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DTI ECONOMICS PAPER NO. 1

Bundling, Tying, and Portfolio Effects

PART 1 - CONCEPTUAL ISSUES

BY PROFESSOR BARRY NALEBUFF
YALE UNIVERSITY

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Foreword

Following the reviews of the DTI in Autumn 2001, the Department emphasised the need to put analysis at the heart of policy-making. As part of this process we have decided to make our analysis and evidence base more publicly available through the publication of a series of DTI Economics Papers that will set out the thinking underpinning policy development.

The first in the series is the study of the impact of bundling, tying and portfolio effects in competition analysis. These issues have played a central role in a number of much-discussed high profile cases in both Europe and the United States recently. To throw light on the debate the DTI commissioned Professor Barry Nalebuff of Yale University and Charles River Associates to prepare this research report.

This is a leading-edge report that will be of value to competition authorities around the world, as well as to practitioners in the UK. However, any views expressed are those of the authors and do not necessarily reflect the views of the DTI, nor should they be treated as a guide to the application of, or interpretation of UK competition policy.

In the next few months the Department will be publishing further DTI Economics Papers. I hope they will stimulate discussion and debate and form part of a wider dialogue between the DTI and the research community.

Vicky Pryce
Chief Economic Adviser and Director General, Economics

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1 Introduction

This report, commissioned by the Department of Trade and Industry (DTI), was prepared by Barry Nalebuff.[1] Any views expressed are the author's and do not necessarily reflect the views of the DTI.

In this report, we use economic theory to explore the impact of bundling, tying, and portfolio effects on competition and the appropriate competition policy response. This is a timely subject. These issues have played a central role in a number of high profile cases in both Europe and the United States over the past several years.

At times, the application of competition policy to bundling and market power leverage has appeared ad hoc. One goal of this paper is to help develop an economics-based framework for understanding the potential impact of these effects. We believe this will help policymakers develop, codify, and enforce appropriate and consistent responses to issues surrounding bundling, tying, and leverage in merger and in antitrust cases.

The four basic requirements set out in the DTI proposal were:

- A clear and up to date synopsis of the economics literature in the area, including definitions;
- A review of competition authorities' (especially the OFT and EC) approach to assessing bundling, plus five to ten case study examples (including at least one telecoms related case);
- Consideration of how the existing approaches and techniques can be developed, improved and more generically articulated;
- Consideration of the implications for the (ex ante) Merger policy role of the OFT; and the "correct" ex post legal test for Chapter II CA98 cases.

We have attempted to address these requirements by posing the following questions:

- What is the appropriate approach and response for competition authorities when faced with cases involving bundling, tying, and portfolio power?
- What market characteristics lead towards the potential of abuses from bundling, tying, or portfolio power?
- How have these theories been interpreted in the past?
- Can past cases be reconciled with the current state of economic theory in these areas?
- How, going forward, should these theories be applied in new competition cases?

1 David Majerus of Charles River Associates assisted in the writing of this report, especially in the case studies presented in the second volume of the report.

This report does not attempt to direct the DTI or any other competition authority or court dealing with a competition issue how to conclude in any particular case. It does, however, address the issues that a competition authority should consider in making such a decision. In some cases, it suggests that common industry practices should be subject to greater scrutiny. In most cases, even the most careful and complete analysis will leave some room for discretion based on the weight given to the evidence and competing policy objectives within differing legal frameworks.

Therefore, this report does not provide a recipe for antitrust or competition policy decision making for bundling, tying, or portfolio effects cases, but rather provides a thorough discussion of the issues that arise and the conceptual and practical problems that these issues present. This discussion should aid in ensuring that competition agencies seek to answer the right questions when dealing with difficult competition policy decisions.

This report is divided into two parts. Part I addresses the conceptual and theoretical issues; Part II consists of thirteen case studies that provide illustrations of competition issues.[2] While Part I uses cases as illustrations of the issues and concepts, in-depth analysis of individual cases is contained in Part II. Each case study contains a statement of the basic facts, issues, and ultimate resolution as well as our analysis of the case.

1.1 Conclusions of the Report

1. *Bundling*: Bundling is the practice of selling two (or more) products together; the products may be available only as a bundle or, if available separately, are offered at a discount relative to their individual prices. Bundling is used for many economic purposes, some clearly legitimate and others more questionable. There are several aspects of bundling that give rise to potential antitrust concerns.
   (i) *The creation of artificial scale economies*. Here we mean that absent bundling, a firm with larger scale or scope would not have an advantage over smaller rivals or entrants. However, the firm employs bundling to artificially create such scale and scope economies. A firm with power in several markets can use various bundling strategies to preserve and protect that market power. We illustrate this using examples from mobile phone pricing and airline pricing of roundtrip discounts.
   (ii) *Raising Rival's Costs*. Bundling and/or tying can be used to deny a rival or potential entrant access to a complementary market. For example, if bundling leads to the disappearance of an independent service market, then a potential entrant will have to enter with both a product and a service network. Cases in this report that illustrate this issue include Kodak, Guinness/Grand Met and SMG radio.

2 The thirteen case studies are Tetra Pak International; Tying and Hilti; Bundling and the GE-Honeywell Merger; GECAS and the GE-Honeywell merger; Independent Service Organizations versus Kodak; Aspen versus Aspen Highlands; Guinness and Grand Metropolitan merger; Interbrew and Bass merger; SMG SRH - Scottish Radio Case; Foreign Package Holidays; BT Telephone and Internet Bundling; Mobile Telephone Pricing; Jefferson Parish Hospital.

(iii) *Lowering Rival's Benefits*. Parallel to the effect of raising rivals' costs is a move that lowers the benefits that consumers anticipate from rivals' products. We use the case of Aspen versus Aspen Highlands to illustrate this effect. While Aspen has traditionally been viewed as an essential facilities case, we believe that it is more appropriate to see this as a bundling strategy. Frequent flyer programs and unlimited passes to a movie cinema chain may fall into this category, as well.

(iv) *Efficiency Offence*. In this case, bundling is used to mitigate what would otherwise be inefficiencies in pricing (such as double marginalisation). As a result, the bundling firm can gain a competitive advantage over rivals. We will discuss this issue in the context of Microsoft Office Suite and the GE-Honeywell merger.

(v) *Leveraging Market Power*. There is a long-standing concern that firms will use their market power in one market to leverage it towards another. This is a long-debated topic in both the academic literature and the courts. Our view is that the majority of court cases on this topic were confused. These cases seemed more connected to price discrimination than to leveraging monopoly across markets, as is discussed in Section 3. While the Chicago School has discredited the static theory of market leverage, there are reasons to believe that a firm can use leverage to gain a dynamic advantage. Here we discuss the role of GECAS in the GE-Honeywell merger case.

(vi) *Bundling to Protect Market Power*. When an incumbent has market power in several goods, it can use bundling as a way to reduce the likelihood and/or mitigate the potential cost of entry to the incumbent. Bundling may also be effective in deterring entry. It reduces the expected profits to an entrant against an incumbent that might be slow to respond (or that might be thought to be slow to respond). The intuition for this effect is that bundling restricts the entrant to go after the more limited market of customers that like its one product and do not care for the other products in the bundle. We consider how bundling can be used to protect existing market power, using Microsoft Office Suite as our example.

(vii) *Bundling as a Commitment Device to Deter Entry*. The first strategic theory of bundling explained how this strategy can be used to help a multi-product firm commit to taking a more aggressive stance towards rivals. In this context, bundling can also lead to advantageous R&D incentives. However, the conclusion is premised on a firm's ability to commit to a bundling strategy. Commitment is required as a firm would seek to abandon bundling in response to entry. This theory has not been connected to specific firm practices and, thus, remains more speculative, for now.

(viii) *Hidden Pricing*. Bundling can also be used to obscure pricing or to engage in bait-and-switch sales tactics. We believe these types of problems can be solved through remedies such as those provided in the travel agent insurance case. These issues are more in the realm of consumer protection than in antitrust. In some cases, however, the form of the bundled pricing contract distorts the nature of price competition to the point where there are large cross-subsidies and even potential entry barriers. The case of mobile phone pricing is relevant to this discussion.

2 *Tied Sales*: Tying is the practice of requiring the purchaser of one product to also purchase a second product. There are many legitimate reasons why firms resort to tied sales. One motivation that leads to an antitrust concern is when the tied sale is used as a metering device to facilitate price discrimination. Before we can determine the appropriate antitrust rule to respond to tying, it would help to achieve greater clarity regarding a more basic question: what is the appropriateness of direct price discrimination done through metering, without the use of a tied sale? As we discuss, the welfare implications of price discrimination are not as clear cut as often thought. Cases that are connected to this discussion include Hilti and TetraPak.

   (i) In many of the court cases, we find that the theoretical explanation of the incentive to tie does not seem to be supported by the facts of the case. These cases include Morton Salt and Jefferson Parish Hospital. In general, we find little evidence that tying has been used to leverage monopoly. However, we are concerned that some examples of tying will lead to the disappearance of essential complements markets, which will make entry more difficult and implicit collusion easier. These issues are not well-captured under the present antitrust tests. We discuss these issues in the context of the Kodak case and the innovation of power-by-the-hour for airplanes.

3 *Portfolio Effects*: It is easy to be confused by what is meant by conglomerate and portfolio effects as this expression has become a catch-all expression used to describe antitrust problems when other theories do not seem to apply. Two firms or lines of business have a conglomerate relationship when they do not fall into the traditional customer, supplier, or competitor role. Portfolio effects tend to include the case of complementor relationships, as well as indirect competitive relationships, along with no relationship.

   Our policy recommendations regarding portfolio effects are based on the nature of the relationship.

   (i) If there is no relationship between the two goods, then portfolio effects are irrelevant.

   (ii) If the relationship is one of customer or supplier, then consider portfolio effects in the same way as one would consider a vertical integration.

   (iii) If the relationship is one of competitors or substitutes, then consider portfolio effects in the same way as one would consider a horizontal merger of substitute products.

   (i) If the relationship is one of complements, then consider portfolio effects in the same way as one would consider a horizontal merger of complementary products. The term portfolio effect is not helpful.

   (v) In sum, we delegate portfolio effects back to their root cause for concern. Note that it is possible for a proposed merger to be considered under several of these categories as two firms can have multiple relationships at the same time.

The cases we discuss to illustrate portfolio effects include three proposed mergers, each blocked by antitrust authorities: P&G/Clorox; Heinz/Beech-Nut, and GE/Honeywell (where we focus on the GECAS aspect).

The remainder of this report has the following structure. In Section 2, we offer precise definitions of pure and mixed bundling, tying, and metering. Section 3 considers the incentive to bundle in light of the Chicago School argument. Section 4 provides a comprehensive list of reasons to bundle along with when bundling might lead to anticompetitive effects. Section 5 presents a number of policy recommendations on how to treat the various types of bundling. Section 6 provides an analysis of tying and metering. Section 7 presents our thoughts on portfolio effects. At the end are two annexes which present some of the mathematical details related to double marginalisation and metering.

2
What is Bundling?

One goal of this report is to help provide a framework for antitrust policy towards bundling, tying, and metering. This is an ambitious task as each of these practices has multiple motivations and a range of consequences.

Like any expedition, our likely chance of success will depend on preparation. Therefore, we ask for the reader's patience as we begin with an overview of the different activities described in this report. The four subsections below provide an explanation of pure bundling, mixed bundling, tying, and metering. Readers who are already familiar with these terms and practices may wish to begin with Section 3, Incentives to Bundle. But even readers who are familiar with the theory and practice of bundling may discover some new applications of these practices in the definitions below.

Section Preview

Definitions and examples of

Pure Bundling
Mixed Bundling
  Volume Discounts
Tying
  Static
  Dynamic
Metering
  Metering via tying
  Pure metering

Our goal here is to ensure that we share a common definition of the terms bundling, tying, and metering. We illustrate each of these terms with some examples, as these practices are more far reaching than one might first assume from the definitions. Having achieved a common understanding of these practices - what they are, how they differ and how they overlap - we then consider each of these practices in turn.

2.1 Pure Bundling

Pure bundling is the simplest case of a bundle:

> **In a pure bundle, two goods, A and B, are only sold together. They are not available for individual purchase. Furthermore, in a pure bundle, the goods A and B are offered only in some fixed proportion, such as one steering wheel and four tyres as part of a car.**

At one level, we can say that it is rare to see a pure bundle forced on consumers. Most often, when consumers are interested in purchasing two goods A and B separately the market makes this available, even if the price is not always attractive. Thus Microsoft Word and Excel can be purchased separately rather than through the Microsoft Office bundle, even if this is typically not at an attractive price.

On the other hand, many goods are sold only as a bundle and this has become so commonplace that we do not even notice it. Thus, a car comes as a bundle of tyres, steering wheel, radio, engine, brakes, and much more. An airplane ticket often includes a meal and the customer cannot buy the trip and the meal separately. A university offers

a bundle of courses.[3] A newspaper bundles its stories together with its ads. A hospital bundles its anaesthesia with its surgery.[4]

For most of our analysis, the examples of pure bundling can and will be subsumed under the generalised category of mixed bundling, described below. By charging a sufficiently high price for individual component sales, in effect, the product is offered for sale only as a pure bundle. Looking at cases of pure bundling primarily serves a valuable pedagogical tool. It illustrates the economic intuition of how bundling works in a simpler setting.

One reason to look at pure bundling arises when the bundling is done through technology. With a contractual bundle, there is at least the possibility of disposing of the unwanted part of the bundle. If you do not like the meals that come with the vacation package, you are free to eat elsewhere (although you have to pay for it). With a technological bundle, disposal of the bundled good may be costly or even impractical. This was a significant concern in Microsoft's integration of Windows and Explorer. It was not clear that customers could dispose of Explorer without harming the performance of the operating system. If Explorer were simply another feature of Windows then this would put other suppliers of operating systems or browsers at a disadvantage. When it is done through technological integration, this makes it even harder for customers to replace Explorer with a competing browser supplier, such as Netscape, even if that browser is given away.

2.2 Mixed Bundling

Mixed bundling is a generalisation of pure bundling:

> **In mixed bundling, goods A and B are sold as an A-B package in addition to being sold individually. The package is sold at a discount to the individual prices. (If the price of the A-B package simply equals the individual prices of A and B then this is not classified as bundling.)**

Microsoft Office is a mixed bundle as Word and Excel are each available as individual products, although there is a significant discount for purchasing them together as part of the Office Suite or bundle.

The key part of the definition of bundling is that the A-B package is sold at a *discount* to the components. If one thought of this as ordering in a restaurant, the prix fixé menu is a bundle that will typically offer a discount compared to ordering à la carte. In some cases, we will see that the A-B package is not sold at any discount at all.[5] In these cases, there is no strategic impact of the package offering and thus we do not consider this to be bundling.

3 While some schools offers classes on an à-la-carte basis, research universities invariably sell their services on a per-semester or per-term basis, bundling courses and tutorials into one package price.

4 In some cases, they may be billed separately, but one cannot mix and match and select the anaesthesiologist from hospital A and the heart surgeon from hospital B.

5 There are some unusual circumstances in which it appears that the bundle is being sold at a *premium* to the sum of the individual component prices. One would think that the astute customer would simply buy a collection of A and B and form his or her own bundle. The problem is that some of the individual goods may end up being sold out or are of lower quality if the customer opts to make à la carte purchase. Examples that follow this rule include an opera series or a summer concert series. There are some very popular acts that customers may expect will sell out. Thus, if customers want to ensure themselves a ticket, especially a good ticket, then they will choose to buy the entire series even if this costs more than the posted component prices. The problem is that the individual concert tickets will go on sale after the series tickets do. For more on this topic, see Rafi Mohammed and Patrick DeGraba, "Intertemporal Mixed Bundling and Buying Frenzies," RAND Journal of Economics, Winter, 1999.

Volume discounts can also be included in the set of mixed bundling practices. Here, think of the two goods as being A and A, and two units of A costs less than buying two one-unit packages individually. The two-unit purchase might be a larger product size (bigger cereal box) or simply a price discount ("buy two suits, get the cheaper one at 50% off").

In some circumstances, the nature of the mixed bundle offering can be quite subtle. For example, until recently, Blockbuster video rental stores purchased their inventory from the studios. Tapes were sold at relatively high prices, such as $69.95, so that the studio could extract some of Blockbuster's anticipated rental profits. This led to shortages of new release movies. To solve this problem, Blockbuster moved to a revenue-sharing contract with the studios. But, as part of that new contract, Blockbuster agreed to carry all of that studio's releases.[6] It is hard to say whether the new contract terms led to a discount or not relative to the previous à la carte purchases. The important point here is that this pricing option is available only to a bundled purchase where the customer buys the full product line. Incentives to carry full product lines will be of interest to us in this study.

2.3 Tying

The term tying can be a bit confusing as it is used in two ways. In the first definition, it is a special case of mixed bundling, while the second is a dynamic form of pure bundling.

The static tie can be thought of as half of a mixed bundle or an exclusivity arrangement.

In the static tied-sale, the customer who wants to buy A must also buy B. It is possible to buy B without A which explains why this is a tie and not a bundle. Thus, the items for sale are B alone or an A-B package.

In some cases, a firm with market power in good A uses it to create sales of good B. For example, only a select number of American professional football (NFL) games are available on broadcast television or cable. It is possible, however, to sign up for an NFL season pass on DIRECTV and thereby get commercial-free access to all games. The NFL season pass is exclusive to satellite - one cannot get an NFL season pass without first signing up for satellite television. But one can buy satellite television without buying an NFL football season pass.

The video game Halo is exclusive to the Xbox format. A customer that wants to buy Halo must also buy the Xbox hardware. Note that Microsoft need not have market power in good A (Halo) in order to create the tie. The tie could arise from their power in the B market (Xbox hardware). In the case of Halo, the software was created by Bungie Studios, which was acquired by Microsoft on June 19, 2000, prior to the launch of Xbox. In this case, Microsoft has some degree of power in each market.

The static tie is done through an exclusivity arrangement that is accomplished through a contract (NFL) or through technological compatibility (Halo).

6 That contract has since been revised. See Washington Post, Oct. 7, 2002, p. A1.

The second type of tying is a dynamic form of a pure bundle.

In order to purchase good A, the customer is also required to purchase good B.[7] What makes this different from the standard pure bundle is that the quantity of good B may vary from customer to customer. Thus the items for sale are A-B, A-2B, A-3B, ... packages

This dynamic form of bundling has the exclusivity feature of the static tie. But, unlike the static tie, the amount of the tied good purchased can vary from customer to customer. It is also the case that the amount of the tied good need not be determined at the time of the initial purchase. For example, imagine a seller of a photocopy machine (good A) were to require the purchaser to also use a specific brand of paper (good B). The paper sales occur over time and vary across users, based on their demand for copies. A customer would not need to determine how much paper to buy at the time the machine was bought. But under the tying contract, whatever paper was required would have to be bought from the machine seller.

This dynamic tied sale is different from the static tie in another way. The goods involved in the dynamic tie are required to use the product. One cannot use a photocopy machine without paper. In contrast, one can enjoy satellite television without an NFL season pass or Xbox without Halo. In that sense, all of the customers who buy A must also buy good B. How much good B they buy will vary based on their intensity of use of good A. We think that this form of dynamic tying can be interpreted as a generalised pure bundle where the bundled goods are bought in different proportions by different customers.

Tied sales have a long history, going back to the early antitrust case involving IBM and its tied sales of punch cards to its calculating machines. Today's tied sales tend to be more subtle. This is not surprising in the United States, where tied sales can be *per se* illegal.[8] But there are ways of making tied sales where the tie is implicit rather than explicit. For example, if a photocopier comes with a service contract, we would say that the service is tied to the copier.

The basic economic motivation behind the dynamic tied sale is to engage in price discrimination - to charge different prices to different customers based on their valuation of the product.[9] This naturally leads us to price discrimination in its purest form, metering.

2.4 Metering

Metering is a form of pricing where the customer pays a per-use fee.

Examples include paying a per-page fee for photocopying, a per-nail fee for a nail gun, a per-hour-of-use fee for an aircraft engine (often called "power-by-the-hour"), or even a per-mile fee for auto insurance.

7 The quantity may be zero. But the customer is not allowed to purchase the tied product from a rival supplier.

8 There are four tests used to establish that a tie is per se illegal. "(1) the existence of separate products; (2) an agreement conditioning the purchase of the tying product upon purchase of the tied product (or at least upon a condition not to purchase the tied product from another seller); (3) sufficient market power with respect to the tying product to restrain competition appreciably in the tied product; and (4) an effect upon a substantial amount of commerce in the tied product." See Troy Paredes, Copyright Misuse and Tying: Will Courts Stop Misusing Misuse?," 9 High Technology Law Journal 271 (1994).

9 As we will discuss, there may be also be strategic considerations; see Kodak case in section 6.3 and case study VI.

Throughout this report, we want to make a distinction between (i) metering and (ii) tying that is used as a metering device. To illustrate this distinction, a photocopy machine seller could achieve a metered price result in two ways:

It could require that the customer purchase its paper at an inflated price (tying).

It could charge a price per copy and allow the customer to purchase any paper on the market (pure metering).

In the first case, the metering is done via the sale of a tied object (paper) while in the second case, the metering is done directly. While tying is not required in the purest form of metering, in its practical application, metering is often accomplished via tying. Although the two approaches have the same impact on the customer, they may have a different impact on the market and, thus, we may want to treat them differently.

At first glance, the simple per-use fee would not seem to require a tied sale. Thus, a per-nail fee for a nail gun does not require the purchase of any particular nail cartridge or nail. It could be accomplished via a counter in the nail gun. But, in practice, the way this is typically accomplished is via the tied sale of a cartridge and nail. In the case of a photocopier, the per-use fee could be based on an internal counter inside the machine. In practice, it is typically accomplished either through toner cartridge sales or a service contract, both of which are directly related to machine usage.

The example of power-by-the-hour for aircraft engines would seem to be a case where the metering is direct. No other product is tied to the use of the engine. But, power-by-the-hour includes maintenance as part of the fee and, thus, the sale or lease of the engine is tied to a service contract.

The per-mile fee for auto insurance is a case of pure metering.[10] Here, the more one drives, the more one pays for insurance. No other good need be purchased along with the insurance. Another pure form of metering is Monsanto's employment of a technology-use fee for purchases of its Roundup-ready crop seeds. For a number of years, the farmers paid the retailer a fee per bag of seed purchase and also paid a 'technology use fee' to Monsanto for every bag purchased.[11]

Metering can be related to input usage (such as is the case with toner cartridges) or to final output. An example of metering based on output is BAA's reliance on revenue-sharing lease contracts rather than square-foot lease contracts for its airport shop contracts.

Historically, firms may have found it easier to impose a tied sale of a consumable good (such as paper, toner, maintenance) than to monitor and collect a direct per-use fee. The Internet may change this pattern as makes it much easier to monitor and charge for usage.

10 This form of insurance pricing is currently under pilot in the U.K. by Norwich Union, under license from Progressive. AXA has similar trials in Italy and Ireland.

11 Monsanto recently switched from a technology-use fee charged to the farmer to a per-unit (bag) royalty paid by the seed company. The previous technology use fee was invoiced to the farmer on a per bag basis. However, the gain from using Monsanto's technology was measured on a per-acre basis, and, thus, Monsanto wanted to charge on a per-acre basis. But, it could monitor seed, not acres. On corn this is not an issue, because the planting rate for corn (bags to the acre) is relatively constant across farms. However, in cotton (and to a lesser degree in soy), the bags-to-acre conversion (or the "seed drop rate") varies by geography. In cotton, Monsanto has charged different technology use fees in different areas. The stated goal was to keep the per-acre price constant.

3
Incentives to Bundle

There is no single explanation of why firms offer bundles. Why do firms advertise? The answer depends on the product, the context, and the type of advertisement. The same is true for bundling.

We find it helpful to separate the incentives to bundle and tie into two broad groups: efficiency reasons and strategic reasons.

Efficiency reasons include the bread-and-butter motivation to reduce cost and improve quality. Bundling can also lead to more efficient (or, more precisely, less inefficient) pricing. Because the result is improved efficiency, even a monopolist would have an incentive to bundle.

Of course, these categories overlap. Efficiency reasons can also be strategic, as the increase in efficiency creates a strategic advantage in the presence of competition when rivals are not able to duplicate the bundling strategy.

Reasons to Bundle

Efficiency Reasons

1. Cost reduction
2. Quality Improvement
3. Reducing Pricing Inefficiencies
   - Price Discrimination
   - Double Marginalisation

Strategic Reasons

4. Entry Deterrence
5. Mitigation of Competition
6. Gain Competitive Advantage
7. Price Obfuscation

Bundling can be used to make it more difficult for an entrant. Even if entry deterrence fails, bundling can also mitigate the impact of entry and put rivals in a weaker position. Bundling also can be used to gain an advantage over customers.

We will discuss each of these reasons for bundling in detail in Section 4. But, first, it will be useful to offer an initial perspective on whether bundling can be used to create or extend market power.

A reason for taking this approach is that it makes sense to present the comprehensive explanations for bundling in order of increasing complexity. In particular, the efficiency reasons are simpler to explain and evaluate than the strategic ones. But this expositional choice makes it harder to see the antitrust policy issues.

Our solution to this problem is to preview the antitrust questions. We start with a review of the Chicago School argument. This helps provide an overview of the issues around bundling, tying, and metering. It also allows us to discuss what are some unconvincing explanations for bundling.

The remainder of this section considers the following topics:

Can Market Power be Leveraged?

Introduction to the Chicago School Argument

Where the Chicago School Argument Breaks Down

1) Metering
2) Dynamics
3) Leveraging Multiple Market Powers
4) Creating Efficiencies

There is often a presumption that firms can leverage power from one market to another. The Chicago School argument provides some surprisingly general conditions under which such leverage is not possible. It is particularly difficult to increase profits by using monopoly market power to create leverage into a competitive market.

All results depend on assumptions. The Chicago School argument has several important limitations. It allows for tied sales of a competitive product when this is used to achieve price discrimination through metering. The Chicago School argument is static; thus, dynamic considerations may provide a motivation for bundling. The Chicago School did not consider the possibility that a firm with power in several markets might bundle these products together and thereby increase its market power. The Chicago School argument also does not take into account the possibility that bundling will lead to efficiencies, either in production or consumption. This overview of the Chicago School argument and its exceptions is designed to provide an overview of the issues that we will discuss in Sections 4, 5, 6, and 7 of the report.

3.1 Can Market Power Be Leveraged?

If one were to ask what the primary antitrust concern regarding bundling is, the naïve answer would centre on a concern that a firm with market power in one good might try to use its market power to extend or leverage its reach into a second market. It would leverage its market power by forcing a bundle onto its customers.[12]

This naïve answer runs into trouble when one first tries to analyse how this leverage is supposed to work. We begin with the Chicago School argument, which shows a serious logical flaw in the straightforward leveraging hypothesis. Indeed, the Chicago School argument helps us appreciate a wide variety of circumstances where bundling is *not* anticipated to cause a problem. To the extent that concerns are raised, the circumstances must lie outside of the Chicago School argument. It turns out that most of the cases we see do, indeed, lie outside the domain of the Chicago School argument. In the end, the naïve answer was not so naïve after all.

12 There is a potential confusion about leverage that we wish to clear up at the start. We have heard the concern that a firm with market power in one market will cross-subsidise a second product in order to drive a rival out of the market. If a firm prices this second product below cost and loses money in order to drive a rival out, this is an antitrust violation. But it should fall under pure predation, not bundling. We call this predation as there is no strategic connection between the two products. If driving the rival out were both possible and profitable in the long run, this strategy could be pursued just as well (and just as illegally) by a firm that does not have the benefit of a separate monopoly market. Thus, when we consider leverage, we look for bundling strategies that lead to an immediate increase in profits.

The Chicago School approach is a perfect introduction to our study in that it shows how market leverage must work by showing how it cannot work.

3.2 Introduction to the Chicago School Argument

Until quite recently, the idea that bundling could be used to leverage power across markets was thought to be a dead end. The Chicago School had largely succeeded in discrediting the idea of leveraging monopoly power (see, for example, Director and Levi (1956) and Schmalensee (1982) for a more formal presentation). To the extent that their argument is applicable, it rules out a broad class of problems where we might be concerned about bundling. Indeed, our interest in bundling will be in the special cases - perhaps less special than previously thought - where the Chicago School argument does not apply.

The Chicago School argument is straightforward and powerful. Consider two goods, A and B, where the seller of A has market power and where good B is a commodity sold at marginal cost, c (i.e. in a competitive market). Can a monopoly A seller gain by leveraging its market power from A into the B market?

For ease of exposition, we imagine the monopoly good A is a ticket to the London Eye, and the commodity good B is bottled water that is priced at its marginal cost, £1.

If bundling were a good idea, then the London Eye should be able to raise its profits by offering an Eye/Water bundle at some price p*. We now show via proof by contradiction that there is no price p* that would lead to higher profits.

Assume that a bundle at price p* did indeed lead to higher profits. Which consumers will purchase this bundle? We first note that, as part of this strategy, the monopolist would discontinue selling Eye tickets, except as part of the bundle.[13] Since the bottled water market is competitive, bottled water would continue to be available in the market at £1. Thus, it is worth purchasing the Eye/Water bundle only if the consumer values the Eye at more than the incremental cost of the bundle over water alone, namely p* - £1.

The London Eye would do at least as well to sell just the Eye at that price, p = p* - £1. All of the consumers who would have bought the bundle will still buy a ticket to the Eye. The London Eye makes just as much money on each individual sale (as the incremental revenue from a bundle sale is just enough to cover the incremental cost of the bottled water). It is even possible that the London Eye will make more money if there are some consumers who value water at less than its cost. (In particular, customers who are not thirsty.) These customers might not have bought the bundle, but might still be willing to purchase a ticket to the Eye at p* - £1.[14]

13 If tickets were available without the bundle, then we would be in the case of a mixed bundle.

14 This argument relies on the assumption that in a competitive market, goods are sold at marginal cost. In this case, the assumption is that there is no profit in selling bottled water at £1. This assumption is open to question. Very few goods are sold at a zero gross margin as this does not allow the seller to recover any fixed costs in the event that the firm has either constant or increasing returns to scale. We recognise that competitive markets may not be compatible with constant returns to scale if there are any fixed costs. That said, even in the typical "commodity" product market, there are profits to be made if a firm can capture incremental sales. This may explain why firms are interested in expanding their sales of "competitive" products.

This argument shows that if a firm has a monopoly or market power, it can earn all of its rents on that good. As Bork (1978) points out, there is only one monopoly profit to be earned.[15]

In the case where all consumers purchase A and B together (shoes and laces), there is no harm in selling them as a bundle. But there is not any gain. The result is a wash. In the case where the demand for A and B are not perfectly correlated (as would be the case with the London Eye and water), then adding a competitively supplied product to a monopoly product to create a bundle can only lower profits in that it creates an inefficient package for some of its consumers.[16]

Although the theoretical argument is unimpeachable, the empirical evidence is less convincing. We do observe bundling even in cases where the Chicago School argument would seem to apply. Two prominent examples include Hilti nail guns and Microsoft Windows. In the case of Hilti, as we discuss later, the company had a patent on the explosive cartridge used in their nail guns. Hence, they had a legal monopoly. And yet, Hilti insisted on selling its cartridges with nails included. The nail market was indeed close to the textbook example of a competitive market.

We must, therefore ask why Hilti followed this strategy and exposed itself to antitrust sanctions when the Chicago School argument demonstrates that identical profits could have been made by raising the price of the cartridge and selling nails at marginal cost?

A straightforward answer - and one given by Hilti - is that it was concerned with issues of quality and safety. This would be consistent with the Chicago School argument that there is no reason to have an antitrust concern. If this is right, then the Hilti case was wrongly decided. It also suggests the need to examine the efficiency reasons for bundling more closely.

Similarly, Microsoft has a monopoly (or near monopoly) on operating systems for the personal computer. And yet, Microsoft decided to bundle its Explorer browser to Windows and expose itself to antitrust investigations. Here, too, Microsoft made an appeal to quality.

While safety and quality are often legitimate motivations for bundling, we think that this may oversimplify the motivation. There are some circumstances where the reliance on quality control as a motivation for bundling or tying is a cause for suspicion. We will examine this issue in the context of the Kodak case in Part II, Section VI as well as in our discussion of HP toner cartridges and warranty issues in Section 6.7. To rewrite Samuel Johnson, safety and quality may be the last refuge of a scoundrel.[17]

15 Bork, Robert, 1978, *The Antitrust Paradox*. New York: Basic Books. (2nd ed. 1993).

16 Of course, if the firm could *prevent* its customers from purchasing water elsewhere, then it could employ the strategy of selling the Eye alone at one price and the Eye with water at a much higher price, where the water is marked up over cost and thereby discriminates against customers who have a high value of the Eye and water. We discuss this case in detail under metering. This example helps clarify the difference between forcing a customer to buy B along with A and preventing a customer from buying B separately from A. Only in the latter case does the Chicago School argument break down.

17 The original quote "Patriotism is the last refuge of a scoundrel" is from Boswell's Life of Johnson. The meaning of this quote is about a pretence of patriotism and thus translates quite well to claims of product quality and safety.

The Chicago School argument denies the profitability of leverage only under some strong assumptions. In both the Hilti and Microsoft cases, the static assumption of a monopoly may be too simplistic. Present market power may erode, and bundling can be a way to preserve and protect that power. While the Chicago School argument is persuasive in a *static* context, it does not take into account the *dynamic* games that firms play.[18] In our discussion of these cases, we try to shed light on this debate.[19] Our view is that there is an element of both stories in these cases. For example, Microsoft was concerned that Netscape could be used as a platform to launch a rival operating system. Thus, defeating Netscape was a way to protect Windows.

For quite some time, it was thought that the Chicago School argument was so general that bundling should never occur for strategic reasons or would at least bring no advantage. Over time, people began to appreciate that this general result did, indeed, rely on some assumptions, which, if relaxed, would provide a strategic explanation for bundling, metering, and tying.

We discuss four groups of exceptions in turn. The first explains the presence of metering and tying, although it does not provide a simple explanation for leveraging market power. The second approach looks at dynamic ways to create leverage. The third exception recognises that even if leverage cannot be brought to a competitive market, it is possible to strengthen or reinforce market power across several markets through the use of bundling. Our fourth exception considers the possibility that bundling will lead to efficiencies, either in production or in consumption.

3.3 Where the Chicago School Argument Breaks Down

3.3.1 EXCEPTION #1: METERING

The first exception, and one noted by the Chicago School, was that the two goods might not be consumed in fixed amounts or fixed proportions.[20] If consumers with a high value of good A are also inclined to purchase more of good B, then the A seller might do a better job of price discrimination by requiring that its customers must also buy B from it at an inflated price. For example, a photocopy machine seller with market power might increase its profits by requiring its customers to buy copying paper at a marked-up price.

This would be true even if the copy paper market is competitive. The firm can lower the price of its machine and raise the price of its paper so as to keep the total cost the same to the marginal consumer. Thus sales of machines can be kept constant.[21] But high-value (high-volume) consumers will end up paying more because of the inflated paper price, and this increased price will flow directly to the monopolist's profits. This strategy illustrates the basic motivation for metering.

18 See Kaplow (1985). This issue is discussed at length in Section 6.

19 In the GE-Honeywell merger case, dynamic issues were central to the EU decision to block the merger. But as we discuss later, no framework was presented nor calculations made to evaluate the claimed dynamic effects.

20 Note that neither Hilti nor Microsoft fits into this category. With Hilti, the nail cartridge came with a fixed number of nails. With Microsoft, the customer is interested in only one copy of Explorer with each operating system.

21 Actually, by lowering the price of the machine, the sales of machines could well go up under this strategy.

We will discuss metering in much greater detail in Section 6 of this report. Here, we provide a brief introduction to the issues as it turns out that many of the bundling cases are better classified as metering. The confusion arises because the way that metering is carried out is through a tied sale, as in our copier and paper example above.

Indeed, many business practices look like bundling until one takes a much closer look. For example, most funeral homes in the United States will not allow the family to bring in an outside casket. This has become a topical issue due to the increased ability to purchase discounted caskets over the Internet. At first glance, this policy would seem to be a bundling strategy in that the funeral service is bundled with the purchase of a casket.

As such, it would seem to directly contradict the Chicago School argument. This is very much a case where the bundled good is used in fixed proportion - one casket per funeral. The market for caskets is competitive, especially on-line. It is hard to imagine that most funeral homes have much market power. But, even if they did, the Chicago School argument says that they should raise the price of their other services and sell the casket at cost.

It should come as no surprise that reality is more complicated than our model. Although only one casket will be used, the quality (type of wood, finish, trim) and hence the price of that casket may differ greatly across funerals. Thus, the family interested in the higher-quality funeral will be charged more via metering of the casket.[22] What initially looks like bundling and a clumsy attempt at market leverage may be a more simple case of price discrimination. In this case, the price of the services is metered through the price (and quality) of the casket.[23]

Metering can be done for several reasons. Just as with bundling, there are efficiency reasons and strategic reasons. The classic efficiency argument would arise when the cost of providing the product is directly related to its use, such as with selling auto-insurance on a per-mile basis (as is being done by Norwich Union) or power-by-the-hour for aircraft engines. In other cases, metering allows the buyer and seller to engage in a more efficient risk sharing. BAA's revenue-sharing contracts helped share the risk of a decline in passenger travel, an event outside the airport vendor's control.[24]

Metering creates more of an antitrust concern when it is used as a tool to enable price discrimination. One might first expect that price discrimination would fall under the efficiency umbrella, in that it results in less-inefficient pricing. Heavy users can be charged a higher price if their use can be metered. Because this allows the initial sale to be made at a lower initial price, this can expand the market, enabling low-volume users to also purchase the product. Hence, it would seem to increase social welfare. As we will discuss at length in Section 6.6, price discrimination is never perfect in practice and,

22 We thank Fiona Scoot Morton for this example. Other explanations include the obfuscating price tactic discussed in the travel insurance case. It may also be the case that the decision is made in two parts: first the choice of a funeral home and then the choice of a casket. The funeral home is practiced in upselling coffins and, thus, is able to exploit its market power once the first decision has been made.

23 We note that restaurants tend to tie wine with a meal. For licensed restaurants, customers are not allowed to bring their own wine. In some cases, restaurants will make an exception if the customer pays a corkage fee. It is interesting to ask why funeral homes have not adopted the corkage fee approach. We might find that the fee is proportional to the price of the casket. Returning to restaurants, why isn't the corkage fee proportional to the price of the wine?

24 These contracts also change the incentives regarding the optimal size of the store and the use of that space.

thus, is not as efficiency-enhancing as this argument (and elementary textbooks) would suggest. The reason is that customers will go to great lengths to avoid being subject to price discrimination and firms will go to great lengths to ensure consumers cannot escape. These wasteful efforts may cause such large distortions that the end result is a reduction in social welfare.[25]

The two issues that are of primary interest to us are the ends and the means of metering:

when is metering a potential antitrust problem however it is implemented;

and

when is metering a potential antitrust problem because of how it is implemented, typically through tying?

We might wish to prevent firms from engaging in price discrimination because of its end result - either because of the potential loss to consumers or because of the potential loss to social welfare. Even if we accept the result of metering, we may object to the way in which it is carried out. (Metering is most often accomplished through the use of a tied sale and this may cause ancillary damage, either intentionally or unintentionally.) These issues are the subject of section 6.

3.3.2 EXCEPTION #2: DYNAMICS

The second exception to the Chicago School argument arises when the bundle or tying requirements end up changing consumer preferences or production costs, in the latter case, either by creating scale or scope economies for the bundling firm or by denying scale to rivals. In Section 6, we develop this explanation for how tying can leverage market power.[26] The argument is dynamic in scope and has a similar feel to the raising rivals' costs literature.

The underlying idea is that bundling or tying is used to eliminate competition in a complementary products market. Rivals or potential entrants will be at a competitive disadvantage in pricing (or supplying) their product to consumers, as they will not have equal access to the required complementary product or products unless they supply them themselves. For example, if incumbents tie service to the sale of a machine, this may eliminate independent service providers. Entrants would then have to build a rival machine and a rival service network in order to compete in the market.

The way in which competitive advantage is gained is subtle in that it works through ancillary effects that may not become manifest right away. For example, the independent service market may not disappear immediately. Even if it does disappear, competition for the initial sale of machines may hold down the lifetime cost of the machine. But the lack of potential competition from entrants can change the

25 These losses are in addition to any rent-seeking activity that may arise in a firm's attempt to attain the monopoly. The classic paper in this area is Gordon Tullock, "The Welfare Costs of Tariffs, Monopolies, and Theft," *Western Economic Journal*, June 1964, 224-232.

26 Bundling can be used to similar effect.

incumbents' incentives to raise prices in a repeated game. It is by moving from a static to a dynamic perspective that the incentive to engage in a tied sale arises and the Chicago argument is avoided.

These effects have been studied in the context of vertical integration. The idea of raising rivals' costs through a vertical integration is a familiar topic in the economics literature.[27] As we will see, bundling and tying can create the horizontal equivalent of raising rivals' costs and thus give rise to the same set of anticompetitive concerns. (By symmetry, bundling and tying can also reduce the benefits offered by rivals; see discussion of Aspen case in Section 4.4.4.)

We use the term "horizontal" in a way that is broader than its common usage. Horizontal relationships typically focus on competitors. But bundling and tying lead us to also consider the horizontal relationship between complementors (see box at right).

The bundling or tying of complements is very different than the combination of competitors. It is much closer to a vertical integration. We will find that the bundling and tying of complements creates the same set of issues that arise with vertical integration, although the means to the end can be slightly different.

A *vertical* relationship is one in which money flows from one party to the other, as in customer to the firm or the firm to its supplier. In a horizontal relationship, the two firms share a common customer or a common supplier. If a customer's buying A raises the value of B, then we say the two firms are complementors. If buying A lowers the value of B, then we say the two firms are substitutors or competitors. Note that the same synergy or competition effect can also exist in a relationship with a common supplier. If a supplier finds it easier to serve customer A because it is also serving customer B, then the two firms are complementors on the supply side; if it becomes harder or more costly to supply A if also supplying B, then the two are competitors on the supply side; see discussion in Section 7.1 under conglomerates.

This effect is central to our discussion of the Kodak case in Section 6.3 and Part II, Section VI. As a result of Kodak's tying of service to its photocopy machines, future entrants may find that independent service providers no longer exist. Thus potential entrants will be required to build a service network along with copier machines in order to enter the market.

We have seen two explanations for tying. Tying can be used to create a metering device to help a firm capture more surplus in a market where power already exists; It can also be used to leverage power across markets (by raising rivals' costs or lowering rival's benefits). In several attempts to consider the market leverage question, the American courts failed to apply the more appropriate explanation. Almost all of the early tying cases naturally fell into the metering category, even though the courts saw them as a means of extending monopoly. In Section 6.4, we discuss the flawed logic in the Morton Salt, Carbice, Leitch Manufacturing, and Motion Picture Patent Co. cases.[28] These cases

27 See Krattenmaker, T.G. and S.C. Salop, (1996), Anticompetitive exclusion: raising rival's cost to achieve power over price, *Yale Law Journal*, 96:209-93.

28 Bowman, "Tying Arrangements and the Leverage Problem," 67, *Yale Law Journal*, 1957.

provide a vivid illustration of the danger in condemning tying for its effect on competition without having any model of how monopoly leverage might take place. We also present an extensive discussion of price discrimination in Section 6.6 when we return to consider the antitrust issues associated with metering and tying.

3.3.3 EXCEPTION #3: LEVERAGING MULTIPLE MARKET POWERS

In spite of the Chicago School argument, leveraging market power is possible. The Chicago School was concerned only with leveraging market power into a competitive market. Market power can also be leveraged in a way that protects and enhances pre-existing market power. There are reasons to offer a bundle when a seller has market power in both the A and the B markets. A case in point is Microsoft. It has market power in *both* Word and Excel and sells them in a bundle as part of its Office Suite. This strategy can be profitable, as bundling enhances existing market power across markets.

One way in which this power is exercised is through increased entry deterrence. Whinston (1990) was the first to re-examine and resurrect the role of tying as an entry deterrent.[29] He recognized that the Chicago School's criticism of leveraging monopoly power from market A to market B applies only if market B is perfectly competitive. Whinston demonstrated the advantages of bundling when the incumbent firm has a monopoly in A and B and seeks to discourage a potential competitor in B with a superior product (or lower cost). In his model, bundling commits the monopolist to being more aggressive against an entrant, and this commitment discourages entry. However, this strategy requires a commitment to bundling; if entry occurs, the incumbent would prefer to abandon its bundling strategy (see section 4.4.7 for more details).

For example, assume that the London Eye started out with a monopoly in both the Eye and bottled water. Its Eye franchise is secure but it is concerned that someone will enter with a superior or cheaper water. If the Eye can commit to selling only an Eye/Water bundle, then a potential water entrant would realize that it could not successfully steal those water customers away from the Eye. The Eye would not be willing to give up its entire bundle profits (all of which come from the Eye monopoly) and would, thus, lower the bundle price to fend off an attack from the superior water. Of course, the Eye would do better still to abandon its policy of only selling a bundle.

In this case, bundling is like a mutual defence treaty between two countries. Prior to an attack, it discourages any potential invader who realizes that an attack on B will also be defended by the resources of A. But if an attacker is not deterred, then the A country, which has to pay the cost of defending B might wish not to have entered into this alliance. With products, there is less of a moral issue in abandoning the defence of battle that costs more than it's worth.

It is also possible to leverage market power across markets in a way that maintains credibility, as demonstrated in Nalebuff (2000a).[30] Here, again, the incumbent has market

29 Whinston, M. D. 1990. "Tying Foreclosure, and Exclusion," *American Economic Review*, 80 (Sept.): 837—59.

30 Barry Nalebuff, (2000a). "Bundling," http://papers.ssrn.com/sol3/papers.cfm?abstract_id=185193.

power in two goods. However, in this model, bundling by the incumbent is a profitable and hence credible response to entry. Bundling is desirable pre-entry due to price discrimination; bundling is profitable post-entry due to its effect of mitigating the cost of entry. A single-product firm will find it difficult to enter against a multi-product incumbent who can bundle. The underlying intuition is that in the presence of a bundle, an entrant will find its market limited to the few customers who like its one product and are not interested in the other products in the bundle. For example, to compete against Microsoft Office, an entrant with a superior word processing program might only be able to attack customers who care about word processing and not about presentation software or spreadsheets. We explore this model in detail in Section 4.4.2.

3.3.4 EXCEPTION #4: CREATING EFFICIENCIES

Our emphasis on leveraging market power has so far focused on strategic reasons to bundle. There are also efficiency reasons that create a strategic advantage when rivals cannot copy them.

There are two ways in which bundling can create this type of advantage. One is through providing a superior product and the other is through providing more efficient pricing. In both of these cases, the bundled good market must not be competitive, as otherwise pricing would already be efficient, and rivals would be able to use the competitive supply to match any value-enhancing bundled offering.

In the case of the pricing side, bundling can be used as a tool to eliminate double marginalisation.[31] As such, it allows a firm to undercut rivals who sell their product individually. Whether or not such a strategy applies to a particular market or not is a surprisingly subtle issue. There are many hidden assumption for this result to hold. We discuss these issues in much greater detail both in Sections 4.3.2.2 and 4.4.1 and in connection with the GE-Honeywell merger case study in Part II, Section IV.

A second way in which competitive advantage can arise is on the value side, where bundling can be used to increase the value of the firm's offering relative to that of a rival. This is a topic that has not been addressed in the literature. The advantage arises when customers value variety, as might be the case at a ski resort. A firm gains an advantage when it puts together a variety bundle that allows the customer to choose among several options, as in a multi-mountain ski pass. When rivals cannot duplicate this strategy, the result is a sustained competitive advantage and possibly a dominant or leading market position. We discuss these issues first in Sections 4.4.4 and 5.3, and again in regard to the Aspen Ski case in Part II, Section VII.

We have provided an introduction to the primary antitrust issues surrounding bundling. We have shown that bundling (along with metering and tying) can be a profitable strategy. It is now appropriate to examine each of the motivations for bundling in detail.

31 Double marginalisation is the extra inefficiency caused by the wholesaler marking up the manufacturer's price when that manufacturer has market power and thus sets a price above marginal cost. For example, if a monopolist with zero marginal costs faced a linear market demand, $q = 1 - p$, it would maximise profits at a price $p=1/2$. But if it had to sell through a wholesaler, it would optimally charge 1/2 to the wholesaler who would mark the price up again to 3/4. The mathematics of this example is worked out in Annex A, where we connect the traditional vertical double marginalisation to the Cournot double markup of complements.

4
Why Bundle: The Complete List

In this section, we provide a detailed review of all the motivations to engage in bundling. This is followed by a similarly detailed explanation of all the motivations to engage in metering and tying.

One way to use this section is to look at the different motivations to see which, if any, might be relevant to a particular case. To help in this approach, we offer a list of plus and minus factors.

Just as a police detective examines each of the suspects for a motive, these plus and minus factors can be thought of as motives and alibis for bundling. A firm that has more plus factors is more likely to find bundling attractive from a strategic perspective. More negative factors suggest that there is either less to gain or higher costs associated with bundling.

Each plus factor is connected with one or more explanations for bundling. (The minus factors are the opposite of the plus factors and, thus, rely on the same explanations.) Thus, the investigator can start with potential motivations and turn to the relevant section to see if they are appropriate to the case at hand.

Indeed, we have already considered one set of factors. As we discussed in our review of the Chicago School argument, there are fewer strategic explanations for bundling when one of the goods is competitively supplied. In contrast, there are several motivations for a multi-product monopolist or oligopolist to bundle. This leads to our first plus factor - that the firm has market power in two or more goods. If this market power is lacking, then we have our first minus factor. In the intermediate case of a monopoly in one good and an oligopoly in the second, bundling can be used to mitigate competition. This is a plus factor, but a weaker one.

As we will see in more detail, bundling can be used as a tool to preserve market power. Preserving market power is of concern to most firms who have it. But this motivation for bundling will not be as strong for a firm that can protect its position through other means, such as a patent. Therefore, patent protection is our second minus factor.

Some of the factors apply to all explanations. High production costs make bundling more difficult in all cases, while low or zero marginal costs make bundling more attractive.

However, the issue of high production costs will be less important when the goods are complements or have highly correlated values, as this will lead to less wasteful consumption when they are bundled.[32]

We show that bundling can be used as a price discrimination tool. Price discrimination will be most relevant if customers have divergent product valuations and firms charge posted prices. If all customers have similar valuations, then there is no gain from price discrimination. Hence our third and fourth plus factors. As bundling is only an imperfect price discrimination tool, if other and better tools are available, then bundling is less important. The most direct tool for price discrimination is to charge different customers different prices. This is common in business-to-business transaction, where prices are negotiated, and less common in consumer markets.

In some cases, whether some feature is a plus or minus factor is more complicated. The issue of correlation in valuation between the goods illustrates this point. For the purposes of price discrimination, a positive correlation in value is a minus factor - price discrimination is less effective when the two goods have a positive correlation. But for purposes of entry deterrence, a positive correlation is a plus factor. Thus, in the event of a positive correlation, we would be on the lookout for bundling to be used as an entry deterrent device or to avoid double marginalisation, but not as a price discrimination tool. In the event of a negative correlation, bundling, tying, and metering would more likely be used for price discrimination.

4.1 Plus Factors / Minus Factors

PLUS FACTORS

- **A firm has market power in two or more goods.**
  See Bundling to Avoid Double Marginalisation
  See Bundling Complements to Undercut Rivals
  See Bundling to Create an Entry Barrier
  See Bundling to Gain Competitive Advantage
  See Bundling to Deny Network Effects/Scale Economies to Entrants
  See Bundling and R&D Incentives
- **A firm has market power in one good**
  See Bundling to Mitigate Competition
- **Firms charge a single price in the market**
  See Bundling to Reduce Pricing Inefficiencies
  (i) Bundling as a Price Discrimination Device
  (ii) Bundling to Reduce Double Marginalisation

32 As always, caution must be used. Some types of bundles do not actually lead the consumer to consume both A and B, but, rather, offer the choice of either A or B. Thus, a consumer with a two-mountain ski pass has a greater variety to choose from, but still can only ski on one mountain at a time. Hence, there is no increased cost in bundling two substitute mountains together. We discuss this "variety bundle" case at great length in Section 4.4.4.

- **Customers have dispersed product valuations**
  See Bundling to Reduce Pricing Inefficiencies
    (i) Bundling as a Price Discrimination Device
    (ii) Bundling to Reduce Double Marginalisation
- **Customers value variety**
  See Bundling to Gain Competitive Advantage
- **Goods A and B have low or zero marginal costs**
  See all cases. Most relevant when goods are not complements or highly correlated in value.
- **Goods A and B are complements**
  See Bundling to Reduce Double Marginalisation
  See Bundling to Create an Entry Barrier
  See Technical Bundling
- **The complements market has economies of scale or network effects**
  See Bundling to Create Network Externalities
    (i) Deny Network Effects / Scale Economies to Entrants

Turning around some of the plus factors leads to a set of minus factors.

MINUS FACTORS

- **One of the goods is competitively supplied**
- **Market power is protected by patent**
- **Firms can engage in price discrimination**
- **Customers have homogenous product valuations**
- **Customers do not value variety**
- **Goods A or B have high marginal cost**
- **Goods A and B are substitutes**

The above list of plus factors describes structural aspects of the market. We can also characterise the types of bundling by their economic motivation. Thus, an investigator who is interested in the potential entry deterrent effects of bundling might want to start with Bundling to Create an Entry Barrier. An investigation into unfair competition might start with Bundling to Undercut Rivals or Bundling to Create Network Externalities.

4.2 Index

- Strategic Reasons

  Bundling Complements to Undercut Rivals

  Bundling to Create an Entry Barrier

  Bundling to Mitigate Competition

  (i) Airline Ticket Pricing

  Bundling to Gain Competitive Advantage

  (i) Variety Bundles

  (ii) Network Pricing

  Bundling to Create Network Externalities

  (i) Bundling to Deny Network Effects / Scale Economies to Entrants

  Technical Bundling

  Bundling as a Commitment to Fight Entry

  Bundling and R&D Incentives

  Bundling as a Way to Obscure Prices

4.3 Efficiency Reasons

4.3.1 BUNDLING TO ACHIEVE COST SAVINGS AND QUALITY IMPROVEMENTS

Perhaps the most obvious reason to bundle two products together is that this leads to a cost saving or quality improvement or both.

For example, it is cheaper to deliver a suite of software packages on a single CD than to send out each one separately. Salinger (1995) recognizes that cost synergies from bundling are most valuable when consumer valuations are positively correlated.[33] Thus, if most consumers would buy both (or neither) A and B when sold separately, then any cost savings from selling them together will create an incentive for a monopolist to sell bundled products when valuations are positively correlated.

In the case of automobiles, it is less expensive for the manufacturer to assemble the car than for the customer to purchase the components individually and assemble them at home. Thus, it is not surprising that a car comes with an engine, transmission, brakes, seats, tyres, and more.

In recent years, carmakers have learned that allowing customers to pick and choose different option packages leads to increased complexity and cost. As a result, they found it could be cheaper to provide all of the options to all of the customers rather than let people debundle the offering.[34] To be clear on this point, savings in administrative costs can make it cheaper to offer all customers an ABC package, compared to letting customers choose two out of three, AB, BC, CA. Less flexibility but standardisation can mean more for all. This standardisation ends up being a bundled offering.

33 Salinger, M. S. (1995), "A Graphical Analysis of Bundling," *Journal of Business*, vol. 68, 85-98.

34 For example, the cost of removing a radio or creating a system in which radios are optional might add more to the cost of the car than the original cost of the radio. In this example, the cheapest way to deliver a car without a radio would be to give the consumer a car with a radio and let the consumer take it out if he so chooses.

Even in the case of cars, where cost savings seem paramount, there are also some puzzles. While cost issues would imply that it might be cheaper to include a radio with all cars, this is less clearly the case with tyres. If a customer would prefer a different set of tyres than those provided as original factory equipment, one might expect that the car maker would take back the unused tyres and provide some credit. This credit might be a low number, reflecting the discounted price at which the tyres were purchased and the administrative cost of returning these tyres to inventory. Even so, the value of tyres would seem large enough that this should be worthwhile.

What are we to conclude when we do not see this in the market? Given that there are several tyre manufacturers and a dozen carmakers, there is no reason to believe that there is an antitrust issue surrounding this bundle. A plausible explanation is that, given the low tyre credit that would be offered to the consumer, very few customers would be interested in making this exchange. A typical customer is content to let the manufacturer make this choice for him or her. Thus, the unbundling does not exist because there is little demand for it.[35]

A different reason why we do not see unbundling is that choice itself may be a problem. We are accustomed to thinking that more choice is always a good thing. Recent work in behavioural decision theory has shown that giving the customer too many choice options will often lead to no choice at all.[36] The customer will postpone the purchase decision. Thus, it is a profit-maximising strategy to restrict the customer choice set so as not to overwhelm the decision-maker. Bundling is one way to accomplish this.

Profits come from creating products with higher value and lower costs than rivals. We have seen how bundling can lead to cost savings. Turning this around, it can equally well lead to value enhancements. For example, by coordinating the interfaces and the commands, the software bundle can offer improved functionality and simplicity. Having one customer service number to call is another way to improve quality. In many products, there is a double finger-pointing problem. If something goes wrong, A blames B and B blames A.

For example, if the printer does not work with the computer, is it the fault of the printer or the computer? But if A and B are sold as a package, then there is one number to call and that company can take responsibility. Similar issues arise in service goods, such as insurance. A homeowner might worry whether his auto and medical policies have overlaps or gaps. One does not want to pay twice for the same coverage or have some problem fall through the gaps. When both policies are sold as a package, the policyholder is less worried that in the event of a claim, each policy will argue that it is the other's responsibility.

It is possible to argue that such cost savings or quality improvements can create an antitrust issue. A firm might gain a large advantage over its rivals by putting such a package together, and this might well force rivals out of the market. However, we reject

35 In some markets, this might give rise to a chicken and egg problem. Competing tyre makers do not have an incentive to advertise their tyres as being superior, as they have no way to sell them. Given the lack of advertising or competition, customers have no reason to consider this decision. In the case of tyres, the secondary market does provide an incentive to advertise.

36 See Ravi Dhar, "Choice Deferral," in The Elgar Companion to Consumer Research and Economic Psychology (ed/ P. Earl and S. Kemp). 1999, Ravi Dhar and I. Simonson, "The Effect of Forced Choice on Choice," Journal of Marketing Research, forthcoming, and Ravi Dhar "Consumer Preference for a No-Choice Option," Journal of Consumer Research, September, 1997.

such arguments. The idea that cost savings or quality improvements should lead to antitrust problems - the efficiency offence argument - runs counter to basic economics. This is no different from saying that a firm should not invest in cost-saving technology or quality improvement. Antitrust policy should not be used to shackle competition.

This is not to say that such bundle packages will be immune from antitrust scrutiny. Rather, we will not count cost savings and quality improvements as part of a problem. Thus, if one of the by-products of the cost-saving bundle is that it makes entry more difficult - not because of the need to compete against a lower-cost rival, but because of a missing complement market - then we can and will address that issue directly.

Our introduction to bundling has, so far, emphasised what might be called non-strategic reasons to bundle. One way of recognising non-strategic effects is to say that this incentive to bundle would exist absent any competitive response.

Continuing in this vein, a firm might want to engage in bundling in order to do a better job with price discrimination. Here, the firm is interested in better playing the pricing game against the customer.

We now consider the set of pricing efficiency reasons to engage in bundling. Although efficiencies are created, these explanations are more controversial. The reason is that bundling is used to mitigate some of the inefficiencies created by a monopoly. In this sense, we have two wrongs making a right. The monopolist is able to do a better job engaging in price discrimination or in avoiding double marginalisation. Thus, the firm is able to do a better job taking advantage of its market power.

In some cases, social welfare will go up, but consumers may end up worse off. In other cases, the result is a win-win - both consumers and the firm are better off when double marginalisation can be avoided. This should not be surprising. The gain from avoiding double marginalisation through the bundled sale of complements is similar to the pricing efficiencies created through vertical integration.

4.3.2 BUNDLING TO REDUCE PRICING INEFFICIENCIES

4.3.2.1 Bundling as a Price Discrimination Device

The majority of the economics literature on bundling has developed the theory of how bundling can be used as a price-discrimination tool by a multi-good monopolist.[37] While we are not convinced this is the most important application of bundling, either for firms or for antitrust authorities, it is surely the most studied and best understood.

37 See Stigler (1968), Adams and Yellen (1976), Schmalensee (1982, 1984), McAfee, McMillan, and Whinston (1989), and Bakos and Brynjolfsson (2000). Stigler, G. J. 1968. A Note on Block Booking. in G. J. Stigler (ed.), The Organization of Industries. Homewood, Ill.: Irwin.; Adams, W. J. and Yellen, Janet L. 1976. Commodity Bundling and the Burden of Monopoly. *Quarterly Journal of Economics* 90 (Aug.): 475-98; Schmalensee, Richard. 1982. Commodity Bundling by Single-Product Monopolies. Journal of Law and Economics, 25 (April): 67-71; McAfee. R. Preston, McMillan, John, and Whinston, Michael D. 1989.Multiproduct Monopoly, Commodity Bundling, and Correlation of Values. *Quarterly Journal of Economics* 104 (May): 371-84; Bakos, Yannis and Brynjolfsson, Eric 2000. "Bundling Information Goods: Pricing, Profits, and Efficiency," *Management Science*.

A typical monopolist faces a pricing dilemma when it has to set one price in the market to all customers. If it prices the object too high, it loses sales. If it prices the object too low, it gives away profits from customers who would have been willing to pay a higher price. In the end, the monopolist chooses a price such that marginal revenue equals marginal cost, but that trade-off is inefficient. There are customers willing to buy the good at prices above cost. This also misses opportunities from the monopolist's perspective, as there are customers who are buying the good and yet are paying well below their value.

In short, the monopolist would like to engage in price discrimination. This may not be practical given limited information about consumers or because of consumers' ability to engage in resale. In this situation, what is a monopolist to do?

If the monopolist only sells one good, there is nothing to be done. But if the monopolist sells two or more goods, bundled pricing can help achieve higher profits by reducing the need for price discrimination.[38]

Price discrimination is necessary only if customers have different values for the good. For example, if half the customers have a value of £10 and the other half have a value of £20, the monopolist would like to set different prices for these two groups. If it were possible to reduce customer heterogeneity, then there would be less need to employ price discrimination. Imagine that the heterogeneity can be reduced all the way so that customers all have identical valuations, say £15. Then a monopolist can extract all of the consumer surplus by charging £15.

Bundling is a useful tool to reduce the heterogeneity in customer valuations. The reason is that the combined customer value of a bundle is often less heterogeneous than the individual values of the components. This will be especially true if the values of components are negatively correlated. The following example from Brandenburger and Krishna (1990) illustrates this point:[39]

CONCERT		
Patron type	**Berlioz/Tchaikovsky**	**Bartok/Stravinsky**
Romantic	40	20
Neo-classical	20	40
Tchaikovsky lover	45	5
Sophisticate	5	45
Willingness-to-pay of Concert Patrons ($)		

38 In that sense, it is a price-discrimination tool as it enables a firm to capture a greater share of consumer surplus while still employing a single price in the market.

39 See Harvard Business School case study 9-191-177, "Bundling."

There are four customer types in this market (Romantic, Neo-classical, Tchaikovsky lover, and Sophisticate), and each makes up one-quarter of the market. For simplicity, we assume there is one of each type. As the product is a concert, we can assume that all the costs are fixed, and so the profit-maximising strategy is to maximise revenue.

As the chart indicates, there is a wide range of valuations for any one concert - from a low of 5 to a high of 45. If the concert organiser has to charge one price for each concert to all its customers, then its optimal price is 40.

Price	Sales	Revenue
45	1	45
40	2	80
20	3	60
5	4	20

It will sell two tickets to each concert and make total revenue of 160. But this misses an opportunity to sell tickets to the customers of each concert with values of 20 and 5 - still above the marginal cost of the concert.

A simple bundle solves this problem.

Bundle Price	Sales	Revenue
60	2	120
50	4	200

A bundled price of 50 leads all customers to purchase a series ticket. As can be seen, there is much less variation in the customer valuation for a series ticket than for an individual concert.

We note that the seller can do even a bit better through a mixed bundle strategy. Selling a series ticket for 60 and a single ticket for 45 leads to sales of 210. This is only 10 short of the total surplus available.

This advantage of bundling is especially apparent when the values of A and B are negatively correlated: offering an A-B bundle leads to more homogeneous valuations among consumers and, thus, the monopolist can capture more of the consumer surplus. Even if A and B have independent valuations, McAfee, McMillan and Whinston (1989) show that a multi-product monopolist still does better by selling A and B as a bundle rather than independently. This is a remarkable result.

This result is very general in that the collection of possible independent goods that could be profitably bundled is unimaginably large. Almost any two goods chosen at random

might be expected to have independent distribution of valuations. For example, pens and cars, or beer and bananas. For any two goods whose valuations are independent, a monopolist can increase its profits by offering an A-B bundle at a discount relative to the optimal monopoly prices of A and B.

If the monopoly has set the price of A and B optimally, then lowering the price of either good by a small amount, say £1, should be a wash. The firm would lose £1 in its existing customers but the additional demand should just make up for the diminished margins.

The remarkable result is that if A and B are each priced optimally, then the monopolist can raise its profits by selling an A-B bundle at a £1 discount to the optimal individual prices of A and B. To see the intuition for this result, consider a discount coupon that offers £1 off the price of B to those who buy A. Taking £1 off costs the firm £1 for all those who would have bought B anyway, but gains the firm some extra customers. As the price of B was set optimally, these two effects just balance out. (Although the discount is given only to those who have bought A, these consumers are a perfectly representative collection of B customers as the valuations of A and B are independent; hence the discount and the market expansion effects still just offset each other.)

Now for the key insight. A coupon that offers £1 off the price of B to those who buy A can also be read as one that offers £1 off the price of A to those who buy B. If the customer buys A and B, he can save £1. Thus the coupon will also have a market-expanding effect on the sales of A. This is all gravy, as the cost of the discount has already been paid and covered by the increased sales of B.

The reason why a bundle discount works is that it creates double the demand expansion for one single discount. It is a more cost-effective way to offer a discount.[40]

Given the strength of this result, the question arises as to why we do not see more examples of bundling, in particular bundling of items with independent valuations. And this advantage of bundling does not stop at two goods. Thus, why do not we see large bundles? There are several explanations:

First, recall that the firm must have a monopoly in each of the goods that is part of the bundle. It is rare for a firm to have monopolies that span a large number of goods.

A second explanation is that we have done these calculations assuming that costs are zero. As costs become increasingly important, the gains from bundling become smaller. If goods have a high marginal cost, then putting them together can lead to inefficient consumption. In these cases, bundling is much less likely to be a profitable strategy.

40 A different way to see the intuition for the advantage of bundling is to recognise that variance(A+B) = variance(A) + variance(B). While variances are additive, standard deviations are not. Take a case where A and B have the same variance. The standard deviation of valuations for A+B is only Sqrt(2) as big as the standard deviation of either A or B. Another way of putting this is that there is less dispersion in the combined values, A+B, than in adding up the dispersion around A to that around B. Consider a series of goods where, for each good, the average customer valuation is 10 with a standard deviation of 1. If we put 100 of these good together, then the average customer valuation of the bundle would be 1,000. But a price of 970 would attract more that 99% of customers. In contrast, a price of 9.7 on an individual item would attract little more than 50% of the customers. The customer's aggregate valuation of a bundle becomes much more predictable as we add more independent items to the bundle. In the limit, as the number of products in the bundle increases, Bakos and Brynjolfsson (1999) show that a monopolist can extract 100% of consumer surplus.

Turning this around, if marginal costs are low or even zero, this will not be an issue. Thus, one of the reasons for the recent attention and concern about bundling is that information goods have a low or zero marginal cost. To the extent that information goods are playing an increasingly important role in our economy, we expect that there will be more opportunities to engage in bundling.

Cost is also less of an issue when consumers naturally consume both of the goods together, such as is the case with hot dogs and mustard or airplane engines and avionics. Thus, production cost issues will also be less of a constraining factor when the goods are complements rather than substitutes.

The motivation for large bundles is also based on the basic assumption that there are a large number of goods each with independent valuations. Take, for example, content over the Internet. At first glance, the value of a song or news item might not seem to be correlated. However, if the user has a high-speed connection versus a regular modem, that will influence the value of all the items - similarly, if the information is being used for work or for pleasure. A customer's willingness to pay for more and more songs will eventually fall as there is insufficient time to listen to them all.

In short, we do not see large bundles because the assumptions required are unlikely to hold.

While the price discrimination explanation for bundling is theoretically sound, we are not persuaded that this is the most relevant motivation for bundling. This explanation for bundling would imply that we are most likely to observe bundling in cases where the two goods have a *negative* correlation in value. We saw this illustrated in the concert ticket pricing example. Consumer valuations were more homogenous for the bundle than for individual tickets. But, if the two goods that are sold together have a perfect positive correlation in value, then there is no extra ability to price discriminate by selling them as a bundle. There is no reduction in the heterogeneity of valuations. Nor is there an ability to expand the market by discounting a bundle relative to the price of the components. All customers would buy the bundle or nothing.[41]

In practice, goods that are bundled together typically have a positive correlation in value. Consider, for example, the Microsoft Office Suite. The value of the different component programs - Word, Excel, PowerPoint - are typically positively correlated in value; if the program is used for a business, all of the applications will have a higher value than if used at home. We believe that this is typically the case for goods that are sold in a bundle. This suggests that there are other motivations and we turn to them now.

4.3.2.2 Bundling to Avoid Double Marginalisation

The idea that bundling can be used to avoid double marginalisation (or double mark-up) is one of the oldest results in all of economics. In 1838, Augustin Cournot showed that bundling could improve the profits of two monopolists selling complementary products.[42]

41 This assumes that costs and valuations are symmetric for the two goods.

42 Cournot, Augustin. 1838. *Recherches sur les principes mathématiques de la théorie des richesses*, Paris: Hachette. English translation: (N. Bacon, trans.), *Research into the Mathematical Principles of the Theory of Wealth* (James and Gordon, Mountain Center: CA 1995)

For Cournot, the two complementary products were only of value when used together. Thus the customer will end up buying both or neither. Cournot used as an example the case of copper and zinc that are combined to make brass. For a more modern example, one can think of the two goods as hardware and software or a lift ticket to a ski mountain and ski equipment rentals.[43]

Cournot's insight is that two monopolists, acting independently, will set an inefficiently high price. Were they to merge or coordinate their pricing, they would lower the price and earn more money. The simple intuition is that the lower price of lift tickets stimulates sales of equipment rentals and vice versa. This is because customers care only about the combined price when deciding to make a purchase. When firms set prices independently, this effect is not considered. The firm lowering the price of lift tickets does not take into account the positive effect this will have on equipment rentals.

The Cournot example is the horizontal equivalent of double marginalisation. Each firm causes a negative externality on the complementary products by raising its price. When the two firms combine, they internalise this effect and lower prices. The two key assumptions driving this result are that both sellers are monopolists (or have market power) and that these products have strong complementarities - so, consumers tend to purchase these products together.

It is not surprising that the merging (or coordinating) firms make more money. What is unusual here is that prices *fall* so consumers are also better off, too. The merger or coordinated pricing leads to a happy situation in which everyone is better off, what is sometimes called a Pareto improvement.

This seductive simplicity of Cournot's argument has led to some confusion about when the theory is applicable. In some ways this result is very general. It does not depend on the specific form of the demand function or the cost function. It does not require that the goods be perfect complements. But there are several hidden assumptions on which the result relies. Two, in particular, are of concern to us.

First, the Cournot basic result depends on an unstated assumption: *that firms set a single price in the market to all customers*. This is a quite reasonable assumption for a typical consumer good, such as Microsoft Office. But it is not a reasonable assumption for many business-to-business applications. With many commercial products, the two parties engage in extensive negotiation as part of the sale process. If the seller has full information and can price discriminate or negotiate with each customer, then the advantage of bundling disappears.

Second, the basic Cournot model does not consider the impact of the coordinated pricing or merger on any other firms in the market. This is by design. In Cournot's framework, the producers of goods A and B were alone in the market. To apply this approach to an oligopoly model, as was the case considered by the Commission in the GE-Honeywell merger, we need to understand how the results change when the two merging firms are not alone in the market. We now turn our attention to this question.

43 Not all skiers will need equipment rentals. Thus, the argument applies to that group of consumers who do not own equipment and can ski only if they obtain both a lift ticket and equipment rental.

4.4 Strategic Reasons

4.4.1 BUNDLING COMPLEMENTS TO UNDERCUT RIVALS

The use of bundling to gain an advantage over rivals was at the heart of the European Commission's case against the GE-Honeywell merger. We examine some of the general issues in this section and then apply this analysis to the GE-Honeywell merger in Section IV of Part II.

When there is competition in the complementary products markets, there are two reasons to cut price: market expansion and competition with rivals.

The previous section set out the Cournot monopoly model. The original Cournot model looked only at market expansion, as there were no rivals from whom market share could be taken. In some cases, the market expansion effect will be small when compared to the potential gain from an increase in market share. For example, in the jet engine industry, a price reduction may increase the total demand for airplane engines. But, such a price reduction is likely to have a small effect on demand for airplanes, as the engine represents only a minority of the total airplane cost. The greater incentive for a price cut is the potential to gain market share from rivals.

Because there are rival firms, there will also be a response to a price cut. This response may offset the potential gain to the merging firms. Thus, we need to consider the impact on the non-merging firms and on consumers to determine the overall social welfare implications of the expanded Cournot effect.

The predictions of such a model are ambiguous as to whether bundling leads to higher profits. The answer will depend upon the parameter values and modelling assumptions.

The reason why the results have changed is that there are now two countervailing effects. Bundled pricing will almost always lead to a reduction in prices due to elimination of the double marginalisation effect. However, because single-product rivals also lower their price, the net gain in market share will be smaller and, thus, the result on profits is ambiguous.

We are also most interested in the case where a firm with products A and B sells them both as a package and individually. This is the mixed-bundling case. Recall here the example of Microsoft Word and Excel, which can be purchased individually or together as part of the Office bundle.

A series of simulations suggests bundling will help a firm expand its share of the market. Whether or not the bundling also leads to a short-run increase in profits is less clear. We provide one example of a simulation below.[44] It is discussed in greater detail in the GE-Honeywell case study. Here, there are two sellers of a differentiated A good and two sellers of a differentiated B good. One of the A sellers gets together with a B seller to offer a bundle. We find that bundling leads to a 3% decline in profits for the firm that bundles and a 20% decline in profits for the firms that sell products individually.

44 This approach is based on Nalebuff (2000b) "Competing Against Bundles" in *Incentives, Organization, and Public Economics*, (P. Hammond and G. D. Myles, eds.) Oxford University Press: London.

Pre bundling	$\Pi_A = 0.50$, $\Pi_B = 0.50$;	$\Pi_{A\ competitor} = 0.50$, $\Pi_{B\ competitor} = 0.50$
Post bundling	$\Pi_{Merged\ firm} = 0.97$;	$\Pi_{A\ competitor} = 0.40$, $\Pi_{B\ competitor} = 0.40$

In this case, we could say that bundling is not an economically rational strategy. This result, though, is quite sensitive to the particular parameters assumed, and with minor changes, the opposite implication (i.e., profitable bundling) is obtained.[45]

In most cases, we find that the firm that bundles has an advantage over its rivals. Even if the bundling firm loses money, its rivals lose more. But how much rivals lose depends on factors such as the number of items in the bundle and the elasticity of total market demand. The results rely on a specific distribution of customer preferences. Bundling leads to larger competitor losses under a uniform distribution of consumer preferences compared to a more concentrated distribution, such as a normal distribution. These different preference distributions reflect not only underlying consumer preferences, but also the firm's knowledge about the customer.

The results also depend on the relative importance of the two goods in the bundle. The assumption made for convenience is that the goods are all of equal importance to the consumer, as in Nalebuff (2000b).[46] But this assumption may not be appropriate. For example, in the GE-Honeywell merger case, there was a question of whether the merged firm would want to bundle engines and avionics. An aircraft engine costs approximately $15 million, while a piece of avionics might sell for $100,000. Nalebuff and Lu (2001) extended the model to allow for asymmetry in importance of the products.[47] In the examples considered, there appears to be little incentive to bundle and minimal impact on competitors when the asymmetry in the importance of the products is so great. In fact, with pure bundling and enough asymmetry, bundling actually increases the profits of all the players in the market.

The extension of the Cournot model to an oligopoly market is at an early stage. To use these types of models to make predictions about the likely impact of a merger, one should customise the model to fit the specifics of the industry. Issues that need to be addressed include the number of goods in the bundle, the relative importance of these goods, and the distribution of consumer preferences.

Even if bundling appears to be profitable, we should examine a broader range of rival responses. We need to consider whether rival firms would respond not just by lowering prices, but by forming competing bundles.

45 For example, bundling typically becomes more profitable as the size of the bundle grows. Thus a two good bundle might not be profitable, whereas a four-good bundle might. Bundling also becomes more profitable when lower prices expand the total market. In our initial simulations, we assumed that the total market size is fixed. While the biggest impact from lowering price comes from gaining market share, there is also the potential to expand the total market. Even if this effect is small, it can be enough to make bundling profitable.

46 Nalebuff, Barry (2000b).

47 Barry Nalebuff and Shihua Lu, "A Bundle of Trouble - Bundling and the GE-Honeywell Merger," Yale SOM working paper, 2001.

In most cases, we find that rivals would earn even less money if they formed a competing bundle. Even so, competition could evolve into bundle versus bundle. Dynamic considerations may lead a firm to prefer to be on a lower, but level, playing field. Issues such as R&D spending may lead a firm to prefer earning 9 in a (9, 10) outcome to earning 10 in a (10, 20) outcome. It is also the case that customers do much better in a bundle versus bundle competition. To the extent that customers are active in shaping the nature of competition, we can expect them to induce players to form competing bundles. A firm that looks ahead to see that the gain from bundling will only be temporary may choose not to go down this path.

As first discussed in the Cournot monopoly model, one must also consider the nature of pricing in the market. The Cournot effect relies on the elimination of a double marginalisation, which, in turn, relies on the inefficiency of monopoly pricing. If, instead, firms negotiate prices and do so with full information about customer preferences, then the outcome should be efficient, and there will be no gain from offering a bundled price.

If a customer prefers Firm A's product to its competitor's, and the extent of those preferences are known, then Firm A will always win a pricing competition. It knows just how much extra it can charge and still win the business.[48] Similarly, the firm that has the most-preferred B product will win that bidding competition. If the two firms with the preferred products are combined, they will still win both competitions. Whether they sell the items individually or as a bundle, the total price premium they can charge is the same.

Nor can bundling leverage market power. Bundling provides no advantage when a firm that has the preferred A product for some customer combines with a firm that has an inferior B product for that customer. The premium it can charge for the A good alone is more than the premium it can charge for the bundle, as adding good B to the bundle makes the bundle less attractive to that customer. Thus bundling leads to lower profits.

We have looked at two simplified descriptions of the market. In the first, firms are uninformed as to customer preferences (or unable to act on them) and thus there is one price to all customers. Here bundling is effective. In the negotiation setting, firms have perfect information about consumer preferences and competitors' costs and customise prices perfectly for each customer. Here, bundling has no impact.

While vendors are often well informed about customers and competitors, their information is not always accurate. Firms can still negotiate prices, even with good but imperfect information as to customer preferences. In that case, the way to model the problem is to consider what is known about customer preferences by the end of the negotiation process. That suggests considering the value of bundling for a series of different customer types. For example, is bundling valuable if the customer is known to prefer both of Firm A's products, but the strength of those preferences is unknown? We provide an introduction to this approach in the GE-Honeywell case study. More detail can be found in Nalebuff and Lu (2001).

48 Here, we are assuming that the firms either know each other's costs or learn this information through the bidding process.

What are we to make of bundling complements to undercut rivals? Bundling will be most effective where firms are unable to price discriminate. Even in those cases, it is not clear why there should be an antitrust concern. Average prices fall in the market. Consumers are better off at the expense of competing firms.[49]

Of course, the potential problem with bundling is not with any immediate loss to social welfare, but, with the long-run impact on competition. Similar to the argument against predation, the concern is that bundled pricing will cause rivals to exit and that this exit will lead to a dominant market position for the bundler. In the policy discussion, Section 5, we discuss how to evaluate this concern. To preview the result, we believe that this concern should be addressed in a fashion similar to the way that we evaluate a predation case.

4.4.2 BUNDLING TO CREATE AN ENTRY BARRIER

In this section, we look at the case for bundling in an oligopolistic environment. We show that bundling is a particularly effective entry-deterrent strategy. A company that has market power in two goods, A and B, can, by bundling them together, make it harder for a rival with only one of these goods to enter the market.

Bundling allows an incumbent to defend both products without having to price low in each. While it is still possible to compete by offering a rival bundle, a monopolist can significantly lower the potential profits of a one-product entrant without having to engage in limit pricing prior to entry.

We also show that bundling continues to be an effective pricing tool even if entry deterrence fails (or if there is already an existing one-product rival). A company with a monopoly in product A and a duopoly in product B makes higher profits by selling an A-B bundle than by selling A and B independently. Leveraging market power from A into B and accepting some one-product competition against the bundle is better than using the monopoly power in good A all by itself. Since bundling mitigates the impact of competition on the incumbent, an entrant can expect the bundling strategy to persist, even without any commitment.

A firm with market power in goods A and B can offer them as a bundle so as to make entry more difficult. Note, first, that this does not fall into the Chicago School argument, as the starting point is market power in both A and B and not just in A. Thus, the bundling is used to protect the market power against entry rather than extend it to another market.

The motivating example for this section is Microsoft Office, in which Word, Excel, PowerPoint, and Outlook are bundled together into a software suite. The consumer could just as well assemble his or her own bundle. In fact, many consumers may feel

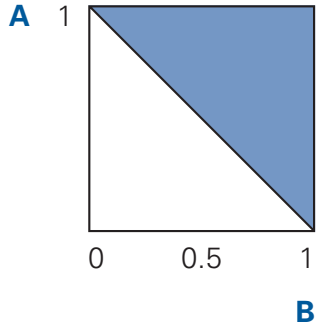
49 One can make the argument that social welfare falls, but this is not a general result. Bundling leads to a fall in social welfare if we start from a model with fixed demand and symmetric firms. In that case, consumers all go to the "closest" firms in the no-bundling solution. When the bundling firm lowers price, it attracts more customers. This leads to an inefficiency in that customers go out of their way (either literally or in the sense that they accept a less good fit) in order to get the price reduction. While consumers are better off, this inefficient allocation of customers to firms means that the customers' gains are less than the reduction in profits. But this argument depends critically on the starting points being completely symmetric. If, for example, the merging firms have a superior position and a larger share, then the bundle discount can lead to increased efficiency. Similarly, if lower prices expand the market, this can also increase social welfare.

that they could do an even better job of assembling a bundle using "best-of-breed" components, perhaps combining Microsoft's PowerPoint with Corel's Word Perfect, IBM's Lotus 123, and Qualcomm's Eudora for email. Since not all of its products are best-of-breed, how does Microsoft gain an advantage by selling its office products as a bundle?

One could argue, as in the previous section, that bundling improves quality and lowers costs. There are synergies between the software applications in Microsoft Office. For example, the commonality of commands and the ability to create links between applications make the products easier to use. A single telephone number to call for help also makes the package more attractive. On the supply side, it is cheaper to include multiple products in a single CD disc than to package each one individually.

In addition to quality and cost, there is a strategic reason to bundle. The basic idea is straightforward. Imagine that a firm sells an A-B bundle rather than A and B individually. If an entrant comes into the market with an A good, then it is limited to selling its product to customers who value A, but who do not particularly like B. Those customers who also like B will prefer to buy the bundle.[50]

This idea is illustrated in the picture below. In this diagram, we assume that consumers are located uniformly in a box. The consumers with a high valuation for good A are located at the top and those with a high valuation for good B are located to the right.



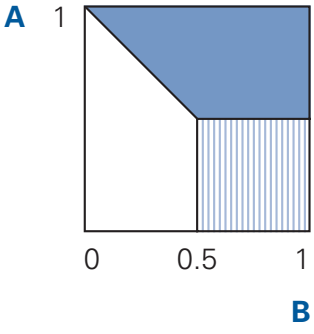
Assume that a monopolist firm selling A and B offers the two products as a bundle at a price of 1. In that case, the firm will sell an A-B bundle to the upper right half of the market, those consumers with a combined value of A+B that exceeds 1.

Now consider the market available to an entrant. If the entrant comes in with just one product, say B, then it can attract only those customers who are willing to pay its price for B and give up A. This is the group of customers in the lower right corner of the box.

The figure overleaf illustrates the market available to an entrant with a single good price at price 0.50 competing against an entrant with a bundle priced at 1. Only consumers who value good B at more than 0.50 are interested in the entrant's product. Since the incremental price of buying the bundle is another 0.50, those customers who value good A at more than 0.50 will buy the bundle, leaving the entrant with only those customers in the lower right quadrant. This is half of what it would otherwise attract if it could sell B without having to compete against the incumbent's bundle.

50 This argument is further developed in Nalebuff (2000a), where it is extended to include mixed bundling.

ENTRY



It is the exclusive supply of A that creates an advantage to the incumbent. Any customer who is unwilling to give up A must buy the bundle and get B in the process. Thus, those customers will not be interested in the entrant's B product. Or, to the extent that they are interested, it will only be how much they are willing to pay for the entrant's B given that they already have the incumbent's B product.

The advantages of bundling become even larger if the incumbent has an incentive to sell the bundle at a price below 1. To the extent that the monopolist is able to extend the reach of the bundle further down the market, there is even less share available to a one-product entrant. It turns out that the Nash equilibrium prices in this game are approximately 0.60 for the two-product incumbent and 0.25 for the one-product entrant.[51] With two goods for sale, you might expect that the incumbent might make twice as much as a one-product rival. In the Nash equilibrium, the entrant makes a profit of 0.366 versus 0.064 or nearly six times as much; see Nalebuff (2000).

There is yet another advantage to an incumbent who offers a bundle. The entrant is practically limited to customers who like its A product and are willing to forgo the B product. There are even fewer of these customers when the A and B goods are either positively correlated in value or when the two goods are complements. Again, the reason is that the entrant is limited to the consumers who like one good but not the other, and there will be fewer of these consumers if the two goods are positively correlated in value or are complements.

It is our view that most bundles do include goods that have a positive correlation in value or that are complements. Customers who value Microsoft Word will also value Microsoft Excel. Most customers who value a plane trip from New York to London will also value a return trip from London to New York.

The literature on bundling as a price discrimination tool emphasises that it works best when the bundled goods have a negative correlation in value. This is when bundling most reduces the dispersion in valuations and allows the monopolist to capture the lion's share of consumer surplus. Bundling still works when the valuations are independent, but the gain from bundling disappears with perfect positive correlation.

51 A Nash equilibrium is a collection of strategies such that if everyone in the game correctly anticipates the strategies of all the other players then no player would like to unilaterally change his strategy. In this case, if the two-product incumbent were to charge a price of 0.60 and the one-product entrant were to charge 0.25, then neither firm would want to vary its price given what the other firm is charging.

The opposite is true when bundling is used as an entry deterrent or monopoly extension strategy. It is most effective when the bundled goods are positively correlated in value. Even with independent valuations, bundling is still an effective tool, but it loses its effectiveness when the goods are perfectly negatively correlated in value. The reason is that a one-product entrant has everything its consumers want when the valuations for A and B are negatively correlated. The markets for A and B are essentially different groups of consumers. In contrast, when A and B are positively correlated, the same group of consumers are buying both A and B and, thus, a one-product entrant cannot satisfy its customers.

In a simple example based on a uniform distribution of preferences, we found that the cumulative advantage to the incumbent was striking. The incumbent raised its profit by 9% if it succeeded in avoiding entry.[52] This was due to the better price discrimination described earlier. At the same time, the potential profit to an entrant fell by 60% - and this is without any attempt to engage in limit pricing. It is rare to find cases where a firm can raise its profits while, at the same time, deterring entry.

It is also worth noting that there was nothing special about deterring entry on the A frontier. The argument would have worked just as well on the B frontier. This is a second remarkable aspect of this strategy. The bundle allows the incumbent to protect both frontiers at the same time. The value of good B is what protects the incumbent against an A entrant, and the value of good A is what protects the incumbent against a B entrant.

The bundling strategy does not deter an entrant who is able to develop both an A and a B good. However, this is typically much harder to accomplish. For example, a firm that develops a better word processing program would also need to develop a better spreadsheet program in order to compete with Microsoft Office. We take the view that developing two innovations is harder than developing one.

4.4.3 BUNDLING TO MITIGATE COMPETITION

Should entry occur, we expect that a bundling strategy will mitigate the cost of this entry. One reason for this is that when a rival enters the market, some of its customers are taken from the incumbent, but others come from customers who were previously left out of the market. The rival with good A has a differentiated product. It appeals to those customers who are not well served by the incumbent - those who like good A but not B, and their desire for A was not so strong as to justify buying the bundle. This group of customers is attracted to the single product firm and yet does not cause the incumbent any loss in demand. Some customers are lost, namely those who like A, but not B, and their desire for A was strong enough to lead them to buy the bundle. Now they can just buy good A. But the fact that the rival only competes for a limited group of customers ends up reducing the scope of competition; see Nalebuff (2000).

52 The specifics of this example can be found in Nalebuff (2000b).

The idea that bundling may help mitigate competition is also explored in Carbajo, De Meza, and Seidman (1990) and Chen (1997).[53] In these two papers, the intuition is that bundling becomes a way for the two competing firms to better differentiate themselves. In Carbajo et. al., one company sells both A and B, while the rival firm only sells B. If the two goods are sold separately, then the profits in B are competed away and, thus, the first firm simply earns the monopoly profits on A. If, in contrast, the first firm only sells A and B as a bundle, then it can go after the high-value customers and leave the rival firm to pick up the low-value customers who go unserved.[54]

Chen's model achieves a similar result through different means. Two companies can each produce products A and B. The two firms are duopolists in the A market, but the B market is competitive. Instead of both firms selling A (and competing away all profits), one sells just A and the other sells just an A-B bundle. In essence, the two firms commit to dividing up the A market. Firm 1 gets the A customers who do not care for B, while firm 2 takes the A customers who also like B.

Note that in these cases, antitrust authorities should have concerns that bundling is being used as a way to divide up the A market. This is the opposite of previous concerns. Instead of bundling being a competitive tool that rivals cannot match, here it is used to facilitate implicit coordination through the creation of differentiated products.

Our one concern in raising this issue is the need for consistency. A firm should not be accused of both unfair competition and collusion at the same time.

We have now shown how bundling can help deter entry as well as reduce the impact of entry should deterrence fail. We now illustrate this effect using airline industry pricing. Throughout most of this report, we will typically comment on previous antitrust cases. Here, we use the framework on bundling as an entry barrier to consider a potential antitrust case that might be brought. Our stylised description of the way bundling is practiced with roundtrip tickets is a starting point for asking more questions.

4.4.3.1 Airline Ticket Pricing

Airline tickets provide a stark example of where bundling seems to be used as an entry barrier. Where is the bundle? The bundle is in the roundtrip. The outbound trip is bundled with the return.[55]

While it is certainly possible to purchase two one-way tickets, this will usually cost significantly more than a roundtrip ticket. This is particularly true if the roundtrip ticket is purchased 21 days in advance and includes a Saturday night stayover.

The question to ask is why airlines do not allow passengers to fly out on one carrier and return on another while still buying the cheap ticket? To be very clear on this topic, the idea would be that the passenger might fly from New York to London on American

53 Carbajo, Jose, De Meza, David, and Seidman, Daniel J. 1990. "A Strategic Motivation for Commodity Bundling," *Journal of Industrial Economics*, 38 (March): 283-98; Chen, Yongmin 1997. "Equilibrium Product Bundling," *Journal of Business*, 85 - 103.

54 The consumer value of A and B are perfectly correlated. This is done so as to eliminate any price discrimination gain from bundling and, thus, concentrate of the competition effect.

55 See Severin Borenstein presentation: Why Don't Airlines Interline?

Airlines (AA) and return on United Airlines (UA).[56] Provided the trip was booked far enough in advance and included a Saturday night stayover, the passenger would be entitled to pay half the AA plus half the UA roundtrip fares.

We posed this question to several airline executives (including the CEO of a well-known European airline). In their initial response, they explained that they had no interest in giving up their customers to a competing airline.

But this does not make sense in that they have every reason to pick up as many customers from other airlines as they would lose. We believe that there are two economic reasons for their bundling strategy. The first is that it facilitates price discrimination, and the second is that it facilitates entry deterrence.

One concern of airlines is that they maintain high prices to business travellers while offering low prices to leisure travellers. Thus, they put in place restrictions that are designed to prevent business travellers from employing the low fares.

Assume that AA has nine flights daily and that UA has four. If the passenger is required to fly both ways on the same airline, then there are 81 + 16 = 97 roundtrip options. This comes from the fact that AA's nine flights in each direction lead to 81 possible roundtrip options while UA's four flights lead to 16 roundtrip options. If passengers could mix and match, then there would be 13 flights in each direction, resulting in a total of 169 roundtrip options. Note that allowing this flexibility increases the number of roundtrip possibilities quite substantially. In our example, the increase is more than 70%.

The leisure traveller may care less about finding his or her exact preferred travel times while the business traveller would be more sensitive to this issue. Thus by not allowing "interlining" across the outboard and return legs, the variety is reduced - a useful way of discriminating against the business traveller.[57] While this argument is logically consistent, we do not believe it is the first-order explanation. For quite similar reasons, not allowing interlining also leaves an entrant at a much bigger disadvantage. Consider again the case of AA, with nine flights a day on a particular route, facing an entrant with one flight. Roughly speaking, we can expect the market shares to be proportional to the number of flights of each player. Thus, we would expect the entrant to obtain 1/10th of the market.[58] This would be the case if customers cared only about one-way trips or interlining were permitted.

56 These two U.S. carriers were chosen solely to help illustrate the problem. It is not our intention to suggest that these particular carriers are better or worse than any others on this issue.

57 We use the term "interlining" as a shorthand. Interlining includes using multiple airlines as part of a one-way and thus is broader than what we have in mind. We are focussed on "interlining" between the outbound and the return portion of the trip.

58 Even with one-way fares, the firm with the large number of flights will have an advantage and thus might be expected to get more market share than its proportion of flights. This is a second-order point relative to the entry deterrence effect discussed in the text. If we assume that the incumbent has M flights and the challenger has N flights, then the challenger's market share will be N/2M. (This is because the challenger will locate in N of the M evenly spaced time intervals created by the incumbent. The two firms split the market where they compete, while the incumbent gets the entire interval where there is no competition.) The ratio of market shares is N/(M+N + M-N) < N/(M+N). Things get much worse with roundtrip flights. Now the market share is (at best) (3/4) N2/M2 and we see a quadratic effect. For example, if N/M = 1/2 ‡ Market share < 3/16. Also there is a loss in social welfare. The average distance travelled is 1/(N+M)2 versus 1/(N2 + M2).

In the case where only roundtrip tickets are sold, then the entrant has just one roundtrip option to compete against AA's 81. Thus, the entrant would be reduced to a market share of 1/82, an amount so small that entry might well not be profitable. In this example, it would have 1/9th as many passengers *per plane*.[59]

Entry is not impossible. For a firm to be competitive, entry must be done on a larger scale. This is more difficult on several accounts. The size of the market may not easily accommodate a larger entrant. Fewer potential entrants will have access to the capital required for large-scale entry. The roundtrip bundling strategy reduces the incentive for a low-cost maverick entering on a small scale, e.g., the likes of Laker Airways. What makes this practice objectionable is that the scale economies are artificial. If incumbents allowed others to "interline" small-scale entrants would not be disadvantaged.

Not only is entry more difficult, but there is also a loss of social welfare. As described in the price discrimination example, customers can choose among only 97 options rather than 169, and this reduction in choice will mean that they will typically have to fly at times farther from their ideal and, thus, suffer lower utility.[60]

When this explanation was provided to airline executives, their response was to question the conclusion: if this leads to monopoly, where are all the profits? Profits can be dissipated through inefficient operating practices. It is also possible that the structural features of the market (evaporating inventory and low marginal costs) make it difficult to recover fixed costs in a competitive environment. While we are sympathetic to this second argument, traditionally, the law does allow anticompetitive practices, even if firms cannot recover fixed costs under perfect competition.[61]

The refusal to allow interlining on discounted roundtrips seems to be a practice designed to protect an airline's market position against both new entrants and entry by other carriers. Evidence from Borenstein (1989) demonstrates that an airline's hub fares are between 2% and 12% higher while Berry et. al. (1996) show that leisure fares are 5% higher and business traveller airfares are 20% higher in hub airports.[62]

In many markets, entry is already more difficult in the airline industry due to limited gate capacity. Thus, one would want to be especially keen to prevent strategies that further limited access to this market.

This leads to a proposal: *require airlines to interline across the outbound and return leg of a discounted roundtrip ticket*.

59 We have made the argument that a firm with a monopoly in goods A and B will sell them as a bundle so as to deny market share to an entrant that only has good B. This can also be interpreted as an entrant who has a comparable good B but an inferior version of good A. Thus the poor schedule for the return leg of the trip is like the inferior version of good B.

60 In our example, we have assumed a symmetric price solution and thus have not analysed the distribution of surplus between consumers and producers.

61 More generally, antitrust laws are not well suited to industries with high fixed costs or increasing returns to scale. In these cases, the competitive result of price=marginal cost leads to losses. While a monopoly is efficient from a static production point of view, this leads to efficiency problems with regard to pricing and innovation.

62 Borenstein, Severin, 1989, "Hubs and High Fares: Dominance and Market Power in the U.S. Airline Industry," *Rand Journal of Economics*, Vol. 20 (3), pp. 344 - 365; Steven Berry, Pablo Spiller, and Michael Carnall, 1996, Airline Hubs: Costs, Markups and the Implications of Customer Heterogeneity, *NBER Working Paper No. W5561*.

Caution: This proposal should be viewed as a recommendation to investigate this topic at greater length. We need to better understand the feasibility of this proposal and its expected effect on pricing.

The proposed remedy is a particularly mild form of regulation. Firms can charge whatever they want and impose whatever restrictions they want on fares. However, they must break down each fare into its two one-way components (and the fare need not be divided 50 - 50). Customers who meet all of the restrictions imposed on the roundtrip (by both sets of carriers) can then buy their roundtrip using two different carriers.

We believe that today's modern reservation systems would make this simple to implement, but this needs to be confirmed. We note that interlining on roundtrips used to be a common practice. In 1984 13% of U.S. domestic roundtrips involved different carriers on the outbound and return legs. By 1997, that fraction had fallen to 1.5%.[63] Borenstein attributes this decline to fare policies restricting discounts on interlined roundtrips, loyalty effects of frequent flyer programs, and increased concentration at airline hubs. It would also be worth investigating the extent to which this type of "interlining" is practiced among airlines that have a code-sharing arrangement.

4.4.4 BUNDLING TO GAIN COMPETITIVE ADVANTAGE

We believe that the use of bundling to create a competitive advantage is an important, but not well understood, concept. The previous example of roundtrip airline tickets suggested a broader effect that we now explore. The general idea is that a multi-product firm can offer more variety than a single product competitor. If the products are all sold individually in the market, then the customer can get all the desired variety by freely mixing and matching. But if products are offered as a bundle, then the best way to get variety is to purchase the bundle.

We illustrate this effect with an example that is an adaptation of the Aspen v. Aspen Highlands court case.[64] Ski resorts ranging from Courcheval to Aspen bundle several mountains together in a multi-mountain pass. Recently, American Ski Company started to offer bundled packages that span ski mountains in Maine, Vermont, and Utah. Phone companies will offer a bundle of mobile and land line. Here, too, these goods would seem to be substitutes in that if the price of mobile calls is raised, the user will divert calls to land lines.

At first glance, this is a different phenomenon than we have previously seen. For a skier at Aspen, the four mountains (Aspen, Snowmass, Buttermilk, and Aspen Highlands) are primarily substitutes. If the lift tickets were sold individually and the price of Aspen (A) were to rise, some of its customers would divert their business to Buttermilk (B). Thus, we have what might seem to be an unusual case of bundling substitute products together.

63 Data from Severin Borenstein presentation "Strategic Incompatibility in the U.S. Airline Industry."

64 Aspen versus Aspen Highlands is discussed in Section VII of Part II.

4.4.4.1 Variety Bundles

Taking a step back, it is too simplistic to say that the four mountains at Aspen are all substitutes. The fact that they offer different levels of difficulty as well as variety is a factor that leads people to pick Aspen in the first place. In this sense, the four mountains are complements rather than substitutes.

Taking this in two steps, if mountain A raises its price, this should lead those at the resort to consume more of mountain B, not less. However, fewer people will choose to go to that resort. Adding these two effects together could well lead to either a net increase or decrease in the consumption of mountain B with a price rise in A. What is really going on is that the price rise leads to a reduced demand for the A-B option and increased consumption of B among those who still choose the option.

To be precise, the cluster of mountains is an example of a class of goods that are ex ante complements and ex post substitutes. Porter (1990) and Brandenburger and Nalebuff (1995) have discussed this idea in the context of business or national strategy.[65] But the quite unusual dual nature of this relationship has not been explored in the academic literature.

One can simply add the ex ante complement effect to the ex post substitute effect to determine whether the two goods are net substitutes or complements. Our view is that this approach would miss the interesting nature of the relationship and the incentive to bundle.

One way to see the difference is that if A and B are pure complements, then the seller of A would prefer that the price of B be as low as possible. This is because the A seller wants as many people as possible to purchase B and thereby increase their willingness to pay for A.

In contrast, if A and B are substitutes, then the seller of A wants the price of B to be as high as possible. The fewer people who purchase B, the fewer people will have their value of A reduced.

The mixed case is more subtle. The seller of A wants the price of B to be low so as to entice people to consider the A-B option over other options. But the A seller does not want the price of B to be so low that it leads all the customers who choose the A-B option to then consume B over A.

Let us call these mixed cases, *variety goods*. Customers value variety even if they consume only some of the varieties.

There is something else about variety goods that makes them special. Customers typically only consume one variety at a time. Thus, even if the marginal cost of producing each good is significant, it does not cost anything extra to offer a customer the *choice* of A or B as a bundle. The customer cannot be on Aspen and Buttermilk at the same time. Other than issues of managing complexity and capacity, there is no extra cost of creating a variety bundle.

65 See Barry Nalebuff and Adam Brandenburger, Co-opetition (1995, Harper-Collin: London) and Michael Porter, Competitive Advantage of Nations, Free Press, 1990.

Examples of variety goods include:

(i) Cable television packages. In choosing between cable and satellite, the customer will look at all of the channel options available in each technology. If satellite has an extra channel option, that will increase the chance that the customer will choose satellite and thus purchase that option as well as the other satellite options. However, once the customer has satellite, the different channels are substitutes in that a price increase in one channel will lead to fewer purchases of that channel and more purchases of other channels

(ii) Airline flight schedules. In choosing between airlines, the customer will look to the airline that offers the most convenient set of travel times. If the price (or availability) of one flight becomes less attractive, that will shift passengers to other flights and also to other airlines.

(iii) Restaurants. One of the puzzles of location theory is that we see a large number of competing restaurants all located next to each other.[66] Chinatowns or the Bangladeshi restaurants along Brick Lane in London are two of many examples. The close proximity of the restaurants brings many more customers and suppliers to the area. But once customers are there, the restaurants are very much in competition for their business.

Each of these environments is an example of a variety bundle. Some happen through the direct action of the firm, while others happen through the marketplace. One difference is when the customer pays for the bundle. In the example of cable, the customer pays for the subscription in advance and then decides what channel to watch. In the case of restaurant districts, the variety is offered for free in that the customer does not have to make a payment until he eats a meal at his chosen restaurant. Ski mountains are more like cable television. Many of the patrons will have booked hotel rooms or purchased property in the area. Only the locals can get the variety without having to commit first. As for airlines, one can pick the airline based on the schedule for this trip. But that might overlook the value of other flights that could serve as a backup if schedules change. Also, to the extent that customers care about frequent flyer programs, they are choosing the location first and then deciding on the specific option later on.

We now examine how this type of bundling can create a competitive advantage by lowering the willingness to pay for a rival's unbundled good. Assume for a moment - and possibly counter to the facts - that each of the four mountains at Aspen is equally valuable to a customer when viewed on its own. Because the mountains are substitutes, adding a second mountain is less valuable than the first.

Thus if the first mountain is worth V to a customer, a second mountain could be worth λV, where $\lambda<1$. A third mountain is worth less than the second. Here, we assume adding a third mountain to a variety package would be worth $\lambda^2 V$.

66 Hotelling (1929) might explain why two restaurants locate next to each other. Each would hope to attract customers coming from opposite directions. But Hotelling could not explain why three or more restaurants would locate along a street. The ones in the middle would not survive.

Offering a skier a choice of any three mountains is, thus, worth $V(1 + \lambda + \lambda^2) > V$. We see that the customer is willing to pay a premium for having the choice of any three mountains. This is an example of creating an economy of scale. Note that if $\lambda = 1/2$, then the customer is willing to pay a 75% premium for having this flexibility. Creating this value comes at little incremental cost, as the skier can be on only one mountain at a time.

Compare this to the position of a fourth mountain that is left out of the bundle. To a customer who has purchased a three-mountain pass, the value of the fourth mountain is reduced to $\lambda^3 V$. In the case of $\lambda = 1/2$, the difference between the two competing firms is striking - the three mountains are worth 14 times more than the single mountain.

Prior to any bundling, each of the mountains could deliver a value of V, and we might expect the market to be divided equally among the four mountains. But if three of the mountains come together, create a pass, and exclude the fourth, then the bundle is worth $V(1+\lambda+\lambda^2)$ or $V(\lambda+\lambda^2+\lambda^3)$, based on whether the skier is planning to buy the fourth mountain's pass; in contrast, the single mountain is worth either V or $\lambda^3 V$, depending on whether the skier will also purchase the three-mountain pass.

In some of these cases, the marginal value of the three-mountain pass will be enough to ensure that it will be purchased. Even when it is not, the much higher value it can deliver makes it very likely to be purchased in a one-on-one comparison. (We have to consider how prices adjust to make this precise.) Thus, the fourth mountain will typically end up being worth only $\lambda^3 V$ in the eyes of the consumer.

Starting from a position of equality, the bundled strategy can create a 14-to-1 advantage (1.75 to 0.125) over the single mountain. With such an advantage, it would not be surprising to see the single mountain being forced out of business or forced to sell to the three-mountain owner.[67]

The facts of the Aspen case were somewhat different than those of our example in three ways. First, the four mountains may not be equal. For some skiers, Aspen is the premier mountain of the four. Second, there was a historical cooperation of bundling the four mountain tickets together that had been stopped. Stopping something is often viewed as different than never having done it in the first place. Third, the case was decided on the issue of whether Aspen was an essential facility. Just as a single railroad line may have to be shared, access to Aspen was viewed as being an essential requirement to sell a ski pass in the Aspen area.

In this analysis, determining the appropriate market will be a challenge. Ex ante, Aspen competes with Vail, Deer Valley, Killington, Whistler, and Courcheval, among many others. Thus, it is hard to say that any one ski area has market power. However, there are a large number of people who are locked into Aspen, primarily due to real estate. This would include not just vacation homes, but also hotels and condos. In this market, the three-mountain group wields tremendous market power.

67 The multi-mountain passes are typically sold as part of a multi-day pass. This creates another advantage for the pass seller. Imagine that the skier is on a seven-day trip. If the person wants to ski six days on the Aspen pass and one day at Aspen Highlands, there is a financial incentive to make Aspen Highlands either the first or last day of the trip (as it is cheaper to buy one six-day pass than two three-day passes). Thus, the pass reduces flexibility regarding when to visit Aspen Highlands.

Our point here is to emphasise that this is a particularly striking example of a much larger phenomenon. We do not think that Aspen was essential to creating the advantage. In some sense, it is access to being part of the bundle that is essential rather than any one mountain. To the extent that one sees a bundle as an essential facility, we have explained how it is that the bundling creates value for the bundler and reduces the willingness to pay for rivals.

Frequent flyer programs work in much the same way. So does a bundle of content for a cable operator. Putting the package together and letting the customer choose among this variety puts a firm with only one product to sell at a distinct disadvantage.[68] While the firm might do fine if its product were perceived at the average value of a good in an (n+1)-good bundle, it may not survive if it is perceived as an incremental good to be added to an n-good bundle.

The more goods that are put together in the initial bundle, the greater the value that is created. This is the sense in which Aspen would do better to compete against Vail by including all four mountains in a pass. But once skiers have been attracted to the bundle, the goods then compete against each other for the customer's business. By excluding a few firms from a bundle, the loss of complements might be small, but the loss to the excluded firm will be enormous. This strategy need only be done for a limited time until the excluded firm concedes to the bundler's terms.

We return to this issue in our discussion of remedies in Section 5.3. There we discuss some possible solutions in the context of the recent variety bundles offered via unlimited movie cinema passes. There is also further discussion of the specifics of the Aspen case in Section VII of Part II.

4.4.5 BUNDLING TO CREATE NETWORK EXTERNALITIES

Bundling can be used to stimulate product sales via a network externality effect. Here we examine how bundling may be used to broaden the scope of an existing network effect. We first look at this in the context of telephone pricing and then in the context of software upgrades that create scale and packaged sales that deny scale to rivals.

4.4.5.1 Network Pricing

We have emphasised creating value through offering product variety. In some cases, the variety of goods offered is actually the other people on the network: the more people, the more variety. Bundling comes into play when firms offer discounted access to the bundle of people on their network. Mobile phone pricing achieves this result in a rather ingenious fashion.

68 While this perspective on variety bundles is original to this report and, to our knowledge, has not appeared in the economics literature, we believe that it is one of the concerns behind the antitrust authority's concerns in the Guinness/Grand Met case. One of the advantages of having a broad line of products is that it becomes easier to offer the customer variety. Single-product firms may find it difficult to compete when the variety offered by the broad line distributor is so great that a relationship is assured and, thus, the single product offering is viewed as being the marginal decision rather than the average one.

Without any strategic pricing, a customer has no particular reason to care about the variety of customers on a particular network. In the United States, there is no reason for a Nynex customer to care whether the person being called is also on Nynex or is on Bell South or AT&T. But programs such as MCI's Friends and Family change this. Here we will consider the mobile phone pricing plans in the U.K. that achieve a similar effect. They do this by providing a significant discount for calling other mobiles on the same network compared to those on competing networks.

Consider a situation in which there are four incumbents, each with a 25% market share, and a fifth entrant with a 0% share. We also assume here that all firms charge a common termination fee to firms across networks. In fact, the size of this termination fee is relatively unimportant as we would expect the balance of trade to mostly wash out. (Terminations fees will be revenue neutral for the four incumbent firms if what they pay to competitors is offset by what is received from competitors.)

Even the network with zero market share would have a level playing field. Every call that the person makes would lead to a termination fee being paid, while any call being received would lead to a termination fee being received. Only to the extent that there is an imbalance between calls being made and received would call termination fees be a factor.

Now consider how the situation changes when the firms decide to create a "variety bundle" in which calls within the network will not be charged a termination fee.

At first glance, the entrant is in a terrible position. Its potential customers would have to pay high termination charges to call almost any other mobile phone, while other operators could offer at least a 25% discount in that at least 25% of calls would be on network.

The entrant can mitigate this disadvantage to some degree. It can use the termination fee it charges to subsidise the termination fee its customers must pay to other networks. Thus, it could offer to match the low-fee calling to anyone on one or all of the incumbent networks. The problem is that other people will still have to pay a high price to call its customers, while people on the other networks will not have their callers paying a high price to reach them on intra-network calls.

In short, by taxing calls in at the same rate that others tax calls going out, an entrant can match the low price fees that its rivals can provide to subscribers. But it cannot also offer subscribers a deal where those who call would not be penalised for being on a different network. (That penalty is needed in order to subsidise the outgoing calls.) Continuing with the trade tariff analogy, having duelling tariffs is not as good as creating a free-trade zone. To the extent that incumbents have large market shares (and even more, that the people on a network are more likely to call others on that network), networks that can establish large internal free trade zones are at a competitive advantage.[69] These zones are created through a type of bundled pricing. The bundle here is the variety offer of discounted calls to the other people on the network. In that sense, this advantage is an

69 One reason is that a family might choose a network together. Similarly, one would expect a company to standardise on a network. Thus network-to-network calls will have a higher market share than the network's own market share.

artificial construct of pricing. As we can establish that it causes a potential problem for entrants, we should ask what benefits it creates. The burden of proof might shift to put these practices into question unless they are explicitly justified.[70]

4.4.5.2 Bundling to Extend Network Effects

Microsoft Office offers a good example of how this effect works.[71] When a customer decides to upgrade from version 5 to version 6 of Word, all of the people who exchange Word files with that person will have an incentive to upgrade. (Otherwise, the person with the upgraded software will have to be especially conscientious about saving files in lower versions of Word and will have to refrain from using any of those features.) As a result, one person upgrading Word can have a ripple effect through an organisation.

So far, we have a network effect but no bundle effect. The bundle effect enters when the way to upgrade Word is via upgrading all of Office. Now, even though the person did not require an upgrade to Excel or PowerPoint, the customer will end up using the newer versions. That means that people who interact with that customer over Excel or PowerPoint will also have an incentive to upgrade. The upgrade of Office makes incompatibility issues much greater and, thus, helps seed the incentive for others to upgrade as well.

The bundle sale helps spread the upgrade contagion effect. An upgrade that may have only spread across a network of Word users now spreads across Word, Excel, and PowerPoint users.

4.4.5.3 Bundling to Deny Network Effects / Scale Economies to Entrants

Turning the previous argument around, bundling can also be used to deny network externalities to a rival. The general idea is that bundling is used as a way to deny rivals access to some large fraction of the market and thereby deny them minimum efficient scale.

This effect is explored in Carleton and Waldman (2002).[72] In a dynamic model, they emphasise how bundling can be used to deny scale to a rival. An example from Rob Gertner illustrates their argument.

Consider a resort hotel that includes meals as part of its package rate. As a result of this bundling, many fewer guests will leave the hotel to explore local restaurants. Consequently, there will be fewer restaurants that the local population can support. Given the few options that might exist, hotel guests will have even less incentive to explore. In fact, the local population might even choose to dine in the hotel, given the lack of variety in town. This further exacerbates the problem.

The hotel can create the start of a vicious circle by taking its customers out of the local restaurant pool. This would not be a problem if restaurants did not have some minimum efficient scale at which to operate. But, like most business, there are increasing returns over some range.

70 These issues are discussed further in the Mobile Telephones case study XIII in Part II.

71 We thank Professor Andrew Bernard of Dartmouth University for suggesting this argument.

72 Dennis W. Carlton and Michael Waldman, 2002, The Strategic Use of Tying to Preserve and Create Market Power in Evolving Industries, *Rand Journal of Economics*, Vol. 33 (2).

It is not clear that this is a profit-maximising strategy for the hotel. If potential tourists consider the package price of the room plus the food, it is not clear that getting rid of local competition will improve the hotel's profit opportunities. On the other hand, having a restaurant with a predictable and steady stream of customers can be profitable, even if it charges market rates.

The idea of denying rivals scale seems to be one of the motivations for tying or bundling. Thus, fewer firms will design plug-ins for Netscape if Microsoft can reduce Netscape's market share by including Internet Explorer as part of its Windows operating system.

A similar network effect often arises in cases of metering. For example, assume that the sale of a photocopy machine together with a service contract leads to the elimination of an Independent Service Operation market. Thus, a firm wanting to enter the copy machine business would also have to build out a service network. But the minimum efficient scale required for a service network might be much larger than that needed for copying machines.

Bundling can lead to the disappearance of essential complements markets and thus make entry harder. This is parallel to raising rivals' costs through vertical integration. In those cases, rivals may be denied access to parts or may find that they have to pay more, and there is less competition in the supply market.

The example of a photocopy machine sold with a service contract is typical of what we see in metering. Hence the issue of denying access to complements will be central to our discussion of metering.

4.4.6 TECHNICAL BUNDLING

The potential anti-competitive issues around technical bundling are well illustrated by the early 1980's case of IBM versus Transamerica.[73] The charge against IBM was that it had purposefully redesigned the interface between its CPU and peripheral tape drive systems so that the previously plug-compatible components sold by Transamerica would no longer work with IBM computers.

Prior to IBM's actions, these alternative peripheral suppliers had achieved success in the market by offering large discounts with equivalent or superior performance. When compatibility was lost, Transamerica (along with most of the other plug-compatible suppliers) lost millions and exited the market.

The natural justification for such a design change is that it is part of a product improvement. The courts generally found this argument persuasive. There was one exception:

> The district court found that IBM redesigned the [System 370 Model 115 and 125] to operate just short of the speed that would have enabled peripherals manufactured by PCMs to attach, and thus that the change unreasonably restricted competition. *Transamerica Computer*, 481 F. Supp. at 1006-08.

73 Transamerica v. IBM, U.S. Court of Appeals, 698 F.2d 1377; 1983.

No damages were awarded as IBM was not viewed as being a monopolist in this specific market and because peripheral sales for these devices were insignificant.

A monopolist can obtain control of the complements market by changing the interface, by delaying publishing interface information, or even by making it uncertain as to what its policy will be. For example, few people would want to finance a start-up whose future sales were entirely dependent on Microsoft allowing a smooth interface with Word or Windows. It seems all too easy to create an incompatibility in the name of a quality improvement.

This is an oft-repeated anecdote from the early 80's period of Microsoft.

> DOS isn't done until Lotus won't run[74]

Whether true or not, it highlights the difficulty of selling a product that competes with a firm that also controls the technological standards. Microsoft's first attempt at a spreadsheet program, Microsoft Multiplan, was a distant second to Lotus 1-2-3. While spreadsheets were an important complement that expanded the market for personal computers, there was still the basic question of who would capture that value. Lotus reduced Microsoft's ability to capture the value created by Multiplan and then Excel. While there are some long-term reputational issues to consider, Lotus had reason to be concerned that Microsoft would use its operating system to disadvantage Lotus.

It does not follow that monopolists will always have an incentive to force out these complementors. Imagine what would happen if in a new improved version of Windows, Microsoft made the operating system incompatible with HP printers. The likely result is that few people would accept this new system. Fewer still would upgrade.

Thus, to the extent that people want their products to be backward compatible with existing complements or peripherals, it is hard for a monopolist to engage in technical bundling.

The argument is less forceful on a going forward basis. Imagine that a new improved Microsoft operating system was incompatible only with HP's *colour* laser printers. For the sake or argument, assume that few customers presently own colour laser printers. Along with the upgrade, Microsoft introduces its new compatible colour printers.

Now, there is no installed base to protest. Customers may feel that Microsoft's limited compatibility will expose them to hold-up later on and therefore resist the upgrade. They may also be concerned that this move will lead to less technological innovation in the Windows peripherals environment, and therefore be less enthusiastic about the upgrade. But, in the end, most customers will accept the upgrade for other reasons (such as it can be preloaded on their new computer) and HP will be at a severe disadvantage in the colour laser printer market.

74 This phrase is quoted in the unofficial Gates biography by James Wallace and Jim Erickson, Hard Drive: Bill Gates and the Making of the Microsoft Empire, HarperBusiness; Reprint edition (May 1993).

As described in the Kodak case (see case study VI and Section 6.3), a firm that reduces the potential ex-post value of its system must compensate for this with an up-front discount, at least to the extent that customers can predict this effect. This suggests that firms with market power may not want to deny compatibility to well-established complements. But, there is little harm in preventing new complementors from getting established, especially those that might have market power in the future. If the complement business is competitive, then the firm with market power does not have to worry about sharing the pie with the complementors. But, if the complementor also has market power, then the complementor can compete for a share of the profits.

It would not be correct to conclude that a monopolist prefers to have no complements. Microsoft would not have much of a pie were it not for Intel. The right conclusion is that a monopolist might be willing to delay the onset of a complement (or to accept a slightly inferior version) if by doing it itself, it could avoid having to share the pie.[75]

Thus, Microsoft offers an audio player, MS Audio 4.0, that complements its operating system. This program competes with the complement provided by Real Audio. If Microsoft did not have an audio player option, it would be in their interest for Real to exist. But once they have a comparable product, then there is much less advantage in having competition.[76]

If all consumers were interested in the audio complement, then Microsoft could capture all of the increased pie by raising the price of the operating system. But, if only 25% of customers see the audio as being worth £10 and the other 75% think it is worth nothing, then Microsoft cannot capture this gain through an increase in the price of Windows. If it has to compete with Real Audio, then the price might fall (to zero) and customers end up the beneficiary. If Real Audio is no longer compatible, then Microsoft alone has a claim to the £10.

At this point, we have illustrated the motivation for technical bundling. This can be done through physical product integration, through incompatibility, or even through delays in publishing interface information. The problem is real but there is no simple remedy. (We see this in the conflict over open standards for AOL's instant messaging service.)

Technical bundling is a symptom rather than a cause. A firm facing competitors will not want to engage in this type of technical bundling unless it truly leads to product enhancements that outweigh the loss in diminished complements. The law can offer some protection and this may eliminate the more egregious behaviour, but we should not expect that enforcement will be easy.

4.4.7 BUNDLING AS A COMMITMENT TO FIGHT ENTRY

We return now to a discussion of the economics literature on bundling as an entry deterrent. Whinston (1990) is an important paper as it was the first to recognise that a firm with market power in several products might be able to leverage them in a way that protects

75 For the most part, the pie gets shared with customers, not the other complementor. As the complementors compete for business, prices fall and customers get the surplus; see discussion of Real Audio that follows.

76 There are some dynamic arguments that suggest that there will be better complements in the future due to competition.

its position. We have not emphasised his result in this report because it requires a commitment to a bundling strategy, and such a commitment is hard to achieve.

The basic insight is that the incumbent firm commits itself to selling its two goods, A and B, only together. Since the two goods are sold together, an attack on one is an attack on both. In Whinston's model, if an entrant were to get any B customers, the incumbent would lose all of its A customers. This is because, in his model, all customers have the same extra value from getting a bundle with A. Thus, in a second-stage pricing game, the incumbent has a great incentive to price the bundle low so as to preserve the value it creates in the A market. The end result is that firm 2 finds it hard to beat the A-B bundle and chooses not to enter the market.

Bundling does not help the incumbent defend itself once the entrant is in the market - quite the contrary. However, this weakness is turned into strength as an entry deterrent.[77] The only way that the incumbent can earn any money is to ensure that the entrant makes zero sales. Even an entrant with a cost advantage or superior product in B is deterred, as the incumbent uses its value in good A to cross-subsidise the B good in the bundle and, thereby, deny the entrant any sales.[78]

This approach requires the incumbent to make a credible commitment to selling its products only as part of a bundle; if entry occurs, the incumbent would prefer not to bundle.

Credibility is not an issue in our earlier approach because the incumbent's post-entry profits are higher with a bundle than without. This is because we allow for heterogeneity in consumer values of A.[79] As a result, the entrant can take a small number of customers without threatening all of the incumbent's sales.[80]

4.4.8 BUNDLING AND R&D INCENTIVES

A commitment to bundling also changes an incumbent's incentives to innovate, as shown by Choi (1998) and Choi and Stefanadis (2001).[81] Bundling gives the monopolist a greater incentive to engage in cost-cutting R&D and, thus, helps preserve and extend its advantageous position.

77 There is the old saying: My enemy's enemy is my friend. In a two-stage game, weakness in the second stage often translates into strength in the first. When the post-entry market is more competitive, then there is less incentive to enter the market (see, for example, Bernheim (1984)).

78 Following Whinston (1990), imagine that the incumbent can produce A at a cost of 0.20 and all consumers value it at 0.50. Both the rival and the incumbent can produce good B. The rival has a cost advantage - its unit cost is 0.10 while the incumbent's unit cost is 0.30. The customers' values of good B are uniformly distributed over [0, 1]. With independent sales, the price of B would be driven down to the incumbent's cost of 0.30 and the lower-cost rival would expect to earn a margin of 0.20 on sales of 0.70. In contrast, if the incumbent sold A only as part of an A - B bundle, then the rival would be willing to price down to 0.10 before conceding the market. Thus the incumbent would be led to sell the bundle at a price of 0.60 (the 0.50 valuation for the A good plus the 0.10 matching the rival's price). It would use 0.20 of the surplus it generates in sales of A to subsidise its cost disadvantage in B. If it didn't make this subsidy, it would make no sales at all. The end result is that the entrant would not be able to attract any customers and, anticipating this, would not enter the market. This argument also illustrates why commitment is required. If the incumbent could debundle following entry, it would forfeit the B market but make higher profits by just selling good A at a price of 0.50.

79 Whinston also considers the case in which there is heterogeneity in the valuation of A. He finds that a high dispersion in the value of good A and a low differentiation in B goods are necessary for bundling to raise the entrant's profits.

80 Secondly, the entrant does not have a cost advantage in B and so the entrant is not forced to cross-subsidise the bundle price. Of course, in Whinston's model if the incumbent does not have a cost disadvantage in B then it can fight the entrant better when the goods are sold independently. Therefore, there is no gain from bundling.

81 Jay Pil Choi, 1998. "Tying and Innovation: A Dynamic Analysis of Tying Arrangements," Columbia University working paper; Jay Pil Choi and Christodoulos Stefanadis, 2001, "Tying, Investment, and the Dynamic Leverage Theory," *Rand Journal of Economics*, Vol. 32, No. 1, pp. 52-71.

The general idea here can be seen through an example. Imagine that a monopolist incumbent in market A commits itself to sell good A only through an A-B bundle. By the Chicago School argument, this will cost it sales and, thus, not be a profit-maximising strategy in the short run.

However, this bundling strategy has created a much bigger incentive for the firm to engage in R&D. Since the firm now needs to sell B in order to earn its monopoly profits on A, it becomes imperative for the firm to reduce the product cost of B. Other firms in the market will appreciate the fact that the monopolist has much bigger R&D incentives and, thus, they will back down or even give up.

Take the case where a £1 investment in R&D will lead to a £1, £2, or £3 savings per unit of production, each with a 1/3 chance. Initially the incumbent and the rival in market B have identical costs, say £5 per unit.

Although the investment would seem to offer a sure return, we must take into account the effect of competition. If both firms reduce their costs by the same amount, then these efficiencies gains are competed away and the firms do not earn back the cost of their investment. The way to make money on this investment is to achieve more cost savings than a rival. At least, that works if the rival does not bundle.

In the case where good B is sold on its own, the incumbent and its rival compete head to head and the firm with the lower cost will make all the sales. There is a 1/9 chance that the incumbent firm will find a £3 savings, while its rival achieves only a £1 savings, leading to £2 of profits. There is another 2/9ths chance that the incumbent will end up with one pound more savings than its rival. Thus, the expected return on this investment is (1/9)£2 + (2/9)£1 = £0.44.

Now compare this to the case where the monopolist is committed to selling in the B market (as this is the only way for it to earn its monopoly rents on good A). Since the rival firm will make no sales, it earns a zero return on R&D. As for the monopoly, any cost savings in B flow directly to the bottom line. Thus the expected value of R&D to the monopolist is (1/3)*(£1+£2+£3) = £2.

The monopolist's gain to R&D is more than four times larger when B is sold as part of a bundle. In contrast, a rival's gain form R&D fall to zero.

This example is extreme in that we have assumed that the monopolist will always sell in the B market no matter how large its cost disadvantage and that the rival B firm will not be able to make any sales to customers who only value B. Choi (2002) generalises his early results to include these cases. Still, the larger point remains. If a firm puts itself in the tough position of having to sell something no matter what (or at least almost always), then it is sure to reap the gains of R&D. This is not something a competing firm can duplicate, as, without the commitment device, the competing firm will expect to reap the rewards of R&D only when it is the low-cost producer in the market. And going against a firm, the situation is even worse, as even if the rival does have lower costs, it may not get to make the sale.

The dynamic effect of all this is to promote R&D by an incumbent monopolist and discourage such investments by rivals. Over time, this can create a profitable situation for an incumbent. Thus, while the initial tying was not profitable, the effect it has on the dynamic play of the game makes up for the initial loss.

It is worth emphasising that this result depends on one critical assumption, namely that the firm is committed to selling its monopoly product only along with good B. This commitment is critical; otherwise, the firm would prefer to free itself from the yoke of its inferior position with good B.

It is not clear that we see many examples of this strategy in business practice. For this theory to be applicable, the incumbent monopolist must sell its monopoly good only as part of a bundle and the bundled good must have competition. The one case that comes to mind is Microsoft Explorer being sold with Windows. Microsoft has a monopoly on Windows and faces competition on Explorer. But there are at least two problems with this application. One is that customers can also use Netscape Communicator even if their computer came with Internet Explorer. This is particularly relevant, as the stand-alone price of Netscape is zero. Hence, Microsoft is not really committed to selling Windows only to people who use Explorer. Second, in this particular case, the marginal cost of both programs is close to zero.[82] Thus, it is not clear that Netscape has less of an incentive to engage in R&D due to Microsoft's tying strategy, compared to a strategy where Microsoft simply gave away Internet Explorer, which is the predicted outcome based on price competition.

In summary, we think the approach is quite correct in its focus on the dynamic effects created by bundling and tying. But we are not convinced that this particular framework explains why bundling will give firms a dynamic advantage through greater incentives to engage in R&D.

4.4.9 BUNDLING AS A WAY TO OBSCURE PRICES

We have, so far, emphasised how bundling can be used in the game against rivals. It has also been used in the game against consumers, as bundling can help a firm obfuscate its pricing. Prices are obscured because consumers do not always comprehend the relationship between the bundle price and a price for each component.

In some cases this is a legitimate activity and in others it is nothing more than a game of "bait and switch", baiting the customer with an attractive price which is not really available. In this case, the activity should be prevented, but the prohibition should fall under the auspices of consumer protection rather than antitrust.

82 Even so, the programs can be profitably sold at a zero price due to fees paid by search engines or for placement on the default home page.

4.4.9.1 Microsoft Office and PowerPoint

The pricing of Microsoft Office illustrates obfuscation rather than bait and switch. When Microsoft first introduced PowerPoint, it was far from an industry standard. At the time, Harvard Graphics had a commanding market share. Microsoft added PowerPoint to its Office bundle while keeping the stand-alone price of PowerPoint high. This served several purposes. Consumers had the perception that they were getting something of high value as part of the bundle. If PowerPoint had a stand-alone price of $19.95, customers would have rightly wondered about the quality of the product. Thus, the use of a bundle allows a firm to introduce a new product to consumers at a great discount, without revealing the scope of the discount. Since no one buys the product at list price, it is hard to know what the market price would be absent the bundle.

4.4.9.2 Travel Agents and insurance

The case of vacation holidays and insurance is more worrying. In the U.K., it was commonplace for vacation travel operators to include insurance as part of a getaway package. The problem was that many of these agents did not include the cost of this insurance in their advertised price.

It is not too surprising that the insurance was priced well above market rates and was used to subsidise the below-cost travel. For companies that did not play this hidden pricing game, it would appear that they were charging above-market prices in their advertisements.

At one level, the solution to this problem was simple. Travel agencies were required to sell any product advertised at that price without the need to buy any ancillary products. Thus if a firm advertised a £19 holiday to Spain, it would be required to sell this item even if the customer did not buy insurance. The travel agent could require that the customer have insurance, but the customer would have to be free to purchase that insurance elsewhere. Travel firms could also continue bundling insurance with their travel but they would have to advertise the fully inclusive price.

The travel insurance case is discussed at greater length in case Section XI of Part II. It should be clear from this short presentation that the problem here is more due to false advertising than to bundling. The good news is that there is a simple remedy, which has been implemented. The bad news is that a review of travel agents' pricing in 2002 suggests that insurance is still overpriced. Although consumers are no longer required to purchase overpriced insurance, many of them still do. Consumer protection laws can stop firms from using bundling to create deceptive prices, but it cannot get consumers to be better shoppers.

5 Policy Recommendations for Bundling

The appropriate antitrust response to bundling will depend on the specifics of the case. Here we suggest some guidelines based on the motivation for bundling.

If the motivation for bundling is price obfuscation, this is really an issue better suited to consumer protection agencies than antitrust authorities.

We focus our attention on how to respond to cases where bundling may lead to a competitive advantage.

As discussed in the previous section, there are several ways that bundling can create an advantage. We start with the Cournot effect. In an environment in which the Cournot effect exists, what should be the antitrust policy toward a merger of two producers of complements, each with market power?

At first blush, the answer would seem to be nothing. Prices fall.[83] Social welfare is typically higher. Consumers gain and competitors lose. This is not the arena for antitrust authorities to get involved.[84]

But antitrust authorities may be concerned that the long-run impact of the combination could be to put competitors out of business. Similar to a predatory pricing case, once the competitors were either hobbled or vanquished, the merging firm would have even more power to raise prices, and then social welfare would fall.

Unlike the typical predatory pricing case, recoupment might or might not be an issue. Depending on the parameters and setup of the model, the combining firms might actually make money in the process of putting their rivals out of the market.

Following this line suggests a several-part test - an extension of one developed by Professor Carl Shapiro to evaluate bundling in the context of the GE-Honeywell merger and by the Department of Justice to evaluate portfolio effects.[85]

83 With pure bundling, we expect all prices to fall. With mixed bundling, the price of the items sold individually will typically rise. This means that some consumers will win while others will lose. Aggregate consumer welfare typically rises, but the gains are smaller.

84 While the European law is concerned with market dominance, the economic rationale would be a concern about high prices. Here the problem is with low prices. The European law does not seem to take efficiencies into account that might lead to lower prices (Schmitz 2002).

85 The Shapiro test was presented to the Merger Task Force. The DOJ guidelines are described in a report submitted to the OECD roundtable on portfolio effects in conglomerate mergers, DOJ (2001).

1. Is there an incentive to bundle?
    a. Under what circumstances does the combined firm earn higher profits through a bundled pricing strategy?
    b. Did either firm have an opportunity to bundle prior to the combination? If so, is there evidence that bundling is a common practice in this industry?
        (i) If we see bundling, then what is the marginal impact of increasing the potential scope of the bundle?
        (ii) If we do not see bundling, then how do the opportunities created by this combination create a different incentive to bundle?
2. What is the immediate gain to consumers from lower prices?
    a. How much do we expect prices to fall due to bundling?
3. What will be the impact on competitors?
    a. How much will competitors' prices fall?
    b. What will be the shift in share?
4. How long do we expect these lower prices to persist?
    a. How long do we expect the rivals will be able to hold out?
    b. Are rivals sufficiently close to exiting the market that this will tip the scales?
    c. Are there large customers with market power that have an incentive to keep multiple firms in the market?
5. If the rivals exit, what is the expected harm?
    a. Will other firms be able to enter the market?
    b. Will large buyers be able to hold prices down?
    c. Or, if prices rise, what is the expected damage?

In short, there are immediate benefits to the combination. How long can we expect these benefits to last? How likely and how big is the potential harm? Or, even simpler, what is the present value of the net expected change in social welfare from allowing the combination?[86]

5.1 Learning from Vertical Integration

At first glance, it might seem that the issues raised by the merger of two complementor firms are novel. We have a case where prices fall. However, these same issues arise in the case of a vertical integration. Thus, we can use the insights gained from the antitrust literature on vertical integration to help inform policy.

86 If we apply this approach to the GE-Honeywell case, the Commission stopped at the first step. Even if bundling were to threaten the long-term viability of competitors, no analysis was made of the tradeoff. Properly discounted for time and the fact that the outcome is uncertain, was there an argument to be made that the net present discounted value would be negative? The Commission made a recommendation against a merger that, by its own account, was expected to lower prices without demonstrating that the expected long-run harm would outweigh short-term gains.

To see the analogy, we note that vertical integration eliminates double marginalisation. The mathematics of this analogy are presented in Appendix A. In the case where both firms are monopolists in their stage of the industry, the price effects are unambiguously good: consumers get lower prices and firms make higher profits. This is because the integration eliminates a pricing inefficiency of a monopoly.

We could also consider the case where the integrating firms each have competitors. It would then follow that the integration would give these two firms a pricing advantage over their rivals. They would gain market share. Whether or not the end result would lead to higher profits would depend on the expected equilibrium response of the competitors. In short, we would ask all the same questions as arose in the example of the Cournot effects in an oligopoly. (We would also want to know whether the firms paid a fixed or negotiated price.)

This leads to a curious question. Typically, the elimination of double marginalisation is viewed as an efficiency-enhancing aspect of a vertical merger. Why is the same not true of a horizontal merger of complements? Or, turning this around, why is there not the same concern that in an oligopoly, a firm that completes a vertical merger will have an advantage over non-integrated rivals who will have less efficient pricing? Since the effect is the same, the treatment should be the same.

Our general view is that antitrust policy towards horizontal mergers of complements has much to learn from the better-developed literature on vertical integration. (In the spirit of symmetry, the learning could go both ways. Our understanding of the issues in vertical integration may be informed by insights from the horizontal theory of complements and bundling.)

5.2 Remedies

When the net impact of some conduct is negative, the next step is to look for remedies, either structural or behavioural, that would solve the problem. In the case of bundling a simple behavioural remedy presents itself. The firm can commit itself not to bundle.

When it is the case that the potential to engage in bundling is what concerns the antitrust authorities, the fact that the merging parties would agree not to offer bundle discounts should signal that this was not an important element of their incentive to merge. And since it was the bundling behaviour that had the potential to lead to dominance, without bundling there would be no dominance.

A no-bundle discount policy is straightforward. A firm can do that by having to provide an itemised breakdown of the package price, giving a price to each component in the package.[87] The individual prices must add up to no more than the bundle price.

87 This itemisation requirement could be applied to posted prices or prices offered as part of a negotiation.

A bundle only works if it is offered at a discount to the components. A firm need not be regulated on what it can charge for each item. It can charge whatever it would like for components and for the bundle just so long as the combined price of the components is not more than the bundle.

In the GE-Honeywell case, the Commission rejected this approach based on its preference for structural over behavioural remedies. Yet this particular behavioural solution does not appear hard to monitor or enforce. If the component elements of a firm's bids are not itemised or add up to more than the package total, that would be an automatic violation.

We recognise that enforcement is not trivial. Because prices are negotiated, not posted, the buyer would have to provide the evidence that the seller was trying to employ a bundle. The buyer would have an incentive to do this if it wanted to purchase only some of the items in the bundle and still get the discount. If the seller refused to extend the discount to each item, this would be a violation of the no-bundling agreement. However, a buyer that brought such an action might find itself in a difficult position in its next negotiation with that seller.

The no-bundling agreement might be difficult to enforce for a second reason: the incentive to bundle might come from the buyer rather than from the seller. In an attempt to get a larger discount, the buyer might say that it will agree to buy both goods A and B if the seller offers a better price. If the seller agrees, neither party has an incentive to report this result to the authorities.

5.3 Policy Options for Variety Bundles

Our review of the Aspen ski case has illustrated how a firm can obtain an advantage over its rivals by offering a variety bundle. One solution to this problem is to ban the bundle. But this remedy has the unfortunate side effect of making consumers worse off. Thus, we look for an approach that provides the efficiency gains of the variety bundle without causing the exclusion effect to firms left out of the bundle.

An approach that will work in some circumstances is to allow other firms to participate in the bundle offering on equal terms. In the case of the ski ticket, Aspen Highland would be allowed to participate in a four-mountain pass. Its share of the revenues would equal its proportion of skiers. This could be measured using bar code scanners on ski passes.[88] Under this system, the different mountains have an incentive to compete for skiers. But, almost by definition, the firms would be allowed to coordinate their pricing. This is not so much a problem in the Aspen case as the four Aspen mountains compete with Vail and other resorts and thus there is a limited ability to raise price.

88 There are also low-tech solutions to revenue sharing. A seven-day all-mountain pass could allow the skier a preset (and required) number of days at Aspen Highlands. The pass could have dots and squares to be punched, and the buyer would specify upfront how many dots (for Aspen) and squares (for Highlands) were desired.

The problem is where one draws the line. Can Aspen and Vail create a two-resort pass to give Colorado an edge over Utah resorts. Can Colorado resorts get together with Utah resorts to compete against the Vermont and Maine pass? How do we balance the gain to consumers from increased variety with the potential decrease in price competition?

These issues become even more complicated when the pass ticket combines variety and unlimited use over an extended period. An unlimited season pass changes the person's incentive to explore other resorts as skiing is free where the pass is honoured and costly elsewhere. This effect is especially pronounced when the pass offers significantly more capacity than the consumer can use.

To illustrate this issue, we use the recent practice of the movie cinema season pass. Such passes have been introduced in France and the U.K. In France, unlimited ticket plans are offered by UCG in Paris and rival chain Pathé in Nantes.[89] In London, Virgin Cinema chain first offered a 4-week pass for £15 or an 8-week pass for £25. After Virgin cinemas were sold to the French company UCG, the two short-term passes were replaced by an annual pass priced at £19.99/month inside London and £9.99 elsewhere.[90] For just under £120, a customer is allowed to see as many movies as he or she wishes for a year.

For many moviegoers, such a pass is a great deal. Compared to the typical single ticket, pass holders save money if they go to more than two movies a month. The movie cinema profits can rise due to increased concession stand sales and by capturing a greater market share.

The unlimited ticket pass makes it more difficult for a rival cinema with only a few screens to enter or compete in the market. For the customer with a UCG pass, the marginal cost of seeing a movie at a UCG cinema is zero. In contrast, the customer has to pay full price at the rival cinema. Thus the comparison is no longer whether the customer prefers movie A or B. The comparison becomes whether the customer prefers movie A for free versus movie B at full price.

Of course, if movie B is good enough and only a few cinemas offer passes, then the rival theatre will still be able to draw a sufficient crowd. But if the movie pass becomes standard industry practice, new cinemas will find it hard to attract customers. Firms with the largest number of screens or locations will have a significant advantage over smaller rivals - a larger advantage than at present.

For simplicity, imagine that UGC has 5 out of the 8 movie screens in a city. A customer who would normally see two movies a month would be expected to see 15 movies at UCG and 9 at rivals. If this customer is attracted by the unlimited pass, then the customer might see 30 movies at UCG and 3 at rivals. The unlimited pass increases UCG's revenue from this customer as well as UCG's market share of this customer's cinema consumption.

89 See *TIME Europe*, August 21, 2000, Vol. 156 No. 8, Just the Ticket.

90 More precisely, the pass is purchased on a monthly subscription basis with a one-year minimum.

A customer who was seeing four movies a month would find the unlimited ticket even more attractive. Prior to the pass, this customer would on average have seen 30 movies at UCG and 18 at rivals. With the pass, this customer might go to 50 movies at UCG and 10 at rivals. In this case, UCG loses some ticket revenue, but overall profits could still rise dues to increased food sales at the concession stand. Rivals cinemas lose both ticket revenue and concession sales.

The immediate impact on customers should be positive. An additional pricing option leads to more choice. High-volume customers get a price discount and lower-volume customers are offered a pricing scheme that more closely reflects marginal costs. The potential problem is that equally efficient firms with fewer screens may find it difficult to compete on the pass option. Customers are unlikely to buy multiple unlimited passes and the firm with the most variety will be able to offer the most attractive pass option. As we saw in the example above, rivals will find it hard to compete on à la carte offerings for customers who have bought a season pass.

This set of concerns led UCG's rivals to ask France's competition authority (Conseil de la concurrence) to prohibit the pass option.[91] Their initial decision was to permit these type of passes to be sold.

This type of question is a preview of what is to come. The music industry is likely to move to an unlimited subscription model. This should raise consumer welfare, especially for high-volume consumers. But the long-run impact on competition and entry is worrisome. This is especially true when the passes cover a greater fraction of customers, extend over longer time periods, cover a greater number of locations, and are exclusive to a leading firm or group of firms.[92]

Requiring the passes to be open to all firms is not an ideal solution. Even if the firms would divide the revenue in proportion to utilisation and thus still compete for customers, it would seem to require all of the participating firms to coordinate on the pricing of the unlimited ticket.

Another potential solution goes in the opposite direction. Instead of encouraging rivals to form a competing pass, a seller would be required to restrict the unlimited pass to a single location, rather than the entire chain. Although this would diminish the value to consumers, it would also reduce the advantage created by having a multi-location cinema group. A one-location entrant could still compete for the season pass market if it had a reasonable number of screens.[93]

91 The issues were complicated by the question of how to allocate the 11% levy on movie ticket sales that subsidise the French movie industry. There was the further concern that this pricing scheme would lead to a decline in arthouse-style movies; if profits were all coming from concession stands, this would lead to more 'popcorn' flicks. See *TIME Europe*.

92 Extending the duration makes it harder to compete as there are fewer customers who can switch or opt-out at any point. With a one-month pass, customers might take a one or two week breather to catch up on alternative films before returning to the pass. This option essentially disappears with a one-year sign up period. A shorter subscription period also allows for more frequent opportunities for rivals to regain lost customers. Although we might consider requiring the minimum signup period to be three or six months, the pricing of the short-term pass might well lead nearly all customers to sign up for the full year, anyway.

93 Richard Zeckhauser suggests an alternative. The pass could be limited to a maximum number of screens. Thus it could cover one location with ten screens or two locations, each with five.

This example also illustrates the need to consider the implications of an industry practice separate from whether it is being done by a dominant or leading firm. Even if the market does not have a dominant firm, an industry-wide move to unlimited ticket pricing has the potential to make the industry less competitive in the future.[94] Indeed, in these cases, the causation can go in the other direction. It is these practices that lead to the formation of a dominant firm.

5.4 Policy Options for Bundles as an Entry Barrier

The bundle discount strategy that leads to an entry barrier is similar to the bundle discount strategy that leads to the elimination of double marginalisation. Yet the mechanism of action is quite different. In the entry barrier story, the two goods need not be complements. Customers can and do value the two goods individually. The way that the incumbent makes entry difficult for a single-product firm is by holding consumer surplus hostage on the other good. Customers who really value the other good will not defect to the entrant. This limits the entrant to customers who like its good and do not have a high value for the other goods in the bundle.

In these cases, one solution is to limit the extent of the bundle discount. That limit might be zero, in which case the firm must offer each part of a package at prices that add up to the package price. It might be ten percent - so that the component prices add up to no more than ten percent more than the package deal. The greater the discount, the more difficult it becomes for a single entrant to compete. The obvious problem is that eliminating discounts leads to a price increase for consumers.

What we would like is for an entrant to be able to use the incumbent's other good to form a competing bundle. Thus, a firm with an improved version of Word would be able to sell it as part of a package with Excel and Powerpoint. The proposed solution is similar to the remedy employed in the Aspen Ski case. But we do not want to be in the position of having to regulate how the revenue sharing would work. Nor do we want to be in a position to regulate prices. The limitation on a bundle discount is an intermediate step. The firm can set any prices it wants, subject only to the constraint that if the customers were to purchase all of the items on an à la carte basis, the total cost would not exceed some pre-specified percent more. In this regard, the 60% price premium for buying the components of Microsoft Office is an example in which the bundle discount seems high.[95] The goal would be to bring down the pricing of the individual components and not to raise the price of the Office bundle. We think this would be the likely outcome, as the vast majority of sales are of the software suite and not of the individual components.

94 When a dominant firm uses these practices, the anti-competitive effect is compounded. At one point, Microsoft sold hardware manufacturers the equivalent of a movie pass to its operating system. The hardware makers paid a single negotiated price to Microsoft, independent of how many Microsoft operating systems they sold. Microsoft turned the marginal cost of its operating system to zero for the reseller. This made it even harder for others to compete.

95 The pricing specifics of Microsoft Office are described in more detail in the "Bundling and the GE-Honeywell Merger" case study.

6
Tying and Metering

6.1 Introduction

The goal of metering is to charge the customer a price based on his or her use of the product. Metering can be done directly or through a tied sale. Under direct metering, the customer is charged a per-use or metered fee that is typically linear but may take other forms. For example, a taxi meter often has a fixed charge for the first distance and then a linear charge thereafter. Under the tied sale, the metering is based on the use of a related product, as is the case with printers and toner cartridges. The toner cartridge usage provides a good indication of how many copies have been made. Note that the tied sale can be implicit rather than explicit. In the case of a toner cartridge, the shape of the cartridge is patented. Thus, consumers are not forced to purchase a toner cartridge along with the printer. Rather, competitors are not allowed to sell compatible cartridges.[96]

More generally, a tied sale is a dynamic form of bundling. The seller requires the customer to purchase a specific second good along with its primary product. The classic antitrust case involved IBM requiring its computer hardware customers to also purchase its punch cards. Such explicit tied sales are rare, as tying is *per se* illegal in the United States. Even so, firms are often able to achieve the same outcome without the explicit tying contract. Tying can be used as a means to meter, but this is not its only potential use.

6.2 Three Reasons to Tie

Broadly speaking, there are three potential reasons why we see tied sales: (1) Preservation of Quality; (2) Price Discrimination or Metering; and (3) Leveraging Market Power. The court decisions have focused on market leverage, while we find the first two explanations more compelling. To the extent that tying is used to leverage market power, we find that the problem is more likely that of entry deterrence rather than monopolisation of a second market.

Firms may be motivated to tie for reasons related to quality and/or safety. For example, if the machine breaks down or the end result fails, the seller will suffer a loss of reputation. Thus, the firm needs to specify other inputs in order to ensure proper results.

A second reason to employ this type of tying is to engage in price discrimination. If the customer's value of the product is positively related to his or her intensity of use, then it will typically be possible to extract more consumer surplus through a two-part pricing scheme. The consumer pays some reduced initial price for the product plus a per-use

96 In Section 6.7, we discuss the issue of refilling used cartridges with ink.

fee. This allows the firm to charge more to high-value customers, while still making sales at lower prices to low-value customers. We illustrate how this works in the case of a photocopy machine in Mathematical Appendix B. When tying or metering is used to engage in price discrimination, there are questions as to whether this is welfare-increasing (the common wisdom here is misleading) and whether it leads to an abuse of market power.

Third, there is a question of whether firms can use their market power in one good to create a second monopoly position. We are generally sympathetic to the Chicago School argument on this point. While the theory for this position is often weak, this is the issue that has been the centre of attention for the courts. Indeed, we find that there is a greater concern that the act of tying will serve to protect the market power in the original market rather than create market power in a second market.

We will consider these three explanations in more detail. The quality and price-discrimination motivations are well understood. Because the idea that tying may lead to enhanced market power or entry deterrence in the original good is a subtle and less well understood argument, we begin with this question.

6.3 Tying and Entry Deterrence

Here we explore how the tying of one good to another reverberates back into the market where the firm has power. For example, if the tying arrangement leads to exit in the tied-good market, this, in turn, may reduce the possibility of entry in the original market.

Entry deterrence may happen for at least two reasons. Either the likely entrant would have come from a firm in the tied-good market, or the loss of competition in the tied-good market becomes a form of raising rivals' costs. Entry is deterred if the tied good is an essential complement to the original product and is no longer available (or is available only at a much higher cost) to a potential entrant.

Let us illustrate this using the example of photocopiers as the original market. If the tied good is paper and we think of paper as a well-developed market, then we may not be concerned that the tying of paper to a photocopier will lead to exit in the paper market. Nor would we typically expect that a paper maker would be a likely entrant into the photocopier market.

The situation is a bit different if the tied good is a service. Now the tying of photocopies to service might well induce independent service operators to exit the business. While this might not cause any immediate antitrust harm (see discussion in Kodak case, Part II, Section VI), the lack of Independent Service Operators could make entry much more difficult for a potential competitor to Kodak (as the firm would need to build a national service operation as well as a copying machine).

Entry deterrence can also arise more directly. An independent service firm might use its expertise in photocopier service and repair to design a new machine and thereby compete with Kodak. Thus, elimination of independent service providers is a way to deter potential entrants.

This scenario becomes more compelling when applied to Microsoft and Netscape. Here, the PC operating system is the original market and an Internet browser is the tied market. Microsoft's tied sales made it more difficult for Netscape to compete in the browser market. Even if consumers were no worse off for the loss of competition in the browser market, they may have lost one of the few potential entrants who could have challenged Microsoft's market power in the operating system market. Indeed, this issue of using tying to deter entry was central to the U.S. antitrust case against Microsoft.

With this understanding of one of the motivations for tying, we look back at some of the early American antitrust cases on tying.

6.4 History of Metering and Tying

Beginning with Bowman (1957), it has long been understood that metering can be a useful price discrimination tool.[97] In fact, at first glance it would seem that most of the early tying cases were much more about metering than about monopoly extension. But the courts found otherwise.[98]

In 1917, Motion Picture Patents had required customers who wanted to use its patented movie projector to purchase its film. When this practice was challenged, the court refused to enforce this contract.[99]

In 1931, Carbice had developed a patented refrigeration container, the sales of which were tied to the use of its dry ice. Again, when other dry ices were used with Carbice's packaging, the courts refused to enforce the tying contract.[100] In the decision Justice Brandeis wrote: "[C]ourts deny relief against those who disregard the limitations sought to be imposed by the patentee beyond the legitimate scope of its monopoly."[101]

In 1938, the Barber Company brought a lawsuit against Leitch Manufacturing.[102] Barber required customers of its patented process for paving cement roads to also purchase its bituminous emulsion. Barber sued to prevent Leitch Manufacturing from selling its competing emulsion to contractors employing Barber's system. The court refused to enforce Barber's contract.

In the decision, Justice Brandeis reinforced his Carbice ruling: "[E]very use of a patent as a means of obtaining a limited monopoly of unpatented material is prohibited."[103]

Perhaps the most famous tying case was decided in 1942, when Morton Salt was challenged for its requirement that customers of its patented salt dispenser only use Morton salt tablets. In this case, a rival firm produced a machine that violated the patent on Morton

97 Bowman, Tying Arrangements and the Leverage Problem, 67, Yale Law Journal, 19, 21 (1957).

98 The arguments in this section have been shaped by Troy Paredes, "Copyright Misuse and Tying: Will Courts Stop Misusing Misuse?," 9 High Technology Law Journal 271 (1994) and Louis Kaplow, "Extension of Monopoly Power Through Leverage," Columbia Law Review, Vol. 85, 1985, pp. 515-556.

99 Motion Picture Patents Co. v. Universal Film Co., 243 U.S. 502, 518 (1917).

100 Carbice Corp. of Am. v. American Patents Dev. Corp., 283 U.S. 27, 32 (1931).

101 283 U.S. 27 (1931) at 32.

102 *Leitch*, 302 U.S. at 460.

103 *Leitch*, 302 U.S. at 463.

Salt's machine. But the defendant ultimately won the case by appealing to the argument that Morton had abused its patent through the forced tie of its salt to the dispenser.

The common theme of these rulings is that the purpose of the tying practice was to extend the firm's monopoly to the tied market and, as such, was an abuse of its patent. Does it seem reasonable that commodity products such as salt or dry ice would be monopolised? It seems much more reasonable that the purpose of the tying contracts was to engage in price discrimination or metering.

The idea that Morton was trying to monopolise the salt tablet market is difficult to reconcile with the fact that the Morton tying contract allowed its customers to purchase salt tablets elsewhere if they were able to obtain a lower price.[104] This price protection clause is also difficult to explain in the context of metering, as the firm has to charge a price premium in order to earn money on the tied good. However, if there are economies of scale in production of the salt tablet, then this contract could help Morton establish scale economies and profits.

It is also quite curious that if metering was the intended purpose of the contract, this argument rarely has been used as a justification of the conduct. According to Kaplow (1985), the argument that the tied product sale is used as a metering device has only been made twice by defendants and then only in summary fashion. "This alternative explanation has not appeared in a Supreme Court brief in the past 63 years. In United Shoe Mach. Co. v. United States, 258 U.S. 451 (1922), counsel for the appellant-defendant allocated one clause of a single sentence in a 1,562 page brief to the proposition that the tied products might serve as a meter to measure the use of the tying product." [105]

Kaplow's review of these cases finds three reasons given by defendants to support tying: (1) Protection of goodwill, preservation of reputation; (2) Profits to finance R&D; and (3) Creating or exploiting economies of scale.

The protection of goodwill and reputation is a clear and easily understood explanation. The idea that tying creates profits to finance R&D or creates economies of scale is more difficult to explain while still maintaining that the firm was not trying to monopolise the tied-good market. How is it that the firm earns additional profits in the tied-good market?

The way the court decision was written, it would appear that the primary concern was whether or not the tying action had been used to disrupt competition in the tied-good market. The court viewed the question before it as whether it "will lend its aid to protect the patent monopoly when the respondent is using it as the effective means of restraining competition with its sale of an unpatented article."[106] The Court decided not to protect the patent as "respondent is making use of its patent monopoly to restrain competition in the marketing of unpatented articles... and is aiding in the creation of a limited monopoly in the tablets not within that granted by the patent."[107] As a result, the Supreme Court allowed the patent to be infringed upon without awarding damages.

104 See Louis Kaplow, "Extension of Monopoly Power Through Leverage," Columbia Law Review, Vol. 85, 1985, pp. 515-556. 322 U.S. at 394, n.5.

105 Kaplow, n. 121.

106 *Morton Salt*, 314 U.S. at 490.

107 Troy Paredes, "Copyright Misuse and Tying: Will Courts Stop Misusing Misuse?" 9 *High Technology Law Journal*, 271 (1994).

But was it reasonable to conclude that Morton's tied sale of salt tablets would create a second monopoly in the market for salt?

It is reasonable to ask why firms felt the need to employ a tied sale when they could have made the full monopoly profit on the patent-protected product. Indeed, this would be the question asked by the Chicago School. As Bork has argued, there is only one monopoly profit to earn.

In each of these three cases, it would at first appear that the firms were using the tied sales as a form of metering. The patent was on the "razor" and the tie was on the "blade." Thus, the customer would buy a single movie projector, refrigeration container, road work technology, or salt dispenser. The intensity of its use would be connected to the demand for film, dry ice, road emulsion, or salt tablets.

In this sense, the courts may have been confused between the firm's desire to extend its monopoly and its desire to price discriminate between customers. However, the explanation of the tied sale as a way to meter and, thereby, engage in price discrimination is not without its own set of challenges.

6.5 Why Not Meter Directly?

The first issue is that tying seems to be a roundabout way of engaging in metering. If the firm wanted to charge heavy users more, why not simply contract with customers to pay a per-use fee? We are not the first to note that forcing a tied sale seems no easier than monitoring usage (see Kaplow 1985).

If a firm selling copying machines wants to charge high-volume users more, why not install a counter in the machine and charge a per-copy fee? Monitoring the counter seems no more difficult, and perhaps even easier, than monitoring whether the customer is using the required paper. (That could explain why we do not see paper being used as the tied product.) Even if it is easy to count copies, it may be even easier to monitor toner cartridges, especially when the seller has a patent on the shape of its toner cartridge.

In many cases, direct monitoring would admittedly be difficult. How does one count how much dry ice has been used in a storage container? Similarly, how much salt has passed through a salt shaker? Adding a counter might be more costly than the original device.

We should also recognise that, in some cases, just such a per-use fee has been adopted. A recent example of this is Monsanto's per-acre technology-use fee for its Roundup® ready crop seed. Similarly, Summit and Visx have charged a per-use fee for their laser eye surgery devices.

An interesting example of pure metering is done by Wizard International, which has pioneered a machine that automates mat cutting for picture framers. When the machine initially came out, stores could rent it for $225/month and pay ten cents per corner (the first 1,000 were included in the base rent). Or, they could pay $370 a month in rent and pay five cents per corner (with 4,000 corners included in the base rent).[108]

108 A picture mat has at least four corners and often more for complicated designs such as a star cut-out. Note that an angle turn of 90 degrees counts as a corner, so circles and ovals are not free.

Buying the machine was not an option. This is understandable, as Wizard wanted to capture as much surplus as possible from high-volume users. But that created an opportunity for a competitor to enter the market. It could target Wizard's most profitable customers by offering a fixed-price contract. Indeed, now that Wizard faces some competition, users can purchase its machine for $15,500 and pay no per-corner fees.

Note that whether Wizard's machines are rented or purchased, the framing store can use whatever mat material it desires. Thus, there is no tying as part of the metering.

The move towards power-by-the-hour in the aircraft engine business is an important example of a pure metering contract.[109] We are not convinced that this is a tool to enable better price discrimination against high-volume users. Price discrimination would be difficult, as engines are also sold on a regular basis. Therefore, heavy users cannot be made to pay more because of a power-by-the-hour contract.

On the other hand, power-by-the-hour contracts allow engine manufacturers to lower their price to low-volume users. This, in turn, means fewer lost sales if they then raise their regular sale price. So the existence of power-by-the-hour pricing could lead to higher prices for heavy users. Even so, there is competition in the market for these users, and this is the force that restrains pricing.

A second effect of power-by-the-hour is on the servicing industry. If the airline owns the engine, the airline is responsible for obtaining service, whereas the manufacturer is responsible under power-by-the-hour. Thus, if enough airlines shift to power-by-the-hour, this will reduce the potential demand for independent service providers.

Just as in the Kodak case (discussed in Section 6.3 and in Section VI of Part II), initially we would not expect that the demise of independent service providers would have any impact on the market. This is because airlines look at the lifetime cost of an engine when placing their initial order. Hence competition for customers would mean that even if the back-end pricing would go up, the front-end pricing would get greater discounts to offset this.

The bigger change is that entry becomes much more difficult. A new engine manufacturer would have to find a way to get its engines serviced all around the world were it to enter the market. Previously, such service operations existed and, hence, this would not have been an issue. But it is possible that power-by-the-hour would lead to the elimination of these operations (or their sale to the engine makers).

If there is no longer any reasonable threat of entry, this makes implicit collusion much more attractive. One of the great problems of collusion is that its very success leads to its demise. Entrants will be attracted to a market with high profits. But if entry can be denied in some other way, then implicit or explicit collusion is a greater concern.

We recognise that this is a roundabout argument. There are several steps to the process:

109 Power-by-the-hour is a pricing scheme for jet engines in which the customer is charged a price for each hour of flight time rather than a fixed price upfront. Hotel rooms are beds-by-the-day and taxi cabs are cars-by-the-kilometre. The power-by-the-hour price typically includes all maintenance.

- Tying leads to the elimination of a previously competitive complements market.
- This does not lead to immediate price increases due to competition over lifetime costs.
- However, future entry is deterred.
- This sets the stage for implicit or explicit collusion.

We believe that regulators and the courts have been too focused on the potential harm caused by one firm adopting a certain practice versus the potential harm when a practice is spread across an industry. Our example of power-by-the-hour illustrates this point.

There may be no harm when one firm, even a leading firm, adopts the policy of power-by-the-hour. This is because one firm alone is not enough to eliminate the independent service industry. However, when other firms in the industry copy this policy, this does lead to the demise of the complements market.

We believe the right question for policy makers to ask is: how do we feel about a practice were it to be adopted by all firms in an industry? If the practice makes entry more difficult, then the practice, rather than a particular firm, needs to be stopped.

6.5.1 A POLICY TOWARDS METERING AND TYING TO METER

The examples of pure metering can help clarify the policy discussion on tying. We might object to tying because we object to the price discrimination inherent in metering. As tying facilitates metering, we would object to the practice because of its metering effect.

We might accept pure metering and still object to tying. One motivation would be the collateral damage done. In this case, our evaluation of tying would depend on its impact on the tied market and the repercussions that might have on the original market. As explained in the section above, we think the courts have focused too much on the potential damage caused to the tied product market and not enough on the potential damage to future competition in the original product market.

The issue of collateral damage arises only if we conclude that the metering itself is not a problem. Our discussions with antitrust authorities in the U.K. suggest that there is no "bright line" answer to how pure metering would be treated. To help inform that discussion, we first consider some of the issues around price discrimination, as metering is simply the tool used to achieve that objective. We then consider whether the tool itself causes harm.

As a starting point, we should ask whether metered use fees create an advantage for large firms over small firms. (In the United States, such differential might be in violation of the Robinson-Patman laws.) We do not see this as a problem. While different customers are paying different fees, they are all facing the same fee schedule. Moreover, in many metering examples, the fee schedule is linear. It need not provide volume discounts.

Thus, a copier that is sold for $1,000 with a $0.01-per-page fee does not discriminate against small customers in favour of large ones. In fact, the purpose is quite the reverse:

it is to charge large customers more. Because the machine can now be sold at a lower price, it is more likely that a small firm will be able to purchase such a machine. In short, if anything, we expect that metering will give small firms an advantage over their larger competitors.

Aside from the issue of a level playing field, we can also ask how to evaluate naked price discrimination. Should it be considered welfare-enhancing, or should it be viewed with suspicion?

One argument is that the firm needs to be able to price discriminate in order to recover fixed costs. This argument is not much different from suggesting that a firm needs to collude in order to raise prices so as to be able to recover fixed costs.

We do not wish to argue against firms making profits. And we are fully aware that industries with high fixed costs and low marginal costs make it difficult to recoup investments in the presence of competition. We want to determine the costs associated with straightforward price discrimination via direct metering.

We find that metering is more likely to impose costs on competition when it is done via an indirect good rather than on measured output. In particular, metering via a tied good can lead to the loss of a vital complements market and a reduced scope for future entrants. Typically, competition makes it difficult for a firm to impose direct metering on its customers. Thus, setting the law so as not to facilitate metering via tied sales is a desirable goal.

6.6 False View that Price Discrimination Leads to Efficient Outcome

Among economists, it is almost taken as a given that price discrimination is efficient. Indeed, perfect price discrimination is efficient.

There are two problems with this argument.

- This treats consumer and producer surplus equally.
- In practice, perfect price discrimination does not exist. All attempts at price discrimination end up imposing large costs, possibly greater than if price discrimination were banned.

Price discrimination will be imperfect on at least two counts. Firms may have only limited tools with which to price discriminate. Therefore, linear metering is an imperfect price discrimination tool. It does not follow that more price discrimination is more efficient.[110]

There is a second and more profound reason why price discrimination is always imperfect. This insight, attributable to UCLA economist Earl Thompson, is that no firm has a perfect monopoly. Consumers can find ways to create substitutes. They will do their best to avoid being subject to price discrimination, and these avoidance efforts end

110 In a standard reservation price model, price discrimination will lead to an increase in social welfare. A necessary, but not sufficient, condition is that price discrimination leads to an expansion in output. See Hal R. Varian, *The American Economic Review,* Vol. 75, No. 4. (Sep., 1985), pp. 870-875. But, as described in the text, these simple economic models miss the distortions caused as consumers work to avoid the monopolist's price discrimination scheme.

up being costly. Unlike the welfare loss of one-price-to-all, where low-value customers end up being excluded from the market, in the case of price discrimination, the high-value customers end up distorting their behaviour, which is why the costs can be especially large.

Take the standard case of airline pricing. They typically use seven-day advance purchase and Saturday night stayover restrictions to offer discounts to leisure customers while still getting business travellers to pay full fare.

In response to this policy, some business travellers now extend their stays to include a Saturday night. This distortion in behaviour can lead to large social losses, well above the incremental gains from the extra demand that arises at low prices.

For example, at the time this report was being written, the American Airlines full fare coach roundtrip ticket price between New York and Los Angeles was $2,321.[111] In contrast, American's seven-day advance purchase with a Saturday night stayover was only $315. These prices were for the same non-stop flights and the same carrier. The price difference creates a $2,006 incentive for a business traveller to distort his or her behaviour.

There are other ways in which these losses could arise. The business traveller could choose to drive rather than fly. The person would pay the one-price-to-all fare, but not the high unrestricted fare. Or, the person might choose not to make the trip. In the case of imperfect price discrimination, there are now two excluded consumer groups. The first is those leisure travellers unwilling to pay the low advance-purchase fare. And there are some business travellers who could have a high value, but are unwilling to pay the even higher unrestricted ticket prices.

We can assume that the businessperson would be willing to buy the $2,321 ticket. The issue is whether, instead, the person can buy the $315 ticket and distort his or her preferred travel times. For illustration, we imagine that the person finds it worthwhile to buy the cheap ticket, even though this leads to $300 in hotel costs and another $1,000 in inconvenience due to the extended trip.

In this case, the net social cost of the distortion of the high-value customer is around $1,200. (Some of the $300 hotel costs would be a transfer to the hotel). This loss is partially offset by a social gain that arises from lower leisure prices and hence more leisure travellers. Assume that without price discrimination the ticket price would have been a more moderate $500. The lower price attracts customers with valuations of $450, $400, and $350, or with a valuation of $400 on average. If the marginal cost of the airline trip is $150, then the distortion cost to the business traveller ($1,200) is almost *five* times the gain of having an extra leisure customer fly ($400 - $150 = $250). Thus, price discrimination (charging $315 and $2,321) will lead to a reduction in welfare unless there are five incremental passengers at a fare of $315 versus $500 for every business customer that ends up staying over a Saturday night to avoid the $2,321 fare (but who would have paid the $500 fare).

111 Pricing data from Expedia.com for a Newark (EWR) to Los Angeles (LAX) non-stop flight. The discount flight departed 11/1/02 and returned 11/3/02 and was reserved on 10/9/02. The full coach fare was the price given for a ticket without any restrictions.

If price discrimination were not allowed, then the airline would pick a more moderate single price, assumed to be $500. It is still worthwhile for the airlines to raise their business price to $2,321 and to lower their leisure price to $315 if 20 percent of travellers distort their behaviour. The airline gains $1,821 on 80 percent of business travellers and loses $185 on 20 percent.

Price discrimination leads to social costs on suppliers as well as on customers. This is as a result of incumbent firms devoting resources to enforce price discrimination and entrants devoting resources to enter these markets. These entry efforts can be inefficient in that the entrant firm has higher costs than the incumbent but is hoping to profit by pricing below the price discrimination umbrella established by the incumbents.

For example, in the case of aircraft engines, a key component is the turbine blade. When this blade becomes chipped or otherwise damaged, the most efficient course of action is to purchase a new blade. However, because customers are often locked in to purchasing spare parts from the original manufacturer, these parts are sold at a high profit margin. The loss in welfare is not that customers do not buy these parts. Rather, firms such as Chromalloy Gas Turbine enter the market and develop technologies to repair damaged turbine blades. The price of the repair is less than the cost of a new blade.

However, the cost of a repair may be more than the manufacturing cost of a new blade. In these cases, it would be more profitable for all parties if Chromalloy were to purchase a new blade at a small markup over its manufacturing cost rather than do the costly repair. The reason why this does not occur is that the engine manufacturer wants to limit the number and scope of blades that Chromalloy can fix. If Chromalloy's repair procedure is to simply provide a new blade, then Chromalloy can then repair all blades.

We conclude our discussion of metering and tying with a prospective case study. We look at some of the cat-and-mouse games that firms play as they try to implicitly tie toner cartridge sales to copiers; we also examine how competitors find ways to defeat these ties and thereby share in the profits. The result of this analysis is a clearer understanding of the costs of tying and some policy recommendations to reduce those costs.

6.7 Tying by Other Means: Warranties and Toner Cartridges

Our first explanation for bundling was that it could create a cost savings or quality improvement. While this is, indeed, a legitimate justification, we suspect that firms may inflate this explanation beyond its reasonable effect.

For example, we know that toner cartridges serve as an effective metering device for copying machines and laser printers. Thus, manufacturers would like to require customers to purchase their toner cartridges and no others. But they may be hesitant to do so in a contractual manner because of antitrust laws.[112] So, they try to achieve

112 Even if the firm does not have a dominant market share in the original sales, it has a 100-percent share of customers using its equipment.

the same result though other means. The first step in this process is to patent the shape of the cartridge. This often prevents others from selling new cartridges to compete with theirs. We suspect that this was not the type of innovation that the patent law was designed to encourage.

Patents alone are not enough to prevent competition. Because the toner cartridges are sold at large markups-it costs $3 to make an inkjet cartridge that retails for $35 - competitors have developed workarounds, such as refilling empty cartridges with replacement ink.[113] Thus, firms have found ways to discourage their customers from using rival products when available.

For example, firms may attempt to intimidate the customer into using their complementary product by creating a fear that using rival products will void the warranty. Consider, for example, the statement by Hewlett Packard regarding the use of non HP toner cartridges:[114]

> The use of a non HP or refilled toner cartridge alone does not affect either your warranty or any maintenance contract you may have with your printer.
>
> However, if an HP LaserJet printer failure or damage is found to be attributable directly to the use of a non HP toner cartridge, HP will not repair the printer free of charge. In this case, standard time and materials charges will be applied to service your printer for that particular failure or damage.

The consumer, therefore, might rightly be concerned that using a non-HP toner cartridge might well put the warranty at risk. HP is not alone in playing this game.

Indeed, the warranty policy at Xerox is even more aggressive. While using non-Xerox cartridges does not void the warranty, customers are warned that they will be liable for service costs and replacement parts if repair is needed as a result of competitive toner or inks. Because the competitive products are of "inconsistent quality," customers are not given an option to get the superior "Xerox Total Satisfaction Guaranty" unless they also use Xerox cartridges:

> For Xerox equipment that uses a copy cartridge and sold by Xerox direct sales force and agents, Xerox provides an extensive warranty (warranty periods differ by product) to our customers to ensure their satisfactory experience with Xerox products. This warranty covers all equipment repairs and provides for Xerox to dispatch a customer service engineer to the customer's site in the event the equipment cannot be repaired remotely. In addition, this warranty, coupled with Xerox Total Satisfaction Guaranty, allows customers, for any reason, to request a replacement unit if they are not satisfied with their equipment. In order to ensure customer satisfaction, optimal equipment performance and equipment reliability, the Xerox warranty is predicated on the customer using Xerox copy cartridges. If a customer elects not to use the Xerox copy cartridge, Xerox will still offer the customer a low cost maintenance plan and

113 See http://www.usatoday.com/life/cyber/tech/2002/06/10/ink.htm.

114 The source of this hard-to-find warranty information is http://www.recharges.com/editorial.htm and http://www.protone.com.au/pages/warranties_spotlight.htm

> will make every effort to ensure that the customer is satisfied with his or her Xerox equipment. *Given the inconsistent quality of non-Xerox copy cartridges and the potential service costs involved with such copy cartridges, however, Xerox will not maintain the equipment under the warranty for free* [emphasis added].
>
> For non-copy cartridge Xerox equipment, the warranty on the equipment will not be void if competitive toner or inks are used. If Xerox determines, however, that such competitive inks or toners are the cause of the equipment malfunction, the customer will be responsible to pay for the service costs including replacement parts. Xerox commitment to our customers is to work very hard to avoid these unnecessary service costs. To accomplish this, Xerox service works hand-in-hand with our customers so they can see for themselves the overall value of using Xerox supplies.

Technology may allow original equipment manufacturers to eliminate these rivals without having to make a formal tie or to create doubts regarding warranties. HP and Epson have developed a chip that is a gas tank equivalent for ink. When the cartridge hits empty, the chip turns off, and even if the cartridge is refilled the cartridge will not work. This chip may eliminate the ink refill market. This policy is justified by a call to quality control.

> As reported in *USA Today*,[115] HP and Epson say the chips benefit consumers because running a printer on an empty cartridge can damage the printer. They also say the generic ink used by the refillers can be damaging to printers. "We don't believe the quality control they're using is as high as ours," says Rajeev Mishra, an Epson manager.

Another approach is to cut off the supply of empty cartridges. The trick here is to induce the consumer to return the cartridge to the OEM, thereby keeping it out of the hands of the ink refillers. The first step in this process is to offer free postage for recycling old cartridges with each new purchase. Lexmark goes one step further by creating, in effect, a $30 deposit that is forfeited if the customer fails to return the used cartridge.[116]

This example reinforces one of our earlier conclusions regarding price discrimination. That is, attempts to price discriminate create inefficiencies. In this case, firms deploy resources developing "self-destruct" chips and other devices to prevent competitors from undermining their attempts to meter the customer through the complementary product of toner cartridges.

It is not just the printer manufacturer who creates inefficiencies. Firms such as Repeat-O-Type spend resources to figure out how to refill toner cartridges. Further inefficiencies are created by the legal wrangling over whether these workarounds are a violation of the patent. HP sued Repeat-O-Type to prevent ink refilling, but lost in court. In short, there are inefficiencies created by firms that spend resources to develop an alternative or second-hand market and by incumbent firms who try to defeat these attempts.

115 See http://www.usatoday.com/life/cyber/tech/2002/06/10/ink.htm

116 See http://www.usatoday.com/life/cyber/tech/2002/06/10/ink.htm.

A second point that comes out of these examples is the rather roundabout way in which firms engage in this metering. It would seem simpler for firms to do the metering directly. They could put a counter on the printer and charge customers a per-page fee. When the counter hits zero, the customer would call up or download a new code and resume printing upon paying a fee.

The fact that they do not use such a direct approach suggests that they would anticipate consumer resistance to this pricing. Consumers may not be fully aware of how much cartridges will cost in the future or how many copies they will get per cartridge. Thus, under the status quo, consumers do not have a good way to compare printers and copiers on a cost-per-page basis.

6.7.1 POLICY RECOMMENDATIONS

In this particular market, there are two appropriate government responses. The first is a consumer protection, rather than an antitrust, issue. Firms might be required to post the average price per page along with the selling price of their machine. This type of price disclosure would at least allow consumers to estimate the lifetime cost of a machine and allow firms to compete on this dimension.

This is a simple idea, but we believe it could have a profound impact. The use of an Energy Star tag allowed customers to understand the expected utility cost of appliances and, thus, helped them justify spending more money up front for the more efficient appliance as they could calculate the future savings.

The second regulatory response is an antitrust issue. The potential harm is through the direct price discrimination - the inefficiencies it may cause because it is imperfect and the possible redistribution of surplus from consumers to manufacturers.[117] Firms should be given guidance as to whether this price discrimination will or will not be tolerated. The fact that it is accomplished though clever technologies or patents should not make something legal that would be prohibited if it were done as direct metering. And if direct metering were allowed, then firms should understand this so that they may consider this more efficient way of price discrimination. Indeed, recognising that direct metering has less chance of fooling customers, authorities may even restrict firms to this type of metering.

We want to anticipate a line of defence that firms will provide to justify their conduct. Just as in the Kodak case, firms may argue that competition in the original equipment sale will defeat any ability for them to earn monopoly profits. They will discount the machine to gain incremental sales and will do so to the point where they have given away all of the anticipated back end profits.

While we are sympathetic to the intuition of this argument, it points, in fact, to a further inefficiency that is actually caused by the firm's inability to perfectly price discriminate. The current practice allows a firm to employ a linear price schedule via the need to buy

117 Here, we are less concerned that future entrants might be denied access to a complements market. We are also less concerned that a firm that refills ink cartridges would be a likely entrant into the printer or copier business.

replacement toner cartridges. Firms will want to sell the printer at a discount, even below cost. The problem is that the firm cannot make the customer promise to make enough copies to justify the initial discount.

The monopolist solution to this problem is to raise the price of the initial machine and slightly lower the price of the copies. This will discourage some low-use customers from buying the machine and creating a loss to the seller.

Unfortunately, competitive sellers cannot follow this strategy. If one raises its initial price, it will lose all of the market, including its high-volume customers.[118]

This conclusion depends critically on the assumption that firms cannot commit to a toner price in the future. This is a strange assumption in that there is no reason why such a contractual commitment would be difficult. Over the life of a printer, there is typically no change in the technology of the cartridge. Thus, it is not clear why a firm could not offer a slightly more expensive machine with a promise to sell replacement cartridges at a discount. Perhaps the answer is that this would force the customer to pay attention to the toner cartridge price, and this is not in the manufacturer's interest. Still, this is a bit of a puzzle for theory and practice. Again, it suggests that a posted full-cost-of-use price would help focus attention on these future costs and perhaps stimulate competition in this dimension.

118 I thank Amelia Fletcher at OFT for suggesting this line of argument.

7
Portfolio and Conglomerate effects

It is easy to be confused by what is meant by conglomerate and portfolio effects. It has become a catch-all expression used to describe antitrust problems when other theories do not seem to apply. In the recent Tetra Laval/Sidel merger case, the Court of First Instance provided the start of a definition:

> ...that the modified merger is conglomerate in type, that is, a merger of undertakings which, essentially, do not have a pre-existing competitive relationship, either as direct competitors or as suppliers and customers.[119]

This is a helpful but incomplete: it leaves out complementors. There are four basic relationships that can exist between two firms or two lines of business. As described in *Co-opetition*,[120] they are

Customer
Supplier

Competitor
Complementor

7.1 The Nature of Portfolio Relationships

We will go into some detail in describing each of these relationships. We do this because we think it is better to look at the potential anticompetitive effect in the context of the relationship type rather than under the umbrella category of portfolio and conglomerate effects.[121]

The first two relationships are *vertical* in nature in that money flows from the customer to the firm to its suppliers (while goods and services flow in the opposite direction). The competitor and complementor relationships are *horizontal* in nature. Two firms (or business lines) that are competitors or complementors share a common set of customers or suppliers.

Two firms are competitors if the willingness to pay for the two goods is less than the sum of the individual willingness to pay for the goods in isolation. Thus, Coca Cola and Pepsi are competitors. A typical customer might pay £1 for a Coke or £1 for a Pepsi, but

119 Paragraph 142, Judgment of the Court of First Instance, 25 October, 2002 in Tetra Laval versus Commission of the European Communities.

120 See Barry Nalebuff and Adam Brandenburger, *Co-opetition* (1995, Harper-Collin: London) and Michael Porter, *Competitive Advantage of Nations*, Free Press.

121 We thank Jonathan Fingleton of the Irish Antitrust Authority for suggesting this approach.

only £1.50 for both a Coke and a Pepsi. Firms can also be competitors on the supply side if the cost of supplying both firms is more than the cost of supplying each firm in isolation. For example, Perdue Farms and Coca Cola are competitors on the supply side as both require supply of CO_2. Perdue uses liquid CO_2 to cool its chickens while Coca Cola uses the gas for carbonation. Each firm's increased demand for CO_2, especially in the summer, raises the cost of supply to the other party.

The complementary relationship can also exist on both the customer and supplier side. An airplane engine and avionics are complements to the airline customer in that their combined value exceeds the value of each in isolation (which is near zero). Perdue Farms and Tennessee Natural Gas Utility are complementors on the supply side. CO_2 is often found as a by-product of natural gas exploration. Thus, it is cheaper to supply Purdue with CO_2 when Tennessee Natural Gas Utility is looking for a supply of natural gas.

To this list, we add three clarifications and one more category. The first clarification is that we recognise potential as well as existing relationships. Thus, the relationship between two firms (or business lines) might be one of a *potential* customer, supplier, competitor, or complementor. Even if P&G did not compete with Clorox in the branded bleach business, P&G was a potential entrant and thus a potential competitor to Clorox.[122]

Second, two firms (or business lines) can have multiple relationships at the same time. Thus, Oxford and Cambridge Universities are competitors for undergraduate students and for faculty, but are suppliers to one another for graduate students and faculty. They are also competitors and complementors in research; they are competitors when two labs are racing to find the same result; they are complementors when one lab builds on the results of the other. Two firms can also be complementors at one stage and then competitors at a later stage, for the same set of customers. We saw this in the context of Aspen Ski, where the multiple mountains complemented each other in bringing more tourists to the Aspen area, but then competed with each other for the skiers once they arrived.

Third, we recognise that there are multiple layers of customers and suppliers. Thus the complementarity may arise at the customer level or at the customer's customer level. For example, if the two firms (or business lines) sell to a distributor and the distributor sells to a retailer who then sells to the end customer, the complementarity (or competition) may arise at any of these levels.

We consider a few examples of multiple business lines to further illustrate the multiplicity of these relationships. Were these lines of business to exist within one firm, the firm would have a portfolio of products and would likely fall under the conglomerate umbrella.

Two West End theatres, the Geilgud and Haymarket, are both complements and substitutes. They are ex ante complements in terms of bringing people to London, but substitutes once they are there. We call this ex ante complements and ex post substitutes.[123]

122 This is a hypothetical case that we will return to when considering the proposed merger between P&G and Clorox. Today, P&G sells Biz Bleach.

123 For completeness, two goods could also be ex ante substitutes and ex post complements. This case does not seem to have arisen in the antitrust literature.

Irish Whiskey and Scotch are likely substitutes for the end customer. At the same time, they may be complements in the distribution business.[124] Thus if the manufacturer sells to a distributor, at the customer level they are complements. (This would also be true if distribution were done in house.) At the customer's customer level or retail shop, they could be ex ante complements and ex post substitutes; having a full line of products helps bring more people into the store and hence the two beverages are complements, but once the customers are in the store the goods are likely substitutes. At the customer's customer's customer (end user) they are likely substitutes.

Crest Toothpaste and Clorox bleach are mostly independent on the end consumer side. Consumption of one good has no discernible impact on the demand for the other product. But it is possible that they are complements in distribution, as the distributor may have economies of scale in carrying a portfolio of products.

Finally, a category to add to the above list is *no relationship*. This is different from saying that the firms "do not have a pre-existing competitive relationship, either as direct competitors or as suppliers and customers." The Court of First Instance definition might allow the two firms to have an indirect relationship, as in a customer's customer. The two firms could have a complementor relationship.[125] We want to distinguish the "no relationship" status as a separate category. For example, Grays, a manufacturer of squash racquets, and United Brands, an importer of Chiquita bananas, have no meaningful economic relationship.

We turn now to examine conglomerate effects in the context of the different relationship types.

7.2 No Relationship Case

When businesspeople talk about portfolio effects, they generally refer to the case where the two goods are unconnected - what we call the no relationship case. *It is our strong view that antitrust should not be concerned with portfolio effects when no relationship exists*.

There was a time when unrelated conglomerates were fashionable. Harold Geneen and ITT Industries represented the heyday of such ventures. But today, we see just the opposite trend. In 1993, AT&T spun off Lucent Technologies (its switching and fibre optic cable business). More recently, AT&T spun off both its wireless and its cable business, leaving it with long distance. Pepsi spun off its quick service restaurant business (Pizza Hut, Taco Bell, and Kentucky Fried Chicken) into Yum Foods. The people who are most worried about conglomerate effects these days are shareholders, where unrelated mergers have been shown to lead to a destruction in shareholder value.

124 If there are several distributors with efficient scale so that the distribution cost and effectiveness is equally if the products are distributed separately or together, then we would not say that complementarity exists at the distribution level.

125 According to the Court of First Instance definition, Intel and Microsoft do not have a pre-existing competitive relationship. This is true. Neither is a significant customer, supplier, or competitor to the other. But they do have an important economic relationship; they are complementors.

We do not have a good explanation for why firms seek to become conglomerates. Some have argued that CEO compensation increases with the span of control. This explanation suggests market imperfections but not antitrust issues. Others have argued that diversification can lead to more steady earnings and thus a higher stock price multiple. A response to this argument is that shareholders are well able to achieve this diversification on their own.

Given our poor understanding of why conglomerates are created or even why they persist, it is hard to develop policy recommendations regarding the combination of unrelated businesses. Indeed, the history of antitrust cases regarding conglomerates reflects this lack of theory.

An early case in this area was the FTC's decision in 1967 to block a proposed P&G-Clorox merger.[126] One has to look hard to find aspects of complements or substitutes between toothpaste and bleach. The courts found an example of each. One concern was that P&G was a potential entrant into the branded bleach market. In that case, the merger would foreclose the potential future competition from P&G. Secondly, the courts saw that Clorox and P&G, as branded goods manufacturers, were both large buyers of advertising. The combined purchasing of the two firms would lead to lower prices, especially for Clorox. The merger was ultimately blocked because the U.S. courts felt that the advertising costs advantages of P&G would make it even harder for rivals to compete with the merged Clorox.

The prevailing wisdom today is that the case was wrongly decided.[127] First, the market definition focussed on the branded bleach product. Even if *branded* bleach was a difficult market to enter, consumers had the option of buying generic bleach. Since the products are quite similar - perhaps even identical - and the generic bleach business is competitive, it is hard to see why the authorities needed to stimulate more competition in the branded bleach market. Second, even if P&G, with its enormous size, was able to get lower-priced advertising rates, this hardly seems to be an insurmountable advantage.[128] Other large firms such as Unilever and Colgate/Palmolive also have attractive advertising rates. P&G could make money by selling time to other companies at its preferred rates. Indeed, some advertising agencies play just this role as they aggregate purchasing across customers to get lower rates. The complements component of the story seems quite weak.

The idea that P&G might have otherwise entered this market was potentially the most convincing component of the story. But, in this specific case, prior to the merger, P&G did a study that led to the recommendation that they not enter the market if they could not purchase Clorox. We have no reason to think that this study was done with an eye towards demonstrating intent to the court. Hence, we do not give much weight to the potential competitor story in this instance.

126 FTC v. Procter & Gamble Co., 386 U.S. 568 (1967).

127 See, for example, William J. Kolasky and Andrew R. Dick, The Merger Guidelines and the Integration of Efficiencies into Antitrust Review of Horizontal Mergers, http://www.usdoj.gov/atr/hmerger/11254.pdf. This critique was notable in that Mr. Kolasky was then Deputy Assistant Attorney General in the Antitrust Division of the U.S. Department of Justice and Dr. Dick was Acting Chief of the Competition Policy Section in the Antitrust Division of the U.S. Department of Justice.

128 This leads to increased efficiency, although more advertising does not necessarily lead to increased welfare.

Going forward, intent would be harder to demonstrate. One cannot have the policy that a firm can only merge if it can show that it would not otherwise enter - such a conclusion can always be generated if required.[129] One would want to have a high threshold test. The initial market would have to have a high degree of concentration; the proposed merging firm would have to be one of a very few number of potential entrants and that it would have to be likely to enter absent a merger. P&G/Clorox fails the first test due to generic bleaches and fails the third part due to its lack of interest in entering this market otherwise. Whether P&G would be the only potential entrant is doubtful when one considers Unilever, Colgate/Palmolive, SC Johnson.[130]

A second and quite recent unrelated conglomerate case is the GECAS component of the GE-Honeywell merger case. We discuss this case in detail in the case studies section. We categorise this is an unrelated conglomerate merger because GECAS is the airplane leasing business and Honeywell is in the avionic (and non-avionic) airplane equipment business. For the most part, these are two distinct businesses.

The connection is that GECAS is a purchaser of new airplanes and in that role has Honeywell as a customer. In spite of the customer relationship, we can say that the businesses are mostly unrelated as the Honeywell purchases are a very small fraction of GECAS's supply costs and GECAS represents under 10% of Honeywell's dollar sales in commercial aerospace equipment.

The Commission tried to build a conglomerate theory based on vertical integration. Normally, the concern with vertical integration is that post integration, rivals will no longer be able to obtain supply at equal terms. This effect is sometimes called raising rivals' costs.[131] However, it would be hard to see how GE would find it profitable to stop selling Honeywell components to others post merger and thereby give up over 90% of Honeywell's market.

Instead of not supplying rivals, the Commission took the exact opposite stance. They believed that GECAS would use its position as an influential customer to tip or lever the market in a way that would greatly expand Honeywell's share. This idea of leveraging power is a commonly told story, but it is not one that has a solid theoretical or empirical basis.[132] Indeed, the Commission relied on a new theory developed just for this case. In the case study, we show that the theory was speculative at best and the evidence failed to support this concern. We believe that history will not look kindly on this aspect of the decision.

In the recent Tetra Laval/Sidel case, the Court of First Instance recognised the general weakness of the conglomerate effects argument.

129 It is possible to give some teeth to a claim that entry absent merger would not be desirable. If there is some chance that the antitrust authorities will block the merger, then the firm could gain credibility by committing not to enter the market in the event the merger is blocked. But such game playing does not seem very practical.

130 Unilever makes Wisk liquid bleach, Colgate sells Javex bleach, SC Johnson's Shout is a non-bleach substitute for bleach in cleaning clothes.

131 See Krattenmaker, T.G. and S.C. Salop, (1996), Anticompetitive exclusion: raising rival's cost to achieve power over price, *Yale Law Journal*, 96:209-93.

132 As discussed in Section 4.3.2, one bundling can lead to higher profits even for the case of two goods that have no relationship. However, the gains are through better price discrimination. Competitors are less likely to be hurt by this type of bundling as the lion's share of the effect is through market expansion and not through increased market share. For example, if United Brands and Grays were to bundle squash racquets with Chiquita bananas, it is hard to argue that other banana producers (or squash racquet makers) would be at a serious disadvantage. To the extent that this type of bundling improves their relative profit position, rivals have a practically unlimited number of options for forming alternative bundles.

> Since the effects of a conglomerate-type merger are generally considered to be neutral, or even beneficial, for competition on the markets concerned, ... the proof of anti-competitive conglomerate effects of such a merger calls for a precise examination, supported by convincing evidence, of the circumstances which allegedly produce those effects[133]

Our policy recommendations regarding portfolio effects go one step further:

> If there is no relationship between the two goods, do not consider portfolio effects.
>
> If the relationship is one of customer or supplier, consider portfolio effects in exactly the same way as one would consider a vertical integration. Instead of calling it portfolio effect, call it vertical integration.
>
> If the relationship is one of competitors, then consider portfolio effects in exactly the same way as one would consider a horizontal merger of substitute products.
>
> If the relationship is one of complements, then consider portfolio effects in exactly the same way as one would consider a horizontal merger of complementary products.

In sum, we delegate portfolio and conglomerate effects back to their root cause for concern. The term portfolio and conglomerate effect is not helpful. That does not mean that we have to pick only one of these categories. *It is entirely possible for a proposed merger to be considered under several of these categories*, as we have observed that two firms can have multiple relationships at the same time.

The issues involved with vertical integration are well known.[134] These merger types are also relatively uncommon. As shown in an OFT report, only 1% (as measured by value) of recent qualified merger cases are vertical in nature.[135] Hence we focus our attention on horizontal issues.

We do not repeat the discussion of complements case in this section. The case of complementary products has been discussed at length in the previous sections on bundling and tying. Included in this discussion is the case of goods that are ex ante complements and ex post substitutes.

This leaves the case of substitute products. Rather than think of this as a portfolio or conglomerate effect, we believe these issues should fall under the broad test of abuse of market power. In the case of a proposed merger, the test should be whether this leads to a substantial lessening of competition. We understand that the UK merger law has recently moved in this direction.

7.3 The Competitors Case

The European approach to horizontal mergers looks for the creation or strengthening of a dominant market position. This approach can lead to a contorted market definition and inconsistent logic. We illustrate the problem using both the recently overturned

133 See paragraph 155.

134 See, for example, part III of M.A. Utton, Market Dominance and Antitrust Policy, Edward Elgar, 1995.

135 See "Merger Appraisal in Oligopolistic Markets," OFT Research paper #19.

Tetra Laval/Sidel case and the proposed merger of Heinz and Beech-Nut in baby foods that was blocked by the FTC in 2000.[136]

We begin with baby foods. In February 2000, H.J. Heinz proposed to acquire Beech-Nut from Milnot. Heinz and Beech-Nut were the second and third largest firms in a three-firm industry. Gerber, owned by Novartis, was the largest player with a 65 percent share, while Heinz and Beech-Nut trailed with 17.4 and 15.4 percent shares, respectively. The merging parties claimed that their combination would give them efficiencies that would allow them to compete more effectively against Gerber.

The claimed efficiencies included moving production to Heinz's modern processing plant and the leveraging of Beech-Nut's superior recipes. Perhaps the greatest cost saving - and one not emphasised by the merging parties - would be their greater power with retailers. As the market leader, Gerber was able to secure shelf space for its products without paying "slotting fees." In contrast, both Heinz and Beech-Nut were forced to pay these fees in their attempt to maintain or expand their market presence. The merger would shift power from the retailers and wholesalers to the manufacturers.

With its commanding market position, almost all stores carried Gerber. The FTC found Gerber was in 90 percent of stores where baby food was sold. Few stores carried all three brands. The FTC took the perspective that Heinz and Beech-Nut compete to be the second brand on the shelf. As a result, a proposed merger between Heinz and Beech-Nut was blocked, not because their combined market share of roughly 30 percent would be dominant, but because this would eliminate competition for the number two position on the shelf.

It would be difficult to demonstrate that this merger would lead to single firm dominance since the combined share of Heinz and Beech-Nut would only be 30%. Therefore, if we are to find a dominant position, either the theory relies on a concept of Heinz/Beech-Nut being collective dominant with Gerber (i.e. there is tacit collusion) or the definition of the market must be contorted to capture the anticompetitive effect. For example, we could define the relevant market to be the second brand on the shelf. In this case, Heinz and Beech-Nut each have nearly 50 percent market share and their combination would lead to nearly 100 percent market share for this number two slot.

This approach works just fine until we have to confront the situation where Gerber proposes to merge with Heinz. If the previous case has declared that Heinz and Beech-Nut are in a different market than Gerber then so there is no dominance created by this combination. Because they are in different markets, this would be treated as a conglomerate case rather than a standard horizontal mergers case.[137]

It would be absurd to think that Gerber and Heinz are in different markets. We believe that even the lawyers advocating a proposed Gerber-Heinz merger would not try to argue that Beech-Nut was in a different market (absent such a finding from a proposed Heinz-

136 The FTC's request for a preliminary injunction was denied by the D.C. District Court but upheld by the D.C. Circuit Court in 2001 and the merger was abandoned See *FTC v. Heinz*, 116 F. Supp. 2d 190 (2000), rev'd 246 F.3d 708 (D.C.Cir. 2001) and 20 Years of Merger Guidelines Enforcement at the FTC: An Economic Perspective, David Scheffman, Malcolm Coate, and Louis Silvia http://www.usdoj.gov/atr/hmerger/11255.htm.

137 This paradox was suggested by John Fingleton.

Beech-Nut merger). Indeed, such a merger will most likely never be proposed because of the impossibility of avoiding market dominance.

Let us then return to the original Heinz-Beech-Nut merger so as to consider its potential effect on market competition:

> First, it would turn a three-firm oligopoly into a duopoly. This could lead to an increase in competition if the combined Heinz-Beech-Nut was more effective in going against Gerber. It could lead to a reduction in competition if the duopoly led to a cosier situation in which both firms were guaranteed a place on the shelf and therefore feel less pressure to lower price. Either outcome is possible and whether the merger would likely lead to more or less competition will depend on the facts of the case. In general, we worry about creating such extreme market concentration. Thus, the burden of proof should be on the merging parties to demonstrate, perhaps even commit, to increased competition. They would need to demonstrate significant efficiencies. These efficiencies must not have been available to either firm acting alone. At the same time, the firms must explain how they were able to survive in the competition against the much larger Gerber absent these efficiencies.
>
> There is a second effect of the merger and this one will likely reduce competition. This effect will arise at the store level. Whereas Heinz and Beech-Nut previously competed for shelf space and paid stores slotting fees, it is more likely that post merger, such fees would not be paid. This would lead to a transfer from retailers to the manufacturer. It is not clear that it would have any impact on end customers. To the extent that antitrust authorities are concerned with the economic position of retailers, there is reason to question this merger.

Note that our analysis of the issues in this case did not require any fallback on the catch-all of portfolio or conglomerate effects as a way of capturing the potential anticompetitive effect of this merger. No appeal to leverage theory is required. Instead, we relied on well-understood and well-grounded economic theory of horizontal mergers.

Next consider the potential arguments against a Gerber-Heinz merger. One option follows the portfolio effect. It treats the market for the first spot on the shelf as distinct from the second spot. This approach leads to a leveraging story. Gerber with its dominant position in the number one slot on the shelf would leverage that strength into a dominant position in the number two slot. As a result, Beech-Nut would eventually be driven out of business and both markets would be monopolised.

Note that this leverage story is at odds with the traditional view of market concentration. In the traditional view of a duopoly, Gerber-Heinz with its even larger share of the market would raise its price to improve its margins. Some of the lost market share when Gerber raises its price would go to Heinz and some to Beech-Nut. To the extent that half of the lost market comes back to the company (through Heinz) means that Gerber has a greater incentive to raise price when its owns Heinz compared to when it does not. This is good for Beech-Nut. To the extent that retailers are looking for a firm to give them bargaining power against Gerber-Heinz, they will have to turn to Beech-Nut. This will also reduce the need for Beech-Nut to pay slotting fees.

In contrast, under the leverage model, Gerber-Heinz lowers its price and takes over Beech-Nut's market position. Beech-Nut's market share and profits are eliminated. Either way the merged entity would be attempting to abuse its market power, either to drive out a rival or to harvest its market share.

We believe that antitrust authorities should be forced to pick one of these scenarios. They should not be allowed to *simultaneously* claim that the merger will lead to less competition (through an increase in market concentration) and increased competition (through leveraged market power to put the unmerged firm out of business).[138] Indeed, as we discuss below, just such a pair of internally contradictory claims were made in the Tetra Laval/Sidel merger case. The ability to claim "X" and "not X" shows the absence of an economic model upon which the theory of harm is based.

Putting these two scenarios side by side, we think the leverage story is less compelling. As a first consequence of a Gerber-Heinz merger, we could assume that Gerber-Heinz would end up on half the shelves and Gerber-Beech-Nut on the other half. The combined Gerber-Heinz would control around 85% of sales. Firms in this position typically have an incentive to raise price. Raising Gerber's price would lead to increased Heinz and Beech-Nut sales, and this would be less costly to Gerber once it owned Heinz. Raising Heinz's price would lead to increased Gerber and Beech-Nut sales, and this, too, would be less costly to Heinz once it takes into account the positive effect on its Gerber parent. This is a vanilla market power case. We are not just focused on what will happen in the number two slot. We are concerned with how the proposed merger will impact Gerber's ability to extract rent in its number one slot.

The hypothetical problem of a Gerber-Heinz merger became all too real in the European Commission analysis of the Tetra Laval/Sidel merger.[139] The second case study in Part II provides an analysis of the earlier Tetra Pak case in which Tetra was found to have abused a dominant position in the non-aseptic (paper) packing market. At that time, Tetra argued that the appropriate market should include other packaging material, such as aseptic paper, plastic (PET), metal, glass, among other liquid food packaging material. Under such a broad market definition, Tetra Pak's market share would most likely not have led to a finding that it had a dominant position.

In examining the substitutability of the products involved, the Commission came to the conclusion that the broad packaging market for liquid foods was not the relevant market within the meaning of Article 86. These different types of packaging competed with each other only in the long term. "In the short and probably even medium term, the conditions of supply and demand were such that the elasticity of substitution for products in relation to prices was almost zero."[140]

The problem arose when Tetra Laval proposed to merge with Sidel, a firm with a leading position in the PET packaging market. If these are truly separate markets, then we have a conglomerate merger as opposed to a horizontal merger.

138 We realise that in criminal cases, the defendant might well claim: I didn't shoot him and if I did shoot him, it was in self-defence.

139 See Tetra Laval/Sidel, case COMP/M.2416 (2001). The analysis of this case follows the lucid explanation presented in RBB Brief 01: A Bridge Too Far?-Complements, Substitutes and Theories of Exclusion in EC Merger Control by RBB Economics (available at http://www.rbbecon.co.uk).

140 Commission decision 92/163/EEC of 24 July 1991 relating to a proceeding pursuant to Article 86 of the EEC Treaty (IV/31043 - TetraPak II) at ¶ 93.

With some exceptions, the thrust of the Commission's case emphasised the danger of the conglomerate aspect of the merger. The Commission was concerned that Tetra would leverage its power in paper to help Sidel achieve a dominant position in the PET market.

If we take paper and plastic as substitutes in the larger market for packaging, then we would make exactly the opposite argument. The combined Tetra Laval/Sidel would use its combined market power to raise price. This would not drive other PET competitors out of the market. Quite the contrary. They would benefit from the decreased competition. Consumers would be the ones who would lose as a result of diminished competition and higher prices. One need not tell a dynamic story where Tetra Laval/Sidel would drive competitors out of the market and then raise price. They would raise price right away.

Which scenario is correct? We believe that 'both' is not a satisfactory answer in this case.[141] Our concern would be the possibility of a substantial lessening of competition, through higher prices, not through leveraging of market power to force rivals out of the market.[142]

7.4 Structural versus Contractual Issues

In our analysis of portfolio effects and throughout this report, we have emphasized the structural aspects of a market. We believe that increased attention should be placed on contractual relationships that can equally well lead to a substantial lessening of competition. There is a direct parallel here to our discussion of remedies. An antitrust problem can be solved though a structural or contractual (behavioural) remedy. It can also be caused through a structural or contractual arrangement. Just as European antitrust authorities have a preference for structural over contractual remedies, they also have placed most of their attention on the effect of structural changes, such as mergers. We believe more attention should be placed on the potential impact of contractual relationships.

Many of the results of a merger can be achieved through a contract. This is especially true in the case of vertical relationships and in complementor relationships. Contractual agreements that lead to the same result as a merger should not avoid scrutiny simply because they do not lead to the combination of two firms.

We also note that contractual agreements can create a problem even without the presence or creation of a dominant firm. A good example of this is a most-favoured customer clause. A firm which has such a clause in its contract with customers will find it harder to respond to an attack by a competitor. In that sense, this will make competitors more aggressive and the market more competitive. But, if all firms have such contracts, then no one has an incentive to be aggressive. Other contracts that may give rise to concern are exclusivity contracts and meet-the-competition clauses.

141 It is possible to argue for both effects if one arises as a result of a competitor relationship and another arises from the complementor relationship. Here, the two effects are coming from the same relationship.

142 It is possible but unlikely that bundling could create market leverage. There is no opportunity to bundle where the customer is choosing between paper and plastic as a *single* packaging material. To the extent that customers are looking to buy more than one packaging solution, the seller might find it worthwhile to offer package discounts or volume discounts (e.g., a price reduction for buying two paper solutions). There is no double marginalisation problem in that the customer gets value from each product on its own. The incentive to bundle is that it might lead to better price discrimination, as described in Section 4.3.2. But given the high marginal costs of packaging, this will not be attractive unless most customers are interested in multiple solutions. Also, to the extent that prices are negotiated, there is less incentive to bundle.

8
Mathematical Annex

8.1 Annex A: The Connection Between Double Marginalisation and the Cournot Effect

Double marginalisation arises when a firm with market power sells its products to an intermediary, who then marks the product up again prior to selling it to the final consumer. The Cournot double marginalisation arises because there are two monopolists, each trying to earn all of the monopoly profits on its one part of a combined purchase. We illustrate both effects using a simple example.

Case 1: Customers buy cars with tyres and Mercedes merges with Pirelli.

Case 2: Customers buy cars without tyres, and Mercedes merges with Pirelli

In both cases, the end result is one supplier and one customer. In first case, the reason to merge is standard double marginalisation. In the second case, the reason to merge is the avoidance of Cournot double marginalisation.

The mathematics of the two cases are similar but not identical. We illustrate this using the case of linear demand curve, $D = 1 - p$.

Consider, first, case 1. Prior to the merger, Mercedes buys tyres from Pirelli at a price of c. For simplicity, we assume that tyres are the only cost. Mercedes then maximises

$$(p-c)(1 - p) \Rightarrow p^* = (1+c)/2.$$

Pirelli anticipates Mercedes pricing and maximises

$$c (1 - p^*) \text{ where } p^* = (1+c)/2.$$

This implies

$$c^* = 1/2, p^* = 3/4.$$

The result is inefficient, even for a monopolist. Combined industry profits would be higher at $p^* = 1/2$, $c^* = 0$. This is the standard double marginalisation effect. Turn now to case 2. If the customer buys the car and tyres separately, then:

Mercedes maximises	$p (1 - p - c)$
Pirelli maximises	$c (1 - p - c)$
and the result is	$p^* = c^* = 1/3$

The result is still inefficient. Coordinated pricing leads to higher profits for both firms when p = c = 1/4 or p + c = 1/2.

Note that the two cases are not quite the same. The reason is that, with the vertical relationship (Mercedes buys from Pirelli), we have a first-mover/second-mover game.

Imagine, instead, that Mercedes employs a fixed markup rule (and can commit to it). If markup is m, then Mercedes maximises

$$m\ (1 - c - m).$$

Pirelli maximises

$$c\ (1 - c - m).$$

This leads to exactly the same results as the complements case. Thus, the only substantive difference between the Cournot double marginalisation and the standard vertical double marginalisation is that, in the vertical relationship, there may be a first mover. If we eliminate the first mover - by setting a markup - then the two cases are truly the same.

This leads to a curious question. Typically, the elimination of double marginalisation is viewed as an efficiency-enhancing aspect of a vertical merger. Why is the same not true of a horizontal merger of complements? Or, turning this around, why is there not the same concern that in an oligopoly, a firm that completes a vertical merger will have an advantage over non-integrated rivals who will have less efficient pricing?

Our general view is that antitrust policy towards horizontal mergers of complements has much to learn from the better-developed literature on vertical integration. It may also have something to teach.

8.2 Annex B: Metering Math Model

In this annex, we illustrate how metering can be used as a price discrimination tool using the example of copying machines. We assume that a consumer can buy copies in the marketplace at a constant price premium of E compared to the cost when a machine is on site. This price represents both the additional financial cost of outsourcing the copying and the time and hassle associated with not having the copying machines on site.

The consumer will purchase a machine if the savings justify the purchase cost. We assume that a machine is sold at price P and comes with an additional charge (possibly zero) of S per copy. Customers differ only in their demand for copies, as measured by D. Thus, a customer with demand D will purchase a machine if and only if

$$P < (E-S)*D$$

We assume that this demand is unobservable and distributed across the population with a cumulate distribution F(D). Absent metering, the firm is forced to charge a price of S=0. The optimal price maximises

$$P^*[1 - F(P/E)],$$

where, for simplicity, we assume that the marginal cost of the machine is zero. In contrast, if the firm can also set a per-copy charge of S, then the firm maximises

$$\int_{P/(E-S)}^{D\max} (P+Sx)f(x)dx$$

Assume that P* is the optimal price when S is required to be zero. Let the marginal consumer be denoted by D*, where D* = P*/E.

The firm can lower D and raise S so as to keep the marginal consumer indifferent. Thus, demand will stay constant, but all customers with demands above D* will pay more. Thus, the firm will always make more money when it can price discriminate. This demonstrates the firm's incentive to price discriminate.

Printed in the UK on recycled paper with a minimum HMSO score of 75
February 2003 Department of Trade and Industry. http://www.dti.gov.uk