

5-15-2020

The Economics and Antitrust of Bundling

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Recommended Citation

Rajeev R. Bhattacharya, *The Economics and Antitrust of Bundling*, 13 J. Bus. Entrepreneurship & L. 1 (2020)

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THE ECONOMICS AND ANTITRUST OF BUNDLING¹

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April 2020

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¹ I sincerely thank Joseph Bial, Michael McDonald, Rebecca Nelson, and participants at the Bar Association of Metro St. Louis for comments. I am very grateful to Ashley Winograd for her research assistance. I do not have any conflicts of interest and the usual disclaimers apply.

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ABSTRACT

This article explains the economics and antitrust of bundling. I first show that popular arguments such as demand complementarities, economies of scope, and price discrimination are not sufficient to explain bundling. I then detail potentially anticompetitive factors such as leverage and opacity. I then use examples to show how variation in consumer valuations explains bundling and is not anticompetitive. Finally, I explore other business judgment rule explanations for bundling.

Keywords: Pure and Mixed Bundles, Demand Complementarities, Economies of Scope, Price Discrimination, Tie-In, Correlation of Demand, Antitrust Litigation, Monopoly Power, Lerner Index, *NCAA v. Board of Regents*

I. INTRODUCTION

Bundling is common (e.g., cable, newspapers), but the economics and antitrust of bundling are poorly understood and worse, grossly misunderstood, by the legal profession. First, I examine the popular arguments advanced for bundling, in particular, demand complementarities, economies of scope, and price discrimination, and show that they do not suffice to explain bundling. Second, I examine potentially anticompetitive factors such as leverage and opacity. Third, I use simple examples to show how bundling is optimal under negative correlation of demand across consumers, and in addition, if there is a wide dispersion in valuations across consumers, then mixed bundling dominates pure bundling. Finally, I explore other business judgment rules such as one-stop shopping and when the bundled product is a significantly different product from the sum of its components.

II. DEFINITIONS AND NOTATIONS

For simplicity, let there be two goods, X and Y , and let the bundle XY consist of one unit of each good. Let P_X and P_Y denote prices of the component goods, X and Y , and let P_{XY} denote the price of the bundle XY .

A. Pure Bundle

P_X and P_Y are each at least as high as P_{XY} . If component X is not for sale, then P_X can be thought of as infinite; and similarly, for component Y .

B. Mixed Bundle

P_X and P_Y are each smaller than P_{XY} , but P_{XY} is smaller than $P_X + P_Y$.

C. Tying

Let X be the tying good and Y be the tied good. P_X is infinite.

III. POPULAR ARGUMENTS

Many reasons are popularly advanced to justify bundling. In this article, I demonstrate that these popular reasons fail to explain the economics of bundling.

A. Demand Complementarities

Consider the situation where multiple products are sold to each customer (e.g., mobile handset and service). Under complementarities of demand, there clearly are advantages to selling both products to each customer, but this argument does not provide a *per se* justification for bundling. However, demand complementarities would make bundling even more attractive to the supplier.

B. Economies of Scope

Economies of scope make it advantageous to supply multiple products (e.g., DSL broadband and telephony). However, economies of scope do not provide a *per se* justification for bundling, even though economies of scope would make bundling even more attractive to the supplier.³

C. Price Discrimination

Price discrimination is often observed on top of bundled offerings (e.g., “free” premium channels on cable TV for a limited period of time). Such price discrimination would make bundling even more attractive to the supplier.

D. Potentially Anticompetitive Factors

There are potentially anti-competitive factors for bundling.

³ See David S. Evans & Michael Salinger, *Why Do Firms Bundle and Tie? Evidence from Competitive Markets and Implications for Tying Law*, 22 YALE J. ON REG. (2005).

E. Leverage

Consider a situation in which a firm has high market power in good *X*, but a weak presence in the market for good *Y*, which is complementary to good *X* (e.g., Microsoft Windows and Internet Explorer). By tying good *X* to good *Y*, a company can potentially increase the market share of good *Y*. This can cause potential foreclosure or barrier to entry, which decreases rivals' output and profits. It also causes less research and development expenditure by rivals, decreasing rivals' future prospects.

F. Opacity

By bundling its products, a supplier can reduce the transparency of its pricing, cost structure, or both. This is particularly important for regulated industries. Examples include "triple play" (cable TV, broadband, and telephony).

G. Product Differentiation

Bundling can increase product differentiation. For example, bundling a durable product with a service (e.g., car and warranty, mobile phone, and service) potentially increases product differentiation.⁴

Such product differentiation can increase consumer utility, which would be pro-competitive.⁵ However, such product differentiation can be superfluous, provide barriers to entry, or be used for predatory purposes, which would be anticompetitive.⁶ Product differentiation can also soften price competition, which would also be anticompetitive.⁷ Thus, bundling that increases product differentiation has an ambiguous effect on competition.⁸

H. Variation in Consumer Values

Bundling under variation in consumer values is not anticompetitive and is arguably a business-judgment factor. Several examples show that under negative correlation of demand, pure bundling is better for the firm than not bundling; and under wide variations in customer valuations, mixed bundling is better for the firm than pure bundling. Several examples also show that under

⁴ *Id.*

⁵ Shon M. Ferguson, *Endogenous Product Differentiation, Market Size and Prices*, REV. OF INT'L ECON. (Oct. 6, 2014), <https://www.onlinelibrary.wiley.com/doi/abs/10.1111/roie/12159>.

⁶ James Williams, *Advantages and Disadvantages of Product Differentiation*, CHRON (Jan. 25, 2019), <https://www.smallbusiness.chron.com/advantages-disadvantages-product-differentiation-66126.html>.

⁷ *Id.*

⁸ *Id.*

positive correlation of demand, bundling and not bundling yield the same profit to the supplier.

IV. PURE BUNDLE VERSUS SEPARATE PRODUCTS UNDER NEGATIVE CORRELATION OF DEMAND

To isolate the fundamental reason behind bundling, consider a situation absent of demand complementarities, economies of scope, and price discrimination. If the valuations of the component goods are negatively correlated across consumers (e.g., if customers who value Microsoft Word more highly tend to value Microsoft Excel less highly), then a pure bundle provides more profit than selling the components separately. I show below that these results remain the same even if demand complementarities and economies of scope are overlaid on top of negatively correlated demand.⁹

Consider the scenario where the marginal cost of Word and Excel is \$5 each—the costs are additive because of the lack of (dis)economies of scope. The valuations of Word and Excel across five consumers, A to E, have a correlation coefficient of -0.98 . For each customer, the valuation for Word and Excel together equals the sum of the customer's valuations of Word and Excel—this follows from the lack of complementarity or substitution of demand.

At unbundled offerings, the optimal price of Word is the lowest among the individual values of Word—this (\$130) is the highest price at which every single customer buys Word. Profit from the purchase of Word by each customer is $\$130 - \$5 = \$125$. Similarly, at unbundled offerings, the optimal price of Excel is \$128, and the profit from the purchase of Excel by each customer is $\$128 - \$5 = \$123$. Total profit at unbundled offerings equals $5 \times (\$125 + \$123) = \$1,240$.

The marginal cost of the bundle is $\$5 + \$5 = \$10$, from lack of (dis)economies of scope. The highest price at which every customer buys the bundle (\$295) is the lowest among the individual values of the bundle—note that this price is greater than the sum of the unbundled prices (\$130 and \$128) due to negative correlation of demand. Profit from the purchase of the bundle by each customer is $\$295 - \$10 = \$285$. Total profit at pure bundle equals $5 \times \$285 = \$1,425$, which is higher than the total profit at the unbundled offerings (\$1,240).

Market power of the supplier in a particular market was defined in *NCAA v. Board of Regents* as “the ability to raise prices above those that would

⁹ See, e.g., William Adams & Janet Yellen, *Commodity Bundling and the Burden of Monopoly*, 90 Q. J. ECON. 475, 483 (1976); Preston McAfee, et al., *Multiproduct Monopoly, Commodity Bundling, and Correlation of Values*, 104 Q. J. ECON. 371, 376 (1989).

be charged in a competitive market.”¹⁰ Since price in a competitive market equals marginal cost, the **Lerner Index** [(price – marginal cost) / price = (price – competitive price) / price] is a measure of market power.¹¹ Also, under profit maximization, Lerner Index = $-1/(\text{own-price elasticity of demand})$ is an increasing function of own-price elasticity; this, therefore, is a very strong and convincing reason for the Lerner Index to be considered a measure of market power. The idea of a “relevant market,” and therefore, market shares and concentration ratios, is tangential to the notion of market power; for example, a firm facing a more elastic demand curve for its particular product (say, with own-price elasticity of demand = -2) will, under profit-maximization, charge a price 100% above competitive price whereas a firm facing a less elastic demand curve for its particular product (say, with own-price elasticity of demand = -1.1) will, under profit-maximization, charge a price 1,000% above competitive price, *irrespective* of how many firms there might be, or how high the concentration might be, in some definition of a “relevant market” that may be of interest to a lawyer not familiar with microeconomics but not to an industrial organization economist.^{12,13} However, I do *not* take a position on whether high market power is grounds for antitrust remedies.

Here, I see that the Lerner Index is 0.96 in each of the unbundled markets for Word and Excel, whereas the Lerner Index is 0.97 for the bundled product.

¹⁰ *NCAA v. Bd. of Regents of U. of Okla.*, 468 U.S. 85, 109 n.38 (1984).

¹¹ See A. P. Lerner, *The Concept of Monopoly and the Measurement of Monopoly Power*, 1 REV. ECON. STUD. 157, 164 (1934); Kenneth Elzinga & David Mills, *The Lerner Index of Monopoly Power: Origins and Uses*, 101 AM. ECON. REV. 558, 560 (2011).

¹² Because, under profit-maximization, $(p^* - p^0)/p^* = -1/(\text{own-price elasticity of demand})$, which implies that $(p^* - p^0)/p^0 = -1/(1 + \text{own-price elasticity of demand})$, where p^* is profit-maximizing price and p^0 is competitive price, and since profit maximization by a particular firm only occurs at an elastic part of the demand curve for its own product (i.e., where own-price elasticity of demand < -1). See, for example, Nobel Prize-winning work by Jean Tirole, *The Theory of Industrial Organization*, MIT Press, 2000, and the classic in legal scholarship, William Landes and Richard Posner, “Market Power in Antitrust Cases,” *Harvard Law Review*, 1981.

¹³ “Market definition is an artificial construction created by antitrust litigation. For any other purpose of economic analysis, the binary question of whether particular firms or products are ‘in’ or ‘out’ of a given market is a meaningless one.” Franklin Fisher, “Mergers: Triage and Treatment,” *Journal of Economic Perspectives*, 1987.

	MS Word	MS Excel	Sum						
Marginal Cost	\$5	\$5	\$10	Additive	At Unbundled Offerings			At Pure Bundle	
					Price of Word	Price of Excel	Total	Price of Bundle	
					\$130	\$128		\$295	
Customer Values					Profit With Separate Prices			Profit at Pure Bundle	
Customer A	\$130	\$166	\$296	Additive	\$125	\$123	\$248	\$285	
Customer B	\$140	\$155	\$295		\$125	\$123	\$248	\$285	
Customer C	\$150	\$152	\$302		\$125	\$123	\$248	\$285	
Customer D	\$160	\$143	\$303		\$125	\$123	\$248	\$285	
Customer E	\$170	\$128	\$298		\$125	\$123	\$248	\$285	
Lowest	\$130	\$128	\$295				\$1,240	\$1,425	
Highest	\$170	\$166	\$303						
Correlation Coefficient (between Customer Values for Word and Excel)		-0.98		Lerner Index	0.96	0.96		0.97	

Now consider the situation where everything else remains the same, but the marginal cost of Word and Excel is \$30 each. At unbundled offerings, the optimal price of Word is the lowest among the individual values of Word—this (\$130) is again the highest price at which every single customer buys Word. Profit from the purchase of Word by each customer is $\$130 - \$30 = \$100$. Similarly, at unbundled offerings, the optimal price of Excel is again \$128, and the profit from the purchase of Excel by each customer is $\$128 - \$30 = \$98$. Total profit at unbundled offerings equals $5 \times (\$100 + \$98) = \$990$.

The marginal cost of the bundle is $\$30 + \$30 = \$60$, from lack of (dis)economies of scope. The highest price at which every customer buys the bundle is the lowest among the individual values of the bundle (again \$295)—note again that this price is greater than the sum of the unbundled prices \$130 and \$128 due to negative correlation of demand. Profit from the purchase of the bundle by each customer is $\$295 - \$60 = \$235$. Total profit at pure bundle equals $5 \times \$235 = \$1,175$, which is higher than the total profit at the unbundled offerings (\$990).

Here, I see that the Lerner Index is 0.77 in each of the unbundled markets for Word and Excel, whereas the Lerner Index is 0.80 for the bundled product.

	MS Word	MS Excel	Sum						
Marginal Cost	\$30	\$30	\$60	Additive	At Unbundled Offerings			At Pure Bundle	
					Price of Word	Price of Excel	Total	Price of Bundle	
					\$130	\$128		\$295	
Customer Values					Profit With Separate Prices			Profit at Pure Bundle	
Customer A	\$130	\$166	\$296	Additive	\$100	\$98	\$198	\$235	
Customer B	\$140	\$155	\$295		\$100	\$98	\$198	\$235	
Customer C	\$150	\$152	\$302		\$100	\$98	\$198	\$235	
Customer D	\$160	\$143	\$303		\$100	\$98	\$198	\$235	
Customer E	\$170	\$128	\$298		\$100	\$98	\$198	\$235	
Lowest	\$130	\$128	\$295				\$990	\$1,175	
Highest	\$170	\$166	\$303						
Correlation Coefficient (between Customer Values for Word and Excel)		-0.98		Lerner Index	0.77	0.77		0.80	

Now consider the situation where everything else remains the same, but the marginal cost of Word and Excel is \$100 each. At unbundled offerings, the optimal price of Word is the lowest among the individual values of Word—this (\$130) is again the highest price at which every single customer buys Word. Profit from the purchase of Word by each customer is $\$130 - \$100 =$

\$30. Similarly, at unbundled offerings, the optimal price of Excel is again \$128, and the profit from the purchase of Excel by each customer is $\$128 - \$100 = \$28$. Total profit at unbundled offerings equals $5 \times (\$30 + \$28) = \$290$.

The marginal cost of the bundle is $\$100 + \$100 = \$200$, from lack of (dis)economies of scope. The highest price at which every customer buys the bundle is the lowest among the individual values of the bundle (again \$295). Profit from the purchase of the bundle by each customer is $\$295 - \$200 = \$95$. Total profit at pure bundle equals $5 \times \$95 = \475 , which is higher than the total profit at the unbundled offerings (\$290).

Here, I see that the Lerner Index is 0.77 in each of the unbundled markets for Word and Excel, whereas the Lerner Index is 0.80 for the bundled product.

	MS Word	MS Excel	Sum					
Marginal Cost	\$30	\$30	\$60	Additive	At Unbundled Offerings			At Pure Bundle
					Price of Word	Price of Excel	Total	Price of Bundle
					\$130	\$128		\$295
Customer Values					Profit With Separate Prices			Profit at Pure Bundle
Customer A	\$130	\$166	\$296	Additive	\$100	\$98	\$198	\$235
Customer B	\$140	\$155	\$295		\$100	\$98	\$198	\$235
Customer C	\$150	\$152	\$302		\$100	\$98	\$198	\$235
Customer D	\$160	\$143	\$303		\$100	\$98	\$198	\$235
Customer E	\$170	\$128	\$298		\$100	\$98	\$198	\$235
Lowest	\$130	\$128	\$295				\$990	\$1,175
Highest	\$170	\$166	\$303					
Correlation Coefficient (between Customer Values for Word and Excel)		-0.98		Lerner Index	0.77	0.77		0.80

Now consider the situation where everything else remains the same, but the marginal cost of Word and Excel is \$100 each.

At unbundled offerings, the optimal price of Word is the lowest among the individual values of Word — this (\$130) is again the highest price at which every single customer buys Word. Profit from the purchase of Word by each customer is $\$130 - \$100 = \$30$. Similarly, at unbundled offerings, the optimal price of Excel is again \$128, and the profit from the purchase of Excel by each customer is $\$128 - \$100 = \$28$. Total profit at unbundled offerings equals $5 \times (\$30 + \$28) = \$290$.

The marginal cost of the bundle is $\$100 + \$100 = \$200$, from lack of (dis)economies of scope. The highest price at which every customer buys the bundle is the lowest among the individual values of the bundle (again \$295). Profit from the purchase of the bundle by each customer is $\$295 - \$200 = \$95$. Total profit at pure bundle equals $5 \times \$95 = \475 , which is higher than the total profit at the unbundled offerings (\$290).

Here, I see that the Lerner Index is 0.23 in the market for Word and 0.22 in the market for Excel, whereas the Lerner Index is 0.32 for the bundled product.

	MS Word	MS Excel	Sum					
Marginal Cost	\$100	\$100	\$200	Additive	At Unbundled Offerings			At Pure Bundle
					Price of Word	Price of Excel	Total	Price of Bundle
					\$130	\$128		\$295
Customer Values	Profit With Separate Prices							Profit at Pure Bundle
Customer A	\$130	\$166	\$296	Additive	\$30	\$28	\$58	\$95
Customer B	\$140	\$155	\$295		\$30	\$28	\$58	\$95
Customer C	\$150	\$152	\$302		\$30	\$28	\$58	\$95
Customer D	\$160	\$143	\$303		\$30	\$28	\$58	\$95
Customer E	\$170	\$128	\$298		\$30	\$28	\$58	\$95
Lowest	\$130	\$128	\$295				\$290	\$475
Highest	\$170	\$166	\$303					
Correlation Coefficient (between Customer Values for Word and Excel)		-0.98		Lerner Index	0.23	0.22		0.32

Now, consider a situation where everything else remains the same, but the marginal cost of both Word and Excel is \$120.

At unbundled offerings, the optimal price of Word at \$130 is the lowest among the individual values of Word—again, this is the highest price at which every single customer buys Word. Profit from the purchase of Word is $\$130 - \$120 = \$10$. Similarly, at unbundled offerings, the optimal price of Excel is \$128, and the profit from the purchase of Excel is $\$128 - \$120 = \$8$. Therefore, total profit at unbundled offerings equals $5 \times (\$10 + \$8) = \$90$.

The marginal cost of the bundle is $\$120 + \$120 = \$240$, which is a result of a lack of (dis)economies of scope. The highest price at which every customer buys the bundle is again \$295, making it the lowest among the individual values of the bundle. Profit from the purchase of the bundle is $\$295 - \$240 = \$55$. Therefore, total profit at pure bundle equals $5 \times \$55 = \275 , which is higher than the total profit of \$90 at the unbundled offerings.

The total profit from the pure bundle is \$275, which is higher than the total profit of \$90 from the unbundled offerings. Here, I see that the Lerner Index is 0.08 in the market for Word and 0.06 in the market for Excel, whereas the Lerner Index is 0.19 for the bundled product.

	MS Word	MS Excel	Sum					
Marginal Cost	\$120	\$120	\$240	Additive	At Unbundled Offerings			At Pure Bundle
					Price of Word	Price of Excel	Total	Price of Bundle
					\$130	\$128		\$295
Customer Values	Profit With Separate Prices							Profit at Pure Bundle
Customer A	\$130	\$166	\$296	Additive	\$10	\$8	\$18	\$55
Customer B	\$140	\$155	\$295		\$10	\$8	\$18	\$55
Customer C	\$150	\$152	\$302		\$10	\$8	\$18	\$55
Customer D	\$160	\$143	\$303		\$10	\$8	\$18	\$55
Customer E	\$170	\$128	\$298		\$10	\$8	\$18	\$55
Lowest	\$130	\$128	\$295				\$90	\$275
Highest	\$170	\$166	\$303					
Correlation Coefficient (between Customer Values for Word and Excel)		-0.98		Lerner Index	0.08	0.06		0.19

To ensure that the results are not a function of the fact that the marginal costs of Word and Excel have been equal in the previous examples, I now consider a situation where everything else remains the same, but the marginal cost of Word is \$5 and that of Excel is \$120.

At unbundled offerings, the optimal price of Word at \$130 is the lowest among the individual values of Word—again, this is the highest price at which every single customer buys Word. Profit from the purchase of Word is $\$130 - \$5 = \$125$. Similarly, at unbundled offerings, the optimal price of Excel is \$128, and the profit from the purchase of Excel is $\$128 - \$120 = \$8$. Therefore, total profit at unbundled offerings equals $5 \times (\$125 + \$8) = \$665$.

The marginal cost of the bundle is $\$5 + \$120 = \$125$, which is a result of a lack of (dis)economies of scope. The highest price at which every customer buys the bundle is \$295, making it again the lowest among the individual values of the bundle. Profit from the purchase of the bundle by each customer is $\$295 - \$125 = \$170$. Total profit at pure bundle equals $5 \times \$170 = \850 , which is higher than the total profit at the unbundled offerings (\$665).

Here, I see that the Lerner Index is 0.96 in the market for Word and 0.06 in the market for Excel, whereas the Lerner Index is 0.58 for the bundled product.

	MS Word	MS Excel	Sum						
Marginal Cost	\$5	\$120	\$125	Additive	At Unbundled Offerings			At Pure Bundle	
					Price of Word	Price of Excel	Total	Price of Bundle	
					\$130	\$128		\$295	
Customer Values					Profit With Separate Prices			Profit at Pure Bundle	
Customer A	\$130	\$166	\$296	Additive	\$125	\$8	\$133	\$170	
Customer B	\$140	\$155	\$295		\$125	\$8	\$133	\$170	
Customer C	\$150	\$152	\$302		\$125	\$8	\$133	\$170	
Customer D	\$160	\$143	\$303		\$125	\$8	\$133	\$170	
Customer E	\$170	\$128	\$298		\$125	\$8	\$133	\$170	
Lowest	\$130	\$128	\$295				\$665	\$850	
Highest	\$170	\$166	\$303						
Correlation Coefficient (between Customer Values for Word and Excel)		-0.98		Lerner Index	0.96	0.06		0.58	

In a similar vein, I now consider a situation where everything else remains the same, but the marginal cost of Word is \$5 and that of Excel is \$50.

At unbundled offerings, the optimal price of Word at \$130 is the lowest among the individual values of Word—again, this is the highest price at which every single customer buys Word. Profit from the purchase of Word is $\$130 - \$5 = \$125$. Similarly, at unbundled offerings, the optimal price of Excel is \$128, and the profit from the purchase of Excel is $\$128 - \$50 = \$78$. Therefore, total profit at unbundled offerings equals $5 \times (\$125 + \$78) = \$1,015$.

The marginal cost of the bundle is $\$5 + \$50 = \$55$, from lack of (dis)economies of scope. The highest price at which every customer buys the bundle is the lowest among the individual values of the bundle (again \$295). Profit from the purchase of the bundle by each customer is $\$295 - \$55 = \$240$. Total profit at pure bundle equals $5 \times \$240 = \$1,200$, which is higher than the total profit at the unbundled offerings (\$1,015).

Here, I see that the Lerner Index is 0.96 in the market for Word and 0.61 in the market for Excel, whereas the Lerner Index is 0.81 for the bundled product.

	MS Word	MS Excel	Sum						
Marginal Cost	\$5	\$50	\$55	Additive	At Unbundled Offerings			At Pure Bundle	
					Price of Word	Price of Excel	Total	Price of Bundle	
					\$130	\$128		\$295	
Customer Values					Profit With Separate Prices			Profit at Pure Bundle	
Customer A	\$130	\$166	\$296	Additive	\$125	\$78	\$203	\$240	
Customer B	\$140	\$155	\$295		\$125	\$78	\$203	\$240	
Customer C	\$150	\$152	\$302		\$125	\$78	\$203	\$240	
Customer D	\$160	\$143	\$303		\$125	\$78	\$203	\$240	
Customer E	\$170	\$128	\$298		\$125	\$78	\$203	\$240	
Lowest	\$130	\$128	\$295				\$1,015	\$1,200	
Highest	\$170	\$166	\$303						
Correlation Coefficient (between Customer Values for Word and Excel)		-0.98		Lerner Index	0.96	0.61		0.81	

V. PURE BUNDLE VERSUS SEPARATE PRODUCTS UNDER

POSITIVE CORRELATION OF DEMAND [FN 6]

The above results do not hold if the valuations are positively correlated.¹⁴ Consider first the scenario where the marginal cost of Word and Excel is \$5 each—as before, the costs are additive because of lack of (dis)economies of scope. The valuation of Word and Excel across five consumers A to E has a correlation coefficient of 0.82. For each customer, the valuation for Word and Excel together equals the sum of the customer’s valuations of Word and Excel—as before, this follows from the lack of complementarity or substitution of demand.

At unbundled offerings, the optimal price of Word is the lowest among the individual values of Word; this (\$130) is the highest price at which every single customer buys Word. Profit from the purchase of Word by each customer is $\$130 - \$5 = \$125$. Similarly, at unbundled offerings, the optimal price of Excel is \$166, and the profit from the purchase of Excel by each customer is $\$166 - \$5 = \$161$. Total profit at unbundled offerings equals $5 \times (\$125 + \$161) = \$1,430$.

The marginal cost of the bundle is $\$5 + \$5 = \$10$. The highest price at which every customer buys the bundle is the lowest among the individual values of the bundle (namely, \$296). Note that this price is equal to the sum of the unbundled prices \$130 and \$166 due to positive correlation of demand. Profit from the purchase of the bundle by each customer is $\$296 - \$10 = \$286$. Total profit at pure bundle equals $5 \times \$286 = \$1,430$, which is the same as the total profit at the unbundled offerings (i.e., under positively correlated demand,

¹⁴ See William Adams and Janet Yellen, *Commodity Bundling and the Burden of Monopoly*, Q. J. OF ECON. (1976); see also Preston McAfee, John McMillan, and Michael Whinston, *Multiproduct Monopoly, Commodity Bundling, and Correlation of Values*, Q. J. OF ECON. (1989).

in the absence of economies of scope and demand complementarities, there is no advantage to bundling).

Here, I see that the Lerner Index is 0.96 in the unbundled market for Word and 0.97 in that for Excel, whereas the Lerner Index is 0.97 for the bundled product.

	MS Word	MS Excel	Sum						
Marginal Cost	\$5	\$5	\$10	Additive	At Unbundled Offerings			At Pure Bundle	
					Price of Word	Price of Excel	Total	Price of Bundle	
					\$130	\$166		\$296	
Customer Values					Profit With Separate Prices			Profit at Pure Bundle	
Customer A	\$130	\$166	\$296	Additive	\$125	\$161	\$286	\$286	
Customer B	\$140	\$167	\$307		\$125	\$161	\$286	\$286	
Customer C	\$150	\$189	\$339		\$125	\$161	\$286	\$286	
Customer D	\$160	\$175	\$335		\$125	\$161	\$286	\$286	
Customer E	\$170	\$200	\$370		\$125	\$161	\$286	\$286	
Lowest	\$130	\$166	\$296				\$1,430	\$1,430	
Highest	\$170	\$200	\$370						
Correlation Coefficient (between Customer Values for Word and Excel)	0.82			Lerner Index	0.96	0.97		0.97	

Now consider the situation where everything else remains the same, but the marginal cost of Word and Excel is \$30 each.

At unbundled offerings, the optimal price of Word is the lowest among the individual values of Word; this (\$130) is again the highest price at which every single customer buys Word. Profit from the purchase of Word by each customer is $\$130 - \$30 = \$100$. Similarly, at unbundled offerings, the optimal price of Excel is again \$166, and the profit from the purchase of Excel by each customer is $\$166 - \$30 = \$136$. Total profit at unbundled offerings equals $5 \times (\$100 + \$136) = \$1,180$.

The marginal cost of the bundle is $\$30 + \$30 = \$60$, because of lack of (dis)economies of scope. The highest price at which every customer buys the bundle is the lowest among the individual values of the bundle (again \$296). Note again that this price is equal to the sum of the unbundled prices \$130 and \$166 due to positive correlation of demand. Profit from the purchase of the bundle by each customer is $\$296 - \$60 = \$236$. Total profit at pure bundle equals $5 \times \$236 = \$1,180$, which is the same as the total profit at the unbundled offerings (i.e., under positively correlated demand, in the absence of economies of scope and demand complementarities, there is no advantage to bundling).

Here, I see that the Lerner Index is 0.77 in the market for Word and 0.82 in the market for Excel, whereas the Lerner Index is 0.80 for the bundled product.

	MS Word	MS Excel	Sum						
Marginal Cost	\$30	\$30	\$60	Additive	At Unbundled Offerings			At Pure Bundle	
					Price of Word	Price of Excel	Total	Price of Bundle	
					\$130	\$166		\$296	
Customer Values					Profit With Separate Prices			Profit at Pure Bundle	
Customer A	\$130	\$166	\$296	Additive	\$100	\$136	\$236	\$236	
Customer B	\$140	\$167	\$307		\$100	\$136	\$236	\$236	
Customer C	\$150	\$189	\$339		\$100	\$136	\$236	\$236	
Customer D	\$160	\$175	\$335		\$100	\$136	\$236	\$236	
Customer E	\$170	\$200	\$370		\$100	\$136	\$236	\$236	
Lowest	\$130	\$166	\$296				\$1,180	\$1,180	
Highest	\$170	\$200	\$370						
Correlation Coefficient (between Customer Values for Word and Excel)	0.82			Lerner Index	0.77	0.82		0.80	

Now consider the situation where everything else remains the same, but the marginal cost of Word and Excel is \$100 each.

At unbundled offerings, the optimal price of Word is the lowest among the individual values of Word; this (\$130) is again the highest price at which every single customer buys Word. Profit from the purchase of Word by each customer is $\$130 - \$100 = \$30$. Similarly, at unbundled offerings, the optimal price of Excel is again \$166, and the profit from the purchase of Excel by each customer is $\$166 - \$100 = \$66$. Total profit at unbundled offerings equals $5 \times (\$30 + \$66) = \$480$.

The marginal cost of the bundle is $\$100 + \$100 = \$200$, because of lack of (dis)economies of scope. The highest price at which every customer buys the bundle is the lowest among the individual values of the bundle (again \$296). Profit from the purchase of the bundle by each customer is $\$296 - \$200 = \$96$. Total profit at pure bundle equals $5 \times \$96 = \480 , which is the same as the total profit at the unbundled offerings (i.e., under positively correlated demand, in the absence of economies of scope and demand complementarities, there is no advantage to bundling).

Here, I see that the Lerner Index is 0.23 in the market for Word and 0.40 in the market for Excel, whereas the Lerner Index is 0.32 for the bundled product.

	MS Word	MS Excel	Sum						
Marginal Cost	\$100	\$100	\$200	Additive	At Unbundled Offerings			At Pure Bundle	
					Price of Word	Price of Excel	Total	Price of Bundle	
					\$130	\$166		\$296	
Customer Values					Profit With Separate Prices			Profit at Pure Bundle	
Customer A	\$130	\$166	\$296	Additive	\$30	\$66	\$96	\$96	
Customer B	\$140	\$167	\$307		\$30	\$66	\$96	\$96	
Customer C	\$150	\$189	\$339		\$30	\$66	\$96	\$96	
Customer D	\$160	\$175	\$335		\$30	\$66	\$96	\$96	
Customer E	\$170	\$200	\$370		\$30	\$66	\$96	\$96	
Lowest	\$130	\$166	\$296				\$480	\$480	
Highest	\$170	\$200	\$370						
Correlation Coefficient (between Customer Values for Word and Excel)	0.82			Lerner Index	0.23	0.40		0.32	

Now consider the situation where everything else remains the same, but the marginal cost of Word and Excel is \$120 each.

At unbundled offerings, the optimal price of Word is the lowest among the individual values of Word—this (\$130) is again the highest price at which every single customer buys Word. Profit from the purchase of Word by each customer is $\$130 - \$120 = \$10$. Similarly, at unbundled offerings, the optimal price of Excel is again \$166, and the profit from the purchase of Excel by each customer is $\$166 - \$120 = \$46$. Total profit at unbundled offerings equals $5 \times (\$10 + \$46) = \$280$.

The marginal cost of the bundle is $\$120 + \$120 = \$240$, because of lack of (dis)economies of scope. The highest price at which every customer buys the bundle is the lowest among the individual values of the bundle (again \$296). Profit from the purchase of the bundle by each customer is $\$296 - \$240 = \$56$. Total profit at pure bundle equals $5 \times \$56 = \280 , which is the same as the total profit at the unbundled offerings (i.e., under positively correlated demand, in the absence of economies of scope and demand complementarities, there is no advantage to bundling).

Here, I see that the Lerner Index is 0.08 in the market for Word and 0.28 in the market for Excel, whereas the Lerner Index is 0.19 for the bundled product.

	MS Word	MS Excel	Sum						
Marginal Cost	\$120	\$120	\$240	Additive	At Unbundled Offerings			At Pure Bundle	
					Price of Word	Price of Excel	Total	Price of Bundle	
					\$130	\$166		\$296	
Customer Values					Profit With Separate Prices			Profit at Pure Bundle	
Customer A	\$130	\$166	\$296	Additive	\$10	\$46	\$56	\$56	
Customer B	\$140	\$167	\$307		\$10	\$46	\$56	\$56	
Customer C	\$150	\$189	\$339		\$10	\$46	\$56	\$56	
Customer D	\$160	\$175	\$335		\$10	\$46	\$56	\$56	
Customer E	\$170	\$200	\$370		\$10	\$46	\$56	\$56	
Lowest	\$130	\$166	\$296				\$280	\$280	
Highest	\$170	\$200	\$370						
Correlation Coefficient (between Customer Values for Word and Excel)		0.82		Lerner Index	0.08	0.28		0.19	

To assure ourselves that the results are not a function of the fact that the marginal costs of Word and Excel have been equal in the examples considered so far, now consider the situation where everything else remains the same, but the marginal cost of Word is \$5 and that of Excel is \$120.

At unbundled offerings, the optimal price of Word is the lowest among the individual values of Word—this (\$130) is again the highest price at which every single customer buys Word. Profit from the purchase of Word by each customer is $\$130 - \$5 = \$125$. Similarly, at unbundled offerings, the optimal price of Excel is again \$166, and the profit from the purchase of Excel by each customer is $\$166 - \$120 = \$46$. Total profit at unbundled offerings equals $5 \times (\$125 + \$46) = \$855$.

The marginal cost of the bundle is $\$5 + \$120 = \$125$, because of lack of (dis)economies of scope. The highest price at which every customer buys the bundle is the lowest among the individual values of the bundle (again

\$296). Profit from the purchase of the bundle by each customer is $\$296 - \$125 = \$171$. Total profit at pure bundle equals $5 \times \$171 = \855 , which is the same as the total profit at the unbundled offerings (i.e., under positively correlated demand, in the absence of economies of scope and demand complementarities, there is no advantage to bundling).

Here, I see that the Lerner Index is 0.96 in the market for Word and 0.28 in the market for Excel, whereas the Lerner Index is 0.58 for the bundled product.

	MS Word	MS Excel	Sum					
Marginal Cost	\$5	\$120	\$125	Additive	At Unbundled Offerings			At Pure Bundle
					Price of Word	Price of Excel	Total	Price of Bundle
					\$130	\$166		\$296
Customer Values					Profit With Separate Prices			Profit at Pure Bundle
Customer A	\$130	\$166	\$296	Additive	\$125	\$46	\$171	\$171
Customer B	\$140	\$167	\$307		\$125	\$46	\$171	\$171
Customer C	\$150	\$189	\$339		\$125	\$46	\$171	\$171
Customer D	\$160	\$175	\$335		\$125	\$46	\$171	\$171
Customer E	\$170	\$200	\$370		\$125	\$46	\$171	\$171
Lowest	\$130	\$166	\$296				\$855	\$855
Highest	\$170	\$200	\$370					
Correlation Coefficient (between Customer Values for Word and Excel)		0.82		Lerner Index	0.96	0.28		0.58

Similarly, consider the situation where everything else remains the same, but the marginal cost of Word is \$5 and that of Excel is \$50.

At unbundled offerings, the optimal price of Word is the lowest among the individual values of Word—this (\$130) is again the highest price at which every single customer buys Word. Profit from the purchase of Word by each customer is $\$130 - \$5 = \$125$. Similarly, at unbundled offerings, the optimal price of Excel is again \$166, and the profit from the purchase of Excel by each customer is $\$166 - \$50 = \$116$. Total profit at unbundled offerings equals $5 \times (\$125 + \$116) = \$1,205$.

The marginal cost of the bundle is $\$5 + \$50 = \$55$, because of lack of (dis)economies of scope. The highest price at which every customer buys the bundle is the lowest among the individual values of the bundle (again \$296). Profit from the purchase of the bundle by each customer is $\$296 - \$55 = \$241$. Total profit at pure bundle equals $5 \times \$241 = \$1,205$, which is the same as the total profit at the unbundled offerings (i.e., under positively correlated demand, in the absence of economies of scope and demand complementarities, there is no advantage to bundling).

Here, I see that the Lerner Index is 0.96 in the market for Word and 0.70 in the market for Excel, whereas the Lerner Index is 0.81 for the bundled product.

	MS Word	MS Excel	Sum						
Marginal Cost	\$5	\$50	\$55	Additive	At Unbundled Offerings			At Pure Bundle	
					Price of Word	Price of Excel	Total	Price of Bundle	
					\$130	\$166		\$296	
Customer Values					Profit With Separate Prices			Profit at Pure Bundle	
Customer A	\$130	\$166	\$296	Additive	\$125	\$116	\$241	\$241	
Customer B	\$140	\$167	\$307		\$125	\$116	\$241	\$241	
Customer C	\$150	\$189	\$339		\$125	\$116	\$241	\$241	
Customer D	\$160	\$175	\$335		\$125	\$116	\$241	\$241	
Customer E	\$170	\$200	\$370		\$125	\$116	\$241	\$241	
Lowest	\$130	\$166	\$296				\$1,205	\$1,205	
Highest	\$170	\$200	\$370						
Correlation Coefficient (between Customer Values for Word and Excel)	0.82			Lerner Index	0.96	0.70		0.81	

VI. MIXED BUNDLE VERSUS PURE BUNDLE UNDER NEGATIVE CORRELATION OF DEMAND

In the absence of demand complementarities, economies of scope, and price discrimination, if the valuations of the component goods are negatively correlated across consumers and highly dispersed across customers, then a mixed bundle can provide more profit than a pure bundle.

Consider first the scenario where the marginal cost of Word and Excel is \$5 each—as before, the costs are additive because of lack of (dis)economies of scope. The valuation of Word and Excel across five consumers A to E has a correlation coefficient of -0.90 . As before, for each customer, the valuation for Word and Excel together equals the sum of the customer’s valuations of Word and Excel—this follows from the lack of complementarity or substitution of demand.

The marginal cost of the bundle is $\$5 + \$5 = \$10$, because of lack of (dis)economies of scope. The highest price at which every customer buys the pure bundle is the lowest among the individual values of the pure bundle (namely, \$252). Profit from the purchase of the pure bundle by each customer is $\$252 - \$10 = \$242$. Total profit at pure bundle equals $5 \times \$242 = \$1,210$.

However, customer A values Word at only \$27 but values Excel at \$250, whereas customer E values Word at \$220 but values Excel at only \$32. The supplier could target Excel separately to customer A—in which case, the supplier could charge \$250 for Excel separately, and make a profit of $\$250 - \$5 = \$245$ from customer A. The supplier could target Word separately to customer E—in which case, the supplier could charge \$220 for Word separately, and make a profit of $\$220 - \$5 = \$215$ from customer E. The bundle could then be targeted to the remaining customers B, C, and D, among whom the lowest value of the bundle is \$280, which would be the best price for the bundle—in which case, the supplier could make a profit of $\$280 - \$10 = \$270$ from each of the customers B, C, and D. The total profit from the mixed bundle, therefore, is $\$245 + \$215 + (3 \times \$270) = \$1,270$, higher than the profit

at the pure bundle (\$1,210). Note that the supplier offers the same schedule of prices to all the customers.

Here, I see that the Lerner Index is 0.96 for the pure bundle; whereas for the mixed bundle, it is 0.96 for the bundle, 0.98 for Word separately, and 0.98 for Excel separately.

	MS Word	MS Excel	Sum				At Pure Bundle				
Marginal Cost	\$5	\$5	\$10					At Mixed Bundle			
							Price of Bundle	Price of Word	Price of Excel	Total	
							\$252	\$280	\$220	\$250	
Customer Values							Profit at Pure Bundle	Profit At Mixed Bundle			
Customer A	\$27	\$250	\$277	\$277			\$242	\$0	\$0	\$245	\$245
Customer B	\$130	\$180	\$310	\$310	\$310		\$242	\$270	\$0	\$0	\$270
Customer C	\$180	\$190	\$350	\$350	\$350		\$242	\$270	\$0	\$0	\$270
Customer D	\$190	\$90	\$280	\$280	\$280		\$242	\$270	\$0	\$0	\$270
Customer E	\$220	\$32	\$252				\$242	\$0	\$215	\$0	\$215
Lowest	\$27	\$32	\$252	\$277	\$280		\$1,210	\$810	\$215	\$245	\$1,270
Highest	\$220	\$250	\$350	2nd Lowest ↑	3rd Lowest ↑						
Correlation Coefficient (between Customer Values for Word and Excel)		-0.90				Lerner Index	0.96	0.96	0.98	0.98	

Now consider the situation where everything else remains the same, but the marginal cost of Word and Excel is \$30 each.

The marginal cost of the bundle is $\$30 + \$30 = \$60$ because of lack of (dis)economies of scope. The highest price at which every customer buys the pure bundle is the lowest among the individual values of the pure bundle (again \$252). Profit from the purchase of the pure bundle by each customer is $\$252 - \$60 = \$192$. Total profit at pure bundle equals $5 \times \$192 = \960 .

However, customer A again values Word at only \$27 but values Excel at \$250, whereas customer E again values Word at \$220 but values Excel at only \$32. The supplier could again target Excel separately to customer A—in which case, the supplier could charge \$250 for Excel separately, and make a profit of $\$250 - \$30 = \$220$ from customer A. The supplier could again target Word separately to customer E—in which case, the supplier could charge \$220 for Word separately, and make a profit of $\$220 - \$30 = \$190$ from customer E. The bundle could again be targeted to the remaining customers B, C, and D, among whom the lowest value of the bundle is \$280, which would be the best price for the bundle—in which case, the supplier could make a profit of $\$280 - \$60 = \$220$ from each of the customers B, C, and D. The total profit from the mixed bundle, therefore, is $\$220 + \$190 + (3 \times \$220) = \$1,070$, higher than the profit at the pure bundle (\$960). Note again that the supplier offers the same schedule of prices to all the customers.

Here, I see that the Lerner Index is 0.76 for the pure bundle; whereas for the mixed bundle, it is 0.79 for the bundle, 0.86 for Word separately, and 0.88 for Excel separately.

Marginal Cost	MS Word	MS Excel	Sum			At Pure Bundle	At Mixed Bundle			
	\$30	\$30	\$60			Price of Bundle	Price of Bundle	Price of Word	Price of Excel	Total
						\$252	\$280	\$220	\$250	
						Profit at Pure Bundle	Profit At Mixed Bundle			
Customer Values										
Customer A	\$27	\$250	\$277	\$277		\$192	\$0	\$0	\$220	\$220
Customer B	\$130	\$180	\$310	\$310	\$310	\$192	\$220	\$0	\$0	\$220
Customer C	\$160	\$190	\$350	\$350	\$350	\$192	\$220	\$0	\$0	\$220
Customer D	\$190	\$90	\$280	\$280	\$280	\$192	\$220	\$0	\$0	\$220
Customer E	\$220	\$32	\$252	\$252		\$192	\$0	\$190	\$0	\$190
Lowest	\$27	\$32	\$252	\$277	\$280	\$560	\$660	\$190	\$220	\$1,070
Highest	\$220	\$250	\$350	2nd Lowest ↑	3rd Lowest ↑					
Correlation Coefficient (between Customer Values for Word and Excel)	-0.90					Lerner Index	0.76	0.79	0.86	0.88

Now consider the situation where everything else remains the same, but the marginal cost of Word and Excel is \$100 each.

The marginal cost of the bundle is \$100 + \$100 = \$200 because of lack of (dis)economies of scope. The highest price at which every customer buys the pure bundle is the lowest among the individual values of the pure bundle (again \$252). Profit from the purchase of the pure bundle by each customer is \$252 – \$200 = \$52. Total profit at pure bundle equals 5 x \$52 = \$260.

However, customer A again values Word at only \$27 but values Excel at \$250, whereas customer E again values Word at \$220 but values Excel at only \$32. The supplier could again target Excel separately to customer A—in which case, the supplier could charge \$250 for Excel separately, and make a profit of \$250 – \$100 = \$150 from customer A. The supplier could again target Word separately to customer E—in which case, the supplier could charge \$220 for Word separately, and make a profit of \$220 – \$100 = \$120 from customer E. The bundle could again be targeted to the remaining customers B, C, and D, among whom the lowest value of the bundle is \$280, which would be the best price for the bundle—in which case, the supplier could make a profit of \$280 – \$200 = \$80 from each of the customers B, C, and D. The total profit from the mixed bundle, therefore, is \$150 + \$120 + (3 x \$80) = \$510, higher than the profit at the pure bundle (\$260). Note again that the supplier offers the same schedule of prices to all the customers.

Here, I see that the Lerner Index is 0.21 for the pure bundle; whereas for the mixed bundle, it is 0.29 for the bundle, 0.55 for Word separately, and 0.60 for Excel separately.

Marginal Cost	MS Word	MS Excel	Sum			At Pure Bundle	At Mixed Bundle			
	\$100	\$100	\$200			Price of Bundle	Price of Bundle	Price of Word	Price of Excel	Total
						\$252	\$280	\$220	\$250	
						Profit at Pure Bundle	Profit At Mixed Bundle			
Customer Values										
Customer A	\$27	\$250	\$277	\$277		\$52	\$0	\$0	\$150	\$150
Customer B	\$130	\$180	\$310	\$310	\$310	\$52	\$80	\$0	\$0	\$80
Customer C	\$160	\$190	\$350	\$350	\$350	\$52	\$80	\$0	\$0	\$80
Customer D	\$190	\$90	\$280	\$280	\$280	\$52	\$80	\$0	\$0	\$80
Customer E	\$220	\$32	\$252	\$252		\$52	\$0	\$120	\$0	\$120
Lowest	\$27	\$32	\$252	\$277	\$280	\$260	\$240	\$120	\$150	\$510
Highest	\$220	\$250	\$350	2nd Lowest ↑	3rd Lowest ↑					
Correlation Coefficient (between Customer Values for Word and Excel)	-0.90					Lerner Index	0.21	0.29	0.55	0.60

Now consider the situation where everything else remains the same, but the marginal cost of Word and Excel is \$120 each.

The marginal cost of the bundle is $\$120 + \$120 = \$240$ because of lack of (dis)economies of scope. The highest price at which every customer buys the pure bundle is the lowest among the individual values of the pure bundle (again $\$252$). Profit from the purchase of the pure bundle by each customer is $\$252 - \$240 = \$12$. Total profit at pure bundle equals $5 \times \$12 = \60 .

However, customer A again values Word at only $\$27$ but values Excel at $\$250$, whereas customer E again values Word at $\$220$ but values Excel at only $\$32$. The supplier could again target Excel separately to customer A—in which case, the supplier could charge $\$250$ for Excel separately, and make a profit of $\$250 - \$120 = \$130$ from customer A. The supplier could again target Word separately to customer E—in which case, the supplier could charge $\$220$ for Word separately, and make a profit of $\$220 - \$120 = \$100$ from customer E. The bundle could again be targeted to the remaining customers B, C, and D, among whom the lowest value of the bundle is $\$280$, which would be the best price for the bundle—in which case, the supplier could make a profit of $\$280 - \$240 = \$40$ from each of the customers B, C, and D. The total profit from the mixed bundle, therefore, is $\$130 + \$100 + (3 \times \$40) = \350 , higher than the profit at the pure bundle ($\$60$). Note again that the supplier offers the same schedule of prices to all the customers.

Here, I see that the Lerner Index is 0.05 for the pure bundle; whereas for the mixed bundle, it is 0.14 for the bundle, 0.45 for Word separately, and 0.52 for Excel separately.

	MS Word	MS Excel	Sum									
Marginal Cost	\$120	\$120	\$240					At Pure Bundle:	At Mixed Bundle			
								Price of Bundle	Price of Bundle	Price of Word	Price of Excel	Total
								\$252	\$280	\$220	\$250	\$250
								Profit at Pure Bundle	Profit At Mixed Bundle			
Customer Values												
Customer A	\$27	\$250	\$277	\$277				\$12	\$0	\$0	\$130	\$130
Customer B	\$130	\$180	\$310	\$310	\$310			\$12	\$40	\$0	\$0	\$40
Customer C	\$180	\$190	\$350	\$350	\$350			\$12	\$40	\$0	\$0	\$40
Customer D	\$190	\$90	\$280	\$280	\$280			\$12	\$40	\$0	\$0	\$40
Customer E	\$220	\$32	\$252	\$252				\$12	\$0	\$100	\$0	\$100
Lowest	\$27	\$32	\$252	\$277	\$280			\$60	\$120	\$100	\$130	\$350
Highest	\$220	\$250	\$350		2nd Lowest ↑	3rd Lowest ↑						
								Lerner Index	0.05	0.14	0.45	0.52
Correlation Coefficient (between Customer Values for Word and Excel)		-0.90										

To assure ourselves that the results are not a function of the fact that the marginal costs of Word and Excel have been equal in the examples considered so far, now consider the situation where everything else remains the same, but the marginal cost of Word is $\$5$ and that of Excel is $\$120$.

The marginal cost of the bundle is $\$5 + \$50 = \$55$ because of a lack of (dis)economies of scope. The highest price at which every customer buys the pure bundle is the lowest among the individual values of the pure bundle, again $\$252$. Profit from the purchase of the pure bundle by each customer is $\$252 - \$55 = \$197$. Total profit at pure bundle equals $5 \times \$197 = \985 .

However, customer A again values Word at only $\$27$, but values Excel at $\$250$, whereas customer E again values Word at $\$220$, but values Excel at only $\$32$. The supplier could again target Excel separately to customer A—in which case, the supplier could charge $\$250$ for Excel separately, and make a

profit of \$250 – \$50 = \$200 from customer A. The supplier could again target Word separately to customer E—in which case, the supplier could charge \$220 for Word separately, and make a profit of \$220 – \$5 = \$215 from customer E. The bundle could again be targeted to the remaining customers B, C, and D, among whom the lowest value of the bundle is \$280, which would be the best price for the bundle—in which case, the supplier could make a profit of \$280 – \$55 = \$225 from each of the customers B, C, and D. The total profit from the mixed bundle, therefore, is \$200 + \$215 + (3 x \$225) = \$1,090, which is higher than the profit at the pure bundle (\$985). Note again that the supplier offers the same schedule of prices to all the customers.

Here, I see that the Lerner Index is 0.78 for the pure bundle, whereas, for the mixed bundle, it is 0.80 for the bundle, 0.98 for Word separately, and 0.80 for Excel separately.

	MS Word	MS Excel	Sum							
Marginal Cost	\$5	\$50	\$55			At Pure Bundle	At Mixed Bundle			
						Price of Bundle	Price of Bundle	Price of Word	Price of Excel	Total
						\$252	\$280	\$220	\$250	
						Profit at Pure Bundle	Profit At Mixed Bundle			
Customer Values										
Customer A	\$27	\$250	\$277	\$277		\$197	\$0	\$0	\$200	\$200
Customer B	\$130	\$180	\$310	\$310	\$310	\$197	\$225	\$0	\$0	\$225
Customer C	\$160	\$190	\$350	\$350	\$350	\$197	\$225	\$0	\$0	\$225
Customer D	\$190	\$90	\$280	\$280	\$280	\$197	\$225	\$0	\$0	\$225
Customer E	\$220	\$32	\$252			\$197	\$0	\$215	\$0	\$215
Lowest	\$27	\$32	\$352	\$277	\$280	\$985	\$675	\$215	\$200	\$1,090
Highest	\$220	\$250	\$350	2nd Lowest ↑	3rd Lowest ↑	Lerner Index	0.78	0.80	0.98	0.80
Correlation Coefficient (between Customer Values for Word and Excel)		-0.90								

VII. OTHER BUSINESS JUDGMENT FACTORS

A. “One-Stop Shopping”

Customers derive benefits from one-stop shopping. For example, Imitrex injection, a popular remedy for migraines and cluster headaches, is sold as a bundle of a pen and a cartridge. Another relevant example is that customers like the convenience of having to pay one bill for “triple play” (cable TV, broadband, and telephony).¹⁵

B. Significant Difference

A bundle is often significantly different from its component products. For example, the popular mixed opioid analgesic Percocet is a bundle of the pure opioid oxycodone and the non-opioid acetaminophen.¹⁶ The pure opioid works on the central nervous system, whereas the non-opioid works on the peripheral nervous system—as a result, the bundle works on both. The pure

¹⁵ See generally Stéphane Caprice & Vanessa von Schlippenbach, *One-Stop Shopping as a Cause of Slotting Fees: A Rent-Shifting Mechanism*, 22 J. OF ECON. & MGMT. STRATEGY 468 (2013).

¹⁶ *Percocet*, WEBMD (last visited Mar. 10, 2020) <https://www.webmd.com/drugs/2/drug-7277/percocet-oral/details>.

opioid has no upper limit on dosage, whereas the non-opioid has an upper limit on dosage—as a result, the bundle has an upper limit on dosage.¹⁷

Using another example, methylated spirit is a bundle of ethyl alcohol and a small amount of methyl alcohol. Ethyl alcohol disinfects but is addictive, and methyl alcohol is toxic. The use of this combination is primary to disinfect.¹⁸

CONCLUSIONS

First, I examined the popular arguments advanced for bundling, in particular, demand complementarities, economies of scope, and price discrimination, and showed that they do not suffice to explain bundling. I then examined the potentially anti-competitive factors such as leverage and opacity. I used simple examples to show how bundling is optimal under the negative correlation of demand across consumers, and, if there is a wide dispersion in valuations across consumers, then mixed bundling dominates pure bundling. I also explored other business judgment rules, such as one-stop shopping and when the bundled product is a significantly different product from the sum of its components.

¹⁷ *Id.*

¹⁸ *Methanol*, SCIENCE DIRECT (last visited Mar. 10, 2020)
<https://www.sciencedirect.com/topics/medicine-and-dentistry/methanol>.

