Vertical Integration of Successive Monopolists: A Classroom Experiment

Narine Badasyan, Jacob K. Goeree, Monica Hartmann, Charles Holt,
John Morgan, Tanya Rosenblat, Maros Servatka, Dirk Yandell*

Revised January 29, 2005

Abstract

This classroom experiment introduces students to the concept of double marginalization, i.e. the exercise of market power at successive vertical layers in a supply chain. By taking on roles of firms, students determine how the mark-ups are set at each successive production stage. They learn that final retail prices tend to be higher than if the firms were vertically integrated. Students compare the welfare implications of two potential solutions to the double marginalization problem: acquisition and franchise fees. The experiment also can stimulate a discussion of two-part tariffs, transfer pricing, contracting, and the Coase theorem.

Keywords: *double marginalization, monopoly, franchising, contracting, vertical integration, classroom experiments*

* Badasyan: Department of Economics, Virginia Tech, Blacksburg, VA 24061
Goeree: Division of the Humanities and Social Sciences, Mail code 228-77, Caltech, Pasadena, CA 91125
Hartmann: Department of Economics, University of St. Thomas, St. Paul, Minnesota.
Holt: Department of Economics, P.O Box 400182, University of Virginia, Charlottesville, VA 22904-00182
Morgan: Haas School of Business and Department of Economics, University of California, Berkeley, CA 94720
Rosenblat: Department of Economics, Wesleyan University, Middletown, CT 06459
Servatka: Department of Economics, University of Arizona, Tucson, AZ 85721
Yandell: School Of Business Administration, University of San Diego, San Diego, CA 92110

This paper began as a group project for the May 2003 NSF Classroom Experiments Conference in Tucson, Arizona, and it is funded in part by the National Science Foundation (SBR 0094800) and the University of Virginia Bankard Fund.

I. Introduction

The problem of double marginalization - or the exercise of market power at successive vertical layers in the supply chain - dates back to Lerner (1934). This problem arises when more than one firm in the supply chain faces a downward sloping demand curve and has the incentive to mark up the product's price above its marginal cost. The sequence of mark-ups leads to a higher retail price and lower combined profit for the supply chain than would arise if the firms were vertically integrated. Consequently, consumer surplus and industry profits rise when firms in the same supply chain merge. This surprising and seemingly counterintuitive result makes it a fascinating topic to teach. At the same time, it is by far one of the most challenging concepts for applied microeconomics students. Without an intuitive understanding of the economic problem, students have trouble believing the mathematical results they derive.

This classroom experiment introduces students to the double marginalization concept by putting them in an interactive environment where they can experientially acquire the economic intuition that drives the results without getting bogged down with mathematics.[1] By taking on roles of firms, students determine how the mark-ups are set at each successive production stage. Students compare the welfare implications of two potential solutions to the double marginalization problem: acquisition and franchise fees. These alternatives demonstrate that double marginalization is not so much a problem of vertical separation as it is an outcome of limited contractual options between the firms.

The experiment also provides a useful review of basic monopoly pricing and marginal revenue concepts, and it can stimulate a discussion of more advanced topics like two-part tariffs, transfer pricing, contracting, and the Coase theorem. It can be successfully adopted in a graduate MBA course as well as in undergraduate courses - intermediate microeconomics, industrial organization, managerial economics, antitrust, law and economics, and applied game theory. If a course uses several experiments, it is a good idea for students to have had a monopoly experiment beforehand to demonstrate these concepts.[2] Finally, we encourage conducting the experiment prior to assigning textbook readings or doing formal analysis in class.

The remainder of the paper proceeds as follows. In section II, we describe in some detail the procedures for conducting the experiment in a classroom setting. Section III presents a discussion of the results of a version of this experiment conducted at Virginia Tech in the summer of 2003. In this

[1] MBA students in particular have trouble seeing the relevance of using equations to address business problems. When we asked students after the experiment how they solved the pricing problem, many of them realized they had set-up their own tables to find the most profitable wholesale price given what the retailers were expected to charge.

[2] Simple monopoly classroom experiments can be found in Bergstrom and Miller (1997), Nelson and Beil Jr. (1994), and the web-based Veconlab site discussed below.

context, we highlight some of the key pedagogical points that the experiment can be used to address. The experiment can also be run on-line with a web-based implementation; the setup and data for an on-line experiment are presented in section IV. Finally, section V offers a brief guide to further readings on the topic. A variety of supplemental materials, including detailed instructions and record sheets for the experiment, are contained in a series of appendices.

II. Procedures

The "paper and pencil" version of this exercise requires between 45 to 75 minutes of class time, depending on class size, number of trading periods, and the depth of the post-experiment discussion. Some preparation must be done before class begins. The instructions and record sheets provided in the Appendix should be copied for each student or group of students that will play the role of a firm. It might be useful to have transparencies ready on which you will record the decisions made by firms in each period. For teaching purposes no money payments are needed; you can announce that all profits are hypothetical.

To begin, divide the class into groups of two or three students each (depending on class size). Each group will represent a "firm" in this experiment. Having three students per group allows for the possibility of using majority voting deciding the firm outcome if decisions cannot be made unanimously. Also, having firms be represented by groups of students provides opportunities for students to discuss strategies with team members, which tends to facilitate learning. You will want to separate the wholesale and retail firms physically to avoid confusion about who belongs to which market and to prevent firms from communicating and colluding with one another. The ID codes on the instruction sheets can be pre-marked to determine which student groups will take the role of retailer and which groups will be wholesalers. Since each market is represented by one wholesaler and one retailer, the ID numbers could be 1W and 1R for market 1, 2W and 2R for market 2, etc. Wholesalers and retailers are matched with one another at the start and remain matched throughout the experiment.

Pass out the instructions to groups of students, read them aloud, and at the conclusion of the instructions go through the columns of the record sheet with the students to ensure understanding. Clearly explain the roles of wholesaler and retailer, and make sure each group understands the role they have been assigned. As noted above, one way to avoid confusion is to have wholesalers on one side of the room and retailers on the other, a procedure that also reduces opportunities for collusion.

The experiment consists of a sequence of trading periods divided into two phases, one with vertically arrayed wholesale-retail pairs, and one with a the possibility of vertical mergers that produce a single integrated seller. In the absence of vertical integration, the wholesaler in each pair first sets a price

and announces this price to the retailer. Then the retailer sets a price and the quantity sold based on the retail demand information provided in the instructions. At the end of each trading period, students calculate profits and record the prices, quantities sold and profits on the record sheet. To speed up decision making, it is useful to display the pricing decisions made by each of the firms and to set a time limit of about 3 minutes per trading period. In a class that is not too large, say 30 or below, it is possible to run this experiment outdoors on a nice day, in which case you would call on wholesalers in order (W1, W2, …) to announce their prices after all price decisions have been made, making sure that the matched retailer records the price as it is announced, and then you would go through the retailers in order, letting them announce their decisions to the matched wholesaler with the matching number. Although these public announcement and /or price posting procedures may induce some imitation and loss of independence that would be undesirable for a research experiment, we have not found the learning value of the exercise to be adversely affected.

Phase I: No Integration

For trading periods occurring during Phase I, the two firms are operated separately, with the wholesaler choosing a price and the retailer choosing a purchase quantity, which in turn determines the retail price via a demand curve that can be presented as a table of prices and quantities. Phase I should consist of enough trading periods that results have started to converge to the theoretical vertical-monopoly predictions that are discussed below. This typically takes two to three trading periods.

Phase II: Vertical Integration

Prior to the start of Phase II, distribute the integration instructions, read them, and answer any questions before running a few more trading periods. Note that this is a more complex treatment, since the firms bargain over the sale price of the possible acquisition, and the procedures allow the wholesaler to acquire the retailer or vice versa. Thus, more time may be needed than in the first market period before equilibrium is reached. If the two firms do not agree on an acquisition, then the round proceeds as in phase I, with the wholesaler selecting a price and the retailer choosing a quantity purchased. If an acquisition is arranged, the merged firm chooses the retail price, which determines the sales quantity and profits, from which the acquisition price is subtracted. The owners of the firm that was sold earn the acquisition price.

At the end of the experiment, discuss the results (students particularly enjoy announcing the most successful retailer and wholesaler) and compare them with the theoretical predictions. In the next

section, we illustrate the lines such a discussion might follow by reporting the results of a version of this experiment. A possible third treatment, involving a franchise fee, is introduced in section IV.

III. Classroom Discussion

The authors have used this exercise at various universities with class sizes ranging from 20 to 120. In this section, we begin with a summary of the results for an undergraduate Principles of Economics class at Virginia Tech in the summer of 2003. The experiment lasted for about 75 minutes, including discussion. Students were from a broad range of majors taking their first semester of the two-semester introductory economics sequence. The 42 students were initially divided into 20 groups (18 groups of 2 students each and 2 groups of 3 students each). There were 10 markets, each with one wholesaler group and one retailer group.

The first phase of the experiment consisted of 2 trading periods with no integration. The retail demand was presented as a table of prices and quantities that were determined by the linear demand function: P=12–Q. The wholesaler paid a unit production cost of $4 and earned the difference between wholesale revenues and costs. The retailer incurred no cost, other than the wholesale price paid for each unit. Retail profits were the retail sales revenue minus the cost of acquiring the units at wholesale.

Table 1: Summary Statistics

	Average Quantity	**Average Wholesale Price**	**Average Retail Price**	**Average Industry Profit**
Period 1 (no integration)	3.5	$6.60	$8.50	$15.75
Period 2 (no integration)	3.6	$6.30	$8.40	$15.84
Period 3 (not merged)	2	$8.00	$10.00	$12.00
Period 3 (merged)	4.5	$5.00	$7.50	$15.75
Period 4 (all merged)	4.2	$5.40	$7.80	$15.96

Table 1 reports summary statistics for the experiment. In discussing the experiment, it is helpful to display a table similar to Table 1 as well as a figure illustrating a graphical analysis of the situation faced by firms as in Figure 1 below. To help the students benchmark the results of the experiments and to connect their choices to the underlying economic concepts, begin with a brief discussion of the figure. First, consider the case of a merged firm. Such a firm faces marginal costs of $4 per unit and marginal revenues indicated by the "Retail Marginal Revenue" line drawn in the figure. This presents a useful opportunity to present the notion that profits are maximized by setting marginal revenue equal to marginal cost, which, as the figure shows, results in a quantity of 4 and retail price of $8. Notice that by the trading period 4, nearly all firms chose this profit-maximizing price.

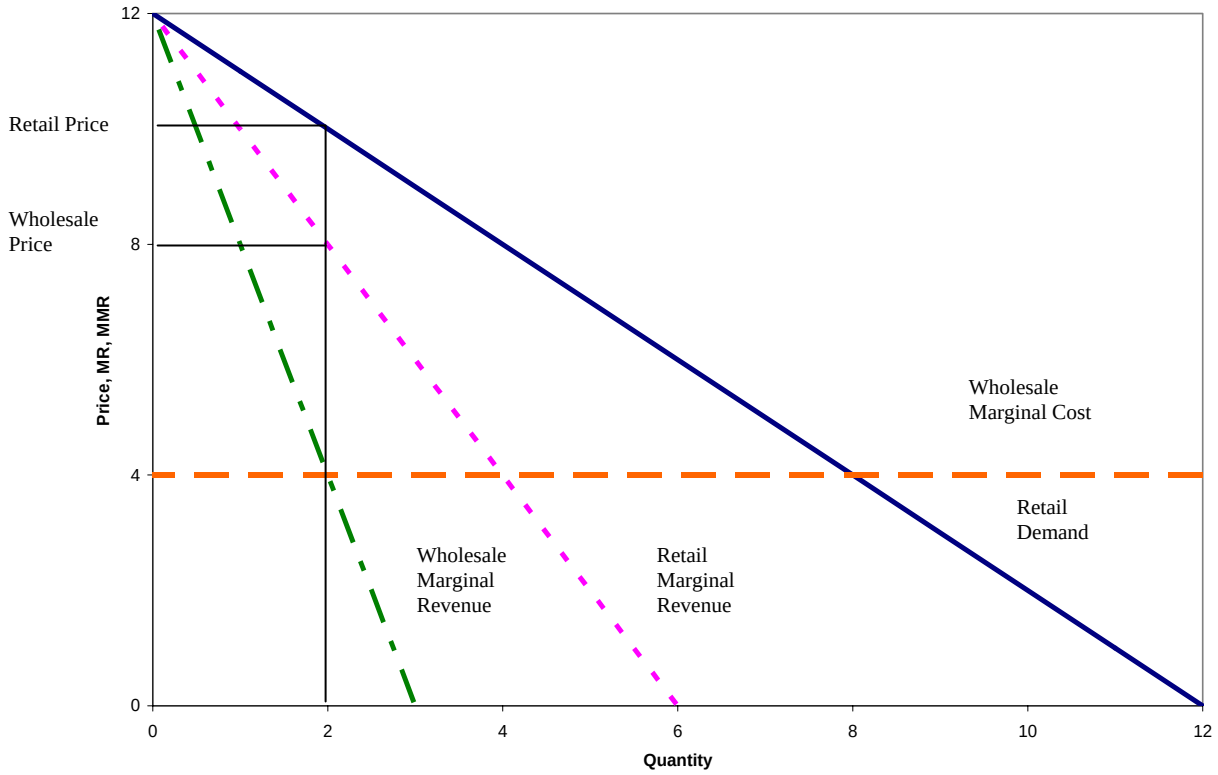

Figure 1: The Double Marginalization Problem

Next, ask students to consider the situation of a retailer when the two firms are not integrated. Notice that for a retailer, the effective marginal cost is simply the price charged by the wholesaler. Again, the principle of profit maximization requires that the retailer set price such that retail marginal revenue equals the retailer's marginal cost. Returning to the results of the experiment, notice that in trading period 1, the wholesale price was $6.60. Draw this line on the graph and look for the intersection with the retailer's marginal revenue curve. Point out to students that this implies that the best price for the retailer is between $8 and $9, which is exactly what we saw in the experiment.

Now turn to the problem of the wholesaler. What price should that firm set? Knowing that the retailer chooses a price such that retailer marginal revenue equals wholesale price, it should now be clear that the effective demand curve the wholesaler faces is the retailer's marginal cost curve. Once this realization is made, then it is obvious that the wholesaler should use this demand curve to construct the "wholesale marginal revenue curve" listed in the figure and price such that wholesale marginal revenue equals marginal cost of $4. This occurs at a wholesale price of $8 and leads to a final retail price of $10.

Returning to the results of the experiment, notice that, for non-integrated firms, the theoretical predictions are met exactly in trading period 3. For trading periods 1 and 2, wholesale prices tend to be lower than predicted. To draw out discussion on the pricing incentives of the upstream firm, it is useful

to ask students to compare the profitability of setting different wholesale prices first, holding fixed the pricing of the downstream firm. For instance, using the period 1 data, a firm setting a wholesale price at $6 and expecting a retail price of $8 would earn $8. On the other hand, increasing its price to $7 while holding fixed the retail price increases profitability by 50%, to $12. Of course, the retail firm might well change its price in response to the new wholesale price. Having students think through the analysis in this fashion helps to illustrate the backward induction aspect of the wholesaler's problem.[3]

Figure 1 can also be used to illustrate consumer surplus as well as to create discussion about how competition authorities should view vertical integration in double marginalized markets. Under non-integration, consumer surplus is simply the triangle formed by the demand curve and the retail price of $10, which has an area of $2. With integration, the retail price falls to $8 and consumer surplus rises to $8; thus consumer surplus quadruples with integration. While the initial instincts of students might be that integration leading to a monopoly is a bad thing for consumers, in this situation, monopoly is preferable to a double marginalized market.

The experiment also allows the instructor to disprove a common misperception held by managers that transfer prices (or the wholesale price in this case) just divides up profits between sub-units. If the prices are set improperly, students observe that production distortions emerge, lowering overall profit. Conversely, the franchise fees are shown not to create distortions but only affect the distribution of surplus among sub-units. Finally, the merger-acquisition simulations reveal that hard bargaining - trying to extract most of the surplus - may be sub-optimal if it leads the parties to refuse to come to an agreement and no production takes place.

Finally, it is useful to ask students how the negotiations to integrate proceeded. In particular, it is useful to highlight that the party (upstream or downstream) gaining control over the integrated firm had no effect on the final decision. Indeed, in period 4, all firms were integrated and chose retail prices very close to theoretical predictions. If you have covered or mentioned the Coase Theorem previously, this is a useful time to remind them of one of its key implications: that with frictionless bargaining, the location of property rights is irrelevant to economic outcomes.

The patterns observed in Table 1 are fairly typical. For these parameters, the retail price without vertical integration tends to converge upward toward the theoretical prediction of $10, which tends to reduce total industry profit (wholesale plus retail). In contrast, merged firms choose prices that are lower and tend to converge to the integrated monopoly price of $8, with an increase in industry earnings. These trends are apparent in Table 2, which shows the results of a second classroom experiment

[3] To evaluate the effectiveness of the use of the experiment, students were asked to complete a questionnaire *ex post*. The student comments were very positive. They indicated that they enjoyed the game and the group interaction and, it helped them to better understand the topic in the context of a realistic interactive example involving pricing and mergers.

conducted at Virginia Tech with 9 firms. Notice that, in theory, mergers should always occur in the second treatment, since a merger raises the total amount of money that can be divided. In the experiment, mergers do not always occur, because bargaining over the division of a variable amount of money is a complicated process that may involve demands, threats, bluffing, and hurt feelings.

Table 2. Results of a Second Classroom Experiment

	Average Quantity	Average Wholesale Price	Average Retail Price	Average Industry Profit
Phase 1 (no integration)				
Period 1	3.4	$5.78	$8.56	$15.22
Period 2	2.4	$6.89	$9.56	$13.11
Phase 2 (integration allowed)				
Period 3				
Merged (6 firms)	5.7	$3.00	$6.33	$11.67
Not merged (3 firms)	3.3	$5.83	$8.67	$14.67
Period 4				
Merged (4 firms)	4.6	$4.00	$7.40	$14.2
Not merged (5 firms)	2.3	$6.75	$9.75	$10.75

IV. A Web-based Implementation with an Additional Franchise Fee Treatment

The time that it takes to run this experiment can be reduced by about a half using an on-line implementation, which permits more periods, additional variations, and more time for discussion. The instructor must go to the Veconlab admin page: http://veconlab.econ.virginia.edu/admin.htm and obtain a "session name" from the User Instructions Menu. Then the instructor should select the Vertical Monopoly program listed under the Markets Menu. The instructor must enter the number of participants (any even integer) and any desired changes from the default setup parameters. Then participants can log in by going to: http://veconlab.econ.virginia.edu/login.htm and entering the instructor's session name. The instructions that participants receive are automatically configured to match the setup parameters for the experiment, which saves the time and effort of preparing paper-based instructions. The students make and confirm decisions, which are transmitted to the server via the internet. Results and earnings are calculated and relayed back to the participants, and are displayed on the instructor

results pages, along with graphs analogous to Figure 1, which can be used to guide subsequent class discussions.

The default parameters implement three treatments, beginning with 5 rounds of no-integration in which each participant is either a wholesaler or a retailer. This phase is followed by 5 rounds in which each participant is forced to have the role of a vertically integrated monopolist (note that there is no negotiation over acquisitions). The final phase involves a return to the non-integrated setup, but now each wholesaler may select a wholesale price and a franchise fee. A retailer who agrees to pay the fee may also choose how many units to purchase at wholesale. If the retailer rejects this fee, then both have zero earnings for the round. The results of a web-based experiment conducted in an experimental economics class at the University of Virginia are shown in Figure 2. The demand curve was linear, as before, with an intercept of 12 and a slope of –1. The wholesale constant cost ($4 in the previous section) was reduced to $2, and a $2 retail cost per unit was added. Thus the integrated firm's marginal cost (for both wholesale and retail activities) remained at $4, and the resulting monopoly price with vertical integration remained at $8, with a quantity of 4 and total profit of $16 (i.e., the revenue of $8x4 minus the cost of $4x4). The average prices for rounds 6-10 converge to this level. In contrast, the first 5 rounds were done without integration, and the average retail prices converged to $10, with a corresponding reduction in quantity and industry profit.[4]

The final 5 rounds show the results of the franchise fee treatment. In theory, the franchise fee, which is made on a take-it-or-leave-it basis in the experiment, offers the wholesaler an opportunity to demand almost all of the downstream firm's profit, since a rejection results on zero earnings. Thus the wholesaler should price at marginal cost so that the downstream firm's pre-fee profit can reach the monopoly level of $16. Then the wholesaler can, in theory, capture most of this by charging a fee that offers only a small profit to the retailer. Notice that this arrangement would solve the double-marginalization problem, since output would be expanded to the monopoly level that would also be observed under vertical integration. In practice, high fees of $10 or more were typically rejected by retailers, and the average fees were in the $7-8 range. As a result, the wholesale price did not fall to marginal cost, and industry output did not expand to the monopoly level. These patterns would not be surprising to anyone familiar with ultimatum game experiments, in which aggressive demands for significantly more than half of the available funds are often rejected by responders who are driven by fairness concerns. Such fairness concerns were expressed clearly in the class discussions following this third treatment.

[4] It should be noted that when using the Veconlab graphics displays that generated Figure 2, the data averages can be shown round by round, and the theoretical predictions can be hidden.

One interesting issue that the instructor may want to raise in the discussion is whether similar problems would be encountered by a "large" wholesaler who deals with large numbers of retailers, each in isolated local monopoly markets.

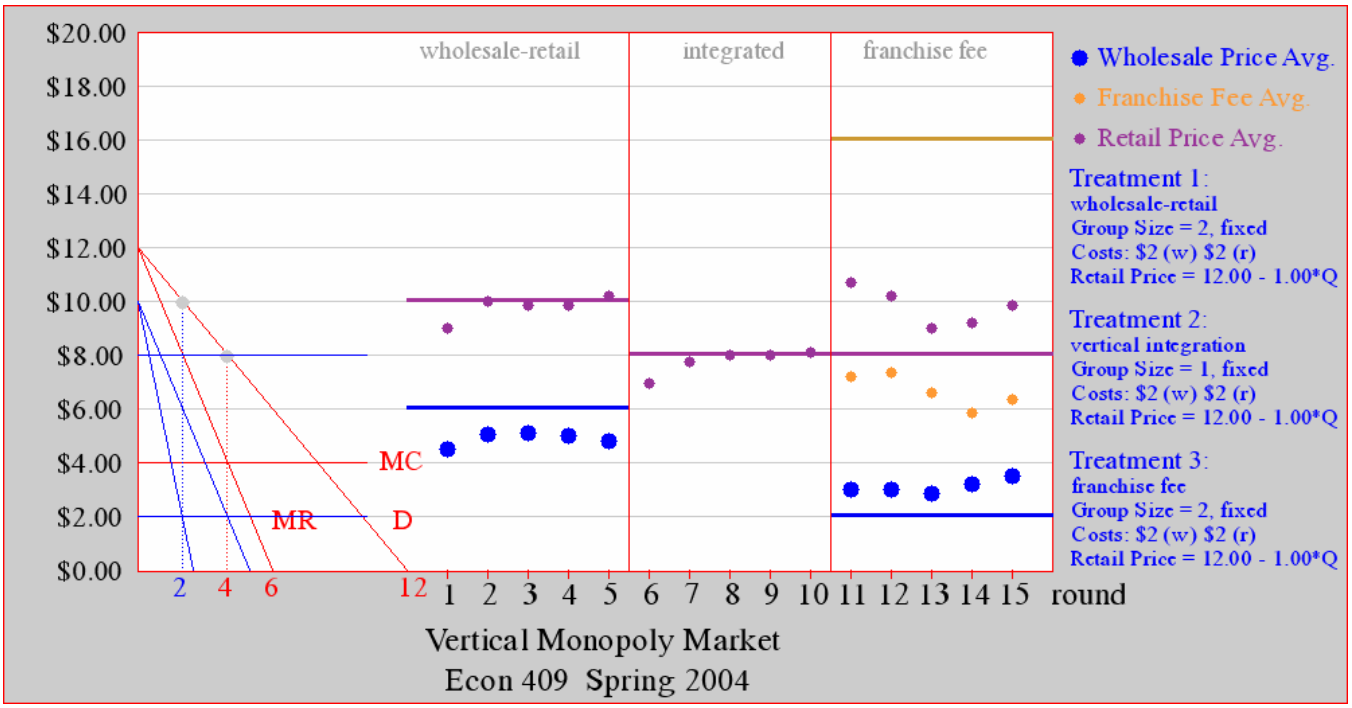

Figure 2. Results for a Web-based Experiment with Three Treatments

V. Further Reading

Standard expositions of double marginalization concept can be found in Cabral (2000) at the undergraduate level and in Tirole (1988) at the graduate level. By far the most well known example of double marginalization is the Fisher Body - General Motors case from the 1920s. Fisher Body was the sole supplier of closed-metal bodies and GM eventually acquired it to reduce post-contractual opportunistic behavior. Klein et al. (1978) use this example to argue that vertical integration is an effective solution to reduce post-contractual opportunistic behavior. A study by Lafontaine (1995) provides a present day example. She finds that prices are systematically lower in fast food restaurants where corporate owners control downstream prices directly. Even though upstream firms in this industry are competitive, a situation equivalent to double marginalization arises because franchisees have to pay royalty rates which that the demand curve they face downward. As a result, a profit maximizing franchisee chooses a lower quantity and a higher price than the franchisor would choose in a vertically integrated setting.

Other empirical studies have documented the price distorting effects of disintegration as well. For example, in the automobile industry Bresnahan and Reiss (1985) find strong evidence of positive mark-ups at successive levels from manufacturer to retailer. West (2000) observes retail liquor prices rising in Alberta, Canada when privatization led to the industry's vertical disintegration. Similar arguments against disintegration were used by the opponents of separating operating system branch from applications during the recent court cases against Microsoft.[5]

While vertical integration is a natural solution to double marginalization, it is not the only solution nor is it the optimal solution in every industry. Mortimer (2002) examines the video rental industry's use of contractual agreements. Traditionally, video stores paid distributors a fixed per unit fee. Since 1998, improvements in monitoring software allowed distributors to offer revenue-sharing contracts to video rental stores. This contracting solution, although short of vertical integration, allows firms greater flexibility than simple linear pricing in addressing the double marginalization problem.

Our experiment focuses on how franchising and vertical integration mitigate double marginalization. Instructors of law and economics, antitrust, and managerial courses may want to discuss other contractual solutions currently being used: vertical integration in the car-rental industry, flexible buy-back policies in the retail book industry, or revenue-sharing contracts to transfer goods between manufacturers and retailers in theatrical movie exhibition industry.

Even though extensive experimental research on monopoly has been conducted over the years, we are aware of only one study on double marginalization. Durham (2000) uses posted-offer institution and a monopolistic upstream firm to compare treatments with one monopolistic downstream firm to three competitive downstream firms. She finds that the presence of competitive downstream firms leads to outcomes similar to those under vertical integration. Her experimental design is slightly more complicated than ours since she allows for asymmetric information about production costs. However, she does not investigate any contractual solutions to double marginalization. Industrial organization instructors may wish to modify our design to allow for competitive downstream firms as implemented in Durham's research experiment. This easy modification would generate a discussion of how differences in market power affect prices.

Finally, an interesting theoretical extension can be found in Economides (1999). He demonstrates that quality is always lower and prices almost always higher (even with lower quality) than would have been chosen by a vertically integrated firm. The intuition students develop with the experiment can generate a discussion of how double marginalization affects a firm's quality choice.

[5] For a non-technical discussion of double marginalization in the context of Microsoft case see Krugman (2000).

Therefore, industrial organization instructors can revisit our experiment to introduce product quality chapters as well.

References:

Bergstrom, Theodore C., and John H. Miller (1997) *Experiments with Economic Principles*, New York: McGraw-Hill.

Bresnahan, Timothy F. and Peter C. Reiss. (1985) "Dealer and Manufacturer Margins." *Rand Journal of Economics*, 16(2): pp. 253-268.

Cabral, Luis M.B. (2000) *Introduction to Industrial Organization*, Cambridge, Massachusetts: The MIT Press.

Chiu, S., E. Mansley, and J. Morgan (1998) "Choosing the Right Battlefield for the War on Drugs: An Irrelevance Result," *Economics Letters* 59: pp. 107-111.

Durham, Yvonne. (2000) "An Experimental Examination of Double Marginalization and Vertical Relationships." *Journal of Economic Behavior and Organization*, 42(2): pp. 207-229.

Economides, Nicholas (1999) "Quality Choice and Vertical Integration." *International Journal of Industrial Organization*, 17(6): pp. 903-14.

Gallini N . T. & Wright B (1991) "Technology transfer under asymmetric information," *RAND Journal of Economics*, 21: pp. 147-160.

Greenhut, M.L. and H. Ohta (1979) "Vertical integration in successive oligopolists," *American Economic Review*, 69: pp. 137-41.

Klein, Benjamin, Robert G. Crawford, and Armen A. Alchian. (1978) "Vertical Integration, Appropriable Rents, and the Competitive Contracting Process." *Journal of Law and Economics*, 21(2): pp.297-326.

Krugman, Paul (2000) "Microsoft: What Next?" *New York Times*, April 26: pp. A21.

Lafontaine, Francine. (1995) "Pricing Decisions in Franchised Chains: A Look at the Restaurant and Fast-Food Industry." *NBER Working Paper No. 5247.*

Lerner, Abba P. (1934) "The Concept of Monopoly and the Measurement of Monopoly Power." *Review of Economic Studies*. 1(3): pp.157-175.

McKenzie, L. (1951) "Ideal output and the interdependence of firms," *Economic Journal*, 61: pp. 785-803

Mortimer, Julie Holland. (2002) "The Effects of Revenue-Sharing Contracts on Welfare in Vertically-Separated Markets: Evidence from the Video Rental Industry." Working Paper.

Nelson, R. G., and Richard O. Beil Jr. (1994) "Pricing Strategy under Monopoly Conditions: An Experiment for the Classroom," *Journal of Agricultural and Applied Economics*, 26(1): pp. 287-298.

Spengler, J (1950) “Vertical integration and anti-trust policy,” *Journal of Political Economy,* 58: pp. 247-52.

Tirole, Jean. (1993) *The Theory of Industrial Organization*, Cambridge, Massachusetts: The MIT Press.

West, Douglas. (2000) “Double Marginalization and Privatization in Liquor Retailing.” *Review of Industrial Organization*, 16(4): pp. 388-415.

Appendix

Pricing in Related Markets: Instructions

Overview

In this experiment, you will learn about pricing in related markets. In this experiment, each of you will be assigned the role of being a wholesaler or a retailer. As a wholesaler, you will sell your product to a single retailer. As a retailer, you buy product, on an as-needed basis, from a single wholesaler and sell it to consumers. Wholesalers and retailers will be matched with one another at the start of the game and will remain matched throughout the game.

The experiment consists of a series of market periods. At the beginning of each period, the wholesaler chooses a price for the wholesale market. After observing the wholesaler's price, the retailer then chooses a price for the retail market. Following this, demand for the product is realized as are profits and or losses for the wholesaler and the retailer. These will be described in more detail below. All wholesalers and retailers are reading the same instructions as you are now.

Wholesaler's Decision

As a wholesaler, your job is to select the wholesale price for your product. You make this decision prior to the time that the retailer sets his or her prices. Following this, retailers will set their prices and buy from you as needed.

Your cost to provide each unit of the good to a retailer is $4/unit. Thus, your profit or loss is simply the difference between the wholesale price and your cost multiplied by the number of units you sell to the retailer. For example, if you set a wholesale price of $5 per unit and sell 6 units, your profits would by (Price – Unit Cost) x Quantity = ($5 – $4) x 6 = $6.

At the end of each period, please record your wholesale price, the number of units sold, your revenues, your costs, and your profits on the record sheet provided.

Retailer's Decision

Before making your retail pricing decision, you observe the wholesale price set for the good. As a retailer, your only cost per unit is the wholesale price. You buy units in the wholesale market only when you make retail sales, so you don't need to worry about inventory. As you would expect, the lower the retail price, the higher the sales level in the retail market. The demand for your product at the retail level is given in the following table:

Retail Price	$12	$11	$10	$9	$8	$7	$6	$5	$4	$3	$2	$1	$0
Units Sold	0	1	2	3	4	5	6	7	8	9	10	11	12

Your job is to choose the retail price, which must be a whole dollar figure from $0 to $12.

Your profit or loss is simply the difference between the retail price and the wholesale price multiplied by the number of units you sell to consumers. For example, if the retail price you chose was $2 and the wholesale price was $1, then you would sell 10 units and earn profits of (Retail Price – Wholesale Price) x Quantity = ($2 – $1) x 10 = $10.

At the end of each period, please record your retail price, the number of units sold, your revenues, your costs, and your profits on the record sheet provided.

Market Information
After each period, the prices set by the wholesaler as well as those selected by the retailer, the quantities sold in each market, and the profits for each of the parties will be displayed on the board.

Are there any questions?

Acquisitions

Now we are going to change the game a little. Prior to the start of the next period and each period thereafter, you will have the opportunity to negotiate to merge the wholesaler and the retailer. If you agree to merge, then one of you, the acquirer, will acquire control of operations of the other firm (called the acquired firm). This control is granted in exchange for a per period payment, called the "per period acquisition cost", which is paid by the acquirer to the former owner of the acquired firm for every period of the rest of the game. This per period acquisition cost is to be negotiated between the wholesaler and the retailer. On your decision sheet, please fill in the blank column G with the words "per period acquisition cost."

If the companies merge, then the acquiring company gets to choose both the wholesale and retail prices for the product. Profits for the acquiring firm are calculated exactly as before *except for a reduction in profits in the amount of the payment to the former owner of the acquired firm. Profits to the former owner of the acquired firm come entirely from the per period acquisition amount previously negotiated.*

If the companies do not merge, then the game proceeds as before, but with another opportunity to merge next period.

Franchise Fees

Now we are going to change the game a little. In this part of the exercise, the wholesaler can now charge the retailer a fixed "franchise fee" in addition to the usual wholesale price. The franchise fee is a fee paid by the retailer for the privilege of carrying the wholesaler's line of fine quality merchandise. It is important to remember that the franchise fee is a fixed amount paid regardless of the number of units bought by the retailer while the wholesale price is paid on a per unit basis. The wholesale firm will have the opportunity to change the franchise fee and the wholesale price in each period.

After learning the franchise fee and the wholesale price, the retailer can choose to accept or reject the franchising arrangement for this period. If the retailer rejects, both the wholesaler and the retailer earn zero profits. If the retailer accepts, then the retailer sets it retail price in the usual way and profits are realized. These profits are exactly the same as in earlier periods except the retailer now has to pay the franchise fee to the wholesaler.

Fill in the words "Franchise Fee" in column G of your record sheet.

Retailer

Record Sheet

A	B	C	D	E	F	G	H
Period	Retail Price per Unit	Quantity Sold	Total Revenue (Column B*C)	Cost per Unit (Price Paid to Wholesaler/ Unit)	Total Cost (Column E*C)		Profit
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							

Wholesaler

Record Sheet

A	B	C	D	E	F	G	H
Period	Wholesale Price per Unit	Quantity Ordered by Retailer	Total Revenue (Column B*C)	Production Cost per Unit	Total Cost (Column E*C)		Profit
1				$4			
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							