

PRICING BEHAVIOR IN CONTESTABLE MARKETS AND
ON THE INTERNET

by
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A Dissertation Submitted to the Faculty of the
DEPARTMENT OF ECONOMICS
In Partial Fulfillment of the Requirements
For the Degree of
DOCTOR OF PHILOSOPHY
In the Graduate College
THE UNIVERSITY OF ARIZONA

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THE UNIVERSITY OF ARIZONA
GRADUATE COLLEGE

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ACKNOWLEDGEMENTS

I would like to thank the members of my dissertation committee, the Economics faculty staff and the department chair, Dr. Mark Walker for their continued support, help, guidance and understanding during my stay at the University of Arizona.

First and foremost, I would like to thank Dr. James C. Cox, my thesis supervisor, for his continuous guidance, generosity and creative direction. Over the last five years I found him to be a wonderful person in addition to his established reputation as a phenomenal economist and a hard task master.

Dr. Martin Dufwenberg's guidance and suggestions have greatly benefitted me. Not only has he been a wonderful mentor but a friend with the kindest of souls.

Dr. Stanley Reynold's comments and suggestions on the first two essays of this dissertation have proved to be invaluable.

Dr. Price Fishback has been a source of great support and encouragement during tough times. I am grateful for his overall suggestions on my dissertation. Especially my third essay benefited greatly from conversations and suggestions from him.

Dr. Ronald Oaxaca's suggestions and insights have greatly aided not only my dissertation essays but other research work as well. I am also grateful to him for agreeing to be the co-chair of my dissertation committee.

Dr. John Drabicki's encouragements have helped me at the most critical of moments. I am grateful for his suggestions on how to build a teaching profile and his critical inputs during my job market preparations.

I am also grateful to Dr. Martin Dufwenberg, Dr. Stanley Reynolds and Dr. John Wooders for their willingness to chair my oral defense if the need had arisen.

I feel indebted to my colleagues Jaret Treber, Simona Lup, Nidhi Thakur and Todd Sorensen for their help, kind words and encouragements.

The Economics Department at the University of Arizona boasts an exceptional group of economists. I learned a tremendous amount from them over the years and enjoyed the conversations and interactions that I had with each. I also gratefully acknowledge my other peers for their assistance and camaraderie. The long hours and years in the department passed away in a flash due to the dynamic and diverse group of witty individuals that comprised the department's graduate students. Life in the department was made manageable due to all the help provided by Mary, Carole, Lana, Jenny and Pat.

I owe a great deal to my wonderful friends who made life in Tucson special. Sonam Gupta's friendship, support and encouragements have proved to be invaluable in all these years. Siddharth Kaza's pathetic humor and Megha Kaza's phenomenal cooking made many an evening worthwhile. Amlan Ghosh's incessant nonsense and Wafa Hakim's clever quips provided me with endless entertainments. Thanks are also due to Rahul Giri and Rubina Verma for their exceptional sincerity and friendship.

Finally, I am blessed to have Subha with her unflagging patience, support and love through all these years.

DEDICATION

This dissertation is dedicated to my parents Dr. Dipankar Dasgupta and Sankari Dasgupta, for encouraging my curiosities, showing me the way and instilling in me the courage to make the journey. I also dedicate it Subha Mani and my grandparents, Dr. Prafulla Dasgupta and Basanti Dasgupta who taught me the value of dotting!

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ABSTRACT

This dissertation is a collection of three essays analyzing the pricing behavior of firms in different market contexts.

In the first essay, I propose that a key determinant of contestability is the nature of the potential entrant's own home market. Is it competitive or monopolistic? I develop a repeated game framework to evaluate whether the threat of "hit and run" entry disciplines incumbent pricing when potential entrants have their own home markets. I test the predictions of the model in an experimental setting and the results show that the threat of entry from firms in monopoly markets does not serve to discipline an incumbent in the contestable market.

The second essay extends the previous analysis to an imperfectly contestable market scenario, when there are sunk costs to entering the monopoly market. Two polar experimental treatments are considered: one where the entrant has its own monopoly market and the other in which it earns normal returns. Results show that the threat of hit and run entry is very potent even in the presence of a modest level of sunk cost only if the entrant firm earns normal returns in its own market. In contrast, firms from monopoly markets tacitly cooperate to charge monopoly prices in each market.

The third essay explores the phenomenon of international price differences in the online book industry. My sample consists of price data collected from 49 online bookstores for 99 books in English from 12 book categories. The online bookstores are situated either in the United States, Canada or the United Kingdom. The data points out that publishers frequently use different list prices for the same book in different countries. This is especially interesting since I find that the list prices provide a general rule of thumb for offered prices in an online bookstore. Regressions with book specific fixed effects, category effects and prominent-bookstore effects suggest that a large part of the offered prices can be explained by the list prices charged at

online stores. The paper provides some discussions on reasons behind such dispersions and its persistence.

Chapter 1

CONTESTABILITY AND THE SIGNIFICANCE OF THE ENTRANT'S HOME MARKET

1.1 Introduction

Regulating a natural monopoly market has always remained a source of concern. The problem arises because of the decreasing average cost structure in the market. Ideally, only one firm serving the whole market demand is the efficient solution to avoid any cost duplication. However, if there is a single unregulated firm serving the whole market it brings up the standard monopoly price gouging and inefficiency. Many utility services share the characteristics of a natural monopoly. As a result, almost all countries in their deregulation phases are concerned with the efficient running of such markets. Restraining monopoly behavior effectively in a natural monopoly market remains a much-debated issue. One approach has been towards creating a “contestable” market¹ environment. This has influenced deregulation policies in the USA and continues to influence deregulation efforts in many other countries.² The theory of contestable markets suggest that in a perfectly contestable market³ the threat of hit-and-run entry by new entrants in the monopoly market can provide the right disciplining stick for the monopolist incumbent to charge a price equal to the average cost of production (the Ramsey optimal price). This outcome is described as a contestable (market) outcome.⁴

Although the role of an entrant firm ‘waiting in the wings’ is crucial to the con-

¹William Baumol in his 1981 address as outgoing president of the American Economic Association put forward the idea of a contestable market.

²Banking Sectors in Europe and Canada, North Sea Helicopter Services in UK, communication sector in regional, rural and remote Australia.

³A perfectly contestable market is devoid of any sunk entry costs. So an entrant can enter a market whenever there are profit opportunities without worrying about sunk costs.

⁴See Baumol Panzar and Willig (1982).

testable outcome, the literature on contestability⁵ does not explicitly model the origin or nature of entrant firms. Who are the possible entrants in the natural monopoly markets? Casual empiricism suggests that the possible entrants are typically firms offering similar products in other markets. For example, in airlines Southwest and United Airlines each have their own airport dominance and are possible entrants in each other's routes. In high-speed DSL services Qwest, Verizon and Earthlink are firms who have their own home markets but are the potential entrants in each other's markets. We are interested in the following question: Does the threat of hit and run entry invoke the right disciplining effect when entrants have their own home markets? If entrant firms have their own home markets it is plausible that although another market is vulnerable to "hit-and-run" entry, the entrant might be reluctant to enter if it fears retaliation in its own market. The point to note is that although the entrant can 'hit', it cannot quite 'run' away because the incumbent might decide to enter and price aggressively in the entrant's own market in an effort to punish him. Since the contestable outcome relies on the possible threats of entry, a possible price war in each other's markets can mitigate that threat to a large extent and make firms behave in a more collusive manner.

In this paper I evaluate for the first time the role of contestability in a framework where firms have their own home markets and are potential entrants in each others' markets.⁶ My experimental results establish that when each firm has its own monopoly market then the contestable outcome is not observed. Instead, prices in the monopoly markets are close to the theoretical monopoly prices. In contrast, if the entrant firm comes from a stylized Bertrand environment or a perfect competition

⁵See Baumol (1982), Brock (1983) and Schwartz (1986) for discussions on the assumptions of contestable markets.

⁶Earlier experimental work [See Coursey, Issac and Smith (1984), Harrison and McKee (1985), Harrison, McKee and Rutstrom (1987)] had the following design: There is a single contested market. At least 2 firms choose price and quantity simultaneously like in a Bertrand price-setting market. The outcomes conformed to the contestable outcome. Harrison (1987) modified the above design to introduce sequential moves by the incumbent and the entrant and found even stronger support for the contestable outcomes.

environment then we do observe the threat of entry to provide enough disciplining force to the pricing behavior of the monopoly incumbent. Hit-and-run entry in initial periods makes the monopolist incumbent price at average cost in later periods.

Section 1.2 provides a literature review, section 1.3 introduces the framework of analysis and possible firm behavior. Section 1.4 discusses the experimental design; Section 1.5 provides the results and Section 1.6 concludes.

1.2 Literature Review

Coursey, Isaac and Smith (1984) conducted the first experiments to look at the effects of monopoly under decreasing cost conditions in a posted offer market setting. In their experiment, sellers all simultaneously post prices and quantities at the beginning of the trading period. Also human buyers were used instead of computerized buyers for possible buyer strategic behaviors. In six of the contested experimental markets, four of the duopolies yielded competitive price outcomes and the other two exhibited downward trends in prices. This was one of the earliest attempts to operationalize the contestability thesis. A point to note here is that buyer strategic behavior could have been responsible for the downward trend in prices rather than the contestability hypothesis. Coursey, Isaac, Luke and Smith (1984) introduced a small amount of sunk cost to evaluate how robust Contestability is to slight changes in its assumptions. They ran twelve sessions, six with simulated buyers and six with human buyers and found that the prices supported a “weak version” of the contestable market hypothesis. It was weak in the sense that prices were found to be closer to the competitive (Ramsey-optimal) level than to the monopoly. In a different study, Harrison and McKee (1985) observed similar low values of monopoly effectiveness in their version of a contested market with designs similar to the Coursey, Isaac, Luke and Smith design except for the introduction of simulated buyers. Harrison (1987) pointed out that a key behavioral assumption about the entrant being able to evaluate the profitability of a market before entry was absent in all the above work since the sellers simultaneously posted prices. In a modified series of experiments to accommodate the behavioral assumption he found stronger evidence in favor of Contestable Markets Hypothesis. V, Millner, Pratt, and Reily (1990) altered the price cutting assumption in an experimental design using a continuous-time flow market. In their design the seller with the lowest price at any instant, made the sale and in this sense was an incumbent. The other seller could observe the price and decide

whether to undercut at the next moment. They found that market efficiencies were low and there weren't any stable pricing behavior. Brown-Kruse (1991) changed the zero opportunity cost of entry present in earlier experiments and added an alternative market which provided a safe haven for the entrant. The entrant could get a fixed payment for being in the alternative market. She found that the mean prices were not significantly different from the earlier zero opportunity cost cases.

1.3 Conceptual Framework

The following section sets the stage for the experimental design described in Section 1.4. Here we describe the contestable market environment we wish to evaluate. Consider two monopoly markets each having a quasi-fixed cost function⁷ of the form

$$C(q) = F + cq \tag{1.1}$$

Let c be the marginal cost of production and F the fixed cost. For each of the markets, we assume the simplest downward sloping linear demand function of the form

$$D(p) = a - bp \tag{1.2}$$

where p is the selling price and a and b are constants. Also assume the market demand and returns to scale are such that if two firms share the market at a common price then each earns negative returns. Define p_0 to be the price at which the demand curve intersects the average cost curve. Let Π_0 be the profit associated with charging a price p_0 . So p_0 is the Ramsey price and Π_0 is the profit associated with charging the Ramsey price. Let Π_m be the monopoly profit in the market if a firm charges the monopoly price p_m . All profits are defined net of costs.

Each of the two markets has an existent incumbent firm. We set up the contestability game as a two-stage decision making process, where firms choose prices and make entry decisions for each selling period. Both firms post prices in their home markets in the first stage. In the second stage the firms get to know the 1st stage price in the entry markets and decide whether or not to enter and post prices in that market. We are interested in firm behavior in an infinitely repeated version⁸ of the

⁷A firm incurs the fixed cost only if it actually sells in the market. The quasi-fixed cost allows an operationalization of the cost-less exit condition for an entrant, crucial for the contestability theory.

⁸Dasgupta (2005a) analyses a model of firm interaction using the above framework, in a one-shot setting as well as in an infinitely repeated game framework.

above two-stage game. One possibility is that each incumbent posts p_0 in its own market to ward off possible entry and enters and undercuts the other firm whenever the latter posts a price greater than p_0 . This would conform to the contestable outcome since both firms thereby choose prices equal to the average cost of production, anticipating hit-and-run entry. However, each firm would then just earn enough to cover the costs of production instead of earning monopoly rents from its home market. This seems unlikely since the two firms could cooperate to realize far greater profits over time.

We outline the simplest grim trigger strategy that would enforce tacit collusion by both firms. Consider the following strategy: an incumbent firm remains in its own home market unless the other enters its home market. If the other firm does enter the incumbent's home market then the incumbent prices at average cost in the next period and at every subsequent period after that forever. Further, in the second stage decision, every time it finds the entrant pricing above average cost in the entrant's own home market it undercuts that price. This essentially means that once an entrant "hits" a market he loses the scope of monopoly profits not only in that market, but in his own market as well, for all subsequent periods.

To verify the above idea, consider an infinitely repeated game where each firm discounts the future by an amount δ . In our framework as long as the following condition holds,⁹

$$\frac{\Pi_m}{1-\delta} > 2\Pi_m + \frac{\delta\Pi_0}{1-\delta} \quad (1.3)$$

or,

$$\delta > \frac{1}{2} \quad (1.4)$$

(where I assume $\Pi_0 = 0$, a profit level associated with average cost pricing) each firm would like to maintain its monopoly position in its home market rather than

⁹See Appendix for proof.

encroach or predate the other market. Intuitively, (1.4) give us the familiar idea that sufficiently patient firms can reap much higher profits by colluding.

We contrast the above situation with a case where the entrant comes from a relatively more competitive market. Consider the simplest situation where one of the firms is an incumbent in a perfectly competitive market earning normal returns Π_0 , and the other firm is an incumbent in the natural monopoly market. Further assume that the profit in the competitive market remains unaffected by entry. We can verify that as long as

$$\Pi_m > 0 \tag{1.5}$$

the incumbent monopolist would like to charge an average cost price p_0 . (See Appendix). The intuition behind the above condition is simple enough. If the entrant is just earning normal returns in the competitive market then any positive profit in the incumbent's market would lure him to attack and undercut that market. This in turn would make the incumbent monopolist wary of charging a monopoly price since he has no scope of retaliation in the entrant's home market. As a result, to avoid being undercut by the competitive entrant the monopolist incumbent would price at average cost.

We also consider an oligopoly market as an alternative competitive market. Suppose the profits in the oligopoly market depend on the number of firms in the market. Let the maximum profit possible for a firm in the oligopoly market be $\bar{\Pi}_n$, when there are n firms in the oligopoly market. Let $\underline{\Pi}_{n+1}$ be the lowest positive profit when there are $n+1$ firms in the market. Consider our two-firm, two-market framework where one of the firms is an incumbent in the oligopoly market and the other an incumbent in a natural monopoly market. A similar grim trigger strategy as described above would suggest that the threat of entry could work as a disciplining force¹⁰ as long as

¹⁰See Appendix for the proof and the description of the grim trigger strategy.

$$\Pi_m > \frac{\delta}{1-\delta} (\bar{\Pi}_n - \underline{\Pi}_{n+1}) \quad (1.6)$$

The above provides us a framework for setting up an experiment to evaluate the contestability hypothesis in a multiple-home-market framework and investigate the incumbent monopolist's behavior under different profit situations for the entrant. This in turn should shed light on the conditions which facilitate or hinder contestable outcomes as means of improving welfare.

1.4 Experimental Design

Analogous to our discussion above, we have a two-firm, two-market setup in our experimental design. Each firm is an incumbent in one of the markets and has the option to enter the other market. Our baseline treatment consists of two natural monopoly markets with the same demand and cost conditions. We will call this the monopoly treatment.

In our second treatment, one of the markets is a natural monopoly market and the other market is a stylized perfectly competitive market. The demand and cost conditions in the monopoly market are the same as the baseline treatment. The payoff in the competitive market is fixed at 1 experimental dollar and there are no costs. This payoff is comparable to the payoff the incumbent gets in the natural monopoly market when it charges a price equal to the average cost of production (Ramsey price). In addition, the payoff in the competitive market remains unaffected by entry. We will refer to this as the perfect competition treatment.

In our third treatment one of the markets is a natural monopoly market and the other market is a stylized Bertrand market. The Bertrand market has an inelastic demand of two units and two existing firms. One of the firms is randomly chosen at the beginning of the experiment as an entrant¹¹ in the monopoly market. The seller with the lowest posted price in the Bertrand market gets a profit of two times that price. If more than one seller chooses the lowest price, then each gets a profit of two times that price divided by the number of sellers who have chosen the same price. We call this the oligopoly treatment.

The decision making in each period is set up as a two-stage game as described in section 1.3. In the baseline monopoly treatment each firm chooses a price in its home market in the first stage. In the second stage the firm gets to know the first stage price

¹¹This restriction on the number of entrants might seem a bit unnatural, but is imposed so that when comparing between the three treatments the experimental results are not affected by an increase in the number of potential entrants.

in the other market and decides whether or not to enter and choose a price in the other market. In the perfect competition treatment, the incumbent firm chooses a price in the monopoly market in the first stage. In the second stage, the competitive entrant gets to know the first stage price in the monopoly market and decides whether or not to enter and choose a price in the other market. In the oligopoly treatment, each firm chooses a price in its home market (monopoly or Bertrand) in the first stage. In the second stage, the monopoly incumbent gets to know the lower of the two chosen prices in the Bertrand market. In this stage, the entrant from the Bertrand market also gets to see the price chosen in the monopoly market. Each of them decides whether or not to enter and choose a price in the other market. The profits are realized at the end of the two stages. Firms with lowest chosen prices in a market, sell in that market to realize profits. All other firms earn zero profits. The two-stage decision operationalizes the fact that each firm can actually evaluate the profitability in the other market before it decides whether to enter the market.¹² The natural monopoly market has the following demand and cost functions:

$$p = 20 - q \tag{1.7}$$

$$c(q) = 32 + 2q \tag{1.8}$$

where \mathbf{p} is the price and \mathbf{q} is the quantity demanded, and $c(\mathbf{q})$ is the cost function.

In all the treatments, we impose fixed matching with a probabilistic stopping rule, with a continuation probability of $2/3$ every period. We do this to accommodate the following: First, the continuation probability of $2/3$, matches our repeated game framework, where firms discount the future by more than one-half. Second, with a probabilistic termination we hope to avoid end game behaviors of participating subjects. The number of firms in the market and the exchange rate of experimental

¹²This is one of the critical behavioral assumptions that contestability hinges on and has been absent in almost all of the earlier experiments on Contestability [See Harrison (1987)].

earnings into real currency are clearly explained in the instructions to the participants (Appendix contains subject instructions).

Our experimental design attempts to bring in all the relevant assumptions of contestability in the laboratory to give the contestable outcome its best chance of success. First, the cost function is of a quasi-fixed nature. So the firm incurs a cost only if it actually sells at its posted price. This facilitates costless exit from a market for an entrant since all it has to do is not post a price in the rival firm's home market in any period following an entry. Due to the two-stage nature of the game each firm can actually evaluate the profitability in the other market before it decides whether to enter the market. As pointed out by Harrison (1987), this is one of the critical behavioral assumptions that contestability hinges upon, absent in most of the earlier experiments on contestability.

The experiments were conducted in the Economic Science Laboratory (ESL) at the University of Arizona with undergraduate student subjects. The experiment was programmed and conducted with z-Tree software (Fischbacher 1999). Table 1.1 summarizes the number of sessions run and the profit levels¹³ in the three treatments.

For each of the treatments we gathered observations for five to seven market pairs. Each of the market pairs consisted of an incumbent firm in a monopoly market and another firm in the 'treatment' market. The experiments typically went on for 30-40 minutes and the average earnings were between \$15 and \$20 inclusive of the \$5 show-up fee.

¹³Given our parameters, choosing a price of 4 should give a payoff of zero experimental dollars. However, we wanted to avoid subject behavior due to zero payoffs. So we increased all payoffs by 1 in the monopoly market which guaranteed a payoff of at least one experimental dollar if the incumbent was the only seller in its home market charging a price of 4.

TABLE 1.1. Summary of Experimental Sessions

Treatment	Number of Firms	Profit Contestable Market	Profit Treatment Market	Sessions
Monopoly	2	50(Max) 1(Min)	50(Max) 1(Min)	7
Perfect Competition	2	50(Max) 1(Min)	1(Max) 1(Min)	7
Oligopoly	3	50(Max) 1(Min)	20(Max) 8/3(Min)	5

1.5 Results

We hypothesize that an entrant from a competitive market disciplines a monopoly incumbent in a perfectly contestable market. In contrast, an entrant with its own monopoly market open to entry, tacitly colludes with the monopoly incumbent of the other market. So, our main variable of interest is the average price over periods, in the contestable natural monopoly market for each of the treatments.

We start by reporting average final prices after the first five periods in the monopoly treatment and the perfect competition treatment.

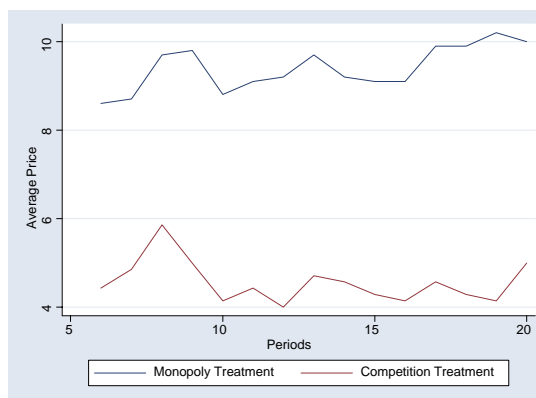


FIGURE 1.1. Average Prices (Monopoly and Competition)

TABLE 1.2. Results of Mann Whitney U-test

Null	U-statistic	P-value
Monopoly price=Competitive price	3.33	0.0008
Monopoly price=Oligopoly price	2.95	0.0031
Oligopoly price=Competitive price	-1.22	0.22

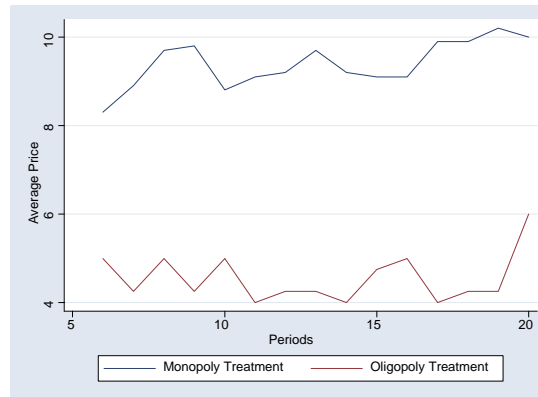


FIGURE 1.2. Average Prices (Monopoly and Oligopoly)

Figure 1.1, shows the average prevailing price in the contestable natural monopoly market for the two treatments. Figure 1.2 shows the average prevailing prices in the monopoly and the oligopoly treatments. Using a Mann Whitney test we found the prices in the monopoly treatment to be significantly different from the competition and oligopoly treatments. We do not find the Oligopoly treatment generating significantly different prices from the Competitive treatment. Table 1.2 reports the U-statistic and associated P-values.

Figure 1.3, describes the average prices in the contestable market for all the three treatments across all periods. As conjectured, average prices in the monopoly treatment are much higher than the other two treatments. The oligopoly treatment and the perfect competition treatment had very similar effects on the natural monopoly market. This comparison is very useful especially to compare the direction of subject

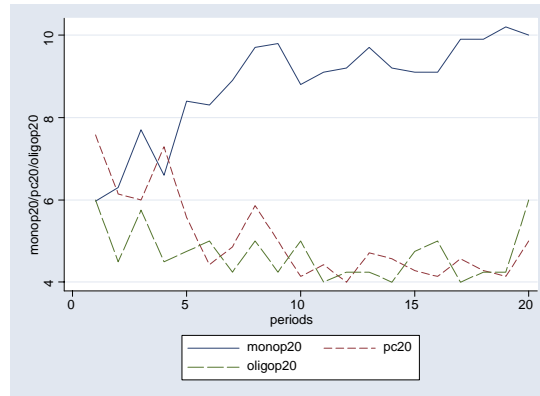


FIGURE 1.3. Average Prices (Monopoly, Competition and Oligopoly)

learning in the three treatments. Notice in the perfect competition treatment and the oligopoly treatment subjects learn to post entry restricting prices. The opposite happens in the monopoly treatment.

We also define a measure to illustrate the disciplining effects of contestability in the three treatments. Let C be a contestability index

$$C = \frac{\Pi_m - \Pi_a}{\Pi_m - \Pi_0} \quad (1.9)$$

where Π_a is the actual profit observed in the experimental monopoly market, Π_m is the theoretical monopoly profit in the market and Π_0 is the profit associated with Ramsey pricing. If $\Pi_a = \Pi_m$, then $C = 0$ and contestability fails to discipline monopoly behavior. Alternatively, when $C = 1$ then contestability is successful in disciplining the monopoly market. Figure 4 illustrates the average value of C across all periods in the monopoly market for each of the treatments. The difference in C across treatments is quite stark. While the monopoly treatment yielded C close to zero in each of the markets, the other two treatments had C close to one or actually one.

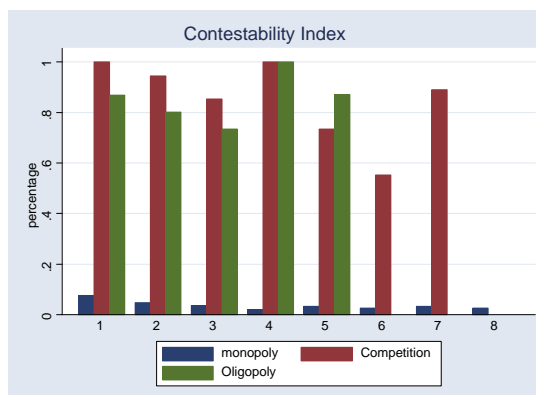


FIGURE 1.4. Contestability Index

1.6 Conclusion

In this experiment we tested the effectiveness of hit-and-run entry in perfectly contestable markets when the entrant and the incumbent each have their own home markets. We find that the threat of entry is successful in lowering prices only if the entrant has relatively lower profits in its own market as compared to the monopoly market, or the entrant's profits are unaffected by entry. In the perfect competition treatment and the oligopoly treatment prices in the natural monopoly market quickly adjusted to the entry restricting, average cost level over several periods. However, in the monopoly treatment prices remain very close to the theoretical monopoly price level.

Our results demonstrate that contestability theory in its conceptualization might have overlooked an important dimension in firm interactions. In particular, the entrant's home-market and the interaction environment between the entrant and incumbent firms need to be incorporated for its successful implementation. The threat of entry is indeed a potential disciplining force when the entrant has very little to lose in the long run by entering an incumbent's market. On the other hand an entrant from a monopoly market would be wary of vigorous price cutting in the other monopoly

market because in the long run it might depress profits in all markets.¹⁴

We should be cautious about extending our experimental market results to naturally-occurring markets. However, we think that our results do have some implications for policy. In contrast to earlier experimental evidence, empirical research on naturally-occurring contestable markets finds little evidence of disciplining effects (see Call and Keeler, [1985]). The possible absence of structural conditions¹⁵ required for perfect contestability has been suggested as a possible reason for this lack of disciplining evidence. However, a plausible reason can be that mutual forbearance by big firms in different markets actually works against the hit-and-run entry disciplining force of contestability. Although the contestability thesis dwells away from government intervention in markets, some screening of the possible entrant pool might actually bring about the desired effects of potential threats of entry.

¹⁴Bernheim and Whinston (2000) suggests similar mutual forbearance results in a more general duopoly-market framework.

¹⁵See Schwartz(1983), Tye(1984), Weitzman(1983)

1.7 Appendix

Consider the following strategy: an incumbent monopolist firm remains in its own home market unless the other enters its home market. If the other firm does enter the incumbent's home market then the incumbent prices at average cost in the next period and at every subsequent period after that forever. Further, in the second stage decision, every time the incumbent finds the entrant pricing above average cost in the entrant's own home market it undercuts that price.

1.7.1 Entrant from a Monopoly Market

If each firm decides to stay in its own market then the present discounted profit stream for each is given by the following

$$\Pi_m + \delta\Pi_m + \delta^2\Pi_m + \delta^3\Pi_m + \dots = \frac{\Pi_m}{1 - \delta} \quad (1.10)$$

Instead if a firm enters and undercuts the incumbent of the other market in a period it gets

$$\Pi_m + \Pi_m - \varepsilon \quad (1.11)$$

in that period and Π_0 from then onwards. So the discounted profit stream to the entrant is given by the following

$$2\Pi_m + \delta\frac{\Pi_0}{1 - \delta} \quad (1.12)$$

I ignore ε for convenience. Assume $\Pi_0 = 0$, a profit level associated with average cost pricing. When (1.1) is greater than (1.2), a firm is better off not entering the other market.

i.e.,

$$\frac{\Pi_m}{1 - \delta} > 2\Pi_m + \delta\frac{\Pi_0}{1 - \delta} \quad (1.13)$$

or,

$$\delta > \frac{1}{2} \tag{1.14}$$

If the firms are sufficiently patient, and each of the firms play by the grim trigger strategy explained in the text then it is in the interest of the firms not to enter each others' markets.

1.7.2 Entrant from a Perfectly Competitive Market

Consider the following situation: an incumbent monopolist firm remains in its own home market unless the other enters its home market. If the other firm does enter the incumbent's home market then the incumbent prices at average cost in the next period and at every subsequent period after that forever. We also assume that the entrant's market only allows zero economic profits, which remains unaffected by entry. If a firm from the perfectly competitive market decides to stay in its own market then the present discounted profit stream it will get is

$$\Pi_0 + \delta\Pi_0 + \delta^2\Pi_0 + \dots = \frac{\Pi_0}{1 - \delta} \tag{1.15}$$

Instead, if the firm enters and undercuts the incumbent of the monopoly market in a period, he gets

$$\Pi_m - \epsilon \tag{1.16}$$

in that period, and Π_0 from then onwards. So the discounted profit stream to the entrant is

$$\Pi_m + \frac{\Pi_0}{1 - \delta} \tag{1.17}$$

We ignore ϵ for convenience. Assume $\Pi_0 = 0$. If (2.1) is greater than (2.2), then a firm is better off entering the monopoly market.

i.e.,

$$\Pi_m + \frac{\Pi_0}{1 - \delta} > \frac{\Pi_0}{1 - \delta} \quad (1.18)$$

or,

$$\Pi_m > 0 \quad (1.19)$$

As long as the profit in the monopoly market is strictly positive the entrant from the perfectly competitive market would like to enter.

1.7.3 Entrant from an Oligopoly Market

Suppose the entrant comes from an oligopoly market with n existing firms. Let the maximum profit a firm can get in the oligopoly market be $\bar{\Pi}_n$. Let $\underline{\Pi}_{n+1}$ be the minimum positive profit possible when there are $n+1$ firms (that is, after one more firm enters the oligopoly market). Consider the following strategy: an incumbent monopolist firm remains in its own home market unless the entrant hits its home market. If the other firm does enter the monopolist's home market then the incumbent prices at average cost in the next period and at every subsequent period after that forever. Further, in the second stage decision, it enters and chooses the lowest price in the oligopoly market. As a result each firm can get at most $\underline{\Pi}_{n+1}$ in the oligopoly market. If the incumbent in the oligopoly market remains in its own market the maximum it can get is

$$\bar{\Pi}_n + \delta\bar{\Pi}_n + \delta^2\bar{\Pi}_n + \dots = \frac{\bar{\Pi}_n}{1 - \delta} \quad (1.20)$$

If it enters and undercuts the monopoly incumbent it gets

$$\Pi_m - \varepsilon \quad (1.21)$$

in that period and $\underline{\Pi}_{n+1}$ from then onwards. So the discounted profit stream to the entrant is

$$\Pi_m + \bar{\Pi}_n + \delta \frac{\underline{\Pi}_{n+1}}{1 - \delta} \quad (1.22)$$

We ignore ε for convenience. If (3.1) is greater than (3.2), a firm is better off entering the monopoly market,

i.e.,

$$\Pi_m > \frac{\delta}{1 - \delta} (\bar{\Pi}_n - \underline{\Pi}_{n+1}) \quad (1.23)$$

1.8 Subject Instruction Sets:

1.8.1 Monopoly Treatment

[Instruction for the Monopoly Incumbent and Entrant]

Introduction : Welcome to this market experiment. You will be matched with another participant for the rest of the experiment. You will get 5 U.S. dollars for participating in the experiment in addition to what you earn in experimental dollars during the experiment. Each experimental dollar is worth 0.01 U.S. dollar.

Instructions There are two markets. You are the only seller in your home market. There is also one seller just like you in the other market. There are multiple periods of the experiment.

In each period there are two stages of decision making that you have to take.

Stage 1: You choose a price between 4 and 11 in your home market. The other seller also chooses a price from the same set of prices in his home market.

Stage 2: You are shown the price chosen by the other seller in his home market. Also the price you have chosen in your home market is shown to the other seller.

Then you decide whether to enter the other seller's home market or not enter his market. If you decide to enter you have to submit a price in that market. The other seller also decides whether to enter your market or not enter your market. If he chooses to enter then he submits a price in your market.

Once you and the other seller have taken the Stage 1 and Stage 2 decisions, one period is over. Your profit for that period is determined by the matrices attached at the end.

Notice the profit in your home market depends on what you choose in the first stage and what the other seller chooses in the second stage. Similarly, the profit in

the other market depends on what the other seller chose in the first stage and what you choose in the second stage.

After every period, the computer program picks a number from 1 through 6 with equal chance. If either 5 or 6 comes up the experiment ends; otherwise, the experiment continues to another period. In other words, after every period you have 2/3rd chance to move on to another period. NOTE: This is the same as rolling a six-sided die. If a 5 or a 6 turns up then the experiment ends; otherwise, the experiment continues to another period.

If you move on to another period, Stages 1 and 2 are repeated again.

At the end of the experiment your total profit from all periods will be converted to U.S. dollars in the mentioned exchanged rate and paid to you.

1.8.2 Perfect Competition Treatment

[Instruction for Entrant from the Competitive Market]

Introduction Welcome to this market experiment. You will be matched with another participant for the rest of the experiment. You will get 5 U.S. dollars for participating in the experiment in addition to what you earn in experimental dollars during the experiment. Each experimental dollar is worth 0.01 US dollar.

Instructions There are two markets. You are the only seller in your home market. You get 1 experimental dollar for being a seller in this market every period. There is another market which is the other seller's home market. There are multiple periods of the experiment.

In each period there are two stages.

Stage 1: The other seller in his home market chooses a price between 4 and 11.

Stage 2: You are shown the price chosen by the other seller in his home market. You have to decide whether to enter the other seller's market or not enter his market. If you decide to enter you have to submit a price in that market. The other seller also decides whether he wants to enter your market or not. If he chooses to enter he gets 1 experimental dollar for being in the market.

Once you and the other seller have taken the Stage 1 and Stage 2 decisions, one period is over. Your profit for that period, in the other seller's home market is determined by the matrix that is attached at the end.

Notice the payment in the other seller's home market depends on what the other seller chooses in the first stage and what you choose in the second stage. In addition, in your home market, you get 1 experimental dollar every period.

After every period, the computer program picks a number from 1 through 6 with

equal chance. If either 5 or 6 comes up the experiment ends; otherwise, the experiment continues. In other words, after every period you have 2/3rd chance to move on to another period. NOTE: This is the same as rolling a six-sided die. If a 5 or a 6 turns up then the experiment ends; otherwise, the experiment continues to another next period.

If you move on to another period, Stage 1 and 2 are repeated again.

At the end of the experiment your total profit from all periods will be converted to U.S. dollars in the mentioned exchanged rate and paid to you.

[Instruction for incumbent in Monopoly Market]

Introduction

Welcome to this market experiment. You will be matched with another participant for the rest of the experiment. You will get 5 U.S. dollars for participating in the experiment in addition to what you earn in experimental dollars during the experiment. Each experimental dollar is worth 0.01 US dollar.

Instructions There are two markets. You are the only seller in your home market. There is another market which has one seller who gets a 1 experimental dollar every period, for being a seller in that market. There are multiple periods of the experiment.

In each period there are two stages of decision-making.

Stage 1: You choose a price between 4 and 11 in your home market.

Stage 2: The price you chose in your home market is shown to the other seller. He then decides whether he wants to enter your home market or not enter your market. If he chooses to enter then he submits a price in your market.

You also decide whether you want to enter the other firm's home market. If you choose to enter, you get 1 experimental dollar from that market.

Once you and the other seller have taken the Stage 1 and Stage 2 decisions, one period is over. Your profit for the period, in your home market, is determined by the matrix that is attached at the end.

Notice the profit in your home market depends on what you choose in the first stage and what the other seller chooses in the second stage. In addition, if you choose to enter the other seller's home market in any period, you get 1 experimental dollar from that market.

After every period, the computer program picks a number from 1 through 6 with

equal chance. If either 5 or 6 comes up the experiment ends; otherwise, the experiment continues. In other words, after every period you have 2/3rd chance to move on to another period. NOTE: This is the same as rolling a six-sided die. If a 5 or a 6 turns up then the experiment ends; otherwise, the experiment continues to another next period.

If you move on to another period, Stage 1 and 2 are repeated again.

At the end of the experiment your total profit from all periods will be converted to U.S. dollars in the mentioned exchanged rate and paid to you.

1.8.3 Oligopoly Treatment

[Instruction for incumbent in Monopoly Market]

Introduction

Welcome to this market experiment. You will be matched with two more participants for the rest of the experiment. You will get 5 dollars for participating in the experiment in addition to what you earn in experimental dollars during the experiment. Each experimental dollar is worth 0.01 US dollar.

Instructions There are two markets A and B. You are the only seller in market A, which is your home market. Market B is the home market for the other two sellers. There are multiple periods of the experiment.

In each period there are two stages of decision-making you have to take.

Stage 1: You choose a price between 4 and 11 in your home market. The other two sellers also choose prices from the same set of prices in their home market.

Stage 2: You are shown the lower of the two prices chosen in market B. Also the price that you chose in your home market A, is shown to only one of the sellers in market B. Then you decide whether to enter the other sellers' home market, or not enter their market. If you decide to enter you have to submit a price in that market. The seller who shown the price you posted in your home market also decides independently whether to enter your home market A, or not enter your market. If he chooses to enter then he submits a price in your market.

Once all the sellers have taken the relevant Stage 1 and Stage 2 decisions, one period is over. The matrix that is attached at the end determines your profit for the period in your home market.

The profit in the other sellers' home market is determined in the following way:

If you do not enter market B then you get zero from market B. The existing two sellers in market B have the following profits. The seller who posted the lower of the two prices gets 2 times the price he chose. The seller who posted the higher price gets zero. If both choose the same price, then each gets a profit equal to the price they chose. If you decide to enter market B and the price you chose for that market is the lower of the three prices you get 2 times the price you chose. The other sellers get zero. If any two of the sellers choose the same price, which is less than the price of the third seller, then both get a profit equal to that price. The third seller who posted the higher price gets zero. If all three sellers choose the same price each gets 2/3rd times that price. If your price is higher than the price of either of the two sellers you get zero.

Notice the payment in your home market depends on what you choose in the first stage and what the other seller chooses in the second stage. Similarly, the payoff in the other market depends on what the other sellers chose in the first stage and what you choose in the second stage.

After every period, the computer program picks a number from 1 through 6 with equal chance. If either 5 or 6 comes up the experiment ends; otherwise, the experiment continues to another period. In other words, after every period you have 2/3rd chance to move on to another period. NOTE: This is the same as rolling a six-sided die. If a 5 or a 6 turns up then the experiment ends; otherwise, the experiment continues to another period.

If you move on to another period, Stages 1 and 2 are repeated again.

At the end of the experiment your total profit from all periods will be converted to U.S. dollars in the mentioned exchanged rate and paid to you.

[Instruction for entrant from Oligopoly Market]

Introduction

Welcome to this market experiment. You will be matched with two more participants for the rest of the experiment. You will get 5 dollars for participating in the experiment in addition to what you earn in experimental dollars during the experiment. Each experimental dollar is worth 0.01 US dollar.

Instructions There are two markets, A and B. You are a seller in market B, which is your home market. There is a second seller in market B as well. Market A is the home market for the third participant. There are multiple periods of the experiment.

In each period there are two stages of decision-making you have to take.

Stage 1: You choose a price between 4 and 11 in your home market B. The other seller in B chooses a price between 4 and 11 independently. The third participant also chooses a price from the same set of prices in his home market.

Stage 2: You are shown the price chosen by the seller in market A. The seller in market A is shown the lower of the two prices chosen in your home market B.

Then you decide whether to enter the other seller's home market or not enter his market. If you decide to enter you have to submit a price in that market. The seller in market A also decides whether he wants to enter your home market or not enter your market. If he chooses to enter then he submits a price in your market. The second seller in your home market has no decisions to take in Stage 2.

Once all the sellers have taken the relevant Stage 1 and Stage 2 decisions one period is over. The matrix that is attached at the end determines your profit for the period in the other seller's home market, A.

The profit in your home market B, is determined in the following way:

If seller from market A does not enter your home market the existing two sellers have the following profits. The seller who posted the lower of the two prices gets 2 times the price he chose. The seller who posted the higher price gets zero. If both choose the same price, then each gets a profit equal to the price they chose. The seller from market A gets no profits from your home market if he chooses not to enter. If seller from market A does enter your home market and chooses a price that is the lower of the three prices he gets 2 times the price he chose. The other sellers get zero.

If any two of the sellers choose the same price, which is less than the price of the third seller, then both get a profit equal to that price. The third seller who posted the higher price gets zero. If all three sellers choose the same price each gets $\frac{2}{3}$ rd times that price. If your price is higher than the price of either of the two sellers you get zero.

Notice the payment in your home market depends on what you and the other seller choose in the first stage and what the seller from market A chooses in the second stage. Similarly, the payoff in the other market depends on what seller from market A chose in the first stage and what you choose in the second stage.

After every period, the computer program picks a number from 1 through 6 with equal chance. If either 5 or 6 comes up the experiment ends; otherwise, the experiment continues to another period. In other words, after every period you have $\frac{2}{3}$ rd chance to move on to another period. NOTE: This is the same as rolling a six-sided die. If a 5 or a 6 turns up then the experiment ends; otherwise, the experiment continues to another period.

If you move on to another period, Stages 1 and 2 are repeated again.

At the end of the experiment your total profit from all periods will be converted to U.S. dollars in the mentioned exchanged rate and paid to you.

[Instructions for incumbent in Oligopoly Market]

Introduction

Welcome to this market experiment. You will be matched with two more participants for the rest of the experiment. You will get 5 dollars for participating in the experiment in addition to what you earn in experimental dollars during the experiment. Each experimental dollar is worth 0.01 US dollar.

Instructions There are two markets, A and B. You are a seller in market B, which is your home market. There is a second seller in market B as well. Market A is the home market for the third participant. There are multiple periods of the experiment.

In each period there are two stages of decision-making you have to take.

Stage 1: You choose a price between 4 and 11 in your home market B. The other seller in B chooses a price between 4 and 11 independently. The third participant also chooses a price from the same set of prices in his home market.

Stage 2: You are shown the price chosen by the seller in market A. The seller in market A is shown the lower of the two prices chosen in your home market B.

Then you decide whether to enter the other seller's home market or not enter his market. If you decide to enter you have to submit a price in that market. The seller in market A also decides whether he wants to enter your home market or not enter your market. If he chooses to enter then he submits a price in your market.

The second seller in your home market has no decisions to take in Stage 2.

Once all the sellers have taken the relevant Stage 1 and Stage 2 decisions one period is over. The matrix that is attached at the end determines your profit for the period in the other seller's home market, A.

The profit in your home market B, is determined in the following way:

If seller from market A does not enter your home market the existing two sellers have the following profits. The seller who posted the lower of the two prices gets 2 times the price he chose. The seller who posted the higher price gets zero. If both choose the same price, then each gets a profit equal to the price they chose. The seller from market A gets no profits from your home market if he chooses not to enter. If seller from market A does enter your home market and chooses a price that is the lower of the three prices he gets 2 times the price he chose. The other sellers get zero.

If any two of the sellers choose the same price, which is less than the price of the third seller, then both get a profit equal to that price. The third seller who posted the higher price gets zero. If all three sellers choose the same price each gets $2/3$ rd times that price. If your price is higher than the price of either of the two sellers you get zero.

Notice the payment in your home market depends on what you and the other seller choose in the first stage and what the seller from market A chooses in the second stage. Similarly, the payoff in the other market depends on what seller from market A chose in the first stage and what you choose in the second stage.

After every period, the computer program picks a number from 1 through 6 with equal chance. If either 5 or 6 comes up the experiment ends; otherwise, the experiment continues to another period. In other words, after every period you have $2/3$ rd chance to move on to another period. NOTE: This is the same as rolling a six-sided die. If a 5 or a 6 turns up then the experiment ends; otherwise, the experiment continues to another period.

If you move on to another period, Stages 1 and 2 are repeated again.

At the end of the experiment your total profit from all periods will be converted to U.S. dollars in the mentioned exchanged rate and paid to you.

Chapter 2

DO FIRMS CONTEST IN THE PRESENCE OF SUNK ENTRY COSTS: AN EXPERIMENTAL INVESTIGATION

2.1 Introduction

Regulation of natural monopoly markets remains a challenging task for policy makers. A classic vision in this regard was William Baumol's idea of a perfectly contestable market.¹ Baumol (1982) argued that in a perfectly contestable market the threat of hit-and-run entry can discipline the monopoly incumbent and generate average cost pricing. A crucial assumption behind such competitive outcomes is the absence of sunk entry costs for the entrant. The contestable market argument pointed out that without the worry of unrecoverable entry costs an entrant would readily jump in to undercut an incumbent posting high prices, and run away whenever the profit opportunities disappear. This in turn would make the incumbents price at average cost where all extra normal profits are gone. Dasgupta (2004a, 2005b) however, points out that even if a market is perfectly contestable, a contestable outcome² in fact depends crucially on the relative profits in the entrant's market when entrants also have their own home markets.

The contestability thesis is built on the assumption that the threat of entry could work as a disciplining force only if there are no sunk costs to entry. Baumol (1984) pointed out that

“.. sunk costs to some degree share with entry barriers the ability to impede the establishment of new firms. The need to sink money into

¹A perfectly contestable market is devoid of any sunk entry cost.

²In a perfectly contestable market the threat of hit-and-run entry by new entrants in the monopoly market forces the monopolist incumbent to charge a price equal to the average cost of production (the Ramsey optimal price), an outcome described as a contestable (market) outcome.

a new enterprise, whether into physical capital, advertising, or anything else, imposes a difference between the incremental cost and the incremental risk that are faced by an entrant and an incumbent. The latter's funds are already committed and are already exposed to whatever perils participation in the industry entails. On the other hand a new firm must take the corresponding amount of liquid capital and turn it into a frozen asset if it enters the business. Thus the incremental cost as seen by a potential entrant, includes the full amount of the sunk costs, which is a bygone to the incumbent.”

Perfectly contestable markets however are a rarity in naturally occurring markets, raising a debate over contestability theory and the investigation of the plausibility and existence of imperfectly contestable markets that approach, but do not strictly conform to the conditions of perfect contestability. The empirical work, using data from naturally occurring markets, evaluating contestability are consequently based on markets that are imperfectly contestable to various degrees.³ The empirical findings have remained inconclusive about how a potential entrant affects the incumbent pricing behavior in imperfectly contestable markets. This is partly due to the absence of reliable measures of entry costs in a market.

In this paper, keeping in mind situations in a naturally occurring market, we relax the assumption of the non-existence of sunk entry costs to look at firm entry behavior in natural monopoly markets and consequent pricing practices by the monopoly incumbent. We extend the Dasgupta (2005b) own-home-market design to evaluate experimentally entrant and incumbent behavior in imperfectly contestable markets where the entrant needs to incur sunk costs to enter another market. Anecdotal evidence suggests that potential entrant firms typically have established market presence in some other geographic region, i.e., have their own home markets in a typical

³Kessides (1991), Call and Keeler (1985), Evenden and Williams (2000)

market environment. To incorporate this observation, we devise a market environment where entrant and incumbent firms have their own home markets, and look at entrant-incumbent behavior in an imperfectly contestable market (in presence of sunk entry costs).⁴

Starting from Bain's (1956) classic work the industrial organization literature has been evaluating strategic interactions between incumbent and entrant firms to actual entry or latent entry.^{5,6} The predictions of these models are sensitive to its assumptions but broadly outlined there can be three basic patterns: i) An incumbent might block entry threats by competing in a manner that the market is not attractive to an entrant (limit pricing). ii) Alternatively, if blocking entry is not feasible an incumbent can modify behavior to restrict entry.⁷ iii) Another possibility is that the incumbent and the entrant might actually collude and share profits. In our experimental design we have a two-firm two-market environment where each firm has an existing home market and has the option to enter the other market. With a simple setup as this, we can expect two possible directions in firm behavior, in our laboratory market environment: i) The presence of unrecoverable entry costs can make entry an unattractive proposition to entrants, in anticipation of retaliatory behavior of established incumbents. Consequently, each firm might like to remain in its own market and not waste its resources in entering other markets. ii) An entrant might actively enter another market every time there is a profit opportunity net of entry costs even if it is transient and leave when profit opportunities disappear. In fact such hit-and-run behavior by an entrant would have a disciplining effect similar to what is predicted in a perfectly contestable market environment; incumbents would

⁴Schwartz and Reynolds (1983) suggest that "once we deviate even slightly from the strict assumptions of perfect contestability, pricing and entry decisions depend upon the nature of firm interactions"

⁵See Tirole(1988) for an overview.

⁶See Bain (1956), Sylos-Labini(1962), Modigliani (1958), Spence (1977), Dixit (1979, 1980) and Milogram and Roberts (1982) for various entrant and incumbent interaction situations.

⁷See Bernheim and Whinston (2000) for a description of such 'spheres of influence'

eventually price lower to make a market unattractive to an entrant firm.

We argue that a critical determinant of alternative firm behavior is the relative profit levels of the markets. We investigate this proposition by creating a laboratory market environment where the entrants can come from either competitive markets or monopoly markets. We find in our experimental results that a modest amount of entry costs (sunk) are not enough to deter frequent entry by firms earning normal profits in their competitive home markets. So in spite of sunk entry costs entrants from competitive markets have a strong disciplining effect on the pricing practices of an incumbent monopolist. In contrast, if the entrant firm has its own monopoly market, the sunk entry cost and retaliatory actions by the incumbent in a natural monopoly market, make hit-and-run entry behavior scarce. The rest of the paper is arranged as follows: Section 2.2 reviews the past experimental literature and introduces our experimental design in an effort to situate it better. Section 2.3 reports the results and Section 2.4 concludes.

2.2 The Experimental Design

2.2.1 Review of previous experimental design

The only other experiment known to us that looked at the effects of sunk entry costs in contestable markets was by Coursey, Isaac, Luke and Smith (1984).⁸ It is important to layout their exact design before we describe our design. The CILS design used the Plato posted offer system where two sellers were simultaneously asked to post a price and quantity pair for a single monopoly market in each of the experimental periods. A seller earned nothing if it decided not to produce and stayed out of the market. To produce in the market a seller was required to buy a production permit (a sunk cost). The permit if purchased was valid for five production-periods for the purchasing firm. To resolve the incumbent/entrant status for the market one of the two sellers was chosen to be an incumbent by the toss of a coin. An “incumbent” in CILS (1984) design was required to begin the experiment by purchasing the seller permits for the first five periods while the “entrant” firm by design stayed out. This gave rise to a protected monopoly market for the first five periods for the “incumbent”. After the first five periods the other firm (or the entrant) was allowed to contest the market where it had the option to buy a permit. From the fifth period onwards to continue production in the market the “incumbent” also had to purchase the production permit. So after the first five periods the distinction between and incumbent disappears in the CILS design and effectively both firms are in a symmetric production situation where they need to invest in sunk entry costs to serve the contestable market. In their conclusion they pointed out that “The fact that the weak version⁹ of the contestable markets

⁸We will use the convention of referring this as the “CILS” design henceforth

⁹CILS (1984) defined a strong version of contestability to be where prices eventually settle down to competitive levels. In contrast they defined a defined a weak form of contestable outcome where prices in the market were such that the observed price in the monopoly market was less than or equal to an arithmetic average of the theoretical monopoly price and competitive price ($P_A = (P_c + P_m)/2$), P_c and P_m being the competitive and monopoly prices respectively. In their results they found that the results supported the weak version of the contestability hypothesis rather than a strong version of contestability where prices converge to competitive prices P_c .

hypothesis receives somewhat stronger support than the strong version... shows that structure alone (economies of scale, entry cost level, and two potential suppliers) is not sufficient to yield precisely the competitive outcomes.”

Harrison (1987) later pointed out that although important by its own merit, CILS design did not accommodate all the necessary assumptions of contestability and further experiments would be illuminating.¹⁰ Our approach was to design a market environment that we believe is better suited to evaluate the effects of sunk entry costs and consequently analyze hit-and-run entry behavior in imperfectly contestable markets. We feel that the CILS (1984) results needed to be extended for the following reasons: First, the fact that both the entrant and the incumbent posted prices simultaneously did not operationalize the assumption of an entrant evaluating a profitable opportunity before entering a market (an important assumption in contestable market hypothesis). Especially, where there are sunk entry costs involved, the sequential decision making process can actually play a big role in an entrant firm’s decisions. Second, we agree with Harrison (1984) that the distinction between an incumbent and an entrant in the CILS (1984) design was not clear. Especially in the context of a sunk entry cost, the prime distinction between an entrant and an incumbent in a market should be that of the entrant’s disability to contest the market without sinking in costs while the incumbent does not have to incur any costs to have an access to the market. As noted earlier, in the CILS (1984) design the incumbent and the entrant were in a symmetric situation after the initial 5 periods, where both the firms needed to invest again in sunk entry costs to have an access to the market. Clearly, there are no incumbency advantage in the design. Instead after the initial five periods both firms are like potential entrants deciding simultaneously to invest or not in order to

¹⁰Harrison(1987) wrote, “ Their results are important by providing further evidence of the extent to which the CMH is behaviorally robust to violations of one key assumption in the basic theory; the absence of entry barriers... it is difficult to conclude that contestability theory is or is not behaviorally robust to the presence of (certain) entry barriers. More theory and experimentation are called for before any such conclusions can be drawn.”

enter the market.

2.2.2 Our Experimental Design

Our research focuses on two different aspects overlooked in previous research findings. First, we evaluate the role of hit and run entry in an imperfectly contestable market¹¹ with a *unique market design* where each firm has its own home market and has an entry opportunity in the other market. Second, our design extends and significantly modifies the previous experimental work on contestability to accommodate a clear distinction between an incumbent and an entrant in an imperfectly contestable market, and incorporates one of the key behavioral assumptions that the entrant can evaluate the profitability in a market before taking entry decisions.

We have a two-firm two-market design where each firm has its own home market and has the opportunity to enter the other market. We assume that the cost function in the monopoly market has the following form,

$$C(q) = S + G(q) \tag{2.1}$$

Where S is the sunk cost of access to the market and $G(q)$ is a quasi-fixed cost function. So $G(q)$ demonstrates the production technology in the market and S is incurred only by an entrant if it chooses to enter an incumbent's market. We motivate the sunk cost with the following story where to enter the other market an entrant needs to "advertise" in the other market. The cost of advertisement is 10 experimental dollars, which is sunk in the true sense of a non-recoverable-cost, independent of the level of production. Once an entrant sinks in the cost it is valid for two production periods. The level of sunk cost relative to profit is chosen keeping the following things

¹¹Unlike a perfectly contestable market, in an imperfectly contestable market there are sunk costs of production, which once committed to cannot be recovered.

in mind: a) if an incumbent prices at or just above average cost then an entrant cannot recover their sunk costs by undercutting b) the entrant cannot recover the sunk cost at any price if it decides to share the market with the incumbent charging the same price c) the entrant has opportunities to recover sunk costs and make profits if it could undercut the incumbent at monopoly prices or close to monopoly prices. Each firm is given a start-up fund of 100 experimental dollars that they can use for the entry fees. Any unused portion of the fund is paid back to the subjects as part of their experimental earnings.

The baseline market game is set up in three stages. In stage one, the two incumbent firms choose prices in their own home markets simultaneously. This is shown to both the firms at the beginning of stage 2. In stage 2, each firm as an entrant decides whether to invest in an entry cost in order to produce in the other market. If it chooses to invest in the entry cost then in stage 3 it can post a price in the other firm's market. Once the third stage is over, one "production period" is over and profits are announced for that period. At the end of every production period the firms get an opportunity to take entry decisions (and invest in entry costs) provided it has chosen not to enter in the previous period. By design, if a firm invests in entry costs it is valid for two production periods in a market. The game is repeated for 25 periods with random rematching.

We have two different treatments. Our benchmark treatment is a market environment where there are two firms each having a home monopoly market. So each firm is an incumbent in one market and has the opportunity to enter the other monopoly market (a potential entrant in that respect). We call this the monopoly treatment. Our contrasting treatment is a market environment where one firm is an incumbent in the monopoly market and the other firm is an incumbent in a stylized competitive market earning normal returns of 1 experimental dollar (Note: The payoffs in the competitive market is a fixed payment unaffected by entry. Also there are no costs in the competitive market.). In the competitive market treatment each subject is

randomly assigned as an incumbent in either of the two markets and have the choice to enter the other market and are potential entrants in this respect.

We use the following numerical values for the quasi-fixed cost function and the demand functions for the natural monopoly market:

$$G(q) = 32 + 2q \quad (2.2)$$

$$p(q) = 20 - q \quad (2.3)$$

The associated monopoly price and profits are $p_m = 11$ and $\Pi_m = 50$. The Ramsey average cost price $p_0 = 4$ which gives rise to zero profits. However to make the payoffs salient in the experiment if a single seller charges a price of 4 he gets a profit of 1 experimental dollars in the natural monopoly market. The payoff in the competitive market is fixed at 1 experimental dollar independent of the number of firms and unlike the monopoly market the profits in the perfectly competitive market remain unaffected by an entry.

The experiments were conducted in the Economic Science Laboratory (ESL) at the University of Arizona with undergraduate student subjects. The experiment was programmed and conducted with z-Tree software (Fischbacher 1999). Table 1 summarizes the number of sessions run and the profit levels in the three treatments. For each of the treatments we gathered observations for six market pairs. Each market pair consists of an incumbent firm in a monopoly market and another firm in the ‘treatment’ market. The experiments typically went on for 45-60 minutes and the average earnings were around \$25 inclusive of the \$5 show-up fee.

TABLE 2.1. Summary of Experimental Sessions

Treatment	Number of Firms	Profit Contestable Market	Profit Treatment Market	Sessions
Monopoly	2	50(Max) 1(Min)	50(Max) 1(Min)	7
Perfect Competition	2	50(Max) 1(Min)	1(Max) 1(Min)	7

2.3 Hypothesis and Results

We hypothesize that when an entrant firm is only earning normal returns in its own market, the effect of sunk entry costs as deterrents to entry is minimal. This would make the incumbent monopolists be wary of posting a high price and force them to lower prices in an effort to dissuade entry behavior by entrant firms. On the other hand, firms earning monopoly rents in their own home markets would be wary of price wars in each others markets as it depresses profits in all markets and would view sunk entry costs as deterrents to entry. They would be reluctant to enter the other firms market, and instead enjoy their home market monopoly. So we expect the effects of sunk entry cost to be polar opposites in the two treatments.

Our variable of interest is the behavior of prices in the monopoly market over time in the two treatments. Figure 2.1 shows us the average prices across sessions in the two treatments.

The average prices were distinctly different in the monopoly treatment as compared to the perfect competition treatment. It is evident that in the monopoly treatment each incumbent learns to choose the monopoly price and enjoying monopoly rents over time. In sharp contrast, the perfect competition treatment shows posted prices going down to an entry-restricting price of 5 and below that.

Figure 2.2 shows the entry decisions by firms in the two treatments. In later

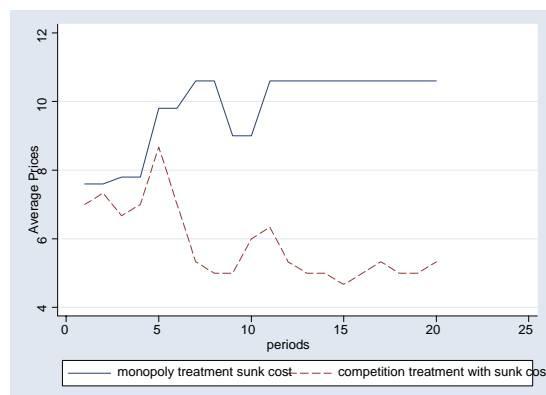


FIGURE 2.1. Average Prices in Treatments

periods both the treatments witness a lack of entry by entrants. However in the monopoly treatment we witness pricing close or at monopoly levels in the monopoly market while in the competitive treatment prices in the monopoly market go quickly down to the entry-restricting prices, close or at average cost levels. In the perfect competition treatment we noticed that frequent hit-and-run entry in the initial periods disciplines the monopoly incumbent later on. The hit-and-run entry actually forces the incumbent to price lower at the entry restricting levels. Consequently there are no entries by entrants in the later periods. In our monopoly treatment we see similar hit-and-run entry in the initial periods. However, in sharp contrast to our perfect competition treatment the monopoly sellers learn to cooperate and post monopoly prices in each of the markets, and not attack each other's markets.

We compared using the Mann-Whitney test the session average prices (averaged over periods for each market pair) in the two treatments and found it to be significantly different.¹² We also found that the monopoly treatment generates significantly higher prices.

¹²U-statistic=2.61, P-value 0.009

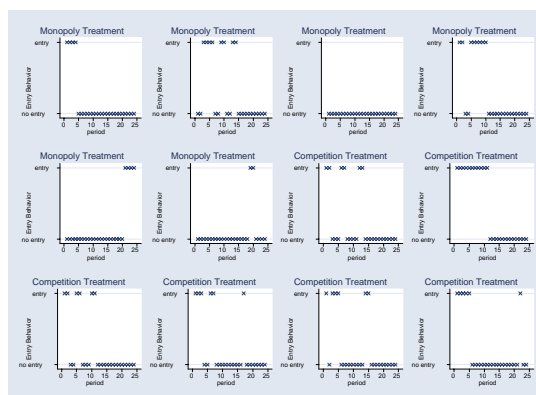


FIGURE 2.2. Entry Choices in the Two Treatments

2.4 Conclusion

We wanted to evaluate whether a modest level of sunk cost discourages hit-and-run entry. We find that entrants from competitive markets do not perceive a modest level of sunk cost as an entry barrier. As a result there is frequent hit-and-run entry in the competitive treatment, whenever prices are high in the monopoly market, which makes the monopoly incumbent wary of charging high prices. So we find that the disciplining mechanism of an entrant waiting on the wings, ready to hit-and-run, works well in spite of sunk entry costs provided the entrant comes from a competitive environment. However, if the entrant firm has its own monopoly home market the sunk costs are in fact perceived as entry barriers by the entrant firms. Instead of entering and undercutting the incumbent's market they learn to remain in their own home markets enjoying monopoly rents. It is important to qualify our results keeping in mind the Smith et.al. (1984) results. Their particular design of contestable markets with sunk costs found that prices do go down but not always to competitive levels. The CILS design defined a “weak version” of contestable market hypothesis where the observed price in the contestable market were less than or equal to an arithmetic mean of the theoretical monopoly price and the competitive price in the market. They

classified their results based on the observed price on the 23rd period and found that all 12 of their sessions conformed to the weak version of the contestable outcome. In our design, we find distinctly different outcomes depending on the entrant's home market condition. With entrants from competitive markets prices go down over time to the entry restricting levels, conforming contestable market behavior outcome. In contrast, with entrants from monopoly markets we find the opposite evolution of prices. In this case the prices in fact go up over time as each firm realizes that it can reap higher profits if they do not compete in each other's home markets.

Our main conclusion is as follows: the behavioral implications for hit-and-run entry of contestability are strong if an entrant is coming from a market earning just normal returns. Even if there is a modest amount of sunk-cost involved entrants enter whenever there are transient profit opportunities. This in turn makes incumbent monopolists price at low levels so that an entrant does not have the scope of undercutting and earning profits. So the contestable outcome is behaviorally quite robust provided an entrant comes from a competitive market as our present results and Dasgupta (2005b) points out. However, when entrants are from monopoly markets contestable outcome is not observed in our current experiments and also in Dasgupta (2005b). Future experiments with our design should consider whether increasing the level of sunk costs could weaken the disciplining behaviors of competitive market entrants.

2.5 Subject Instruction Sets

2.5.1 Monopoly Treatment

[Instructions for the Incumbent/Entrant in a Monopoly Market]

Introduction Welcome to this market experiment. You will be matched with a new participant after every two periods in the experiment. You will get 100 experimental dollars as start-up funds. In case you do not use up all your start-up funds during the experiment, the left over will be paid back to you in addition to what you earn in experimental dollars during the experiment. Each experimental dollar is worth 0.01 U.S. dollar.

In addition, you will also get 5 U.S. dollars for participating in the experiment.

Instructions There are two markets. You are the only seller in your home market. There is also one seller just like you in the other market. There are 20 periods of the experiment.

In each period there are two stages of decision-making.

Stage 1: You choose a price between 4 and 11 in your home market. The other seller also chooses a price from the same set of prices in his home market.

Stage 2: You are shown the price chosen by the other seller in his home market. Also the price you have chosen in your home market is shown to the other seller.

Decide whether to sell in the other seller's home market or not sell in his market. However to sell in the other market you need to purchase a sale permit to enter that market, which costs 10 experimental dollars. Once you buy the permit for the other market you can submit a price in that market. The other seller also decides whether

to sell in your market or not sell in your market. If he chooses to sell in your market he has to similarly buy a permit for your market.

A permit if bought is valid for two successive periods, after which you have to re-purchase the permit again if you decide to sell in the other market.

After both the sellers have completed the Stage 1 and Stage 2 decisions, one period is over. The matrices attached at the end determine your profit for that period. Notice the profit in your home market depends on the price you choose in the first stage and what the other seller does in the second stage. Similarly, the profit in the other market depends on the price the other seller chose in the first stage and what you do in the second stage.

The computer screen will also show your profits at the end of every period, the prices in each market and the start-up funds left after every two periods. If you use up all your start-up funds before the twenty periods, your earned profits will be used if you want to buy permits in subsequent periods.

At the end of the experiment your total earnings from all periods will be converted to U.S. dollars in the mentioned exchanged rate and paid to you.

2.5.2 Perfect Competition Treatment

[Instructions for the Incumbent in a Monopoly Market]

Introduction Welcome to this market experiment. You will be matched with a new participant after every two periods in the experiment. You will get 100 experimental dollars as start-up funds. You will get 5 U.S. dollars for participating in the experiment in addition to what you earn in experimental dollars during the experiment. Each experimental dollar is worth 0.01 US dollar.

Instructions There are two markets. You are the only seller in your home market. There is another market which has one seller who gets a 1 experimental dollar every period, for being a seller in that market. There are 20 periods of the experiment.

In each period there are two stages.

Stage 1: You choose a price between 4 and 11 in your home market. The other seller has no decisions to take in this stage.

Stage 2: The price you chose in your home market is shown to the other seller. He then decides whether he wants to sell in your home market or not sell in your market. However to sell in your market he needs to purchase a sale permit which costs 10 experimental dollars. If he buys the permit he can submit a price in your market. A permit if bought is valid for two successive periods, after which he has to re-purchase the permit again if he decides to sell in your market.

You also decide whether you want to enter the other firm's home market. You don't need a permit to enter the other seller's home market. If you choose to enter, you get 1 experimental dollar from that market.

Once you and the other seller have taken the Stage 1 and Stage 2 decisions, one period is over. The matrices attached at the end determine your profit in your home market for that period. Notice the profit in your home market depends on the price you choose in the first stage and what the other seller does in the second stage.

In addition, if you choose to enter the other seller's home market in any period, you get 1 experimental dollar from that market.

The other seller will get 100 experimental dollars as start-up funds for buying the sale permits. If he uses up all his start-up funds in the course of the experiment, his profits will be used if he decides to buy permits in subsequent periods.

The computer screen will show your profits and the prices in your market at the end of every period.

At the end of the experiment your total earnings from all periods will be converted to U.S. dollars in the mentioned exchanged rate and paid to you.

[Instructions for the incumbent in the Competitive Market]

Introduction Welcome to this market experiment. You will be matched with a new participant after every two periods in the experiment. You will get 100 experimental dollars as start-up funds. In case you do not use up all your start-up funds during the experiment, the left over will be paid back to you in addition to what you earn in experimental dollars as profits during the experiment. Each experimental dollar is worth 0.01 U.S. dollar.

You will also get 5 U.S. dollars for participating in the experiment.

Instructions There are two markets. You are the only seller in your home market. You get 1 experimental dollar for being a seller in this market every period. There is another market which is the other seller's home market. There are 20 periods of the experiment.

In each period there are two stages.

Stage 1: The other seller in his home market chooses a price between 4 and 11. You have no decisions to take in this stage.

Stage 2: You are shown the price chosen by the other seller in his home market. Decide whether to sell in the other seller's home market or not sell in his market. However to sell in the other market you need to purchase a sale permit to enter that market, which costs 10 experimental dollars. Once you buy the permit for the other market you can submit a price in that market. A permit if bought is valid for two successive periods, after which you have to re-purchase the permit again if you decide to sell in the other market.

The other seller also decides whether he wants to enter your market or not. He does not have to buy a permit. If he chooses to enter your market he gets 1 experimental dollar as well for being in your home market.

Once you and the other seller have taken the Stage 1 and Stage 2 decisions, one period is over. The matrices attached at the end determine your profit in the other seller's home market for that period. Notice the profit in the other seller's home market depends on the price the other seller chose in the first stage and what you do in the second stage.

In your home market, you will get 1 experimental dollar every period regardless of what you earn in the other seller's home market.

The computer screen will show your profits at the end of every period, the prices in the other market and the start-up funds left after every two periods. If you use up all your start-up funds in the course of the experiment, your profits will be used if you want to buy the permits in subsequent periods.

At the end of the experiment your total earnings from all periods will be converted to U.S. dollars in the mentioned exchanged rate and paid to you.

Chapter 3

CROSS-COUNTRY PRICE DIFFERENCES IN THE ONLINE BOOK INDUSTRY

3.1 Introduction

Local, national and international price differences have been a source of continuing interest in economic research. The literature has focused on issues like underlying cost differences, industry structure and price discrimination in analyzing issues of price differences. In making international price comparisons added focus have been on issues of trade policy restrictions, and purchasing power parity.¹ The literature suggests that there is consistent evidence of price differences locally, nationally and globally. The degree of price inequality varies substantially across different industries.

Traditionally, the literature on price divergence has focused on the bricks and mortar prices. However, in the last decade the internet has provided a new market structure, offering an opportunity to re-study issues of price dispersion, price-discrimination and market structures in this easily accessible and rapidly emerging market. The much hyped ease of access to information, suggested that the internet markets will be highly competitive. Economists and analysts alike suggested a Bertrand environment that would benefit consumers by driving prices lower. However, subsequent research repeatedly suggests that the pricing behavior in the virtual e-stores has fallen well short of the predicted cut-throat competition. In fact more and more findings suggest the internet markets behave in a fashion similar to the brick and mortar stores. Even though visiting an e-store is much more convenient than

¹Verboven (1996), Gil-Pareja (2003), Lutz (2004) and Goldberg and Verboven (2005) reports market specific pricing behavior in the automobile market. Danzon and Chao (2000) point out that drug prices are not higher in the US than in other countries as thought of commonly. Haskel and Wolf (2001) use data on prices of the IKEA furniture company to report deviations of 20-50% from the law of one price and conclude strategic pricing to generate such deviations.

visiting a physical bookstore, a host of recent papers offer consistent evidence of price dispersion for identical commodities available on online stores. They demonstrate that the price of seemingly identical products on the internet vary substantially even though it is allegedly very easy for consumers to engage in comparison shopping.²

The internet retail stores have not only been growing nationally but have started showing global presence.³ In addition, competitive global shipping rates and comparable delivery times have made it easier to access and order from stores outside the home country of the consumer. Some of the recent emerging retail giants like Amazon.com Yahoo and Ebay are making their presence felt globally with separate presences in different countries.

The research on online markets has a few different directions. The first considers extents of price dispersion and issues of quality comparisons between different online stores within a country. The second is where online prices have been compared to bricks and mortar stores.⁴ A third direction of research has been comparing price dispersion internationally on the internet retail stores.⁵

Our research belongs to the last category above. In particular, we look at pricing behavior in the global online book retail industry. The online book retailing business creates an interesting market environment. The prominent e-retail stores very often have country specific websites. For example, Amazon runs Amazon.com in USA, Amazon.ca in Canada Amazon.de in Germany and Amazon.co.uk in the

²Bailey (1998), Brynjolfsson and Smith (2000), Clemons, Hann, and Hitt (2000), Smith (2001) and Baye, Morgan and Scholten (2001) find very high levels of dispersion in Internet markets. Pan, Ratchford, and Shankar (2001) and Scholten and Smith (2002) find intermediate levels of price dispersion. On the other extreme, Ellison and Ellison (2001, 2005), Brown and Goolsbee (2002), Morton, Zettelmeyer, and Silva-Risso (2001) find very little dispersion and a relatively narrow distribution of prices.

³VeriSign, Inc., in its fifth edition of the VeriSign Internet Security Intelligence Briefing (February 28, 2005) pointed out that the E-Commerce Growth and Trends Internet commerce grew dramatically during the holiday season in 2004 with e-commerce dollar volume rising 88 percent as compared to the same period in 2003, and transaction volume growing by 39 percent year-over-year.

⁴See Clay, Krishnan, and Wolff (2001), Brynjolfsson and Smith (2000) and Scholten and Smith (2002)

⁵See Baye, Gatti, Kattuman and Morgan (2002)

United Kingdom.⁶ Although these e-retail stores have country specific identities (internet addresses) there are no obvious restrictions in ordering from a web-store outside a consumer's home country. Especially since the physical product is homogeneous, shipping costs are relatively small, pricing information is easily available online; and arbitrage opportunities are available one can expect uniform pricing behavior. This raises an interesting situation in comparing prices internationally. In a traditional IO model price discrimination would suggest that a producer should price in each country according to the demand curve it faces and would be able to charge different prices and maintain that price discrimination provided there are no arbitrage opportunities or arbitrage costs are prohibitively high. On the other hand, if consumers have access and information about all the stores, arbitrage should narrow international on-line price gaps. In the case of online bookstores since a consumer has access to all the country-specific web-stores and can order from anywhere an immediate issue of interest is whether internet retailers still manage to maintain different prices in the different (country-specific) retail stores. A second issue of interest is that if we find such existing price difference what are the causes of its existence and persistence?

Previously, Clay and Tay (2001) described existence of international price differences in textbooks. They looked at internet retail prices and publisher's suggested prices in the US to point out the high retail-margins for the US based internet retailers. In this paper we bring in and extend previous strands of research⁷ on online book prices and book publishing business. We collect retail prices of books from different categories of books from prominent and fringe book-retailers from three different countries with comparable economic conditions, the United States, Canada and the United Kingdom. We also collect data on book characteristics, publishing houses

⁶Notice, that from the retailer's point of view they have to price books not only for sale online but price such that it can compete with the brick and mortar stores in that country.

⁷Clay, Krishnann and Wolff (2001), Clay, Krishnann, Wolff and Fernandes (2002), Clerides (2002,2004) find retail store characteristics or physical characteristics of books or publishing houses can contribute to different prices of a particular title.

and on suggested retail prices of every book title in our sample. The data collected in this study finds the existence of persistent and often large differences in the prices of books⁸ across countries. There are different possibilities for such observed price differences. The price differences can be due to retail level strategies, for example, a fringe store offers a lower price as compared to bigger book retailers. It can be because retailers in a particular country are more competitive leading to online international price competitions. A third possibility is that the price differences are not retailer specific but originate at the publisher level who price books differently across countries. Our data on the publisher's suggested retail prices (list prices) point out that the list prices are different across countries. We also find that the list prices in the home country of the internet book store are the most important determinant of the offered price by an internet book-retailer in the country.⁹ Hence, the observed price dispersion of online retail prices of books are a result of the different country-specific list prices for the same title. We also find that offered prices net of shipping costs in internet retail stores do not differ enough so that ordering from a different country can be substantially cheaper depending on the title. However, given the existence of persistent price differences for a while now, there does not seem to be enough consumers searching to order from the cheapest store internationally. I discuss possible explanations based on cost and demand conditions that might help to explain the price differences and suggest that the observed differences in list prices are more demand driven than cost based. I also discuss possible reasons from a consumer's search behavior which might lead to price differentials persisting in the internet era.

⁸Recently, the textbook category received a lot of attention in US national media for large price differences. See "Students find \$100 Textbooks Cost \$50, Purchased Overseas," (Oct. 21, 2003 New York Times); "When Books Break the Bank; College students Venture Beyond the Campus Store," (Sep. 16, 2003 New York Times)

⁹Clerides (2002) has similar findings using book price data from the brick and mortar stores in the United States booksellers where he finds that book retailers typically adhere to the publishers suggested retail price.

3.2 Background of the Online Book Industry

The book market is one of the oldest of the Internet retail sectors and therefore is the one most likely to have reached stability in pricing behavior and market structure. In the 1980s some computer books were being sold on the internet. Gradually as access to the internet increased, Market penetration of online bookstores jumped from around 2% percent in 1998 to almost 5 and a half percent in 1999.¹⁰ Consumers with internet access found it convenient to order on-line and stores have improved customer service and developed methods to inform consumers about other books of interest using software that identifies a particular consumer's purchasing habits. One unique feature of the book industry is that each title and every version of a title can be identified by a number known as the International Standard Book Number. This number has facilitated consumer search for a particular title and the retailers ease of stocking the title. On-line stores also stand to gain from smaller fixed costs because they do not own brick-and-mortar outlets.¹¹

The two largest bricks-and-mortar booksellers in the USA are Barnes & Noble and Borders Bookstores. Together these account for over 40 per cent of books sold in the traditional US book sector. Amazon.com was among the first companies to start selling books online. All of Amazon's sales are through the internet. Since its foundation in July 1994, it has been the leading online retailer. Banrnesandnoble.com (Bn.com) has been in operation since May 1997 and has led the most successful counterattack by the traditional retailers into the online market. Fatbrain.com, formerly the Computer Literacy Bookstore, launched its online operations in February 1996. It runs

¹⁰Source: Book Industry Study Group, 2000

¹¹Online bookstores face very similar wholesale prices for books. The only form of discount is typically for volume purchases. However, as a result of a lawsuit in the book industry, all retailers now with even minimal volume pay roughly equal wholesale prices for title. Although, it has been argued and cited that very large stores (Amazon, Barnes & Noble and Borders) may receive additional discounts of up to 7 percent of list price for warehousing books and engaging in advertising campaign. Thus depending on the payments for these services, the largest store may get slightly larger net discounts. All other stores face the same price for books, as compared to setting up a brick and mortar store (Source: Bookweb.org)

some traditional bricks-and-mortar stores, but since 1999 has shifted its emphasis from traditional to online retailing. It was bought by Bn.com in November 2000, and still trades using the Fatbrain name. Buy.com entered the market in June 1997 as a general online retailer, and follows a low-price strategy. Borders was slower than its competitors to move online, setting up an online presence in May 1998. Borders has a small market share and remains a fringe player. The fringe firm A1books.com has been selling books since 1995. There have been a mushrooming of fringe firms in the USA alone. The two largest players, Amazon.com and Bn.com, which have been competing since 1997, though dominate the online market till date.

In the last few years, there has been a surge of online price comparison sites that help consumers compare prices across different stores. Initially, the price comparison engines (such as Dealtime, Buy.com and MySimon) were devoted to searching multiple products like electronic products and other consumer items. Overtime search engines have come up which cater to bookstore prices exclusively (like icampus.com, addall.com and bublos.com). At the outset this should result in more informed consumers since finding out prices on the internet should be easier compared to sampling the brick and mortar stores. One important point to note while comparing prices internationally is that there aren't many comparison sites searching bookstores internationally. In fact almost all of the price comparison sites cover mainly US based online stores. At the time the data was collected we only found two price comparison engines, Addall.com and Bublos.com, which offered to search online bookstores that are not based in United States. However, by default even these two sites searched USA based bookstores only. As a result if a consumer is unaware of price differences in other international stores they would typically not search for prices internationally. A typical consumer might also have a lack of trust to interact internationally.

3.3 Literature Review

The main body of research in studying the internet markets has been on issues on price dispersion. One of the earlier works by Lee (1997) found that prices for used cars were higher on the Internet than in conventional channels. Bailey (1998) found similar results for a wide variety of items like books, compact disks, and computer software for the period of 1996 through 1997. Later work by Brynjolfsson and Smith (1999) on books and compact disks for 1998-99 found that Internet retailers had lower prices than conventional stores. They also found that prices were more or less dispersed depending on the weights used for market proxies. Clemons, Hitt and Hann (1998) looked at the online travel industry and found that online ticket agents were involved in significant product differentiation by quoting very different time-price pairs to identical consumer requests. Baye, Gatti, Kattuman and Morgan (2002) studied the impact of the Euro on prices charged by online retailers within the EU. They found that the Euro changeover in 2002 neither mitigated price differences nor resulted in purchasing power parity for products sold online. Further, contrary to the predictions of purchasing power parity, they found significant differences in the prices charged by firms both within and across seven countries in the European Union.

There has been some significant work focusing exclusively on the online book industry. Clay, Krishnan, Wolff, and Fernandes (2002) analyze whether online firms differentiate themselves or not in the online market. They looked at 107 book titles during a week of April 1999 to investigate whether low-cost availability of pricing information led to price convergence on the internet, and whether the price dispersion can be explained by product differentiation (shop characteristics in this case) and found that prices were the same on and off-line. They concluded that online prices had not converged, and differentiation had almost no measurable impact. Also when they controlled for the books that the online and off-line stores carried they found that both charged the same unit price on average. Clay, Krishnan and Wolff (2002)

analyses the relationship between competitive market structure, advertising and price dispersion on the Internet. Using data from the online book industry from August 1999 to January 2000 they found that overall, advertising and competitive structure had their predictive effect. More competition led to lower prices and price dispersion. At the firm level the authors found considerable heterogeneity in behavior. Clay and Tay (2001) looked at cross-country price differentials in the online textbook industry. They looked at the retail prices of 95 textbook titles in 2001 from nine large online bookstores. They used information on USA list prices of every title. Using their measure of normalized price (offered price/USA list price) they found that normalized prices in UK to be strikingly small. They point out that this probably suggests that the US retailers have higher margin.

3.4 Data

3.4.1 Collection

This paper looks at a dataset collected between Fall 2002 and Spring 2003. Some of the bookstores used in previous analyses have gone out of business or have fallen from prominence. Also comparison engines exclusively dealing with prices on the online book industry have gained prominence and exposure. The comparison engines should ideally increase competitive pressures and have the effect of minimizing price dispersion. So this dataset can be looked upon as newer evidence in analyzing the international online price dispersion in the book industry. The data was collected using two bookstore comparison websites Addall.com and Bublos.com, which deal exclusively in comparing prices of books from different online bookstores. We also checked to verify that Bublos.com and Addall.com include all the bookstores that the other search engines search, and in addition include many other bookstores that the other comparison engines do not look at. Both of these sites have the option to search for book prices internationally. Both the price comparison sites cover all the prominent stores and many fringe stores from United States, Canada and United Kingdom. In addition, addall.com displays results from France and Germany as well.

I restricted attention to the United States, Canada and United Kingdom for the following reasons: First, shipping charges often were as high as 15 dollars or more for orders from either France or Germany by consumers in any of the other three countries. Second, economic conditions in the three countries in our sample are more similar. Third, the US, UK, and Canada comparison has an advantage in that they are all English speaking countries. In contrast, demand elasticities for English books in France and Germany are likely to be quite different. Finally, from the point of view of data collection, the only bookstores from France and Germany that are in the comparison site database are the two branches of Amazon, Amazon.fr and Amazon.de,

which severely restricts our data coming from those two countries.

The two comparison engines compare prices from over 40 bookstores originating from different countries. Some are the prominent players like Amazon.com, Amazon.co.uk, and WhSmith. Others are fringe players like Tesco, Pickabook, Hedgehog-books etc. Table 1.1 lists all the bookstores in our sample.

We collected books from the categories described in the Bowker's Manual.¹² Table 1.2 lists all the categories. We selected 12 of those categories for this analysis which are also listed in table 1.2. In the literature category we used titles under the Mass market Fiction and the Original Fiction category as representative of the most popular categories. To ensure that data on prices remained consistent in a store, the offered prices for our sample were rechecked using the comparison engines for any change. All price data was converted to US dollars.¹³

Most of the stores in our sample offered a variety of shipping options. We decided to focus on the default lowest cost, slowest delivery shipping rates for each store. Table 1.3 compares the promised delivery times and rates from the bookstores. The standard shipping option for United States orders costs about \$3.24 with an average delivery time of 6.9 days. Ordering the same book from the United Kingdom would cost about \$3.62 with a delivery time of 10.3 days. Finally ordering it from Canada would cost about \$3.87 with a delivery time of 9.8 days. The big name bookstores often offer free shipping as promotions with larger orders. In addition, ordering from either UK or Canada from online book retailers have the advantage that the purchases are not subject to either VAT or GST. Further, United States Custom allows all orders below \$2000 to enter the country duty free and without any checks to quicken the process of delivery. These effectively make international purchases quite convenient

¹²Founded in 1872, by R. R. Bowker, it is the official U.S. agency for assigning ISBNs and is the North America's leading provider of bibliographic information.

¹³The currency rate we used to convert all prices in dollars was the same as suggested in the comparison sites, that is 1 pound = 1.56 USD and 1 Canadian Dollar = 0.67 USD. Although the rates fluctuate day to day, these rates are a reasonable average to convert the prices to US dollars at that time.

and feasible.

3.4.2 Analysis

I initially collected information on a small sample of 38 random titles to see the difference in the publisher's suggested retail prices (to be described as list prices from now on) and corresponding differences in offered retail prices, which are the selling prices in the online retail stores (See Table 1.4). The difference were striking (For example the difference in the maximum and minimum price of title 3 was \$66.5; the same measure for observation 24 was \$76.8 and for observation 28, 73.38). Therefore, I enlarge the dataset to address the phenomenon more carefully. The final sample comprises of 2141 price quotes that include the offered price of an title in an online bookstore retail and the corresponding publisher's suggested list prices for that title in each of the three different countries in our sample. Our sample of 102 titles are selected from the 12 book categories that we choose.

Figures 1 and 2 show the distribution of publishers' list price differences in dollars between USA-UK and Canada-UK respectively. To do this we define similar prices to occur if the UK list price is less than or equal to 5% of the USA list or the Canada list price. For both US-UK and Canada-UK the mode is at zero, but we can see that list price differences lie on either side of the mode. The average price differences for books that are more expensive in the U.S. than in the U.K is \$12.44. Books that cost more in the UK than in the US have an average price difference of \$6.5. The average price differences for books that are more expensive in Canada than in the UK is \$14.82 and for books that are more expensive in UK the average differences is \$9.46.

The above histograms naturally lead to the following questions: Do publishers offer different list prices for the same book in different countries? Second, are price differences across countries uniform? And if they are not then, do the book categories

FIGURE 3.1. Histogram for price differences (USA-UK)

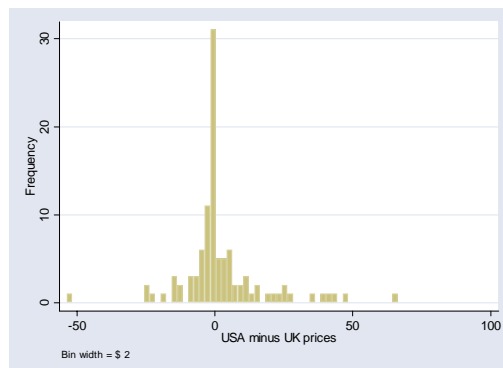
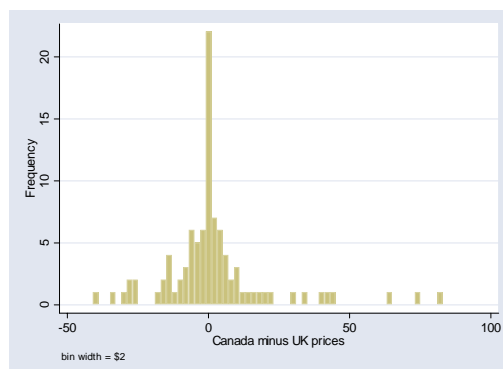


FIGURE 3.2. Histogram for price differences (Canada-UK)



matter? Finally, do the differences in list prices show up in corresponding differences in the offered prices? To quantify and test for price differences in a formal manner we ran a number of simple regressions.

3.4.3 Results on List Prices and Book Categories

The results of regressions of list prices on country dummies for each book category (UK being the omitted country) are shown in Table 1.4. Books in Economics and Psychology are respectively priced 23.36 and 13.55 dollars higher in the USA than in the UK. In contrast, Mass-market Fiction and Mathematics are cheaper in the United Kingdom than in the USA by about \$1.91 and \$12.15 respectively. Our finding that any of the countries does not have uniformly higher or lower prices for books might have some bearing on consumers which we will address in the penultimate section.

3.4.4 Results on Offered Prices and Book Categories

We next look at a similar regression exercise to see how offered retail prices on internet stores differ across countries for the book categories in our sample. The results are reported in Table 1.5. The correlation coefficient between the internet bookstores' offered price and the publishers' list prices in our sample is 0.947 and we find that offered prices are typically a small discount or markup over the list price.¹⁴ As a result, there is striking similarity in the direction of movement in a title's offered prices and list price across our sample countries.

We next estimate the following reduced form models of book prices.

Offered prices = f (Book characteristics, OriginCountry, BookPublisher, Prominent-Bookstore)

Effective prices = f (Book characteristics, OriginCountry, BookPublisher, Prominent-Bookstore)

¹⁴Clerides (2002) has similar findings for books sold on bricks and mortar stores.

We include number of pages in a book as possible cost shifters. In addition, we use dummies for hard or soft cover as a proxy for the marginal costs of producing a book, Hardbacks and longer books are expected to cost more to produce.¹⁵ We use dummies for prominent bookstores and fringe bookstores to look at effects that has on offered prices.¹⁶ We also use dummies for different publishing houses to see whether that contributes to our observed price differences. In our analysis we make a distinction between offered price and effective prices. The former is the price that an internet retailer offers and the latter is the final price inclusive of shipping costs. Estimating our OLS model with these two different prices can help us to identify whether the shipping costs can contribute to any meaningful price difference across countries which would prevent arbitrage behavior.

We find that the list prices are economically significant in explaining the offered price at internet retail stores. We also find that fringe-stores typically offer a small discount (\$2.34) compared to the bigger and prominent stores. As expected, for all book categories, hard-covers are substantially more expensive than soft covers. Meanwhile, the numbers of pages contribute a small but significant positive amount to the price of a title. Controlling for the publishers' list prices, taking all categories together, the (effective) prices in the United States and Canada are slightly cheaper (roughly \$2 and \$3) compared the United Kingdom (see Table 1.8).

We next run a similar model on a subset of books (399 observations) that we identify as textbooks and find that they are much more expensive in the United States and Canada compared to the United Kingdom (see Table 1.9).

Our finding that on an average for all categories together prices are slightly cheaper in the United States as compared to the United Kingdom might have an effect on the

¹⁵Clerides(2002) finds that the fixed and marginal costs of book production depends on the physical characteristics of the book and finds an average marginal cost of \$2.95 for hard covers and \$1.74 for the paperbacks.

¹⁶Clay et. al (2001) find offered prices coming from their sample of fringe bookstore different as compared to major online bookstores.

consumer search behavior. We discuss this in the next section.

3.5 Sources of Price Differences

The results lead to two questions: What can lead to the price differences across countries? This is a question that traditional economics can probably answer to a reasonable extent. The second question even more puzzling for traditional economics - the phenomenon of persistent price differences given the low cost of using the internet? We discuss and verify some possible reasons.

From the cost side, a primary reason for price difference can be due to publishing costs. For example, often prominent titles and especially text books have international student's editions which are sold in developing countries like India or China for about one tenth the price of the book in USA. However, these books typically are of an inferior binding and paper quality which can be a primary reason behind such steep price discounting.¹⁷ In contrast, our sample consists of books of qualities that are identical and comparable. Also none of the countries in our sample have any obvious cost advantages in terms of production costs.¹⁸ Another source of differential pricing can be if royalties differ in the country of sale. Informal conversations with a publishing house and some authors suggest that there are no such differentials; royalties are typically fixed as a percentage of home country prices.¹⁹

We suggest that this difference in prices can arise more due to the differences in demand for each book or category of books. Could publishers be dictating different list prices based on the elasticity of demand in the markets? Every standard model of price discrimination suggests that a discriminating seller will charge higher prices to the more inelastic demand. It is possible that consumers in a country are price sensitive to a book or a particular category of books and price inelastic in other segments. Typically, the two countries might have different demand curve intercepts

¹⁷For example very often bestsellers and textbooks publishers strike a deal with the local publishers in a country and consequently the local publishers print them locally (Source: GAO report 2005)

¹⁸See Clerides(2002).

¹⁹Source: Nielson BookScan Report: Quarterly report December 2005.

and consequently profit maximization would dictate different prices in the two countries. The starkest price differences arise in the text book category. Differences in demand elasticity may arise from differences in the structures of universities in the three countries. The USA has a well established culture of colleges/universities specializing in education. There is a big text book market where authors from American universities and colleges regularly publish new text books and especially undergraduate textbooks. In contrast, few authors from UK universities write textbooks. Very often these texts are “required” materials for courses in the United States, particularly undergraduate courses. In contrast, in the British system of education, textbooks are rarely considered as “required” materials. The Academic and Professional Publishing Market Statistics conducted a survey and found that about 20-35% of the faculty prescribe a textbook; out of those 17-20% ask students to buy it as a required material. We also had email conversations with many of the faculty teaching in the United Kingdom. Our conversation confirms the conclusion of the above surveys that in the United Kingdom textbooks are typically not a required material and is more used in conjunction with lecture notes where the latter assumes a lot of importance. This is especially true of second and third year courses of undergraduate education. A single textbook does not define the course and students are expected to read widely. This difference in academic environment very probably generates a captive market in the United States and consequently publishers can charge higher prices here.

Further research on the back ground of such a possibility in the case of textbook establishes that publishers in fact do admit to such practices. The National Association of College Stores reports that with the recent reports of escalating textbook prices and instances in which publishers sell U.S. textbooks in other countries at lower prices led 14 members of Congress in 2004 to ask the Government Accountability Office (GAO) to determine amongst other things what factors explain the reason behind a given U.S. textbook may retail outside the United States for a different price. The GAO is the independent, investigative arm of Congress. In preparing its response

to Congressional requesters, the GAO met with NACS, publishers, wholesalers, and student advocacy groups, and considered college textbook pricing data from the U.S. Bureau of Labor Statistics' Consumer Price Index (CPI) and the U.S. Department of Education's Integrated Postsecondary Education Data System (IPEDS). In July 2005, prior to the GAO releasing its report to Congressional requesters, NACS had an opportunity to review and comment on a draft version of the report. In August 2005, "College Textbooks: Enhanced Offering Appear to Drive Recent Price Increases," was made public.²⁰ Amongst its several findings the report suggested that the price of a U.S. textbook may differ when it is sold in other countries because publishers price their texts to compete in local markets (e.g. based on local incomes, students' willingness to pay for them, the availability of competing textbooks produced locally, differences in instructional styles, etc). We reproduce the relevant parts of the report below.

3.5.1 On the GAO Report

After conversations with the publisher's association the committee concluded that college textbook prices in the United States may exceed prices in other countries because textbook publishers assign prices reflecting market conditions found in each country.²¹ Country specific conditions such as differences in income levels or the importance of textbooks in a curriculum influences the demand for textbooks in a country. Publishers typically incur substantial costs in order to develop textbooks, but once these development costs have been undertaken, the additional cost of producing more copies is quite low. As a result, a publisher may be able to profitably sell

²⁰Copies of the full report are now available online at:<http://www.gao.gov/cgi-bin/getrpt?GAO-05-806>.

²¹Horvitz (1966) describes a rule of thumb for pricing of books that publishers use. They first estimate first year sales; then estimate costs for those copies; publishers typically use a multiplier which is between (3.5 and 5) which provides margin for overhead, royalties, advertising and retail profits; finally, they verify whether price is within comparable range of similar books; if it is not they lower prices.

textbooks in one country at prices that are closer to actual costs of printing and distributing additional copies while charging higher prices in the United States that reflect the substantial development costs undertaken. Traditionally, the geographical separation of markets has made it difficult for U.S. students to acquire lower-priced textbooks from other countries. More recent developments in Internet commerce have reduced the costs for buyers in the United States to acquire textbooks from other countries, causing publishers to reexamine their distribution arrangements.

Textbook publishers told the GAO that college textbooks are developed primarily for sale in the United States, based on cost considerations and demand forecasts for the North American market. However, the textbooks are also sold internationally when there is demand internationally of a particular title. Textbooks developed for certain academic disciplines are more likely to have broader international appeal than others, according to publishers. The report gives examples of mathematics, science, and engineering textbooks which has global appeal. In contrast, textbooks used in disciplines like political science, may be more country specific in dealing with the experiences, institutions and culture. In assigning prices to the U.S. textbooks sold in the international marketplace, publishers reported that they consider local market conditions and the willingness and ability of students to purchase the textbook. As there can be significant inter-country differences in the demand for textbooks, publishers reported that they make country-by-country and book-by-book distribution and pricing decisions. While choosing a list price they consider income levels, the cost of living, the role of the textbook in the classroom, intellectual property protections, the strength of the local currency, and the prices of competing textbooks sold in that marketplace. In some cases, international prices may be substantially lower than prices at which the textbook is sold in the United States, while in other cases, they may be the same as or higher than U.S. prices. For example, in many developing countries, incomes are generally too low for students to buy textbooks at U.S. prices. However, in areas where the cost of living is generally higher than in the

United States, such as in Scandinavian countries, textbook prices may be higher.

In addition to income levels, differences in instructional styles and systems of higher education influence publishers' pricing decisions. For example, publishers reported that even though average income levels are high in the United Kingdom, textbooks tend to sell for lower prices than in the United States because the demand for textbooks is lower. Specifically, they said that instructors in the United Kingdom are more likely to recommend several textbooks for students to consider, rather than requiring a specific textbook. Additionally, publishers told the GAO committee that there is less demand for electronic and print supplements to support teaching and learning in non-U.S. markets. Publishers also told out that due to the highly subsidized nature of higher education in the United Kingdom and European countries, students are less willing to pay out-of-pocket costs for textbooks at U.S. prices. Publishers further pointed out that they view textbook prices in Canada and Australia similar to those in the United States because the instructional styles are similar in that instructors select specific textbooks for their classes. Publishers also pointed out that in these markets there is also greater demand for U.S. textbooks that have been adapted to the local culture or economy.

The GAO report points out that historically, the geographic separation of countries served as a natural barrier preventing arbitrage from occurring across countries. Geographic distances and lack of information made it difficult for individuals or businesses in the United States to save money on textbooks by purchasing lower-priced textbooks in other countries and having them shipped to the United States, a practice commonly referred to as re-importation. However, recent technological developments in electronic commerce have diminished the effects of this natural barrier, increasing awareness of prices in other countries and making it easier for students and retailers to purchase lower-priced textbooks from international markets. Publishers have expressed concern about the re-importation of lower-priced textbooks from international locations. Specifically, they cited the ability students have to purchase

books from online distribution channels outside the United States at lower prices, which may result in a loss of sales for U.S. retailers. Additionally, the availability of lower-priced textbooks through these channels has heightened distrust and frustration among students regarding textbook prices, and college stores find it difficult to explain why their textbook prices are higher, according to the National Association of College Stores. Retailers and publishers have also been concerned that some U.S. retailers may have engaged in re-importation on a large scale by ordering textbooks for entire courses at lower prices from international distribution channels.

Publishers reported that they intend for the textbooks they distribute in other countries to be sold for use in those countries, not for resale to the United States, and so have taken recent actions to limit large-scale re-importation. Most of the publishers with whom we spoke say they are particularly concerned about the actions of foreign distributors and U.S. retailers that may result in large-scale re-importation of textbooks. As a result, publishers told the GAO committee that they have taken recent steps to limit the reimportation of textbooks in large quantities. Specifically, publishers told us that they have strengthened their agreements with foreign wholesalers to prevent the large-scale sale of U.S. textbooks back to the United States. Some publishers have also made an agreement with an online retailer outside the United States to limit the number of copies of a given textbook that can be delivered to a single U.S. address in one order. Because these measures target only large-scale re-importation of U.S. textbooks, they do not prevent U.S. students from purchasing single copies of textbooks from international sources.

We believe that similar demand side reasons leads to international differences in list prices in the different categories. For example, the UK bookseller's organization employs Book Marketing Ltd. to do yearly surveys on consumer buying behavior. They found that U.K. consumers do not find Hardcover fictions worth buying. Only paperback versions are considered "value for money". Also, children's books are considered as worthwhile investment which has educational and long-term value. This

fits well in our findings that the “Mass market fiction”, which are paperback versions of popular fictions, and the “Juvenile” categories are priced higher in the UK.

This brings us then to the next puzzle. Multi-market price discrimination is based on the background of no arbitrage between markets. Even though publishers can try to prevent large scale re-importation what stops individual consumers from buying from the cheaper webstore or using the price comparison sites to make a more informed decision? Once someone knows of the foreign website or the comparison site, observing international prices is a very low cost activity. So, why don't enough consumers actively arbitrage to bring back similar prices internationally?

The first observation we have to offer is that very few comparison sites display book prices from international retailers. Curiously, even for comparison sites that do search internationally, the default search option is price comparisons within the USA. Consequently, many consumers do not appear to be aware of such arbitrage opportunities. Conversations with casual internet shoppers suggest that people typically herd on other's shopping choices. The less internet savvy consumers would typically ask a friend for a possible bookstore to buy from in their online shopping experience which makes consumers often herd to a relatively expensive and prominent store even if there are cheaper prices available. Typically people who do not have enough experience of online shopping and comparing prices online, may get stuck at the more well-known, more expensive retailers without being aware of cheaper opportunities abroad. As a result, infrequent consumers have a tendency to search less and only across a few well-known stores. Ellison and Ellison (2005) look at consumer's purchasing decisions for computer memory chips in the United States and find that consumers have a tendency to buy from sellers within the state in which they reside in and a marginal preference for lower shipping time. Judging from their result and argument, we think that even if consumers are made aware of cheaper international prices a majority of them would find transaction from international stores costly due to a preference for buying from their own home country retail stores. Suttles (2002)

uses survey data to provides similar arguments and shows that for online shopping within the United States trust and awareness are very highly correlated with high prices.

We observe that the publisher's price discrimination efforts based on the lack of consumer awareness are further accentuated by the e-retail store's advertising efforts. Amazon.com in its email advertisements and in its website store is not transparent of the existence of their global stores in the United Kingdom or in Canada. They can be found only by scrolling all the way down to see the names of its other stores in small prints at the very bottom of the homepage. The links are side-by-side with "Help", "Join Advantage", "Investor Relations", "Join Associates" etc. As a result, the less internet savvy consumers remain completely unaware of the existence of the other international retail stores. We also find in our sample that list prices and consequently offered prices vary across different categories of books so that one country does not have an uniformly high or low offered price for every category of books. Very few one-time purchasers might have the time or tenacity to shop and compare internationally for each of their purchasing decisions. In addition, we find that on an average with all categories together ordering form the United States or Canada can be slightly cheaper than from the United Kingdom, international search efforts by consumers can be further limited.

3.6 Conclusion

We extend previous research work on online pricing in the internet book retailing business by looking at the online availability of books in retail stores internationally. We find that there is considerable dispersion in prices of books sold online when we consider retail stores across countries. Our analysis points out that in fact only a small amount of these differences in prices can be attributed to retailer level pricing strategies and other book characteristics. Our data shows that the major difference in international prices comes from the difference in suggested list prices by the book publishers. We provide documentation which points out that the difference in list prices stems from differences in demand in the countries, i.e., publishers price discriminate across countries. We also suggest possible reasons why publishers' price discriminating behavior has survived on online retail stores internationally even though internet price search is suggested to be less costly. Even though there have been arguments that search for prices online are costless compared to the brick-and-mortar stores it is getting more and more obvious that it is not quite so. The internet shopping has its own form of friction and imperfections. A convenient form of price discrimination seems apparent in online commerce today where difference in awareness and convenience levels are matched with different price levels where time sensitive, non-internet-savvy consumers are discriminated against. The retailers with the highest levels of prominence and brand image are able to sustain large price premiums. Consumers typically buy from retailers that they are aware of and also pay higher prices to retailers they trust and feel comfortable with.

TABLE 3.1. List of Bookstores

USA	UNITED KINGDOM	CANADA
1000s of discountbooks AlBooks Alibris Amazon.com Barristerbooks.com Barnes&Noble BiggerBooks Bookcloseout Bookpool.com Booksense Borders Buy.com Christianbook.com Classbook.com DoubleDiscount 3:16 eCampus.com Elephantbooks.com FatBrain.com GrabABargain.com HalfPriceComputerBooks HedgeHogBooks Powell's TextBookSource TextbookX.com TotalCampus.com VarsityBooks.com Wiley WorldBookstore	Alphabet Street Amazon UK Bloomsbury BoLUK BooksDirect WHSmith Tesco Pickabook Books Student Book world Country Bookshop Blackwell's Internetbookshop The Book Pl@ce History Bookshop Waterstone's Online	Amazon.ca Chapters Indigo Tesco

TABLE 3.2. Standard Deviationa in List Prices and Offered Prices Across Countries of the Initial Sample

Book	Stdev of list price	Stdev of offered price	Max-Min in list price
1	0.60	3.67	2.94
2	0.91	6.14	2.88
3	31.4	26.14	66.5
4	2.9	10.22	11.38
5	3.03	3.84	10.5
6	0.70	3.21	3.07
7	2.53	7.41	5.32
8	22.14	22.67	47.53
9	3.9	2.06	16.96
10	9.27	8.11	33.56
11	6.53	6.63	4.68
12	2.3	6.2	8.10
13	2.16	14.87	4.22
14	1.59	11.58	6.68
15	12.92	14.48	26
16	2.14	22.95	8.4
17	3.53	10.46	17.37
18	0.82	5.65	2.63
19	5.9	12.04	18.39
20	12.01	17.06	31.08
21	3.79	10.74	7.49
22	2.91	15.09	7.7
23	1.66	15.63	3.54
24	25.76	24.21	76.80
25	19.97	19.07	40.60
26	5.28	7.53	11.53
27	8.04	9.26	16.45
28	29.7	31.73	73.38
29	1.97	4.26	6.66
30	11.38	4.26	41.72
31	2.07	2.92	7.98
32	4.0	37.6	15.39
33	7.38	7.76	21.24
34	17.53	16.94	34.92
35	3.4	12.73	12.32
36	33.28	27.64	66.11
37	5.85	8.73	13.51
38	12.64	11.92	30.12

TABLE 3.3. Shipping time and rates in U.S. dollars from representative bookstores

Origin	Store	Days	Base
USA	Abebooks	3-7	3.5
	Amazon.com	3-7	3.49
	Barnes&Noble	3-6	3.48
	Buy.com	3-10	0
	Powells	10-14	3.5
	A1books	8-10	3.95
	Blackwell	3-7	4.5
	Alibris	7-10	3.5
UK	Amazon	10-15	4.28
	Alphabet Street	5-21	1.45
	StudentBook World	7-10	1.45
	Tesco	8-14	4.29
	Blackwells	7-10	6.0
	WHSmith	7-10	4.27
Canada	Chapters	8-16	3.25
	Indigo	7-14	4.52
	Amazon	6-8	3.85

TABLE 3.4. Book Categories

All Categories	Sample Categories
Agriculture	Biography
Arts	Business
Bigraphy	Economics
Business	History
Education	Juvenile
Fiction	Massmarket Fiction
General Works	Original Fiction
History	Maths
Home Economics	Medicine
Juvenile	Philosophy
Language	Psychology
Law	Travel
Literature	
Medicine	
Music	
Philosophy	
Psychology	
Poetry	
Religion	
Science	
Sociology	
Economics	
Sports	
Technology	
Travel	

TABLE 3.5. Results on List Prices and Book Categories

List Price	Category	USA	Canada
	Biography	-3.17	-4.88
	Business	-5.38	-14.7
	Economics	23.36***	21.2***
	History	-3.49	2.19
	Juvenile	-7.2***	-5.9
	Massmarket Fiction	-1.91***	-1.89***
	Original Fiction	1.76**	1.13
	Mathematics	-12.15*	-9.2
	Medicine	-4.86	-5.31
	Philosophy	-0.6	5.4
	Psychology	13.55***	12.16
	Travel	1.58	0.945

Significance levels: ***1%, **: 5%, *:10%

TABLE 3.6. Results on Offered Prices and Book Categories

List Price	Category	USA	Canada
	Biography	-6.94	-1.14
	Business	-13.26*	-14.27
	Economics	25.36***	24.34***
	History	-3.49	2.19
	Juvenile	-12.2***	-8.5
	Massmarket Fiction	-0.7	-0.24
	Original Fiction	5.65***	5.47***
	Mathematics	-15.3**	-16.82
	Medicine	-11.07**	-3.86
	Philosophy	-1.31	6.12
	Psychology	9.17***	15.58**
	Travel	0.89	0.48

Significance levels: ***1%, **: 5%, *:10%

TABLE 3.7. Results Using the Whole Sample

<i>Dependent Variable</i>					
	Effective price	Effective price	Effective price	Effective price	Offered Price
List price	0.97***	0.96***	0.98***(0.019)		
USA		-3.16***	-2.9*** (0.73)	-6.5*** (2.62)	-5.8** (2.68)
Canada		-0.73	-2.13** (1.03)	-4.22 (2.65)	-3.57 (2.53)
America					
Hardcover				32.94*** (4.98)	33.12*** (4.81)
Fringestores			-2.34*** (0.41)	1.004 (0.9)	-0.83 (0.747)
# of pages				0.03**	0.029** (0.010)
University press					1.77 (4.29)
Intercept	0.97***	2.90***	5.13*** (1.05)	23.17*** (5.83)	18.25 (16.53)
N	2139	2139	2139	2139	2139
R ²	0.96	0.89	0.89	0.29	0.29

TABLE 3.8. Results on the Textbook subsample

	Effective Price	Offered Price
USA	16.27**(5.73)	18.8*** (4.49)
Canada	29.01**(7.55)	25.23*** (3.68)
Hardcover		20.7**(9.45)
Fringestores		-1.61(1.13)
# pages		0.059*** (0.02)
Univ. Press		-15.27** (5.3)
Intercept	61.09*** (4.28)	4.55(15.94)
N	399	399
R sq	0.09	0.44

Significance levels: ***1%, **: 5%, *:10%

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