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Illustrations of Price Discrimination in Baseball¹

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I. Introduction

After many years of overly simplistic pricing, pricing strategy in Major League Baseball has now evolved to recognize the complexity of the supply and demand factors for baseball tickets. Most important among these factors is the demand uncertainty teams experience from game to game, often with a high degree of variation. There are many causes of this variation, such as the quality of the opponent or the day of the week. Perhaps the least understood factor is competition for fans' discretionary spending, yet in other industries this is of paramount concern when setting price. If an owner is lucky, there are capacity constraints (i.e., limited stadium seating) that prevent the team from satisfying total demand. Calling such a constraint lucky is ironic; owners of teams playing in smaller stadiums used to complain that they couldn't compete financially because they had fewer seats to sell, but times have changed along with the economic model of a sports team. Now, team owners pine for smaller facilities with more amenities where they can charge higher prices for regular seats, club seats, and luxury suites, taking advantage of the excess demand that a small, high-

¹ We would like to thank Ronald Park for his excellent research assistance.

quality venue can generate. For example, the new Yankee Stadium has a reduced seating capacity of 52,325 (including standing room) compared to the old stadium's capacity of 56,886.²

In general in a sports facility, the quality of each seat varies to such an extent that the best seat in the stadium can sell for twenty times the price of the worst seat. "Scaling the house" or pricing integrity (where prices are set with the goal of filling the stadium from the bottom up) is achieved by trial and error. This need for experimentation is especially strong when a team moves into a new stadium where demand for each quality level of seat is more difficult to predict and where no history exists upon which to base a pricing decision. Such a situation arose recently when the Yankees opened New Yankee Stadium and found they had priced the first nine rows of seats substantially above the sell-out level, some as high as \$2,625 for a single game! Games after opening day saw the first nine rows of some sections entirely empty. The team quickly cut many of the seat prices in half. This learning-by-doing aspect of pricing is typical in sports; baseball, with many games to learn from, can quickly reach equilibrium.

Adding to the complexity is the notion that fans are purchasing an array of products and services, not just a ticket. Fans pay for parking, concessions, and merchandise. All MLB teams generate additional revenues from some or all of these sources. Pricing a ticket involves understanding not only the attendance decisions of fans, but also how that ticket price might impact the purchase decisions of fans upon entering the stadium. It is typically in the franchise's interest to charge a lower ticket price if the club shares in these ancillary revenue streams than would be the case if the club cared only about ticket revenues (or was paid a fixed fee from a concessionaire for pouring rights).³ This follows from the standard economics of multi-product firm pricing.

In fact, Krautmann and Berri (2007) find that a typical MLB team charges a price that is 56% lower than it would be otherwise, in order to bring more fans to the game and thus make more money at the concessions stand. Teams with large facilities face added pressure to discount (or even give away tickets for free) in order to fill the house. A full stadium adds to the fan experience, helps create future fans, adds to ancillary revenues, and helps satisfy sponsors (who want as many eyeballs

² http://newyork.yankees.mlb.com/nyy/ballpark/new_stadium_comparison.jsp

³ See Krautmann and Berri (2007), Marburger (1997), Fort (2003), and Rascher, McEvoy, Nagel and Brown (2007) for discussions of the complementarity of tickets and concessions.

noticing their sponsorship as possible, which in turns allows them to charge the sponsor more). Moreover, an unsold ticket “expires” with the event itself and cannot be saved for sale at a later date, unlike the situation facing a durable goods company who can hold the product and sell it later. In this sense, a baseball franchise has similar economics to a hotel or airline in that the inventory is perishable. However, the short-run profit-maximizing decision to sell tickets cheaply (or give them away) can influence future demand because customers may become accustomed to giveaways or price discounts. This in turn may lower long-term profits, as in the vacation cruise and hotel industries, where last minute discounting has become expected and price-sensitive consumers may delay their purchase decisions hoping for a discount.⁴ Franchises fight this urge to discount, but it is much easier to resist if the team’s stadium is smaller, lowering, or eliminating entirely, the need to give away free tickets to ensure a sellout.

Recently, secondary (or resale) markets have grown in importance with StubHub and eBay leading the way. These on-line markets allow a fan or broker to sell a ticket (below, at, or even above face value) to a final purchaser who attends the game. Less formal secondary market sales, commonly called “scalping,” have existed for baseball tickets for decades, and MLB has traditionally disapproved of ticket reselling. Team owners felt that the scalper was making money on a product from which only the franchise should benefit. They also feared being blamed if fans purchased counterfeit tickets through the secondary market. Nevertheless, when the Chicago Cubs saw how much money ticket brokers were making from Cubs tickets (whose games routinely sell out), the team experimented with the secondary market. The Cubs created its own broker and sold high-quality tickets directly to the secondary market rather than offering these for sale to the public at face value (essentially via an informal auction). While the Cubs suffered negative public relations and media coverage when it was revealed that the team was “scalping” its own tickets, nevertheless the experiment proved how lucrative the secondary market can be to a team with excess demand for its tickets. This may have contributed to MLB’s new attitude toward resellers – MLB recently signed a deal with StubHub to formalize Baseball’s relationship with the secondary market and make it easy for fans to resell their tickets on-line through the MLB web site.

⁴ See for example, “Travelers Find It Pays to Wait for Late Deals,” at <http://online.wsj.com/article/SB123854405756676003.html>

At the same time that teams have embraced the secondary market, clubs have also begun to shift some of the secondary market revenues into their primary markets by introducing variable ticket pricing (VTP). Under VTP, a franchise charges a different price for the same seat at different games throughout the season depending on an estimate of demand for each game, made prior to the start of the season. Usually, teams selected higher price levels for a key rivalry game, for the traditional popular days of the week or month, or for special events like July 4th, etc, and lower prices for less popular games. As teams have become more comfortable with VTP, they have created as many as five different price levels throughout the season for a single seat (Rascher, McEvoy, Nagel, and Brown, 2007). An even more robust version of VTP is known as “dynamic pricing,” in which teams use an auction mechanism or a daily calculation of demand to allow the price of all unsold tickets to rise and fall with demand, right up to the day of the game (as opposed to VTP, where prices are locked in at the start of the season based on estimated demand). The San Francisco Giants began this process for all of their tickets for the 2010 season (after experimenting with selected seats in 2009).

Essentially, the law of one price does not apply to baseball. Creative pricing strategies that have been in place in other industries, including second- and third-degree price discrimination, two-part tariffs, and dynamic pricing, are now being adopted by baseball franchise owners after many years of more simplistic pricing strategies. Indeed, much of the current wave of sophisticated baseball pricing is essentially what for nearly a century, economists have been calling second-degree price discrimination.

II. Price Discrimination

Arthur Pigou is generally credited with first explaining in detail the economics of price discrimination and creating the commonly used taxonomy of first-, second-, and third-degree price discrimination.⁵ Although to “discriminate” simply means to separate or differentiate, the term now carries a more common negative meaning related to the unfair treatment of a person based on the group or class to which that person belongs, rather than on merit. Economists, though, still use the word “discrimination” in the term “price discrimination” to mean charging a different price for the same or similar product to different market segments or customers, without any negative undertones.

⁵ See Pigou (1912) and Pigou (1920).

Stigler (1987) defined price discrimination as occurring “when two or more similar goods are sold at prices that are different ratios to marginal costs.” This helped handle the issue of the inclusion of transport costs leading to two different prices (because of different transport costs). It also creates a definition more suitable to the sort of price discrimination seen in sport where every ticket sold differs from every other ticket on some dimension (e.g., different opponent; different day of the week; different section, row, or seat), or so two identical products are never sold. Traditional examples of price discrimination include first-, second-, and third-class tickets on trains,⁶ senior or youth discounts for movies or food, matinee movie pricing, lunch pricing at restaurants, and the difference in pricing of hardcover versus paperback books.

Stigler’s definition makes an important point – price discrimination, as practiced, typically does not involve identical goods, but rather goods or services which may be identical on many core dimensions, but which differ with respect to ancillary features. A narrow definition of price discrimination implies that different prices for any two *different* seats at a game does not constitute price discrimination because the quality of the seat location varies across the two seats. However, focusing on highly similar goods (rather than identical ones) creates a definition of price discrimination more suitable to the sort of pricing strategies seen in sports, where every ticket sold differs from every other ticket on some dimension (e.g., different opponent; different day of the week; different section, row, or seat).

Indeed, the need for price discrimination to go hand-in-glove with some form of product differentiation has been recognized from the start in economics (Phlips, 1981). The classic examples of price discrimination listed above do not involve identical goods. Seeing a movie during the day is a different product than seeing it at night (because of the time difference). The decision to buy a hardcover or paperback book involves products with different quality covers, but more importantly, involve a question of timing, since paperback books are typically only sold months after the release of the hardback. Clearly lunch and dinner differ in terms of timing, but also potential ambience and import (hence some of the success of the dating service “It’s Just Lunch”). Yet, in all of these

⁶ In 1849, Dupuit analyzed the phenomenon of third-class trains being intentionally shabby (to discourage well-off travelers from purchasing the inexpensive tickets). So questions related to the pricing of different quality seats at the same event are nothing new to economists.

examples (including the example of two different tickets to see the same Red Sox game), while the products may differ on many dimensions, the core product is sufficiently similar, and the differentials in pricing are not purely related to the marginal cost of providing the ancillary dimensions. Indeed, in many cases, the cost of providing two differently priced sports ticket is identical.

Rosen and Rosenfeld (1997) show that any industry where marginal cost is less than average cost (as occurs in baseball) will tend to price discriminate. Also, Dana (2001) shows that demand uncertainty and price setting in advance (both occurring in baseball) under monopoly lead to price dispersion and price discrimination. As economic theory predicts, price discrimination is common in sports. For example, Shmanske (2004) comprehensively studies pricing at golf courses and finds that there are different prices based on the age of the golfer, the day of the week, time of day (twilight rates), whether the golfer is a resident of the local community (or resides outside of the area), and volume discounts. He shows that greater variability in prices results in increased profits.

Baseball, in particular, is filled with examples of price discrimination and, as Baade and Matheson (2006) point out, the growth in new baseball stadiums has provided more opportunities to price discriminate. For instance, the differences in regular and premium seating are magnified in new stadiums by providing premium ticket holders with access to clubs and restaurants and larger seats. Additionally, new stadiums tend to sell out more often, which may indicate that fans received higher consumer surplus attending games in these new facilities (as evidenced by the excess demand and prevailing prices leading to sellouts).

III. First-Degree Price Discrimination

Perfect or first-degree price discrimination is when a firm is able to charge each customer her willingness-to-pay (WTP). For many reasons, this type of pricing is not relevant to baseball (or any other industry), not the least of which is that a customer has no incentive to reveal her WTP to the seller. Theoretically, perfect price discrimination is actually welfare maximizing because the team would continue to sell tickets right up to the point where its incremental or marginal costs are equal to the price of the ticket. Indeed, as Philips wrote in 1981, “generally, discriminatory prices will be required for an optimal allocation of resources in real life situations.” [Philips, p.1] Given the

relatively low costs of selling an additional ticket, this would effectively sell out almost any stadium (given sufficient demand). In other words, because perfect price discrimination results in more of the product being sold, total welfare ends up higher, even though welfare is captured by the seller and none by the consumers. See Figure 1 for a general taxonomy of price discrimination and examples in baseball.

--Insert Figure 1 here--

IV. Second-Degree Price Discrimination

A more practical approach to price discrimination comes in the form of second-degree price discrimination. Second-degree price discrimination occurs when a seller offers consumers a menu of consumption options, each priced differently, and asks consumers to self-select their preferred categories. One common example of second-degree price discrimination is a volume discount, where a firm will offer one unit of a product for \$5, but three units for \$10. Consumers who value a lower price (even if they have to store excess units) will pay less per unit if they buy three at a time; consumers who prefer not to store the product will pay \$5. The seller doesn't need to police who is given access to the discount; instead the seller lets consumers sort themselves.

Second-degree price discrimination is well suited to many of the questions of baseball pricing because it is so flexible. One form of second-degree price discrimination that has been with baseball from its early days is the idea of multi-tiered pricing. Fans are well conditioned to pay one price for upper reserved tickets to a game and to pay more for box seats, and fans sort themselves out into categories based on their willingness to pay more for higher quality seats. This is the essence of second-degree price discrimination – the team offers a pricing menu and fans self-select their preferred combination of quality and price.

This example shows how useful it is to be flexible in recognizing that while a box seat to a game is not an identical product to an upper reserved seat at the same game, the two tickets sufficiently share the core product (in this case, attendance at a particular baseball game) that the price discrimination framework is useful for analyzing pricing, even if the products are clearly not identical on every dimension of quality.

Volume Discounts

Price discrimination in many industries involves discounts for volume purchases. These can often be tied to cost differentials, but when they are not, it is a form of price discrimination. Baseball teams typically will offer lower prices and an enhanced experience to a group willing to purchase tickets in bulk.⁷ Teams may also create special events at their games, where respected members of the community (such as teachers or firefighters) are honored or where cultural groups are encouraged to attend and a group discount is offered.⁸ Similarly, teams offer family plans which provide a discount for two adults and two or more children from the same family. For example, the Arizona Diamondbacks offer “Family Fridays at Chase Field,”⁹ and the St. Louis Cardinals offer an “Albert Pujols Family Pack.”¹⁰

Bundled Pricing

Product bundling is the practice of offering multiple products for sale as one combined product. In baseball, season tickets are a bundled product because each ticket could be sold separately. Season tickets have been available for decades in MLB. Historically, season tickets were the same price (per ticket) as individual tickets for the same seat. The purchaser was guaranteeing a ticket for each game in the same seat as well as a guaranteed option to buy tickets to playoff games, should the team reach the post-season. Also, season ticket holders were guaranteed the same seat (or better) the following season. More recently, MLB season tickets often come with a per-game discount. For instance, the San Diego Padres in 2010 offered up to 35% off the single game ticket price when buying a full season ticket in some seating locations.¹¹

A more recent development is the partial season ticket, or mini-plan. For example, in 1993, the Milwaukee Brewers began selling 16- and 13-game ticket packages with themes such as Sunday

⁷ http://sandiego.padres.mlb.com/sd/ticketing/groups/benefits_pricing.jsp and

http://oakland.athletics.mlb.com/oak/ticketing/group_info.jsp

⁸ http://oakland.athletics.mlb.com/oak/ticketing/group_events.jsp

⁹ <http://arizona.diamondbacks.mlb.com/ari/ticketing/familyfridays.jsp>

¹⁰

http://stlouis.cardinals.mlb.com/news/press_releases/press_release.jsp?ymd=20080214&content_id=2373636&vkey=pr_stl&fext=.jsp&c_id=stl (“To allow fans an opportunity to be a part of some of these great promotional dates, a Pujols Family Pack ... [has] been created and contain[s] seven games for the price of five. The Pujols Family Pack includes the Fredbird Bobble Belly, the Albert Pujols bobblehead as well as the Build-a-Bear Workshop Bear, Coca-Cola/Wal-Mart lunch box, Yadier Molina pennant, Six Flags tickets and more.”)

¹¹ <http://sandiego.padres.mlb.com/sd/ticketing/season.jsp>

games only or day games only. The franchise increased its full-season equivalent ticket package sales by 43% compared to the previous season (Howard and Crompton, 2003).

“Loaded” Ticket

There are a number of reasons to bundle two different products. These include leveraging one product in order to sell another product, realizing economies of scope that may exist across products, the provision of products that work together more seamlessly, or capturing more of the existing value in the marketplace that is lost from separately pricing two products. In professional baseball, the last of the above-listed reasons seems to be the impetus for offering an “all-you-can-eat” (AYCE) or “loaded” ticket that includes a seat to the game, all-you-can-eat concessions, and a parking pass.

If the willingness-to-pay (WTP) for tickets and food varies widely across consumers to the point where some value the “experience” that includes concessions more than the game, and others value the game itself more than the concessions, then bundling for that reason alone can be more profitable. Bundling allows more of this joint value to be captured by the seller than if the items were sold separately. An optimal pricing strategy, called mixed bundling, accounts for this diversity of preferences by having some seats with a bundled ticket and other seats (the rest of the stadium) priced for the game alone with concessions sold separately. In total, this will capture more of the WTP of the entire fan base (which, it is assumed, has fans who are distributed across the spectrum between mostly preferring the game and mostly preferring the food and experience). Adams and Yellen (1976) show that mixed bundling will always dominate pure bundling.

Specifically, it turns out that bundling is most effective when there is a negative correlation between the values that the different customer types have for each item. For instance, if there is a group of pure baseball fans and a group who like to eat at the game. Both groups value both products within a “loaded” ticket, but each one has a different ranking of the importance of them. Bundling effectively lessens the degree of variation of the individuals’ valuation of the product, thus allowing a better price to be chosen for the bundled product. This is why bundling works (Varian, 1989).

The St. Louis Cardinals (MLB) have offered these bundled tickets for over a decade, and recently increased the number of seats with the all-you-can-eat option to over 2,000. Most other teams limit

their use of this pricing tactic to premium and club seats. However, clubs have recently begun offering these AYCE deals to lower-priced seats that typically have gone unsold. In 2007, the Los Angeles Dodgers (MLB) segregated a section of their \$6-\$8 bleacher seats and added AYCE concessions, raising the total ticket price to \$35. This section, sponsored by convenience store retailer *am/pm* to emphasize the food and beverage aspect of the bundle, has resulted in the largest price increase of those analyzed in Figure 2 (DeSchrive and Rascher, 2008).

--Insert Figure 2 here--

The Atlanta Braves (MLB) recently offered two different AYCE packages. One, called “Ballpark Favorites” charges an additional \$30 for all-you-can-eat from a limited menu that includes hot dogs, popcorn, soft drinks, chips, etc., and another option called “Barbecue and More” offers barbecued food along with beer for an additional \$60.

Non-price promotions, aimed at getting fans out to the ballpark, have a long tradition in baseball. Bat day and other non-price promotions are a form of bundled pricing where the customer (or just the first 15,000 customers, for instance) receive special merchandise like a cap, bat, bag, bobble head, etc. along with their seat at the game. McDonald & Rascher (2000) showed that these types of promotions increased attendance by 14%, more than outweighing the cost of providing the promotions. In this case, product bundling worked quite easily. In fact, the Beanie Babies promotions in the late 1990s and early 2000s drew thousands of additional fans to each MLB game that offered special, limited edition, Beanie Babies stuffed toys.¹²

Two-Part Tariff

If the ticket and concessions purchases are unbundled (as opposed to the bundled “loaded” ticket described above), then this is more akin to a two-part tariff (Depken and Grant, forthcoming), where in order to purchase concessions, one must first purchase a ticket. In this view, an MLB team is a multi-product firm selling concessions, but only to customers who first purchase a ticket. Using data from 1991-2003, Depken et al. show that MLB teams engage in price discrimination that involves the tradeoff between ticket and concessions pricing.

¹² Sandomir, Richard. “Baseball: And Now Batting Cleanup...; Maybe Valentino the Beanie Baby Can’t Hit, but Who Cares?” *The New York Times*. 11 August 1998, p. C1.

Personal Seat Licenses

A pure example of a two-part tariff is the personal seat license (PSL). PSLs are a fairly recent development, typically used by teams and municipalities as a way to help finance a new sports facility. High-demand fans (with enough income or wealth) are targeted and are sold a PSL, allowing them the right to then purchase season tickets each year, typically for as long as the stadium is used by the team. This is a form of a two-part tariff because in order to buy a season ticket, one must first purchase a PSL. It is a mechanism to help finance a facility's construction by capturing some of the additional consumer surplus up front (see Fort, 2003; and Leeds and von Allmen, 2002).

For example, if a fan values a season ticket at \$2,000 per year, but is only charged \$1500 per year, then the net present value of the additional \$500 going out 20 years (the expected useful life of the stadium) can be charged to the consumer up front. Of course, a franchise is not going to know each customer's exact WTP, but can come up with estimates. Leeds et al. suggest that PSLs allow the club to charge a competitive (or more competitive) price for the season tickets. This sells more tickets and removes some of the deadweight loss associated with monopoly power pricing. However, the club captures some of the consumer surplus via the PSL.

Quality Discrimination

As described by Tirole (1988), quality discrimination is the common means of putting price discrimination into practice. The formal economic analysis of quantity discrimination is the same for quality discrimination (i.e., the math laying out the benefits of pricing discounts based on volume different volume levels works identically for pricing which varies based on quality differences). Consumers have varying tastes for quality. The quality of the seat is used as a market segmentation device (similar to how BMW segments buyers with the 525, 535, and 545 series or how The Gap, Inc. uses Banana Republic, The Gap, and Old Navy as channels to target three different segments).

Multi-tiered Pricing

There are different schools of thought as to the breadth of the definition of price discrimination, and how price discrimination compares to price dispersion and multi-tiered pricing. For example, Fort (2003) explains that charging different prices by the time of day, day of week, and age of fans is

price discrimination, but charging different prices for different seats at the same game or for different opponents over the season (VTP) is not price discrimination, because in his view, the latter products are sufficiently different to constitute distinct products. Moreover, because a fan can generally resell his/her ticket, true price discrimination is rarely possible, argues Fort, because effective price discrimination requires the ability to prevent arbitrage. To Fort, pricing baseball tickets based on quality differences is simply multi-tiered pricing (charging different prices for different goods from the same seller).

Yet, as Dupuit explained over a hundred and fifty years ago, offering different levels of quality is typically the mechanism that allows second-degree price discrimination to work, even with the possibility of arbitrage. Building the second-class train car with a roof and nicer amenities compared with the third-class train car helped nudge the higher income (or higher demand) passengers into the better seats. Certainly, the higher income passenger could purchase the less expensive ticket (directly or from a reseller), but the variation in quality of travel was used to encourage self-selection and thus sell tickets in each train car. Nineteenth century trains were similar to a modern baseball stadium with more expensive, more comfortable seating closer to the action, with access to special clubs and/or food service at one's seat. While the product is different in a strict sense, nevertheless, the quality difference causes consumers on a different part of the demand curve to identify themselves by which level of quality they select. Fort's assertion is more relevant to third-degree price discrimination, where the exact same product is sold at different prices and reselling must be prevented to make discrimination effective. Second-degree price discrimination is much less vulnerable to arbitrage concerns.¹³

In addition to simply selling tickets, baseball teams also try to make sure the best seats, those nearest to the field, sell out even if the upper deck is not full, a process known as "pricing integrity." In order to achieve this, the team needs to "scale the house" to ensure that the differences in price between the lower and upper section seats result in high demand for the lower sections. In other words, the best seats need to feel like the better deal to enough fans that they prefer to spend more

¹³ Arbitrage would be a problem for second-degree discrimination based on quality if fans could purchase inexpensive upper reserved seats and then, once inside the stadium, move into better seating. This would be the equivalent, in Dupuit's train example, of riding first class on a third-class ticket. In very low-attendance situations, this can be a problem, but generally teams use ushers, and seat information printed on the tickets, just as trains have and continue to use conductors to prevent this sort of arbitrage.

and get the high quality seat, if given the chance. If too few fans see the good seats as the comparative bargain, the upper deck will fill up and the prime seats will go unsold.

Humphreys and Soebbing (2008) discuss how new baseball stadiums tend to show greater price dispersion. Price dispersion is simply the situation in which more than one price exists in the marketplace for the same product. This usually occurs when multiple sellers are selling a common product, but because it can also arise with a single seller, the concept of price dispersion overlaps with the concept of price discrimination. Using data from MLB, Humphreys et al. show that teams with more price dispersion (more price options on their menu) have higher attendances, all else equal. This raises total welfare because more seats are sold for a given demand. Newer facilities tend to have more prices available because new stadium designs accentuate differences among seating sections and also because historical precedent has made teams in older stadiums reluctant to completely revamp their prices.

Variable Ticket Pricing

Variable ticket pricing is a form of second-degree price discrimination, where games for which demand is expected to be higher have higher prices than low-demand games. Variable ticket pricing has been used in college athletics for years, much earlier than its adoption in professional sports. For instance, tickets to the “Big Game” between the University of California at Berkeley and Stanford have had higher prices (often twice as high) for that event than for the other football games of either team throughout the season for at least two decades. The phenomenon came much later to baseball. Starting in the early 2000s, a few MLB teams (e.g., Giants and Rockies) first implemented variable ticket pricing. The Rockies charged four different prices for the same seat based on the time of year, day of the week, holiday, or the quality of the opponent (as determined prior to the season). In 2004, a seat in the outfield pavilion ranged from \$11 for a value game to \$21 for a marquee game. In 2010, the outfield pavilion prices ranged from \$18 to \$50.

Technically, one could describe this as “intertemporal price discrimination” because while the core product (attendance at a given team’s games) is the same, on the important dimension of time the products differ and consumers are asked to self-select. Instead, economists reserve the term “intertemporal price discrimination” for the phenomenon (common in durable goods like electronics), where prices to “early adopters” tend to be high, and prices are lower for less

enthusiastic buyers who are willing to wait to purchase the product. Moreover, VTP doesn't just offer a choice between times; the opponent varies as well, which pushes right to the edge of the question of what is the core product and what is an ancillary dimension.

The theory of variable ticket pricing is straightforward, as described by Rascher et al. (2007). The revenue maximizing price for any product varies as the demand for that product rises and declines. As shown in Figure 3, the solid line represents the average demand for an Atlanta Braves game in 1996. The price \$13.06 (Point A, with an elasticity of -1.0) maximizes revenue and draws almost 36,000 fans. However, the dashed line shows the demand for opening day, which drew nearly 49,000 fans (Point B, with an elasticity of -0.73). If the same price of \$13.06 was charged for opening day, then ticket revenues would have been about \$640,000 for the game. If instead the price were raised to maximize revenues for this specific game, revenues would have been \$655,000 at a price of \$15.46 (Point C, with an elasticity of -1.0). The 18% price rise would increase ticket revenue by 2.5%.

--Insert Figure 3 here--

Carrying this exercise out for all 30 MLB teams across their 81 home games would have resulted in an increase in ticket revenues of about 2.6%. While this is not a large increase in revenues, the increase in revenues translate almost directly to profit because there are virtually no additional costs associated with the adoption of variable ticket pricing. In a business like MLB, where profit margins are typically reported to be less than 10% (and often are negative), this strategy can result in double-digit increases in income for an MLB club. Rascher, et al. expand their analysis to incorporate games that are sold out (where the true demand at the given prices is not known) as well as the impact of lower attendance (at a higher priced VTP game) on complementary concessions and merchandise revenues.

In two case studies of individual MLB clubs, Mondello and Rishe (2004) and Cabral (2010) each focus on the variable ticket pricing of the St. Louis Cardinals and New York Mets, respectively. Mondello et al. shows that between 30-50% Cardinals' fans would be willing to pay higher ticket prices for higher quality opponents and weekend games. Cabral notes that the Mets sold out most of their seating sections (1994-2004), but not the Upper Reserved section, which had a lot of game-

by-game variability. He also finds that VTP ought to lower the variability in attendance from game to game by lowering attendance at high demand games, *ceteris paribus*, and raising it at low demand games. The Mets converted to VTP during 2003, but the resulting ticket sales did not comport with Cabral's original hypothesis (indeed, Mets ticket revenue dropped in their first season using VTP). In addition, attendance variance was constant pre- and post-VTP. Cabral found a price elasticity of demand of -0.35 for that Upper Reserved section alone, consistent with other findings in baseball. A confounding factor is that the team played worse during 2003 compared with 2002, their last season without variable ticket pricing. Thus Cabral concludes that the 2003 results did not adequately test the hypothesis in question, because the lower revenues might have been caused by lower game quality, not the switch to VTP.

Dynamic Pricing

In 2009, the San Francisco Giants (one of the first teams to adopt VTP) experimented with more dynamic pricing. Specifically, the ticket price for 2000 seats in certain sections in the bleachers and upper deck that had not been selling well was changed each day (until it sold) based on sales conditions, pitching matchups, the weather, opponent, recent team performance, promotions, and day of the week. In one example, during a series against the Mets, some bleacher seats regularly priced at \$17 sold for between \$15 and \$33, depending on the pitching matchups, etc. The Giants claim that revenue earned on those seats increased by 17% in 2009. Beginning in 2010, the Giants began selling all of the seats for all 81 home games this way. Such dynamic pricing is essentially the extreme version of VTP. With VTP, ticket prices vary by game, but are pre-set prior to the start of the season based on estimates of demand for each game. In dynamic pricing the fluctuations in demand during the season are captured in the selling price by the market, because the team allows ticket prices to move with demand.

Secondary (Resale) Markets

The same economic analysis that demonstrated the benefits of variable and dynamic ticket pricing also supports the conclusion that secondary markets lead to more efficient (higher total welfare) outcomes and generally results in fans who most value attendance attending any given game. As with dynamic pricing (as well as VTP), secondary markets result in higher prices for seats/games in high demand and lower prices for seats/games with low demand. However, with dynamic (and variable) ticket pricing, the gains in efficiency are typically captured by the team in the form of

higher profits. In a secondary market, the same efficiency gains are typically shared among consumers (who are able to find other consumers with higher valuations and make a mutually beneficial trades) and firms engaged in resale (ticket resellers, often disparaged as “scalpers”).

Secondary markets allow for an additional form of second-degree price discrimination, where fans who value price certainty will tend to pay face value in advance in the primary market (but give up flexibility), and fans who are flexible can often get discounted seats close to game time. Sweeting (2008) explains that baseball ticket prices typically decline as the game approaches (a ticket is a perishable good and as the event draws closer there is an increased probability of not selling the ticket at all) for many of the same reasons that hotels and cruises will offer last minute discounts. On the other hand, Courty (2003) shows that some fans are uncertain as to their own valuation of attendance at an event and thus are willing to pay a premium to attend a desirable game without an advance commitment. These distinct pricing options are similar to the sort of second-degree pricing seen in air travel, where late-paying consumers may either get a bargain on a flight with low demand or may pay a very high price for the flexibility of purchasing a last-minute, unrestricted ticket.

Secondary markets also play an efficiency role, making other forms of price discrimination function more smoothly. For example, secondary markets reduce the risk to early (first-sale) purchasers in a market, by providing a form of insurance to fans who purchase in advance, who thus know that if their plans change, the ticket can be sold, mitigating any losses and potentially providing for a profit. This is in stark contrast with the less efficient market for airlines tickets where resale is highly restricted (primarily because of security concerns) and as a result advance-sale tickets can go unused and where demand in the primary market may be reduced for fear of purchasing a non-refundable ticket that goes unused.

The benefits to consumers and teams from the existence of a robust secondary market are many. For example, demand for season tickets will generally be higher when season ticket holders know that for the subset of their purchase for which they hold a low personal valuation, it will be possible to offer those tickets up to fans with higher valuations. This can result in higher first-sale prices and higher sales. For teams that value sellouts and high attendance, secondary markets provide an efficient way to sell tickets in advance (esp. through season tickets) without risking too many “no shows,” who fail to purchase ancillary services like parking, concessions, and team merchandise.

Nevertheless, ticket resellers are typically denigrated by teams as “scalpers” and middle-men, who profit off of the value created by others. This is an economically naïve critique that ignores the fact that in many industries, distribution channels are often a source of value and economic efficiency and as a result are often profitable lines of business. Instead, the historical animosity to ticket resale appears to have stemmed, in part, from teams’ inability to capture the profits from resale, and thus, as discussed above, once MLB teams found a way to participate in the revenue streams generated from resale (through deals with firms like StubHub), this resistance to ticket resale has subsided.

Other concerns, such as the legitimate concern that re-sold tickets open the opportunity for counterfeiting, appear to have diminished as the ticket resellers have become more corporate – with websites such as StubHub and TicketExchange offering money-back guarantees replacing a “scalper” standing on a street corner with no possible recourse for a dodgy deal.

As discussed throughout this chapter, much of the history of sports ticketing has involved fairly simplistic strategies for pricing, which led to large gaps between ticket price and consumers’ (high) valuation of the best seats and the best games. See for example Courty (2003), who discusses the traditional view that under-pricing in the primary markets is the primary driver of the economic efficiency gains from secondary markets. However, even as first-sale ticket pricing has become more sophisticated, secondary markets continue to provide efficiency gains. Some of these gains have come from technology – as internet resale has helped make secondary markets much less spotty than street-corner sales. Other gains come from the fact that even the most dynamic of ticket pricing strategies cannot diversify away all fan risk to changed circumstances, and so secondary markets continue to provide demand-enhancing “insurance” to fans purchasing in the primary market.

One potential down-side to secondary markets is the extent to which these markets distort pricing in the primary market. Because secondary markets grow demand for tickets (by lowering the risk of a first-sale purchase), they can increase prices, but generally this sort of increase is associated with increased welfare (though increased demand). However, some argue that vibrant secondary markets encourage profit-seeking ticket brokers to come into the primary market and to capture profits that teams should have earned (with dynamic pricing) or capture surplus that fans should have captured

(by getting an under-priced ticket through effort, like waiting in line, or through good luck). In some sense, these arguments are less about economics and more about societal attitudes towards resellers – regardless of whether a team, a broker, or another fan ultimately makes the final sale to the fan who attends, the economics of matching tickets with those who value them the highest is fundamental to maximizing total welfare.

V. Third-Degree Price Discrimination

Third-degree price discrimination is the form easily understood because it includes the classic examples like senior or youth discounts. This type of price discrimination requires the seller to segment the market and price to each group according to their price elasticity of demand, but unlike second-degree discrimination, third-degree discrimination requires that the seller prevent one group of purchasing at the other group's price. For example, this is done by requiring identification for age-related discounts or for military discounts. The San Diego Padres offer a military discount whereby a member of the military gets \$6 off any ticket regularly priced at or above \$14.¹⁴

The key to successfully implementing third-degree price discrimination is to prevent resale of the good by the low-priced purchaser to the high-priced purchaser (creating an arbitrage opportunity). This contrasts with second-degree discrimination where the seller simply provides a menu and lets the heterogeneity inherent in demand sort out who wants and gets what. With third-degree price discrimination, one purchase option is usually unambiguously preferred by all consumers, but the seller only lets certain identifiable buyers purchase at the favored price. This is easy to do for goods that are hard to resell (like electricity or other services like food at a restaurant or personal exercise training services). In other cases, a seller may use a contract with a customer that says the product cannot be resold (like when students get educational discounts on software but agree not to resell their software).

Third-degree price discrimination works best when groups with distinct demand can be separately identified. For example, assume a minor league baseball game has the following inverse demand function for non-students: $P=20-Q/80$, and the marginal cost of selling a ticket is \$0. Similarly, the inverse demand function for students (who can be identified via a student ID card) is $P=10-Q/40$. The revenue-maximizing single price is \$8.33 leading to \$8,333 in ticket revenue. This is represented

¹⁴ <http://mlb.mlb.com/sd/ticketing/military.jsp>

by the horizontal and vertical dotted lines in Figure 4 at \$8.33. If the team instead offered a discount to students who can show a student ID, and everyone else paid the full price, the results change substantially. The two-tiered optimal pricing is at \$5 for students and \$10 for non-students (shown by the dashed lines in the figure). This results in the same 1,000 seats being sold, but with total ticket revenue at \$9,000, an increase of 8%.

--Insert Figure 4 here--

VI. Conclusion

Leaving aside the questions of terminology -- whether price discrimination requires the exact same product be sold at different prices by the same seller, or whether one follows the traditional, broader definition as originally posited by Dupuit (1849) and Pigou (1912 and 1920) which allows for price discrimination in conjunction with product differentiation, it is clear that Major League Baseball teams engage in pricing practices that are consistent with many of the teachings of the price discrimination literature. In particular, baseball teams commonly offer a large menu of options for customers that vary by seat location, day of week, opponent quality, group size, number of games purchased, age, military status, etc., all of which mirror the teachings on second- and third-degree price discrimination. These economic theories can be understood and their impacts can be observed by viewing the actual outcomes that take place in baseball. It is one of the few industries in which we can observe demand at prevailing prices (notwithstanding sellout games). This allows economists to test empirically the economic theories of pricing.

As just one such example, baseball pricing proves the welfare benefits of price discrimination. Bradbury (2007) notes that regardless of whether MLB has monopoly power, it is a price-discriminating organization. A single price is not charged, but instead many prices across the thirty teams and within each franchise. Given the wide-ranging menu of prices, there is not a restriction of output and thus there is not the usual welfare loss or deadweight loss associated with single-price monopoly pricing. In fact, welfare is increased by price discrimination.

Price discrimination is an attempt to capture consumer surplus, but also satisfy demand by those whose willingness to pay is less than the “one-price” optimal level. Teams utilize and accentuate the notion that sitting closer to the field provides a higher quality experience, by charging different

prices. Part of the price difference is the quality difference and part of it is price discrimination (or as Tirole labeled it, quality discrimination).

Price discrimination of this nature, focused on differing degrees of quality, bundled goods, volume discounts, and other forms of second-degree price discrimination, is commonplace in MLB. Indeed, it is safe to say that every single MLB ticket is sold under some form of price discrimination. As teams grow increasingly sophisticated in their pricing strategies, price discrimination is becoming more precise, more wide-spread, and more profitable, while at the same time providing for more opportunities for more fans to find tickets at a price they are willing to pay. Unlike a baseball game, where one team must lose and one must win, price discrimination allows for win-win economic outcomes for teams and fans alike.

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Figure 1. Taxonomy of Price Discrimination in Baseball

Level of Discrimination	Concept	Examples
First-Degree Price Discrimination	Charging each consumer his/her true reservation price	Mostly theoretical. Well-designed auctions can approximate first-degree price discrimination
Second-Degree Price Discrimination	Offering a menu of options and letting consumers self-select based on their preferences	Volume Discounts <i>Family Plans</i> <i>Group Plans</i>
		Bundled Pricing <i>Season Tickets</i> <i>Mini-Plans</i> <i>All-You-Can-Eat</i> <i>Non-Price Promotions (e.g., Bat Day)</i>
		Two-Part Tariffs <i>Purchasing a Ticket then Concessions</i> <i>PSLs</i>
		Quality Discrimination <i>Multi-tier Pricing</i> <i>Variable Pricing</i> <i>Dynamic Pricing</i> <i>Secondary (Resale) Markets*</i>
Third-Degree Price Discrimination	Offering a menu of options but requiring proof of membership to access desirable pricing	Discounts to identifiable groups <i>Senior Discounts</i> <i>Youth & Student Discounts</i> <i>Military Discounts</i>

**Secondary Markets are a form of second-degree price discrimination and they also make other forms of price discrimination work more efficiently.*

Figure 2. All-You-Can-Eat Tickets in MLB

Team	Seats	Ticket Price	Package Price	Difference (in \$)	Difference (in %)
Atlanta Braves	1,000	\$12	\$30	\$18	150%
Atlanta Braves	200	\$32	\$60	\$28	88%
St. Louis Cardinals	2,010	N/A	N/A	N/A	N/A
Kansas City Royals	400	\$22	\$35	\$13	59%
Los Angeles Dodgers	N/A	\$7	\$35	\$28	400%
Baltimore Orioles	800	\$25	\$40	\$15	60%
Texas Rangers	450	\$23	\$29	\$6	26%
<i>Average</i>	810	\$20	\$38	\$18	130%
<i>Weighted Average</i>					76%
<i>Median</i>	625	\$23	\$35	\$17	74%

Note: the weighted average is weighted by the number of seats, so it does not include the Cardinals or Dodgers.

Figure 3. An Example of Variable Ticket Pricing

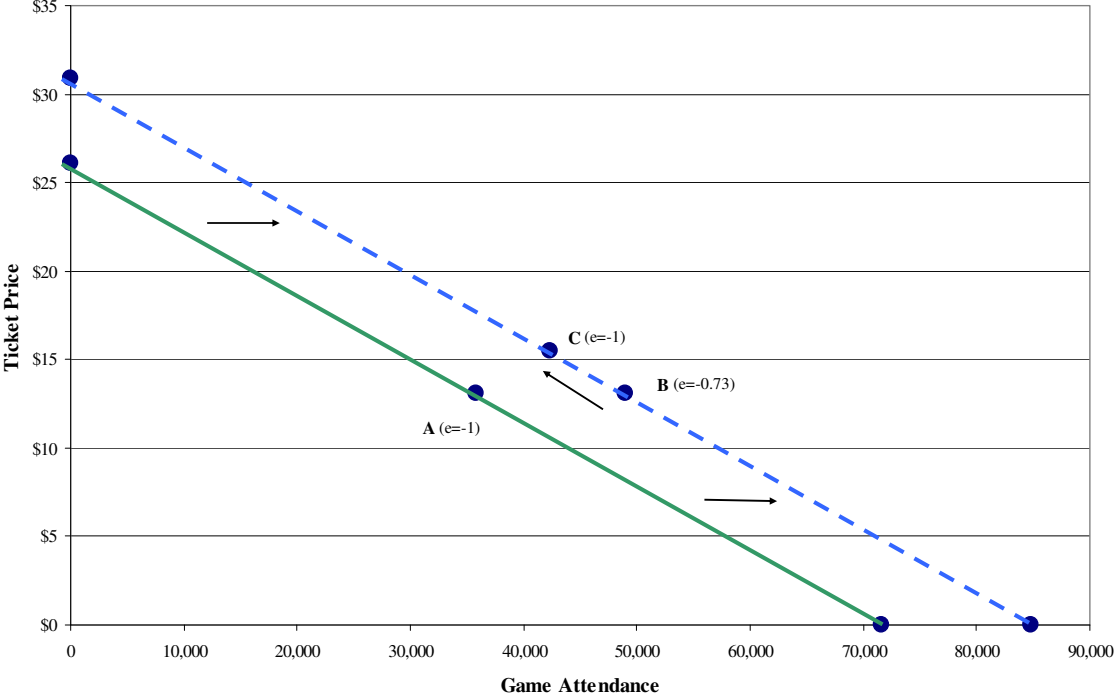


Figure 4. Third-Degree Price Discrimination – Student Discounts

