

Svoboda, František

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Searching for Ideal Price Discrimination in the History of Opera: Lottery as a Way to Get a Consumer Surplus

František Svoboda / fsvoboda@mail.muni.cz

Department of Musicology, Faculty of Arts, Masaryk University, Brno, CZ

Abstract

The present paper discusses a hypothetical but markedly interesting and effective form of price discrimination stemming from the evolution of opera as a distinctive cultural subdomain. The first chapters of the text describe in detail the origins of the *genre* and *institution*, characterising concurrently the genesis of partial price discrimination measures to yield the maximum consumer surplus possible. Opera apparently epitomises a prime example illustrating the business model based on price discrimination: unlike, for instance, drama as another category of theatrical entertainment, opera has always been accompanied by high costs, and effectively implemented price discrimination thus became a vital component of the relevant economic framework. The second section of the article then proposes a theoretical concept that exploits the individual discrimination methods applied within opera and that, using the lottery principle, exhibits a potential to acquire full consumer surplus.

Keywords

price discrimination, consumer surplus, opera history

Since its principal stages, opera has embodied a genuinely costly manner of diversion, with enormous expenses attributed to already the first performances conceived in the papal Rome of the mid-16th century. The costs, however, were covered by affluent patrons from within papal circles, serving as an instrument to confirm the maecenases' social roles and statuses. In this context, the admission, being another factor to underline the patron's prestige, was free but available only to invited guests. Importantly, the high expenditures did not constitute an obstacle to the shows; rather than that, the overall investment symbolised the representative character of the events and the social significance of the hosts. The problem of operational costs, associated with the search for balanced market prices, came to be analysed only in Venice, whose opera houses were the first ones to function upon market principles in a competitive environment, making them pursue innovation and cost reduction. Yet profit could not be guaranteed, and the settlement of emerged operating deficits remained a responsibility of opera house shareholders; thus, from the very beginning, the solution to opera-related economic questions consisted in various systems of price discrimination.

The evolution of opera and the related entrepreneurial domain

Lorenzo Bianconi and Thomas Walker¹ define **three practical models** that stood at the cradle of opera as an eminent art form; these models differ according to whether the actual operating modes were to be permanent or occasional and whether admission fees applied or not.

The first of the variants, a patronage-based one, accompanied the formation of opera as a genre. In Rome under Pope Urban VIII of the Barberini family, the Pope's nephews Cardinals Francesco and Antonio Barberini organised initial opera performances occasionally, on a shock basis, but repeatedly, with carnivals providing the most convenient opportunities to stage such events. An *arena* to hold an audience of 4,000 was erected at the Four Fountains Palace² for Gianlorenzo Bernini and associated scenographers to create sophisticated spectacles incorporating stunning theatrical effects. The most widely known and best described performance of the era was *Chi soffre, spera* released in 1637. The libretto was authored by Giulio Rospigliosi, the later Pope Clement IX, and the music embodied the creative efforts of Virgilio Mazocchi and Marco Marazzoli.³ The stage design was then formed through the abilities of the well-renowned architect Gianlorenzo

1 BIANCONI, Lorenzo – WALKER, Thomas. Production, consumption and political function of seventeenth-century opera. *Early Music History*, 1984, no. 4, p. 209–296.

2 PRUNIÈRES, Henry – NORTON, Herter M. D. Opera in Venice in the XVIIth Century. *The Musical Quarterly*, 1931, Vol. 17, No. 1, p. 7.

3 BIANCONI, Lorenzo – WALKER, Thomas, op. cit., p. 216.

Bernini, whose use of theatre space eventually found application in multiple works of art, such as the Ecstasy of Saint Theresa.⁴

The given type of private patronage, above all, represented the family and expressed its attitudes to both culture and the audience invited. The operas performed in Rome and produced by the Barberini family invariably constituted very exclusive, costly shows, albeit not even the prime House of the papal Rome of that time lacked the effort to cut its expenses where possible, especially as regards negotiations with contractors. (It is not without interest that Roman opera production accounts exhibit repeatedly granted substantial charge deductions, ranging between 15 and 40%; an average discount of 33% was obtainable on both work performed and materials used. Such a scheme then may express an excess of supply over demand in luxury goods. Importantly, we are nevertheless left with the open question of whether the outlined practices were common only in Rome or constituted a general, standard procedure within the dealings between a contracted artist and an influential client.)⁵ Despite such an approach, however, entrance fees were not levied, and only invited attendees, including primarily Rome's aristocracy and ambassadors, could be admitted. But the overall count of the audience in an event oscillated around 3,500 persons, and it is thus not surprising that such a crowd eventually comprised also people of lesser means, or 'di minor conto'.⁶

The total cost of the four productions of *Chi soffre, spera* amounted to 3,668 scudi (an equivalent of approximately 33,000 Venetian lire), of which the most prominent single item incorporated lighting expenses. These corresponded to 683 scudi worth of candles; other major expenses arose from the scene design (580 scudi), costumes and accessories (over 500 scudi), wood (500 scudi), music copying (142 scudi), and orchestra wages (123 scudi, for an ensemble markedly larger than its Venetian counterparts established in the later years). Wages did not exceed 1/3 of the costs, although the funds necessary for the very preparation and rehearsing far surpassed those common in that period. The rehearsals lasted more than a month, and the singers were accompanied by a paid lutanist.⁷

The second functional model, which, unarguably, made opera a much celebrated diversion available to a significantly broader set of social strata, gradually developed in Venice. Unlike the opera of Rome, the Venice variant embodied more of a business-based than a social concept, meaning that already its initial phases witnessed certain methods of price discrimination to ensure profit or, in the least, the basic recovery of investment for private shareholders. Institutionally, the opera of Venice followed on from the theatrical patronage of the city's patricians, who had theatres put up on their lands to stage comedies or tragedies during carnivals. An essential innovative step that facilitated price discrimination was taken around the year 1580. At the time, two new theatre buildings appeared in Venice to accommodate *commedia dell'arte*, and their architectural layout introduced a major novelty to the existing practice: boxes, or loges,

4 GARDNER, Helen – TANSEY, Richard G. – KLEINER, Fred S.. *Gardner's Art Through the Ages*. Belmont, CA: Thomson Wadsworth, 2006, p. 523.

5 BIANCONI, Lorenzo – WALKER, Thomas, op. cit., p. 217.

6 Ibid., p. 220.

7 Ibid., p. 218 a 235.

to be hired out to the public. Several storeys of such boxes then formed separate, private rooms, where the (usually patrician) subscribers regularly settled to watch the performances. This type of theatre, profoundly different from the style applied by Andrea Palladio in designing the Teatro Olimpico of Vicenza, gradually came to be adopted as the prototype of opera houses, substantially improving their budgets via price discrimination to stratify the space available through the high-priced boxes and the economical stalls or parterres. Such an arrangement soon began to spread across Europe, riding the wave of the success of the 17th century Italian opera.⁸

Venetian opera also laid the foundation of the common economic structure of opera houses, especially through the activity of the modified *Compagnie della Calza*, associations of young noblemen established already in the 15th century to organise and fund theatre pieces for carnivals or other social occasions, such as the welcoming ceremonies for princes or ambassadors; triumphal entries; and weddings.⁹ The original multi-shareholder corporations supporting culture were newly completed with managers, or impresarios, to satisfy the specific requirements of the operatic realm; their responsibilities involved supervising the production, hiring the artists, and making business and art-related decision.¹⁰ At the fundamental stages, the opera greatly benefited from a large and easily accessible reservoir of well-trained Venetian singers and musicians; before the actual beginnings of the genre in Venice, the city's musical life oscillated around the outstanding Saint Mark's Basilica, the central church of the Doges (The quality of the choirs soared after Claude Monteverdi had relocated to Saint Mark's, ensuring that no less than 30 singers and 20 musicians perform on various festive occasions.¹¹ The singers of St. Mark's nevertheless jointly frequented also other churches and private homes, and a similar association was forged by the musicians. At the Basilica, singers were directed by the vice-chapelmaster; outside the home church, however, the singers would perform freely, choosing a representative from among their number to negotiate contracts or engagements. The repertoire thus contained devotional motets and amorous madrigals alongside to comply with the client's wishes.¹² Such a concentration of talent, together with the freedom to offer services outside the long-term engagement, then nurtured the fast-growing roots of the opera, which eventually built upon temporary contracts with various singers and musicians; these artists were relatively abundant and enjoyed the advantage of not being obliged to a single employer. The well-available theatrical spaces, good organisational structures, sufficient amount of highly skilled professionals, intensive effective demand during carnivals, and smoothly accessible capital – remarkably, the growing rates of private investment in the operatic domain correspond to the business opportunities lost from the end of the 16th century in both spice trade and the

8 MUIR, Edward. Why Venice? Venetian Society and the Success of Early Opera. *Journal of Interdisciplinary History*, 2006, Vol. 36, No. 3, p. 335.

9 Ibid., p. 334.

10 GLIXON, Beth L. – GLIXON, Jonathan E. *Inventing the Business of Opera: The Impresario and His World in Seventeenth-Century Venice*. Oxford University Press, 2005, p. 4.

11 PRUNIÈRES, Henry – NORTON, Herter M. D., op. cit., p. 3.

12 Ibid., p. 3.

profitable markets of the German states.¹³ All the factors combined favourably to foster the successful development of opera at the lagoons.

The Roman concept of the genre was brought to Venice from the Eternal City in 1637 by two composers and librettists, Francesco Manelli and Benedetto Ferrari, who, in conjunction with a group of singers, were leased the Teatro San Cassiano to open a public opera house. At the time, this entrepreneurial move involved major risk as opera was considered courtly entertainment, and its conversion to a pastime for the masses seemed unfeasible.¹⁴ In the winter season of 1637, the ensemble premiered *L' Andromeda*, an opera featuring Ferrari's libretto and Manelli's music. Benedetto Ferrari had hired the building at his own cost and, analogously, used his savings to support the production of *L' Andromeda*. The collective of actors were transferred from Rome to be complemented with the singers and musicians of St. Mark's.¹⁵ The opera exploited the approach of the Rome school, inclusive of the complex structuring, draperies, and scenic effects, and proved an immense success; apparently, it also ended in profit, due in part to the fact that Manelli and Ferrari adjusted the performances to fit the more modest possibilities of Venice. As the authors thus avoided the necessity to please a demanding audience accustomed to grandiose Roman-style productions with 60 – 80 musicians and countless singers,¹⁶ they retained the ability to employ only minimal musical accompaniment, and such a model quickly became favoured also in other regions of the peninsula.¹⁷ In the following half a century, the orchestral minimum, which also markedly reduced the wage costs, comprised two harpsichords, a dozen or less string instruments, and two trumpets to accompany overtures and scenes of war or triumph. Another aspect to positively contribute to the overall cost reduction then rested in the fact that the 12 characters could be sung by a mere 7 singers, including Manelli, whose outstanding bass enabled him to play both Neptune and Astarco the wizard.

It can be assumed that the venturesome business plan ultimately produced the desired outcome because a further opera was introduced in the following season. Ferrari funded the production again, yet this time he had won the support of 5 or 6 other singers, who invested their money in the expectation of profit. By 1639, the third year of the enterprise, three opera stages had been established, and as early as 1678 carnival visitors could relish 150 performances offered at nine opera houses.¹⁸ Thus, opera progressively grew to constitute the central art form in Venice, constantly refreshed through competition between the theatres and benefiting from a wide selection of librettists, composers, and singers; the genre has its stars, subscribers, sold-out shows, and cultural tourism appeal that attracted guests intent solely on seeing a piece.¹⁹ The escalated pace of

13 MUIR, Edward, op. cit., p. 352.

14 PRUNIÈRES, Henry – NORTON, Herter M. D., op. cit., p. 6.

15 BUELOW, George J. *A History of Baroque Music*. Bloomington: Indiana University Press, 2004, p. 82.

16 PRUNIÈRES, Henry – NORTON, Herter M. D., op. cit., p. 7.

17 BIANCONI, Lorenzo – WALKER, Thomas, op. cit., p. 235.

18 BUELOW, George J., op. cit., p. 83.

19 MUIR, Edward, op. cit., p. 347.

production, together with the resulting standardization, left the same imprint on the history of art and artistic output as the first assembly line in the Venetian Arsenal did on the history of management.²⁰

Venetian audiences differed from those of Rome. While the latter normally comprised invited members of the upper classes, admitted free of charge and applauding out of sheer politeness, the former included almost exclusively paying attenders, namely, somewhat less well situated citizens that “had paid admission for the right to see and judge freely“. The parterre seats or standing spots were left unnumbered, placing early comers at an advantage, and the most sought-after places invariably turned into locations of “real battling“.²¹ Interestingly, anyone intending to read the libretto needed to buy a small candle as the auditorium was poorly lit and then kept utterly dark during the actual performance.

In 1659, twenty years after opera had firmly rooted in the Venetian cultural milieu as a distinguished institution *sui generis*, the Teatro San Cassiano presented *Antioco*, an opera whose production and funding were recorded in multiple sources, including the account book belonging to Marco Faustini, a non-aristocratic leaseholder of the theatre, an impresario, and a co-founder of the opera company. The *Compagnia* came into existence on 5 May 1657, joining together four members, each of whom obliged himself to supply the venture with 200 ducats a year. Considering that the annual rent of the Tron family’s Teatro San Cassiano amounted to 800 ducats (One Venetian Ducat equalled 6.4 Venetian lira), the principal deposit was probably derived from the essential prerequisite of securing – regardless of the character and results of a given season – a stable operational background for the opera (notably, a theatre owner was the sole participant in the entire opera business mechanism who effectively could not lose his asset, bearing zero entrepreneurial risk.²² Three out of the four investors undertook to cover any operating debt, a fact suggesting that funding the opera ceased to be automatically regarded as profitable and the risk of potential loss was envisaged; however, the related reputation, enjoyment of being entertained, and achievable benefits still invited men of action to enter the business (towards the end of the 17th century, the fundamental scheme with stakeholders (caratadori) investing in opera to gain profit from a successful season had already spread across the diverse Italian states, not least because of the comparatively low losses incurable in cases of commercial flop).²³

Marco Faustini was leased the boxes and the resulting revenue. Separating the chapter of boxes from other receipts apparently embodied a common accounting procedure to guarantee working capital to the impresario.²⁴ In the Teatro Sant’Aponal, the rent per

20 MARTIN, John. *Organizational behavior and management*. London: Thomson Learning, 2005, p. 45–46.

21 PRUNIÈRES, Henry – NORTON, Herter M. D., op. cit. p. 8.

22 GLIXON, Beth L. – GLIXON, Jonathan E. op. cit., p. 4.

23 Ibid., p. 11.

24 This particular division of the proceeds apparently originated from an older tradition of double rent in theatres, a scenario where the building owner could either hire the entire house out to the venturers interested for a fixed price, as was the case with Faustini’s group, or retain the loge rental revenues to let the production company extract the regular income associated with the theatre admission fees and the sale of parterre

one of the 48 boxes equalled 20 ducats, whereas that for the entire house reached only 60 ducats; the Teatro San Cassiano, with assumed 98 boxes in the year 1657, applied the fee of 25 ducats per loge hired out. If, as indicated above, the yearly rental price of 800 ducats for the theatre was paid out of the basic deposits made by the co-partners within the *Compagnia*, the impresario could thus spend up to 2,450 ducats (or 15,680 Venetian lire, VI) on producing a piece, which, moreover, yielded further, continuous proceeds from ticket sales.²⁵ The box lease merely provided for seat or stall reservation; analogously, booking a place to sit, or a *scagno*, in the parterre cost 1.6 VI. The box leaseholders, their guests, and parterre ticket holders all nevertheless had to pay another admission fee, referred to as *bollettini* and usually amounting to 4 VI. Each spectator therefore paid twice – once for entering the theatre, and once for taking a seat.²⁶

In the carnival season between 25 January and 24 February 1657, *Antioco* was staged twenty-four times and remained the only opera performed in the Teatro San Cassiano that year, despite the fact that the opera houses of Venice regularly presented two pieces a season. The production costs totalled 37,111.15 Venetian lire (equalling approximately 5,985 ducats), with almost a half of the sum spent on the musicians' wages and about a fourth allocated towards paying the top singers visiting from Milan, Turin, and Rome (such costs were nevertheless partly covered by private donors; for instance, the noblemen Antonio Mocenigo and Angelo Moresini undertook to supply a whole 560 out of the 2,240 Venetian lire paid to the singer G. A. Cavagna.²⁷ The remaining expenses related to setting the stage (2,666 lire), completing the costumes (3,025 lire), and other operational procedures, including, above all, the lighting with candles (1,920 lire)).

The opera performances generated a deficit of no less than 8,388 Venetian lire, coverable from the income amassed via hiring out the boxes (10,230 VI at the most, after deducting the house rentals). Evaluating the data contained in the account book, Bianconi and Walker presume, likely correctly, that the opera of Venice was not particularly profitable, despite the common belief; from such a perspective, the stagings could then easily be interpreted in the sense of a diversion supported especially by the patricians for their own cultural or social benefit (Two thirds of the opera goers were box holders and their guests or entourage, namely, the higher classes; people of lower status then formed the rest, gathering in the parterre. The price for the cheapest pair of tickets, *bollettino* + *scagno*, amounted to 5.6 Venetian lire, a sum slightly higher than the daily wage of a workman). Whereas Roman opera exploited in full the generous funds of affluent patrons, the Venetian pattern, based on the underlying framework of a commercial republic

tickets (PRUNIÈRES, Henry – NORTON, Herter M. D., op. cit. p. 6). The economy of the loges separated from the other accounting items is traceable also in the 18th century London opera (GIBSON, Elizabeth. *op. cit.*, p. 51). Generally, however, such a procedure was more convenient for genuine theatres, whose overall costs scarcely soared as high as those of operas; in the latter category of entertainment, the material expenses (costumes and scenery) and labour costs, especially as regards the pay for the librettist, composer, musicians, dancers, and extras, markedly surpassed the levels common in the former. (GLIXON, Beth L. – GLIXON, Jonathan E. op. cit., p. 3).

25 BIANCONI, Lorenzo – WALKER, Thomas, op. cit., p. 223.

26 *Ibid.*, p. 225.

27 *Ibid.*, p. 224.

widely experienced in running or hosting joint-stock companies to conduct seaborne trade, relied on shared capital; accordingly, opera in Venice (and later elsewhere across the peninsula or, for instance, in London) embodied an institution definable as “non-profit business investment”.²⁸ To conclude our discussion of the second model, we can thus propose that although property owners regularly allowed new theatre houses to be built, impresarios or shareholders invested their capital in novel productions, and librettists, composers, musicians, and singers received their engagements, being active within the field was apparently very problematic in terms of achievable profit. The assertion is evidenced by several corresponding processes, such as the distinctive series of commercial failures within London opera throughout the 18th century.²⁹

The third working approach is illustrated by the example of the city of Reggio Emilia, with the relevant description dating back to 1683. In this case, the short opera seasons were always scheduled for the first days of May to coincide with the spring markets, utilising the associated influx of potential spectators (similarly to Venice, where the *festival* visitors were targeted for the given purpose); moreover, such timing enabled the organisers to bring in singers from the Venetian scene, whose performing period had already ended, and to borrow the wardrobe. In the *Reggio* area, opera had been staged occasionally since 1668, and the irregular productions exploited a very simple form of franchising, namely, a complete piece shown during the relevant season was purchased from a Venetian house. Characteristically, the productions of 1683 commenced with a trip to Venice, where, at the end of the season, the Reggio city representatives made a successful attempt to purchase the libretto and music of one of the praised performances shown that year; the piece thus obtained was the season’s first opera, presented in the Teatro San Cassiano.

The production required the investment of 18,707 Modena lire (MI), of which almost one half, or 8,828 MI, went to the singers; two of their choir had sung the entire season in Venice³⁰ before joining the Reggio cycle. The revenue from the boxes was largely consumed by the rental, construction, and maintenance of the theatre, as in Venice. Even though the noble families hiring the loges routinely paid for the service, the individual boxes were assigned by drawing lots – a procedure that might have had substantial consequences regarding the degrees of price discrimination. The problem will be further analysed within the final chapters of the paper. At this point, let us continue the discussion by noting that, in addition to the scheme just indicated, Reggio opera managers

28 MUIR, Edward, op. cit., p. 332.

29 MILHOUS, Judith. *Opera Finances in London, 1674-1738*. *Journal of the American Musicological Society*, 1984, Vol. 37, No. 3, p. 567-592 or GIBSON, Elizabeth. *Italian Opera in London, 1750-1775: Management and Finances*. *Early Music*, 1990, Vol. 18, No. 1, p. 47-59.

30 The material costs, inclusive of the costumes borrowed, reached 6,215 Modena lire (MI), and the wages totalled 3,360 MI. Considerable savings were achieved in the chapter of mechanical and special effects as the former had not been assumed for the plot and the latter comprised only a fire to conclude the second act. The orchestra, larger than those of Rome or Venice, constituted a full-scale body of two harpsichords, a theorbo, five violins, three violas, a cello and a contrabass; here, the collective pay amounted to 774 MI, out of which 306 MI altogether went to the outstanding trumpeters of the ducal court of Modena. (BIANCONI, Lorenzo – WALKER, Thomas, op. cit., p. 232-235).

applied also time-based price discrimination. The admission tickets, or bollettini, sold at prices progressively decreasing between the opening and the closing appearances: the first three out of the seven shows were offered for 6 MI each, with the remaining four respectively priced at 4 MI, 3.1 MI, 3.5 MI, and 1.1 MI. Such values definitely could not be labelled as popular, especially if the cheapest voucher represented the daily wages of a tailor.³¹

After deducting patron donations from the actual receipts, we can claim that the Reggio opera production of 1683 incurred a deficit of 4,644 Modena lire, amounting to approximately 23% of the total costs; however, the data related to the boxes are not considered, primarily due to their questionable availability. Importantly in this context, the patronage of the venture was assumed by the Duke of Modena, and therefore the sponsor's office also most likely acted as the last resort to cover the liabilities.

By final definition, revisiting the principles and features of all the central schemes outlined above, the Roman concept thoroughly stemmed from patronage, and its very costly productions eliminating admission fees constituted a token of cultural, social, and political prestige. Contrary to this, the Venetian model was an entrepreneurial one, building on the efforts of the impresario, or the organising spirit behind the curtain. However, not even such a pattern, openly exposed to market competition, was devoid of the at least occasional support of patrons; besides, and perhaps more significantly with respect to the underlying economic principles, promoting opera at the lagoon also necessitated high-risk investment embodied in the capital base to fund the *compagnia*.³² The Reggio Emilia model is then synonymous with a mixed approach relying on an influential benefactor to contribute his authority, financial backing, and willingness to cover possible deficits. Importantly, the regions of Europe where, in the years to come, opera began to thrive as a privately held business, adopted the basic price discrimination methods shaped in Venice and Reggio.

Price discrimination methods and the volume of consumer surplus in opera

The common price discrimination formula proposes that a seller “*discriminates when he sells two identical units of goods at different prices, either to two different buyers or to the same customer*“.³³ In the context of our topic, the central question consists in whether the sale of opera tickets falls within such discrimination. One of the most prominent arguments towards a positive answer is that the tickets are sold for an opera staging, meaning that the service provided rests in the actual theatrical performance, which satisfies the definition of an *identical service*. The seats and their varying prices thus only indicate and value

31 BIANCONI, Lorenzo – WALKER, Thomas, op. cit., p. 233.

32 Ibid., p. 234.

33 MIRAVETE, Eugenio J. *Price discrimination (theory)*. In *The New Palgrave Dictionary of Economics*, Durlauf, and Steven N., Blume, Lawrence E. ed. London: Palgrave Macmillan, 2008, p. 626.

the readiness of diverse customers to pay differently for the given identical service, epitomising the market segmentation of opera-goers, who pay variously to gain admission to the same piece. Although such an assertion could be contradicted by emphasising the fact that each visitor occupies a seat having characteristics different from those of the others, and therefore the discussed product is inhomogeneous, this interpretation lacks consistency with competing analyses of price discrimination, which usually neglect similar small benefit alterations.³⁴ The fundamental question can then indeed be answered positively: the sale of opera tickets is conducted within the boundaries of price discrimination and exhibits distinctive aspects of the strategy.

The individual forms of price discrimination are mostly classified via Pigou's taxonomy, which stratifies the process into three degrees³⁵ based on the relation between the monopolistic seller and the particular buyer and considering the availability of information on the demand prices attributable to each buyer. Interestingly, Pigou's taxonomy of price discrimination regularly leads economists astray, making them ponder on the rate of obtainability of data on the individual reservation price or distribution of consumers' valuation or optimal pricing.³⁶ Thus, the practical approach appears to function in a markedly more convenient manner here: a large number of fields and sectors exhibit low market segmentation costs because the prices in the concrete individual segments differ in the long-term perspective and the sellers can make do with monitoring minor demand fluctuations within these segments. A typical example of the attitude lies in opera, but other sectors are easily associable with it too; their set comprises fields where the information on the specific pricing and/or distribution of consumers' valuation is acquired simply through quantity changes in the individual market segments at price variation. Price discrimination, connected with market segmentation,³⁷ embodies a long-term process to change market environment rather than a one-shot business affair, and Pigou's classification thus does not seem to be pragmatic.

An alternative to the taxonomy can be found in stratifying price discrimination not according to the amount of information available to the seller but based on the man-

34 The price for an Uber car ride will vary according to the comfort guaranteed by the vehicle; the more costly hardback book will provide a utility value identical with that of the less expensive paperback; a business class flight ticket will offer considerable luxury while taking the passenger to the same destination as an economy class ticket. All the examples of a single service containing minor utility differences are nevertheless considered and examined as standard forms of price discrimination (cf. CLERIDES, Sofronis K. *Book Value: Intertemporal Pricing and Quality Discrimination in the U.S. Market for Books*. *International Journal of Industrial Organization*, 2002, Vol. 20, No. 10, p. 1385–1408; STAVINS, Joanna. Price discrimination in the airline market: the effect of market concentration. *The Review of Economics and Statistics*, 2001, Vol. 83, No. 1, p. 200–202; or GILLEN, David and Tim HAZLEDINE. *The New Price Discrimination and Pricing in Airline Markets: Implications for Competition and Antitrust*. Working paper for XIV Pan-American Conference of Traffic & Transportation Engineering, 2010).

35 PIGOU, Arthur C. *Economics of welfare*. London: MacMillan and Co., 1920, p. 243–244.

36 BERGEMANN, Dirk – BROOKS, Benjamin – MORRIS, Stephen. The limits of price discrimination. *American Economic Review*, 2015, Vol. 105, No. 3, p. 921–957.

37 At this point, we could pose the question of whether price discrimination and market segmentation actually constitute more than two sides of the same coin; to simplify the discussion, the problem will nevertheless be left unopened.

ner in which he acquires such data from the market, namely, according to the practical implementation of the strategy. Price discrimination will then include several subsets: *the spatial* (to illustrate this subset, let us consider seats in an opera auditorium or Formula GP platforms), *intertemporal* (exemplifiable by the admission charges in Walt Disney theme parks), *functional* (functional discrimination, namely, the approach to discriminate via modest adjustment of the functions, can be considered price discrimination only if a completely homogeneous product is not necessarily required. In the literature, however, a market segmentation scenario where minimal changes to the product cause major price variations is regularly included within price discrimination (in relation to diverse processes and cases, such as hardback and softback books³⁸), and *consumer groups* (corporations may decide to give advantages to certain consumer groups; these are prominently represented by students, who enjoy specific concessions) and *their combinations* (for example, intertemporal and spatial discriminations are applied concurrently in multiple schemes: a Formula 1 GP ticket for all segments of all stands is obtainable at a lower cost if purchased well in advance).

The realm of opera has traditionally been dominated by the spatial and intertemporal subsets as typical representatives of the concept. The historical roots of the former are closely bound with Venice; the city's playhouses introduced spatial discrimination, dividing their auditoria into differently priced sectors, with the loges on hire being substantially more expensive for the occupiers than the unreservable parterre benches. Such a simple differentiation gradually spread to other parts of the country and beyond, and current opera-goers already enjoy auditoria which comprise multiple diverse zones. Thus, for example, the six basic spatial sections inside the Royal Opera House of London are split further to include smaller blocks characterised by highly varied values at 14 price levels.

In light of the above scenario, we can then point out again that, in the first decades of the genre, the Venetian entrepreneurs distributed the effective demand into merely two segments, rendering the potential to yield most of the consumer surplus lower than it could have been otherwise. As the time advanced, however, the spatial approach grew in popularity to progressively intensify the segmentation of auditoria: Referring back to the Royal Opera House, fourteen price levels clearly exhibit the potential to win an essential portion of the consumer surplus, and this condition will be illustrated in the case below.

Let us assume for simplicity that each seat is assigned certain financial worth, or a customer's threshold price; that no two prices are the same; that the seats can be arranged in dependence on quality from the most expensive to the cheapest ones; that the price differences are uniform; and that the cost variances between the seats, due to factors such as the acoustics or good visibility of and distance from the stage, remain minimal. Having formed the premise, we can establish the set of decreasing subjective appraisals (or a demand curve) following an opera performance. If the prices are fixed in a Pareto-effective manner, namely, we have a sold-out auditorium, where any rise in the price of a seat would cause the room to be partly unoccupied, then complete price discrimination

38 CLERIDES, Sofronis, op. cit.

has been accomplished, and we acquire full consumer surplus. An identical result is obtained even when the auditorium thus sectioned is further partitioned into segments, with the price of a seat determined to be the average cost of a seat in a given segment. In practice, however, full consumer surplus will not be obtainable on such an ideal basis, because if the cost of a seat indeed expresses the buyer's threshold price, nobody will pay an amount higher than his or her threshold price. A feasible solution then consists in the opera house setting the ticket price in a given segment to the lowest seat value, $p_{1min} \dots p_{14min}$, enabling all admission payers in that segment to hold a better (and more expensive) seat. The segment will be sold out, but a portion of the consumer surplus vanishes (see Fig. 1)

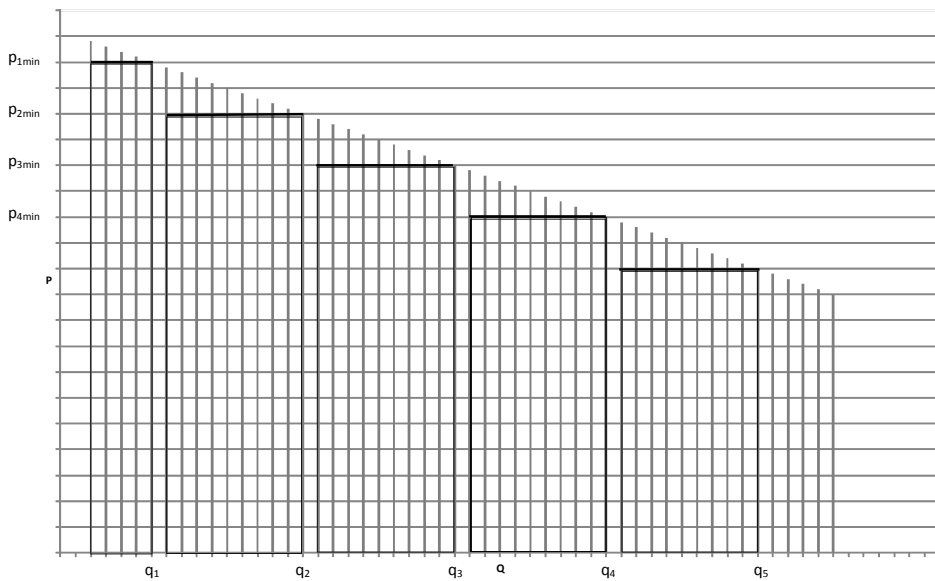


Fig. 1 Decreasing prices of seats and their segmentation

If the hypothesised assignment of a price to each individual seat is considered excessively strong and unrealistic, we can attain the same set of decreasing subjective appraisals, or a demand curve, differently. Suppose that an opera theatre (the Royal Opera House, for instance) has configured its auditorium to include 14 blocks of variously priced seats; that all the blocks have been sold out; and that any price increase would prevent the blocks from being sold out completely. These fourteen units combining the realised number of seats, $n_1 \dots n_{14}$, and prices, $p_1 \dots p_{14}$, yielding the total revenue Y , can be theoretically unfragmented into n units which reflect the quantity of seats in the entire auditorium and are assigned the decreasing hypothetical seat prices, p_s , in such a manner that the total revenue Y from the sold-out auditorium will not change. Unfrag-

menting the real prices and receipts will also facilitate the formation of a set of hypothetical subjective appraisals (or a demand curve) usable for deriving the real demand curve, as in the above assumption; the derivation conditions are nevertheless closer to the real-world framework. In view of the fact that the price within the segment has again been modelled on the cheapest seat, $p_{1\min} \dots p_{14\min}$, a part of the consumer surplus will not materialise.

Having thus created an aggregate of decreasing subjective appraisals, or a demand curve, where we could expend a portion of the consumer surplus, we can proceed further to put the question of whether there exists a potential to acquire the remaining consumer surplus or even the consumer surplus above the demand curve.

The corresponding answer can be retrieved from the ticket sales system of Reggio Emilia, in which the intertemporal type of price discrimination complements the spatial subset and both are uniquely combined with lottery, supplying price discrimination with novel capacities.

Interestingly, intertemporal discrimination arose from social conventions: the much sought-after and conventionally prestigious premieres were almost six times more expensive than the last – and cheapest – performances, appealing primarily to price-sensitive consumers. The original, two-segment price discrimination was expanded with intertemporal segmentation in four timespans to shape substantially more precise price discrimination, especially if compared to the Venetian model.

Yet a markedly wider breakthrough came only later with the use of lottery. At the time, during the 16th and 17th centuries, this principle was commonly interconnected with art in countries such as the Netherlands, where lotteries epitomised one of the regular ways for an artist to sell his paintings.³⁹ The inclusion of lottery brought about a major shift in sales logic, offering possibilities otherwise absent in the standard presumptions of sale and purchase.

Let us suppose an opera theatre that materialises a partial consumer surplus by means of segmenting the auditorium. Further, assume that the seats can be arranged according to their quality, from the best to the worst ones. These seats, thus classified via the cardinalist approach, are then subdivided into multiple segments (again referring to the fourteen sectors of the Royal Opera House as an example). The theatre may decide to join two segments into one, and the individual seats will not be sold to buyers but randomly assigned within the united segment at the given price. The customers thus participate in a lottery game, winning seats of differing characteristics, good or worse, within the integrated segment. At this moment, the total price set for this segment constitutes a very important aspect. Assuming that each seat has its own worth, p_n , we can calculate the average cost in the relevant block, $p_a = \sum p_n / n$; the resulting amount is, on the condition of regular intervals between the prices of the individual seats, identical with the price of the more expensive of the segments, p_{\min} . Theoretically – if the prices within the respective associated blocks are set to the above-mentioned average, namely, the sum of the individual different seat prices equals the product of the number of seats

39 ROMEI, Ed, and Gerbrand KOREVAAR. Dutch Guilds and the Threat of Public Sale, In *Mapping Markets for Paintings in Europe 1450–1750*, Marchi, Neil de – Miegroet, Hans J. van (eds). Turnhout, 2006, p. 175.

and the pre-defined average price in the given sections of the auditorium, $\sum p_n = p_a \times n$ – the theatre will extract the full consumer surplus (Fig. 2).

A crucial problem nevertheless lies in whether the buyers will be willing to engage in such a process. Those of the more costly segment would, at the price they would have normally paid to that moment for the certainty of occupying a good seat, purchase a mere lottery ticket with equivalent chances of winning an acceptable or an inferior seat. But as no alternative scenario is available, they will take part in the game, paying for the ticket – also due to very small, neglectable differences in the pricing and quality of seats located inside the neighbouring segments. Additionally, as already noted, the seats and their varied worth only indicate and appraise the willingness of diverse buyers to pay differently for an identical service, one and the same opera performance. An opera-lover wishes to be sure that they will attend the staging, and the nominal cost will remain the same for them. Buyers interested in the less expensive segment, however, face a somewhat dissimilar situation: Although they need to pay a price in excess of their threshold, the system is a lottery, with a surcharge $(p_{1min} - p_{2min})$ enabling these customers to purchase a chance to gain a seat in the upper segment. Such a chance then justifies the modestly higher price applied.

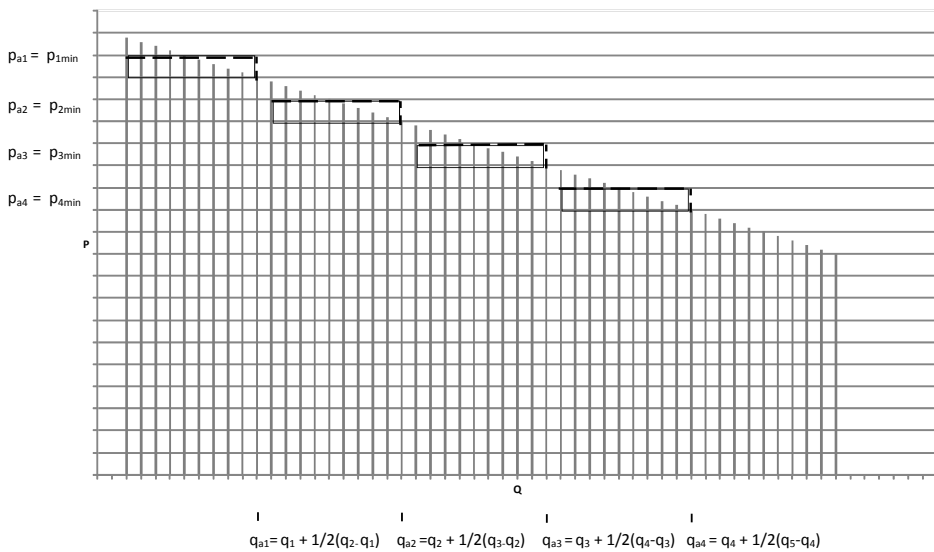


Fig. 2: Segments integration with ticket lottery for average price

If, in general terms, we intended to acquire total consumer surplus, we could employ lottery. If we proved that equality in both the probability of a win or a loss and the cost could not keep a buyer from purchasing a ticket, because the risk of loss in the game is relatively small and maintained in equilibrium by the existing chance of gaining a some-

what better seat, it would be possible to realise the total consumer surplus. To be able to put this hypothetical structure on a foundation more solid than mere speculation, we need either a proof that opera goers typically exhibit a higher rate of risk-seeking or an item of evidence showing that buyers are ready to participate in a lottery scheme provided that the costs remain low and the real loss (an inferior seat within a segment of similar options) is neglectable, comparably to the real win. In this respect, we thus seek an instrument to prove that a lottery mechanism with small wins and losses is characterised by more a pronounced tendency towards accepting the risk (The alternative is to assume that the purchaser will not recognize a slight increase in the price p_1 ; however, such an approach would contradict the essential presumption of ideal price discrimination, namely, that any price increase in any seat would lead to the given seat remaining vacant).

As regards the proposition that opera goers tend to seek risk, the effort to find a corresponding proof will probably be unsuccessful. With respect the latter theory, however, acquiring the evidence is undoubtedly difficult but not impossible. To this day, only few authors have analysed the problem of the willingness to undertake risk where the probabilities of a win or a loss diverge merely moderately; most papers have developed the discussion within the boundaries of large differences in the probability of a win and/or major variation in gain, building on the basic outlook of prospect theory (remarkably, the extremes of risk and revenue were explored by Kahnemann and Tversky, whose prospect theory proposes that people underweight outcomes that are merely probable in comparison with outcomes that are obtained with certainty.⁴⁰ As concluded by the researchers, “*losses loom larger than gains*”). Yet at the same time it is vital to admit that the gap has recently been partly filled, and several studies already confirm that for low-stakes gamble risk-seeking is more common.⁴¹ One of the first researchers to stress the relationship between small stakes and positive preference for gambling behaviour was Harry Markowitz,⁴² who had his respondents decide between the certainty of obtaining 10 cents and a 10% chance of winning a dollar. In the experiment, considering the small reward, most participants preferred an unsafe win to an insignificant amount of readily accessible money. Further, Markowitz proposed that for each person there exists a point where risk-seeking turns into risk-aversion (in Markowitz’s view, a person may prefer the 10% probability of winning \$100 to the certainty of obtaining \$10, but when the amounts have increased, he or she will switch to risk aversion, favouring the safe acquisition of a smaller sum). At low stakes, however, we can observe the *peanuts effect*, or risk

40 KAHNEMAN, Daniel – TVERSKY, AMOS. *Prospect Theory: An Analysis of Decision under Risk. Econometrica*, 1979, Vol. 47, No. 2, p. 263–292, or KAHNEMAN, Daniel – TVERSKY, AMOS. Loss Aversion in Riskless Choice: A Reference-Dependent Model. *Quarterly Journal of Economics*, 1991, Vol. 106, No. 4, p. 1038–1061.

41 WEBER, Bethany. J. – CHAPMAN, Gretchen B. Playing for peanuts: Why is risk seeking more common for low-stakes gambles? *Organizational Behavior and Human Decision Processes*, 2005, Vol. 97, No. 1, p. 31–46; PRELEC, Drazen – LOEWENSTEIN, George. Decision Making over Time and under Uncertainty: A Common Approach. *Management Science*, 1991, Vol. 37, No. 7, p. 770–786.

42 MARKOWITZ, Harry. The Utility of Wealth. *Journal of Political Economy*, 1952, Vol. 60, No. 2, p. 153.

taking for small gains.⁴³ Under such conditions, it is then possible to allow for the opera theatre lottery, focused on the seating in associated segments and to recognise the resulting chances of realising a consumer surplus; these steps remain fully legitimate even when we assume an opera-lover so rational that they know not only all consequences of their decision-making and the real cost of the seats but also are able to determine the probability of a win.

Conclusion

The primary problem affecting opera management consisted in that the genre arose from principally non-profit activities, namely, the generous patronage of papal Rome and privately funded social events organised by Venetian aristocracy. The opera business was characterised by high financial demands on the entrepreneurs, and repeated attempts to practise it on a fully private and profitable basis yielded ambivalent outcomes. The unstable, limited profitability of the productions as experienced in 17th century Venice and London or Vienna a hundred years later⁴⁴ or the fact that, in certain cases, opera depended on massive subvention by patrons or larger institutions nevertheless cannot obscure the effort of opera theatres to cover the major portion of their expenses from relevant operating revenues; thus, the theatres introduced price discrimination into the business, achieving substantial success in the pursuit to acquire the greatest possible portion of the consumer surplus. The system of spatial and intertemporal discrimination applied in 17th century Venice was then refined to remain in use until the present time, whose requirements are being satisfied by highly sophisticated forms of the concept.

Spatial discrimination methods facilitate extraction of a substantial part of consumer surplus; theoretically, their use may enable us obtain the entire surplus. Another step, having the potential to shift the spatial discrimination within opera to a more advanced level, could be identified in integrating the lottery principle, an approach that hypothetically makes it possible for opera houses to gain full consumer surplus. This notion builds on the finding that lottery games with small stakes appeal to the human risk-taking capability. Even if the principle is utilised in only a section of a theatre's auditorium (such as the boxes), there still remains a potential to acquire a portion of the consumer surplus.

The above-discussed concept could certainly be clothed in definitional mathematical tools; however, the paper attempts to attract the attention managers and scholars interested in opera history as well as of both neoclassical mathematical analysts and followers of the Austrian school. Mathematicians and adherents of optimisation may tailor the framework to suit their theoretical and practical needs; managers, historians and Austrian-oriented scholars, I presume, will consider the assumptions and the idea, which

43 PRELEC, Drazen – LOEWENSTEIN, George, *op. cit.*

44 GIBSON, Elizabeth. *op. cit.*

stresses the importance of subjective preferences and their moderate real deformations, acceptable.

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