Are Nonprofits Unfair Competitors for Businesses?
An Analytical Approach

Yong Liu and Charles B. Weinberg

This study examines duopoly price competition between a for-profit firm and a nonprofit organization. It shows that the competitive outcome is predominantly the consequence of their different objective functions. The damage to the for-profit caused by the nonprofit’s policy and regulatory advantages is only marginal. Moreover, the for-profit can protect itself by acquiring Stackelberg price leadership.

The competition between for-profit firms and nonprofit organizations has produced a fair amount of controversy and has attracted an increasing amount of research (e.g., Rose-Ackerman 1990; Schiff and Weisbrod 1993). A particular debate focuses on unfair competition, a claim that various policy and regulatory advantages that nonprofits receive are the driving force that places for-profits in unfavorable market positions. For example, nonprofits in the United States typically do not pay corporate income tax and, in general, are exempt from state and local property taxes as well as some sales taxes. Other nonprofit advantages include receiving lower postal rates. Small for-profit businesses and the industry groups that represent them, especially the U.S. Small Business Administration, have complained in public forums and to regulatory bodies (Weisbrod 1988, p. 107; see U.S. Small Business Administration 1983). They claim that the “decisive” advantages enjoyed by the nonprofits enable them to charge lower prices than private firms, many of which thus lose their competitive edge and find it difficult to survive (e.g., Bennett and DiLorenzo 1989, p. 2).

In response, the nonprofit sector points out that the unfair competition criticism is mainly based on anecdotal information; its validity has not been examined by rigorous analyses. The sector also suggests that several benefits available to the business sector (e.g., small business set-asides, loan guarantees, management assistance, tax credits and deductions, depreciation allowances, access to capital and business expertise) may be significant enough to render the criticism moot (Pires 1985).

The purpose of this article is to examine the significance of regulatory advantages that nonprofits receive in affecting competitive outcomes in a market in which for-profits and nonprofits coexist. We also explore situations in which for-profits can possibly avoid (or reduce) competitive disadvantages.

Industry Background

In the United States, the number of nonprofit organizations has more than tripled from approximately 310,000 in 1969 to nearly 1,000,000 today (Weisbrod 1998, p. 69). As a result of this quick growth, competition between for-profit firms and nonprofit organizations has rapidly intensified.

On the one hand, for-profits are active in most industries in which nonprofits historically have operated, such as health care, child day care, family counseling, research and development, and arts and education (e.g., Pires 1985). For example, Salamon and Anheier (1998) report that nonprofits and for-profits account for 51% and 17% of U.S. hospitals, respectively. Of nursing homes, 20% are nonprofits and 75% are commercial. The arts and entertainment industry is also marked by an extensive mixture of organizations. In Boston, for example, some of the well-known performing arts organizations have nonprofit status (e.g., American Repertory Theatre), and others are for-profit (e.g., Colonial Theatre). Private, for-profit businesses are entering the university-degree market. For example, University of Phoenix reports that more than 75,000 students have enrolled, “many of whom are earning accredited bachelor’s degrees in fields such as business, nursing, and education, as well as MBA degrees” (Farrington 1999, p. 81).

On the other hand, nonprofits compete in several markets that are typically regarded as commercial. The nonprofit Mountain Equipment Co-op competes aggressively in the outdoor clothing and equipment retail market in Canada. In the audiovisual education industry, nonprofits (e.g., Minnesota Educational Computing Corporation, which is the most well known) compete with private firms by producing and distributing their own audiovisual materials or computer software; producing products for others; distributing products created by other organizations; renting, equipment, facilities, and videos; training and consulting; and repairing equipment (Bennett and DiLorenzo 1989). Retail organizations regularly complain about (what they consider unfair) competition from nonprofits. Table 1, based on a survey that asked business respondents to indicate whether they faced competition from nonprofits, shows extensive competition in the six industries studied. Depending on the industry stud-

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1 As a business owner commented, “Unfair competition occurs when a nonprofit organization’s tax-exempt status allows it to undercut competitors who pay taxes” (Murray 2003).
Table 1. Perceived Tax-Exempt Competition by For-Profits in Selected Industries

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<thead>
<tr>
<th>Industry</th>
<th>Projected Respondents</th>
<th>No Competitor</th>
<th>One Competitor</th>
<th>More Than One Competitor</th>
<th>Top Three Types of Tax-Exempt Competitors</th>
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<tr>
<td>Audiovisual</td>
<td>356</td>
<td>36</td>
<td>7</td>
<td>57</td>
<td>University or college: public</td>
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<td>University or college: private</td>
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<td>YMCA/YWCA or YMHA/YWHA</td>
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<td>Recreation/health/sports/fitness club</td>
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<td>Hospital</td>
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<td>Racquet sports</td>
<td>462</td>
<td>10</td>
<td>19</td>
<td>71</td>
<td>University or college: public</td>
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<td>Business or professional association</td>
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<td>Religious organization</td>
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<tr>
<td>Research and testing</td>
<td>215</td>
<td>16</td>
<td>2</td>
<td>82</td>
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<td>Tour</td>
<td>28</td>
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<td>39</td>
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<td>Religious organization</td>
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<tr>
<td>Travel agent</td>
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<td>6</td>
<td>39</td>
<td>University or college: public</td>
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<td>Social/fraternal organization</td>
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<tr>
<td>Veterinarian</td>
<td>18,444</td>
<td>39</td>
<td>20</td>
<td>41</td>
<td>Humane or animal welfare organization</td>
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<td>University or college: public</td>
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Source: Bennett and DiLorenzo (1989, Table 2.2). Original data are from U.S. General Accounting Office (1987).
Notes: YMCA/YWCA = Young Men’s (Women’s) Christian Association; YMHA/YWHA = Young Men’s (Women’s) Hebrew Association.

ied, between 40 and 80% of respondents said that they faced more than one nonprofit competitor in their local market.²

The Literature

Relatively few studies have examined the competition involving nonprofit organizations. In the limited literature, Rose-Ackerman (1990, 1996) suggests that ideology and ideological commitment preselect the people who are likely to own/operate nonprofit organizations. In turn, this attracts customers who value this commitment and prefer to rely on the nonprofit form because it signals reliability and credibility. Some research focuses on whether different institutional forms imply different market behavior. For example, Weisbrod (1998) finds that private for-profit firms, church-related nonprofits, and other nonprofits differ in their use of price and waiting lists as alternative distributional mechanisms. Tuckman (1998) uses Porter’s (1980) five-force model to identify the conditions in which the commercialization of nonprofits is likely to occur. Tuckman suggests that increased competitive intensity between nonprofits and for-profits tends to push nonprofits to use more heavily for-profit business techniques. Similar points of view can be found in the social marketing literature (e.g., Andreasen 1994, 2002), in which researchers have observed “a general model of intersector transfer of marketing concepts and tools from the commercial to the nonprofit sector” (Andreasen 2001, p. 4). Despite the growth of knowledge about nonprofit organizations and the controversy surrounding nonprofit versus for-profit competition, the equilibrium outcome and market structure of industries in which nonprofits and for-profits coexist remain largely unstudied.³

Existing research on markets in which organizations with different objective functions compete primarily focuses on markets that comprise private firms and public or government enterprises, and these studies are mostly concerned with social welfare issues. The existing studies are quite different from ours, which focuses on competitive strategies. Furthermore, most of these studies make use of Cournot-type games; that is, competition occurs as rivals set quantity decisions. A natural choice in constructing these games is to assume that products are homogeneous (see, e.g., Beato and Mas-Colell 1984; Kremer, Marchand, and Thisse 1989; Tirole 1988). We argue that the products that different types of organizations provide are presumably different. Thus, we allow for a varying degree of product substitutability and examine a Bertrand pricing game. Notably, our allowance of product substitutability led to several unexpected results. In addition, the existing studies on mixed markets have adopted different game rules. We assume that the public firm is the Stackelberg leader (Bös 1986; Rees 1984) or the follower (Beato and Mas-Colell 1984) or that it moves

²In industries in which nonprofits and for-profits coexist, on average nonprofits are larger in terms of both number of employees and revenue. This is inconsistent with the situation of the economy as a whole, in which on average for-profits are larger (Rose-Ackerman 1996).

³Questions about the survivability and equilibrium of markets in which organizations with different objective functions coexist have also been raised by, for example, Pires (1985), in the discussion of for-profits’ entry into traditionally nonprofit arenas, and Mahajan and Venkatesh (2000), in the discussion of customer share-maximizing firms in the online business domain. From managerial and regulatory points of view, analyses of these markets will provide valuable insight on competitive strategies and public policy.
simultaneously with the private firm (Cremer et al. 1989). Such assignment of game rules is, by and large, arbitrary (see, e.g., Cremer, Marchand, and Thissee 1989, p. 283). In this article, we examine all three possible situations and provide justifications for each of them. Finally, the issues that we examine, such as unfair competition, are unique to the nonprofit and for-profit markets.

Using a duopoly model of price competition, we show that whereas the for-profit is indeed worse off when it competes with a nonprofit, its loss in market share and profitability is almost entirely the consequence of different organizational types (which we model as different objective functions). The policy and regulatory advantages that the nonprofit receives (which we model as a reduction in marginal cost) play an insignificant role. Acquiring Stackelberg price leadership may help the for-profit receive positive profits in a highly competitive market (which we model as high product substitutability) that would be unprofitable for it in a simultaneous game. A less competitive market denies the for-profit this potential benefit.

The remainder of the article is organized as follows: We set up the model to examine competitive outcomes in a market in which a nonprofit and a for-profit coexist, assuming that the rivals move simultaneously. Next, we explain and examine Stackelberg situations. We discuss other objective functions of the nonprofit, market entry and exit, and some empirical evidence in support of the theoretical findings. We conclude with a discussion of limitations and further research. Throughout the article, we summarize the main substantive findings as “Findings.”

Markets in Which Nonprofits and For-Profits Coexist

Several important features distinguish nonprofits from for-profits. First, typical nonprofits tend to help disadvantaged people, provide social services, and support socially beneficial programs. Such social profit necessarily leads to nonfinancial objectives (Gallagher and Weinberg 1991). Second, nonprofits face a nondistribution constraint enforced by law. They cannot use the revenue from either operations or other sources to compensate board members, trustees, and other “owners” or “incorporators” beyond an economic salary. A corollary of this constraint is that a nonprofit must use all its resources for purposes compatible with its nonfinancial objectives. Together with the nonfinancial objectives, the nondistribution constraint forces nonprofits to focus on the distribution of their products as long as their financial resources can support the activities. Third, the socially beneficial nature of nonprofits enables them to seek support from donors and government. However, faced with declining government support and unable to increase private givings substantially, nonprofits are increasingly turning to commercial activities by selling products or services for revenue (Dart and Zimmerman 2000; Dees 1998; Schiff and Weisbrod 1993).

In a market in which a nonprofit and a for-profit compete, the competition is asymmetrical as a result of the different nature of the competitors. In our model, each of the duopolists provides one product. The products are substitutes, but the degree of substitution varies. We do not intend to model public goods, and we restrict the discussion to privately consumed goods.

Competing on prices, both the for-profit and the nonprofit generate revenue by selling to customers. The nonprofit can receive donations, the amounts of which are often linked to its performance in serving clients. Although other types of financial resources (e.g., government subsidy) are often determined by regulations and are not necessarily the consequence of market behavior, they can be viewed as ways for the nonprofit to reduce fixed or marginal costs, which we discuss in a subsequent section.

We first set up the demand functions. We denote the for-profit with the subscript f and the nonprofit with the subscript n. Following Shubik and Levitan (1980) and Raju, Sethuraman, and Dhar (1995), we specify market demand as follows:5

\[ \pi_i = \frac{1}{2} \left[ 1 - p_i + \theta(p_j - p_i) \right], \]

where \( i, j = f, n \) represents the two rivals; \( q_i \) is the demand for product \( i \); and \( p_j \) indicates price. Parameter \( \theta \) captures the degree of cross-price sensitivity or product substitutability; a higher \( \theta \) implies more intensive competition (\( \theta > 0 \)).

The demand system specified in Equation 1 leads to well-behaved isoprosit curves. We plot a set of these curves in Figure 1, which is helpful during the discussion of the reaction functions and the Stackelberg games. We assume that competitors have the same fixed costs \( F \). Their marginal costs are \( c_f \) and \( c_n \), respectively (\( 0 < c_f, c_n < 1 \)).

5Shubik and Levitan (1980) initially proposed demand functions with this structure (i.e., a term of own-price effect and another term capturing price difference effects), which can be derived from consumer utility maximization. We refer interested readers to Shubik and Levitan (p. 89) for details.

![Figure 1. Isoprofit Curves and Price Reaction Functions of Firm 1](image-url)
Different Objective Functions

The for-profit naturally maximizes profits. We can write the objective function as

\[ \max \pi_f = (p_f - c)q_f - F. \]

Nonprofits are not profit maximizers. In this article, we begin with the assumption that the nonprofit maximizes quantity sold. This is the nonprofit objective function supported most frequently by existing studies. For example, Steinberg (1986) examines the revealed objectives of nonprofits in five industries. His results show that public welfare, education, and arts nonprofits are quantity maximizers. In a study of Red Cross blood-service units, Jacobs and Wilder (1984) find evidence for the objective function in which output is maximized subject to a break-even constraint. GAPinski (1984) shows that the Royal Shakespeare Company, a nonprofit performing-arts organization in Britain, produces more output and sets lower prices than does a profit maximizer. Support for quantity maximization can also be found in, for example, the works of Rose-Ackerman (1987) and Weinberg (1980). Although we believe that quantity maximization captures a significant amount of market reality, we examine other possible nonprofit objective functions in the “Discussion” section and show that the main results derived from quantity maximization are robust to a wide range of nonprofit objective functions.\(^6\)

As we discussed previously, nonprofits must consider restrictions imposed by the availability of financial resources. Their competitive behavior should reflect this consideration. Therefore, a nondeficit budget constraint has been used extensively in nonprofit studies (e.g., Netz 1999; Rose-Ackerman 1987; Weinberg 1980) and indeed is supported by empirical research (e.g., Jacobs and Wilder 1984).

Donations are an important financial resource for many nonprofit organizations. When modeling the donation effect, we acknowledge that many private donors base their donation decisions on the nonprofit’s mission and how effective the nonprofit is in achieving its goals (e.g., Rose-Ackerman 1996; Weinberg 1980). In the context of maximizing quantity, we can formulate donation as an increasing function in quantity served to the market. The most parsimonious way to do so is to use a linear response function:

\[ D_n(q_n) = t q_n, \ t > 0, \]

where \( t \) is the response rate of donation.\(^7\)

Thus, we can write the nonprofit’s pricing problem as follows:

\[ \max q_n = \frac{1}{2} (1 - p_n + t(p_f - p_n)), \]

subject to \((p_n - c)q_n + t q_n \geq F\).

Market Equilibrium Without Regulatory Advantages

Recall that concern about unfair competition focuses on the regulatory advantages that the nonprofit receives, such as a lower postal rate. The primary consequence of these advantages is a lower operational cost (i.e., the marginal cost in our model). To examine how decisive the advantages are in pushing the for-profit into unfavorable market situations, and thus to address the validity of the unfair competition criticism, we examine the benchmark situation by assuming that the regulatory advantages do not exist. Thus, we begin with an analysis in which the nonprofit and the for-profit have a common marginal cost \( c \). We then compare the results with the situation in which the nonprofit receives the advantages. We assume away donations for the moment to enable us to focus on the main issue.

Price Reaction Functions and Equilibrium

We solve for the price reaction functions \( p^*_f(p_n) \). Obtaining \( p^*_f(p_n) \) is straightforward:

\[ p^*_f(p_n) = \frac{1 + (1 + \theta)c + \theta p_n}{2(1 + \theta)}. \]

We solve the constrained maximization problem for the nonprofit, which indicates that the optimal price is achieved when the budget constraint is binding.\(^8\) We find that the nonprofit’s reaction function is

\[ p^*_n(p_f) = \left\{ \frac{1 + \theta p_f + (1 + \theta)c}{2(1 + \theta)} \right\} \]

\[ -\sqrt{\left(1 + \theta p_f + (1 + \theta)c\right)^2 - 4(1 + \theta)(c + \theta cp_f + 2F)}/2(1 + \theta). \]

Figure 1 illustrates the reaction functions (Equations 5 and 6). If Firm 1 is a for-profit, its reaction curve will be line BC, which represents price responses that lead to optimal profit levels. For a nonprofit, only the isoprofit curve representing zero profit is relevant because of the binding budget constraint. Thus, if Firm 1 is a nonprofit, the reaction curve is AB, where Point B is the lowest point on the zero isoprofit curve. For each price that Firm 2 charges, the nonprofit...
potential can set two price levels to remain at breakeven. Because the left branch of the zero isoprofit curve represents the lower price and thus greater quantity, the nonprofit will respond along line AB. Although it is not illustrated in Figure 1, both the nonprofit and the for-profit reaction curves show the desired property (i.e., become steeper as θ increases), which indicates a more competitive market.

As in typical Bertrand games, the for-profit’s reaction function follows the “strategic complement” pattern (Bulow, Geanakoplos, and Klemperer 1985; Tirole 1988, pp. 207–208): One party’s increasing (decreasing) price induces the rival to raise (lower) its price. However, the nonprofit’s reaction curve is downward sloped. Such a strategic substitute pattern has been mainly associated with price competition.10 It indicates that if the for-profit increases its price, the nonprofit will lower its price to gain more customers. However, if the for-profit decreases its price, the nonprofit’s best reaction is to raise its own price to attract the additional customers. However, if the nonprofit decreases its price, the for-profit will raise its price. In this way, both prices will move in the same direction. The only exception occurs if the nonprofit’s price is set at or below the for-profit’s price. In this case, the nonprofit will maintain its price and continue to attract customers.

Finding 1: Unlike the reaction function of for-profits, that of nonprofits in a pricing game is of the strategic substitute type; that is, it is downward sloping.

If a price equilibrium exists, it will occur at the intersection between \( p^f(\theta_f) \) and \( p^n(\theta_n) \). We solve Equations 5 and 6 simultaneously to obtain equilibrium prices \( p^f_\ast \) and \( p^n_\ast \):

\[
7 \quad p^f_\ast = \frac{50θ^2 + 100θ + 4 + 15cθ^2 + 14cθ + 4c + 4cθ^3 - 4θ\sqrt{K}}{4(θ^2 + 4θ + 2)(1 + θ)}
\]

and

\[
8 \quad p^n_\ast = \frac{3θ + 2 + 2cθ^2 + 5cθ + 2c - θ\sqrt{K}}{2(θ^2 + 4θ + 2)}.
\]

where \( K \) is a complicated closed-form function of \( θ, c, \) and \( F \). The Appendix provides the details of \( K \) and other complex functions.

We can show equilibrium quantities that correspond to \( p^f_\ast \) and \( p^n_\ast \) to be positive. Therefore, the price equilibriums fall into the appropriate region described by the demand system of Equation 1. Note that different from for-profit competitions, the nonprofit’s fixed costs is an important factor that influences equilibrium prices.

The equilibrium solutions bear several desirable properties. First, both prices decrease as competition becomes stronger. Second, the local monopoly case arises as \( θ \) approaches zero. As \( θ \) approaches infinity, the market features perfect competition, and both equilibrium prices equal marginal cost. Finally, as long as an equilibrium exists, the nonprofit charges a lower price than does the for-profit. The duopoly market ceases to exist as the nonprofit begins to charge a higher price than the for-profit (the proof is provided in the section “Comparison of Nash Equilibrium Prices in the For-Profit Versus Duopoly Market” in the Appendix).

A price equilibrium exists when neither the nonprofit nor the for-profit earns negative profits.11 In the section “The Properties of Price Equilibriums” in the Appendix, we examine in detail the properties of the equilibrium prices. We summarize the key findings as follows:

Although the nonprofit is able to remain at breakeven, the for-profit will receive positive profit only when \( F \) is less than \( F_1 \):

\[
9 \quad F_1 = \frac{4θ^2 + 4θ + 1 - 2c - 8cθ^2 + 4c^2θ^2 + 4c^2θ + c^2}{2(2θ^2 + 9θ^3 + 16θ + 4)}.
\]

Thus, the duopoly market exists in equilibrium only when fixed cost is less than \( F_1 \).

The degree of competitive intensity (\( θ \)) also influences the price equilibriums. If the competing products are too similar to each other (i.e., \( θ \) is high), the market may not be competitive. However, the market equilibrium may not break even even for the case in which the nonprofit does not earn positive profit or the nonprofit cannot break even. As we detail in “The Properties of Price Equilibriums” in the Appendix, this upper limit of \( θ \) equals \( θ_1 \).12 The duopoly market obtains in equilibrium only when \( θ < θ_1 \).

As \( F \) and \( c \) increase, \( p^n_\ast \) increases at a much faster rate than does \( p^f_\ast \). This happens because the nonprofit’s budget constraint makes it more sensitive to changes in costs. The price difference between the nonprofit and the for-profit thus increases as costs become higher. This pattern is illustrated in Figure 2, Panel A.

Figure 2, Panel B, indicates that both \( p^f_\ast \) and \( p^n_\ast \) decrease as competition intensifies. However, \( p^n_\ast \) decreases at a slower rate than \( p^f_\ast \) does, making the price difference continuously decrease. Thus, contrary to the case of cost changes, the nonprofit is less sensitive to changes of competitive intensity. The explanation of this draws on the result that a nonprofit tends to reduce its price to the degree of breakeven. Unless the market is highly competitive (i.e., cross-price sensitivity of demand is high, which induces a net loss for the for-profit and therefore no equilibrium), the changes in \( θ \) do not shift much demand between the two competitors. Therefore, the nonprofit’s price can be reduced by a small amount to remain at breakeven. The insensitivity of the nonprofit to changes in competitive intensity when two nonprofits compete is shown to a fuller extent in the “Discussion” section.

Finding 2: The nonprofit’s ability to charge a lower price than the for-profit decreases as costs increase and/or competition intensifies. However, the market equilibrium breaks down before the nonprofit is forced to charge a higher price than the for-profit.

Finding 3: Compared with a for-profit rival, the nonprofit’s pricing behavior is more sensitive to changes in cost factors but less sensitive to changes in competitive intensity.

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10This pair of incompatible reaction curves may have strong implications for tacit collusion involving nonprofits. Cooperation is accommodated if the rivals respond similarly to each other’s actions. Thus, collusive behavior seems to be unlikely in a market in which for-profits and nonprofits coexist (for an example of price fixing by the Ivy League schools, see Netz 1999).

11Otherwise either will stay out of the market in a perfect equilibrium.

12The approximate linear expression of \( θ_1 \) is \( θ_1 = 14.25 - 19.18c - 151.99F \), which indicates that the higher the costs, the lower is the maximum competitive intensity that allows for a price equilibrium to exist.
The For-Profit’s Loss

To address the issue of unfair competition, we examine the extent to which the for-profit is worse off as a result of the existence of a nonprofit competitor. We make two comparisons for this purpose. First, what is the impact on the focal for-profit when it faces a nonprofit rather than a for-profit competitor in duopoly competition? Second, what is the impact of a nonprofit entrant on a for-profit monopolist? Note that at this point we assume that there are equal costs for the duopoly rivals. Any gain or loss to the competitors is thus entirely the consequence of different objective functions, which have nothing to do with the advantages conveyed by public policy.

The for-profit duopoly result is well known. At equilibrium, each for-profit would charge \((1 + (1 + \theta)c)/(2 + \theta)\) and would receive a profit of \((1 + \theta)(1 – c)^2/[2(2 + \theta)^2] - F\). If the for-profit competes with a nonprofit, at equilibrium the for-profit would charge \(p_f^*\), as in Equation 7, and would receive a profit of \(\pi_f(c, F, \theta)\), which has a complicated closed-form expression.

The competition with a nonprofit (rather than another for-profit) has two effects on the focal for-profit. First, it makes an otherwise profitable market unprofitable. Specifically, if the competitor is another for-profit, the focal for-profit earns positive profit as long as \(F < (1 + \theta)(1 – c)^2/[2(2 + \theta)^2]\). However, competition with a nonprofit is not profitable for a for-profit when \(F < F_1\), and it holds that \(F_1 < (1 + \theta)(1 – c)^2/[2 + (2 + \theta)^2]\). Second, the for-profit’s profit is much lower when the competitor is nonprofit rather than for-profit. At parameter values \(c = 1, \theta = .7,\) and \(F = .06\), the for-profit’s profit is .034 in a for-profit duopoly and .013 when it competes with a nonprofit. This indicates a 62% decrease. Other parameter values produced similar results. Therefore, the for-profit is much worse off when facing a nonprofit than another for-profit, even if the nonprofit does not receive any policy advantages.

Now consider the case of a for-profit monopolist that faces a linear demand curve 13 The optimal demand curve that is consistent with the duopoly. The for-profit duopoly result is well known. At equilibrium, each for-profit would charge \(1 + (1 + \theta)c)/(2 + \theta)\) and would receive a profit of \((1 + \theta)(1 – c)^2/[2(2 + \theta)^2] - F\). However, competition with a nonprofit is not profitable for a for-profit when \(F < F_1\), and it holds that \(F_1 < (1 + \theta)(1 – c)^2/[2 + (2 + \theta)^2]\). Second, the for-profit’s profit is much lower when the competitor is nonprofit rather than for-profit. At parameter values \(c = 1, \theta = .7,\) and \(F = .06\), the for-profit’s profit is .034 in a for-profit duopoly and .013 when it competes with a nonprofit. This indicates a 62% decrease. Other parameter values produced similar results. Therefore, the for-profit is much worse off when facing a nonprofit than another for-profit, even if the nonprofit does not receive any policy advantages.

Now consider the case of a for-profit monopolist that faces a linear demand curve \(1 + (1 + \theta)c)/(2 + \theta)\). The optimal strategy is to charge \(p_f^* = (1 + c)/2\), sell \(q_f^* = (1 – c)/2\), and receive a profit of \(\pi_f^* = (1 – c)^2/4 – F\). Two effects similar to the case of a for-profit duopoly arise. First, the nonprofit entrant can make a market that is profitable for a for-profit monopolist unprofitable, because the for-profit earns positive monopoly profit as long as the fixed cost is less than \((1 – c)^2/4\), which is greater than \(F_1\). Second, the for-profit’s profit drops (quite drastically) when a nonprofit competitor enters the market. At the same parameter values \(c = 1, \theta = .7,\) and \(F = .06\), it holds that \(\pi_f^{10} = .143\) and \(\pi_f^{11} = .013\), which indicates a 91% decrease. Table 2 (specifically the column “No Cost Advantage”) presents similar results for more parameter values. We summarize the result as follows:

Result 1: A for-profit can be much worse off when there exists a nonprofit rival, even in the absence of any policy advantages to the nonprofit.

The Role of Regulatory Advantages

We now turn to the case in which regulatory advantages are available to the nonprofit. As we discussed previously, we can conveniently model such advantages as a lower marginal cost.14 Assuming that the nonprofit’s marginal cost is \(c_n\) and the for-profit’s marginal cost remains at \(c\), we resolve the price equilibrium:

\[
(10) \quad p_f^* = \frac{[5c_n^2 + 100 + 4 + 11\theta c^2 + 12\theta + 4c + 3c_n^3]}{[c_n^3 + \theta c^2 + 2c_n\theta - \theta\sqrt{M}]/(4\theta^2 + 4\theta + 2)(1 + \theta)},
\]

and

\[
(11) \quad p_n^* = \frac{3\theta + c_n\theta^2 + 4c_n\theta + c^2\theta + 2 + 2c_n\theta + \theta - \sqrt{M}}{2\theta^2 + 4\theta + 2}.
\]

The closed-form expression of \(M\) is presented in the Appendix.

Compared with the situation of equal cost \(c\) for both rivals, a new (and lower) marginal cost \(c_n\) for the nonprofit induces both of them to charge a lower price. Furthermore,}

13This is the monopoly demand curve that is consistent with the duopoly demand functions in Equation 1.

14The situation in which these advantages reduce fixed costs for the nonprofit is straightforward (no additional solving is needed) and generates outcomes that resemble those of reduced marginal costs. Moreover, tax exemptions have an effect similar to that of reduced costs.
the nonprofit reduces its price to a greater extent than does the for-profit. As a result, the nonprofit captures not only all the new demand that the lower prices generate but also some demand that is served by the for-profit in the equal-cost case. To quantify the impact of this cost difference on the for-profit, we further examine $c_n = rc$. That is, the nonprofit receives policy advantages that amount to a $(1 - r)$ percentage reduction in marginal cost.

The result of $r = .80$ is summarized in the “Cost Advantage (r)” column in Table 2. For example, in a moderately competitive market ($\theta = .7$) the focal for-profit will earn a profit of .010 when it competes with a nonprofit that receives a 20% cost reduction (leading to $c_n = .80c$). This is 71% less than what it would obtain if the competitor is another for-profit. Although this is a dramatic loss for the for-profit, note that 62% is actually due to the difference in objective functions and only 9% is due to costs, as we have discussed. Compared with the situation of being a monopolist, the for-profit loses 93% in profits when there is a nonprofit rival. However, again, 91% of this drop is due to the presence of a nonprofit competitor, and only 2% is due to cost differences.

The message of this analysis is clear: It is the nature of the competitors that matters the most, not the policy or regulatory advantages that the nonprofit receives. The for-profit is put into unfavorable market positions because its profit-maximizing behavior is inherently vulnerable to the competition from a service-maximizing nonprofit. At most, the regulatory advantages play a secondary role that is far from decisive. If a for-profit suffers profit loss (and becomes unable to survive) in the competition with a nonprofit, it would make no substantial difference even if the nonprofit did not receive any favorable treatments.

Result 2: The regulatory advantages received by the nonprofit are neither decisive nor necessary to induce losses for the for-profit and to enable the nonprofit to charge a lower price. The dominant factor that drives the competitive outcome is the nature of the competitors, especially their objective functions.

**Stackelberg Price Leadership**

We have established that the for-profit occupies an unfavorable market position when it competes with a nonprofit, even if it has no regulatory advantage. Is there any strategy that the for-profit can adopt to reduce or avoid such unfavorable situations? In this section, we change the assumption that the rivals move simultaneously to the assumption that either the for-profit or the nonprofit may have Stackelberg price leadership. We show that the for-profit may benefit from acquiring Stackelberg price leadership but a nonprofit cannot.

Stackelberg leadership assumes that a competitor can credibly announce its price earlier and with foresight of the rival’s reaction. In the context of our model, a for-profit may have the leadership as a result of its better use of competitive strategies that are common in the business world (Rose-Ackerman 1990; Tuckman 1998), whereas a nonprofit may have this competitive advantage as a result of being more influential in terms of size and revenue (see Note 2). A particular example of nonprofit Stackelberg leadership is the market in which nonprofits historically have been the product provider and for-profits have been late entrants. In such a market, the nonprofit might be better informed of market conditions and thus can compete as a price leader. For example, such a scenario could unfold as colleges and universities increasingly contend with online alternatives, many of which are for-profit businesses (e.g., Farrington 1999).

A Stackelberg leader has the chance to increase its profit to a level higher than that obtained in a simultaneous game. It does so by finding the position on the follower’s reaction curve that leads to the highest profit. Note that the leader’s price-reaction function of the simultaneous game is no longer relevant in solving the Stackelberg game. Instead, the Stackelberg leader examines the intersection of the follower’s reaction curve with its own isoprofit curves (and seeks the highest profit) (for a detailed description of Stackelberg games and their solutions, see Tirole 1998). In the traditional context of for-profit competition, Stackelberg leadership enables the price leader to raise price and enhance its profits, regardless of the intensity of the competition. The price follower will also set a higher price. Ultimately, only the consumers are worse off (Tirole 1988, p. 331).15

---

15We can show that these typical results hold for the demand system of Equation 1 if the duopolists are both for-profits. However, many of them cease to hold for the model of a market in which a nonprofit and a for-profit coexist.
However, the Stackelberg outcome in the market in which a nonprofit and a for-profit compete is quite different from the traditional situation in which two for-profits compete. We provide the technical details of the Stackelberg solutions in the Appendix (“Stackelberg Leadership When a For-Profit and a Nonprofit Compete”), but we discuss the key findings and their intuition in the text. For the ease of discussion, we refer to the price equilibrium in the Stackelberg game as “Stackelberg equilibrium” and that in the simultaneous game as “Nash equilibrium.”

The Nonprofit as the Stackelberg Leader

When the nonprofit competes as the Stackelberg price leader, the game is solved by substituting the for-profit’s reaction function into the nonprofit’s objective function (and the budget constraint). We found two prices that the nonprofit may adopt as follows:

\[ p^*_N = \frac{5\theta + 2c\theta^2 + 2 + 2c + 5\theta^2 - \sqrt{K}}{2(\theta^2 + 4\theta + 2)} \]

and

\[ p^*_N = \frac{5\theta + 2c\theta^2 + 2 + 2c + 3\theta + \sqrt{K}}{2(\theta^2 + 4\theta + 2)} \]

where the superscript NS indicates nonprofit Stackelberg. The for-profit’s responses to \( p^*_N \) and \( p^*_N \) are derived from \( p^*_N (p_N) \). It can be shown that the nonprofit’s quantity is greater when it charges \( p^*_N \), which is thus the nonprofit Stackelberg price.

Note that \( p^*_N \) is identical to \( p^*_N \), the nonprofit’s Nash equilibrium price. In other words, being able to announce its price earlier and foresee the for-profit’s reaction does not enable the nonprofit to charge a lower price than that in the Nash equilibrium. The explanation is as follows: A profit-seeking Stackelberg leader usually moves to a different iso-profit curve where profits are greater. However, the nonprofit’s behavior is significantly different; because of the (binding) budget constraint, it always remains on the same iso-profit curve where profit is zero. This constraint, which is embedded with the nature of nonprofit organizations, removes any advantages that Stackelberg leadership may produce.

Result 3: The nonprofit Stackelberg equilibrium is the same as the Nash equilibrium, regardless of the level of competitive intensity.

The For-Profit as the Stackelberg Leader

When the for-profit acts as the price leader, it is impossible to obtain closed-form solutions for the game. As we show in the Appendix, the best strategy of a for-profit acting as the Stackelberg leader depends on the level of competitive intensity (\( \theta \)).

When \( \theta \) is comparatively high (i.e., \( \theta > \theta_1 \)), the Stackelberg equilibrium is superior to the Nash equilibrium for the for-profit; it may use the Stackelberg leadership position to improve its profits. We now summarize the explanation, which is detailed in the Appendix.

Because of the strategic substitute nature of the nonprofit price-reaction function, the for-profit lowers its price to take advantage of the Stackelberg leadership. This induces the nonprofit to increase its price to remain at breakeven. When the competitive intensity is high (\( \theta > \theta_1 \)), the price changes result in enough shift of demand such that the for-profit earns greater profits than it would in a simultaneous game. However, when the competitive intensity is low (i.e., \( \theta < \theta_1 \)), the for-profit does not anticipate sufficient demand shift by charging a lower price. As a result, it cannot earn greater profits than in the simultaneous game. Thus, when \( \theta < \theta_1 \), Stackelberg leadership does not benefit the for-profit.

For illustration purposes, Table 3 provides numerical examples for these two patterns of the for-profit Stackelberg results. For the lower \( \theta \) in each pair of costs (e.g., \( \theta = 1 \)), the for-profit’s profit is lower in the potential Stackelberg equilibrium than it is in the Nash equilibrium. For the higher \( \theta \) (e.g., \( \theta = 5 \)), the for-profit’s profit may increase from a negative level in the simultaneous game, which does not have a duopoly Nash equilibrium, to a positive level in the Stackelberg game.

Recall that \( \theta_1 \) separates the profitable and unprofitable regions for the for-profit in a simultaneous game. We found that across all feasible values of \( \theta \), the profit level changes signs at \( \theta_1 \) between the simultaneous game and the for-profit Stackelberg game. Specifically, if the competitive intensity is low (i.e., \( \theta < \theta_1 \)) such that the for-profit earns positive profits in the simultaneous game (and thus a Nash equilib-

### Table 3. The For-Profit as a Stackelberg Price Leader and Its Profits

<table>
<thead>
<tr>
<th>Marginal Cost (c)</th>
<th>(.01)</th>
<th>(.04)</th>
<th>(.01)</th>
<th>(.04)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Competition ((\theta))</td>
<td>(1)</td>
<td>(5)</td>
<td>(1)</td>
<td>(5)</td>
</tr>
<tr>
<td>(p^*_F)</td>
<td>(.330)</td>
<td>(.182)</td>
<td>(.345)</td>
<td>(.210)</td>
</tr>
<tr>
<td>(p^*_N)</td>
<td>(.118)</td>
<td>(.117)</td>
<td>(.181)</td>
<td>(.185)</td>
</tr>
<tr>
<td>Profit*</td>
<td>(.043)</td>
<td>(.010)</td>
<td>(.020)</td>
<td>(-.003)</td>
</tr>
<tr>
<td>(p^*_B)</td>
<td>(.000)</td>
<td>(.059)</td>
<td>(.000)</td>
<td>(.197)</td>
</tr>
<tr>
<td>(p^*_B)</td>
<td>(.300)</td>
<td>(.158)</td>
<td>(.300)</td>
<td>(.215)</td>
</tr>
<tr>
<td>Profit*</td>
<td>(-.075)</td>
<td>(-.040)</td>
<td>(-.105)</td>
<td>(.003)</td>
</tr>
</tbody>
</table>

Notes: \(p^*_F\) and \(p^*_N\) are the Nash equilibrium; \(p^*_B\) and \(p^*_B\) are the potential for-profit Stackelberg equilibrium that corresponds to Point B in Figure A1, Panel B. Note that if the profit is negative, a perfect duopoly equilibrium does not exist.
rium exists), the potential Stackelberg position makes the for-profit incur a net loss (thus, the Stackelberg equilibrium is the same as the Nash equilibrium). In contrast, a more competitive market (i.e., \( \theta > \theta_1 \)) that is unprofitable in the simultaneous game can be profitable if the for-profit obtains Stackelberg leadership.

Result 4: Obtaining Stackelberg price leadership in a more competitive market (\( \theta > \theta_1 \)) helps the for-profit survive in the competition with a nonprofit. Without this leadership, the for-profit will earn negative profit; thus, the duopoly Nash equilibrium does not exist. In a less competitive market (\( \theta < \theta_1 \)), a Nash equilibrium exists, and the Stackelberg equilibrium is identical to the Nash equilibrium.

Previous research has shown that in the competition between for-profits, consumers are worse off if the firms compete in a Stackelberg game rather than a simultaneous game. This does not hold when the for-profit faces a nonprofit rival. First, if both the Stackelberg equilibrium and the Nash equilibrium exist, they are the same. Second, if the for-profit is able to take advantage of the Stackelberg leadership in a highly competitive market, only the Stackelberg equilibrium exists. Therefore, there is nothing to say about consumers being better or worse off between the two solutions.

A few studies on a mixed market of private and public enterprises also have examined the Stackelberg behavior. Although the findings are mixed, welfare is typically improved over the Nash equilibrium when the public firm acts as Stackelberg leader (e.g., Vickers and Yarrow 1988). Our Stackelberg results are different; maybe more important, allowing for product substitutability enables us to identify the different behavior of a for-profit Stackelberg leader in markets with different competitive intensity.

Discussion

To concentrate on the main issue of unfair competition, the analysis so far has avoided an explicit analysis of the effect of donations. As we discussed in the previous section, donations provide additional revenue for the nonprofit. When a linear donation response function is used (Equation 3), the nonprofit’s budget constraint becomes \([p_n – (c – t)]q_n \geq F\). The consequence of donations is thus a reduced marginal cost for the nonprofit. The results regarding the nonprofit’s advantage in marginal cost then apply. Specifically, both the nonprofit and the for-profit need to drop prices, and the for-profit loses demand to the nonprofit.

More generally, whenever \(\partial D_n/\partial q_n > 0\), the net effect of donations is to bring down the marginal cost. However, the effective marginal cost may no longer be constant. How quickly and to what extent it decreases depend on the shape of the donation response curve.16

In the remainder of this section, we provide analysis of and discussion about the robustness of the results to nonprofit objective functions, market entry and exit, a comparison of equilibrium between a market served by two nonprofits and a market served by two for-profits, and some empirical support for the results.

Robustness of Results to Other Nonprofit Objective Functions

Quantity maximization is the nonprofit objective function that has been widely adopted and supported in the literature. It describes the behavior of many nonprofit organizations. Nevertheless, the results we derived in the previous section are not restricted to quantity maximization.

On the basis of empirical evidence and following Steinberg (1986) and Lowry (1997), we specify a more general objective function that maximizes the weighted average of total budget and quantity. At a minimum, a large budget may bring higher managerial salaries and prestige for the nonprofit.

\[
\text{max } U = \delta(F + cq) + (1 – \delta)q_n
\]

where \(0 \leq \delta \leq 1\). Depending on the managers’ preference for these two components, and in some cases as a political compromise among members of the board of directors, different nonprofits may operate under different values of \(\delta\). For example, the tension in arts organizations between mission and market can be conceptualized as a debate over the value of \(\delta\). Voss, Cable, and Voss’s (2000) distinction among five organizational value dimensions can be modeled as a low value of \(\delta\) for a market-oriented organization and a high value of \(\delta\) for an achievement-oriented one.

In Equation 14, the marginal utility of quantity equals \(\delta c + (1 – \delta)\), which is always positive because \(0 \leq \delta \leq 1\). Thus, the family of objective functions with budget and quantity maximization has the same equilibrium solutions as quantity maximization.

Indeed, any objective function that takes the general format of

\[
\text{max } U[p_f; p_n, v(p_f, p_n)]
\]

where \(v(\cdot)\) is any arbitrary component of utility, can be analyzed in essentially the same way as we do in this article. The results based on quantity maximization still hold as long as the partial derivatives satisfy \(\partial(U/\partial p_n) + (\partial U/\partial v) \times (\partial v/\partial D_n) < 0\). A particular example of this type of objective function is the maximization of consumer surplus.

There are situations in which the nonprofit wants to maintain a certain amount of revenue for purposes such as improving product quality, expanding into new service areas, or preparing for unforeseen events. The pricing problem can then be modified by adding a positive amount of profits to the budget constraint. The effect is the same as when the nonprofit has higher fixed costs (see Note 14).17

16In an empirical study of the Royal Shakespeare Company, Gapinski (1984) shows that grants, mainly from the Arts Council of Great Britain, led to lower prices and a larger audience for the performances.

17If the amount of (positive) profits that the nonprofit receives becomes large enough, the for-profit and the nonprofit may end up charging the same equilibrium prices. These prices are the same as those in the typical for-profit competition situations and obtain when the nonprofit operates on the particular isoprofit curve that intersects \(p_f/p_n\) with its left branch exactly at the point at which the typical for-profit equilibrium occurs. As the amount of nonprofit profits decrease, both the nonprofit’s and the for-profit’s equilibrium prices drop, and the nonprofit’s price becomes less than that of the for-profit. In the one-period game, however, it is straightforward to show that the budget constraint is binding.
Therefore, the results derived from quantity maximization appear to be robust to a wide range of nonprofit objective functions. Other possible objective functions include maximization of prestige, employee income, total revenue, or a specified quantity/quality trade-off. Except for the support of quantity maximization, little empirical guidance on nonprofit objectives exists. It is beyond the scope of this article to discuss all possible alternatives in detail.

**Fixed Costs and Market Entry**

It is well known that fixed cost plays an important role in determining market entry decisions. Holding the opportunity cost of entry at zero, the for-profit does not want to participate in market competition if the fixed cost is higher than \( F_1 \). However, when the fixed cost is higher than \( F_1 \) but lower than \( F_2 \), the nonprofit is able to remain at breakeven if the duopoly market exists. This suggests that \( F_1 < F < F_2 \) is a region in which the nonprofit can survive the duopoly competition but the for-profit cannot, which is essentially a reserved market for the nonprofit. This finding contradicts the perception that the goal of profit maximization necessarily leads to greater profit for the for-profit than what a quantity maximizing nonprofit can obtain. It is exactly this difference in objective functions that leaves the for-profit with a net loss, whereas the nonprofit is able to break even for this range of \( F \).

Finding 4: Fixed costs in the range of \( (F_1, F_2) \) create a reserved market for the nonprofit. Although the nonprofit can break even in a duopoly market, the for-profit will lose money if it chooses to compete.

When \( F \) is less than \( F_1 \), a Nash equilibrium obtains in the duopoly market. If \( F \) exceeds \( F_2 \), either the nonprofit or the for-profit can be a monopolist, depending on which is the first mover. The nonprofit monopoly price equals \( \frac{1 + c - \sqrt{(1 + c)^2 - 4(c + F)}}{2} \), which is lower than the for-profit monopoly price of \( \frac{1 + c}{2} \).

We can show that a third critical value of \( F \) exists, which we denote as \( F_3 \). Above \( F_3 \), the fixed cost becomes prohibitively high such that neither the for-profit nor the nonprofit can serve the market even as a monopolist. As a result, the market collapses. From the monopoly prices shown previously, we can derive \( F_3 \) to be \( \frac{(1 - c)^2}{4} \).

Figure 3 illustrates the nonlinear relationship between fixed costs and market structure. Note that in the case of prohibitively high fixed costs for socially desirable products, the nonprofit is more likely to be the survivor for exogenous reasons. The government or donors may become involved to help the nonprofit overcome the entry barrier.

**Symmetrical Games**

In this section, we extend the analyses of the for-profit versus nonprofit duopoly to a market in which two nonprofits compete. The primary reason for this extension is that in reality, nonprofit organizations not only compete with for-profits but also are involved in competition with other nonprofits. Such competition occurred initially as the nonprofits in the same market competed for financial resources such as donation and grants. As more nonprofits came to exist, they began to compete for customers as well. For example, depending on universities’ market positioning, they actively compete for academically gifted students, minority students, student athletes, and full-tuition students. Thus, it is valuable to examine the competitive outcome when nonprofits compete and compare it with the more established result of for-profit competition.

We use the superscripts \( f \) and \( n \) to denote the for-profit duopoly and the nonprofit duopoly in these symmetrical games, respectively. Solving the profit and quantity maximization problems, we obtain \( p^*_f = p^*_n = \frac{1}{2} \left[ 1 + \left( 1 + \theta c \right)/2 - \sqrt{\left( 1 + c \right)^2 - 4 \left( c + F \right)} \right] \), and \( p^*_f = p^*_n = \left( 1 + c \right) - \sqrt{\left( 1 + c \right)^2 - 4 \left( c + 2F \right)} \).

We note two properties of \( p^* \). First, the price equilibrium depends on fixed cost \( F \) because of the budget constraint. The goal of quantity maximization leads to marginal cost pricing if \( F \) becomes zero. This is different from \( p^*_f \), which, regardless of \( F \), is always greater than the first-best outcome of marginal cost pricing. Second, the intensity of competition (\( \theta \)) does not influence the nonprofit price equilibriums. We find this to be both interesting and unexpected because \( \theta \) does matter for the nonprofit reaction function (Equation 6). Our explanation of this result draws on the symmetry between the two nonprofits and the fact that both of them target breakeven. The ultimate impact of a higher \( \theta \) is to make the rivals more sensitive to each other’s action. In the context of traditional for-profit competition, this would lead to lower prices and lower profits. However, the competing nonprofit duopolists always remain at zero profit, no matter how intensive the competition is. Thus, \( \theta \) does not affect the profit level of the nonprofits; it can only affect the price equilibriums by shifting demand between the two rivals according to Equation 1. Because the identical costs of the duopolists imply that the rivals’ prices are always equal at equilibrium, the impact through this path disappears as well.

The equilibrium price in the nonprofit-served market is lower than that in the for-profit-served market. Thus, to make socially beneficial products more accessible to consumers, nonprofit dominated markets are preferred. Consistent with Rose-Ackerman (1996), socially minded managers would be attracted to such markets.

If we compare the price equilibriums of the asymmetrical game (i.e., \( p^*_f \) and \( p^*_n \)) with those of the two symmetrical games (i.e., \( p^*_f \) and \( p^*_n \)), we find that \( p^*_f > p^*_n > p^*_f > p^*_n \) for all possible parameter values. A for-profit charges a lower price

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18It is important to note that the universities (and nonprofit organizations in a broader context) emphasize how they are different from one another when competing for students.
when it competes with a nonprofit than with a for-profit, because the nonprofit competitor prices more aggressively. However, a nonprofit charges a higher price when it competes with another nonprofit than with a for-profit. The intuition is that the nonprofit has more flexibility in setting its price if the competitor is a profit-oriented firm rather than an equally low price–oriented nonprofit organization.

Finding 5: At Nash equilibrium, the nonprofit charges a higher price if it competes with another nonprofit than if it competes with a for-profit.

Because $p^f$ is the highest among all the equilibrium prices, consumers are worse off if they are served by two for-profits than by either two nonprofits or by a mixture of nonprofit and for-profit. In contrast, because the equilibrium price in the two-nonprofit market falls between those in the for-profit versus nonprofit duopoly market (i.e., $p^f > p^n > p^b$), it is not transparent which of the two markets provides greater consumer welfare (thus, the greatest among all the three market structures). If we measure consumer welfare by net consumer surplus, which is defined as aggregated consumer utility and equals the area under the demand curve but above the horizontal line of a given price level, we can show that the for-profit’s price in the for-profit versus nonprofit duopoly market is too high, such that consumers are still better served by a pair of nonprofit duopolists.19

Concluding Remarks

On the basis of a duopoly model of price competition, we examine the controversial issue of unfair competition between for-profits and nonprofits. As a result of different objective functions and the nonprofit’s need to satisfy a non-deficit budget constraint, the equilibrium results are different from those found in traditional for-profit markets. Most important, our key results contradict the argument for unfair competition. We show that, at least for the duopoly demand system we investigate, the difference in objective functions is responsible for a dominant majority of the disadvantage a for-profit faces when competing with a nonprofit. The regulatory benefits to the nonprofit are far from decisive in favoring the for-profit in unfavorable market positions. As a result, the unfair competition criticism may have exaggerated the effect of these benefits. We also find that obtaining Stackelberg leadership may help the for-profit survive in the competition.

A theoretical result that is directly testable is that whenever market equilibrium obtains, the nonprofit can and will charge a lower price than the for-profit competitor (see Finding 2). We now provide some survey findings to support this result. The data all come from mature markets that are likely to be in a stable state. First, Bennett and DiLorenzo (1989, p. 145) examine the audiovisual education market for deaf people and find that nonprofits charge about 20% less than commercial firms do, for an average of $11.75 per minute compared with $14.51 per minute. Second, in 2000, we surveyed 17 day care centers in a major city on the West Coast. The nonprofits charged an average of $2.69 per hour, and the for-profits charged an average of $2.98 (note that we did not control for quality differences in this survey). Third, Merliss and Lovelock (1980) report that nonprofit performing-arts organizations in Boston charged a lower price than did for-profit organizations at both the high end and the low end of the price range. Their sample included organizations such as the American Repertory Theatre, the Shubert Theatre, Boston Symphony Orchestra, the Wilbur Theatre, and the Colonial Theatre. We repeated the survey in September 2003 and found that the average price at the low end charged by nonprofits was $19, compared with $31 by the for-profits; however, at the high end there was only a minimal price difference, which averaged approximately $70.20

Some researchers have attempted to explore whether institutional forms (e.g., nonprofit versus for-profit) necessarily imply different market behavior (e.g., Schlesinger 1998). Our results indicate that at least for pricing decisions, institutions that are different in nature should behave differently in the rational pursuit of their goals. By the same token, if no substantial difference is observed on nonprofits’ pricing practice, it is likely that either the management is inefficient or, according to Weisbrod (1988), the nonprofits are just “for-profit in disguise.”

Our analysis provides support for the view that market competition can be an effective mechanism for driving managerial efficiency for nonprofits (e.g., Pires 1995). As we have shown, the nonprofit is sensitive to changes in costs. Beyond certain upper boundaries, it cannot survive the competition. Thus, to serve its goals better, the nonprofit needs to strive for lower costs by efficient production and management.

The duopoly model we analyze is static in nature. The differences between for-profits and nonprofits make it worthwhile to examine some dynamic aspects. Besides the issue of long-term efficiency, our results imply that nonprofits and for-profits may differ in innovative behavior and in the adoption of advanced technologies (e.g., the Internet). The findings that nonprofits are more sensitive to changes in fixed costs and that they do not have access to equity markets make it more difficult for nonprofits to bear a significant startup cost in order to be innovative. Moreover, compared with investors in equity markets, private donors and government agencies appear to be less motivated to bear risks of innovative behavior.21

Our main results, which we developed in detail for a quantity-maximizing organization, hold for a broad range of nonprofit objective functions. Nevertheless, some nonprofits pursue other goals. For example, producer self-satisfaction is an important objective for some arts organizations (Adizes 1975; Voss, Cable, and Voss 2000). Empirical studies of both the prevalence of different objective functions and their impact on competitive behavior are

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19Mathematically, the net consumer surplus provided by organization i (when competing with organization j) is

$$\text{NCS}_i = \int_{p_i}^{p_j} \frac{1}{\theta p_i p_j (1 + \theta)} \left(1 - \frac{p + \theta (p - p)}{2}\right) dp,$$

where $p_i$ and $p_j$ are the price levels.

20This points to a possible behavioral feature of the nonprofit: As it is trying to maximize usage, it may charge a higher price to customers whose willingness to pay is greater. We leave this issue for further research.

21Gallagher and Weinberg (1991) suggest that public scrutiny of nonprofits and of government spending may be important factors underlying such risk aversion.
needed. Our theoretical results imply several empirical questions to be addressed by further research. For example, it would be worthwhile to examine a particular industry (e.g., child day care) for the predicted pricing patterns that are related to variables such as organizational types, market structure, and donation levels.

Moreover, we have focused on one type of nonbusiness organization only: the nonprofit. Other organizations, such as cooperatives, associations, government agencies (e.g., the Tennessee Valley Authority), and crown corporations (in England, Canada, and elsewhere), also pursue goals other than profit maximization (e.g., Blais and Dion 1990; Kwoka 2002). For example, several government-backed insurance organizations (e.g., Wisconsin State Life Insurance Fund, Oregon Medical Insurance Pool) play an important role of risk mitigation in some of the insurance markets. The analytical approach developed herein can be used to study their competitive behavior and possibly to further studies on other markets in which organizations with different objective functions compete.22

In this article, we do not model product decisions; thus, product positioning is exogenous. We recognize that the ideology of nonprofits may constitute an important factor driving them to provide products or services that profit-oriented firms do not provide (or underprovide). Although price competition alone shows many interesting results, it would be beneficial to model more than one dimension of competition. A possibility is to explore how nonprofits compete with for-profits on both price and quality. As Rose-Ackerman (1996) speculates, they may end up serving different market segments.

Appendix

Closed-Form Expressions

\[
K = 12c^2\theta + 9c^2\theta - 8c - 18c\theta^2 + 9\theta^2 + 4 + 120 \\
+ 4c^2 - 24c\theta - 160\theta^2 - 80\theta^2 - 96\theta^2 - 32F.
\]

\[
M = 4c\theta + C^2\theta^4 + 4 - 2c\theta c_n - 12c\theta^2 c
- 4c\theta c + c^2\theta^2 - 8c^2 + c^2\theta + 12F \\
- 10c\theta^2 - 10c\theta c_n - 8c\theta^2 + 12\theta \\
- 8c\theta - 12c - 80\theta^2 + 20c\theta^2 + 8c\theta^3 \\
+ 16c^2\theta^2 + 12c^2\theta^3 - 6c\theta^3 + 6c\theta^3 - 96\theta F.
\]

Comparison of Nash Equilibrium Prices in the For-Profit Versus Nonprofit Duopoly Market

We used a backward deduction process to compare the magnitudes of \(p_n^*\) and \(p_f^*\). If we assume that \(p_n^* \leq p_f^*\), we have

\[
p_n^* \leq \frac{1 + (1 + \theta)c + \theta p_n^*}{2(1 + \theta)}
\]

from Equation 5. This translates to

\[
p_n^* \leq \frac{1 + c + c\theta}{2 + \theta}.
\]

In contrast, Equation 6 indicates that any valid solutions of \(p_f^*\) and \(p_n^*\) need to satisfy \([1 + \theta p_n^* + (1 + \theta)c] \geq |p_n^* \times 2(1 + \theta)|\), because the expression under the square-root sign needs to be nonnegative. Substituting Equation 5 for \(p_f^*\), we have

\[
2(1 + \theta)p_n^* \leq 1 + \theta \frac{1 + (1 + \theta)c + \theta p_n^*}{2(1 + \theta)} + (1 + \theta)c,
\]

which results in

\[
p_n^* \leq \frac{2 + 30 + 50c + 30c^2 + 2c}{4(1 + \theta)^2 - \theta^2} = \frac{1 + c + c\theta}{2 + \theta}.
\]

Inequality A6 is exactly the same as inequality A4. By definition, Equation A6 holds as long as there is an equilibrium. Thus, it must be the case that \(p_n^* \leq p_f^*\) at any equilibrium. Market equilibrium breaks down before the nonprofit begins to charge a higher price than does the for-profit.

The Properties of Price Equilibriums

We examine the existence of price equilibriums and their relative sensitivities to changes in costs and competitive intensity. First, we simultaneously solve two inequalities \((K > 0\) and \(p_n^* \leq p_f^*)\) to ensure that \(p_n^*\) and \(p_f^*\) are valid expressions. This results in a possible upper bound of \(F\) above which no equilibrium exists:

\[
F_{\text{max}} = \frac{(1 - c)^2(1 + \theta)}{2(2 + \theta)^2}.
\]

Second, as long as the equilibrium obtains, the nonprofit remains at breakeven. For the for-profit, we substitute the equilibrium prices back into Equation 2 and solve \(\pi_f(F, c, \theta) = 0\). We then derive two critical values of \(F\):

\[
F_1 = (40^2 + 40 + 1 - 2c + 8c\theta - 8c\theta^2 + 4c\theta^2 + 4c^2\theta^2 - 96\theta^2 + 160\theta^2 + 20c\theta^2 + 8c\theta^3 + 16c^2\theta^2 + 2c^2\theta^3 - 6c\theta^3 + 6c\theta^3 - 96\theta F).
\]

\[
F_2 = (1 - c)^2(1 + \theta) \quad \frac{2 + 30 + 50c + 30c^2 + 2c}{4(1 + \theta)^2 - \theta^2}.
\]

It holds that \(F_1 < F_2\) (note that \(F_2 = F_{\text{max}}\)). The for-profit is able to earn positive profit when \(F\) is less than \(F_1\), and \(\pi_f\) decreases as \(F\) increases. However, when \(F\) falls within \((F_1, F_2)\), \(\pi_f\) becomes negative. Thus, a market exists in equilibrium only when fixed cost is lower than \(F_1\).

We can similarly obtain the effect of competitive intensity (\(\theta\)) on the prices. First, corresponding to Equation A7, \(\theta\) must be in the following range for a price equilibrium to exist:

\[
\theta_{\text{min}} = \frac{-8F + (1 - c)^2 - \sqrt{B}}{4F},
\]

\[
\theta_{\text{max}} = \frac{-8F + (1 - c)^2 + \sqrt{B}}{4F},
\]

22We have assumed that the nonprofit provides its product by charging a positive price. We thus exclude cases in which nonprofits provide free products. In those cases, nonprofits may cross-subsidize their activities with revenues from other sources, such as donations, government grants, or mission-related commercial activities (Schiff and Weisbrod 1993). Olson’s (1971) by-product theory provides an appealing framework for modeling such situations.
where \( B = -8F + 16Fc - 8Fc^2 + 1 - 4c + 6c^2 - 4c^3 + c^4 \). We can show that \( \theta_{\text{min}} \) is always negative and thus that the effective range of \( \theta \) becomes \((0, \theta_{\text{max}})\). Second, another critical value of \( \theta \), which we denote as \( \theta_1 \), exists between 0 and \( \theta_{\text{max}} \). When \( \theta \) falls within \((0, \theta_1)\), the for-profit receives positive profits at equilibrium. When \( \theta \) falls within \((\theta_1, \theta_{\text{max}})\), the for-profit cannot cover fixed costs and thus loses money. The duopoly equilibrium obtains only when \( \theta < \theta_1 \). Because analytical solutions are not possible, we examine the properties of \( \theta_1 \) with numerical processes. We calculate the exact values of \( \theta_1 \) at a dense grid of values of \( c \) and \( F \). We then use these values in a linear regression with \( \theta_1 \) as the dependent variable and \( c \) and \( F \) as independent variables. The regression results in \( \theta_1 = 14.25 - 19.18c - 151.99F \), with a satisfying \( R^2 \) of .70.

**Stackelberg Leadership When a For-Profit and a Nonprofit Compete**

In this section, we provide detailed analysis for the Stackelberg games. Figure A1 illustrates the economic structure when either the nonprofit or the for-profit takes the Stackelberg price leadership. The isoprofit curves, which are shown in Figure 1 to be well behaved, are essential in deriving the Stackelberg solutions.

**Nonprofit Stackelberg**

Recall that the Nash equilibrium and the nonprofit Stackelberg equilibrium are identical. Figure A1, Panel A, provides the explanation for this result. As the Stackelberg leader, a competitor has the opportunity to select any point along the follower’s reaction curve, which contains the Nash solution. Although a profit-seeking price leader usually moves to a different isoprofit curve where profits are greater, the nonprofit remains on a single isoprofit curve, \( \pi_n = 0 \), as a result of the (binding) budget constraint. Thus, instead of having a continuous choice among the points along \( \pi_f^*(\pi_n) \), the nonprofit only makes a discrete choice between \( \pi_{nNS} \) (shown as Point A) and \( \pi_{fNS} \) (which is the Nash solution). As we discuss in the text, \( \pi_{fNS} \) and the corresponding \( \pi_{nNS} \) lead to higher quantity for the nonprofit.

**For-Profit Stackelberg**

As we note in the text, closed-form solutions for the for-profit Stackelberg game cannot be found. We used Figure A1, Panel B, to derive the for-profit Stackelberg results. Recall from Figure 1 that \( \pi_f^*(\pi_n) \) is the price reaction curve of the nonprofit, and \( \pi_f^*(\pi_n) \) is that of the for-profit. If the Nash equilibrium (i.e., \( \pi_{nNS} \) and \( \pi_{fNS} \)) exists, it obtains at the intersection between the two curves.

Figure A1, Panel B, shows two types of for-profit isoprofit curves, which represent all possible situations. The first type is \( \pi_f^1 \) and \( \pi_f^2 \), and the second type is \( \pi_f^2 \). Note that the shape of these isoprofit curves directly relates to the intensity of competition (i.e., the magnitude of \( \theta \)). When \( \pi_f^2 \) is the isoprofit curve, the market is less competitive than when \( \pi_f^1 \) and \( \pi_f^2 \) are the isoprofit curves. This is because for a given amount of change in \( \pi_n \), the for-profit must make a greater change in \( \pi_f \) to maintain the same profit level if \( \pi_f^1 \) and \( \pi_f^2 \) are the isoprofit curves rather than \( \pi_f^2 \). In other words, as competition intensifies, the for-profit needs to change \( \pi_f \) to a greater extent to maintain a certain profit level in response to a given change of \( \pi_n \). As a result, \( \pi_f^1 \) and \( \pi_f^2 \) are graphically “flatter” than \( \pi_f^2 \). If the isoprofit curves follow the curves illustrated by \( \pi_f^1 \) and \( \pi_f^2 \), the for-profit Stackelberg leader can move to isoprofit curves that bring greater profit. The highest level it can receive while maintaining Stackelberg equilibrium is \( \pi_f^2 \). This obtains at Point B, the endpoint of \( \pi_f^*(\pi_n) \). Note that the for-profit enhances its profit by lowering the price from \( \pi_f^* \). This is a result of the unusual strategic substitutes pattern that \( \pi_f^*(\pi_n) \) follows and is in contrast to the established results for typical for-profit competitions (in which the Stackelberg price is higher than the Nash price). The for-profit’s price at Point B is the lowest it may charge; otherwise, the nonprofit cannot survive and the duopoly market ceases to exist.

If the isoprofit curves are similar to \( \pi_f^2 \), the Nash equilibrium is achieved at a tangent point on \( \pi_f^*(\pi_n) \). Specifically, the point at which isoprofit curve \( \pi_f^2 \) touches the reaction curve \( \pi_f^*(\pi_n) \) is the Nash equilibrium. Any other points on \( \pi_f^*(\pi_n) \) would lead to lower profits for the for-profit. As a result, the for-profit Stackelberg equilibrium is the same as
the Nash equilibrium. The intuition behind this result is as follows: In a less competitive market, little demand is gained from competition by lowering price. In the simultaneous game, the nonprofit’s intention to set price to the lowest extent induces both rivals to preempt most of the switchable demand. Thus, the for-profit’s potential gain from lowering the price is minimal; it actually does not compensate for the loss in profit margin. Even though the for-profit has the opportunity to do so as the Stackelberg leader, it will not receive greater profits than in the Nash equilibrium.

Recall that the competitive intensity is captured by the magnitude of \( \theta \). It is important to note that there is no absolute value of \( \theta \) that separates a less competitive market from a more competitive market. A particular value of \( \theta \) can imply a less competitive market if the costs (\( F \) and \( c \)) are low or a more competitive market if the costs are high. The same \( \theta \) with lower costs does not force rivals (especially the nonprofit) to compete as aggressively as they would in the case of high costs. The main reason is that lower costs imply a potentially larger profit margin, and it is relatively easy for the nonprofit to remain at breakeven (recall that we have shown that \( \theta_1 \) is monotonically decreasing in \( F \) and \( c \)).

References


