

The Nonprofit Sector and Industry Performance

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Abstract

Given the importance of nonprofit industries in the economy, little analysis has been conducted as to whether the behavior of such industries differs from that of for profit industries. Extending previous firm-level analyses, we propose a neoclassical theory with an endogenous nonprofit sector. Our analysis implies that nonprofit firms have a competitive advantage over for-profit firms, so that marginal changes in the industry operate through the for-profit sector. As such, marginal industry behavior is identical to that of a for-profit industry, and nonprofit regulations may have a limited impact or even no impact on overall industry performance. Our theory has the methodological advantage that standard for-profit analysis applies directly to nonprofit firms, because they can be analyzed as for-profit firms with lower costs. We discuss aspects of the empirical literature that test this theory of nonprofit activity.

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1 Introduction

From the birth of capitalism, governments have explicitly defined the concept of a nonprofit firm and regulated these firms accordingly. This definition has been written into Anglo-American law for at least 400 years. The English Statute of Charitable Uses, passed in 1601, granted tax-exempt status to organizations and their donors that engaged in specific types of charitable activities and that kept their annual incomes below the pre-specified limit of 200 pounds sterling.¹ The practice of granting tax relief in exchange for limits on firm behavior was brought to America by the colonists.² It has two important features, which continue to regulate nonprofit activity in today's federal and state tax law. First, only those firms that engage in a few *specifically named* activities—such as health care, poverty relief, or education—are eligible to become nonprofit.³ Outside such industries, the law does not grant nonprofit status to any firm, even though incentives for nonprofit production may be present. Second, a nonprofit firm must accept a constraint on the profits it can legally distribute. This has always been the price of nonprofit tax-exemptions.⁴

It has become increasingly important to understand the nature of the nonprofit sector, which now accounts for a substantial amount of economic activity. In the US, estimates suggest that this sector produces one-fifth of research and development, the vast major-

¹For a discussion of this Statute and the history of nonprofit law in England, see Adler (1922), Persons et al (1977), Belknap (1977), and Balk (1971).

²Federal tax exemptions for nonprofit charities were granted from time of the very first Federal tax acts (Belknap, 1977; Persons et al., 1977). The history of nonprofit tax exemption by the various state governments is examined by Zollmann (1924).

³In the US, for example, only those corporations and organizations engaging in charitable, religious, or public health activities, are eligible to apply for nonprofit tax-exemption under section 501(c) of the Tax Code (Department of the Treasury, 1997).

⁴In the US, nonprofit firms receive federal tax breaks through corporate income tax exemption, tax-deductibility for donors, and tax-free debt, which is of considerable importance for the hospital sector. State and local governments often complement these tax breaks through exemption from their income and property taxes.

ity of human capital outside of on-the-job-training, as well as the majority of health care production, which alone accounts for about one-sixth of US economic activity (Rudney, 1987). About one-fifth of all US firms are incorporated under nonprofit status. Health care production dominates the nonprofit sector in the US and accounts for about half its total employment. Most of this nonprofit activity is concentrated in hospitals, where eighty-five percent of employment is nonprofit, as it has been since the end of World War II. Education and research make up the second largest component of nonprofit employment with about twenty percent, followed by social services, such as child-care and job-training, with about fifteen percent.

Previous research on the nonprofit sector has analyzed the behavioral differences between profit-maximizers and firms with nonpecuniary motives.⁵ One strand of this analysis has emphasized the advantage nonprofit firms have in better controlling agency costs.⁶ Another has developed the premise that nonprofit firms find themselves at a disadvantage, because they lack the discipline and efficiency imposed by a residual claimant.⁷ The theoretical analysis has been accompanied by a large literature that has used firm-level data to assess within-market differences between nonprofit and for-profit firms.⁸

⁵The analysis of the effects of racial discrimination on input markets in Becker (1958) is an early formal discussion of nonpecuniary firm motives. For general discussions of the differences between nonprofit and for-profit firms, see Weisbrod (1977, 1987, 1988), Gaynor and Vogt (1999), Hansmann (1980), Powell (1987), Rose-Ackerman (1986, 1996), and the references contained therein. For discussions of nonprofit firm behavior in health care, see Newhouse (1970), Pauly and Redisch (1973), Harris (1977), Becker and Sloan (1985), Gertler (1989), Gertler and Waldman (1992), Sloan and Steinwald (1980), Dranove (1988), Dranove and Ludwick (1999), and Sloan (1997). Also see Clotfelter (1992) for a discussion of the redistributive effects of nonprofit regulations.

⁶Glaeser and Shleifer (2001) present a useful formal discussion of this idea, along with several new implications of it; they build on the work of Hansmann (1987), James and Rose-Ackerman (1986), and Easley and O'Hara (1982). The normative implications of nonprofits' ability to address unobservable shirking on quality are discussed in Shleifer (1998).

⁷See Alchian and Demsetz (1972) or Borjas et al. (1983).

⁸Sloan (1999) has written a recent review of this empirical literature.

However, even though there exists much popular and academic concern about the extent to which non-profits should be involved in an industry,⁹ little seems understood about how competition between the two organizational forms affects aggregate *industry* performance, as opposed to firm-level behavior. This has left a significant void in the literature, because evaluating regulations or other changes in mixed industries requires a positive theory of how such industries respond to them.¹⁰

The crucial first step in understanding these industries is accounting for the choice of profit status. Any firm in a nonprofit-eligible industry is free to choose its profit status. We argue this choice is governed by a tradeoff between the ability to keep profits in the for-profit sector, and the tax subsidies available to nonprofit firms. No profit-maximizing firm would forego its profits simply to receive cost-reducing subsidies. However, firms funded by the capital of donors with nonpecuniary motives—evidenced by the absence of pecuniary returns on donations to nonprofit firms—may wish to forego profits in order to expand output. This implies that firms choosing nonprofit status are more likely to have nonpecuniary motives. As a result, they will enjoy a competitive advantage over for-profit firms, because altruism makes them willing to sell output at a lower price. Indeed, we show that altruistic firms can be usefully analyzed as if they were pure profit-maximizers with a cost-advantage. This cost advantage is reinforced by regulatory benefits, such as lower taxes.

This implies that nonprofit firms have a competitive advantage over for-profits, and that for-profit firms are the marginal ones that respond to changes in regulations, market condi-

⁹Consider, for example, the debates over for-profit medicine and education in the US, or for-profit lotteries in England.

¹⁰There is, however, an emerging body of empirical work studying competition in industries with nonprofit and for profit firms, pioneered by Gaynor and Vogt (2003).

tions, or other incentives. This in turn has the important methodological implication that mixed industries may be analyzed using the standard neoclassical methods developed for the for-profit sector, because marginal industry changes operate through that sector alone. These insights lead to several important positive and normative implications. Nonprofit regulations influence an industry through their impact on the *for-profit* sector, and in particular through their impact on the entry and exit of for-profit firms. Indeed, since industry performance depends on the cost structure of the for-profit sector, the industry will not respond at all when for-profit firms are homogeneous and perfectly competitive. Note that this nonprofit neutrality result obtains even though we predict firm-level differences in the behavior and objectives of nonprofits and for-profits.

Although industry performance may not respond to nonprofit regulations, the marginal position of the for-profit sector does help explain why some markets are dominated by nonprofits more than others. In particular, we predict that growth in demand will induce entry by marginal for-profit firms and thus raise the share of for-profit activity in the industry. Similarly, a reduction in publicly-provided output will lead to an increase in for-profit output, because the exit of public firms leads to entrance by marginal for-profit firms. This is consistent with the aggregate historical experience of the largest nonprofit industry in the US—hospitals. From 1948 to 1998, the aggregate share of nonprofit hospitals remained remarkably stable, at around 70 percent. Over the same period of time, however, changes in the share of public hospitals offset changes in for-profit share nearly perfectly. From 1948 to 1973, the public share rose from 18 to 30 percent, while the for-profit share fell from 22 to 11 percent. From 1973 to 1998, on the other hand, the public share fell from 30 to 26

percent, while the for-profit share rose from 11 to 14 percent.¹¹

While the normative implications are surprising and interesting, their power rests on the validity of the positive implication that for-profit firms are marginal. The paper attempts to document that this implication is consistent with a broad array of empirical work on nonprofit behavior, and even sheds new light on earlier work.

Our analysis is generally applicable to industries with nonpecuniary motives. Even without nonprofit regulations, altruistic producers hold competitive advantages over their profit-maximizing peers, because their preference for output allows them to absorb pricing below average cost. This implies that altruists will be the first to enter and last to leave any industry, whether it is wine production, restaurant management, music, or art. The results are somewhat similar to the analysis of discrimination in Becker (1958), which can be thought of as a theory of reverse altruism, or a dislike for particular outputs or inputs.

The paper may be briefly outlined as follows. Section 2 discusses how the two sectors compete and argues that firms with nonpecuniary motives enjoy a competitive advantage over profit-maximizing firms. Section 3 derives the industry equilibrium and the movement of industry-wide variables in the presence of competition between the nonprofit and for-profit sectors. Section 4 discusses extensions to the basic model, and Section 5 compares the empirical literature with our predictions.

¹¹Data are constructed from annual issues of *Hospital Statistics*, published by the American Hospital Association.

2 The Analysis of Firms with Nonpecuniary Motives

We first analyze the firm-level implications of altruism in production. Our analysis makes the crucial point that firms with nonpecuniary motives can be viewed most simply as profit-maximizers with a cost advantage. This allows the use of standard neoclassical analysis.

For a given level of output q , denote profits by $\pi(q) \equiv p(q)q - c(q)$, where $p(q)$ is the inverse demand function, and $c(q)$ is the cost function. The firm's owner derives utility from her own goods consumption y , as well as the inputs and outputs, x and q , of the firm.¹² Her preferences may be characterized by the utility function $u(y, x, q)$, where u is concave and increasing in consumption. Output preferences represent a desire to produce independent of monetary gain, but this may be distinct from the usual meaning of "altruism." For example, an educational institution may be willing to trade some profits for more research, or a hospital may be willing to lower profits in order to provide more advanced care, even though their motives for doing so may not be strictly "altruistic."

In this framework, the concepts of "investor" and "donor" are unified. Just as a profit-maximizing investor will invest in the company which maximizes her financial return, a profit-deviating donor will donate to the firm which maximizes her nonpecuniary objectives. The analogy between investors and donors also applies to profits: when a firm makes positive profits, the investor is the residual claimant; when the firm makes losses, the donor chooses to cover the loss out of her own consumption for the sake of her nonpecuniary objectives. Therefore, all our implications for the level of profits translate into implications for the level

¹²The case in which the owner values the industry's output in addition to her own produces qualitatively similar results. The fact that firms value their own output to some extent, however, is central. Without this assumption, there is a free-rider problem in which a single altruist has little incentive to enter the marketplace. This seems inconsistent with the appearance of small nonprofit firms in eligible industries.

of donations. We should stress, however, that even firms with few or no donations—such as hospitals—can be driven by nonpecuniary motives: in non-competitive settings, such firms can earn positive profits.¹³ Additionally, there may be an unobserved “donor” in the form of a residual claimant willing to absorb operating losses. Examples would be church- or university-affiliated hospitals, whose parent institutions may absorb operating losses, even though their donations are not readily observed.

Since we do not wish to separate ownership and control, the firm consists of a single investor/donor who has access to a production technology and maximizes $u(y, x, q)$ subject to the constraint that consumption y and input costs $w \cdot x$ must be covered by his wealth, y_0 , and sales:

$$y + w \cdot x \leq y_0 + p(q)q$$

As a result, the firm maximizes the induced utility function:¹⁴

$$v(q, \pi(q)) \equiv u(y_0 + \pi(q), x(q), q),$$

where $x(q)$ is the input demand function, and the endowment of wealth is represented by y_0 . If $v_q > 0$, we will call the firm a *profit-deviator*. Although the objectives of managers may be unclear, it seems less controversial to claim that donor-controlled firms value more than just profits, since donors invest with zero monetary reward. The first-order necessary

¹³For a discussion of nonprofit firms in non-competitive markets, see Lakdawalla and Philipson (1997).

¹⁴The problem admits an interior solution for consumption when $\lim_{y \rightarrow 0} u_y(y, x, q) = \infty$.

condition for the firm's problem may be written as

$$v_q + v_\pi \pi_q = 0 \Rightarrow p_q q + p = c_q - \frac{v_q}{v_\pi}. \quad (1)$$

In the special case of profit-maximization, in which $v_q = 0$, the above condition reduces to the familiar equality between marginal revenue and marginal monetary cost c_q . The more the producer values output relative to profits, the larger is the marginal rate of substitution $\frac{v_q}{v_\pi}$, the smaller is the *total* marginal cost (net of monetized utility from output), and thus the higher is output. The first order condition in equation 1 makes clear that profit-deviators act as if they maximize profits, subject to a reinterpreted or *effective* marginal cost function $c_q(q|v, y_0) = c_q(q) - \frac{v_q}{v_\pi}(q)$. This simple but important methodological point allows us to analyze nonprofit behavior in a neoclassical fashion, without developing a non-standard analytical framework.¹⁵

Altruistic production admits wealth effects that are not ordinarily present for profit-maximizers. For example, if output is a normal good in the sense that $\frac{\partial}{\partial y_0} u_q \geq 0$, the first order condition in equation 1 implies that richer altruists will choose to produce more than poorer ones, all else equal. Moreover, wealth can be thought of as isomorphic to the degree of output preference: a single wealthy altruist with moderate output preferences can take the place of several poorer altruists with stronger output preferences. Formally, the monetary value of output, $\frac{v_q}{v_\pi}$, rises both with the degree of altruism (u_q) and wealth (y_0).¹⁶ For the balance of this paper, we abstract from explicitly considering variation in wealth. Rather,

¹⁵Philipson and Posner (2001) exploit this to analyze antitrust policy for the nonprofit sector.

¹⁶Abstracting from input preferences u_x , v_π falls with wealth, holding output fixed.

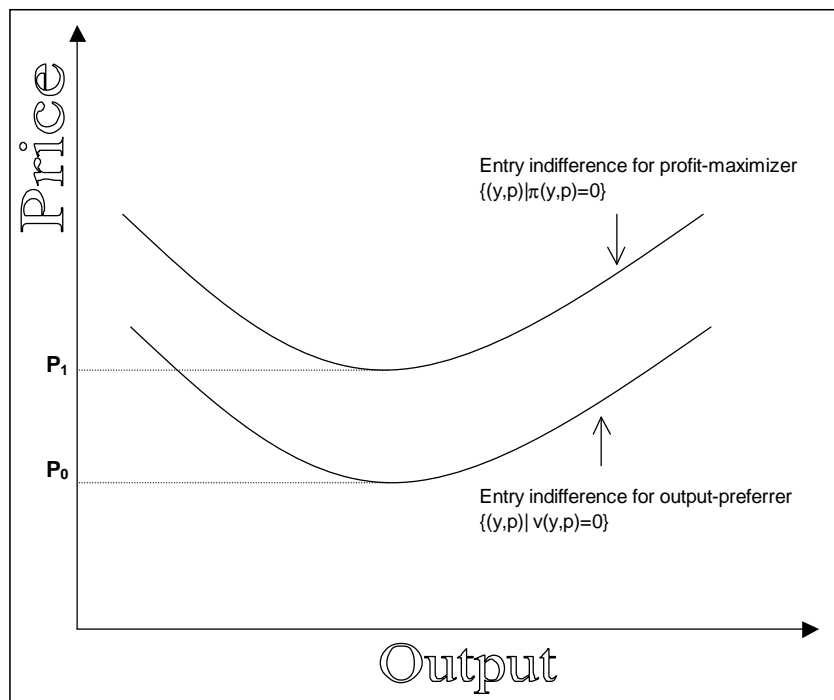


Figure 1: Long-run break-even curves for profit-maximizer and profit-deviator.

we think of an individual’s “altruism” as determined both by his marginal utility of output u_q , and by his wealth y_0 . Output preferences become stronger if marginal utility rises, or if the wealth of output-preferrers rise.

In the long-run, given free entry and exit in a competitive market, the break-even combinations of output and price (q, p) are defined by

$$v(q, pq - c(q)) = v(0, 0).$$

Under profit-maximization, these combinations reduce to the average cost-curve $p = c(q)/q$, which is assumed to have the standard U-shape throughout the paper. As illustrated in Figure 1, profits along the break-even curve are always negative for altruists, implying that

donations are made.¹⁷ Specifically, $v_q > 0$ and $v(q, \pi) = v(0, 0)$ implies $\pi < 0$. Altruists thus have average monetary costs above price at the break-even point. Although it has not been previously emphasized, the willingness of a profit-deviator to sustain pricing below average cost has important competitive implications. If there were an infinite number of potential suppliers of each type v , then the long-run price would move to its lowest point along the break-even curve of *all* types, leaving only the firms with the strongest nonpecuniary motives. In the case of two firm types, as in Figure 1, the lowest sustainable price is p_1 for the profit-maximizing firms and $p_0 < p_1$ for the profit-deviating firms. This directly implies that profit-maximizers may be driven out of the market by profit-deviators, even if all firms have the same production technology.

In a more general setting where donors/investors are separate from firms, the competitive advantage of profit-deviators is best understood as a lower cost of capital. Donations represent capital provided at negative interest rates, since they do not require interest or principal payments. However, the fact that nonprofit firms spend money soliciting and competing for the capital of donors provides evidence that donors, and thus profit-deviating firms, may be scarce.

3 Market Equilibrium with Nonpecuniary Motives

The previous section showed that a firm with nonpecuniary motives can be thought of as a neoclassical profit-maximizer with a cost advantage. In this section, we consider market

¹⁷These donations could be in the form of foregone profit opportunities, rather than simply monetary donations. Alternatively, donations could be implicit, in the form of tax breaks, demand subsidies, or volunteer labor.

equilibrium in an environment with profit-deviators and profit-maximizers. We consider both unregulated equilibrium, and equilibrium in the presence of regulated nonprofit status.

3.1 Unregulated Equilibrium

The starting point for our analysis of industry-wide outcomes is a distribution of preferences and technologies for firms. This precludes an analysis of how underlying preferences (or technologies) evolve, but it follows the usual conventions of neoclassical economic theory (although cf Becker, 1996). For simplicity, suppose preferences are indexed by the parameter $\alpha \in [0, 1]$.¹⁸ Profit-maximizers have $\alpha = 0$, and in general, a firm's preference for output rises in α . Call m the firm's minimum average cost of production. Altruistic firms act as if they were profit-maximizers with the *effective* cost functions $C(q|\alpha, m)$,¹⁹ where marginal and average costs fall in α , and m is minimum average production cost.

In this section, we consider the simplest case in which all firms use the same production technology. Just as with neoclassical analysis, this case provides the sharpest predictions. In Section 4.2, we explore more general joint distributions of preferences and technology. In this initial case, all firms have the same minimum average cost m , but they differ in their preferences. In keeping with the assumption of constant costs in the industry, we suppose there is a perfectly elastic supply of profit-maximizers, i.e., firms with $\alpha = 0$. There is also some distribution of profit-deviators, $A(\alpha)$, where A has support $(0, 1]$. Since the distribution

¹⁸In keeping with the previous discussion, α reflects the combined effects of underlying output preferences u_q and wealth y_0 .

¹⁹Given the cost-function $c(q)$, the effective cost function of an altruist is:

$$C(q|\alpha) = \int_0^q [c_q(\theta) - \frac{v_q(\theta, \pi|\alpha)}{v_\pi(\theta, \pi|\alpha)}] d\theta$$

This implies, as assumed throughout, that $C_q(q|\alpha)$ falls in α .

of altruism has very little impact on our results, we confine our attention to the case where $\alpha = \alpha_H > 0$ for all profit-deviators, and there are A such firms in total, where $A \in (0, \infty)$.

With homogeneous technology, all profit-deviators act as if they have lower costs than the profit-maximizers. Therefore, in mixed industries, profit-maximizers will be the marginal firms, whose behavior governs marginal changes in industry price and quantity. The long-run behavior of industry output and price are thus unaffected by the presence of profit-deviators. Profit-maximizing firms, those with the highest average and marginal cost, can survive only if the long-run price is at or above their minimum average cost. In other words, they can survive only if the output supplied by profit-deviators cannot satisfy demand at a price lower than m , the minimum average cost of all firms.

Formally, given a demand function $D(p)$, profit-maximizers can exist only if

$$D(p) > q(p|\alpha_H)A, \quad \forall p \leq m \quad (2)$$

where $q(p|\alpha_H)$ is the supply function of the profit-deviator. For the marginal firm $\underline{\alpha}$ whose rents, but not necessarily profits, are zero, effective average cost equals price:

$$p = \frac{C(q(p|\underline{\alpha})|\underline{\alpha})}{q(p|\underline{\alpha})}.$$

Only firms with enough altruism produce; that is, only firms with $\alpha \geq \underline{\alpha}$ are in the market. If there are enough altruists to cover market demand, the price will be $p = \frac{C(q(p|\alpha_H)|\alpha_H)}{q(p|\alpha_H)}$, which lies strictly below the minimum average cost of profit-maximizers m . In this case, the industry is entirely nonprofit.

However, if altruists cannot meet demand at the price m , the price rises to exactly m , and profit-maximizers enter until excess demand is eliminated. Therefore, under the standard condition of perfectly elastic supply among profit-maximizers, long-run price gets driven down to minimum average cost, and long-run quantity is given by the market demand at this price. In the long-run, the market behaves as if there were only profit-maximizers:

$$p = m,$$

$$Q = D(m).$$

In spite of firm-level differences in preferences and behavior between profit-maximizers and profit-deviators, the long-run industry equilibrium is unaffected.

Their altruism confers a competitive advantage on profit-deviators. This differs from previous findings, which emphasized the idea that profit-maximizers are more driven to please their customers in a competitive market. Under this view, if profit-maximizers price at minimum average cost, competitive markets force profit-deviators to eliminate rents they might otherwise spend on output (cf, James and Rose-Ackerman, 1986). Industry-level analysis leads to a different conclusion: competition allows profit-deviators to drive out profit-maximizers with neither market power nor a cost advantage introduced by regulation.²⁰

²⁰It is often claimed that because nonprofits spend donations on their own goals, rather than the goals of donors, nonprofit firms survive only when they possess market power (James and Rose-Ackerman, 1986). However, even in the presence of donations, competition across firm types eliminates waste and makes the firm's goals compatible with the donor's goals.

3.2 Equilibrium with Nonprofit Regulations

As discussed in the introduction, nonprofit regulations have long been a feature of capitalism. Therefore, the unregulated equilibrium discussed earlier has to be distinguished from the public regulation of production which defines the nonprofit sector. This distinction departs from previous analysis, which treats nonprofit status as exogenous and does not separate a firm's choice of *regulatory* status—whether nonprofit or not—from its *preferences*. This section discusses the industry behavior that results from competition between the regulated nonprofit sector and the unregulated for-profit sector. Nonprofit regulations affect industry behavior through their impact on the for-profit sector, and particularly through their impact on the entry and exit of for-profit firms. As a result, regulations will have no impact on industry behavior if long-run supply is perfectly elastic, in which case firm entry or exit does not affect industry price and quantity.

Let d indicate the regulatory choice of the firm, where $d = 1$ when a firm chooses to be for-profit and $d = 0$ when it decides to be nonprofit. The nonprofit sector is defined by a distribution constraint and cost-reducing tax breaks; nonprofits have lower corporate income, property, and benefit taxes. More precisely, under nonprofit status, the firm is constrained to have economic profits below a certain regulated level $\pi \leq \pi_R$, but under for-profit status, profits are unconstrained. Standard (as opposed to effective) cost functions differ across status: denoting by $c^d(q)$ the cost function in status d , we assume that $c^0(q) \leq c^1(q)$ and $c_q^0(q) \leq c_q^1(q)$. Holding output fixed, both total and marginal costs are lower in the nonprofit sector. A firm in sector d with preferences v now has the *effective* marginal cost function $C_q^d = c_q^d - \frac{v_q}{v_\pi}$, with the supply function $q^d(p|v)$. Since nonprofit firms have to respect the

distribution constraint, the respective profit functions for the two sectors are

$$\pi^0 = \min\{\pi_R, pq^0 - c^0(q^0)\}$$

and

$$\pi^1 = pq^1 - c^1(q^1).$$

Presented with the option of nonprofit status, the firm chooses between the ability to retain positive profits, and the ability to produce more output given nonprofit tax breaks.

We first consider the determinants of nonprofit activity at the firm and industry level in a competitive setting. When production technology is uniform, every profit-maximizing firm in the industry will choose for-profit status, because it does not value the extra output afforded by nonprofit tax breaks. Every profit-deviating firm, on the other hand, will choose nonprofit status, because the non-distribution constraint never binds on it in equilibrium.²¹ To understand this result, consider first the case where the marginal firm is profit-maximizing. It earns zero profits at the equilibrium price p . Since all profit-deviators are more altruistic than the profit-maximizing marginal firm, they will choose higher output and lower (negative) profits than the marginal firm.²² Now suppose that the marginal firm

²¹This presumes that $\pi_R = 0$. In reality, $\pi_R < 0$ is more likely: donors cannot recover a financial return that is even equal to the opportunity cost of capital; this makes distributed *economic* profits strictly negative. This means that profit-maximizers strictly prefer for-profit status. However, this also means that a very weak degree of altruism might not be enough to overcome the loss of financial profits equal to opportunity cost, so that some sufficiently weak altruists (i.e., those with relatively low α) may choose for-profit status. We restrict our attention to firms sufficiently altruistic to forego the opportunity cost of capital. Considering these weak altruists explicitly would introduce heterogeneity into the costs of for-profit firms but would leave our results otherwise unchanged.

²²To see that profits fall with altruism, observe that a firm with utility $v(q, \pi(q))$ will respect the first order condition $\frac{v_q}{v_\pi} = c_q - p$. Since $\frac{v_y}{v_\pi}$ is a measure of altruism, the more altruistic firms will choose a higher cost-price differential. In other words, more altruism leads to higher output and lower profits.

is profit-deviating. It must be earning negative profits, in order that its rents be driven to zero; all other profit-deviators are at least as altruistic as the marginal firm and must also be earning negative profits.

Denote by $m \equiv \min_q \frac{c^1(q)}{q}$ the minimum average cost of a for-profit firm. Since nonprofit producers are altruistic, they can be thought of as facing lower minimum average (effective) cost than for-profit producers. They are willing to produce at less than m . As a result, for-profit firms will be able to enter only if the output supplied by nonprofit firms does not meet demand at any price below m :

$$q^0(p|\alpha_H)A < D(p), \quad \forall p \leq m. \quad (3)$$

If this condition holds, the long-run price must rise to m in order to draw in profit-maximizers. There will then be $N^0 = A$ nonprofit firms, and N^1 for-profit firms covering residual demand at a price of m :

$$N^1 q^1(m|0) = D(m) - q^0(m|\alpha)A. \quad (4)$$

The for-profit sector is thus composed of marginal firms. As a result, industry behavior mimics that of an entirely for-profit industry, insofar as the long-run price is equal to minimum average cost. We continue to have the neoclassical results that $p = m$ and $Q = D(m)$. In addition, since marginal changes in aggregate price and quantity are driven only by the response of the marginal firm, changes in tastes, technology, or government policy affect the industry entirely through their impacts on the for-profit sector; put differently, one may understand the industry's response to any intervention without knowing anything about the

nonprofit firms in the industry.

3.3 Aggregate Industry Effects of Public Interventions

The type of competition that makes for-profit firms marginal also has implications for how the nonprofit sector affects industry-wide behavior. First, reductions in nonprofit costs, such as tax breaks, do not affect aggregate price, quantity, or consumer welfare, unless they affect the marginal for-profit firm. However, cost reduction will tend to raise the share of activity conducted by nonprofit firms. This may result from increased tax breaks for nonprofits, increases in the supply of donated labor, or increases in the availability of altruism. Since the analysis is the same for all these sources of cost reduction, consider the case of tax breaks without loss of generality.

Suppose that tax breaks reduce the costs of nonprofit firms by some fraction r , and that the monetary cost function for nonprofit firms can then be written as

$$c^0(q) = (1 - r)c^1(q)$$

On the level of the firm, increases in r clearly raise output and lower long-run price. However, changes in r affect the industry only if they influence the marginal firm, whose costs may not even depend on r . Growth in r will tend to raise the level of nonprofit output and will thus drive out some profit-maximizing firms. The share of for-profit firms and for-profit output will fall as a result.²³ However, recall that the industry-wide long-run price is given by

²³Note that changes in the share of nonprofit activity do not affect industry behavior, even though the same economic variables may affect both the share of nonprofit activity and industry behavior.

the minimum average cost of the marginal for-profit firm. If all potential profit-maximizing entrants have the same cost structure, and if the increase in r does not raise the output of the nonprofit sector enough to drive all for-profit firms out of business,²⁴ the increase in r will affect neither price nor quantity at the industry level:

$$\frac{dQ}{dr} = \frac{dp}{dr} = 0$$

The same neutrality would hold if, for example, the distribution constraint were made more stringent. However, changes in regulations will have some effect on price and quantity in the short-run, where the supply of for-profit firms may be constrained and marginal costs may slope upward. In this case, the exit of higher cost for-profit firms may lower the minimum average cost of the new marginal for-profit firm. This would lower the industry-wide price and raise industry-wide output. In both cases, however, regulations affect industry-wide prices and quantities only to the extent that they impact the *unregulated* sector, because between-sector differences are eliminated by competition.

The effect of changes in demand is similar. Suppose that an increase in demand subsidies (or a shift in consumer tastes) raises demand for the industry's output. At the prevailing price, industry-wide output must rise, and new for-profit firms must enter to meet the increase in demand. As a result, the share of for-profit output and firms must rise. In the long-run, where supply is perfectly elastic, entrance by new for-profit firms has no effect on industry-wide price, even though industry-wide quantity rises. In the short-run, supply

²⁴In industries without any for-profit sector, the effect of changes in r will be precisely the same as the effect of an industry-wide Pigovian subsidy.

may be upward sloping, and the increase in demand may also raise industry-wide price.

Supply-side interventions in the market also have unusual effects in the presence of non-profit firms. In Section 2, we observed that wealth increases the output of altruists whenever output is a normal good to firm owners. This contrasts with the usual independence of wealth and output in the profit-maximizing firm. Increases in the wealth of consumers raises demand and for-profit share. However, increases in the wealth of *producers* raises nonprofit share, because it makes altruists more willing to produce, while leaving for-profit firm behavior unaffected. Therefore, any supply-side intervention that increases the wealth of firms—e.g., an across-the-board tax cut that leaves relative and absolute input prices unchanged—increases nonprofit share.

Finally, entrance by publicly-funded firms will raise industry-wide quantity and lower price only in the short-run, but not in the long-run. Moreover, public production trades off on a one-for-one basis with *for-profit* production. If Q^g denotes the exogenously chosen output produced by the government, there will be mixed production in the private sector as long as demand at minimum average cost is not exhausted by the public and nonprofit sectors: $D(m) \geq Q^0 + Q^g$. The private market functions as always, with consumers being served first by nonprofit firms, and for-profit firms covering any residual demand. Assuming that we continue to observe mixed production, the output of the nonprofit sector is given exactly as before: the A altruists produce their optimal output at the price m . However, the output of the for-profit sector is decreased by the entrance of public firms, because there is less residual demand to cover. This exit of for-profit firms will not affect prices and quantities in the long-run, where supply is perfectly elastic, but it will lower the share of

for-profit activity. The output of the private nonprofit and for-profit sectors may be written as:

$$Q^0 = q^0(m|\alpha_H)A$$

$$Q^1 = D(m) - Q^g - Q^0$$

In fact, the public sector *perfectly* crowds out the for-profit sector, but does not affect the output of nonprofit firms.²⁵

$$\frac{dQ^0}{dQ^g} = 0$$

$$\frac{dQ^1}{dQ^g} = -1$$

Only the for-profit firms get crowded out, because they are at a competitive disadvantage relative to the private nonprofit firms. A one percent increase in public market share will induce a one percent decrease in for-profit market share, while leaving the market share of nonprofits unchanged. This contrasts with the view that nonprofit production exists to fill needs not met by the public sector (cf, Weisbrod, 1988).

Much like the rest of our theory, this discussion of policy interventions presumed that preferences and technologies remain stable. These represent the primitive parameters in our economy within the confines of which comparative static results play out. We have covered the case in which public policy can stimulate nonprofit activity—e.g., by awarding bigger tax breaks—but we exclude the possibility that it can stimulate *altruism*, which we have

²⁵When there are no for-profit firms, public firms may crowd out some nonprofit firms.

argued is the underlying psychological parameter distinct from the observed profit status choice. It is conceivable that public policy could stimulate altruism itself, whether by means of stimulating public-spiritedness, patriotism, and the like, but we leave this possibility to future work.

4 Extending the Basic Model

In presenting our theory of industry behavior, we have focused on the conventional case of quantity provision with identical production technologies. Extending the model to include the provision of different quality levels and heterogeneous production technologies is straightforward.

4.1 Quality Competition and the Nonprofit Sector

Suppose that all firms can choose to operate at different quality levels, and that profit-deviators may value quality in addition to quantity. In fact, they may prefer lower or higher quality levels: e.g., a soup kitchen may produce food of lower quality in order to be able to serve more clients.

It is straightforward to derive a quality-differentiated industry equilibrium, with implications that are analogous to the base case. The key issue is the mix of firms that produce at a given quality level. For-profit firms are marginal at every quality level where they are present, and production will be mixed at every quality level where demand exceeds the availability of profit-deviators to supply it.

At a given level of quality, changes in nonprofit regulations operate through the for-profit

sector, whenever such firms are present. Moreover, if for-profit firms are homogeneous, changing nonprofit regulations only affects output at quality levels where there were not previously any for-profit firms. Second, as before, regulatory changes may affect the share of nonprofit firms and output at a given quality level. Changes which reduce nonprofit cost will (weakly) raise the nonprofit share at all quality levels, while increases in demand will (weakly) raise the for-profit share at all quality levels.

4.2 Heterogeneous Preferences and Technology

In this section we investigate how the distribution of primitive parameters, namely firm preferences and technology, affects the analysis of market structure and industry performance. These more general manifestations of our theory provide additional richness, but at the expense of some empirical sharpness. We consider the implied industry effects of a joint distribution $F(m, \alpha)$ of minimum average costs and altruism, where each combination of parameters has the firm-level supply schedule $q(m, \alpha)$.

Earlier, we discussed how output preferences are exactly analogous to wealth: higher wealth for an altruist functions exactly as a stronger degree of output preference, when output is a normal good. As a result, uniform increases in the wealth of suppliers function as uniform increases in altruism, and vice-versa. For this reason, it sacrifices no generality to consider a single preference parameter α that embeds both wealth and underlying output preferences. However, from a positive point of view, it is important to note that α is a derived parameter, which depends both on wealth and underlying output preferences. Market-wide increases in the wealth of altruists serve to raise the degree of output preference α , and

vice-versa.

The individual and aggregate implications of altruism and costs depend on how they co-vary. There is now an additional dimension along which competitive advantage varies: firms can be relegated to the margin if their preferences are less altruistic, *or* if their production technologies are less efficient. Define $\mu(m, \alpha)$ as the effective minimum average cost for a firm with preference parameter α and technical minimum average cost m . Given the joint distribution $F(m, \alpha)$, the general expression for the share of altruists in the market at a given price p can be written as:

$$\frac{\int_{\alpha > 0} I(\mu(m, \alpha) < p) dF(m, \alpha)}{\int_{\alpha \in [0, 1]} I(\mu(m, \alpha) < p) dF(m, \alpha)} \quad (5)$$

If all altruists have minimum average costs no greater than those of profit-maximizers, all the previous results hold exactly. This is equivalent to the existence of a sufficiently negative correlation between costs and altruism. However, differences arise if there is independence, weak negative dependence or positive dependence between these parameters. In these cases, the altruism of nonprofit firms must be balanced against their possible inefficiencies in production. As a result, there can be altruistic firms on the margin, and/or inframarginal profit-maximizers.

Consider first the case in which preferences and technology are uncorrelated. We can have nonprofit entrants, but on average, the pool of potential nonprofit firms will have lower effective costs than the pool of potential for-profit firms. Therefore, nonprofit firms will enter growing markets earlier than for-profit firms. In this sense, nonprofit firms are actually more responsive to new opportunities than for-profit firms. Empirically, this implies that

the mean age of nonprofit firms will tend to be higher. However, policies that lower the cost of nonprofit firms are no longer neutral: they can expand supply by drawing in new altruistic nonprofit entrants. There are also fewer clear implications about changes in the share of nonprofit firms, because both altruists and profit-maximizers can be on the extensive margin. The complications arise because altruism is no longer a sufficient predictor of a firm's effective costs; one must also consider technical efficiency. However, it is still true that the average altruist enjoys a cost-advantage over the average profit-maximizer. This yields an empirical implication of practical importance: conditional on monetary costs (which can be observed), nonprofits should be more likely to enter an industry and less likely to leave it.

The alternative case is that of a negative correlation between altruism and technological advantage. Altruism confers a competitive advantage, but this could be outweighed by technical disadvantages. From an empirical point of view, our theory implies that for-profit firms are more likely to be marginal, conditional on a level of technology. Unconditionally, there are no clear predictions on which firm type is more likely to be marginal, because the effects of altruism compete against the effects of technology. However, we continue to have the implication that nonprofit firms have a competitive advantage, conditional on monetary costs. More generally, this case demonstrates an important point that has not been widely appreciated: nonprofit firms are the less efficient ones only if they are exogenously endowed with less efficient technology; incentives alone can never lead to this result.

5 Empirical Evidence

While the general models provide some rich and interesting implications, the basic model of homogeneous technology provides the sharpest empirical predictions. In this section, we document the ways in which the simple model's implications match the body of extant empirical work on nonprofit industries.

The theory of industry behavior has several testable empirical predictions that flow from the marginal position of for-profit firms. Much of the existing empirical literature is consistent with this prediction. In an early study, Steinwald and Neuhauser (1970) find that, during the 1960s, statewide population growth appeared to drive growth in the market share of for-profit hospitals; for-profit firms thus moved to satisfy marginal increases in demand.²⁶ Relman (1980) argues further that the 1966 enactment of Medicare and Medicaid subsidization induced significant growth in the market share of for-profit hospitals. More generally, Schlesinger (1984) finds that sharp upswings in for-profit activity have followed the implementation of several public programs aimed at subsidizing demand. The converse also appears to be true, according to Gulley and Santerre (1993), who find that government regulation aimed at constraining price, such as rate review regulation in the hospital industry, has depressed for-profit market share.

More recently, Gaynor and Vogt (2003) have estimated a structural model of demand in the California hospital industry to study the behavior of nonprofit and for-profit firms. They find evidence consistent with our theory: nonprofit hospitals have lower marginal costs but

²⁶Steinwald and Neuhauser also report the finding that growth in per capita income is negatively correlated with growth in for-profit market share. This should not be as surprising as they suggest, because growth in per capita income will tend to increase the health of the population and lower the demand for hospital care. Growth in population at constant per capita income, however, will raise this demand.

enjoy higher markups than for-profit hospitals. They also provide evidence that nonprofits face less elastic demand than for-profit hospitals; this is also consistent with the market power afforded to inframarginal firms.

In addition, there is significant previous evidence that public production trades off with for-profit production. Gulley and Santerre (1993) find that, from 1967 to 1987, the aggregate market share of for-profit hospitals has risen by 5.5 percentage points, while the aggregate market share of public hospitals has fallen by 5.3 percentage points.²⁷ Lefgren and Philipson (1999) document the continuation of this trend through the early '90s and find further that the aggregate share of for-profit hospitals, as opposed to *market* share, has risen almost entirely at the expense of the aggregate share of public hospitals. Likewise, Ettner (1999) finds that for-profit psychiatric hospitals have replaced the output lost to the departure of many public psychiatric hospitals over the last few decades.

Finally, in earlier work, we have shown how the behavior of the US long-term care industry exhibits patterns consistent with the marginal position of for-profit firms (Lakdawalla and Philipson, 1997). States with more generous Medicaid coverage of long-term care exhibit a greater share of for-profit activity, measured by share of beds or share of nursing homes; this is consistent with the idea that areas with higher demand draw in more for-profit firms. In addition, higher shares of public production tend to be associated with lower shares of for-profit production, but unchanged shares of nonprofit production. This is consistent with a situation in which the presence of public providers perfectly crowds out for-profit provision, but not inframarginal nonprofit provision. Similarly, states with higher property taxation

²⁷Market share is measured as the share of beds.

rates, which affect the relative value of nonprofit status, are associated with higher shares of nonprofit activity.

The results above suggest that for-profit firms are more sensitive to demand changes, and more likely to enter or exit in response to changing market conditions. This is consistent with an alternative theory in which for-profit firms are marginal, but it is also consistent with one in which for-profits face lower costs of entry or exit, due to regulatory protections or capital market frictions (e.g., protection against involuntary bankruptcy) for nonprofit firms. Therefore, consider an alternative theory in which for-profit and nonprofit firms are equally likely to be marginal in terms of costs, but for-profit firms have lower entry and exit costs. This theory also predicts that for-profit firms are unconditionally more likely to enter or exit an industry in response to demand changes, but there is a testable difference, pointed out by Chakravarty et al. (2005).

If for-profits are marginal in mixed industries, the difference between for-profit and nonprofit exit rates ought to be greater in mixed markets than segregated markets. The entry cost theory would not predict this result. To see why, consider a world in which only entry costs differed. For-profits would universally exit and enter at higher rates than nonprofits, but these entry/exit rates would be independent of whether there are nonprofit firms present in the same market. Conversely, our model predicts that nonprofit firms are less likely to exit when for-profits are present than otherwise, because nonprofit firms are marginal only if there are no for-profits present. Chakravarty et al. (2005) provides support for our prediction. They show that for-profits are differentially more likely to exit from mixed markets than segregated ones. That is, the difference between for-profit and nonprofit exit rates is

larger for firms in mixed markets than for firms in segregated markets.

6 Concluding Remarks

We have presented an industry-level theory of nonprofit behavior and discussed its sharp empirical implications.²⁸ Industry-level analysis of the competition between nonprofit and for-profit firms leads to very different positive and normative implications than firm-level analysis. In spite of firm-level differences, the existence of a nonprofit sector has a limited impact on industry performance, for the classic case of perfect competition with homogeneous technology. More generally, nonprofit regulations matter only insofar as they influence the behavior of the for-profit sector.

The results of this paper flow from the crucial insight that for-profit firms are the marginal ones when both firm types are present. They are less likely to be altruistic, and they do not receive the preferential regulatory and tax treatment available to nonprofit firms. Both these characteristics put them at a competitive disadvantage. As a result, an industry with both types of firms will behave (and can be analyzed) on the margin just like a standard neoclassical for-profit industry, because its marginal firms are for-profit. This conclusion leads to important predictions about the industry-level impact of nonprofit regulations, changes in demand, technology, and public production.

Our paper suggests an important potential area of theoretical research on nonprofit activity: the efficiency of unregulated profit-deviating firms. Many researchers have argued that nonprofit firms, who lack residual claimants, do not behave efficiently in the sense that

²⁸Our theory is compared to and contrasted with other prevailing theories of nonprofit behavior in Malani and Philipson (2000).

they do not adopt marginal cost pricing (cf, James and Rose-Ackerman, 1986). Our analysis of the competition between profit-maximizers and profit-deviators implies, however, that Pareto-efficient production does not require marginal and minimum average cost pricing. Competition pushes the profit-deviator's efficient price below marginal and average monetary costs. There may be unexploited gains from trade between consumers and producers, even when prices are at cost. Their output preferences make it optimal for firms to price below cost, as evidenced by costs that exceed sales for many nonprofit firms, including most US universities. It seems necessary, therefore, to think more carefully about the meaning of efficiency in the presence of profit-deviating firms and consequently about the role of antitrust policy in mixed industries, a question that is taken up in Philipson and Posner (2001).

Our research also suggests a way for future researchers to interpret firm-level empirical analysis on the behavioral differences between nonprofit and other types of organizations. This analysis frequently regresses behavioral outcomes, e.g. pricing or output quality, on firm-level controls and a dummy for nonprofit status. Since the choice of organizational form is correlated with the behavioral outcome, the nonprofit dummy picks up both the difference in organizational form and the difference in the objectives of a firm that chooses to be nonprofit. In our analysis, more altruistic firms choose to be nonprofit, so that a nonprofit dummy would also pick up differences in altruism.²⁹ Therefore, the coefficient on these dummies cannot be used to ascertain the effect of taking away the tax advantages and non-distribution constraints of nonprofit status. The estimated effect will invariably

²⁹Norton and Staiger (1994) discuss the econometric issues posed by this endogeneity in their analysis of location choice.

include the effect of firm preferences, which are independent of regulation. This is also true because the firm-level coefficient may not reflect the industry-level effect. Our analysis shows that nonprofit firms may produce more than for-profit firms, even though the presence of nonprofit firms in an industry may have no effect. Future research can help provide a better understanding of how firm-level organizational differences can be used to assess the effects of changes in nonprofit regulations.

On a more general methodological level, it is somewhat surprising that economic research has not explored the effects of competition between the nonprofit and for-profit sector on industry outcomes. The almost exclusive focus on the for-profit sector in economics has overlooked this extensive part of the economy. Although special and idiosyncratic models of nonprofit firms exist in the literature, this paper demonstrates that *standard neoclassical analysis* of the profit-maximizing firm affords powerful and empirically testable predictions about industries with nonprofit firms. These industry-level predictions often conflict with those extrapolated from firm-level analysis. The well-established tools and results of neoclassical firm and industry behavior, including the assumption of profit-maximization and free entry, seem to have many unexplored implications for the nonprofit sector, both because profit-deviating firms may be viewed *as if* they maximized profits, and because the existence of the nonprofit sector itself may not cause an industry to behave any differently than an exclusively for-profit counterpart.

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