Nonprofit tax exemptions and market structure: The case of fitness centers*

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September 2014

Abstract

Nonprofits are increasingly present in industries with a large for-profit sector, raising questions about their competitive advantage afforded by the nonprofit tax exemption. We estimate an equilibrium model of market structure for recreation/fitness centers to assess whether nonprofit and for-profit firms compete directly for the same customer base. Our results suggest that the two ownership types serve independent markets. Consequently, nonprofits do not meaningfully crowd out for-profit competitors. We find that local property taxes, as a proxy for a firm's tax burden, significantly affect for-profit entry and that nonprofit entry would fall by 25%, without affecting for-profit entry, if the same property tax liability was imposed.

Keywords: entry, nonprofit firms, tax exemptions

JEL Classification: L10, L3, H25

*We thank the Entrepreneurship and Family Business Research Center and the Dean's Research Fund at the Wharton School for financial support. Besan Abu-joudeh, Luciana Costa, and Anthony DeFusco provided outstanding research assistance. All remaining errors are our own.

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1 Introduction

In the US, many industries are comprised of both nonprofit (NP) and for-profit (FP) firms. Within these industries, we observe significant variation in the market shares and entry patterns of both ownership types. Approximately 50% of hospitals are nonprofit, while nonprofit banks (i.e., credit unions) have a 7% market share. In higher education, for-profit institutions award approximately 18% of associate degrees and are gaining in market share (AHA, 2009; FDIC, 2009; College Board, 2009). In this research paper, we investigate the market structure of recreation/fitness centers in order to provide insight into two questions that arise as to why we would observe such different market structures: (i) Do consumers view the products as substitutes, or does each ownership type serve distinct segments of the population? And (ii), how much do tax benefits awarded to nonprofits affect entry decisions and competitive interaction?

Most theoretical models of mixed ownership markets suggest that the existence of both for- and nonprofit firms arises from the presence of asymmetric information between consumers and firms about quality of service provided in the market (Steinberg; 2006). Consumers value high quality, but may often be unable to observe a particular firm's quality level in advance. Since NPs do not need to (and cannot) return profits to their funders, they may have an incentive to offer higher-cost, and higher-quality, services. A firm's nonprofit status is then an effective signal of its high-quality offerings, and the nonprofit serves consumers with a high willingness to pay for quality.

The restriction on distributing profits implies that all investments and donations into the nonprofit are sunk; they cannot be reimbursed to the donor upon dissolution of the firm (Harrison and Laincz; 2008). Other benefits must therefore accrue to nonprofits in order to explain their existence. One possibility is that nonprofit firms value objectives outside of profit maximization; Lakdawalla and Philipson (2006) point to value placed on serving a large number of customers. They demonstrate that when nonprofits place independent weight on the quantity of services provided, they perceive marginal costs to be lower than a strictly profit-maximizing firm providing the same quantity. These lower costs can produce increased entry and decreased exits by nonprofits. A few studies have found evidence to support this hypothesis (Chakravarty et al.; 2006; Harrison and Laincz; 2008). The magnitude of increased entry due to such an altruistic motive has not been documented.

Beyond altruistic motives, nonprofits further benefit from sizable tax exemptions that may

similarly provide increased entry incentives. A nonprofit classified as a 501(c)3 organization under the US Federal Tax Code is not required to pay federal income tax and is, in most cases, also exempt from state income, sales, and property taxes. These exemptions can be substantial. Medium-sized businesses with between one and 2.5 million dollars in annual receipts, the size of a mid-sized fitness center, pay on average $43,000 in taxes in 2009, while survey-evidence compiled by IHRSA suggests that the same fitness centers' earnings before taxes range from $130,000 to $210,000.[1] The estimated tax burden thus amounts to between 20 and 33%.

This has generated debate over whether this degree of NP subsidization is appropriate, in particular in traditionally mixed industries, such as health care. For-profit firms argue that the exemptions provide an unfair cost advantage to nonprofits that allows them to be more competitive than they otherwise would, while providing services with unclear public benefit (see, e.g., Rose-Ackerman (1986) and for an industry account, Atkins' 2003 article in Club Industry on "Profit vs. nonprofit: Unfair Competition?"). Accordingly, legislators have in recent years required increased documentation from small charities under the 2006 Protection Act, and Congress questioned the IRS about its oversight of nonprofit hospitals in 2011. Given large deficits in state and local budgets, a number of states including Illinois and Connecticut have in recent years begun to challenge the property tax exemptions for some of their nonprofits.

The argument that tax exemptions grant unfair competitive advantages to nonprofits is predicated on at least two assumptions: 1) the tax exemption increases entry by nonprofits to the exclusion of for-profit competitors, and 2) nonprofit and for-profit services are substitutes.

Limited evidence is available to speak to the first assumption. Gulley and Santerre (1993) and Hansmann (1987) show that nonprofit market share is higher in areas with higher marginal tax rates. Whether this implies increased entry or decreased exit for nonprofits relative to for-profits is unclear. Harrison (2008) shows that higher tax rates encourage entry of nonprofits, in particular in industries with a greater likelihood of for-profit competitors. However, unlike the current paper, this previous study does not include matched for-profit firm data, but instead proxies for likely for-profit exposure using information on the nonprofit's sources of revenue.

Duggan (2002) addresses the second assumption by investigating the response of hospitals to an increase in California's Medicaid reimbursement rates. He finds that increased for-profit competition in a market increases the nonprofit response to the policy change consistent with a change in

[1] See IRS (2010), "IRS data book Table 2, FY 2009," available at `http://www.irs.gov/taxstats/article/0,,id=206490,00.html`, accessed on 01/04/2011; and IHRSA (2006) "Profiles of Success".

the objectives of the nonprofit hospital, implying at least some substitutability between the services of nonprofit and for-profit hospitals. Ballou (2008) and Freeborn et al. (2009) focus on whether nonprofits crowd-out their for-profit competitors. The results of these studies are mixed and complicated due to the presence of a large government sector. Ballou (2008) finds that a for-profit nursing home is more likely to enter a market in the absence of a nonprofit. He also shows that government nursing homes are more likely to enter markets which for-profits deem unprofitable. Freeborn et al. (2009) estimate a more general model of entry by substance abuse centers that similarly allows for strategic interaction between nonprofit, government, and for-profit centers. Their results suggest instead that in the three-sector substance abuse industry, it is government facilities that crowd-out other private (and nonprofit) clinics.

In this paper, we build a structural model of entry between for-profit and nonprofit firms that allows the value of entry to differ systematically between the two types of firms, due perhaps to potential altruism by the nonprofit. We incorporate the cost imposed on for-profits by state and local taxes into their profitability. This allows us to simultaneously investigate the intensity of competition in the sector and the effect that the disparate tax treatment of different ownership types has on entry. We use our model to predict how nonprofit entry, and indirectly for-profit market structure, would respond to a reduction in the nonprofit value equivalent to the estimated tax contribution to FP profit. To our knowledge, this is the first study to investigate crowd-out and the extent of crowd-out attributable to nonprofit tax exemptions.

We estimate our model using data on the market structure of for- and nonprofit fitness and recreation facilities in mid-sized markets. The fitness industry provides many advantages in implementing such a study. Nonprofits and specifically Young Men's Christian Associations (YMCAs) are a sizeable portion of the market, holding an estimated 20% market share and accounting for approximately 12% of facilities (IHRSA 2009, Guidestar). Moreover, unlike industries such as healthcare, education, and the arts, government involvement within the sector is minimal. Government-run fitness centers comprise an extremely small portion of the market. In addition, government grants and other third-party payments are also a relatively small portion of the revenue base for the YMCAs who rely heavily on membership dues and program service revenues.

Our paper proceeds in six sections. First, section 2 presents relevant background information about the recreational and fitness industry and the role of nonprofit competitors in the sector. It contains some detail about the organizational structure of the YMCA, which operates as a network

of largely independent local firms linked by a common mission. We then present in section 3 an empirical equilibrium model of entry by ownership type, allowing for type-specific differences in the value of entering a local market and incorporating directly the taxes that reduce a FP entrant's profitability. Section 4 outlines the data that we use to estimate the parameters of the model. We combine detailed information on the presence and count of non- and for-profit competitors in a set of local markets with market-specific demand and cost shifters. Since local tax data are typically difficult to collect, we detail our sources and approach to computing local tax burdens.

We then turn to the results of our estimation in Section 5. In contrast to some of the prior literature, our results suggest only limited competitive interaction between the for-profit and the nonprofit firms in the markets we study. While our evidence suggests that FP profitability declines significantly in the number of for-profit competitors a firm faces, nonprofit entry has only a statistically insignificant and economically small effect. Similarly, a nonprofit's entry decision is typically not significantly affected by the structure of the for-profit segment. We thus find evidence of minimal crowd-out by nonprofits. This suggests that concerns that nonprofit tax exemptions put for-profits at a competitive disadvantage are largely unfounded, at least in this setting. We also find, however, that local taxes depress FP profitability and that nonprofit entry would fall by 25% if the nonprofit's value were reduced by the full estimated tax impact. This suggests that tax policy is effective at promoting a nonprofit presence in local markets. We conclude in Section 6 with a discussion of our results.

2 Background

Recreation centers encompass several types of facilities including those strictly devoted to one particular sport (i.e., Racquetball/squash courts, swimming pools, and yoga studios). For the purposes of our study, we focus exclusively on centers providing comprehensive fitness facilities. Within this category, individuals could choose membership at a commercial or nonprofit facility. They may also be affiliated with an institution that provides fitness and health care facilities as part of its services. Examples include universities, hospitals, and churches. Outside this latter category where nonprofits are clearly present, nonprofit facilities comprise a nontrivial portion of the market. Their market share as of 2007 was approximately 20% according to membership statistics (American Sports Data, 2009). Of this 20%, Young Men's Christian Associations (YMCAs) are clearly the

dominant firm type with Young Women's Christian Associations (YWCAs) and Jewish Community Centers (JCCs) following as fringe competitors. Using our selected markets as an example, there were 245 YMCAs, 10 JCCs, and 3 YWCAs. Moreover, the JCCs hold only about .5% of the national membership market share. Our paper therefore uses YMCAs as the major nonprofit competitor.

The YMCA was initially founded in England in 1844 and the first US organization began in Boston in 1851. The founding organization focused on evangelical objectives early in its history but acquired an emphasis toward health and fitness toward the end of the 19th century. Today, YMCA's primary activities include operation of fitness facilities, sports and aquatic programs, and child care, including after school programs.

The YMCA is comprised of both a national resource office (the National Council) and a set of so-called 'member associations', or local YMCAs. Each local YMCA is an independent and autonomous 501(c) (3) tax-exempt corporation governed by a volunteer board of directors and locally funded. According to ReferenceUSA, there are 4,519 facilities nationwide associated with the YMCA in 2009. This facility count overestimates the number of fitness facilities as many of these are located at churches or schools, primarily providing after school services. Tax return information[2] provides a lower bound on the number of YMCAs since we obtain firm, not facility, level information. In 2010, there were approximately 1,100 active YMCAs in the country. Many of these firms operate multiple branches.

The National Council operates in some aspects akin to a franchisor. It has ownership to the name "Young Men's Christian Association" and all other intellectual property, which can only be used under its authorization by member associations. The local associations must meet certain affiliation requirements, including supporting the organization's statement of purpose, providing regular financial and other information to the National Council, recognition by the Internal Revenue Services as an exempt organization, and paying member dues to the National Council. Each local YMCA's national member dues are calculated on the basis of a "fair share support" formula, which amounts to approximately 1 to 2% of its revenue.[3] In 2010, YMCA member dues amounted to 55% of the National Association's total revenue. Other major sources of revenue include government grants and individual contributions.

In return, the National YMCA provides leadership and support to individual members. This consists of both financial and non-financial support. It acts as a unified voice of the YMCA and

[2]Obtained from GuideStar, `http://www.guidestar.org/`.

[3]Based on member dues expenses listed on Form 990 tax returns for a sample of 15 YMCAs in our data set.

communicates the message to national audiences; in 2010 the National Council spent $1.4 million on lobbying expenditures.[4] The National Association also works directly with local YMCAs by providing training and leadership development, helping develop skills in program areas such as child care, aquatics safety, and community development. Lastly, the National YMCA provides program support funding to new and underserved communities, which allows local YMCAs to offer financial assistance to low-income members of their community. These grants are usually limited in size, however. In 2010, the National Council distributed $8.3 million in grants to 593 US-based member associations.[4] The range of grant sizes awarded is from $5,050 to $1,126,741, with an average of $26,416 and median of $10,655.

In contrast to typical franchise arrangements, the National YMCA is relatively passive in the development and expansion of local YMCAs, leaving entry, changes in ownership, and consolidation decisions to its local member firms. If a community is interested in establishing a new YMCA, it must apply to the National Council for recognition and meet the minimum requirements: a population of at least 25,000 residents within a 12-mile radius, and a primary market analysis that determines community need and capacity.[5] If the proposed new market falls within 50 to 75 miles of a city with an already existing YMCA, the potential entrant enters into negotiations with that firm about expansion into the interested community. The National Council estimates the initial start-up cost for the first three years of operation to be one million dollars and this amount must be fundraised within the local community before a YMCA is recognized. Member associations must be self-supporting and derive revenue from contributions, membership, and program fees.

For the average YMCA, about 27% of revenues come from donations and grants while 60% are from program related services. These program revenues can further be broken down into dues (25% of revenues) and other program fees (34%). Membership fees paid for use of the fitness facility should be classified as dues while individual payment for swimming lessons are designated as other program service revenues. It is likely that the dues calculation is an underestimate. Membership fees are more likely to be incorrectly classified as program fees than the reverse. While we cannot ascertain the percentage of YMCAs that properly distinguish between these revenue sources, the data nonetheless suggest that a significant portion of YMCAs' revenue base stems from their fitness services.

[4]See the National Council's 2010 tax filings, available at `www.ymca.net/organizational-profile/form-990-2010.pdf`, accessed 11/29/2011.

[5]See `http://www.ymca.net/start-new-y/start-a-y-form.pdf`, accesses 11/25/2011.

The market share garnered by these YMCAs also does not appear to be concentrated to limited market areas. Table 1 presents general demographic characteristics for 7,744 Census places or groups of Census places, if they share zip codes or Census tracts, in the contiguous US. Of those cities, 751 markets, or about 10%, house at least one reported tax-return headquarter for an incorporated YMCA. These tax return locations do not take into account multi-branch firms. Using the 4,519 YMCA facilities listed in ReferenceUSA as an upper bound, we find that YMCAs are located in 1,276 of the 7,744 markets. These data also allow us to construct a lower bound on the number of YMCA fitness facilities nationwide by removing all branches that do not list NAICS code 713940 (Fitness and Recreational Sports Centers) as an industry description. We find that 1,063 branches, located in 373 markets, meet this criterion. These upper and lower bounds on the number of markets with YMCAs seem reasonable given that the firm counts using tax return data fall between them. Irrespective of the metric, we find that YMCAs are more likely to locate in larger markets and markets with a population that is more educated, wealthy, and slightly older. The population also tends to be represented by more single persons, and African Americans.

3 Empirical Model

We envision a market m with a total of N potential firm participants, segmented into N_{FP} for-profit firms (FP) and – in line with our empirical setting – a single nonprofit firm (NP). Each potential entrant i must decide whether to enter the market.

Similar to Bresnahan and Reiss (1990) and Gaynor and Vogt (2003), we model the per-firm profit function for for-profit competitors as:

$$\Pi_{FP} = V_{FP} \times q_{FP} - F_{FP} \tag{1}$$

where

$$\begin{aligned} V_{FP} &= \text{per-capita variable profit} \\ q_{FP} &= \frac{D_{FP}}{N_{FP}} \times S \\ D_{FP} &= \text{per-capita demand} \\ N_{FP} &= \text{number of for-competitors} \\ S &= \text{market size} \\ F_{FP} &= \text{fixed cost} \end{aligned}$$

Since we do not observe price and quantity information for the for-profit firms in our sample, we cannot estimate V and D separately and thus specify a reduced-form payoff function. As we discuss below, for-profit facilities offer a relatively homogeneous product, and we assume that they each earn an identical profit of

$$\pi_{FP,m} = \exp\left(X_m\beta_{FP} + g(N_{FP,m}, \theta_{FP}) + \gamma_{FP}I_{NP})\right) - F_{FP,m} \tag{2}$$

Here, X captures demand and cost characteristics that influence the profitability of the market. Functions of the number of for-profit and nonprofit competitors in the market (N_{FP} and an indicator for the presence of the nonprofit, I_{NP}) enter the payoff function separately, via $g(\cdot)$ and γ_{FP}, in order to capture own and cross-type competitive effects from firm presence similar to Mazzeo (2002).

Fixed costs are comprised of observed and unobserved components such that:

$$F_{FP,m} = \exp(Z_m\delta_{FP} + \eta T_m + \epsilon_{FP,m}) \tag{3}$$

Common measures of Z_m include the average land value in the market (Bresnahan and Reiss; 1991; Ballou; 2008). Our focus is on the property taxes for this land (T_m), which may be capitalized into rents in the case where the for-profit leases its facility.

For-profits also pay income taxes on their profits; we subsume both federal and state income

tax rates into τ_m. The after-tax payoff function is therefore:

$$\begin{aligned}\Pi_{FP,m} &= \pi_{FP,m}(1-\tau_m) \\ &= \Big(\exp(X_m\beta_{FP} + g(N_{FP,m},\theta_{FP}) + \gamma_{FP}I_{NP,m}) \\ &\quad - \exp(Z_m\delta_{FP} + \eta T_m + \epsilon_{FP,m})\Big)(1-\tau_m)\end{aligned} \tag{4}$$

Nonprofits, as discussed earlier, are generally not subject to income or property taxes. We therefore set $\tau_m = T_m = 0$. At the same time, other not-for-profit motivations may enter their objective function. Lakdawalla and Philipson (2006), for example, propose that nonprofits put weight on the quantity of consumers served. Then, the nonprofit payoff function takes the form:

$$\begin{aligned}\Pi_{NP,m} &= \pi_{NP,m} + \nu q_{NP,m} \\ &= V_{NP,m} \times q_{NP,m} + \nu q_{NP,m} - F_{NP,m},\end{aligned} \tag{5}$$

where, in contrast to the for-profit's fixed cost, the nonprofit fixed cost is given by:

$$F_{FP,m} \quad = \quad \exp(Z_m\delta_{NP} + \epsilon_{FP,m}) \tag{6}$$

For the same level of quantity, the payoff functions in Equations 4 and 5 illustrate three reasons why nonprofits may be more likely to enter a market. First, the lack of taxes increases firm profitability; setting $T_m = 0$ decreases the firm's fixed costs. Second, placing independent value on the size of the market served (q) irrespective of its role in profit increases the nonprofit's entry into a market. For example, the nonprofit may put weight on serving more members because it values better health and well-being for its customers (common in YMCA mission statements). Lastly, we allow for type-specific parameters on the demand and cost shifters to reflect that different ownership types face different demands and costs, providing a separate explanation for different entry propensities across types.

Without a more fully specified variable profit function, which would – beyond the available information on the nonprofit's price – require information on its competitors' prices, we cannot separately identify the weight the nonprofit places on market served, ν, from the intercept in its variable profit. We thus submerge it into variable profit, $V_{NP,m}$, which we specify as $\exp(X_m\beta_V +$

$h_1(N_{FP,m}, \gamma_V)$). Our ownership-specific parameters on market characteristics, β_V, thus capture the nonprofit motive of quantity maximization, but we are unable to directly quantify the portion attributable to a nonprofit motive, separately from preference differences between the services offered by nonprofit and for-profit firms.

We begin by initially assuming a similar reduced form for the nonprofit value as the for-profit specification. Since we observe prices, revenues, and thus quantity for nonprofits (see Section 4 for analysis of how we back out q), we use this information to then add a nonprofit demand function, which allows us to investigate potentially differential effects of the for-profit market on variable profits and the size of the market served by the nonprofit.

In the latter specification, we assume that the demand for fitness services offered by the nonprofit is given by

$$q_{NP,m} = \exp(X_m\beta_D + h_2(N_{FP,m}, \alpha_{NP}) + \epsilon_{D,m}), \tag{7}$$

where h_2 captures the effect of N_{FP} for-profit firms on nonprofit membership and ϵ_D represents the likely measurement error introduced into the nonprofit membership data by our revenue-based derivation, as discussed in Section 4.

Substituting in for q and grouping terms gives:

$$\begin{aligned}\Pi_{NP,m} = \exp(\big(X_m\beta_V + h_1(N_{FP,m}, \gamma_V)\big) \times \exp\big(X_m\beta_D + h_2(N_{FP,m}, \alpha_{NP})\big) \\ - \exp(Z_m\delta_{NP} + \epsilon_{NP,m})\end{aligned} \tag{8}$$

We consider several specifications for the effect of additional for-profit competition on an entrant's payoff and nonprofit membership. First, we allow the number of firms to shift payoffs linearly, resulting in $h_1(N_{FP}, \gamma_V) = \gamma_V \times (N_{FP})$ and $h_2(N_{FP}, \alpha_{NP}) = \alpha_{NP} \times (N_{FP})$. We also consider more flexible functional forms to capture that the impact of additional competition is likely larger in more concentrated markets, and introduce separate indicator variables for each observed market structure.

3.1 Equilibrium Concepts

Given the payoff functions above, we assume that firms make an entry decision by comparing the payoff to entering with the value of remaining out of the market, which we normalize to zero. An

equilibrium of the resulting discrete game is a for-profit/nonprofit entry configuration, (N_{FP},I_{NP}), such that given the entry decision of the nonprofit, all N_{FP} for-profit firms make positive profit, while an additional firm would earn negative profit. Similarly, an entering nonprofit needs to earn positive value given the for-profit competition it faces. Formally, the equilibrium conditions describing an optimal firm-configuration are:

$$\begin{aligned} \Pi_{FP,m}(N_{FP}, I_{NP}) &\geq 0 \\ \Pi_{FP,m}(N_{FP}+1, I_{NP}) &< 0 \\ \Pi_{NP,m}(N_{FP}) &\geq 0 \end{aligned} \tag{9}$$

Substituting for the value and taking logs results in the following equilibrium condition governing nonprofit entry:

$$\begin{aligned} \ln(\Pi_{NP,m}) = \big(X_m\beta_V + h_1(N_{FP,m}, \gamma_V)\big) + \big(X_m\beta_D + h_2(N_{FP,m}, \alpha_{NP})\big) \\ - (Z_m\delta_{NP} + \epsilon_{NP,m}) \geq 0 \end{aligned} \tag{10}$$

A reason behind our use of the logarithmic specification is that it facilitates identification of the total effect of demographic attributes and forprofit competition on nonprofit entry, while estimation of the quantity equation,

$$\ln(q_{NP,m}) = X_m\beta_D + h_2(N_{FP,m}, \alpha_{NP}) + \epsilon_{D,m}, \tag{11}$$

provides us with separate contributions to membership. Combining terms, we obtain the following entry condition:

$$\ln(\Pi_{NP,m}) = X_m\beta_{NP} + h(N_{FP,m}, \gamma_{NP}) - Z_m\delta_{NP} - \epsilon_{NP,m} \geq 0 \tag{12}$$

We have also estimated non-exponentiated versions of Equations 4 and 5, allowing quantity to enter the nonprofit value from entry multiplicatively and benefitting from functional form restrictions to estimate the separate effects of the variables of interest on per-member variable profit, but prefer this specification for identification purposes. Note further, that while our focus on differentiated

competition by ownership type resemble studies such as Mazzeo (2002) and Schaumans and Verboven (2008), our set-up differs in that we do not allow firms a choice of ownership type, which appears natural in our context.

3.2 Estimation

We estimate the parameters of the model by comparing the predictions of the entry model and demand equation to the configuration and membership information that we observe in data. We address the possibility of multiple equilibria, where multiple configurations – for example $(N_{FP}, 1)$ and $(N_{FP}+1, 0)$ – satisfy conditions 9, in estimation by applying an equilibrium selection rule, similar to Berry (1992) and Jia (2008). While we could in principal employ a moments-inequality estimator akin to Ciliberto and Tamer (2009) or Pakes et al. (2006), we find in our setting that the estimated parameters are stable under alternative equilibrium selection mechanisms. We thus employ this approach to simplify the counterfactual analyses we conduct using our parameter estimates below. We consider four equilibrium selection mechanisms: the for-profit moves first; the nonprofit moves first; the equilibrium with the highest industry value is chosen; or the most-profitable firm moves first.

In estimation, we truncate the number of for-profit entrants at six. For every realization of the error-terms $(\epsilon_{FP,m}, \epsilon_{NP,m}, \epsilon_{Q,m})$ and values for the payoff function parameters, the model, combined with the considered equilibrium selection rule, assigns a particular ownership-type configuration based on the market's data. With the two ownership types, the model's prediction of the firm configuration can take on one of 14 possible values.

We assume that the market-level unobservables, $(\epsilon_{FP}, \epsilon_{NP}, \epsilon_Q)$ are distributed according to a trivariate normal distribution with correlation coefficients of zero and standard deviations of $(1, 1, \sigma_Q)$. As discussed above, the nonprofit's value from entering depends on its combined prediction of q and V_{NP}. Since we assume that ϵ_Q represents pure measurement error, it does not enter this prediction of variable profit. As a result, the likelihood consists of the product of the likelihood of the observed firm configuration and the normal probability density function of the demand residual implied by the parameter set and the observed membership.[6]

[6]For the nonprofit side alone, we have also estimated models that allow for a correlation between ϵ_{NP} and ϵ_Q, using the index of fixed cost and the proximity to other YMCA locations outside of the market as exclusion restrictions for identifying the entry condition separately from demand. Such a specification controls for the role of selection on unobserved market attributes that could drive both entry and membership and confound the estimates of the remaining parameters. In practice, we estimated correlation coefficients that were both statistically insignificant and

We integrate the joint probability distribution $f(\epsilon_{FP,m}, \epsilon_{NP,m})$ numerically over the region of the $(\epsilon_{FP,m}, \epsilon_{NP,m})$ space that corresponds to the observed outcome. As in Mazzeo (2002), we employ smoothed simulated maximum likelihood to select the payoff function parameters that maximize the probability of the observed market configurations across all markets. The likelihood function is

$$L = \prod_{m=1}^{M} \left(\sum_{r=1}^{R} \frac{I((N_{FP}, I_{NP})^{p}_{r,m} = (N_{FP}, I_{NP})^{o}_{m})}{R} \right) \times \tag{13}$$

$$\left(\frac{J_m}{\sigma_Q} \phi \left(\frac{\epsilon_Q({qNP}^{p}_{m}) - \epsilon_Q({qNP}^{o}_{m})}{\sigma_Q} \right) {INP}^{o}_{m} + (1 - {INP}^{o}_{m}) \right) \tag{14}$$

where $(N_{FP}, I_{NP}, q_{NP})^{p}_{m}$ refer to the predicted ownership configuration and quantity, and $(N_{FP}$, I_{NP}, $q_{NP})^{o}_{m}$ are the outcomes observed in the data for market m. ϕ denotes the standard normal pdf, and J_m is the Jacobian of the transformation from ϵ_Q to q_{NP}.

4 Data

In order to estimate the model above, we need information on the presence of nonprofit and for-profit firms in selected markets, demand and cost characteristics of the market, including information on property and income taxes. We define a market as a Census place or set of Census places[7] that satisfy two criteria: (1) the total market population, calculated as the population of all of the Census places in the market, falls between 10,000 and 200,000 and (2) no other adjacent markets within 10 miles were larger than 10,000 inhabitants. This resulted in 629 medium-sized, self-contained markets that allow us to clearly identify the competing firms in the market, as well as the population that they serve. Figure 1 depicts a map of the dispersed markets.

Based on this market criterion, we used ReferenceUSA to acquire information on full-service fitness centers within these markets. We limit ourselves to eight sub-sectors within the 6-digit NAICS code 713940, defined as Fitness and Recreational Sports Centers. This classification rules out facilities that are not full-service fitness centers (i.e., swimming pools, kid's gymnasiums, squash/tennis courts).[8] We further eliminated, based on the facility name, any other facilities that were not

close to zero in magnitude. As a result, the parameters of interest were unaffected by introducing correlation between the two equations, motivating our current reliance on uncorrelated errors across equations.

[7]We identified Census places that fall into the same market area as follows. We overlaid the universe of Census places with zip codes and Census tracts using the online geographic correspondence engine MABLE/Geocorr. We grouped Census places together that shared either zip codes or Census tracts.

[8]The 8-digit NAICS codes are: 71394001, 71394009, 71394011, 71394013, 71394015, 71394016, 71394028, 71394030.

full-service fitness facilities.[9] In addition, we removed any duplicates in which seemingly different facilities were located at the same address.

The resulting sample contains 2,117 fitness facilities. In our analyses below, we treat the firms as homogeneous competitors, focusing on the number – rather than the identity – of for-profit firms per market. The ReferenceUSA data contain some basic firm descriptors that allow us to assess the validity of this assumption. Firms in the sample are typically small; 80% of them have less than 10 employees and 83% have sales below $500,000. Their facilities, in contrast, are relatively large, with 77% indicating a square footage above 10,000 square foot. Along these dimensions, the firms are thus relatively similar. They differ in organizational form, however, with 38% of firms indicating being affiliated with a fitness chain. The largest of these, accounting for 62% of chain affiliations, is "Curves". Chain affiliates and independent gyms do not differ systematically along the reported outlet characteristics, however, and since the focus of our study lies on understanding nonprofit and for-profit interactions, we do not differentiate between chain and non-chain outlets going forward.

Most of the information on nonprofit facilities (approximately two thirds) was obtained through the methodology above. However, nonprofits such as the YMCA are frequently multi-product firms, providing child care in addition to health-related services. In order to ensure a full sample of full-service fitness centers, we selected the sub-sample of YMCAs from Reference USA's full listing of YMCA-affiliated locations that fall within our selected markets and obtained information for firms containing "YWCA", "Young Women", "YMHA", "JCC", or "Jewish Community Center" in their name. For each of these observations, we verified whether a fitness center was on-site either through the facility's website or through phone calls. If we could not independently verify the presence of a fitness facility, we deleted the firm from the sample. Since YWCAs and JCCs are present in only 2% of the 629 markets, we drop them from the analysis and refer to YMCAs and nonprofits interchangeably.

YMCAs are present in 266, or 42%, of markets. Relative to the sample of for-profit fitness centers, YMCAs are typically larger when measured using employee counts; only 5.64% of YMCAs have less than 10 employees and the modal size category, at 35% of observations, is 50–99 employees.[10] Further, YMCAs are typically older with the median firm having been listed continuously

[9] This includes for example firms with only "Yoga Studio" or "Kickboxing" in the title.

[10] Note that ReferenceUSA does not allow us to distinguish between part-time and fulltime employees; as a result, we cannot rule out that nonprofits use a different mix of workers than for-profits.

since 1984 or earlier, compared to 2003 for the median for-profit firm. Beyond the difference in organizational form, non- and for-profit firms thus differ significantly along other dimensions as well, justifying investigating the nonprofit entry decision separately from the for-profit side.

We use the firm information to generate a count of for-profit and nonprofit firms at the market level. Table 2 summarizes the firm-count distribution in our selected markets. For-profit facilities exist in 579 out of 629 markets. We observe 38 markets without either for- or nonprofit fitness facilities. For-profits are therefore more strongly represented in each market. The propensity of nonprofit entry increases in the number of for-profit competitors: Markets with four or fewer FPs are less likely on average to have a YMCA present, with 36% of markets having a YMCA. This contrasts with an entry rate of 67% for markets with five or more for-profit firms. We observe a long right tail on the distribution of FP facilities. As we discuss below, we truncate the for-profit firm count distribution in estimation to ensure a sufficiently large number of market observations for each realized firm count to ensure parameter identification.

As discussed in the modelling section, we use YMCA quantity information, specifically average membership, in order to incorporate the potential nonprofit motive and also to more fully distinguish between changes in NP variable profits and demand. We do not directly observe membership but instead use membership rates and financial information in order to back out quantity. Specifically, we collected single and family membership rates for each YMCA facility. Each NP facility is linked to a YMCA organization that files a 990 tax return and we use the 2008 return to acquire the financial information. The tax return provides separate lines for membership and other mission-related revenues (i.e. daycare fees, swimming fees) but not all organizations distinguish between these types of revenues. For organizations that report membership dues (approx 32%), we divide revenues by the single and family rates to arrive at an upper and lower bound for total number of members. We also use these observations to calculate the average proportion of all mission-related revenues from membership dues, adjusted by the number and type of additional programs offered by the organization. We then apply that ratio to mission-related revenues to estimate dues for organizations where membership revenues are not separately reported. Finally, we calculate the per-facility membership by assuming that the organization membership is divided evenly among all fitness centers associated with that organization.

Table 3 shows that the average membership for our markets is 1,623. This number is slightly lower but consistent with industry estimates of 2,444 members per gym on average and an in-

terquartile range of 741 to 4,628 [11]. A simple regression also shows that the quantity estimates are related to population, income, and other major demand shifters within a market.

We merge the firm count information with demand and cost shifters of each firm type's profit that influence the entry decision. We measure market size by population. We include demographic information on per-capita income, age (percent of population between 18 and 65), educational attainment (percent of population with at least a bachelor's degree), and marital status (percent of one-person households) in order to capture the per-capita demand for fitness services. In addition, we experimented with other demographic characteristics such as the median age, ethnicity, and the poverty rate of the population and found them to be insignificant in explaining entry. We gathered these Census data at the zip-code level and aggregate them to the market level by summing population across zip-codes and calculating population-weighted averages of all demographics.

Other factors, such as the overall health consciousness of the population and weather trends in the area, likely influence a person's propensity to join a fitness center as well. We control for regional variation in attitudes toward exercise by including each market's distance in miles to the nearest coast. A host of self-reported and objective variables is available to capture the health status and climate in a given area. However, there is a tension between providing richness to the specification and maintaining a computationally tractable number of regressors. Since we are primarily interested in identifying the contribution of the overall attribute on entry, rather than the direct effect of one specific variable, we combine the variables into a general health and a weather index. As in Scott Morton and Podolny (2002), we employ principal components analysis in order to create these indices. We apply varimax rotation to each factor and employ the first factor as our index. Each index is standardized to mean zero and standard deviation one. The weather index incorporates information on the occurrence of extreme or inclimate weather and on environmental conditions that would make it more difficult to exercise outside. We base the health index on variables measuring diet, smoking, excessive drinking, self-reported overall health status, and ability to receive preventive medical care. A description of each individual variable, source of data, and summary statistics are provided in the Appendix.

Confirming our rationale for constructing the indices, many of the individual variables are highly correlated. For health, all but two of the 16 independent variables load at least 35% of their variance on the first factor, capturing a total of 38% of the total variation in the variables. Each

[11] See IHRSA (2006): "Industry Data Survey of the Health and Fitness Club Industry," Boston, MA.

of the remaining factors provides less than 10% of additional variation. A higher value for the health index indicates a less healthy lifestyle in that market. Similarly, six of the eleven weather variables load at least 67% of their variation on the first factor. The index captured at least 20% of the variance of the remaining five variables. In total, the index captures 43% of the variables' total variation, with larger values indicating a more severe climate, which implies conditions less amenable for outdoor exercise.

As discussed in the Background section, individuals have other outlets for exercise besides general membership fitness centers. They may choose to use a fitness center at an institution with which they have an affiliation. One of the most common examples is students and faculty utilizing college fitness facilities. We therefore control for the presence of a major four-year college in the selected market, as identified in the National Center for Education Statistics' IPEDS data base.

On the cost side, we employ a firm cost index that measures the general fixed and variable costs of operating in a market. It includes information on the average price of housing, our proxy and best measure for land values, the average retail wage rate in the area, and a cost of living measure. Seventy-five percent of the variance loads to the first factor, explaining at least 80% of the variance of each of the individual cost variables. Larger values for the cost index imply higher costs of doing business in that market.

Finally, there are a number of profit shifters that affect one of the two firm types only. On the for-profit side, these are primarily tax measures, which by definition do not affect nonprofit entry directly. They include federal income and state and local business taxes. Since we do not observe variation in the corporate federal income tax rate, we focus on state and local business taxes to investigate the role of the tax burden in affecting for-profit entry relative to their nonprofit counterparts. Ernst & Young (2010)[12] cite property taxes as the largest individual contributor to local and state business taxes, amounting to an estimated 37% of total business taxes in 2009. State corporate and individual business income taxes, in contrast, are together estimated to contribute only 18% to the total. We collect information on the latter by compiling marginal state income tax rates from the National Tax Foundation. In line with the findings by Ernst & Young, for the markets in our sample, state income tax rates average to only 6.6%, with a standard deviation of 1.5%, for the subsample of 381 markets with non-zero tax rates.

Systematic information on local business property tax rates and taxes paid is difficult to obtain.

[12]See Ernst & Young and COST (2010), "Total state and local business taxes: State-by-state estimates for fiscal year 2009," available at `www.cost.org/WorkArea/DownloadAsset.aspx?id=76116`, accessed 03/26/2011.

For a subset of 284 properties among the total of 2,117 for-profit facilities and for 74 of the 179 nonprofit facilities, we were able to obtain property-specific 2008 tax values and assessments from two web-based databases, `HomeInfoMax.com` and `realquest.com`. Since nonprofits might pay taxes on non-exempt property, this information allows us to verify that the nonprofits use their facilities primarily for mission-related, tax-exempt activities and that any non-exempt activities occupy a small share of the total property utilized by the nonprofits in our sample. We confirmed that property taxes for all nonprofits in our sample are indeed negligible. The tax information available for the for-profit facilities allows us to investigate the firms' own-versus-rent decision. The data indicate that 42% of the properties are owner-occupied, while 56% are not, the occupation information being unavailable for the remaining two percent. Since commercial leases are frequently structured to include base rent plus payments for the tenants share of real estate taxes and expenses, however, property taxes impose direct costs on both occupation types. Beyond indicating occupation status, the data is too sparse and exhibits excessive variation in reported tax payments to use it to generate a market-level measure of tax burden that could be applied to all facilities in the particular market.

We instead compute a market-level property tax variable using several sources of data. From each of the market's County Assessor offices, we obtained information on the county's average real property millage rate, covering county, municipal, school, and other local jurisdictions' tax levies. We further collected data from Ernst & Young (2010, see footnote 12) on each state's total property tax payments and translated these into per-capita terms by dividing by the total number of business tax returns per state filed with the IRS in 2009.[13] By this measure, a firm in the average state pays total business taxes of $19,164 and property taxes of $6,573 in 2008. Last, we use data from the Census' American Community Survey on property tax payments and assessed property values to calculate a state-wide millage rate since we did not collect millage rates for all counties in each state, only those in our selected markets.[14] To derive a measure of effectively paid, average property taxes per firm in each of the markets, we normalize the county millage rate by the state's average millage rate and multiply by state-level property taxes. Across our sample markets, the average property tax paid amounts to $6,590, with an interquartile range of $4,201 to $8,061.

[13] See IRS (2010), "IRS data book Table 3, FY 2009". `http://www.irs.gov/taxstats/article/0,,id=206490,00.html`, accessed 05/11/2011.

[14] Note that the American Community Survey reports residential property tax payments and assessments. For a large share of the counties in our sample, the same millage rate applies to commercial and to residential property. As a robustness check, we also compute property taxes using the average millage rate of the counties in our sample as a proxy for state-level millage rates. The correlation of the resulting property tax measure and the one we employ is 0.8485.

There are also a number of factors that we believe to increase the likelihood of entry for the YMCA, yet are unlikely to impact a for-profit's entry decision (except indirectly through competitive interaction). The core mission of promoting Christian values suggests that the overall religious affiliation of the population may play a role, which we capture with the county's share of Christian adherents. In addition, given that many YMCAs also provide child care and after-school services, we include the percentage of children 9 and under in the nonprofit value function. Finally, we use the full YMCA corporate tree to calculate, for a given market m, the number of YMCAs that are not in market m, but are within 25 miles of this market. Since each local chapter is affiliated with the national YMCA organization, a pronounced presence of YMCAs in surrounding markets may play a role in the likelihood of entry due to spillovers from networking, local programming, and general knowledge about YMCA franchising, advertising, and the overall structure of the organization.

Table 3 presents descriptive statistics for our demographic and tax variables. Column 1 summarizes the information for all of our markets. Columns 2 and 3 segment the markets based on the presence of for-profit and nonprofit firms. When we truncate the number of for-profit firms at six, as we do in estimation below, there are on average 3.2 facilities in our 629 markets in total, with 2.8 of these being for-profits. Not surprisingly, our selected markets are larger than all US markets shown in Table 1.

Markets with at least one for-profit are very similar to all selected markets. Of course, much of this is a function of the fact that for-profits are present in almost all of the selected markets. From column 3, we see that nonprofits are more likely to enter larger markets, with an average population size of 60,000, compared to 45,200 for all markets. Larger markets similarly attract a disproportionately larger number of for-profit firms. Other demographics are quite similar between columns 2 and 3.

We also find that nonprofits tend to locate in areas where for-profits face higher property taxes, with average property taxes in markets with a nonprofit presence amounting to \$7,300 relative to \$6,600 for the full sample. Of course, disentangling whether these trends are a function of correlations with market size or arise from strategic decisions on the part of the firms is the purpose of the structural analysis to follow.

5 Analysis

5.1 Estimation Results

Before turning to the estimates of the full model outlined in section 3, we begin by estimating single-equation entry models, considering each ownership type's decision separately. Table 4 presents estimates for an ordered probit model of the number of for-profit competitors and for a probit model of the nonprofit's entry decision. The specifications control for the entry decision of the other type, treating their decision as exogenous and not imposing the joint equilibrium conditions in equation 9. Thus, the regressions do not ensure either existence or uniqueness of an equilibrium.

Panel A provides estimates taking nonprofit entry as given and focusing on for-profit entry. In terms of sign and significance, most of the demand shifters are of the expected sign. Size of the market, education level, and single status of the population increase the profitability for fitness centers in that market. In addition, markets with a generally healthier population and less amenable climate for outdoor exercise, as well as markets closer to the coast, are more likely to observe increased entry of FPs. However, after controlling for other factors, FPs have a larger presence in lower income markets and also markets with fewer adults between 18 and 65. We also find no effect from the presence of a major college, our control for institutional gyms. As anticipated, higher property taxes, as a proxy for tax liabilities if entering a particular market, have a statistically significant, negative effect on the likelihood of FP entry.

The thresholds for profitability (i.e., $FP_2 - FP_6$), as expected, indicate negative competitive effects, with profit declining most strongly in moving from a monopoly to a duopoly market, and tapering off as more entry occurs. The presence of a nonprofit significantly decreases a for-profit's profitability. This would be consistent with for-profits responding to nonprofit entry decisions and provides support for employing a simultaneous equilibrium condition to disentangle the equilibrium effect of the nonprofit from other profitability shifters that correlate with its entry.

The results for the nonprofit's entry decision conditional on for-profit market structure (Panel B) show a preference for different types of markets. The size of the market, while a positive influence on entry, seems to play a smaller role in the nonprofit entry decision. Nonprofits are also more likely to enter markets with a larger single population. YMCAs do not seem to be as influenced by income, weather, or health related aspects of the market.

We find weak evidence of for-profit cross-competitive effects on the nonprofit's entry decision.

The nonlinear FP competitive effects ($\gamma_1 - \gamma_6$ given in columns 2 and 3) are insignificant. In fact, the first two FP coefficients have a positive point estimate. However, the linear competitive effect in column 4 is negative and significant, suggesting some strategic interactions between the firm types. Contrasting this result to Panel A, one might deduce that for-profits are more affected by nonprofit competitors than vice versa. However, our coefficient estimates are biased if any market shifters that are unobserved are positively correlated between the two ownership types' payoffs. Such issues are addressed below by estimating the number of firms of each type simultaneously.

In Table 5, we allow for the simultaneous entry of both nonprofits and for-profits, using three different equilibrium selection criteria. When multiple equilibria exist, the first column assumes that FPs enter first. Next we assume that the last firm to enter is the one that maximizes total industry profits in the market. Finally, we assume that the most profitable firm moves first. In all three specifications, we omit corporate income taxes and also assume that an additional FP entrant has a constant effect on the NP's value (i.e., linear cross-competitive effects). Our estimates are quite stable across all three selection assumptions. This result may indicate that the FP tends to also be the most profitable firm, so that the equilibrium selection mechanisms coincide, but provides added confidence in our results. Future work will investigate alternative mechanisms for robustness.

Comparing these results to Table 4, we find several significant differences in the impact of the regressors on entry. As expected, income now increases entry for both the FP and the YMCA. A more highly educated population no longer is significant in explaining FP entry but is less associated with the presence of a YMCA. The cost index also plays a larger role in shifting entry to the left, especially for the YMCA. However, property taxes continue to be significant and negative in their impact on FP entry. The point estimates are slightly lower but in the same range as those found in Table 4.

The largest difference occurs for the cross-competitive effects; NPs and FPs do not seem to have a significant impact on each other's entry decision. This result, particularly for the NP cross-competitive effect is counter to the notion that NPs are crowding-out FPs in the marketplace. Indeed, it suggests that each ownership type functions in a fairly separate market, once common demand and cost characteristics are considered. Assuming the robustness of these results (which we test in Table 5), this finding implies that a FP will not replace a NP in the event of its exit.

Table 6 presents estimates for our main regressors of interest only, considering more flexible

functional form specifications for competitive interaction. We allow for nonlinear cross-competitive effects for the NP entry decision and also include the state income tax rate, interacted with the FP profit function. We present results using the selection criteria that the most profitable firm moves first, which resulted in the highest likelihood in Table 4. We note, however, that the results continue to be similar across the selection criteria. The point estimate for the income tax parameter is around one as expected, but is not significant, possibly because of limited variation in state income tax rates. Aside from this income tax addition, the results are very similar to those presented in Table 5. Property taxes continue to be negative and significant. Allowing for a nonlinear effect of FPs on NP entry increases the magnitude of some of the estimated competitive effects. We also continue to find evidence that YMCAs do not appear to crowd-out FPs. When we include income taxes, we do find a negative effect of the first and third for-profit on nonprofit value. We impose in estimation that the strategic interactions be negative as it is difficult to imagine positive spill-overs that the for-profit sector would generate for NP value. For $\gamma(FP = 2)$ and $\gamma(FP = 4)$, this condition was not satisfied and we set them to zero. Combining this with the fact the other FP cross-competitive effects in the remaining specifications are insignificant, we are hesitant to put much weight on these estimates.

Table 7 now incorporates the complete specification of equation (7) where demand and variable profits are identified separately for the NP. We currently have no correlation between NP demand and variable profits. The coefficient on property taxes and the NP competitive effect on the FP are slightly larger for the FP but mostly similar to our previous estimates. The NP profit function is also roughly the same in magnitude as earlier findings with the exception of the FP competitive effect where we could not estimate a negative effect. However, the FP competitive effect is negative and significant for the demand estimates, suggesting that the effect of FP competition may be more on the intensive rather than the extensive margin. The NP demand estimates are intuitive and generally in the same direction as the profit function estimates.

5.2 Direct and Indirect Effects of Property Taxes on Market Structure

We use the estimates from in Table 7 to conduct several policy experiments. These are summarized in Table 8. First we measure formally the extent of crowd-out. We do so by solving the estimated model under the assumption that the nonprofit's unobserved shocks to payoffs, ϵ_{NP}, are sufficiently negative that in equilibrium, it does not choose to enter. We report in column (2) the expected

number of for-profit and nonprofit entrants across markets in this scenario. As nonprofit entry declines from 0.36 firms in the average market to zero, we observe that the number of for-profits increases from 2.68 to 2.80, an increase of only 3.7%.

The next two analyses focus on the importance of property taxes in entry and membership. We first illustrate the response in the number of for-profits to increases in property taxes. We calculate the optimal configuration for each market under the estimated payoff functions assuming a for-profit faced a property tax that is one standard deviation, or $3,400, higher than what it currently pays in the market. In response to the higher tax liability, estimated for-profit entry declines by $\tilde{7}$%, or one tenth of a standard deviation. We predict virtually no change in the nonprofit response to this lower propensity of for-profit entry, in line with the results that for-profits do not have an economically meaningful effect on nonprofit value. We do predict a 2.7% increase in NP membership as a result of the FP decline.

The last policy experiment is the one of primary interest. Here, we consider how nonprofit entry would respond were the nonprofit's value shifted by the estimated property tax reduction in for-profit payoffs. Table 8 reports results from revoking the nonprofit tax exemption fully; Figure 2 considers instead for- and nonprofit entry under alternative property tax exemption rates, using the empirical distribution of the tax parameter to construct 95% confidence intervals for the response. Our results suggest that a full removal of tax exemptions would lower the average nonprofit entry probability by close to 24% from 0.357 to 0.29 in the average market. The total number of competitors similarly falls from 3.08 to 3.03 since the reduced propensity of nonprofit competition encourages only an additional 0.02 for-profit firms to enter. Both within the nonprofit sector and in the industry in total, the number of consumer choices thus declines.

We also estimate a 24% decline in membership to YMCAs. As mentioned earlier, our data do not allow a prediction of what degree of this decline in membership would be absorbed by the for-profits but, given our FP entry predictions, any subsequent increase would mostly occur at existing for-profit facilities. Perhaps more importantly, to the extent that our NP motive assumption of additional weight on the number of clients served is accurate, for-profits would likely not completely absorb the decline. Thus, our estimates suggest a loss of fitness care provision both on the extensive and intensive margin.

5.3 Spillover Effects to other Nonprofit Service Offerings

As mentioned earlier, the YMCA, distinctive from FP fitness facilities, often provides youth-related services. This multi-product nature of the YMCA highlights another dimension of tax effects on YMCA entry in the fitness center markets: to what extent would decreased entry in NP fitness provision decrease youth programs and other community benefits generated by the nonprofit? For our markets, we therefore collected data on whether the YMCA also provides (i) full-time daycare facilities and (ii) after-school programs.

The first attribute to note about the multi-product nature of the YMCA is that fitness service provision is the most common of the three services. Of 202 markets where the YMCA has a presence, we observe fitness centers in 181, daycares in 104 and after-school programs in 150. Provision of youth-related services is also highly related to the presence of fitness services; of the 21 markets without a fitness center, only 3 provided daycare services while 8 had after-school programs.

In Table 9, columns (1)-(3), we estimate the probability of a daycare or after-school program controlling for market characteristics and the presence of a fitness center. We omit the fitness center regressor in Column (1) to investigate whether the addition of the fitness center variable changes the market level regressors which does not appear to be an issue. We also include the total number of daycares/after-school programs in the market in Column (3) to control for competitive effects in the youth services market. Neither of these specification changes produce substantive changes in our estimates. Given the descriptive statistics above, it is not surprising that we continue to find a strong correlation between the presence of fitness centers and youth programs. The data therefore suggest that if a YMCA chooses to exit the fitness market, they would likewise no longer provide these youth programs. Of course, this simple regression does not control for the endogeneity of fitness centers; there could exist unobservable market characteristics that make both services profitable. The overall size of the facility, which we do not observe, most likely increases the provision of both types of services. We therefore run a bivariate probit in column (4), using our Health and Weather indices as exclusion restrictions, and find a correlation of .9 between the two equations. Although not conclusive, these results are highly consistent with a story of cross subsidization of the relatively unprofitable youth services by the more profitable fitness services.

Given the high correlation between fitness and youth services observed above, we assess whether markets that are at risk for losing a YMCA fitness center due to revocation of the tax exemption are also more likely to have youth programs. Using the counterfactual analysis presented in Table

8, we construct a variable *AtRisk* equal to the difference between the predicted base probability of entry (PB) and the predicted probability of entry were the NP to pay the full amount of property tax (PT). We then use several measures of this variable as a regressor in our probit analysis in Table 10. In column (1), we first classify a YMCA as at risk for exiting the fitness center market if $PB >= 0.5$ and $PT <= 0.5$ and the difference between the probabilities is larger than 20%. In column (2), we simply use the continuous difference in probabilities, while column (3) segments the markets based on the median of the difference in probabilities. The estimates suggest that at-risk YMCAs are disproportionately more likely to operate a daycare and provide after-school programs.

We use these findings to predict a range for the number of daycare and after-school closures. Our first classification in column (1) is intuitive in that it identifies markets where a nonprofit changed from being "more likely to enter" to "less likely to enter." That is, it should capture YMCAs that are at the margin of entering. This measure predicts that in 24 markets, or 13.3% of markets, the nonprofit would no longer provide fitness services were it to have to bear the full for-profit property tax burden. Of those 24 markets, 12 have daycares while all 24 have after-school programs. Based on the findings above, it is plausible to assume that 100% of those daycares/after-school programs would leave. If we instead apply our estimates from column (1) at the mean, we estimate a closure of no daycares but 26 after-school centers. Similarly, we would predict the loss of 19 daycares and 26 after-school programs respectively using the estimates from column (2). The estimates using column (3) are quite similar for afterschool programs but imply a loss of more daycares. Our analysis cannot anticipate what percent of this loss would be absorbed by other firms, but any absorbtion would not come from the FP fitness centers as youth-services are not part of their service portfolio. Thus, the second-order effects to other markets where the NP provides less profitable social services should not be ignored.

The government might choose to provide these lost services, using the tax revenues generated from the property tax revocation. We focus our attention on the provision of afterschool services, given the general sparseness of these services in the marketplace. The childcare data used above provided information on the number of children served in afterschool programs in California. On average, we find that each CA afterschool program served about 65 students, with YMCAs providing a slightly larger average capacity of 68 slots. Outside estimates indicate an average cost of $24 for each afterschool student served. Using these figures, along with the estimated tax revenues, we can calculate the percent of the costs that the tax revenue could cover. We use two estimates of

tax revenues as seen in Table 11. The first assumes NPs would pay the same amount of taxes as the average FP in a particular market while the second uses our data on the assessed value of the YMCA property. The NP property tax is prone to measurement error since there is less incentive for assessors to keep this data current and accurate. Moreover, we were not able to collect information on all NP properties similar to our FP firms as discussed earlier. Nonetheless, we believe it is important to use both estimates since the tax exemption creates different incentives for investment in property.

Indeed, we estimate higher tax revenues if we use the NP property tax data, indicating that NPs currently have higher assessed values. The higher revenues would therefore translate into a higher subsidy rate. Using the actual childcare capacity and the tax data for the California (CA) YMCAs, we find that the government could subsidize between 2.5 and 11 percent of the afterschool costs if all of the taxes generated were used to provide afterschool services. If we simply use the average afterschool capacity of CA YMCAs (68 student slots), our estimates suggest average subsidy rates between 1.6 and 8 percent depending on which tax revenue estimate is utilized. The estimates decline due to the assumed increased capacity provided by the YMCAs. Finally, we regress capacity on area demographics of population, income, race, and age of the population to predict the capacity for the CA YMCAs. Our in-sample prediction provides estimates of 2 and 9 percent subsidies for afterschool services.

We then use the CA childcare data to extrapolate to our other markets. Assuming 68 student slots provided at each YMCA produces subsidy rates between 2.5 and 11 percent. However, adjusting for population and other demographics are important as anticipated; CA YMCAs on average run larger afterschool programs. Once we take into account market size, we find the average subsidy for all of our NP markets is 3% using the FP property data to estimate tax revenues and 13% when using the NP property tax data. The similarly in the subsidy rates for CA and our other markets provides some degree of confidence in our estimate ranges. Moreover, the median and percentiles of the subsidy given in Table 11 are reasonably tight and demonstrate that outliers are not driving the results. Given the variety of assumptions made to generate these estimates, we still exercise caution in drawing broad conclusions but the estimates suggest modest subsidy rates. Afterschool programs are not 100% subsidized by the YMCAs but municipalties will need to weigh whether government subsidies are sufficiently large enough relative to the YMCA providing the services.

6 Discussion

In this paper, we estimate a structural model of entry to assess the extent of competitive interaction between different ownership types in markets where both for- and nonprofits have significant presences. Our results show limited strategic interactions between the two firm types in the recreation and fitness center setting we study. This suggests that nonprofit and for-profit firms serve largely separate markets. We find that both non and for-profit firms have a higher likelihood of entry in higher income markets, however, suggesting that the nonprofit does not seek to enter primarily low-income, underserved markets. Our results indicate further that FP profit and hence entry decline in the level of taxation, which we approximate with local property taxes paid. Nonprofit entry would decline by roughly a quarter were this market segment to be exposed to the same property tax liability. Since we find limited scope for for-profit crowd-out by the nonprofit sector, there would be only a small response in for-profit entry.

The apparent lack of crowd-out that our results indicate contrasts with findings in studies of other mixed industries, primarily in the health care sector. A possible explanation is that nonprofits like the YMCA use their entry to realize multi-faceted missions. The YMCA, for example, promotes both youth development and healthy living, which may allow it to segment its customer base more distinctly than nonprofits in other mixed ownership industries are able to. In contrast, in hospital markets, a commonly studied mixed sector, a nonprofit firm may aim to provide some amount of charity care, but continues to serve all patient groups. Research going back to Dranove (1988) points to the potential for cross-subsidization in such settings where a nonprofit that values output shifts some of the cost of serving its targeted population to private paying patients through higher prices.

In our context, there is similar potential for cost-shifting in that most nonprofit recreation centers offer reduced rates to qualifying low-income members. In addition, however, the YMCAs may cross-subsidize across services offered and use fitness center revenue streams to subsidize youth programs such as after-school programming and activities. In line with this hypothesis, we find that in 99% of the YMCA entry instances in our markets, the organization offers fitness facilities and programs. In only 1% of cases does a local organization offer after-school programming only. Further, 51% of the YMCAs in our data operate some kind of child care facility; 71% offer after-school care.

Our results provide evidence that revocation of nonprofit property tax exemptions would decrease overall fitness provision in a market, given that the less frequent nonprofit presence does not spur increased for-profit entry. While we may independently be concerned about this decrease, the multi-product nature of the YMCA brings out another common concern: does decreased entry in the NP fitness provision decrease cross-subsidization of youth programs and therefore lead to a decline in other community benefits generated by the YMCA? Although data limitations prevent us from estimating a full model of cross-subsidization, our results suggest that between 11 and 25% of daycares would be at risk of being closed were the nonprofit to exit from providing its fitness services, suggesting the impact on the provision of core mission-related services could be significant.

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Figures and Tables

Figure 1: Sample Markets (n=629)

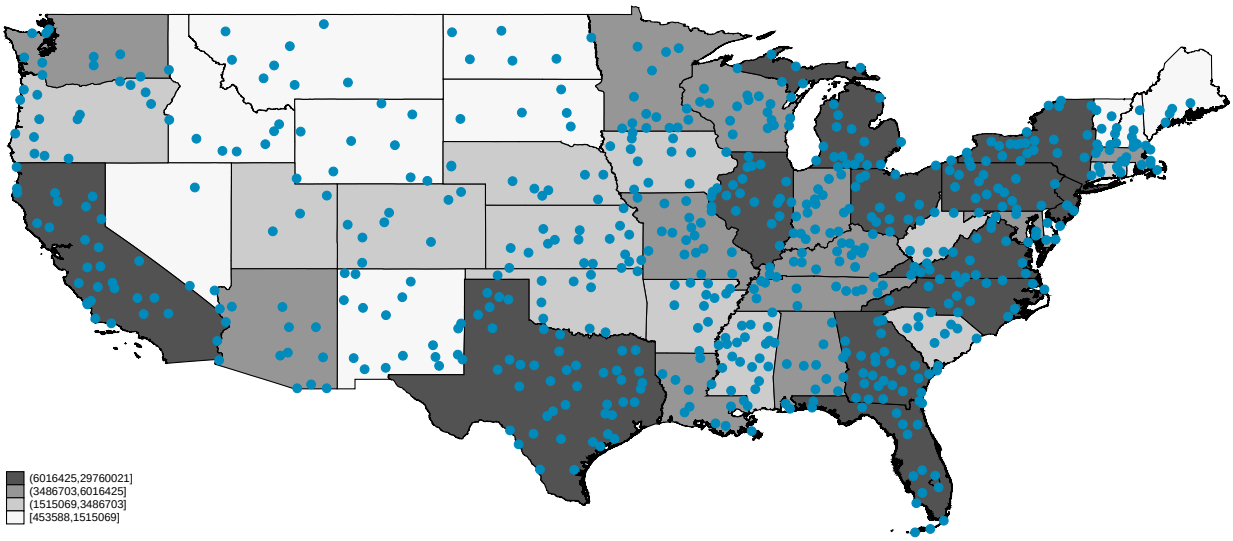

Figure 2: Nonprofit and For-Profit Entry under alternative Nonprofit Property Tax Exemption Rates

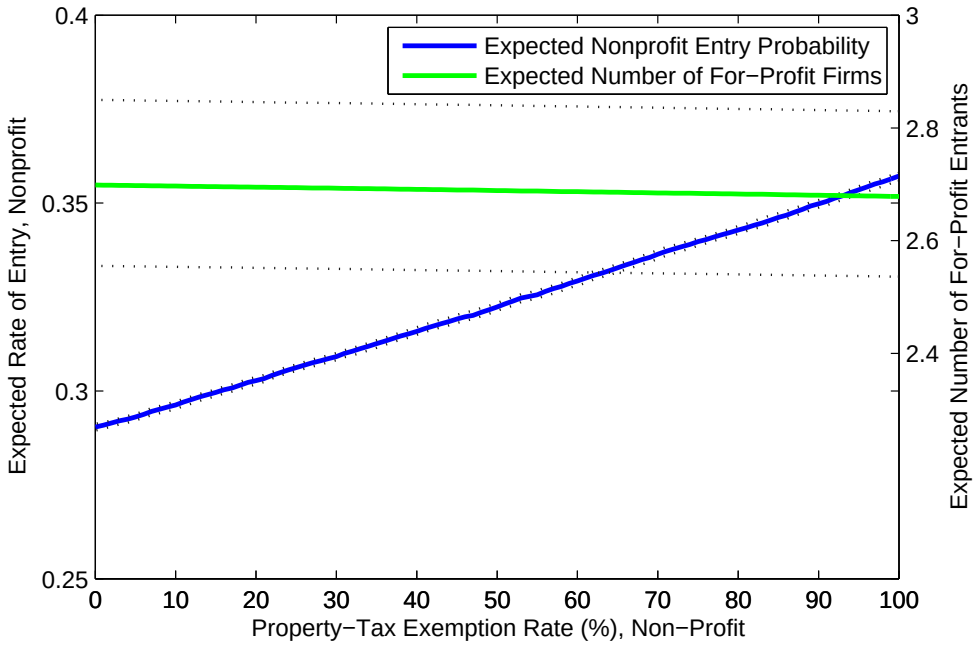

Table 1: Descriptive Statistics, US and Select Markets

		Markets with ≥ 1 YMCA		
			Reference USA Listings	
	All Markets	Form 990 Filers, 2000	Lower Bound	Upper Bound
Population (000)	34.84	238.85	302.98	160.11
Income (000)	18.28	20.43	21.41	21.18
Percent aged 18-65 (%)	59.58	61.12	61.35	61.18
Percent $\geq$ Bachelor's degree (%)	13.78	17.15	19.34	17.25
Percent single households (%)	24.41	27.03	25.98	25.42
Percent black (%)	6.64	8.79	9.73	8.24
Number of markets	7743	750	512	1275

Table 2: Cross-Tabulation of Firm Counts for Selected Markets

	Number of Nonprofits		
For-Profit Count	0	1	Total
0	38	12	50
1	93	53	146
2	73	60	133
3	72	34	106
4	43	19	62
5	15	25	40
6	10	8	18
7	2	9	11
8	1	3	4
9	0	2	2
11	5	22	27
16	0	1	1
17	1	2	3
18	3	1	4
19	4	5	9
20	2	6	8
21	1	4	5
Total	363	266	629

Table 3: Descriptive Statistics, Profit Shifters

	All Markets		Markets w/ FPs		Markets w/ NP	
	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev
Market population (000) (Pop)	45.97	39.18	47.40	40.25	60.28	48.02
Per capita income ($000) (Income)	17.79	3.49	17.95	3.46	18.60	2.97
Percent college graduates (Perc BA+)	0.19	0.08	0.19	0.08	0.20	0.08
Percent single households (Perc Single)	0.26	0.04	0.26	0.04	0.27	0.04
Median age	36.02	4.44	36.12	4.41	36.44	3.81
Distance to coast (m00) (Dist Coast)	3.48	3.11	3.39	2.85	3.57	3.05
Weather index	0.00	1.00	0.03	0.99	0.21	0.91
Health index	−0.00	1.00	−0.03	1.00	−0.12	0.93
Weekly retail wages (Retail Wage)	0.43	0.05	0.43	0.05	0.43	0.05
Fixed cost index	0.00	1.00	−0.02	0.96	−0.01	0.90
Property tax ($000) (Prop Tax)	6.74	3.34	6.75	3.38	7.30	3.78
Corporate income tax rate (Inc Tax)	0.06	0.03	0.06	0.03	0.06	0.03
Percent less than 10 yrs (Perc Youth)	0.13	0.02	0.13	0.02	0.13	0.02
# of YMCAs within 25m (Y 25m)	3.03	7.12	2.98	6.89	4.59	9.24
University in market Y/N (Pres of Univ)	0.30	0.46	0.31	0.46	0.38	0.49
# of FPs; truncated at 6 (# FPs)	2.75	1.86	2.99	1.75	3.21	1.99
Market with YMCA (Pres of NP)	0.42	0.49	0.44	0.50	1.00	0.00
YMCA membership (000)	0.68	1.16	0.71	1.19	1.60	1.31
N	629		579		266	

Note: Sources of the data are as follows: Pop, Income, Perc 18 to 65, Perc BA+, Perc Single, Perc Youth–Census 2000; Dist Coast–Global Land 1km Base Elevation Project, National Oceanic and Atmospheric Administration; Prop Tax–Ernst & Young / COST FY 2009 50-State Business Tax Study, County State Assessor offices, and Census Bureau's American Community Survey (2004-2009); Inc Tax–Tax Foundation; Perc Christian–Association of Religion Data Archives; Y 25m, Pres of NP, and # FPs–Reference USA. The Weather, Health, and Fixed Cost indices are the first factors from factor analysis using variables described in the Appendix. The factors are rotated using varimax and predicted such that the mean=0 and standard deviation=1.

Table 4: Single-Equation Ordered Probit Models of the Numbers of For-Profit and Nonprofit Firms

	Number of For-Profit Firms		Presence of Nonprofit Firm		
	(1)	(2)	(3)	(4)	(5)
Log of Pop	1.696***	1.849***	0.934***	1.329***	1.325***
	(0.092)	(0.101)	(0.103)	(0.150)	(0.158)
Log of Income	1.269***	1.668***	3.125***	3.495***	3.409***
	(0.440)	(0.451)	(0.674)	(0.687)	(0.701)
Perc BA+	1.542*	0.950	−3.637***	−3.513***	−3.573***
	(0.935)	(0.958)	(1.255)	(1.276)	(1.308)
Perc Single	0.992	1.731	9.148***	9.072***	8.315***
	(1.502)	(1.538)	(2.151)	(2.191)	(2.234)
Dist Coast	−0.086***	−0.092***	−0.035	−0.052*	−0.050*
	(0.018)	(0.018)	(0.027)	(0.027)	(0.028)
Weather index	0.154**	0.162***	0.044	0.063	0.087
	(0.062)	(0.062)	(0.079)	(0.080)	(0.081)
Health index	−0.394***	−0.433***	−0.224**	−0.303***	−0.297***
	(0.066)	(0.067)	(0.087)	(0.090)	(0.091)
Retail Wage	0.377	−0.192	−4.682***	−4.760***	−4.777***
	(1.205)	(1.213)	(1.649)	(1.672)	(1.711)
Fixed cost index	−0.284***	−0.313***	−0.350***	−0.383***	−0.366***
	(0.075)	(0.076)	(0.115)	(0.114)	(0.117)
Prop Tax	−0.054***	−0.050***			
	(0.015)	(0.015)			
Y 25m			0.041***	0.033***	0.032***
			(0.012)	(0.012)	(0.012)
Pres of Univ		0.049		0.104	0.106
		(0.108)		(0.139)	(0.140)
Pres of NP		−0.441***			
		(0.101)			
# FPs				−0.193***	
				(0.049)	
FP = 1					0.150
					(0.264)
FP = 2	−1.224***	−1.241***			0.0728
	(0.089)	(0.090)			(0.266)
FP = 3	−0.830***	−0.852***			−0.608*
	(0.064)	(0.065)			(0.284)
FP = 4	−0.748***	−0.772***			−0.877**
	(0.065)	(0.067)			(0.318)
FP = 5	−0.584***	−0.591***			−0.529
	(0.068)	(0.069)			(0.356)
FP = 6	−0.514***	−0.513***			−0.771*
	(0.074)	(0.074)			(0.351)

Note: *, **, *** p-value $\leq$ 10%, 5%, and 1%, respectively. Specifications (1) and (2) also include Median Age and the State Income Tax rate, while specifications (3) through (5) include Median Age and the Percent Youth, which are statistically insignificant across specifications in determining the observed number of firms.

Table 5: Endogenous Ownership-Type Model Estimates: Most Profitable Type Moves First

	Number of For-Profit Firms	Presence of Nonprofit Firm
Log of Pop	1.747***	1.128***
	(0.131)	(0.254)
Log of Income	1.503***	3.383***
	(0.511)	(0.761)
Perc BA+	1.268	−3.672***
	(0.998)	(1.303)
Perc Single	1.179	8.958***
	(1.697)	(2.150)
Dist Coast	−0.001***	−0.001*
	$(2.0E{-}4)$	$(3.0E{-}4)$
Weather index	0.174**	0.052
	(0.068)	(0.089)
Health index	−0.405***	−0.286***
	(0.069)	(0.102)
Retail Wage	$1.0E{-}4$	−0.005***
	(0.001)	(0.002)
Fixed cost index	−0.287***	−0.358***
	(0.077)	(0.119)
Prop Tax	−0.531***	
	(0.160)	
Y 25m		0.034***
		(0.013)
Pres of Univ	0.018	0.131
	(0.114)	(0.138)
Pres of NP	−0.235	
	(0.230)	
# FPs		−0.103
		(0.109)
FP = 2	−1.217***	
	(0.086)	
FP = 3	−0.844***	
	(0.068)	
FP = 4	−0.760***	
	(0.069)	
FP = 5	−0.590***	
	(0.074)	
FP = 6	−0.512***	
	(0.076)	
Log-likelihood	-1218.970	

Note: *, **, *** p-value $\leq$ 10%, 5%, and 1%, respectively. Specification also includes Median Age, State Income Tax rate (for-profit), and Percent Youth (nonprofit).

Table 6: Comparison of Select Model Estimates under Alternative Equilibrium Selection Assumptions

	Most Profitable Firm Moves First	For-Profit Moves First	Nonprofit Moves First	Most Profitable Industry Equilibrium
Select ForProfit Profit Shifters				
Fixed cost index	−0.287***	−0.287***	−0.299***	−0.318***
	(0.077)	(0.078)	(0.077)	(0.077)
Prop Tax	−0.531***	−0.528***	−0.539***	−0.551***
	(0.160)	(0.160)	(0.160)	(0.161)
Pres of Univ	0.018	0.018	0.017	0.028
	(0.114)	(0.113)	(0.114)	(0.114)
Pres of NP	−0.235	−0.233	−0.233	−0.271
	(0.230)	(0.236)	(0.223)	(0.226)
FP = 2	−1.217***	−1.218***	−1.218***	−1.213***
	(0.086)	(0.086)	(0.086)	(0.085)
FP = 3	−0.844***	−0.843***	−0.842***	−0.846***
	(0.068)	(0.068)	(0.068)	(0.068)
FP = 4	−0.760***	−0.757***	−0.762***	−0.769***
	(0.069)	(0.069)	(0.069)	(0.069)
FP = 5	−0.590***	−0.589***	−0.596***	−0.604***
	(0.074)	(0.074)	(0.075)	(0.075)
FP = 6	−0.512***	−0.512***	−0.508***	−0.515***
	(0.076)	(0.077)	(0.076)	(0.077)
Select Nonprofit Value Shifters				
Fixed cost index	−0.358***	−0.353***	−0.380***	−0.366***
	(0.119)	(0.119)	(0.117)	(0.117)
Y 25m	0.034***	0.033**	0.033**	0.035***
	(0.013)	(0.013)	(0.013)	(0.013)
Pres of Univ	0.131	0.129	0.119	0.104
	(0.138)	(0.138)	(0.136)	(0.137)
# FPs	−0.103	−0.100	−0.122	−0.101
	(0.109)	(0.114)	(0.099)	(0.104)
Log-likelihood	−1218.970	−1218.971	−1219.154	−1219.412

Note: *, **, *** p-value $\leq$ 10%, 5%, and 1%, respectively. Specifications also include Median Age, State Income Tax rate (for-profit), and Percent Youth (nonprofit).

Table 7: Endogenous Ownership-Type Model Estimates: Inclusion of NP Demand

	Number of For-Profit Firms	Presence of Nonprofit Firm	Nonprofit Quantity Choice
Log of Pop	1.479***	0.970***	0.820***
	(0.064)	(0.120)	(0.152)
Log of Income	1.660***	2.884***	2.372***
	(0.365)	(0.591)	(0.740)
Perc BA+	0.369	−3.846***	−1.321
	(0.695)	(1.020)	(1.421)
Perc Single	2.834***	6.739***	5.136**
	(1.062)	(1.555)	(2.189)
Dist Coast	−0.091***	−0.046	−0.005
	(0.012)	(0.030)	(0.023)
Weather index	0.133***	0.124*	−0.030
	(0.049)	(0.070)	(0.090)
Health index	−0.290***	−0.220***	−0.107
	(0.047)	(0.074)	(0.088)
Retail Wage	0.001	−0.006***	
	(0.001)	(0.001)	
Fixed cost index	−0.238***	−0.416***	
	(0.057)	(0.112)	
Prop Tax	−0.361***		
	(0.114)		
Y 25m		0.043***	
		(0.011)	
Pres of Univ	−0.251***	0.263***	0.044
	(0.076)	(0.099)	(0.133)
Pres of NP	−0.243***		
	(0.068)		
# FPs		−0.024	−0.106**
		(0.034)	(0.048)
FP = 2	−1.073***		
	(0.067)		
FP = 3	−0.742***		
	(0.056)		
FP = 4	−0.682***		
	(0.055)		
FP = 5	−0.508***		
	(0.057)		
FP = 6	−0.411***		
	(0.057)		
StdDev, ϵ_Q			0.809***
			(0.040)
Log-likelihood		-1617.163	

Note: *, **, *** p-value $\leq$ 10%, 5%, and 1%, respectively. Specification also includes Median Age, State Income Tax rate (for-profit), and Percent Youth (nonprofit).

Table 8: Crowd-Out and the Role of Tax Exemptions in Affecting Market Structure

	Base	No nonprofit	Tax increase	No tax exemption
Outcome				
For-profit	2.678	2.783	2.531	2.699
Nonprofit	0.357	0.000	0.358	0.290
Membership (000)	0.518	0.000	0.527	0.441
Change				
For-profit		0.104	−0.148	0.020
Nonprofit		−0.357	0.001	−0.067
Membership		−0.518	0.009	−0.077
Percentage Change				
For-profit		0.037	−0.068	0.008
Nonprofit		−1.000	0.003	−0.237
Membership		−1.000	0.018	−0.236

Note: We display predicted numbers of firms and membership, as well as changes therein under counterfactual assumptions on the profit function shifters. Membership reported in 1,000s. Equilibrium entry predictions are based on the parameter estimates in Table 7. The 'Base' case corresponds to the demographics used in estimation; in the data, the observed number of firms averages to 2.749 and 0.423 for for-profits and nonprofits, respectively. Average membership averages to 686.38. Columns (2) through (4) illustrate market structure outcomes under the absence of a nonprofit, a one standard deviation increase in property taxes, and a removal of the property tax exemption for nonprofits, respectively.

Table 9: Probit Models of Nonprofit's Decision to Offer Youth Services

	Probit (1)	Biv Probit, Youth Program & Fitness Ctr (2)	Probit (3)	(4)
Day care				
Log of Pop	0.800***	0.888***	0.310**	0.596**
	(0.189)	(0.173)	(0.125)	(0.245)
Log of Income	4.533***	3.961***	1.810*	2.103*
	(0.898)	(0.831)	(0.927)	(1.140)
Median Age	−0.052*	−0.047	−0.044	−0.033
	(0.029)	(0.030)	(0.032)	(0.042)
Perc BA+	−4.957***	−3.973**	−3.721**	−3.452
	(1.746)	(1.615)	(1.709)	(2.190)
Perc Single	8.305***	7.818***	6.815**	7.442**
	(2.713)	(2.670)	(2.769)	(3.524)
# day cares	−0.007	−0.012*		−0.012
	(0.007)	(0.006)		(0.009)
Pres of Y gym			2.433***	2.616***
			(0.248)	(0.366)
After school programs				
Log of Pop	0.792***	0.926***	0.437***	0.845***
	(0.158)	(0.129)	(0.131)	(0.225)
Log of Income	3.672***	3.470***	0.371	0.008
	(0.744)	(0.723)	(0.838)	(1.090)
Median Age	−0.034	−0.034	−0.002	0.008
	(0.026)	(0.025)	(0.030)	(0.040)
Perc BA+	−1.392	−0.703	2.106	4.466*
	(1.457)	(1.442)	(1.610)	(2.295)
Perc Single	2.743	2.218	−0.443	−2.620
	(2.315)	(2.253)	(2.562)	(3.280)
# after school offerings	0.001	−0.008**		−0.017**
	(0.006)	(0.003)		(0.008)
Pres of Y gym			2.688***	2.995***
			(0.179)	(0.260)
Obs	457	457	629	457

Note: *, **, *** p-value $\leq$ 10%, 5%, and 1%, respectively. All specifications also include retail wages, the fixed cost index, the percent youth, and the percent Christian , which are statistically insignificant across specifications in affecting the youth program offering decision.

Table 10: Effect of Fitness Center Exits on Nonprofit's Decision to Offer Youth Services

	Probit Model of Youth Service Offering		
	(1)	(2)	(3)
Day care			
Exit of Fitness Center Y/N	0.004		
	(0.300)		
Decrease, Fitness Ctr Entry Probability		2.200	
		(1.409)	
Above-Median Decrease in Entry Probability Y/N			0.296*
			(0.167)
Loss of Programs	0	19	31
Share of Programs Lost	0.003	0.126	0.208
After school programs			
Exit of Fitness Center Y/N	0.569		
	(0.480)		
Decrease, Fitness Ctr Entry Probability		5.573**	
		(2.544)	
Above-Median Decrease in Entry Probability Y/N			0.342*
			(0.205)
Loss of Programs	26	26	21
Share of Programs Lost	0.116	0.118	0.093
Obs	266	266	266

Note: *, **, *** p-value $\leq$ 10%, 5%, and 1%, respectively. Selected estimated coefficients from Probit models of the propensity of observing nonprofit day care and after school programming in a market. All specifications control for population, income, median age, and percent of population with at least a bachelor's degree, percent single, and percent youth.

Table 11: Estimate of Subsidy to Afterschool Programs from Generated NP Taxes

	Source of Estimated Taxes							
	FP property data				NP property data			
California	mean	25%	median	75%	mean	25%	median	75%
Tax	7299.53	4904.84	6760.79	8564.91	30303.76	18073.3	28746.29	37174.84
Subsidy								
Actual Capacity	2.9%	2.0%	3.2%	3.8%	13.4%	9.1%	14.7%	17.6%
Assumed Capacity of 68	1.6%	1.6%	1.6%	1.6%	8.0%	7.3%	7.5%	7.5%
Est. Capacity Adj for Demographics	1.8%	1.4%	2.0%	2.0%	8.6%	8.4%	9.1%	9.3%
All Markets								
Tax	4591.29	4453.02	4567.96	4567.96	22509.57	20683.45	21217.34	21217.34
Subsidy								
Actual Capacity		N/A				N/A		
Assumed Capacity of 68	2.6%	1.7%	2.4%	3.0%	10.7%	6.4%	10.2%	13.2%
Est. Capacity Adj for Demographics	3.0%	1.9%	2.8%	3.7%	12.6%	7.4%	11.7%	15.5%

Note: The table provides estimates of the taxes generated in our markets if the NP property tax exemption was revoked. We also estimate the potential subsidy to afterschool programs if 100% of the generated revenues were applied. *FP property data* uses the average of the FP property taxes paid in a market to predict the generated revenues. *NP property data* uses the observed assessed value of the NP property and multiplies by the average millage rate in the market to predict revenues. Estimates of the size of the afterschool programs (capacity) is calculated using the (i) actual capacity data for California (CA) (ii) average of the CA market afterschool size of 68 students and (iii) predicting capacity using the CA data and adjusting for demographic characteristics of the market.

Appendix

A-1 Details on Variable Construction

In this appendix, we summarize the variables used to construct the weather, health, and fixed cost indices. In each case, we implement principal components factor analysis (PCFA), rotate the factor loadings using varimax, and use the first factor from each PCFA. As discussed in the Data section, the first factor captures a large portion of the total variance from all of the variables used for each index. The first two columns provide descriptive statistics for each variable. To give a better sense of the interpretation of each factor, we also provide the correlation of each individual variable to the first factor.

Table A-1: Variables used in construction of Weather Index

	Mean	SD	Corr to First Factor
Mean # of Days Min Temperature $\leq$32 Deg. F	96.827	55.292	0.919
Mean # of Days Max Temperature $\geq$90 Deg. F	42.779	35.825	−0.844
Mean # of Heating Degree Days (Base 65 Degrees F)	145.852	59.813	0.972
Mean # of Cooling Degree Days (Base 65 Degrees F)	68.895	36.417	−0.932
Mean # of Days with Precipitation $\geq$0.01 Inch	104.467	31.642	0.517
Snowfall - Avg Total in Inches	29.434	35.032	0.829
Average Relative Humidity	68.289	8.980	0.087
Normal Precipitation, Inches	36.349	15.577	−0.182
Average number of unhealthy days	6.178	1.089	−0.198
Number of days air quality was unhealthy, 2005	3.103	5.042	−0.197
Ozone Days	3.332	10.421	0.017

Note: All weather information comes from the National Environmental Satellite, Data, and Information Service (NOAA). Averages are calculated from the beginning of data recording at a weather station through 2009. Climatological normals are 30-year average values over the period 1971-2000. For each market, we use data from the closest weather station to the market centroid.

Table A-2: Variables used in construction of Health Index

	Mean	SD	Corr to First Factor
% of zips w/ healthy food store	0.377	0.164	0.067
Liquor stores/population×10,000	1.075	0.868	−0.354
variableposition== 3.0000	0.279	0.037	0.626
% Binge Drinking	0.144	0.048	−0.607
Average life expectancy	76.487	1.866	−0.874
Self-rated health status	0.172	0.051	0.784
Death: coronary heart disease (count)	180.784	42.729	0.670
Death: lung cancer (count)	58.158	12.642	0.732
Death: stroke (count)	62.343	15.260	0.543
% Smokers	0.227	0.049	0.572
% Uninsured	0.170	0.058	0.048
(# of Primary Care Physicians/pop)×100,000	100.988	47.380	−0.317

Note: Data on the presence of healthy food stores, the density of liquor stores, and prevalence of binge drinking comes from the University of Wisconsin Population Health Institute's County Health Rankings 2006, and 2002–2008 in the case of binge drinking. The remaining data come from the Department of Health and Human Services' Community Health Status Indicators (CHSI) report, 2008. All data are at the county level and are matched to markets based on the market's primary county.

Table A-3: Variables used in construction of Fixed Cost Index

	Mean	SD	Corr to First Factor
Median Housing Value (000), 2005-2009	147.930	98.982	0.940
Military Housing Allowance for Pay Grade E1, 2008	634.074	197.287	0.940

Note: Data on median home values from the Census Bureau's American Community Survey 5-Year Estimates of Median Housing Value of Owner-Occupied Housing Units. All data are at the county level and are matched to the markets based on the market's primary county. Data on military housing allowance from the Department of Defense Travel Management Office. Data matched to markets based on zip codes.

A-2 Robustness: Endogenous Ownership-Type Model

Table A-4: Alternative Profit Function Specifications: Most Profitable Firm Moves First

	Additive Income Tax in FP Profit		FP Profit Interacted with Income Tax	
	Base Specification	Nonlinear Cross-Competitive Effects	Linear Cross-Competitive Effects	Nonlinear Cross-Competitive Effects
Select ForProfit Profit Shifters				
Fixed cost index	−0.287***	−0.278***	−0.313***	−0.310***
	(0.077)	(0.078)	(0.080)	(0.084)
Prop Tax	−0.531***	−0.553***	−0.512***	−0.588***
	(0.160)	(0.159)	(0.170)	(0.176)
Pres of Univ	0.018	0.012	−0.032	0.021
	(0.114)	(0.112)	(0.117)	(0.123)
Pres of NP	−0.235	−0.106	−0.214	−0.078
	(0.230)	(0.224)	(0.232)	(0.234)
FP = 2	−1.217***	−1.206***	−1.259***	−1.313***
	(0.086)	(0.082)	(0.131)	(0.135)
FP = 3	−0.844***	−0.831***	−0.873***	−0.898***
	(0.068)	(0.067)	(0.099)	(0.100)
FP = 4	−0.760***	−0.765***	−0.791***	−0.831***
	(0.069)	(0.075)	(0.098)	(0.103)
FP = 5	−0.590***	−0.580***	−0.618***	−0.634***
	(0.074)	(0.071)	(0.091)	(0.093)
FP = 6	−0.512***	−0.507***	−0.541***	−0.554***
	(0.076)	(0.077)	(0.090)	(0.093)
Select Nonprofit Value Shifters				
Fixed cost index	−0.358***	−0.386***	−0.356***	−0.398***
	(0.119)	(0.131)	(0.120)	(0.132)
Y 25m	0.034***	0.033**	0.032**	0.033**
	(0.013)	(0.013)	(0.013)	(0.014)
Pres of Univ	0.131	0.106	0.123	0.097
	(0.138)	(0.141)	(0.137)	(0.141)
# FPs	−0.103		−0.114	0.276
	(0.109)		(0.106)	(0.313)
FP = 1		0.250		0.276
		(0.324)		(0.313)
FP = 2		−0.043		−0.053
		(0.223)		(0.219)
FP = 3		−0.626***		−0.644***
		(0.217)		(0.216)
FP = 4		−0.160		−0.187
		(0.296)		(0.287)
FP = 5		0.319		0.421
		(0.367)		(0.353)
FP = 6		−0.149		−0.261
		(0.351)		(0.334)
Log-likelihood	−1218.970	−1214.5605	−1218.751	−1213.268