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Does Market Size Matter for Charities?

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Abstract

We analyze implications of market size for market structure in the charity sector. While a standard model of oligopolistic for-profit competition predicts a positive relationship between market size and firm size, our analogous model of competition between prosocially motivated charities predicts no such correlation. If charities are biased towards their own provision, a positive association between market size and provider size can arise. We examine these predictions empirically for six different local charity markets. Our findings reject the hypothesis that charities pursue unbiased prosocial objectives, and suggest that increased competition in the charity sector can lead to rationalization in provision.

Keywords: Competition in charity sectors, Market structure
JEL: H41, L11, L13, L31, L33

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Highlights

- We provide novel theoretical results on oligopolistic competition in the charity sector.
- Non-prosocial bias towards own provision leads to excessive entry.
- Increased competition in larger markets can lead to rationalization of entry and production choices in the charity sector as it does in the for-profit sector.
- We show empirical evidence of non-prosocial motives for Canadian charities.
- Provider size increases with market size while the number of providers increases less than proportionally with market size.

1. Introduction

There is growing interest in the question of how to measure performance in the provision of collective goods (Atkinson, 2005; Simpson, 2009). As the not-for-profit sector is responsible for providing a sizeable share of collective goods and services and receives a substantial amount of direct or indirect financial support from government,[1] there is also specific interest in the performance of not-for-profit providers and its determinants.[2]

In this paper, we study how inter-charity competition shapes entry decisions and market structure in charitable sectors.[3] This question is important, because the design of optimal government policies vis-à-vis the charitable sector is likely to depend on the answer.

We offer a new model of oligopolistic competition between charities providing horizontally differentiated goods and services, as well as the first empirical analysis of competitive conduct in different charitable sectors.[4] Charities operate in different areas and have different geographical scope; but they also differ in their precise roles. Because of this, when evaluating implications of the number of charities competing within a particular location and charitable activity, one must account for variety effects as well as technological considerations. In the presence of product differentiation, the key trade-off driving economic performance is between the fixed costs incurred by each charitable provider and the additional benefits delivered by the distinctiveness

[1]For example, in the United Kingdom in 2017, the annual gross income from 168,237 charities in the UK was £75.35 billion, with those charities receiving almost £3.8 billion of tax relief from the UK government (see www.gov.uk/government/statistics/cost-of-tax-relief); in Canada in 2016, tax relief for 86,000 registered charities was about CDN$8.5 billion, that is, 67% of the sector's annual income of approximately CDN$12.8 billion (see www.canadahelps.org/en/the-giving-report/).

[2]We use the words charity and not-for-profit here interchangeably as our analysis applies to both not-for-profits that rely on donations and those that rely on sales for revenue.

[3]This question has been little studied in the academic literature, which has mostly focused on donors' choices – for example, on how tax incentives can promote charitable giving (studies include Almunia et al., 2018; Scharf and Smith, 2015).

[4]Implications of policy reforms for competition and quality of provision of health services have been analyzed extensively (e.g., see Propper et al., 2008; Cooper et al., 2011). However, these studies do not focus on entry (a recent exception being the theoretical analysis of Besley and Malcomson, 2016) or market structure. Other studies (including Gaynor and Vogt, 2003; Gaynor and Town, 2011; Capps et al., 2010) have asked if the choice of organizational form affects the pricing decisions of competing hospitals; but these studies abstract from entry decisions. There is research on the effect of competition on entry decisions of hospitals, but there are very few contributions looking at other types of private providers of public goods, which is what we are interested in doing here; a recent exception is Bowblis (2011), who examines, among other things, the effect of public insurance on closures of for-profit and not-for-profit nursing homes respectively. One paper that focuses on entry in the broader not-for-profit context is Lakdawalla and Philipson (2006), but their interest is on the question of selection of organizational form through entry decisions, and not, as is ours, the implications of market size on market structure in a not-for-profit context. Two recent related studies are Scharf (2014), which presents a theoretical model of competition between charities and charity selection; and Perroni et al. (2018), which examines the effect of coordination on efficient charity selection. The paper by Gaynor and Town (2011) contains a comprehensive and fairly recent overview of the literature.

of that provider's offering. To date there has been no systematic attempt to derive a theory of not-for-profit competition under product differentiation that can be directly compared to and related to analogous models used to study and measure competition in the for-profit sector.

As a benchmark case, we first model competition between for-profit firms providing symmetrically differentiated products under conditions of free entry and through technologies that give rise to economies of scale in production (resulting from a combination of fixed costs and linear variable costs). To adapt this framework to the not-for-profit case, we incorporate the key feature that differentiates a for-profit organization from a not-for-profit organization, namely charities face a nondistribution constraint. This requires them to balance revenues and expenses "on average", which in turn shapes their conduct "on average", preventing them from pursuing profit maximization. In our analysis, we consider both the case where charities' motivation is purely prosocial, that is, when their objective is social surplus maximization, and the case where charities are biased towards their own activities and are therefore also driven by non-prosocial motives (as in Scharf, 2014).

Our model generates the usual predictions for the for-profit sector – both the number of firms and their average size will increase in market size, as in Bresnahan and Reiss (1991). Intuitively, under oligopolistic competition firm size is inefficiently low because of excessively high mark-ups; larger markets are more competitive and result in lower mark-ups, which in turn requires a larger volume of sales to cover fixed costs. An increase in market size can thus bring firm size closer to its socially optimum size, promoting rationalization in production. The results for the not-for-profit case when providers are fully prosocially motivated are strikingly different: an increase in market size raises the number of providers (proportionally) but has no effect on the size of individual providers (which always remains equal to its social optimum). In contrast, when not-for-profit providers are biased towards their own activities, they will be inefficiently small, since this bias causes over-entry. In this case, an increase in the market size increases number of providers less than proportionally, and also raises the size of individual providers, and thus, leads to rationalization in production. However, this mechanism is different from the one operating in the for-profit case. For not-for-profits, larger markets already serve more varieties, making it harder for a provider that is partially driven by prosocial motives to justify adding new varieties at the expense of a decrease in the scale of provision of existing varieties. The model thus delivers testable predictions concerning the relationship between market size and average producer size, and these predictions are distinctively different depending on providers' competitive conduct and motives.

We then test empirically whether these predictions hold in panel data for registered Canadian charities. We separately study six different charitable sectors providing local goods and services: food and clothes banks, daycare, housing, senior care, disabled care, and festivals and performances. In our preferred empirical specification, we find that market size (defined as population at the municipality level) is positively correlated with both average charity size (expenditures and number of employees) and the number of charities, with the latter increasing less than proportionally with market size. Neither of these findings can arise in a setting of not-for-profit competition amongst charities that are purely driven by prosocial motives; however, they are consistent with a scenario where charities are biased towards their own output. We elaborate on the selection criteria of different charity sectors for analysis in Appendix B, on the optimal market definition in Appendix C, and on the selection of our preferred empirical specification in Appendix E. We subject the results to a number of robustness checks in Section 3.4. We also compare the estimated elasticities in not-for-profit sectors to results in comparable for-profit sectors, as well as examine the association between competition and fundraising in the data. These analyses provide further support for the presence of non-prosocial motives.

Our findings have important implications for the debate on the effects of government policies regarding the charitable sector, a debate that has largely ignored how public policies affect inter-charity competition and market performance. Our analytical framework predicts that, when charities are biased towards their own output, (excessive) free entry results in charities that are inefficiently small relative to the optimal size. Government intervention may then be warranted to encourage charities to exploit economies of scale. Even in the absence of government intervention, increased not-for-profit competition in a larger market can be counted on to mitigate inefficient entry as it does in the for-profit case, but for very different reasons. This also suggests that there may be a comparatively stronger need for corrective measures in not-for-profit markets that are comparatively small, either because they address a need that has a comparatively more limited scope or because of the limited geographical reach of charities' activities.

To the best of our knowledge, our study is the first to investigate the relationship between market size and provider size in the not-for-profit sector. The departure from profit maximization in the context of not-for-profits has been investigated by others; but, as mentioned, that literature has focused mainly on the provision of education and health services. Here we focus on more broadly defined not-for-profits. There have been a few contributions studying inter-charity competition, but these have focused mainly on the implications of organizational form,[5] and/or differential regulatory and tax regimes.[6] The mechanics of entry in the not-for-profit sector, and their implications for market structure in the charitable sector have received scant attention. This is rather surprising, as it is hard to find another category of economic activity for which competition would not be at the center of any analysis of economic performance. In striking contrast, the competitive conduct of firms in the profit sector and its implications for industry structure have been studied extensively by a long and established literature.

[5]See for example, Alchian and Demsetz (1972); Hansmann (1980); Easley and O'Hara (1983); and Glaeser and Schleifer (2001).

[6]For example, Lakdawalla and Philipson (2006).

The rest of the paper is structured as follows. The next section introduces a theoretical model that compares competition outcomes for for-profit firms and for not-for-profit providers. Section 3 describes the data, the estimation procedures and the empirical results. Section 4 concludes.

2. Market Size and Market Structure

We describe parallel models of oligopolistic competition under conditions of free entry for the for-profit and the charity sectors. Our aim is to make both of these models as simple as possible and as comparable as possible, both with respect to each other and with respect to standard theories of competition between providers.

In our analysis, we take market size (defined in terms of the aggregate value of demand) as exogenous, and model how the equilibrium size and number of providers vary endogenously with exogenous changes in market size. In this sense, the model is a partial-equilibrium model that abstracts from endogenous effects on market size arising from changes that occur in other markets – or, equivalently, as a general equilibrium model in which the the cross-price elasticity of demand of the good produced in the market under consideration is zero. In turn, exogenous variation in market size in the model can be thought of arising from variations in income and/or population or variations in the level of demand itself.

2.1. Preferences, Technologies, and Optimal Industry Structure

Consider an economy with a large number of consumers having identical incomes and identical preferences for symmetrically differentiated varieties of a given good produced by N providers. Preferences have a CES structure (as in Dixit and Stiglitz, 1977), with primal, linearly homogeneous representation (in terms of utility)

$$U = \left(\sum_{i=1}^{N} {q_i}^{(\sigma-1)/\sigma} \right)^{\sigma/(\sigma-1)}, \quad \sigma > 1, \tag{1}$$

where q_i is the quantity of variety i – the variety produced by provider $i \in \{1, \ldots, N\}$ – and σ is the (constant) elasticity of substitution between different varieties. With identical preferences and incomes, the utility of a representative individual (1) coincides with social welfare.

The total spend by consumers on all varieties (i.e. market size) is M. Providers face identical costs, $C(q_i) = F + c\, q_i$ for producing a given quantity q_i of their variety, where F represents fixed costs, and c is a constant marginal cost.

We characterize outcomes for two different industry structures, namely competition between for-profit providers and competition between charities. The planning optimum, which is common to the two scenarios, is found by maximizing the level of welfare (which coincides with (1)) by choice of N and for $q_i = q$ for all i, subject to the resource constraint $N(c\,q+F)=M$. This gives

$$N^* = \frac{M}{\sigma F}\,, \tag{2}$$

which increases proportionally with market size, M. The socially optimal provider size, measured in terms of variable plus fixed costs, is

$$r^* = \sigma F\,, \tag{3}$$

which is independent of market size, M, and corresponds to a level of output per provider equal to $q^* = (\sigma-1)F/c$.

2.2. The For-profit Case

Next, we derive predictions about the relationship between market size and market structure in a model of for-profit oligopolistic competition under symmetric product differentiation.

The dual representation of (1) in terms of the unit cost of utility, P, is

$$P = \left(\sum_{i=1}^{N} {p_i}^{1-\sigma}\right)^{1/(1-\sigma)}, \tag{4}$$

where p_i is the price of variety i. From this, using standard principles, we can derive an expression for uncompensated demand for variety i:

$$q_i = M\,P^{\sigma-1}\,{p_i}^{-\sigma}. \tag{5}$$

Profits for firm i are $\pi_i = (p_i - c)q_i - F$, and associated revenues are $r_i = p_i q_i$. Each firm, i, then chooses p_i so as to maximize its own profits while taking the pricing choices of all other firms, p_{-i}, as given. For a given N, a symmetric non-cooperative equilibrium in pricing choices, $p_i = p$, $\forall i$, is identified by the condition

$$\left|\frac{\partial \pi_i}{\partial p_i}\right|_{p_i=p\ \forall i} = 0. \tag{6}$$

This gives $p_i = p = c\left(1+\dfrac{N}{(N-1)(\sigma-1)}\right)$, $x_i = x = \dfrac{M}{Nc}\,\dfrac{(N-1)(\sigma-1)}{1+(N-1)\sigma}$, $\forall i$, and so

$$\pi_i = \pi = \frac{M}{1+(N-1)\sigma} - F,\ \ \forall i. \tag{7}$$

In an equilibrium with free entry, we must have $\pi_i = \pi = 0$, $\forall i$. This identifies an equilibrium number of firms, N, as

$$N = \frac{M+(\sigma-1)F}{\sigma F} > \frac{M}{\sigma F} = N^*, \tag{8}$$

and thus an equilibrium level of revenue per firm (firm size) equal to

$$r = M/N = \frac{\sigma F}{1 + (\sigma - 1)F/M} < \sigma F = r^*. \tag{9}$$

Proposition 1. *An increase in market size produces a less-than-proportional increase in the number of for-profit firms along with an increase in the size of individual firms.*

PROOF: The effect of an increase in M on firm size N, after replacing M with $(\sigma - 1)F\,r/(\sigma F - r)$ from (9), can be expressed as

$$\frac{\mathrm{d}N}{\mathrm{d}M}\frac{M}{N} = \frac{r}{\sigma\,F} < 1. \tag{10}$$

where the inequality comes from (9). The effect of an increase in M on r is

$$\frac{\mathrm{d}r}{\mathrm{d}M}\frac{M}{r} = \frac{\sigma\,F - r}{\sigma\,F} > 0. \tag{11}$$

□

The equilibrium number and size of providers in an oligopolistic, for-profit equilibrium, as identified by (8) and (9), differ from their social optimum counterparts: the number of firms is inefficiently large and firm size is inefficiently small ($N > N^*$ and $r < r^*$). An increase in market size causes firms to become larger and closer in size to the socially optimal size (for N approaching infinity, condition (9) coincides with the condition identifying the socially optimal firm size); i.e., a larger market brings about rationalization in production choices.

This result parallels the prediction tested by Bresnahan and Reiss (1991) with reference to an oligopolistic setting where firms produce a homogeneous good but face increasing marginal costs. In their model, as in ours, with oligopolistic competition between for-profit providers there is too much entry resulting in a suboptimal firm size; an increase in market size then raises competition and brings firm size closer to its socially optimal level.[7]

A formulation with CES preferences provides an ideal benchmark for modelling the relationship between competition and firm size, because it implies that under monopolistic competition the decentralized outcome coincides with a planning optimum, which would generally not be the case with non-CES preferences. So, in this model, if the number of competing firms is sufficiently large, an increase in market size has no effect on firm size. This means that effects of market size on firm size stem only from oligopolistic responses and asymptotically vanish as competition increases.

[7]A classic paper demonstrating the possibility of excess entry in equilibrium is Mankiw and Whinston (1986). See Amir et al. (2014) for an example of a recent extension of that framework.

2.3. *Charity Markets*

Charities – be they donative charities (non-commercial, i.e. receiving donations) or commercial charities (charging a price for its output) – differ from for-profit organizations because they face a non-distribution constraint, i.e. they cannot disperse any surplus of revenues over costs. So, although they can incur surpluses and losses in the short run, on average (i.e., in a long-run sense) their revenues cannot depart from their expenditures,[8] and so there is no scope for them to pursue a profit maximization objective.

The discussion in this section focuses on the donative charity case, which directly implies marginal cost pricing; but it can be shown that the same analysis and results also apply to the case of commercial charities – provided that they operate under the same non-distribution constraint. In deriving results for the not-for-profit case, we also abstract from the public good nature of output – if present (the case where charities provide public goods is addressed later, when we discuss results).

In a symmetric noncooperative equilibrium, a binding non-distribution constraint means that, in order for providers not to incur a loss, the donations, d_i, received by provider i must cover full costs, $c\, q_i + F$, and so $q_i = (d_i - F)/c$. At the margin, however, donors face a marginal cost of provision equal to c.[9] The allocation of the total spend, M, that maximizes utility (1) from the point of view of donors is then identified by the conditions $\frac{\sigma-1}{\sigma}\left(\frac{d_i - F}{c}\right)^{-1/\sigma} = c$, $\forall i$, and $\sum_{i=1}^{N} d_i = M$. These give

$$d_i = d = M/N, \tag{12}$$

and

$$q_i = q = \frac{M/N - F}{c}. \tag{13}$$

The associated level of utility is $N^{\sigma/(\sigma-1)}(M/N - F)/c \equiv \widehat{U}(N)$, and provider size is $M/N \equiv \widehat{r}(N)$.

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[8] Many not-for-profit organizations, such as schools and hospitals, routinely run current-account surpluses that translate into capital-account investments that allow the organization to grow in size. Even if sustained indefinitely, this pattern is consistent with the organization breaking even in present value terms, with donors anticipating this and carrying out a forward-looking calculation analogous to the one we describe here for a static environment. As a robustness check, in our empirical analysis we look at how market size affects both average expenditures and average revenues of providers.

[9] A substantial fraction of charities' revenues come from government, but this need not affect charities' and donors' marginal calculations; i.e. if X is a government grant and so $q_i = (d_i - F + X)/c$, the marginal cost of provision faced by donors is still c. Matching government grants or tax relief for donations, on the other hand, can affect the price of giving and thus marginal giving incentives. The implications and effects of these incentives have been studied by a large literature (which includes Feldstein and Clotfelter, 1976; Roberts, 1987; Scharf, 2000; Bakija and Heim, 2011; Almunia et al., 2018). We will touch on the role of donation subsidies later when we discuss government policies that could be used to correct for excessive entry.

Denoting with $\Gamma^E(N)$ the payoff for a participating representative provider if N providers are present in total, and with $\Gamma^X(N)$ the payoff for a representative provider if N providers are present and the provider in question does not participate, the marginal entry decision, characterizing an equilibrium level of N in a symmetric outcome, is then identified by the level of N for which $\Gamma^E(N) \geq \Gamma^X(N-1)$ and $\Gamma^E(N+1) < \Gamma^X(N)$. The payoff for a fully prosocially motivated, not-for-profit provider coincides with social welfare, and thus equals $\widehat{U}(N) = \Gamma(N) = \Gamma^E(N) = \Gamma^X(N)$; the marginal entry decision is then simply given by the inequalities $\widehat{U}(N) \geq \widehat{U}(N+1)$ and $\widehat{U}(N) \geq \widehat{U}(N+1)$, or, in differential terms (i.e. allowing N to vary continuously),

$$\frac{\mathrm{d}\widehat{U}}{\mathrm{d}N} = N^{1/(\sigma-1)} \frac{M/N - \sigma F}{(\sigma-1)\, c} = 0. \tag{14}$$

This gives

$$N = \frac{M}{\sigma F} = N^*. \tag{15}$$

and so $q = (\sigma-1)F/c$, which in turn gives

$$r = c\, q + F = \sigma F = r^*; \tag{16}$$

i.e. fully prosocially motivated providers should replicate the socially optimum outcome. This immediately delivers the following result:

Proposition 2. *If charities are fully prosocially motivated, an increase in market size produces a proportional increase in the number of charities, and so it has no effect on the size of individual charities.*

Unlike in the for-profit case, increased competition in a larger market between prosocially motivated providers will have no beneficial effect on production choices, which always be efficient independently of market size.[10]

The assumption that charities are fully prosocially motivated is a strong one; and indeed a large literature has highlighted how charities may pursue objectives other than profit maximization or social surplus maximization, such as, for example, the maximization of own revenues (see the previously mentioned survey by Gaynor and Town, 2011).

A simple way of modelling a departure from the objective of surplus maximization is to amend $\Gamma^X(N)$ and $\Gamma^E(N)$ as follows:

$$\Gamma^E(N) = \mu\, \widehat{s}(N) + \widehat{U}(N), \tag{17}$$

[10] These conclusions extend to commercial charities. If a charity is a prosocially motivated commercial provider pricing at average cost, then the symmetric provision equilibrium for given N coincides with the one found under marginal cost pricing, as do entry choices.

where the first term, with $\mu \geq 0$, is a premium that the charity attaches to its own activities, above and beyond the charity's concern for social welfare (prosocial motivation), and $\widehat{s}(N)$ is a measure of own activities.[11] We will consider the implications of non-prosocial concerns based on two alternative measures: revenue, i.e. $\widehat{s}(N) = \widehat{r}(N) = M/N$, and market share, i.e. $\widehat{s}(N) = 1/N$.

While the social surplus component accrues to a charity independently of whether or not it enters the market, accrual of the non-prosocial component is contingent upon entry. The no-entry condition (14) must thus be amended as follows:

$$\mu\, \widehat{s}(N) + \frac{\mathrm{d}\widehat{U}(N)}{\mathrm{d}N} = 0. \tag{18}$$

The presence of a premium on own activities results in a divergence from optimality with respect to the number and size of providers operating in the charitable market: for $\mu = 0$, condition (18) coincides with the condition for social surplus maximization, i.e. it identifies the socially optimal number of providers for a given market size, M; an increase in μ from zero starting from the socially optimal N makes the left-hand side of the above positive, and so N must rise relative to a case with $\mu = 0$ (the total derivative $\mathrm{d}N/\mathrm{d}\mu$ evaluated at $\mu = 0$ is positive). This implies that own-output biased not-for-profits make positively biased entry decisions, resulting in excessive entry and a suboptimal scale of production.[12] Intuitively, own-output bias means that charities wish to be active and choose to enter even if, in terms of social welfare (i.e. from the point of view of donors), the variety gains from having an additional provider do not justify incurring the additional fixed cost.

In this case, it can be shown that an increase in market size mitigates excessive entry:

Proposition 3. *If charities providers are partially prosocially motivated, being also concerned about their own revenue or their market share beyond social surplus, an increase in market size raises the size of individual charities. The number of charities rises less than proportionally with market size.*

PROOF: Considering first a scenario with revenue concerns ($\hat{s}(N) = r = M/N$), and letting $r = M/N$, we can rewrite the FOC as

$$\mu\,(\sigma - 1)\,\frac{r^{\sigma/(\sigma-1)}}{\sigma F - r} = M^{1/(\sigma-1)}. \tag{19}$$

Totally differentiating (18) with respect to N and M, and using (19) to substitute for $M^{1/(\sigma-1)}$,

[11] This specification is consistent with the literature incorporating additional elements over and above social surplus in charities' objectives. Much of that literature however, has not focused on entry decisions, but rather on the effect that these additional elements may have on ex-post competitive conduct.

[12] Some of the literature on not-for-profits, for example, Philipson and Posner (2009) effectively assume that $\mu = \infty$, i.e. that not-for-profit providers only care about their own output.

gives

$$\frac{\mathrm{d}N}{\mathrm{d}M}\frac{M}{N} = 1 - \frac{\sigma F - r}{\sigma^2 F - r} < 1. \tag{20}$$

where the positive sign of the ratio in the second term follows from $\sigma F - r > 0$ and $\sigma > 1$ (implying $\sigma^2 F - r > \sigma F - r > 0$). Totally differentiating (19) with respect to r and M, and using (19) to substitute for $M^{1/(\sigma-1)}$, gives

$$\frac{\mathrm{d}r}{\mathrm{d}M}\frac{M}{r} = \frac{\sigma F - r}{\sigma^2 F - r} > 0. \tag{21}$$

Proceeding in the same way for a scenario with market share concerns, we obtain

$$\frac{\mathrm{d}N}{\mathrm{d}M}\frac{M}{N} = 1 - \frac{\sigma F - r}{\sigma F - r/\sigma} < 1; \tag{22}$$

$$\frac{\mathrm{d}r}{\mathrm{d}M}\frac{M}{r} = \frac{\sigma F - r}{\sigma F - r/\sigma} > 0. \tag{23}$$

□

The intuition for this result is that the marginal entrant balances the prosocial opportunity cost of entry – the second term in (18) – against the non-prosocial gains from entering – the first term in (18), which is proportional to size. The larger is market size (and thus the number of varieties provided) the smaller are the variety gains from having an additional variety being provided, and so the higher the net social cost to potential entrants (who are partially driven by prosocial motives) of adding varieties above the socially optimum number while sacrificing scale in the provision of existing varieties,[13] which in turn discourages entry.

Thus, if charities are biased towards their own activities, an increase in market size can mitigate incentives for excessive entry and raise provider size closer to its socially optimum level, as it does in the for-profit case. In the for-profit case, this happens because increased competition raises the elasticity of firm-specific demand and lowers markups, which in turn forces firms to operate on a larger scale in order to cover fixed costs. In the not-for-profit case, the effect does not come from increased competition in the traditional sense of the term; rather, a larger market size raises the relative social cost of pursuing non-prosocial objectives.

2.4. *Discussion*

The theoretical implications of our analysis are, in principle, empirically testable. On the basis of Propositions 2 and 3, if we observe provider size in charity markets to be invariant in market size, this should be interpreted as a reflection of providers

[13]For a given provider size, $r = M/N$, the absolute value of the marginal social cost of adding varieties above the optimum equals $(M/r)^{1/(\sigma-1)}\,(\sigma F - r)/(\sigma - 1)$, which is increasing in M.

being purely prosocially motivated, whereas if we see provider size to increase in M, we should conclude that providers must be only partially prosocially motivated.

Our discussion has focused on scenarios where providers are homogeneous in terms of their technology and size. In Appendix A, we show that in a for-profit, monopolistically competitive scenario where the distribution of productivity types is Pareto – a specification widely adopted in the literature that focuses on firm heterogeneity, following Hopenhayn (1992) – *average* firm size is invariant to a change in market size. The same is true for not-for-profit providers. Thus, under these conditions, even when providers are heterogeneous in terms of their size, effects of market size on firm size should come solely from oligopolistic responses. This also implies that an estimation strategy that focuses on the average size of charities in the market is appropriate whether or not firms are heterogeneous in size.[14]

We have abstracted from the fact that in many cases the goods that are funded by private donations and provided by charities are public goods. Accounting for the public good nature of not-for-profit provision, however, does not change the structure of the question or the conclusions. The main implication is that there are positive externalities that are not accounted for in the donation decision of individual donors, i.e. for any given variety the social effect on the quantity available for consumption from an additional dollar of donations towards that variety is larger than the corresponding private effect (the effect that is accounted for in donations choices) by a constant factor that equals the number of donors/users of the good. If income can also be used for private consumption – unlike in the formulation of preferences (1) that we have used to develop our arguments – then, for any given variety, the amount supplied will be below the social optimum. However, conditional on this wedge being in place for *any* number of providers, the (second-best) socially optimal level of N is as before, and conclusions concerning the effect of an increase in market size on charity size are the same as for a scenario with private goods.[15]

We have also abstracted from the role of fundraising in the competition between charities for donors. Loosely speaking, fundraising can be thought of as lowering the perceived price of giving (or equivalently as raising the perceived benefits of giving) to donors, and so in this respect it has analogous effects to a donation subsidy. But unlike donation subsidies, fundraising involves real costs and so it inefficiently dissipates resources. Rose-Ackerman (1982) was among the first study to point to a link between the non-prosocial motives of competing charities and 'excessive' (socially wasteful)

[14]In our case, the distribution of charity sizes is broadly consistent with Pareto, that is, there are many small charities and a long tail of larger charities. Moreover, we show that our empirical results are robust to conducting the analysis at the level of individual charities instead of the market average.

[15]Suppose for example, that there are K donors with identical preferences and all contributing to the same varieties of public goods; and that preferences are quasilinear in the public good composite, as defined by (1), with the utility function taking the form $y + \theta U^{\eta}$, with $\eta \in (0, 1)$. If we compare the cooperative and noncooperative levels of spending (M) on collective goods in this case, the noncooperative level is lower by a factor $K^{1/(\eta-1)} < 1$. However, other than for the fact that M is at a suboptimal level, our analysis and results goes trough unchanged.

fundraising: for a given total spend, M, competitive fundraising reduces the funds available to finance provision and hence welfare (assuming that it does not directly affect the value of charities' activities), and so fundraising competition is a symptom of charities' conduct departing from social welfare maximization. From this perspective, if charities are, at least in part, driven by non-prosocial motives, we would expect changes in the degree of competition between them to be reflected in changes in their fundraising efforts; and vice-versa, observing an empirical relationship between inter-charity competition and fundraising effort would be indicative of non-prosocial motives in inter-charity competition.

In theoretical terms, however, the sign of the relationship between the degree of competition and the intensity of charities' fundraising efforts is not a priori clear: having to compete with more charities may prompt a charity to do more fundraising, but it may also reduce the effectiveness of any given fundraising promotion, inducing a charity to reduce its fundraising efforts. In a model of differentiated charity provision (which assumes CES preferences as we do in ours), Castaneda et al. (2008) show that increased competition (an increase in the number of competing charities) is predicted to raise the share of charities' expenditures devoted to fundraising.[16] Thus, an increase in market size, provided it that raises the number of charities, should cause fundraising costs to rise in relative terms.

Finally, our theoretical framework can also provide testable predictions with respect to the comparison between for-profits and charities. This, however, requires making some additional ceteris paribus assumptions. For the same size and the same technology and preferences parameters (F, c and σ), the theory predicts that, when charities' non-prosocial concerns relate to market share, the elasticity of provider size with respect to market size (expression (23)) should be larger in the not-for-profit case than in the for-profit case (expression (11)); i.e., assuming that the departure from optimal size is the same in both situations – in one case due to mark-ups in the other to a non-prosocial bias as represented by a positive μ – when we increase the market size, provider size should respond comparatively more in the not-for-profit case. If charities' non-prosocial concerns relate to revenues, on the other hand, the comparison is ambiguous.

2.5. Policy Implications

There is a widespread presumption amongst both academic economists and practitioners that free competition is the most effective cure against monopolistic inefficiencies in private markets. Market enlargement, resulting either from increased economic activity or from integration of previously segmented markets (e.g. following a reduction in trade costs) intensifies competition, reducing the market power of individual

[16] In their analysis an increase in inter-charity competition is modelled as an increase in the number of charities. In ours, the size of individual charities also changes; if there are scale economies in fundraising, there could be further effects on fundraising effort, which could compound with the effects described by Castaneda et al. (2008).

firms and improving allocative efficiency.

This idea is based on well-established notions of firms' incentives in for-profit markets; but previously it has not been clear if and how it carries over to the case of not-for-profit providers. We have shown that if charities' motives depart from pure prosocial objectives, they will choose to operate at a scale that is sub-optimally small, just as in the for-profit case. In this case, increased competition in a larger market can correct for the excessive entry. The novel lesson is that for charities the effect operates through the tradeoff faced by providers between their prosocial and non-prosocial motives, rather than through a change in the elasticity of demand they face as in the for-profit case.

Our analysis relates primarily to the question of whether market expansion (occurring independently of any government policies) can improve performance in the not-for-profit sector. We can nevertheless refer to it to draw conclusions about the potential of government policies in promoting efficiency. A price-based policy intervention directly correcting for excessive entry by less-than-fully prosocial providers in not-for-profit markets would require raising the cost of opportunity cost of entry, i.e. "taxing" entry. We can think of such a tax as raising fixed costs from F to $(1+\kappa)F \equiv \tilde{F}$, but leaving everything else unchanged (with the revenues from the entry tax being returned to individuals in a lump-sum fashion). The required entry tax, κ^*, that ensures that N equals its socially optimum level (i.e., $N^* = M/(\sigma F)$ can be found by replacing F with $\tilde{F}$ in (18) and equating (18) with (14), which gives $\kappa^* = \mu\, c\, (\sigma-1)(N^*)^{1/(1-\sigma)}$ when charities' objectives include revenue concerns and $\kappa^* = \mu\, c\, (\sigma-1)(N^*)^{1/(1-\sigma)}/M$ when they include market-share concerns.

Although there are no readily available policy instruments that could be used to directly tax entry, there are several ways of achieving this indirectly through the instruments that *are* available. In particular, if giving is sufficiently price sensitive (Roberts, 1987), there are independent reasons to incentivize private giving through government subsidies – typically taking the form of tax relief on charitable donations or matching government grants. Nondiscriminatory donation subsidies raise the volume of spend (M) but do not address excessive entry; subsidies that discriminate against donations towards entry costs (core costs), on the other hand, could do so. Government grants to charities could also be structured so as to raise the opportunity cost of entry, either by limiting the extent to which funds can be used to cover entry costs or by rewarding larger, more established firms. A limitation of these approaches, however, is that there may be other good reasons for not adopting policies that could undermine charities' ability to deal with core costs: charities have less scope for accessing capital markets and so revenue fluctuations are more challenging for them, making funding of core costs crucial; additionally, if there is scope for charities to select alternative technologies that involve lower fixed costs but result in higher average costs (and are thus less efficient), penalizing expenditures towards fixed cost could lead to inefficient technology adoption.

3. Empirical Evidence

3.1. Data and Sample Selection

Charitable contributions in Canada are eligible for tax relief, with tax receipts provided to donors by the organizations to whom the donation is made. The Canada Customs and Revenue Authority (CCRA) keeps track of these tax receipts by requiring all issuing organizations to file an annual information return, the T3010, within a specified period after the end of the charity's financial year. Among other things, information contained on the forms includes charities' fiscal period end, their registration number, detailed information about their revenues and expenditures, their geographical areas of activities (municipal; provincial; national; international);[17] their full postal address; and a summary of their main activities. Our raw data consists of the universe of T3010 forms submitted to CCRA over the period 1997-2005 and 2011.

These data consists of 84,677 charities (in the year 2011). The most common type of charity is a religious organization, which we do not consider here. We focus on six charity service sectors that are likely to benefit only local residents, providing public services that could in principle be also provided by the public sector and that are well represented in the data: food and clothing banks, daycare centers, housing charities, senior care, disabled care, and charities organizing festivals and performances.[18]

Markets are defined at the level of Census Sub-Divisions (CSD), a statistical unit defined by Statistics Canada that usually corresponds to municipalities as defined by provincial governments. Appendix C discusses empirical and simulation evidence which suggests that defining markets on the basis of CSDs should be the preferred choice amongst those available to us given the information that is contained in our data.[19] As the borders of CSDs change often, such as when municipalities merge or secede, to keep our units of observation stable through our analysis we use the 2011 CSD definitions to define our markets and adjust the data from earlier years to correspond as closely as possible to 2011 CSDs. We then assign each charity to its market using geospatial software, and either the geographic coordinates of the charity (available until 2005), or the address and postal code (for 2011).[20]

Average charity size in a market is measured as the average of charities' total expenditures in the market. Market size is measured by the total population in the CSD. We construct a panel with information on market characteristics by linking our charity data to Canadian census data from years 1996, 2001, 2006 and 2011 at the CSD level, by linking 1996 Census data to 1997 charity information, and 2006 Census data to 2005 charity information. Being able to rely on a panel with five years intervals between

[17]This information is only available until 2008.

[18]These sectors and their selection criteria are described in more detail in the Appendix B.

[19]Other possible market definitions are based on Forward Sortation Areas (FSA), postal codes, and Census Metropolitan Areas and Agglomerations (CMA and CA), which are groups of municipalities with combined population over 10,000.

[20]Appendix D explains the construction of our dataset in greater detail.

each cross-section is useful for our estimation purposes, as it gives us information on within-market, over-time variation in market size – the main explanatory variable.

We complement our analysis of not-for-profit markets with a comparable data set on for-profits firms. Every business in Canada that fills an annual tax form (including the usual T2 but also the T3010 filled by charities) is included in the Canadian Business Register (BR), maintained by Statistics Canada. We have data from the BR from 2007 to 2011: Number of firms by employment category, Dissemination Area (small statistical area of 400 to 700 population) and 6-digit NAICS industry. We aggregate Dissemination Areas (DA) at the level of Census Subdivisions. Since a direct mapping between DAs and CSDs is not available in Statistics Canada, we use GIS software and boundary files to allocate DAs to CSDs (see Appendix D for more details). The BR data contains employment information only by size categories and geographic unit. Unlike the charity data, it is not at individual business level. From this dataset, we calculate the number and average employment of firms by 6-digit industries and CSD. The number of firms is given by employment size category (1 to 4 employees, 5 to 9, 10 to 19, 20 to 49, 50 to 99, 100 to 199, 200 to 499, and 500 or more.). To measure average firm size, we use the mid-point of each size category, times the number of firms in that category. We do not count firms of indeterminate size.

One important limitation of this data is that the BR includes both for-profit and not-for-profit entities, and there is no reliable way of excluding the charities from the BR on the basis of the information that is available. Still, comparing patterns found in the charity data with corresponding patterns found in the BR data can allow for an indirect comparison between charities and for-profit providers, although the difference in the elasticity estimates obtained for the two dataset will understate the difference between the responses of for-profit and not-for-profit providers.

The nature of the data also calls for some sample selection. In the Canadian system, the costs to an organization to remain registered as a charity are negligible. Accordingly, in the Charity data we observe many instances in which a charity remains registered in a given year but is inactive (dormant), i.e., it reports zero expenditures or it provides no expenditure information. In some cases, charities report expenditures that are negligible, which strongly suggests *de facto* dormancy. To deal with this measurement problem, we treat charities as inactive if they report expenditures less than CDN$30,000[21] – or if they do not report them at all. Nevertheless, any minimum cost, revenue or expenditure threshold that we may want to set in order to discriminate between active and inactive charities is necessarily arbitrary. We investigate the robustness of the results to the inclusion of the smaller charities: results are quite similar to our main results.

In addition to excluding charities below the CDN$30,000 threshold, when analyzing the effects of market size on expenditures, we only include those charities that are active for the full duration of the sample. Given this sample restriction, the size of the

[21] This amount corresponds to the revenue limit needed to be included in public data from the BR.

charities that are continuously active is implicitly taken as being representative of all charities, including those that are not continuously active. This may be desirable because the classification of charity sectors can be quite broad, and an increase in market size may attract a wider variety of charity types, which could affect average provider size for reasons other than the competition mechanism that we want to focus on. For example, new senior care entrants may possibly not provide the standard care service but perhaps only some consulting. Such new entrants could be small due to being different, but not due to the effect of market size in the way that we think about it in the theoretical model. Focusing on how the size of charities already in the market responds to market size change provides a cleaner test of our theoretical predictions. However, we also carried out the regressions using the full sample of active charities, and results are quite similar to our main results. Moreover, as this sample restriction omits any entrant and exiting charities, and thus removes any time series variation in the number of charities in each market, we relax this restriction when analyzing the effect of market size on the number of charities.

3.2. Analysis

The testable predictions of our model concern the effects of market size on the number and size of charities. To analyze these relationships in the data, we focus on the number of charities and their average size within individual markets. Our main specification estimates the following equation:

$$\ln Y_{it} \;=\; \alpha + \gamma \ln Market\_Size_{it} + \mathbf{x}_{it}'\beta + \epsilon_{it}, \tag{24}$$

with markets indexed by i, and $t \in \{1997, 2001, 2005, 2011\}$. In our main specifications, our variable of interest, $Market\_Size_{it}$, is measured as the total population in a market in a given year, and the outcome, Y_{it}, as the number of providers in the market in a given year or the average level of expenditures by providers in a market in a given year. The vector $\mathbf{x}_{it}$ includes a number of market-specific control variables.[22] In the fixed-effects specifications, α is replaced with α_i.

To begin with, we present descriptive statistics on these main outcome variables of interest in Table 1. We have altogether 5,253 markets, many of which do not contain any charities operating in our chosen sectors. After the sample restrictions, with reference to the year 2011, we use information on 403 markets containing food and clothing banks, 399 markets for daycare centers, 463 markets for housing charities, 413 markets for senior care and 446 markets for disabled care organizations as well as 304 markets for charities organizing festivals and performances. All the variables appear to contain considerable variation across markets.

Our main results are shown in Table 2 for the effect of market size on average char-

[22]These variables are: log of mean household income, share of population over sixty-five years old, share of population under five years old, share without a high school diploma, share with university degree, share of immigrants, unemployment rate, log of average rental price.

Table 1: Descriptive Statistics on Charities and Business Register, by CSD, for 2011

	N	Mean	Std. Dev.	Min.	Max.
Charities, Number of Providers (exp.>30,000)					
Daycare	399	2.65	9.12	1	132
Food and Clothing Banks	403	2.41	5.36	1	75
Housing	463	2.69	6.63	1	90
Seniors	413	2.11	5.27	1	72
Disabled	446	3.29	7.74	1	99
Festivals and Performances	304	4.97	16.9	1	193
Charities, Average Employment (Non-dormant, exp.>30,000)					
Daycare	315	37.1	35.2	2.50	249.5
Food and Clothing Banks	154	12.4	13.6	2.50	68
Housing	279	40.4	62.5	2.50	500
Seniors	179	22.8	49.6	2.50	349.5
Disabled	295	72.9	85.1	2.50	500
Festivals and Performances	111	15.4	25.1	2.50	172.3
Charities, Average Expenditures (Non-dormant, exp.>30,000)					
Daycare	323	1,074,483	1,219,222	31,853	8,641,190
Food and Clothing Banks	190	409,487	647,394	30,277	5,408,711
Housing	317	1,571,627	2,440,329	35,008	23,707,902
Seniors	208	757,937	2,048,451	32,776	23,115,650
Disabled	312	2,614,811	4,045,785	31,997	51,355,444
Festivals and Performances	148	445,053	1,110,827	33,000	12,617,122
Business Register, Number of Providers (exp.>30,000)					
Daycare	1,390	6.63	35.1	1	964
Food and Clothing Banks	2,634	23.0	154.0	1	5,059
Housing	1,603	6.36	42.3	1	1,313
Seniors and Disabled	890	4.21	13.1	1	237
Festivals and Performances	563	5.59	28.7	1	439
Business Register, Average Employment (exp.>30,000)					
Daycare	1,390	12.4	13.0	2.50	149.5
Food and Clothing Banks	2,634	13.1	12.3	2.50	349.5
Housing	1,603	5.36	6.72	2.50	76
Seniors and Disabled	890	19.6	34.6	2.50	500
Festivals and Performances	563	7.71	17.6	2.50	349.5

ity size and in Table 3 for the effect of market size on the number of providers. Both tables include results from pooled OLS regressions and market fixed-effects regressions, with and without additional control variables, for the four years in the panel (1996, 2001, 2006 and 2011). Our preferred specification is the one in the second column of both tables: Pooled OLS regressions with control variables. In Appendix E, we discuss the reasons for focusing attention on this specification. Briefly, the fixed-effects specification is not able to find a positive and statistically significant correlation between firm size and market size in our BR data even for standard for-profit retail industries, which is both out of line with evidence from previous empirical literature that shows that the effect exists (e.g., Campbell and Hopenhayn, 2005), and which also contradicts a strong theoretical prior that the effect should be present. The pooled OLS is able to produce the expected result for the BR sample, mainly due to smaller standard errors.

Table 2 reports our results on average charity size. Both with and without control variables, we find that there is a significant association between market size and charity size in all six sectors. The elasticities are all below unity, ranging between 0.16 and 0.36. In Table 3, we find a similar result on our other outcome: a positive association between market size and the number of charities. The elasticities are also all below unity, ranging between 0.24 and 0.47.

In the last two columns of Table 2 and Table 3, we add CSD-level fixed effects. With fixed effects alone (no additional controls), the relationship between market size and firm size remains positive and statistically significant in four sectors, and the relationship between market size and the number of charities remains positive and significant for five sectors. However, when including control variables in addition to the fixed effects, we only find a positive association between these variables in one sector for charity size, and in two sectors for the number of providers. In the case of charity size, the statistically significant coefficients in fixed-effects regressions are larger than in the corresponding pooled OLS regressions.

Interpreting the results in light of our preferred specification, we conclude that market size is positively associated with both the number of providers in the market and their average size. On the basis of our model's predictions (Propositions 2 and 3), the interpretation of this result would be that the charities in our sample are not fully prosocially motivated. Indeed, recall that Proposition 2 predicts that if our charities are fully prosocially motivated, an increase in market size would increase their number proportionally, but not their average size, whereas Proposition 3 predicts that for only partially prosocially motivated charities market size raises the size of providers and that the number of providers rises less than proportionally – which is the case here.

To find additional support for our theoretical interpretation of the relationship between market size and the size and number of charities, we can look at how market size affects fundraising. As discussed in Section 2, we would expect an increase in market size to raise the share fundraising costs in total costs if charities' motives are not fully prosocial.

Table 4 presents results of regressions of market size on the average share of expen-

Table 2: Effects of Market Size (in logs) on Average Expenditures (in logs), Full Panel

	(1)	(2)	(3)	(4)
	Daycare			
log *Population*	0.23***	0.24***	1.12***	0.20
	(0.024)	(0.032)	(0.31)	(0.18)
N	1,214	1,171	1,214	1,171
R^2	0.140	0.250	0.140	0.129
	Food and Clothing Banks			
log *Population*	0.24***	0.31***	2.10***	0.61*
	(0.036)	(0.045)	(0.39)	(0.29)
N	635	614	635	614
R^2	0.160	0.193	0.160	0.171
	Housing			
log *Population*	0.26***	0.28***	0.55**	0.070
	(0.027)	(0.041)	(0.17)	(0.11)
N	1,208	1,161	1,208	1,161
R^2	0.136	0.177	0.136	0.117
	Seniors			
log *Population*	0.21***	0.22***	0.98*	0.19
	(0.033)	(0.047)	(0.42)	(0.44)
N	755	733	755	733
R^2	0.081	0.094	0.081	0.064
	Disabled			
log *Population*	0.35***	0.27***	1.01**	-0.15
	(0.033)	(0.050)	(0.31)	(0.20)
N	1,181	1,154	1,181	1,154
R^2	0.143	0.261	0.143	0.046
	Festivals and Performances			
log *Population*	0.15***	0.23***	1.12*	0.82*
	(0.038)	(0.049)	(0.44)	(0.41)
N	528	505	528	505
R^2	0.059	0.112	0.059	0.077
Market Fixed Effects	No	No	Yes	Yes
Controls	No	Yes	No	Yes

Note: The outcome is log(average expenditures). Standard errors are in parentheses, clustered at the market level. Models with control variables also include: log of mean household income, share of population over 65 years old, share of population under 5 years old, share without a high school diploma, share with university degree, share of immigrants, unemployment rate, log of average rental price.
Significance levels: * 10% ** 5% *** 1%.

Table 3: Effect of Market Size (in logs) on Number of Providers (in logs), Full Panel

	(1)	(2)	(3)	(4)
	Daycare			
log *Population*	0.30***	0.33***	-0.073	-0.11
	(0.029)	(0.033)	(0.071)	(0.080)
N	1,505	1,447	1,505	1,447
R^2	0.461	0.527	0.461	0.374
	Food and Clothing Banks			
log *Population*	0.32***	0.37***	0.54***	0.28*
	(0.027)	(0.027)	(0.12)	(0.12)
N	1,299	1,265	1,299	1,265
R^2	0.484	0.576	0.484	0.484
	Housing			
log *Population*	0.30***	0.32***	0.20*	0.13
	(0.022)	(0.025)	(0.079)	(0.068)
N	1,748	1,678	1,748	1,678
R^2	0.488	0.540	0.488	0.425
	Seniors			
log *Population*	0.24***	0.27***	0.31**	0.23
	(0.028)	(0.030)	(0.097)	(0.12)
N	1,455	1,397	1,455	1,397
R^2	0.372	0.433	0.372	0.371
	Disabled			
log *Population*	0.39***	0.46***	0.30***	0.13
	(0.024)	(0.024)	(0.081)	(0.090)
N	1,742	1,698	1,742	1,698
R^2	0.548	0.623	0.548	0.495
	Festivals and Performances			
log *Population*	0.41***	0.47***	0.47***	0.31***
	(0.036)	(0.033)	(0.13)	(0.088)
N	1,188	1,145	1,188	1,145
R^2	0.512	0.611	0.512	0.564
Market Fixed Effects	No	No	Yes	Yes
Controls	No	Yes	No	Yes

Note: The outcome is log(number of providers). Standard errors are in parentheses, clustered at the market level. Models with control variables also include: log of mean household income, share of population over 65 years old, share of population under 5 years old, share without a high school diploma, share with university degree, share of immigrants, unemployment rate, log of average rental price.
Significance levels: * 10% ** 5% *** 1%.

ditures dedicated to fundraising activities. As in previous specifications, these results are expressed as elasticities. The number of observations is lower, since information on fundraising is missing for many charities. In four of our sectors, we find a positive and statistically significant relationship between market size and the share of fundraising expenditures. In three of those sectors, that relationship is robust to the inclusion of control variables (Column 2).[23]

These patterns are again consistent with an explanation where charities are partially prosocially motivated, which leads to both excessive entry and excessive fundraising; but where a larger market size (leading to increased competition) mitigates the bias in entry, increasing the size of charities and bringing it closer to the social optimum, while, at the same time, exacerbating the bias in relation to excessive fundraising.

3.3. Comparison to the Private Sector

Our theoretical framework provides testable predictions also with respect to the comparison between for-profits and not-for-profits. As discussed in Section 2, the theory predicts that when charities' non-prosocial concerns relate to market share, the elasticity of provider size with respect to market size should be larger in the not-for-profit case than in the for-profit case.

Besides providing yet another angle at testing the model, the comparison of for-profits to charities may help in alleviating some of the endogeneity issues (see Appendix E for detailed discussion). Assuming the endogeneity issues related to unobserved costs and demand are similar for charities and for-profits, they are differenced out when we compare the elasticities estimated from the for-profit data to those from the charity data.

Previously, we used expenditures as our measure of producer size. In the Business Register data, however, only employment is available. For that reason, we use employment also as the measure of producer size in the charity data to carry out our comparisons. Another difficulty lies in the way BR data is made available publicly: we do not have micro-level data, or a direct measure of average size of producers in a market. Instead, we have the number of firms per category of employment size, from which we infer average employment in the market. In order to facilitate the comparisons, we first create a similar categorization by employment in the charities data, and then estimate average employment from those categories. Therefore, we have calculated the average employment variable for the charity data in exactly the same way as for the BR data, despite this leading to losing some accuracy of information in the charity data.

[23] The share of fundraising expenditures reflects a ratio, so it is not clear whether we should estimate our regressions in log-log form. In fact, using a linear form we do not find any statistically significant effect of market size on the share of fundraising expenditures, although the estimates are mostly positive. However, a Box-Cox regression suggests an optimal $\theta = 0.113$, which is close to a logarithmic specification. Moreover, a comparison of the log-likelihoods with $\theta = \{-1, 0, 1\}$ suggests that $\theta = 0$ is the most appropriate model, corresponding to a logarithmic specification.

Table 4: Effect of Market Size (in logs) on the Share of Fundraising Expenditures (in logs), Full Panel

	(1)	(2)	(3)	(4)
	Daycare			
log *Population*	0.019	0.11	-0.16	1.50
	(0.039)	(0.060)	(0.87)	(1.13)
N	628	608	628	608
R^2	0.000	0.051	0.000	0.005
	Food and Clothing Banks			
log *Population*	0.17**	0.16	0.49	-0.16
	(0.062)	(0.092)	(1.35)	(1.53)
N	300	293	300	293
R^2	0.031	0.080	0.031	0.011
	Housing			
log *Population*	0.28***	0.39***	-0.82	-3.55
	(0.071)	(0.11)	(1.84)	(2.62)
N	253	247	253	247
R^2	0.086	0.146	0.086	0.087
	Seniors			
log *Population*	0.096	0.046	1.03	4.32
	(0.067)	(0.11)	(1.06)	(2.19)
N	307	303	307	303
R^2	0.008	0.024	0.008	0.009
	Disabled			
log *Population*	0.27***	0.26**	-1.02	-0.081
	(0.058)	(0.096)	(0.86)	(0.92)
N	606	598	606	598
R^2	0.048	0.118	0.048	0.005
	Festivals and Performances			
log *Population*	0.15*	0.18**	-0.58	0.47
	(0.057)	(0.065)	(1.04)	(1.95)
N	322	307	322	307
R^2	0.036	0.093	0.036	0.032
Market Fixed Effects	No	No	Yes	Yes
Controls	No	Yes	No	Yes

Note: The outcome is ln(share of fundraising expenditures). Standard errors are in parentheses, clustered at the market level. Models with control variables also include: log of mean household income, share of population over 65 years old, share of population under 5 years old, share without a high school diploma, share with university degree, share of immigrants, unemployment rate, log of average rental price.
Significance levels: * 10% ** 5% *** 1%.

We manually match the NAICS 6-digit industries that seem to best correspond to the six charity sectors chosen for our analysis, using the sector and industry definitions. For some industries the comparison is straightforward. For example, there are both for-profits and not-for-profits providing daycare services, and they all operate under the same single NAICS code. On the other extreme are charities providing food and clothing banks, which we compare to all private businesses who provide food and clothing (cafeterias, limited service restaurants, grocery retail stores, etc.). In that case, we may be comparing across somewhat different products.[24]

Table 5 describes the effect of market size on average employment per charity and the number of providers, both for charities and for providers in the Business Register. First, for all BR sectors and in four out of five charity sectors, we find that the effect of market size on average employment is statistically significant and robust to the inclusion of control variables (only in two sectors for charities). In two sectors, we find that the effect of market size is larger for charities than for the providers in the Business Register data (which include both charities and for-profit firms): Daycare and Food & Clothing Banks. In the other three sectors, they are similar across the two samples.

Focusing on the daycare sector, which has the most direct correspondence to a NAICS industry, this result also lends some support to the idea that charities do not act in a fully prosocially motivated way.

Regarding the number of providers, we consistently find that market size has a larger effect in the BR data. Since that dataset includes both charities and for-profit firms, this result is as expected. However, in both datasets, we do find a positive association between market size and the number of providers.

3.4. Robustness Checks and Discussion

To assess the reliability of our findings, we conduct several robustness checks. First, we use average revenues instead of average expenditures as an alternative measure of charity size. This is to account for the fact that charities face a non-distribution constraint that is only binding in the long run, but expenses and costs do not have to balance on a short-term basis (and they do not, particularly for not-for-profit organizations that incur large capital expenses, such as hospitals). The results confirm our previous findings.[25]

Second, we use alternative definitions of market size. For the senior and disabled care sector we re-define market size as the number of old residents, and for the daycare sector as the number of young. It should be noted that while these measures are likely to capture better the size of the market in terms of demand for these services in these

[24]The full list of correspondences is as follows. Daycare includes NAICS 624410; Festivals and Performances includes NAICS 711311, 711321, 711322, 711511, 711512, 711111, 711112, 711120, 711130, 711190; Housing includes 531111, 531112; Seniors and Disabled Care are combined and matched with NAICS 624120, 624310; Food and Clothing Banks include 624210, 722330, 722210, 722310, 445110, 445120, 448110, 448120, 448130, 448140, 448150, 448199, 448210.

[25]The tables reporting the results of this robustness check and the following ones in this section are all available in the online supplementary material.

Table 5: Effects of log Population on Average Employment and Number of Providers, Charities only vs. Business Register

	(1)	(2)	(3)	(4)
Dependent Variable:	Average Employment		Number of Providers	
	Daycare			
Charities	0.17***	0.21***	0.31***	0.32***
	(0.029)	(0.035)	(0.041)	(0.039)
Business Register	0.059**	0.091***	0.79***	0.78***
	(0.022)	(0.027)	(0.032)	(0.035)
t-test (*p*-value)	0.000	0.000	0.000	0.000
	Festivals			
Charities	0.075	0.045	0.40***	0.42***
	(0.081)	(0.097)	(0.10)	(0.081)
Business Register	0.12*	0.17*	0.62***	0.60***
	(0.054)	(0.086)	(0.10)	(0.10)
t-test (*p*-value)	0.498	0.121	0.000	0.031
	Housing			
Charities	0.12*	0.17	0.36***	0.33***
	(0.053)	(0.092)	(0.044)	(0.049)
Business Register	0.12***	0.12**	0.83***	0.82***
	(0.030)	(0.041)	(0.046)	(0.051)
t-test (*p*-value)	0.944	0.589	0.000	0.000
	Seniors and Disabled			
Charities	0.26***	0.11	0.38***	0.44***
	(0.046)	(0.071)	(0.039)	(0.045)
Business Register	0.20***	0.15**	0.65***	0.72***
	(0.037)	(0.058)	(0.029)	(0.033)
t-test (*p*-value)	0.196	0.624	0.000	0.000
	Food and clothing			
Charities	0.23***	0.45***	0.23***	0.34***
	(0.056)	(0.071)	(0.032)	(0.040)
Business Register	0.14***	0.081*	0.98***	1.05***
	(0.040)	(0.041)	(0.034)	(0.056)
t-test (*p*-value)	0.232	0.000	0.000	0.000
Controls	No	Yes	No	Yes

Note: Regression results are combined using *suest* in Stata. Standard errors are in parentheses, clustered at the market level. Tests are for the equality of the coefficients across datasets. Models with control variables also include: log of mean household income, share of population over 65 years old, share of population under 5 years old, share without a high school diploma, share with university degree, share of immigrants, unemployment rate, log of average rental price.
Significance levels: * 10% ** 5% *** 1%.

industries, it is not clear that they are better than overall population size at measuring the volume of donations that charities are competing for. The results in the pooled OLS regressions (our preferred specification) are almost identical to those obtained using total population.

Third, we estimate our regressions with a sample that also includes dormant charities. Our results do not change significantly. Fourth, results are also robust to trimming out large and small markets, which is an indication that outliers are not driving the results. Fifth, instead of estimating our regressions using the average size of charities in a market as the outcome, we estimate our regressions with individual charities as the unit of observation, and thus the size of each individual charity as the outcome. The results are robust also to this change of specification. Sixth, to address the possible concern that government funding might be treated differently than private donor funding when competing for donations and in regulating the charities' profits, we investigate how results change if we add the share of government funding as a control variable. The results are robust also to expanding the specification in this way. Seventh, we use the median of expenditures instead of the average, to account for potential differences in the distributions across markets. The results are robust to this modification. Eighth, we include *province*, *year*, and *province* $\times$ *year* fixed effects, since provinces could introduce different policies at different times that affect both population levels and the size of charities. The results are robust to this modification.

Another potential source of bias for our regressions on the charity sample is that we are missing information on the number of other active producers in these markets. However, this is unlikely to lead to wrong conclusions for two reasons. First, our model's predictions apply to each individual producer; we use the average over providers as the outcome only because we need a market-level variable. But since the prediction applies to each individual provider, average size should respond in the same way in any subset of producers in a given market. Second, the presence of private or public producers is very likely to vary across sectors, and is nonexistent in the Food and Clothing Banks sectors. If this omitted information was driving the results, we should see more heterogeneity in results across the sectors in terms of qualitative conclusions.

Finally, because the 2011 data does not contain information on whether a charity operates at the local, regional or national level, we use all charities in our main estimations. However, our theoretical model relates to charities providing services and competing for donations in a single market; it does not consider the implications of competition in overlapping markets. To restrict the analysis to well-defined markets, we carry out the same analysis for a restricted sample in which we omit year 2011 data and only include local charities, that is those charities that report being active only within their municipality. These results confirm those from our main specification.

4. Conclusion

We present a simple oligopoly model of charities providing differentiated services and competing for donors. The model delivers testable predictions that allow us to both contrast effects of market size in for-profit and charity markets and to discriminate between alternative modes of competitive conduct in charitable markets depending on whether charities pursue purely prosocial objectives or are also guided by non-prosocial concerns.

We test the model's predictions concerning the relationship between market size and the size and number of providers in Canadian data for registered charities as well as for for-profit entities. Our findings of a positive relationship between market size and charity size reject the hypothesis that charities are purely driven by prosocial motives, and are consistent with a model of charities that are biased towards own production. In this case, increased competition in larger markets can produce a beneficial pro-competitive effect in charity markets, as it does in for-profit markets. The mechanism underlying this effect is that larger markets already serve more varieties, making it harder for a provider that is partially driven by prosocial motives to justify adding new varieties at the expense of a decrease in the scale of provision of existing varieties. This curbs the excessive entry that bias towards own provision induces.

Besides providing and testing a model of competition for the third sector, a novel undertaking as such, our results have direct policy implications. As more intense competition can be counted on to improve economic performance in charity markets as well as in for-profit markets, government policies may have a more important role to play in smaller, "less competitive" charitable markets than they do in larger ones.

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References

Alchian, A., Demsetz, H., 1972. Production, information costs, and economic organization. American Economic Review 62, 777–95.

Almunia, A., Lockwood, B., Scharf, K., 2018. More giving or more givers? the effects of tax incentives on charitable donations in the UK, mimeo, University of Birmingham.

Amir, R., Castro, L. D., Koutsougeras, L., 2014. Free entry versus socially optimal entry. Journal of Economic Theory 154, 112–125.

Atkinson, T., 2005. The Atkinson review: Final report. Measurement of Government Output and Productivity for the National Accounts. Palgrave Macmillan.

Bakija, J., Heim, B., 2011. How does charitable giving respond to incentives and income? dynamic panel estimates accounting for predictable changes in taxation. National Tax Journal 64, 615–650.

Besley, T., Malcomson, J., 2016. Choice and competition in public service provision, CEPR Discussion Papers No. 11,441.

Bowblis, J., 2011. Ownership conversion and closure in the nursing home industry. Health Economics 20, 631–644.

Bresnahan, T., Reiss, P., 1991. Entry and competition in concentrated markets. Journal of Political Economy 99, 977–1009.

Campbell, J., Hopenhayn, H., 2005. Market size matters. Journal of Industrial Economics 53, 1–25.

Capps, C., Dranove, D., Lindrooth, R., 2010. Hospital closure and economic efficiency. Journal of Health Economics 29, 87–109.

Castaneda, M., Garen, J., Thornton, J., 2008. Competition, contractibility, and the market for donors to nonprofits. Journal of Law, Economics & Organization 24, 215–246.

Cooper, Z., Gibbons, S., Jones, S., McGuire, A., 2011. Does hospital competition save lives? evidence from the english nhs patient choice reforms. Economic Journal 121, F228–F260.

Dixit, A., Stiglitz, J., 1977. Monopolistic competition and optimum product diversity. American Economic Review 67, 297–308.

Easley, D., O'Hara, M., 1983. The economic role of the nonprofit firm. Bell Journal of Economics 14, 531–38.

Feldstein, M., Clotfelter, C., 1976. Tax incentives and charitable contributions in the united states: A microeconometric analysis. Journal of Public Economics 5, 1–26.

Gaynor, M., Town, R., 2011. Competition in health care markets. In: Pauly, M., McGuire, T., Barros, P. P. (Eds.), Handbook of Health Economics. Vol. 2, Elsevier, pp. 499–637.

Gaynor, M., Vogt, W., 2003. Competition among hospitals. RAND Journal of Economics 34, 764–785.

Glaeser, E., Schleifer, A., 2001. Not-for-profit entrepreneurs. Journal of Public Economics 81, 99–115.

Hansmann, H., 1980. The role of the non-profit enterprise. Yale Law Journal 89, 835–901.

Hopenhayn, H., 1992. Entry, exit, and firm dynamics in long run equilibrium. Econometrica 60, 1127–1150.

Lakdawalla, D., Philipson, T., 2006. The nonprofit sector and industry performance. Journal of Public Economics 90, 1681–98.

Mankiw, N. G., Whinston, M., 1986. Free entry and social inefficiency. RAND Journal of Economics 17, 48–58.

Perroni, C., Pogrebna, G., Sandford, S., Scharf, K., 2018. Are donors afraid of charities' core costs? Scale economies in nonprofit provision, technology adoption and entry, Mimeo, University of Birmingham.

Philipson, T., Posner, R., 2009. Antitrust in the not-for-profit sector. Journal of Law and Economics 52, 1–18.

Propper, C., Burgess, S., Gossage, D., 2008. Competition and quality: Evidence from the NHS internal market 1991-9. Economic Journal 118, 138–170.

Roberts, R., 1987. Financing public goods. Journal of Political Economy 95, 420–37.

Rose-Ackerman, S., 1982. Charitable giving and 'excessive' fundraising. Quarterly Journal of Economics 97, 193–212.

Scharf, K., 2000. Why are tax expenditures for giving embodied in fiscal constitutions? Journal of Public Economics 75, 365–87.

Scharf, K., 2014. Impure pro-social motivation in charity provision: Warm-glow charities and implications for public funding. Journal of Public Economics 114, 50–57.

Scharf, K., Smith, S., 2015. The price elasticity of charitable giving: Does the form of tax relief matter? International Tax and Public Finance 22, 330–352.

Simpson, H., 2009. Productivity in public services. Journal of Economic Surveys 23 (2), 250–276.

Appendix A Heterogeneous Providers

Suppose that there is a mass $\overline{N}$ of providers differing with respect to their productivity; specifically a provider with productivity ϕ faces marginal cost $1/\phi$.[26] Provider productivity types are distributed according to a Pareto distribution with a continuous support $[1, \infty)$ and with p.d.f. $f(\phi) = a\phi^{-(1+a)}$, $a > 0$. As before, preferences for differentiated varieties are of the CES type. In what follows, we assume $\sigma < 1 + a$ (which is necessary for the problem to be well-defined).

In a equilibrium with free entry, if a for-profit provider with productivity ϕ' is active (implying that it makes non-negative profits), then all providers with productivity $\phi > \phi$ will also be active: with $\sigma > 1$ and a constant markup rate, revenues and thus gross profits are increasing in ϕ, and so are net profits for a common fixed cost, F. So, if the marginal provider (the provider that breaks even) is of type ϕ_0, the total number of providers is

$$N = \overline{N} \int_{\phi_0}^{\infty} f(\phi)\, d\phi = \overline{N}\,(\phi_0)^{-a}, \tag{25}$$

and we can write utility as

$$U = \overline{N} \int_{\phi_0}^{\infty} x(\phi)^{(\sigma-1)/\sigma}\, d\phi. \tag{26}$$

Constrained utility maximization gives demands

$$x(\phi) = K(\lambda)\, p(\phi)^{-\sigma}, \tag{27}$$

where $K(\lambda) \equiv \left((\sigma-1)/(\lambda\sigma)\right)^{\sigma}$, and where λ is the marginal utility of income. In a scenario where the number of providers is large, each will take λ as given, which results in a profit-maximizing pricing choice

$$p(\phi) = \xi\,\frac{1}{\phi}, \tag{28}$$

where $\xi \equiv \sigma/(\sigma-1)$; this results in revenues

$$r(\phi) = p(\phi), x(\phi) = \lambda^{-\sigma}\, \xi^{1-2\sigma}\, \phi^{\sigma-1}. \tag{29}$$

Total industry revenues are then

$$\overline{N} \int_{\phi_0}^{\infty} f(\phi)\, r(\phi)\, d\phi = \frac{\lambda^{-\sigma}\, \xi^{1-2\sigma}\, a\,(\phi_0)^{\sigma-(1+a)}}{1+a-\sigma}. \tag{30}$$

Equating (30) to total spend, M, solving for λ and replacing the solution into (29), we obtain an

[26] The mass of providers ($\overline{N}$) can be thought of as resulting of forward-looking choices by potential entrants (as in Hopenhayn, 1992). As we will show, predictions on size are independent of $\overline{N}$, making $\overline{N}$ irrelevant for the purposes of our discussion.

expression for revenues of providers of productivity ϕ as a function of M:

$$r(\phi) = \frac{1+a-\sigma}{a} \, (M/\overline{N}) \, (\phi_0)^{1+a-\sigma} \, \phi^{\sigma-1}. \tag{31}$$

Equating the gross profits of the marginal firm, which equal to $r(\phi_0)/\sigma$, with F, solving for ϕ_0, and replacing the resulting expression into (25), we obtain

$$N = \frac{1+a-\sigma}{a\,\sigma F} M. \tag{32}$$

This is linear in M and so changes in M leaves mean firm revenue (M/N) unchanged. An analogous conclusion applies to an equilibrium under not-for-profit competition, which for $\mu = 0$ coincides with the planning optimum (derivations in this case involve finding the optimal level of provision for each active provider type ϕ, producing at marginal cost $1/\phi$, as a function of ϕ_0 and M, using this to find the welfare-maximizing ϕ_0, and then substituting this into (25)).

Thus, if the number of providers is sufficiently large (i.e. in a monopolistically-competitive setting), market size has no effect on average provider size in either for-profit or not-for-profit markets, independently of whether providers are homogeneous or heterogeneous. This means that, whether or not providers are heterogeneous under these conditions, effects of market size on provider size come solely from oligopolistically competitive responses.

Appendix B Charity Sectors

Our selection of charity sectors is driven mainly by practical reasons: we choose a representative set of service sectors among those that are well represented in the data. Table B.1 shows the twenty most common sectors in the data in terms of the number of charities. By far the most common type of charity is a religious organization. We do not consider those here as their objective function may differ from the other charities and perhaps their main goal is not to provide such public services that the public sector would have an interest in providing. We focus on six charity service sectors that are likely to benefit only local residents and provide public services that could in principle be also provided by the public sector. Others among the top ten most common ones we exclude are scholarships, youth services and concert halls. We exclude concert halls as we include a similar group of festivals that is more common. We exclude both scholarships and youth services as both seem to provide mainly scholarships and awards, again not a typical public service. The sectors we focus on are Food and Clothing Banks, Daycare centers, Housing charities, Senior Care, Disabled Care, and charities organizing Festivals and Performances (boldfaced in the table). We have verified that the main results are similar in the excluded four top_10 sectors to the six sectors we include in the analysis here. These results are available from the authors.

Here we report more detailed information on the type of charities that operate in the six sectors we analyze. We also describe how the number of charities in a market is related to market size. In these descriptive statistics we have not applied the sample restriction concerning dormant charities that we use in the regressions.

The charities in the Food and Cloth Bank sector seem almost always to be soup kitchens: among the English names, many mention "food bank" in the name; among the French names, "La Soupière" is common. If they engage in secondary activities, the most common type of additional activity listed is "other low-income services".

The Daycare sector charities, as far as we can tell, seem all to provide daycare services. The typical names of these charities include "Daycare center", "Daycare Society" or "Centre de la Petite Enfance". When they are involved in secondary activities, they most often list summer camps.

The charities in our Housing sector seem to be somewhat more diverse. Based on their names, some target their services to certain groups, such as the elderly or the poor. Among the ones that have listed a secondary activities, common activities include food and cloth banks, senior care, disabled care and legal assistance.

There is also some diversity in the Senior Care sector. While many of the names contain the expressions "Senior club", "Senior center" or "Senior société", others include veterans' associations or charities providing special physical equipment for the elderly. It seems that perhaps even more actual elderly care homes are listed as housing charities rather than as senior care charities. Among their secondary activities, by far the most common is disabled care; this seems to be natural, because often elderly individuals can also be more-or-less disabled.

Among the actual Disabled Care sector, the most commonly listed secondary activities are elderly care and housing. The names of the disabled care charities often reflect their target group or disability, such as mental health, blindness, physical disabilities or autism.

The Festivals and Performances sector relates to music, dance and theatre groups as well as related festivals. The listed secondary activities also relate to culture and music.

Tables B.2-B.7 show the number of firms tabulated by market size groups. The picture is similar for all the sectors. The patterns is broadly consistent with the theory, as larger markets have more charities on average. A striking difference with typical patterns for for-profit sectors is that there are a number of quite large markets that do not have any entrants.

Appendix C Market Definition

Given the information available in our data, we could define markets as municipalities (i.e. CSD), Forward Sortation Areas (FSA), Census Metropolitan Areas (CMA) or Census Agglomerations (CA). In this appendix, we look at the question of which option is preferable.

FSAs are used in the Canadian postal system. In Canada, a postal code is an alphanumeric six-character string that takes the form 'A1A 1A1'. The FSA is a geographical area in which all postal codes start with the same three characters (the 'A1A' part of the code). The first letter 'A' of the code stands for a postal district (most provinces/territories are assigned a unique postal district – with the exception of Ontario and Quebec, which, due to their respective sizes, have more (three for Ontario and five for Quebec); the cities of Toronto and Montreal each have their own postal district ('H' for Montreal and 'M' for Toronto). The digit is a variable that takes on a value of zero for wide rural regions, and nonzero for urban areas. The second letter represents a specific rural region, an entire medium-sized city, or a section of a major metropolitan area.

Census Metropolitan Areas and Census Agglomerations are statistical units defined by Statistics Canada. They comprise one or more municipalities (CSDs) that are closely integrated together. Statistics Canada uses commuter flows to determine whether two or more cities are closely integrated. CMAs must have a total population of at least 100,000, with at least 50,000 in the core municipality, while the core municipality of a CA must have a population of at least

Table B.1: Number of Charities by Sector, 2001

Sector	Number	Percentage
Religion	29,805	43.4
Other	2,853	4.15
Festivals, performing groups, musical ensembles	2,324	3.38
Services for the physically or mentally challenged	1,840	2.68
Scholarships, bursaries, awards	1,698	2.47
Seniors' services	1,483	2.16
Food or clothing banks, soup kitchens, hostels	1,448	2.11
Housing	1,407	2.05
Children and youth services	1,369	1.99
Concert halls, etc.	1,324	1.93
Daycare	1,169	1.70
Hospitals	951	1.38
Public education, other study programs	884	1.29
Support of schools and education	870	1.27
Independent schools and boards	869	1.26
Historical sites, heritage societies	864	1.26
Youth groups	842	1.22
Specialized health organizations	831	1.21
Cemeteries	818	1.19
Other services for low-income persons	805	1.17
Total (including not listed)	68,740	100

Table B.2: Number of Charities by Market Size: Daycare

CSD Population	$N = 0$	$N = 1$	$N = 2$	$N = 3$	$N = 4$	$N = 5+$	Total
< 500	2,241	6	0	0	0	0	2,247
$500 - 1,000$	906	29	0	0	0	0	935
$1,000 - 5,000$	1,242	116	4	0	0	0	1,362
$5,000 - 10,000$	246	51	12	0	0	0	309
$10,000 - 50,000$	193	76	29	2	1	2	303
$> 50,000$	14	16	25	11	6	25	97
Total	4,842	294	70	13	7	27	5,253

Table B.3: Number of Charities by Market Size: Food and Clothing Banks

CSD Population	$N = 0$	$N = 1$	$N = 2$	$N = 3$	$N = 4$	$N = 5+$	Total
< 500	2,235	10	2	0	0	0	2,247
$500 - 1,000$	919	16	0	0	0	0	935
$1,000 - 5,000$	1,195	150	15	2	0	0	1,362
$5,000 - 10,000$	195	90	21	3	0	0	309
$10,000 - 50,000$	129	96	43	24	7	4	303
$> 50,000$	8	8	11	8	11	51	97
Total	4,681	370	92	37	18	55	5,253

Table B.4: Number of Charities by Market Size: Housing

CSD Population	$N=0$	$N=1$	$N=2$	$N=3$	$N=4$	$N=5+$	Total
<500	2,238	7	2	0	0	0	2,247
$500-1,000$	892	42	1	0	0	0	935
$1,000-5,000$	1,208	134	18	1	0	1	1362
$5,000-10,000$	232	60	15	2	0	0	309
$10,000-50,000$	163	84	31	16	3	6	303
$>50,000$	9	9	10	14	8	47	97
Total	4,742	336	77	33	11	54	5,253

Table B.5: Number of Charities by Market Size: Seniors

CSD Population	$N=0$	$N=1$	$N=2$	$N=3$	$N=4$	$N=5+$	Total
<500	2,177	67	2	1	0	0	2,247
$500-1,000$	856	68	10	1	0	0	935
$1,000-5,000$	1,156	165	37	3	0	1	1,362
$5,000-10,000$	210	80	15	4	0	0	309
$10,000-50,000$	142	97	50	10	2	2	303
$>50,000$	10	16	20	15	8	28	97
Total	4,551	493	134	34	10	31	5,253

Table B.6: Number of Charities by Market Size: Disabled

CSD Population	$N=0$	$N=1$	$N=2$	$N=3$	$N=4$	$N=5+$	Total
<500	2,241	6	0	0	0	0	2,247
$500-1,000$	911	24	0	0	0	0	935
$1,000-5,000$	1,225	116	16	3	1	1	1,362
$5,000-10,000$	215	66	17	9	2	0	309
$10,000-50,000$	137	76	39	24	13	14	303
$>50,000$	4	2	14	7	4	66	97
Total	4,733	290	86	43	20	81	5,253

Table B.7: Number of Charities by Market Size: Festivals and Performances

CSD Population	$N=0$	$N=1$	$N=2$	$N=3$	$N=4$	$N=5+$	Total
<500	2,225	21	1	0	0	0	2,247
$500-1,000$	912	20	3	0	0	0	935
$1,000-5,000$	1,250	91	14	5	1	1	1,362
$5,000-10,000$	230	53	17	6	3	0	309
$10,000-50,000$	152	68	27	28	13	15	303
$>50,000$	4	13	7	3	6	64	97
Total	4,773	266	69	42	23	80	5,253

10,000. In addition to rules based on commuter flows, CMAs and CAs are also defined in such a way that they are spatially contiguous.

To determine what level of geographical disaggregation constitutes a market, we investigate the bias caused by an inappropriate choice of market definition. The key characteristic to consider here is whether a certain market definition implies a larger or smaller market than another. In the case of CMAs and CAs, it is clear that they are larger than CSDs (or FSAs). In the case of FSAs, however, they can be larger or smaller than CSDs, although typically they are smaller. In rural areas, one FSA may include several municipalities. In urban areas, FSAs may only correspond to a small part of a municipality.

In order to understand the bias that could arise from an incorrect market definition in our estimation of the effects of market size on average provider size, consider an example economy. In this economy, the real market is defined by zone A. However, suppose that we mistakenly run our analysis using sub-zones of A as our markets: A1 and A2. Consider the case where the population increases in A1 but not in A2. Assuming that there is a positive relationship between market size and average charity size, average charity size will increase in both subzones A1 and A2, because the underlying relationship is based on the "true market", A. In this case, we have no population increase in A2, yet a charity size increases in A2. Moreover, we have a large relative population increase in A1, but a relatively smaller increase in the charity size, than the real effect would imply. Both of these forces lead to a bias towards zero in our estimation.

Consider now the opposite case, in which the "real" markets are zones A1 and A2, but in which we estimate our regressions using the combined zone A that includes both A1 and A2. If the population in A1 increases, so will charity size in market A1. Moreover, assume that population size does not change in A2, then neither will average charity size in A2. As we aggregate up these markets to A, we will see a moderate increase (i.e. both are smaller than in A1 alone) in both population and average charity size in A. Therefore, using markets that are too large does not automatically lead to any bias as average response in A is correct (in a linear world), even if it does lead to unnecessary imprecision.

Our claim therefore is that, for the purpose of studying our question, focusing on markets that are too small can bias conclusions but using markets that are too large does not. To prove this point, we run simple Monte Carlo simulations, using the Stata programs detailed in the online supplementary material.

First, we assume that our units of observation are too small, so that many of our data points are actually in the same market. This simulation would correspond to the case where real markets are CSDs but instead we conduct our analysis at the FSA level. In this simulation we find that the elasticity of average expenditures to market size is under-estimated. With a real value of 0.25, our average estimate is 0.088 (with a standard deviation of 0.0073). In all 1,000 repetitions, we can reject the null hypothesis that our estimate is equal to 0.25.

Second, we assume that our units of observation are too large and include more than one real market. This would correspond to the case where real markets are CSDs but we conduct the analysis at the CMA/CA level. In this simulation we find an estimate of the elasticity of average expenditures to market size about equal to the true value of 0.25: our estimate is equal to 0.26 with a standard deviation of 0.05. In only 115 of 1,000 repetitions, we can reject the null hypothesis that our estimate is equal to 0.25.

In addition to carrying out these simulations, we conduct our main analysis at three differ-

Table C.1: Comparison of coefficients of Market Size on Charity Size, Across Market Definitions

	(1)	(2)	(3)	(4)	(5)	(6)
	FSA		CSD		CMA	
			Daycare			
log *Population*	0.047	0.041	0.23***	0.24***	0.23***	0.31***
	(0.037)	(0.055)	(0.024)	(0.032)	(0.044)	(0.068)
N	1,964	1,440	1,214	1,171	318	317
R^2	0.001	0.086	0.140	0.250	0.124	0.263
			Food and Clothing Banks			
log *Population*	-0.043	0.038	0.24***	0.31***	0.28***	0.057
	(0.077)	(0.086)	(0.036)	(0.045)	(0.050)	(0.075)
N	1,117	781	635	614	193	193
R^2	0.001	0.163	0.160	0.193	0.145	0.289
			Housing			
log *Population*	0.088	0.012	0.26***	0.28***	0.26***	0.19
	(0.069)	(0.074)	(0.027)	(0.041)	(0.054)	(0.10)
N	1,773	1,298	1,208	1,161	301	301
R^2	0.002	0.111	0.136	0.177	0.104	0.278
			Seniors			
log *Population*	0.17*	0.25*	0.21***	0.22***	0.34***	0.42**
	(0.078)	(0.11)	(0.033)	(0.047)	(0.081)	(0.13)
N	1,255	894	755	733	195	195
R^2	0.009	0.080	0.081	0.094	0.115	0.213
			Disabled			
log *Population*	0.11	0.059	0.35***	0.27***	0.35***	0.27*
	(0.062)	(0.079)	(0.033)	(0.050)	(0.068)	(0.11)
N	1,825	1,286	1,181	1,154	322	322
R^2	0.003	0.114	0.143	0.261	0.118	0.295
			Festivals and Performances			
log *Population*	-0.20**	-0.0094	0.15***	0.23***	0.43***	0.25
	(0.064)	(0.086)	(0.038)	(0.049)	(0.074)	(0.13)
N	1,096	743	528	505	175	175
R^2	0.022	0.207	0.059	0.112	0.264	0.318
Controls	No	Yes	No	Yes	No	Yes

Note: Standard errors are in parentheses, clustered at the market level. Models with control variables also include: log of mean household income, share of population over 65 years old, share of population under 5 years old, share without a high school diploma, share with university degree, share of immigrants, unemployment rate, log of average rental price. Significance levels: * 10% ** 5% *** 1%.

Table C.2: Comparison of coefficients of Market Size on the Number of Providers, Across Market Definitions

	(1)	(2)	(3)	(4)	(5)	(6)
	FSA		CSD		CMA	
	Daycare					
log *Population*	0.14***	0.22***	0.30***	0.33***	0.74***	0.59***
	(0.029)	(0.026)	(0.029)	(0.033)	(0.057)	(0.070)
N	2,388	1,766	1505	1447	378	377
R^2	0.040	0.105	0.461	0.527	0.675	0.747
	Food and Clothing Banks					
log *Population*	0.11***	0.16***	0.32***	0.37***	0.71***	0.72***
	(0.023)	(0.027)	(0.027)	(0.027)	(0.030)	(0.042)
N	2,050	1,431	1299	1265	429	429
R^2	0.029	0.137	0.484	0.576	0.779	0.799
	Housing					
log *Population*	0.15***	0.18***	0.30***	0.32***	0.74***	0.61***
	(0.026)	(0.030)	(0.022)	(0.025)	(0.037)	(0.056)
N	2,428	1,779	1,748	1,678	445	445
R^2	0.036	0.097	0.488	0.540	0.731	0.767
	Seniors					
log *Population*	0.12***	0.19***	0.24***	0.27***	0.64***	0.52***
	(0.025)	(0.026)	(0.028)	(0.030)	(0.050)	(0.067)
N	2,102	1,520	1,455	1,397	414	414
R^2	0.039	0.101	0.372	0.433	0.672	0.697
	Disabled					
log *Population*	0.13***	0.20***	0.39***	0.46***	0.74***	0.64***
	(0.024)	(0.028)	(0.024)	(0.024)	(0.026)	(0.042)
N	2,711	1,956	1,742	1,698	502	502
R^2	0.032	0.111	0.548	0.623	0.784	0.817
	Festivals and Performances					
log *Population*	0.0085	0.20***	0.41***	0.47***	0.84***	0.58***
	(0.033)	(0.034)	(0.036)	(0.033)	(0.040)	(0.052)
N	2,253	1,640	1,188	1,145	412	412
R^2	0.000	0.233	0.512	0.611	0.741	0.814
Controls	No	Yes	No	Yes	No	Yes

Note: The table reports the estimated coefficients on $ln(population)$. Standard errors are in parentheses, clustered at the market level. Models with control variables also include: log of mean household income, share of population over 65 years old, share of population under 5 years old, share without a high school diploma, share with university degree, share of immigrants, unemployment rate, log of average rental price.
Significance levels: * 10% ** 5% *** 1%.

ent geography levels: FSA, CSD, and CMA/CA. Tables C.1 and C.2 present our results for the pooled OLS models. We find that the results are consistent with CSDs being the real markets (at least a good approximation). Indeed, in five of six markets, the elasticity of charity size with respect to market size is lower at the FSA level than at the CSD level. In four markets, the estimates are similar at the CSD and CMA level. CMA results are less precise in many cases as the sample size is also smaller. Assuming CSDs are the relevant markets, we would expect an analysis at the FSA level to find lower estimates, since FSAs are often smaller than CSDs. We would also expect an analysis at the CMA/CA level to find estimates similar to those with CSDs, since CMAs and CAs are strictly larger than CSDs. This is indeed the case, and thus we are confident that CSD is preferable unit of analysis in our case amongst those available.

Regarding the number of providers, our results are as expected: the larger the units of observation, the larger the effect of size on the number of providers.

Appendix D Data Sources

We conduct our analysis at the market level, with markets defined as municipalities (a general term encompassing towns, cities, villages, etc.). In Canadian statistics, municipalities are known as Census sub-divisions (CSD). The borders of these CSDs are re-defined (usually in Census years) according to the evolution of administrative boundaries, due, for example, to municipal mergers and secessions. This feature makes it particularly hard to study municipalities in panel data. To keep the definition of a market constant, we define markets using the borders of CSDs in 2011, and adjust data from prior years accordingly using GIS software.

For the analysis, we use three main sources of data. For data on charities, we use administrative data on charities from the Canadian Revenue Agency (form T3010). For data on all businesses, we use administrative data on businesses by industry from the Canadian Business Register, maintained by Statistics Canada. Finally, for socio-economic and control variables, we use the Community Profiles from the 1996, 2001, 2006, and 2011 Censuses, administered by Statistics Canada.

D.1 Charities

Each year, charities have to fill out a form (T3010) about their activities and submit it to the Canadian Revenue Agency. We use the data from these forms at the individual charity level. We restrict our attention to years closest to the ones in which we also have Census data (so 1997, 2001, 2005, 2011).

First, we need to assign these charities to a market (i.e., 2011 CSD). From 1997 to 2005, the data is geo-coded. Using the latitude and longitude of every charity, we map the charities location on the map of Canada, and find the code of the CSD in which they are situated. For 2011 data, the charities are not geo-coded. We do, however, have the street address, postal code, city, province, and BN code (unique identifier). As a first step, we use the combination of town name and province to assign each charity to a CSD. This step assigns a CSD to 64,573 charities.

Many charities make mistakes on the T3010 forms, or list their address as some smaller village or neighbourhood that is only part of the bigger (official) municipality. To match the rest of the charities, we assign them to CSDs using the BN code and the assigned CSD of the same charity in the previous data (2007). Doing so assigns a CSD to an additional 18,145 charities. Finally, if these steps do not result in finding a location, we assign a CSD code using the postal code. Doing so requires knowing where postal codes lie on the map of CSDs. We use a crowd-sourced shapefile of postal codes available from geocoder.ca, and overlap it with the shapefile of 2011 CSDs, assigning each postal code to a CSD using the centroid of postal code geometries. Since these postal code geometries sometimes cross CSD boundaries, they only imperfectly capture the city of operation of the charity. Nevertheless, we are able to assign a market to an additional 3,657 charities using this method.

D.2 Business Register

Every business in Canada is assigned a Business Number (BN), and is included in the Canadian Business Register (BR), maintained by Statistics Canada. Note that this register also includes the charities. We have simple data from the BR from 2007 to 2011: number of firms by Dissemination Area (small statistical area of 400 to 700 population) and by 6-digit NAICS industry. We aggregate Dissemination Area at the level of Census Subdivisions using GIS software and boundary files. The number of firms is disaggregated by employment size category (1 to 4 employees, 5 to 9, 10 to 19, 20 to 49, 50 to 99, 100 to 199, 200 to 499, and 500 or more). Some firms are categorized as of "indeterminate" size: these could be firms where the owner is the only worker, or where the family are employees, for example. Some firms are uncategorized in terms of geography: they are included in the provincial "residue". We cannot assign them to a CSD. To measure average firm size, we use the mid-point of each size category, times the number of firms in that category. We do not count firms of indeterminate size. We thus obtain average firm size by NAICS industry and by 2011 municipality.

D.3 Census

The final data source is the Canadian Census. Specifically, we use the Community Profiles from the 1996, 2001, 2006, and 2011 Census.[27] These profiles are available for different geographical units, but we use the CSD level, available in all years. The borders of the CSDs are not stable through the whole period, so we need to adjust the data. To do so, we use the CSD shapefiles for years 1996, 2001, and 2006, and find the centroids of the CSDs. We overlap the centroids[28] on the shapefile for 2011 CSDs, and assign each CSD of prior years to a 2011 CSD. This gives us a correspondence file for CSD_t to CSD_{2011}. The geometry of some CSDs contains errors. In those cases, we do not find the centroid, so we manually add the correspondence of those CSDs to 2011 CSDs, by looking at the geographic maps.

We then take the whole dataset of CSD Community Profiles for each year, and collapse the data to the level of 2011 CSD. For non-count data (i.e., average income), we use the population-weighted averages across CSDs. We then obtain a panel of Community Profiles from 1996 to 2011 using relatively stable geographic definitions.

Appendix E Specification Selection

Given that our data has a panel structure, we have a choice to make between pooled OLS or market level fixed effects regressions. We can rely on economic theory, previous empirical

[27] The 2011 Census only includes basic information such as population. In 2011, the Census was instead complemented by a National Household Survey, to which response was optional. For that reason, the 2011 Census suffered from more data suppression.

[28] We use the *realcentroids* plugin in QGIS to adjust centroids to be inside borders only.

literature and our for-profit data to guide our specification selection. A robust prediction of standard for-profit firm oligopoly theory is that larger markets are more competitive and have lower price-cost markups. Because producers in more competitive markets must recover their fixed costs by selling more (at a lower markup), average firm size should increase in marker size. Campbell and Hopenhayn (2005) show evidence of this effect and show that this increase takes place even in large markets.

One potential endogeneity issue in our analysis is that large markets may have higher population density and thus possibly involve larger (unobserved) fixed costs – for example, due to typically higher house and land prices and wages, providers in larger/higher-density markets are very unlikely to face smaller fixed costs, and could face larger fixed costs. Large markets may also feature more elastic demand as they may contain a wider variety of choices. Both features would translate in larger markets containing larger producers even if an increase in the size of each market does not lower markups. This would result in a spurious positive correlation between market size and establishment size. The benefit of fixed-effects estimation is that it may alleviate these concerns. One drawback of fixed-effects estimation is that market sizes may not vary enough over time for there to be enough identifying variation. In some sense this is a standard bias vs. precision trade-off.

Nevertheless, it is clear that even with fixed effects we cannot rule out potential endogeneity. For example, population growth could be accompanied by other unobservables such as economic growth, and thus, the issues would be similar to cross-sectional analysis. Moreover, fixed effects can potentially even increase the endogeneity issues if time series correlation between market size and unobserved economic conditions is stronger than the cross-sectional correlation.

Fortunately, we can use our for-profit data to analyze which one is the optimal choice: Given the strong theoretical arguments, and the existing evidence (i.e., Campbell and Hopenhayn, 2005), we prefer specifications that in the for-profit data deliver a positive and statistically significant correlation between market size and the average firm size over those that do not.

In this Appendix, we analyze the effect of market size on average firm size in the same industries analyzed by Campbell and Hopenhayn (2005) using our for-profit data. We report both pooled OLS and fixed effects specifications with and without control variables. Table E.1 presents these results. The first two columns show the results for pooled OLS estimations. These essentially replicate the results of Campbell and Hopenhayn (2005): market size is positively correlated with the size of providers and this relation is significant. However, when including fixed effects, the significance of this correlation completely vanishes in seven out of twelve industries. In the remaining five industries, the effect is only present either with or without control variables. Adding fixed effects always increases standard errors, but in some cases also the change in the point estimates is substantive, and thus, we cannot rule out the relevance of the aforementioned endogeneity issues in those few cases. However, by and large, the inflated standard errors seem to be behind the loss in significance. This supports the use of pooled OLS over the fixed-effects model. More importantly, only the pooled OLS is able to produce the theoretically expected result. Therefore, it seems prudent to prefer the pooled OLS specifications over the fixed-effects specification also in our main analysis.

Table E.1: Coefficients on log *Population*, in regressions of market size (in logs) on average employment (in logs), using Business Register Data, across selected industries (2007 and 2011)

Industry	(1)	(2)	(3)	(4)
Grocery stores	0.36***	0.33***	-0.18	-0.35*
	(0.010)	(0.015)	(0.15)	(0.16)
Car dealers	0.30***	0.34***	0.090	-0.37
	(0.015)	(0.023)	(0.26)	(0.32)
Auto supply	0.14***	0.17***	0.21	0.079
	(0.0099)	(0.015)	(0.21)	(0.25)
Gasoline	0.11***	0.060***	-0.0063	-0.45
	(0.0076)	(0.010)	(0.14)	(0.25)
Women's clothing and specialty stores	0.18***	0.18***	0.65*	0.74
	(0.013)	(0.018)	(0.30)	(0.54)
Shoe stores	0.20***	0.19***	0.71	0.53
	(0.015)	(0.021)	(0.41)	(0.59)
Furniture stores	0.21***	0.25***	0.63*	0.067
	(0.017)	(0.024)	(0.32)	(0.45)
Home furnishing stores	0.19***	0.19***	0.22	0.49
	(0.013)	(0.018)	(0.35)	(0.37)
Radio, TV, computers, music stores	0.15***	0.15***	0.48**	0.40
	(0.0087)	(0.013)	(0.17)	(0.24)
Restaurants	0.26***	0.22***	-0.038	-0.087
	(0.0085)	(0.011)	(0.17)	(0.23)
Refreshment places	0.30***	0.28***	0.30	0.43*
	(0.010)	(0.014)	(0.16)	(0.21)
Drug stores	0.23***	0.27***	0.25	0.34
	(0.012)	(0.017)	(0.21)	(0.29)
Market Fixed Effects	No	No	Yes	Yes
Controls	No	Yes	No	Yes

Note: The outcome is log(average employment). Industries are selected based on those in Campbell and Hopenhayn (2005). Standard errors are in parentheses, clustered at the market level. Models with control variables also include: log of mean household income, share of population over 65 years old, share of population under 5 years old, share without a high school diploma, share with university degree, share of immigrants, unemployment rate, log of average rental price.
Significance levels: * 10% ** 5% *** 1%.

Appendix F Additional Tables (Not for Publication)

Table F.1: Effect of Market Size (in logs) on Average Revenues (in logs)

	(1)	(2)	(3)	(4)
	Daycare			
log *Population*	0.24***	0.23***	1.10***	0.13
	(0.024)	(0.032)	(0.30)	(0.19)
N	1,212	1,170	1,212	1,170
R^2	0.138	0.239	0.138	0.131
	Food and Clothing Banks			
log *Population*	0.25***	0.31***	2.35***	1.08**
	(0.039)	(0.046)	(0.39)	(0.38)
N	634	613	634	613
R^2	0.155	0.190	0.155	0.176
	Housing			
log *Population*	0.27***	0.28***	0.60***	0.10
	(0.027)	(0.040)	(0.17)	(0.11)
N	1,205	1,158	1,205	1,158
R^2	0.140	0.186	0.140	0.134
	Seniors			
log *Population*	0.22***	0.24***	0.89	0.25
	(0.033)	(0.047)	(0.46)	(0.48)
N	753	731	753	731
R^2	0.087	0.101	0.087	0.069
	Disabled			
log *Population*	0.35***	0.28***	1.05***	-0.068
	(0.033)	(0.050)	(0.31)	(0.22)
N	1,181	1,154	1,181	1,154
R^2	0.142	0.253	0.142	0.064
	Festivals and Performances			
log *Population*	0.14***	0.22***	0.99*	0.60
	(0.038)	(0.050)	(0.43)	(0.42)
N	527	505	527	505
R^2	0.053	0.108	0.053	0.064
Market Fixed Effects	No	No	Yes	Yes
Controls	No	Yes	No	Yes

Note: The outcome is log(average revenues). Standard errors are in parentheses, clustered at the market level. Models with control variables also include: log of mean household income, share of population over 65 years old, share of population under 5 years old, share without a high school diploma, share with university degree, share of immigrants, unemployment rate, log of average rental price.
Significance levels: * 10% ** 5% *** 1%.

Table F.2: Descriptive Statistics on control variables for 2011

	N	Mean	Std. Dev.	Min.	Max.
Population	5,253	6,372.9	55,583.9	0	2,615,060
Household Mean Income	2,831	54,760.6	18,082.1	10,733	181,454
Share over 65 (%)	4,556	16.6	7.85	0	93.7
Share under 5 (%)	4,556	5.79	3.07	0	22.4
Share w/o high school (%)	3,439	32.4	16.5	0	100
Share university-educated (%)	3,439	8.82	8.42	0	71.4
Share of immigrants (%)	2,881	4.53	6.78	0	59.6
Unemployment rate (%)	3,439	11.2	11.9	0	100
Average gross rent	2,225	653.3	213.4	154	2,148

Table F.3: Effect of log *Population* on Charity Size, Market Size Defined by Relevant Population, Selection of Industries

	(1)	(2)	(3)	(4)
	Daycare			
log(population under 5)	0.21***	0.24***	-0.58***	0.018
	(0.024)	(0.032)	(0.14)	(0.11)
N	1,213	1,171	1,213	1,171
R^2	0.127	0.247	0.127	0.070
	Seniors			
log(population over 65)	0.22***	0.22***	1.01***	0.48*
	(0.034)	(0.046)	(0.28)	(0.23)
N	755	733	755	733
R^2	0.086	0.098	0.086	0.086
	Disabled			
log(population over 65)	0.39***	0.26***	1.33***	0.12
	(0.035)	(0.048)	(0.14)	(0.15)
N	1,178	1,154	1,178	1,154
R^2	0.161	0.256	0.161	0.174
Market Fixed Effects	No	No	Yes	Yes
Controls	No	Yes	No	Yes

Note: Standard errors are in parentheses, clustered at the market level. Models with control variables also include: log of mean household income, share of population over 65 years old, share of population under 5 years old, share without a high school diploma, share with university degree, share of immigrants, unemployment rate, log of average rental price.
Significance levels: * 10% ** 5% *** 1%.

Table F.4: Effect of log *Population* on Number of Providers, Market Size Defined by Relevant Population, Selection of Industries

	(1)	(2)	(3)	(4)
		Daycare		
log(population under 5)	0.29***	0.33***	-0.10**	-0.092*
	(0.029)	(0.033)	(0.036)	(0.045)
N	1,502	1,446	1,502	1,446
R^2	0.452	0.526	0.452	0.350
		Seniors		
log(population over 65)	0.26***	0.27***	0.21***	0.18**
	(0.029)	(0.029)	(0.051)	(0.068)
N	1,453	1,397	1,453	1,397
R^2	0.386	0.429	0.386	0.366
		Disabled		
log(population over 65)	0.41***	0.46***	0.26***	0.095
	(0.024)	(0.025)	(0.049)	(0.065)
N	1,737	1,698	1,737	1,698
R^2	0.559	0.606	0.559	0.443
Market Fixed Effects	No	No	Yes	Yes
Controls	No	Yes	No	Yes

Note: Standard errors are in parentheses, clustered at the market level. Models with control variables also include: log of mean household income, share of population over 65 years old, share of population under 5 years old, share without a high school diploma, share with university degree, share of immigrants, unemployment rate, log of average rental price.
Significance levels: * 10% ** 5% *** 1%.

Table F.5: Effects of Market Size (in logs) on Average Expenditures (in logs), Full Panel, Including Charities with Low Expenditures

	(1)	(2)	(3)	(4)
		Daycare		
log *Population*	0.24***	0.24***	1.28***	0.20
	(0.021)	(0.029)	(0.29)	(0.16)
N	1,505	1,447	1,505	1,447
R^2	0.155	0.260	0.155	0.130
		Food and Clothing Banks		
log *Population*	0.18***	0.21***	2.10***	0.60*
	(0.026)	(0.033)	(0.38)	(0.29)
N	1,299	1,265	1,299	1,265
R^2	0.091	0.119	0.091	0.107
		Housing		
log *Population*	0.26***	0.26***	0.58*	-0.063
	(0.024)	(0.036)	(0.23)	(0.19)
N	1,748	1,678	1,748	1,678
R^2	0.118	0.171	0.118	0.028
		Seniors		
log *Population*	0.20***	0.22***	0.99***	0.046
	(0.025)	(0.036)	(0.29)	(0.27)
N	1,455	1,397	1,455	1,397
R^2	0.075	0.083	0.075	0.007
		Disabled		
log *Population*	0.34***	0.24***	1.37***	0.048
	(0.030)	(0.043)	(0.30)	(0.23)
N	1,742	1,698	1,742	1,698
R^2	0.126	0.245	0.126	0.091
		Festivals and Performances		
log *Population*	0.10**	0.18***	0.64	0.14
	(0.032)	(0.039)	(0.34)	(0.26)
N	1,188	1,145	1,188	1,145
R^2	0.026	0.085	0.026	0.012
Market Fixed Effects	No	No	Yes	Yes
Controls	No	Yes	No	Yes

Note: The outcome is log(average expenditures). Standard errors are in parentheses, clustered at the market level. This regression includes all charities, even those with expenditures lower than CDN $30,000. Models with control variables also include: log of mean household income, share of population over 65 years old, share of population under 5 years old, share without a high school diploma, share with university degree, share of immigrants, unemployment rate, log of average rental price.
Significance levels: * 10% ** 5% *** 1%.

Table F.6: Effect of Market Size (in logs) on Average Expenditures (in logs), Trimmed Markets

	(1)	(2)	(3)	(4)
		Daycare		
log *Population*	0.24***	0.25***	1.16**	0.29
	(0.031)	(0.038)	(0.35)	(0.18)
N	1,107	1,076	1,107	1,076
R^2	0.103	0.242	0.103	0.100
		Food and Clothing Banks		
log *Population*	0.25***	0.29***	2.61***	0.65
	(0.043)	(0.052)	(0.42)	(0.35)
N	571	562	571	562
R^2	0.112	0.140	0.112	0.122
		Housing		
log *Population*	0.30***	0.30***	0.62**	0.18
	(0.040)	(0.050)	(0.20)	(0.12)
N	1,084	1,055	1,084	1,055
R^2	0.111	0.162	0.111	0.107
		Seniors		
log *Population*	0.18***	0.18**	1.65***	0.32
	(0.044)	(0.055)	(0.43)	(0.47)
N	696	683	696	683
R^2	0.041	0.056	0.041	0.040
		Disabled		
log *Population*	0.37***	0.27***	1.25***	-0.31
	(0.051)	(0.066)	(0.36)	(0.19)
N	1,060	1,047	1,060	1,047
R^2	0.092	0.217	0.092	0.024
		Festivals and Performances		
log *Population*	0.063	0.13*	1.60***	0.78
	(0.051)	(0.058)	(0.42)	(0.47)
N	464	455	464	455
R^2	0.006	0.047	0.006	0.007
Market Fixed Effects	No	No	Yes	Yes
Controls	No	Yes	No	Yes

Note: The outcome is log(average expenditures). Standard errors are in parentheses, clustered at the market level. Models with control variables also include: log of mean household income, share of population over 65 years old, share of population under 5 years old, share without a high school diploma, share with university degree, share of immigrants, unemployment rate, log of average rental price.
Significance levels: * 10% ** 5% *** 1%.

Table F.7: Effect of Market Size (in logs) on Number of Providers (in logs), Trimmed Markets

	(1)	(2)	(3)	(4)
	Daycare			
log *Population*	0.22***	0.23***	-0.068	-0.090
	(0.020)	(0.026)	(0.080)	(0.084)
N	1,355	1,317	1,355	1,317
R^2	0.334	0.364	0.334	0.209
	Food and Clothing Banks			
log *Population*	0.28***	0.33***	0.44***	0.13
	(0.021)	(0.022)	(0.12)	(0.13)
N	1,170	1,155	1,170	1,155
R^2	0.384	0.470	0.384	0.256
	Housing			
log *Population*	0.25***	0.26***	0.17*	0.12
	(0.017)	(0.021)	(0.083)	(0.069)
N	1,574	1,528	1,574	1,528
R^2	0.374	0.398	0.374	0.277
	Seniors			
log *Population*	0.15***	0.17***	0.30**	0.13
	(0.016)	(0.021)	(0.11)	(0.13)
N	1,311	1,278	1,311	1,278
R^2	0.206	0.230	0.206	0.145
	Disabled			
log *Population*	0.34***	0.40***	0.29**	0.13
	(0.020)	(0.023)	(0.092)	(0.10)
N	1,568	1,545	1,568	1,545
R^2	0.420	0.485	0.420	0.368
	Festivals and Performances			
log *Population*	0.37***	0.39***	0.48***	0.29***
	(0.025)	(0.030)	(0.14)	(0.083)
N	1,070	1,054	1,070	1,054
R^2	0.435	0.477	0.435	0.404
Market Fixed Effects	No	No	Yes	Yes
Controls	No	Yes	No	Yes

Note: The outcome is log(number of providers). Standard errors are in parentheses, clustered at the market level. Models with control variables also include: log of mean household income, share of population over 65 years old, share of population under 5 years old, share without a high school diploma, share with university degree, share of immigrants, unemployment rate, log of average rental price.
Significance levels: * 10% ** 5% *** 1%.

Table F.8: Effects of Market Size (in logs) on Total Expenditures of Individual Producer (in logs), Full Panel, At Charity Level

	(1)	(2)	(3)	(4)
	Daycare			
log *Population*	0.083***	0.078***	0.39**	-0.084
	(0.012)	(0.018)	(0.15)	(0.051)
N	3477	3432	3477	3432
R^2	0.035	0.141	0.035	0.049
	Food and Clothing Banks			
log *Population*	0.22***	0.17***	0.27***	0.11
	(0.019)	(0.033)	(0.063)	(0.077)
N	2035	2012	2035	2012
R^2	0.144	0.175	0.144	0.124
	Housing			
log *Population*	0.16***	0.11***	0.15***	-0.014
	(0.016)	(0.027)	(0.040)	(0.055)
N	3565	3518	3565	3518
R^2	0.067	0.104	0.067	0.052
	Seniors			
log *Population*	0.12***	0.076*	0.097	-0.020
	(0.021)	(0.033)	(0.066)	(0.084)
N	2121	2097	2121	2097
R^2	0.043	0.072	0.043	0.019
	Disabled			
log *Population*	0.10***	0.077*	0.090*	-0.034
	(0.019)	(0.032)	(0.035)	(0.035)
N	4134	4106	4134	4106
R^2	0.017	0.096	0.017	0.033
	Festivals and Performances			
log *Population*	0.15***	0.23***	0.18***	0.061
	(0.018)	(0.028)	(0.044)	(0.050)
N	3480	3454	3480	3454
R^2	0.051	0.079	0.051	0.020
Producer Fixed Effects	No	No	Yes	Yes
Controls	No	Yes	No	Yes

Note: The outcome is log(total expenditures) and the unit of observation is an individual producer in a given year. Standard errors are in parentheses, clustered at the market level. Models with control variables also include: log of mean household income, share of population over 65 years old, share of population under 5 years old, share without a high school diploma, share with university degree, share of immigrants, unemployment rate, log of average rental price.
Significance levels: * 10% ** 5% *** 1%.

Table F.9: Effects of Market Size (in logs) on Average Expenditures (in logs), Full Panel, with Share of Revenue from Government

	(1)	(2)	(3)	(4)
	Daycare			
log *Population*	0.24***	0.25***	0.60*	0.14
	(0.025)	(0.031)	(0.25)	(0.19)
N	903	894	903	894
R^2	0.165	0.250	0.156	0.102
	Food and Clothing Banks			
log *Population*	0.24***	0.32***	1.30**	-0.0086
	(0.036)	(0.045)	(0.46)	(0.47)
N	460	447	460	447
R^2	0.201	0.257	0.149	0.020
	Housing			
log *Population*	0.28***	0.30***	0.29	-0.014
	(0.028)	(0.042)	(0.15)	(0.13)
N	909	891	909	891
R^2	0.157	0.179	0.060	0.012
	Seniors			
log *Population*	0.26***	0.24***	0.38	0.011
	(0.036)	(0.049)	(0.35)	(0.47)
N	568	560	568	560
R^2	0.135	0.146	0.104	0.000
	Disabled			
log *Population*	0.36***	0.27***	0.88*	-0.25
	(0.034)	(0.053)	(0.41)	(0.22)
N	890	883	890	883
R^2	0.157	0.262	0.155	0.004
	Festivals and Performances			
log *Population*	0.17***	0.24***	0.93	0.91*
	(0.038)	(0.052)	(0.49)	(0.42)
N	421	408	421	408
R^2	0.095	0.128	0.080	0.089
Market Fixed Effects	No	No	Yes	Yes
Controls	No	Yes	No	Yes

Note: The outcome is log(average expenditures). Standard errors are in parentheses, clustered at the market level. Models with control variables also include: log of mean household income, share of population over 65 years old, share of population under 5 years old, share without a high school diploma, share with university degree, share of immigrants, unemployment rate, log of average rental price.
Significance levels: * 10% ** 5% *** 1%.

Table F.10: Effects of Market Size (in logs) on Median Expenditures (in logs), Full Panel

	(1)	(2)	(3)	(4)
	Daycare			
log *Population*	0.18***	0.19***	1.13***	0.22
	(0.023)	(0.032)	(0.31)	(0.18)
N	1,214	1,171	1,214	1,171
R^2	0.090	0.226	0.090	0.106
	Food and Clothing Banks			
log *Population*	0.19***	0.24***	1.96***	0.62*
	(0.033)	(0.043)	(0.38)	(0.29)
N	635	614	635	614
R^2	0.104	0.135	0.104	0.124
	Housing			
log *Population*	0.19***	0.21***	0.51**	0.032
	(0.027)	(0.040)	(0.17)	(0.12)
N	1,208	1,161	1,208	1,161
R^2	0.073	0.123	0.073	0.071
	Seniors			
log *Population*	0.13***	0.13**	0.94*	0.24
	(0.030)	(0.045)	(0.43)	(0.44)
N	755	733	755	733
R^2	0.033	0.049	0.033	0.038
	Disabled			
log *Population*	0.16***	0.054	0.83**	-0.30
	(0.034)	(0.049)	(0.30)	(0.21)
N	1,181	1,154	1,181	1,154
R^2	0.032	0.194	0.032	0.016
	Festivals and Performances			
log *Population*	0.032	0.10*	1.03*	0.76
	(0.030)	(0.045)	(0.44)	(0.41)
N	528	505	528	505
R^2	0.003	0.042	0.003	0.007
Market Fixed Effects	No	No	Yes	Yes
Controls	No	Yes	No	Yes

Note: The outcome is log(median expenditures). Standard errors are in parentheses, clustered at the market level. Models with control variables also include: log of mean household income, share of population over 65 years old, share of population under 5 years old, share without a high school diploma, share with university degree, share of immigrants, unemployment rate, log of average rental price.
Significance levels: * 10% ** 5% *** 1%.

Table F.11: Effects of Market Size (in logs) on Average Expenditures (in logs), Only Local Charities

	(1)	(2)	(3)	(4)
	Daycare			
log *Population*	0.22***	0.23***	0.62*	0.18
	(0.023)	(0.030)	(0.25)	(0.17)
N	897	888	897	888
R^2	0.145	0.249	0.145	0.094
	Food and Clothing Banks			
log *Population*	0.20***	0.28***	1.18*	-0.060
	(0.034)	(0.044)	(0.49)	(0.49)
N	453	443	453	443
R^2	0.141	0.187	0.141	0.001
	Housing			
log *Population*	0.26***	0.28***	0.058	-0.24
	(0.028)	(0.042)	(0.25)	(0.27)
N	891	876	891	876
R^2	0.140	0.182	0.140	0.030
	Seniors			
log *Population*	0.15***	0.14**	0.25	-0.18
	(0.035)	(0.050)	(0.33)	(0.66)
N	563	560	563	560
R^2	0.045	0.072	0.045	0.029
	Disabled			
log *Population*	0.33***	0.22***	0.64	-0.25
	(0.035)	(0.054)	(0.40)	(0.25)
N	837	831	837	831
R^2	0.133	0.246	0.133	0.001
	Festivals and Performances			
log *Population*	0.14***	0.20***	0.84	1.20**
	(0.041)	(0.055)	(0.57)	(0.42)
N	371	359	371	359
R^2	0.054	0.109	0.054	0.067
Market Fixed Effects	No	No	Yes	Yes
Controls	No	Yes	No	Yes

Note: The outcome is log(average expenditures). Standard errors are in parentheses, clustered at the market level. Models with control variables also include: log of mean household income, share of population over 65 years old, share of population under 5 years old, share without a high school diploma, share with university degree, share of immigrants, unemployment rate, log of average rental price.
Significance levels: * 10% ** 5% *** 1%.

Table F.12: Effect of Market Size (in logs) on Number of Providers (in logs), Only Local Charities

	(1)	(2)	(3)	(4)
	Daycare			
log *Population*	0.31***	0.33***	0.067	-0.0025
	(0.031)	(0.034)	(0.076)	(0.078)
N	1,082	1,070	1,082	1,070
R^2	0.460	0.525	0.460	0.067
	Food and Clothing Banks			
log *Population*	0.30***	0.36***	0.57**	0.34*
	(0.029)	(0.029)	(0.18)	(0.16)
N	863	849	863	849
R^2	0.456	0.557	0.456	0.486
	Housing			
log *Population*	0.29***	0.32***	0.032	0.0081
	(0.023)	(0.026)	(0.074)	(0.076)
N	1,229	1,207	1,229	1,207
R^2	0.476	0.528	0.476	0.013
	Seniors			
log *Population*	0.24***	0.27***	0.068	-0.0089
	(0.029)	(0.032)	(0.093)	(0.12)
N	1,001	989	1,001	989
R^2	0.377	0.436	0.377	0.002
	Disabled			
log *Population*	0.34***	0.43***	-0.11	-0.063
	(0.023)	(0.025)	(0.11)	(0.11)
N	1,213	1,202	1,213	1,202
R^2	0.518	0.602	0.518	0.309
	Festivals and Performances			
log *Population*	0.39***	0.42***	0.27*	0.22
	(0.036)	(0.030)	(0.13)	(0.12)
N	758	742	758	742
R^2	0.515	0.609	0.515	0.512
Market Fixed Effects	No	No	Yes	Yes
Controls	No	Yes	No	Yes

Note: The outcome is log(number of providers). Standard errors are in parentheses, clustered at the market level. Models with control variables also include: log of mean household income, share of population over 65 years old, share of population under 5 years old, share without a high school diploma, share with university degree, share of immigrants, unemployment rate, log of average rental price.
Significance levels: * 10% ** 5% *** 1%.

Table F.13: Effects of Market Size (in logs) on Average Expenditures (in logs), with Province and Year Fixed Effects

	(1)	(2)	(3)	(4)
	Daycare			
log *Population*	0.21***	0.18***	0.043	0.053
	(0.023)	(0.028)	(0.17)	(0.18)
N	1214	1171	1214	1171
R^2	0.460	0.480	0.165	0.143
	Food and Clothing Banks			
log *Population*	0.26***	0.41***	0.42	0.25
	(0.035)	(0.044)	(0.26)	(0.29)
N	635	614	635	614
R^2	0.289	0.371	0.227	0.165
	Housing			
log *Population*	0.25***	0.29***	0.063	-0.088
	(0.028)	(0.042)	(0.12)	(0.12)
N	1208	1161	1208	1161
R^2	0.261	0.267	0.101	0.000
	Seniors			
log *Population*	0.16***	0.20***	-0.10	-0.091
	(0.036)	(0.050)	(0.28)	(0.47)
N	755	733	755	733
R^2	0.168	0.174	0.004	0.001
	Disabled			
log *Population*	0.28***	0.25***	-0.038	-0.24
	(0.032)	(0.045)	(0.15)	(0.19)
N	1181	1154	1181	1154
R^2	0.376	0.393	0.021	0.000
	Festivals and Performances			
log *Population*	0.13**	0.21***	0.28	0.73
	(0.044)	(0.053)	(0.36)	(0.42)
N	528	505	528	505
R^2	0.099	0.169	0.072	0.077
Market Fixed Effects	No	No	Yes	Yes
Controls	No	Yes	No	Yes

Note: The outcome is log(average expenditures). Standard errors are in parentheses, clustered at the market level. Models with control variables also include: log of mean household income, share of population over 65 years old, share of population under 5 years old, share without a high school diploma, share with university degree, share of immigrants, unemployment rate, log of average rental price.
Significance levels: * 10% ** 5% *** 1%.

Table F.14: Effects of Market Size (in logs) on Average Expenditures (in logs), with Province, Year, and Province×Year Fixed Effects

	(1)	(2)	(3)	(4)
	Daycare			
log *Population*	0.22***	0.18***	0.0063	0.084
	(0.023)	(0.028)	(0.14)	(0.14)
N	1214	1171	1214	1171
R^2	0.486	0.509	0.238	0.283
	Food and Clothing Banks			
log *Population*	0.26***	0.42***	0.63*	0.36
	(0.035)	(0.044)	(0.30)	(0.31)
N	635	614	635	614
R^2	0.306	0.399	0.228	0.218
	Housing			
log *Population*	0.25***	0.29***	0.068	0.011
	(0.029)	(0.043)	(0.12)	(0.12)
N	1208	1161	1208	1161
R^2	0.271	0.277	0.073	0.009
	Seniors			
log *Population*	0.16***	0.20***	0.046	-0.27
	(0.037)	(0.051)	(0.29)	(0.48)
N	755	733	755	733
R^2	0.203	0.210	0.066	0.002
	Disabled			
log *Population*	0.28***	0.25***	-0.24	-0.31
	(0.032)	(0.046)	(0.15)	(0.19)
N	1181	1154	1181	1154
R^2	0.385	0.405	0.002	0.000
	Festivals and Performances			
log *Population*	0.13**	0.20***	0.52	1.04*
	(0.045)	(0.055)	(0.38)	(0.50)
N	528	505	528	505
R^2	0.119	0.188	0.069	0.076
Market Fixed Effects	No	No	Yes	Yes
Controls	No	Yes	No	Yes

Note: The outcome is log(average expenditures). Standard errors are in parentheses, clustered at the market level. Models with control variables also include: log of mean household income, share of population over 65 years old, share of population under 5 years old, share without a high school diploma, share with university degree, share of immigrants, unemployment rate, log of average rental price.
Significance levels: * 10% ** 5% *** 1%.

Appendix G Monte Carlo Simulation Code (Not for Publication)

Stata Code 1: Monte Carlo Simulation: Units of Observation are too small

```
clear

postfile simuls beta var n rej using simulsfile_toosmall, replace

quietly forvalues i=1/1000 {
        clear
        * Create a dataset of sub-markets
        * (unit of observation in hypothetical regression)
                set obs 10000
                gen pop = runiformint(50,125000)
        * Merger them in real markets
                gen id = _n
                gen market = round(id,2)
        * Calculate population of market
                bysort market: egen popmarket = total(pop)
                gen logpopmarket=log(popmarket)
        * Calculate average expenditure in market, with noise
                gen logavgexp_market = 10 + 0.25*log(popmarket)
                gen avgexp_market = exp(logavgexp_market) + 200000*rnormal()
        * Sub-markets all have the same charity size
        * since that variable is defined at the market level only
                gen logavgexp=log(avgexp_market)
                gen logpop = log(pop)
        * Regression at sub-market level
                capture reg logavgexp logpop
                if _rc==0 {
                        mat b=e(b)
                        mat v=e(V)
                        test _b[logpop]==0.25
                        gen rej = r(p)
                        post simuls (b[1,1]) (v[1,1]) (e(N)) (rej)
                }
                else {
                        post simuls (.) (.) (.) (.)
                }
}
postclose simuls

postutil clear
```

Stata Code 2: Monte Carlo Simulation: Units of observation are too large

```
clear

postfile simuls beta var n rej using simulsfile_toolarge, replace

quietly forvalues i=1/1000 {
        clear
        * Create a dataset of real markets
                set obs 1000
                gen pop = runiformint(100,250000)
        * Calculate average expenditure in the market, add noise
                gen logavgexp = 10 + 0.25*log(pop)
                gen avgexp = exp(logavgexp) + 200000*rnormal()
        * Arrange them in groups, our units of observation
        * (each group includes 2 markets)
                gen id = _n
                gen group = round(id,2)
        * Calculate population and average expenditure at the group level
                collapse (rawsum) pop (mean) avgexp [w=pop], by(group)
        * Regressions at group level
                gen logpop=log(pop)
                gen logavgexp=log(avgexp)
                capture reg logavgexp logpop
                if _rc==0 {
                        mat b=e(b)
                        mat v=e(V)
                        test _b[logpop]==0.25
                        gen rej = r(p)
                        post simuls (b[1,1]) (v[1,1]) (e(N)) (rej)
                }
                else {
                        post simuls (.) (.) (.) (.)
                }
}
postclose simuls

postutil clear
```