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Kimberley Ann Scharf

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Kimberley Ann Scharf, University of Warwick and CEPR

ABSTRACT

Scale Economies in Nonprofit Provision, Technology Adoption and Entry*

We study competition between nonprofit providers supplying a collective service through increasing-returns-to-scale technologies. When providers adopt a not-for-profit mission, the absence of a residual claimant can impede entry, pro- tecting the position of an inefficient incumbent. Moreover, when the goods provided are at least partly public in nature, buyers face individual incentives to divert donations towards providers that adopt low-fixed cost technologies, and so providers may forgo the adoption of more efficient technologies that require fixed costs. In these situations, government grants in support of core costs can have a non-neutral effect on entry, technology adoption, and industry performance.

Kimberley Ann Scharf
Department of Economics
University of Warwick
Coventry
CV4 7AL

Email: k.scharf@warwick.ac.uk

1 Introduction

We observe considerable variation in the composition of the funding sources of different charities: for some, the bulk of funding is represented by government grants, whereas for others, government grants are a relatively minor component of funding; and there is considerable variation in cost structures across charities and charitable sectors, which is likely to reflect variation in technologies. There also appears to be some correlation between funding and cost structures: focusing on Canadian charities' revenues and costs across different sectors of activities, we find evidence (presented in Section 5) of a positive correlation between fixed costs and the level of government funding received by charities relative to the total funding received.

It is plausible that large fixed costs would make charities vulnerable to fluctuations in the level of private funding, which might in turn induce them to actively seek government funding; but this does not imply that government should oblige. For-profit firms also face fixed costs and uncertain cash flows, just as non-profit firms do, but this does not justify public support even when there is a public interest in promoting competition and entry of the most efficient firms; indeed, as first pointed out by Baumol and Willig (1981), fixed, non-sunk costs need not impede entry and efficient selection of producers. The same principle could apply to non-profit firms: provided that donors are fully informed about charities' performance, unfettered competition between charities will allow those charities that deliver the highest value for donors to attract the most funding and to be best positioned to meet their fixed costs and deal with a fluctuating cash flow; those charities that cannot handle their fixed costs will then be (efficiently) selected out. Thus, although government support of charities may be warranted on the grounds that charities provide collective goods and services, it is not obvious that it should be warranted specifically on the basis of core funding needs.

In this paper we set out a pro-competitive based rationale for why government funding of fixed costs may be called for in the case of non-commercial, non-profit providers, and conjecture that the observed positive correlation between govern-

ment funding and charities' fixed costs may relate to the way that scale economies in provision affect entry and technology adoption incentives in non-profit sectors.

We show that, in non-profit sectors, the combination of fixed costs with a non-distribution constraint gives rise to two different types of selection failure.

The first relates to entry by new providers. In the presence of a non-distribution constraint, any surplus or shortfall experienced by a non-profit provider is reflected in its (long-run) level of provision rather than in its residual profit claims: non-profits may incur surpluses or losses in a given period, but costs and revenues must balance out in the long-run. This makes a switch by a single individual towards a start-up provider unattractive even if this start-up is potentially more efficient, because such a switch would result in lower rather than higher provision unless the switch is coordinated across individuals. As a result, when non-profit providers face fixed costs, non-cooperative provision equilibria – as characterized by Bergstrom, Blume and Varian (1986) – can support an inefficient status quo; that is, in the absence of a residual claimant, fixed costs can translate into entry barriers. This contrasts with the case of for-profit firms, where price competition in the presence of a residual claimant always makes switching to lower cost providers worthwhile for individual consumers even when there are fixed, non-sunk costs.

The second source of failure relates to technology adoption by incumbents. When the services that are provided include both a private consumption and a collective consumption component, individuals are able to benefit from provision that they do not directly contribute to. This means that the link between the payments individuals make towards fixed costs and the inframarginal gain they experience from being able to access the service provided is broken. As a result, individuals will face incentives to abandon those charities that adopt technologies with fixed costs in favour of other charities that adopt inferior, variable-cost-only technologies; this will in turn induce charities to forgo opportunities to exploit scale economies and adopt inferior technologies.

Although these results follow quite naturally from the structure of the interaction between donors who face competing charities, to the best of our knowledge, they

have not been identified before in the literature.

Our analysis and conclusions are consistent with the prominence given by charities to the aim of securing core funding. Charities often lament that donors are typically unwilling to fund core costs – making it difficult for start-up charities to get off the ground and for more established charities to cover management and general administration costs – and consistently lobby government to step in with grants to cover their fixed operating costs.[1] Government funding choices do appear to be sensitive to charities' core funding needs, but what is not clear is whether this is motivated by the need to promote entry by new charities – overcoming the implicit entry barriers that fixed costs induce in the presence of a non-distribution constraint – or by the need to support efficient technology adoption by incumbents. Focusing on information from a comprehensive panel of Canadian charities to look at this question, we find no evidence of more core government funding being directed to support the start-up costs of new entrants. On the contrary, it is the older, more established, charities that receive comparatively larger grants (relative to their size).

Our paper contributes to the debate on conduct and performance in the non-profit sector vis-à-vis the for-profit sector. This has focused mainly on the implications of organizational form for internal performance along various dimensions – information and agency costs (Alchian and Demsetz, 1972; Hansmann, 1980; Easley and O'Hara, 1983; Glaeser and Schleifer, 2001), differential regulatory and tax regimes (Lakdawalla and Philipson, 2006), access to pro-socially motivated workforce (Ghatak and Mueller, 2009). The implications of organizational form for inter-charity competition and industry structure have received less attention. A recent exception is Philipson and Posner (2009), who study – as we do here – competition between providers that pursue non-profit objectives. Their focus, however, is differ-

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[1] The difficulties that charities face in persuading donors (especially small ones) to make donations that are not earmarked towards project costs and can be used to fund core costs leads charities to formulate specific core funding strategies. See, for example, Scott (2003) and Institute for Philanthropy (2009).

ent from ours, as they consider markets that are not contestable, i.e. where there are barriers to entry, concluding that, as in the case of for-profit firms, antitrust regulation may be called for. Their arguments hinge on the incentives that non-profit firms have to defend their incumbency position even when it is not socially efficient to do so. The sources of inefficiency we identify here stems instead from the relationship between private donors' decisions on the one hand and entry and technology adoption decisions on the other in the presence of fixed costs. While antitrust measures are not well suited to tackle the kinds of failure we identify here, public support of core funding needs may be able to alleviate it.[2]

The rest of the paper is structured as follows. Section 2 describes our basic modelling setup. Section 3 looks at provision outcomes under monopoly. Section 4 focuses on entry. Section 5 discusses some evidence on the relationship between fixed costs and government funding for the Canadian case. Section 6 concludes.

2 Setup

2.1 Preferences and technologies

There are h identical individuals, denoted by $i \in H \equiv \{1, \ldots, h\}$ each endowed with some exogenous income y – which, without loss of generality is assumed to be equal to unity – and each consuming a private and/or collective service provided by non-profit suppliers as well as consumption that is purely private. Assume Cobb-Douglas preferences of the form

$$U(g^i, z^i) = \theta \ln g^i + (1 - \theta) \ln z^i, \qquad 0 \leq \theta \leq 1, \tag{1}$$

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[2] Another recent study that is distantly related to ours is Ghatak and Mueller (2009), which shows how a for-profit manager, acting as residual claimant, may be comparatively better positioned to engage pro-socially motivated workers in incentive contracts. This somewhat parallels our conclusion that, in the presence of fixed costs, the residual-claimant position of for-profit start-ups can make it comparatively easier for them to divert contributions away from incumbents than is the case for non-profits.

where g^i and z^i are respectively individual i's effective consumption of the service in question and other private consumption. In turn, effective consumption of the service, g^i, may result from a combination of private and collective consumption benefits. Specifically, if x^i is the amount of the service "purchased" by i, and x^{-i} is the amount purchased by others, consumption benefits for i are

$$g^i = \varphi(x^i + \gamma x^{-i}), \quad \gamma \in [0, 1]. \tag{2}$$

where $x^{-i} \equiv \sum_{j \neq i} x^j$ and $\gamma > 0$ measures the extent to which the service is collective in nature,[3] and ϕ is a scale parameter. If we impose $\varphi = 1/(1 + (h-1)\gamma)$ and define $\sigma \equiv \varphi(h-1)\gamma$, we can write

$$g^i = (1 - \sigma)x^i + \sigma \bar{x}^{-i}, \tag{3}$$

where

$$\bar{x}^{-i} = \frac{x^{-i}}{h-1} = \frac{\sum_{j \neq i} x^j}{h-1} \tag{4}$$

is the average purchase by all individuals other than i. This specification intentionally abstracts from scale economies in provision arising from group size – g^i is normalized so that, for $x^i = x, i \in H$, it is invariant to changes in γ – with the parameter $\sigma \in [0, (h-1)/h]$ combining the extent of individual spillovers with group size to determine the degree of "publicness" of provision.[4] This is convenient for developing comparative statics results but does not affect the structure of the model, nor does it affect conclusions (an equivalent representation in terms of h and γ can always be found for any given σ).

Provision of the service by some provider j can take place through a technology that features a fixed cost, F_j, and a constant marginal cost, c_j. We shall assume that,

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[3] A fully equivalent interpretation of this mixed private/public benefit formulation is that the private component reflects an individual's "warm glow" from contributing to collective consumption.

[4] If $\gamma = 1$ (pure public good case), then σ only reflects group size; on the other hand, for a given group size, variations in σ can be interpreted as reflecting variations in γ.

absent a profit objective, providers aim at maximizing their own output.[5]

Assuming provision is carried out by provider j, in a symmetric outcome where $x^i = x$ for all consumers and where the fixed costs of provision are allocated equally across individuals, we have $g = x$ and $z^i = 1 - F_j/h - c_j g$ for all i. The socially efficient level of provision is then identified by the condition

$$\frac{U_g(g, 1 - F_j/h - c_j g)}{U_z(g, 1 - F_j/h - c_j g)} \equiv \mathrm{MRS}(g, 1 - F_j/h - c_j g) = c_j, \tag{5}$$

(with subscripts denoting partial derivatives), which is independent of σ.

2.2 Information and the not-for-profit constraint

Service providers are non-profit entities that face a non-distribution constraint, i.e. their profits must be zero.[6] This constraint can be viewed as an endogenous response to the presence of output verification constraints – an idea that has been discussed extensively in the literature going back to Hansmann (1980). That is, if service delivery is not verifiable in contractual arrangements, providers facing a zero profit constraint would outperform for profit providers, and consequently the non-profit organizational form would be selected.[7]

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[5] This is standard in the literature on non-profits, and amounts to assuming that providers are biased towards own provision, i.e. they value their own provision more than they value provision by other suppliers. For a general discussion of non-profits' objectives and conduct, see Brown and Slivinski (2006).

[6] In a dynamic framework, short-run profits can be positive or negative even when a non-distribution constraint is present, but profits must be zero in the long run. However, in our static, a-temporal framework, a non-distribution constraint translates directly into a zero-profit constraint.

[7] With collective consumption, overall output may be difficult to verify even when deliveries to individual purchasers are fully verifiable. This makes verification problems comparatively more likely to occur in the case of collective goods, as the following example illustrates. Suppose that two individuals each contribute an overall amount v towards provision of a purely collective service with marginal cost $c = 1$; even if each contributor is able to verify that an amount v is provided as a direct consequence of her own individual contribution, she may be unable to verify that an additional

Individuals can fully observe providers' technologies. Providers have full information about individuals' preferences as well as other providers' technologies.

3 Monopoly provider

Suppose first that the service is provided by a single supplier enjoying a monopoly position, who produces the service through a technology with a cost structure (c, F) – the question of how fixed costs relate to entry by potential challengers is addressed in the next section.

We restrict our attention to anonymous (nondiscriminatory) pricing schemes that offer identical terms to all individuals – who in turn are assumed to be identical in the model. Given that what is provided is a service rather than a good, there are no re-sale opportunities that could limit the use of two-part pricing. The provider can thus charge a two-part tariff – a combination of an access fee, t, and a price, p, per unit provided.[8] Buyers then choose whether or not to access the service on offer, incurring an access fee of t, and how much of the service to purchase at price p if they do.

The non-distribution constraint for the provider requires $ht + pX - F - cX = 0$, where X is the total amount provided. If p is to be taken by customers as a marginal price – on the basis of which they formulate their demand choices – the above constraint must be satisfied for any possible value of X, not just in equilibrium.[9] From

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amount v is also provided as a result of the other individual's contribution. In this case, the provider may be able to supply a total amount v (rather than an amount $2v$) and still satisfy its contractual obligations with each of the two contributors.

[8] Anonymous two-part pricing schemes are indeed widely used, more or less explicitly, in the sale of commercial (private) services by both for-profit and not-for-profit providers; for example, health care providers often combine "initial consultation" charges with lower follow-up charges, but they do not differentiate charges according to patients' characteristics – children being the only common exception to this rule.

[9] Suppose that the constraint were only to hold in equilibrium, i.e. that it would be violated if

a game theoretic perspective, the pricing choice is an ex-ante offer made by the supplier to customers, where the total price payable depends on the subsequent quantity choices of customers to arrive at a transaction involving a combination of price and quantity – a combination that must always be feasible in light if the non-distribution constraint.[10] This means that, if n individuals choose to access the service, then $(t = F/n, p = c)$ is the only feasible pricing structure for a supplier. Thus, for an individual who chooses to access the service, the amount payable towards coverage of fixed costs depends on the number of individuals accessing the service. Given this pricing scheme, individuals choose whether or not to participate, paying the access fee, t, and, simultaneously, how much of the service to purchase at marginal price $p = c$. For $\sigma = 0$ (when the service is purely private) individuals only care about the number of other individuals accessing the service, because of its effect on the access fee, $t = F/n$; for $\sigma > 0$ (when the service has a public component) individuals are also affected by how much other individuals choose to purchase.

The resulting game can be formally defined in terms of strategies $(x^i, \ldots, x^h)$, $x^i \geq 0$, and payoffs $\Pi^i(x^i, \ldots, x^h) = \theta \ln g^i + (1 - \theta) \ln (1 - cx^i - t(x^i))$, $i \in H$, where $g^i = (1 - \sigma)x^i + \sigma \sum_{j \neq i} x^j / (h - 1)$, $t(x^i) = F/n$ for $x^i > 0$, $i \in H$, $t(0) = 0$, and $n = \sum_i \text{sgn}(x^i)$ – with sgn(.) denoting the sign function. In what follows, we will focus on – and characterize – symmetric, non-cooperative equilibria of this game.

For the assumed specification of preferences, if individual i chooses to pay t to

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customers were to demand one more unit of output above the equilibrium level. Since the supplier is bound by a zero-profit constraint, it would not be able to supply the extra unit at the stated conditions, implying that p could not be taken as a marginal price by customers.

[10] An alternative assumption is that buyers choose payments rather than quantities, implying that, out of equilibrium, the quantities provided adjust to accommodate any budget surplus or shortfall. This may be more natural for scenarios where the good provided is exclusively public in nature (i.e. for high levels of σ). Our main arguments concerning inefficient entry, however, relate to scenarios where the service provided has both a private and a public component. As we shall see later (Footnote 16), in those scenarios, the two specifications have almost identical implications.

directly access the service, her individually optimal (utility-maximizing) level of service purchase at marginal price c is the level for which

$$(1 - \sigma) \operatorname{MRS}(g^i, 1 - t - cx^i) = (1 - \sigma)\frac{\theta}{1 - \theta}\frac{1 - t - cx^i}{g^i} = c. \tag{6}$$

Note that if n individuals access the service, they will each purchase the same amount $x^i = x > 0$ – with the level of x being identified by condition (6).[11] Thus, we can write $\bar{x}^{-i} = (n - 1)x/(h - 1)$ and $g = (1 - \sigma)x + \sigma(n - 1)x/(h - 1)$.

With $\sigma = 0$ – the private good case – we have $g^i = x^i$. Given the assumed preferences, g^i is an essential good, i.e. $\lim_{g^i \to 0} U(g^i, z') < U(g'', z'')$ for any possible combination of values $z' > 0, g'' > 0, z'' > 0$. This implies that the individual will always choose to access the service for any level of t. Since all individuals will always choose to access the service, n always equals h, and thus t equals F/h.

If $\sigma > 0$, i.e. if the service is not purely private in nature, the quantity of the service purchased after gaining direct access to provision, as well as the effective level of g^i experienced by any given individual, i, will depend on the choices of others. Specifically, suppose that there are $n - 1$ other individuals accessing the service, collectively purchasing an amount x^{-i}. Then if i also chooses to directly access the service at level x^i, she will incur a private cost $cx^i + F/n$ and obtain a level of g^i equal to $g^i = (1 - \sigma)x^i + \sigma x^{-i}$; whereas if she chooses not to directly access the service, she will incur no private cost and experience a level of g^i equal to $g^i = \sigma x^{-i}$. Whether or not participation is individually optimal depends on the spillover rate, σ, and the size of the access fee, $t = F/n$: the larger the spillover, the more the individual will benefit from the provision of others, and the less she will be willing to pay to secure direct access.

We next characterize the conditions under which a pure-strategy equilibrium exists in which no individual randomizes over the decision of whether or not to access the service, i.e. where any individual i either chooses to participate ($x^i > 0$)

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[11] Strict quasiconcavity of U implies that (6) can only be satisfied for all participating individuals if $x^i = x$ for all n.

or chooses not not participate ($x^i = 0$). We first establish that, if such an equilibrium exists, it will feature $n = h$:

Result 1 *If there exists a pure-strategy equilibrium where some individuals always participate in provision, it will involve all individuals participating.*

PROOF: The proof proceeds as follows: we first characterize incentives for participating individuals to stop participating and for non-participating individuals to start participating; we then show that there cannot exist an equilibrium where a subset of individuals participate and where participating individuals do not wish to stop participating, and non-participating individuals do not wish to start participating.

For the purposes of this proof, it will be convenient to define $q(\sigma, n) = (n - 1 + (1 - \sigma)(h - n))/(h - 1)$ (note that $q(\sigma, n)$ is increasing in n and equal to unity for $h = n$); this allows us to write $g = q(\sigma, n)x$, implying $x = g/q(\sigma, n)$ and $\bar{x}^{-i} = ((n-1)/(h-1))g/q(\sigma, n)$. Also, let $\hat{g}(\sigma, n)$ denote the level of collective consumption – as identified by condition (6) – in a symmetric equilibrium with n individuals accessing the service. One can verify that this equals

$$\hat{g}(\sigma, n) = (1 - \sigma)\theta \frac{1 - F/n}{c(1 - \theta + \theta(1 - \sigma)/q(\sigma, n))}. \tag{7}$$

If a participating individual, say individual i, deviates from participation starting from a situation where n individuals participate, she will experience a level of g^i equal to $\sigma((n-1)/(h-1))\hat{g}(\sigma, n)/q(\sigma, n)$.[12] Choosing to continue to participate in provision will then be weakly preferable for i if and only if

$$U\left(\sigma((n-1)/(h-1))\hat{g}(\sigma, n)/q(\sigma, n), 1\right)$$

$$-U(\hat{g}(\sigma, n), 1 - F/n - c\hat{g}(\sigma, n)/q(\sigma, n)) \equiv \hat{\Omega}(\sigma, n) \leq 0. \tag{8}$$

On the other hand, starting from the same situation, if one of the $h - n$ individuals not participating in provision, say individual i, chooses to participate, while all other n individuals

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[12] As already discussed, this implies that the total fixed costs, F, will now be shared amongst the remaining $n - 1$ individuals.

that are already participating keep their purchases at $x = \hat{g}(\sigma, n)/q(\sigma, n)$, she will experience a payoff equal to $\max_{x^i} U\big((1-\sigma)x^i + \sigma(n/(h-1))\hat{g}(\sigma, n)/q(\sigma, n), 1 - F/(n+1) - cx^i\big)$. Choosing to continue not to participate in provision will then be preferable for i if and only if

$$
\max_{x^i} U\Big((1-\sigma)x^i + \sigma\big(n/(h-1)\big)\hat{g}(\sigma, n)/q(\sigma, n), 1 - F/(n+1) - cx^i\Big)
$$

$$
- U\Big(\sigma\big((n-1)/(h-1)\big)\hat{g}(\sigma, n)/q(\sigma, n), 1\Big) \equiv \hat{\Psi}(\sigma, n) \le 0. \tag{9}
$$

For a pure-strategy equilibrium with $n < h$ participating individuals to exist, we must have $\hat{\Omega}(\sigma, n) \le 0$ and $\hat{\Psi}(\sigma, n) \le 0$, which in turn requires $U\big(\hat{g}(\sigma, n), 1 - F/n - c\hat{g}(\sigma, n)/q(\sigma, n)\big) > \max_{x^i} U\big((1-\sigma)x^i + \sigma(n/(h-1))\hat{g}(\sigma, n)/q(\sigma, n), 1 - F/(n+1) - cx^i\big)$. But this condition cannot be satisfied, since $\max_{x^i} U\big((1-\sigma)x^i + \sigma(n/(h-1))\hat{g}(\sigma, n)/q(\sigma, n), 1 - F/(n+1) - cx^i\big) > \max_{x^i} U\big((1-\sigma)x^i + \sigma((n-1)/(h-1))\hat{g}(\sigma, n)/q(\sigma, n), 1 - F/n - cx^i\big) = U\big(\hat{g}(\sigma, n), 1 - F/n - c\hat{g}(\sigma, n)/q(\sigma, n)\big)$. No such contradiction exists for $n = h$, since in this case the condition $\hat{\Psi}(\sigma, n) \le 0$ becomes irrelevant. □

For such an equilibrium to exist, individuals must strictly prefer participation to non-participation. It can be shown that, for small enough spillovers, this will be the case:

Result 2 *A pure-strategy, symmetric equilibrium where all individuals choose to pay the access fee to access provision will exist for σ lying within an interval $[0, \tilde{\sigma}]$.*

PROOF: In order to derive the relevant conditions for $\Omega(\sigma) \equiv \hat{\Omega}(\sigma, h) \le 0$ to be satisfied, we can reason as follows. We note first that $\lim_{\sigma \to 0} \Omega(\sigma) = -\infty$ and $\lim_{\sigma \to 1} \Omega(\sigma) = -(1 - \theta)\ln(1 - F/n) > 0$; and so, by continuity, there must be at least one value $\tilde{\sigma}$ for which $\Omega(\sigma) = 0$. We can also note that the second term of $\hat{\Omega}(\sigma, h)$, as defined in (8), is increasing in σ (decreasing in absolute value). The first term is increasing in $\sigma g(\sigma)$, where $g(\sigma) \equiv \hat{g}(\sigma, h)$. In turn the expression $\sigma g(\sigma)$ can be increasing or decreasing in σ, but its first derivative with respect to σ is monotonically decreasing – the second derivative of $\sigma g(\sigma)$ with respect to σ is

$$
-\frac{2(1-\theta)\theta\left(1 - F/h\right)}{c(1 - \theta\sigma)^3} < 0. \tag{10}
$$

We can then conclude that there there will exist a single $\tilde{\sigma}$ such that $\Omega(\tilde{\sigma}) = 0$, and such that $\Omega(\sigma) < 0$ for $\sigma < \tilde{\sigma}$ and $\Omega(\sigma) > 0$ for $\sigma > \tilde{\sigma}$. An equilibrium with access by all individuals will then exist for $\sigma \in [0, \tilde{\sigma}]$. $\qquad\square$

For $\sigma > \tilde{\sigma}$, the only symmetric equilibrium will be in mixed strategies – i.e. it will feature individuals selecting a level of spending $x^i > 0$ (participation) with some probability and a level $x^i = 0$ (no participation) with the complementary probability. This equilibrium will be identified by a condition stating that the expected payoff from choosing direct access equals the expected payoff from not doing so.[13] For the purpose of our analysis, we will restrict our attention to cases where an equilibrium in pure strategies exists – although our arguments could be extended to the mixed-strategy case.

As should be expected, spillovers in provision imply that provision choices will be suboptimal. In the presence of fixed costs and entry fees, however, there are two separate margins of choice to consider, the extensive margin (whether or not to pay the access fee to gain direct access to service provision) and the intensive margin (how much of the service to purchase at marginal cost). With respect to the latter, inspecting expression (6) for a symmetric outcome with $n = h$ and $x^i = x$, one can verify that a Pigouvian correction – a subsidy on price at a rate $s = \sigma/(1 - \sigma)$ that reduces the price faced by individuals to $c/(1 + s) = (1 - \sigma)c$ – can internalize

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[13] Letting π denote the probability with which each individuals chooses to access the service directly, a mixed strategy equilibrium will then satisfy the indifference condition

$$E\big[U(g^i, 1)\big] - E\big[U((1 - \sigma)x^i + \sigma\bar{x}^{-i}, 1 - F/h - cx^i)\big] = 0, \tag{11}$$

where E is the expectation operator, x^i maximizes $E\big[U((1 - \sigma)x^i + \sigma\bar{x}^{-i}, 1 - F/h - cx^i)\big]$, and $\bar{x}^{-i} = (h' - 1)/(h - 1)x^i$, with $h' \in (0, \ldots, h)$ denoting a particular realization of mixed strategies where h' individuals access the service. As h approaches infinity, with probability approaching one the number of individuals accessing the service will be $h' = \pi h$, provision will be $\hat{g}(\sigma, \pi h)$, and the indifference condition will approach the condition $\hat{\Omega}(\sigma, \pi h) = 0$, where $\hat{\Omega}(.)$ is a defined in the proof of Result 1. Note that since the service is an essential good in individuals' preferences, an equilibrium with $\pi = 0$ can never exist.

externalities in marginal provision choices (choices on the intensive margin): if individuals face a subsidized price $p' = p/(1+s) = (1-\sigma)p$, the level of provision coincides with the private provision level as identified by (6) with $\sigma = 0$. However, such a subsidy cannot correct for the effect of the externality on choices made on the extensive margin. This is because free riding incentives with respect to access fees relate to a discrete decision rather than a marginal choice. What this implies is that subsidization of entry fees (or, equivalently, fixed costs) at the standard Pigouvian rate of $\sigma/(1-\sigma)$ is unable to force full internalization. Thus, fixed costs introduce a form of free riding that cannot be tackled by standard Pigouvian remedies, requiring instead subsidies that are specifically targeted to fixed costs.

Result 3 *Under monopoly provision, and in the presence of fixed costs, public subsidization of all price components at a rate that reflects the marginal spillover from private provision cannot generally ensure a first-best outcome.*

PROOF: Suppose that all purchases are subsidized at rate s, with the revenue requirement covered by a uniform lump-sum tax. Those making purchases then face a marginal price equal to $(1-\sigma)c$ and face a lump-sum tax equal to σcg, making their private consumption equal to $1 - F/h - cg$ – as in the private good case. An individual who deviates from participation still faces a lump-sum tax equal to σcg and so her private consumption increases to $1 - \sigma cg$ rather than to 1. The payoff change experienced by the deviator is then

$$U\big(\sigma g(\sigma), 1 - \sigma cg(\sigma)\big) - U\big(g(\sigma), 1 - F/h - cg(\sigma)\big) \equiv \Omega^s(\sigma), \tag{12}$$

which is not generally equal to zero. For σ approaching zero, $\Omega^s(\sigma)$ approaches minus infinity; for $\sigma = 1$, we can express $\Omega^s(1)$, substituting from (7) and (1), as

$$\Omega^s(1) = (1-\theta)\left(\ln\left(1 - \theta\left(1 - \frac{F}{h}\right)\right) - \ln\left(1 - \theta\left(1 - \frac{F}{h}\right) - \frac{F}{h}\right)\right) > 0. \tag{13}$$

The derivative of $\Omega^s(\sigma)$ with respect to σ is

$$\frac{\theta}{\sigma}\frac{1 - \sigma(1 - F/h)}{1 - \theta\sigma(1 - F/h)} > 0. \tag{14}$$

Thus, there will be a range of values of σ below $\sigma = 1$ where deviation will be profitable even in the presence of a Pigouvian subsidy, and where therefore an additional subsidy on access fees will be required.

Subsidization of access fees at the same rate $s = \sigma/(1 - \sigma)$ may still be insufficient to induce full internalization: proceeding as above, one can show that there will still be a range of values to the left of $\sigma = 1$ where an even higher subsidy on access fees will be required.

A 100% subsidy on access fees (or fixed costs) combined with a Pigouvian subsidy on variable fees will always be able to support a first-best outcome. □

4 Entry

We now come to the heart of our analysis, i.e. the question of how fixed costs in charity provision affect entry. As we shall see, fixed costs result in two different kinds of "failures" with respect to entry decisions. The first is a failure to enter: fixed costs can keep out more efficient challengers, protecting inefficient incumbents. The second is a failure to repel entrants: fixed costs can encourage entry by inefficient challengers, undermining the position of a more efficient incumbent.

4.1 Unsuccessful challenges by more efficient providers

In the case of competition between for-profit providers, fixed costs that are not sunk do not translate into entry barriers for challengers. In contrast, in the case of non-profit providers, the presence of fixed costs can effectively act as a barrier to entry and protect the position of inefficient incumbents.

Consider a provider (the "incumbent") supplying an amount $g(\sigma)$, where $\sigma < \tilde{\sigma}$, and suppose that the incumbent faces a challenger that has access to a technology involving the same marginal cost, c, as the incumbent but a lower marginal cost $F_E < F$. Given that providers are output maximizers that value own provision, having a less efficient technology would not induce the incumbent to accommodate entry by a challenger.

Starting from a situation where all individuals are making purchases from the incumbent, an individual who deviates from that choice and chooses to switch to the

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challenger would incur an entry fee equal to the full amount, F_E, of the challenger's fixed costs, and would choose a level of x^i satisfying the condition

$$(1 - \sigma) \, \text{MRS}(\tilde{g}^i, 1 - F_E - cx^i) = c, \tag{15}$$

with $\tilde{g}^i = (1 - \sigma)x^i + \sigma g(\sigma)$, and experience a payoff change equal to

$$U(\tilde{g}^i, 1 - F_E - cx^i) - U(g(\sigma), 1 - F/h - cg(\sigma)). \tag{16}$$

If F_E is sufficiently large, then deviation is not profitable despite the fact that the challenger has lower fixed costs.

Result 4 *In the presence of fixed costs, a challenger with the same marginal cost as the incumbent, and lower fixed costs $F_E < F$, will be unable to contest the position of the incumbent if $F_E > F/h$.*

PROOF: To show this, note that deviation is always unprofitable for F_E – since the individual can purchase the service at the same marginal cost but has a lower disposable income – and it is always profitable for $F_E = 0$ – if the individual switches and chooses $\tilde{x}^i = g(\sigma))$, she will experience the same g^i but a higher z^i (and she can further improve on this by re-optimizing). Since the deviation payoff is decreasing in F_E, there exists a minimum value $\underline{F}_E < F$ above which deviation is unprofitable. Note that, for $F_E = F/h$, a deviator would have the same disposable income and face the same marginal price, and so would choose $x^i = g^i(\sigma)$, which would make the deviation payoff equal to $U(g(\sigma), 1 - F/h - cg(\sigma))$. We can therefore conclude that $\underline{F}_E = F/h$ for all value of σ. Thus, when fixed costs are large – $F_E > F/h$ – the monopoly position of the incumbent cannot be contested by a challenger even if this can provide services at a lower average cost, unless the challenger can bring about a coordinated switch by all donors. $\qquad\square$

The difference between the non-profit case and the for-profit case is that coordination between donors towards efficient charities is more difficult to achieve than coordination of consumers towards efficient firms. In the case of for-profit firms

consumers can be "herded" effectively through price competition: a for-profit challenger can undercut the incumbent and induce all consumers to switch, and it can do so credibly because consumers need not concern themselves about whether the challenger will succeed in meeting its objectives – i.e. the challenger is a residual claimant. This is not the case for non-profit charities: a non-profit challenger facing a binding non-distribution constraint is unable to make a corresponding binding offer to all donors to provide the service at a lower average cost. If all individuals were to switch to the challenger, average costs would be lower, but individuals would only switch if they believed that others would do the same; as a result, no-one will switch.

Thus, in the case of non-profit providers the presence of fixed costs may give rise to entry barriers and result in inefficient selection even when technologies are such that markets would be fully contestable and efficient in an analogous for-profit scenario. It should be stressed that this conclusion hinges on the non-distribution constraint faced by non-profit providers, and not on whether or not the service is collective in nature (the value $\underline{F}_E$ is independent of σ) – although the collective nature of the service may be ultimately responsible for the adoption of a non-profit form, because of the more stringent verification requirements that can affect the provision of collective goods.

4.2   Successful challenges by less efficient providers

Now consider again an incumbent supplying an amount $g(\sigma)$, where $\sigma < \tilde{\sigma}$, but suppose that the incumbent faces a challenger that has access to a technology (F_E, c_E) which involves no fixed costs ($F_E = 0$) and a higher marginal cost $c_E > c$, and is overall less efficient than the incumbent's. Specifically, we will assume that the challenger's technology is such that the payoff of individuals in a symmetric pure-strategy equilibrium where the challenger becomes a monopoly provider is less than the corresponding payoff under the incumbent:

$$U\big(g(c_E,\sigma), 1 - c_E g(c_E,\sigma)\big) < U\big(g(\sigma), 1 - F/h - cg(\sigma)\big). \tag{17}$$

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Given that providers are output maximizers that value own provision, having a less efficient technology would not discourage the challenger.

Starting from a situation where all individuals are making purchases from the incumbent, an individual who deviates from that choice and switches to the challenger would incur no access fee, and would choose a level of x^i satisfying the condition

$$(1 - \sigma) \, \mathrm{MRS}(\tilde{g}^i, 1 - c_E x^i) = c_E, \tag{18}$$

with $\tilde{g}^i = (1 - \sigma)x^i + \sigma g(\sigma)$, and experience a payoff change equal to

$$U(\tilde{g}^i, 1 - c_E x^i) - U\big(g(\sigma), 1 - F/h - cg(\sigma)\big) \equiv \Phi(c_E, \sigma). \tag{19}$$

Result 5 *A challenger with an inferior technology with no fixed costs and a marginal cost $c_E \in \underline{c}_E, \bar{c}_E$, where $\underline{c}_E > c$, may be able to contest the position of a more efficient incumbent facing fixed costs F.*

PROOF: First, note that selecting $x^i = 0$ and obtaining a payoff $U(\sigma g(\sigma), 1)$ is always feasible for a deviator, but here the deviator has the option of supplementing $\sigma g(\sigma)$ with a direct purchase at no fixed fee and at a marginal cost of c_E. Selecting $x^i = 0$ while still having this option would be optimal if

$$c_E = (1 - \sigma) \, \mathrm{MRS}\big(\sigma g(\sigma), 1\big) \equiv \bar{c}_E(\sigma). \tag{20}$$

For $c < c_E < \bar{c}_E(\sigma)$, a choice $x^i > 0$ is optimal and yields a higher payoff than a choice $x^i = 0$. We can then conclude that, for $c < c_E < \bar{c}_E(\sigma)$, a deviator will do better by switching to the challenger than by abstaining from all purchases, i.e. $\Phi(c_E, \sigma) > \Omega(\sigma)$.

Consider now a scenario with $\sigma = \tilde{\sigma}$, i.e. where $\Omega(\sigma) = 0$. In this scenario, for $c_E = \bar{c}_E(\tilde{\sigma})$, we have

$$c_E = (1 - \tilde{\sigma}) \, \mathrm{MRS}\big(\tilde{\sigma} g(\tilde{\sigma}), 1\big) = (1 - \tilde{\sigma}) \, \mathrm{MRS}\big(g(c_E, \tilde{\sigma}), 1 - c_E g(c_E, \tilde{\sigma})\big), \tag{21}$$

from (18) and (20). Equality in the marginal rates of substitution implies equal ratios of g to z, i.e. This implies $\tilde{\sigma} g(\tilde{\sigma}) = g(c_E, \tilde{\sigma}) / \big(1 - c_E g(c_E, \tilde{\sigma})\big)$. Since $1 - c_E g(c_E, \tilde{\sigma}) < 1$, this

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implies $\tilde{\sigma}g(\tilde{\sigma}) > g(c_E, \tilde{\sigma})$, which in turn implies $U(\tilde{\sigma}g(\tilde{\sigma}), 1) > U(g(c_E, \tilde{\sigma}), 1 - c_E g(c_E, \tilde{\sigma}))$. Given that $\Omega(\tilde{\sigma}) = 0$ – and thus $U(\tilde{\sigma}g(\tilde{\sigma}), 1) = U(g(\tilde{\sigma}), 1 - F/h - cg(\tilde{\sigma}))$ – we can conclude that $U(g(\tilde{\sigma}), 1 - F/h - cg(\tilde{\sigma})) > U(g(c_E, \tilde{\sigma}), 1 - c_E g(c_E, \tilde{\sigma}))$, i.e. (17) is satisfied with strict inequality. Since the difference between $U(g(\sigma), 1 - F/h - cg(\sigma))$ and $U(g(c_E, \sigma), 1 - c_E g(c_E, \sigma))$ is monotonically increasing in c_E, there will exist a non-empty interval $(\underline{c}_E(\tilde{\sigma}), \bar{c}_E(\tilde{\sigma}))$, where (17) is satisfied. And since, as noted above, for c_E strictly less than $\bar{c}_E(\tilde{\sigma})$, we have $\Phi(c_E, \tilde{\sigma}) > \Omega(\tilde{\sigma}) = 0$, we can conclude that for c_E in the interval $(\underline{c}_E(\tilde{\sigma}), \bar{c}_E(\tilde{\sigma}))$, condition (17) is satisfied and $\Phi(c_E, \tilde{\sigma}) > 0$.

Finally, for c_E in the interior of $(\underline{c}_E(\tilde{\sigma}), \bar{c}_E(\tilde{\sigma}))$, the expression $\Phi(c_E, \tilde{\sigma})$ is strictly positive. The second derivative of $\Phi(c_E, \sigma)$ with respect to σ is

$$-\frac{\theta^2 \left(c_E \left(1 - \frac{F}{h}\right) - c\right)^2}{\left(\theta\sigma \left(c_E \left(1 - \frac{F}{h}\right) - c\right) + c\right)^2} < 0, \tag{22}$$

which means that, for $\sigma < \tilde{\sigma}$, the expression $\Phi(c_E, \sigma)$ crosses zero at most once. By continuity, we can then conclude that for any given $c_E \in (\underline{c}_E(\tilde{\sigma}), \bar{c}_E(\tilde{\sigma}))$, there exists a left-hand side neighbourhood of $\tilde{\sigma}$ where $\Omega(\sigma) < 0$ and $\Phi(c_E, \sigma) > 0$, i.e. where the presence of an inefficient challenger will cause defection from a more efficient incumbent who would otherwise supplied the service to all individuals. The symmetric equilibrium outcome will then be one where all individuals access provision from the challenger, with no-one facing individual incentives to switch back to the incumbent (if selecting to the challenger is preferred to selecting the incumbent starting from a situation where all individuals access the incumbent – making the access fee equal to F/h – it will be even more so when there is a single individual accessing the incumbent for an access fee equal to F).[14] $\qquad\square$

By switching to an alternative, lower fixed cost provider, individuals can redirect the resulting private savings in access fees towards direct purchases of the collective good. To the extent that individuals value g, this can be comparatively a more attractive option than directing the same fee savings towards private consumption – the only option that is open to deviators under monopoly – even if the alternative

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provider faces comparatively higher marginal costs. Thus, the presence of a lower fixed cost challenger may undermine the position of an otherwise secure, more efficient incumbent.

It may be the case that the incumbent has flexibility in its choice of technology; in this case, the presence of a less inefficient challenger can induce the incumbent to switch to an inferior technology with no fixed costs in order to protect its position. Suppose, for example, that beforehand (at some time zero) the incumbent can choose to adopt the same technology as the challenger's. Then, given that it places a premium on its own provision, it will do so rather than facing exclusion. The end result is the same. In either case, the presence of fixed costs can bring about inefficient entry and/or (equivalently) the adoption of inferior technologies by incumbents.

4.3 Corrective policies

As noted in Section 2, when provision is carried out by a non-profit monopolist, government subsidization of fixed costs may be required to promote efficient access decisions by service users. In the presence of competition between different providers, government subsidization of fixed costs can also play a role in promoting efficient selection of service providers. Funding of core costs of start-ups of charities is in line with the practice of government grants aimed at establishing some "seed" funding. Established charities also routinely seek and obtain funding from government that is targeted to cover their "core" costs. According to our analysis, if fixed costs of start-ups are fully or partially funded by government, entry by more by efficient charities will be possible. If the fixed costs of established charities are publicly funded, this will prevent competition from inducing inefficient technology choices. In such situations, government funding of core costs would have intrinsically non-neutral effects on private provision: it will affect technology selection and thus "real" provision rather than just its monetary value, and would therefore not simply "crowd out" private spending.

Subsidization of access fees (or equivalently funding of charities' fixed costs) will

generally dominate direct regulation as a way of promoting efficient selection, as the latter would require the government to have full information on the technologies of individual providers; but it will still require an assessment of the comparative severity of the two kinds of failures related to competition and entry: if there is a presumption that start-ups can promote the adoption of more efficient technologies and that funding of established charities would instead promote technological entrenchment and the adoption of unnecessarily high fixed costs technologies, then government funding of core costs should be directed towards start-ups; if instead there is a presumption that start-ups are inefficient, opportunistic challengers that can take advantage of the higher fixed costs of established charities in order to divert private funds their way, making it difficult for established charities to fully exploit opportunities for economies of scale in provision, then core funding of core costs should be directed towards established charities.[15]

5 An example

The above results can be illustrated by means of an example. Let $h = 100$, $\theta = 1/10$, $F = 5$, $c = 1$. An individual's payoff in a symmetric outcome where all individuals make purchases from the incumbent, for varying values of σ, is shown as the solid curve in Figure 1. The dotted curve in the same figure represents the deviation payoff for an individual who chooses to make no purchases. This crosses the solid line at $\sigma \simeq 0.33$. So, for $\sigma < 0.33$, all individuals make purchases from the incumbent if the incumbent is a monopoly provider.

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[15] A potential problem with this approach is that funding of core costs may induce an output-maximizing monopoly provider to adopt comparatively inefficient technologies that exhibit higher fixed costs and lower marginal cost: provision depends inversely on marginal cost, and so it may be maximized by a comparatively less efficient technology choice that involves higher fixed costs; subsidization of fixed costs may facilitate the adoption of such technology. In the absence of Pigouvian correction, such a choice may serve to partially offset the effect of the externality on choices on the intensive margin, albeit at a direct cost in terms of productive efficiency.
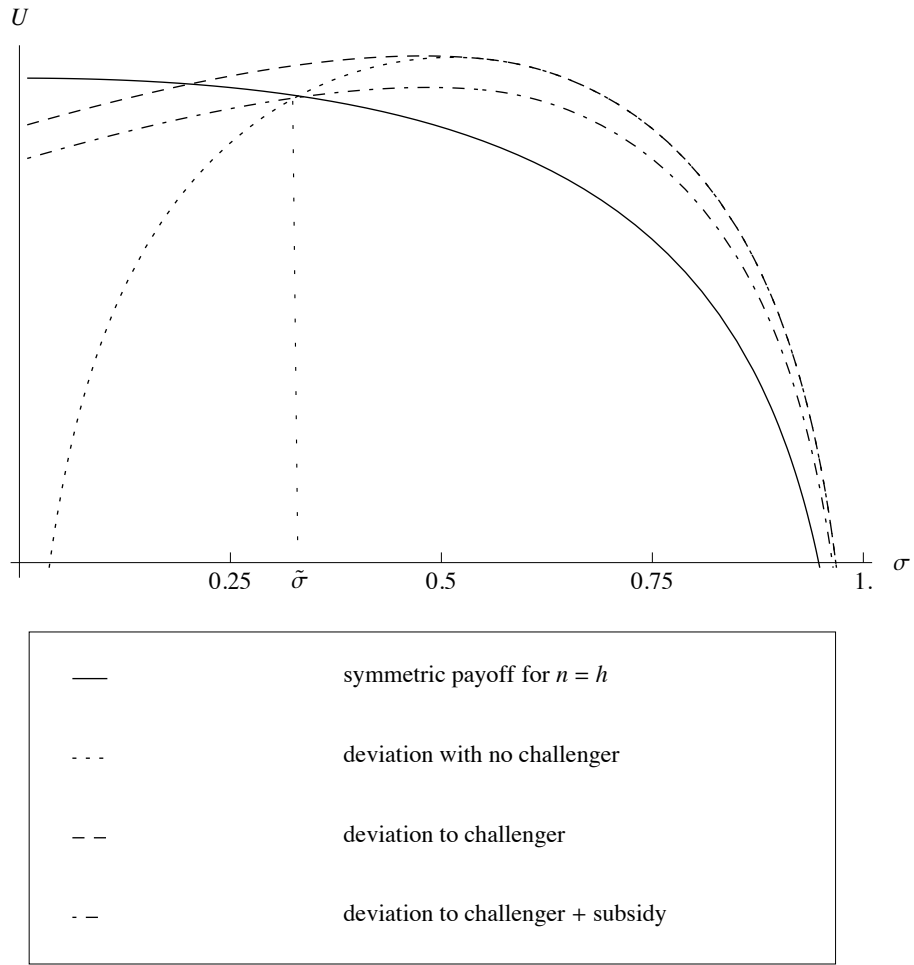
Figure 1: Example - efficient technology choice by incumbent

$F = 5$, $c = 1$, $F_E = 0$, $c_E = 2$, $h = 100$, $\theta = 1/10$

Consider now a potential entrant with $c = 1$ and $F_E = 2/30$. Since $F_E > F/h = 0.05$, the potential entrant will be unable to challenge the position of the incumbent. However, if the government subsidizes the entrant's fixed costs at a rate equal to or greater than 25%, entry will be possible.

Consider now an entrant with $F_E = 0$ and $c_E = 2$. The symmetric equilibrium payoff where all individuals buy from the entrant (not shown) lies everywhere below the payoff for a symmetric outcome where all individuals make purchases from the incumbent (the solid curve in Figure 1), so condition (17) is satisfied for all values of σ. The deviation payoff for an individual who switches to the entrant is shown as the dashed curve in Figure 1. This crosses the curve representing the symmetric outcome payoff where all individuals make purchases from the incumbent (the solid curve) at $\sigma \simeq 0.2$. So, for σ between 0.2 and 0.33, the entrant would be able to contest the position of the incumbent, even if the latter is a more efficient provider.[16]

Suppose the incumbent also has access to an alternative technology with fixed costs $F' = 3/2$ and marginal cost $c' = 3/2$. The corresponding symmetric outcome payoff and deviation payoff are shown in Figure 2. The symmetric outcome payoff lies everywhere below the corresponding payoff for the technology with $F = 5, c = 1$ (shown in Figure 1), so the alternative technology is comparatively inefficient. However, for $\sigma \in (0.2, 0.33)$ the entrant cannot challenge the position of the incumbent if the latter adopts the alternative technology. Accordingly, for $\sigma \in (0.2, 0.33)$ an output maximizing incumbent would choose to adopt the less

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[16] As noted earlier, an alternative assumption that could be made regarding out-of-equilibrium conjectures is that the total payment (including the access fee) remains constant for nondeviators and provision falls in order to offset the loss in total access fees – i.e. that strategies are defined in terms of expenditures rather than quantities. This would imply that the spillover experienced by a deviator is reduced by a further amount $F/(h(h-1)c)$. In this case, the deviation gain experienced by a defector is non-monotonic in σ – it is first increasing in σ and then decreasing in σ for σ close to unity. However, for h large, the divergence between the two specifications is negligible in the vicinity of $\tilde{\sigma}$ – in the example examined, under the alternative specification, the spillover experienced by a deviator at $\tilde{\sigma}$ would be reduced by a further amount $\tilde{\sigma}F/(h(h-1)c) < 0.0002$, corresponding to approximately 1/130 of its initial level, with negligible effect on the deviation payoff.
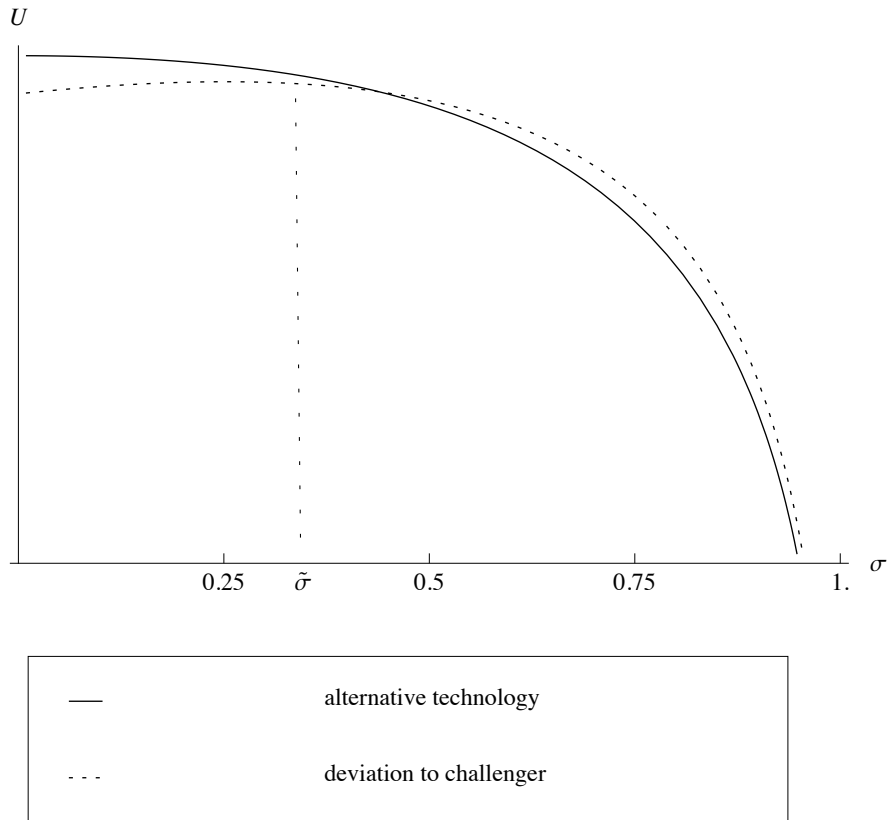
U

σ

0.25   σ̃   0.5   0.75   1.

| ——— | alternative technology |
| - - - | deviation to challenger |

Figure 2: Example – alternative, inefficient technology choice by incumbent
$F = 3/2$, $c = 3/2$, $F_E = 0$, $c_E = 2$, $h = 100$, $\theta = 1/10$

efficient technology.

Suppose next that the government grants a 25% subsidy on access fees, and that this is funded by a lump-sum tax on all individuals. This would reduce the access fee to 0.75 F/h, and would correspondingly reduce the payoff for individuals who deviate to the entrant; this payoff is shown as the dash/dotted curve in Figure 1. With this subsidy, the position of the incumbent is protected, and its incentives to adopt less efficient technologies are removed.

6   Evidence from Canada

If charities' core funding needs are a key determinant of government grants, then, other things equal, we should observe a higher ratio of government to private funding in those charitable sectors that have higher fixed costs.[17] Patterns of government funding across different charitable sectors seem to be consistent with this prediction.

Focusing on evidence pertaining to Canadian charities, Figure 3 plots the average ratio of fixed costs to total costs, *FC_ratio*, against the average ratio of government to total funding, *GF_ratio*, for thirty different charitable sectors as defined by the Canada Revenue Agency, averaged over the period 1997-2005. These were computed using a new data set of annual returns for 48,346 distinct Canadian charities; evidence on non-profits is comparatively scarce, and this data set is unique in that it provides systematic accounting information relating to charities' revenues and costs across all charitable sectors. The ratio of fixed costs to total costs is obtained as the ratio of "management and general administration expenses" to "total expenditures"; the ratio of government to total funding is obtained as the ratio of "total revenue from government" to the sum of "total revenue from government",

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[17] Hansmann (1981) shows that government subsidies may be required for non-profits that face high fixed costs and provide excludable goods (the specific case examined is that of the performing arts) but for a reason very different from the one discussed here. Our argument also applies to the case of non-excludable public goods.

"revenue from memberships", "revenue from fund-raising", and "total gifts".[18]

Figure 3 shows a clear (and statistically significant) positive correlation between fixed costs and government support. In our interpretation, this correlation reflects a relationship flowing from the structure of operating costs to government support – whether this is a result of active government policies or a government response to lobbying by charities. A contrasting interpretation of this positive correlation between fixed costs and government support is that charities may adjust their cost structure in response to increased funding by government, i.e. a reverse direction of causation. However, results of panel-based Granger causality tests performed on the above sample of charities, run counter to this latter interpretation.[19]

According to our analysis, government funding of fixed costs may be warranted

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[18] We focus on charities that report fixed costs and government support ratios lying strictly within the interval $(0, 1)$. Our sample also excludes non-religious charities; although these can obtain government support to fund activities other than those relating to religious worship, most of their budget is represented by private donations (almost 99% on average). The vast majority of all Canadian charities are non-commercial in nature – in our sample, revenues from sales of goods and services average to less than three percent of total revenues.

[19] Using the full panel of charities over the 1997-2005 period, we compared the following two dynamic panel specifications: (a) $FC\_ratio_{i,t} = \alpha_1 FC\_ratio_{i,t-1} + \beta_0 GF\_ratio_{i,t} + \eta_i + u_{i,t}$ (contemporaneous independent variable); and (b) $FC\_ratio_{i,t} = \alpha_1 FC\_ratio_{i,t-1} + \beta_0 GF\_ratio_{i,t} + \beta_1 GF\_ratio_{i,t-1} + \eta_i + u_{i,t}$ (contemporaneous and lagged independent variable), with charities' fixed costs at time t as the dependent variable and government support ratios as the independent variable; and where the $u_{i,t}$'s are IID error terms and the η_i's are charity fixed effects that are assumed to be uncorrelated with the error terms. If adding the lagged independent variable significantly improves the forecast, then we can say that x causes y in the Granger sense (see Holtz-Eakin *et al.* (1988) for a discussion of Granger causality methods with panel data). To test for this, we estimated both specifications using the Arellano-Bond GMM estimator (Arellano and Bond, 1991), and then performed a Wald test for the forecast improvement obtained from moving from (a) to (b) (i.e. adding the lagged variable). In both specifications, the contemporaneous effect of the independent variable is found to be positive The Wald test, however, gives a χ^2 statistic of 1.38 with a P-value of .24 – implying that the government support ratio does not appear to "Granger cause" the fixed cost ratio. On the other hand, doing the same for the reverse direction of causation also gives a positive estimate for the contemporaneous effect of the fixed cost ratio on the government support ratio and a Wald χ^2 statistic of 2.93 with a P-value of .09.
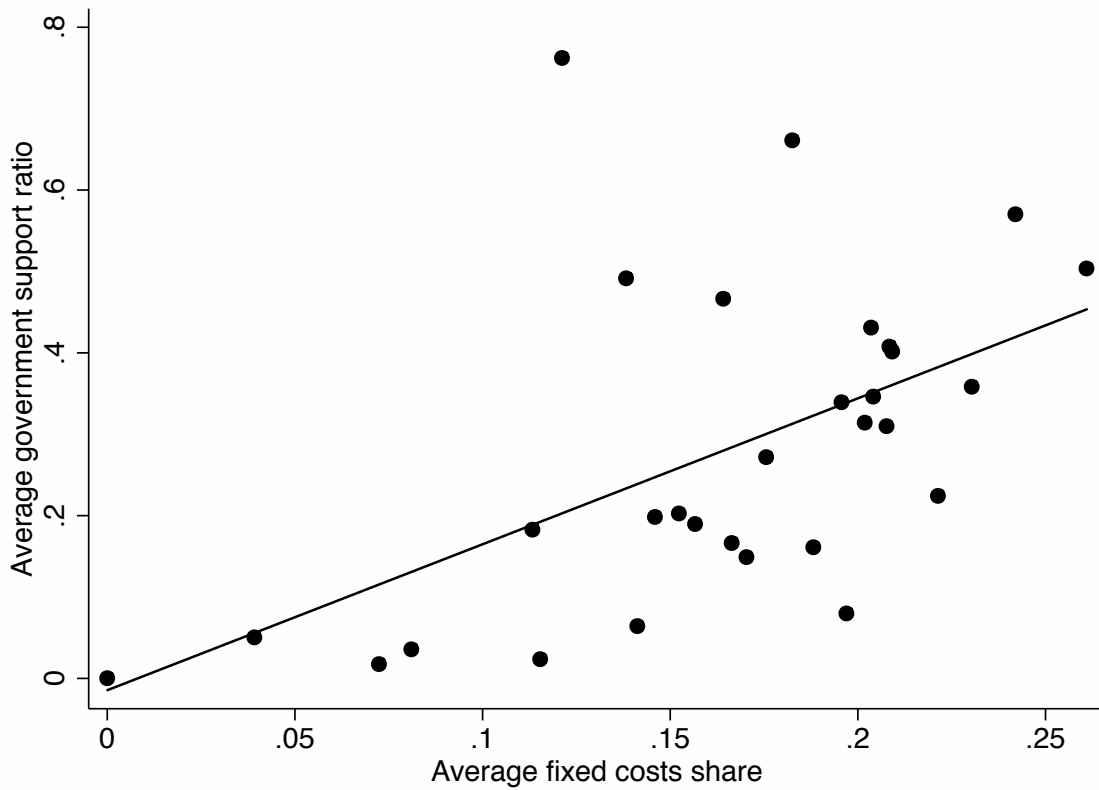
Notes: (i) from a sample of 48,346 Canadian, non-religious charities over the period 1997-2005; (ii) the solid line depicts a linear regression fit of the data points.

Figure 3: Cost structure and government support in Canadian charitable sectors

in order to correct failures relating to competition and entry, either to facilitate entry of new charities or to support incumbents that face competition by new charities. One way to discriminate between these two possible sources of correlation is to look at how funding correlates with the characteristics of the charities that receive comparatively more grants from government. In the data, we can identify those charities that have been active for only one period, and thus construct a time-variant indicator, *Old*, of whether the charity has just started its activity in the current period – assigning a value of 0 to Old_{it} if the charity was first active at t, and a value of 1 if it was already active at $t - 1$.

We then ran panel regressions, covering the period 1998-2005, relating charities' funding structure to their age and cost structure: specifically we ran one specification where the ratio of government to total funds, *GF_ratio*, for each charity is regressed against the aforementioned charity age indicator, *Old*, including sectoral and regional fixed effects; and one where the charity age indicator, *Old*, is further interacted with the fixed cost ratio, *FC_ratio*, (which is also included as a separate regressor). Results are shown in Table 1. In both specifications, the coefficient for the age indicator is positive and significant at the 1% level. The interaction with the fixed cost ratio also exhibits a positive and significant coefficient.[20]

Thus, at the charity level, there is no evidence of more government funding being directed to support the start-up costs of new entrants. On the contrary, it is the older charities that receive more government grants, and it is the old charities that have comparatively higher fixed costs that get more funding. In light of our analysis, the observed patterns would be consistent with a need to protect more established charities that have comparatively larger fixed costs from adverse competition, enabling them to exploit scale economies in provision in the face of competitive pressure from inefficient entrants. Admittedly, the pattern of established charities receiving comparatively more government funding may have other explanations that have little

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[20] The negative and significant coefficient on the fixed cost ratio means that, for new charities, *FC_ratio* is negatively correlated with *GF_ratio*.

Table 1: Funding structure of old and new charities

	Dependent variable: *GF_ratio*	
	(1)	(2)
Old	.014 (< .01)	.011 (< .01)
FC_ratio		−.002 (.58)
Old×FC_ratio		.011 (.01)
N	45,326	45,103

Panel regressions over the period 1998-2005,
incorporating sectoral and provincial fixed effects.
Non-religious charities only. P-values in brackets.

Legend:

GF_ratio:	ratio of government to total funding
FC_ratio:	ratio of fixed to total costs
Old:	age indicator (new=0, old=1)

to do with optimal policy choices on the part of government – it may simply be that established charities are better at soliciting funding from government. This interpretation, however, would not explain why the effect should be stronger for charities that exhibit larger fixed costs. Nevertheless, we can make no claim here that the evidence we present identifies a competition-related intent in observed funding decisions. We just note that, if we were to interpret observed funding decisions as being optimal, we should conclude that, in these decisions, the need to shelter established charities from inefficient challengers must be dominating the need to promote entry by more efficient start-ups.

7   Summary and conclusion

We have re-examined the notion of contestability in the context of non-profit competition. We have shown that, unlike in the case of for-profit firms, fixed (non-sunk)

costs will generally give rise to inefficient selection of non-profit providers. This is because, in the absence of a residual claimant pursuing a profit motive, unco-ordinated donor choices can protect the position of an inefficient incumbent; and because inefficient challengers can leverage on free-riding with respect to fixed-cost related charges to divert private spending away from more efficient incumbents. Government funding of fixed costs can enable entry by more efficient providers and protect more incumbents from inefficient challengers.

The debate on the effect of government funding on the private provision of public goods and services has so far largely ignored the effects of government funding on inter-charity competition and market structure in the third sector. Our analysis shows that, once entry and technology adoption decisions are accounted for, there is no longer a theoretical prior that government grants that are directed towards charities' core funding needs should be neutral, i.e. that they should simply crowd out private donations. On the contrary, such grants are able to affect entry and/or charities' technology choices – and hence provision efficiency.

Our theoretical analysis has intentionally abstracted from a number of real-world complications that would need to be incorporated in any applied model of compe-tition and entry. In particular, services provided by competing charities are likely to be viewed by donors and users of the services as being imperfect substitutes – con-sistently with the observation that multiple charities co-exist within a sector, and in parallel with the structure of applied models of competition and entry in private goods markets. Finally, empirical identification of the effects we have formalized above would require a fully specified model of entry and inter-charity competition as well as a richer data set than that which is currently available.[21]

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[21] It is well understood that in models of competition with heterogeneous firms, the relationship between competition and industry structure hinges on the model's specific assumptions (Sutton, 1991). Thus, a fully developed empirical analysis of the relationship between fixed costs and entry would necessitate a structural estimation approach – and data that can support it.

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