Charitable Giving with Search Frictions

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Abstract How important are search frictions in the market for charitable donations? I study a dynamic search and matching model to produce new insights for our understanding of the charitable sector. First, the model highlights the role that charity characteristics play in equilibrium donations. Second, charity competition takes the form of a congestion externality. This externality can be influenced by policy instruments like the tax treatment of donations. Finally, empirical support for the model in a form of a charitable giving Beveridge curve is presented.

Keywords: Search; Matching; Charity
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1 Introduction

How important are search frictions in the market for charitable donations? While many studies of voluntary contributions to public goods focus on the efficiency of provision, few have studied how donors and charities coordinate in a decentralized setting. However, as displayed below in Figure 1, the market for charitable donations persistently contains charities that are actively engaged in search with over half of the population of Canadian charities incurring fundraising expenditures in each year between 2003 and 2017. In this paper I explicitly model the process of charities searching for and matching with donors using an adaptation of the Diamond, Mortensen and Pissarides model (see Diamond (1982), and Mortensen and Pisaarides (1994))[1]. The essence of the model presented below is that donors wish to give but need to be asked by the right charity first. By abstracting from the public goods problem of provision by the charitable sector, this analysis provides novel insights for researchers interested in voluntary contributions and the charitable sector. This paper also presents a novel application of random search that may be of interest to search and matching theory enthusiasts.

The first insight from our model is an analytic expression for donations that depends upon the characteristics of the charity that a donor is matched with as well as equilibrium market conditions. Prior work in the theory of public and club goods produces expressions for donations as a function of individual preferences, incomes, and the contributions of others to that public good (see Andreoni (2006) for an overview). Such expressions are useful for characterizing the efficient level of provision for a single public good. However such expressions are not easily reconciled with observational data for the charitable sector, a sector that is characterized by the diversity of the goods and services provided. People give to charities for a variety of reasons some intrinsic and some extrinsic, some instrumental and some relational.[2]

Having an expression for donations that depends on readily observable and measurable variables and that is independent of the contributions of others can be helpful for

[1]For an overview of these and other contributions to search theory see Rogerson, Shimer and Wright (2005).

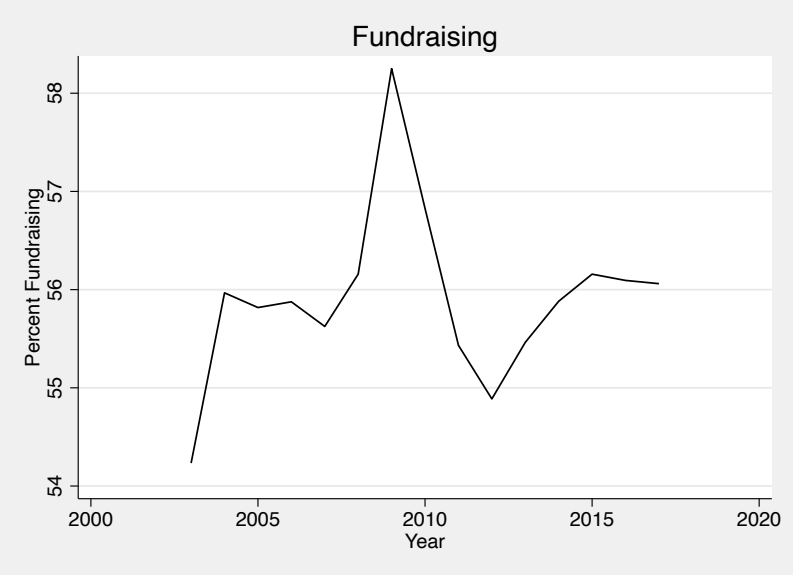
[2]See Caviola et al. (2021) on the psychological motive, Park et al. (2017) and Harbaugh et al. (2009) on the neurological motive, DellaVigna et al. (2012) on the social motive, and Andreoni and Rao (2011) and Anjdreoni et al. (2017) on the role of being asked to give.

a variety of settings in which donors may not readily avail themselves of financial information for the soliciting charity when being asked to give, or may have poorly informed expectations of the donations of others. For example, Shang and Cronson (2009) find that informing potential donors of the contributions of others can increase their own contributions, and Ottoni-Wilhelm et al. (2017) show experimental evidence of impure altruism that increases in the size of the charity. Our approach to charities is inspired by Giovanniello et al (2019) who argue that the tax treatment of donations is not just about public good provision but also the protection of minority interests in a pluralistic democracy.

The second insight from the model is a clear statement of the magnitude of the congestion externality that the presence of a searching charity imposes on other charities that are searching for donors. This introduces a new approach to studying the efficiency of fundraising. Each time a new charity seeks a donor it has an impact on the sector. This externality has been largely absent from the literature on charitable giving, but is important to consider when designing policy for the charitable sector. A third insight from the model is that it can be used to characterize an analytic expression for the tax price elasticity of donations. This is a frequently estimated policy parameter. However little theoretical research is available to help researchers understand why estimated responses to the tax treatment of donations may differ across donors or charities as has been found in numerous studies[3]. A search and matching framework generates plausible explanations for those results. It also provides guidance for setting the tax price of donations so as to affect the congestion externality.

A final contribution of this manuscript is to provide some empirical support for the theoretical framework. While there is no econometric test of model predictions developed there is some evidence of the appropriateness of the search and matching framework for studying the charitable sector. The first is Figure 1, which shows the proportion of registered charities in Canada that have reported fundraising expenses for the years 2003 - 2017. As is clear, the majority of charities incur search costs, but the incidence of incurring search costs is not constant and varies over time. Using the presence of fundraising expenditure as a measure of charity search and the frequency of tax filers not claiming donations as a measure of unmatched donors we construct a plot de-

[3]See Duquette (2016), Hickey et al (2023)



scribing the relationship between these measures over time. The negative relationship displayed in the graph is analogous to the Beveridge Curve often referenced when discussing the state of the labour market. See Elsby et al. (2015) for an overview of this literature. This new evidence demonstrates some of the value that a search model of giving can generate to inform policy.

The remainder of the paper is organized as follows: section two presents the related literature, section three the model, section four the measure of donation market tightness, section five discusses our findings and section six concludes.

2 Related Literature

The theoretical literature on the economics of charity is heavily influenced by two contributions. The first is Sameulson (1954) characterization of the optimality conditions for the efficient provision of a public good. In this piece Sameulson reflects in the section titled "Impossibility of decentralized spontaneous solution" that "So much for the involved optimizing equations that an omniscient calculating machine could theoretically solve if fed the postulated functions. No such machine now exists." The passage goes on to describe that the information necessary for solving the problem

is overwhelming. And this all for a single public good! Further work in the area by Bergstrom, Blume and Varian (1985) describes how non-zero but likely less than efficient provision of a public good may occur through voluntary contributions. In their setting donors act strategically by determining their donations with reference to the donations of others. Bergstrom Varian and Blume show that under most conditions a voluntary contribution game will lead to underprovision of public goods. Positive contributions occur in this environment because some individuals have sufficiently high valuations of the public good and sufficiently high incomes to support their contributions. If a sufficiently endowed individual had sufficiently altruistic preferences, then this lone contributor could in theory support the efficient provision of a pure public good. But this scenario also borders on the omniscient.

Andreoni (1990) expands the literature on voluntary contributions to public goods by incorporating the "warm glow" that donors receive from contributing to a public good.The addition of the warm glow motive for giving can reduce the extent to which voluntary contributions fall short of what is required for efficiency of public good provision. In Andreoni's framework, donors care about the level of the public good consumed by themselves and the warm glow they receive from the act of gift making. The warm glow motive for giving is how I model donor preferences for charitable donations in the search and matching model below. The expression for donations that we arrive at is influenced by market tightness and the attributes of charities themselves. If matched donors internalize part of a charity's costs through Nash Bargaining over the surplus generated by the match. Andreoni (1990) summarizes how theories of warm glow giving provide more predictive power.

Fundraising plays the same "necessary evil" role in Andreoni and Payne (2001) as Rose-Ackerman (1982), there are no donations without it, but fundraising comes at the expense of public good provision. Andreoni and Payne (2001) introduce a second charity in an environment where fundraising communicates ideological positions and donors select charities that are the best match for their preferences. Yildrim and Karasteva (2011) model fundraising that targets users and non-users of charitable outputs; and Yildrim and Karasteva (2016) considers fundraising competition amongst charities where some are scam charities. Both models consider the information frictions involved in the donation solicitation environment. The model in the present paper

uses a matching function to capture the roll of all frictions in the donation problem, and warm glow as the single motivator for making a donation. This abstraction is consistent with some approaches to altruistic donations, see for example Ashraf and Bandiera (2017) and their theory of finite altruistic capital provided that donors do not need to know the donations of others.

The search and matching approach generates competition amongst charities in the form of entry and presents itself in the marketplace as a form of congestion.Bilodeau and Slivinski (1997) study charity competition focusing on the reduction in welfare that results from a lack of coordination amongst charities. More recently Aldeshev, Marin and Verdier (2020) study NGO competition in an environment with latent donors. They show that charity clustering emerges in equilibrium with donors support multiple charities. Focusing on the entry decision as opposed to the donation decision as the appropriate margin for competition in the sector is in line with recent studies that find that donations to an individual charity are not impacted by the donations made to other charities. Meer (2017) in a field experiment shows that the addition of another cause in a solicitation environment does not reduce giving to other causes. Similarly Deriugina and Marx (2021) find that the increased demand for emergency aid caused by tornadoes does not crowd out giving to pre-existing local causes. Scarf et. al (2022) also find that new appeals generate new donations and do not displace donations. These findings, and research by Adena and Huck (2019) all suggest that giving to charities is sticky, and that a matching approach to the donor-charity relationship is worth considering.

We also make a contribution to our understanding of how donations respond to the tax price of charitable donations. Some studies have considered the optimal tax treatment of donations to public goods. See Saez (2004) who considers how donations can distort the optimal taxation of income, and Diamond (2006) who notes that when donors receive warm glow from giving there are deeper considerations to also consider. More recently Aronsson et al. (2024) extends the approach of Diamond (2006) to introduce fundraising frictions when charities and governments produce public goods, noting that the optimal subsidy for donations is reduced as the magnitude of these costs increases. Aronsson et al (2025) finds a similar reduction in the optimal subsidy for donations in the presence of fundraising costs when charities redistribute income. They

also highlight that stigma assigned to recipients of charity services would also reduce the optimal subsidy for donations. Our approach to fundraising is different because we assume that once matched the donor and charity split the surplus of their match through Nash Bargaining. This assumption about how donors and charities arrive at equilibrium donations has both sides of the transaction responding to the tax treatment of donations.

The positive question of what is the effect of tax concessions for charitable donations on giving has received a lot of recent attention. More research on the tax treatment of donations is empirical. Hickey et al. (2019) shows that donors are not fully aware of the tax treatment of donations, and that when there is more salience of the tax treatment of donations, donations increase. Almunia et al (2021) studying the UK, and Hickey et al (2023) studying Canada both display that the estimated effect of the tax price on donations is amplified as one moves upwards in the income distribution. Duquette (2016) uses a data on charities in the US to show that donors to different causes respond differently to the tax treatment of donations. Hungerman and Ottoni-Wilhelm (2021) add further nuance to this literature showing that donors respond differently to a match than a rebate.

3 Model

Here we describe the steady state of a search, matching and bargaining model of charitable giving. In the model there are individuals and charities. Individuals want to give to charities if they are a good match. Charities wish to serve in the public interest but they require donations to do so. With a unit mass of individuals, letting n_t denote matched individuals and u_t denote the unmatched we have $n_t + u_t = 1$. Below we suppress the time subscripts for ease of exposition when referring to objects in a steady state where $n_t = n_{t+1}$.

3.1 The Matching Function

Rather than appeal to ideological position or proximity of charitable goods and services available to donors, we model the matching process through a matching function. This is a useful way of capturing a variety of frictions in a parsimonious way. $M(u, v)$ is a concave, increasing, constant returns to scale, homogeneous of degree one matching function. Its inputs u and v are the measures of unmatched donors and charities respectively. Its output is the number of successful matches in each period. The probability of a charity being successfully matched with a donor can be rewritten as $q(v/u) = M(u, v)/v$. The fraction v/u will be referred to below as the charity market tightness, and denoted by θ. The probability that an unmatched donor will be matched with a charity in a period is $\theta q(\theta)$. For what follows we assume a Cobb-Douglas functional form for the matching function:

$$M(u, v) = Au^{\alpha}v^{1-\alpha} \tag{1}$$

A steady state requires that the measure of unmatched donors is as follows;

$$u = \frac{b}{b + \theta q(\theta)} \tag{2}$$

where b is the probability of the break-up of a match. Already this expression characterizes some important insights on the market for charitable donations. The measure of unmatched donors in equilibrium is determined by the ratio of the probability that a donor loses their match (b) to the sum of the probabilities of match break up (b) and a donor getting a new match ($\theta q(\theta)$). As the probability of match break-up increases the equilibrium measure of unmatched donors increases. New matches are not automatic. They require that charities search and there is randomness involved in the creation of new matches. Through this framework we can see that exogenous events that increase match dissolution as in Bottan and Perez-Truglia (2015) can lead to persistent reductions in charitable giving.

3.2 Value Functions Approach

Let D be the value of being a donor; L the value of being an unmatched donor or loner. These are the only two outcomes for individuals and we characterize the value of being in each state with value functions as follows:

$$D = \psi + y^D - d + \beta[bL + (1-b)D] \tag{3}$$

$$L = y^L + \beta[\theta q(\theta) D + (1 - \theta q(\theta))L] \tag{4}$$

The value of being a donor, D, is the flow value of being a donor plus the discounted continuation value. This discounted continuation value is the expected flow value in the next period, which is the value of being a loner, L, with probability b and the value of being a donor, D, with probability $1 - b$. Here ψ is the flow value of warm glow that a donor receives when matched with a charity and d the flow value of donations transferred to the charity. $\beta = (1 + r)^{-1}$. y^D is the donor's after tax disposable income and y^L is the after tax disposable income of an unmatched loner. We treat ψ as exogenous, while d and θ will be determined in equilibrium below.

Charities can be in one of two possible states: fundraising F and serving S. These are characterized below:

$$S = d - a + \beta[bF + (1-b)S] \tag{5}$$

$$F = -c + \beta[q(\theta)S + (1 - q(\theta))F] \tag{6}$$

Serving charities receive donations, d. These charities operate as warm glow producers. For more on the economics of warm-glow motivated charities see Scharf (2014). We assume that receiving donations is not costless, charities must give the donors some warm glow - we assume that costs a. These costs of providing warm glow are exogenous and can be thought of as an administrative cost; the cost of communicating with donors. Fundraising also has a cost, c, and the probability that a charity finds a loner is $q(\theta)$. In equilibrium there is free entry into fundraising, so fundraising should earn zero expected profits. This implies that the value of serving, S can be given as:

$$S = \frac{c}{\beta q(\theta)} \tag{7}$$

Plugging this into the value for S we get the first expression for d:

$$d = a + \frac{r+b}{q(\theta)}c \tag{8}$$

In words, equilibrium donations must be equal to the administrative cost of handling donations plus a weighted cost of search. The cost of search is weighted by the discount rate plus the probability of match breakdown all divided by the probability that a charity finds a new match. The probability of a charity finding a new donor depends on the matching function and the tightness of the market for donations: $\theta = \frac{v}{u}$. In equilibrium we need another condition to pin down both d and θ and we model this as bargaining.

Nash bargaining determines the level of equilibrium donations. Note that at present, the flow of warm glow is exogenous. This requires some motivation. First note that there is no requirement that a donations is a bilateral flow of utility. It can be unilateral. But, we want to capture equilibrium donations that are endogenous, and this is the simplest way to do so. Donations will maximize the joint surplus.

$$Max_{(D-L),S}(D-L)^{\phi}S^{(1-\phi)} \tag{9}$$

$$\text{subject to} P = D - L + S \tag{10}$$

This gives first order conditions:

$$D - L = \phi P \tag{11}$$

$$S = (1-\phi)P \tag{12}$$

From the bellman equations above we see that we can re-write D as a function of L and after some algebra we arrive at an additional expression for equilibrium donations:

$$d = \psi + y^D + y^L + \phi(\theta c - \psi - y^D + a - y^L) \tag{13}$$

This alternative expression for equilibrium donations tells us that donations are increasing in the warm glow provided by charities, ψ, the donor's income as both a donor and a loner, and the tightness of the market for donations, θ. Donor's also are willing to bear their share of the costs of search c and administration a. This is in stark contrast to theories of impact giving where administrative and fundraising costs are viewed as non-program expenditures to be minimized. Why the difference? Nash Bargaining is the maximization of the joint surplus. Charities and donors are in it together in a cooperative sense. It is also important to note that donations do not depend on the output of charity - this is by assumption - but also consistent with the evidence provided in the introduction.
We combine the above expression with $d = a + \frac{rb}{q(\theta)}c$ to get:

$$a + \frac{rb}{q(\theta)}c = \psi + y^D + y^L + \phi(\theta c - \psi - y^D + a - y^L) \tag{14}$$

The above is the implicit function for θ. Thus we have: equilibrium d and equilibrium θ.

Definition. *An **equilibrium** in the market for charitable donations is a tuple - $\{u^*, v^*, d^*\}$, given parameters, $\{b, \psi, \phi, \alpha, y^D, y^L, r, c, a\}$ such that the following three conditions hold:*

$$u^* = \frac{b}{b + \theta^* q(\theta^*)} \tag{15}$$

$$a + \frac{rb}{q(\theta^*)}c = \psi + y^D + y^L + \phi(\theta^* c - \psi - y^D + a - y^L) \tag{16}$$

$$d^* = \psi + y^D + y^L + \phi(\theta^* c - \psi - y^D + a - y^L) \tag{17}$$

4 Welfare

A utilitarian social planner would maximize warm glow net of administrative and vacancy costs by choosing vacancies and matches. Note that the social planner is unconcerned with the level of donations because in this environment without public goods (or bads) donations are a transfer. Hosios (1990) demonstrates that in models

of random search, matching and bargaining the outcome is efficient only when the elasticity of the matching function with respect to the measure of unmatched donors is equal to the bargaining power of donors. The condition for the congestion externality imposed by each additional charity to be entirely offset by the thick market externality is the following:

$$\eta_u = \frac{dM(\cdot)}{du}\frac{u}{M(\cdot)} = \alpha A u^{\alpha-1} v^{1-\alpha}\frac{u}{A u^{\alpha} v^{1-\alpha}} = \alpha \text{ is efficient } \iff \alpha = \phi \tag{18}$$

This expression is a knife-edge case, as both parameters above can be thought to be reduced-form products of more micro-founded behaviour by charities and donors. It is interesting because as we depart from this knife-edge case we see potential for welfare enhancing government interventions. If $\alpha < \phi$ then policies that increase the number of unmatched donors would increase welfare. If $\alpha > \phi$ then policies that increase the number of unmatched charities would increase welfare. When the decentralized equilibrium is inefficient a limited social planner will wish to adjust the tax price of giving to encourage market tightness, θ to approach the measure associated with the optimal measure of matches. The quantification of similar tradeoffs for labor market tax policies are described in detail in Boone and Bovenberg (2002) and Lavecchia (2020).

4.1 Tax treatment of Donations

To continue with a parsimonious model we consider a change in the tax treatment of donations to be a change in the disposable income of donors, y^D. As such we can consider the elasticity of charitable donations with respect to the tax price to be the negative of the elasticity of charitable donations with respect to disposable income in the state of donating. In reality, the tax treatment of charitable donations is also impacted by the overall tax system, the tax treatment of income and the administration of the tax code. Here we abstract from these considerations and present the tax price elasticity of donations, $\eta_{d,t}$ as:

$$\eta_{d,t} = -\frac{dd}{dy^D}\frac{y^D}{d} = -(1-\phi)\frac{y^D}{d} = \frac{(1-\phi)y^D}{a + \frac{rb}{q(\theta)}c} \tag{19}$$

This is an interesting and novel framing of the tax price elasticity of charitable donations. Notice that this is increasing in ϕ, a, r, and b; decreasing in $q(\theta)$, y^D, and c. What this tells us in words is that the larger is the share of surplus given to donors the more responsive is donations to tax price. Similarly with more costs of providing warm glow a, or a higher probability of match dissolution, b, or greater impatience of donors r, donors respond more to tax price. Conversely, the higher is the probability that a charity finds a new donor $q(\theta)$ and the higher is donor's after tax income y^D the less responsive are donations to the tax price. This provides a potential theoretical explanation for Duquette (2016) which demonstrates that the tax price elasticity of received donations has substantial variation across types of charities. This characterization of the elasticity of donations suggests that charity and donor heterogeneity are both important determinants of the heterogeneity of tax price elasticity estimates.

These results are interesting because this is the first characterization of the tax price elasticity as a function of charity characteristics. Typically theories of charitable giving have treated the tax price elasticity as either a pure preference parameter to be estimated, or a composite of a preference parameter and a feature of the tax setting environment. Now we see that the responsiveness of donations to tax price will depend on important features of the environment that affect both sides of the market for charitable giving.

Much of the research on the tax treatment of charitable giving is concerned with the estimation of the tax price elasticity. A point of reference for policy discussions that follow these works is the treasury efficiency of the tax price. The tax price is often claimed to be treasury efficient if $|\eta_{d,t}| = 1$, meaning that each additional reduction in the tax price reduces government tax revenue in a manner that is equally offset by the increase in donations to charities[4]. Here we can express an empirically relevant

[4]This is discussed in Andreoni's 2006 handbook chapter. For a different perspective see Steinberg's

statement of when the tax treatment of donations meets this definition of treasury efficient:

$$|1 = \eta_{d,t}| \iff (1 - \phi) = \frac{a + \frac{rb}{q(\theta)}c}{y^D} \tag{20}$$

Of all the elements of the above expression the most difficult to quantify is likely the bargaining power of donors relative to charities, ϕ. One can argue that this large or small in magnitude, however given that other elements are more easily gleaned from the literature, and that most estimates of the tax price elasticity of giving from observational studies on economy wide data featuring many charities come close to $|1 = \eta_{d,t}|$ we can use such an expression to instead infer an estimate of ϕ.

5 Empirical evidence of the role of market tightness

Much of the analytic results of the modelling environment stem from the matching function and Nash Bargaining. In particular, the matching function itself is sufficient to generate a negative relationship between fundraising and unmatched donors. The reason is, that as there are more unmatched donors, there searches will be more successful, and as a result fundraising will fall. Similarly, if fundraising is high, unmatched donors are more frequently matched, and these new matches reduce the measure of unmatched donors. This relationship it quite intuitive, but unlike the above statements regarding welfare and the tax price elasticity of giving, the role of market tightness on the incidence of matches is independent from the assumption of Nash Bargaining for the determination of donations.

To explore this, I used data from Canada from 2003 to 2012. Using the Canada Revenue Agency's T3010 information returns, I measure the proportion of charities that report incurring fundraising expenses. This is one measure of search. Certainly word of mouth by charity supporters and solicitation by volunteers are important methods of recruiting new donors and maintaining relationships with existing donors. However,

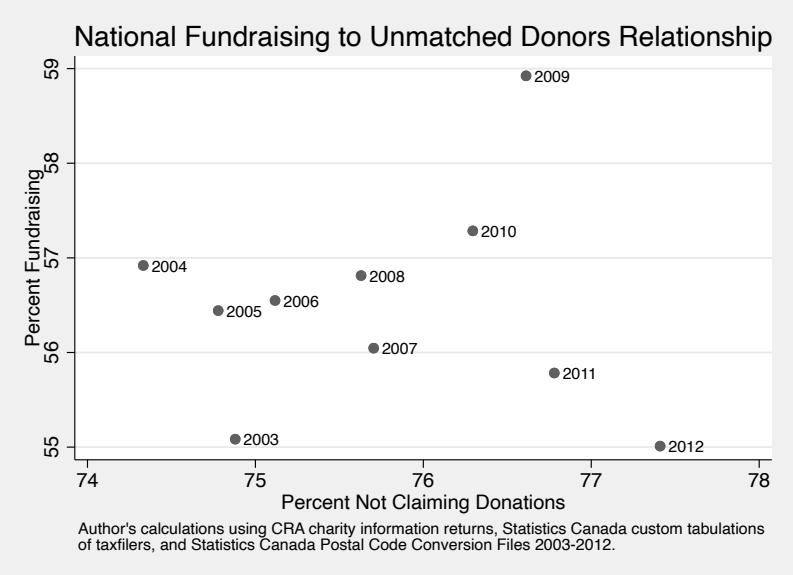
2021 handbook chapter or Kaplow (2024), both of which show that this assertion requires strong assumptions about the role of government grants.

these methods are difficult to measure. The reporting of charity expenses for search are perhaps a lower bound estimate of the measure of charities involved in search, however it is also a measure of those who may have had more intensity in their search as they paid a monetary costs. If monetary and non-monetary costs of search are highly correlated then movements in charity fundraising expenditures would be highly correlated with other search activities.

To learn about the measure of unmatched donors I use Statistics Canada custom tables extracted from the Longitudinal Administrative Database. These data include an indicator for whether a tax filer reported a charitable contribution on their tax return. These data are used to calculate the proportion of tax filers that report making a contribution to a registered charity in that tax year. This data does not capture all donors. However, it is very likely that the fraction of unmatched donors in the population is highly correlated with the fraction of unmatched tax filers. Canadian tax filers are eligible for a non-refundable tax credit that is independent of their income. The credit rate applied to reported donations differs depending on the amount donated and varies across provinces and over time. However, without a standard deduction (as in the US), all Canadians have an incentive to report their donations. Even if a tax filer has owes no income tax the unused credits can be carried forward or applied to previous year tax balances for five years in the past or future. This data is presented in Figure 2.

Figure 2 shows that there is a negative relationship between the fraction of charities fundraising and the fraction of tax filers who are not matched to a charity. There is a significant disruption to this negative relationship when we notice that in 2009 both the fraction of charities fundraising and the fraction of unmatched tax filers increased at the same time. This was likely due to the significant impact of the financial crisis on the charitable sector. Donors suffered significant decreases in income as a result of the recession.[5] Similarly, the financial market downturn would have impacted donor wealth. Charities themselves often hold financial assets, and rely upon donations from foundations whose assets are exposed to global market conditions. As a result

[5]Hickey, Smith, and Payne (2024) shows that there was a large decrease in donors as well as a decrease in the amount donated. The sharpest reduction in donations was reported by donors in the top 1% of income earners.



the negative income effect on both charities and donors can explain this seemingly anomalous observation.

6 Discussion

This paper demonstrates the promise of taking seriously the decentralized nature of voluntary contributions. Future research aimed at understanding entry would be useful. Laboratory examinations of willingness to provide and to solicit for the generation of public goods should be explored.

Future research which aims to measure the important parameters of the model would be very important for creating an environment in which policy evaluation can take place. Simulating the effects of government grants on entry and search effort would be useful to gain a richer understanding of how equilibrium fundraising and donations respond. Similarly one can model the effects of targeted tax price policies which may support different segments of the charitable sector.

This paper demonstrates that altruism and public good provision are conceptually unimportant for understanding some functions of the charitable sector, namely: fundraising and matching of charities to donors. The decision to enter into a fundrais-

ing campaign appears to respond to market tightness. As does the incidence of being unmatched as a donor. Random matching explains the data in a way that previously had not been considered. This is not to say that public goods models and altruistic motivations are unimportant: but that we should be clear about which artefacts of the data we are trying to explain with our theories. This is very important. Laboratory experiments that demonstrate under provision of public goods through voluntary contributions may be used to appeal to more generous tax treatment of donations. However, these ignore the congestion externality that may be amplified by such a policy. Donor responses to large gifts, and government grants have been shown to respond as models of partial altruism would predict. The margins of charity entry and exit, and the response to match breakdown are the margins most suitable for the search and matching model described here.

Our ignorance of the public good dimension of the charitable endeavour is a limitation of our model, and reduces its scope to inform responses to some shocks. However, there is an essential feature of the charitable endeavour that is harnessed through such an approach. That is the respect for pluralism. Some charitable endeavours are considered public goods by all, take for example a university hospital. It is hard to argue that the research and service produced are entering negatively into the utility of a single citizen. However, other charitable endeavours like some religiously affiliated organizations may provide opposing services. One charity may promote activity X, while the other may condemn activity X. This is an essential feature of the charitable sector - it encourages the provision of minority preferred public goods. However it is difficult to discuss welfare in an environment that permits such extreme rivalness in the form of adversity in the consumption of public goods.

Random matching is an essential feature of the environment described above. However, there are lots of examples of non-random matching in the charitable sector. In fact, the philanthropic endeavour with its large foundations incurring high fixed costs demonstrates the search effort that large donor are willing to incur to find the right match for their contributions. While large donors make up a small fraction of total donors, their donations have a large influence on mean donations.

The unexplored trade-off between congestion externality and the efficient provision of

the public good is worth more attention. While the aggregate data includes adversarial charities, one could glean non-adversarial charities from the adversarial charities. Adversarial charities are not a public bad in general, and their presence is only a bad for those who hold strongly opposing views. As such, one could model the non-adversarial charities as providing pure public goods and the adversarial charities as providing a form of non-excludable private good that is also appreciated by the majority. Changes in policy would then impact entry in all forms of public good creation.

7 Conclusion

Search and matching theory provides some novel insights for the charitable sector. First it demonstrates that equilibrium donations are in part determined by the presence of frictions. Second, it presents researchers with an appropriate area for considering forms of inter-charity competition. Third, it enables us to understand an often overlooked externality - the congestion externality - generated through excessive entry in fundraising. Fourth, and finally, this perspective directs researchers towards measuring novel features of the charitable sector, in particular the fundraising-unmatched donor relationship. This first attempt to encourage search and matching enthusiasts to study the charitable sector may bear fruit - if the manuscript has found the eyes of the appropriate authors!

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9 Appendix

Derivation of equilibrium d and θ:

$$D = \frac{\psi + y^D - d + \beta bL}{(1 - \beta(1-b))} \tag{21}$$

and D-L is then:

$$D - L = \frac{\psi + y^D - d + \beta bL}{(1 - \beta(1-b))} - L = \phi P \tag{22}$$

using

$$S = \frac{d-a}{1-\beta(1-b)} = (1-\phi)P \tag{23}$$

we get:

$$\frac{\phi}{1-\phi}\frac{d-a}{1-\beta(1-b)} = \frac{\psi + y^D - d + \beta bL}{1-\beta(1-b)} - L \tag{24}$$

which is:

$$\frac{\phi}{1-\phi}(d-a) = \psi + y^D - d + \beta bL - (1-\beta(1-b))L \tag{25}$$

$$\frac{1-\phi}{1-\phi}d + \frac{\phi}{1-\phi}(d-a) = \psi + y^D + \beta bL - (1-\beta(1-b))L \tag{26}$$

after some algebra we get:

$$d - \phi a = (1-\phi)(\psi + y^D - L + \beta L) \tag{27}$$

or

$$d = \psi + y^D - \phi(\psi + y) + (\beta - 1)L - \phi(\beta - 1)L + \phi a \tag{28}$$

or

$$d = \psi + y^D + \frac{r}{1+r}L - \phi(\psi + y^D - a + \frac{r}{1+r}L) \tag{29}$$

Next we solve the $D - L$ expression for $\frac{r}{1+r}L$ and substitute back into the above:

$$D - L = \frac{(1 - \beta + \beta\theta q(\theta))L - y^L}{\beta\theta q(\theta)} - L = \frac{\phi c}{(1-\phi)\beta q(\theta)} \tag{30}$$

$$(\frac{(1 - \beta + \beta\theta q(\theta)) - y^L}{\beta\theta q(\theta)} - 1)L = \frac{\phi c}{(1-\phi)\beta q(\theta)} \tag{31}$$

$$(\frac{(1 - \beta + \beta\theta q(\theta))}{\beta\theta q(\theta)} - 1)L = \frac{\phi c}{(1-\phi)\beta q(\theta)} + \frac{y^L}{\beta\theta q(\theta)} \tag{32}$$

$$(\frac{(1 - \beta + \beta\theta q(\theta))}{\beta\theta q(\theta)} - \frac{\beta\theta q(\theta)}{\beta\theta q(\theta)})L = (\frac{\phi c}{(1-\phi)} + \frac{y^L}{\theta})\frac{1}{\beta\theta q(\theta)} \tag{33}$$

which simplifies to:

$$\frac{1}{\theta}(1 - \beta)L = \frac{\phi}{1-\phi}c + \frac{y^L}{\theta} \tag{34}$$

or:

$$\frac{r}{1+r}L = y^L + \frac{\phi}{1-\phi}\theta c \tag{35}$$

Substituting this into the above we get:

$$d = \psi + y^D + \frac{r}{1+r}L - \phi(\psi + y^D - a + \frac{r}{1+r}L) \tag{36}$$

$$d = \psi + y^D + y^L + \frac{\phi}{1-\phi}\theta c - \phi(\psi + y^D - a + y^L + \frac{\phi}{1-\phi}\theta c) \tag{37}$$

$$d = \psi + y^D + y^L + \frac{\phi}{1-\phi}\theta c + \phi(-\psi - y^D + a - y^L - \frac{\phi}{1-\phi}\theta c) \tag{38}$$

$$d = \psi + y^D + y^L + \phi(\frac{\theta c}{1-\phi} - \psi - y^D + a - y^L - \frac{\phi}{1-\phi}\theta c) \tag{39}$$

$$d = \psi + y^D + y^L + \phi(\frac{(1-\phi)\theta c}{1-\phi} - \psi - y^D + a - y^L) \tag{40}$$

$$d = \psi + y^D + y^L + \phi(\theta c - \psi - y^D + a - y^L) \tag{41}$$