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## Why volunteer? Evidence on the role of altruism, image, and incentives

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## ABSTRACT

We examine motivations for prosocial behavior using new data on volunteer firefighters that contain a dictator game based measure of altruism, surveyed measures of other behavioral factors, and call records that provide an objective measure of time spent volunteering. Controlling for a variety of other explanations, we find that the decision to volunteer is positively correlated with altruism as well as with concern for social reputation or “image.” Moreover, by utilizing variation in the presence and level of small stipends paid to the firefighters, we find that the positive effect of monetary incentives declines with image concerns, supporting a prediction that extrinsic incentives can crowd out image motivation for prosocial behavior.

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## 1. Introduction

The prominent role of volunteering in the charitable provision of goods and services has helped to motivate a variety of theoretical models of prosocial behavior over the past twenty years. Explanations of why people supply labor seemingly for free have jointly and alternately considered volunteering as a consumption good, as a way of ensuring the provision of a public good, as a means of investing in human capital, as a means of gaining other extrinsic rewards, and as a manifestation of underlying tastes and attributes such as extroversion, altruism, or a desire to look “good” to others (e.g., Andreoni, 1989; Bénabou and Tirole, 2006; Clary and Snyder, 1999; Duncan, 1999; Menchik and Weisbrod, 1987; Ziemek, 2006). However, a lack of appropriate data has left us with a more sparse empirical literature and an incomplete understanding of the extent to which these various possibilities drive volunteerism in practice. Survey-based evidence suggests that wages and income are related to volunteer labor supply (Freeman, 1997; Menchik and Weisbrod, 1987). However, Freeman (1997) finds that a larger determinant of volunteering is simply being asked and concludes more attention should be paid to tastes for

prosocial activities, of which there are few measures in existing surveys.

We introduce data from a sample of volunteer firefighters and non-volunteer community members to provide evidence on possible taste-based motivations for volunteering as well as a link between an experimental measure of altruism and a real-world outcome. The data are a combination of information from a survey, a field experiment, and fire department records. The survey provides the usual demographic and income controls as well as measures from personality inventories of traits such as extroversion and risk aversion. We deviate from using only survey measures of personality traits because, along with problems associated with the hypothetical nature of some survey questions, self-reports may be especially susceptible to what (Carpenter, 2002) terms *idealized persona bias* in which a respondent projects the person that he would like to be. We therefore use an experimental measure of altruism via a representative version of the dictator game in which there are real material costs associated with revealing prosocial preferences.<sup>1</sup> And, rather than relying on self-reports of volunteer labor supply, we utilize call records from fire departments that record which members “turned out” for calls over the course of a calendar year.

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[cmyers@middlebury.edu](mailto:cmyers@middlebury.edu) (C.K. Myers).<sup>1</sup> Experiments are “representative” if the decision problem reflects some aspect of the participant's environment (see Carpenter et al., 2008 for a discussion).

We find that altruism is a key motivator in choosing to join the volunteer fire service, which supports the external validity of our version of the dictator game in predicting real-life behavior. However, conditional on selection, altruism plays a role in training hours but not in call response. In contrast to the results for altruism, image concerns, as proxied by having a vanity license plate, are associated with the decision to volunteer and with the visible activity of call response, but not with the less visible activity of training, supporting predictions that the effect of image concerns increases with the visibility of the activity (Andreoni and Bernheim, 2009; Bénabou and Tirole, 2006; Nelson and Greene, 2003). Moreover, we find that paying small stipends to the volunteers increases turnout for some, but that the effect is dampened for those who have greater image concerns. These results confirm recent theoretical predictions that providing extrinsic motivations to volunteers can have unintended negative effects by crowding out image motivations to volunteer (Bénabou and Tirole, 2006).

Although it is not our primary focus, we also present evidence on motivations such as being invited, volunteering to make friends or benefit one's career, and religion. Overall, these factors appear to play a positive role in the decision to become a volunteer, but to have a small or even negative relationship with the amount of time spent volunteering.

We proceed with an overview of theories of prosocial behavior such as volunteering and with a model that incorporates altruism, image concerns, and material rewards into the decision to volunteer. Section 3 then provides a description of the data. In Sections 4 and 5 we examine selection into the fire service and the call turn out of volunteer firefighters. We offer concluding remarks in Section 6.

## 2. A model of “turning out”

Papers in the public finance and labor literatures have traditionally treated prosocial behavior such as volunteering as generating some combination of a public good, consumption good, or investment good (Brown and Lankford, 1992; Duncan, 1999; Menchik and Weisbrod, 1987). Others have focused more on the role of “pure” and “warm-glow” altruism in motivating volunteers (Andreoni, 1989, 1990, 2006; Becker, 1974; Bénabou and Tirole, 2006). The differences in terminology – which serve to emphasize the nature of the activity versus the nature of the volunteer – mask what are essentially similar approaches. Whether volunteering is thought of as a public good or as the product of pure altruism, the individual cares only that some level of the good is provided and not who is responsible for the provision; hence, government spending on the public good will “crowd out” private donations of time or money. If volunteering is instead a consumption good or the product of “impure” or “warm-glow” altruism, (Andreoni, 1990) the act of giving itself generates utility for the volunteer, and government provision will not compete to the same extent with private provision. The available empirical evidence suggests that volunteers care both about the level of provision of their product as well as about the act of giving. Government spending appears to at least partially crowd out volunteering (Brown and Lankford, 1992; Duncan, 1999; Menchik and Weisbrod, 1987; Ziemek, 2006) and in the lab people behave in a manner consistent with a mixture of “pure” and “warm-glow” altruism (Andreoni, 1993; Andreoni and Miller, 1993, 2002; Hoffman et al., 1994; Forsythe et al., 1994; Goeree et al., 2002; Palfrey and Prisbrey, 1997). A third possibility is that there are other extrinsic motivations for volunteering beyond utility gained from the public good created or by the act of giving. One example is investment models in which volunteering is a means of obtaining human capital that will yield returns in the labor market (Menchik and Weisbrod, 1987; Ziemek, 2006).

Like Ariely et al. (2009) we borrow from the model of prosocial behavior developed by Bénabou and Tirole (2006) (BT), which emphasizes the relationship between (pure or impure) altruism, extrinsic motivations, and image concerns. Our model is slightly simpler in that we focus attention on one's interest in maintaining a reputation for prosociality and ignore any other image concerns. While simpler, our version is still sufficient to motivate the issues on which we collect data.

Agents in the model are motivated by three factors: altruistic preferences, extrinsic monetary incentives, and image concerns. Agents with altruistic preferences for the social good place a value,  $v_a$  on prosocial activities,  $a$ , like joining the local fire department or “turning out” for individual calls. Agents may receive monetary compensation,  $y$ , for their prosocial acts (e.g., some firefighters receive modest hourly wages for their efforts) which they value at  $v_y y$ . Lastly, some agents care about their reputation or image in the community according to  $R(a, y)$ . Combining these three sources of motivation with the cost of engaging in prosocial acts,  $C(a)$ , we have:

$$U(a) = (v_a + v_y y)a + R(a, y) - C(a). \tag{1}$$

The first and last terms in Eq. (1) are straightforward especially because we set  $C(a) = \frac{ka^2}{2}$ ; however, the image concerns require further elucidation. We assume that an agent's preference type,  $(v_a, v_y)$ , is determined by an independent draw from a bivariate normal distribution and define one's image concern as follows:

$$R(a, y) = x I_T(z) E(v_a | a, y) \tag{2}$$

where  $x$  determines the extent to which an altruistic act will be visible and  $I_T: z \rightarrow \{0, 1\}$  is an indicator function publicly identifying those agents who are motivated by image,  $E(v_a | a, y)$ , or the beliefs of others about the agent's value on prosocial activities. In other words, agents with image concerns comprise a subset  $T$  of the population.

Substituting Eq. (2) and  $\frac{ka^2}{2}$  into Eq. (1) and differentiating yields the first order conditions for the optimal level of prosocial behavior which depend on whether or not image concerns matter.

$$ak = \begin{cases} v_a + v_y y & \text{if } z \notin T \\ v_a + v_y y + x \frac{\partial E(v_a | a, y)}{\partial a} & \text{if } z \in T \end{cases} \tag{3}$$

For those unconcerned with image the optimal level of prosociality is easy to determine:  $a^* = (v_a + v_y y) / k$ .

Solving the first order condition for those agents valuing image is harder than it first appears because it is not simply a matter of evaluating the expectation,  $E(v_a | a, y)$ , and substituting in its derivative. At the heart of the model is a signal extraction problem in which on-lookers need to evaluate the altruistic intentions of the agent ( $v_a$ ) using the entire decision problem. In other words on-lookers need to anticipate how agents will respond to incentives when they evaluate their actions.

To see the subtle nature of the problem, we (following BT) exploit the fact that an agent's choice of  $a$  reveals a clue about his intentions. The clue, from Eq. (3), is that  $v_a + v_y y$  is equal to  $ak - x \frac{\partial E(v_a | a, y)}{\partial a}$  at the optimum. This means that although one cannot determine  $v_a$  directly from one's choice of  $a$ , one can make inferences about  $v_a$  based on  $v_a + v_y y$  because  $v_a$  and  $v_y$  are jointly distributed and  $y$  is exogenously determined.

Valuation types are distributed  $N\left(\bar{v}_a, \begin{bmatrix} \sigma_a^2 & \sigma_{ay} \\ \sigma_{ay} & \sigma_y^2 \end{bmatrix}\right)$  which means that after considerable calculation one can derive

$$E(v_a|a, y) = E(v_a|v_a + v_y y) = \bar{v}_a + \frac{\sigma_{v_a, v_a + v_y y}}{\sigma_{v_a + v_y y}^2} (v_a + v_y y - \bar{v}_a - \bar{v}_y y)$$

and after substituting from the first order condition (3) we get

$$E(v_a|a, y) = \bar{v}_a + \frac{\sigma_{v_a, v_a + v_y y}}{\sigma_{v_a + v_y y}^2} \left( ak - x \frac{\partial E(v_a|a, y)}{\partial a} - \bar{v}_a - \bar{v}_y y \right). \quad (4)$$

Now notice that if we take the derivative of Eq. (4) with respect to  $a$  we get

$$\frac{\partial E(v_a|a, y)}{\partial a} = \rho k - \rho x \frac{\partial^2 E(v_a|a, y)}{\partial a^2}. \quad (5)$$

where  $\rho = \frac{\sigma_{v_a, v_a + v_y y}}{\sigma_{v_a + v_y y}^2}$ . With some rearranging, Eq. (5) takes the form of a linear differential equation that has the general solution

$$\frac{\partial E(v_a|a, y)}{\partial a} = \rho k + \xi e^{-\frac{a}{\rho x}}$$

in which  $\xi$  is a constant of integration. Lastly, as in BT, because the agent's objective function is well behaved only if  $\xi = 0$ , an interior solution occurs where  $\frac{\partial E(v_a|a, y)}{\partial a} = \rho k$  and the first order condition for agents with image concerns becomes

$$ak = v_a + v_y y + x \rho k.$$

The last thing to do is to evaluate  $\rho$  and substitute. This results in the following prediction about the extent to which agents will engage in prosocial behavior.

**Proposition 1.** *There is a unique equilibrium in which prosocial acts depend on one's type, the material incentive and whether or not one is concerned with image. Those not concerned with image contribute at the level  $a^* = \frac{(v_a + v_y y)}{k}$  and those with image concerns contribute  $a^* = \frac{(v_a + v_y y)}{k} + x \frac{\sigma_a^2 + y \sigma_{ay}}{\sigma_a^2 + 2y \sigma_{ay} + y^2 \sigma_y^2}$ .*

Regardless of one's concern for image, altruistic preferences,  $v_a$ , increase one's supply of prosocial behavior. The net effect of the material incentive  $y$ , however, is only unambiguously positive for acts that are not visible or for those agents who do not worry about their image. Using Proposition 1 we can generate three comparative static predictions which will form the basis of our empirical examination of the behavior of volunteer firefighters.

**Corollary 2.** *Agents with higher altruistic valuations supply more prosocial behavior.*

**Corollary 3.** *Agents who do not care about image supply more prosocial behavior when the material incentive increases.*

**Corollary 4.** *For agents who care about image and  $\sigma_{ay} = 0$ , an increase in material incentives crowds out the image motivation for prosocial behavior. The net effect of material incentives on the provision of prosocial behavior is ambiguous.*

Clearly, the derivative  $\partial a^* / \partial v_a$  is positive indicating that we should expect an unequivocal relationship between one's altruistic preference and volunteer behavior. Likewise, for those people who do not worry about their image, the effect of an increase in the material incentive,  $\partial a^* / \partial y|_{z \in T}$ , should also be positive. However, once one's image enters into the calculations, the effect of material incentives on prosocial behavior becomes less clear.<sup>3</sup> If we are willing to consider the BT baseline case of  $\sigma_{ay} = 0$ , then the derivative of interest,  $\partial a^* / \partial y|_{z \in T}$ , indicates at least partial crowding out of image incentives because the derivative of the image part of  $a$  is negative. That is, providing material incentives for prosocial behavior can crowd out image motivations to perform good deeds. What is unknown is whether the direct positive effect of material incentives is outweighed by the indirect negative effect on image. In the case of our volunteer firefighters, we will see that the two effects are of roughly equal magnitude so that the net effect of material incentives is zero for volunteers with image concerns.

### 3. An overview of the data

Vermont is comprised mostly of rural areas that rely on volunteer firefighters to respond to emergencies such as hazardous material spills, vehicle accidents, carbon monoxide alarms, and, of course, fires. Of the 237 fire departments in the state, only 10 are made up of full-time paid professional firefighters while the remainder rely on volunteers.

In February of 2006 we sent an initial survey to fire chiefs in the state that requested information on the number of firefighters at their department, any compensation paid, annual calls, and training requirements. One hundred twenty nine surveys were returned, yielding a 55% response rate.<sup>4</sup> Based on these surveys, the time commitment for volunteer firefighters is substantial. Half of departments require that volunteers complete "Firefighter" training, which requires 144 hours of class time over seven months, before being admitted as a full member. Firefighters who drive department vehicles or seek additional certification in fire fighting, tactical rescue, and other areas of expertise are required to complete additional training. All departments that we contacted also have training sessions that are usually held once a month. In addition to time spent training, volunteer firefighters in the state of Vermont are provided pagers that issue a company-specific tone in the event of a call followed by radio information from the dispatcher. Ideally, firefighters are expected to respond to a tone if they are nearby and able, but in practice there is little oversight and each firefighter decides on a call-by-call basis whether to respond. The number of calls varies by department; the median number of calls in 2005 for our sample was 79, or roughly a call every four and a half days.

In the summer of 2006 we conducted an experiment and a survey of 205 Vermont volunteer firefighters from 39 departments by both visiting individual stations and by attending the state firefighter convention or "muster." We contacted departments that had responded to our initial survey to ask if they had and were willing to share "call records" for 2005 with the date, time, and nature of each call as well with information on which of the firefighters responded. Not all departments keep or are willing to share such detailed records, but the chiefs of six departments agreed to do so. We then visited these departments during their monthly meetings and passed out fifteen-page experiment/survey booklets for the firefighters to

<sup>3</sup> The effect of material incentives is only unclear if the prosocial behavior is visible. If prosocial acts are not publicly visible (i.e.,  $x = 0$ ) then they do not affect image and there is no image motivation to crowd out.

<sup>4</sup> We observed no correlation between the size or locations of the towns associated with departments and response rates. We do not know of other data on Vermont fire departments that would allow further exploration of the determinants of response and assume that response is, in fact, not random. However, observations from the initial department surveys do not form the basis for analysis in the paper.

<sup>2</sup> Following from the fact that if  $(x_1, x_2) \sim N\left(\begin{matrix} \mu_1 \\ \mu_2 \end{matrix}, \begin{bmatrix} \sigma_1^2 & \sigma_{12} \\ \sigma_{12} & \sigma_2^2 \end{bmatrix}\right)$  then  $(x_1|x_2) \sim N\left(\mu_1 + \frac{\sigma_{12}}{\sigma_2^2}(x_2 - \mu_2), (1 - \rho^2)\sigma_1^2\right)$  where  $\rho$  is the correlation coefficient,  $\frac{\sigma_{12}}{\sigma_1 \sigma_2}$ .

complete, which yielded 143 firefighter observations. We also set up a booth at the annual state muster, which is attended by firefighters from throughout the state, and passed out our materials, yielding another 62 observations, although these cannot be paired with call records from any department.

So that we could study selection into the fire service, we also conducted our protocol with non-firefighter Vermonters. We purchased a sample of 2000 addresses in the state that were drawn randomly on all criteria save gender. Because firefighters are predominantly male, we chose to oversample males in the community survey. Community members were sent letters with a brief explanation of the protocol accompanied by a booklet that was identical to that distributed to the firefighters with the exception of detailed questions related to firefighting. In order to increase response rates, we also gave them the option of responding online, although only 10% did so. Four hundred thirteen community members responded to the full survey. Twelve of these community members happened to be current volunteer firefighters and were added to the sample of firefighters.<sup>5</sup> Of the remaining 401 community members, 189 reported no volunteer activity and form the control group to which we compare firefighters. The 212 community members who engaged in some other form of volunteer activity were removed from the analysis presented here because it is not clear whether they are an appropriate control group given that, while they are not volunteering for the fire service, they are engaging in other volunteer activities.

Comparing the demographic composition of community respondents to weighted Current Population Survey (CPS) data from December 2006, we see that our sample of community members is similar to both the state of Vermont and to the U.S. more generally. The mean age in the sample of community members, which was restricted to adults aged 18 or older, is 48, while the national and state mean age of adults is 46. The mean weekly earnings of community members in our sample is \$758 versus \$743 in the U.S. and \$615 in Vermont. Finally, while our sample of non-volunteer community members is 63% male, this reflects the sample design rather than a large gender differential in response rates.

### 3.1. Motivations for volunteering

We gathered data on six behavioral motives for volunteering for the fire service. In addition to the two motives that the model focuses on (altruism and image), we asked survey questions about career concerns, using the fire service to make or be with friends (or being an extrovert in general), one's attitude towards risk, and volunteering to comply with religious beliefs. The details are as follows.<sup>6</sup>

Our proxy for altruism comes from a field experiment based on the original dictator game (Forsythe et al., 1994) and a version in which a context similar to the decision to volunteer was emphasized (Eckel and Grossman, 1996). In the original dictator game, subjects are asked to donate to a random participant selected by the experimenter. There has been some debate about how to interpret the resulting donation. Donations may be motivated by altruism, but may also reflect an "experimenter effect" arising from the experimenter's ability to observe the subjects' actions (Hoffman et al., 1994). We implement a modified version of the dictator game based on (Eckel and Grossman, 1996) in which the subjects' actions are more clearly linked to altruism. In our version of the game, participants were first

asked to pick among thirteen charities or write in a charity of their choice. They were then asked to decide how much of a \$100 endowment to transfer to their chosen charity. Given the large expected sample size, each participant was told that we would randomly implement 10% of the allocation decisions after they were all collected, yielding an expected payoff of \$10 if all of the money was kept. After the collection phase was finished we wrote checks to the charities for the total amounts donated and, to preserve the anonymity of their responses, we sent unnamed VISA gift cards for the residual shares of the \$100 to the chosen decision-makers. Obviously, we could not run the experiment double blind because we needed to send the chosen decision-makers the money that they decided to keep and we needed to match the experiment and survey data to the call records for the firefighters. That said, we tried to make the decision as anonymous as possible. In addition to the unnamed gift cards, participants were always referred to by an anonymous alphanumeric code, they were explicitly told not to write their names anywhere on the booklets and, during the firehouse visits, participants returned their completed booklets in a covered box near the back of the room away from the experimenters.

By allowing the subjects to choose from among a long list of charities or even to write one in, we greatly increase the chances that a given subject will be able to donate to a recipient that they feel is deserving. Eckel and Grossman (1996) show that when subjects are provided with this type of context, donations increase, suggesting that the dictator game allocation is motivated by altruism.

Fig. 1 presents a histogram of charitable allocations in the dictator game for volunteer firefighters, volunteer community members, and non-volunteer community members. We use the amount allocated to charity as a proxy for altruism in the analysis that follows.<sup>7</sup> Volunteer firefighters and volunteer community members have similar outcomes in the dictator game, and both groups tend to donate more than the non-volunteer community members. The mean donation for the firefighters was \$77.35, while that for volunteer community members was \$76.20, and the difference is not statistically significant ( $t = 0.7399$ ,  $p = 0.4598$ ). The non-volunteers, by contrast, have a mean allocation of \$67.92, which is significantly different from the allocation of either volunteer group. ( $P$ -values for pairwise tests of mean allocations for the two volunteer groups versus the non-volunteers are both less than 0.05.) The similarity between the distribution of allocations for the two volunteer groups (Kolmogorov–Smirnov test yields a  $p$ -value of 0.742, indicating no significant difference between the distributions) is noteworthy for two reasons. First, it supports the decision to exclude the volunteer community members from the models of selection into volunteer firefighting that follow. Second, the similarity in outcomes also is consistent with the assumption that the slight change in protocol for firefighters and community members (i.e., visiting the stations versus mailing the booklets) did not have a noticeable effect on allocations.<sup>8</sup>

The second motivation for volunteering that we consider is concern for one's image. As with altruism, an indirect and less obvious approach to measuring image concerns seems more likely to yield an accurate measure. Instead of asking directly whether a participant valued his or her reputation in the community, we asked a question designed to determine whether he or she chose to display information

<sup>7</sup> If we instead include an indicator for the respondent giving all of the money to charity, the results in the next two sections are similar.

<sup>8</sup> This assumption is further supported by two observations. First, the 12 volunteer firefighters who were picked up in the community surveys have a mean dictator game allocation of \$77.29, which is quite similar to the mean of \$78.33 observed for the firefighters who were surveyed in person. The distributions of their allocations are also similar, although the very small sample of firefighters from the mail survey precludes statistical inference. Second, although our selection equations focus on a comparison of the volunteer firefighters to the non-volunteer community members, we note that we obtain similar estimates of the relationship between the dictator game allocation and the propensity to volunteer when comparing volunteer community members and non-volunteer community members, who both completed the mailed surveys.

<sup>5</sup> For the twelve firefighters who completed the community surveys, we are missing information on the firefighter-specific questions that were not included in that version of the survey. In our analysis, these twelve firefighters are included in the probit models of selection into the group of firefighters. However, they are not included in the models of volunteer hours or call response.

<sup>6</sup> For the sake of length, we only highlight the design of our experiment and survey. A copy of the survey booklet is provided as an online appendix to provide detailed information on the protocols.

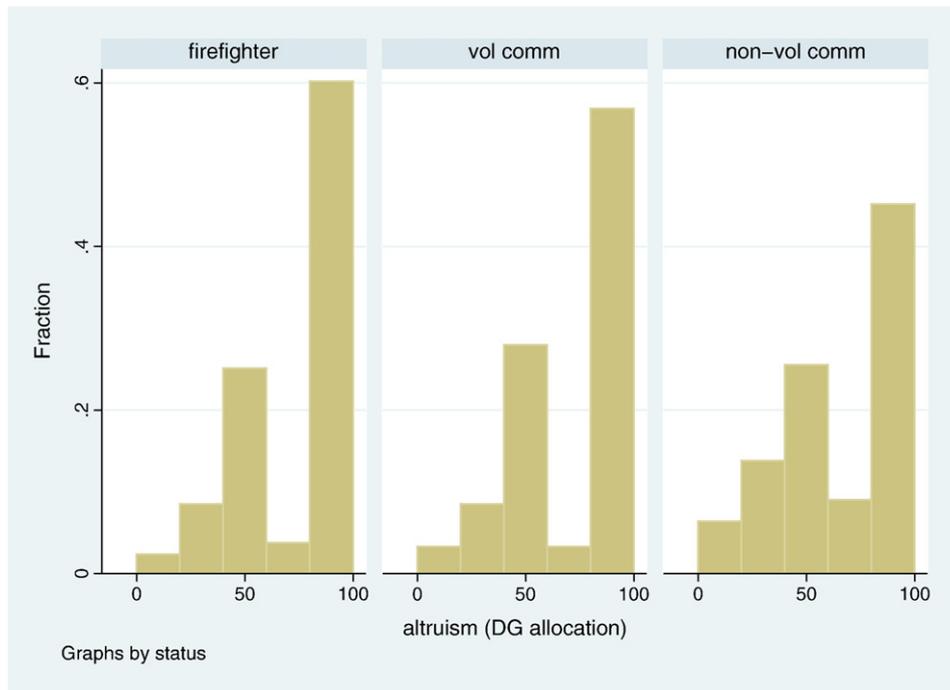


Fig. 1. Allocation to charity in dictator game by volunteer status.

about him or herself to others. When people in the state of Vermont register their automobiles they are randomly issued a license plate but can choose to pay more to receive a “vanity plate,” which has special lettering or of the addition of a special placard. Examples of possible placards include endangered animals on the “Conservation” plate, children's drawings on the “Building Bright Futures” plate, the purple heart medallion issued to wounded soldiers or the international symbol of the Freemasons. We asked whether our participants purchased such a vanity plate for their vehicles. There are a variety of placards available to all Vermonters and we intend ownership of a vanity plate to be a proxy for image concern for both community members and firefighters. However, most firefighters select the placard shown in Fig. 2. Displaying the Maltese cross on one's vehicle broadcasts to everyone that the driver is a person that volunteers a lot of time to the community. It is also important to note that the placard in Fig. 2 does not help volunteers respond to tones quickly because most volunteer firefighters purchase warning lights and sirens for their personal vehicles for this purpose. In other words, there are ways to be modest about one's involvement (e.g., by installing dashboard-mounted rather than roof-mounted flashing red lights on a personal vehicle) but spending more on the plate in Fig. 2 is not one of them.

We also considered other, un-modeled, reasons why people might volunteer for the fire service. It might be the case, for example, that

people think that volunteering will enhance their performance on the job or help them get a job (Clary and Snyder, 1999). To assess this motive we asked about the degree to which respondents agreed with three statements about the career impacts of volunteering. People might also volunteer because they are extroverts and the fire service allows them a new opportunity to interact with other people. In addition to two direct questions about making friends or having friends already in the fire department, we asked participants to respond to five extroversion statements borrowed from the NEO personality inventory (Costa and McCrae, 1992). Interior fire fighting is not the only risky endeavor facing volunteers; simpler tasks like ventilating a roof can become dangerous when certain circumstances are accounted for (e.g., height, pitch, roofing material, weather). It might, therefore, be reasonable to believe that risk seekers are more likely to join. We included six statements from the (Weber et al., 2002) risk assessment scale to assess each individual's willingness to engage in behaviors that were risky to one's health (e.g., bungee jumping). The last factor that we thought might motivate a person to volunteer for the fire service is his commitment to religion. Because many religions preach service to one's community, we asked participants to rate how religious they were and we asked them how often they attended religious services.

In addition to the behavioral measures that we focus on, we collected an extensive set of demographics and two factors that we either thought would be particularly important in this situation or have been discussed before. Many fire departments in Vermont are associated with long family traditions and many people join because of family connections. Because of this we gathered information on whether a respondent currently has or has had a family member in the fire service (*family ff*). Freeman (1997) found that one of the biggest indicators of whether or not one volunteers is whether the person had been explicitly asked to serve. We asked a similar question (*invited*).

Table 1 provides a description of the variables used in the analysis as well as their means for volunteer firefighters and non-volunteer community members. For inventories in which participants responded to a number of statements (career concerns, extroversion,



Fig. 2. Sample vanity plate.

**Table 1**  
Variable descriptions and means.

Variable	Description	Volunteer firefighters	Community members
<i>Behavioral factors</i>			
Altruism	Allocation to charity in dictator game (\$0–\$100)	77.35	67.92
Image	I(non-standard (“vanity”) license plate)	0.23	0.11
Career	Factor score for 3 questions about volunteering and career concerns	0.26	−0.23
Friends1	Volunteering is a good way to make friends (scale 1–5)	4.60	4.10
Friends2	I(friends on fire department prior to joining)	0.75	0.47
Extroversion	Factor score for 5 extroversion questions	0.18	−0.21
Risk	Factor score for 6 risk questions	0.32	−0.14
Religious	I(attends religious services and/or rates religious outlook as at least somewhat religious)	0.66	0.52
Family ff	I(have family member who is a firefighter)	0.59	0.24
Invited	I(have been invited to join local fire department)	0.67	0.12
<i>Demographics and other factors</i>			
Residence far	I(home is >2 miles from fire station)	0.35	0.40
Work far	I(work is >2 miles from fire station)	0.51	0.25
Age	Age in years	38.61	47.99
Male	I(male)	0.93	0.63
Student	I(student)	0.08	0.04
Married	I(married)	0.61	0.59
Children <= 12	I(young children at home)	0.39	0.64
Children 13–18	I(older children at home)	0.26	0.53
<hs education	I(education < high school degree)	0.08	0.05
hs education	I(high school degree)	0.35	0.25
>hs education	I(education beyond high school)	0.57	0.70
VT native	I(born in Vermont)	0.64	0.46
Employed	I(currently employed)	0.92	0.76
Income <15k	I(annual household income <15,000)	0.07	0.09
Income 15–35 k	I(annual household income 15–35,000)	0.16	0.20
Income 35–50 k	I(annual household income 35–50,000)	0.17	0.17
Income 50–75 k	I(annual household income 50–75,000)	0.24	0.22
Income 75–100 k	I(annual household income 75–100,000)	0.16	0.16
Income >100 k	I(annual household income >100,000)	0.20	0.16
Wage (if employed)	Hourly wage or, for salaried workers, imputed wage	17.42	22.92
Donation	Amount of household's charitable donations in past year	469.18	799.39
<i>Firefighter-specific variables</i>			
Presence of stipend	I(fire department pays hourly stipend for calls)	0.67	.
Amount of stipend	Amount of hourly stipend or, for departments that offer lump sum incentives, imputed hourly stipend	5.34	
Training hours	Usual monthly training hours	10.28	
Call hours	Usual monthly call hours	18.94	
Number of observations		217	189

attitudes towards risk), we summarize their motives via factor analysis. Looking at differences in means, we see that, relative to non-volunteer community members, volunteer firefighters score higher on all behavioral measures that we expect to contribute to a proclivity for prosocial behaviors. Firefighters allocate more to charity in the dictator game, are more likely to have a vanity plate, and score

**Table 2**  
Logit models of selection into volunteer firefighting.

	Model 1		Model 2	
	coef	s.e.	coef	s.e.
Altruism (DG allocation)	0.0077*	0.0044	0.0072	0.0055
Image (vanity plate)	0.6656*	0.3867	1.0251**	0.5154
Career (factor score)	0.2940	0.1915	−0.0563	0.2645
Friends1 (make friends)	0.7000**	0.2837	1.1029***	0.3635
Friends2 (friends on dept)	0.0108	0.3328	−0.3158	0.3951
Extroversion (factor score)	0.1983	0.1675	0.2976	0.2090
Risk (factor score)	0.4888***	0.1623	0.2325	0.2523
Religious	0.4204	0.2964	0.5591	0.3912
Family ff	1.2273***	0.3031	1.3099***	0.3754
Invited	2.4848***	0.3363	2.0703***	0.4332
Demographic controls	No		Yes	
Number of observations	386		320	

The table reports estimated coefficients from logit models of selection into volunteer firefighting. The sample is composed of community members who do no volunteer activities and volunteer firefighters, the latter of which are over-sampled so that they account for approximately half of the observations. We implement the prior correction method from the relogit package (Tomz et al., 1999) to correct for the choice-based sampling design. Additional demographic controls include age, gender, student status, marital status, children under age 12, children aged 12–18, education level, employment status, income, wage, Vermont native, annual charitable donations, and distance from residence and place of work to fire station.

\*  $p < 0.10$ .

\*\*  $p < 0.05$ .

\*\*\*  $p < 0.01$ .

higher on inventories of career concerns in volunteering, social concerns in volunteering, extroversion, and risk. Firefighters are also more likely to be religious, to have family members who are firefighters, and to have been invited to join the department. Moreover, all differences in behavioral factors between firefighters and non-volunteer community members are significant with  $p$ -values below 0.01.

#### 4. Estimates of the decision to volunteer

Table 2 presents the coefficients from a logit model of selection into the volunteer fire service. The dependent variable indicates whether a respondent belongs to our sample of volunteer firefighters or to the sample of non-volunteer community members. Because joining the fire service is a rare event – approximately 1.2% of Vermonters are volunteer firefighters – we implemented a “choice-based” or “endogenous” sampling design in which we select on the outcome of interest to oversample firefighters.<sup>9</sup> (Manski and Lerman, 1977) have shown that the slope coefficients from a logit model are consistent under this type of sampling design, but that the intercept estimator is inconsistent. Intuitively, because firefighters are over-represented in the sample, the intercept estimator overstates the “base” probability of being a firefighter, but the slope coefficients, which represent linear marginal effects of covariates on the log-odds ratio, remain consistent. To correct the intercept for the choice-based sampling design we implement the prior correction method described by King and Zeng (2001).

In Model 1 we estimate the relationship between the decision to volunteer and various potential motivations (altruism, image concerns, career concerns, social concerns and extroversion, risk attitudes, religiosity, family in the fire service, and an indicator for being invited). We increase the number of variables in Model 2 to include demographic controls for age, gender, marital status, children, educational attainment,

<sup>9</sup> In correspondence with the authors dated March 12, 2010, Kristy Oxholm, president of the Vermont State Firefighters organization, stated that there are roughly 5000 members of the organization and that there are about 1000 more volunteer firefighters in the state who are not members. We estimate the percentage of Vermonters in the fire service by dividing 6000 by the number Vermonters age 15 and older in 2008 obtained from the United States Census (2010).

student status, employment status, income, wages, Vermont nativity, charitable donations, and distance from residence and workplace to the local fire department.

The estimates indicate a positive relationship between altruism and selection into volunteering.<sup>10</sup> In Model 1, a \$10 increase in the dictator game allocation is associated with an 8% increase in the odds of being a volunteer firefighter relative to a non-volunteer community member ( $p = 0.08$ ).<sup>11</sup> After implementing the prior correction technique, the corresponding marginal effect is a 0.26 percentage point increase in the probability of being a volunteer firefighter, a large effect relative to the 1.2% of the population that is in the fire service. In addition, having a vanity plate, our proxy measure of image concern, is associated with a 95% increase in the odds of being a volunteer firefighter ( $p = 0.089$ ). We also find that respondents who agree that volunteering is a good way to make friends or who have a taste for risk are significantly more likely to volunteer for the fire service. Finally, as expected, having family members who have been firefighters has a strong positive relationship with firefighting. Being invited also has a strong positive correlation with the decision to volunteer, as found previously by Freeman, (1997).

The coefficient on our proxy for altruism in Model 2, which includes additional demographic controls, is similar to that in Model 1 but, because the standard error increases with the reduction in sample size due to missing observations of added variables, the coefficient is no longer significant ( $p = 0.19$ ). The coefficients on reputation, volunteering to make friends, risk preferences, having family members who are firefighters, and being invited remain quite similar. Unreported coefficients for the demographic controls are, overall, as expected. We estimate that younger individuals, men, and those without children at home are more likely to volunteer, which is not surprising given that the fire service has traditionally been male-dominated and that volunteer firefighting can be physically rigorous, time intensive, and unpredictable.

### 5. Estimates of turnout

The data include both a subjective and objective measure of the level of participation in the volunteer fire service. First, we asked firefighters to estimate their average monthly hours spent on training and other fire-related “work.” Second, we obtained call records from six participating departments that listed details of each call and which firefighters responded. We are able to match 122 firefighters from our survey to these call records.

#### 5.1. Using self-reported hours

Table 3 reports the results of separate log-hours regressions of firefighter-estimated training and call hours. Interestingly, altruism appears to be positively associated with training hours but not with call hours while image is positively associated with call hours but not with training. Responding to calls (in uniform on a large red truck with blaring sirens) is presumably far more visible than training (which usually takes place inside the station or in the station parking lots). The results suggest that altruism plays a larger role in the less

<sup>10</sup> Although researchers typically treat attitudinal measures such as altruism as exogenous, reverse causality may be an issue because while an attitude such as altruism influences the decision to volunteer, the act of volunteering could also in turn affect altruism. In an earlier version of this paper, (Carpenter and Myers, 2010), we explore possible instruments for altruism and demonstrate that the relationship between altruism and selection into volunteering is of greater magnitude (and statistically significant) after instrumenting for altruism. Although we must be cautious in interpreting the correlations presented here, they are interesting unto themselves in that they provide evidence on how volunteers differ from non-volunteers as well as offer evidence on how outcomes typically observed in the lab relate to a real-life behavior.

<sup>11</sup> The exact percent changes were calculated using  $\% \Delta y = 100 \cdot [\exp(\beta \Delta x) - 1]$ .

**Table 3**  
Regressions for log training and call hours.

	Call hours		Training hours	
	coef	s.e.	0.1720	s.e.
Altruism (DG allocation)	-0.0016	0.0038	0.0111**	0.0052
Image (vanity plate)	0.4016*	0.2333	0.0748	0.2926
Career (factor score)	-0.2189	0.1428	-0.0921	0.1960
Friends1 (make friends)	0.0764	0.1658	-0.0458	0.2145
Friends2 (friends on dept)	0.2128	0.2560	-0.0781	0.3104
Extroversion (factor score)	-0.0214	0.1420	0.1245	0.1720
Risk (factor score)	0.1223	0.1099	-0.0644	0.1492
Religious	-0.1561	0.3194	-0.3659	0.3659
Family ff	0.0160	0.1777	-0.0392	0.2217
Invited	0.3208	0.3610	0.3233	0.3547
Demographic controls	Yes		Yes	
Instrumental variables	No		No	
Number of observations	146		148	

The table reports coefficients from log-linear regression models of firefighters' self-reported call and training hours. The top 1% of hours is dropped from the samples. Standard errors are robust. Additional demographic controls include age, gender, student status, marital status, children under age 12, children aged 12–18, education level, employment status, income, wage, Vermont native, annual charitable donations, years of experience, distance from residence and place of work to fire station, and fixed effects for large stations. \* $p < 0.10$  \*\* $p < 0.05$  \*\*\* $p < 0.01$ .

visible venue while reputation plays a larger role in the more visible one. However, overall our models had little explanatory power and most coefficients were not statistically significant. This may reflect a lack of variation in self-reported hours. The 25th and 75th percentiles of usual monthly training hours were 4 and 11 h. The 25th and 75th percentiles of usual monthly call hours were 8 and 25 h.

The lack of explanatory power may also result from errors in self-reporting. Using the call records and call durations, we reconstruct individual firefighters' actual average monthly hours spent on call response and compare them to their self-reported hours. We report the difference in actual and self-reported hours in Fig. 3. The average firefighter self-reports spending nine more hours per month on non-training work than we observe for him using call records and, as the distribution shows, a large majority (91%) of firefighters substantially overestimate their hours.<sup>12</sup> This large error in self-reported volunteer labor supply is particularly troubling given that, to our knowledge, previous studies of volunteerism all have relied on self-reported volunteer hours.

#### 5.2. Using an objective measure of call response

To provide a more objective measure of volunteer labor supply, we use station call records for calendar year 2005. The data form an unbalanced panel in which each observation records whether an individual firefighter responded to a particular call and include controls for station, call, and firefighter characteristics.<sup>13</sup> Tables 4 and 5 report the results of several specifications of a linear probability model of call response with standard errors clustered at the individual firefighter level.<sup>14</sup> Overall, models using the objective measure appear to have greater explanatory power than those using self-reported hours.

<sup>12</sup> In unreported regressions, we do not observe a statistically significant relationship between the error in self-reported hours and observable characteristics. If we use actual call hours rather than self-reported hours as the dependent variable, the results are similar to those in Table 3, although the magnitude of the reputation effect is smaller when using actual call hours.

<sup>13</sup> Stations with more calls are over-represented in this panel. Controls are included for station-specific effects as well as for call volume and spacing. A separate balanced sample was also created by randomly selecting calls for each firefighter so that the number across firefighters is the same. Results using the balanced sample are not substantially different than those presented here.

<sup>14</sup> We choose to use a linear probability model rather than a probit or logit model to avoid difficulty in interpreting the interaction terms (Ai and Norton, 2003) and in allowing for general forms of within-cluster correlation (Wooldridge, 2006). Fewer than 2% of predictions fall outside of the [0,1] range. The results are robust to a linear random effects specification as well as to a logit specification.

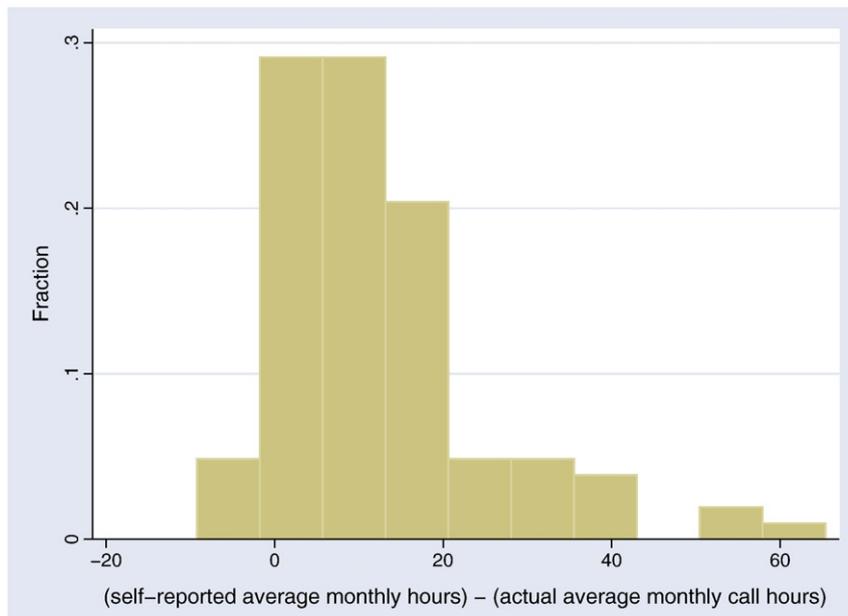


Fig. 3. Distribution of error in self-reported hours.

Table 4 presents three models of call response. In Model 1 we control only for characteristics of the call, call history, and department fixed effects. We find that firefighters are less likely to respond to calls during typical work hours or in the middle of the night. Call response is decreasing in the number of calls in the past week, suggesting increasing opportunity costs or decreasing marginal utility of responding to closely spaced calls. As any volunteer firefighter could tell us, turnout is higher for calls for any sort of fire as opposed to vehicle accidents, alarms, etc. In Model 2 we add measures of different explanations for prosocial behavior and in Model 3 we add demographic controls.

Altruism as measured by the dictator game allocation positively influences selection into the fire service, but does not have a large or statistically significant effect on call response conditional on selection. Concern for one's image, however, continues to be positively correlated with prosocial behavior; the firefighters with a vanity plate are 11 to 15 percentage points more likely to respond to a call than those without. Career is also positively associated with call response, as it was with selection into volunteering.

It is interesting to note that the point estimates suggest that several factors that exhibited a positive relationship with the decision to volunteer have an insignificant or negative relationship with the decision to respond to a call. For instance, in Model 3 of Table 2 the odds of volunteering are 200% greater for someone who agrees that volunteering is a good way to make friends ( $p < 0.01$ ) and 75% greater for someone reporting that he is religious ( $p = 0.05$ ). However, in Model 3 of Table 4 someone reporting that volunteering is a good way to make friends is 4.3 percentage points less likely to respond to a call ( $p = 0.13$ ) and someone who is religious is 7.2 percentage points less likely to respond to a call ( $p = 0.012$ ). This suggests that what motivates signing up to volunteer does not necessarily correlate with showing up. One explanation is that these people tend to sign up for numerous volunteer activities, which limits their commitment to each individually.

In Table 5 we introduce controls for extrinsic incentives. There is substantial variation across volunteer fire departments in Vermont in the presence and level of small stipends paid to firefighters. Many departments offer no recompense for the firefighters' time. However, others have a small pot of money that is divided annually among the

firefighters. Others pay an hourly stipend for time spent on calls. These payments are unlikely to exceed the direct costs of participation in any of the volunteer departments. Seventy percent of departments in our initial survey offer no compensation and, among those with an hourly wage for calls, the mean is \$8.34, far below the \$17.42 mean hourly wage of employed firefighters who are often leaving work to respond to calls. Moreover, training time is not compensated by any departments and firefighters are responsible for purchasing the lights and sirens for their personal vehicles, which cost several hundred dollars. We use two alternative measures of extrinsic incentives: a dummy variable indicating the presence of a stipend (Model 4) and the amount of any stipend paid (Model 5). Because the presence and level of stipends are colinear with the six departments represented in the sample, we remove the department indicators and replace them with a measure of annual call volume, which is likely an important determinant of call response that was controlled for previously with the station indicators.

We are particularly interested in whether the interaction between extrinsic incentives and image concerns is negative, as predicted by the model. Although we are concerned that *image* and *stipend* could potentially be endogenous, the interaction terms in Models 5 and 6 are less likely to be inconsistent. For this to occur, the interaction between *image* and *stipend* would need to be correlated with the error term once the direct effects of the two variables (and other observables) have been partialled out. That is, we would need a story in which there is some factor other than image motivation that is both correlated with the propensity to obtain a vanity plate and with the response to stipends. It is quite difficult to come up with such a story. An example would be that plates are given to firefighters as rewards for volunteer service in lieu of stipends. This is impossible, however, because plates must be obtained and paid for by the individuals who will use them.<sup>15</sup>

<sup>15</sup> In addition to image concerns, vanity plates might also be purchased by firefighters who are particularly enthusiastic. While we might control to some extent for "enthusiasm" with all the covariates already in our regressions, there might still be some cause to worry about endogeneity in the estimate of the direct effect of image concern. That said, enthusiasm cannot easily account for the interaction effect: there is nothing about being an enthusiastic firefighter that prevents such individuals from also responding positively to monetary incentives.

**Table 4**  
Linear probability models of call response.

	Model 1		Model 2		Model 3	
	m.e.	s.e.	m.e.	s.e.	m.e.	s.e.
<i>Call characteristics</i>						
Spring	0.0146	0.0098	0.0125	0.0099	0.0087	0.0113
Summer	0.0187	0.0131	0.0184	0.0132	0.0126	0.0148
Fall	0.0155	0.0153	0.0151	0.0157	−0.0014	0.0167
Weekend	0.0846***	0.0166	0.0842***	0.0173	0.1031***	0.0207
Typical work hours (8–5)	−0.0875***	0.0142	−0.0946***	0.0144	−0.1043***	0.0152
Late night (11–5)	−0.0358**	0.0142	−0.0316**	0.0146	−0.0245	0.0181
Fire call	0.0831***	0.0103	0.0805***	0.0106	0.0959***	0.0137
Calls in last week	−0.0017*	0.0010	−0.0018*	0.0010	−0.0021	0.0013
<i>Firefighter characteristics</i>						
Altruism (DG allocation)			−0.0002	0.0006	−0.0000	0.0005
Image (vanity plate)			0.1085**	0.0450	0.1447***	0.0331
Career (factor score)			0.0636**	0.0255	0.1288***	0.0284
Friends1 (make friends)			−0.0265	0.0298	−0.0431	0.0284
Friends2 (friends on dept)			−0.0315	0.0423	−0.0805**	0.0381
Extroversion (factor score)			0.0008	0.0186	−0.0092	0.0162
Risk (factor score)			−0.0390**	0.0187	−0.0245	0.0202
Religious			−0.0544	0.0467	−0.0720	0.0463
Family ff			0.0640*	0.0352	0.0596**	0.0269
Invited			0.0672	0.0437	0.0444	0.0446
Department indicators	Yes		Yes		Yes	
Demographic controls	No		No		Yes	
Number of firefighters	119		83		83	
Number of observations	22,775		21,808		15,099	

The table reports linear probability estimates of the response of volunteer firefighters to emergency calls. The dependent variable indicates whether firefighter *i* responded to call *k*. Standard errors are clustered at the firefighter level. The additional demographic controls in Model 3 include the following: age, gender, student status, marital status, children under age 12, children aged 12–18, education level, employment status, income, wage, Vermont native, annual charitable donations, and distance from residence and place of work to fire station. The results are similar for a logit specification and for a linear probability model with firefighter random effects.

\*\*\*  $p < 0.01$ .  
\*\*  $p < 0.05$ .  
\*  $p < 0.10$ .

In Model 4 of Table 5, we find that the image concerns and the presence of a stipend are both positively associated with turning out to a fire call. Firefighters with a vanity plate are 31 percentage points more likely to respond to a call than firefighters without one, and firefighters who are paid an hourly stipend are 19 percentage points more likely to respond to a call than firefighters who are not paid a stipend. But the positive effect of a stipend is canceled for firefighters who have vanity plates; the effect of a stipend for those with image concerns is effectively zero. Looking at Model 5, in which the level rather than the presence of a stipend is used, we see essentially the same result. For a \$1 increase in the level of a stipend, firefighters who do not have vanity plates are 2 percentage points more likely to turn out to a call. The marginal effect of a stipend for firefighters who have vanity plates, however, is not significantly different from zero. The negative coefficients on the interactions terms indicate that for firefighters with image concerns the positive direct effect of small extrinsic incentives is canceled by the negative indirect effect of incentives on their image for altruism.

**6. Conclusion**

We have introduced unique data on volunteer firefighters and non-volunteer community members that combine survey measures of demographic and behavioral attributes with a measure of altruism generated by the dictator game. The data also include an objective measure of volunteer labor supply for the firefighters via departmental call records. Using these data, we are able to test the predictions of a model in which prosocial behavior is determined by a combination of altruism, image concerns, and extrinsic motivations.

We find that altruism as measured by the dictator game plays a role in the real-life decision to volunteer, and that it also is positively correlated with firefighter training hours. Image concerns as proxied

by having a vanity license plate, on the other hand, are positively associated with the decision to volunteer and with the visible activity of responding to a call, but not with the less visible activity of training.

Recent research has focused on the potential impacts of offering extrinsic incentives for prosocial behavior. We are able to offer empirical evidence on this by taking advantage of variation in the presence and level of small stipends paid to volunteer firefighters in Vermont. We find that offering such extrinsic incentives to volunteers has the direct effect of increasing call response. However, for firefighters with image concerns this effect is canceled out by the negative effect of incentives on the image value of volunteering so that extrinsic incentives have zero net effect on the probability turning out for a fire call. This result suggests that policy makers and volunteer organizations wishing to influence prosocial behaviors should account for the complex interplay of extrinsic incentives and image. Volunteers may value monetary rewards, but such rewards can also have the indirect and presumably unanticipated effect of discouraging prosocial behavior among those who care about being perceived as altruistic.

Turning to other factors, point estimates suggest that social and career concerns, a desire to make friends, religion, and being invited all play a positive role in the decision to volunteer. However, all of these factors save career concerns and being invited have a small or negative relationship to the decision to turn out for a call. As with altruism, what motivates an individual to become a volunteer does not necessarily carry through to greater time devoted to volunteering.

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**Table 5**  
Linear probability models of call response with interaction terms.

	Model 4		Model 5	
	m.e.	s.e.	m.e.	s.e.
<i>Call characteristics</i>				
Spring	0.0060	0.0113	0.0083	0.0113
Summer	0.0112	0.0149	0.0114	0.0149
Fall	-0.0004	0.0168	-0.0013	0.0168
Weekend	0.1017***	0.0210	0.1024***	0.0209
Typical work hours (8–5)	-0.1067***	0.0150	-0.1062***	0.0150
Late night (11–5)	-0.0264	0.0187	-0.0275	0.0188
Fire call	0.0918***	0.0137	0.0932***	0.0137
Calls in last week	-0.0020	0.0013	-0.0019	0.0013
Calls in 2005	-0.0006***	0.0001	-0.0005***	0.0001
<i>Firefighter characteristics</i>				
Altruism (DG allocation)	0.0005	0.0006	0.0004	0.0006
Image (vanity plate)	0.3076***	0.0580	0.2891***	0.0576
Career (factor score)	0.1330***	0.0295	0.1399***	0.0297
Friends1 (make friends)	-0.0283	0.0249	-0.0326	0.0248
Friends2 (friends on dept)	-0.0865**	0.0388	-0.0877**	0.0379
Extroversion (factor score)	-0.0108	0.0140	-0.0087	0.0142
Risk (factor score)	-0.0182	0.0207	-0.0220	0.0210
Religious	-0.0932**	0.0393	-0.0910**	0.0385
Family ff	0.0649**	0.0265	0.0729***	0.0269
Invited	0.0209	0.0396	0.0319	0.0399
<i>Stipend/image interactions</i>				
Presence of stipend	0.1941***	0.0425		
Presence of stipend*vanity plate	-0.2110***	0.0669		
Amount of stipend			0.0241***	0.0053
Amount of stipend*vanity plate			-0.0217***	0.0078
Department indicators	No		No	
Demographic controls	Yes		Yes	
Number of firefighters	83		83	
Number of observations	15,099		15,099	

The table reports linear probability estimates of the response of volunteer firefighters to emergency calls. The dependent variable indicates whether firefighter *i* responded to call *k*. Standard errors are clustered at the firefighter level. Additional demographic controls include the following: age, gender, student status, marital status, children under age 12, children aged 12–18, education level, employment status, income, wage, Vermont native, annual charitable donations, and distance from residence and place of work to fire station. The results are similar for a logit specification and for a linear probability model with firefighter random effects. \* $p < 0.10$  \*\* $p < 0.05$  \*\*\* $p < 0.01$ .

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**Appendix A. Supplementary data**

Supplementary data associated with this article can be found, in the online version, at doi:10.1016/j.jpubeco.2010.07.007.

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