Social Influences and the Private Provision of Public Goods: Evidence from Charitable Contributions in the Workplace

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Current Version: December, 2006

This paper investigates the factors that influence an individual's decision to make voluntary contributions to a public good, focusing on the role of social influences. Measuring social influences is challenging, due to several factors. Group selection may be based on unobservable tastes, there may be unobservable shocks that affect all group members, and the behavior of all group members is determined simultaneously. Proprietary data from the workplace giving campaign of a large national company are used. These data contain detailed information, which can be used to overcome the difficulties often associated with measuring social influences. This paper formulates the problem of measuring social influences as one of estimating the relationship between individual behavior and the behavior of peers by selecting appropriate instruments for group behavior. The results suggest that individual giving behavior is affected by social influences, and that social influences are stronger within salary quartiles and, in some situations, within genders.

1. Introduction

Privately provided public goods play a significant role in our society and economy. Many important services are provided by charitably supported nonprofit organizations. Sectors that particularly rely on voluntary contributions include higher education and health and human services organizations, such as the Red Cross, the Salvation Army and the United Way. In 2000, individuals gave a total of $152 billion to nonprofits, representing 1.8 percent of total personal income.[1] If gifts from all sources are considered, that amount rises to over $200 billion. Given this significant role, understanding the motivations behind the voluntary provision of public goods has motivated many researchers in economics as well as other fields.

The private provision of public goods potentially suffers from the free rider problem described by Samuelson (1954 and 1955). Warr (1982), Roberts (1984) and Bergstrom, Blume, and Varian (1986) develop theoretical models where people only care about their consumption of private goods and the overall level of provision of public goods. These models predict free riding (especially by the poor), and full or partial crowding out. In practice, there appears to be much less free riding than predicted by these models and crowding out is only partial. According to the Independent Sector,[2] 70 percent of people contributed to non-profit organizations in 1998 and mean contributions for contributing households were over $1000, representing 2.1 percent of their household income.[3] In addition individuals at all income levels make contributions. Experimental research further confirms high rates of participation in the private provision of public goods.[4] Empirical evidence suggests that there is less than full crowding out.[5]

In an attempt to reconcile theory and behavior, Andreoni (1988 and 1989), and Cornes and Sandler (1984) have formulated models in which utility is derived from not only the consumption of private goods and the total provision of public goods, but also from the act of giving, referred to as "warm-glow". The predictions of these models are more in line with actual behavioral patterns. While these models always predict less free riding, the exact nature of the utility gained from personal contributions is not always articulated. One important possibility is that warm glow derives from social influences, although not all social influences cause warm glow. Society may solve the free rider problem by developing norms or social conventions that encourage sacrifice for the good of the group. While a number of theoretical models investigate these forces, see Sugden (1984), Glazer and Konrad (1996) Harbaugh (1998) and Rege (2004), little empirical measurement is available. The existing empirical

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[1] See Giving USA (2001).
[2] The Independent Sector is an organization made up of nonprofits, foundations, and corporations that researches areas relevant to strengthening nonprofits and acts as an advocate for nonprofits in the political arena.
[3] This amount represents the mean annual contribution and thus may be skewed by very large donations.
[4] See Daws and Thaler (1988)
[5] See Kingma (1989), Andreoni (1993) and Ribar and Wilhelm (2002)

literature on social influences on giving will be discussed in section 2. Social influences could also include coercion or pressure that causes people to make contributions, but does not result in "warm glow". Many people feel that this type of pressure is particularly common in the workplace.

The behavior of donors and fundraisers for nonprofit organizations also suggests that social influences are believed to play an important role. According to the Independent Sector (2000) 77 percent of those who made donations to nonprofits report that they did so because they were asked to give by someone they knew well. Fundraisers often design their campaigns to leverage the power of social influences. For example, they often have past donors solicit additional contributions. Countless organizations use bike-a-thons and walk-a-thons where participants must solicit sufficient donations from their friends in order to participate in the event. This technique taps into peer networks and the power of social connections. Others recognize that individuals may be more likely to contribute if they know that others are doing so as well; therefore they publicly displayed thermometers that measure dollars raised towards their goal. These behaviors indicate a belief that social influences play a role in individual contribution decisions.

This paper measures social influences in a context involving the private provision of public goods: workplace fundraising for charities. In this paper, social influences are defined to occur when social contact causes the individual to change his or her giving behavior. Social influences occur when individual contributions or participation are different depending on whether or not there is social contact, holding constant the set of possible contributors, individual characteristics and other environmental factors. If there were no social influences, individual giving behavior would not change when social contact was initiated. Social influences could arise from either the giving behavior or the characteristics of one's peers, referred to as endogenous effects and contextual effects respectively. For example, social norms, pressure to conform, and information provision by a peer represent possible causes of social influences due to endogenous effects. Social influences due to contextual effects could arise if an individual is more likely to give when one of his or her peers is handicapped, for example. Any measure of social influence in this paper should be interpreted to include both endogenous and contextual effects. Social influences could occur between many people; this paper focuses on social influences within groups of people who work together and interact on a regular basis.

Social influences must be carefully defined in the context of public goods, where individual giving behavior is likely to be affected by the overall contributions of others due to crowding out. Crowding out does not represent a social influence, because it occurs irrespective of whether there is social contact. Social influences do not include correlation between individual behavior and peer behavior caused by experiencing the same externally determined environmental factors, because the effects of these factors do not depend on the existence of social contacts between the individuals they

influence. For example, city wide natural disasters, characteristics of the local United Way, having an office in the same building as the local Red Cross, and receiving information from campaign coordinators represent common shocks, not social influences. In this paper social influences will be studied in the context of workgroups. These groups are defined by their physical proximity and assignment to the same work group, which allows identification of people who actually know each other.

The data for this study are proprietary records from a large national bank. The data contain extensive information on the company's employees and their participation in the company's workplace giving campaign in 2000 and 2001. These data are derived from the company's payroll database, thus they contain information on demographic characteristics, employment history, and annual income. Most importantly, there is information on physical location and workgroup, making social groups identifiable. Finally, the data include contribution amounts and the name of the recipient organization.

Difficulties measuring social influences are well known and are discussed extensively in the literature on peer effects. These difficulties are discussed in more detail in sections 2 and 4 of this paper. These problems are surmountable in the context of workplace giving for several reasons. First, social groups are clearly defined and identifiable. Second, the proclivity for contributing to public goods plays a smaller role in the selection into groups in the workplace than in other settings. Factors such as knowledge, productivity, and experience are the primary criteria influencing work-group assignment. Third, changes in the composition of social groups that are arguably exogenous can be related to changes in behavior. Public use datasets typically do not provide rich information on social groups, making their use problematic in this context.

This paper formulates the problem of measuring social influences as one of estimating the relationship between individual behavior and the behavior of peers using peer characteristics as instruments for group behavior. Changes in group composition over time are also exploited to measure the impact of social influences. In this case, the characteristics of new peers, former peers, and continuing peers are used as instruments for the change in group behavior.

This analysis supports the hypothesis that social influences play an important role in the private provision of public goods. Controlling for individual characteristics, a 10 percentage point increase in peer participation for broadly defined social groups is associated with a 3.8 to 4.3 percentage point increase in the likelihood that an individual participates, and a $100 increase in the mean contribution of the broadly defined social groups is found to be associated with a an increase in individual contributions by $1.70 to $7.00. The results also suggest that social influences are stronger among groups defined more narrowly by salary quartile and sometimes gender, but not among groups defined by age group.

In section 2, the relevant literatures on peer effects and the determinants of charitable giving are discussed. Section 3 describes the data used for this study. Section 4 describes the general framework for analysis. Section 5 discusses the results. Section 6 concludes.

2. Literature Review

This paper is related to and informed by two strands of the literature. The first is the literature on the measurement of peer effects in other contexts. The methodologies described and used in this strand of literature inform the methods used in this paper. The second discusses the determinants of voluntary contributions to charity, including the role of social influences.

2.1 The Peer Effects Literature

Recently, there has been a growth of literature that seeks to measure the relationship between individual behavior and peer behavior, often referred to as social norms or peer effects. These effects have been studied in a variety of situations ranging from the classroom to the dorm room to the workplace. In all of these settings, there are social groups that are clearly defined and observable. Without these institutional settings, it is difficult to define social groups and it may not be possible to identify any effects. The evidence for social effects is mixed, and depends on the exact situation being studied.

The identification of social influences is complex and many potential pitfalls exist. Manski (1993, 1995, and 2000), Brock and Durlauf (2000), Moffitt (2000), and Durlauf (2001) develop formal frameworks for measuring these effects and describe the difficulties associated with measurement. The literature describes two types of social effects. First, there may be endogenous effects that cause an individual's behavior to change in response to changes in the behavior of his or her peers, holding peer characteristics constant. Second, there may be contextual effects that cause an individual's behavior to change in response to changes in the characteristics of his or her peers, holding peer behavior constant. The distinction between endogenous and contextual effects is not always clear and in many cases it is not possible to separately identify these two types of effects. Therefore, endogenous and contextual effects typically are either considered jointly or one type of effect is assumed away. In this paper, social influences are defined include both endogenous and contextual effects; any measured effect should be interpreted to represent both endogenous and contextual effects.

In the context of workplace giving, endogenous effects occur when individuals give more because they observe their peers giving more. A very simple example of a contextual effect would occur if

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[6] Eisenberg (2002) provides an excellent summary of this literature.

individuals gave more when they had a peer who is in wheelchair because it reminded of them of their duty to help those who are less fortunate. Alternatively, people who have peers that are highly compensated may give more than those with less highly compensated peers, in order to show off and fit in with their wealthy peers.

In the literature, the definition of contextual effects is often confused with a correlation between group characteristics and exogenously determined characteristics of the environment. In the case of workplace giving, if campaign organizers provide additional information on the quality of a particular charity to departments that include highly compensated executives, then individual donations may be correlated with the average salary of the group. If the campaign organizers instead provided the same information to all groups, then this correlation between individual behavior and group characteristics would disappear. In this scenario the correlation between group characteristics and individual behavior is driven by common environmental factors and not by a contextual effect.

Several confounding factors stand in the way of measuring the effects of social influences. First, because groups make decisions simultaneously, it is difficult to tell the difference between the influencer and the influenced. Manski refers to this as the reflection problem. The second potential problem is selection; groups may be formed in a way that selects members with similar tastes. Third, there may be correlated effects, which occur when there are external unobservable effects that cause members of the group to behave similarly. For example, correlated effects exist when all members of a group change their behavior in response to advertising. The existence of these external shocks can further complicate the measurement of social influences if the external shocks are correlated with group characteristics. These issues will be discussed more precisely, when a formal framework is introduced in section 4.

Several other papers have studied various forms of social effects in the workplace. Because prior knowledge of group makeup and characteristics are necessary to identify peer effects, departments in the workplace provide an excellent setting to study these phenomena. Ichino and Maggi (2000) look at counterproductive behavior in a large Italian firm. They find evidence that Northern Italians who have a proclivity towards counterproductive behavior are likely to move to the south, where attitudes towards hard work are more lax. Similarly, highly productive Southern Italians tend to move to the north. Their results suggest that selection drives some but not all of the similarity between individual behavior and peer behavior. Sorensen (2004) studies health insurance choices. He finds that the correlation between individual behavior and peer behavior is stronger when observable characteristics are more similar. Duflo and Saez (2002 and 2003) examine enrollment in tax-deferred savings accounts. In the first paper they look at subgroups within departments and find that own-group effects are larger than cross-group effects, suggesting that common shocks and selection alone are not behind the correlation in behavior. In their second paper, they use a randomized experiment to provide additional information to some employees. In

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this experiment, they find evidence that information is shared within workgroups. Providing additional information on tax-deferred accounts to only some members of a group caused all members of the group to change their behavior. These papers provide empirical support for the existence of peer effects in other workplace situations.

2.2 Voluntary Contributions to Charity

A number of empirical papers consider the role of social influences in determining individual participation and contributions. Unlike this paper, none of these papers uses data where social groups are observable. Experiments, surveys designed to focus on charitable giving, and publicly available datasets such as the Consumer Expenditure Survey have been used to investigate the motivations behind voluntary contributions to charity.

Long (1976) and Keating, Pitts and Appel (1981) use surveys that ask specifically about the method of solicitation for gifts. Long's results are mixed, but suggest that in some circumstances being asked to contribute by someone you know may lead to increases in the amount contributed. Keating et al. only consider contributions to the United Way, and find that people who work at companies that have United Way campaigns are more likely to contribute. This result is not surprising because very few people are asked to contribute to the United Way outside of the workplace, and other research suggests that people who are not asked tend not to contribute. Schervish and Havens (1997) use the 1992 Survey of Giving and Volunteering in the United States. They find that being asked to contribute by a friend or business associate has a significant positive effect on the percentage of income given, but that being encouraged by an employer has a negative effect on contributions. One drawback of this investigation is that their results are based on self-reported motivations for giving

Experimental research, such as Fehr and Gächter (2000 and 2002), Gächter and Fehr (1999), Andreoni and Petrie (2004), Rege and Telle (2004), Van Dijk, et al. (2002), and Dawes and Thaler (1988), has found that a lack of anonymity, social connectedness, and sanctions cause people to contribute more to public goods. In a field experiment, Soetevant (2005) confirms that finding that anonymity reduces contributions.

Andreoni and Scholz (1998) consider the same questions posed in this paper. They use the Consumer Expenditure Survey to measure the effect of donations by an individual's social reference group on his or her own donations. They define social reference groups based on socio-economic and demographic characteristics of each household. Andreoni and Scholz are able to identify subsets of the population that value contributing more than others do. However, the data used by Andreoni and Scholz

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[7] For example Gächter and Fehr (1999), Andreoni and Petrie (2004), and Rege and Telle (2004).

do not allow them to measure social influences as defined in this paper because they are unable to observe whether or not individuals actually know each other. Feldstein and Clotfelter (1976) use data and methods similar to those used by Andreoni and Scholz and find no evidence of an effect of group behavior on individual behavior.

This paper, in contrast to previous work, defines social reference groups to include only individuals who actually interact with each one another. This makes it possible to identify how an individual's choices are affected by the behavior of other members of his or her social group. Andreoni and Scholz point out that a workplace giving campaign or a university capital campaign might be a better place to study the role of social influences in the private provision of public goods. While Fehr and Gächter (2000) and (2002), Dawes and Thaler (1988), and Andreoni and Scholz (1998) provide insight into the motivations for giving, this paper will further our understanding by examining actual contributions in a social setting, where extensive information is available concerning each member of each group.

3. Data

In order to study the role of social influences on the private provision of public goods very detailed data is needed. The ideal dataset would contain information on contributions, demographics, income data, and information regarding social groups. Typical publicly available data uses a random sample of individuals, making it impossible to observe social groups. Data from an employer has the potential to provide more of the necessary data. One of the primary benefits of using workplace data is that it is easy to identify people who know each other. In addition, there is less likelihood of selection bias. While people may choose their friends based on their charitable giving, it seems less likely that this particular source of selection bias plays a significant role in the selection of employees. Factors such as knowledge, productivity and past experience are probably more important.

Many companies operate workplace giving campaigns that allow the employees to make one time or regular payroll deduction contributions to nonprofit organizations. Often contributions can only be made to one nonprofit organization, typically the local United Way.[8] Recently these restricted campaigns have started to fall out of favor, and many employers have opened their campaigns to other nonprofits, some are open to all registered 501(c)(3) organizations.

The United Way of America assisted in the search for a company to participate in this research. Their National Corporate Leadership group helps companies that operate in many locations coordinate

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[8] The United Way operates like a franchise. Each local United Way is an independent due paying member of the larger organizations. The characteristics of United Ways can vary dramatically across locations. Each United Way covers a territory defined by zip codes, so there is no overlap.

their campaigns and work with the local United Ways in each location. The companies that work with the National Corporate Leadership group where ideal candidates for this research. These large national corporations obviously contain many social groups. In addition, there are many employees engaging in the same job but in different social groups. Similarity in work tasks across locations could potentially avoid the problem of selection biases. Finally, a company with geographic diversity would avoid any potential biases due to local United Way scandals or controversy.[9] The National corporate leadership group helped identify several potential companies. Obtaining legal permission to access employee databases proved to be an enormous hurdle.

Access to proprietary data from a large national bank was secured. The bank operates both traditional retail banking services and investment banking services. The bank has over 75,000 employees and operates in over 20 states. The provider of the data for this project has asked to remain anonymous; therefore detailed information regarding the company is not included. For confidentiality reasons, the size of the sample is not divulged, however the sample size is large (generally in the tens of thousands) and will not negatively affect statistical significance. The data contain information related to employment, contributions and demographics for all employees as of September 2001. The data also contain similar information for most of those employees from September 2000. The company allows contributions to any registered 501(c)(3) and the structure of the campaign is roughly the same across all locations. The company does not match contributions.[10]

The campaign hierarchy contains several levels. There is a national campaign chair and co-chair chosen from the upper levels of the company hierarchy who oversee the campaign and participate in decisions regarding campaign marketing and goals. Below the chairs are the State Presidents (a job title, not a campaign title) who are expected to play a motivational role in the campaign. There are also division leaders selected from each of the major lines of business to ensure effective campaign communication and coordination across different parts of the company. The bottom level within the campaign hierarchy is the campaign team.

Each employee is assigned to a campaign team. Teams are based on location and line of business and are normally intended to have between 5 and 75 employees (although the actual sizes range from 1 to 573). Over 50 percent of employees are on teams of 20 or fewer people. Campaign teams are intended to overlap with actual work groups and are based on physical location and department. Team assignments are not based on other characteristics, such as demographics or giving history. Teams are also assigned a

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[9] For example, during 2000 and 2001, funding of the Boy Scouts of America led to much debate. Also due to recent near bankruptcy by the Silicon Valley United Way, using a company near Stanford did not seem practical.

[10] This is preferable because without a match, the convenience of regular payroll deduction and social pressures to participate are the primary motivations for participating in the campaign, as opposed to giving outside of the workplace.

team captain. For many teams, the workgroup manager serves as the captain. Captains are selected based on officer status, level within the company, and contribution history. In addition, preference is given to people who have served as a team captain in the past. However, serving as a team captain is voluntary, thus an alternate may be chosen. In some cases a team may have no captain, if the first candidate refuses or leaves the company and a replacement cannot be found. It is important to note that captains are considered to be part of the social group and that their influence is included in the measure of social influences.

At the beginning of the campaign, each employee receives an "ask letter". These letters introduce the campaign and suggest a contribution amount. These amounts are a function of income and past contributions. A common practice in fundraising is to annually ratchet up the amount that each person is asked to give. For example, if you donated $2 per month year 2000, then in 2001, you might be asked to donate $3 per month. There were 6 different letters sent to employees. Three of these letters included a list of employees who contributed $1000 or more in the previous year. These lists are sent to people who are considered to be capable of contributing at least $1000. People who make a donation of $1000 or more are known as leadership givers. Those who received the list of the previous year's leadership givers may be able to directly observe the past behavior of some members of their social group.

In addition to the ask amounts, employees receive a giving guide. The materials given to the employees clearly state, "This guide is based on previous associate giving. We know associates' individual lifestyles will determine their gift amounts, and we suggest they use this chart only as a guide." Despite this statement actual gift amounts tend to be less than the giving guide would suggest. The suggested and actual contributions as a percent of salary are listed in Table 1.

The campaign takes place in two stages. In the first stage (which lasts about 1 month), "Pacesetters" are asked to make a contribution. Pacesetters, primarily employees at or above the senior vice president level, represent roughly 4.4 percent of the company's employees.[11] While Pacesetters are asked to donate in the first stage, they have the option of donating during the second stage as well. In the second stage, the remainder of the employees are asked to make donations. This two-stage structure is a common campaign characteristic used in many types of fundraising campaigns.[12] In 2001, the first stage

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[11] Because the data for this project comes from a bank with numerous branches, the percentage of employees designated as Vice Presidents may be higher than in other organizations.

[12] See Varian (1994) Andreoni (1998) and (2004), and Vesterlund (2002) for a discussion of these types of campaigns.

took place in August and the second stage was in September. Employees were scheduled to receive their campaign information on or around September 10.[13]

The data used in this research contain two types of information: campaign related characteristics and employee characteristics. Nearly all employees are included in this analysis. Those with questionable salary information are excluded. This represents less than 0.5 percent of the sample. The CEO is also excluded. Table 2 contains summary statistics of all variables. The campaign data include pledge amount, non-profit designation, team assignments, team leader indicators, ask amounts, pace setter indicator, and the letter version received. The participation rate is 57 percent, the mean annual contribution conditional on participation is $271, and the median is $72. In addition, using the workplace zip code, it is possible to identify which United Way is most likely to influence an individual either through information provision directly through the workplace or through more general marketing and publicity.

The employment data contain information on pay, hierarchy, line of business, location, tenure, age and gender. There are two measures of annual pay: contractual pay and an estimate of actual pay that takes into account bonuses and actual hours worked by hourly employees. The hierarchy information includes information such as level, vice president, senior vice president, and executive vice president indicators, and manager status. General line of business and specific cost centers are also included. The location information includes city, state and work zip code as well as an internal mail code. The mail code allows identification of people who sit within a small proximity of each other. Mail codes range in size from 1 to 537. Fifty percent of employees are in mail codes of 19 or fewer people. In addition, over 300 employees work primarily from home. These people have less regular contact with their fellow employees thus they may be less affected by the people in their department.

The key benefit to studying workplace giving is the unique ability to observe social groups. Campaign teams and mail codes will be used to identify an individual's peers. People who sit near one another and work together are the most likely to know each other, and therefore the most likely to discuss the giving campaign, and in turn the most likely to influence each other's contributions. Because teams are designed to include people who work together (as defined by their physical proximity and their cost center), these groups are likely to have significant overlap. Therefore, the two definitions are studied independently.

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[13] Obviously the events of September 11 had some impact on employee giving in 2001. There is a slight increase in participation from 55.5 percent to 57.4 percent. But this exogenous shock merely acts as a time effect. Everyone in the country was affected by these events, although people in New York and Washington DC may have been more affected. Because employees are allowed to contribute to any 501(c)(3), one might expect that many would make donations to the Red Cross disaster relief fund or the United Way's September 11th Fund, or other fire fighter relief

Some methods will make use of changes in groups over time. In these methods, it is not possible to examine social groups based on campaign teams. The definitions of teams are not consistent over time. Mail codes, on the other hand, are defined similarly in both years, and therefore can be used to examine changes in social groups. An individual is designated as a mover if their physical location changes, however if 85% of employees in the location move together or their group is subsumed into another location, they are classified as not moving.[14]

4. Framework

Because of the complexities inherent in measuring social influences, it is useful to consider this problem in the context of a formal model. Each individual (i) is assigned to a group (k) and a subgroup (j) within that group. An individual's giving behavior in period t (G_{ijkt}) is a function of their characteristics (X_{ijkt}), mean subgroup behavior ($\bar{G}_{-i,jkt}$), mean subgroup characteristics ($\bar{X}_{-i,jkt}$), unobservable common shocks that affect all members of the group in the same way, such as environmental conditions (η_{kt}), and unobservable shocks to and characteristics of the individual's tastes (ε_{ijkt}). In all analyses, subgroup behavior and characteristics are defined as the behavior or characteristics of the other members of an individual's subgroup, i.e. the individual is excluded. In addition $\bar{X}_{-i,jkt}$ is assumed to contain the same characteristics as X_{ijkt}. Here subgroup behavior is defined as the mean contribution, but other possibilities, such as the median contribution and the participation rate, are discussed below. This simplified linear model, which does not impose a non-negativity constraint on contributions, helps to highlight the problems inherent in attempting to measure social influences. An individual's behavior is given by the following:

$$G_{ijkt} = \alpha + \beta X_{ijkt} + \gamma \bar{G}_{-i,jkt} + \delta \bar{X}_{-i,jkt} + \eta_{kt} + \varepsilon_{ijkt} \tag{1}$$

Here both γ and δ represent social influences. Following Manksi (1993), endogenous effects, captured by γ, occur when the amount an individual gives is influenced by the amount given by their peers. Contextual effects, captured by δ, occur when the characteristics (rather than the behavior) of an individual's peers influence their gift amount. Manski defines both endogenous and contextual effects as social effects and shows that it is not possible to separately identify the two coefficients. Therefore, many papers on peer effects assume only one type of social effects exist. While this assumption may not reflect

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funds. In fact, less than 3 percent of employees gave to these organizations. In contrast, Giving USA (2002) reports that 65% of Americans gave to support September 11th relief.

reality, it is useful to consider the cases where only endogenous effects or only contextual effects exist before considering the case where both effects are present.

The key difference between the framework described here and that used by Manski is the distinction between groups and subgroups. Each individual is assigned to a group, k, and a subgroup within that group, j. The group assignment process is not explicitly modeled. However, in this model, it is assumed that unobservable common shocks occur at the group level. We will show that when fixed effects are included to control for these unobservable common shocks at the group level, the coefficient on group behavior can be interpreted as indicating whether social influences are stronger at the subgroup level than at the group level. In the implementation of the methods described below, subgroups will be defined so that all members of a single subgroup will be members of the same group and most groups will include multiple subgroups. In choosing variables to define groups and subgroups there is a tradeoff between narrowly defined groups and broadly defined subgroups. Ideally, groups should be defined narrowly enough to capture all common external factors, while subgroups should be defined broadly enough to include all individuals who might influence each other. In practice, this is impossible and there are tradeoffs between narrowly and broadly defined groups and subgroups.

In section 5, eight group-subgroup combinations will be considered. The first two define subgroups broadly in order to include those who are most likely to be an individual's peers. Groups will be defined by the local United Way covering their workplace; this roughly approximates the metropolitan area. Subgroups will be defined by the campaign team or by the mail code. In this case, there are approximately 400 groups and 8,500-10,500 subgroups. The next six definitions of groups and subgroups will define groups narrowly in order to capture unobservable common shocks with more confidence. In this case, groups are defined by mail codes or team and subgroups are defined by gender, salary quartile, and age group. This results in 10,500 groups and over 20,000 subgroups.

This section defines 2 methods to measure social influences assuming only endogenous effects exist and 2 methods to measure social influences assuming only contextual effects exist. For each type of effect, one method uses cross sectional data and one uses panel data.

4.1 The Case of Endogenous Effects: $\gamma \neq 0, \delta = 0$

In much of the literature on peer effects, contextual effects are ignored and only endogenous effects are considered. In this case the equation describing individual behavior becomes:

$$G_{ijkt} = \alpha + \beta X_{ijkt} + \gamma \overline{G}_{-i,jkt} + \eta_{kt} + \varepsilon_{ijkt} \qquad (2)$$

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[14] A number of different definitions of moving were tested. The results are robust to small changes in the definition of who moves and who stays in the same location.

The goal of this analysis is to estimate γ. An accurate measure of γ is interpreted as the effect of a change in individual l's gift, without allowing re-equilibration of the behavior of other group members or external shocks, on the gift of individual i. It is useful in what follows to have reduced-form expressions for G_{ijkt} and $\overline{G}_{-i,jkt}$. For individual i:

$$G_{ijkt} = (1+\gamma^2\phi)(\alpha + \beta X_{ijkt} + \eta_{kt} + \varepsilon_{ijkt}) + \sum_{l \neq i} \gamma\phi(\alpha + \beta X_{ljkt} + \eta_{kt} + \varepsilon_{ljkt}) \tag{3}$$

and the average behavior of all other members of the subgroup is:

$$\overline{G}_{-i,jkt} = \gamma\phi(\alpha + \beta X_{ijkt} + \eta_{kt} + \varepsilon_{ijkt}) + \sum_{l \neq i} \phi(\alpha + \beta X_{ljkt} + \eta_{kt} + \varepsilon_{ljkt}). \tag{4}$$

In equation 3, ϕ is the weight placed on the characteristics of each of the other members, excluding i, of group k and subgroup j, and is given by the following expression:

$$\phi = \frac{1}{(1-\gamma)(N-1+\gamma)} \tag{5}$$

From equation 4 we can see that the mean behavior of all others in subgroup j depends on the characteristics of individual i, unless $\gamma = 0$. As discussed by Manski (1993, 2000) and Moffitt (2001), the coefficients in equation 2 are difficult to identify due to several problems. In general, these problems arise because the reduced form expression for $\overline{G}_{-i,jkt}$ contains η_{kt} and ε_{ijkt}.

An examination of equation 4 highlights the problems associated with using OLS to estimate equation 2. Despite the biases inherent in the estimation of equation 2, many papers that attempt to measure peer effects include this estimation. There are four primary sources of biases. Manski has called the first problem the reflection problem. This refers to the simultaneous determination of individual behavior and subgroup behavior which causes the average contributions of others, $\overline{G}_{-i,jkt}$, to be correlated with the individual's unobservables, ε_{ijkt}. Because of the simultaneous determination of behavior, ε_{ijkt} appears in equation 4. Therefore, OLS is only appropriate if $\gamma = 0$. The second problem is the group selection problem. This problem arises if individuals are assigned to groups based on their unobservable taste for giving or factors that are correlated with that unobservable taste. Within each group or subgroup, ε_{ijkt} may be correlated with ε_{ljkt}. If this is true, then ε_{ijkt} and $\overline{G}_{-i,jkt}$, which is a function of ε_{ljkt}, will be correlated. This problem would disappear if group assignment were random. The third problem is the existence of environmental factors and unobservable common shocks within groups (η_{kt}). The term η_{kt} picks up environmental factors that affect the entire group, as opposed to ε_{ijkt}, which represents individual unobservable characteristics. Because η_{kt} enters into the equation for

$\overline{G}_{-i,jkt}$, it is obvious that subgroup behavior is correlated with the unobservables. A fourth related problem is that groups and subgroups may not be defined correctly. Groups should be defined narrowly enough to capture common unobservable effects, while subgroups should be defined broadly enough to include those peers who influence an individual. These problems all contribute to the biased estimates of γ obtained using OLS.

Estimation of the reduced form equation for individual gift amounts, G_{ijkt} shown in equation 3 avoids the first three of these problems. If group selection and common environmental factors are not correlated with observable group characteristics this method will identify the existence of endogenous effects. If the coefficients on subgroup characteristics are significant and it is assumed that there are no contextual effects and no common shocks correlated with subgroup characteristics, then endogenous effects exist. However this method does not allow for measurement of the magnitude of the endogenous effects.

If measuring the magnitude of social influences is desired an alternative method is needed. The remainder of this section will systematically address the four problems described above. While the problem of appropriately defining groups and subgroups is primarily an empirical issue, it is valuable to address the distinctions between groups and subgroups here as well. Up to this point we have assumed that social influences occur at the subgroup level and that common unobservable effects affect all members of group in the same way. If subgroups are defined too narrowly or do not reflect social groups, it is possible that social influences could occur at the group level as well. If the magnitude of social influences is different at the subgroup level than at the group level, then including a group level fixed effect described here will identify whether social influences are stronger at the subgroup level. A derivation of this is included in the appendix. Here, the addition of a group level fixed effect will control for the group's average contribution, leaving the following equation to be estimated:

$$G_{ijkt} = \alpha' + \beta'X_{ijkt} + (\lambda - 1)\gamma''\overline{G}_{-i,jkt} + \theta_k d_{kt} + \varepsilon'_{ijkt}. \tag{6}$$

Where $\theta_k d_{kt}$ represents the group fixed effects and λ represents the additional weight placed on the behavior of peers in the same subgroup. It is reasonable to assume that within any group there are likely to exist subgroups within which the influence of peer behavior is stronger than the influence of the behavior of peers outside of that subgroup. The coefficient on $\overline{G}_{-i,jkt}$ can now be interpreted as the additional impact of social influence at the subgroup level.

If the coefficient on subgroup behavior is zero or negative, then that implies that social influences are not stronger at the subgroup level than at the group level. This is especially likely if subgroups are defined narrowly and therefore do not reflect an individual's closest peers, for example if subgroups were

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defined by some irrelevant factor such as eye color. If the coefficient is positive, it implies that social influences are stronger at the subgroup level than at the group level. This seems particularly likely if groups are defined so broadly that an individual is unlikely to know most members of their group, for example when groups are defined by cities. The tradeoff between broadly defined subgroups and narrowly defined groups will be further examined in the results section.

The group fixed effects, which were added above to control for possible social influences at the group level, will also address the problem of the possible existence of unobservable common shocks to the group. So long as common shocks occur at the group level and not the level of the subgroup, group level fixed effects will control for common shocks experienced by group members. When groups are defined broadly at the level of the local United Way, then fixed effects will control for correlated unobservables that affect all members of a large geographical area, such as citywide United Way scandals or local natural disasters.

Alternatively, if groups are mailcodes or teams and subgroups are based on salary level, gender or age, then group level fixed effects would control for correlated unobservables that affect all people in the same mailcode or team. This includes characteristics such as the physical layout of the office, extra posters in the office, and any encouragement by supervisors or management from other teams and mailcodes that applies to all workers in the group. In addition, this will control for selection at the level of the team or the mailcode; if people are selected into a workgroup based on a characteristic that is correlated to the proclivity for giving, then the group fixed effect will control for this. For this to hold requires the assumption that the desire for this characteristic is applied equally to all subgroups (such as all ages or genders or salary levels) in the group. This assumes that correlated unobservables do not occur at the level of the subgroup. This may be a strong assumption, therefore several definitions of subgroups are included.

While the addition of fixed effects can address the problems of unobservable common shocks and selection at the subgroup level, the results from OLS will still be biased because subgroup behavior is endogenous. Therefore the use of instrumental variables is more appropriate. An appropriate instrument will satisfy the following three conditions. First, the instrument must be uncorrelated with individual i's shock in the current period, ε_{ijkt}. If selection bias leads to a correlation between the unobservable individual characteristics, ε_{ijkt} and ε_{ljkt}, of members of a subgroup then the instruments for $\overline{G}_{-i,jkt}$ must be uncorrelated with ε_{ljkt} for all i and l. Second, the instrument must be correlated with average subgroup behavior, $\overline{G}_{-i,jkt}$. Many potential instruments satisfy the final condition, that they be correlated with subgroup behavior. However, it is difficult to find instruments that will always satisfy the conditions

that they be uncorrelated with the unobservables. This is especially true when the selection of group members leads to a correlation between the individual unobservable characteristics

A commonly used solution, to correct for the simultaneity problem and the possible correlation between subgroup behavior and unobservables, is to use the average characteristics of the other subgroup members, $\overline{X}_{-i,jkt}$, as an instrument for average subgroup behavior, $\overline{G}_{-i,jkt}$.[15] This instrument was first proposed by Case and Katz (1991). Because the characteristics of other subgroup members enter into the reduced form equation (equation 4), subgroup characteristics are likely to be correlated with subgroup behavior and to be uncorrelated with the individual unobservable characteristics and tastes, ε_{ijkt}. The primary problem with this method is that there may be unobservables that are correlated with subgroup characteristics, in particular common shocks, η_{kt}, may be related to subgroup characteristics, $\overline{X}_{-i,jkt}$. For example, external pressure to contribute, from the CEO or other executives, could cause different information to be provided to employees at the senior levels within the company than to those at lower levels within the company. If this is the case, then the instrument will be correlated with the unobservables. The inclusion of group level fixed effects to control for unobservable common shocks will avoid this potential problem.

By combining the use of group level fixed effects and by using subgroup characteristics as an instrument for subgroup behavior the problems of simultaneity and group level common shocks are addressed. These two methods will provide the best estimate of social influences in cross sectional data. However, the problem of group selection remains. Estimating equation 2 or 6 using instrumental variables will measure social influences, assuming that group selection does not bias the results. As mentioned before, biases due to the problem of group selection based on unobservable characteristics are less likely in this setting than in other settings because individuals are likely to be selected on factors other than their proclivity for giving. While one can argue that group selection is unlikely to be a significant problem in this setting, there is still the possibility that group selection will bias our results. With cross sectional data this problem can not be addressed, but with panel data it may be possible to overcome the problem of group selection.

With panel data is possible to observe changes in subgroup composition over time. Here the change in individual giving from year 0 to year 1 is used as the independent variable.

$$G_{ijk0} = \alpha + \beta X_{ijk0} + \gamma \overline{G}_{-i,jk0} + \theta_k d_{k0} + \varepsilon_{ijk0} \tag{7a}$$

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[15] Group characteristics are only an appropriate instrument when social influences include endogenous effects but not contextual effects. If there were contextual effects, group characteristics would be included in the estimation equation and therefore could not be used as instruments.

$$G_{ijk1} = \alpha + \beta X_{ijk1} + \gamma \overline{G}_{-i,jk1} + \theta_k d_{k1} + \varepsilon_{ijk1} \tag{7b}$$

$$\Delta G_{ijk,10} = G_{ijk1} - G_{ijk0} = \Delta\alpha + \beta\Delta X_{ijk,10} + \gamma\Delta\overline{G}_{-i,jk,10} + \theta_k\Delta d_{k,10} + \Delta\varepsilon_{ijk,10} \tag{7c}$$

Differencing can remove the group selection problem if individuals are selected into groups based on permanent characteristics. For example, individuals may be selected into groups based on their ability to be a leader, a characteristic that is likely to remain constant. Assume that:

$$\varepsilon_{ijkt} = \mu_{ijk} + \zeta_{ijkt}. \tag{8}$$

Where μ_{ijk} represents permanent unobservable characteristics and ζ_{ijkt} represents transitory unobservables. If it is assumed that selection is based on permanent characteristics then differencing will remove any biases due to group selection. Equation 7c then becomes:

$$\Delta G_{ijk,10} = \Delta\alpha + \beta\Delta X_{ijk,10} + \gamma\Delta\overline{G}_{-i,jk,10} + \theta_k\Delta d_{k,10} + \Delta\zeta_{ijk,10}. \tag{9}$$

In this case, those factors that influence selection, μ_{ijk}, which are constant over time are removed. This method will only include people who stay in the same location from one year to the next in the sample, so that differencing will remove common shocks that are constant over time. For example, this method removes the effect of an office being located in the same building as the Red Cross. There may be common shocks that are not constant over time; therefore group fixed effects are still included. Peer groups will include both people who stay in one location and people who change locations.

The problem of group level common shocks is corrected with fixed effects and the problem of group selection is corrected by differencing. However, the reflection problem remains. Again looking at the reduced form for $\Delta\overline{G}_{-i,jk,10}$ is valuable.

$$\begin{aligned}
\Delta\overline{G}_{-i,jk,10} &= \gamma\phi\left(\Delta\alpha + \beta\Delta X_{ijk,10} + \theta_k\Delta d_{k,10} + \Delta\zeta_{ijk,10}\right) \\
&\quad + \phi\sum_{l\neq i}\left(\Delta\alpha + \beta\Delta X_{ljk,10} + \theta_k\Delta d_{k,10} + \Delta\zeta_{ljk,10}\right)
\end{aligned} \tag{10}$$

Where ϕ is given by equation 5. The reflection problem arises here because the error terms in equation 7c also appear in equation 10. One potential remedy to this problem would be to use the change in subgroup characteristics, $\Delta\overline{X}_{-i,jk,10}$, as an instrument for the change in the average giving of the subgroup overall.

There are two sources of variation in $\Delta\overline{X}_{-i,jk,10}$. First, the characteristics of each employee in a particular subgroup will change from year to year. Obviously, each person's age will increase every year. Similarly, salaries are likely to increase each year. Changes in these characteristics of one's peers may not have much effect on average peer contributions. However, the second source of variation, changes in

group composition, is more likely to influence peer contributions. Group membership is not constant over time; employees change jobs with in a given firm and divisions are restructured. Average subgroup contributions are more likely to change when the subgroup changes due to the addition of new members than when the characteristics of individual subgroup members change. If social influences are important, then changes in subgroup composition are likely to change an individual's contributions.

Given these two sources of variation in subgroup characteristics, there are several potential instruments. In order to better understand these potential instruments, it helps to build on the current notation. Because peer behavior and peer characteristics exclude the individual's behavior, they are always measured relative to a particular person. For any given individual who stays in the same subgroup from one year to the next, there are peers that stay in their subgroup over time, peers that join their subgroup, and peers that leave their subgroup. In order to discuss changes over time, a superscript will be added to the average peer characteristics, for example $\overline{X}_{-i,jk1}^{stay,leave,1}$. This superscript denotes who is included in this subgroup and the year that their characteristics are measured. So $\overline{X}_{-i,jkx}^{stay,join,y}$ denotes the average characteristics in year y of stayers and joiners of subgroup j and group k in year x, excluding individual i.

The most obvious possible instrument for the change in peer behavior is the difference between peer characteristics in year 1 and year 0, $\overline{X}_{-i,jk1}^{stay,join,1} - \overline{X}_{-i,jk0}^{stay,leave,0}$. However, this is likely to primarily measure changes in the characteristics of particular employees and imposes restrictions on the functional form of the relationship between changes in peer characteristics and changes in peer behavior. This requires that stayers and joiners must have the opposite impact on the change in peer contributions as stayers and leavers. Therefore this instrument is not used. Instead, the characteristics in 2000 of stayers, joiners and leavers, $\overline{X}_{-i,jk1}^{stay,0}$, $\overline{X}_{-i,jk1}^{join,0}$, and $\overline{X}_{-i,jk0}^{leave,0}$, are jointly used. Using only characteristics in 2000 focuses on changes in characteristics due to changes in subgroup composition. Minimal restrictions are placed on the functional form, allowing the characteristics of stayers, joiners and leavers to have different effects on changes in subgroup behavior.[16] As in the cross sectional method, peer characteristics are likely to be correlated with the change in average subgroup behavior, and are not likely to be correlated with the unobservables.

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[16] Other possible instruments included $\overline{X}_{-i,jk1}^{stay,join,0} - \overline{X}_{-i,jk0}^{stay,leave,0}$ and $\overline{X}_{-i,jk1}^{stay,join,0}$ and $\overline{X}_{-i,jk0}^{stay,leave,0}$ used together. These clearly focus on changes in peer characteristics due to changes in the composition of the group. However both of these restrict the functional form of the relationship between changes in peer behavior and peer characteristics. Therefore, only the least restrictive relationship is used.

The methods described here systematically remove the problems associated with measuring social influences. The addition of group fixed effects controls for group level common shocks. Using subgroup characteristics as an instrument corrects for the biases due to simultaneity. Combining these to corrections provides the best estimate of social influences in cross sectional data. With panel data it is possible to improve upon these estimates. This method uses the first difference to correct for biases due to group selection and examines a variety of instruments that capture changes in peer characteristics, primarily focusing on changes due to members joining and leaving a subgroup.

4.2 The Case of Contextual Effects: $\gamma = 0, \delta \neq 0$

In the previous section, it was assumed that endogenous effects were the only form of social influences. This section focuses on contextual effects. Individual behavior is now described by the following equation.

$$G_{ijkt} = \alpha + \beta X_{ijkt} + \delta \bar{X}_{-i,jkt} + \eta_{kt} + \varepsilon_{ijkt} \tag{11}$$

In this case the goal is to measure the effect of average peer characteristics on individual behavior, δ. In accordance with Manski (1993), the terms in equation 3, the reduced form equation with endogenous effects only, are equivalent to those in equation 11. In estimating this equation it is not possible to identify whether there are contextual or endogenous effects. However, if it is assumed that there are only contextual effects then it is sufficient to estimate equation 11. In this case there is no simultaneity problem. However there may be correlation between the observable characteristics and the unobservables due to group selection or group level common shocks, analogous to the problems addressed in section 4.1, biasing the estimate of δ. The problem of group level common shocks can again be addressed by including group level fixed effects. The potential for social influences at the group level can be addressed by varying the definition of groups and subgroups.

If there is group selection based on unobservables that are correlated with the subgroup average characteristics, then the coefficient δ will measure not only contextual effects but also subgroup selection. Under appropriate assumptions, it is possible to control for biases due to group selection by examining the change in individual contributions over time. This is analogous to the case with endogenous effects. This method examines the effects of changes in subgroup characteristics on changes in individual contributions, given in the following equation:

$$\Delta G_{ijk,10} = \Delta \alpha + \beta \Delta X_{ijk,10} + \gamma \Delta \bar{X}_{-i,jk,10} + \theta_k \Delta d_{k,10} + \Delta \zeta_{ijk,10} . \tag{12}$$

However $\Delta \bar{X}_{-i,jk,10}$ captures changes in subgroup characteristics due to changes in the characteristics of the subgroup members as well as changes due to the addition or removal of subgroup members. Individuals are arguably less likely to respond to changes in the characteristics of their peers, such as one

person receiving a raise, than to changes subgroup composition. In addition, as in the endogenous effects case, it may be preferable to impose fewer restrictions on the functional form of the social influences. Therefore, this method will jointly consider the characteristics of stayers, leavers, and joiners $\overline{X}_{-i,jk1}^{stay,0}$, $\overline{X}_{-i,jk1}^{join,0}$, and $\overline{X}_{-i,jk0}^{leave,0}$. As in the case with endogenous effects, the sample is limited to individuals who stay in the same location from one year to the next, in order to remove the constant effects of selection that enter each year.

4.3 The Case of both Endogenous and Contextual Effects: $\gamma \neq 0, \delta \neq 0$

Manski shows that with prior knowledge of the makeup and characteristics of groups, it is possible to separate correlated effects from social influences. In this paper, social influences are defined to include both effects of peer behavior and effects of peer characteristics, holding fixed external factors that affect all group members. Thus for the purposes of this work, it is not necessary to separately identify endogenous effects and contextual effects. Nevertheless, it is important to separate social influences from correlated effects.

If it is assumed that there are both endogenous and contextual effects, then individual behavior is described by equation 1. While the reduced form with both endogenous and contextual effects is quite a bit more complicated than in the case with endogenous effects only, the functional form is similar to that of equation 4.[17] Now the coefficient on $\overline{X}_{-i,jkt}$ contains both δ and γ. Whether we approach the problem of measuring social influences by assuming $\gamma \neq 0 \,\&\, \delta \neq 0$ or $\gamma \neq 0 \,\&\, \delta = 0$ or $\gamma = 0 \,\&\, \delta \neq 0$ does not matter. Estimating an equation where individual gifts are a function of individual and subgroup characteristic will produce the same results regardless of whether endogenous effects, contextual effects or both are assumed. In this framework, it is not possible to separate endogenous and contextual effects. Any measurement of a coefficient on $\overline{G}_{-i,jkt}$ or $\overline{X}_{-i,jkt}$ should be interpreted as an indication of a social influence, not an indication of only endogenous effects or contextual effects. If the taste for giving is assumed to be a characteristic that is unobservable to the

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[17] In this case the reduced form for $\overline{G}_{-i,jkt}$:

$$\overline{G}_{-i,jkt} = \left[\frac{1}{1-\gamma} \frac{1}{N-1+\gamma} \right] * \left[\begin{array}{l} \gamma \left(\alpha + \left(\dfrac{\delta}{\gamma} - \beta \right) X_{ijkt} + \eta_{kt} + \varepsilon_{ijkt} \right) \\ + \left[(N-1)(\beta + \delta) - \delta(1-\gamma) \right] \overline{X}_{-i,jkt} \\ + \sum_{l \neq i} \left(\alpha + \eta_{kt} + \varepsilon_{ljkt} \right) \end{array} \right]$$

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econometrician, then the distinction between endogenous effects, where an individual is affected by their peers' behavior, and contextual effects, where an individual is affected by their peers' characteristics, is even less clear. Therefore, any of the methods discussed above for measuring endogenous effects or contextual effects can be used to identify social influences.

4.4 Additional Issues and Limitations

The framework and methods described above address many of the potential difficulties in measuring social influences. Using instrumental variables, group fixed effects, and first differences address the problems of simultaneity, unobservable environmental factors that are common within groups, and group selection. However, several additional issues should be addressed before proceeding to the results. First, the average giving behavior of the other members of the subgroup may not be observable to individual i. If this were the case, the relevant measure of peer behavior would be their observable behavior related to their desire to give, not the actual amount given. Then, the average amount given is a proxy for the relevant variable. This creates an errors-in-variables problem, in addition to the problems discussed above. The existence of this errors in variables problem will add the requirement that any instruments need to be uncorrelated with this measurement error.

Second, two measures of individual behavior will be considered: contribution amounts and the decision to participate in the campaign. Contribution amounts are likely to be very sensitive to income. Many employees would not be able to afford to make $1000 contributions. One the other hand, all employees can afford to participate. Contributions as small as $2 per pay period or one time contributions of $1 are allowed. In addition, many workplace giving campaigns focus on high participation rates, therefore the decision to participate may be particularly relevant. In practice, this decision may be more susceptible to social influences because many companies focus on participation numbers when implementing their campaigns. How much each person contributes is not as important as how many people contribute.[18]

Third, individual gift amounts can not be negative and participation is clearly a binary variable; therefore linear models may be inappropriate. Tobit and probit regressions are also considered. In these non-linear models, the problems associated with measuring social influences remain. Thus the methods described above will still address these problems. These functional forms are addressed in the section on

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[18] Smith, Kehoe and Cremer (1995) suggest that past research into charitable contributions is flawed and that a two-stage selection model would be more appropriate. In the first stage, participation would be predicted, and contributions would be predicted in the second stage. They use past charitable behavior to identify participation, arguing that it will not have an impact on the contribution amount. They acknowledge the concern that those who participated in other campaigns might contribute more than those who had not given before. A two-stage selection method is not used in the current paper because no suitable selection variable is available.

robustness. Instrumental variables are implemented in the tobit and probit setting following the method of Newey (1987). A tobit model is appropriate if desired contributions can take on any value, positive or negative, but actual contributions must be greater than or equal to zero. However, it is not clear that individuals who do not participate would prefer to take money away from public goods. The probit regressions focus only on the decision to participate or not. While the tobit and probit models may be more appropriate, estimation of tobits and probits for the narrowly defined subgroups, with thousands of group fixed effects, is prohibitively difficult. Therefore linear models are used in the majority of the tables. It was possible to estimate tobits and probits for the broadly defined subgroups, including roughly 400 fixed effects. These results are included in the section on robustness.

The institutional importance of the participation decision suggests that participation rates may better capture the role of social influences. The fourth problem is that the mean contribution of an individual's peers may not be the best measure of the social influences that are experienced. To address this issue, the median contribution and the participation rate of the subgroup (excluding individual i) are also considered. Using a different measure of subgroup behavior does not change the underlying concepts addressed in the framework, but formulating the framework in terms of the mean is more intuitive.

In addition to these four concerns, which can be addressed, there are a number of limitations that are not addressed by the methods used here. First, by using the first difference, the possibility of group selection based on permanent unobservable characteristics is addressed. However, if selection is based on transitory unobservable characteristics that are correlated with the taste for giving then the group selection problem remains. Second, this methodology has assumed that the marginal effect of increasing the average contribution of the subgroup is the same for all groups regardless of their size. In actuality, teams and mail codes, and therefore the subgroups within them, vary in size. For the largest subgroups, the average contribution may be a noisy measure of the behavior of an individual's relevant peers. When there are many people in the subgroup, the individual may not interact with all of them. In these cases, the subgroup may not represent social groups. Third, an individual's social group may not overlap with the groups and subgroups that they belong to. For example, subgroups are sometimes defined by demographic characteristics. This definition of subgroups assumes that individuals will interact with and be influenced by people who share their observable characteristics. However, other factors may play a bigger role in determining social interactions and influences. Fourth, team captains are included in the social group. While it could be argued that team captains exert a different type of influence compared to other possibly more equal peers, the methods in this paper assume that the team captain is no different from any other member of the social group. The methods used in this paper do not address these limitations.

5. Results

5.1 Measuring Social Influences

Using the framework and methods developed in section 4, this section presents the results of the estimation. Table 3 presents the estimation results of cross sectional data method with endogenous effects for both definitions of individual behavior (contribution and participation), with groups defined by local United Ways and subgroups defined by teams.[19] The first column examines the effect of peer behavior defined by the mean contribution of others in the same team on individual contributions.[20] The second column examines the effect of peer behavior defined by the participation rate or the other team members on the individual's participation decision. Recall that these regressions include fixed effects to control for group level common shocks and instrument for subgroup behavior using the average characteristics of the subgroup. In this and all tables, the instruments include the same characteristics as controlled for in the regression. These results indicated that there is a positive and statistically significant relationship between individual behavior and the behavior of other members of their team. Using an linear IV framework, a $100 increase in the team's mean contribution is associated with at $7.00 increase in individual contributions. Focusing on the decision to participate also indicates that a 10 percentage point increase in the participation rate is associated with a 4.33 percentage point increase in the probability of participating. The participation rate is 57 percent, the mean annual contribution conditional on participation is $271, and the median is $72.

Table 3 also presents the coefficients on other control variables included in the regressions. The signs of each coefficient are in line with expectations. Salary and tenure with the company have a significant positive effect on the amount given and the likelihood of participation. The likelihood of participating increases with age, and has a positive but insignificant effect on contribution amounts. Team captains and pacesetters are more likely to give, and make larger contributions than those who are not designated these roles. Interestingly, controlling for other factors, men tend to give more than women, although the estimate of the coefficient is not significant, but are less likely to participate in the campaign. Finally people who work from home are less likely to participate and give less. This provides circumstantial evidence that in the absence of social interaction, contributions to the private provision of public goods are less likely.

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[19] For the purposes of comparison, the results from OLS, OLS with fixed effects, and using instrumental variables without fixed effects are presented in an appendix available from the author.

[20] In this case, the analysis focuses only on behavior in 2001. The data for 2000 are not as complete as that for 2001. First, it does not contain all employees in 2000, only those who were also employed by the company in 2001. In addition, the salary information is not as complete.

Table 4 and 5 presents a number of variations on the information contained in Table 3. In each table, there are 24 counterparts of the regressions in Table 3. Eight definitions of social groups and 3 definitions of group behavior are considered. Only the coefficients on subgroup behavior are included in this table, but the same controls used in Table 3 were included in each regression. Table 4 examines the relationship between peer behavior and individual contributions. Table 5 examines the relationship between peer behavior and the individual's decision to participate in the campaign.

The eight regressions in the first column of Table 4 examine the relationship between the mean contribution by other members of the subgroup and the individual's contribution for 8 definitions of groups and subgroups. When groups and subgroups are defined broadly, there is evidence of social influences at the subgroup level. A $100 increase in the mean contribution of the mail code is associated with a $1.70 increase in individual contributions, and a $100 increase in the mean contribution of the team is associated with a $7.00 increase in individual contributions. When subgroups are defined narrowly by demographic characteristics, the evidence of social influences is mixed. For both definitions of groups, there is evidence of stronger social influences among subgroups defined by salary quartile and sometimes gender, than among members of the mail code or team. A $100 increase in the mean contribution of the subgroup is associated with an $0.00 to $4.60 increase in individual contributions, when groups are defined by team. A $100 increase in the mean contribution of the subgroup is associated with an $11.50 to $12.50 increase in individual contributions, when groups are defined by mail codes. However, when subgroups are defined by age groups and groups are defined by mail codes or teams, a negative relationship between subgroup behavior and individual behavior is found. A $100 increase in the mean contribution of the subgroup is associated with a $3.30 to $6.80 decrease in individual contributions. These results suggest that within a mail codes and teams social influences are stronger among people of the same gender and salary level, but are not stronger among people of the same age group. Age group, it seems, is not a good approximation of social groups.

The second column of Table 4 examines the relationship between the median contribution of the subgroup and the individual's contribution. The third column examines the relationship between the subgroup's participation rate and the individual's contribution amount. The results for both of these definitions of peer behavior are similar to those described in the previous paragraph. For the broadly defined subgroups, median contribution and participation rates have a significant and postive relationship with individual contributions. Interestingly, within teams median contributions have a much larger effect than mean contributions; a $100 increase in the median contribution of the team is associated with a $25.50 increase in individual contributions, while a similar increase in the mean contribution is only associated with a $7 increase in individual contributions. This suggests that individuals who make unusually large contributions have less of an effect on their peers. For the narrowly defined subgroups

based on demographics, the median contribution of those in the same gender and salary quartile has a positive effect on individual contributions, while the behavior of those in the same age group has a negative effect.

The results presented in Table 5, replicate the methods used in Table 4, however in this case the dependent variable is individual participation. The relationship between the average contribution of and individual's peers and the individual's decision to participate, while statistically significant at times, is not remarkably large. When subgroups are defined broadly, a $100 increase in the mean contribution of the subgroup increases the likelihood that the individual will participate by only 0.009 to 0.016 percentage points, 0.012 to 0.038 percentage points for a $100 increase in the median contribution. When subgroups are defined narrowly, a statistically significant relationship is only found for subgroups defined by salary quartile, where a $100 increase in the mean or median contribution increases the likelihood that the individual will participate by only 0.0002 to 0.001 percentage points. For the other narrow subgroups, gender and age group, the relationship between the subgroups average contribution and individual participation is not statistically significant.

In the third column of Table 5, which examines the relationship between the subgroup's participation rate and the likelihood that an individual will participate, there is evidence of social influences for some subgroups. For the broadly defined subgroups, a 10 percentage point increase in the subgroup's participation rate is associated with a 3.8 to 4.3 percentage point increase in the likelihood that an individual will participate. When the group is defined by mail code, there is only evidence of stronger social influences for the subgroups defined by salary quartile, where a 10 percentage point increase in the subgroup's participation rate is associated with a 4.6 percentage point increase in the likelihood that an individual will participate. For subgroups defined by gender and age group, there is no evidence of stronger social influences. When the group is defined by team, there is evidence of stronger social influences for all subgroups, where a 10 percentage point increase in the subgroup's participation rate is associated with a 0.6 to 4.6 percentage point increase in the likelihood that an individual will participate.

The results in this Tables 4 and 5 suggest some general conclusions. First, the behavior of team members is more highly correlated than the behavior of people who are in the same mail code. There are several possible explanations. Campaign designers may do a good job of assigning teams to include actual social groups. However, given the enormous size of the company and centralized team assignments this would be surprising. It seems more likely that there are important unobservable shocks occurring at the team level. This may be due to the presence of a team leader who is charged with providing information and encouraging team members to participate in the campaign. This particular example should be interpreted as social influences. Second, the relationship between individual and peer behavior is weaker for means than for medians. When peer behavior is defined by means, the presence of

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outliers may introduce too much noise into the measurement of γ. Third, social influences are not stronger among individuals in the same age group than among individuals in the same mail code or team. Fourth, among subgroups defined by gender, social influences to contribute more are sometimes stronger than among broadly defined subgroups. Fifth, social influences are stronger among individuals in the same salary quartile than among individuals in the same mail code.

The results presented in Tables 4 and 5 suggest that social influences may play a role in individual contribution and participation decisions; however, there is still a potential bias due to the possibility that group selection is based on unobservable characteristics that are correlated with the proclivity for giving. Table 6 addresses this problem by examining changes in individuals' contributions from 2000 to 2001. However, when looking at changes over time, it does is not possible to look at groups defined by teams because team definitions are not consistent over time. We can look at changes in physical location. Between 2000 and 2001, 65% of employees remain in the same location. For the broadly defined subgroups, a \$100 increase in the mean contribution of an individual's subgroup is associated with an \$11.20 to \$15.40 increase in individual contributions. For the narrowly defined subgroups based on salary and gender, a \$100 increase in the mean contribution of an individual's subgroup is associated with a \$15.00 to \$21.70 increase in individual contributions. The coefficients for subgroups defined by gender and salary quartile are similar in magnitude to those found in Table 4. Only subgroups defined by age find no significant correlation, again suggesting that social influences are not as important among subgroups defined by age as they are among the more broadly defined subgroups. There is less evidence that changes in subgroup participation affect changes in individual contributions. Only subgroups defined by team and gender have significant coefficients on changes in subgroup participation.

The results presented in Table 6 provide the best evidence so far of social influences. While these regressions all focused on the relationship between individual behavior and subgroup behavior, the source of the correlation may in fact be contextual effects; therefore these estimated coefficients on peer behavior should be interpreted as a simplified measure of both endogenous and contextual effects. The next three tables present the results of the three methods for measuring contextual effects; these can also be interpreted as a reduced form estimate of the endogenous effects model.

Table 7 examines the relationship between subgroup characteristics and individual contributions including group level fixed effects. Increases the proportion of the team who are selected as pacesetters are consistently associated with increases in individual contributions. There is no systematic significant relationship between individual contributions and other subgroup average characteristics. Table 8 is the same as Table 7, but examines the relationship between individual participation and subgroup characteristics. Increases in the proportion of the team who work from home are usually associated with

decreases in the likelihood that an individual will participate. The probability that an individual will participate increases with the proportions of the subgroup that are pacesetters. There is no systematic significant relationship between individual contributions and other subgroup average characteristics.

Table 9 examines the relationship between the change in average peer characteristics over time and the change in the individual's contributions, including group fixed effects. Here groups are defined by the local United Way and the subgroups are defined by the mail code and team. The instruments used in the panel data method with endogenous effects are used as explanatory variables in this table. When subgroups are defined by mail codes, only the coefficients on average salary of leavers, average salary squared of stayers and leavers, average tenure of joiners, and the proportion of joiners that are pace setters are significant. When subgroups are defined by teams, only the coefficients on average salary, average salary squared of leavers, proportion of leavers who are male, and the proportion of leavers that are pacesetters are significant. While the characteristics stayers, leavers and joiners are significant predictors of the change in subgroup average contributions and participation (the first stage results for two-stage least squares in Table 6), for the most part these variables are not significant predictors of the change in individual contributions.

5.2 Robustness

Throughout the course of this research, several other specifications were considered. In general these produced similar results, not reported here.[21] As discussed in Section 4.4, tobits or probits might provide better estimates. Table 10 compares the coefficients on subgroup behavior when regressed on individual contributions using a linear model and a tobit model. Table 11 compares the coefficients on subgroup behavior when regressed on individual participation using a linear model and a probit model. Regardless of the measure of peer behavior, the estimates of the coefficients on subgroup behavior are smaller using a linear model than a tobit or probit. In all cases the signs and the statistical significance are the same. While the probit model finds larger coefficients that the linear probability model, the magnitude of the relationship between the average contribution of the subgroup and the likelihood that the individual will participate are still small. Using tobits and probits would strengthen the arguments for the existence of social influences. However, it is prohibitively difficult to estimate tobits or probits with thousands of fixed effects for the narrowly defined groups.

In one specification, the sample was limited to employees who work in bank branches. Investment banking, information technology, call center, administrative and executives were excluded. This removes the possibility of common shocks that are related to a group's role within the company and

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[21] Copies of tables for these additional specifications are available from the author.

reduces the problem of selection bias since similar characteristics are likely to be valued in employees at all branch locations. Again, positive and significant coefficients were found. In another specification, within each group one person was selected as the group leader, based on their level in the company, designation as a vice president, or manager status. The group leader's behavior was also included in the regression. These results suggest that the behavior of group leaders have a positive marginal effect on their employees' contributions and participation decisions. One common complaint about workplace giving campaigns is that individuals feel their employers coerce them to participate. Another estimation looked at the effects of the previous year's campaign contributions and participation on changes in salary. These results that suggest contribution amounts and participation decisions do not affect the percent change in salary; it seems that people are not rewarded for participating in the campaign.

Finally, the past average behavior of joiners was considered as a possible instrument for current the current average behavior of a stayer's peers. With this specification, the estimated relationship between peer behavior and individual behavior was greater than when peer characteristics were used as an instrument. There are two possible explanations for this. One suggests that the social influences measured in this paper are a lower bound on social influences. The other suggests that past peer behavior is not a valid instrument. When average peer characteristics are used as an instrument for peer behavior, individual behavior is regressed on the portion of peer behavior that can be explained by their observable characteristics. However, social influences could be stronger when an individual's peers give more than is expected. This idiosyncratic taste for giving of an individual's peers would enter the equation for individual giving in the same way as an unobservable common shock. The estimated relationship between peer behavior and individual behavior with past behavior used as an instrument could also be upwardly biased by unobservable common shocks. However, the results from these other specifications suggest that social influences may be stronger than those measured here.

6. Conclusion

Using peer group characteristics and past behavior as instruments for peer behavior, this paper finds evidence for the existence of social influences in the context of the voluntary provision of public goods. The individual's participation decision, to give or not to give, is strongly influenced by the participation of peers. Both how many people give and how much they give are good predictors of gift amounts. Individuals are also responsive to changes in the contribution behavior of their peers over time. However, these effects are not necessarily due to the giving behavior of one's peers. It is not possible to separately identify endogenous and contextual effects. Individuals may respond to the same characteristics of their peers that make their peers more charitable.

In this paper social influences are measured at several levels. First, social groups are defined broadly by physical proximity and workplace giving campaign teams. In these cases there is evidence that social influences play an important role in individuals' contribution and participation decisions. Social groups are also defined narrowly, by characteristics such as gender, salary quartile and age group. These regressions examine whether social influences are stronger among subsets of the group that share characteristics, than among the group as a whole. Here there is evidence that social influences are stronger among those in the same salary quartile. For subgroups defined by gender, the results are mixed, social influences to contribute more are stronger, but social influences to participate are not. This suggests that common shocks and selection explain only part of the correlation between individual and peer behavior. Social influences are not stronger among subgroups defined by age groups than among the group as a whole.

Social influences may cause contributors to feel warm glow, thus this paper provides additional empirical support for theoretical models that include a warm glow or joy of giving term. The significance of the social influences found in this paper, suggest one explanation for the lack of free riding seen in the private provision of public goods. While free riding may still be likely in more anonymous situations, in situations where the provision of public goods is organized around social groups, social influences may provide an explanation for low levels of free riding. Social influences in giving could be caused by information provision, social norms, or merely the power of suggestion. With the exception of information provision each of these explanations for the existence of social influences could help to overcome free riding. In order to identify which of these theories cause social influences a randomized experiment is necessary.

While this paper only considers social influences on giving in the workplace, these forces are likely to play a role in other settings. Social influences may help to explain why so many individuals make contributions rather than free ride and why there is less than full crowding out in the private provision of public goods. In addition, understanding the role of social influences may have policy implications. If social influences work across income levels then changes in tax policy may have broader implications than initially anticipated. Wealthy individuals are the most likely take tax deductions for their charitable donations. Changes in tax deductibility of donations will directly impact the wealthy; the resulting changes in their giving may also affect the giving behavior of other income groups.

Future research can provide insight into the distinction between the exact forms of social influences and their existence in other settings. Extensions of this research might also include how group members influence the decision of which type of organization to donate to, looking at the effects of group composition and size, focusing on different segments of the workforce, or experimental work.

Appendix

When social influences are stronger at the subgroup level than at the group level, then the methods described here will identify whether social influences are stronger at the subgroup level. To see this more clearly, assume that individual contributions are a function of the individual's characteristics, the average contributions of their peers, group level common shocks and an individual shock:

$$G_{ijkt} = \alpha + \beta X_{ijkt} + \gamma \tilde{G}_{-i,jkt} + \eta_{kt} + \varepsilon_{ijkt} . \tag{A.1}$$

Where $\tilde{G}_{-i,jkt}$ is the weighted average of the contributions of all members of group k except individual i:

$$\tilde{G}_{-i,jkt} = \frac{\sum\limits_{i'j'k'\neq ijk} G_{i'j'k'} w(j')}{\sum\limits_{i'j'k'\neq ijk} w(j')} . \tag{A.2}$$

and individuals in the same subgroup as individual i are weighted by a factor of λ:

$$w(j') = \begin{cases} 1 & if \ j' \neq j \\ \lambda \geq 1 & if \ j' = j \end{cases} . \tag{A.3}$$

If $\lambda > 1$, the contributions of peers in subgroup j will receive more weight than those in the same group but in other subgroups. If we then assume that within each group there are K subgroups and each subgroup contains N people, it can be shown that individual contributions are a function of their characteristics the group's average contributions (including individual i), the additional impact of the subgroup's contributions (excluding individual i), group level common shocks, and individual shocks.[22] This is given by:

$$G_{ijkt} = \alpha' + \beta' X_{ijkt} + \gamma'' \overline{G}_{kt} + (\lambda - 1) \gamma'' \overline{G}_{-i,jkt} + \eta'_{kt} + \varepsilon'_{ijkt} . \tag{A.4}$$

The estimates of the coefficients in equation A.4 will not be exactly the same as those in equation 2; however the interpretation of each coefficient is similar.[23] Here, the addition of a group level fixed effect will control for the group's average contribution, leaving the following equation to be estimated:

$$G_{ijkt} = \alpha' + \beta' X_{ijkt} + (\lambda - 1) \gamma'' \overline{G}_{-i,jkt} + \theta_k d_{kt} + \varepsilon'_{ijkt} . \tag{A.5}$$

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[22] While the assumption that all subgroups are the same size and that each group contains the same number of subgroups is not an accurate assumption, the interpretation that γ measures the additional social influence of an individual's peers in the same subgroup is correct.

[23] Here coefficients marked with a single ' are defined by $\xi' = \dfrac{\xi}{1 + \frac{\gamma}{NK - 1 + (\lambda - 1)(N-1)}}$, and coefficients marked with a

double ' are defined by $\psi'' = \dfrac{\psi}{1 + \frac{\gamma}{NK - 1 + (\lambda - 1)(N-1)}} \times \dfrac{N-1}{NK - 1 + (\lambda - 1)(N-1)}$.

Where $\theta_k d_{kt}$ represents the group fixed effects. The coefficient on $\overline{G}_{-i,jkt}$ can now be interpreted as the additional impact of social influences at the subgroup level.

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Table 1: Giving Guide

Salary	Suggested Giving as % of Salary	Suggested Gift Amount	Mean Actual Giving as % of Salary*	Median Actual Giving as % of Salary*
Less than $15,000	0.60%	$1 – 90	1.42%	0.42%
$15,000 – 19,999	0.80%	$120 – 160	0.34%	0.26%
$20,000 – 29,999	1.00%	$200 – 300	0.35%	0.21%
$30,000 – 59,999	1.50%	$450 – 900	0.39%	0.22%
$60,000 – $124,999	2.00%	$1200 – 2500	0.64%	0.40%
$125,000 and above	2.50%	$3125 +	1.38%	0.92%

* For those who participate in the campaign

Suggested amounts in this table comes from the corporate campaign materials provided to employees. Actual gifts as a percent of salary are taken from the data.

Table 2: Summary Statistics

Campaign Related Behavior	Mean	Stan. Dev.	Min	Max
Pledge in 2001 ($)	156	607	0	50,000
Participation in 2001 (%)	0.574	0.495	0	1
Pledge in 2000 ($)	149	588	0	31,050
Participation in 2000 (%)	0.555	0.497	0	1
Team Captain in 2001 (%)	0.061	0.239	0	1
Team Captain in 2000 (%)	0.046	0.209	0	1
Pacesetter in 2001 (%)	0.044	0.204	0	1
Pacesetter in 2000 (%)	0.034	0.181	0	1
Ask Amount in 2001 ($)	619	845	0	32,592
Received list of large donors (%)	0.149	0.356	0	1

Employment Related Information	Mean	Stan. Dev.	Min	Max
Contractual Pay in 2000 ($)	39,485	30,906	0	1,250,000
Actual Pay ($)	46,266	121,196	300	8,380,105
Tenure as of 2001 (years)	8.289	8.324	-0.1397	53
Vice President 2001 (%)	0.167	0.373	0	1
Senior Vice President 2001 (%)	0.045	0.208	0	1
Executive Vice President 2001 (%)	0.001	0.037	0	1
Works from home (%)	0.002	0.048	0	1
Age in 2001 (years)	39	11.820	15	97
Male (%)	0.301	0.459	0	1

Changes	Mean	Stan. Dev.	Min	Max
Moved locations between 2001 & 2000 (%)	0.356	0.479	0	1
Difference 2000 & 2001 Gift ($)	24.716	1095	-25,000	350,000
Difference 2000 & 2001 Pay ($)	11082	114339	-125,000	8,180,105

Table 2: Summary Statistics (cont)

Number of Group	2000	2001
Number of Teams	6,853	8,555
Number of Mail Codes	10,895	10,499
Number of Cost Centers	14,051	14,810

Social Group Variables	Mean	Stan. Dev.	Min	Max
Team size in 2001	43	67	1	573
Mail Code size in 2001	57	94	1	537
Cost Center size in 2001	34	62	1	531

Note: For Social Group Variables the level of observation is the individual, not the social group.

Table 3: The Effect of Individual Characteristics and Group Behavior on Individual Contributions and Participation

Dependent Variable	Contribution	Participation
Independent Variables		
Team Mean Gift 2001 (Excl. individual)	0.070	
	(0.0079)***	
Team Participation Rate 2001 (Excl. individual)		0.433
		(0.0145)***
Salary 2001	0.003	2.91E-07
	(0.0000)***	(2.05E-08)***
Salary Squared	-3.30E-10	-4.83E-14
	(0.0000)***	(4.15E-15)***
Male	3.992	-0.054
	(3.1972)	(0.0028)***
Age 2001	0.144	0.004
	(0.1441)	(0.0001)***
Tenure as of Oct 1 2001	4.478	0.007
	(0.2091)***	(0.0002)***
Team Captain 2001	126.540	0.149
	(6.0916)***	(0.0053)***
Pace Setter 2001	708.670	0.107
	(8.1423)***	(0.0071)***
Mail To Home 2001	-216.154	-0.057
	(47.0448)***	(0.0411)
Constant	-146.849	0.089
	(188.7101)	(0.0089)***

*** Significant at 1% level, ** Significant at 5% level, * Significant at 10% level

Note: Standard errors in parentheses. Coefficients on United Way level fixed effects excluded. Instrument for Subgroup behavior using subgroup average characteristics.

Table 4: The Effects of Peer Behavior on Individual Contributions

Group	Subgroup	Subgroup Behavior		
		Mean Contribution	Median Contribution	Participation Rate
United Way	Mail code	0.017 (0.0060)***	0.027 (0.0086)***	337.944 (16.8707)***
United Way	Team	0.070 (0.0079)***	0.255 (0.0169)***	371.936 (16.7521)***
Team	Gender	-0.001 (0.0088)	0.022 (0.0113)**	112.479 (37.3901)***
Team	Salary Quartile	0.046 (0.0095)***	0.120 (0.0146)***	-46.998 (18.1645)***
Team	Age Group	-0.033 (0.0074)***	-0.041 (0.0091)***	-35.989 (27.7642)
Mail code	Gender	0.125 (0.0106)***	0.154 (0.0130)***	234.042 (35.0305)***
Mail code	Salary Quartile	0.115 (0.0104)***	0.164 (0.0147)***	50.004 (16.0592)***
Mail code	Age Group	-0.068 (0.0089)***	-0.082 (0.0107)***	-46.513 (26.3732)*

*** Significant at 1% level, ** Significant at 5% level, * Significant at 10% level
Notes: Standard errors in parentheses. Each coefficient represents the results of a separate regression with fixed effects and instrumenting using subgroup average characteristic. To save space, coefficients on salary, salary squared, male, age, tenure, team captain, pace setter, work from home and fixed effects are omitted from the table. Subgroup behavior is calculated excluding the individual.

Table 5: Effects of Peer Behavior on Individual Participation

Group	Subgroup	Subgroup Behavior Mean Contribution (in $100s)	Median Contribution (in $100s)	Participation Rate
United Way	Mail code	0.009 (0.0006)***	0.012 (0.0008)***	0.382 (0.0147)***
United Way	Team	0.016 (0.0007)***	0.038 (0.0016)***	0.433 (0.0145)***
Team	Gender	1.23E-05 (0.0000)	1.77E-05 (0.0000)*	0.061 (0.0334)*
Team	Salary Quartile	0.000201 (0.0000)***	0.000318 (0.0000)***	0.469 (0.0165)***
Team	Age Group	6.41E-06 (0.0000)	8.36E-06 (0.0000)	0.070 (0.0260)***
Mail code	Gender	0.001 (0.0011)	0.001 (0.0013)	0.005 (0.0353)
Mail code	Salary Quartile	0.023 (0.0010)***	0.033 (0.0015)***	0.463 (0.0166)***
Mail code	Age Group	-0.001 (0.0009)	-0.001 (0.0011)	0.023 (0.0269)

*** Significant at 1% level, ** Significant at 5% level, * Significant at 10% level

Notes: Standard errors in parentheses. Each coefficient represents the results of a separate regression with fixed effects and instrumenting using subgroup average characteristic. To save space, coefficients on salary, salary squared, male, age, tenure, team captain, pace setter, work from home and fixed effects are omitted from the table. Subgroup behavior is calculated excluding the individual. Estimated using linear probability model.

Table 6: Effects of Changes in Behavior of Social Group on Changes in Individual Contributions

Group	Subgroup	Subgroup Behavior	
		Mean Contribution	Participation Rate
United Way	Mail code	0.112	47.770
		(0.0283)***	(32.0203)
United Way	Team	0.154	104.121
		(0.0543)***	(48.1030)***
Mail code	Gender	0.150	262.565
		(0.0255)***	(73.6550)***
Mail code	Salary Quartile	0.217	-85.635
		(0.0310)***	(72.9239)
Mail code	Age Group	-0.010	10.800
		(0.0182)	(50.6727)

*** Significant at 1% level, ** Significant at 5% level, * Significant at 10% level

Note: Standard errors in parentheses. Each coefficient represents the results of a separate regression. To save space, coefficients on change in salary, change in salary squared, change in team captain, change in pacesetter and fixed effects are omitted. Group behavior is always calculated excluding the individual. Estimated using 2SLS, using characteristics of Stayers, Leavers, Joiners as instruments for the change in subgroup behavior

Table 7: Effects of Characteristics of Social Group on Individual Contributions

Group	UW	UW	Team	Team	Team	Mail code	Mail code	Mail code
Subgroup	Team	Mail code	Gender	Salary Quartile	Age Group	Gender	Salary Quartile	Age Group
Subgroup average salary	-0.001	-3.76E-04	-4.77E-04	-0.001	-2.45E-04	0.001	7.80e-06	-0.001
	(0.0000)**	(2.53e-07)***	(0.0000)***	(0.0001)***	(0.0000)***	(0.0001)***	(0.0001)	(3.0E-5)***
Subgroup average salary squared	-6.67E-11	1.03E-12	-1.82E-10	-2.08E-10	3.38E-12	-1.93e-10	-1.78e-10	2.00e-11
	(0.0000)**	(3.57e-12)	(0.0000)***	(0.0000)***	(0.0000)*	(2.05e-11)***	(2.89e-11)***	(1.73e-12)***
Subgroup prop male	-42.863	-48.686		19.387	15.402		19.242	-0.072
	(7.8160)**	(7.8497)***		(8.8798)**	(7.2332)**		(7.7368)**	(6.7375)
Subgroup average age	-1.873	-1.026	-0.807	-0.678	0.891	-0.329	-1.176	0.785
	(0.3790)**	(0.3766)***	(0.3085)***	(0.3669)*	(0.4358)**	(0.4725)	(0.3162)***	(0.4013)**
Subgroup average tenure	5.132	6.936	2.336	-1.151	0.017	-0.811	-0.033	-0.283
	(0.5233)**	(0.5169)***	(0.4213)***	(0.4723)**	(0.3819)	(0.7181)	(0.4178)	(0.3567)
Subgroup prop captains	33.696	17.220	-30.374	6.068	-19.264	-25.064	26.433	9.446
	(22.4686)	(19.6411)	(13.3096)**	(12.6846)	(10.1977)*	(15.3980)	(11.0515)**	(10.0535)
Subgroup prop pacesetters	404.775	216.448	385.659	382.737	75.815	70.010	269.441	182.484
	(17.2467)**	(16.8245)***	(14.3549)***	(21.6776)***	(14.8759)***	(19.7120)***	(20.6135)***	(14.6055)***
Subgroup prop work from home	-87.790	129.872	-115.751	197.849	-140.049	-298.483	-262.115	-156.999
	(80.4230)	(78.0509)*	(48.3353)**	(113.1108)*	(71.5559)**	(150.7127)**	(115.5809)**	(122.0049)

*** Significant at 1% level, ** Significant at 5% level, * Significant at 10% level

Notes: Standard errors in parentheses. To save space, coefficients on salary, salary squared, male, age, tenure, team captain, pace setter, work from home and fixed effects are omitted from the table. Group behavior is always calculated excluding the individual. When subgroups are defined by gender, the proportion of the subgroup that is male is always exactly the same as the dummy for male, and therefore is dropped.

Table 8: Effects of Characteristics of Social Group on Individual Participation

Group	UW	UW	Team	Team	Team	Mail code	Mail code	Mail code
Subgroup	Team	Mail code	Gender	Salary Quartile	Age Group	Gender	Salary Quartile	Age Group
Subgroup average salary	5.15E-08	-1.270E-07	-1.38E-07	6.14E-09	-6.37E-09	7.67E-09	1.06E-06	-5.10E-08
	(3.76E-08)	(3.60e-08)***	(0.0000)***	(0.0000)***	(0.0000)	(7.85e-08)	(9.47e-08)***	(3.07e-08)*
Subgroup average salary squared	-4.18E-14	-1.22E-14	-5.61E-14	-1.23E-15	1.75E-18	6.24E-16	-3.13E-13	2.35E-15
	(5.44E-15)***	(5.07e-15)**	(0.0000)***	(0.0000)***	(0.0000)	(2.08e-14)	(2.89e-14)***	(1.76e-15)
Subgroup prop male	-0.099	-0.068		2.97E-04	-0.002		0.025	-0.014
	(0.0072)***	(0.0081)***		(0.0001)***	(0.0067)		(0.0077)***	(0.0069)**
Subgroup average age	-0.003	-0.002	-0.001	-5.52E-06	2.41E-04	-0.0000493	0.001	0.000
	(0.0003)***	(0.0004)***	(0.0003)***	(0.0000)*	(0.0004)	(0.0005)	(0.0003)**	(0.0004)
Subgroup average tenure	0.007	0.007	0.002	3.42E-06	3.55E-04	-7.03E-06	0.005	0.000
	(0.0005)***	(0.0005)***	(0.0004)***	(0.0000)	(0.0004)	(0.0007)	(0.0004)***	(0.0004)
Subgroup prop captains	0.024	0.007	-0.044	0.001	0.021	-0.015	0.063	0.021
	(0.0208)	(0.0207)	(0.0127)***	(0.0001)***	(0.0095)**	(0.0156)	(0.0111)***	(0.0103)**
Subgroup prop pacesetters	0.331	0.356	0.302	0.002	0.006	0.020	0.011	0.002
	(0.0159)***	(0.0185)***	(0.0137)***	(0.0002)***	(0.0139)	(0.0200)	(0.0206)	(0.0149)
Subgroup prop work from home	-0.051	-0.387	-0.214	0.002	-0.057	-0.256	-0.048	-0.005
	(0.0742)	(0.0830)***	(0.0461)***	(0.0010)*	(0.0667)	(0.1528)*	(0.1157)	(0.1247)

*** Significant at 1% level, ** Significant at 5% level, * Significant at 10% level

Notes: Standard errors in parentheses. To save space, coefficients on salary, salary squared, male, age, tenure, team captain, pace setter, work from home and fixed effects are omitted from the table. Group behavior is always calculated excluding the individual. When subgroups are defined by gender, the proportion of the subgroup that is male is always exactly the same as the dummy for male, and therefore is dropped.

Table 9: Effects of Characteristics of Social Group on Change in Individual Contribution Amount

Group	UW	UW
Subgroup	Mail Code	Team
Change in Pay	1.97E-04	-0.004
	(0.0003)	(0.0008)***
Change in Pay Squared	1.21E-08	4.62E-08
	(1.11e-09)**	(3.65E-09)***
Change in Team Captain	29.995	-27.919
	(5.7834)**	(15.0671)*
Change in Pacesetter	-41.79071	-223.530
	(10.4995)**	(24.5024)***
Average Pay in 2000 of Stayers	-5.60E-05	0.001
	(0.0002)	(0.0006)**
Average Pay in 2000 of Leavers	-0.001	0.001
	(0.0002)*	(0.0005)***
Average Pay in 2000 of Joiners	0.000	3.72E-05
	(0.0002)	(0.0005)*
Average Pay Squared in 2000 of Stayers	3.19E-09	-5.28E-09
	(1.08e-09)**	(4.19E-09)
Average Pay Squared in 2000 of Leavers	5.43E-09	-1.63E-08
	(1.34e-09)**	(3.12E-09)***
Average Pay Squared in 2000 of Joiners	-5.83E-10	-7.51E-09
	(1.39e-09)	(4.82E-09)
Proportion Male of Stayers	0.245	16.774
	(6.6523)	(17.1374)
Proportion Male of Leavers	-2.193	15.865
	(4.4215)	(7.5325)**
Proportion Male of Joiners	5.040	-3.991
	(5.1849)	(12.4948)
Average Age in 2000 of Stayers	0.264	-0.322
	(0.2755)	(0.6451)
Average Age in 2000 of Leavers	0.058	0.084
	(0.2151)	(0.3506)
Average Age in 2000 of Joiners	-0.298	-0.053
	(0.2332)	(0.4959)
Average Tenure in 2000 of Stayers	-0.122	-0.928
	(0.3873)	(0.9678)
Average Tenure in 2000 of Leavers	0.087	0.127
	(0.3142)	(0.5219)
Average Tenure in 2000 of Joiners	0.964	0.517
	(0.4096)*	(0.8635)

Table 9: Effects of Characteristics of Social Group on Change in Individual Contribution Amount (cont.)

Group Subgroup	UW Mail Code	UW Team
Proportion of Stayers Team Captain in 2000	-23.306	16.733
	(15.7628)	(49.3034)
Proportion of Leavers Team Captain in 2000	0.141	-9.970
	(8.6824)	(14.3554)
Proportion of Joiners Team Captain in 2000	3.825	7.832
	(13.2007)	(37.2081)
Proportion of Stayers Pacesetter in 2000	11.826	-40.432
	(16.8214)	(44.0711)
Proportion of Leavers Pacesetter in 2000	-3.653	41.665
	(13.7305)	(21.7331)*
Proportion of Joiners Pacesetter in 2000	72.356	34.669
	(19.0364)**	(55.0450)
Constant	6.854	-26.371
	(113.9961)	(23.9380)

*** Significant at 1% level, ** Significant at 5% level, * Significant at 10% level

Notes: Standard errors in parentheses. Group behavior and characteristics are always calculated excluding the individual.

Table 10: Robustness: Effects of Behavior of Social Group on Individual Contributions: OLS vs. Tobit

Group	Subgroup	Reg. Type	Subgroup Behavior		
			Mean Contribution	Median Contribution	Participation Rate
United Way	Mail code	OLS	0.017 (0.0060)***	0.027 (0.0086)***	337.944 (16.8707)***
United Way	Mail code	Tobit	0.040 (0.0086)**	0.111 (0.0124)***	733.765 (24.7223)***
United Way	Team	OLS	0.070 (0.0079)***	0.255 (0.0169)***	371.936 (16.7521)***
United Way	Team	Tobit	0.152 (0.0112)***	0.511 (0.0234)***	812.685 (24.2697)***

*** Significant at 1% level, ** Significant at 5% level, * Significant at 10% level
Notes: Standard errors in parentheses. Each coefficient represents the results of a separate regression. Regressions are estimated including fixed effects and instrumenting for subgroup behavior using subgroup characteristics. To save space, coefficients on salary, salary squared, male, age, tenure, team captain, pace setter, work from home and fixed effects are omitted from the table. Group behavior is calculated excluding the individual.

Table 11: Robustness: Effects of Behavior of Social Group on Individual Contributions: Linear Probability vs. Probit

Group	Subgroup	Reg. Type	Subgroup Behavior		
			Mean Contribution (in $100s)	Median Contribution (in $100s)	Participation Rate
United Way	Mail code	Linear Prob.	0.009 (0.0005)***	0.012 (0.0008)***	0.382 (0.0147)***
United Way	Mail code	Probit	0.013 (0.0007)***	0.021 (0.0010)***	0.410 (0.0187)***
United Way	Team	Linear Prob.	0.016 (0.0007)***	0.038 (0.0016)***	0.433 (0.0145)***
United Way	Team	Probit	0.020 (0.0009)***	0.053 (0.0019)***	0.471 (0.0186)***

*** Significant at 1% level, ** Significant at 5% level, * Significant at 10% level
Notes: Standard errors in parentheses. Each coefficient represents the results of a separate regression. Regressions are estimated including fixed effects and instrumenting for subgroup behavior using subgroup characteristics. To save space, coefficients on salary, salary squared, male, age, tenure, team captain, pace setter, work from home and fixed effects are omitted from the table. Group behavior is calculated excluding the individual. Probit results are probability scaled.