Partisan Interactions

Evidence from a Field Experiment in the United States^{*}

Ricardo Perez-Truglia[†]

Guillermo Cruces

Microsoft Research

CEDLAS-FCE-UNLP and IZA

This Draft: March 2015. First Draft: November 2013.

Abstract

We study the role of partisan interactions for political participation and geographic polarization. We sent letters to 92,000 contributors from all U.S. states during the 2012 presidential election campaign. We used administrative data to measure the effect of the information contained in those letters on the recipients' subsequent contributions. We found that if an individual's contribution is more visible to her neighbors, her contribution increases if a majority of her neighbors supports her party, whereas it falls if a majority of her neighbors supports the opposite party. This evidence suggests that individuals expect favorable treatment from own-party peers and hostile treatment from opposite-party peers, which is conducive to polarization. We also generated non-deceptive experimental variation in the recipient's perception of the contributions of others. We find that, while individuals care about the contributions of others, the implications for polarization are mixed. Finally, we discuss the implications of our findings for disclosure policy in U.S. campaign finance.

JEL Classification: C93, D03, D64, D71, D72, D83, H41.

Keywords: social interactions, political participation, polarization, campaign contributions, field experiment.

^{*}Ricardo Perez-Truglia would like to give special thanks to Raj Chetty for his advice and encouragement. Funding for the mailing experiment and the post-election survey was generously provided by the Lab for Economic Applications and Policy and the Warburg Funds (Harvard University) and by CEDLAS-FCE-UNLP. Alberto Alesina, Robert Barro, Raj Chetty and Monica Singhal provided valuable feedback in the early stage of the project. We would like to thank Dan Bernhardt, Nicolas Bottan, Stefano DellaVigna, Rafael Di Tella, John Friedman, Matthew Gentzkow, Edward Glaeser, Nathan Hendren, Larry Katz, Roger Koenker, Markus Mobius, Gautam Rao, László Sándor, Jesse Shapiro, James Snyder and Ugo Troiano for their valuable feedback, along with participants in seminars at Harvard, Chicago Booth, Stanford GSB, Brown University, Microsoft Research, Central European University, the University of Michigan, UNLP, IECON-UDELAR and the London School of Economics. Julian Amendolaggine provided excellent research assistance. We are grateful as well to Belynda Bady, Jane Calhoun, Dean Gallant, Diane Frishman, Helena Rovner and Norma Truglia for their help conducting the field experiment and the survey. A previous version of this paper circulated under the title "Social Incentives in Contributions." This project was reviewed and approved in full and in advance by the Committee on the Use of Human Subjects in Research at Harvard University.

[†]Corresponding author: rtruglia@microsoft.com. Microsoft New England Research and Development (NERD) Lab, Office 12073, 1 Memorial Drive, Cambridge MA 02142.

1 Introduction

Partisan conflict, growing polarization in Congress, and an increasingly divided electorate have become mainstays of American political life (McCarty, Poole and Rosenthal, 2006). At the macro level, the economic costs of these political divisions can be high (Azzimonti, 2011), as in the government shutdown in 2013. Political polarization is also palpable in everyday life through, for instance, the political segregation of social networks (Gimpel, Lee and Kaminski, 2006; Bishop, 2008; Gentzkow and Shapiro, 2011; Cho, Gimpel and Hui, 2013). Social interactions could play an important role in shaping this segregation. For example, if Republicans anticipate unfavorable treatment from social interactions with Democrats, that provides incentives for Republicans to segregate with other Republicans. This paper provides unique revealed-preference evidence about the precise causal mechanisms through which partisan interactions affect political participation and polarization.¹

Most forms of political participation (with notable exceptions, such as the act of voting) reveal the party or cause that an individual supports. Examples include making campaign contributions, attending rallies, making political comments on online social networks, or merely discussing politics with others. As a result, the effect of social interactions on those forms of participation can be markedly partisan. Specifically, we discuss two distinct channels through which social interactions may affect political participation and polarization. First, an individual may care about being observed by her peers: for instance, disclosing one's party affiliation through political participation can result in better treatment by supporters of one's party and in harsher treatment by supporters of the opposite party. We call this the *conformity channel*. Second, in interacting with others, an individual may care about the political behavior of her peers. Interacting with individuals who are politically active, for instance, may create an expectation of being more active. We call this the *comparison channel*. In other words, while the conformity channel is the result of feeling observed by others, the comparison channel is the result of observing the behavior of others.

To study these partian interactions, we exploited the unique institutional setting of U.S. campaign finance. Federal law dictates that campaign committees must report the identity of individuals who contribute over \$200 to the Federal Election Commission (FEC) along with personal information. The FEC makes these contribution records not only publicly available but, more importantly, easily accessible online. The FEC website provides up-to-date² disaggregated information about contributors, including full name and address, occupation,

¹The existing evidence on peer effects in political participation are subject to the usual challenges in the identification of these effects: see for example the discussion in Gimpel, Lee and Kaminski (2006), Cho et al. (2013) and Perez-Truglia (2014).

²This data is updated approximately once a month (see Section 3 for more details).

employers, contribution amount and date, and the party and candidate to which the contribution was made. Moreover, the FEC website offers a tool that allows visitors to search for contributors on the basis of each of these characteristics (e.g., name, address).³ The fact that an individual's contributions are observable by others and that an individual can observe (and thus be influenced by) the contributions of others makes campaign contributions in the United States an excellent context for studying partian interactions.

In May 2012, we sent letters with individualized information related to campaign contributions to a sample of 91,998 individuals from all U.S. states who, according to the FEC records, had made a contribution to a presidential campaign between April 2011 and April 2012. The sample included individuals who, on average, had contributed about \$500 at that point. The letters sent to these subjects were identical in every aspect except for some pieces of information that were randomly assigned in a non-deceptive way to test the conformity and comparison channels. We then used the FEC records to measure how the randomized information contained in the letters affected the subject's subsequent contributions during the remainder of the campaign – the six months between the mail delivery and the end of the 2012 presidential campaign.

The first treatment arm was designed to test the conformity channel, by generating exogenous variation in the visibility of the recipient's own contribution. This type of letter provided information about the public nature of campaign contribution records and how to access the FEC's online search tool. We randomly assigned these recipients to one of two sub-treatments. Individuals in one sub-treatment received a letter indicating that theirs was the only household in the area randomly chosen to be sent a letter of this type. Individuals in the other sub-treatment received a letter that was identical in every aspect to the first except that it indicated that their household along with other households in the area had been randomly selected to receive a letter of this type. The second sub-treatment differs from the first in that other individuals in the area also received information about how to access the FEC records, thereby making the recipient aware that her future contributions could be monitored by her neighbors. Thus, the difference between these two sub-treatments can be interpreted as increased visibility of the recipient's contributions in the eyes of her neighbors.

The second treatment arm was designed to test the comparison channel, by generating exogenous variation in the recipient's perception of the contribution behavior by her peers. We sent a letter that listed the semi-anonymized names of the recipient and nine other contributors from the recipient's area of residence, as well as the amounts contributed and the parties contributed to. We randomly selected those nine individuals from the recipient's thirty closest contributors. This selection was based on a series of parameters that we varied

³See Appendix D for more details.

randomly to create non-deceptive exogenous variation along multiple dimensions of the list of contributors: e.g., the average amount contributed and the number of individuals contributing to the recipient's party. As a result, this methodology creates exogenous variation in the recipient's perception of the contributions of others.

The results for the conformity channel suggest that the visibility of one's contributions does indeed matter, and in a markedly partisan way. We find that, when feeling more monitored by neighbors, an individual's contribution increases if a majority of her neighbors supports her party, but decreases if a majority supports the opposite party. These effects are not only statistically significant, but large in magnitude. Our preferred treatment-on-the-treated estimates suggest that in highly polarized areas, with 80% of neighbors supporting one party, our subtle visibility treatment decreased the amount contributed by minority supporters by 40% and increased the amount contributed by majority supporters by 20%.⁴ This evidence is consistent with partisan interactions where individuals treat favorably supporters of their own party and unfavorably supporters of the opposite party. Since these partisan interactions increase participation by the local majority and decrease participation by the local minority, they exacerbate polarization of political participation. Furthermore, if individuals anticipate the preferential treatment from like-minded peers, these partisan interactions can exacerbate the incentives for political segregation.

The results for the comparison channel suggest that an individual's contributions are also significantly affected by her perceptions about the contribution behavior of others. Recipients contributed more when neighbors of the same party were shown to contribute higher average amounts (in the table of contributors included in the letter). This effect is significant both statistically and economically. Our preferred treatment-on-the-treated estimate indicates that for each additional \$100 in the average amount contributed by own-party neighbors, the recipient's own contribution increased by \$11.5. While there are other plausible interpretations, this evidence is consistent with the formation of a social norm about what constitutes a "fair" contribution amount.

Individuals did not contribute significantly more, however, when neighbors from the opposite party were shown to contribute higher average amounts. This finding is consistent with theories of identity (Akerlof and Kranton, 2000), according to which individuals form social norms based on the behavior of peers with whom they identify (in this case, neighbors who support the same party). This comparison effect can induce polarization, because individuals become more active when other like-minded peers are more active. In addition to

⁴These estimates correct for the fact that many individuals may have discarded the mailpiece we sent to them. We conducted a post-election survey to obtain information for this correction. See Section 4.1.4 for details.

the information on the average amount contributed, we also examined whether individuals care about the distribution of contributions across parties. Individuals contributed less when there was a higher number of own-party relative to opposite-party contributors. This evidence differs from predictions based on social norms theory, according to which an individual should feel more pressure to contribute when a higher number of her peers contribute. As a result, this mechanism can reduce, rather than increase, polarization.

While our evidence is based on the particular case of campaign contributions, similar partisan interactions very likely take place with most forms of political participation, such as talking about politics, sharing political news, attending rallies, and even registering to vote. Furthermore, in the case of campaign contributions, we present some complementary evidence that the use of the FEC search tool arises naturally, without the need for our experimental interventions. First, we conducted a survey eliciting contributor's knowledge about the open nature of the FEC disclosure policy. The results indicate extensive awareness about the public nature of contribution records. Second, we used a large dataset on Internet browsing data to study whether individuals use the FEC online contribution records. The evidence suggests that the FEC search tool is widely used by individuals and, moreover, it seems to be used to learn about other individuals (e.g., friends, neighbors) rather than to learn about the candidates.

In terms of voting, the literature has long emphasized the importance of social pressure (Knack, 1992) and social norms (Riker and Ordeshook, 1968).⁵ In a seminal contribution, Gerber, Green and Larimer (2008) conducted a field experiment in which, close to election day, individuals were sent letters with lists of neighbors and their previous voting turnout history. The letters also promised to publicize the recipient's future voting behavior to her neighbors. The authors found that these letters had a large positive effect on subsequent turnout, which they interpret as arising from some combination of social norms and social pressure. Unlike most other forms of political participation, though, the act of voting does not in itself reveal the party or cause that the individual supports.⁶ As a result, Gerber et al. (2008) and other related studies (Funk, 2010; DellaVigna, List, Malmendier and Rao, 2014) do not present any evidence about how individuals interact with peers from the same and the opposite party.⁷ Instead, to the best of our knowledge, our paper is the first to provide experimental evidence about partisan interactions. Additionally, we make a methodological

 $^{^5\}mathrm{As}$ discussed in Ali and Lin (2013) and in our model in Appendix I, these two forms of incentives are not mutually exclusive.

 $^{^{6}}$ In their informational experiment, Gerber et al. (2008) did not disclose any information related to partisan affiliation.

⁷A number of studies have extended the analysis in Gerber et al. (2008). For an overview of this literature, see Green and Gerber (2010).

contribution by developing an experimental design capable of disentangling different forms of social incentives, such as the effects of being observed by others versus the effects of observing what others do.

Our findings also provide new insights into the debate on why individuals make contributions to political campaigns. Individual contributions represent a large portion of campaign funding in the United States: approximately 80% of the \$1.7 billion dollars raised in the 2012 presidential race consisted of individual contributions.⁸ The political economy implications of campaign contributions, as well as its regulation, are salient topics of public debate and scholarly research (Campante, 2011; Gilbert, 2013). However, to understand the consequences of campaign contributions, we must first establish its determinants, which are not yet fully understood (Ansolabehere et al., 2003). By showing the importance of social incentives, our findings provide new insights into the motives for contributing. Moreover, our results suggest that campaign contributions may be considered a form of pro-social behavior, insofar as social incentives play a similarly important role in other forms of pro-social behavior (Frey and Meier, 2004; Bénabou and Tirole, 2006, 2011; Gerber et al., 2008; Andreoni and Bernheim, 2009; Allcott, 2011; DellaVigna et al., 2012; Bottan and Perez Truglia, 2012; Chetty et al., 2012; Ali and Lin, 2013; DellaVigna et al., 2014).

While our main goal was not to evaluate the impact of the FEC's disclosure policy, our findings provide some insights into the design of this policy. The alleged purpose of making contribution records easily accessible to the general public online is to help voters learn about candidates. The results of our experiment indicate, however, that public records may be used to exert social pressure on friends, neighbors and coworkers, which can lead to higher geographic polarization and unwanted welfare costs.⁹ We use complementary Internet browsing data that suggests that this phenomenon commonly occurs. Finally, we suggest simple modifications to the current disclosure policy that could minimize these unintended uses without compromising the regulation's original goals. More generally, our study provides insights into the wider area of information disclosure, privacy, and the welfare effects of their regulation, both in the public and private sectors.

The paper is organized as follows. Section 2 discusses the relevant hypotheses and the experimental design used to test them. Section 3 presents the data sources and the implementation of the field experiment. Sections 4 present the results. Section 5 discusses the policy implications. The final section concludes.

 $^{^{8}}$ Individual contributions will probably gain even more importance after the 2014 decision of the U.S. Supreme Court to eliminate contribution limits (McCutcheon v. FEC ruling, April 2 2014).

⁹Gentzkow and Shapiro (2011) show that the advent of the Internet, through online news consumption, may reduce political polarization in America. On the contrary, our evidence shows one mechanism through which the increasing use of the Internet may increase polarization.

2 Hypotheses and Experimental Design

2.1 The Conformity Channel

2.1.1 Hypotheses

In their social interactions, individuals care about how they are perceived by others (Bénabou and Tirole, 2006, 2011). They may care about their social image for instrumental reasons (e.g., getting favors) or for hedonic reasons. Being held in high esteem by neighbors, for instance, can lead to favors and invitations to events, whereas low esteem may imply indifference or even hostility. In these social interactions, peers may care about a range of characteristics, such as trustworthiness, good taste and income. In this paper, we consider the possibility that peers care about the political party that the individual supports (or, more broadly, which candidate, causes, or ideology the individual identifies with). The existence of partisan favoritism has been long recognized (e.g., Campbell et al., 1960), and is consistent with evidence that individuals report to be more sympathetic with supporters of their own political party (e.g., Iyengar, Sood and Lelkes, 2012; Iyengar and Westwood, 2015).¹⁰

Due to their visibility, campaign contributions can reveal the party that an individual identifies and the level of commitment with that party (again, more generally, also about the affiliation with candidates, causes and ideologies). In this section we study how the visibility of partisanship may affect the decision to participate in politics. A vast majority of the existing models of social interactions deal with social-signaling in relation to actions that are unambiguously perceived as good or bad by others (e.g., Bénabou and Tirole, 2006, 2011). Under partisan favoritism, however, contributors interact with supporters of both parties and thus face a dual audience.¹¹ For instance a higher contribution to a Democratic presidential candidate may generate positive reactions from Democratic peers but negative reactions from Republican peers. As a result, the effects of more visible contributions will depend on the partisan composition of the peers with whom the individual interacts: higher visibility should have a higher effect on participation the higher the share of the audience that sympathize with the individual's own party. For instance, if an individual interacts only with supporters of her party, an increase in the visibility of contributions would be expected

¹⁰See Sunstein (2015) for a review of related studies. Gentzkow and Shapiro (2011) find that the level of political segregation of direct social interactions with neighbors, coworkers and family members is higher than the segregation in online and offline media consumption. Furthermore, Gerber et al. (2013) show that some individuals do not vote because they do not trust the privacy of voting, which could perhaps suggest that they do not want to disclose their partian affiliation.

¹¹Similar dual-audience setups appear in other models of political participation: e.g., Gentzkow, Shapiro and Sinkinson (2014) studying media outlets and Glaeser, Ponzeto and Shapiro (2005) studying religious networks.

to make contributing more attractive, due to the positive effects on interactions with likeminded peers. If, on the contrary, the individual interacts exclusively with supporters of the opposite party, then higher visibility would make contributions less attractive, due to the resulting negative effects in social interactions. Appendix I provides a simple signaling model that formalizes this intuition,¹² which is based on the more general idea of conformity from Bernheim (1994).¹³

2.1.2 Experimental Design

The first treatment arm was designed to induce an exogenous variation in the visibility of the recipient's contributions. We used the FEC search tool as a medium for creating variation in this visibility. But first, it is useful to understand what is the state of knowledge about the open disclosure of campaign contribution records. We conducted a survey of contributors (details will follow in Section 3.3 below) that included questions about this issue. Figure 1.a shows that a large majority of respondents¹⁴ (86%) agreed with the statement that contribution records were a matter of public information, while the remaining 14% reported that they believed them to be confidential.¹⁵ Moreover, when survey participants were asked how confident they were about their response, only 11% of those who said that contribution information was public stated that they were unsure of their answers. These survey results indicate that knowledge about the FEC disclosure policy (indeed, it seems to be even more widespread than knowledge about contribution limits, which is another important aspect of campaign finance regulations).¹⁶ Widespread awareness of the disclosure policy among contributors is not surprising, given that campaign committees are required to collect detailed information from individual contributors and, when they do, they must explain that this information is required by the FEC due to the disclosure policy. This awareness is consistent as well with the Internet browsing data presented in Section 5 indicating that the FEC's search tool and other websites based on its information are widely accessed.

¹²There are other plausible interpretations of these conformity effects, however. For instance, though neighbors may already know that an individual supports the opposite party, they may be more hostile if an individual makes a campaign contribution.

¹³This model shows, among other things, that the above prediction is qualitatively robust to the introduction of homophily (i.e., a higher likelihood of interacting with more like-minded neighbors).

¹⁴These figures correspond to responses from subjects in our sample of contributors who were not subjected to any informational treatment – i.e, those in the No-Letter group (see Section 3 for details).

¹⁵Strictly speaking, some contribution records are a matter of public record while others are not (e.g., records for contributions of \$200 or less are not reported to the FEC). The wording in the survey was very general since we wanted to measure general awareness of the public nature of this information rather than test the subjects on the details of the regulation. Appendix B presents more details about the survey instrument, including a facsimile with the exact wording of this question and of response options.

¹⁶When asked about contribution limits, 70% of respondents selected the correct amount (\$2,500) from a list, while 20% selected the *Don't Know* option (see Figure B.1 in the Appendix).

Since the vast majority of contributors knew about the public nature of contribution records, sending information about the FEC disclosure policy to them should have only a limited effect on their perception of the visibility of their contributions. However, our survey results indicate that contributors are uncertain as to whether their neighbors know about the public nature of contribution records: Figure 1.b indicates that only 40% of respondents believed that the majority or the vast majority of their neighbors believed that contribution records: were confidential. This may well reflect a belief among contributors that only a minority of their neighbors make contributions as well, and a belief that non-contributors are likely less aware of the public nature of contribution records than their contributor counterparts. These results suggest that informing a contributor's neighbors about how to access contribution records may have a potentially larger impact on perceived visibility of contributions.

We designed a type of letter, which we labeled Website, for the purpose of providing information on how to use the FEC website to search for individual contributors (for a sample, see Appendix A.1). This flyer-like mailpiece consisted of a single sheet of paper that was folded and sealed to form an envelope (see sample in Appendix A.6). As with all the other types of letters used in this experiment, we identified the research purpose of the communication: "This letter is part of a study of political campaign contributions made by individuals which is being conducted by researchers at Harvard University." The letters included the URL of the project's website, which provided basic information on the project as well as contact information for the research team and for Harvard's Institutional Review Board (see Appendix C for the content of this site). The main purpose of the site was to provide interested subjects with contextual information about our study to clear up any doubts about its legitimacy by placing emphasis on its academic and non-partisan nature.¹⁷

This Website letter contained a list that included the name of the recipient and of her five closest contributors, along with the party and the amount given by each of those listed.¹⁸ The recipient of the letter was always the second name on the list; the full name of the recipient was used (other contributors were identified only by first name and initial of last name) and highlighted on the list. This short list of contributors was included for two reasons: first, to draw the recipient's attention to the content of the letter and, second, to reinforce

¹⁷Although the website did contain general information about the main research objective, to avoid contamination of the results, no information was provided on the precise hypotheses being tested or on the existence of several different treatment types. We directed individuals who were interested in receiving a debriefing brochure (a non-technical summary of the study's main hypotheses and results) to send an e-mail to a dedicated e-mail address with the indication that we would reply by sending a brochure only after the data collection process was completed.

¹⁸The median pairwise distance between the recipients and their five closest neighbors who were contributors was 0.35 miles.

the perception that contribution records are indeed publicly available by providing verifiable information (including the recipient's own contributions to date). The second paragraph of the letter identified the FEC as the source of the information and explained that the name, address, and other details about contributions were readily accessible online. That paragraph also included a link to the FEC's website search tool along with the statement that the website could be used "to see which candidates or political parties your neighbors, friends, family and co-workers are contributing to."

We introduced an exogenous variation in the visibility of the recipient's contributions by including two sub-treatments: Website-Self and Website-Neighbors. These two letter sub-types were identical in all aspects, except for a message prominently displayed in a box located right below the list of contributors stating:

Website-Self: "Your household was the only household randomly chosen from your area to receive a letter of this type."

Website-Neighbors: "Your household and other households in your area were randomly chosen to receive a letter of this type."

This information was non-deceptive: we conducted the randomization such that those receiving the Website-Self were the only ones in their area to receive the letter, while there were multiple recipients of the Website-Neighbors letter within an area.¹⁹ Since other individuals in their area also received information about how to access the FEC records, recipients of Website-Neighbors letters should have considered it more likely that their neighbors use the FEC search tools to monitor their future contributions (relative to recipients of the Website-Self letters); every other aspect of the letters, and thus any other potential effect, was identical. In other words, the difference between these two sub-treatments can be interpreted as an increase in the visibility of recipients' contribution to their neighbors.²⁰

To estimate the effect of higher visibility, we proceeded as follows. Let Y_i be a measure of the recipient's post-treatment contributions. The econometric specification is:

¹⁹Specifically, we divided the United States into disjointed geographical areas of similar population. These areas were randomly assigned to one of two groups. In areas assigned to the Website-Self treatment, exactly one household (randomly selected among all households in the area in our FEC database of contributors) was sent a letter of this type. In the areas assigned to the Website-Neighbors treatment, we randomly selected two households to be sent these letters. We assigned twice as many areas to the Website-Self than to the Website-Neighbors type so that the expected number of households receiving each sub-treatment was the same.

²⁰In the letters, we emphasized the fact that households were randomly selected to receive these letters in order to minimize the possibility that recipients make spurious inferences on the basis of having been selected for our mailing. Significantly, the letters did not specify whether the neighbors receiving the Website letter were contributors or not. In reality, because of the way we selected our sample, we only sent letters to contributors.

 $Y_i = \beta_0 \cdot HigherVisibility_i + \beta_1 \cdot HigherVisibility_i \cdot ShareOwnParty_i + \alpha \cdot ShareOwnParty_i + \delta X_i + \varepsilon_i$ (1)

where *Higher Visibility* is a dummy variable that takes the value of 1 if the subject was assigned to the sub-treatment Website-Neighbors and the value of 0 if she was assigned to the sub-treatment Website-Self. *Share Own-Party* denotes the proportion of the recipient's neighbors who support the recipient's party. The marginal effect of the higher-visibility treatment in a given area is given by: $\beta_0 + \beta_1 \cdot ShareOwnParty_i$. The conformity channel predicts that higher visibility will discourage participation in areas where a vast majority of neighbors support the opposite party (i.e., $\beta_0 < 0$), but will encourage participation in areas where the vast majority of neighbors support the same party (i.e., $\beta_0 + \beta_1 > 0$). Finally, X_i is a group of control variables such as the pre-treatment contributions made by the recipient. The inclusion of these variables improves the precision of the estimates slightly, but the results are robust even when they are excluded.

2.2 The Comparison Channel

2.2.1 Hypotheses

The social norms theory provides an attractive framework for understanding why individuals may care about the participation of others. According to social norms theory, individuals are more motivated to engage in pro-social behavior when they perceive others to be doing so (Cialdini, 1984; Akerlof and Kranton, 2000). There is a substantial body of empirical and theoretical work on the role of social norms in influencing non-partian behavior, such as voting, charitable giving, energy conservation, and peer review (Frey and Meier, 2004; Bénabou and Tirole, 2006, 2011; Gerber et al., 2008; Allcott, 2011; DellaVigna et al., 2012; DellaVigna et al., 2013; Bottan and Perez Truglia, 2012; Chetty et al., 2012; Ali and Lin, 2013).²¹

More specifically, the social norms theory poses that individuals care only about the behavior of others with whom they identify (Akerlof and Kranton, 2000). Thus, applying the social norms model to partisan behavior implies that individuals may react very differently to the participation of individuals of their own and opposite party. First, an individual's contribution may increase with her perception of the average amount contributed by others, which may be used to assess the contribution norm. More precisely, an individual is likely

²¹For example, Frey and Meier (2004) implemented a field experiment in which they sent information about students' past donations to a university's social fund to a randomly-assigned sample of potential donors. Those who were told that a high percentage of students had donated in the past gave more than those who were told that only a small fraction had contributed.

to care about the average amount contributed by members of the same political party more than about the average amount contributed by members of the opposite party (indeed, she may not care at all about those contributions). A second prediction is that an individual may also care about the extensive margin of participation. That is, an individual's contribution may increase if she perceives that a higher number others are contributing. More precisely, an individual may respond more positively to the participation rate among supporters of her own party than among supporters of the opposite party.

2.2.2 Experimental Design

We devised a treatment arm called the List letter that provided information about the behavior of other contributors in the recipient's area. A sample letter is presented in Appendix A.3. The letter contained the same contextual information as the Website letter regarding the purpose of the communication (research), the project's website, and contact information. The bulk of the List letter, though, consisted of information about presidential campaign contributions made by the recipient and by nine other individuals from the recipient's area of residence from April 1, 2011 to April 1, 2012. The information included, in table form, the party and the amount contributed by each of those listed. The recipient's own contribution and name (highlighted) was at the top of the list in order to draw the recipient's attention and to demonstrate the credibility of the study since the individual could confirm that the information was accurate. To facilitate the assimilation of the information, contributions were ordered from highest to lowest amounts, first for Democratic candidates and then for Republican candidates. Since the main purpose of this treatment arm is to study how contributors act when they observe others rather than how they behave when they feel observed by others, we tried to prevent, to the extent possible, recipients from feeling that their contribution activity was more exposed to their neighbors due to our letter. Specifically, we did not make reference to the FEC's website search tool; we semi-anonymized the records by using initials only for last names; and we selected contributors from a broad geographical $area.^{22}$

We used an algorithm that randomly selected the nine contributors to be included in the table in order to introduce experimental variation in the lists presented to the recipients. We first obtained the geo-location for all individuals listed in our baseline FEC database. Then, for each contributor i assigned a List letter, we identified the thirty closest contributors, L_i , which we defined to be the individual's neighbors.²³ The nine neighbors included in the table

²²The median pairwise distance between the recipient and the nine neighboring contributors was 1.2 miles.

 $^{^{23}}L_i$ is constructed on the basis of pairwise distances as the crow flies. These neighboring contributors were selected from all FEC records, not only from our selected subject pool.

were selected from L_i first by ordering the list of thirty contributors in the area according to a composite index and then by picking the top nine contributors from the ordered list. The value of the composite index for a given neighbor j was a function of j's party, Party(j), of the amount contributed by j during the preceding twelve months period, Amount(j), and a set of constants, $\epsilon_i(j)$:

$$Index_{i}(j) = \theta_{i}^{D} \cdot 1 \left[Party(j) = DEM \right] + \theta_{i}^{A} \cdot Amount(j) + \epsilon_{i}(j)$$

The parameters $\{\theta_i^D, \theta_i^A\}$ are the recipient-specific weights assigned to each of those dimensions. The list of the top nine neighbors is a function of those parameters, denoted by $g(L_i; \theta_i^D, \theta_i^A)$. The baseline list refers to the list of nine neighbors given by setting the two weights to zero, $g(L_i; 0, 0)$. The weight assigned to the political party component was randomly selected from three possible values: $\theta_i^D = -c_p, 0, c_p$, with $c_p > 0$. Similarly, the weight assigned to the contribution amount was randomly selected from three possible values: $\theta_i^A = -c_a, 0, c_a$, with $c_a > 0$. We calibrated the distribution of the parameter values so that the average characteristics of the lists were not biased relative to the baseline.²⁴ Note that the information provided was not deceptive insofar as the letters stated that the table included nine of the recipient's neighbors and, given our definition of neighbors, that claim always holds true.

This composite index induced exogenous variation in the contribution patterns shown in each List letter. Table 3 presents three possible lists of nine neighbors generated by different combinations of the parameter weights. The panel on the left presents the baseline list $(\theta_i^D = 0, \theta_i^A = 0)$. The center panel presents the list obtained when the Democratic weight is assigned a negative value $(\theta_i^D < 0, \theta_i^A = 0)$. When this operation is performed, two of the Democratic contributors that appear on the baseline list are replaced by two Republican contributors. In the panel on the right, the weight on the amount is assigned a positive value $(\theta_i^D = 0, \theta_i^A > 0)$. Here, two of the Democrat contributors that appear on the baseline list are replaced by two other Democrats who contributed higher amounts, and one of the Republican contributors is replaced by one Republican who contributed a higher amount.

Our identification strategy does not rely on a comparison of post-treatment contributions by individuals who received the List letters and those who did not receive any letter. It relies, rather, on the comparison between individuals who received List letter. A simple example conveys intuition on the estimation of these effects. Imagine that we sent some contributors a table with an average contribution of \$500 while we sent others a table with an average

²⁴We calibrated as well the distribution of the parameter values to yield an orthogonal variation in key dimensions of the list, such as the average amounts contributed and the number of contributors to the Democratic party.

contribution of \$600. In that case, we could estimate a regression of the post-treatment contributions on a variable that takes the value of 0 for the recipients randomly assigned to the \$500-letter and the value of 100 for the recipients assigned to the \$600-letter. If the estimated coefficient on that variable is 0.1, it would imply that each additional dollar in average contributions shown in the letter caused the recipient to contribute an additional ten cents.

We can generalize the above framework for the case when we simultaneously randomize multiple dimensions of the information contained in the letter. Let $f^{j}(\cdot)$ represent any statistic j from a given list (e.g., the mean contribution to the recipient's own party), and recall that Y_i denotes the recipient's post-treatment contributions. The econometric specification is:

$$Y_i = \sum_j \beta_j \cdot \Delta f_i^j + \delta X_i + \varepsilon_i \tag{2}$$

Where $\Delta f_i^j \equiv f^j(g(L_i; \theta_i^D, \theta_i^A)) - f(g(L_i; 0, 0))$ is the value of statistic j in the list shown to the individual compared to the value that would have resulted if she had received the baseline list (for instance, the mean contribution in the list sent minus the mean contribution in the baseline list). Since the variation in Δf_i^j is driven entirely by the random assignment of $\{\theta_i^D, \theta_i^A\}$, the coefficient on Δf_i^j can be interpreted as the causal effect of the f_i^j included in the list on the recipient's post-treatment contributions.²⁵ As a measure of how much exogenous variation was induced, the correlation between the mean amount contributed in the actual table sent to the recipient and the mean amount in the baseline table is about $0.75.^{26}$

Last, note that if individuals care about the contribution behavior of others, the equilibrium distribution of contributions will depend on how individuals form their perceptions about the behavior of others. This question is particularly relevant to disclosure policies; disseminating objective information, for instance, could correct biases in the formation of beliefs. To explore this hypothesis, we introduced an additional sub-type of letter (labeled List-Placebo) and we randomized an additional feature of the List letter (List-Once vs. List-

 $^{^{25}}$ We can also illustrate the intuition for this methodology by means of a parallel with an instrumental variables regression. The endogenous variable would be the actual value of the statistic for the contributions shown in the table (e.g., the mean amount) and the first stage would consist of a model that predicts the value of such statistic using the random assignment of the weighting coefficients. The difference, however, is that we have perfect knowledge of the "first stage."

²⁶Note that simply selecting nine of the thirty closest neighbors at random, without a composite index, would also introduce exogenous variation in the information included in the table of contributors. A simple random selection process, though, would not have given us any control over how much exogenous variation was introduced for each statistic k, possibly resulting in insufficient variation for the regression analysis. On the other hand, one should not induce too much exogenous variation, otherwise that could compromise the credibility of the information provided to the subject.

Update). Due to space constrains, these additional features of the experimental design, and the results they yielded, are presented in Appendix H.

3 Data Sources and Implementation of the Field Experiment

3.1 Subject Pool and Data Sources

Our subject pool was based on a subsample of the FEC contribution records, specifically some 280,456 individuals who had made over \$200 in contributions to a presidential campaign committee from April 1, 2011 to April 1, 2012.²⁷ While the FEC's records are remarkably comprehensive, there were some instances of missing or inconsistent information. Since the number of individuals in this initial sample was substantially higher than the number of subjects needed for our experiment, we adopted a conservative approach and limited the subject pool to those individuals for whom the highest quality information was available (e.g., quality of address information). We applied a number of additional arbitrary criteria, such as excluding contributors from Washington D.C. and those geographically isolated from other contributors (for more details, see Appendix E). After applying these criteria, our final subject pool consisted of 191,832 individuals.²⁸ Appendix E provides some descriptive statistics for this subject pool: 53% were Democrats, 59% were male and 79% were white. The Appendix also shows evidence that this subject pool was highly representative of the universe of individuals who contributed during the 2012 presidential campaign.

Of the 191,832 contributors in the subject pool, 91,998 were randomly assigned to be sent a letter: 36,773 were sent a Website letter, 36,795 a List letter, and 18,430 a List-Placebo letter.²⁹ Within each treatment arm, we randomly assigned them to the sub-treatments described in the previous section (e.g., Website-Self and Website-Neighbors). We refer to the 99,834 individuals who were not assigned a letter as the No-Letter group. The random

²⁷The sample was drawn from the FEC records as of April 25, 2012. For the sake of simplicity, we considered only direct individual contributions to presidential committees, not other types of contributions, such as a loan to a candidate. While we did not include contributions to other committees (e.g., PACs, SuperPACs) in our subject pool, we analyzed the effects of our experiment on these types of contributions.

²⁸The sample also excludes 1,002 individuals who were sent letters later deemed undeliverable or redirected by USPS. We took several measures to clean the address information in the FEC database, including geocoding, crosschecking an individual's information across different records, and matching the data with the USPS National Change of Address database. Our mailing provider indicated that about 5% of letters are undeliverable even when address databases are carefully cleaned, so our efforts along these lines can be considered successful. The results are robust to alternative treatments of those observations.

²⁹We did not conduct a pilot, because otherwise we would have needed to wait for four years until the next presidential election to conduct the experiment.

assignment, which was conducted at the household level,³⁰ was stratified at the 3-digit ZIP code (ZIP-3) level. Appendix E presents average pre-treatment characteristics for each of the treatment groups, including the amount of pre-treatment contributions and the party contributed to. The treatment groups are balanced in all the observable characteristics, as we would expect from the random assignment to treatments.

3.2 Timing of the Experiment and Outcomes of Interest

The letters were sent on May 6, 2012, four days after the Republican National Committee had declared Mitt Romney the party's presumptive nominee. The outcome variable was simplified by sending the letters once each party had a single presidential candidate, which meant we did not have to compare contributions from the same individual to different candidates. Unless stated otherwise, the outcomes of interest throughout our study are the individual campaign contributions made to the Obama or Romney committees from the estimated mail delivery until the official end of the election cycle, that is, December 31, 2012 (in practice, there were virtually no contributions shortly after election day, November 6).³¹ We called these "post-treatment" contributions. The "pre-treatment" contributions, which were used in falsification tests, correspond to total contributions made between April 1, 2011, and the date when the letters were delivered.

Table 1 describes the contribution patterns of individuals in the No-Letter group before and after treatment. The top panel presents detailed statistics for the pre-treatment period, during which 52% contributed to President Obama and the remaining to Republican candidates.³² On average, individuals contributed about \$524 during the pre-treatment period. Republican contributed substantially larger amounts than their Democratic counterparts, which was expected given that the Republican candidates were taking part in a primary while President Obama was only in the general election. The bottom half of Table 1 presents similar statistics for post-treatment contributions. During the post-treatment period, 48.9% of our subjects made at least one contribution. For those who made contributions during the post-treatment period, the average amount contributed was \$587. When the dependent variable in the regressions presented below is amount of post-treatment contributions, we use an interval regression model to take into account the censored nature of this outcome.³³ There

 $^{^{30}}$ That is, all household members were assigned to the same treatment group. About 96% of the households in the subject pool included only one contributor.

³¹See Appendix E for details on how we define the date of delivery for each individual according to USPS records. Our main results are robust if we define pre- and post- contributions according to the date when the letters were mailed rather than delivered.

³²For individuals in the No-Letter group, the we defined the date dividing pre- and post-treatment contributions as the median date when other letters were delivered in their 5-digit ZIP code.

³³Note that if a Republican did not make a pre-treatment contribution to Romney, she may appear as

are significant differences in post-treatment contributions across parties: e.g., the probability of making a post-treatment contribution was 75.9% for supporters of Obama, but only 38.6%for Romney supporters and 11.9% for supporters of other Republican candidates. Because of these differences in baseline rates, it is not straightforward to compare the magnitude of the effects across party lines.³⁴

3.3 Post-Election Mail-In Survey

Data for the key outcome variable, the recipient's post-treatment contributions, was obtained from the FEC administrative records. Additionally,we conducted a mail-in survey survey with a subsample of our subjects to provide some descriptive evidence to complement the experimental results. We sent the survey on December 6, 2012, one month after the date of the 2012 presidential election, because we did not want any of the information contained in the letter to contaminate the effects of the letters sent in the experiment. The intended recipients, 34,966 in total, were a random sample of individuals from the No-Letter group (one third) and from the Website group (two thirds). The envelope contained a letter, a survey questionnaire, and a prepaid business-reply envelope. Recipients were asked to fill out the survey and mail it back in the envelope provided.³⁵ The survey included five questions about knowledge of campaign finance law and a final subjective question about how much an individual should contribute to presidential campaigns. We received 9,414 responses, which means the response rate was 21.21%. Appendix B contains the survey instrument and provides further details on this survey and its response rate.

The purpose of this survey was twofold. First, it was designed to provide some descriptive evidence to complement the experimental results. As discussed above in Section 2.1.2, it provides, for instance, a measure of awareness of the FEC disclosure policy. The second goal was to provide evidence to adjust and aid the interpretation of the magnitudes of the effects identified by our mailing experiment. The intuition of this adjustment is as follows. We decided to send the letters out during the presidential campaign, when most of the subjects were flooded with mailings related to the upcoming election and the campaign. Mass mailing experts told us that a substantial share of subjects – most likely a majority – would not read or even open the letters we sent to them. As a result, our field experiment identifies the effect

not having made a post-treatment contribution to Romney if that contribution is below \$200 (that is, the FEC threshold). We use the interval regression model instead of a simple censored regression model to take that information into account. In practice, the interval regression model and the censored model yield very similar results.

³⁴Nevertheless, conditional on those who contributed something, the average post-treatment contribution is very similar across candidates.

 $^{^{35}}$ As an incentive for participation, we included prizes awarded by lottery to individuals who mailed in the completed survey before January 31, 2013 (for details, see Appendix B).

of sending someone a letter, which differs from the effect of reading the letter. To adjust for this difference, we needed an estimate of the proportion of individuals who actually read the letter. As discussed in detail in Section 4.1.4 below, the data collected in this survey provides such an estimate.

4 Experimental Results

4.1 Results: The Conformity Channel

4.1.1 Main Results

The evidence about the conformity channel is based on the sample of 36,773 subjects sent letters of the Website type. The estimation is given by equation 1, in which *Higher Visibility* is a dummy that takes the value of 1 if the subject (the recipient of the letter) was assigned to the Website-Neighbors letter and 0 if the subject was assigned to the Website-Self letter. *Share Own-Party* in turn is the proportion of the recipient's neighbors who support the recipient's party, defined as the share of contributors to the subjects's party over the three previous presidential campaigns who reside in the recipient's 3-digit ZIP code.³⁶

As a first approach, Figure 2 depicts the effect of *Higher Visibility* on the probability of making a contribution in the post-treatment period, estimated for different values of *Share Own-Party*. Consistent with the prediction of the conformity channel, the effect of *Higher Visibility* increases with *Share Own-Party*: when the majority of a subject's neighbors support her party, higher visibility increases the probability that she will make a contribution; when supporters are evenly split between the two parties, higher visibility has no effect on the likelihood of contributing; and when most of a subject's neighbors support the opposite party, higher visibility decreases the probability of a subject making a contribution.

Table 2 presents the baseline results in regression form, along with a number of robustness checks. The results in column (1) present the effects of the higher visibility treatment on the amount contributed during the post-treatment period. The estimated coefficients are again consistent with the predictions yielded by the conformity channel: the significant negative coefficient on *Higher Visibility* indicates that the treatment reduces participation in areas where everyone supports the party that the recipient opposes, while the significant positive coefficient on the interaction between *Higher Visibility* and *Share Own-Party* indicates that

 $^{^{36}}$ The results are robust to using alternative measures of *Share Own-Party*. The advantage of using contribution data instead of electoral results is that the former provides the exact location for each contributor, which allows for a finer measure of geographic party composition. In any case, our party composition variable, based on the share of contributors, has a very high linear correlation (0.88) at the county level with an alternative variable based on electoral results.

the effect of the higher visibility treatment is more positive (or less negative) when *Share* Own-Party is higher.

The coefficients from Table 2 can be used to estimate the effects of the higher visibility treatment in areas with different values of *Share Own-Party*. For instance, increasing visibility would reduce the amount contributed by about \$77 (p-value<0.05) when everyone supports the party the recipient opposes; increasing visibility would reduce the amount contributed by an insignificant \$13 (p-value>0.10) when neighbors are evenly split between the two parties;³⁷ and increasing visibility would increase the recipient's contribution by about \$52 (p-value<0.05) when all neighbors support the same party as the recipient.

A representative example of a highly polarized area is given by a ZIP-3 where 80% of contributors support one of the two parties (corresponding to the mean share of individuals supporting the majority party in the upper-quartile of this variable in our sample). Our results indicate that, in such areas, higher visibility would reduce by about \$51 the amount contributed by supporters of the minority party and increase by about \$26 the amount contributed by supporters of the majority party. These effects are not only statistically, but also economically, significant. The effects of \$51 and \$26 constitute respectively 8.7% and 4.4% of the average amount contributed by subjects who made further contributions during the post-treatment period (\$587). Indeed, these estimates severely underestimate the true effects of visibility, for example, due to the possibility that only a minority of subjects read the fliers that were sent to them. To provide a more accurate assessment of the magnitude of the effects, Section 4.1.4 below discusses and addresses some of these issues.

Column (7) in Table 2 reproduces the results from column (1) but with the probability of making at least one post-treatment contribution, rather than the amount contributed, as the dependent variable. The sign and statistical significance of the coefficients are consistent with the results from column (1). There are, however, some differences in terms of magnitude. In areas where 80% of neighbors support the majority party, the higher visibility treatment reduces the probability of contributing by 1.6 percentage points among supporters of the minority party and increases the probability of contributing by 1.7 percentage points among supporters of the majority party. These effects of 1.6 and 1.7 percentage points represent respectively 3.3% and 3.4% of the baseline contribution rate of 48.9%. It would appear, then, that while still significant, the effects on the decision to contribute (i.e., the extensive margin) were smaller than the effects on the amount contributed (i.e., the intensive margin) - 8.7% and 4.4% of the average amount contributed, as shown above).

³⁷Note that the conformity effects become zero approximately where the share of own-party neighbors is one half. In a model of conformity, such as the signaling model in Appendix I, whether the effects cancel out at this or at a different point depends on a number of factors, such as if individuals are more likely to interact with supporters of their own party (i.e., homophily) and if they value those interactions symmetrically.

4.1.2 Robustness Checks

A simple and straightforward way to check the randomness of treatment assignment is to compute the "effects" of our experiment on pre-treatment, rather than post-treatment, contributions. Column (8) in Table 2 presents the results from this falsification test.³⁸ As expected, the higher visibility treatment had no "effect" on pre-treatment contributions: the estimates of the coefficients on *Higher Visibility* and on its interaction with *Share Own-Party* are very close to zero, statistically insignificant and precisely estimated.

According to our interpretation, individuals feel more monitored by their neighbors and, thus, the effect of visibility depends on the partisan alignment between the subject and her neighbors. A further potential concern with our results is that the heterogeneous effects by partisan alignment reflect heterogeneity by other location characteristics that are correlated to partisan alignment. Column (2) and (3) presents some robustness checks. On the basis of our discussion of how partisan interactions work, the effect of visibility should be mediated by the political preferences of the recipient's close neighbors, but, conditional on that, should not be mediated by the political preferences of more distant individuals. Column (2) in Table 2 presents the results of a regression model similar to the one presented in column (1), but it includes an additional interaction between *Higher Visibility* and the share of own-party contributors in the ZIP-3s adjacent to the recipient's ZIP-3.³⁹ The coefficients on *Higher Visibility* and on its interaction with *Share Own-Party* continue, in this case, to be significant and very similar to those in the baseline specification in column (1). The coefficient on the interaction between *Higher Visibility* and the share of own-party contributors in the adjacent areas, however, is close to zero and statistically insignificant.⁴⁰

As an additional falsification test, the regression presented in column (3) adds to the baseline model shown in column (1) an interaction between *Higher Visibility* and the share of low-income households in the recipient's area. As expected, the coefficients on *Higher Visibility* and its interaction with *Share Own-Party* are once again practically identical to those in column (1). The coefficient on the interaction between *Higher Visibility* and the share of low-income households in the recipient's area is close to zero and statistically insignificant.⁴¹ Furthermore, the results did not vary significantly when interactions with other characteristics of an individual's area of residence were included (results not reported).

 $^{^{38}}$ For obvious reasons, the specification in column (8) does not include the pre-treatment contributions as control variables as is the case in column (1).

³⁹We define two ZIP-3s to be adjacent only if their geographic boundaries touch. Our definitions are based on the U.S. Census cartographic data.

⁴⁰The difference between the coefficients on these two interactions is also statistically significant.

⁴¹The estimate of this coefficient is less precise than the estimate of the coefficient on the interaction of *Higher Visibility* and *Share Own-Party*. This is due to the fact that the share of low-income households varies much less across ZIP-3s than the share of supporters of the recipient's party.

We can also explore the timing of the effects of higher visibility. It is likely that our Website-Neighbors subjects eventually forgot that we had sent letters to their neighbors, which means that such information became less salient. As a result, we should expect that the effect of our higher visibility treatment should, if anything, diminish over time. Columns (4) and (5) from Table 2 present estimates of the effect of higher visibility on the post-treatment amount contributed before and after September 1, 2012, respectively. This date divides the post-treatment period roughly into two halves of approximately four months and with similar average contribution amounts. The results from columns (4) and (5) suggest that, indeed, the effects of the higher-visibility treatment faded over time. For example, if all neighbors supported the party that the recipient opposes, an increase in visibility would bring a decrease in the amount contributed of about \$78 during the first four months of the post-treatment period (p-value<0.01), but of only about \$28 during the following four months (p-value>0.10). This finding also implies that the magnitude of the effects of visibility would be substantially larger if we focused our analysis on the short-term reactions.

We can also assess whether the higher visibility treatment affected contributions to other electoral campaigns besides the presidential campaign (e.g., Senatorial races). More precisely, we would expect that a Democrat contributor in a highly Republican area should feel pressure to contribute less to all Democratic candidates, not only Obama. Column (6) reports the results of a regression with the same specification as in column (1), but with the posttreatment amount contributed to non-presidential committees as the dependent variable (this information was also obtained from the FEC public records).⁴² This additional outcome has the disadvantage that it has less variation in our subject pool: e.g., only 14.4% of our subjects contributed to non-presidential campaigns during the post-treatment period, whereas 49% contributed to presidential campaigns.⁴³ The estimates from columns (1) and (6) are remarkably similar, suggesting that the effect of the higher visibility treatment on non-presidential contributions may well be similar to its effect on presidential contributions. However, due to the anticipated lack of precision, the estimates from column (6) are are not statistically significant at conventional levels.

⁴²For the sake of simplicity, this measure excludes contributions to non-presidential committees or candidates from a party different from the one to which the presidential contributions were made (such cross-party variations in contributions are a very small minority: less than 1% of non-presidential contributions are made to another party). The results are robust to the inclusion of all non-presidential contributions in this variable.

⁴³Due to FEC reporting requirements, the proportions here, as in the rest of the paper, represent only individuals contributing more than the \$200 threshold.

4.1.3 Potential Confounding Factors and Alternative Interpretations of Results

While the impact of our higher visibility treatment is consistent with the presence of conformity effects, there are some alternative interpretations of our results worthy of discussion.

The first is that individuals use campaign contributions to send signals about characteristics that are not of a partisan nature – for instance, to signal wealth, generosity or level of civic engagement. There are, however, more efficient ways to signal those traits, such as buying an expensive car to signal wealth, or making non-anonymous charitable contributions to signal altruism. However, even though non-partisan signaling may exist, it could not explain our findings. For instance, non-partisan signaling cannot explain the heterogeneity in the effect of higher visibility with respect to *Share Own-Party*. Furthermore, if individuals were signaling income or altruism then higher visibility should always result in higher contributions. Thus, non-partisan signaling could not explain our finding of a negative effect of higher visibility on contributions for supporters of the local minority party.

A second alternative explanation for the effects of higher visibility could be leadingby-example. According to this conjecture, individuals give more if they feel observed by neighbors because they believe that others will follow their lead and, in turn, contribute more themselves. This is unlikely to be driving our results for at least two reasons. First, an individual's contribution has a minor effect on the average contribution of her neighbors, so subjects cannot rationally expect to have a substantial influence on the social norm. Second, leading-by-example predicts that the effect of higher visibility will be zero when the share of own-party neighbors is zero (since there would be no one to follow the lead) and increase as the share of own-party neighbors increases. Leading-by-example, then, could not explain our finding of a negative effect of higher visibility on contributions for supporters of the local minority party. In other words, leading-by-example may explain part, but not all, of the estimated effect of higher visibility.

Last, although highly unlikely, it is theoretically possible that recipients of Website-Neighbors letters, as opposed to recipients of Website-Self letters, want to change their contributions because they perceive that their neighbors have greater access to information about contributions and in turn that will change the neighbor's contributions. However, this alternative interpretation also fails to explain how higher visibility interacts with *Share Own-Party*.⁴⁴

⁴⁴Consider, for example, the extreme case in which all neighbors of a given area support the same party. We find that receiving the Website-Self letter, as opposed to no letter, had no significant effect on a recipient's contribution (results available upon request). As a result, the recipient of a Website-Neighbors letter should not expect her neighbors to change their behavior. This alternative explanation would imply no difference in contributions between the Website-Neighbors and the Website-Self sub-treatments in areas where all neighbors support the same party, which is inconsistent with our findings of a significant positive difference

4.1.4 Assessing the Magnitude of the Effects

In this subsection, we discuss the possibility that our previous results significantly underestimate the effects of higher visibility and provide some plausible alternatives with which to estimate the true magnitude of the effects.

The first consideration is that our estimates capture the effect of visibility following a relatively minor intervention: a letter on campaign contributions that provides a limited number of neighbors with information on how to access the FEC's search tool. As discussed in Section 5 regarding our Internet browsing data, due to the existence of the FEC search tool, individuals may potentially feel observed by a much greater number of peers. Second, exactly who could potentially observe one's contributions is, in all likelihood, a very important aspect of the conformity channel. We estimate the effect of an increase in visibility among neighbors, but individuals could arguably care more about their social interactions – and, hence, visibility – among friends, relatives, coworkers and employers, who may largely live in other neighborhoods.⁴⁵ Third, most recipients of our mailing appeared in the FEC search tool before receiving our letter,⁴⁶ which means that there was already some publicly available information about which party the individual supported. The fact that higher visibility affected the marginal contribution even for this sample makes our results more remarkable.⁴⁷

Last but not least, the results provide estimates of the effect of having been mailed a letter with certain information, which we denominate the Intention to Treat (ITT) effect. To assess the importance of higher visibility would require estimating the effect on the individuals who actually read the letter, which we denominate the treatment on the treated (TOT) effect.⁴⁸ The ITT effects can be scaled up to TOT effects using the inverse of the reading rate r (i.e., the proportion of recipients who actually read the letters we sent): $TOT = \frac{1}{r}ITT$. A substantial share of experimental subjects – probably a majority – may not have read the letters we

in those areas.

⁴⁵In an ideal experiment, we would design an intervention based on an increase in visibility among an individual's reference group constructed from her social networks. Since such data is not available, we relied instead on a geographic proxy, a common feature in the literature on social interactions (for a discussion in the context of consumption signaling, see Perez-Truglia, 2013).

⁴⁶There is a lag between the itemized contribution records, which we used to form our subject pool, and the appearance of those contributions in the FEC's online search tool database. It is possible, then, that a recipient of one of our letters did not appear on the search tool database until some time (approximately one month) after receiving our mailing.

⁴⁷An additional contribution would still have an effect on the perceptions of neighbors insofar as it would make a party affiliation even more salient in the search results and signal higher commitment to a party. The effects of higher visibility should be much stronger, however, among individuals for which an additional contribution would take them above the \$200 disclosure threshold.

⁴⁸Note also that the treatment effects for individuals who read the letter could be different from the treatment effects for individuals who did not read the letter (in the counterfactual case of having read it), especially if the two groups of individuals differ in key characteristics (e.g., if those prone to reading unsolicited mail are more concerned about their social image).

sent them: our mailing was sent in the middle of the presidential campaign, when potential voters, especially those who had made contributions before, were being flooded by large amounts of unsolicited physical and electronic mailings soliciting campaign contributions and providing information about the candidates and the election. While we attempted to make our mailpiece stand out, so did the candidates' campaign committees.⁴⁹

For our statistical power calculations, we consulted mass-marketing experts who provided us with estimates for our mailpiece's expected reading rate. These estimates ranged from 10% to 25%, which explains why we used such a large sample for conducting the experiment. Relatedly, the Environmental Protection Agency (EPA) indicates that about 50% of unsolicited mail is discarded before being opened, which provides a conservative upper bound on the reading rate. Visitors to our project's website account for 5% of the letters we sent, which in turn provides a conservative lower bound for the reading rate.⁵⁰ These lower and upper bounds, however, are not very informative since they imply scale-up factors for the intention to treat effects ranging from 2 to 20. This broad range was one of the motivations to conduct the post-election mail-in survey. One of its main goals was to provide a more precise and objective estimate of the reading rate.

Since the primary piece of information in our Website letter was the public nature of contribution records, we would expect an individual who had read our letter to have a greater awareness of the public nature of contribution records. Figure 3 compares the distribution of beliefs about the public nature of contribution records between survey respondents who were selected not to receive any letter (the No-Letter group) and recipients of our Website letters. As expected, respondents who had received a Website letter were significantly less likely to report being unsure about the public nature of contribution records. More precisely, the share of respondents who were unsure about the public nature of contribution declined from 19.2 percentage points in the No-Letter group to 15.8 percentage points in the Website group. Assuming that a subject who had read the letter would always report certainty about the disclosure policy, that difference of 21.5% implies a reading rate of r = 0.215 (with a 90% confidence interval of 0.146-0.284). Reassuringly, this estimate of the reading rate is within the range of estimates provided by our mass-mailing experts. Appendix F presents a more detailed discussion of this estimate of the reading rate, including alternative estimators.⁵¹

We can use the estimated reading rate to scale-up the magnitude of the effects of higher

⁴⁹In particular, for cost reasons, our mailpiece consisted of a folded flyer instead of a regular envelope, and these flyers typically stand out less than letters in envelopes.

⁵⁰The website was merely referenced in the letters and not indexed by search engines.

 $^{^{51}}$ The response rate to the mail-in survey, 21.2%, suggests that its reading rate was probably much higher than that of the original treatment letters. This difference can be explained by the very different conditions under which the mail-in survey was sent – i.e., after the presidential election (see Appendix F for a detailed discussion).

visibility. Our results indicated that, in an area where 80% of the population supports one party, the higher visibility treatment induced a drop in post-treatment contributions of 8.7% of the baseline rate for recipients supporting the local minority party, and an increase of 4.4% for recipients supporting the local majority. These effects, while significant, are not remarkably large. The scale-up factor of 4.6 (i.e., $\frac{1}{0.215}$) implied by the reading rate, however, indicates that the TOT effects were substantially larger: -40% (i.e., -8.7%×4.6) and 20% (i.e., 4.4%×4.6), respectively.⁵² Even with a reading rate twice as high, the effects of higher visibility would still be very large. In sum, the evidence suggests that the conformity channel is of first-order importance for understanding political participation.

4.2 Results: The Comparison Channel

4.2.1 Main Results

The evidence about the comparison channel is based on the sample of 36,795 subjects sent letters of the List type. The estimation is given by equation 2, which consists of regressing the post-treatment contributions on the characteristics of the table of contributors included in the letter: the average amount contributed to the recipient's own party (\bar{c}_{own}) and to the opposite party (\bar{c}_{opp}), as well as the number of contributors to the recipient's party on the list (N_{own}). As explained in Section 2.2.2, the coefficients on these variables are identified using only the exogenous variation created by our random assignment procedure.

Table 4 presents the regression results. The specification in column (1) includes as independent variables the average amount contributed to the recipient's own party (\bar{c}_{own}) and the average amount contributed to her opposite party (\bar{c}_{opp}). These independent variables were defined in hundreds of dollars. The coefficient on \bar{c}_{own} indicates that for each \$100 increase in this variable, there is a statistically significant increase in the recipient's own contributions of about \$2.58 (p-value<0.10). While we cannot discard other interpretations, this evidence is consistent with the models of social norms, which predicts that individuals contribute more if they perceive that similar individuals (i.e., geographically close individuals supporting the same party) contributed higher average amounts. In contrast, the coefficient on the contributions of neighbors who support the opposite party indicates that an increase of \$100 in \bar{c}_{opp} has an insignificant effect on the subject's contribution (-\$0.09, p-value>0.10). This finding is also consistent with identity theories (Akerlof and Kranton, 2000), according to which an individual does not follows the behavior of peers with whom that individual does not identify. This mechanism suggests that individuals may be more active politically when

⁵²These calculations assume that the reading rate does not vary with the share of own-party neighbors. The results are very similar if we relax this assumption.

they interact with like-minded neighbors who are more politically active. As a result, this mechanism can induce geographic polarization in political participation.

The economic significance of the social norms effects can be qualified. Like conformity effects, social norms effects are intention to treat estimates, since we do not know which recipients actually read the letter. According to the calculations in Section 4.1.4, the treatment on the treated effect may be 4.6 times greater than the intention to treat effect. This would imply that for each \$100 increase in \bar{c}_{own} , the recipients who actually read the letter increased their contributions by \$11.87 (i.e., 2.58×4.6).⁵³

While social norms is our preferred interpretation of these results, there are alternative interpretations for this finding. Contributors may, for example, react to the average contributions of others in relation to an "optimal" contribution amount given a certain goal (e.g., making a pivotal contribution, buying a future favor from a politician, etc.). To provide complementary evidence on the economic significance of social norms, we included a question in the post-election survey intended to quantify the respondent's perception of the contribution norm. This question asked how much an individual earning an average income should contribute to a presidential campaign (question 8 in the survey's questionnaire, presented in Appendix B). By matching the responses to this question to the FEC records, we can measure the relationship between the perceived social norm and the actual contributions made by respondents during the 2012 presidential campaign. Figure 4 shows that, as expected, there is a significant positive relationship between the perceived contribution norm and actual contributions. Furthermore, the regression coefficient suggests that for each \$100 increase in the perceived contribution norm, the respondent's contribution increases by about 11.21 (p-value<0.01).⁵⁴ This estimate is remarkably close to the 11.87 from the experiment's scaled-up results. These two sources of evidence, as well as the coincidence between them, suggest that social norms are a significant factor in determining campaign contributions.

Table 4 presents additional results on the comparison channel. Column (2) presents the results from a specification that includes as an independent variable the number of individuals on the list who contributed to the recipient's party (N_{own}) , in addition to the average amounts contributed to the recipient's own and to the opposite party, \bar{c}_{own} and

⁵³It should be noted that, in fact, this is just the effect of the information provided, $\bar{c}_{own}^{provided}$, on the recipient's contribution, c. A more relevant structural parameter is the effect of the perceived social norm, \bar{c}_{own}^{norm} , on c. The latter effect is mediated by the fact that individuals do not necessarily adjust their posterior beliefs about the social norm solely in response to the information provided. Our estimated effect, $dc/d\bar{c}_{own}^{provided}$, results from the multiplication of two effects: $dc/d\bar{c}_{own}^{provided} = dc/d\bar{c}_{own}^{norm} \times d\bar{c}_{own}^{norm}/d\bar{c}_{own}^{provided}$, where $d\bar{c}_{own}^{norm}/d\bar{c}_{own}^{provided}$, represents the learning rate. Since this learning rate is expected to be somewhere between 0 and 1, the structural parameter of interest, $dc/d\bar{c}_{own}^{norm}$, is a multiple of the effects reported here $(dc/d\bar{c}_{own}^{provided})$.

⁵⁴This regression only includes responses from individuals in the No Letter group.

 \bar{c}_{opp} . Social norms theory predicts that a higher value of N_{own} should increase the recipient's contribution because individuals feel pressured to behave like the majority. The negative and statistically significant coefficient on N_{own} in column (2) suggests that, to the contrary, the effect operates in the opposite direction. For each additional individual supporting the same party on the list, the recipient reduced the amount of her contribution by \$6.15 (p-value<0.05). The magnitude of this effect is equivalent to the effect of decreasing the mean contribution of own-party neighbors by \$214.⁵⁵ The negative effect of N_{own} on the recipient's contribution suggests that contributions may be subject to some form of free-riding. For example, in line with models of warm-glow giving (Andreoni, 1989), an individual may feel less guilty about not contributing when she perceives that her party is already doing well. Similarly, an individuals may feel more special about making a contribution when few other individuals from participating when like-minded peers participate at a higher rate, which can actually reduce rather than foster polarization.

4.2.2 Robustness Checks

As with conformity effects, a first robustness test is to check the randomness of the treatment assignment by estimating the "effects" of our experiment on pre-treatment contributions. The specification in column (4) presents the results of this falsification test. As expected, all of the coefficients are close to zero and statistically insignificant. We can quantify the effects of the information about contribution patterns on the extensive margin of contributions as well. The specification in column (3) from Table 4 is the same as in column (2), with the only difference that the dependent variable is the probability of making at least one posttreatment contribution. The relevant coefficients from column (3) have the same sign as their correlates in column (2), but they are not statistically significant. This result suggests that the comparison channel is more relevant for the intensive margin than for the extensive margin of contributions.⁵⁶ Last, Appendix G presents a number of additional results, such as testing whether the effect of N_{own} originates from the competitive nature of campaign contributions,⁵⁷ the timing of the effects, and the effects on non-presidential contributions.

⁵⁵The effects of the number of contributors supporting the same party (N_{own}) and of the average amount contributed to that party by neighbors on the list (\bar{c}_{own}) are similar in magnitude, in the sense that the impact of a one standard deviation increase in N_{own} (corresponding to the non-experimental variation in this variable) is similar in magnitude to the impact of a one standard deviation decrease in \bar{c}_{own} .

⁵⁶Note also that the effect of the conformity channel on the amount contributed was also greater than the effect on the probability of making post-treatment contributions.

⁵⁷For example, Augenblick and Cunha (2015) conducted an experiment in which potential Democratic donors received a postcard from a Democratic candidate with a picture of the candidate and one of two randomly assigned messages. They found that the message "Small Republican contributions have been

4.2.3 Discussion: Implications for Disclosure Policy

Our findings on comparison effects are remarkable in that, unlike other field experiments on topics such as charitable giving and energy conservation, our informational treatments did not contain specific messages that would prime individuals to pay attention to a particular dimension of the information provided.⁵⁸ In other words, we did not include suggestive messages like "the average contribution in your neighborhood was \$500." Instead, our letters simply provided itemized information about neighbors' contribution records, and the recipients were free to do whatever they wanted with that information provided in the letter suggests that they were learning something useful from the itemized contribution records. In turn, this implies that an unrestricted disclosure policy may perhaps correct some systematic biases in perceptions of the contribution patterns of others, thereby affecting the equilibrium distribution of contributions. In Appendix H, we provide some suggestive evidence about the existence of systematic biases in these perceptions.

5 Implications of the Findings for the FEC's Disclosure Policy

With the advent of the Internet and the proliferation of online services provided by both the public and private sectors, the issues of information disclosure and privacy have become salient topics in the public debate. Nonetheless, there is still limited evidence about those issues and their effects. While our main goal was not to evaluate the impact of the FEC's disclosure policy, in this section we discuss some insights relevant to the ongoing debate on this policy.

The requirement that all political contributions be filed with a regulatory agency such as the FEC is key to preventing corruption and to enforcing other campaign regulations. The purpose of making detailed contribution records easily accessible online to the general public, as in the current regulation, is less clear, however. For example, voter turnout records are publicly available, but much harder to access than contribution records. Because of the spread of the Internet, the dynamics surrounding information access have changed dramatically since

averaging \$28" elicited higher contributions than the message "Small Democratic contributions have been averaging \$28", which they attribute to a competition effect.

⁵⁸For instance, Allcott (2011) studies a field experiment in which subjects were mailed information with the energy consumption patterns of similar neighbors. Instead of providing itemized consumption levels for each neighbor, the letters provided information about aggregates of the recipient's comparison group consumption (the mean and the 20th percentile of the group).

the time the original legislation was crafted (the Federal Election Campaign Act of 1971 - FECA). As a result, this component of the law has been the object of lively public debate in recent years (Gilbert, 2013). The primary justification of an open disclosure policy is that voters can use public records to learn about candidates. As noted by Gilbert (2013), the spirit of this argument is clearly expressed in the Supreme Court's 1976 *Buckley v. Valeo* ruling, which modified some aspects of the 1971 FECA: "Disclosure provides the electorate with information [...] in order to aid the voters in evaluating those who seek federal office. It allows voters to place each candidate in the political spectrum more precisely than is often possible solely on the basis of party labels and campaign speeches."

Our research identifies two additional ways in which the open disclosure of contribution records can affect contribution decisions and the welfare of contributors. The evidence on the comparison channel suggests that the dissemination of unbiased information about contributions could correct systematic biases in the perceptions about the contribution behavior of others, which would affect the equilibrium distribution of contributions (see also Appendix H). However, the welfare implications from these effects are unclear.⁵⁹

The conformity channel seems to have richer implications for the disclosure policy. Our results indicate that individuals care about the visibility of their contributions, most likely due to the anticipated social pressure from friends, neighbors, and coworkers. A boss could, for instance, deny a promotion to an employee who contributed to the opposite party or neighbors could ostracize a household that contributed to the minority party. The conformity channel could have a chilling effect on participation by local minorities and entail unwanted welfare costs.⁶⁰ Consistent with our findings, there is substantial anecdotal evidence of systematic harassment of supporters of local minority parties by supporters of local majority parties: e.g., the FEC records were used to harass supporters of ballot proposition 8 in California in 2008, they were allegedly used by the Internal Revenue Service to target supporters of the Tea party (e.g., Briffault, 2010; La Raja, 2014). Our evidence suggests that these unintended effects are not isolated cases but, instead, they are more systematic and widespread. Moreover, even decades before the contribution records were made easily acce-

⁵⁹For example, even if correcting biases increased total contributions, this may not be desirable if a good deal of campaign spending is wasteful. More important, providing access to aggregate, rather than individual, data on contributions could yield the same effect, so this channel provides no argument for disseminating identifying information about the contributors.

⁶⁰The effect of existing disclosure policy on individual welfare depends on the exact nature of the social interactions potentially affected by visibility, something our study cannot pin down. We could rationalize the findings with an optimistic (but unlikely) scenario in which favorable treatment by like-minded neighbors represents a zero-sum game in the form, for instance, of the distribution of a fixed number of favors among neighbors. In this case, higher visibility would result in a redistribution of favors from supporters of the local majority, but it would neither add nor subtract value from social interactions.

sible online, the aforementioned 1976 *Buckley v. Valeo* ruling acknowledged the potential for these unintended effects: "Contributors of relatively small amounts are likely to be especially sensitive to recording or disclosure of their political preferences. These strict requirements may well discourage participation by some citizens in the political process, a result that Congress hardly could have intended."

One potential concern is that our findings were artificial, in the sense that individuals felt social pressure because of our mailing intervention but would not have felt social pressure in their normal lives. To elicit whether social pressure arises naturally, we provide some descriptive evidence about the use of the FEC public records. For that, we employ a proprietary dataset with anonymized records of the browsing history of a sample of millions of Americans from January 2013 to December 2014,⁶¹ a period corresponding to the 2014 U.S. Congressional election campaign cycle.⁶²

A first question is whether the FEC records are being accessed at all. We found that 21%of visitors to the FEC website during that time period used the search tool for individual contributors.⁶³ This is a remarkably large share considering that the FEC website provides a number of tools in no way related to searching for individual contributors, tools that are used routinely by public officials, politicians, campaign staff members, reporters, and academics. The link to the individual contributor search tool is not even featured on the FEC website's main page: at the time of the 2012 election, a visitor who wanted to reach the search tool on the FEC's website had to click first on "Campaign Finance Disclosure Portal," then on "Search," and finally on "Individual Contributor Search." The FEC's search tool and its information are available on other websites as well. According to our browsing data, the number of individual contributor searches conducted on two websites that disseminate FEC data amounted to 65% and 55% of the comparable searches conducted on the FEC's website. While we do not have a very reliable way of estimating the total traffic to these websites, our back-of-the-envelope calculations suggest a total number of searches conducted in these websites in the order of tens of millions. Consistent with this, OpenSecrets.org, a website providing access to FEC contribution records, reported nearly 35 million pageviews to its website in 2012, from more than 5 million unique visitors.⁶⁴

A second relevant question is what the FEC records are being used for. Answering this question is much harder, but we nonetheless offer some suggestive evidence. First, we can

 $^{^{61}}$ Unfortunately, we do not have data on the socio-economic characteristics of the individuals included in the sample, so we cannot compare those characteristics with that of the U.S. population or that of contributors.

 $^{^{62}}$ Ideally we would use data for the 2012 presidential campaign cycle, but that data is not available.

 $^{^{63}}$ We do not present standard errors because, due to the large sample size, they are extremely small.

⁶⁴Source: https://www.opensecrets.org/about/tour.php.

make inferences based on when the FEC search tool was accessed. If the main reason for accessing the FEC information is to learn about candidates, the records should be accessed at a much higher rate in the months preceding an election. We found, though, that the number of visits to the FEC's online search tool was roughly stable over the entire timeframe, and it actually decreased slightly as the election (held on November, 2014) drew closer: the number of visits to the search tool (relative to the total number of visits to the FEC website) was 14.5% higher during the period spanning from January to October, 2013 than from the period spanning from January to October, 2014. This timing suggests that individuals use the FEC search tool primarily for personal reasons, such as to learn about the political affiliation of their peers (neighbors, friends, coworkers, and subordinates) rather than to gather information about candidates.

A second way of eliciting the purpose for accessing the FEC search tool is based on the types of searches that individuals conducted with this search tool. While we do not have access to what specific content users searched for, we do have data on the criteria used in each search (e.g., searching by name, address, candidate). This data is not available for the FEC search tool, but is available for another website that offer a search tool that is very similar to the FEC search tool. This search tool allows visitors to search contributors by name, state, zip code, employer, and/or candidate. We found that 86% of the searches were conducted with the the name of a contributor as the only criterion. Of the remaining 14%, less than half included the name of a candidate (the remaining searches were for a particular zip code or employer). These patterns are also consistent with the conjecture that individuals are using the FEC search tool to seek information about their peers rather than to seek information about the candidates.

Some simple modifications to the current policy could reduce the unintended uses of the FEC records without compromising the legislation's original goal. If the goal of the FEC's disclosure policy is to allow voters to learn about candidates, specific identifying information about who makes each contribution – information like name, address, employer – should be largely irrelevant. In other words, it is hard to conceive how knowing the names of each individual contributing \$300 could provide any valuable information about the candidate.⁶⁵ Without altering the current requirement that campaign committees record and report to the FEC all contributions over \$200, the FEC could restrict the amount of identifying information about contributors that they make available to the general public (e.g., using initials instead of full names, ZIP codes rather than full addresses). Another simple solution would be to

⁶⁵It could be argued that the identity of those making very large contributions, especially if they are public figures (businesspeople, artists, etc.), provides valuable information about the candidate such as, for instance, whether the candidate will be likely to support the interests of the contributor, reluctant to investigate corruption charges, etc.

disclose to the general public identifying information for contributions above a threshold higher than \$200.⁶⁶ A stronger measure would be to impose a small pecuniary or nonpecuniary cost for accessing information about the identity of a smaller contributor.⁶⁷ This shift in policy would in no way inhibit reporters searching for information on the identity of contributors, but it would discourage those using the search tool with the goal of exerting social pressure on friends, relatives and neighbors.

6 Conclusions

We presented novel evidence about the impact of partisan interactions on political participation and their implications for geographical polarization. We found that feeling observed by neighbors significantly increases the contributions of individuals supporting the local majority party, but decreases contributions by supporters of the minority party. As a result, these partisan interactions exacerbate the geographic polarization of political participation. Furthermore, if individuals anticipate the preferential treatment from like-minded peers, these partisan interactions can also exacerbate the incentives for political segregation.⁶⁸ We found as well that an individual's contribution is affected by her perception of the contribution behavior of others, although with mixed implications for polarization. While our study examines the particular case of campaign contributions, we believe that, except in forms of participation that do not reveal partisanship (e.g., voting), similar partisan interactions take place with other forms of political participation, such as talking about politics, sharing political news, attending rallies, and maybe even registering to vote.

While our field experiment was not designed to evaluate the disclosure policy for U.S. campaign finance, our findings provide some insights useful to the ongoing policy debate (Gilbert, 2013). The original justification for ample disclosure of individual campaign contributions was based on the idea that individuals would use contribution records to learn about candidates. It appears from our evidence, though, that individuals may be using those public

⁶⁶Simply adjusting the \$200 threshold for inflation would make a significant difference: it has not been changed since 1979 and, according to the BLS' inflation calculator, the 2014 equivalent of \$200 in 1979 is \$650. In fact, in its Buckley ruling the Supreme Court suggests that the threshold for disclosure was arrived at in a wholesale fashion by simply updating much older regulations: "Indeed, there is little in the legislative history to indicate that Congress focused carefully on the appropriate level at which to require recording and disclosure. But we cannot require Congress to establish that it has chosen the highest reasonable threshold."

⁶⁷For example, the FEC could require some form of identification (e.g., social security number) from those searching for detailed individual contribution records and make that information public.

⁶⁸Increased segregation can also translate into more polarized beliefs: e.g., if campaigns use the segregated networks to target their political messages (Glaeser, Ponzeto and Shapiro, 2005), if individuals get a biased sample of the available information (Gentzkow and Shapiro, 2011), or if individuals learn irrationally from the available information (Glaeser and Sunstein, 2009).

records to obtain information about their peers. This may have unintended consequences, such as welfare costs and a chilling effect on local minorities. We suggest some simple modifications to the disclosure policy that would reduce those potential negative effects while safeguarding its original purpose. Our study provides insights as well into future avenues of research in the wider area of information disclosure, privacy, and the welfare effects of their regulation.

References

- Akerlof, G.A. and Kranton, R.E. (2000), "Economics and identity," Quarterly Journal of Economics, Vol. 115 (3), pp. 715–753.
- [2] Ali, S.N. and Lin, C. (2013), "Why People Vote: Ethical Motives and Social Incentives," American Economic Journal: Microeconomics, Vol. 5 (2), pp. 73–98.
- [3] Allcott, H. (2011), "Social norms and energy conservation," Journal of Public Economics, Vol. 95, pp. 1082–1095.
- [4] Andreoni, J. (1989), "Giving with Impure Altruism: Applications to Charity and Ricardian Equivalence," Journal of Political Economy, Vol. 97 (6), pp. 1447-58.
- [5] Andreoni, J. and Bernheim, B.D. (2009), "Social Image and the 50-50 Norm: A Theoretical and Experimental Analysis of Audience Effects," Econometrica, Vol. 77 (5), pp. 1607-1636.
- [6] Ansolabehere, S.; de Figueiredo, J.M. and Snyder, J.M. (2003), "Why is There so Little Money in U.S. Politics?" Journal of Economic Perspectives, Vol. 17 (1), pp. 105-130.
- [7] Augenblick, N. and Cunha, J.M. (2015), "Competition and Cooperation in a Public Goods Game: A Field Experiment," Economic Inquiry, Volume 53(1), pages 574–588.
- [8] Azzimonti, M. (2011), "Barriers to Investment in Polarized Societies," American Economic Review, 101(5): 2182-2204.
- [9] Bénabou, R.J.M. and Tirole, J. (2011), "Laws and Norms," NBER Working Paper No. 17579.
- [10] Bénabou, R.J.M. and Tirole, J. (2006), "Incentives and Prosocial Behavior," American Economic Review, Vol. 96 (5), pp. 1652-1678.
- [11] Bernheim, D. (1994), "A Theory of Conformity," Journal of Political Economy, Vol. 102 (5), pp. 841-877.
- [12] Bishop, B. (2008), "The Big Sort: Why the Clustering of Like-Minded America Is Tearing Us Apart." New York: Houghton Miin Harcourt.
- [13] Bottan, N.L. and Perez Truglia, R. (2012), "Religious Congregations and Pro-Social Behavior: Lessons from an Event-Study Analysis of the U.S. Catholic-Clergy Scandals", available at SSRN: http://ssrn.com/abstract=1922950.
- [14] Briffault, R. (2010), "Two Challenges for Campaign Finance Disclosure After Citizens United and Doe v. Reed," William & Mary Bill of Rights Journal Vol. 19, pp. 984-1024.
- [15] Campante, F. (2011), "Redistribution in a Model of Voting and Campaign Contributions," Journal of Public Economics, Vol. 95 (7-8), pp. 646-656.

- [16] Campbell, A.; Converse, P.E.; Miller, W.E. and Stokes, D (1960), "The American Voter: Unabridged Edition." New York: Wiley.
- [17] Chetty, R.; Saez, E. and Sandor, L. (2012), "What Policies Motivate Pro-Social Behavior? An Experiment with Referees at the Journal of Public Economics," Working Paper.
- [18] Cho, W.; Gimpel, J.G. and Hui, I.S. (2013), "Voter Migration and the Geographic Sorting of the American Electorate," Annals of the Association of American Geographers, Vol. 103 (4), pp. 856-870.
- [19] Cialdini, R. (1984), "Influence." New York: William Morrow and Company.
- [20] DellaVigna, S.; List, J. and Malmendier, U. (2012), "Testing for Altruism and Social Pressure in Charitable Giving," Quarterly Journal of Economics, Vol. 127 (1), pp. 1-56.
- [21] DellaVigna, S.; List, J.; Malmendier, U. and Rao, G. (2014), "Voting to Tell Others," Working Paper.
- [22] Frey, B.S. and Meier, S. (2004), "Social Comparisons and Pro-social Behavior: Testing 'Conditional Cooperation' in a Field Experiment," American Economic Review, Vol. 94 (5), pp. 1717-1722.
- [23] Funk, P. (2010), "Social Incentives and Voter Turnout: Evidence from the Swiss Mail Ballot System," Journal of the European Economic Association, Vol. 8 (5), pp. 1077–1103.
- [24] Gentzkow, M. and Shapiro, J.M. (2011), "Ideological Segregation Online and Offline," Quarterly Journal of Economics Volume 126 (4), pp. 1799-1839.
- [25] Gentzkow, M.; Shapiro, J.M. and Sinkinson, M. (2014), "Competition and Ideological Diversity: Historical Evidence from US Newspapers," American Economic Review, Vol. 104 (10), pp. 3073-3114.
- [26] Gerber, A.S.; Green, D.P. and Larimer, C.W. (2008), "Social Pressure and Voter Turnout: Evidence from a Large-scale Field Experiment," American Political Science Review, Vol. 102 (1), pp. 33-48.
- [27] Gerber, A.; Huber, G.; Doherty, D.; Dowling, C. and Hill, S. (2013), "Do Perceptions of Ballot Secrecy Influence Turnout? Results from a Field Experiment," American Journal of Political Science, Vol. 57 (3), pp. 537–551.
- [28] Gilbert, M. (2013), "Campaign Finance Disclosure and the Information Tradeoff," Iowa Law Review, No. 101.
- [29] Gimpel, J. G., Lee F. E., and Kaminski, J. (2006), "The Political Geography of Campaign Contributions in American Politics." The Journal of Politics, No. 68, pp 626-639.

- [30] Glaeser, Edward L. and Sunstein, Cass R. (2009), "Extremism and Social Learning," Journal of Legal Analysis, Vol. 1, pp. 263–324.
- [31] Glaeser, Edward L.; Ponzetto, Giacomo A. M. and Shapiro, Jesse M. (2005) "Strategic Extremism: Why Republicans and Democrats Divide on Religious Values," The Quarterly Journal of Economics, Vol. 120 (4), pp. 1283-1330.
- [32] Green, D. and Gerber, A. (2010), "Introduction to Social Pressure and Voting: New Experimental Evidence," Political Behavior, Vol. 32 (3), pp. 331-336.
- [33] Iyengar, S.; Sood, G. and Lelkes, Y. (2012), "Affect, Not Ideology," Public Opinion Quarterly, Vol. 76 (3), pp. 405–431.
- [34] Iyengar, S. and Westwood, S.J. (2015), "Fear and Loathing Across Party Lines: New Evidence on Group Polarization," American Journal of Political Science, forthcoming.
- [35] Knack, S. (1992), "Civic Norms, Social Sanctions, and Voter Turnout," Rationality and Society, Vol. 4 (2), pp. 133–56.
- [36] La Raja, R. (2014), "Political Participation and Civic Courage: The Negative Effect of Transparency on Making Small Campaign Contributions," Political Behavior, Volume 36(4), pages 753-776.
- [37] McCarty, N.; Poole, K.T. and Rosenthal, H. (2006), "Polarized America: The Dance of Ideology and Unequal Riches." Cambridge: MIT Press.
- [38] Perez-Truglia, R. (2013), "A Test of the Conspicuous-Consumption Model Using Subjective Well-Being Data," Journal of Socio-Economics, Vol. 45, pp. 146–154.
- [39] Perez-Truglia, R. (2014), "Conformity Effects and Geographic Polarization: Evidence from an Event-Study Analysis of Residential Mobility in the U.S.," Mimeo, Harvard University.
- [40] Riker, W.H. and Ordeshook, P.C. (1968), "A Theory of the Calculus of Voting," American Political Science Review, Vol. 62 (1), pp. 25–42.
- [41] Sunstein, C.R. (2015), "Partyism," University of Chicago Legal Forum, forthcoming.
Figure 1: Contributors' Perception of the Confidentiality of Contribution Records (Post-Election Mail-In Survey)



a. Perception of whether contribution records are confidential/public:

b. Perception of the proportion of neighbors who believe that contribution records are confidential/public:



Notes: N=3,068 (a) and 3,018 (b). Responses to our post-election mail-in survey by subjects in the No-Letter group. Panel (a) combines answers to questions 4 and 5 from the questionnaire. Panel (b) is based on question 7 from the questionnaire. For a copy of the questionnaire, see Appendix B.

Figure 2: Effect of Higher Visibility on the Probability that the Recipient Make a Post-Treatment Contribution, by Political Composition of the Recipient's Area

Effect of Higher Visibility (Website-Neighbors - Website-Self)



<u>Notes</u>: N=36,773. Observations from subjects assigned to the Website letter. The regression line and its confidence interval were estimated from a regression of a dummy for whether the individual made a post-treatment contribution on a dummy for whether the subject was assigned the Website-Neighbors sub-treatment, the share of own-party contributors in the 3-digit ZIP code, the interaction between the two latter variables, and a set of individual-level controls (for more details about the regression, see the notes to Table 2). The dots correspond to a binned-scatterplot representation of the partial regression plot. Standard errors clustered at the ZIP code/party level.

Figure 3: Effect of the Website Letter on the Belief that Contribution Records are Confidential/Public (Post-Election Mail-In Survey)



<u>Notes</u>: N=9,414. Histograms of responses to the post-election mail-in survey. No-Letter corresponds to respondents who did not receive any letter during the experimental stage, while Website group corresponds to respondents who received a Website-Self or a Website-Neighbors letter. This measure of perception of the public nature of contribution records combines the answer to a first question about disclosure policy and the answer to a second question about the respondent's confidence in that first answer (questions 4 and 5 from the questionnaire in Appendix B, respectively).

Figure 4: Relationship Between Self-Reported Contribution Norm and Actual Amount Contributed (Post-Election Mail-In Survey)



What amount should an average-income individual contribute?

<u>Notes</u>: N=3,018. The figure is based on a combination of responses to the post-election mail-in survey from subjects in the No-Letter group and data on those respondents' contributions from FEC records. The horizontal axis represents the quintiles of the distribution of responses to the survey question about how much individuals "should" contribute to a presidential campaign (question 8 from the questionnaire in Appendix B). The y-axis represents the average amount contributed by respondents during the presidential election cycle.

	All	Pre-treatment contribution to		
		Obama (DEM)	Romney (REP)	Others (REP)
Pre-Treatment Period				
Amount Contributed (\$)	524.24 (633.30)	372.79 (367.40)	649.45 (673.24)	706.58 (842.96)
Post-Treatment Period				
Percent Contributed at Least Once	$48.91 \\ (49.99)$	$75.93 \\ (42.75)$	$38.61 \\ (48.69)$	$11.86 \\ (32.33)$
Amount Contributed (\$), if Positive	586.97 (681.77)	568.16 (644.95)	600.29 (716.40)	$753.04 \\ (921.02)$
Observations	99,834	52,316	12,971	34,547

Table 1: Pre-Treatment and Post-Treatment Contribution Patterns, No-Letter Group

<u>Notes</u>: Average contribution behavior with standard deviations in parenthesis. The pre-treatment period spans from April 1, 2011 to the date the letter was received, and the post-treatment period spans from the date the letter was received to December 31, 2012. The other Republican candidates are: Bachman, Cain, Gingrich, Huntsman, Paul, Pawlenty, Perry and Santorum. Data from FEC public records.

		Post-Treatment Contributions					Pre-Treatment	
	(1) \$	(2) \$	(3)	(4) \$	(5) \$	(6) \$	(7) $P(\$>0)$	(8) \$
Higher Visibility (Website-Neighbors - Website-Self)	-77.173^{**} (37.889)	-71.752^{*} (42.459)	-70.614 (75.145)	-78.356^{***} (27.959)	-27.778 (31.359)	-78.827 (259.332)	-2.684^{**} (1.335)	-15.272 (22.828)
Interaction with:								
Share own-party in ZIP-3	$128.817^{**} \\ (61.984)$	$\frac{147.302^*}{(87.026)}$	$128.292^{**} \\ (62.523)$	$141.962^{***} \\ (45.400)$	31.294 (51.026)	$ \begin{array}{c} 130.346 \\ (425.212) \end{array} $	5.422^{**} (2.346)	24.852 (37.181)
Share own-party in adj. ZIP-3		-29.059 (98.188)						
Share low-income in ZIP-3			-13.389 (127.535)					
Regression Method Sub-Period	Interval	Interval	Interval	Interval <sep-1< td=""><td>Interval \geq Sep-1</td><td>Interval</td><td>OLS</td><td>OLS</td></sep-1<>	Interval \geq Sep-1	Interval	OLS	OLS
Contribution Type Mean Outcome	Pres. \$286	Pres. \$286	Pres. \$286	Pres. \$144	Pres. \$143	Non-Pres. \$292	Pres. 49%	Pres. \$517

Table 2: Experimental Evidence on the Conformity Channel

<u>Notes</u>: N=36,773. * significant at the 10% level, ** at the 5% level, *** at the 1% level. Standard errors clustered at the ZIP code/party level. Observations from subjects assigned to Website letters. The dependent variable in columns (1) through (6) is the amount contributed during the post-treatment period. The dependent variable in column (7) takes the value of 100 if the individual made at least one post-treatment contribution and 0 otherwise. The dependent variable in column (8) is the dollar amount contributed in the pre-treatment period. *Higher Visibility* is a dummy on whether the subject received a Website-Neighbors rather than a Website-Self letter. *Share Own-Party (ZIP-3)* stands for the share of own-party contributors to presidential campaigns in the ZIP-3 during the three previous presidential election cycles. *Share Own-Party (Adj. ZIP-3)* refers to the same variable averaged over the ZIP-3s adjacent to the ZIP-3 where the individual resides. *Share Low-Income (ZIP-3)* refers to the share of income-earning adults with an annual income below \$30,000 (U.S. Census, 2010). All the regressions except the one in column (8) include as controls the variables interacted with *Share Own-Party*, the time before delivery of the mailpiece, and a set of variables with pre-treatment period: before and after September 1, 2012. The contribution type *Pres.* corresponds to presidential committees (i.e., Obama and Romney), while *Non-Pres.* corresponds to non-presidential committees. *Mean Outcome* corresponds to the average of the outcome variable over the entire sample. Data on contributions from the FEC public records (see Table 1 for descriptive statistics).

Baseline ($\theta_i^D = 0, \ \theta_i^A$	$^{1} = 0)$	Low DEM ($\theta_i^D < 0, \ \theta_i^A = 0$)			High Amount ($\theta_i^D = 0, \ \theta_i^A$		
Contributor	Amount	Party	Contributor	Amount	Party	Contributor	Amount	Party
G., R.	\$1,000	DEM	G., R.	\$1,000	DEM	G., R.	\$1,000	DEM
W., D.	\$500	DEM	S., L. Y.	\$500	DEM	H., J. B.	\$1,000	DEM
S., L. Y.	\$500	DEM	A., S.	\$250	DEM	P., R.	\$700	DEM
W. , Т . К .	\$500	DEM	B., R.	\$250	DEM	W., D.	\$500	DEM
A., S.	\$250	DEM	W., S. B.	\$1,100	REP	S., L. Y.	\$500	DEM
B., R.	\$250	DEM	O., T. F.	\$800	REP	W ., т . к .	\$500	DEM
W., S. B.	\$1,100	REP	B., M. A.	\$400	REP	W., S. B.	\$1,100	REP
B., M. A.	\$400	REP	A., E. A.	\$250	REP	O., T. F.	\$800	REP
A., E. A.	\$250	REP	H., V.	\$250	REP	B., M. A.	\$400	REP

Table 3: Identification of Comparison Channel: Sample Treatment Lists Generated with Different Parameter Values

Notes: This is an example of how the algorithm generates different lists of nine neighbors from a given sample of the recipient's thirty closest contributing neighbors. See Section 4.2 for a detailed description of the algorithm.

	Post-Tre	atment Co	Pre-Treatment	
	(1) \$	(2) \$	(3) $P(\$>0)$	(4) \$
\bar{c}_{own}	2.582^{*} (1.446)	$2.877^{**} \\ (1.450)$	$0.045 \\ (0.048)$	$ 1.094 \\ (0.918) $
\bar{c}_{opp}	-0.088 (0.911)	-0.609 (0.951)	-0.050 (0.042)	-0.362 (0.611)
N _{own}		-6.147^{**} (2.883)	-0.165 (0.112)	$0.940 \\ (1.760)$
Regression Method Mean Outcome	Interval \$295	Interval \$295	$\begin{array}{c} \text{OLS} \\ 49\% \end{array}$	OLS \$528

Table 4: Evidence on the Comparison Channel

<u>Notes</u>: N= 36,795. * significant at the 10% level, ** at the 5% level, *** at the 1% level. Standard errors clustered at the ZIP code/party level. Observations from subjects assigned to the List letter. The dependent variable in columns (1) and (2) is the the amount contributed during the post-treatment period. The dependent variable in column (3) takes the value of 100 if the individual made at least one post-treatment contribution and 0 otherwise. The dependent variable in column (4) is the dollar amount contributed during the pre-treatment period. All the independent variables except N_{own} are expressed in hundreds of dollars (i.e., the estimates correspond to effects of \$100 changes in the independent variables). \bar{c}_{own} (conversely, \bar{c}_{opp}) corresponds to the average contribution of all the individuals in the letter's table who contributed to the recipient's own (conversely, other). N_{own} is the number of individuals in the table who contributed to the recipient's party. See Table E.3 for descriptive statistics for all these independent variables. All the regressions except for the one in column (4) include the usual control variables: the time before delivery of the mailpiece and a set of variables with pre-treatment contributions to each candidate. Data on contributions from the FEC public records (see Table 1 for descriptive statistics).

Online Appendix: Not For Publication

A Further Details on Treatment Letters

Appendices A.1-A.5 show samples of the letters for different treatment types and sub-types. All these letter types shared basic characteristics. They all included the same header ("Boston, April 25th 2012") and the same last paragraph: "This letter is part of a study of political campaign contributions made by individuals which is being conducted by researchers at Harvard University. You can find more information about this project, including contact information, on our website." The letters included the web address of the project's website, shown in Appendix C, which provided basic information about the research project, and contact information to reach the research team and the University's Institutional Review Board. The main purpose of the website was to provide contextual information about our study to interested subjects, and to dissipate any doubts about its legitimacy, emphasizing its academic and non-partisan nature. Although the website provided some general information about the main research objective, to avoid the contamination of the experimental results, the website did not provide any details about the precise hypotheses to be tested, nor about the existence of several different treatment types. We directed individuals who were interested in receiving a debriefing brochure (a non-technical summary of the study's main hypotheses and results) to send an email to a dedicated address. We sent the brochure only after the data collection process was completed.

The mailing consisted of a single sheet of paper that folded and sealed to make a letter-size mailpiece. The outside of the mailpiece, a sample of which is shown in Appendix A.6, was the same for all treatment types. The design reflected two objectives. First, we wanted to maximize the credibility of the content. The outside of the mailpiece had the non-profit postage as well as the sender's Harvard address, in order to increase the recipient's confidence in the origin of the letter. We also wanted to maximize the recipient's interest in the letter and avoid it being discarded as junk mail. For this reason, we included a personalized message on the front (smaller font) and on the back (larger font) of the outside of the mailpiece. This message included the name of the recipients had made contributions in the past, a personalized letter referring to this topic should have piqued the recipient's interest. However, in the middle of the election cycle these contributors probably received a great deal of unsolicited mail related to the campaign, so we expected that a majority of our letters would be discarded without even being opened. The implications for our estimates are discussed in Section 4.1.4 in the body of the paper.

A.1 Sample Letter: Website-Self

Dear John,

This letter is part of an effort to disseminate information about political campaign contributions made by individuals from your neighborhood:

Name of contributor	Amount - Party contributed to	Name of contributor	Amount - Party contributed to
S., ANITA	\$600 – DEM	H., ROBERT L	\$300 – DEM
DOE, JOHN	\$375 – DEM	L., EDMOND	\$2,500 – REP
T., WILLIAM JR	\$1,000 – REP	G., LISA	\$1,000 - REP

YOUR HOUSEHOLD WAS THE ONLY HOUSEHOLD RANDOMLY CHOSEN FROM YOUR AREA TO RECEIVE A LETTER OF THIS TYPE

The above table contains a list of the total campaign contributions to presidential candidates made by 6 individuals from your neighborhood in the period from April 1, 2011 to April 1, 2012, according to the public records published by the Federal Election Commission.

Your full name, address and details about your campaign contributions are freely available to anyone with Internet access. You can search for individual contributions by first and last name, or by zip code, using the following tool from the website of the Federal Election Commission:

www.fec.gov/finance/disclosure/norindsea.shtml

You can use this website to see which candidates or political parties your neighbors, friends, family and co-workers are contributing to. Access to the data is anonymous.

This letter is part of a study of political campaign contributions made by individuals which is being conducted by researchers at Harvard University. We will not send any more letters about past or future contributions to your household or to your neighbors. You can find more information about this project, including contact information, on our website:

Information Dissemination on Campaign Contributions

A.2 Sample Letter: Website-Neighbors

Dear John,

This letter is part of an effort to disseminate information about political campaign contributions made by individuals from your neighborhood:

Name of contributor	Amount - Party contributed to	Name of contributor	Amount - Party contributed to
S., ANITA	\$600 – DEM	H., ROBERT L	\$300 – DEM
DOE, JANE	\$375 – DEM	L., EDMOND	\$2,500 – REP
T., WILLIAM JR	\$1,000 – REP	G., LISA	\$1,000 - REP

YOUR HOUSEHOLD AND OTHER HOUSEHOLDS IN YOUR AREA WERE RANDOMLY CHOSEN TO RECEIVE A LETTER OF THIS TYPE

The above table contains a list of the total campaign contributions to presidential candidates made by 6 individuals from your neighborhood in the period from April 1, 2011 to April 1, 2012, according to the public records published by the Federal Election Commission.

Your full name, address and details about your campaign contributions are freely available to anyone with Internet access. You can search for individual contributions by first and last name, or by zip code, using the following tool from the website of the Federal Election Commission:

www.fec.gov/finance/disclosure/norindsea.shtml

You can use this website to see which candidates or political parties your neighbors, friends, family and co-workers are contributing to. Access to the data is anonymous.

This letter is part of a study of political campaign contributions made by individuals which is being conducted by researchers at Harvard University. We will not send any more letters about past or future contributions to your household or to your neighbors. You can find more information about this project, including contact information, on our website:

Information Dissemination on Campaign Contributions

A.3 Sample Letter: List-Once

Dear John,

This letter is part of an effort to disseminate information about political campaign contributions made by individuals. According to the public records of the Federal Election Commission, <u>this is</u> <u>a list of the political campaign contributions to presidential candidates made by 10 individuals</u> <u>from your neighborhood</u>:

	April 1, 2011 to April 1, 2012		
Last name initial and first name of contributor	Amount contributed	Party contributed to	
DOE, JOHN	\$250	REP	
M., CHARLES	\$1,000	DEM	
C., SUSAN	\$500	DEM	
D., ANN	\$500	DEM	
B., CAROL	\$250	DEM	
L., ANNE	\$212	DEM	
W., CHARLOTTE T.	\$200	DEM	
W., MELANIE	\$2,500	REP	
P., JAMES	\$2,000	REP	
H., PATRICK	\$750	REP	

THIS IS THE ONLY TIME WE WILL CONTACT YOU. WE WILL <u>NOT</u> SEND A LIST OF FUTURE CONTRIBUTIONS TO YOUR HOUSEHOLD OR TO OTHER HOUSEHOLDS IN YOUR AREA.

This letter is part of a study of political campaign contributions made by individuals which is being conducted by researchers at Harvard University. You can find more information about this project, including contact information, on our website:

Information Dissemination on Campaign Contributions

A.4 Sample Letter: List-Update

Dear Jane,

This letter is part of an effort to disseminate information about political campaign contributions made by individuals. According to the public records of the Federal Election Commission, <u>this is</u> <u>a list of the political campaign contributions to presidential candidates made by 10 individuals</u> <u>from your neighborhood</u>:

	Past contributions: April 1, 2011 to April 1, 2012		<i>Future contributions to be reported:</i> May 1, 2012 to December 1, 2012		
Last name initial and first name of contributor	Amount contributed	Party contributed to	Amount contributed	Party contributed to	
DOE, JANE	\$495	DEM			
F., BEATRICE	\$1,000	DEM			
W., FREDRICA	\$712	DEM			
L., ANN	\$250	DEM			
D., GENIEVE	\$2,500	REP			
V., PAUL	\$2,500	REP			
D., KATHERINE	\$2,500	REP			
W., SETH	\$2,500	REP			
R., ERIC	\$1,000	REP			
E., STUART	\$500	REP			

WE WILL SEND AN UPDATED LIST OF FUTURE CONTRIBUTIONS TO SOME HOUSEHOLDS. SOME OF YOUR NEIGHBORS MAY RECEIVE SUCH A LIST.

This letter is part of a study of political campaign contributions made by individuals which is being conducted by researchers at Harvard University. You can find more information about this project, including contact information, on our website:

Information Dissemination on Campaign Contributions

A.5 Sample Letter: List-Placebo

Boston, April 25th 2012

Dear Jane,

This letter is part of an effort to disseminate information about political campaign contributions made by individuals. Your household was randomly chosen to receive this information.

According to the Federal Election Commission, the limits on campaign contributions for individuals are as follows:

- \$2,500 to each candidate or candidate committee per election.
- \$30,800 to national party committee per calendar year.
- \$10,000 to state, district & local party committee per calendar year.
- \$5,000 to any other political committee per calendar year.
- \$117,000 overall biennial limit (\$46,200 to all candidates and \$70,800 to all PACs and parties).

This letter is part of a study of political campaign contributions made by individuals which is being conducted by researchers at Harvard University. You can find more information about this project, including contact information, on our website:

Information Dissemination on Campaign Contributions www.campaign-information.info

A.6 Outside of the Mailing

Outside of the mailing - front

DEAR JOHN: IMPORTANT INFORMATION ABOUT POLITICAL CAMPAIGN CONTRIBUTIONS	Harv 108 J Cam	ard University .ittauer Center bridge, ΜΛ 02138	Nonprofit Org. US Postage PAID Permit No. 492 04104
	TO:	111111111111111111111111111111111111	5

Outside of the mailing - back

DEAR JOHN: IMPORTANT INFORMATION ABOUT POLITICAL CAMPAIGN CONTRIBUTIONS

B Further Details on Post-Election Mail-In Survey

We collected complementary information from a subsample of our subjects by means of a mail-in survey sent after the election. The survey was sent by mail on December 6, 2012, one month after the 2012 presidential election day. The intended recipients, 34,966 in total, were a random sample of individuals from the No-Letter group (one third) and from the Website treatment group (two thirds). The survey instrument and its envelope are shown in the following pages. The envelope contained a letter and the survey on two sheets of paper, and a smaller prepaid business-reply envelope. The recipient was asked to fill out the the survey and mail it back in the provided envelope by dropping it in a USPS mailbox. The individual could keep the separate letter, which contained details about the survey (e.g., confidentiality of the responses) as well as contact information for the research team. During the three months after we sent the surveys, we received 9,414 responses. This implies a response rate of 21.21%. It should be noted that there were significant differences in response rates for key sub-groups of the population. Most notably, the response rate for Democrats, at about 27%, was substantially higher than that of Republicans, at about 12%. The information from the survey discussed in the paper thus over-represents Democrat contributors.

As an incentive for participation, the letter informed recipients that there were lottery prizes for individuals who responded and mailed back the survey before January 31, 2013. Half of the recipients were randomly assigned to be eligible for ten lottery prizes of \$100 each, while the other half were eligible for ten lottery prizes of \$200 each. The purpose of randomizing the stakes of the lottery was to provide some orthogonal variation in response rates that could be exploited to correct potential selection biases in the mail-in survey respondent pool. The response rate was only half a percentage point higher in the group eligible to the higher lottery prize, which implies an increase in the response rate of approximately 2.6%. This effect is relatively small and not statistically significant (p-value of 0.16). Such small effect of the lottery prize does not provide useful variation for the analysis. The fact that contributors did not react significantly to this economic incentive is probably due to the fact that the average recipient is relatively well-off and thus less sensitive to pecuniary incentives. Nevertheless, we must note that the odds of receiving a prize were low, which could have resulted in very small differences in the perceived expected value of the prize.

Last, Figure B.1 shows the distribution of responses for two questions that were not included in the main body of the paper. Figure B.1.a shows the perceptions about the regulation of contribution limits, while Figure B.1.b shows the perceptions about contribution norms.

Figure B.1: Knowledge about Contribution Limits and Contribution Norms (Post-Election Mail-In Survey)



a. According to the law, what is the maximum

contribution an individual can make to a campaign

b. How much do you think a politically engaged individual with an average income should contribute to a presidential campaign per election cycle (every four vears)?



<u>Notes</u>: N=3,060 in panel (a) and 2,854 in panel (b). The data corresponds to the responses to our postelection mail-in survey by subjects in the No-Letter group. Panel a presents the histogram of responses to a question about the respondent's knowledge of the maximum contribution level per committee (see question 3 from the questionnaire in Appendix B). Panel b presents the distribution of responses to the survey question which asked recipients to state how much one "should" contribute to a presidential campaign (see question 8 from the questionnaire in Appendix B).

Survey Instrument

Cambridge, November 10th 2012

Dear John Doe,

We are researchers from Harvard University who are carrying out a non-partisan study about campaign contributions in the United States. This study includes a short survey designed to find out how much citizens know about the rules and regulations applying to individual campaign contributions.

We need your help for this study. We kindly ask you to take two minutes of your time to fill out this short, confidential survey and send it back to us in the pre-paid and pre-addressed envelope enclosed with this letter. You do not need to affix a stamp to the envelope. You can simply drop the letter into any US Postal Service mailbox. Of course, your participation is completely voluntary.

As a token of our gratitude for helping us with our research, all of those responding to this survey and mailing it back to us will automatically enter a lottery for 10 prizes of \$100. Your chances in the lottery do not depend on your responses to the questions in the survey – Winners will be randomly chosen among all of those sending the survey back to us.

In the other side of this page you can find more information regarding the purpose of our research and the lottery prizes. You may keep this letter for your records – You do not need to send it back to us.

Sincerely,

Ricardo Perez-Truglia and Guillermo Cruces The research team

Email: rtruglia@fas.harvard.edu Address: Littauer Center G16R, 1805 Cambridge Street, Cambridge, Massachusetts 02138

Purpose of the study

This is part of a strictly academic project, and our research is not affiliated with any candidate or political party. The survey includes questions about certain features of the campaign contribution laws and regulations. The purpose of our research project is to study the implications of those features. Your responses to this survey will be confidential – Your responses will not be shared with anyone under any circumstances. Our research project has no commercial or political objective and is in compliance with the rules regulating the use of contribution information. If you are interested in receiving information about the results of the studies we are conducting, just send an email to rtruglia@fas.harvard.edu with the subject line "Debriefing" and we will send you information about our work as soon as our studies are finished.

Terms of the lottery

All the individuals who respond to the survey before January 31st 2013 (returned letters postmarked by that date) will be included in the lottery for the Amazon gift cards. Your odds of winning a prize will depend on the number of individuals who respond to the survey. For example, if - as expected - 1,500 individuals respond the survey, your chances of winning a prize will be of 1 in 150. Each individual can win a maximum of one (1) prize. If you are one of the winners, you will be notified by February 2013 by a letter sent to the same address where you received the survey. If you want us to use a different address, please state so in the space provided in the survey page.

For more information about this project, please visit the project's website www.people.fas.harvard.edu/~rtruglia/campaign-survey.htm

Thank you in advance for your cooperation!

We are researchers from Harvard University who are carrying out a non-partisan study about campaign contributions in the United States. This is the short survey we mention in the accompanying letter. We kindly ask you to take two minutes of your time to fill out this short, confidential survey and send it back to us in the pre-paid and pre-addressed envelope enclosed with this letter. You do not need to affix a stamp to the envelope. You can simply drop the letter into any US Postal Service mailbox. Thank you for your cooperation.

1-	Plea	se tell us you	r gender		
		Male	Female		
2-	Your	r age (Please	mark ONE optior	ו)	
		Under 20	20-29	30-39	Over 40
3-	Wha a ca	it is the maxim mpaign comm	um contribution ittee per electior	that an individu 1? (Please mark	al can legally make to ONE option)
		\$1,500	\$2,500	\$4,000	🔲 l don't know
4-	How tions your	accessible do s to political c best guess. (o you think that ampaigns is? If Mark ONE option	information on you do not knov ı)	individuals' contribu- w, please just give us
		The law says amounts contr and that inform	that the identity o buted and the iden nation can be easily	f contributors to atity of recipients a y obtained by anyo	political campaigns, the re all public information one with Internet access
		The law says amounts cont information wh	that the identity o ributed and the ic nich cannot be acc	f contributors to lentity of recipien essed by third pa	political campaigns, the ts are all confidentia l rties.
5-	How ONE	sure are you option)	about your ans	wer to the previ	ous question? (Mark
		Very sure	Somewhat s	sure	Jnsure
			х	ii	

6- In your answers to the previous two questions, you told us what YOU believe. Now we want to know what you think that OTHERS believe. Think about people in your neighborhood. What do you think their best guess would be about how accessible the information on individual campaign contributions is? (Mark ONE option)



Most people would say that the identity of contributors to political campaigns, the amounts contributed and the identity of recipients are all **public** information.



Most people would say that the identity of contributors to political campaigns, the amounts contributed and the identity of recipients are all **confidential** information.

7- Would you say that... (Mark ONE option)

A **vast majority** of your neighbors believe that information on individual campaign contributions is **public.**



A **majority** of your neighbors believe that information on individual campaign contributions is **public.**



A **majority** of your neighbors believe that information on individual campaign contributions is **confidential.**



A **vast majority** of your neighbors believe that information on individual campaign contributions is **confidential.**

8- In your opinion, how much do you think a politically engaged individual with an average income should contribute to a presidential campaign per election cycle (every four years)?

Please enter an amount:

Respondent: John Doe (123 MAIN ST, SPRINGFIELD, VA 22150-1234)

\$

Thanks for your response! We will contact you by mail if you win one of the lottery prizes. If needed, please write down an alternative address to receive any further correspondence about the prize:

C Text Displayed on the Project's Website Mentioned in the Letters

Welcome to our website. We are a group of researchers at Harvard University studying political campaign contributions made by individuals. With that goal, we are sending out personalized mailings about campaign contributions in the U.S. If you received a letter and have any questions about the information provided to you, or our research, please feel free to email us at <u>link</u> and we will get back to you as soon as possible.

The purpose of our research project is to study the implications of the public's awareness about the open nature of campaign contributions. The ultimate goal is to understand the different mechanisms through which the open nature of this information may affect contributions. We hope that the research will shed light on the advantages and disadvantages of alternative disclosure policies, which we believe is a very important issue. If you are interested in receiving information about the results of the studies we are conducting, just send us a blank email to <u>link</u> and we will send information about our work as soon as our studies are finished. This is part of a strictly academic project, and our research is not affiliated with any candidate or political party. All the information that we used in our mailings is publicly accessible through the website of the Federal Election Commission (FEC). This website includes a search tool with which anyone can access information about individual contributions by donor name (<u>link</u>). This research team at Harvard includes Ricardo Perez-Truglia, a PhD student in Economics (<u>link</u>), and Dr. Guillermo Cruces (<u>link</u>). Mr. Perez-Truglia's primary thesis advisor is Professor Nadarajan Chetty. You may write to Ricardo Perez-Truglia directly at the above address and you may also reach his faculty thesis advisers by writing to <u>link</u>.

All individuals who received a letter about campaign donations were randomly selected by an automated computer program from the public records of the FEC. The information provided in the letter was available from public records and was selected without regard to party affiliation. The FEC explicitly allows the use of information about individual campaign contributions for academic research such as this project. The specific activities identified as permissible by the Federal Election Commission include the use of individual contributor information for bona fide academic research projects that do not involve the sale or use of that information for a commercial purpose or for soliciting contributions (see FEC Advisory Opinion No. 1986-25). Our research project has no commercial or political objective and is in compliance with the rules regulating the use of contribution information. For more information, please see the FEC's "sale and use brochure" (link). This project was reviewed and approved in advance by Professor Chetty and by the Committee on the Use of Human Subjects in Research, a research ethics committee (also known as an "institutional review board" or "IRB") at Harvard University. Complaints or problems concerning any research project may, and should, be reported if they arise. The Committee can be reached via email (link) or by telephone (link).

Thank you again for your visit to this website and for your interest in our research. *Ricardo Perez-Truglia and Guillermo Cruces (the research team)*

D Snapshots of the FEC Website's Search Tool

The FEC provides an easily accessible online database of individual campaign contributions. The database can searched by first and/or last name:

Transaction Query By Individual Contributor					
Search Using the Following Criteria:					
Individual Name (<i>Last, First</i>):					
Get Listing Clear Form					

Advanced search can be done by other criteria, such as city, state, date range, and so forth:

Advanced Transactio	n Query By Indivi	idual Contributor	
Search From the Following Criteria:			_
Individual Name (Last, First):			
City:			
State (Select as many as appropriate):	ALL		
	ALABAMA	E	
	ALASKA		
	AMERICAN SAMOA	T	
Zipcode:			
Employer/Occupation:			
Amount Range:	From	То	
NOTE: Currently the 'Date Range' f	ield must be used with at le	east one other constraint	
Date Range:	From	То	Format: MM/DD/YYYY
Туре:	Federal Contributions	Non-Federal (Soft Money)	All Contributions
Send Query Clear Form			

This is a sample of how the search results are displayed (they are the same for basic and advanced search). This sample is for one transaction - the search tool displays one record per transaction:

Individual Contributions Arranged By Type, Giver, Then Recipient Contributions to Political Committees

DOE, JOHN ELIOT, ME 03903 HOMEMAKER PAUL, RON VIA RON PAUL 2012 PRESIDENTIAL CAMPAIGN COMMITTEE INC. 12/16/2011 250.00 <u>12345678900</u>

The (fictitious) number $\underline{12345678900}$ has a hyperlink to the exact page of the Schedule A-P corresponding to the transaction. The following is a sample Schedule A-P:

SCHEDULE A-P ITEMIZED RECEIPTS	Use separate schedule(s) for each category of the Detailed Summary Page	FOR LINE NUMBER: (check only one) PAGE 9410 / 17901 16 17a 17b 17c 17d 18 19a 19b 20a 20b 20c 21
Any information copied from such Reports a or for commercial purposes, other than usin	and Statements may not be sold or used by any g the name and address of any political committ	person for the purpose of soliciting contributions ee to solicit contributions from such committee.
NAME OF COMMITTEE (In Full) Ron Paul 2012 Presidential Ca	ampaign Committee Inc.	
A. Full Name (Last, First, Middle Initial) Doe, John		Transaction ID : 0992651
Mailing Address 123 Fake Street		12 / 16 / Y Y Y Y Y 2011
Eliot	ME 03903	
FEC ID number of contributing federal political committee.	C	Amount of Each Receipt this Period
Name of Employer Homemaker	Occupation Homemaker	250.00
Receipt For: 2012 Primary General Other (specify) ▼	Election Cycle-to-Date 500.00]

E Further Details on the Implementation of the Field Experiment

E.1 Subject Pool

As detailed in Section 3, a total of 280,456 unique individuals were listed in the FEC records as having made a contribution to a presidential candidate between April 1, 2011 and April 1, 2012. This sample was obtained from the FEC's public records as of April 25, 2012, which includes contributions made until April 1 of that year. This sample of contributors excludes individuals contributing \$200 or less over the course of the election cycle, as these individuals are not required to be reported to the FEC. While campaigns have increasingly relied on these donors (they represented 41.2% of all individual contributions in 2008 and 47.7% in 2012), the available evidence indicates that, besides the evident differences in income, those making small and large contributions are fairly similar.ⁱ

We discarded a substantial fraction of the original 280,456 contributors for data quality and other reasons, resulting in a final subject pool of 191,832 individuals. We present here a list of the most important reasons and criteria. We do not report what percentage of individuals were excluded for each reason because a majority of the excluded individuals were excluded for multiple reasons. We excluded observations for which the address information was invalid and could not be corrected (e.g., missing street number). We also excluded individuals reporting addresses used by more than two unique individuals (which most likely corresponds to work addresses) and individuals who provided P.O. boxes as their home address. We matched the address information to the NCOA database to identify individuals or households that changed residence over the previous 18 months, and we excluded all individuals who changed residence since the date when they made their first contribution during the election cycle. We excluded individuals who reported contributions in multiple addresses. We excluded individuals whose mean distance (as the crow flies) from the ten closest contributors was over three miles. We also excluded individuals who had already made a total contribution over \$1,500, all contributors living outside the 50 U.S. States, and all contributors in Washington D.C.

E.2 Descriptive Statistics and Balance Test for Randomization

Table E.1 presents summary statistics of individual characteristics from our experimental sample of early contributors (first column) compared to all contributors to presidential cam-

ⁱMcAdams, J. and Green, J.C. (2002). "Fat Cats and Thin Kittens: Are People Who Make Large Campaign Contributions Different?", CATO Institute Briefing Paper no. 76.

paigns from the 2012 election cycle (second column) and to the general U.S. population (third column). The comparison between the first two columns indicates that the average contributor in our sample was fairly representative of all contributors to the 2012 presidential election to the extent that they exhibit similar socio-economic characteristics, including racial composition and income. There are, however, some differences in contributors to the Obama campaign. This is due to the fact that our subjects were early contributors and, because of the Republican primary, Republican candidates started their campaigns earlier. Our subject pool also has higher average contributions, which is partly due to the fact that Republicans, who contributed higher amounts, are over-represented in the experimental sample. Finally, the comparison of the first two columns with the third column illustrates the well documented fact that contributors are significantly different from the average U.S. citizen in several ways: e.g., contributors are more likely to be males, white and more likely to live in urban and wealthier areas.

Table E.2 presents summary statistics for a number of pre-treatment characteristics for each of the treatment types, including the amount of pre-treatment contributions and the party contributed to. As expected due to random assignment, the treatment groups are balanced in their observable characteristics. The last column reports the p-values from a test where the null hypothesis is that the means of the row variable for the six groups are equal. These tests indicate that the differences across treatments are not only very small but also statistically insignificant.

E.3 Mailing Delivery

The date of delivery of each letter is an important factor to consider when determining exposure to our information treatment. We were able to track the delivery status of each letter through the USPS scanning system, which does not confirm delivery but provides an estimate of when the letter was out for delivery (i.e., it tracks when and where each letter was last scanned). We generated a proxy for time of delivery equal to the most recent date when the letter was scanned if it was not forwarded or returned. For letters with incomplete tracking information, we imputed delivery information from other mail pieces in our batch delivered in the same 9-digit ZIP code. While the USPS tracking data is not a perfect indicator of delivery, it is a good approximation that provides a conservative lower bound for the actual date of delivery. Again, this proxy of delivery does not necessarily indicate that the letters were received or read, as the mailing did not include delivery confirmation service. We also constructed a proxy for the time when individuals may have read the letters. The letters included a link to a website with contact information for the research team and details about the research project. The website records indicate the number and date of visits. It is likely that individuals visited the website on the same day that they read the letter, or at least within the next few days. The distribution of visits to the website over time thus provides a proxy for the time when the individuals read the letters.

Figure E.1 compares our proxy of delivery date from the USPS tracking data with data on visits to the project's website. Figure E.1.a indicates that the number of letters in each State was almost exactly proportional to the number of unique visitors to the website – the Rsquared for the regression line in the Figure is 0.98. This strong correlation indicates that the proxies for letter delivery and letters read are consistent. Figure E.1.b shows the distribution of new visitors to the website over time and the USPS-based proxy for mail delivery. The two distributions are very similar, although visits to the website seem to have a lag with respect to the proxy for delivery date. This is consistent with the fact that individuals do not necessarily read the mail the same day they get it. The difference in the right tail of the two distributions indicates that visits to the website sometimes occurred weeks after the letters were delivered. This probably corresponds to individuals who accumulate mail over time, or to those who were absent from their homes for some time. All in all, the evidence is consistent with our proxy for delivery being a conservative lower bound estimate of the actual date of delivery.

E.4 Descriptive Statistics about the Table of Contributors Shown in the List Letter

The List letter type includes a list of 9 neighbors along with the amount contributed and party contributed to. Section 2.2.2 describes the methodology used to create random non-deceptive variation in this list of itemized contribution records. Table E.3 presents summary statistics about the contribution records shown in that table, such as the average amount contributed by own- and opposite-party neighbors, as well as the number of neighbors contributing to the party of the recipient. We computed those statistics using the lists of contributors that would have been produced if we had set all of the weighting parameters to zero. That is, the variation in the contribution behavior corresponds to the baseline lists. As a result, Table E.3 illustrates the "natural" variation in contribution records and does not include the "induced" variation due to the randomization of the weighting parameters.





<u>Notes</u>: date of delivery provided by USPS. Number of visitors to the website includes unique visitors that reached the website directly (approximately 83% of the visits) or indirectly through a search engine (in virtually all cases after searching for "www.campaign-information.info" or "campaign-information.info").

	Subject Pool	All 2012 Contributors	U.S. Averages
Percent Democrat	52.59 (0.11)	64.55 (0.05)	51.40
Mean Amount Contributed (\$)	811.69 (2.01)	559.39 (0.82)	
Percent Male	59.37 (0.11)	$55.15 \\ (0.05)$	49.14
Percent White	79.14 (0.05)	78.77 (0.02)	62.99
Percent Black	$11.95 \\ (0.03)$	$12.01 \\ (0.01)$	12.07
Population Density in ZIP-5	6.17 (0.04)	$\begin{array}{c} 6.36 \\ (0.02) \end{array}$	3.9
Mean Household Income (\$1,000s), ZIP-5 average	105.01 (0.26)	98.09 (0.11)	55.24
Observations	191,832	1,070,098	

Table E.1: Comparison of Individual Characteristics for Individuals in the Subject Pool, for All Contributors in the 2012 Election Cycle and for the General U.S. Population

<u>Notes</u>: Average individual characteristics (standard deviations in parenthesis). The first column corresponds to individuals who made contributions to presidential campaigns from April 1, 2011 to April 1, 2012 and were selected for the field experiment according the criteria described in Section 3. The second column corresponds to all individuals who made contributions to presidential campaigns during the 2012 election cycle (the subject pool in the first column is a subset of this group). The third column corresponds to country-averages using the ZIP code level 2010 U.S. Census data. Data on contributions from the FEC public records, which includes individuals contributing over \$200 to a campaign committee. The FEC database does not report information about the gender or the ethnicity of individual contributors. However, we constructed proxies for these variables based on information provided by the U.S. Bureau of the Census, which reports the joint distribution of first names and gender, and the joint distribution of last names and ethnicities. Population density and mean income come from 2010 U.S. Census data. The U.S. average share of democrats corresponds to the share of Democrat votes in the 2008 presidential election.

	(1) No Letter	(2) Placebo	(3) Website	(4) Website	(5) List	(6) List Update	(7) Difference Tost P value
	NO-Letter	1 lacebo	Dell	reighbors	Once	Opuate	Test I -value
Percent Democratic	52.59	52.67	53.33	52.53	52.46	52.00	0.24
	(0.16)	(0.37)	(0.37)	(0.37)	(0.37)	(0.37)	
Pre-treatment Contribution (\$)	524.24	520.15	516.55	517.57	528.91	526.30	0.29
	(2.00)	(4.51)	(4.56)	(4.70)	(4.74)	(4.76)	
Percent Male	59.26	59.59	58.66	59.68	59.54	59.91	0.19
	(0.16)	(0.37)	(0.37)	(0.37)	(0.37)	(0.37)	
Percent White	79.12	78.99	79.17	79.20	79.20	79.32	0.82
	(0.07)	(0.17)	(0.17)	(0.17)	(0.17)	(0.17)	
Percent Black	11.91	12.11	11.86	11.98	12.10	11.90	0.40
	(0.05)	(0.11)	(0.11)	(0.11)	(0.11)	(0.11)	
Percent Hispanic	4.12	4.16	4.03	4.06	3.84	3.99	0.23
	(0.05)	(0.11)	(0.11)	(0.11)	(0.10)	(0.11)	
Observations	99,834	18,430	18,314	18,459	18,396	18,399	

Table E.2: Balance of Observable Individual Characteristics across Treatment Groups

<u>Notes</u>: Averages for different pre-treatment individual-level characteristics for treatment groups. Standard deviations in parenthesis. The last column reports the p-value of a test in which the null hypothesis is that the mean is equal for all the treatment groups. Data on amount contributed and recipient party from FEC public records (see Table 1 for some descriptive statistics of this data). Ethnicity and sex were imputed according to first and last name frequencies reported by the U.S. Census Bureau.

	Mean (Sd)
\bar{c}_{own}	6.33(4.88)
\bar{c}_{opp}	5.92(5.42)
$N_{ m own}$	5.31(2.22)
$\sum c_{ m own} - \sum c_{ m opp}$	11.07 (48.97)
$\left \sum c_{\rm own} - \sum c_{\rm opp}\right $	36.70(34.25)

Table E.3: Informational Effects: Summary Statistics

Notes: N = 36,795. Summary statistics corresponding to the sample of individuals assigned to the List treatment. The descriptive statistics for these variables correspond to the counterfactual baseline letter (i.e., when all the weighting parameters used to generate the list of 9 neighbors are set to zero). All these variables except N_{own} are expressed in hundreds of dollars. \bar{c}_{own} (conversely, \bar{c}_{opp}) corresponds to the average contribution of all the individuals in the list who contributed to the recipient's own (opposite) party. N_{own} is the number of individuals in the list who contributed to the recipient's party. $\sum c_{own} - \sum c_{opp}$ is the difference between total contributions to the own- and opposite-party. $|\sum c_{own} - \sum c_{opp}|$ is the absolute value of $\sum c_{own} - \sum c_{opp}$.

F Further Results on the Scale Up of Effects with the Post-Election Mail-In Survey

F.1 Alternative Estimate

Section 4.1.4 presents results on the effect of the information in our treatment, with an estimate of the implicit reading rate of our letters of r = 0.215 (with a 90% confidence interval between 0.146 and 0.284), and a scale-up factor of 4.6. This estimate originates in the assumption that the Website letter reduced the proportion of those being unsure about their answers about the publicity of contributions in our post-election mail-in survey. Alternatively, we could assume that the Website letter decreased the proportion of those who did not know that contribution records were public: i.e., it shifted individuals from any response category to being somewhat sure or very sure about the publicity of contribution records. The share of respondents who did not select any of these two categories was 25.6% in the No-Letter group and 21.2% in the Website group. The difference between the two results in an implicit reading rate of r = 0.171 and a scale up factor of 5.8. This alternative estimate thus leads to an even higher scale-up factor. The estimate in the body of the paper and this alternative estimate are both within the range provided by the mass-mailing experts which we used for our power calculations.

One reason why these two estimates differ is that the Website letter did not affect some individuals who reported to be somewhat or very sure that campaign records were confidential. Figure 3 presents the distribution of beliefs about the publicity of contribution data for survey respondents from the No-Letter and from the Website treatment groups. Receiving a Website letter did not modify the perception of respondents who reported to be very sure or somewhat sure that the contribution records were confidential. A possible interpretation is that those individuals report this because they interpret the FEC disclosure policy differently: e.g., they may argue that records are confidential because because SuperPACs can be used to make veiled contributions, or because the contribution records are confidential for small donors (i.e., with contributions below the \$200 disclosure threshold).

F.2 Qualification of the Main Results

The discussion in the body of the paper indicated large scaled-up effects. We can, of course, qualify the results obtained with these simple estimates of the reading rate. A first concern is that the Website letter may have induced a lower willingness to participate in the mail-in survey, which could lead to an under-estimation of the reading rate. However, the mail-in survey response rate was 21.0% for subjects in the No-Letter group and 21.3% for recipients

of the Website letter, and this 0.37 percentage points difference is not only very small but also statistically insignificant (p-value of 0.357).

A second concern is that the mail-in survey sample may not be representative of the subject pool, and thus the estimated reading rate may not be representative of the reading rate for our overall sample. However, individuals who were more likely to read our letter were probably also more likely to respond to our survey. For instance, more pro-social subjects, or those who had more free time, may have been more likely to have read our Website letter and to have responded to our mail-in survey. This type of bias implies an over-estimation of the reading rate and, in turn, an under-estimation of the scaled-up effects. A third concern is that our estimate of the reading rate is based on the assumption that all of the recipients of the Website letter who were unsure about the publicity of individual contributions went on to report that this information is public in the mail-in survey. Some of these recipients, however, might not have been induced to state that these records are public even after reading the letters. This implies that we could be under-estimating the actual reading rate. In any case, even with a reading rate half as large (and a scale-up factor half the size) as in our estimates, the conformity effects would still imply very large changes in contribution behavior.

Last, it should be noted that the mail-in survey's response rate, 21.2%, was relatively high, which suggests that the reading rate for the original treatment letters may have been even higher. In fact, this response rate was more than twice what we expected and used for our power calculations. However, the conditions of the survey mailing were very different than the conditions of the experimental mailing. First, the mail-in survey was sent in a closed envelope, whereas the experimental mailpiece consisted of a single sheet of paper that folded and sealed to make letter-sized mailpiece, and the latter design is more likely to be discarded unopened. Second, contributors received much more unsolicited physical and electronic mailing related to the election at the time we sent the experimental mailpieces, in the middle of the presidential campaigns. On the contrary, we sent the mail-in survey a month after the election, when subjects were not receiving any correspondence related to the campaign. This also implies that the mail-in survey envelope was substantially less likely to be discarded unread than the mailpieces corresponding to the experiment.

G Robustness Checks for the Comparison Channel

G.1 The Investment Motive

In section 4.2 we reported that a higher number of own-party contributors (N_{own}) discourages contributions. In this appendix, we explore whether the effect from N_{own} may be due to contributors updating their beliefs about the probability of making a pivotal contribution.

Some individuals may contribute because of the perception that, with some probability, their marginal contribution will change the election outcome (Ansolabehere et al., 2003). This is similar to the probability of being a pivotal voter in a model of voter turnout (e.g., Dhillon and Peralya, 2002).ⁱⁱ One common argument against this theory, similar to the argument about a marginal vote, is that the average individual contribution of a few hundred dollars is infinitesimal when compared to the several hundreds of millions of dollars raised by each candidate, so that the probability of making a pivotal contribution is extremely small. However, individuals may still systematically over-estimate this probability. One prediction from this line of reasoning is that individuals should be more likely to contribute when an election is close. Since the distribution of contributions between the two parties may be a signal of how close an election will be, a prediction from this theory is that contributors should care about the contributions of others. For example, if we assume that a close campaign signals a close election, then a contributor should be more eager to make a contribution when she observes that the "contribution race" is more even. Note that, however, the List letter included contribution records from the individual's area of residence, so that this could affect the perception of making a pivotal contribution only to the extent that individuals extrapolate how the campaign is going from the local to the national level.

The regression results are presented in Table G.1. Column (1) reproduces the results from the baseline specification in Section 4.2. Column (2) replaces N_{own} by the difference in total contributions between both parties, $\sum c_{own} - \sum c_{opp}$.ⁱⁱⁱ As in column (2), the significant negative coefficient suggests that recipients make less generous contributions when they are shown that their own party is doing better than the opposite party. To disentangle the pivotal contribution motive, the specification in column (3) includes as an additional independent variable the absolute value of the difference between the total amounts contributed to the recipient's own and opposite-party, $|\sum c_{own} - \sum c_{opp}|$, which is a measure of how uneven the campaign is. The coefficient on this variable has the expected sign: individuals are less

ⁱⁱDhillon, A. and Peralta, S. (2002), "Economic Theories of Voter Turnout," The Economic Journal, Vol. 112 (480), pp. F332-F352.

ⁱⁱⁱNote that, in this specification, increasing \bar{c}_{own} while holding N_{own} constant has an effect through both \bar{c}_{own} and $\sum c_{own}$.

motivated to make a contribution in more uneven races. However, this coefficient is smaller than the coefficient on $\sum c_{own} - \sum c_{opp}$, and it is not statistically significant. Furthermore, the coefficient on $\sum c_{own} - \sum c_{opp}$ remains similar to the corresponding coefficient from column (2).

A potential issue with this definition of the unevenness of the campaign is that it does not take into account that an evenly split distribution of contributions in an area with a strong majority of one party may signal that the opposite party has a strong advantage. We consider an alternative definition of the unevenness of the campaign that addresses this concern. Intuitively, for an area where we would expect Democratic contributions to lead by \$10,000, our alternative unevenness measure takes the value of zero if the recipient is shown a list where the Democratic contributions lead by \$10,000, and it is more positive the further away the Democratic lead is from \$10,000.^{iv} Column (5) presents the results of a specification with this alternative definition of unevenness as an independent variable. The estimated coefficient on this alternative measure of uneveness is greater (in absolute value) than the corresponding coefficient from column (4), but still statistically insignificant. More important, the coefficient on $\sum c_{own} - \sum c_{opp}$ remains similar to the corresponding coefficient from column (2). These findings suggests that, even though the investment motive may play a significant role in contribution behavior, it does not seem to drive the effects of the information contained in the List letters.^v

G.2 Timing of the Effects and Effects on Non-Presidential Contributions

Columns (5) through (7) in Table G.1 show some additional results. Columns (3) and (4) consider the contributions during two post-treatment sub-periods: before and after September 1, 2012. The coefficient on \bar{c}_{own} is similar for the two sub-periods, and their difference is statistically insignificant. This finding suggests that our letter had a lasting effect on the contribution norm. The coefficient of N_{own} , however, is statistically significant during the fist sub-period but close to zero and statistically insignificant during the second half of the post-treatment period – the effect of N_{own} only lasted for the first half of the post-treatment period. One potential explanation for this finding is that, as the election neared, the recipients obtained new information about the total contributions to the two presidential campaigns

^{iv}The independent variable of interest is obtained by computing the difference of $\sum c_{own} - \sum c_{opp}$ between the list sent and the baseline list, and then computing the absolute value of this difference.

^vTo be fair, it is possible that the investment motive would have been more relevant if, instead of generating variation in how close the campaign was, we had created variation directly on how close the election was expected to be (such as using information from prediction markets).

that overrode the information provided in our letter. Indeed, information about the total contributions raised by both campaigns was periodically reported on and discussed in the media during the election cycle.

Last, column (7) shows the effects on non-presidential contributions. Recall that a limitation with this additional outcome is that non-presidential contributions have little variation in our subject pool: e.g., merely 14.4% of our subjects contributed to non-presidential campaigns during the post-treatment period, compared to 49% for presidential contributions. The coefficients on \bar{c}_{own} , \bar{c}_{opp} and N_{own} have the same sign in column (7) than in column (1), suggesting that the information about presidential contributions may have affected nonpresidential contributions in the same direction than it affected presidential contributions. However, due to lack of variation in the dependent variable, the coefficients from column (6) are much less precisely estimated and as a result they are not statistically significant at conventional levels.

	Post-Treatment Contributions							
	(1) \$	(2) \$	(3)	(4) \$	(5) \$	(6) $$$	(7) \$	
$\bar{c}_{ m own}$	$2.877^{**} \\ (1.450)$	$\begin{array}{c} 4.194^{***} \\ (1.579) \end{array}$	$\begin{array}{c} 4.679^{***} \\ (1.686) \end{array}$	$\begin{array}{c} 4.351^{***} \\ (1.588) \end{array}$	1.452 (1.208)	2.223^{*} (1.147)	9.201 (11.370)	
$ar{c}_{ ext{opp}}$	-0.609 (0.951)	-1.426 (1.082)	-1.364 (1.084)	-1.529 (1.087)	-0.092 (0.721)	-0.547 (0.779)	-6.686 (6.993)	
$N_{ m own}$	-6.147^{**} (2.883)				-6.748^{***} (2.304)	-0.949 (2.271)	-25.199 (19.494)	
$\sum c_{\mathrm{own}} - \sum c_{\mathrm{opp}}$		-0.415^{**} (0.173)	-0.432^{**} (0.176)	-0.438^{**} (0.174)				
$\left \sum c_{\rm own} - \sum c_{\rm opp}\right $			-0.155 (0.179)					
$\left \sum c_{\rm own} - \sum c_{\rm opp}\right ^{\star}$				-0.323 (0.201)				
Regression Method	Interval	Interval	Interval	Interval	Interval	Interval	Interval	
Sub-Period Contribution Type Mean Outcome	Pres. \$295	Pres. \$295	Pres. \$295	Pres. \$295	<sep-1 Pres. \$147</sep-1 	\leq Sep-1 Pres. \$149	Non-Pres. \$292	

Table G.1: Robustness Checks for Experimental Evidence on the Comparison Channel

Notes: N= 36,795. * significant at the 10% level, ** at the 5% level, *** at the 1% level. Standard errors clustered at the ZIP code/party level. Observations from subjects assigned to the List letter. All the independent variables except N_{own} are expressed in hundreds of dollars (i.e., the estimates correspond to effects of \$100 changes in the independent variables). \bar{c}_{own} (conversely, \bar{c}_{opp}) corresponds to the average contribution of all the individuals in the list who contributed to the recipient's own (opposite) party. N_{own} is the number of individuals in the list who contributed to the recipient's party. $\sum c_{own} - \sum c_{opp}$ is the difference between total contributions to the ownand opposite-party. $|\sum c_{own} - \sum c_{opp}|$ is the absolute value of $\sum c_{own} - \sum c_{opp}$. See Table E.3 for descriptive statistics for all these independent variables. These independent variables are included in the regression as the difference between the value computed with the list sent to the recipient and the corresponding value computed in the baseline list, except $\left|\sum c_{own} - \sum c_{opp}\right|^{*}$ for which we first compute the difference of $\sum c_{own} - \sum c_{opp}$ between the list sent and the baseline list, and then use the absolute value of this difference. The outcome variables in columns (5) and (6) correspond to two disjoint sets of the post-treatment period: before and after September 1, 2012. The contribution type Pres. corresponds to presidential committees (i.e., Obama and Romney), while Non-Pres. corresponds to non-presidential committees. Mean Outcome corresponds to the average of the outcome variable over the entire sample. All regressions include as control variables the time elapsed until mailing delivery and a set of variables with the pre-treatment contributions to each candidate. Data on contributions from the FEC public records (see Table 1 for descriptive statistics).

H Results on the Effects of Disseminating Unbiased Information about Contribution Records

In this appendix, we study whether there may be any systematic biases in the perceptions about the contribution behavior of others, and whether the dissemination of objective information may correct those biases.

We measure the effect of providing contributors with unbiased information about contribution records of other individuals in their area (i.e., the table of contributions contained in the List letter). If individuals had a systematically biased perception of the contribution behavior of others, then the unbiased information should have a significant effect on their contributions. For instance, suppose that individuals, on average, under-estimate the average amount contributed by other supporters of their same party. Since the individual's contribution is increasing in this belief (see Section 4.2), then the distribution of unbiased information should have a positive effect on the contributions of the recipients.

However, the comparison of contributions between the List and No-Letter subjects may be contaminated by other pieces of information contained in the List letter that are unrelated to the information about contribution behavior of others. For instance, simply receiving a letter about campaign contributions may remind individuals about their commitment to contribute, and this could have a positive effect on future contributions independently of the information provided in the body of the letter. Alternatively, receiving a letter from a research team may have an effect of its own, for example by making the individual think that campaign contributions are more important than previously thought. We devised an additional treatment arm, List-Placebo, with the same format than the List letter but, instead of providing a table about the contributions of neighbors, it displayed standard regulatory information about contribution limits, taken verbatim from the FEC's regulations. We did not expect this information to have an effect on contributions, because these regulations are generally well known,^{vi} and, most importantly, because contribution limits were not binding for virtually all of the individuals in our subject pool. The Placebo letter could still have some effects if, for example, it works as a reminder that the individual must make a contribution, because of the feeling that the recipient is part of an academic study, etc. By comparing the effects of the List and List-Placebo letters, we can provide some suggestive evidence about the effect of the List letter that can be attributed exclusively to the table with information about contributions of others, rather than to these other confounding factors.

There is, however, a second limitation with this comparison. We explicitly took measures to ensure that recipients of the List letter would not feel more observed by their neighbors:

^{vi}See for example Figure B.1.a in the Appendix.
e.g., semi-anonymizing the records, not including information about the search tool of the FEC website, choosing neighbors from a broader geographical area. Despite our efforts, however, it is possible that part of the effect of the List letter, compared to the List-Placebo letter, came from the recipient feeling more observed by neighbors. In principle, this should not be a problem because, as seen in the results about conformity effects, the average effect of increased visibility is practically zero. However, since we did not know this fact before running the experiment, we randomized another aspect of the List-letter to test whether it significantly increased the perceived visibility of the recipient's contribution. We randomly assigned subjects to one of two variations of the List treatment: List-Once (illustrated in Appendix A.3) and List-Update (Appendix A.4). The only difference between these two variations was that in the List-Update letter we stated that an updated list with contributions by neighbors could be sent at the end of the election cycle, whereas the List-Once letters specified that a letter of this type would not be sent again in the future. If individuals felt that their names could be recognized by neighbors they knew, they should feel more monitored in terms of their future contributions from the List-Update letter, because the neighbors would get an update about the subsequent contributions.

Table H.1 presents a series of comparisons between the post-treatment amounts contributed in these different treatment groups. Column (1) shows that, compared to the No-Letter group, sending an individual a List letter increases the amount contributed posttreatment by about \$18.8. This effect is statistically significant at the 1% level, and also economically significant. Recall that, among those who contributed at least once during the post-treatment period, the mean amount contributed was about \$587. This means that the effect of the List letter accounted for 3.2% of this baseline contribution. Column (4) shows that the effect of the List letter on the probability of making a post-treatment contribution was about 0.42 percentage points (p-value<0.10). Once again, the effect of the List letter amounted to just under 1% of the baseline rate of 48.9% (i.e. the mean probability of posttreatment contribution in the No-Letter group). As a falsification test, column (5) estimates the "effect" of the List letter on pre-treatment contributions. As expected, the coefficient is very close to zero and statistically insignificant.

Columns (2) and (3) explore whether the effects of the List letter were indeed due to the information about the contribution patterns of others. Instead of comparing the List and No-Letter groups, column (2) offers a comparison between the List and List-Placebo groups. The coefficient is similar in magnitude (\$15.1) than the corresponding coefficient from column (1) (\$18.8), and it is also statistically significant. Furthermore, we cannot reject the null hypothesis that these two coefficients are equal. Another way of looking at this evidence is that, compared to the No-Letter group, the List-Placebo did not affect the contribution behavior of recipients. Last, column (3) compares post-treatment contributions between the List-Update and List-Once groups. The difference between these two is very close to zero and statistically insignificant. This result suggests that the effect of the List letter cannot be attributed to increased visibility of the recipient's contribution.

In sum, the evidence from this appendix suggests that the information about contribution records from the List letter may have corrected some systematic biases in the recipients' perception about the contribution behavior of others. More precisely, the positive effect on contributions may imply that individuals systematically under-estimate the mean amount contributed by own-party neighbors, that they over-estimate the number of own-party contributors relative to the opposite-party contributors, or a combination of both.^{vii}

^{vii}In unreported results we also find that the effect of the List letter was more positive in areas with higher average contributions by own-party neighbors and in areas where the total contributions to the own-party are surpassed by the total contributions to the opposite-party.

	Post-Treatment				Pre-Treatment
	$(1) \\ \$$	(2) \$	$(3) \ \$$	(4) P(\$>0)	(5) \$
List vs. No-Letter	$18.784^{***} \\ (6.062)$			0.416^{*} (0.239)	$2.223 \\ (4.362)$
List vs. List-Placebo		15.056^{*} (9.048)			
List-Update vs. List-Once			-0.428 (10.778)		
Observations Regression	136,629 Interval	55,225 Interval	36,795 Interval	136,629 OLS	$\begin{array}{c} 136,\!629 \\ \mathrm{OLS} \end{array}$

Table H.1: Estimating the Effects of Disseminating Unbiased Information about Contribution Records

<u>Notes</u>: * significant at the 10% level, ** at the 5% level, *** at the 1% level. Standard errors clustered at the ZIP code/party level. The dependent variable in columns (1) through (3) is the the amount contributed post-treatment. The dependent variable in column (4) takes the value 100 if the individual made at least one contribution post-treatment and 0 otherwise. The dependent variable in column (5) is the dollar amount contributed in the pre-treatment period. All regressions except column (5) include the usual set of individual-level control variables: time since mail delivery and a set of variables on pre-treatment contributions to each candidate.

I Conformity Effects in a Model of Partisan Signaling

I.1 The Model

In this Appendix, we formalize the intuition behind the conformity channel. For that, we present a model where contributions can be used as a signal of the political affiliation of the contributor. This model follows the tradition of a signaling approach to social interactions, as in Bernheim (1994) and in Bénabou and Tirole (2006).

Individuals, indexed by subscript *i*, can make a discrete contribution denoted by $c_i \in \{-1, 0, 1\}$. $c_i = -1$ means that the individual contributes to the left-wing party, $c_i = 1$ means that the individual contributes to the right-wing party and $c_i = 0$ means that the individual does not contribute to any political party. The discrete nature of contributions is just a convenient simplification to facilitate the tractability of the model. The intuition of the model, however, extends to the case where individuals can make contributions of different amounts. Moreover, even though we are interested specifically in monetary contributions, c_i may also be interpreted as other forms of potentially-observable forms of political participation, such as attending a rally, displaying candidate's yard signs or simply speaking in favor of a candidate.

The individuals belong to reference groups. We will refer to other individuals in i's reference group as *i*'s neighbors. In the empirical analysis, we rely on a geographic proxy for an individual's reference group, but this may represent something more general than just geographic vicinity. Reference groups may include family members, friends, acquaintances and co-workers, for instance. A given reference group is comprised by a continuum of agents who differ in a parameter α_i , distributed in the support $[\underline{\alpha}, \overline{\alpha}]$ according to the cumulative distribution function $F_{\alpha}(\cdot)$, with $\underline{\alpha} < 0$ and $\overline{\alpha} > 0$. The parameter α_i indicates the party supported and the strength of i's political affiliation. Individuals with $\alpha_i < 0$ sympathize with the left-wing party and those with $\alpha_i > 0$ sympathize with the right-wing party. Thus, $S_{R} = F_{\alpha}(0)$ and $S_{L} = 1 - F_{\alpha}(0)$ are the shares of individuals supporting the left and right parties, respectively. Agent i's utility from contributing to her favorite party is given by $-K + |\alpha_i|$, and her utility from contributing to the opposite party is $-K - |\alpha_i|$. The parameter K > 0 represents the fixed cost of contributing, including both pecuniary and non-pecuniary costs. If only these costs were present, individuals with $\alpha_i < -K$ would contribute to the left-wing party, individuals with $\alpha_i > K$ would contribute to the right-wing party, and individuals with $-K < \alpha_i < K$ would refrain from making any contribution.

There are also indirect costs and benefits from making contributions. Each individual belongs to one reference group, and interacts with other members of the same group, which we also refer to as neighbors. In these interactions, some characteristics of the individual are not perfectly observable to her neighbors, such as her affluence, her disposition towards pro-social behavior, her party affiliation and its strength, among many others. The interaction may be more or less beneficial for the individual depending on what the neighbor perceives about her characteristics. For instance, neighbors may have a kinder or more positive attitude toward individuals that are affluent, that exhibit civic behavior, or that share the neighbor's political preferences. While these characteristics are not directly observable to neighbors, contributions can be observed with certain probability, for instance because neighbors may look up the individual's contribution activity using the FEC website's search tool. Making contributions more visible to neighbors should thus affect the individual's desired contribution level, and this effect should depend on what the neighbor learns from the observed contribution. If contributions signal mostly income or wealth and being perceived as affluent is considered a positive trait, then more visibility should increase contributions. Similarly, if contributions signal pro-social attitudes then more visibility should also increase contributions. However, there are many other more efficient ways to signal affluence and pro-social behavior, for instance buying an expensive car or making named contributions to local charities. It is thus unlikely that individuals use campaign contributions primarily to signal those traits.

When an individual interacts with a neighbor, the utility an individual can expect from this interaction is a function of the coincidence or divergence in political affiliations with the neighbors. Political preferences are not directly observable by others, but contributions may be observed. Whether the individual contributed, and the party contributed to, is visible to *i*'s neighbors with some probability v, and unobservable with probability 1-v.^{viii} Contributions are made prior to the interactions with neighbors.^{ix} When the contribution is observable, a neighbor can infer the individual's political preference - in a probabilistically sense - from the observed contribution (or lack thereof). Let $P_i^j = P^j(c_i, c_{-i})$ be the perceived probability that *i* sympathizes with party *j* given *i*'s contribution, c_i , and the vector of everyone else's contributions in the same reference group, c_{-i} . The utility from the interaction with a neighbor of party *j* is $\delta(P_i^j)$. The function $\delta(\cdot)$ is monotonically increasing, which means that neighbors treat individuals better when they believe that they support their own political party.

Denote P_i^R the perceived probability that individual *i* sympathizes with the right-wing

^{viii}An alternative interpretation of the probability parameter v is that the contribution information is always a matter of public record, but each individual is uncertain as to whether her neighbors know about these records or about their publicity, and, if they know about it, whether they would try to access this information.

^{ix}Note that the individual does not know whether her contribution will be observable to others when deciding about her contributions.

party. When her contribution is observable to neighbors, the indirect utility for a right-wing individual is given by:

$$S_R\mu\delta\left(P_i^R\right) + S_L\left(1-\mu\right)\delta\left(1-P_i^R\right)$$

This is a weighted average of the expected utilities from interacting with right-wing and left-wing neighbors, where the weights are given by the parameter μ in conjunction with the proportion of neighbors sympathizing with each party, S_R and S_L . Similarly, the indirect utility for a left-wing individual is given by:

$$S_R(1-\mu)\delta\left(P_i^R\right) + S_L\mu\delta\left(1-P_i^R\right)$$

The parameter $\mu \in \left[\frac{1}{2}, 1\right]$ captures what we denominate political homophily, the tendency of individuals to interact with sympathizers of their own political party. The parameter μ can have one of the following two interpretations (or a combination of the two). First, it may represent differences in the likelihood of meeting a neighbor of each party. Second, it may represent party-based differences in how individuals value the interactions. The case where $\mu = \frac{1}{2}$ corresponds to a situation where individuals are matched with neighbors regardless of their political preferences, while in the case where $\mu > \frac{1}{2}$ each individual is relatively more likely to interact with neighbors supporting their own political party.^x Alternatively, $\mu = \frac{1}{2}$ could mean that individuals have the same valuation of interactions with neighbors from either party, while $\mu > \frac{1}{2}$ could indicate that individuals value interactions with own-party neighbors relatively more.

We make two simplifying assumptions to make the model tractable. First, we assume that α_i is uniformly distributed. Second, we assume that $\delta(\cdot)$ is linear. Without any loss of generality, we normalize the intercept of $\delta(\cdot)$ to zero: i.e., $\delta(P) = \gamma \cdot P$. In the signaling equilibrium there will be three groups defined by two thresholds: $\alpha_L^* \in (\underline{\alpha}, 0)$ and $\alpha_R^* \in$ $(0, \overline{\alpha})$.^{xi} Individuals with $\alpha_i \leq \alpha_L^*$ will contribute to the left-wing party, individuals with $\alpha_L^* < \alpha_i < \alpha_R^*$ will not contribute at all, and individuals with $\alpha_i \geq \alpha_L^*$ will contribute to the right-wing party. Let $\Omega_R(\Omega_L)$ denote a right-wing (left-wing) individual's utility from interacting with neighbors when her own contribution is unobservable. The utility for a right-wing individual from contributing to her favorite party is:

^xHowever, the fact that individuals are more likely to bond with neighbors of the same political party should not be interpreted as an exogenous parameter, i.e., $\mu > \frac{1}{2}$, but instead as part of the indirect costs embedded in $\delta(\cdot)$. That is, revealing oneself as a sympathizer of the opposite party (with respect to the neighbors) is disadvantageous because this results in fewer and/or poorer connections within the reference group.

^{xi}Note that we implicitly assume an interior solution.

$$-K + \alpha_i + \upsilon S_R \mu \gamma + (1 - \upsilon) \,\Omega_R$$

The utility for a left-wing individual from contributing to her favorite party is:

$$-K - \alpha_i + \upsilon \left(1 - S_R\right) \mu \gamma + \left(1 - \upsilon\right) \Omega_L$$

The utility of not contributing for a right-wing individual is:

$$\upsilon \left[\left(S_R - 1 + \mu \right) \gamma \frac{\min \left\{ \alpha_R^\star, \overline{\alpha} \right\}}{\min \left\{ \alpha_R^\star, \overline{\alpha} \right\} - \max \left\{ \alpha_L^\star, \underline{\alpha} \right\}} + \left(1 - S_R \right) \left(1 - \mu \right) \gamma \right] + \left(1 - \upsilon \right) \Omega_R$$

The utility of not contributing for a left-wing individual is:

$$\upsilon \left[\left(S_R - \mu \right) \gamma \frac{\min \left\{ \alpha_R^\star, \overline{\alpha} \right\}}{\min \left\{ \alpha_R^\star, \overline{\alpha} \right\} - \max \left\{ \alpha_L^\star, \underline{\alpha} \right\}} + \left(1 - S_R \right) \mu \gamma \right] + \left(1 - \upsilon \right) \Omega_L$$

By construction, α_R^{\star} is such that a right-wing individual with $\alpha_i = \alpha_R^{\star}$ is indifferent between contributing to the right-wing party and not contributing at all:

$$\alpha_R^{\star} = v\gamma \left(S_R - 1 + \mu\right) \frac{\min\left\{\alpha_L^{\star}, \overline{\alpha}\right\}}{\min\left\{\alpha_R^{\star}, \overline{\alpha}\right\} - \max\left\{\alpha_L^{\star}, \underline{\alpha}\right\}} + K \tag{3}$$

The analogous expression for a left-wing individuals is:

$$-\alpha_L^{\star} = v\gamma \left(S_R - \mu\right) \frac{\min\left\{\alpha_R^{\star}, \overline{\alpha}\right\}}{\min\left\{\alpha_R^{\star}, \overline{\alpha}\right\} - \max\left\{\alpha_L^{\star}, \underline{\alpha}\right\}} + K \tag{4}$$

This system of two equations and two unknowns characterizes the signaling equilibrium. Denote $\alpha^* = \{\alpha_L^*, \alpha_R^*\}$ and let $\Theta = \{\alpha^* : \alpha_L^* \in (\underline{\alpha}, -\frac{K}{2}), \alpha_R^* \in (\frac{K}{2}, \overline{\alpha})\}$. We will focus on equilibria with $\alpha^* \in \Theta$. The first requirement in Θ is that the solution is interior, i.e., $\underline{\alpha} < \alpha_L^* < \alpha_R^* < \overline{\alpha}$.^{xii} The second requirement, $\alpha_L^* < -\frac{K}{2} < 0 < \frac{K}{2} < \alpha_R^*$, basically restricts the analysis to equilibria in which the mass of non-contributors to each party is above the threshold $\frac{K}{2}$. This condition is consistent with the fact that only a small share of individuals contribute to political campaigns. This condition also guarantees that the equilibrium effects described below are of second order and therefore do not override the direct effects of changes in the relevant parameters.^{xiii}

^{xii}It would be straightforward to extend the Propositions to the alternative scenario, although the notation would be significantly more complicated. Intuitively, we would need to reproduce the whole analysis for each corner solution.

^{xiii}Even though the propositions focus on the more plausible equilibria in Θ (given the fraction of contributors in the actual population), it is straightforward to extend the comparative statics for $\alpha^* \notin \Theta$ based on the proofs provided here.

Proposition 1. Given parameter values in a non-empty set Π , a signaling equilibrium exists, it is unique and it belongs to Θ .

Proofs of the propositions are provided at the end of this Appendix. While we cannot specify an explicit solution for the model, we can use the implicit function theorem to perform the key comparative statics. The following proposition presents a prediction about the effect of visibility on contributions relevant for the empirical analysis.

Proposition 2. In any signaling equilibrium from Θ , an increase in visibility (v) induces a change in the number of contributors to the majority party that is greater than the change in the number of contributors to the minority party.

If there are more neighbors identified with an individual's party, she will have greater incentives to signal her political preference by making a contribution to that party. In terms of the empirical application presented in this paper, the proposition implies that an exogenous variation in v should result in a very specific form of heterogeneous effects: the effect of changes in visibility on contributions should be increasing in the share of neighbors supporting the same party as the contributor.

Proposition 3. In any signaling equilibrium from Θ , an increase in visibility (v) induces a change in the number of contributors to party j that is positive if $S_j > 1 - \mu$, null if $S_j = 1 - \mu$, and negative if $S_j < 1 - \mu$.

We should expect changes in v to have effects of opposite signs on contributions for individuals in two different groups: we should expect a negative effect for those with $S_j < 1 - \mu$, and a positive effect for individuals with $S_j > 1 - \mu$. For example, if $\mu = \frac{1}{2}$, which denotes a pattern of interactions with neighbors independent of their political preferences, we should expect an exogenous increase in v to increase contributions for individuals who belong to the majority party in the area, and a reduction in contributions for those identified with the minority party. As a result, an increase in v in a given reference group should result in one of two scenarios. If $S_j > \mu$ (so that $S_j > 1 - \mu$ and $1 - S_j < 1 - \mu$), greater visibility will increase contributions to the majority party but reduce those to the minority party. Alternatively, if $1 - \mu < S_j < \mu$ (so that $S_j > 1 - \mu$ and $1 - S_j > 1 - \mu$), then an increase in visibility will increase contributions to both parties, but (because of Proposition 2) the increase will be greater for the majority party.^{xiv}

^{xiv}If we allowed the scenario with $\mu < 1/2$ then a fourth possibility would arise: if $S_j < 1 - \mu$ and $1 - S_j < 1 - \mu$, an increase in visibility decreases contributions to both parties in the reference group, although the fall would be milder for the individuals of the majority party.

Finally, the results also provide a more intuitive interpretation for the condition α_L^{\star} < $-\frac{K}{2} < 0 < \frac{K}{2} < \alpha_R^{\star}$. Changes in visibility have both direct and equilibrium effects on contributions. The direct effect is that, holding constant all other agent's contribution patterns, greater visibility makes contributions to a given party either more or less attractive, depending on whether S_j is lower or higher than $1 - \mu$. For example, if $\mu = \frac{1}{2}$ then an increase in visibility makes contributions more attractive for the sympathizers of the majority party and less attractive for the sympathizers of the minority party. The equilibrium effect, in turn, results from the fact that other individuals should also react to the change in v, thereby altering the political composition of the pool of non-contributors. For example, if as a result of a change in v contributions by individuals identified with the majority party increase, the signal of making no contributions would become more closely associated to being sympathetic to the minority party, thereby changing the value of not making a contribution. When the share of non-contributors is large enough, i.e. $\alpha_L^{\star} < -\frac{K}{2} < 0 < \frac{K}{2} < \alpha_R^{\star}$, these equilibrium effects are of second order, so the net effect is dominated by the direct effects. However, if the share of non-contributors is very low, then the equilibrium effects may override the direct effects and change the sign of the overall impact of the change in visibility. We only discuss the comparative statics under the more realistic condition where only a small share of individuals make campaign contributions, although it is straightforward to derive predictions under alternative scenarios.

Last, if we define geographic polarization as the difference in contributions to the two parties within a given reference group, the following Corollary is implied by Proposition 2:

Corollary 1. In any signaling equilibrium from Θ , an increase in visibility of contributions (v) will increase geographic polarization.

I.2 **Proof of Propositions**

I.2.1 Proof of Proposition 1

From Equation 4 we obtain:

$$\alpha_L^{\star 2} + \alpha_L^{\star} \left[K - \alpha_R^{\star} \right] - \left(\upsilon \gamma \left(S_R - \mu \right) + K \right) \alpha_R^{\star} = 0$$

Using the quadratic formula:

$$\alpha_L^{\star} = \frac{\alpha_R^{\star}}{2} - \frac{K}{2} - \sqrt{\left(\frac{\alpha_R^{\star}}{2} - \frac{K}{2}\right)^2 + \left(\upsilon\gamma\left(S_R - \mu\right) + K\right)\alpha_R^{\star}}$$

We only use the left root because the right root cannot have simultaneously $\alpha_L^{\star} < -\frac{K}{2}$ and $\alpha_R^{\star} > 0$. Note that we also need $(v\gamma (S_R - \mu) + K) > 0$, which implies that $\alpha_L^{\star} < 0$. We can replace in Equation 3:

$$\alpha_{R}^{\star} = \upsilon\gamma \left(S_{R} - 1 + \mu\right) \frac{-\frac{K}{2} + \frac{\alpha_{R}^{\star}}{2} - \sqrt{\left(\frac{K}{2} - \frac{\alpha_{R}^{\star}}{2}\right)^{2} + \left(\upsilon\gamma \left(S_{R} - \mu\right) + K\right)\alpha_{R}^{\star}}}{\alpha_{R}^{\star} - \left[-\frac{K}{2} + \frac{\alpha_{R}^{\star}}{2} - \sqrt{\left(\frac{K}{2} - \frac{\alpha_{R}^{\star}}{2}\right)^{2} + \left(\upsilon\gamma \left(S_{R} - \mu\right) + K\right)\alpha_{R}^{\star}}\right]} + K$$

and then define:

$$f_{R}(\alpha_{R}) = v\gamma \left(S_{R} - 1 + \mu\right) \frac{-\frac{K}{2} + \frac{\alpha_{R}}{2} - \sqrt{\left(\frac{K}{2} - \frac{\alpha_{R}}{2}\right)^{2} + \left(v\gamma \left(S_{R} - \mu\right) + K\right)\alpha_{R}}}{\alpha_{R} - \left[-\frac{K}{2} + \frac{\alpha_{R}}{2} - \sqrt{\left(\frac{K}{2} - \frac{\alpha_{R}}{2}\right)^{2} + \left(v\gamma \left(S_{R} - \mu\right) + K\right)\alpha_{R}}\right]} + K$$

We thus need to prove that a fixed point of $f_R(\alpha_R)$ exists and is unique in the domain $\alpha_R \in \left(\frac{K}{2}, \overline{\alpha}\right)$. Define $g_R(\alpha_R) = f_R(\alpha_R) - \alpha_R$. First we need to prove that $g'_R(\alpha_R) > 0$. Given that, we would only need to find conditions such that $g_R\left(\frac{K}{2}\right) > 0$ and $g_R(\overline{\alpha}) < 0$ to prove existence and uniqueness. Starting with $g'_R(\alpha_R)$:

$$g_{R}'(\alpha_{R}) = \frac{\left[-\frac{K}{2} + \frac{\alpha_{R}}{2} - \sqrt{\left(\frac{K}{2} - \frac{\alpha_{R}}{2}\right)^{2} + (\upsilon\gamma(S_{R} - \mu) + K)\alpha_{R}}\right]}{\left(\alpha_{R} - \left[-\frac{K}{2} + \frac{\alpha_{R}}{2} - \sqrt{\left(\frac{K}{2} - \frac{\alpha_{R}}{2}\right)^{2} + (\upsilon\gamma(S_{R} - \mu) + K)\alpha_{R}}\right]\right)^{2} - 1$$

To prove that $g'_{R}(\alpha_{R}) < 0$, it is sufficient that:

$$\frac{\alpha_R}{2} - \frac{K}{2} < \sqrt{\left(\frac{\alpha_R}{2} - \frac{K}{2}\right)^2 + \left(\upsilon\gamma\left(S_R - \mu\right) + K\right)\alpha_R}$$

If $\frac{\alpha_R}{2} - \frac{K}{2} < 0$, this condition is automatically satisfied. If $\frac{\alpha_R}{2} - \frac{K}{2} > 0$, we must have $(v\gamma (S_R - \mu) + K) > 0$, which we already had to assume. We must then find conditions such that $g_R\left(\frac{K}{2}\right) > 0$ and $g_R(\overline{\alpha}) < 0$, where:

$$g_R\left(\frac{K}{2}\right) = \upsilon\gamma\left(S_R - 1 + \mu\right)\frac{-\frac{1}{4}K - \sqrt{\frac{9}{16}K^2 + \upsilon\gamma\left(S_R - \mu\right)\frac{K}{2}}}{\frac{3}{4}K + \sqrt{\frac{9}{16}K^2 + \upsilon\gamma\left(S_R - \mu\right)\frac{K}{2}}} + \frac{K}{2}$$

$$g_R(\overline{\alpha}) = v\gamma \left(S_R - 1 + \mu\right) \frac{-\frac{K}{2} + \frac{\overline{\alpha}}{2} - \sqrt{\left(\frac{K}{2} - \frac{\overline{\alpha}}{2}\right)^2 + \left(v\gamma \left(S_R - \mu\right) + K\right)\overline{\alpha}}}{\alpha_R - \left[-\frac{K}{2} + \frac{\overline{\alpha}}{2} - \sqrt{\left(\frac{K}{2} - \frac{\overline{\alpha}}{2}\right)^2 + \left(v\gamma \left(S_R - \mu\right) + K\right)\overline{\alpha}}\right]} + K - \overline{\alpha}$$

We now need to reproduce the entire analysis for α_L : i.e., we need to prove that a fixed point of $f_L(\alpha_L)$ exists and is unique in the domain $\alpha_L \in (\underline{\alpha}, -\frac{K}{2})$. From Equation 3 we obtain:

$$\alpha_R^{\star} = \frac{K}{2} + \frac{\alpha_L^{\star}}{2} + \sqrt{\left(\frac{K}{2} + \frac{\alpha_L^{\star}}{2}\right)^2 - \left(K - \upsilon\gamma\left(S_R - 1 + \mu\right)\right)\alpha_L^{\star}}$$

In this expression, we need to assume that $(K - \upsilon \gamma (S_R - 1 + \mu)) > 0$. From the following:

$$f_L(\alpha_L) = -\upsilon\gamma \left(S_R - \mu\right) \frac{\frac{K}{2} + \frac{\alpha_L^{\star}}{2} + \sqrt{\left(\frac{K}{2} + \frac{\alpha_L^{\star}}{2}\right)^2 - \left(K - \upsilon\gamma \left(S_R - 1 + \mu\right)\right)\alpha_L^{\star}}}{\left[\frac{K}{2} + \frac{\alpha_L^{\star}}{2} + \sqrt{\left(\frac{K}{2} + \frac{\alpha_L^{\star}}{2}\right)^2 - \left(K - \upsilon\gamma \left(S_R - 1 + \mu\right)\right)\alpha_L^{\star}}\right] - \alpha_L^{\star}} - K$$

we can proceed in a similar manner than for $f_R(\alpha_R)$, since $(K - \upsilon\gamma (S_R - 1 + \mu)) > 0$, $g'_L(\alpha_L) < 0$. To sum up, if the parameter values belong to the following set then an equilibrium exists, it is unique and it belongs to Θ :

$$\Pi = \left\{ \begin{array}{l} \left\{ K, \mu, \underline{\alpha}, \overline{\alpha}, \upsilon, \gamma \right\} : g_R\left(\frac{K}{2}\right) > 0, g_R\left(\overline{\alpha}\right) < 0, g_R\left(\underline{\alpha}\right) > 0, g_L\left(-\frac{K}{2}\right) < 0, \\ K > \max\left\{ -\upsilon\gamma\left(S_R - \mu\right), \upsilon\gamma\left(S_R - 1 + \mu\right) \right\} \end{array} \right\}$$

Finally, it is trivial to prove that Π is non-empty by means of an example.

I.2.2 Proof of Proposition 2

Denote $C_R = \frac{\overline{\alpha} - \alpha_R^*}{\overline{\alpha} - \underline{\alpha}}$ as the mass of individuals contributing to the right-wing party and $C_L = \frac{\alpha_L^* - \underline{\alpha}}{\overline{\alpha} - \underline{\alpha}}$ as the mass of individuals contributing to the left-wing party. It follows that:

$$\frac{dC_R}{d\upsilon} - \frac{dC_L}{d\upsilon} = \frac{1}{\overline{\alpha} - \underline{\alpha}} \left[-\frac{d\alpha_R^{\star}}{d\upsilon} - \frac{d\alpha_L^{\star}}{d\upsilon} \right]$$

We need to prove that $S_R > \frac{1}{2}$ implies that $\frac{dC_R}{dv} - \frac{dC_L}{dv} > 0$. To establish this, we need to obtain expressions for $\frac{d\alpha_R^*}{dv}$ and $\frac{d\alpha_L^*}{dv}$. We will calculate those derivatives using the implicit function theorem. We start by defining:

$$F(\upsilon, \alpha_R^{\star}, \alpha_L^{\star}) = \begin{bmatrix} \alpha_R^{\star} - \upsilon\gamma \left(S_R - 1 + \mu\right) \frac{\alpha_L^{\star}}{\alpha_R^{\star} - \alpha_L^{\star}} - K \\ -\alpha_L^{\star} - \upsilon\gamma \left(S_R - \mu\right) \frac{\alpha_R^{\star}}{\alpha_R^{\star} - \alpha_L^{\star}} - K \end{bmatrix}$$

$$H = \begin{bmatrix} \frac{dF_1}{d\alpha_R^*} & \frac{dF_1}{d\alpha_L^*} \\ \frac{dF_2}{d\alpha_R^*} & \frac{dF_2}{d\alpha_L^*} \end{bmatrix} = \begin{bmatrix} 1 + \upsilon\gamma \left(S_R - 1 + \mu\right) \frac{\alpha_L^*}{\left(\alpha_R^* - \alpha_L^*\right)^2} & -\upsilon\gamma \left(S_R - 1 + \mu\right) \frac{\alpha_R^*}{\left(\alpha_R^* - \alpha_L^*\right)^2} \\ \upsilon\gamma \left(S_R - \mu\right) \frac{\alpha_L^*}{\left(\alpha_R^* - \alpha_L^*\right)^2} & -1 - \upsilon\gamma \left(S_R - \mu\right) \frac{\alpha_R^*}{\left(\alpha_R^* - \alpha_L^*\right)^2} \end{bmatrix}$$

$$M_{\alpha_{R}^{\star}}^{\upsilon} = \begin{bmatrix} \frac{dF_{1}}{d\upsilon} & \frac{dF_{1}}{d\alpha_{L}^{\star}} \\ \frac{dF_{2}}{d\upsilon} & \frac{dF_{2}}{d\alpha_{L}^{\star}} \end{bmatrix} = \begin{bmatrix} -\gamma \left(S_{R} - 1 + \mu\right) \frac{\alpha_{L}^{\star}}{\alpha_{R}^{\star} - \alpha_{L}^{\star}} & -\upsilon\gamma \left(S_{R} - 1 + \mu\right) \frac{\alpha_{R}^{\star}}{\left(\alpha_{R}^{\star} - \alpha_{L}^{\star}\right)^{2}} \\ -\gamma \left(S_{R} - \mu\right) \frac{\alpha_{R}^{\star}}{\alpha_{R}^{\star} - \alpha_{L}^{\star}} & -1 - \upsilon\gamma \left(S_{R} - \mu\right) \frac{\alpha_{R}^{\star}}{\left(\alpha_{R}^{\star} - \alpha_{L}^{\star}\right)^{2}} \end{bmatrix}$$

$$M_{\alpha_{L}^{\star}}^{\upsilon} = \begin{bmatrix} \frac{dF_{1}}{d\alpha_{L}^{\star}} & \frac{dF_{1}}{d\upsilon} \\ \frac{dF_{2}}{d\alpha_{L}^{\star}} & \frac{dF_{2}}{d\upsilon} \end{bmatrix} = \begin{bmatrix} 1 + \upsilon\gamma \left(S_{R} - 1 + \mu\right) \frac{\alpha_{L}^{\star}}{\left(\alpha_{R}^{\star} - \alpha_{L}^{\star}\right)^{2}} & -\gamma \left(S_{R} - 1 + \mu\right) \frac{\alpha_{L}^{\star}}{\alpha_{R}^{\star} - \alpha_{L}^{\star}} \\ \upsilon\gamma \left(S_{R} - \mu\right) \frac{\alpha_{L}^{\star}}{\left(\alpha_{R}^{\star} - \alpha_{L}^{\star}\right)^{2}} & -\gamma \left(S_{R} - \mu\right) \frac{\alpha_{R}^{\star}}{\alpha_{R}^{\star} - \alpha_{L}^{\star}} \end{bmatrix}$$

By the implicit function theorem, we know that:

$$\frac{d\alpha_R^{\star}}{d\upsilon} = -\frac{\det\left(M_{\alpha_R^{\star}}^{\upsilon}\right)}{\det\left(H\right)} = \gamma\left(S_R - (1-\mu)\right)\frac{\alpha_L^{\star} + \frac{K}{2}}{-\left(\alpha_L^{\star} + \frac{K}{2}\right) + \left(\alpha_R^{\star} - \frac{K}{2}\right)}$$

Then, for $\frac{d\alpha_L^{\star}}{d\upsilon}$:

$$\frac{d\alpha_L^{\star}}{d\upsilon} = -\frac{\det\left(M_{\alpha_L^{\star}}^{\upsilon}\right)}{\det\left(H\right)} = \gamma\left(S_L - (1-\mu)\right) \frac{\alpha_R^{\star} - \frac{K}{2}}{-\left(\alpha_L^{\star} + \frac{K}{2}\right) + \left(\alpha_R^{\star} - \frac{K}{2}\right)}$$

Finally, we can replace back in $\frac{dC_R}{dv} - \frac{dC_L}{dv}$:

$$\frac{dC_R}{d\upsilon} - \frac{dC_L}{d\upsilon} = \frac{1}{\overline{\alpha} - \underline{\alpha}} \gamma \left[\frac{\left[-\left(\alpha_L^{\star} + \frac{K}{2}\right) + \left(\alpha_R^{\star} - \frac{K}{2}\right) \right] \left(S_R - \frac{1}{2}\right) - \left(\mu - \frac{1}{2}\right) \left[\alpha_L^{\star} + \alpha_R^{\star}\right]}{-\left(\alpha_L^{\star} + \frac{K}{2}\right) + \left(\alpha_R^{\star} - \frac{K}{2}\right)} \right]$$

Combining $F_1(\cdot) = 0$ and $F_2(\cdot) = 0$, we know that:

$$\alpha_R^{\star} + \alpha_L^{\star} = \upsilon \gamma \left(S_R - \frac{1}{2} + \left(\mu - \frac{1}{2} \right) \right) \frac{\alpha_L^{\star}}{\alpha_R^{\star} - \alpha_L^{\star}} - \upsilon \gamma \left(S_R - \frac{1}{2} + \left(\frac{1}{2} - \mu \right) \right) \frac{\alpha_R^{\star}}{\alpha_R^{\star} - \alpha_L^{\star}}$$

Plugging this expression in the previous equation, we obtain:

$$\frac{dC_R}{d\upsilon} - \frac{dC_L}{d\upsilon} = \frac{1}{\overline{\alpha} - \underline{\alpha}} \gamma \left[\frac{\left[-\left(\alpha_L^{\star} + \frac{K}{2}\right) + \left(\alpha_R^{\star} - \frac{K}{2}\right) + \left(\mu - \frac{1}{2}\right)\upsilon\gamma\right] \left(S_R - \frac{1}{2}\right) + \upsilon\gamma \left(\mu - \frac{1}{2}\right)^2}{-\left(\alpha_L^{\star} + \frac{K}{2}\right) + \left(\alpha_R^{\star} - \frac{K}{2}\right)} \right]$$

If $\mu \geq \frac{1}{2}$, then $S_R > \frac{1}{2}$ implies $\frac{dC_R}{dv} - \frac{dC_L}{dv} > 0$, which is exactly what we needed to prove.

I.2.3 Proof of Proposition 3

Recall the values of $\frac{dC_R}{dv}$ and $\frac{dC_L}{dv}$ from Proof of Proposition 2:

$$\frac{dC_R}{d\upsilon} = -\frac{1}{\overline{\alpha} - \underline{\alpha}} \frac{d\alpha_R^*}{d\upsilon} = \gamma \frac{S_R - (1 - \mu)}{\overline{\alpha} - \underline{\alpha}} \frac{-\left(\alpha_L^* + \frac{K}{2}\right)}{-\left(\alpha_L^* + \frac{K}{2}\right) + \left(\alpha_R^* - \frac{K}{2}\right)}$$
$$\frac{dC_L}{d\upsilon} = \frac{1}{\overline{\alpha} - \underline{\alpha}} \frac{d\alpha_L^*}{d\upsilon} = \gamma \frac{S_L - (1 - \mu)}{\overline{\alpha} - \underline{\alpha}} \frac{\alpha_R^* - \frac{K}{2}}{-\left(\alpha_L^* + \frac{K}{2}\right) + \left(\alpha_R^* - \frac{K}{2}\right)}$$

Since $\alpha^* \in \Theta$, we have $-\left(\alpha_L^* + \frac{K}{2}\right) > 0$, $\alpha_R^* - \frac{K}{2} > 0$ and $-\left(\alpha_L^* + \frac{K}{2}\right) + \left(\alpha_R^* - \frac{K}{2}\right) > 0$. It is straightforward to verify that the sign of $\frac{dC_j}{dv}$ is positive if $S_j > 1 - \mu$, null if $S_j = 1 - \mu$, and negative if $S_j < 1 - \mu$.