YALE LAW SCHOOL

John M. Olin Center for Studies in Law, Economics, and Public Policy
Research Paper No. 562

Voluntary Taxation and Beyond: The Promise of Social-Contracting
Voting Mechanisms

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Abstract: Would you volunteer to pay a carbon tax if 99% of other Americans also volunteered to pay such a tax? Instead of traditional referenda, it is possible to structure plebiscites which would only bind a subset of the population (for example, to be subject to a carbon tax) if that subset's individually chosen conditions for participation are met. While provision-point mechanisms with exogenously set provision points have garnered billions of dollars in private contributions, a broader class of "social contracting" mechanisms exist that allow individuals to bid on their preferred provision points. This article shows how both partial and probabilistic bidding schemes might foster voluntary subpopulation participation in a range of public good applications, and reports results from a series of randomized surveys of Internet respondents assessing the potential support for such subgroup "social contracting." The respondent bids would, for example, support an equilibrium in which approximately 25% of the public would voluntarily commit to pay an additional 10% tax on electricity. Provision-point bidding and probability-bidding mechanisms are shown to increase willingness to participate both in voluntary taxation and in civil disobedience experiments. A probability-bidding mechanism increases the expected number of civil disobedience volunteers more than 9-fold relative to a mechanism where the probability of participation is exogenously given. In a separate sexual assault reporting experiment, subgroup social contracting is shown to shift 10% of subjects from informal reporting to matching escrows without cannibalizing the proportion of subjects who report formally – thus enhancing the expected number of sexual assault complaints that will ultimately be investigated.

1

INTRODUCTION

It is rational to support a tax increase but not to volunteer to unilaterally pay the tax. But citizens rarely consider whether they would support, say, a carbon tax, if it only applied to a subset of the population. This article analyzes a family of bidding referendum mechanisms that allow individual voters to volunteer to pay a tax (or take on some other burden) so long as a sufficient proportion of other voters also volunteer. The notion of voluntary taxation seems like an oxymoron,[1] but about half the cost of World War II was financed by voluntary purchases of war bonds, which effectively had a tax built in because the bonds paid out below-market returns (Ayres & Nalebuff, 2009).[2] Bidding mechanisms can facilitate social contracting in which subsets of the population agree to joint sacrifice to support some common cause.

Technology today allows government to do much more in eliciting and coordinating such subgroup preferences instead of relying solely on across-the-board coercive taxation. For example, voters who are asked not whether they support a mandatory carbon tax, but instead are asked what percentage of tax-paying volunteers in the population would be sufficient to induce them to volunteer to be bound by such a tax, might rationally respond with an amount less than 100 percent.

Analogous mechanisms for coordinating voluntary contributions form a central part of crowdfunding platforms such as Kickstarter.com. Kickstarter has raised more than $2 billion under a system where project creators and other entrepreneurs set a minimum funding goal. Offered contributions are only collected if the goal is met by a pre-specified deadline.[3] Voluntary contribution mechanisms requiring that some threshold be met have been used for hundreds of years. The first illustrated edition of John Milton's *Paradise Lost* was only published after a sufficient number of subscriptions were received (Shawcross, 1975). In 1783, Mozart, foreshadowing Kickstarter, offered manuscripts "beautifully copied, and supervised by the composer himself" of three piano concertos (K413-415), but in six months "complained that it was taking a long time to secure enough subscribers . . . despite the fact that he had meanwhile scored a great success on two fronts" (Philip, 2004).

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[1] Others have studied whether giving taxpayers more choice on how their tax dollars are spent would increase compliance (Schizer & Listokin 2012); or whether taxpayers should be given more choice to choose from a menu of alternative taxes and deductions (Abramowicz & Blair-Stanek 2016).

[2] Between 1938 and 1948, voluntary taxation was also a central way that the "Jewish state-in-the making" was financed (Likhovski 2011).

[3] The founder of the Groupon platform (named by combining "group" and "coupon"), which provides discounts on goods and services only if a pre-specified number of people buy in, also created "The Point" platform that:

> allowed any to write a campaign exhorting others either to do something (stage a demonstration, for example) or give money to a cause (say, make election day a national holiday). People could make a monetary pledge and enter their credit card numbers on the site, but they would be charged only if a predetermined tipping point—a campaign's target number of people or money—was reached.

(Coburn 2010).

Mechanisms of this sort have been described by a dizzying variety of names, including the street performer protocol (Kelsey & Schneier, 1999),[4] the Wall Street performer protocol (Rasch 2001),[5] the ransom publishing model, the completion bond,[6] the assurance contract, the threshold pledge, and the fund-and-release system. There is an extensive game-theoretic and empirical literature analyzing the essentially equivalent "provision-point mechanism" (PPM). In a PPM, as with Kickstarter, if aggregate contributions meet or exceed the provision point threshold, the public good project is funded. Otherwise, the good is not provided, and all contributions are refunded (Rondeau, Schulze, & Poe, 1999). Some "dichotomous choice" implementations limit contributors to giving nothing or some fixed amount, while other "open-ended choice" implementations allow contributors to choose any non-negative contribution amount. In some implementations, excess funds are proportionately rebated to contributors. In other implementations, excess funds are returned to the highest contributors. In some "extended benefit" implementations, excess funds are used to increase production of the public good (Swallow, Anderson, & Uchidac, 2012).

Bagnoli and Lipman (1989) have shown that the provision-point mechanism can induce an interior Nash equilibrium of the contribution game, but it can give rise to multiple Nash equilibria including inefficient equilibria in which individual players do not offer to contribute to socially valuable projects because they correctly expect other players not to offer. Alexander Tabarrok (1998) and later Robertas Zubrickas (2014) considered an alternative PPM in which if aggregate contributions fell short of the provision point, contributors who offered money would receive back more than they offered. The payment of these failure bonus rebates are off the equilibrium path but make it a dominant strategy for players to bid for socially valuable projects (and thus can eliminate the "no one offers" equilibrium) (Zubrickas, 2014).

Several experimental studies suggest that PPMs can "greatly reduce free riding and increase the proportion of demand revealed in large group, single shot environments" – especially in comparison with "Voluntary Contribution Mechanisms" in which contributors are simply asked to volunteer non-refundable contributions without any triggering provision point (Poe, Clark, Rondeau & Schulze, 2002). In laboratory experiments, the PPM has tended to implement the public good in about 50 percent of trials, but the problem of free-riding remains substantial (Isaac et al., 1989; Cadsby & Maynes, 1999; Marks & Croson, 1999).

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[4] Paul Harrison (2002) has proposed the "rational street performer protocol" under which a contributor pledges to "donate one dollar in every $____ raised over $____ up to a maximum contribution of $____."

[5] "[B]ond backers [might] specify that their bonds would not pay off unless someone else bought at least $n worth of bonds. A bond backer could even specify that their bond would not take effect unless specific companies or individuals contributed n dollars." (Rasch 2001)

[6] The "social policy bonds" proposed by Ronnie Horesh (1992) instead seek to incentivize private parties to solve policy problems. Under this proposal, the government would issue bonds that would pay a fixed amount if and only if at some point in the future a social objective, say reducing unemployment, had been achieved. The bonds would be issued initially to any investor at a market-determined price reflecting the likelihood of the objective being achieved. Entrepreneurs would have an incentive to purchase the bonds and then increase the chance of reaching the objective. Commitment bonds can also be used to change the incentives of government to achieve policy objectives (Abramowicz & Ayres, 2012).

Field experiments in a variety of different settings have shown the feasibility of provision-point mechanisms (Rose et al., 2002). For example, a field experiment set in Jamestown, Rhode Island soliciting contributions to protect the Bobolink, "one of only a few species that sings while in flight," found that contributions generated from a provision-point mechanism approached those generated by an incentive-compatible pivot mechanism (based on the Clarke tax) (Swallow, Anderson, & Uchidac, 2012; Clarke, 1971). More to the point, Steven Rose and coauthors (2012) used a telephone intervention to test the take-up rate of a provision-point mechanism with a money back guarantee. More than 15% of electricity users contacted in Buffalo accepted the study's telephone offer:

> The GreenChoice program would be funded voluntarily. Customers who decide to join the program would pay an additional fixed fee of $6 per month on their NMPC bill. This fee would not be tax deductible. . . . Enough customers would have to become GreenChoice partners to pay for the program. For example, if 12,000 customers joined the first year, they would invest $864,000, which would allow Niagara Mohawk to plant 50,000 trees and fund a landfill gas project. The gas project could replace all fossil fuel electricity in 1200 homes. However, if after 1 year, participation was insufficient to fund GreenChoice activities, Niagara Mohawk would cancel the program and refund all the money that was collected.

But while smaller-scale green power programs (in Traverse City, MI and Fort Collins, CO) reached their provision points, the New York GreenChoice had much lower participation rates in the general population where bill inserts instead of telephone marketing was used.

This article tries to contribute to the provision-point literature in four ways. First, I provide a typology of what might be called "social contracting" mechanisms that allow subsets of the population to make common cause in contributing to public goods. The provision-point mechanism turns out to be a special case of a much broader category of implementation. Second, I show that the class of social-contracting mechanisms includes implementations where players make potentially binding bids over the provision points that would induce them to participate. This participation-point bidding is a contribution because it allows the population to endogenously determine the provision point instead of forcing the mechanism designer to determine it exogenously. While there are some contexts where the minimum cost of the public good makes exogenous provision points the natural implementation, there are other public good settings in which the level of provision are more efficiently determined solely by the population's preferences. Some of the social contracting bidding mechanisms discussed below allow population subgroups, by bidding, to discover these preference-determined provision levels. My typology also includes implementations in which voters bid the probabilities that they would be willing to participate conditional on the aggregate offered probabilities of participation by other voters. These types of probabilistic implementations can be useful with regard to public goods that require only a subset of the population to make lumpy (exogenously given)

contributions. For example, citizens might volunteer to participate in a draft lottery to conscript a certain number of troops so long as at least a certain number of other citizens also volunteer.

Third, this article analyzes a simple model with provision-point bidding that shows how aversion to being a "free-rider" (not participating when your peers participate) or to being a "sucker" (participating when your peers do not) can impact the equilibrium level of subpopulation participation. The model makes plausible how psychic costs and benefits might induce voters to rationally bid for intermediate participation probabilities or proportions. The model's results resonate with the U.S. efforts during World War II to inculcate solidaristic preferences for group participation in the war bonds. At that time, "Buying [war bonds] was the patriotic thing to do. Bond rallies with stars like Rita Hayworth and Bette Davis generated mass support for 'the greatest investment on earth'" (Ayres & Nalebuff, 2009).

Fourth, and finally, the article provides "proof of concept" evidence from a series of online surveys showing that, even in the absence of stirring publicity campaigns, substantial subsets of the public report willingness to join together to volunteer to pay taxes, to report sexual assault, and to probabilistically participate in civil disobedience. For example, the respondent bids would support an equilibrium in which approximately 25% of the public would voluntarily commit to pay an additional 10% tax on electricity. By randomizing the framing of these questions, the survey results also provide evidence that government initiatives can support higher levels of equilibrium participation. We show that a probability-bidding mechanism increases the expected number of civil disobedience volunteers more than 9-fold relative to a mechanism where the probability of participation is exogenously given. Finally, subgroup social contracting is also experimentally shown to shift 10% of subjects from informal sexual assault reporting to Callisto-like matching escrows without cannibalizing the proportion of subjects who formally complain.

The remainder of the article is divided into three parts. Part I places provision-point mechanisms within a much larger family of social-contracting mechanisms that allow population members to individually bid about their conditional willingness to contribute toward various projects. This Part also describes a range of policy applications in which these mechanisms might be deployed. Part II presents a model with provision-point bidding that allows bidders to experience varying psychic costs of being a free-rider or a sucker. Part III then discusses the design and results of randomized surveys that test how people might respond to provision-point bidding in a variety of different contexts.

I.   IMPLEMENTATIONS AND APPLICATIONS

A. *Implementations of Social-Contracting Bidding Mechanisms*

This Part describes a class of social-contracting mechanisms in which individuals make potentially binding bids to contribute to some public good. There are many analogues to auction

design. As with auction bidding, whether a particular bid will become binding depends on the bids of other participants. While auction mechanisms produce "price discovery" and identify which players will trade at the equilibrium price, social-contracting mechanisms produce "provision discovery" and identify which subset of players will contribute at the equilibrium provision level. And as with auctions, social-contracting bidding might be implemented with open sequential ascending or descending bids. But for ease of explication, I will focus on the family of mechanisms that can be implemented through sealed simultaneous bidding.

1. *Fixed Provision Point, Bid Contributions*. As discussed in the Introduction, the most analyzed family of social-contracting mechanisms is the PPM. The mechanisms share the key feature that the mechanism designer announces a fixed provision point, which is the minimum aggregate contribution for which the social contract will proceed. The players then place potentially binding bids with respect to their willingness to participate, conditional on the aggregate contribution exceeding that provision point. As discussed above, some PPMs are structured with what the literature calls dichotomous choice (DC) bids (such as the GreenChoice $6 contribution), while other PPMs allow open-ended (OE) bidding (such as Kickstarter's varying dollar amounts). PPMs also differ in how they treat excess contributions – with extended benefit (EB) implementations applying the excess to the public good, with proportional rebates (PR) implementations returning the excess in proportion to the initial bids, and with some adopting what are called uniform price (UP) with the excess rebated to the highest initial bids.

2. *Fixed Contributions, Bid Provision Points*. The core structure of the PPMs, however, can be flipped. Instead of fixing the provision point ex ante and bidding over DC or OE contributions, it is possible to fix the potential contributions (limiting them to DC) and instead structure bidding over the provision point itself. For example, the GreenChoice mechanism could have been changed to allow bidders to nominate the minimum provision point at which they would be willing contribute: "I hereby volunteer to contribute $6 per period so long as at least X% of other utility users also volunteer."[7] To make the mechanism voluntary, it is important to allow respondents to respond with bids signaling that they would not want to participate regardless of the level of support by their peers. Thus, in answer to the foregoing question, bidding to volunteer only if at least 101% of other users volunteered would signal an unwillingness to volunteer under any circumstances.

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[7] Equivalent provision-point bidding could alternatively be framed in terms of an aggregate number of participants ("so long as at least X other users") or an aggregate dollar amount ("so long as there are at least $X in total contributions"). Equivalent provision-point bidding can also be framed in terms of the extent of non-participation ("so long as no more than X other users fail to contribute"). While economically equivalent, alternative framings might induce different cognitive/behavioral reactions. One might also allow bidders to express ranges of aggregate participation (including upper as well as lower bounds) as a condition of their participation: "so long as at least X% and no more than Y% of other utility users contribute." Upper bounds of this kind might make sense if participants experienced diminishing benefits from aggregate participation beyond a certain point. Bidding with more nuanced conditions is also conceivable: "so long as a majority from each neighborhood/subgroup also contributes."

Structuring the mechanism with bidding over the provision point allows subgroups of the population to make common cause by discovering the aggregate provision level that is supported. The mechanism agent would aggregate the bids and announce which bidders are bound to contribute because their individually chosen conditions were met.[8] In some contexts, the provision point discovery has little value because the minimum (and maximum) provision point is externally given by the cost of producing some fixed public good. But in other contexts, the public good has no clear minimum or maximum level of provision. We see some examples of this in existing PPMs with extended benefit treatment of excess contributions. In some of these circumstances, the provision-point minimum is not chosen as the minimum level of socially beneficial aggregate contribution, but instead the provision point is strategically chosen by the mechanism designer with an eye toward what aggregate level is feasible given the preferences of community. Some law schools, for example, have set a provision point percentage of participation to create focal points of participation for class gifts. In some settings, it is more natural to fix the level of the individual contribution, because the type of beneficial contributions come in more indivisible increments. For example, "I hereby volunteer to show up to pick up trash on Saturday so long as X other people also volunteer."

Provision-point bidding raises interesting questions of default setting. The legal regime must have a way of treating individuals who fail to bid. In a traditional referendum (say, on the across-the-board imposition of a new tax), failing to vote impacts usually neither the numerator nor denominator in determining whether the proposition passes.[9] But with provision-point bidding, one might conceivably attribute default bids to any possible provision point. For example, for the mechanism asking for fixed contributions "so long as X% of others" also contribute, one could imagine defaults ranging anywhere from 0 to 101%. Three defaults have particular salience. A default of 101% would presume that non-bidders would not want to volunteer under any circumstances. A default of 50% would presume that non-bidders would want to volunteer only if a majority of their peers also volunteered, while a default of 0% would presume that non-bidders would want to volunteer regardless of the percentage of others volunteering. At first, it would seem that a 0% default would be unconstitutionally aggressive in assuming that citizens would be committed through their silence. But this is not necessarily true. A tax referendum with a 0% default is equivalent to a traditional across-the-board increase, but where each individual is given the choice to opt out conditionally (1-100%) or unconditionally (101%). Since it would clearly be constitutional for a legislature to enact an across-the-board tax, it should, a fortiori, be constitutional for a legislature to enact an across-the-board tax with an individual opt-out. Indeed, as adumbrated below in the empiricism discussion, while implementations of social-contracting mechanisms can be (and in the instance of Kickstarter and

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[8] The resolution to the social-contracting mechanism is analogous to the resolution in the Chatterjee and Samuelson (1983) bidding mechanism in which the mechanism agent announces whether trade will occur because the conditional offers of the buyers and seller overlap (Myerson & Saitherwaite, 1983). In legal terms, the mechanism bids (like all auction bids) are a special species of conditional offers/acceptances.

[9] More complicated consequences are possible with quorum requirements or if silence is interpreted as non-support for the proposition.

other crowdsourcing sites, have been) organized and offered by non-government mechanism entrepreneurs, government is uniquely placed to establish opt-out implementations. Just as some governments have established presumed organ donations with an opt-out (Ayres, 2012), government might enact presumed participation with an opt-out option. Indeed, one might imagine that members of Congress, who oppose a carbon tax, would not oppose a more libertarian carbon tax with the opt-out that provision-point bidding provides.

3. *Bid Both Contributions* and *Provision Points.* While adding to the cognitive complexity, it is possible to implement social-contracting mechanisms in which voters bid both their level of contribution and their provision point. For example, the mechanism might ask each voter to report a single contribution/provision point pair (c_i, p_i). The mechanism would then identify the equilibrium support by identifying the highest bid p_i for which there would be sufficient contributions.[10] Or one might even imagine mechanisms in which each voter was asked to report contribution/provision point schedules that conveyed how much a voter was willing to contribute for every possible provision point. We would generally expect that, in these schedules, a voter's willingness to contribute would (weakly) increase with the provision point.[11] For example, a voter might not be willing to contribute anything for low provision points, but would contribute increasing amounts if peer contributions exceed particular benchmarks.

4. *Bidding Probabilistic Contributions.* While the foregoing implementations have emphasized monetary contributions, which are naturally divisible into different increments, there are settings in which individual public good contributions are lumpier. In these contexts, what is needed is for a subset of the population to make a non-divisible contribution. In such settings, mechanisms can still achieve ex ante divisibility by allowing probabilistic contributions. For example, when my employer asked me to undertake an unpleasant task that was of marginal value to our institution, I offered a 1/3rd probability of undertaking the task if the school could find two other professors to offer a similar probabilistic commitment.[12] This example is most

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[10] More formally, let I_i be an indicator function which is equal to 1 if the ith voter is bound in equilibrium:

$$I_i(p_i, p) = \begin{cases} 1, & if \ p_i \leq p \\ 0, & otherwise \end{cases},$$

where p equals the proportion in the population that is bound. The equilibrium support in the game (p*) can then be calculated as:

$$p^* = \sum_i c_i I_i(p_i, p'),$$

$$where \ p' = \underset{p_j}{\mathrm{argmax}} \ (\sum_i c_i I_i(p_i, p_j)) \ s.t. \sum_i c_i I_i(p_i, p_j) \geq p_j.$$

[11] Although, as mentioned above, a voter might reduce her willingness to contribute if the provision point reached a level of diminishing private returns.
[12] Similarly, when students at a happy hour honoring the music of Taylor Swift were having difficulty finding someone to start singing karaoke versions of her songs, I offered to contribute a 50% chance of singing first if

analogous to an implementation with a fixed provision point and contribution bids, where the probabilities offered can vary. But it is possible to implement any of the foregoing types of social-contracting mechanisms with probabilistic contributions. For example, one might have instead fixed probabilistic contributions that are offered, conditioned on varying provision point probabilities being offered in aggregate. Thus, for example, a voluntary *Hunger Games* lottery might ask voters: "I would be willing to participate in a 1 in 1,000 chance of being my district's representative, so long as X other people also volunteered to participate in the lottery." Voluntary randomized mechanisms have been used in the real world to resolve "battle of the sexes"-type conflicts – where the public good is coordinating players' behavior but where the players prefer different types of coordination. The practice of asking for volunteers to participate in a drawing of straws to undertake some unpleasant but needful task is a real-world example of a probabilistic public-good mechanism – as when the shipwrecked lifeboat survivor in the English criminal case R v Dudley and Stephens (1884) proposed drawing straws to determine who would be eaten.

Prospect theory might suggest whether policymakers would try to instill a loss or gain frame when trying to enlist subgroup support (Kaneman & Tversky, 1979). For example, a lottery mechanism for kidney donations is more likely to be framed as a loss if the choice to participate is opt-in (so that default is non-participation), but may be more likely to be framed as a gain if the default is assured participation. One can imagine legislation creating a presumption of volunteering with certainty to donate a kidney by default, with an option to choose a lower probability of donating (including a probability of zero) if a fixed aggregate probability is bid. Prospect theory's "fourfold pattern of risk attitudes" suggests that individuals may prefer the lottery result when losses have moderate probabilities or gains have small probabilities (Tversky & Fox, 1995).

5. *Rebate Bonuses.* As mentioned above, it is possible to use rebate bonuses in mechanisms with fixed provision points to reduce the likelihood of equilibria in which aggregate contributions fall short of the provision point (See Tabarrok, 1998; Zubrickas, 2014). These mechanisms divide a pre-specified reward (*R*) among bidders in proportion to the size of their bid if the aggregate contributions fall short of the provision point – so that bidders receive a "more than your money back" guarantee that the provision point will be met. With these rebate bonuses, it becomes a dominant strategy (under many information settings) to bid something toward provision of a public good because players can benefit whether or not the public good is provided. For public goods that produce social benefits greater than their private costs, the

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someone else would contribute a 50% chance. Such private mechanisms are already implemented through a daring game that is sometimes called "Odds" (or "Odds Are"). See http://www.selassid.net/games/games/odds-game.html ("At any point, you can think of a dare for someone else to do. Go up to them and ask them "what are the odds that you'll *whatever dare*?…[The dared person then choses] some odds like '1 in .' E.g. '1 in 10' or '1 in 5' or '1 in 100.' The odds they pick will be the probability that they have to do this thing. So if they don't want to do it, they can pick smaller odds…On the count of three, both of you say a number between 1 and X inclusive. If both of you say the same number, [the dared person has] to do the dare.").

payment of the rebate becomes an off-equilibrium incentive, which in equilibrium need not be paid.

Some of the benefits of rebate bonuses can be captured through the foregoing implementations without a fixed provision point. For example, when bidders report the provision point that would be sufficient to induce their fixed contribution, it is possible for the mechanism to offer the reward to those bidders who, in equilibrium, are not bound because their provision point bids (p_i) exceeded the equilibrium provision level (p^*) but fell below some exogenously given provision goal (p^{goal}). The individual rewards (R_i) would go disproportionately to the non-bound bidders who bid most aggressively, to wit:

$$R_i = R\left(\frac{p^{goal} - p_i}{\Sigma_i p^{goal} - p_i}\right), for\ all\ i\ s.t., p^* \le p_i \le p^{goal}.\ [13]$$

Rebate bonuses of this kind would analogously give more robust incentives for players to bid aggressively and could thereby increase the equilibrium supported level of participation (p^*). Unlike rebate bonuses in fixed provision-point implementations, a mechanism with rebate bonuses and provision-point bidding is more likely to induce payment of the reward in equilibrium. For example, a carbon-tax mechanism – wherein voters volunteer to pay a 10% tax if a sufficient proportion of the population is bound – might be structured to pay bonuses to those who were not bound. If p^{goal} were set at 100%, it would be virtually assured that the reward would be paid (as some recalcitrant anti-tax voters would bid 101%). But setting the provision goal at an amount that approximates a conservative estimate of the proportion that would be supported in equilibrium (say, p^{goal} = 40% for the foregoing carbon tax example) might more robustly assure at least partial provision without producing a substantial probability that the reward would be paid in equilibrium. Setting a conservative p^{goal} might also allow awarding a simpler rebate, such as dividing the award equally between all bidders with bids $p^* \le p_i \le p^{goal}$. With equal rebates, the p^{goal} amount is more likely to become a focal bid, which might induce an equilibrium provision in which $p^* > p^{goal}$. If half of bidders bid p_i = 40% (= p^{goal}) or less, then p^* = 50%.[14]

B. *Applications*

Most broadly, the social-contracting mechanisms could be applied to any public good problem as a means of discovering subgroup support. For example, as mentioned above, referendum mechanisms with provision-point bidding might easily be applied to the carbon tax (taking the form, "I agree to pay the carbon tax if at least X% of my peers are also bound."). Such voluntary taxation might garner more support than traditional mandatory-for-all taxation.

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[13] Analogous rewards are available for the generalizations in which players bid contribution/provision point pairs – where the goal would be to reward most generously the bidders who bid most aggressively in terms of contributions or provision points (but still were not bound).

[14] Given these attractive attributes, it is surprising that crowdfunding websites, such as Kickstarter, have not given their project entrepreneurs the option of offering rebate bonuses.

While legislators who are worried independently about the dangers of growing government might still oppose giving citizens even the option of paying a carbon tax, the libertarian argument for facilitating a more explicit form of social contracting might garner new sources of support. The revenue from a carbon tax could be rebated or even prebated in ways that preserve the incentive effect of the tax while keeping the tax revenue-neutral (Ayres, 2010).

The possibility of referenda to induce voluntary taxation might be opened for bidding just to those subpopulations who would be subject to the tax. For example, the so-called "Buffett Rule" – which would require all those with incomes of $1 million or more pay at least 30 percent of their income in federal income taxes – could be partially implemented as a voluntary tax with provision-point bidding. A referenda limited to taxpayers with more than $1 million incomes might be asked to complete the referenda statement: "I would be willing to pay a 30% minimum rate as long as X% of other people with incomes above $1 million also agreed to pay this rate."

Congress has a long history of enabling voluntary taxation. As recently as Sept. 14, 2012, the House, by voice vote, passed "The Buffett Rule Act of 2012" which would allow high-income taxpayers to individually volunteer to pay additional amounts "to the federal government, over and above their tax liability, for deficit reduction" (Bartlett, 2012).[15] Even without this legislation the Treasury has two separate mechanisms to accept what amount to voluntary tax payments. Since 1843, it has maintained a 'Gifts to the United States' account,[16] and since 1988, the Treasury's Bureau of the Public Debt has maintained an account for 'Gift Contributions to Reduce Debt Held by the Public,' which in 2015 received contributions of more than $5 million.[17] These unilateral contributions prove that some people are willing to volunteer to pay more tax than is required by law, but a social-contracting mechanism that allows payments to be conditional on participation by others would almost certainly generate revenue orders of magnitude more, without any ex ante or de jure coercion.

In addition to voluntary taxation, one might imagine social contracting over waivers of particular deductions. For example, the home mortgage interest deduction has been widely criticized as a hugely expensive and at best only moderately effective economic incentive (Dickerson, 2015; Frederick, 2013; Morrow, 2012).[18] But the deduction also has large popular

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[15] "Representative Chris Van Hollen, Democrat of Maryland, characterized the Republican legislation as a 'pretty please' bill. As he put it, 'Pretty please, Warren Buffett, pretty please, Mitt Romney, won't you help contribute a little bit more toward reducing our deficit?'" (Bartlett 2012).

[16] "Financial gifts can be made by check or money order payable to the United States Treasury and mailed to…Gifts to the United States, U.S. Department of the Treasury, Credit Accounting Branch, 3700 East-West Highway, Room 622D, Hyattsville, MD 20782" (Bureau of the Fiscal Service).

[17] "Acting for the Secretary of the Treasury, the Bureau of the Public Debt may accept gifts of…[m]oney…[a]n outstanding government obligation…[or o]ther intangible personal property…Gifts to reduce debt held by the public may be inter vivos gifts or testamentary bequests" (U.S. Department of the Treasury).

[18] As Morrow (2012) writes, "The mortgage interest deduction is an extremely expensive incentive that is ineffective at increasing rates of homeownership, nonresponsive to economic conditions, resistant to change and structurally flawed." Similarly, Frederick (2013) sums up the literature: "Numerous studies in government, academics, economics, and law have concluded that the mortgage interest deduction has little impact on homeownership."

support (Frederick, 2013; Morrow, 2012). A social-contracting referendum might discover a subset of citizens who are willing to waive their right to take this deduction if a sufficient number of peers also waive. In the alternative, a referendum among millennials might discover a subset who are willing to narrow their right – for example, by conditioning the deduction on a commitment against cash-out financing (possibly in exchange for some alternative ex ante compensation) (Ayres & Mitts, 2014). Or in the alternative, one might imagine using a mechanism among various age cohorts and/or income cohorts to discover whether a subset of peers would collectively agree to reduce their social security benefits – by, say, delaying the retirement age or subjecting a greater portion of the benefit to taxation. Some might be willing to reduce their benefits if a sufficient proportion of their peers are also willing.

Voluntary commitments by a majority of citizens may change the politics of enacting across-the-board requirements. For example, if 60% of millionaires voluntarily opted into a collective commitment to pay the Buffett tax, it might make it easier to involuntarily tax the remaining 40% who would then be seen to unfairly free-ride. Alternatively, one might imagine that, if 60% of Americans waived their 2nd Amendment rights, it might induce pressure to restrict the rights of the remaining 40%. As in other legislative contexts, it is unclear as an a priori matter whether a compromise will, over time, be a springboard to further reform or a barrier that enervates a reform movement.[19]

Social-contracting mechanisms might be applied to a variety of political activities. For example, Eric Zolt and others are in the process of launching a web-based platform, called Repledge, which would allow members "to pledge money to a federal candidate while at the same time designating a charity to receive the funds if the pledge is 'matched' by supporters of the opposing candidate" (Fed. Election Commission, 2015). Analogously, one could imagine matching algorithms and social-contracting mechanisms through which corporations would conditionally agree not to expend funds on lobbying or political contributions.

A kind of social-contracting mechanism is at the heart of the Callisto escrow mechanism for sexual assault reporting – which allows (potentially unacquainted) people who were assaulted by the same perpetrator to make common cause by independently agreeing that information about their assault will be forwarded to school authorities if a second report against the same perpetrator is received in escrow (Ayres, 2015b; Ayres & Unkovic, 2012).

Even cherished constitutional and civil rights might be subject to collective waiver via a social-contracting referendum. Take for instance, the 2nd Amendment. A referendum giving Americans the option to complete the declaration: "I hereby waive my right to possess firearms as long as X other Americans also waive" would create the possibility of voluntary social contracting. Fred Vars (2015) has shown that getting people to sign onto "Do Not Purchase" lists

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[19] Shipan and Volden (2006) provide an interesting empirical study on whether local smoking bans help or hinder movements to pass statewide bans.

might prevent hundreds of gun suicides annually.[20] A campaign facilitating collective waivers of 2nd Amendment rights might go even further, reducing gun violence. While Congress cannot constitutionally prohibit firearm possession (*Heller*, 2008), it might be able to facilitate this form of private contracting about the right. Indeed, since constitutional rights are usually options – which importantly gain value from the ability to exercise or *not* exercise them – granting citizens greater power to contract ex ante over whether they will exercise the right is a way to further increase their individual value.

Referenda over privacy rights might analogously further collective values. For example, a subset of Americans might, as a way to prevent terrorism, volunteer to be subject to more surveillance or ex ante waive their right not to be subject to unreasonable search if a sufficient proportion of their neighbors also volunteer. Some citizens already grant the police the right to stop and search their car if it is ever seen being driven between the hours of 1 A.M. and 5 A.M. (Vollmer, 1988). Privacy referenda facilitating collective waivers regarding surveillance might, for example, provide systemic benefits by letting police more easily identify witnesses to particular crimes. But private ordering with regard to some fundamental rights would likely run afoul of the Constitution (Blocher & Miller 2016). A referendum giving women the option of waiving their abortion rights if a sufficient proportion of other women also waived would likely not produce binding waivers on even the subset of women's whose conditions were met. The Court would likely find that even a self-chosen, voluntary waiver would unconstitutionally burden the woman's later choice (Ayres, 2010-11). With regard to some constitutional rights, the ex post liberty interest trumps the interest in ex ante contractual freedom.

Public good settings that call for indivisibly lumpy contributions from a subset of the population are, as described above, apt for probability-bidding mechanisms. A quintessential example would be a military draft lottery. But while participation in the Vietnam lottery was mandatory for U.S. males of a certain age (Selective Service System), one can easily imagine a draft implemented with citizens individually setting their conditions for participation: "I'm willing to be subject to the 1 in 10 chance of being drafted so long as X others are subject to a similar chance."

The ambit of probabilistic social-contracting mechanisms could include volunteering for adoption lotteries for Syrian refugees or civil disobedience lotteries to protest police brutality. The sphere of applicability includes any setting where a group of people believe the world would be better off if some volunteered. Analogously, the mechanism might, for example, be applied for inter vivos kidney donation. More than 4,000 Americans with end-stage kidney disease die each year waiting for a transplant, and more than 100,000 Americans are currently on the transplant waiting list (National Kidney Foundation). Living donors who donate one of their two healthy kidneys can dramatically reduce this problem without a substantial reduction of their own life expectancy (Kiberd, 2013). Imagine that the United States Department of Health and

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[20] I have commented on this initiative elsewhere (Ayres, 2015a).

Human Services announced a "living donor lottery" where volunteers agree to take a 1 in 1,000 chance of being chosen to make a living donation of one of their kidneys. Persons selected by the lottery would receive $5,000 to compensate for the possibility of lost wages and out-of-pocket costs, as well as priority for any organ donation that he or she subsequently needed. The transplant would only proceed if the donor was a perfect antigen match with someone on the waiting list and both donor and recipient met all other medical requirements. HHS would then try to get people to make the following pledge: "If 5 million other Americans joined me, I would be willing to take a one in a thousand chance of making a living kidney donation."[21] A voluntary lottery of this kind might resonate with citizens' sense of fairness. And as discussed above, from a behavioral economics perspective, participation is particularly likely if HHS were able to the frame the choice in terms of relative losses. Faced with a certain solidaristic loss of being seen as not doing one's fair share or a 1 in 1,000 chance loss of a small personal health risk, people might be willing to roll the dice.

An existing platform for securing bone marrow already implements a kind of probabilistic social contracting. The "Be the Match" registry asks volunteers to mail a cheek swab sample and give a "commitment to take the next step if a patient needs you to donate your cells for a life-saving bone marrow transplant" (BeTheMatch.org, 2016). But the commitment to donate is only probabilistic: about 1 in 40 are called for more invasive testing, and only 1 in 300 are selected as a potential donor.

In many of these settings, it may be illegal or inadvisable to force, ex post, those selected by lottery to participate against their will. Even though draftees were jailed for refusing to serve in the military, it is inadvisable to threaten jail time for people who refused to follow through as adopting parents or kidney donors. But in other settings, the volunteerism can be automated. For example, many survivors of sexual assault might realize that the world would be better if more assaults were reported for investigation, but these survivors also rationally fear retaliation and harassment if they report their assaults. A "probabilistic escrow" mechanism might allow survivors to probabilistically share this retaliation risk by randomly forwarding for investigation only a subset of actionable complaints.

Volunteering to participate in a randomized control trial is a mechanism that already exists where a subset of people take a chance that their name will be called to participate in the public good of creating new information. But at least as a theoretical matter, it might be possible to induce even more voluntary participation by giving participants more power over the conditions of their participation: "I'm willing to participate so long as I have at least X% chance of receiving the trial drug" or "I'm willing to participate so long as at least X other people also

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[21] The mechanism is a traditional provision-point mechanism with dichotomous choice of contributing a fixed positive or zero probability amount. But one could implement instead with a fixed probability (but bidding over the provision point): "If X million other Americans joined me, I would be willing to volunteer for 'living donor lottery.'"

participate."[22] Mechanisms with various forms of probability bidding can be instituted without diminishing the power of the trial to make causal inferences.[23]

While the foregoing examples of probabilistic bidding mechanisms have focused on mechanisms aimed at garnering individual volunteers, analogous mechanisms might be applied to inducing voluntary participation by groups, organizations or political units. Interstate compacts routinely become effective when authorizing legislation is passed by a predetermined number of states. For example, Montana passed legislation making the Interstate Compact for Adult Offender Supervision "effective and binding upon the later of July 1, 2001, or the enactment of the compact into law by 35 states" (MCA 46-23-1115**).** The National Popular Vote compact is instead structured to become effective when conditional statutes are passed by states representing a majority (270) of the Electoral College's votes (Amar & Amar, 2001).[24] Currently, 11 jurisdictions possessing 61% of the triggering elector vote amount have passed conditional statutes.[25]

The classic NIMBY problem of choosing a town to place a trash dump is a ready, alternative example of how social contracting by local government might be implemented. The towns in a region may each realize that having a trash dump within driving distance is a public good, but none of the towns wants it in their back yard. While various auction mechanisms with compensation may lead to efficient choice of site, one might imagine circumstances in which towns would prefer to volunteer probabilistically: "Glendale is willing to take a 20% chance of the dump being placed within its borders so long as the aggregate probability subscription reaches 100%." Probabilistic mechanisms can thus add to local government toolkit for social contracting over public goods.

II. A MODEL OF VOLUNTARY TAXATION BIDDING WITH FREE-RIDER AND SUCKER AVERSION

The last section sets out an array of implementations and applications that help define the potential scope of social-contracting mechanisms. This section analyzes equilibrium behavior in a single voluntary taxation bidding implementation with particular assumptions about psychic

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[22] This question conditions participation on the RCT having sufficient statistical power.

[23] People who demand a high probability of receiving the trial drug may be different from those who demand a low probability, but the potential difference can be controlled for in analyzing the trial results of the control and treatment groups (Malani, 2006).

[24] The Supreme Court has upheld under the Compact Clause actions undertaken taken by a body created by conditional statutes providing that the body would come into being only when seven or more states enacted similar statutes (U.S. Steel Corp. v. Multistate Tax Commission, 1978).

[25] If triggered, the compact requires the "presidential elector certifying official of each member state [to] certify the appointment…of the [the national popular vote winner's] elector slate nominated in that state" (www.nationalpopularvote.com).

(and non-psychic) costs of participation (and non-participation). In this mechanism, each voter bids by submitting the minimum proportion (p_i) of the population (N) that needs to be bound in order for that voter to be bound. Let $I_i(p_i, p)$ be an indicator function which is equal to 1 if the ith voter is bound:

$$I_i(p_i, p) = \begin{cases} 1, & if\ p_i \geq p \\ 0, & otherwise \end{cases},$$

where p equals the proportion in the population that is bound.

The equilibrium support in the game (p^*) can be then calculated as:

$$p^* = \sum_i \frac{I_i(p_i, p')}{N},$$

$$where\ p' = \underset{p_j}{\operatorname{argmax}} \left(\frac{\sum_i I_i(p_i, p_j)}{N}\right) s.t. \frac{\sum_i I_i(p_i, p_j)}{N} \geq p_j)$$

I assume that each voter has accurate expectations of how other voters will vote and explore, conditional on these expectations, how a representative voter will optimally choose p_i.

As is standard in public good models, imagine that the value of the ith voter is a weakly increasing linear function of the proportion of people who participate in contributing to the public good, but that participation comes at a cost (C_i). We also assume that each voter might experience psychic costs if her participation choice deviates from others. Specifically, we imagine that a voter might be averse to being a "sucker" or "free-rider." Sucker aversion occurs when a voter participates but few of her peers participate; free-riding aversion occurs when a voter fails to participate but many of her peers participate.

In particular, imagine that these influences on the ith voter's value are captured by the following equation:

$$V_i(p_i, p) = B_i p + I(p_i, p) \left[\frac{B_i}{N} - C_i - S_i(1 - p)^2\right] - (1 - I(p_i, p))F_i p^2, \tag{1}$$

where $B_i \geq 0$ represents the ith voter's linear increase benefit from the population's participation, $S_i \geq 0$ represents sucker aversion costs and $F_i \geq 0$ represents the free-rider aversion costs. Equation (1) can be rewritten as:

$$V_i(p_i, p) = B_i p - F_i p^2 + I(p_i, p)\left[\frac{B_i}{N} - C_i - S_i(1 - p)^2 + F_i p^2\right]. \tag{2}$$

A voter expecting that a given proportion of others p will be bound will (weakly) benefit from participating when the final expression in brackets is positive:

$$\left[\frac{B_i}{N} - C_i - S_i(1-p)^2 + F_i p^2\right] \geq 0. \tag{3}$$

The first two terms within the bracket reflect the voter's internalized benefit $(B_i*(1/N))$ of increasing the participating proportion and cost (C_i) of participating. The second two terms reflect the psychic impact of participating, which is captured by a decrease in voter value from sucker aversion (S_i) and an increase in voter value from free-rider aversion (F_i). In the absence of psychic influences, an individual voter would choose to participate only if the marginal benefit from participating (B_i/N) exceeded the voter's cost of participating (C_i). But the presence of free-rider costs from non-participation when others participate can drive voters to want to participate if a sufficient proportion of their fellow voters do, even if non-psychic costs exceed non-psychic benefits. More generally, the possible presence of sucker and free-riding aversion creates the possibility that the voter will only want to participate if a sufficient proportion of others in the population are expected to be bound. Equation (3) is (weakly) positive when:

$$p_i^{min} = \frac{2S_i + \sqrt{4S_i^2 - 4(F_i - S_i)(\frac{B_i}{N} - C_i - S_i)}}{2(F_i - S_i)}. \tag{4}$$ [26]

When $p > p^{min}$, the ith voter will want to participate in the voluntary taxation plan. When the expected participation rate of others falls below this critical proportion, the ith voter will not want to participate. The representative voter's optimal voting strategy – which will only bind voters in circumstances where the voter wants to be bound – is to adopt the following bidding strategy:

$$p_i^* = \begin{cases} 0, if \ p_i^{min} < 0 \\ p_i^{min}, if \ 0 \leq p_i^{min} \leq 1 \\ 1, if \ p_i^{min} > 1 \end{cases}. \tag{5}$$

Even though I began by assuming that each voter knows the voting of other voters (and hence how much of the other population would be bound in equilibrium), the optimal voting strategy is independent of these expectations and, as seen in equations (4) and (5), can depend solely on the voter's own valuations. As an illustration, for a voter with higher sucker costs than free-riding costs $(F_i = 5$, and $S_i = 10)$ but whose non-psychic costs and benefits are in equipoise $(B_i/N = C_i = 1)$, the optimal bid would be just above 65%. Whereas, if the voter instead had relatively higher free-riding costs $(F_i = 15$, and $S_i = 10)$, the optimal bid would drop to approximately 48% – as the voter would be willing to participate to avoid the psychic costs of non-participation.

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[26] Equation 3, which is quadratic in p, has two roots, but only the positive root is a relevant solution (between 0 and 1). When $F_i = S_i$, equation 3 becomes linear in p and p^{min} becomes:

$p_i^{min} = \frac{C_i + S_i - \frac{B_i}{N}}{2S_i}$. When the solutions are undefined because the quadratic discriminant is negative and the free-riding costs (F_i) are greater (less) than the sucker costs (S_i), then the voter would always (never) want to participate.

The presence of potential free-riding costs can cause voters to participate (by bidding less than 100%) who, on the basis of their non-psychic costs, would not want to participate. For example, a voter whose non-psychic marginal benefit of participation (B_i/N) is 1 and cost of participation (C_i) is 2 will nonetheless bid approximately 47% with free-riding costs (F_i) of 10 (and $S_i = 1$). It is easy to construct equilibrium examples in which all voters voluntarily are bound to participate in a program where the total social costs exceed the total social benefit. For example, if all $(N = 100)$ have the foregoing values $(B_i/N = 1, C_i = 2, F_i = 10, S_i = 1)$, then all voters will bid 47%. Consequently, all participate in an equilibrium that will produce no free-riding or sucker costs but with non-psychic costs ($200) that exceed the social benefit ($100).[27]

Conversely, one can construct examples where psychic costs chill a voter from volunteering to unconditionally participate. For example, a voter whose non-psychic marginal benefits exceed her cost of participation (say, $(B_i/N = 2$, and $C_i = 1)$, but who experiences much greater sucker aversion than free-riding aversion $(S_i = 10, F_i = 1)$, would only want to conditionally participate if approximately 93% of others in population participated. In settings where the non-psychic benefits from participating are diminishing in the proportion of peers participating, the free-riding incentive will be greater, and it may not be feasible to sustain substantial voluntary participation.

There are many other ways that psychic costs might be modeled. Some voters, for example, might only experience free-riding costs if the non-psychic social benefits exceed the social costs of participating. Others may experience psychic benefits of solidaristically conforming their behavior to that of their peers. But this simple model is sufficient to show that: (i) voters might rationally bid intermediate proportions, (ii) sub-population participation can be supportable equilibria, (iii) high sucker aversion can chill voters' willingness to participate even when private benefits exceed non-psychic costs, and (iv) high free-rider aversion can induce participation even when private non-psychic costs exceed private benefits. The last of these results is especially important for policymakers when deciding whether holding this new kind of bidding referendum is likely to improve social welfare.

III. EMPIRICISM

A. GCS and MTurk Data

Data collection occurred using two online platforms. The first, Google Consumer Surveys ("GCS"), is a service where the researcher pays to show a survey to respondents as part of a "surveywall" (as opposed to a "paywall") before the respondent is able to access online content. The second, Amazon Mechanical Turk ("MTurk"), is a service in which the researcher pays U.S. subjects to complete a task. For this project, the task was to take a survey on the online platform

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[27] The comparative statics of the model are straightforward: p^{min} tends to (i) decrease as non-psychic benefits (B_i/N) increase, (ii) increase as the non-psychic costs (C_i) increase, (iii) decrease as the free-riding costs (F_i) increase, and (iv) increase as the sucker costs (S_i) increase.

Qualtrics. MTurk adds a fee on top of the workers' payments. Each platform is discussed in more detail in Online Appendix Section I.

One survey was run on GCS, the Carbon Tax (Fixed Provision Points) survey. Four surveys were run on MTurk: the Carbon Tax (Fixed Provision Points) survey, the Carbon Tax (Variable Provision Points) survey, the Civil Disobedience survey, and the Sexual Assault survey. The Carbon Tax (Fixed Provision Points) MTurk survey and the Civil Disobedience MTurk survey share the same set of respondents.

GCS provides researchers with demographics for most, but not all, respondents. In our survey, 4,283 of 5,721 (74.9%) had non-missing values for gender, age, and region. Survey weights were provided by GCS for this group, ensuring that the respondent group is representative of internet-using Americans. The other 25.1% of observations were dropped.[28] Of the remaining 4,283, 98.2% had a non-missing income variable and 97.6% had a non-missing urban density variable (see Online Appendix Table 2).

All MTurk survey respondents were asked detailed demographic questions. These included U.S. state, gender, race and ethnicity, age, sexual orientation, income, marital status, education, registered political party, and voter choice in the 2012 presidential election (see Online Appendix Table 2 and Online Appendix Exhibit 14). There were no missing values for demographic variables.

Within each survey, respondents were sorted into multiple treatment groups. Endogeneity is not theoretically a concern for the MTurk data because of treatment randomization. Online Appendix Tables 3-6 show empirically that the treatment groups were properly randomized, with balance across demographic covariates. However, treatment groups were not randomly selected for the GCS sample. Instead, the treatment group survey arms were run simultaneously as separate surveys. There are three reasons to believe that the treatment assignments emulate random assignment: the data was collected simultaneously, the survey arms targeted the same population of users, and a 24-hour grace period ensured that no user took more than one survey. Stratified sampling and post-stratification weights reported by GCS confirm that the groups were balanced on gender, age, and region (see Online Appendix Table 3). However, among the 6 income categories and 3 urban density categories, the treatment group assignment is predictive of the income and urban density category in 3 of 9 instances at the $p < .05$ level. Controlling for these variables, however, does not affect the results reported below (see Online Appendix Table 7).

The respondent samples generated by GCS and MTurk are necessarily taken from a subset of Americans: those who use the Internet. GCS offers stratified sampling and post-stratification weighting to achieve representativeness of the internet-using population with regards to gender,

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[28] The analyses below were also performed with this group as well (weights are not used for these analyses). The results are not affected.

age group, and region. However, neither GCS nor MTurk produces a sample with identical demographic characteristics to Americans as a whole. Online Appendix Table 2 compares the July 2015 Current Population Survey to the four online samples collected for this paper.[29] Based on the demographics collected by GCS, the GCS respondent sample contains a greater proportion of middle-income respondents than the nation as a whole. Based on self-reported demographics, MTurk respondents skew male, white, young, single, and educated.

B. Carbon Tax (Fixed Provision Points) Survey

Method. The Carbon Tax (Fixed Provision Points) survey was run on both survey platforms. The survey asked a one-sentence question, randomly varying x:

Would you volunteer to pay a 10% carbon tax on electricity if at least x% of other U.S. households also volunteered to pay?

The variable x took the following 11 values: 1%, 10%, 20%, 30%, 40%, 50%, 60%, 70%, 80%, 90%, and 99% (see Online Appendix Exhibits 1-2 for screenshots of the 50% version of this question).[30] A control question was also asked at random as a 12th survey arm: "Would you support a 10% carbon tax on electricity?" Responses for all questions were limited to Yes and No.[31] Response rates for the GCS Fixed Provision Points survey averaged 13.3% (see Online Appendix Table 1).[32]

Results. The GCS and MTurk results for the Fixed-Provision Points Carbon-Tax surveys are summarized in Figure 1, which shows the proportion of subjects indicating they would volunteer to pay a 10% carbon tax on electricity at each provision point:

Figure 1: GCS and MTurk Carbon Tax Fixed Provision Points Survey Results

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[29] Data downloaded from https://www.ntia.doc.gov/page/download-digital-nation-datasets (accessed June 8, 2016).

[30] The GCS survey omitted the 1% category.

[31] The sole exception is that GCS required that the control question have three response options: Yes, No, and I prefer not to say. A February 22, 2016 email from GCS required that the third option be added for "sensitive political topics." The MTurk question responses remained Yes and No.

[32] For reference, among about 24,000 responses to surveys run by Google as part of a white paper, the response rate was 16.75% (McDonald, Mohebbi, & Slatkin, 2016).
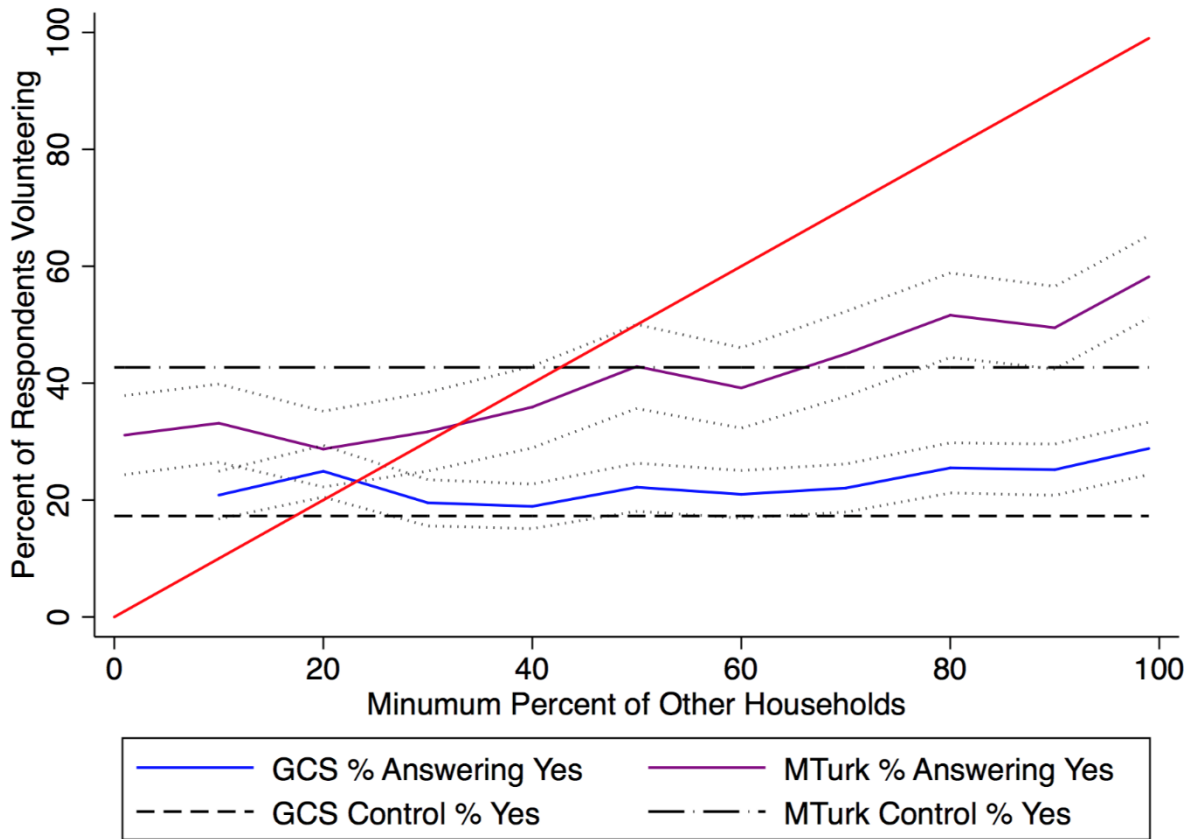
Notes: N = 4,283 for GCS, *N* = 2,228 for MTurk. 95% confidence intervals are shown using dotted lines. Only GCS respondents with full demographics are included (unweighted). "GCS Control % Answering Yes" (17.3%) is the percentage of people who answer "Yes" to the question "Would you support a 10% carbon tax on electricity?"[33] "MTurk Control % Answering Yes" (42.7%) is the percentage of people who answer "Yes" to the question "Would you support a 10% carbon tax on electricity?"

We see that in both platforms the provision-point mechanism elicits commitment from a substantial minority of respondents. Figure 1 shows that among GCS respondents, after applying GCS-provided weights to render the sample more representative, we see that 24.9% indicated they would volunteer "if at least 20% of other U.S. households also volunteered to pay" (and this sample proportion was statistically different than 20% at p = .052).[34] The figure also shows that among the MTurk respondents, 28.7% said they would volunteer "if at least 20% of other U.S. households also volunteered to pay." 31.7% said they would volunteer "if at least 30% of other U.S. households also volunteered to pay." Using the Current Population Survey data, it is also possible to reweight the MTurk and the Google sample data based on the gender, age group, and region joint distribution proportions in the national population. After re-weighting the observations to match the more nationally representative CPS data, the MTurk dataset suggests

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[33] 50.8% of respondents answered "No" and 31.9% answered "I prefer not to say" (the third option is required by GCS for "sensitive political topics" (February 22, 2016 email)).

[34] After applying post-stratification weights based on the Current Population Survey to the data, this number changes slightly to 25.3%. See note 35 and Online Appendix Figure 1.

that 40.6% of Americans would be volunteer "if at least 30% of other households also volunteered to pay."[35] Thus, both of these Internet survey samples produced support with at least a quarter of respondents' conditions for volunteering to be bound having been met.

Figure 1 also indicates that the willingness of the GCS respondents to volunteer to pay the tax was relatively independent of the particular treatment's provision point. As mentioned, when the provision point was 20%, 24.9% of respondents would volunteer to be taxed. But the proportion willing to volunteer if at least 80% of other households volunteered was just 26.9%.[36] In the GCS sample, giving respondents the ability to make their decision to volunteer conditional on a minimum fraction of other households volunteering did increase the general willingness to be bound relative to the control question, where just 17.3% indicated a support for a tax that would bind 100% of households.

In comparison, when asked the fixed provision point questions the MTurk sample showed a generally higher willingness to participate, and a greater elasticity of their participation levels with regard to the underlying provision point.[37] Thus, the proportion of respondents volunteering to pay rose from 28.7% to 51.6% as the provision-point rose from 20% to 80%.[38] And for the provision points above 70%, the proportion willing to volunteer exceeds the proportion in the control group, 42.7%.[39] Thus, in both samples, a larger percentage of respondents expressed a preference for a regime where they and a subset of other households volunteered to be bound, than for a regime where 100% of households would be bound.

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[35] See Online Appendix Figure 1 (25.6% in the weighted sample volunteer "if at least 20% of other households also volunteer"). While the reweighting helps produce an estimate that is more representative of the national population, the reweighting methodology has several limitations. First, reweighting places high weights on responses from subjects aged over 35 because they are underrepresented in the data. This introduces volatility (as shown by a large increase in the size of the confidence interval), and places a large emphasis on a relatively small number of respondents. Second, the weighting procedure implicitly assumes that internet-using citizens (who are able to respond to the survey) would have the same responses, on average, as non-internet-using citizens.

[36] Overall, regressing the proportion of support on the provision-point produced evidence of a statistically significant positive upward slope of .063, but whose size indicates that a 10 percentage point increase in the provision point would only occasion a .63 percentage point increase in the proportion of respondents volunteering to be bound.

[37] The greater elasticity in the MTurk sample may be due to respondents paying more attention to the specifics of the question than the GCS respondents. In contrast to GCS respondents, who may simply wish to move on to view the online content behind the "surveywall," MTurk respondents have been explicitly paid to pay attention.

[38] A regression analogous to the one described in Note 37 showed that a 10 percentage point increase would occasion a statistically significant increase of 2.7 percentage points in the proportion of respondents volunteering to be bound.

[39] One possible reason for the higher support for an across the board carbon tax in the MTurk sample is that 31.9% of the GCS respondents chose the (Google-required) option of answering "I prefer not to say" when asked the question. A January 2015 Resources for the Future/New York Times/Stanford University survey asked respondents if they favored or opposed "[i]increasing taxes on electricity so people use less of it" as a way "for the federal government to try to reduce future global warming." 25% of the 1,006 respondents were in favor, and 74% were opposed (Resources for the Future, New York Times, and Stanford University, 2015) This similar question garnered support between the GCS (17.3%) and MTurk (42.7%) percentages. The higher proportion of MTurk respondents who supported the tax may be due to the fact that they are generally more liberal than the U.S. population as a whole (about 45% are registered as Democrats, and about 59% voted for Obama in 2012) as well as more educated. See Online Appendix Table 2.

C. Carbon Tax (Variable Provision Points) Survey

Method. The Carbon Tax (Variable Provision Points) survey was run on MTurk with the crucial innovation that respondents were allowed to engage in provision-point bidding, rather than merely volunteer or not to be bound if an exogenously fixed provision point was reached. Respondents were also randomly assigned to one of four vignette groups: "Government Control," "Government Plus Rebate," "Government Plus Renewable Energy," and "Utility Sponsor." The survey presented a short prompt to respondents before asking for a response. The "Government Control" prompt was as follows:

> Imagine that the U.S. government has announced a new voluntary carbon tax initiative where customers can commit to pay an additional 10% per kilowatt-hour as a way to encourage reduced energy consumption. Your household would only have to pay the tax if a sufficient percentage of other households also paid.

> What percentage of households would also have to volunteer to pay the tax before you would volunteer to pay?   Move the sliding bar below to answer, or click the box below if you don't want to volunteer regardless of what other households do.

Respondents could choose any integer value between 0 and 100% using a sliding bar.

The prompts presented to the three other vignette treatment groups varied the content and wording (see Online Appendix Exhibits 3-6). "Government Plus Rebate" added that any money collected would be rebated on a per capita basis, so that if a household paid less than average in tax they would receive more money back (and receive less if they paid more than average in tax). "Government Plus Renewable Energy" instead described that the tax money would fund renewable energy research grants instead of going to the federal government's coffers. The "Utility Sponsor" prompt described utility companies rather than the U.S. Government as the sponsor of the program.

Results. Figure 2 shows the cumulative proportion of respondents that were willing to be bound at various provision points. For example, the proportion of respondents who indicated they would be willing to be bound if at least 19% of other households had to pay was added to those who said they would be willing to be bound if at least 20% of other households had to pay in order to calculate the level of support for a 20% provision point.

Figure 2: MTurk Carbon Tax Survey: Variable Provision Points by Treatment
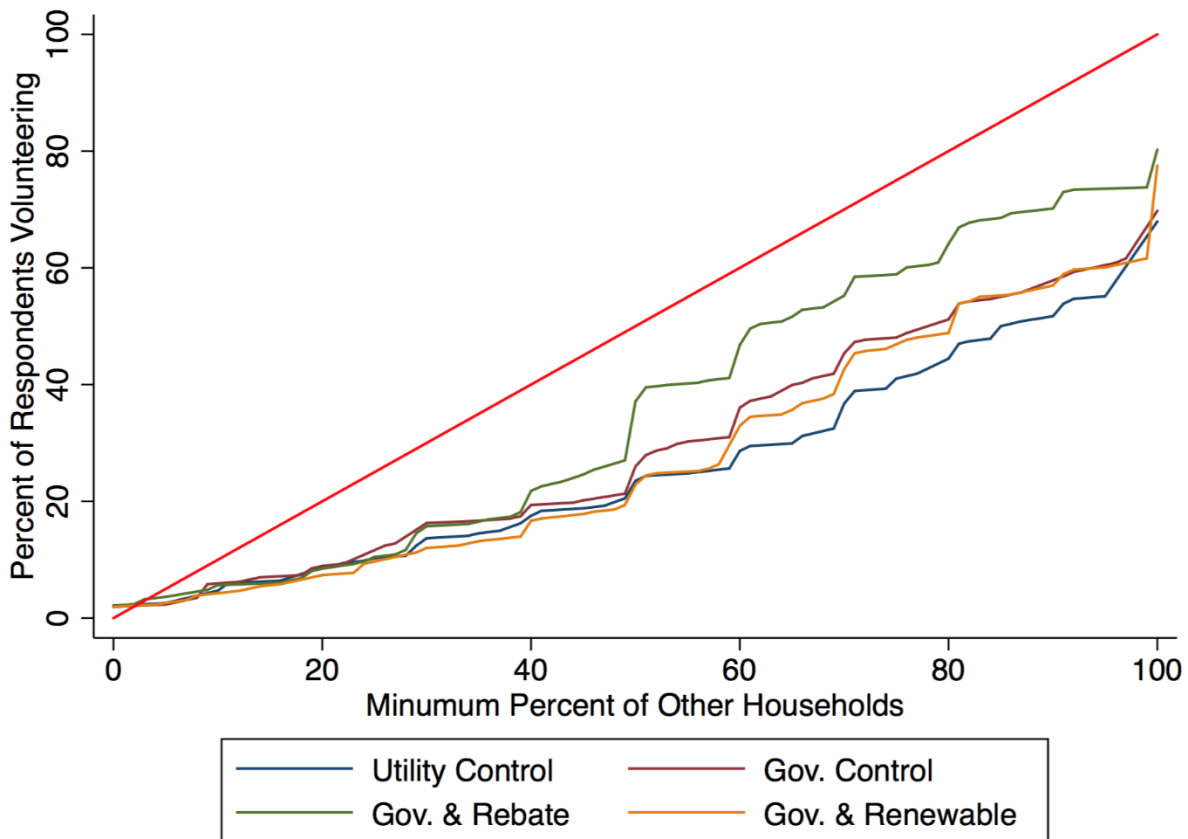
Figure 2 suggests that respondents' willingness to participate was more elastic with respect to the provision point when they were allowed to engage in provision-point bidding than when the provision point was exogenous fixed.[40] For example, the "Government Plus Rebate" group garnered 8.5% support when the provision-point bidding was at 20%, but 64.1% support when the provision-point bidding was at 80%.[41] Allowing voters to bid their own provision points might thus be better able to discover higher levels of support that might have been missed with fixed provision-point mechanisms. For example, Figure 2 reveals jumps in support not just at 51%, when a majority of other households are also bound, but also at 71%. While the equilibrium support for the vignettes groups is quite low,[42] the vignette with government sponsorship and pro-rata rebates of the tax produced responses which were within shouting distance of binding substantial majorities. The "Gov. & Rebate" group had 39.5% of

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[40] Fred Vars and I have similarly shown in an MTurk vignette experiment that people's willingness to waive their 2nd Amendment rights increases if a majority of other people in their state has also waived their rights (Ayres & Vars, 2016).

[41] A grouped logit regression (with a continuous provision point variable and treatment dummies) indicates that a 10% increase in the provision point from 50% to 60% is associated with between a 7.4 ("Utility Control") to 9.5 ("Gov. & Rebate") percentage point increase in support.

[42] The vignette with the highest level of support was the "Gov. & Rebate" group where 3.2% of respondents indicated a willingness to be bound if at least 3% were bound.

respondents volunteering for a provision point of 51% or less (11.5% below the 45-degree line) and 58.5% volunteering for a provision point of 71% or less (12.5% below the 45-degree line). A coordinated publicity campaign might trigger the kinds of solidaristic benefits or free-rider costs modeled in the last section in ways that would induce a majority of Americans to be bound if most other households also volunteered.

Finally, Figure 2 reveals the impact that the different randomly-assigned vignettes had on subjects' willingness to bid – with the government sponsorship and pro-rata rebates outpacing the other three groups. Table 1 statistically confirms this result by showing the estimated treatment effects of OLS regressions with regard to subject's decision to opt out and, for those not opting out, of a subject's decision on what provision point to bid. The nested regressions were run both with and without a full set of demographic controls.

Table 1: Carbon Tax Variable Provision Points Regression Results

Variable	Opts Out (=1)	Opts Out (=1)	Minimum Percentage of Other Households That Also Need to Volunteer (0-100%)	Minimum Percentage of Other Households That Also Need to Volunteer (0-100%)
Government Control	-0.018	-0.018	-4.473	-3.255
	(0.042)	(0.042)	(3.198)	(3.227)
Government Plus Rebate	-0.123***	-0.122***	-7.010**	-6.170**
	(0.040)	(0.040)	(3.008)	(3.039)
Government Plus Renewable Energy Grants	-0.096**	-0.080**	2.109	3.368
	(0.040)	(0.040)	(3.112)	(3.112)
Constant	0.321***	0.180***	63.201***	51.500***
	(0.031)	(0.064)	(2.374)	(5.221)
Full Demographic Controls	NO	YES	NO	YES
Observations	998	998	738	738
R-squared	0.014	0.086	0.017	0.083

Notes: Robust standard errors are in parentheses. The omitted treatment category is "Utility Control." "Opt Out" means that the respondent did not choose any percent at which they would be willing to volunteer to pay the carbon tax. The number of observations drops to 738 in columns 3 and 4 because respondents who opted out are omitted. See Online Appendix Table 8 for full models with demographic coefficients.

Table 1 shows that subjects are less likely to opt out when the government was the sponsor of the program than when utility companies sponsored the program – and the disparity was statistically significant for both the "Government Plus Rebate" and "Government Plus Renewable Energy Grants." The vignette with government sponsorship and pro-rata rebates not only produced the lowest opt-out rate but, for those who did not opt out, produced statistically lower provision point bids (where a lower individual bid indicates an increased willingness to be bound). The provision-point bidding regression with full demographic controls did not indicate systematic bidding differences related to MTurk subjects' self-reported gender, race, education,

income, or region, but did find that older and Republican subjects were statistically less willing to volunteer to be bound than younger and Democratic subjects.

D. Civil Disobedience Survey

Method. The Civil Disobedience survey was run on MTurk. Respondents were randomly assigned to one of three groups: a "Fixed 5% Probability" group, a "Variable Probability" group, or a "Fixed 100% Probability" group. The "Fixed 5% Probability" group, for example, was asked if they would participate in an act of civil disobedience at a probability of 5%, contingent on being picked in a lottery. The survey presented a short scenario before asking the three groups different questions. The baseline scenario was as follows:

Imagine that you are 25 and live in a large U.S. city. The police are stopping minority pedestrians to question them in a proportion that far exceeds their participation in local crime. What's worse, it has come out that the mayor and the chief of police explicitly agreed to a race-based policing policy to target black and Hispanic men.

"Black Lives Matter" organizers hope to hold a protest this weekend in which 50 people will block a major freeway and be subject to misdemeanor arrest. Organizers have asked for volunteers to take part in a civil disobedience lottery, where volunteers whose names are drawn agree to participate in the protest. The lottery will only be held if there is sufficient participation to assure that at least 50 people will be subject to misdemeanor arrest.[43]

The groups were then asked one of the following participation questions:

1. The "Fixed 5% Probability" group was asked, "Would you be willing to participate in the lottery if there was a 1 in 20 (5%) chance of your name being drawn?"
2. The "Variable Probability" group was asked, "If you could choose the probability of your name being drawn, what probability between 1% and 100% would you pick? Move the sliding bar below to answer, or click the box below if you are not willing to participate."
3. The "Fixed 100% Probability" group was asked, "Would you be willing to participate?"

For screenshot examples, see Online Appendix Exhibits 7-10.

Results. A minority of subjects in each group were willing to participate in their group's mechanism – with opt-in rates of 29.5% for the "Fixed 5% Probability" group, 47.0% for the "Variable Probability" group, and 24.2% for the "Fixed 100% Probability" group (see Table 3, infra). Table 2 reports the estimated treatment effects on opt-in for nested OLS regressions without and with full demographic controls:

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[43] Another set of subjects were randomly assigned to a condition that was identical to the Fixed 100% Probability condition except that it eliminated the final "sufficient participation" sentence from the baseline scenario. However, as reported in Online Appendix Table 9, respondents gave statistically similar responses irrespective of whether this sufficient participation" sentence was deleted. Therefore, for ease of exposition, I report here just the results for the "Fixed 100% Probability – With 'Sufficient Participation' Sentence" condition.

Table 2: Civil Disobedience Regression Results

Variable	Opts In (=1)	Opts In (=1)
Fixed 5% Probability	0.053**	0.054**
	(0.026)	(0.026)
Variable Probability	0.228***	0.233***
	(0.028)	(0.028)
Constant	0.242***	0.340***
	(0.018)	(0.053)
Full Demographic Controls	NO	YES
Observations	1,681	1,681
R-squared	0.042	0.113

Notes: Robust standard errors are in parentheses. The omitted category is "Fixed 100% Probability – With 'Sufficient Participation' Sentence." See Online Appendix Table 9 for the results of the regression with "Fixed 100% Probability – Without 'Sufficient Participation' Sentence." "Opts In" means that the respondent was willing to volunteer at any probability between 1-100%. See Online Appendix Table 9 for full models with demographic coefficients.

Table 2 shows that, relative to the omitted "Fixed 100% Probability" group, the "Fixed 5% Probability" group and the "Variable Probability" group produced statistically greater levels of mechanism participation – with the "Fixed 5% Probability" group being 5 percentage points more likely to opt in and especially with the "Variable Probability" group being 23 percentage points more likely to opt in. Thus, in comparison to the traditional all-or-nothing referendum to participate or not, the civil disobedience study provides "proof of concept" evidence that allowing people to volunteer probabilistically can spur more subjects to contribute a chance of participation.

Moreover, Table 2 shows that allowing participant choice over the size of the probability can spur even more participation than a referendum in which the probability was exogenously given. As shown below in Table 3, 47.0% of the variable probability group opted in to the mechanism, while only 29.5% of the "Fixed 5% Probability" group opted in. Indeed, the ability to bid one's probability elicited a higher proportion of bids greater than or equal to 5% than the proportion that was willing to hazard an exogenously given 5% probability of participation – 36.8% vs. 29.5% – indicating that subjects' ability to control their risk caused them perversely to be willing to risk more.[44]

Table 3: Civil Disobedience Volunteer-Equivalents by Treatment Group

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[44] Online Appendix Table 9 shows a regression of the "opt in" on full demographic controls and found that African-American and Hispanic respondents were, respectively, 25.2 and 13.2 percentage points more likely to opt in than non-Hispanics whites, and that Republicans were 15.7 percentage points less likely opt in than Democrats.

Group	N	Percent Opting In	Volunteer-Equivalents (Per Subject)
Fixed 5% Probability	573	29.5%	0.015
Variable Probability	551	47.0%	0.147
Fixed 100% Probability	557	24.2%	0.242

Notes: "Percent Opting In" represents the percentage of respondents who choose to participate at any probability between 1-100%. "Volunteer-Equivalents (Per Subject)" is equal to the expected number of volunteers given the proportion of respondent opting in and the probabilities of participating conditional on opting in. For example, a respondent choosing a variable probability of 15% is equal to .15 volunteer-equivalents.

Overall, Table 3 shows that a probability-bidding mechanism increases volunteer equivalents, that is, the expected number of civil disobedience volunteers, more than 9-fold relative to the exogenously given "Fixed 5% Probability" condition (.147 vs. .015). But Table 3 also shows that greater levels of opting in does not guarantee greater expected participation levels. While the fixed 5% and variable probability groups produced higher rates of opting in than an all-or-nothing choice of the "Fixed 100% Probability" condition, the higher (100%) probability of participating conditional on opting in outweighed the lower opt-in rate. Thus, Table 3 shows that the "Variable Probability" condition produced more expected volunteers per subject than the "Fixed 5% Probability" condition (.147 vs. .015 volunteer equivalents). But the more traditional "Fixed 100 Probability" condition produced by far the highest result with .242 volunteer equivalents per subject. Thus, while the civil disobedience survey shows that probability bidding can (like provision-point bidding in the carbon tax experiment) produce greater willingness to contribute than some exogenously chosen conditions, there are still times where exogenous choices may induce even more de facto support than would arise though individual subject bidding.

E. Sexual Assault Survey

Method. The Sexual Assault survey was run on MTurk. Respondents were randomly assigned to one of three groups: "Control," "Matching Escrow," and "Lottery Escrow." The three groups were presented with the same scenario:

Imagine you are a college student in your junior year at a medium-sized California university. Last night, at a party thrown by friends, you had too much to drink. You went home with a friend you had hooked up with several times before. While you both were at your apartment you believe your friend may have sexually assaulted you.

Respondents in the control group were then asked which of three options they would most likely choose: do nothing, file an informal report (non-actionable by school administrators), or file a format complaint of sexual assault (see Online Appendix Exhibits 11-13). Respondents in the

"Matching Escrow" group were asked the same question and given the 3 control group optional responses but also given the option of responding:
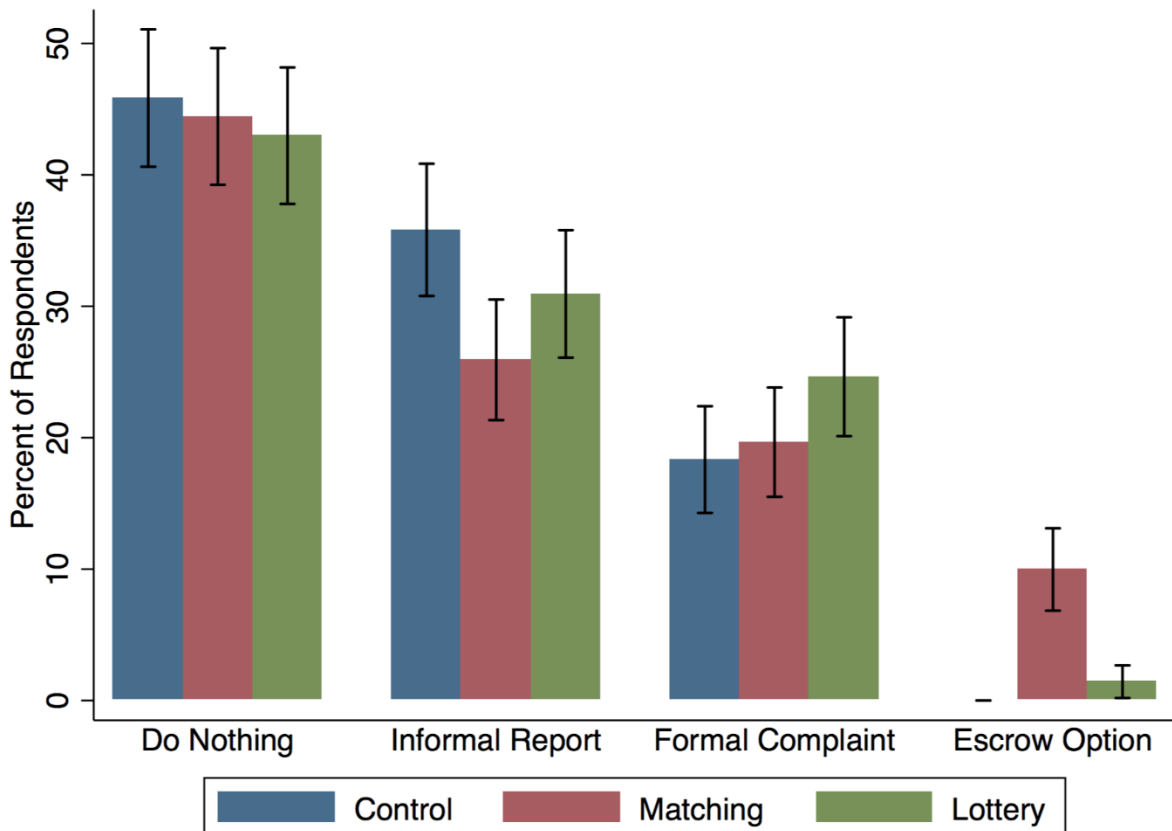
> Deposit a formal complaint into a "matching mechanism" (the complaint will be forwarded to the school to launch an investigation only if another person also files a complaint accusing the same person of sexual assault)

Respondents in the "Lottery Escrow" group were asked the same question and given the same 3 control group optional responses together with the option of responding:

> Deposit a formal complaint into a "lottery mechanism" (if 4 other complaints are also deposited into the "lottery mechanism," one of the 5 complaints will be randomly chosen and forwarded to the school to launch an investigation)

Results. Figure 3 shows the proportion of subjects in each condition that chose each of the available options:

Figure 3: Sexual Assault Responses by Treatment Group

First, we can see that including the Callisto-like "matching" option was, relative to the control condition, able to reduce the proportion of respondents who "Do Nothing" (by 1.4 percentage points) and who chose to informally report (by 9.9 percentage points), and to increase the proportion of respondents who chose to formally complain (by 1.3 percentage points) and chose the matching escrow option (by 10.0 percentage points). Thus, while there was a theoretical possibility that giving respondents the matching escrow option would cause some subjects who would have opted for a formal complaint under the control condition to switch to the matching escrow option (where in equilibrium some orphaned reports would go uninvestigated) (Ayres & Unkovic, 2012), Figure 3 shows that this cannibalizing of formal complaints failed to occur.[45] Indeed, offering the matching escrow option occasioned a nominal increase in the proportion of respondents who opted to formally complain.

Table 4 reports the results of OLS nested regressions without and with full demographic controls estimating the treatment effects of being assigned to different conditions on particular reporting choices. The table confirms that the matching escrow (relative to the omitted control condition) caused a statistically significant 10 percentage point decline in informal reporting and simultaneously a 10 percentage point increase in the use of the matching escrow option (from 0% in the control to 10.0% in the Matching Escrow condition).

Table 4: Sexual Assault Regression Results

Group	Do Nothing	Do Nothing	Informal Report	Informal Report	Formal Complaint	Formal Complaint	Escrow Option	Escrow Option
Lottery Escrow	-0.029	-0.029	-0.049	-0.046	0.063**	0.064**	0.014**	0.010
	(0.038)	(0.038)	(0.036)	(0.036)	(0.031)	(0.031)	(0.006)	(0.007)
Matching Escrow	-0.014	-0.005	-0.099***	-0.109***	0.013	0.016	0.100***	0.099***
	(0.038)	(0.038)	(0.035)	(0.036)	(0.030)	(0.030)	(0.016)	(0.016)
Constant	0.458***	0.482***	0.358***	0.411***	0.183***	0.055	0.000	0.052
	(0.027)	(0.072)	(0.026)	(0.067)	(0.021)	(0.055)	(.)	(0.034)
Full Demographic Controls	NO	YES	NO	YES	NO	YES	NO	YES
Observations	1,049	1,049	1,049	1,049	1,049	1,049	1,049	1,049
R-squared	0.001	0.033	0.008	0.033	0.004	0.038	0.053	0.084

Notes: Robust standard errors are in parentheses. The omitted treatment category is the control. See Online Appendix Table 10 for full models with demographic coefficients.

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[45] There remains the possibility that cannibalizing informal complaints will reduce equilibrium deterrence because some informal complainants that were cannibalized might have converted their complaints to formal complaints and some would allow "interim measures" that would provide some redress. For example, Yale University sexual misconduct procedures provide that the Title IX coordinate "may offer an informal investigation, mediation, counseling, or other means of resolving the [informal] complaint." http://provost.yale.edu/uwc/procedures

Second, Table 4 provides evidence that the subjects' response to the Lottery Escrow option violates Arrow's "independence of irrelevant alternatives" assumption. In the control group, only 18.3% of subjects opted to file a formal complaint, but subjects who were instead randomly assigned to a group giving them the additional alternative of choosing the Lottery Escrow option responded by opting to formally complain 24.6% of the time. The Table 4 regressions show that adding this seeming irrelevant Lottery Escrow alternative statistically increased the proportion of subjects who choose to formally report by more than 6 percentage points.

Imagine that a choice of chocolate or vanilla ice cream is initially offered to a group of people. If the group is then offered the alternative of strawberry ice cream in addition to chocolate and vanilla, it should not cause people to switch from preferring to chocolate to vanilla. But this anomaly occurs in Figure 3 and Table 4 – when offered the additional alternative of lottery escrows, some respondents switch from "Do Nothing" or filing informal reports to filing formal complaints. One explanation for why this might be happening is that the lottery escrow is similar – but inferior – to formal reporting. They are similar because both can be thought of as having probabilities of investigation (20% vs. 100%). But the lottery escrow is inferior to formal reporting because many people find it capricious to allow chance to decide whether one's complaint is investigated. Offering the lottery escrow may – counter to Arrow's assumption – draw more people to choose the formal complaint option because it makes the formal complaint more salient. Subjects who have "wrong choice" aversion may now prefer the formal complaint because they are at least assured that it is a better choice than the lottery escrow option (Kelman et al., 1996). Just as offering a new alternative of "crappy vanilla" may draw people to switch from chocolate to (regular) vanilla, offering the lottery escrow seems to have drawn more people from choosing reporting options with no chance of investigation to choosing the formal complaint with its certainty of investigation.

Finally, Table 5, analogous to Table 3, reports a calculation of the expected number of formal complaints per subject under each condition. To estimate the expected number of formal complaints produced by the "Matching Escrow" condition, it is necessary to make an assumption about the proportion of escrow deposits that will be matched and hence released for investigation. In Table 5 this proportion is assumed to be 10%.

Table 5: Sexual Assault Formal Complaint-Equivalents

Group	N	Formal Complaint-Equivalents (Per Subject)
Control	349	0.183
Matching Escrow	351	0.207
Lottery Escrow	349	0.249

Notes: "Formal Complaint-Equivalents (Per Subject)" is equal to the sum of formal complaint probabilities per subject. A choice of the matching escrow option is assumed to (have a match rate of and) produce .1 formal complaints, and a choice of the lottery escrow option is expected to produce .2 formal complaints.

If we distinguish reporting options that produce a chance of investigation (formal complaints or one of the escrow options) from those reporting options that do not create a possibility of investigation (doing nothing or informal reporting), we can see in Figure 3 that subjects who encountered the "Matching Escrow" condition were most likely to choose an option with a chance of investigation (29.6% for Matching Escrow vs. 18.3% and 26.1% respectively for the Control and Lottery Escrow conditions). But as with civil disobedience volunteerism, the probability of investigation given particular choices matters. Table 5 shows that the "crappy vanilla" effect of the Lottery Escrow condition drives a sufficient number of people toward formal complaints (with its 100% chance of investigation) so as to make that condition produce the highest expected number of formal complaint-equivalents.[46]

Stepping back, we can see from the experimental results described in these sections that provision-point voting mechanisms hold promise in identifying subpopulations that are willing to enter into binding voluntary agreements to participate in everything from carbon taxation to sexual assault reporting. Moreover, there is some reason to think that provision-point bidding may at times induce higher levels of participation – both because it requires less entrepreneur information to exogenously set a provision point and because it gives volunteers more control and "ownership" of their participation conditions. While there are severe limits on the inferences that can be drawn from small scale MTurk and GCS survey experiments, the results are at least suggestive that the subgroup social-contracting voting mechanisms deserve a place in the policymaker's toolkit.

CONCLUSION: GOVERNMENT AS PLATFORM

Mitt Romney, in a Republican presidential primary debate, said "I pay all the taxes that are legally required and not a dollar more," and "I don't think you want someone as the candidate for president who pays more taxes than he owes" (Washington Post debate transcript, 2012).[47] While Romney would presumably find it patriotic to volunteer for the army or public service, volunteering to make a financial sacrifice for one's country in the form of a voluntary tax payment is somehow beyond the pale. The mechanisms described in this article, however, force us to reconsider our preferences about the unchartered intermediate range between individual volunteerism and across-the-board coercion. Is it beyond the pale for Romney or another citizen to agree to pay a tax if a sufficient number of other people also agree to pay?

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[46] The Matching Escrow condition would only produce as many Formal Complaint equivalents per subject as the Lottery Escrow condition if we assumed a match rate of 64.3%.

[47] In fact, however, Romney sometimes "voluntarily overpaid his taxes by taking less of a deduction for his charitable contributions than he was permitted" (Bartlett, 2012).

The impulse of allowing political subgroups to make such binding agreements is an important force behind the creation of local governments. Indeed, there are obvious analogues between the Tiebout model where people vote with their feet and PPM models where people vote with their contributions. But the same advances in technology that have made Kickstarter and Groupon possible can be leveraged to allow new sets of similarly-minded citizens to make common cause. The technology of the Internet radically reduces the costs of multi-party contracting. Just a few years ago, it would have been implausible for tens of thousands of heretofore disconnected citizens to enter into a binding agreement because of the mundane transaction barriers of identifying, negotiating, and executing the contract. This is no longer so. Social-contracting mechanisms need not be parasitic on geographic residence. The notion of "voting to volunteer" simultaneously explodes the notion that voters need to be geographically contiguous and that action needs to be either "state action" or "private action." Rather, the mechanism described here can be fostered by the state but driven by groups of private citizens forming new, geographically disparate and heretofore unknown political compacts.

We are used to thinking of social contracting as a convenient fiction where "the consent of the governed" is at best tacitly granted. But subgroup social contracting replaces hypothetical consent with actual consent. Instead of thinking of government solely as a source of mandates and prohibitions, subgroup social contracting reimagines government also as a "platform" where dispersed sets of citizens can cheaply identify and contract with others. Government fostering the opportunity for such subgroup contracting can enhance the liberty of all.

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