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What is the Impact of Pricing Gun Violence on Support for Gun Control Organizations?

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By

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Abstract

This paper investigated the impact of economic valuation of gun control on views, attitudes, and behaviors towards gun control legislation in an experimental setting. The data for this study was collected through the use of a survey administered on MTurk in March 2019. The sample consists of 810 participants evenly disturbed between a treatment group and a control group. Both groups received a narrative regarding gun violence in the United States, however the treatment group received economic valuation information in addition to the qualitative description. Participants were then given the opportunity to donate a part of their compensation to a gun control organization. Prior research has shown that salience of monetary value of natural resources lead to decreased support for natural resource conservation funds (Goff et al., 2017) Using a probabilistic regression model, we found that economic valuation information increased likelihood of supporting a tax policy that would decrease gun violence but increase taxes with no impact on propensity to donate. Furthermore, we found that participants who were female, college-educated, or gun owners when subjected to the treatment were more likely to support the proposed tax policy. Based on this evidence, we assert that economic valuation information has the potential to increase support for gun control legislation.

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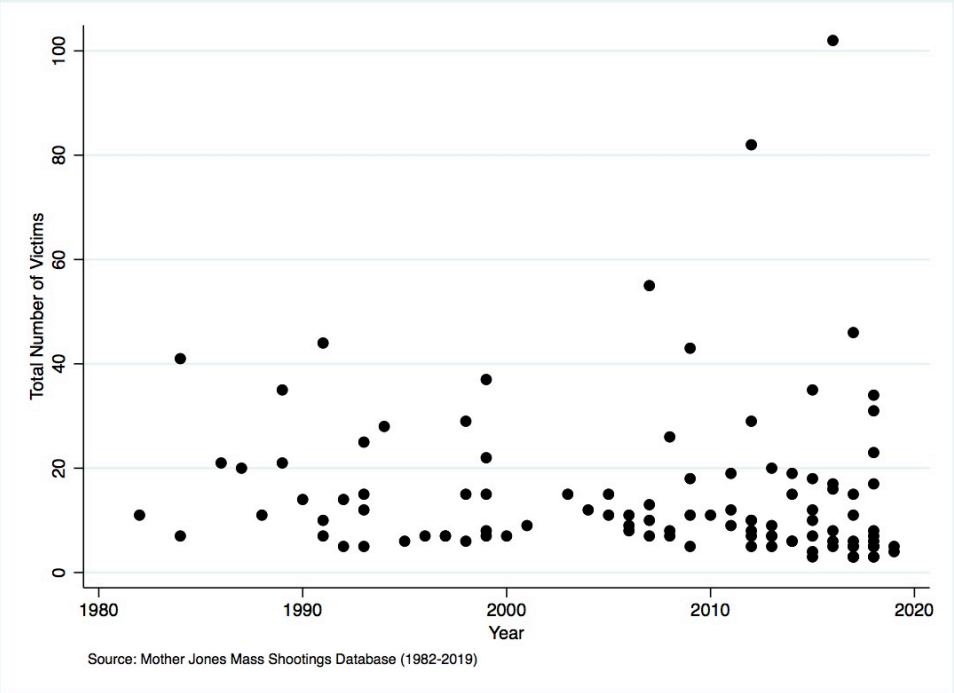
1 Introduction

Over the past decade the rise in gun violence has sparked a political and social debate over gun control laws. Cook and Leitzel (1996) define gun control as laws that regulate the manufacture, import, sale, possession and use of guns, with the ultimate purpose of reducing gun violence. Examples of gun control laws are laws aimed to prevent criminals and delinquents or those suffering from mental health illnesses from buying firearms.

There are various types of crimes that are considered gun violence incidents including: homicides, mass shootings, suicides, and other crimes such as armed robberies. In 2016 there were 38,551 deaths by firearms, of which 14,415 were homicides representing 72.82 percent of all homicides in the United States (US) (Statista, 2018; Center for Disease Control and Prevention, 2018). Furthermore, there were 154 injuries in 6 mass shooting events, of which 83 were fatalities and 71 were injuries (Mother Jones Mass Shooting Database, 2018). While 2016 provides a more recent snapshot of the magnitude of gun violence it is important to note long term trends. As shown in Figure 1, there is a rise in the frequency of mass shootings occurring over the past decade. Since 1982, 55 percent of all mass shootings were conducted by a shooter with a prior signs of mental health issues, and only 30 percent of guns used to carry out the reported 110 mass shootings were obtained illegally.

Figure 1. Total number of victims in Mass Shootings (1982-2016)



Jacobs (2002) described the motivation behind literature about gun control as the belief that the widespread availability of firearms caused the recent surge in the frequency and magnitude of gun violence incidents. Despite the presence of literature devoted to gun control issues, little of this literature has studied the topic through an economic lens. A few studies have attempted to estimate the economic value of gun control (e.g. Cook and Ludwig, 2001; Charles 2018). However, a review of the literature identified an important gap; to our knowledge there are currently no studies examining if the metrics used to value gun control are effective in altering people's views, attitudes, and behaviors. Papers published on gun control and gun violence have significant policy implications, so it is important to understand if economic valuation information influences people's behavior. This work seeks to contribute to this gap in the literature by determining whether economic valuation information influences support for gun control. Therefore, we posed the following research question: how do people's views, attitudes, and behaviors towards gun control change when information about the economic value of gun control?

Past work examined a similar question in the context of environmental resources. Engelen and Neuteleers (2014) hypothesized that economic valuation information leads to the "crowding-out" of intrinsic motivation to engage in pro-environment behavior. Motivation crowding theory suggests that when presented with information regarding the monetary benefit of an environmental program, an individual whose prior behaviors were motivated by care for the environment is instead motivated by the monetary value of the program. Therefore, the extrinsic monetary motivation crowded-out the initial intrinsic motivation of caring about the environment causing less pro-environment behavior. Another hypothesis suggests that economic valuation information serves as a monetary prime which causes self-interest activation. This hypothesis was experimentally tested by Goff et. al (2017). The authors found that when subjected to information regarding the economic valuation of natural resources, individuals were less likely to donate to nationally-recognized nature conservation organizations.

In this study, we hypothesized that support for gun control would be affected by the presence of economic valuation information, however we anticipated heterogeneity in response to the valuation information. Specifically, we expected that those who are intrinsically motivated to support gun control will either be unaffected by the treatment or will decrease support, while those who typically do not support gun control will increase their support.

The empirical framework for this study was based on Goff et. al (2017). This study involved 810 participants recruited through the use of Amazon Mechanical Turk (MTurk). Half of the participants were randomly assigned to a treatment group and the other half were assigned to a control group. The treatment group was exposed to information regarding the economic benefit of gun control, while the control group only received a qualitative narrative. We then compared these groups on two different outcome measures: (i) stated willingness to be taxed for a gun control program that will reduce gun violence, and (ii) within-experiment choice to donate

to a non-profit organization that advocates for gun control measures. This method not only allowed us to measure the impact of economic valuation information on donations but posed an interesting comparison of stated versus revealed preferences. To analyze results, we used probabilistic regression and tests of proportions.

We found that exposure to economic valuation information does not impact donations but increased likelihood to support a tax policy by 7 percentage points. As hypothesized, we found heterogeneity across different demographic groups. We found that females who were subjected to the treatment were 13 percent more likely to support a tax policy that would increase taxes but decrease gun violence than females in the control group. Furthermore, we found that gun owners who were subjected to the treatment were 9.5 percent more likely to support the proposed tax policy than those in the control group. Lastly, we found that participants with a bachelor's degree and beyond were 9.5 percent more likely to support the proposed tax policy than college-educated participants in the control group. These findings are contrary to our hypothesis that in general the treatment group will be unaffected by the presence of economic valuation information with heterogeneity in responses across different demographics.

Our findings carry significant policy implications, mainly our findings suggest that in order to increase propensity to donate, gun control organizations can target economic valuation information to groups such as those who view gun control as an important topic. Furthermore, our findings suggest that there is a general ascription of responsibility for gun violence to the government, and thus the majority view a tax policy as the appropriate corrective measure. Thus, our findings suggest that the use of economic valuation information will increase support for a tax policy.

This paper is structured as follows: Section 2 explores literature related to gun control, Section 3 details the experimental and analysis methods used, Section 4 discusses data and

results, Section 5 provides analysis and interpretation of results, and Section 6 concludes the paper.

2 Literature Review

2.1 Gun Control in the United States

2.1.1 Background of Gun Control in the United States

What most uniquely distinguishes the gun control debate in the US relative to other countries is the existence of a constitutional right for citizens to bear arms. In 1791, the second amendment of the constitution was ratified to include the following: "A well-regulated Militia, being necessary to the security of a free State, the right of the people to keep and bear Arms, shall not be infringed. (Legal Information Institute, 2018)" Researchers believe that there is a surge in the number and magnitude of gun violence incidents. This belief sparked a long and heated debate regarding the need for stricter gun control laws. This subsection aims to give a brief overview of gun control in the US.

What adds further complexity to the gun control debate in the US are the vast differences in state laws regarding gun control. There are 5 main ways in which states can be categorized regarding gun control: shall-issue (PA, VA, NC, SC, GA, FL, AL, TN, KY, OH, IN, IL, LA, MI, WI, MN, IA, OK, TX, NE, SD, MT, CL, NM, UT, NV, WA, OR), discretionary issue (CT), no permit required (NH, VT, ME, MS, AR, MO, KA, AZ, ID, WY, ND, AK) rights restricted (NY, MA, RI, NJ, MD, CA, HI) and rights infringed (NRA, Institute for Legislative Action, 2018).[1] To mitigate the vast differences between states there exists an overarching federal law with the

[1] Shall-issue are states which allow, according to specific requirements, law-abiding citizens the permit to carry concealed firearms. Discretionary use are states which provide the government with discretion over the issuance of a permit, but generally grants permits. No permit required are states which allow individuals to carry concealed firearms without a permit. Very limited issue are states which give the government complete discretion over issuance. Lastly, rights infringed are states which completely prohibit carrying firearms outside the home or place of business.

primary purpose of preventing lax firearm laws in one state to undermine the restrictive laws in another (Cook and Leitzel, 1998). These state law differences provide an interesting setting for researchers to study the effectiveness of gun control.

2.1.2 The Effectiveness of Gun Control

The correlation between crime rate and the spread of firearms in the US has been widely studied. This is due to a constitutional right for citizens to "bear arms" coupled with a vastly higher violent crime rate than other comparable economies such as Britain and Australia (Hawkins and Zimring, 1997). These factors have sparked a plethora of academic debates aiming to examine the impact of gun control on the reduction of gun violence. Within the vast amount of literature surrounding this question there is a great degree of disagreement over the effectiveness of gun control.

To better understand the disparity in research, it is important to consider the argument for stricter versus more lax gun control laws. Schneider (2018), in his study of the relationship between gun control and crime rates in Brazil, eloquently stated both arguments. The author stated that while the widespread of guns can lead to deterrence of criminals and thus an increased sense of protection, it can also lead to the higher probability of the use of guns in escalating situations thus resulting in a higher risk of victimization.

The motivation behind the majority of past literature is the belief that there is a recent surge in the frequency and magnitude of gun violence incidents caused by the widespread availability of firearms (Jacobs, 2002). However, not all researchers agree. Some researches such as Arson, Follman, and Pan (2013) argue that there is a spike and record number of casualties in mass shootings in 2011. Others like DeLateur and Fox (2013) in their breakdown of social "myths" surrounding gun control argued that it is the biased definition of mass shootings, which

excluded any incidents due to gang violence or robberies, which caused an upward skew in data. Furthermore, some authors argue that stricter gun control leads to lower crime rates (Baack and Kwon, 2005). Others found that gun control has a mild impact on gun related deaths (Kwon et. Al, 1997), and some found that gun control does not reduce crime rates (Moorhouse and Wanner, 2006; Duggan, 2001).

Baack and Kwon (2005) found that comprehensive gun control legislation lowers the number of gun-related deaths between one to six deaths per 100,000 inhabitants of each state. The authors used a multivariate linear regression to investigate the impact of a set of determinants such as socioeconomic factors, law enforcement, and a holistic gun control measure, on the rate of firearm deaths in each state. The authors explained that the different levels of gun control legislations used in different studies caused the disparity in findings of past literature. They accounted for this variation through the use of a holistic measure made up of a composite of legislations that not only relate to gun control, but other socioeconomic issues as well. The authors argued that this measure more effectively addresses the main research question because a multifaceted and complicated issue such as gun control is more holistic and thus demands a holistic approach. The main limitation of this measure is the inability to distinguish whether the decrease in crime rates is a result of gun control legislations or other socioeconomic factors that were included in the composite of legislations.

Kwon et al. (1997) evaluated the effectiveness of gun control laws by dividing states into two groups: states with restrictions, and states with no restrictions. The authors were the first to use a multivariate statistical linear regression model which takes into account socioeconomic factors as well as gun control laws. The authors examined the relationship between the number of gun related deaths per 100,000 population in a state and gun control in 1990. They found that gun control has a “very mild effect” on gun violence. They explain the “mild” impact, rather than

the expected strong relationship between gun control and gun violence, by the differences in state laws. Due to the stronger relationship between gun violence and socioeconomic factors such as unemployment, the authors concluded that resources may be more effectively used if not geared towards restrictions on gun control. There are two main limitations for this literature; firstly, states vary significantly in the degree of restrictions imposed on gun regulation and so a more elaborate grouping system may have better accounted for state differences. Secondly, as with any state-level study, it is difficult to separate the impact of state laws on gun violence due to movement of individuals and thus the movement of guns across state boarders. To control for this limitation the authors conducted a municipality-level analysis and found the same result.

Moorhouse and Wanner (2006) used state-level data and the Open Society Institute gun control index to estimate the impact of gun control on crime rates. The authors used 10 categories of crime rates in 1999 and 2001, and controlled for a vector of demographic, economic and low enforcement control variables in different linear cross-sectional regressions. They found no support for the contention that gun control reduces crime rates. Furthermore, the authors provided empirical support that it is the high crime rate and higher proportion of Democrats in state legislature that leads to the adoption of gun regulations and not the effectiveness of existing laws. The authors argued that the ineffectiveness of gun control is because unlike law abiding citizens are expected to conform to gun control regulations, criminals regularly violate the law and thus obtain would firearms illegally. The limitations of this paper as with any state-level research paper is the inability to control for the movement of firearms between state borders and therefore the inability to measure the true impact of stricter gun control on crime rates. To control for this disparity the authors looked into the impact of neighboring states; however, this does not absorb the full impact of this limitation as individuals can move to further states.

Duggan (2001) found that gun ownership rates are strongly linked to homicide rates. The researcher used the sale of gun magazines as a proxy for gun ownership. The author considered the impact of gun ownership on homicide rates from 1980-1998. He concluded that higher gun ownership leads to higher homicide rates. Furthermore, the author used this proxy to measure the impact of the right-to-carry laws on gun ownership. Using county-level and state-level data, he found that there is no impact of stricter gun control laws on gun ownership. Furthermore, the author found no relationship between the levels of violent crime and right-to-carry laws. Duggan's (2001) paper contributed to the existing literature as it asserted the positive relationship between gun ownership and crime rates, but inefficient gun control laws. Secondly, although the use of gun magazine sales is a close and unique proxy, the use of it also raises limitations regarding the author's findings since sales can either over or underestimate gun ownership rates.

This section of the literature review shows that there are mixed conclusions regarding the effectiveness of gun control. Although there is an abundance of literature aiming to answer this question, slight changes in the data used, variables considered, or time frame used leads to a wide range of conclusions. While there is a wealth of social literature surrounding the gun control debate and its relationship to gun violence, there is limited literature aiming to study the topic through an economic lens. The economic literature which is of importance to this study aims to economically value gun control. As with any repugnant good economists have used a sophisticated array of non-market valuation techniques.

2.2 Methods of Valuation

Existing literature classified methods of economic valuation into two main categories: ex-ante approaches, and ex-post approaches (Cook and Ludwig, 2001). Ex-ante approaches measure

the economic impact of an event prior to its occurrence. In valuing gun control, ex-ante approaches capture the risk of victimization. For example, an ex-ante approach would measure how much people are willing to pay for a crime-reduction program aiming to decrease gun violence thus reducing the future risk of victimization. We will review the following ex-ante approach: Contingent Valuation (CV). Ex-post methods measure the economic impact incurred due to the occurrence of a gun violence incident. For example, an ex-post method captures the change in housing prices due to a mass shooting. However, ex-post methods can also be used prior to an event to estimate the economic impact given previously incurred impact. We will review the following ex-post approaches: Statistical Value of a Life (VSL), Cost-of-Illness (COI), Hedonic Property Value (HPV), and Tax Ownership (TO).

Ex-post approaches are more widely used as it is easier to measure the impact of an event after it has occurred. For example, the HPV method can provide a tangible measure of the decrease in home value due to gun violence. However, although the decrease in home value is a substantial economic impact, it does not capture other costs incurred such as the fear of further victimization. While ex-ante approaches are more challenging; they are more relevant to the decision problem that policymakers face as they approximate risk before the occurrence of an economically adverse event.

All the methods reviewed for this study can be considered methods of Monetary Valuation (MV) also referred to as economic valuation. MV is defined as the method of assigning a monetary value to non-market goods (Engelen and Neuteleers, 2014). There is an extensive amount of literature which criticizes the use of MV. O'Neill (1997) criticized MV for its inability to capture the full value of a good because it does not absorb moral or evaluative standpoints. The author said that the absence of ethicality in the monetary value of goods deems it as inappropriate. Similarly, to O'Neill (1997), the main criticism that Engelen and Neuteleers

(2014) proposed is that MV leads to a reduction in the value placed as the monetization of certain goods does not capture the full extent to which people value goods. Furthermore, prior research insinuated that MV reduces the intrinsic motivation behind pro-social activities (Pfeffer and DeVoe, 2009), and leads to self-interested behavior in experimental settings (Vohs, Mead, and Goode, 2006; Goff, Waring, and Noblet, 2016).

The main gap in existing literature is the measurement of people's responsiveness to the use of economic valuation metrics. Since the gun control debate is at the center of US politics, papers written on this topic have significant policy implications. By measuring people's responsiveness to the use of different methods of economic valuation, our paper will provide insight into the effectiveness of valuing gun control and the impact of economic valuation on support for gun control legislation. The next subsections present and critique existing literature which has measured the economic value of gun control.

2.2.1 Contingent Valuation

Carson (2012) highlighted that CV circumvents the absence of markets by presenting hypothetical markets in which consumers have the opportunity to buy and sell services which exist outside the scope of the market. The purpose of CV is to approximate willingness to pay (WTP) or willingness-to-accept (WTA) a good or service which exists outside the realm of market transactions. WTP and WTA are approximated through surveying individuals regarding the dollar value they place on a change in quantity, quality, or access to an un-priced good (Gregory, Lichtenstein, and Slo Vic, 1993). This method is most widely used in environmental economics to approximate the economic value of environmental resources. For example, it can be used to estimate the economic impact of occurrences such as oil spills (Fourcade, 2011). However, this method is used by governments as well as researchers. In 1982, the Department of

the Interior and Congress incorporated the use of CV when considering missions with natural resource depletion (Carson, 2012).

The main limitation of CV is that it is inaccurate as it relies on human response rather than actions (Fourcade, 2011). However, as an ex-ante approach it is one of few methods which capture f social costs that other non-survey-based methods are unable to capture. For example, when asking individuals how much they are WTP to reduce the frequency of oil spills, not only is the direct economic cost evaluated (for example the cost of cleaning an oil spill), but the marginal social costs as well (for example the social cost such as the feeling of guilt).

Cook and Ludwig (2001) conducted the first estimation of the economic impact of the reduction of gun violence through CV. The authors found that individuals are willing-to-pay $21.8 billion to reduce gun injuries in 2001 dollars. The authors used the number of gun related injuries in 2001 to find that overall willingness to pay equated to $1.06 million per injury. The authors first gathered information regarding the respondents' attitudes towards government policies, and gun regulations. Then respondents were asked if they would support annual taxes for a program that would make it more difficult for criminals and delinquents to obtain guns, estimating a 30 percent decrease in gun injuries. [2] The authors then adjusted the estimated $21.8 billion to external impacts on individual responses such as household size and household income. The authors found that as income and size increase the WTP increases, and thus using a maximum-likelihood estimate found the total WTP is equal to $ 24.5 billion or $1.2 million per injury in 2001 dollars. This translated into a $240 increase in taxes for the average household, which the authors argued is not implausible due to the high fear of violent crimes in the US. The authors stated that these results are consistent with estimates calculated using the Statistical Value of a Life.

[2] The amount of annual tax was randomly assigned to participants, the amounts were $50, $100, or $150.

WTP captured four main factors; the reduction in risk of being shot, the reduction of risk that members of the household are shot, value of the reduction of risk of others outside the household being shot, and lastly reduction in the population risk of gunshot injury. WTP captures these risks by surveying individuals about different hypothetical situations with the different risk levels (i.e. some questions were geared toward reduction of risk of different members of the households while other questions only asked about personal risk of being shot). Although the WTP approach captured a wide range of economic factors that ex-post approaches cannot, there are shortcomings to the survey-based method. Firstly, generally respondents tend to overstate the baseline risk of gunshot injury, and thus would have overestimated their WTP for the reduction of risk. Secondly, this method faces the problem of revealed versus stated preferences, as individuals might have overstated WTP without revealed payments in annual taxes to mitigate this limitation. Thirdly, there is a tendency for survey respondents to present themselves favorably to interviewers thus participants would have overstated their WTP. Lastly, it is possible that survey respondents did not take questions seriously.

2.2.2 Hedonic Property Value

Charles (2018) used a Hedonic Property Value (HPV) method to measure the correlation between housing prices and public-school shootings. The hedonic framework is a commonly used tool to quantify the value of non-market goods through the estimation of willingness to pay for goods and amenities. The HPV method used differences in home value to estimate the economic impact of mass shootings. The author based his study on the established finding that school quality strongly influences home value. The use of mass shootings is a good metric to measure the impact of gun violence as mass shootings are thought of as random acts of violence which are unrelated to other common crimes, this mitigated any concerns regarding endogeneity

effects. Charles (2018) used a difference-in-differences method to measure the difference in pre-sale and post-sale home property values following five main shootings.

The author found that after controlling for confounding variables such as number of bedrooms, distance to highway, lot size, square feet, and distance to mass shooting site, homes surrounding the Sandy Hook Elementary School, where a mass shooting took place, were sold for 6.9 percent less than homes in the surrounding areas. This translates into an average loss of home value of $26,000, or an implied aggregate of $12 million in capital losses. The author found similar results of an estimated 6 percent loss in home value and an aggregate capital loss of $6 million following the mass shooting which took place in Muskegon Heights High School. As for the Sparks High School, the author found a loss of 5.3 percent in home value and an aggregate capital loss of $7.3 million.

The main limitation of the study design is the limited sample size of five public school shootings. There are also limitations regarding the generalizability of this method; since this method was based upon the impact of school quality on housing value, it is difficult to generalize this design onto other mass shootings which did not take place in schools, as well as other gun violence incidents.

However, the use of home value as an approximation to the economic impact of gun control is instrumental for our study. A home is the largest investment that a person makes, and thus their largest capital asset. Therefore, it is reasonable to believe that in our study when participants were shown information regarding the loss in home value due to gun violence, survey respondents would have found this information compelling.

2.2.3 Statistical Value of a Life (VSL)

The Statistical Value of a Life (or Value of a Statistical Life VSL) is the most widely used method aiming to economically measure the impact of gun violence. Past literature used

estimates of VSL multiplied by the number of gun-related deaths, to calculate the impact of gun violence (Schneider, 2018; Cook and Ludwig, 2001; Cook and Ludwig, 2006). While this method most directly captures the impact of gun violence, i.e. the impact due to incurred deaths, there is disparity in VSL. The most common empirical methods of calculating VSL are the present value earnings with wage potentials, and wage-risk tradeoffs.

Mishan (1971) used the change in compensation due to changes in occupational risks as the estimate of a life. Thaler and Rosen (1976) used the society's willingness to pay to save a life. Similarly, to Mishan's (1971) risk approach, Thaler and Rosen (1976) used wage-risk differentials data to measure how much people are compensated for occupational risk. The authors found that people are willing to pay at least $8.80 per year (in 1967 dollars) to reduce risk of death by 20 percent. Viscusi (1993) reviewed several methods of estimating VSL including estimation using wage-risk tradeoffs, the implicit value of injury by using wage-injury risk tradeoffs, and contingent valuation. Viscusi (1993) estimated the value of a life between $3.7 and $8.6 million. Levitt and Venktash (2000) calculated the wage premium paid to gang members in selling drugs and found the value of a life between $8,000-$127,000, with an average of $55,000.

The main limitation of using wage potential is the assumption that wages at the time of death remain stagnant in the future, which is an unrealistic assumption given that usually wages tend to increase over time. The main limitations of using wage-risk differentials are the inability to compare identical jobs with different fatality risks, endogeneity of risk, and the assumption that agents are making informed decisions when accepting different compensation levels (Ashenfelter, 2006). Since our study is aiming to measure how people's views, attitudes, and behaviors change when exposed to economic valuation information, it is important to note the

ethical problems associated with placing a monetary value on a life as highlighted in literature (such as Ashenfelter (2006) who described the value of a statistical life as distasteful).

Past literature regarding the economic impact of gun control used VSL to calculate the economic impact of gun violence. Cook and Ludwig (2001) through the use of CV found that VSL is around $5.6 million. Cook and Ludwig (2006), in their paper estimating the marginal social cost of handgun ownership, used the conservative VSL of $1 million/life to estimate the appropriate license fee for handguns per household.

For the purposes of this study, we included Table 1 to show the economic impact of gun violence using VSL. Economic impact was calculated using the average number of deaths per year, and 3 measures of VS. In accordance with past literature, the 3 measures used are: conservative estimate of $1 million/life, lower bound of $3 million/life, and upper bound of $8 million/life. The average number of annual deaths due to gun violence is 38,000 deaths/year (Center for Disease Control and Prevention, 2018).

Table 1. Value of a Statistical Life

Value of Statistical Life	Economic Impact (2018 dollars)
$1 million/ life	$38 billion
$3 million/ life	$114 billion
$8 million/ life	$304 billion

2.2.4 Cost-of-Illness (COI)

While the Value of a Statistical Life captures the economic impact incurred due to the number of fatalities caused by gun violence, it fails to capture the cost incurred due to non-fatal injuries. Schneider (2018) used the COI approach to approximate the economic impact of gun-shot wounds. The COI is calculated using unit medical productivity costs and lost productivity costs, to find lifetime costs of injuries (Corso et. al, 2006). Corso et al (2006) calculated the lifetime costs to equal $406 billion across 50 million Americans in 2000, or approximately $8,120/injury.

The limitation of this method is in the calculation of lost productivity. Lost productivity is calculated using wage potentials. As mentioned in the previous section, the use of wage potentials leads to inaccuracies. Furthermore, while the COI approximates the economic impact of non-fatal injuries, similarly to the VSL method, there are other economic impacts to gun violence which are not absorbed such as the decreased sense of protection resulting from gun violence.

Methods such as VSL and COI can be considered monetary proxies for the impact of gun violence due to fatalities and injuries, but these methods do not capture all economic impacts. Since this study measured people's response to economic valuation, it is not necessary to provide the most holistic economic approach.

Total economic impact due to gun related injuries is calculated as the product of average injuries annually and COI. Given that the average number of non-fatal injuries from gun violence is 85,000 injuries annually (Center for Disease Control and Prevention, 2018). Then the total economic impact from COI is $690 million per year. A summary of the measures of economic impact in 2018 dollars is shown in Table 2.

Table 2. Methods of Economic Valuation

Method of Valuation	Measure of Economic Impact (in 2018 dollars)	
Contingent Valuation	$34.74 billion	
Statistical Value of a Life	$1 million/ life	$38 billion
	$3 million/ life	$114 billion
	$8 million/ life	$304 billion
Hedonic Property Value	6 percent decrease in house value	
Cost-of-Illness	$690 million	

2.3 Economic Theory and Past Literature View of Economic Valuation

O'Neill (1997) discussed the gap between the practice of environmental policy makers when making decisions, and the ideal practice offered by economists. He stated that economic theory appeals to Monetary Valuation (MV) when making decisions while managers do not.

Proponents of MV view it as a tool to assist in the allocation of scarce resources to maximize society's well-being. This is due to the view of MV as a common measure through which trade-offs can occur leading to the optimal allocation of resources and maximum well-being.

Well-being is defined as the satisfaction of preferences where the strength of a preference can be measured through willingness to pay for satisfaction (O'Neill,1997). Although O'Neill was not in support of the use of MV, he recognized that in order to maximize well-being, one must have an informed preference, and the economic valuation of goods serves as a piece of information which will ultimately lead to higher well-being. In conclusion, the author recognized monetary valuation as an important step in the decision-making process undertaken by policy makers, but it is merely a step that does not capture all that is necessary.

Engelen and Neuteleers (2014) used economic theory to explain how people respond to the use of MV. The authors used two main economic effects to analyze the impact of MV on people's attitudes: the price effect and crowding-out. The price effect states that increased price increases supply. Therefore, through providing a monetary value to goods, the "price" increases and so supply of that good will also increase. Crowding-out has the opposite effect in that a monetary value acts as an extrinsic motivator which can decrease intrinsic motivation, which is referred to as motivation crowding theory. Take the example of an individual who is in support of a good which helps the environment because they are intrinsically motivated i.e., they care about the environment. When providing the individual with a monetary value for this good the two effects will influence their behavior. If they are in support of the good, the monetization of it will introduce an external motivator which will support the existing internal motivation. This is called the "crowd-in" effect. However, if the monetization is perceived as "controlling" then the new extrinsic motivator will "crowd-out" the existing internal motivator. This is problematic for policy makers as individuals will now expect a monetary compensation for supporting the

environment (similarly to the study conducted by Falk and Szech (2013) where participants were more likely to trade a mouse's life for money when it was through a market setting). Past literature found that receiving monetary compensation reduces satisfaction from acting altruistically (Foster, 1997; Grove-White, 1997; Pearce, 1996). On the other hand, the price effect predicts that the monetization of the good will increase supply. Therefore, it is difficult to accurately predict how MV can change or enhance certain attitudes and there has been little empirical work to answer this pressing question. Engelen and Neuteleers (2014) stated that the relative strength of the price effect and crowding-out effect depends on specific conditions. This highlights the main limitation of the price effect and crowding-out effect in trying to explain behavioral changes; inability to generally predict how valuation information can change behavior.

Engelen and Neuteleers (2014) developed four hypotheses which can be tested empirically, one of which directly contributed to the purpose of our study. Engelen and Neuteleers (2014) hypothesize that MV has framing and crowding effects on those exposed to it. They then suggest indirectly subjecting participants to MV by presenting them with the results of a MV study. The authors propose that individuals are asked to rank, in order of importance, economic and non-economic reasons to support or inhibit a good. They hypothesized that the groups who are subjected to MV will attach less importance to non-economic reasons. The authors suggested that the higher rank of economic reasons is due to the "economic" frame that the monetization of a good leads to, which is referred to as the "framing effect". However, this paper fails to recognize alternative explanations to the higher ranking of economic reasons; people can be extrinsically motivated and thus the introduction of economic reasons may lead to increased motivation and thus the desired activity of pro-environment behavior.

Goff et al. (2017) provided an alternative economic explanation to that proposed by Engelen and Neuteleers (2014). Goff et al. (2017) used priming effect to explain the way people respond to exposure to the economic valuation of environmental goods. The authors hypothesized that economic valuation may act as a monetary prime and priming adversely impacts pro-environmental behaviors.

Furthermore, Goff et al. (2017) used an experimental framework in which participants were randomly assigned to a treatment group or a control group. The control group recieved a qualitative description of natural resources in the US. The treatment group received similar text in addition to the monetary values associated with these resources. Participants were then given the option to donate to a nationally-recognized conservation organization. Participants were asked how much they would be willing to be taxed per year to protect natural resources. The authors found that participants in the treatment group donated less, with slight variations by gender identity, to the natural resource organizations relative to the control group, with no increased willingness to pay in taxes. The authors explained this result by self-interest activation caused by priming and framing effects from economic valuation information. The main limitation of this study is the inability to conclusively determine which effect adversely impacted donations; i.e. was the monetization of natural resources raising ethical distaste and thus lower donations or is the priming effect leading people to regard others less significantly. This paper contributed to our study by establishing an experimental framework on which to base our study. As derived from Goff et al. (2017), the empirical framework of our study is an experimental design. The data was collected through the use of a survey which was constructed based on the survey design of Goff et al. (2017). The control group received a qualitative description of the impact of gun violence, and the treatment group received a similar narrative in addition to economic valuation information regarding the impact of gun violence.

For our paper we used the crowding-out effect suggested by Engelen and Neuteleers (2014) and the findings of Goff et al. (2017) to hypothesize that that those who are intrinsically motivated to support gun control will either be unaffected by the treatment or will decrease support, while those who typically do not support gun control will increase their support.

Our paper contributes to the existing work of economists MV by pioneering literature which empirically measures the influence of MV on people's attitudes and views. Our paper contributes to a limited pool of literature regarding the economic valuation of gun control. It is also the first literature aiming to measure the impact of economic valuation information on views, attitudes, and behaviors toward gun control.

3 Methods

3.1 Overview

The data for this study was obtained through the use of an online survey completed by US residents recruited through the use of Amazon Mechanical Turk (MTurk). The survey was conducted in March 2019 and approved by the Institutional Review Board (IRB) at Skidmore College.

3.2 Participant Recruitment and the Mechanics of MTurk

Participants in this study were recruited through the use of MTurk. In order to become a worker or a requester (entity requesting work completed) on MTurk, one merely needs a mailing address, a valid email address and an Amazon Payment Account. Workers can scroll through a list of jobs, referred to as Human Intelligence Tasks (HITs). They can then voluntarily undertake tasks and receive compensation for each completed task. Payment to participants is facilitated by MTurk, transferring funds from the requester's account to the worker's account.

In order to have qualified for the current study participants were required to be US citizens of at least 18 years of age. Participants were offered a compensation of $1, with an additional $0.50 bonus for successful completion of this study. The survey was estimated to take no more than 5 minutes to complete, thus offering participants an hourly wage comparable to average compensation offered on MTurk of $6-$10 an hour.

A common problem that arises with the use of surveys as HITs is the phenomenon of "spammers": individuals who scroll through surveys without reading instructions in order to complete as many tasks as possible. To account for this problem we employ quality control measures throughout the survey as discussed below.

3.3 Advantages and Disadvantages of the use of MTurk

The heightened use of MTurk in experimental settings inspired a surge of literature on the advantages and disadvantages of MTurk with no general consensus from researchers on the quality of data produced. Some researchers argued that MTurk is a source of inexpensive and high-quality data that is at least as reliable as traditional sources (Buhrmester, Kwang, and Gosling, 2011; Paolacci, Chandler, Ipeirotis, 2010, Johnson and Ryan, 2018). Others argued that the nature of MTurk leads to falsification (i.e. participants misrepresenting themselves) and results in skewed data (Wessling, Huber, Netzer, 2017).

Mason and Suri (2011) conducted demographic analysis using a sample of around 3,000 workers. They found that 55 percent of workers reported as female, 45 percent reported as male, and, with a median age of 30 years old and median income of $30,000 per year. Most participants were from the US or India, due to the payment structure of MTurk, however there were participants from over 50 countries and all 50 US states. (Buhrmester et. al, 2011) This

demonstrates one of the biggest advantages to the use of MTurk; the potential for subject pool diversity.

Other key advantages that MTurk offers over traditional sources are: low-cost, practical and quick access to subject pools. Since HITs can be completed from anywhere in the world, this leads to a widely diverse subject pool. Buhrmester et al. (2011) concisely highlighted the most frequently cited advantages that MTurk offers relative to traditional sources: the collection of data inexpensively and rapidly. These advantages were recited by Chandler et al. (2010), in their review of the use of MTurk relative to other data sources. The authors emphasized that MTurk is an inexpensive, accessible, and diverse alternative to traditional subject pools. This makes MTurk a viable alternative to traditional experimental procedure.

However, many doubts still exist regarding the quality of data that MTurk produces. Huber et. al (2017) found that a large proportion of respondents in paid MTurk studies claim a false identity, or activity in order to qualify for a study. The authors claimed that the financial incentives behind most studies entices participants to misrepresent themselves. This claim was disputed by Buhrmester et. al (2011). They conducted an experimental test using different compensation levels on MTurk and found even at low compensation rates, payment levels do not appear to affect data quality. To combat doubts surrounding data quality, we embedded quality control measures in our survey to identify "spammers" and decrease quality bias.

3.4 Experimental Procedure

The survey was posted on MTurk in March 2019. Workers on MTurk were able to view a brief descriptive message detailing the approximate length of the task, the compensation, and the nature of the survey. Workers who accepted the task were redirected to a survey link hosted by Qualtrics. Upon opening the link participants were instructed to read an Informed Consent form

and given the opportunity to exit the study. There were a total of 810 participants in our study who provided informed consent and successfully completed the survey.

Qualtrics' randomization capabilities were used to randomly assign participants to either the control or treatment condition. The survey began with a descriptive narrative regarding gun violence in the US. The narrative provided information regarding the magnitude of gun violence, the number of gun-related deaths and injuries, and other impacts on American society. However, what distinguished the control group from the treatment group, i.e. the imposed treatment, is the presence of economic valuation information in the treatment group narrative. An excerpt of the two narratives highlighting the imposed treatment is shown in Table 3. Effort was made to keep both narratives as similar as possible to ensure accuracy in determining the treatment effect.

Table 3. Gun Violence description excerpts by experimental condition

Experimental Condition	Gun Violence description excerpt
Control Group	Gun violence, defined as gun-related crimes including homicides, mass shootings, suicides, armed robberies, etc., is a leading cause of premature death in the United States in the United States, gun violence leads to an average 85,000 injuries and 38,000 deaths per year.
Treatment Group	Gun violence, defined as gun-related crimes including homicides, mass shootings, suicides, armed robberies, etc., is a leading cause of premature death in the United States. In the United States, gun violence leads to an average 85,000 injuries and 38,000 deaths per year. The estimated economic impact of gun-related deaths is $30.4 billion per year and the economic impact of non-fatal injuries has been estimated at $690 million per year.

Refer to Appendix A for the full version of the control and treatment group narratives.

Upon successful completion of the reading portion, participants were shown the following:

> *Before you move on to the survey portion of the study, we are allowing you the chance to **donate your $0.50 work bonus** to a nationally recognized gun control advocacy organization. Making a donation is voluntary. Choosing not to donate will not affect your participation in any way.*

The nationally recognized gun control advocacy organizations were the Brady Campaign, the Coalition to Stop Gun Violence, and Everytown for Gun Safety. Organizations were randomized such that each participant had the opportunity to donate to one of the three organizations. Each participant was given a brief description of the goal of the organization before deciding if they wanted to donate, as shown in Table 4. This question measured the impact of economic valuation information on revealed preferences to support gun control advocacy organizations.

Next, participants were asked if they would be willing to support a policy that would increase taxes in order to decrease gun violence. The wording of the question is shown in Table 4. This question aimed to derive the impact of economic valuation information on stated preferences to support gun control advocacy. The text of this question is extracted from Cook and Ludwig (2001) in which the researchers use similar wording to approximate willingness to pay to reduce gun violence.

Table 4. Primary Outcomes Questions

Donation to Gun Control Advocacy Groups	Question
Brady Campaign	The Brady Campaign aims to decrease gun violence by increasing the rigor of background checks in the process of acquiring a gun. Would you like to donate your $0.50 bonus to the Brady Campaign?
Coalition to Stop Gun Violence (CSGV)	The Coalition to Stop Gun Violence focuses on gun violence crimes that are more frequent such as homicides and suicides, as opposed to mass shootings. Would you like to donate your $0.50 bonus to the CSGV?
Everytown for Gun Safety	Everytown for Gun Safety focuses on rigorous background checks including stricter rules for individuals with a history of domestic violence to acquire firearms. Would you like to donate your $0.50 bonus to Everytown for Gun Safety?
Outcome- Taxes	Question
Taxes	Would you support a policy that would increase your taxes by $50/year to fund a program aiming to make it more difficult for criminals and delinquents to acquire guns if this program was expected to reduce gun-related violence by 30 percent?

Lastly, participants were asked attitudinal questions measuring support for gun control and gun control policies as shown in Table 5, followed by demographic questions. The text of the attitudinal questions was derived from a survey conducted by the Pew Research Center.[3] Upon completion of the study participants were given a unique 9-digit code which is entered on MTurk to receive compensation.

3.5 Manipulation Check

To determine whether the treatment was noticed by our participants, we use a manipulation check. The manipulation check is a question asking participants to report agreement with the following statement:

There is no way to place a dollar value on the impact of gun violence in our society

If the sample is balanced in demographic characteristics across the control and treatment groups, then it is reasonable to assume that any statically significant differences in mean response between the treatment and control group were due to the presence of the economic valuation information. Therefore, we used this question as a determinant of the validity of the method used to deliver the treatment.

3.6 Quality Control Measures

There were three main quality control measures used in this survey. If participants failed two of the three quality control measures, then they were removed from the sample during secondary analysis. We found that 51 participants failed two of the three quality control measures. In order to determine "failure" of the quality control measure, we used histograms of

3 Key takeaways on Americans' views of guns and gun ownership (2017) https://www.pewresearch.org/fact-tank/2017/06/22/key-takeaways-on-americans-views-of-guns-and-gun-ownership/

the outcomes of the quality control measures and determined thresholds. The first quality control measure was a page timer to track the number of seconds a participant spent reading the narrative. This measure was put in place in order to monitor participants' attention to the narrative. Participants who spent less than 20 seconds reading the page failed the first quality control measure.

The second quality control measure was a comprehension question following the narrative. Comprehension questions were tailored to the treatment condition and thus the given information (i.e. the treatment group was asked a question about the economic impact of gun violence and the control group was asked a qualitative question). Not only did this quality control measure check for understanding of the narrative, it also reaffirmed the treatment for participants in the treatment group by reintroducing economic valuation information in the prompt of the question following the narrative. Participants were not able to proceed with the survey until they correctly answered the comprehension question. Using a histogram, we determined that the majority of participants successfully completed the comprehension question in under 4 clicks. Therefore, participants who incorrectly responded more than 4 times failed the second quality control measure.

The third quality control measure was the use of a "check" question. Participants were informed that the purpose of this question was to monitor attentiveness to question prompts and instructed to choose an answer. Participants who answered this question incorrectly failed the third quality control measure.

The use of quality control measures served the purpose of limiting data quality bias. This enabled us to accurately derive conclusions from reliable data. Furthermore, as highlighted previously there is doubt surrounding the quality of data produced from MTurk, so the use of quality controls addressed problems such as "spammers" which are the basis of those doubts.

3.7 Primary Outcome Variables

There are two primary outcome variables ($donated_i$), and ($taxes_i$). The variable ($donated_i$) is a binary variable varying at the individual level. This variable has a value of 1 if the individual donated to a gun control advocacy group, and 0 if they did not. The variable ($taxes_i$) is a binary variable varying at the individual level for which a value of 1 means the individual indicated that they are willing to be taxed for a stricter gun control policy.

Table 5. Primary Outcomes Questions

Questions
Report your agreement to the following statements…
1. Gun Control is a topic that is that is important to me.
2. The government needs to do more to reduce gun violence.
3. There is no way to place a dollar value on the impact of gun violence in our society.
Report your support to the following gun control polices…
1. Preventing the mentally ill from purchasing guns.
2. Banning gun purchases by people on no-fly or watch lists.
3. Banning "assault-style" weapons.
4. Increasing restrictions on the locations in which concealed carry is allowed.
5. Prohibiting teachers and officials from carrying guns in K-12 schools.
6. Requiring a permit for all concealed carry.

3.8 Control Variables

The control variables in our model are gender, age, college education, attitudes regarding gun control and gun control policies, political affiliation, religious affiliation, previous donation behavior, order of outcome variable questions, and past encounters with gun violence. These variables were used to control for the impact of different demographic characteristics on the outcome variables. However, the relationship between demographic characteristics and propensity to donate is an interesting area of further research. For example, the relationship between religious affiliation and donation is an interesting research question which can be explored in further literature.

3.9 Empirical Framework

3.9.1 Average Treatment Effect

Our primary model of analysis was a probabilistic regression model (probit). Since the primary outcome variables, or the dependent variables, are binary variables, the use of a probabilistic regression model allowed us to measure the impact of exposure to economic valuation information on the likelihood of donation or taxation. The primary independent variable, $treatment_i$ is a binary variable which has a value of 1 if the pariticpant received the treatment and 0 if the participant did not. This model is shown in Equation 1 and Equation 2. The secondary model is with the inclusion of a vector of control variables $\chi(control)_i$ as shown in Equation 3 and Equation 4. The control variables are listed in Section 3.8.

$$\Pr\left(donated_i = 1\right) = \phi\left(\beta_0 + \beta_1 * treatment_i\right) \quad (1)$$

$$\Pr(taxes_i = 1) = \phi\left(\beta_0 + \beta_1 * treatment_i\right) \quad (2)$$

$$\Pr\left(donated_i = 1\right) = \phi\left(\beta_0 + \beta_1 * treatment_i + \beta_2 * \chi(control_i)\right) \quad (3)$$

$$\Pr\left(taxes_i = 1\right) = \phi\left(\beta_0 + \beta_1 * treatment_i + \beta_2 * \chi(control_i)\right) \quad (4)$$

3.9.2 Heterogeneity Analysis

We conducted a heterogeneity analysis to determine how different subgroups in our sample responded to the treatment. Due to results of past literature, we expected heterogeneity in the treatment effect across different subgroups of our sample (Goff et. al, 2017). We hypothesized that females, participants with a college education, and gun owners would respond differently to the treatment relative to the general sample.

i. Gender

Based on heterogeneity in donation behavior across genders found in Goff et. al (2017) we hypothesized that the treatment will impact females differently than other

genders. To capture these differences, we looked at the results of the probabilistic regression model for females in the treatment group and compared the result to females in the control group. We also considered other genders in the different treatment conditions.

ii. Education

We hypothesized that participants with higher levels of education (i.e. bachelor's degree and above) are more likely to understand valuation methods, thus valuation information. Therefore, we hypothesize heterogeneity in the treatment effect across participants with a bachelor's degree and beyond and participants with less than a bachelor's degree in the treatment group. Similarly, to gender, we use da probabilistic regression model to capture differences.

iii. Gun ownership

We hypothesized that gun owners, as individuals who typically do not support gun control polices, would increase their donations when subjected to the treatment. This is because we expected that economic valuation information will serve as an extrinsic motivator for gun owners. Those who typically do not support gun control do not have an intrinsic motivation to support gun control prior to the treatment, therefore the extrinsic motivator of monetary value will not crowd out any intrinsic motivation. Thus, the extrinsic motivator of the treatment will increase donation behavior. To capture these differences, we conducted a heterogeneity analysis across those who are gun owners in the treatment group vs the control group, and similarly to non-gun owners.

4 Data and Results

4.1 Sample Size

A power analysis was used to determine the required sample size. We used the propensity to donate from Goff et al. (2017) as the estimate of the proportion of participants in our sample who will choose to donate. To achieve a statistical power of 0.80, the typical lower bound for analysis, and assuming approximately 48 percent of participants would donate in the control and 38 percent would donate in the treatment, we determined a necessary sample size of 768 participants. We therefore recruited 800 participants to ensure an appropriate sample following quality control exclusions.

4.2 Participant Characteristics

4.2.1 Demographic Characteristics

Eight hundred and ten participants were recruited from across the US. The sample is 45.1 percent female, with an average age of 35 years (SD=10.49), as shown in Table 6. The majority of participants have at least a bachelor's degree (65.6 percent).

We found no statistically significant differences between the control group and treatment group in basic demographics including gender identification, college-education, gun ownership, political affiliation, race, employment and religious affiliation at alpha of 1 percent.[4] Summary statistics by treatment condition are shown in Table 7.

There are 405 participants in the control group. The control group is 44.1 percent female, with an average age of 35 (SD= 9.92). There are 404 participants in the treatment group. The treatment group is 46.3 percent female, with an average age of 36 (SD=11.01). Both the control group and the treatment group are majority white (72.83 percent).

[4] A balance check was conducted with the use of a logistic model. The dependent variable is the treatment variable, and the independent variables are basic demographic variable. At alpha of 1% we find no statically significant results, thus concluding a balanced sample across treatment conditions.

We used a probabilistic regression model in order to measure the impact of demographic characteristics and previous donation behavior on present propensity to donate and willingness to support a proposed tax policy. We found that participants with a bachelor's degree and beyond were 9.86 percent more likely to donate and 7 percent more likely to support a tax policy. Furthermore, we found that participants who identified as conservative were 18.2 percent more likely to donate than those who identified as progressive or moderate. Lastly, we found that participants who identified as authoritarian were 13.4 percent more likely to donate than those who identified as liberal or moderate.

Next, we found that past donation behavior impacts present propensity to donate. We found that participants who have previously donated to social causes were 15 percent more likely to donate, and those who have previously donated to gun control organizations were 41.5 percent more likely to donate. [5]

Table 6. Summary Statistics for Sample

Variables	(1) N	(2) mean	(3) SD	(4) min	(5) max
Outcome Variables					
donated	810	0.331	0.471	0	1
taxes	809	0.711	0.454	0	1
age	809	35.88	10.49	18	70
education	809	21.20	2.315	2	25
religion	790	0.478	0.500	0	1
female	809	0.451	0.498	0	1
college	810	0.656	0.475	0	1
support	808	7.248	2.344	0	10
employed	810	0.816	0.388	0	1

The sample consists of 810 participants. This table provides a summary of key characteristics of participants.

[5] For full results of the probabilistic regression model refer to Table B.1 in Appendix B

4.2.2 Overview of Participant Responses to Attitudinal Questions.

As shown in Table 8, 26.4 percent of the control group and 20.5 percent of the treatment group own guns. Furthermore, 37.8 percent and 39.9 percent identify as having a conservative political ideology in the control and treatment groups respectively. Overall participants reported agreement with the importance of gun control, the need for government intervention, and the inability to place a dollar value on the impact of gun control. Participants in both the treatment and the control group reported agreement with stricter gun control policies. We calculated the variable (support) as the average of responses to questions about support for gun control policy (questions 1-6 in Table 8). We found no statistically significant difference in average support for gun control policy across the treatment group and control group.

Table 7. Summary Statistics of Sample by Treatment Condition

	(1)	(2)	(3)	(4)
	Control Group		Treatment Group	
Variables	N	Mean	N	Mean
Outcome Variables				
donated	405	0.336	404	0.327
		(0.473)		(0.470)
taxes	405	0.677	404	0.745
		(0.468)		(0.436)
female	404	0.441	404	0.463
		(0.497)		(0.499)
college	405	0.669	404	0.641
		(0.471)		(0.480)
employed	405	0.825	404	0.809
		(0.381)		(0.393)
age	405	35.38	404	36.38
		(9.928)		(11.01)
religion	391	0.478	399	0.479
		(0.500)		(0.500)
support	404	7.132	404	7.363
		(2.406)		(1.162)
income	403	3.613	404	3.542
		(1.953)		(1.787)

The sample consists of 810 participants., evenly distributed across treatment conditions. This table provides a summary of key characteristics of participants in each treatment condition.

The Pew Research Center conducted a survey of the general US population regarding views and attitudes towards gun control. We found that the percentage of gun owners, reasons for owning a gun, and general agreement with stricter gun control policies were consistent with the findings from the Pew Research Center survey. Thus, we concluded that our sample is representative of the US general population for the purpose of our study.

We used a probabilistic regression model to measure the impact of attitudes towards gun control on propensity to donate and willingness to support the proposed tax policy. We found that for every one-point increase on a scale of 0-10 in agreement with the importance of gun control participants were 1.89 percent more likely to support a tax policy.

4.2.3 Overview of Donation and Taxation Behavior

As shown in Table 6, 33.5 percent of all participants donated to a gun control advocacy group. This result is similar to the donation proportion to a natural resource organization found in Goff et. al (2017). As shown in Table 7, 33.6 percent of the control group donated, and 32.7 percent of the treatment group. Furthermore, 67.7 percent of the control group and 74.5 percent of the treatment group supported the proposed tax policy.

To investigate the relationship between donation and taxation, we included taxes as a control variable in the probabilistic regression model with donation as the dependent variable and vice versa. The results of this model are shown in Table B.1 in Appendix B. We found that participants who donated were 18 percent more likely to support a tax policy. Furthermore, participants who supported the tax policy were 18.3 percent more likely to donate. Therefore, we concluded that the outcome variables are positively related. Lastly, we found that the order in which the outcome variable questions were presented to participants impacted willingness to support taxation. We found that when presented with the taxation question first, participants were more likely to support a tax policy with no impact on donation behavior.

4.3 Average Treatment Effect

4.3.1 Manipulation Check

In order to determine validity of the experimental design to deliver the treatment we used a two-sample t-test to test for differences in mean responses to the attitudinal questions. We found a statistically significant difference in mean response to our manipulation check question. We found that those in the treatment group reported lower agreement with the rejection of monetary valuation (M=6.75) than those in the control group (M= 7.091), (t=1.673, p=0.0473)

Since the treatment is exposure to economic valuation information then intuitively, we expected those who are exposed to the treatment to accept monetary valuation. This finding was strengthened with the balanced distribution of participants and the lack of universal differences in gun control policy support. Thus, we concluded that the difference in mean response was due to the treatment narrative.

Table 8: Summary Statistics by Treatment Condition: of Key Variables

	(1)	(2)	(3)	(4)
	Control Group		Treatment Group	
Variables	N	mean	N	mean
gunowner	405	0.264	404	0.205
		(0.441)		(0.405)
conservative	405	0.378	404	0.399
		(0.485)		(0.490)
authoritarian	405	0.299	404	0.265
		(0.458)		(0.442)
Attitudinal: Report your agreement with the following statements:				
1. Gun control is a topic that is important to me	405	7.244	404	7.092
		(2.292)		(2.472)
2. The government needs to do more to address gun violence	405	7.126	404	7.458
		(2.911)		(2.843)
3. There is no way to put a dollar value on the impact of gun violence	405	7.091	404	6.765
		(2.629)		(2.913)
Gun Control Policy: Report your support for the following gun control policies:				
1. Preventing the mentally ill from purchasing guns.	405	7.970	404	8.119
		(2.350)		(2.338)
2. Banning gun purchases by people on no-fly or watch lists.	404	7.636	404	8.089
		(2.613)		(2.439)
3. Banning assault-style weapons.	404	6.926	404	7.183
		(3.458)		(3.328)
4. Increasing restrictions on the locations in which concealed carry is allowed.	404	6.421	404	6.589
		(3.385)		(3.343)
5. Prohibiting teachers and officials from carrying guns in K-12 schools.	404	6.012	404	6.094
		(3.525)		(3.431)
6. Requiring a permit for all concealed carry.	404	7.824	404	8.106
		(2.795)		(2.758)
support	404	7.132	404	7.363
		(2.406)		(2.278)

This table provides a summary of the results to questions measuring variables which directly impact support for gun control. These variables include political ideology, gun ownership, and agreement with statements regarding gun control and stricter gun control policies.

4.3.2 Donation Treatment Effect

We began our analysis by examining average treatment effect on donation behavior through the use of tests of proportions. We found no statistically significant difference between

the proportion of participants who donated in the control group and the proportion of participants who donated in the treatment group, Z=0.274, p=0.7840 with no difference in donations across gun control advocacy organizations. These results are contradictory to the findings of Goff et. al (2017) who found a statistically significant difference in donation to a natural resource organization between the control and treatment group (a higher proportion of the control group donated). We then conducted a probabilistic regression model with and without the inclusion of control variables. As reported in Table 9, when accounting for control variables we found no statistically significant impact of the treatment on donation behavior.

Table 9: Donation and Taxation for Sample

Variables	donated		taxes	
	(1)	(2)	(3)	(4)
treatment	-0.00907	-0.000621	0.0685**	0.0700**
	(0.331)	(0.0388)	(0.0318)	(0.0356)
control	No	Yes	No	Yes

This table reports the results of the probabilistic regression model for donated and taxes with and without control variables. Refer to Table B.1 in Appendix B for full marginal effects.
Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

4.3.3 Taxation Treatment Effect

Using the same test of proportions, we found a statistically significant difference in the proportion of participants who support a policy that decreases gun violence but would increase taxes in the treatment group and the control group, Z=-2.15, p=0.0317. As shown in Table 7, a larger proportion of the treatment group (74 percent) said they would be willing to support a tax policy, than the proportion of participants in the control group (67 percent). These findings were confirmed by the use of a probabilistic regression model as shown in Table 9. We found that when accounting for control variables, participants in the treatment group were 7 percent more likely to support the proposed tax policy.

4.4 Conditional Treatment Effect

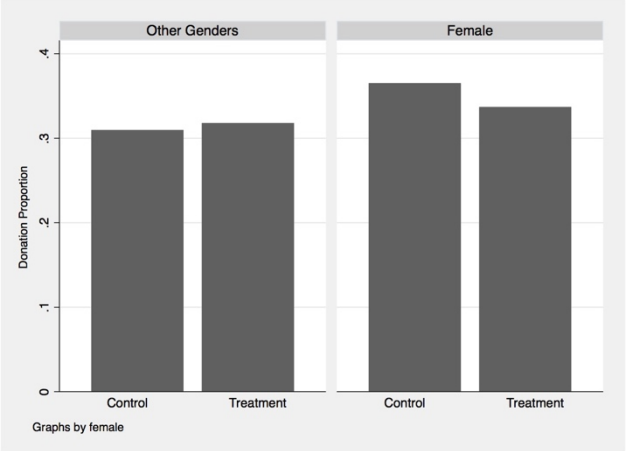
Due to findings from past literature we hypothesized heterogeneity in the impact of the treatment on different demographic subgroups. To analyze these differences, we conducted a heterogeneity analysis by splitting our sample into different demographic groups. We considered a sample of only females, a sample of only gun owners, and a sample of only college-educated participants. We then compared females in the treatment group to females in the control group and so on for the different demographic groups.

4.4.1 Heterogeneity Analysis: Gender

As shown in Panel A of Figure 2, there was a difference in the proportion of females willing to support the tax policy in the treatment group and the proportion of females in the control group. Therefore, using a sample of only females, we found that females who are a part of the treatment group were 13.3 percent more likely to support a tax policy than females in the control group with no treatment effect on other gender participants in the treatment group, as shown in Table 10. Thus, we concluded that the treatment increased females' willingness to support a tax policy unlike other genders.

Figure 2. Donation and Taxation by Treatment Condition for Females and Other Genders

Panel A: Donation



Panel B: Taxation

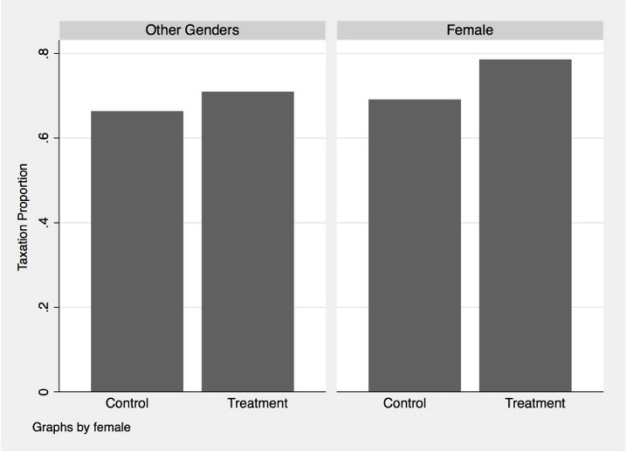


Table 10: Heterogeneity analysis: Donation and Taxation for Females and Other Genders

	Female				Other Genders			
Variables	donated		taxes		donated		taxes	
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
treatment	-0.0283	-0.00222	0.0951**	0.133**	0.00824	-0.0283	0.0460	0.0488
	(0.0500)	(0.0616)	(0.0458)	(0.0520)	(0.0441)	(0.0512)	(0.0440)	(0.0503)
Control	No	Yes	No	Yes	No	Yes	No	Yes
N	365	333	365	333	433	409	443	409

This table reports the results of the probabilistic regression model for a sample of only females, and a sample of other gender participants. Refer to Table B.2 in Appendix B.

Standard errors in parentheses

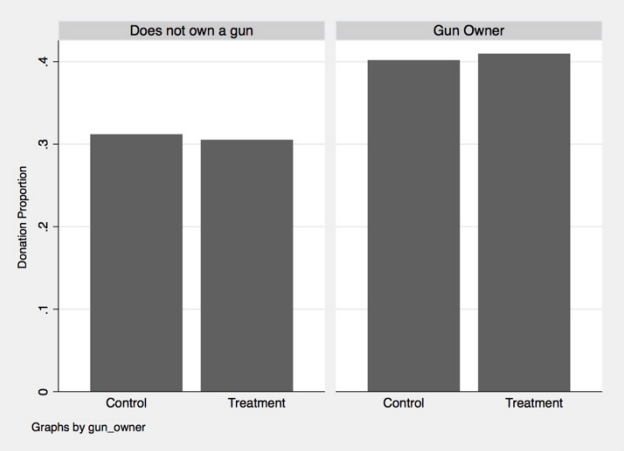
*** p<0.01, ** p<0.05, * p<0.1

4.4.2 Heterogeneity Analysis: Gun Ownership

As shown in Panel A of Figure 3, a larger proportion of gun owners donated than the proportion of non-gun owners with no differences between gun owners in the treatment and the control group. Furthermore, as shown in Panel B of Figure 3 a larger proportion of non-gun owners supported a tax policy than the proportion of gun owners. This result is further explored in Table 11 using a probabilistic regression model, we found that gun owners who were subjected to the treatment were 9.5 percent more likely to support a tax policy than gun owners in the control group with no statistically significant impact of the treatment on non-gun owners.

Figure 3. Donation and Taxation by Treatment Condition for Gun Owners and Non-Gun Owners

Panel A: Donation



Panel B: Taxation

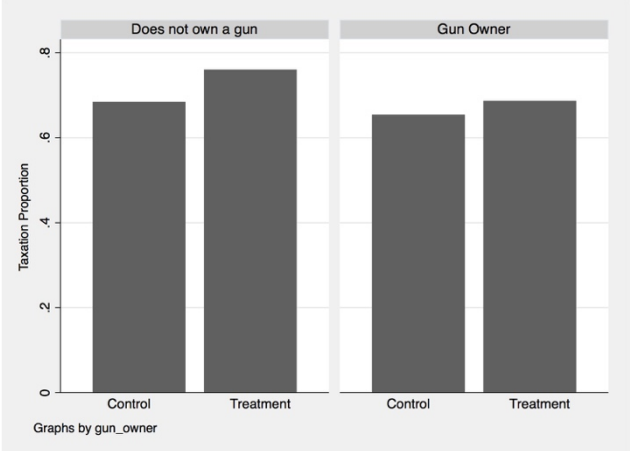


Table 11: Heterogeneity analysis: Donation and Taxation for Gun Owners and Non-Gun Owners

	Gun Owner				Non-Gun Owner			
Variables	donated		taxes		donated		taxes	
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
treatment	-0.0283	0.0129	0.0951**	0.0467	-0.0210	-0.0229	0.0583	0.0598
	(0.0500)	(0.0980)	(0.0458)	(0.0881)	(0.0424)	(0.0426)	(0.0397)	(0.0398)
Control	No	Yes	No	Yes	No	Yes	No	Yes
N	190	333	190	333	619	409	619	409

This table reports the results of the probabilistic regression model for a sample of only gun owners, and a sample of only participants who do not own a gun. Refer to Table B.3 in Appendix B.

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

4.4.3 Heterogeneity Analysis: College Education

As shown in Panel A of Figure 4, a larger proportion of participants with a bachelor's degree and beyond donated to a gun control organization with no difference in the proportion of donation between the treatment and the control group. Furthermore, as shown in Panel B, a larger proportion of participants with a bachelor's degree and beyond supported a tax policy than participants with less than a bachelor's degree. This result is shown in Table 12; we found that college-educated participants in the treatment group were 9.5 percent more likely to support a tax policy than college-educated participants in the control group. Furthermore, we found no statistically significant impact of the treatment on participants with less than a bachelor's degree.

Figure 4. Donation and Taxation by Treatment Condition for Participants with a Bachelor's Degree and beyond and Participants with less than a Bachelor's Degree

Panel A: Donation Panel B: Taxation

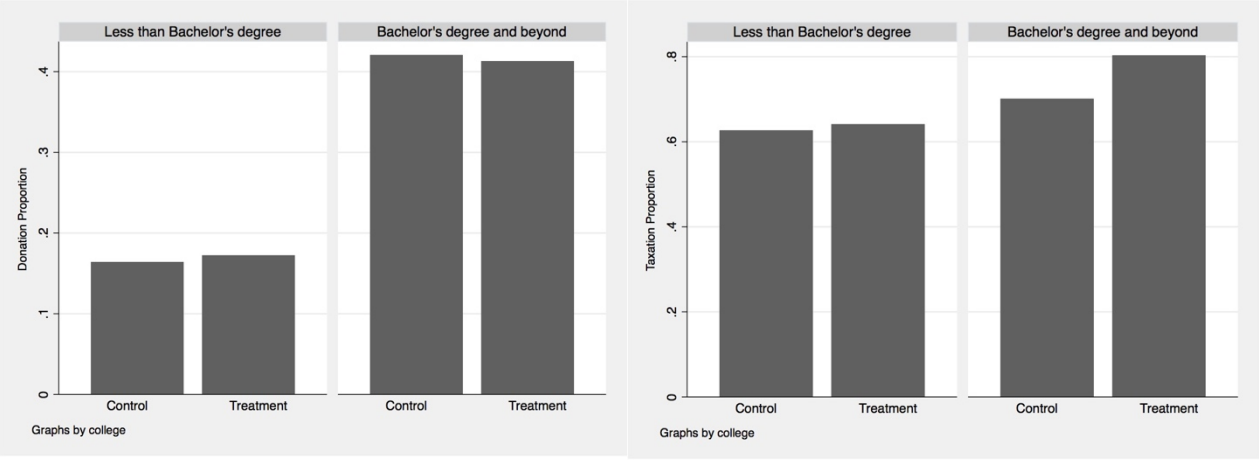


Table 12: Heterogeneity analysis: Donation and Taxation for Participants with a Bachelor's Degree and beyond and Participants with less than a Bachelor's Degree

	Bachelor's Degree and Beyond				Less than Bachelor's Degree			
Variables	donated		taxes		donated		taxes	
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
treatment	-0.00754	0.00931	0.102***	0.0954**	0.00823	0.0211	0.0145	-0.0150
	(0.0428)	(0.0556)	(0.0372)	(0.0408)	(0.0448)	(0.0358)	(0.0577)	(0.0693)
Control	No	Yes	No	Yes	No	Yes	No	Yes
N	190	333	190	333	619	409	619	409

This table reports the results of the probabilistic regression model for a sample of only participants with a bachelor's degree and beyond, and a sample of only participants who have less than a bachelor's degree . Refer to Table B.4 in Appendix B.

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

4.5 Interaction Terms

In order to further measure the impact of the treatment on different subgroups of our sample we conducted a probabilistic regression model with the use of interaction terms. The results of this model are reported in Table 13. We found that those who identified with a religious affiliation and received the treatment were 14.5 percent more likely to donate than those who did not receive the treatment. Furthermore, we generated three dummy variables to represent responses to attitudes towards gun control: (gov), (imp) and (dollar). The dummy variables have a value of 1 if the participant reported agreement with the statement above the median response. For example, the (gov) variable has a value of 1 if the participant reported agreement with the statement "the government needs to do more to address gun violence" higher than the median response for the sample. We found that those who identified with a religious affiliation and received the treatment were 14.5 percent more likely to donate than those who did not receive the treatment. Furthermore, we generated three dummy variables to represent responses to attitudes towards gun control: (gov), (imp) and (dollar). The dummy variables have a value of 1 if the participant reported agreement with the statement above the median response. For example, the (gov) variable has a value of 1 if the participant reported agreement with the statement "the government needs to do more to address gun violence" higher than the median response for the sample.

Table 13. Interaction Terms

Variables	taxes		donated	
	(1)	(2)	(3)	(4)
female x treatment	0.0546	0.0938	-0.0356	-0.0194
	(0.0610)	(0.0636)	(0.0648)	(0.0750)
college x treatment	0.0941	0.104	-0.0185	0.000430
	(0.0616)	(0.0666)	(0.0742)	(0.0831)
employed x treatment	-0.0957	-0.0742	-0.0383	-0.00565
	(0.0848)	(0.0938)	(0.0889)	(0.0968)
religion x treatment	0.0417	-0.0173	0.137*	0.145*
	(0.0619)	(0.0732)	(0.0714)	(0.0863)
gun x treatment	-0.0478	-0.0131	0.0143	0.0416
	(0.0787)	(0.0856)	(0.0783)	(0.0987)
conservative x treatment	-0.0321	-0.00198	-0.0640	0.00456
	(0.0669)	(0.0736)	(0.0638)	(0.0807)
authoritarian x treatment	-0.0173	-0.122	0.121	0.0714
	(0.0749)	(0.0930)	(0.0799)	(0.0926)
gov x treatment	-0.0203	-0.0446	0.0559	0.0111
	(0.0653)	(0.0740)	(0.0703)	(0.0837)
imp x treatment	0.121**	0.153***	-0.00752	-0.0419
	(0.0561)	(0.0579)	(0.0661)	(0.0746)
dollar x treatment	-0.0789	-0.0109	-0.0619	-0.0329
	(0.0678)	(0.0726)	(0.0681)	(0.0788)
support x treatment	-0.0842	0.0118	-0.0269	0.0500
	(0.0808)	(0.0713)	(0.0976)	(0.0816)
Control	No	Yes	No	Yes
Observations	808	744	808	744

4.6 Quality Control Measures

As mentioned in Section 3.6, 51 participants failed two of the three quality control measures. After removing participants who failed from our sample, we ran the analysis methods reported above. We did not observe any significant changes to our results, and therefore concluded high data quality without the influence of data quality bias on results.

5 Discussion

5.1 Overview

We found that participants who received the treatment narrative were more likely to support a tax policy. This finding was bolstered by further heterogeneity analysis where we found that when the treatment was imposed on college-educated participants, female participants, we observed an increase in likelihood to support tax policy. Together, these outcomes do not provide support for our hypothesis that valuation information impacts donations to an organization that advocates for gun control measures. However, these outcomes support heterogeneity in response to valuation information. The following subsections will offer explanations and limitations of key findings.

5.2 The treatment does not impact donation but increased support for a tax policy aiming to reduce gun violence.

We found no evidence that exposure to economic valuation information impacts donation behavior. However, we did find that exposure to such information increases likelihood of supporting a tax policy. Therefore, similarly to Goff et al. (2017) we considered the possibility that ascription of responsibility (AR) impacts propensity to donate. As shown in Table 8, individuals in the treatment group reported higher agreement with the need for more government action to reduce gun violence. Therefore, it is within reason to assume that individuals in the treatment group may be more likely to ascribe responsibility of gun control to public entities such as governments. They may then believe that it is those entities, such as governments, who benefit from the cost savings incurred due to reduced gun violence, and thus donation to non-profit private sector organizations is not appropriate. This explanation is consistent with the impact of the treatment effect on increased likelihood to support tax policies aiming to reduce gun violence.

This finding aligns with Engelen and Neuteleers' (2014) predicted "price effect". The authors hypothesized that the monetary valuation of goods would incentivize individuals to increase supply of said good, i.e. this hypothesis states that individuals in the treatment group should show increased support to gun control policies as decreased gun violence will result in significant cost savings. We concluded that exposure to economic valuation information lead to increased support for a tax policy due to salience of cost saving benefits of reduced gun violence.

The main limitation of this finding which inhibited clear conclusions is the variation in revealed and stated preferences. The lack of statistical significance across both revealed and stated preferences drives a gap in the robustness of the treatment effect. However, in our analysis we found that revealed and stated preferences are positively correlated. We found that participants who donated to a gun control organization were more likely to support a tax policy and participants who supported a tax policy were more likely to donate. Therefore, although there is a gap between revealed and stated preferences the positive impact of the outcome variables on each other indicated consistency in participant behavior towards gun control

5.3 College-educated participants when subjected to the treatment were more likely to support a tax policy to reduce gun violence.

Our results showed that participants who have a bachelor's degree, a master's degree or beyond were more likely to donate to a gun control advocacy group and more likely to support a tax policy aiming to reduce gun violence. We did not find that the treatment impacted donation behavior for college-educated participants more strongly. Furthermore, we did not find the treatment effect on support for the tax policy by participants with less than a bachelor's degree. This outcome provided support for our hypothesis that at higher education levels participants are more likely to understand the valuation methods used and thus respond differently to the

treatment. Similarly, to the explanation employed in Section 5.2, we considered the possibility that at higher education levels participants were more likely to ascribe responsibility for reduced gun violence to public entities. Thus, it is public entities who benefit from the cost saving impacts of reduced gun violence so causing increased likelihood to donate and support tax can increase likelihood of supporting the tax policy thus explaining the heterogenous treatment effect.

5.6 Participants who reported agreement with the importance of gun control when subjected to the treatment were more likely to support a tax policy.

We concluded that participants who agree with the importance of gun control were intrinsically motivated to support gun control prior to the survey. Contrary to our hypothesis, we found that participants who are intrinsically motivated to support gun control when subjected to the treatment were more likely to support a tax policy. Participants in the treatment group have an extrinsic motivator to support gun control resulting from the treatment. We used motivation crowding theory to explain our results. This theory predicts that the introduction of an extrinsic motivator could lead to the crowd-in effect and so increased support for gun control. Therefore, we concluded that for our sample the introduction of the extrinsic motivator, due to monetary valuation, supported the existing intrinsic motivation thus leading to the observed increase in likelihood to support a tax policy.

5.7 Our contribution to existing literature and further areas of research

Our paper contributes to the limited pool of literature aiming to measure the influence of economic valuation information on views, attitudes and behaviors. Furthermore, our paper is a pioneer in the use of experimental exposure to economic valuation information regarding a

present social issue to measure impact on revealed and stated preferences. Our paper also contributes to existing literature by examining variation in propensity to donate across different demographic groups, and by analyzing existing economic theories used to predict behavior changes in response to monetization of goods. Lastly, our literature is the first to measure the impact of economic valuation information on views, attitudes, and behaviors towards gun control.

Areas of further research that result from our research include the impact of motivation crowding theory on different demographic groups. Furthermore, a study that extends from our paper could investigate the impact of different valuation methods on behaviors and attitudes. For example, the treatment group could be segmented such that each subgroup received one piece of valuation information. Lastly, another area of research could investigate a similar design study with the opportunity for participants to vary donation amounts.

5.7 Limitations of our findings

A key assumption that our experimental design relies on is the assumption that ordinary citizens are unaccustomed to valuation information and thus have no frame of reference. Therefore, participants might have only been exposed to the influence of monetary priming through viewing dollar values rather than the influence due to understanding the valuation information. This limits our findings as we are unable to accurately answer our research question

Another limitation is the subtle differences that naturally exist between the treatment and control group narrative. For example, that narrative received by the treatment group was longer due to the additional information thus risking lack of attention to the narrative relative to participants in the control group. Therefore, we acknowledge that these limitations make the treatment effect less compelling.

We also recognize the limitation resulting from the low compensation offered. Participants were offered $1 for successful completion of the study; the low compensation amount might incentivize people to not read as carefully as to not dedicate time to a low-compensation task. To combat this limitation, we use quality control measures. However, the quality control measures might not absorb the full effect of quality bias in our data. Furthermore, the donation amount of $0.50 represents half of the given compensation, and so we risk the deterrence of donations since the donation amount represents a large percentage of the offered compensation. To combat this limitation further research could offer a different compensation structure such that participants can choose the donation amount.

As highlighted previously there is doubt surrounding the generalizability of findings produced from samples recruited from MTurk. There is doubt in previous literature regarding the proximity of demographic characteristics of MTurk workers to the demographic characteristics of the general U.S. population. For example, one disparity in our study is as follows; the majority of our sample had a bachelor's degree and beyond, but this is not the case for the general U.S. population. Furthermore, as shown through our findings we conclude that a college-education significantly influences propensity to donate when exposed to our treatment. Therefore, this is a limitation of this finding as the result might not be generalizable to the general U.S. population due to the differences in education characteristics between the sample and the population.

Lastly, another limitation to our findings is the variation in stated and revealed preferences. While the impact of the treatment was significant on support for tax policy, the lack of statistical significance on donations raises the question of whether or not there is increased support for gun control legislations. However, as previously discussed we mitigated some of this limitation by our finding that the outcome variables are positively correlated.

5.8 Implications of findings

While our findings carry implications regarding donation behavior in experimental settings, implications are unclear due to limited generalizability, and uncertainty about the treatment effect. As highlighted in our limitations the use of MTurk inhibits generalization of findings to the U.S. population.

However, a key implication of our paper is that our findings provide evidence of change in behavior when exposed to economic valuation information. With the rise of media attention surrounding the gun-control debate, there is an increase in the mention of economic valuation information to estimate the impact of gun violence. Therefore, our research showed that economic valuation information can increase support to tax policies and so help support gun control legislations, with no significant impact on propensity to donate.

Another implication is the variation in propensity to donate across different demographic and attitudinal characteristics. This can help with identifying target groups for donation campaigns aiming to help support gun control organizations. For example, a higher proportion of gun owners donated to a gun control organization than non-gun owners, thus suggesting the possibility of tailoring donation campaigns to gun owners.

6 Conclusion

Contrary to existing literature, our paper examined the impact of exposure to economic valuation information on views, attitudes, and behavior towards gun control. Our paper explored the impact of economic valuation information on propensity to donate, and willingness to support a tax policy which would reduce gun violence but increase taxes across different demographic characteristic. Furthermore, our paper examined the differences in revealed and stated preferences to support gun control, and the impact of economic valuation information on

both types of preferences. Our hypothesis was that donations to an organization that advocates for gun control measures will be affected by the presence of economic valuation information, but we anticipated heterogeneity in response to the valuation information across different demographics. Specifically, we expected that those who are intrinsically motivated to support gun control would either be unaffected by the treatment or would decrease their donation while those who typically do not support gun control would increase their donations.

The design of this study was an experimental framework for which data was collected through the use of a survey administered to the U.S. residents over the age of 18 through MTurk. Our sample consisted of 810 participants evenly distributed across a treatment group and a control group. The main model used to analyze this data was a probabilistic regression model.

We found that exposure to economic valuation information does not impact donations but increases likelihood to support a tax policy by 7 percentage points. While the magnitude of this finding is not large, it is significant because we conclude that economic valuation information influenced support for gun control legislation. As hypothesized, we found heterogeneity across different demographic groups. We found that females, gun owners, and college-educated participants who were subjected to the treatment were more likely to support a tax policy that would increase taxes but decrease gun violence than females in the control group. These findings are contradictory to our hypothesis that the treatment group's propensity to donate would be affected by the presence of economic valuation information. However, the findings are consistent with our hypothesis that there exists heterogeneity in responses to the treatment across different demographic groups.

Our paper contributes to a limited pool of literature aiming to experimentally measure the impact of economic valuation information on behavior and attitude. To our knowledge, this

study is the first to measure changes in donation behavior, and willingness to be taxed for gun control advocacy when exposed to economic valuation information.

The main limitation to our findings is differences in revealed and stated preferences; while the treatment increased likelihood to support a tax policy, the treatment did not statistically significantly impact propensity to donate. However, we did find a positive correlation between donation and taxation behavior.

Further research from our study can examine differences in propensity to donate across demographic groups, and the impact of prior beliefs whether that is political ideologies or more specifically beliefs regarding gun control, on the treatment effect. This study can be utilized as the basis for further experimental work. Furthermore, this study showed that the use of economic valuation information is an effective tool to increase support for taxation policies but is ineffective in raising donations.

Appendix A. Control Group and Treatment Group Narrative

I. Control Group Narrative

Due to the existence of a constitutional right for citizens to acquire firearms, and a vastly higher violent crime rate in the U.S. than in other comparable countries such as Britain and Australia, gun violence and gun control are heatedly discussed topics at the center of current U.S. politics.

Gun violence, defined as gun-related crimes including homicides, mass shootings, suicides, armed robberies, etc., is a leading cause of premature death in the United States. In the United States, gun violence leads to an average 85,000 injuries and 38,000 deaths per year.

Beyond deaths and injuries, gun violence has other significant impacts on American society. Mass shootings, defined as shooting incidents having 3 or more victims excluding the shooter, in public movie theaters and shopping malls, have impacted the public's sense of safety, and by consequence, their behaviors. Ten percent of all mass shootings occur in public schools, causing high levels of fear and anxiety for students, parents, and school staff throughout the country and adversely impacting the schools and communities where these shooting occur.

II. Treatment Group Narrative

Due to the existence of a constitutional right for citizens to acquire firearms, and a vastly higher violent crime rate in the U.S. than in other comparable countries such as Britain and Australia, gun violence and gun control are heatedly discussed topics at the center of current U.S. politics.

Gun violence, defined as gun-related crimes including homicides, mass shootings, suicides, armed robberies, etc., is a leading cause of premature death in the United States. In the United States, gun violence leads to an average 85,000 injuries and 38,000 deaths per year. The estimated economic impact of gun-related deaths is $30.4 billion per year and the economic impact of non-fatal injuries has been estimated at $690 million per year.

Beyond deaths and injuries, gun violence has other significant impacts on American society. Mass shootings, defined as shooting incidents having 3 or more victims excluding the shooter, in public movie theaters and shopping malls, have impacted the public's sense of safety, and by consequence, their behaviors. According to a recent study, the value of reducing people's risk of experiencing gun violence by 30 percent has been estimated at $24.5 billion per year. Ten percent of all mass shootings occur in public schools, causing high levels of fear and anxiety for students, parents, and school staff throughout the country and adversely impacting the schools and communities where these shooting occur. For example, school shootings have been found to drive down home values in these communities by approximately 6 percent.

Table B.1: Donation and Taxation for Full Sample

VARIABLES	(1) donated	(2) taxes	(1) donated	(2) taxes
treatment	0.00158	0.0712**	-0.000621	0.0700**
	(0.0386)	(0.0343)	(0.0388)	(0.0356)
female	0.00354	0.0246	0.0120	0.0224
	(0.0390)	(0.0349)	(0.0390)	(0.0363)
college	0.121***	0.0727*	0.0986**	0.0701*
	(0.0395)	(0.0389)	(0.0400)	(0.0406)
age	0.00169	-0.00468***	0.00244	-0.00504***
	(0.00194)	(0.00173)	(0.00194)	(0.00181)
employed	-0.0434	-0.0657	-0.0363	-0.0559
	(0.0532)	(0.0418)	(0.0531)	(0.0438)
religion	-0.0273	-0.00450	-0.0264	-0.0241
	(0.0431)	(0.0386)	(0.0431)	(0.0408)
gun_owner	0.0210	-0.00375	0.0569	0.0335
	(0.0491)	(0.0420)	(0.0527)	(0.0439)
Gun control is a topic that is important to me			0.00290	0.0189**
			(0.0108)	(0.00864)
The government needs to do more to address gun violence			0.0353***	0.0189*
			(0.0135)	(0.0104)
There is no way to put a dollar value on the impact of gun violence			0.00415	0.0112
			(0.00834)	(0.00699)
Preventing the mentally ill from purchasing guns			-0.0248**	-0.00703
			(0.0119)	(0.0109)
Banning gun purchases by people on no-fly or watch lists.			-0.0102	0.0166*
			(0.0120)	(0.00995)
Banning assault-style weapons			0.00696	0.00309
			(0.0107)	(0.00876)
Increasing restrictions on the locations in which concealed carry is allowed.			0.0134	0.0116
			(0.0107)	(0.00918)
Prohibiting teachers and officials from carrying guns in K-12 schools.			0.00988	-0.000315
			(0.00858)	(0.00759)
Requiring a permit for all concealed carry			-0.0176	0.0154*
			(0.0118)	(0.00865)
conservative			0.182***	-0.0300
			(0.0544)	(0.0490)
authoritarian			0.134**	-0.0164

			(0.0561)	(0.0513)
donate_gun	0.160***	0.186***	0.415***	-0.0272
	(0.0407)	(0.0408)	(0.0723)	(0.0740)
donate_social	0.490***	-0.000848	0.154***	0.171***
	(0.0639)	(0.0689)	(0.0407)	(0.0428)
support_dummy			0.00551	-0.0490
			(0.0663)	(0.0609)
past_gun	0.0225	0.0334	0.0139	0.0143
	(0.0485)	(0.0416)	(0.0483)	(0.0441)
order_taxes	0.0541	0.100***	0.0494	0.0932***
	(0.0390)	(0.0341)	(0.0386)	(0.0354)
taxes	0.215***		0.183***	
	(0.0399)		(0.0424)	
donated		0.213***		0.180***
		(0.0405)		(0.0436)
Observations			498	498

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table B.2: Heterogeneity Analysis: Donation and Taxation for Females and Other Genders

	Female		Other Genders	
	(1)	(2)	(3)	(4)
VARIABLES	donated	taxes	donated	taxes
treatment	-0.00222	0.133**	-0.0283	0.0488
	(0.0616)	(0.0520)	(0.0512)	(0.0503)
college	0.114*	0.0129	0.130**	0.126**
	(0.0632)	(0.0578)	(0.0520)	(0.0581)
age	0.00362	-0.00182	0.00193	-0.00614**
	(0.00300)	(0.00255)	(0.00256)	(0.00259)
employed	-0.0499	0.00971	0.0450	-0.0583
	(0.0790)	(0.0652)	(0.0644)	(0.0626)
religion	0.00250	-0.0870	-0.0700	0.0468
	(0.0673)	(0.0553)	(0.0575)	(0.0567)
gun_owner	0.106	0.0949	0.00426	-0.0133
	(0.0921)	(0.0581)	(0.0654)	(0.0625)
Gun control is a topic that is important to me	0.0287*	0.0208*	-0.0143	0.0195
	(0.0166)	(0.0113)	(0.0147)	(0.0123)
The government needs to do more to address gun violence	-0.00512	0.0175	0.0746***	0.0214
	(0.0206)	(0.0147)	(0.0182)	(0.0147)
There is no way to put a dollar value on the impact of gun violence	0.00748	0.0112	0.00308	0.0118
	(0.0136)	(0.00978)	(0.0106)	(0.00978)
Preventing the mentally ill from purchasing guns.	0.00553	-0.0257	-0.0397***	-0.00357
	(0.0228)	(0.0169)	(0.0140)	(0.0144)
Banning gun purchases by people on no-fly or watch lists.	-0.0323	0.0492***	-0.00338	-0.00417
	(0.0212)	(0.0157)	(0.0142)	(0.0134)
Banning assault-style weapons	-0.0213	0.00835	0.0229*	-0.00309
	(0.0192)	(0.0131)	(0.0133)	(0.0114)
Increasing restrictions on the locations in which concealed carry is allowed.	0.0612***	0.00404	-0.00551	0.0158
	(0.0192)	(0.0130)	(0.0126)	(0.0120)
Prohibiting teachers and officials from carrying guns in K-12 schools.	0.00288	0.00111	0.00860	-0.00382
	(0.0138)	(0.0110)	(0.0108)	(0.0101)
Requiring a permit for all concealed carry.	-0.00967	-0.00901	-0.0312*	0.0333***
	(0.0181)	(0.0123)	(0.0161)	(0.0127)
conservative	0.174**	-0.117*	0.219***	0.0190
	(0.0830)	(0.0710)	(0.0795)	(0.0703)
authoritarian	0.210**	-0.00180	0.0998	0.0240
	(0.0889)	(0.0698)	(0.0739)	(0.0717)
donated_social	-7.07e-06	1.04e-05	2.03e-06	-1.39e-06

	(6.55e-06)	(1.02e-05)	(5.26e-06)	(1.06e-06)
donate_gun	0.478***	-0.00556	0.506***	-0.0166
	(0.103)	(0.0997)	(0.102)	(0.109)
support_dummy	-0.0136	-0.164**	0.00575	0.0276
	(0.108)	(0.0808)	(0.0865)	(0.0860)
past_gun	-0.0572	0.0249	0.0805	0.0774
	(0.0730)	(0.0627)	(0.0691)	(0.0597)
order_taxes	-8.00e-05	0.138***	0.0882*	0.0759
	(0.0606)	(0.0517)	(0.0517)	(0.0501)
taxes	0.203***		0.224***	
	(0.0656)		(0.0508)	
donated		0.195***		0.233***
		(0.0580)		(0.0588)
Observations	333	333	409	409

Table B.3: Heterogeneity Analysis: Donation and Taxation for Gun Owners and Non-Gun Owners

	Gun Owner		Non- Gun Owner	
	(1)	(2)	(3)	(4)
VARIABLES	donated	taxes	donated	taxes
treatment	0.0129	0.0467	-0.0229	0.0598
	(0.0980)	(0.0881)	(0.0426)	(0.0398)
female	0.205*	0.108	-0.0333	0.0116
	(0.109)	(0.0900)	(0.0431)	(0.0406)
college	0.288***	0.0480	0.0758*	0.0898**
	(0.0971)	(0.103)	(0.0442)	(0.0450)
age	0.00164	-0.00961**	0.00413**	-0.00356*
	(0.00576)	(0.00446)	(0.00207)	(0.00201)
employed	0.198*	-0.0722	-0.0530	-0.0190
	(0.108)	(0.110)	(0.0569)	(0.0496)
religion	-0.140	0.198*	-0.0126	-0.0368
	(0.131)	(0.107)	(0.0467)	(0.0447)
Gun control is a topic that is important to me	-0.0378	-0.0213	0.0202	0.0375***
	(0.0238)	(0.0190)	(0.0127)	(0.0102)
The government needs to do more to address gun violence	0.0479	0.00492	0.0242	0.0191
	(0.0316)	(0.0217)	(0.0158)	(0.0122)
There is no way to put a dollar value on the impact of gun violence	0.0202	0.0196	0.00280	0.00833
	(0.0259)	(0.0184)	(0.00882)	(0.00766)
Preventing the mentally ill from purchasing guns.	-0.0767**	0.00426	-0.0114	-0.00920
	(0.0341)	(0.0259)	(0.0132)	(0.0125)
Banning gun purchases by people on no-fly or watch lists.	0.00756	0.0600**	-0.0124	0.00554
	(0.0345)	(0.0237)	(0.0133)	(0.0119)
Banning assault-style weapons	0.0497*	0.00590	0.00343	0.00113
	(0.0276)	(0.0190)	(0.0127)	(0.0104)
Increasing restrictions on the locations in which concealed carry is allowed.	-0.0195	0.0253	0.0235*	0.0132
	(0.0287)	(0.0227)	(0.0120)	(0.0101)
Prohibiting teachers and officials from carrying guns in K-12 schools.	0.0222	0.0225	0.00329	-0.00493
	(0.0245)	(0.0191)	(0.00926)	(0.00844)
Requiring a permit for all concealed carry.	-0.0208	-0.0170	-0.0235*	0.0255**
	(0.0264)	(0.0169)	(0.0141)	(0.0109)
conservative	0.102	-0.136	0.218***	-0.0154
	(0.115)	(0.100)	(0.0658)	(0.0573)
authoritarian	0.0441	-0.0350	0.174***	-0.0294
	(0.133)	(0.121)	(0.0665)	(0.0598)

donated_social	2.32e-06	-1.28e-06	-4.56e-06	6.11e-07
	(1.23e-05)	(1.56e-06)	(4.54e-06)	(3.72e-06)
donate_gun	0.391***	0.156	0.535***	-0.0560
	(0.149)	(0.126)	(0.0817)	(0.0931)
support_dummy	-0.00346	-0.0114	0.00888	-0.0666
	(0.154)	(0.155)	(0.0753)	(0.0675)
past_gun	0.171	-0.0903	-0.0200	0.0537
	(0.129)	(0.109)	(0.0533)	(0.0481)
order_taxes	-0.0160	0.171**	0.0645	0.0791**
	(0.101)	(0.0858)	(0.0425)	(0.0397)
taxes	0.180		0.209***	
	(0.114)		(0.0425)	
donated		0.102		0.218***
		(0.114)		(0.0449)
Observations	333	333	409	409

Table B.4: Heterogeneity Analysis: Donation and Taxation for College and Non-College educated participants

	College		Non- College	
	(1)	(2)	(3)	(4)
VARIABLES	donated	taxes	donated	taxes
treatment	0.00931	0.0954**	0.0211	-0.0150
	(0.0556)	(0.0408)	(0.0358)	(0.0693)
female	0.0159	-0.0125	-0.00743	0.0947
	(0.0560)	(0.0422)	(0.0369)	(0.0697)
gun_owner	0.120	0.0511	-0.00267	0.0375
	(0.0747)	(0.0493)	(0.0478)	(0.0860)
age	0.00326	-0.00612***	-0.000362	-0.00296
	(0.00288)	(0.00215)	(0.00176)	(0.00331)
employed	-0.145*	-0.0811	0.0501	-0.0349
	(0.0810)	(0.0507)	(0.0368)	(0.0791)
religion	-0.0602	-0.0334	0.0114	-0.0236
	(0.0614)	(0.0468)	(0.0446)	(0.0806)
Gun control is a topic that is important to me	0.0100	0.00924	-0.000916	0.0246
	(0.0164)	(0.0108)	(0.00948)	(0.0153)
The government needs to do more to address gun violence	0.0417**	0.0144	0.0200	0.0346*
	(0.0196)	(0.0122)	(0.0126)	(0.0200)
There is no way to put a dollar value on the impact of gun violence	-0.00555	0.00978	0.0114	0.0102
	(0.0117)	(0.00844)	(0.00852)	(0.0125)
Preventing the mentally ill from purchasing guns.	-0.0404**	0.0111	-0.00410	-0.0478**
	(0.0192)	(0.0132)	(0.0103)	(0.0211)
Banning gun purchases by people on no-fly or watch lists.	-0.0200	0.00568	0.000437	0.0384**
	(0.0179)	(0.0122)	(0.0105)	(0.0184)
Banning assault-style weapons	0.00598	0.0217**	0.00559	-0.0289*
	(0.0174)	(0.0110)	(0.00910)	(0.0164)
Increasing restrictions on the locations in which concealed carry is allowed.	0.0339*	0.0109	-0.00497	0.0130
	(0.0173)	(0.0122)	(0.00853)	(0.0155)
Prohibiting teachers and officials from carrying guns in K-12 schools.	0.00418	-0.00578	0.0135*	0.00877
	(0.0127)	(0.00927)	(0.00759)	(0.0139)
Requiring a permit for all concealed carry.	-0.0275	0.00666	-0.00265	0.0284*
	(0.0180)	(0.0102)	(0.0112)	(0.0171)
conservative	0.221***	-0.0578	0.0982	0.0224
	(0.0734)	(0.0571)	(0.0665)	(0.0945)
authoritarian	0.216***	0.00983	-0.0324	-0.0508

	(0.0712)	(0.0568)	(0.0447)	(0.107)
donated_social	0.213***	0.175***	0.0435	0.185**
	(0.0593)	(0.0557)	(0.0408)	(0.0721)
donate_gun	0.387***	-0.00631	0.442**	0.0566
	(0.0803)	(0.0729)	(0.184)	(0.206)
support_dummy	0.0481	-0.0825	-0.0624	0.0352
	(0.0929)	(0.0700)	(0.0671)	(0.119)
past_gun	0.0236	0.0330	-0.0215	-0.00352
	(0.0696)	(0.0515)	(0.0407)	(0.0824)
order_taxes	0.0334	0.0864**	0.0741**	0.105
	(0.0548)	(0.0403)	(0.0362)	(0.0703)
taxes	0.199***		0.126***	
	(0.0651)		(0.0411)	
donated		0.133***		0.287***
		(0.0514)		(0.0791)
Observations	485	485	259	259

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