Vote Selling in the United States: Introducing Support Vector Machine Methods to Analyzing Conjoint Experimental Data

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Abstract

This paper explains that democracy has been theorized as a multidimensional concept. Yet, clientelism—as a democratic failure—has been studied almost exclusively from a unidimensional perspective. We argue that to better understand the motivations behind clientelism and the micro-dynamics that drive it, studies should situate the phenomena within the multidimensionality of *democracy*. This paper makes both methodological and substantive contributions to the literature by leveraging a conjoint experiment on hypothetical vote selling in a consolidated democracy. Conjoint designs ask respondents to choose from hypothetical profiles that combine multiple attributes. To study which democratic dimension(s) should fail to produce clientelism, we presented subjects two hypothetical candidates that supported (or not) every policy (attribute). Using machine learning techniques, we identify which dimensions should "fail" to produce likely vote-sellers.

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Keywords— conjoint designs; vector support machines; support for democracy; United States.

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We both thank.

I. Toward a Multidimensional Study of Clientelism

Democracy has been theorized as a multidimensional concept. Referring particularly to *polyarchies*, Dahl (1971, p. 3) explains that among some of the requirements for sustaining a democracy, there must be some institutional guarantees that create opportunities to (1) formulate preferences, (2) signify those preferences, and (3) have preferences weighted equally when conducting a government.

Yet, clientelism—as a democratic failure—has been studied almost exclusively from a unidimensional perspective. We believe that there exists a methodological and conceptual alignment—one that biases our inferences. On the one hand, qualitative, historical and/or ethnographically based contributions describe clientelist transactions as complex and multidimensional. Leveraging qualitative techniques, researchers are able to provide "thick descriptions" (Goertz 1973) of the phenomena at hand (Posada-Carbó 1996; Sabato 2001; Auyero 2000; Szwarcberg 2013; Borges 2019). On the other hand, statistical, survey, and/or experimentally based work mostly explores singular aspects related to clientelism—typically, the effect of a single variable (or treatment) on the probability of clientelism. Quantitative scholars then usually focus on the "effects of causes" rather than on the "causes of effects" (Pearl 2015). For example, using a field experiment in Benin, Wantchekon (2003) stresses the role of "incumbency" on vote buying, while Jensen and Justesen (2014, p. 227) focus on the impact of "poverty" on vote buying. While the quantitative literature on clientelism has advanced on a number of important questions, most studies concentrate their efforts on a single variable which (when possible) is manipulated in an experimental or quasi-experimental design (Corstange 2012; Imai, Park, and Greene 2015; Nichter and Peress 2017; Hicken et al. 2015; Hicken et al. 2018; Michael and Thachil 2018; Bratton 2008; Weitz-Shapiro 2012; González-Ocantos, Kiewiet de Jonge, and Nickerson 2014; Bahamonde 2018; Bahamonde 2020; Oliveros 2016).

Substantively, we argue that to better understand the motivations behind clientelism and the micro-dynamics that drive it, studies should situate the phenomena within the *multidimensionality of democracy*. While qualitative researchers are better equipped to properly do so, the are some quantitative techniques that might provide broader explanations for the causes of clientelism. We do not argue that these quantitative tools might give us the kind of rich explanations ethnographies provide. However, we hope this paper provides multidimensional answers to a multidimensional concept. Ultimately, this paper tries to provide a multidimensional explanation for clientelism within the "effects of causes" approach. Exploiting a novel conjoint dataset, this paper developed an

experimental designs which sough to answer *which of the three democratic subdimensions explained by Dahl (1971) should fail to produce clientelism?*

The evidence that this paper presents may be associated with a probable erosion of American democracy.[1] Foa and Mounk (2016, p. 7) document a deep "crisis of democratic legitimacy [that] extends across a [...] wider set of indicators" in the United States. They find that 26% of millennials declare that it is "unimportant" in a democracy for people to "choose their leaders in free elections" (Foa and Mounk (2016, p. 10), and Foa and Mounk (2017)). And such, this study follows a "least-likely" design presenting the United States as a "crucial case." As Levy (2008, p. 12) explains, "[i]nferential leverage from a least likely case is enhanced if our theoretical priors for the leading alternative explanation make it a most likely case for that theory." Since the vote-buying literature mostly considers developing countries and describes vote sellers as poor (Weitz-Shapiro 2014, p. 12), uneducated (González-Ocantos, Kiewiet de Jonge, and Nickerson 2014), and undemocratic (Carlin and Moseley 2015), the willingness to sell votes in the United States should be low, making it a difficult case study on vote selling.

Methodologically, this paper contributes to the literature by leveraging a conjoint experiment on hypothetical vote selling in a consolidated democracy. First, most quantitative studies have been conducted in developing countries, seriously narrowing the scope of our inferences. In part, this is because the clientelism literature usually focuses on realized behaviors only—that is, actual clientelist transactions. Unfortunately, by ignoring attitudes of potential vote sellers, particularly when it comes to the willingness to sell, selection bias seriously threatens causal inferences. Geddes (1990, p. 131) explains the well-known selection issues of studying "only cases that have achieved the outcome of interest." Thus, and following the lead of González-Ocantos, Kiewiet de Jonge, and Nickerson (2014) and Bahamonde (2020), this paper presents experimental evidence of hypothetical willingness to sell the vote in the United States. Second, we introduce machine learning techniques, particularly support vector machine analyses (SVM) for analyzing conjoint datasets.

The paper continue as follows. First we explain the logic of conjoint analyses and their main contribution to political science. Second we introduce a novel dataset of U.S. voters representative at the country level. In this section we analyze our conjoint dataset exploiting the traditional approach and explain its shortcomings. Third we introduce the support vector machine approach to analyzing conjoint data, and proceed to explain its main advantages. We also provide `Matlab` routines to

[1] Relatedly, see Levitsky and Ziblatt (2018).

qc: one paragraph explain why SVM are "good"

hb: summarize methods, findings and contribution, the paper continues as follows. 1 paragraph

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replicate the data analyses. The final section concludes. qn:?

II. Traditional Conjoint Analyses

Conjoint designs ask respondents to choose from hypothetical profiles that combine multiple attributes, "enabling researchers to estimate the relative influence of each attribute value on the resulting choice or rating" (Hainmueller, Hopkins, and Yamamoto 2014, p. 2). Typically, survey participants are given a number of "tasks" where they have to make a number of choices between—usually—two set of profiles. It is generally accepted that Luce and Tukey (1964) started the conjoint design (Green and Srinivasan 1978; Franchino and Zucchini 2015).

This methodology has been widely used in marketing research to measure "consumer trade-offs among multi-attributed products and services" (Lenk et al. 1996, p. 174). Typically, researchers in that field would assign arbitrary utilities to investigate "how much difference each attribute could make in the total utility of a product" (Orme 2010, p. 79). Utilities were assigned according to general expectations, for instance, a "respondent generally prefers higher gas mileage to lower gas mileage" (Green and Srinivasan 1978, p. 107). At the time this seemed particularly interesting given the impossibility to truly randomize the set of attributes. Hence, the analyst needed to set the utilities associated with every attribute in advance, usually building a small number of attribute combinations (profiles) (Lenk et al. 1996, p. 175). Much research was done arguing how ranked attributes or attribute ratings were better than using assigned utilities (Carmone, Green, and Jain 1978, p. 301). For instance, Louviere, Flynn, and Carson (2010, p. 60) criticize the use of arbitrary utilities assigned to every attribute, making traditional conjoint analyses incompatible with economic theory. Since traditional conjoint designs exploited the "additive measurements" of the utilities associated with the respective attribute (Luce and Tukey 1964, p. 2), some times this might lead to non-accounted-for nonlinearities.

A number of topics have been studied, such as preferences for health care (Ryan 2000), vaccine decision making (Seanehia et al. 2017), preferences for energy-saving measures (Poortinga et al. 2003), preferences toward different food packagings (Silayoi and Speece 2007), consumer demand for fair trade (Hainmueller, Hiscox, and Sequeira 2015), evaluations of teaching performance (Kuzmanovic et al. 2013), roommate choice (Shafranek 2019) and renter behavior (Hankinson 2018). Just to name a few examples in political science, conjoint designs have been used to study attitudes toward

immigrants (Hainmueller and Hopkins 2015), preferences toward political candidates (Franchino and Zucchini 2015; Horiuchi, Smith, and Yamamoto 2017; Horiuchi, Smith, and Yamamoto 2020; Mares and Visconti 2020), the role of candidate sex on voter choice (Ono and Burden 2019) and the role of the information environment in partisan voting (Peterson 2017).

Hainmueller, Hopkins, and Yamamoto (2014) "introduced conjoint analysis to political science as a survey experimental method for causal inference" (Horiuchi, Markovich, and Yamamoto 2020, p. 1), particularly making conjoint designs compatible with the potential outcomes framework of causal inference (Rubin 1974). Since then, a number of important studies have been published, making a very common tool for causal inference in political science (Cuesta, Egami, and Imai 2020). In part, this is due to the simplicity of the main quantity of interest developed by Hainmueller, Hopkins, and Yamamoto (2014, p. 3)—the *average marginal component effect* (AMCE).[2] The quantity equals the counterfactual probability where a specific characteristic would be chosen if the value of that characteristic is absent (Hainmueller, Hopkins, and Yamamoto 2014, p. 11).[3] Since the AMCE does not rely on arbitrary utility assignments nor does resort to functional form assumptions (Hainmueller, Hopkins, and Yamamoto 2014, p. 3), it has become a very common quantity of interest in political science, specially, because also it avoids "unnecessary statistical assumptions" at the same time that improves "internal validity than the more model-dependent procedures" (Hainmueller, Hopkins, and Yamamoto 2014, pp. 2–3).[4] Importantly, they show that "when attribute levels are randomized independently from one another, the ordinary least squares (OLS) estimates of the coefficients from the linear regression of the choice indicator on the set of dummy variables for the levels of the attributes provide unbiased and consistent estimates of the AMCEs" (Horiuchi, Smith, and Yamamoto 2017, p. 14).[5] Others have argued that when attribute levels are randomized, the design "reduces social desirability bias by providing many potential reasons for supporting or opposing a proposed [attribute]" (Hankinson 2018, p. 7),[6] while others offer guidance regarding the number of

[2]Due to space concerns, we are not deriving the AMCE here. The AMCE has been well explained and widely used before. See Equation 5 in Hainmueller, Hopkins, and Yamamoto (2014, p. 11). In addition to that, see Egami and Imai (2019), who have introduced another quantity of interest, the average marginal interaction effect (AMIE).

[3]Importantly, Leeper, Hobolt, and Tilley (2020, p. 6) explain that arbitrary choice of reference category when computing the AMCE might introduce "highly distorted descriptive interpretations of preferences among subgroups of respondents."

[4]Yet, some necessary assumptions need to be made. For instance, in order to make statistical inferences, the AMCE depends on (clustered) standard errors, which in turn rely on the central limit theorem. See Hainmueller, Hopkins, and Yamamoto (2014, p. 17).

[5]Hainmueller, Hopkins, and Yamamoto (2014, p. 15) show that OLS estimators have "identical" properties to the subclassification estimators, and therefore this" implies that the linear regression estimator is fully nonparametric."

[6]However, see Horiuchi, Markovich, and Yamamoto (2020).

attributes by developing a two-stage conjoint design (Bansak et al. 2019).

III. Studying Clientelism Multidimensionally via Conjoint Designs

The multidimensional study of clientelism is novel in the quantitative literature. Quantitative contributions on vote buying, vote selling and clientelism in general, are usually unidimensional. Survey experiments have been widely used to study this phenomena. For instance, Bahamonde (2020) and González-Ocantos, Jonge, et al. 2012; González-Ocantos, Kiewiet de Jonge, and Nickerson 2014; González-Ocantos, Kiewiet de Jonge, and Nickerson 2015 use a list experiment to study the effect of vote-selling prices or specific issues related to norms and legitimacy on the probability of clientelism. While these and other studies have advanced a number of important questions in the discipline, unfortunately, they are able to study one aspect at a time, mainly, by manipulating a word, a sentence, a framing or a number. As Hainmueller, Hopkins, and Yamamoto (2014, p. 2) point out, these designs "have an important limitation for analyzing multidimensional decision making."

Our multidimensional approach builds directly on Carlin and Singer (2011), Carlin and Moseley (2015), and Carlin (2018). Using survey data, they build a series of multidimensional indexes to measure—in Dahlian terms—attitudes towards democracy. Particularly, using the Q-Method and cluster analyses, they account for the multifaceted views towards a democracy. Considering this multidimensional approach to studying issues related to democracy, but also leveraging the Hainmueller, Hopkins, and Yamamoto (2014) approach to designing a conjoint experiment, we developed a conjoint design aimed to studying the multidimensionality of conditions that make vote selling most likely. Particularly, we are interested in studying the multidimensionality of conditions that make vote selling most likely.

Which democratic dimension(s), as specified by Dahl (1971), should fail to make clientelism more likely? Conjoint designs are suitable tools to "determine which components of the manipulation produce the observed effect" (Hainmueller, Hopkins, and Yamamoto 2014, p. 2). Table 1 specifies three general dimensions that should be satisfied for a country to be considered a democracy. Every dimension has a number of requirements. In order to operationalize Dahl (1971)'s requirements, for the conjoint experiment, we devised five attributes that reflected these requirements: (1) *citizens can associate with others and form groups*, (2) *media can confront the government*, (3) *citizens can vote in the next two elections*, (4) *president cannot rule without congress* and (5) *citizens can run*

Dalh's Polyarchy Dimension	Dalh's Requirements for a Democracy	Experimental Operationalization: Five Polyarchy Attributes
Formulate preferences	Freedom to form and join organizations	Citizens can associate with others and form groups
	Freedom of expression	Media can confront the government
	Right to vote	Citizens can vote in the next two elections
	Right of political leaders to compete for support	President cannot rule without Congress
	Alternative sources of information	Media can confront the government
Signify preferences	Freedom to form and join organizations	Citizens can associate with others and form groups
	Freedom of expression	Media can confront the government
	Right to vote	Citizens can vote in the next two elections
	Eligibility for public office	Citizens can run for office for the next two elections
	Right of political leaders to compete for support	President cannot rule without Congress
	Alternative sources of information	Media can confront the Government
	Free and fair elections	Citizens can vote in the next two elections
Preferences are weighted equally in conduct of government	Freedom to form and join organizations	Citizens can associate with others and form groups
	Freedom of expression	Media can confront the government
	Right to vote	Citizens can vote in the next two elections
	Eligibility for public office	Citizens can run for office for the next two elections
	Right of political leaders to compete for support/votes	President cannot rule without Congress
	Alternative sources of information	Media can confront the Government
	Free and fair elections	Citizens can vote in the next two elections
	Institutions for making government policies depend on votes and other expressions of preference	Citizens can vote in the next two elections

Table 1: Dimensions of Democracy (Dahl 1971) and Their Corresponding Experimental Operationalizations.

Note: *Dahl (1971) specifies three general dimensions that should be satisfied for a country to be considered democratic. Every dimension has a number of requirements. In order to operationalize these requirements for the conjoint experiment, we devised five attributes that reflected these requirements (third column). As Table 2 shows, all participants were asked to choose between hypothetical candidates that either supported or rejected each of these five attributes.*

for office for the next two elections. Given that conjoint designs are able "to identify the causal effects of various components of a treatment in survey experiments" (Hainmueller, Hopkins, and Yamamoto 2014, p. 2), we claim that this is the correct tool to answer the aforementioned question.

To study which democratic dimension(s) should fail to produce clientelism, we presented subjects two hypothetical candidates that supported (or not) every policy (attribute). We recognize that the resulting candidate profiles are highly unlikely. Unlikely profiles (such as doctors with no education) have been a big concern in the conjoint literature. So far the suggestion has been to delete them before hand by restricting randomization of certain unlikely profiles (Hainmueller, Hopkins, and Yamamoto 2014) or by marginalizing "factors over the target population distribution" via the population AMCE (Cuesta, Egami, and Imai 2020, p. 12). While acknowledging the advantages of both approaches our goal is identifying a set of democratic attributes that, when absent, make clientelism more likely. In fact, external validity seems to be the trade-off when building a case study according to the *least*-likely case design (Levy 2008). In addition, one of the methodological contributions of this paper is to overcome selection bias by studying *hypothetical* behaviors, specially the ones where the outcome of interest has not been produced (Geddes 1990). And finally, there are several survey experiments that have fielded hypothetical questions, mostly putting respondents in experimental conditions that do not necessarily mimic reality. For instance, Bahamonde (2020) finds that a big portion of U.S. voters would be willing to sell their vote to an hypothetical candidate in exchange for money, while Ballard-Rosa, Martin, and Scheve (2017) examine a number of tax proposals "that are infeasible in the real world politics" (Cuesta, Egami, and Imai 2020, p. 5). Nonetheless, in order to minimize possible concerns of external validity, survey participants were asked to choose *which candidate represented the lesser of the two evils* for them.

Table 2 shows one possible realization of the experiment. It is important to note that every attribute was randomly assigned, and consequently, every participant in practice chose between two unique hypothetical candidates. Also, in order to minimize experimental fatigue, the *can* and *cannot* were capitalized.

The conjoint experiment was framed as a study about crime in the United States, not as a study about clientelism. Participants were asked to read an excerpt mentioning a number of crimes. All were formatted as news pieces. The idea was to explain "vote selling" to "newsreaders." To further prevent the possibility of biased answers when asking participants the direct question about vote selling, the question stated that there was the hypothetical possibility of doing one of the illegal

In the next section you will see 10 different candidates presented in pairs. Each candidate supports different policies. Some candidates might or might not share some similarities/differences. You might not like any of them, but we want to know which candidate represents the lesser of the two evils for you. You might want to focus your attention on the issues that you care about the most.	
Candidate 1	**Candidate 2**
Media CAN confront the government	Media CANNOT confront the government
President CANNOT rule without Congress	President CAN rule without Congress
Citizens CANNOT vote in the next two elections	Citizens CANNOT vote in the next two elections
Citizens CAN run for office for the next two elections	Citizens CAN run for office for the next two elections
Citizens CAN associate with others and form groups	Citizens CANNOT associate with others and form groups

Which of these candidates represents the lesser of the two evils for you?

Candidate 1 ☐	Candidate 2 ☐

Table 2: A Multidimensional Approach to Studying Clientelism: A Conjoint Design (example).
Note: *Participants were asked to choose between two hypothetical candidates (`Candidate 1` and `Candidate 2`). Every entry was filled at random according to the five different attributes explained in Table 1. In practice, every subject chose between two unique hypothetical candidates. Note that in order to highlight the differences between the two candidates, the* can *and* cannot *were capitalized. The idea was to minimize experimental fatigue.*

things mentioned in the excerpt. And that this possibility would be randomly assigned. However, all participants were directly asked whether they would be interested in selling their vote. Following Bahamonde (2020), to capture the willingness to sell without the potential costs, participants were asked whether they would be willing to accept the offer, assuming they would not go to jail. After answering the conjoint portion of the study (as explained in Table 2), participants were asked to answer a battery of socio-demographic and political questions.

I. Classic Conjoint Data Approach

Collected in 2016, the data (N=11,080) are representative at the national level.[7] Figure A1 shows the geographical distribution of survey respondents, grouped by party identification. Following Hainmueller, Hopkins, and Yamamoto (2014), we computed the AMCE via the OLS estimator using clustered standard errors. In this section we present two different classic conjoint analyses. In the first one, we show the hypothetical candidates that were selected by survey respondents (`Candidate Selected`). In the second set of analyses, we change the dependent variable of the attribute-specific OLS estimators for the vote-selling question (which is also dichotomous) for the direct question about vote selling (`Vote Selling`). The rationale behind this second set of analyses is the same that the one of first set of analyses, i.e. to identify specific attributes that are associated with the outcome of interest.

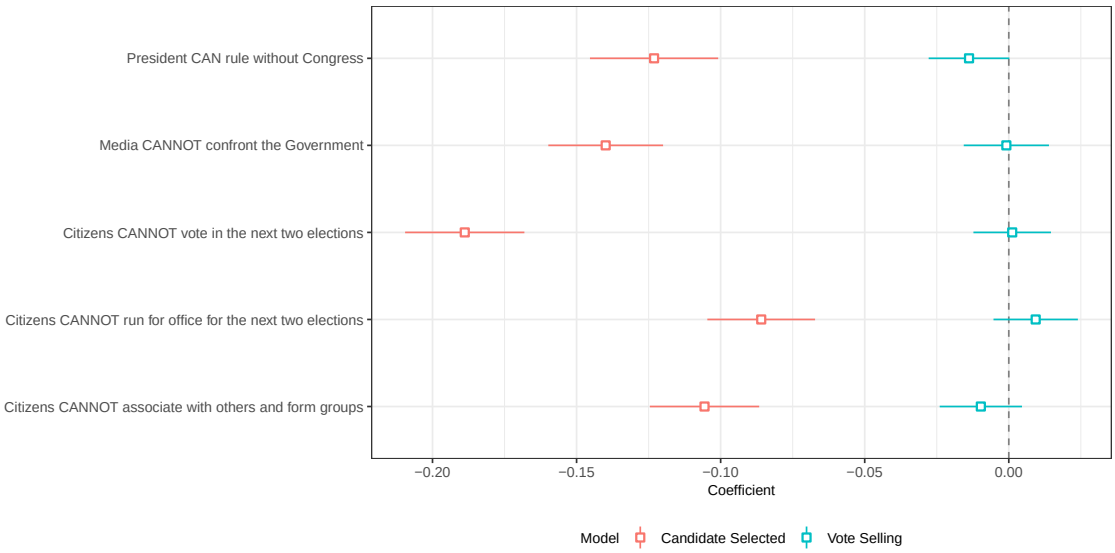

Figure 1: Classic AMCE Analyses: Candidate Selection and Vote Selling Models.
Note: *Following Hainmueller, Hopkins, and Yamamoto (2014), the figure shows the corresponding AMCEs for every of the attributes explained Table 1. These attributes were based on Dahl (1971).*

[7] 1108 respondents, everyone answering 5 tasks with 2 candidates each. *Research Now SSI* collected the data between March 2 and March 6. Survey respondents belong to the online panel owned and administered by SSI. Notice of IRB exemption Protocol #E16-292 is kept on file at the Office of Research and Regulatory Affairs of [redacted] University.

hb: improve fig note of amce:plot

hb: analyze figure 2 briefly

IV. Analyzing The Conjoint Data via Support Vector Machines

V. Conclusion

cq: explain why the traditional analyses fall short in explaining the data

cq: motivate why SVM are better.

hb: to do

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VI. Appendix

I. Geographical Distribution of Survey Respondents

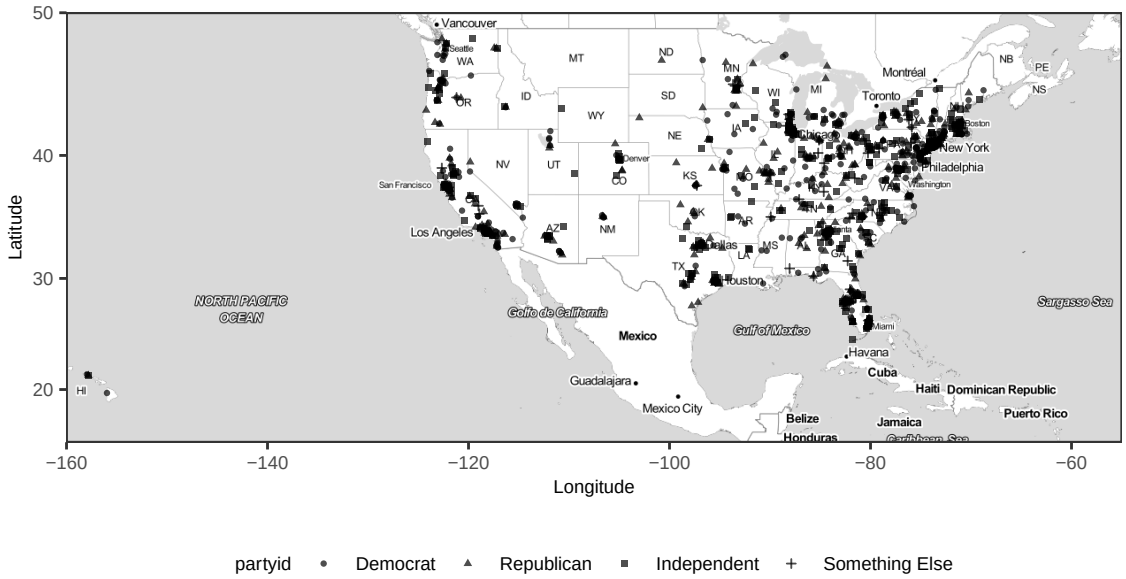

Figure A1: *Geographical Distribution of Survey Respondents by Party Identification.*

II. Experimental Manipulations and Vignettes

Distractor Paragraph. The next paragraph was used to distract subjects from the main purpose of the study, and also to define vote selling. After reading the excerpt, participants were told about the hypothetical possibility of doing one of the illegal things mentioned in the excerpt. And that this possibility would be randomly assigned. However, all participants were directly asked whether they would be interested in selling their vote (as seen on Direct Question.

> Washington, D.C.– A department store downtown had a robbery incident last week, reporting several missing iPods from their inventory. Authorities also inform that a group of local residents are trying to ``sell'' their votes to political candidates ahead of a local election for city council. Residents approached some of the candidates running for office and offered to vote for that candidate in return for monetary compensation. In a different subject matter, the local police station released a report on driving habits and behaviors in the Capitol district last week. Finally, cyber–crime has become an increasingly serious issue in the area in the past few year.

Direct Question. All subjects read the next paragraph, and then *all* answered the direct question:

> Now you will be entered into a random lottery for the opportunity to do ONE of the illegal things you just read before. This means that you might be randomly offered to hypothetically do ANY of the activities mentioned before.

> After a random assignment, you have been selected for the opportunity to hypothetically sell your vote. This means that you will have the hypothetical opportunity to accept money from a candidate for your vote. Would you be willing to accept the offer, assuming you would not go to jail? By selecting ``Yes,'' you could earn up to $ 1,000.

Es nuestro approach causal inference? Al menos si cumple con 3 assumptions en Hain-mueller2014a. Estas son dadas por el diseno del experimento.