

# Citizen Support for Domestic Drone Use and Regulation

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## Abstract

Recently, governments, commercial firms, and individuals have increased their use of unmanned aerial vehicles (i.e., “drones”). As with many new technologies, drone use has outpaced government oversight. Attempts to regulate the technology have been met with intense public backlash. Therefore, governments need to understand the public’s preferences for a regulatory regime. Analyzing national survey data, we address two questions: (a) What policies do Americans prefer for the regulation of drones? and (b) Does the public believe the federal, state, or local government or nongovernmental actors should be responsible for regulating drone use? Public preferences are one of several important inputs affecting policymaking; therefore, our results provide an important overview of current public opinion toward drone policy, as well as a theoretical blueprint for understanding how such opinions might fluctuate overtime.

## Keywords

drone, public opinion, federalism, regulation, technology

The use of drones (unmanned aerial vehicles) by the Los Angeles Police Department (LAPD) sparked heated debate in 2017. The controversy began 3 years prior when the LAPD acquired two drones but were deterred from

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using them after intense community protests by antidrone activists. The issue was revived in October, 2017 when the Los Angeles Police Commission considered guidelines for drone usage and a 1-year pilot project (Woods & Gazzar, 2017). Before proceeding, the Police Commission held public meetings. Groups including the Stop LAPD Spying Coalition and the American Civil Liberties Union provided 5,000 signatures opposing the program; Black Lives Matter Los Angeles also opposed the program. Despite strident opposition, the panel overseeing the LAPD unanimously approved the guidelines, and voted 3-to-1 in favor of the 1-year pilot test.<sup>1</sup> Public opposition to this decision culminated in protests and arrests (Wick, 2017).

Los Angeles is not the only city in which drone policy has collided with public opposition. Officials in Seattle purchased drones but then stopped the program after the officers who introduced it at a public meeting were shouted down (Clarridge, 2013). An aroused public led other smaller cities to back away from or place moratoriums on drone use (West & Bowman, 2016). Much of the public backlash against law enforcement use of drones has been driven by concerns over privacy and government intrusion, similar to concerns surrounding body imaging at airports (Vicinanze, 2015), license plate readers (Merola, Lum, Cave, & Hibdon, 2014), red-light cameras (Vock, 2015), and officer-worn cameras (Police Executive Research Forum 2017).

Attempts by the Federal Aviation Administration (FAA) to regulate private drone use were met with several protracted and successful lawsuits by drone enthusiasts (O'Sullivan, 2017). Public policymakers are becoming aware of the need to regulate both government and private drone use, but they are also becoming aware of the backlash that can occur if they act with insufficient public input. The public's reaction can have important consequences for regulatory control at all three levels of government, requiring decision makers to balance the concerns of the general public, drone users, and government agencies. Concerns over regulation highlight the following questions: (a) What policies or restrictions on drone usage does the public support? and (2) Who should be responsible for regulating drones: federal, state, or local governments?

Due to the rapid pace of technological development, drone use has outpaced governments' ability to regulate it, and opinions on how and who should regulate drones is often unknown. This study adds to the growing body of literature assessing public opinion toward drones (Kreps, 2014), specifically, those opinions regarding policies and the placement of responsibility for that regulation with the federal, state, or local governments. The background section briefly reviews the growing ubiquity of uninhabited aircraft. We then summarize what is currently known about the public's preferences toward federal, state, and local government policy actions, and from

this, we develop and test several hypotheses. The “Data and Method” section describes our data, procedures, and variable specifications. Based on our findings, we conclude by discussing how public opinion might shift as drone technology and government responses to it develop.

## **Background**

Although the use of drones by the military is well known (Ceccoli & Bing, 2015), there is growing interest in domestic drones for government, commercial, and recreational use (Calo, 2014; West & Bowman, 2016b; Villasenor, 2013, pp. 462-464). Projections indicate that by 2020, seven million public, commercial, and personal drones will be flying overhead (Farber, 2014; Finn & Wright, 2012). Other predictions about the industry include US\$82 billion in economic benefits, and the creation of more than 100,000 jobs by 2025 (Sakiyama, Miethe, Lieberman, Heen, & Tuttle, 2017). Akin to ride-sharing and home-sharing, drones are an insurgent technology operating on the unregulated fringes of regulated markets.

Under the 2012 FAA Modernization and Reform Act (FMRA), Congress, with bipartisan support, tasked the FAA with integrating drones into U.S. airspace. Some lawmakers and advocacy groups have argued for a robust federal approach to regulating drones, whereas others oppose such a preemptive approach, favoring instead flexibility for subnational or nongovernmental experimentation (Bennett, 2014; Farber, 2014; Kaminski, 2013). The division of policymaking among federal, state, and local government officials and nongovernmental actors is currently evolving, but with little input from the public. Depending on the case in question, the public has been reluctant to allow either law enforcement use of drones or “heavy-handed” government regulation of private use of drones. Three sets of drone users are of particular interest in this study: law enforcement, commercial firms, and recreational hobbyists.<sup>2</sup>

### *Law Enforcement*

Spurred by the availability of grants from the U.S. Department of Homeland Security, law enforcement units have used drones for more than a decade (Salter, 2014, 169, McDougal, 2013). The most prevalent uses are for traffic management, crime-scene photography, search and rescue, mass evacuations, and aerial viewing of fires (Gettinger, 2017). Such uses are not without controversy; public concerns over safety and fears of “Orwellian-style” monitoring and weaponization have been prominent (West & Bowman, 2016a, 2016b, Bachman, 2017).

Nonetheless, law enforcement agencies have purchased or are considering using drones in many major cities. Currently, 347 state and local police, sheriff, fire and emergency agencies in 43 states fly unmanned aerial drones (Gettinger, 2017). Public backlash has stymied many of these efforts because public officials, in the absence of systematic public opinion data, misjudged the extent of public support for government drone use.

### *Commercial Firms*

The consulting group PricewaterhouseCoopers projects the global market for commercial drones could be worth US\$127 billion (G. Smith, 2016), and the FAA estimates that approximately 420,000 commercial drones will be operating by 2021 (Bachman, 2017). Many retailers believe drones could revolutionize product delivery by making it faster and cheaper to deliver packages.<sup>3</sup> However, private industry fears that this vast potential could be undermined by overly restrictive regulations (Manjoo, 2015). For example, the private market would be affected significantly if the FAA were to ban drones from delivering packages over long distances or at night, which it attempted to do (Madrigal, 2014; Vanian, 2016).<sup>4</sup>

Despite industry lobbying efforts, the FAA's 2016 rules for nonhobbyist unmanned aircraft (known as Part 107 of the Federal Aviation Regulations) impose several restrictions on commercial usage of drones below 55 pounds, including requirements that the drone remain in sight of the operator at all times, not exceed 100 mph, not exceed a flying altitude of 400 feet, not fly outside of daylight or twilight hours, and must be at least 5 miles away from any airport. These rules also require any commercial drone operators to receive a remote pilot certification, register the aircraft with the FAA, and undergo a background check (Lee, 2016). These regulations effectively prohibit the delivery of packages to consumers by companies such as Amazon.com or FedEx (Lee, 2016), though firms do have the opportunity to apply for a waiver. Drone providers and user organizations prefer self-restraint and self-regulation (Clarke, 2014), including building hardware restrictions into drones (Harman, 2015).

### *Recreational Hobbyists*

As the FAA has been mulling over the balance between keeping the skies safe without slowing the growth of a new technology, recreational customers have been purchasing drones for pleasure and prefer to minimize restrictions on where, how, and when they can use their drones. The voice of the hobbyist is muted in the policy process compared with that of government

and commercial advocates, but what hobbyists lack in lobbying power they partially make up for in growing numbers, enthusiasm, and the ability to challenge regulations in court. Consequently, federal regulations are currently in flux; after the FAA issued severely restrictive regulations requiring noncommercial drone registration, the D.C. Circuit Court of Appeals overturned the regulations (O'Sullivan, 2017).

## **Government Response and Public Attitudes Toward Drones**

### *The Role of Federalism in the Drone Policy Debate*

All three levels of government have debated and implemented drone policies. However, there is no clear delineation of authority between them. Policymaking authority is still in flux, and there is significant room for public opinion to make that delineation. Many state and local legislative bodies have considered policy responses to the public's concerns over the increasing use of drones. Drone regulation at the local level has been patchwork, varied, and subject to delay.<sup>5</sup> Some local governments have considered regulating drones within their jurisdiction, but they face the potential for state level pre-emption of their drone policies.<sup>6</sup> In all, 17 states criminalize certain uses of drones. Some states, but not all, have addressed commercial use of drones.<sup>7</sup> State legislators have also considered policies to address law enforcement use.<sup>8</sup> Amid this patchwork of policy action at the federal, state, and local level, it is unclear which level of government (if any) the public wishes to take policy action on drones. The actions of policymakers clearly attest to this.

When asked which level of government would "do the best job when it comes to solving many of the problems and issues we face," the American public often expresses the highest level of confidence in the federal government, followed by state and local government (Arceneaux, 2005). However, these numbers fluctuate across time, survey question wording, and issue area (e.g., Pew Research Center, 2015; Shaw & Reinhart, 2001). The available data therefore suggest that Americans believe that all levels of government should, to some degree, take policy action and provide services within a board range of policy areas (Cantril & Cantril, 1999; Grodzins, 1960; Thompson & Elling, 1999).

When we peer deeper, however, polls show that Americans' preferences for government action are highly conditional. Schneider, Jacoby, and Lewis (2011) and Schneider and Jacoby (2008) conclude that public preferences for policy action by different levels of government are dependent on the issue area. For example, Cantril and Cantril (1999) find that citizens want

day-to-day operations of schools to be the purview of local governments, but they believe that states should provide educational certifications and financial assistance. In this same vein, Konisky (2011) finds that citizens prefer state governments to enact policies protecting drinking water and preserving natural areas, state and federal governments to reduce smog, and the federal government to reduce pollution (Konisky 2011). The only environmental issue for which more than 40% of respondents supported local government action was urban sprawl. To wit, public preferences for policy assignment across issue areas and across levels of government are highly nuanced.

### *Public Attitudes on Drone Regulation*

Available public opinion data on the support for domestic use of drones and for specific drone policies are limited, sector specific, and the results are often mixed. For example, the Pew Research Center reported 2014 National Survey results that were, by and large, unenthusiastic: nearly two thirds of Americans thought introducing nonmilitary drones would be a change for the worse if “personal and commercial drones are given permission to fly through most U.S. airspace” (A. Smith, 2014). Lieberman and colleagues (2014, p. 2; see also Miethel, Lieberman, Sakiyama, & Troshynski, 2014) showed that “public acceptance of aerial drone usage is highly contextual, depending upon the specific area of its application.” This finding is borne out by Sakiyama and colleagues (2017) who find “substantial variation across areas of domestic policing” (p. 9). Nonetheless, national surveys find support for aerial drones in many facets of law enforcement, especially, when used to solve or deter crime (Scott, 2015), aid search and rescue missions, and track down runaway criminals or control illegal immigration (Ackerman, 2012; Scott, 2015). However, no study of public attitudes toward aerial drones has compared support for policies across sectors (government, commercial, and private hobbyists) and for policies across levels of government (federal, state, and local). To this point, policymakers have at best a fuzzy read on which policies the public supports or which level of government the public wants to institute those policies.

### *The Role of Public Opinion in Policymaking*

Although the focus of this study is on the public’s response to drones, and their preferences with regard to government regulation of this new technology, there is debate as to whether there actually is a link between public preferences and policy outcomes (Page, 1994). For example, recent research by Achen and Bartels (2016) and Gilens and Page (2014) cast

doubt on the ability of the mass public to affect policymaking. In addition, traditional theories suggest that the major contours of public opinion are determined by partisan elites (Zaller, 1992) and that partisan elites are driven by organized interests rather than the desires of the mass public (Bawn et al., 2012).

However, there is also a long line of literature detailing policy responsiveness to public opinion (e.g., Bartels, 1991; Bishin, 2009; Hayes & Bishin, 2012; Hutchings, 1998; Page & Shapiro, 1983; Pratchett & Wilson, 1996). Evidence suggests that policymakers do respond to mass opinion rather than just elite opinion (Enns, 2015; Leighley & Oser, 2018; Mishler & Sheehan, 1993; Stimson, MacKuen, & Erikson, 1995; Wlezien, 1995) and that the mass public is able to develop opinions independent of elite influence (Bullock, 2011; Friedman, 2012). Although the literature provides a mixed read, public opinion can affect policy outcomes depending on the issue, its salience, the policy-making body, and whose opinions are being expressed.

Likewise, the democratic element of the American system pushes policymaking toward public preferences because ignoring them can lead to electoral backlash (Nyhan, McGhee, Sides, Masket, & Greene, 2012), to the sorts of backlash witnessed, specifically, against drone policies in Los Angeles and Seattle, or in lawsuits such as those against the FAA. Policies at the local level—even if well intentioned and seemingly innocuous—can arouse public protest, particularly, in issue areas that touch on fear of losing personal freedom, privacy, and local control. This has been the case with drones, but also with land use (Hurley & Walker, 2004), genetically modified food (Harmon, 2014), and bicycle sharing policies (Dovey, 2017).

As it stands, neither party has taken a strong stance on drone use, and according to traditional theories of public opinion formation (Zaller, 1992), this has kept those who identify with either party from doing the same. As such, studying opinion toward drone policy provides insight into public opinion that studying other, more polarized policy areas (i.e., climate change), may not. In lieu of clear elite signals, partisans have sometimes converged, for example, both Republicans and Democrats have expressed skepticism of law enforcement deployment of drones due to privacy concerns.

## Hypotheses

The existing literature suggests that public opinion centers around partisan affiliation. In the case of drone policy, however, domestic drones are relatively new, and the parties have yet to stake out strong or opposing positions (Lowy, 2012). As such,

**Hypothesis 1:** Partisan affiliation will not be significantly related to support for drone regulation.

Republicans generally have more confidence in governments that they perceive as closer to the people and, thus, are more likely to select local and state governments to take policy action (Uslaner, 2001). In line with this preference, the Republican-controlled House has recently passed legislation to decentralize the responsibility for drone policy from the federal government to state and local governments (Vanian, 2017), and the 2012 national Republican Party platform expressed general concern about “unreasonable government intrusion” (Gilens, 2012, p. 2). Given this, when provided the option to have states rather than the federal government craft regulations, we might expect Republicans to prefer that drone legislation be handled at the state or local level:

**Hypothesis 2:** Republicans will be more likely than Democrats to support legislation originating from the state and local level.

However, when addressing the use of drones by law enforcement and the military, Republicans might favor these uses more than Democrats given the Republican Party’s “hawkish” stances on crime and terrorism (Petrocik, 1996):

**Hypothesis 3:** Republicans, more than Democrats, will favor the use of drones by Law Enforcement.

**Hypothesis 4:** Republicans, more than Democrats, will favor the use of drones by the Military.

We also surmise that regardless of level of government policymaking, Democrats will support policy action to regulate drones more so than Republicans, given that Republicans generally favor more limited government (Goren, 2005):

**Hypothesis 5:** Democrats will favor more regulations in general than Republicans.

Although the expectations listed above are grounded in prior research of federalism, partisanship, and public opinion, the domestic use of drones is a new policy issue that has not been studied widely. Therefore, it is possible that these traditional explanations for preferences may not hold within the context of drone policymaking

## Data and Method

We use data from the 2016 pre-election Cooperative Congressional Election Study (CCES) survey, conducted by YouGov from September 28 to November 7 ( $N = 1,000$  American adults).<sup>9</sup> Each of the individuals in the sample responded to questions about drones, as well as to a series of questions about partisanship, education, age, income, gender, and other demographic information (Ansolabehere & Schaffner, 2017).<sup>10</sup> The majority of the survey questions about drones focused on domestic use by law enforcement, commercial firms, and private citizens, but some additional questions were also included to address the public's view on military use.

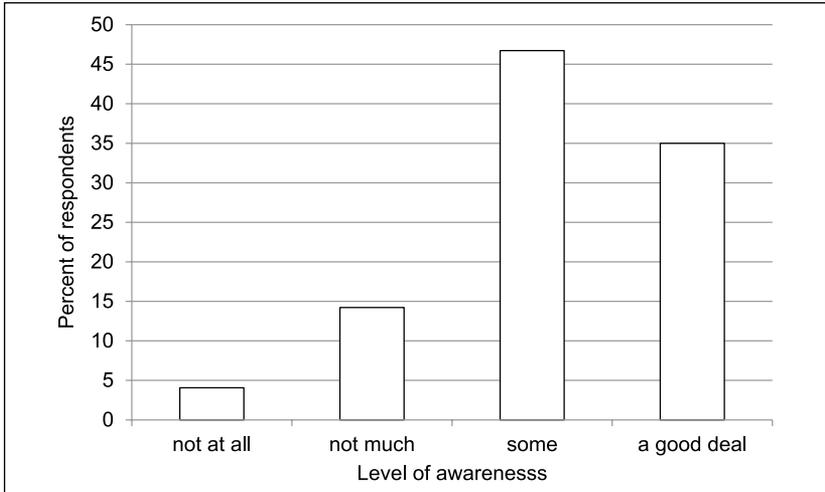
### Dependent Variables

Respondents' attitudes about drones were measured in four ways. The first question asks about awareness of drone use: "How much have you heard about the use of unmanned aircraft, sometimes called 'drones,' by the military, law enforcement agencies, companies (e.g., deliveries by Amazon.com), and fellow citizens: 'a good deal,' 'some,' 'not much,' or 'not at all'?" (recoded to run low-to-high:  $\bar{x} = 3.13$ ,  $SE = 0.03$ ). As seen in Figure 1, the data show that Americans are generally well aware of the use of drones. More than 81% of Americans claim to have "some" or "a good deal" of knowledge about drones, whereas less than 5% have not heard of drones.

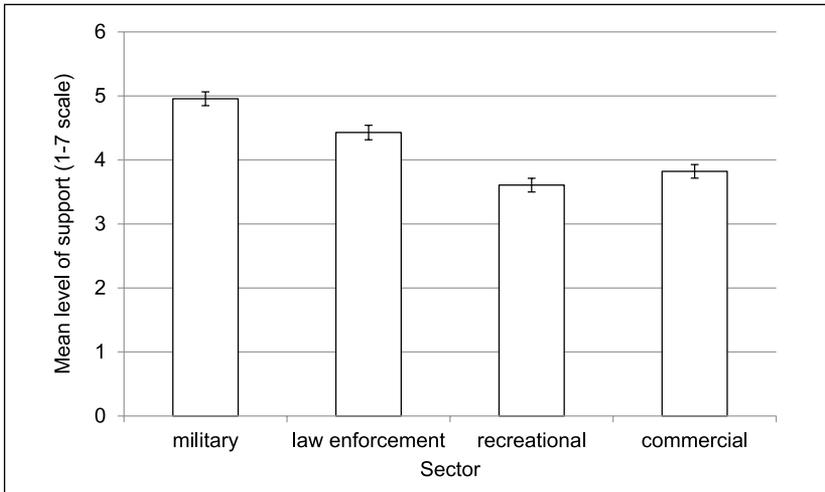
Second, we asked, based on a 1-to-7 scale, from low-to-high, how supportive respondents are of the use of drones in four different sectors: military ( $\bar{x} = 4.96$ ,  $SE = 0.06$ ), law enforcement ( $\bar{x} = 4.43$ ,  $SE = 0.06$ ), recreational ( $\bar{x} = 3.61$ ,  $SE = 0.05$ ), and commercial ( $\bar{x} = 3.82$ ,  $SE = 0.05$ ). The mean level of support for use of drones, by sector, is shown in Figure 2. Support for military use was the highest, followed by law enforcement, commercial, and recreational use.

The third set of questions asked respondents to check which of the nine following regulations they support for law enforcement, commercial, and private use of drones. These policy options mirror current or proposed regulations:

- All drones must be registered with the FAA
- Drones may not be used to take pictures of private property without permission
- Drones may not be flown more than a certain distance from the drone operator
- Drones may not be used to take pictures on public land (e.g., parks, beaches)



**Figure 1.** Level of awareness of drone use.



**Figure 2.** Mean level of support for the use of drones by sector ( $\pm$  95% confidence interval).

- Drones can only be operated by trained and certified personnel
- Drones may not be flown in the airspace of airplanes

- Drones cannot be equipped with lethal weapons (only asked with regard to law enforcement use)
- Require that pictures or video taken are available for public inspection, unless exempt by law (only asked with regard to law enforcement use)
- Drones may not be flown without a warrant for their use (only asked with regard to law enforcement use)
- I do not support any of these regulations

The order in which these options were presented to the survey respondent was randomized, with the exception of “I do not support any of these regulations,” which was always presented last on the list. The options addressing lethal weapons, public inspection, and warrants apply only to law enforcement, therefore, respondents were not allowed to choose them for commercial or private use.

The support for these regulations, by sector, is presented in Table 1. Looking across the different sectors of use, there is relatively high support among the American public for requiring drones to be registered with the FAA, not to be operated in the airspace of airplanes, and not to be allowed to take pictures of private property without permission. With specific regard to law enforcement use of drones, a majority of Americans (65%) believe that the use of lethal weapons should not be allowed, but less than a majority are in favor of necessitating warrants or making videos and pictures taken by drones a matter of public record. The final row of Table 1 indicates that few Americans are in favor of imposing no government regulation of drone use.

Based on the results in Table 1, the mean number of regulations favored by respondents, by sector of use, was calculated. Regulation on law enforcement use ( $\bar{x} = 4.72$ ,  $SE = 0.08$ ) was higher than that for use by commercial entities ( $\bar{x} = 3.55$ ,  $SE = 0.06$ ) and private citizens ( $\bar{x} = 3.37$ ,  $SE = 0.06$ ). However, this is because respondents were offered more regulation response options for law enforcement use. If we compare regulations for each sector of use using only the six policies that applied to all three sectors, we find that the public chooses a similar number of regulations for law enforcement compared with the other two sectors ( $\bar{x} = 3.25$ ,  $SE = 0.06$ ).

The fourth set of measures of American public opinion about drone use is based on a series of questions used to identify which institution should take “primary responsibility for regulating” the use of drones by law enforcement, commercial entities, and private individuals. Summary statistics of the level of support for drone regulation, by sector of use and institution of enforcement, are presented in Table 2. The data show that support for regulation at the federal and state level is highest for law enforcement and commercial use.

**Table 1.** Support for Drone Regulation by Sector of Use and Regulation Type.

|   | Law<br>enforcement<br>use | Commercial<br>use | Private<br>use |
|---|---------------------------|-------------------|----------------|
| All drones must be registered with the FAA                          | 64.9                      | 66.2              | 56.1           |
| Drones may not be flown in airspace of<br>airplanes                 | 72.8                      | 75.3              | 73.7           |
| Drones may not be flown more than certain<br>distance from operator | 42.0                      | 44.9              | 57.2           |
| No pictures of private property without<br>permission               | 61.0                      | 69.6              | 71.1           |
| No pictures on public land (e.g., parks,<br>beaches, etc.)          | 24.5                      | 34.4              | 32.9           |
| Only can be operated by trained and<br>certified personnel          | 59.5                      | 64.5              | 46.0           |
| Drones cannot be equipped with lethal<br>weapons                    | 64.6                      | —                 | —              |
| Drones may not be flown without a warrant<br>for this use           | 38.6                      | —                 | —              |
| Videos and picture are available for public<br>inspection           | 44.6                      | —                 | —              |
| I do not support any of these regulations                           | 9.0                       | 9.3               | 11.4           |

Note. Cell entries are the percent of respondents who support the regulation. Rows and columns do not sum to 100% because respondents were allowed to “check all that apply” for each sector of drone use. FAA = Federal Aviation Administration.

**Table 2.** Support for Drone Regulation by Sector of Use and Institution of Enforcement.

|                    | Law enforcement use | Commercial use | Private use |
|--------------------|---------------------|----------------|-------------|
| Federal government | 38.6                | 40.0           | 27.0        |
| State government   | 41.8                | 38.6           | 36.9        |
| Local government   | 18.6                | 14.5           | 32.3        |
| Commercial firms   | 1.0                 | 6.9            | 3.8         |

Note. Cell entries are the percent of respondents who support the regulation. Respondents were only allowed to select one institution of regulation enforcement for each sector of drone use.

Support for enforcement by local government increases in the case of drone use by private individuals.

## *Independent Variables*

The above survey responses indicate the public's opinions with regard to drones. Now we turn our analysis to explain why individuals hold these preferences. This multivariate analysis accounts for respondent sex (0 = "males," 1 = "females";  $\bar{x} = 0.52$ , SE = 0.02); level of education (1 = "no high school," 6 = "postgraduate degree";  $\bar{x} = 3.21$ , SE = 0.05); household income (1 = "less than US\$10,000," 16 = "US\$150,000 or more";  $\bar{x} = 6.08$ , SE = 0.11); partisanship (1 = "Strong Democrat," 7 = "Strong Republican";  $\bar{x} = 3.63$ , SE = 0.07); a 5-point scale of general mistrust in government ranging from low to high ( $\bar{x} = 3.36$ , SE = 0.03), birth year ( $\bar{x} = 1,969$ , SE = 0.56); an indicator of whether the respondent or someone in his or her immediate family is either on active duty or retired from the military (0 = "no," 1 = "yes";  $\bar{x} = 0.57$ , SE = 0.02); a 0-to-100 Google Trends' score on the search term "drone" in the respondent's state during the time period while the survey was being conducted ( $\bar{x} = 44.03$ , SE = 0.26); an indicator of whether the respondent's state has enacted any law(s) regarding drones (0 = "no," 1 = "yes";  $\bar{x} = 0.68$ , SE = 0.01); a 4-point scale of interest in politics ranging from low to high ( $\bar{x} = 3.20$ , SE = 0.00); and an indicator of where the respondent identified their race/ethnicity as non-White ( $\bar{x} = 0.27$ , SE = 0.01). The drone awareness variable described in the previous section is also included in the multivariate analyses where drone awareness is not the dependent variable. A more specific 3-point measure of mistrust in local government is also added to the analysis of the public's preferences on government regulation of drone use ( $\bar{x} = 1.83$ , SE = 0.02).

## **Results**

The survey respondent is the unit of analysis.<sup>11</sup> The data were weighted using a measure provided by YouGov to produce results equivalent to those that would be found in a representative sample of American adults.

### *Awareness of Drone Use*

The analysis of variation in awareness of drones (Table 3) shows that women are less aware of drone usage than men, and individuals with better education, younger respondents, those with ties to the military, and respondents with a greater level of interest in politics are more aware. For example, in the case of ties to the military, the predicted probability that respondents with military ties know "a good deal" about drones is .37 compared with .28 among those without ties to the military.

**Table 3.** Multivariate Regression Analysis of Awareness of Drone Use.

|  |               |
|--|---------------|
| Females  | -.62*** (.08) |
| Education  | .10*** (.03)  |
| Household income   | .01 (.01)     |
| Partisanship (Democrat–Republican)                               | -.01 (.02)    |
| General mistrust of government                                   | -.03 (.04)    |
| Birth year (older–younger)                                       | .01** (.002)  |
| Active duty, veteran, and/or family ties to military service     | .24** (.09)   |
| Google Trends on searches for “drone” in respondent’s state      | .001 (.005)   |
| Drone law(s) enacted in respondent’s state (0 = “no,” 1 = “yes”) | -.07 (.08)    |
| Interest in Politics (low–high)                                  | .41*** (.05)  |
| Race (0 = “White,” 1 = “non-White”)                              | -.17 (.09)    |
| Log-likelihood   | -845.50       |
| Pseudo $R^2$   | .13           |
| N  | 873           |

Note. Cell entries are ordered probit coefficients (standard errors in parentheses, cut points not presented). Cases with missing data were excluded from the analysis using listwise deletion.

\* $p \leq .05$ . \*\* $p \leq .01$ . \*\*\* $p \leq .001$ .

### *Support for Regulation of Drones by Sector of Use*

The first column in Table 4 shows that for military applications, older respondents, and individuals with higher incomes are more supportive. Likewise, Republicans are more supportive than Democrats, which supports Hypothesis 3. For example, the predicted probability that Strong Democrats “strongly support” the use of drones by the military is .17 compared with .33 among Strong Republicans.

For law enforcement applications (Table 4, second column), individuals with higher levels of education, lower incomes, higher levels of mistrust in the government, younger respondents, people residing in states with more active Google searches about drones, and non-Whites are less supportive. For example, the predicted probability that respondents who “strongly agree” that the government can be trusted and “strongly support” the use of drones by law enforcement is .22; among respondents who “strongly disagree” that the government can be trusted, the predicted probability drops to .13. The data also show that Republicans are more supportive than Democrats of law enforcement use of drones, providing support for Hypothesis 4. For example, the predicted probability that Strong Democrats “strongly support” the use of drones by law enforcement is .12 compared with .24 among Strong Republicans.

**Table 4.** Multivariate Regression Analysis of Support for the Use of Drones by Sector.

|  | Military       | Law enforcement | Recreational  | Private sector |
|--|----------------|-----------------|---------------|----------------|
| Females  | -.12 (.08)     | -.01 (.08)      | -.41*** (.08) | -.20** (.08)   |
| Education  | -.04 (.03)     | -.08** (.03)    | -.002 (.03)   | .05 (.03)      |
| Household income   | .03* (.01)     | .04** (.01)     | -.01 (.01)    | .004 (.01)     |
| Partisanship (Democrat–Republican)                               | .09*** (.02)   | .08*** (.02)    | -.001 (.02)   | -.02 (.02)     |
| General mistrust of government                                   | .05 (.03)      | -.09* (.03)     | -.07* (.03)   | -.04 (.03)     |
| Birth year (older–younger)                                       | -.02*** (.002) | -.01*** (.002)  | .01*** (.002) | .004 (.002)    |
| Active duty, veteran, and/or family ties to military service     | .15 (.08)      | .10 (.08)       | .08 (.08)     | .03 (.08)      |
| Awareness of drone use   | .09 (.05)      | -.07 (.05)      | .03 (.05)     | >-.001 (.05)   |
| Google Trends on searches for “drone” in respondent’s state      | -.002 (.004)   | -.01* (.004)    | -.002 (.004)  | -.004 (.004)   |
| Drone law(s) enacted in respondent’s state (0 = “no,” 1 = “yes”) | -.03 (.08)     | .11 (.08)       | .07 (.08)     | -.07 (.08)     |
| Interest in politics (low–high)                                  | .002 (.05)     | -.06 (.05)      | -.15*** (.05) | -.13** (.05)   |
| Race (0 = “White,” 1 = “non-White”)                              | -.12 (.09)     | -.21* (.09)     | -.19* (.09)   | -.21* (.09)    |
| Log-likelihood   | -1,480.53      | -1,589.54       | -1,588.78     | -1,605.71      |
| Pseudo R <sup>2</sup>  | .05            | .04             | .02           | .01            |
| N  | 873            | 873             | 873           | 873            |

Note. Cell entries are ordered probit coefficients (standard errors in parentheses, cut points not presented). Cases with missing data were excluded from the analysis using listwise deletion.

\* $p \leq .05$ . \*\* $p \leq .01$ . \*\*\* $p \leq .001$ .

For recreational sector use (Table 4, third column), women, individuals who mistrust the government, respondents with a higher level of interest in politics, and non-Whites are less supportive. For example, the predicted probability that respondents who “strongly agree” that the government can be trusted and “strongly support” the use of drones for recreational purposes is .07; among respondents who “strongly disagree” that the government can be trusted, the predicted probability drops to .04. The results also show that younger respondents are more supportive of recreational applications. For

example, the predicted probability that a 25-year-old respondent “strongly supports” the use of drones for recreational purposes is .08; for a 60-year-old respondent, the predicted probability drops to .04.

With regard to private sector use, the results in the fourth column of Table 4 indicate that women, individuals with higher levels of interest in politics, and non-Whites are less supportive of this application of the technology. For example, the predicted probability that a female respondent “strongly supports” the use of drones for private sector use is .07, whereas the predicted probability increases to .10 among male respondents. These results also indicate no discernible partisan differences in support for recreational drone use, providing support for Hypothesis 1.

Our analysis of variation in the number of drone regulations favored by respondents, by sector of use, is presented in Table 5. The results in the first row of the table indicate that women are more in favor of drone regulation, across all sectors. For example, in the case of law enforcement use, of the nine regulatory options offered to respondents, women are predicted to favor 5.2 regulations, whereas male respondents are predicted to favor 4.3 regulations. In contrast, the results in Table 5 indicate that younger Americans are generally in favor of less regulation across all sectors. For example, in the case of commercial use of drones, a 25-year-old is predicted to favor 3.1 regulations, whereas 60-year-old respondents are in favor of 3.8 regulations. The first column of Table 5 shows that respondents who are more aware of how drones are used are more supportive of regulations on law enforcement usage. For example, individuals who have “a good deal” of awareness of drone use are predicted to favor 5.2 regulations on law enforcement use of drones, whereas respondents who are “not at all” aware of drone technology favor 3.7 regulations. The results in the second column of Table 5 indicate that respondents with higher levels of interest in politics are more in favor of regulations on commercial use of drones. For example, respondents who follow politics “most of the time” were predicted to be in favor of 3.8 regulations, whereas individuals who “hardly at all” follow politics are predicted to be in favor of 2.8 regulations. Although Hypothesis 5 expected Democrats to favor more regulations than Republicans, we do not find that this is the case.

### *Support for Regulation of Drones by Institution of Enforcement of Use*

Table 6 presents an analysis of the variation in the level of support for drone regulations by institution of enforcement and sector of use. These multinomial logit analyses are representative of respondents’ support for regulations

**Table 5.** Multivariate Regression Analysis of Number of Drone Regulations Desired by Respondents by Sector of Use.

|  | Law enforcement use | Commercial use  | Private use     |
|--|---------------------|-----------------|-----------------|
| Females  | .19*** (.06)        | .20*** (.05)    | .29*** (.06)    |
| Education  | .01 (.02)           | .02 (.02)       | .02 (.02)       |
| Household income   | >.001 (.01)         | .003 (.01)      | .01 (.01)       |
| Partisanship (Democrat–Republican)                               | –.02 (.01)          | .003 (.01)      | –.003 (.01)     |
| General mistrust of government                                   | .02 (.03)           | >.001 (.02)     | >.001 (.03)     |
| Specific mistrust in local government                            | –.05 (.05)          | –.03 (.04)      | –.07 (.05)      |
| Birth year (older–younger)                                       | –.01** (.002)       | –.01*** (.002)  | –.01*** (.002)  |
| Active duty, veteran, and/or family ties to military service     | –.04 (.05)          | –.01 (.05)      | .005 (.05)      |
| Awareness of drone use   | .12* (.05)          | .09 (.05)       | .09 (.05)       |
| Google Trends on searches for “drone” in respondent’s state      | .01 (.003)          | .003 (.004)     | .003 (.004)     |
| Drone law(s) enacted in respondent’s state (0 = “no,” 1 = “yes”) | –.03 (.05)          | –.04 (.05)      | –.03 (.05)      |
| Interest in politics (low–high)                                  | .08 (.04)           | .11** (.04)     | .06 (.04)       |
| Race (0 = “White”, 1 = “non-White”)                              | .03 (.06)           | .004 (.06)      | –.004 (.06)     |
| Constant   | 11.33** (3.68)      | 11.47*** (3.35) | 14.45*** (3.33) |
| Log-likelihood   | –2,073.37           | –1,761.75       | –1,769.55       |
| $\chi^2$   | 64.18***            | 65.52***        | 85.48***        |
| N  | 873                 | 873             | 873             |

Note. Cell entries are Poisson regression coefficients (standard errors in parentheses, cut points not presented). Cases with missing data were excluded from the analysis using listwise deletion.

\* $p \leq .05$ . \*\* $p \leq .01$ . \*\*\* $p \leq .001$ .

by the government (i.e., federal, state, and local) as opposed to regulation by commercial firms (i.e., the “base category” in the analysis). Commercial regulation was selected as the base category because of the low level of support for commercial regulation (Table 2). Given the complexity of this analysis, rather than providing examples of marginal effects as above, we discuss the general trends seen in the results presented in Table 6.

**Table 6.** Multivariate Regression Analysis of Variation in Support for Regulations by Level of Government and Sector of Drone Use.

|  | Law enforcement use |               |               | Commercial use |                |              | Private use   |               |               |
|--|---------------------|---------------|---------------|----------------|----------------|--------------|---------------|---------------|---------------|
|  | Federal             | State         | Local         | Federal        | State          | Local        | Federal       | State         | Local         |
| Females  | 1.08 (.58)          | 0.49 (.57)    | 0.34 (.59)    | 0.19 (.47)     | -0.25 (.46)    | -0.44 (.50)  | 1.71** (.61)  | 1.15 (.59)    | 1.37* (.60)   |
| Education  | 0.25 (.33)          | 0.14 (.33)    | 0.17 (.34)    | 0.20 (.16)     | 0.14 (.15)     | -0.07 (.17)  | 0.09 (.20)    | 0.11 (.19)    | -0.01 (.20)   |
| Household income   | -0.24 (.20)         | -0.24 (.20)   | -0.29 (.20)   | 0.09 (.07)     | 0.06 (.07)     | 0.02 (.08)   | 0.16* (.08)   | 0.13 (.08)    | 0.15 (.08)    |
| Partisanship (Democrat–Republican)                               | 0.11 (.20)          | 0.25 (.20)    | 0.38 (.20)    | -0.26* (.10)   | -0.04 (.10)    | 0.04 (.12)   | -0.02 (.14)   | 0.05 (.14)    | 0.06 (.14)    |
| General mistrust in government                                   | 0.45 (.37)          | 0.74* (.37)   | 0.78* (.38)   | -0.11 (.19)    | 0.08 (.19)     | 0.13 (.22)   | -0.30 (.21)   | -0.07 (.20)   | 0.18 (.20)    |
| Specific mistrust in local government                            | -1.45 (.76)         | -2.00** (.76) | -1.99* (.79)  | 0.15 (.33)     | -0.47 (.33)    | -0.14 (.36)  | 0.28 (.43)    | -0.23 (.42)   | -0.12 (.42)   |
| Birth year (older–younger)                                       | -0.02 (.02)         | -0.03 (.02)   | -0.03 (.02)   | -0.04** (.02)  | -0.04* (.02)   | -0.03 (.02)  | -0.06** (.02) | -0.06** (.02) | -0.06** (.02) |
| A active duty, veteran, and/or family ties to military service   | -2.32* (.91)        | -2.16* (.92)  | -2.60** (.93) | 0.03 (.45)     | -0.03 (.46)    | -0.62 (.51)  | -0.64 (.57)   | -0.38 (.56)   | -0.73 (.56)   |
| A awareness of drone use   | 0.33 (.49)          | 0.33 (.50)    | 0.30 (.51)    | -0.54 (.27)    | -0.94*** (.27) | -0.57 (.32)  | 0.03 (.35)    | -0.20 (.36)   | -0.11 (.35)   |
| Google Trends on searches for “drone” in respondent’s state      | 0.05 (.03)          | 0.03 (.03)    | 0.03 (.03)    | -0.04 (.02)    | -0.02 (.03)    | -0.03 (.02)  | 0.02 (.02)    | 0.01 (.02)    | 0.02 (.02)    |
| Drone law(s) enacted in respondent’s state (0 = “no,” 1 = “yes”) | -1.79 (.99)         | -1.90 (1.00)  | -1.90 (1.02)  | -0.66 (.50)    | -0.43 (.50)    | -1.30* (.54) | -0.59 (.66)   | -0.87 (.64)   | -0.79 (.65)   |
| Interest in politics (low–high)                                  | 1.95*** (.49)       | 1.70*** (.49) | 1.66*** (.50) | 0.56* (.25)    | 0.78** (.25)   | 0.34 (.27)   | 0.18 (.39)    | 0.15 (.38)    | -0.04 (.38)   |
| Race (0 = “White,” 1 = “non-White”)                              | -1.34 (.75)         | -2.26** (.75) | -1.83* (.78)  | -0.27 (.44)    | -0.46 (.45)    | -0.14 (.50)  | -0.20 (.55)   | -0.62 (.54)   | -0.22 (.54)   |
| Log likelihood   |                     | -837.23       |               |                | -907.55        |              |               | -983.61       |               |
| R <sup>2</sup>   |                     | .11           |               |                | .12            |              |               | .07           |               |
| χ <sup>2</sup>   |                     | 146.32***     |               |                | 153.93***      |              |               | 94.18***      |               |
| N  |                     | 873           |               |                | 873            |              |               | 873           |               |

Note. Cell entries are multinomial logit regression coefficients (standard errors in parentheses). The preference for commercial firms to oversee drone regulation is treated as the base category. Cases with missing data were excluded from the analysis using listwise deletion.  
\**p* ≤ .05. \*\**p* ≤ .01. \*\*\**p* ≤ .001.

With regard to use by law enforcement agencies, individuals who generally mistrust the government are more supportive of regulation on the state and local level. In contrast, respondents who have a more specific mistrust in local government, and individuals with ties to the military, are less supportive of regulation of law enforcement use by state and local government. The data also indicate that individuals with higher levels of interest in politics support regulation of law enforcement use of drones by all three levels of government.

For commercial use, Republicans, younger Americans, and individuals residing in states with drone regulations already in law are generally less supportive of drone regulation. In contrast, respondents with a higher level of interest in politics are more supportive of regulation of commercial use of drones.

In the case of use of drones by private citizens, women and individuals with higher household incomes are more in favor of regulation. In contrast, younger Americans are less likely to support regulation of private use of drones.

## Discussion

Drones are rapidly diffusing into civilian life. With or without a regulatory regime, drones will reshape the world in the same way other new technologies such as cellular phones, the Internet, and ride-sharing (e.g., Uber, Lyft) have. But like other nascent technologies, current institutional practices will be upended once the technology is taken to its logical end. And, despite being an overall boon to the economy, drones will leave some industries, companies, and individuals worse off.

Government at all levels often steps in both to curtail the injuries caused to legacy industries by emerging technologies and to promote public safety. This has been witnessed in recent battles between ride-sharing companies and local governments. Just as ride-sharing has upended the taxi industry, drones have the ability to upend dozens of industries. Both those who stand to gain and those who stand to lose will attempt to push for regulations in their favor, and these battles have already begun. In this study, we offer comprehensive insight on public support for drone regulations across sectors (law enforcement, commercial, and hobbyist) and across level of government (federal, state, and local). The drone industry is comprised of interests that are wealthy and politically powerful (e.g., Amazon.com) and therefore has the ability to sway policy debates in its favor. Therefore, it is essential to track public support for regulation of drone use in detail and across sector and level of government.

Congress is currently working toward pushing drone regulation to the states and localities, but federal agencies will still need to implement some

rules given that drones will travel over state lines, constituting interstate commerce. Whatever public debates there are about drones, they have not turned partisan at this point. This is largely reflected in our findings (e.g., Table 4 indicating no relationship between partisanship and opinions on regulation of recreational and private sector use of drones). It is likely that the public has yet to divide on the issue of drone regulation based on party affiliation because partisan elites have not (yet) taken vocal opposing positions from each other (Mullinix, 2016; Zaller, 1992). Partisan elites have not polarized because (a) neither party has developed a concrete reason to be opposed to drones at this time and (b) the industries that stand to be affected negatively by them have not yet been able to bring either party to their side. If this were to happen, the debate about drones will likely turn partisan. As policies solidify over time, it will be important to follow public opinion on the matter to see how the public, industry, and governments interact as the technologies develop. But as it stands, some argue the need for a robust federal approach to regulating drones, whereas others oppose such an approach, favoring flexibility instead.

Our results also show that the public is very aware of domestic drone use. This is quite remarkable given that the technology has yet to be fully “rolled out.” Internet searches for drone information have steadily increased over the last decade, with a spike coming in late 2016 likely driven by heightened news coverage of domestic drones (e.g., pizza delivery, product delivery, and drones as Christmas gifts). The public also seems to be in favor of drone regulation, particularly, when it comes to protecting privacy and airplanes. On other regulations, the public is more divided. We also find that public support for military use of drones was the highest, followed by law enforcement, commercial use, and recreational use.

We also note, however, that our analysis leaves a significant amount of variation unexplained. Specifically, our results show that because drones have not yet become politicized by party elites, partisanship does not play a strong role in predicting the public’s opinions toward drones.<sup>12</sup> But, we expect that if partisan elites were to begin sending diverging cues to the public, partisanship would likely become the potent predictor of opinion.

As drones continue to become part of the American technological landscape, it will be increasingly important for policymakers and scholars to seek guidance from the public. As such, additional research is needed to examine the American public’s opinions about drone policy and to further “peer under the hood” to understand how opinions about nascent technologies form as they are adopted.

## Appendix

**Table A1.** State Policies on Drones in 2016.

| State          | Laws | Resolutions | Warrant requirements | Protection from nongovernment operators | Criminal penalties | States pre-emption |
|----------------|------|-------------|----------------------|---|--------------------|--------------------|
| Alaska         |      |             | ✓                    |   |                    |                    |
| Alabama        |      | ✓           |                      |   |                    |                    |
| Arkansas       | ✓    |             |                      | ✓                                       | ✓                  |                    |
| Arizona        | ✓    |             |                      |   | ✓                  | ✓                  |
| California     |      |             |                      | ✓                                       |                    |                    |
| Colorado       |      |             |                      |   |                    |                    |
| Connecticut    |      |             |                      |   |                    |                    |
| Delaware       |      |             |                      |   |                    | ✓                  |
| Florida        | ✓    |             |                      |   |                    |                    |
| Georgia        |      | ✓           |                      |   |                    |                    |
| Hawaii         | ✓    |             |                      |   |                    |                    |
| Iowa           | ✓    |             | ✓                    |   |                    |                    |
| Idaho          |      |             |                      |   |                    |                    |
| Illinois       | ✓    |             | ✓                    |   |                    |                    |
| Indiana        |      |             | ✓                    |   | ✓                  |                    |
| Kansas         | ✓    |             |                      | ✓                                       |                    |                    |
| Kentucky       |      |             |                      |   |                    |                    |
| Louisiana      |      |             |                      |   | ✓                  |                    |
| Massachusetts  |      |             |                      |   |                    |                    |
| Maryland       | ✓    |             |                      |   |                    | ✓                  |
| Maine          | ✓    |             | ✓                    |   |                    |                    |
| Michigan       |      |             |                      |   |                    | ✓                  |
| Minnesota      |      |             |                      |   |                    |                    |
| Missouri       |      |             |                      |   |                    |                    |
| Mississippi    | ✓    |             |                      | ✓                                       | ✓                  |                    |
| Montana        | ✓    |             | ✓                    |   |                    |                    |
| North Carolina | ✓    |             |                      |   | ✓                  |                    |
| North Dakota   |      |             | ✓                    |   |                    |                    |
| Nebraska       |      |             |                      |   |                    |                    |
| New Hampshire  | ✓    |             |                      |   |                    |                    |
| New Jersey     |      |             |                      |   |                    |                    |
| New Mexico     |      | ✓           |                      |   |                    |                    |
| Nevada         |      |             |                      |   | ✓                  |                    |
| New York       |      |             |                      |   |                    |                    |
| Ohio           | ✓    |             |                      |   |                    |                    |
| Oklahoma       | ✓    |             |                      |   |                    |                    |
| Oregon         | ✓    |             |                      |   | ✓                  | ✓                  |
| Pennsylvania   |      | ✓           |                      |   |                    |                    |
| Rhode Island   |      | ✓           |                      |   |                    | ✓                  |
| South Carolina |      |             |                      |   |                    |                    |
| South Dakota   |      |             |                      |   |                    |                    |
| Tennessee      | ✓    |             |                      |   | ✓                  |                    |

(continued)

**Table A1. (continued)**

| State         | Laws | Resolutions | Warrant requirements | Protection from nongovernment operators | Criminal penalties | States pre-emption |
|---------------|------|-------------|----------------------|---|--------------------|--------------------|
| Texas         |      |             |                      |   | ✓                  |                    |
| Utah          |      |             | ✓                    |   | ✓                  |                    |
| Virginia      | ✓    |             | ✓                    |   |                    | ✓                  |
| Vermont       | ✓    |             | ✓                    |   | ✓                  |                    |
| Washington    |      |             |                      |   |                    |                    |
| Wisconsin     | ✓    |             |                      |   | ✓                  |                    |
| West Virginia | ✓    |             |                      |   |                    |                    |
| Wyoming       |      |             |                      |   |                    |                    |

Source. National Conference of State Legislatures (ncsl.org).

**Table A2.** Replication of Multivariate Regression Analysis of Awareness of Drone Use (Table 3) Using Ideology Instead of Partisanship.

|   |               |
|---|---------------|
| Females   | -.62*** (.08) |
| Education   | .08** (.03)   |
| Household income  | .01 (.01)     |
| Ideology (Liberal–Conservative)                                     | -.07* (.02)   |
| General mistrust of government                                      | -.003 (.04)   |
| Birth year (older–younger)  | .01** (.002)  |
| Active duty, veteran, and/or family ties to military service        | .21* (.09)    |
| Google Trends on searches for “drone” in respondent’s state         | .004 (.005)   |
| Drone law(s) enacted in respondent’s state (0 = “no,”<br>1 = “yes”) | -.05 (.09)    |
| Interest in politics (low–high)                                     | .38*** (.05)  |
| Race (0 = “White,” 1 = “non-White”)                                 | -.17 (.09)    |
| Log-likelihood  | -795.74       |
| Pseudo $R^2$  | .11           |
| $N$   | 838           |

Note. Cell entries are ordered probit coefficients (standard errors in parentheses, cut points not presented). Cases with missing data were excluded from the analysis using listwise deletion.

\* $p \leq .05$ . \*\* $p \leq .01$ . \*\*\* $p \leq .001$ .

**Table A3.** Replication of Multivariate Regression Analysis of Support for the Use of Drones by Sector (Table 4) Using Ideology Instead of Partisanship.

|  | Law            |                |               |                |
|--|----------------|----------------|---------------|----------------|
|  | Military       | enforcement    | Recreational  | Private sector |
| Females  | -.15 (.08)     | .04 (.08)      | -.40*** (.08) | -.21** (.08)   |
| Education  | -.02 (.03)     | -.07** (.03)   | -.01 (.03)    | .04 (.03)      |
| Household income   | .03** (.01)    | .04** (.01)    | -.01 (.01)    | .01 (.01)      |
| Ideology (Liberal–<br>Conservative)  | .09*** (.02)   | .09*** (.02)   | -.03 (.02)    | -.01 (.02)     |
| General mistrust of<br>government  | .05 (.03)      | -.08* (.03)    | -.07* (.03)   | -.08* (.03)    |
| Birth year (older–<br>younger)   | -.02*** (.002) | -.01*** (.002) | .01*** (.002) | .004 (.002)    |
| Active duty, veteran,<br>and/or family ties<br>to military service           | .22** (.08)    | .13 (.08)      | .09 (.08)     | .02 (.08)      |
| Awareness of drone<br>use  | .12* (.05)     | -.03 (.06)     | .03 (.05)     | .04 (.05)      |
| Google Trends<br>on searches<br>for “drone” in<br>respondent’s state         | -.003 (.004)   | -.01* (.004)   | -.003 (.004)  | -.005 (.004)   |
| Drone law(s)<br>enacted in<br>respondent’s state<br>(0 = “no,”<br>1 = “yes”) | -.02 (.08)     | .11 (.08)      | .07 (.08)     | -.06 (.08)     |
| Interest in politics<br>(low–high)   | .01 (.05)      | -.03 (.05)     | -.14*** (.05) | -.13** (.05)   |
| Race (0 = “White,”<br>1 = “non-White”)                                       | -.22 (.09)     | -.28*** (.09)  | -.23** (.09)  | -.21* (.09)    |
| Log-likelihood   | -1,414.51      | -1,530.14      | -1,519.28     | -1,536.22      |
| Pseudo R <sup>2</sup>  | .06            | .04            | .02           | .01            |
| N  | 838            | 838            | 838           | 838            |

Note. Cell entries are ordered probit coefficients (standard errors in parentheses, cut points not presented). Cases with missing data were excluded from the analysis using listwise deletion.

\* $p \leq .05$ . \*\* $p \leq .01$ . \*\*\* $p \leq .001$ .

**Table A4.** Replication of Multivariate Regression Analysis of Number of Drone Regulations Desired by Respondents by Sector of Use (Table 5) Using Ideology Instead of Partisanship.

|  | Law<br>enforcement<br>use | Commercial<br>use | Private use     |
|--|---------------------------|-------------------|-----------------|
| Females  | .14** (.06)               | .16*** (.05)      | .25*** (.06)    |
| Education  | -.003 (.02)               | .01 (.02)         | .01 (.02)       |
| Household income   | >-.001 (.01)              | .001 (.01)        | .01 (.01)       |
| Ideology (Liberal–<br>Conservative)                                    | -.05*** (.01)             | -.04** (.01)      | -.03* (.01)     |
| General mistrust of<br>government                                      | .04 (.02)                 | .02 (.02)         | .02 (.02)       |
| Specific mistrust in local<br>government                               | -.09* (.04)               | -.06 (.04)        | -.09* (.04)     |
| Birth year (older–younger)   | -.004** (.002)            | -.005** (.002)    | -.01*** (.002)  |
| Active duty, veteran, and/or<br>family ties to military service        | -.03 (.05)                | -.002 (.05)       | -.01 (.05)      |
| Awareness of drone use   | .08 (.04)                 | .06 (.04)         | .07 (.05)       |
| Google Trends on searches for<br>“drone” in respondent’s state         | .01 (.003)                | .004 (.003)       | .004 (.004)     |
| Drone law(s) enacted in<br>respondent’s state (0 = “no,”<br>1 = “yes”) | -.02 (.05)                | -.02 (.04)        | -.03 (.05)      |
| Interest in politics (low–high)  | .07 (.03)                 | .11** (.04)       | .06 (.03)       |
| Race (0 = White, 1 = non-<br>White)                                    | .08 (.05)                 | .04 (.05)         | .04 (.06)       |
| Constant   | 9.67** (3.29)             | 9.63*** (3.08)    | 14.06*** (3.36) |
| Log-likelihood   | -1,925.96                 | -1,657.33         | -1,678.19       |
| $\chi^2$   | 69.60***                  | 82.59***          | 89.17***        |
| N  | 838                       | 838               | 838             |

Note. Cell entries are Poisson regression coefficients (standard errors in parentheses, cut points not presented). Cases with missing data were excluded from the analysis using listwise deletion.

\* $p \leq .05$ . \*\* $p \leq .01$ . \*\*\* $p \leq .001$ .

**Table A5.** Replication of Multivariate Regression Analysis of Variation in Support for Regulations by Level of Government and Sector of Drone Use (Table 6) Using Ideology Instead of Partisanship.

|  | Law enforcement use |               |               | Commercial use |                |              | Private use |              |              |
|--|---------------------|---------------|---------------|----------------|----------------|--------------|-------------|--------------|--------------|
|  | Federal             | State         | Local         | Federal        | State          | Local        | Federal     | State        | Local        |
| Females  | 1.56* (.72)         | 0.99 (.72)    | 1.02 (.74)    | -0.14 (.51)    | -0.59 (.50)    | -0.61 (.55)  | 1.54* (.69) | 1.02 (.68)   | 1.31 (.68)   |
| Education  | 0.29 (.32)          | 0.22 (.32)    | 0.32 (.33)    | 0.14 (.15)     | 0.10 (.15)     | -0.004 (.17) | 0.004 (.18) | 0.03 (.18)   | -0.05 (.18)  |
| Household income   | -0.22 (.19)         | -0.22 (.19)   | -0.25 (.19)   | 0.08 (.07)     | 0.05 (.08)     | 0.01 (.08)   | 0.15* (.07) | 0.14 (.07)   | 0.17* (.07)  |
| Ideology (Liberal-Conservative)                                  | -0.26 (.25)         | -0.07 (.25)   | -0.01 (.25)   | -0.22* (.11)   | 0.02 (.11)     | 0.15 (.12)   | -0.18 (.22) | -0.09 (.21)  | -0.05 (.22)  |
| General mistrust in government                                   | 0.18 (.36)          | 0.49 (.37)    | 0.58 (.37)    | -0.05 (.20)    | 0.17 (.20)     | 0.26 (.22)   | 0.01 (.21)  | 0.22 (.20)   | 0.47 (.21)   |
| Specific mistrust in local government                            | -1.09 (.62)         | -1.70** (.62) | -1.54* (.63)  | 0.15 (.39)     | -0.57 (.40)    | -0.12 (.41)  | 0.26 (.51)  | -0.31 (.51)  | -0.19 (.51)  |
| Birth year (older-younger)                                       | -0.03 (.03)         | -0.03 (.03)   | -0.03 (.03)   | -0.03* (.01)   | -0.02 (.02)    | -0.001 (.02) | -0.04 (.02) | -0.03* (.02) | -0.04* (.02) |
| Active duty, veteran, and/or family ties to military service     | -2.33** (.91)       | -2.11* (.92)  | -2.49** (.93) | 0.19 (.46)     | -0.16 (.46)    | -0.06 (.52)  | -0.18 (.62) | 0.05 (.61)   | -0.18 (.61)  |
| Awareness of drone use   | 0.31 (.48)          | 0.26 (.49)    | 0.52 (.50)    | -0.59 (.28)    | -0.94*** (.29) | -0.41 (.33)  | -0.06 (.38) | -0.13 (.38)  | -0.01 (.38)  |
| Google Trends on searches for "drone" in respondent's state      | 0.08* (.04)         | 0.07 (.04)    | 0.06 (.04)    | -0.04 (.02)    | -0.02 (.02)    | -0.03 (.02)  | 0.01 (.02)  | 0.01 (.03)   | 0.02 (.02)   |
| Drone law(s) enacted in respondent's state (0 = "no," 1 = "yes") | -1.23 (1.03)        | -1.34 (1.04)  | -1.26 (1.05)  | -0.30 (.48)    | -0.08 (.49)    | -0.83* (.55) | 0.07 (.59)  | -0.24 (.57)  | 0.01 (.57)   |
| Interest in politics (low-high)                                  | 1.93*** (.50)       | 1.73*** (.51) | 1.76*** (.52) | 0.67** (.23)   | 0.99** (.24)   | 0.66* (.27)  | 0.40 (.37)  | 0.40 (.37)   | 0.27 (.37)   |
| Race (0 = "White," 1 = "non-White")                              | -1.66 (.88)         | -2.67** (.88) | -2.50* (.78)  | -0.15 (.48)    | -0.53 (.50)    | -0.52 (.56)  | -0.37 (.57) | -0.81 (.57)  | -0.52 (.57)  |
| Log-likelihood   |                     | -786.42       |               |                |                |              |             | -929.94      |              |
| R <sup>2</sup>   |                     | .12           |               |                | .12            |              |             | .06          |              |
| χ <sup>2</sup>   |                     | 137.50***     |               |                | 153.50***      |              |             | 106.33***    |              |
| N  |                     | 838           |               |                | 838            |              |             | 838          |              |

Note. Cell entries are multinomial logit regression coefficients (standard errors in parentheses). The preference for commercial firms to oversee drone regulation is treated as the base category. Cases with missing data were excluded from the analysis using listwise deletion.  
\*p ≤ .05. \*\*p ≤ .01. \*\*\*p ≤ .001.

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## Notes

1. Countering this, Los Angeles Police Department (LAPD) representatives said they received 1,675 emails, claiming that the overwhelming majority supported drone deployment (Sklar, 2017); however, only 6% of the 1,675 emails the department received actually supported drone use according to City News Service (Wick, 2017).
2. Many government agencies beyond law enforcement have explored drone use (Markowitz et al., 2017), but these uses are less controversial and therefore peripheral to our analysis.
3. In 2013, for example, Amazon.com captured public attention with its proposal for a drone delivery system, and the company made its first ever drone delivery in December of 2016 in the United Kingdom. In June 2017, the U.S. Patent and Trademark Office published an Amazon.com patent application for “beehive-like towers” to serve as fulfillment centers for package delivery by drones in cities throughout the United States (Yurieff, 2017).
4. In a 2015 interview with *The Telegraph*, Amazon.com CEO Jeff Bezos said, “The technical problems are very straight ahead. The biggest issue, or the biggest thing that needs to be worked on, is the regulatory side” (Quinn, 2015).
5. In 2015, Chicago was the first U.S. city to pass comprehensive drone legislation. The Chicago ordinance largely mirrors newly released FAA requirements for drone use by commercial entities, but the Chicago restrictions apply to commercial and recreational users alike, and creates no-fly zones over schools, hospitals, police stations, and places of worship (Zickuhr, Stahl, & DuPuis, 2016). To address citizen privacy concerns, the Chicago city council also made it illegal for any drone operator to fly a drone “directly over” a person or private property without consent (Zickuhr et al., 2016). Several large cities including San Jose, Santa Clara, Miami, and Los Angeles have passed ordinances limiting drone use near airports, public parks, and special events, such as the Super Bowl (Zickuhr et al., 2016). Ocean City, New Jersey, for example, chose to temporarily ban drones altogether to allow city officials more time to consider the issue of drones (Zickuhr et al., 2016).
6. For example, in 2017 the State of Florida passed a law that pre-empts local regulation of drones (Lamb, 2017). Although some local officials claim that local governments should have the authority to craft policies tailored to their individual municipalities, Florida state policymakers argue “vesting the regulation

of unmanned aircraft in the state will alleviate any patchwork regulation of unmanned aircraft that currently exists and may promote the use of unmanned aircraft” (Lamb, 2017). As of 2016, seven other states (Arizona, Delaware, Maryland, Michigan, Oregon, Rhode Island, and Virginia) had drone regulation pre-emption laws in place (National Conference of State Legislatures [NCSL], 2016).

7. Louisiana, for example, requires registration and licensing fees for drones used in commercial agricultural activity (NCSL, 2016). A more detailed summary of drone policies, by state, is provided in the Appendix Table A1.
8. Vermont, for example, has warrant requirements for law enforcement while allowing for the use of drones in search and rescue operations and the assessment of natural disaster damage. Under Vermont law, any law enforcement agency’s use of drones must be reported to the Department of Public Safety (National Conference of State Legislatures, 2016). A recently proposed bill in the Connecticut legislature would ban armed drones in the state, but only for commercial and recreational users, exempting law enforcement agencies from the proposed ban (Bachman, 2017).
9. YouGov maintains panels of individuals who volunteer to complete surveys over the Internet. More individuals participated in the study than were included in the data set. The subset of participants included in the data set was selected using YouGov’s matched sample methodology. This method entailed two steps. First, a representative target sampling frame of U.S. citizens was created using demographic data from a variety of sources, including the American Community Survey, the Current Population Survey, and the Pew U.S. Religious Landscape Survey. Second, for each member of the target sample, at least one member from the pool of opt-in participants was selected for inclusion in the data set. This matching process was based on the following variables: sex, age, race, years of education, interest in politics, employment status, Evangelical or “born again” Christian status, marital status, partisanship, and political ideology. The result is a data set comprised of participants who have the same measured characteristics as the target sample.
10. Prior approval to conduct all elements of the study was granted by the University of Miami, Human Subjects Research Office on 13 September 2016 (Protocol 20120757/MOD00013692). YouGov, the provider of the research participants, complies fully with European Society for Opinion and Marketing Research (ESOMAR) standards for protecting individuals’ privacy and information. YouGov respects the privacy of all of its visitors and participants. YouGov’s privacy policy outlines what personally identifiable information is collected, how the information is used, with whom the information may be shared, and the security procedures in place to help prevent loss, misuse, or alteration of information under their control. All YouGov panelists join voluntarily through a double opt-in procedure, where respondents must confirm their consent by responding to an email. YouGov invites people to complete self-administered surveys via the web using a panel of respondents. Panelists are provided the privacy policy when they

voluntarily sign up and are provided a link to this policy with each study request. Specifically, each invitation states that their participation is voluntary and confidential. YouGov's detailed privacy policy is available online ([today.yougov.com/about/privacy](http://today.yougov.com/about/privacy)). Participants were free to stop participating at any time by closing their web browser. Participation in the study was confidential. Identifying information, such as names or addresses, was not collected during the study.

11. All analyses were conducted using Stata/SE (version 14.2; stata.com).
12. Included in the Appendix (Tables A2-A5) are versions of our models with political ideology replacing partisanship. The results are similar. That said, unlike partisanship, which responds to elite party cues, the results in the Appendix show that in some cases, ideology may be a better predictor of public opinion on drones. This indicates that individuals may be able to use their ideology to form opinions about drones in the absence of strong signals from party elites.

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