# Private Eyes in the Sky:

*Emerging Technology and the Political Consequences of Eroding Government Secrecy*

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**ABSTRACT**

How do emerging technologies that erode governments' near-monopolies on intelligence information affect public support for leaders and their foreign policies? Technologies – like imagery satellites – that were once the domain of state governments are now increasingly available to commercial and private actors. As a result, non-government entities can now exercise the *disclosure decision*, publicly divulging information whose release was once controlled by states. We argue that non-government entities with access to these technologies serve as alternative information sources that can verify government claims or reveal activities governments have not previously acknowledged. Using original survey experiments we find that commercial satellite imagery can serve as an informational cue that shifts public opinion, and, depending on its content, either attenuates or bolsters the effect of similar cues from government sources. The findings advance academic and policy debates over secrecy in international relations and on the effect of emerging technologies in the security domain.

Returning from his May 2018 summit with North Korean leader Kim Jong-un, President Donald Trump tweeted that "everybody could feel safer now" because "There is no longer a Nuclear Threat [*sic*] from North Korea" (Baker and Sang-Hun 2018). Within months, however, news reports circulated commercial satellite imagery identifying 13 hidden missile bases north of the 38th parallel, challenging Trump's claims (Bermudez, Cha, and Collins 2018; Murphy 2018). Even if the missile activity did not explicitly violate the terms of the summit agreement, this imagery cast doubt on Trump's continued insistence that the rockets and missiles "have stopped" (Sanger and Broad 2018).

The contradictions between Trump's claims and Kim's nuclear program became even more stark following an aborted second summit in February 2019. Think tanks and media outlets published more commercial satellite imagery revealing that North Korea had begun reconstituting a missile site it had partially dismantled in 2018 (Bermudez and Cha 2019). Even Trump was forced to acknowledge that North Korea had been expanding its weapons arsenal (Sanger and Broad 2019).

How do emerging technologies that erode governments' near-monopolies on national security information affect foreign policymaking? A growing research program on secrecy has identified incentives states have to maintain their informational advantage in the national security realm relative to private actors. In some cases, keeping information secret minimizes scrutiny of norm-violating behavior or circumvents political pressure to take action in situations that leaders would rather avoid (McManus and Yarhi-Milo 2017; Carson and Yarhi-Milo 2017; Carson 2018; O'Rourke 2018). In other cases, states may choose to disclose information in ways that serve their interests, either through public announcements or selective disclosure to international monitoring agencies (Carnegie and Carson 2018; 2019).

Much of this literature presumes that states maintain control over what we term the *disclosure decision*: the choice governments make regarding whether, when, and how to release sensitive information about foreign actors. In recent decades, monitoring technologies – such as imagery-gathering satellites – that were once the domain of highly capable superpowers have proliferated in the private sector. This diffusion of information technology has enabled non-government actors to monitor world events more seamlessly, chipping away at state control over the disclosure decision.

We advance the study of secrecy in international relations by investigating whether technologies that reduce information asymmetries between leaders and their citizens shift public opinion. New technologies, ranging from commercial satellites to social media, provide vast quantities of information that have the potential to influence public preferences (Kreps 2020). Public preferences can, in turn, shape the behavior of democratic leaders, who often consider public opinion when making foreign policy (Tomz, Weeks, and Yarhi-Milo 2020). We explore whether information-gathering technologies limit the government's freedom of action in the foreign policy domain, contributing to debates on whether the proliferation of information sources makes it harder (Baum and Potter 2019) or easier (Joseph and Poznansky 2018) for publics to constrain leaders' foreign policymaking.

We propose two pathways – *verification* and *revelation* – that chart how the disclosure of sensitive security information collected using non-government technologies can shape public attitudes towards political leaders and their foreign policies. Under the verification mechanism, non-government actors use information gathered by systems like commercial satellites to provide an independent check on a government leader's claims in the foreign policy arena. This information can either confirm or contradict government claims, potentially bolstering or

weakening support for leaders and their policies. Under the revelation mechanism, non-government actors can unmask previously unacknowledged information that governments might seek to keep hidden. Disclosure of this information could generate public pressure for the government to take action in cases it might have otherwise ignored or tolerated.

To test these mechanisms, we field survey experiments that explore how disclosure of commercial satellite imagery affects public preferences toward leaders and their foreign policy decisions. We find that verification of a president's claims by commercial satellite imagery can be just as influential in shaping public attitudes as information supplied by government intelligence agencies. When commercial imagery supports a president's claims during a hypothetical nuclear crisis, respondents are, on average, more likely to perceive the president as trustworthy, more likely to vote for the leader in future elections, and slightly more likely to support the president's plans to address the crisis compared to a baseline condition in which no such verification occurs. This increased favorability toward the leader and his proposed policies is comparable in magnitude to situations when similarly confirming information is released by government intelligence agencies. When commercial imagery contradicts the president's claims, respondents are, on average, less likely to perceive the president as trustworthy, less likely to vote for the leader in future elections, and less likely to support the president's plan to deal with the nuclear threat.

When commercial imagery reveals information about a rival state's use of chemical weapons against its citizens that had not been disclosed publicly, we find the public is more supportive of using force to punish the rival, relative to a baseline condition without revelation. Case studies in the appendix provide additional support for these mechanisms by illustrating the role that commercial satellite imagery played in influencing U.S. public opinion and policy

towards North Korea's nuclear program, Beijing's militarization in the South China Sea, and Uyghur internment in Xinjiang.

This paper contributes to three bodies of international relations scholarship. First, we advance the study of secrecy beyond the incentives and disincentives states have to disclose sensitive information. Specifically, we investigate what happens when states no longer control the disclosure decision. Second, the paper contributes to debates over how informational cues affect public support for foreign policy. Researchers have previously explored how elites, international organizations, humanitarian agencies, and domestic opposition groups can influence public opinion toward foreign policy decisions (Chapman and Reiter 2004; Fang 2008; Chapman 2009; Grieco et al. 2011; Busby et al. 2019). We extend this research by examining whether non-government actors armed with information gathering technologies can provide salient informational cues. More importantly, we analyze how cues from non-government entities interact with those from the president and government agencies. Third, we contribute to debates over the influence of emerging technologies in international relations. Recent studies have explored how technologies like drones, cyber capabilities, and autonomous weapons affect public support for the use of force, but they have largely overlooked the role of commercial information-gathering technologies and how their diffusion affects the government's freedom of action in the foreign policy domain. (Walsh and Schulzke 2018; Horowitz 2016).

**THEORY**

*State Secrecy and the Disclosure Decision*

States historically maintained a near-monopoly on the apparatus used to gather intelligence on foreign entities. The financial, material, and human resources needed to develop and operate

networks of spies, satellites, and other collection systems were typically beyond the reach of non-state actors.[1] Gathering sensitive information about the behavior of foreign actors was therefore the near-exclusive province of intelligence agencies and their state masters.

Once intelligence agencies collected this information, government officials typically controlled whether, when, and how to release it. We term this the "disclosure decision," the government's choice to publicly release or acknowledge information that was initially secret and concealed from one or more audiences.[2] These authorized disclosures can take a variety of forms, including announcements by government officials, press releases, and the government's provision of information directly to media outlets or non-governmental organizations.

When deciding whether to disclose this information, governments weigh the political, strategic, and operational benefits against potential costs. In some cases, governments might release information to mobilize support from domestic and international audiences. During the Cuban Missile Crisis, for example, the U.S. ambassador to the United Nations famously confronted his Soviet counterpart with reconnaissance imagery revealing Soviet missile sites in Cuba (Dobbs 2008, 129–32). Governments might also reveal information to demonstrate their capacity to hold a rival at risk. Israel's security services, for instance, release information about the locations and identities of Hezbollah personnel to signal that Israel can target the group (Riemer and Sobelman 2019). Moreover, states seeking to enforce compliance with international agreements often disclose sensitive information to "name and shame" violators. In so doing, states can rally allies

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[1] Many multinational firms had access to information about foreign entities, but this information was not typically released to broader audiences.

[2] This comports with Carson's (2018, 5) definiton of secrecy. We distinguish this authorized disclosure of information from unauthorized leaks. See Sagar 2013

around efforts to punish violators and dissuade other states from engaging in deviant behavior (Keohane 1984; Finnemore and Sikkink 1998; Keck and Sikkink 1998).[3]

Disclosing sensitive security information, however, is not without its drawbacks. In some cases, governments withhold state secrets because public disclosure offers no tangible political benefit. In other instances, governments may be reluctant to disclose information for fear of exposing the methods used to obtain intelligence. This "disclosure dilemma" may compel states to pass information to allies or international organizations that can act on information without exposing its source (Carnegie and Carson 2019, 270). Alternatively, states may fear that exposing deviant behavior of adversaries will normalize transgressions in ways that undermine international regimes (Carnegie and Carson 2019). Exposing information about rivals can also trigger destabilizing security competition, both by provoking other states to respond to a rival's behavior and by fueling domestic pressures for more confrontational policies among hawkish elites and the general public (Carnegie and Carson 2018; Carson 2018).

### *Proliferation of Information Technologies and the Erosion of the Disclosure Decision*

The proliferation of new information-gathering technologies by non-state actors has weakened state control over both information collection and the disclosure decision. The disclosure of sensitive information by third party, non-government actors – such as think tanks, private firms, humanitarian organizations, and the media – can amplify both the benefits and drawbacks discussed above. Leaders have traditionally benefited from what Baum and Potter (2008, 43) termed the "elasticity of reality," the ability of elites to frame foreign policy events in ways that may depart from accurate depictions of these events.

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[3] In some cases, shining a spotlight on activity has led to domestic backlash or even an intensification of deviant behavior. See Hafner-Burton 2008; Risse, Ropp, and Sikkink 1999

The profusion of technologies that gather and publish data disclosing activities of friendly and rival actors – including commercial imagery satellites and internet-based ship and aircraft tracking – could erode, though not eliminate, this elasticity. For example, despite Moscow's denials, photos posted on Instagram revealed Russian military deployments in Ukraine (Szoldra 2014). Private actors with this information can choose to disclose it, often without the political, operational, legal, and ethical constraints that guide a government's disclosure decision. This information can subsequently reach audiences around the world via ever expanding internet and mobile networks. The ability of new technologies to expose sensitive activities may make states reluctant to initiate covert operations (Joseph and Poznansky 2018). They also shrink the "backstage" where rivals tacitly collude in concealing each other's covert activities to dampen escalatory pressures (Carson 2018).

Although non-government actors have access to a range of information gathering technologies, we focus on commercial imagery satellites. Commercial imagery is increasingly available to non-government entities, who can obtain high resolution images at little cost. International law does not prohibit satellite overflight, and private firms can legally collect, sell, and disseminate information obtained via satellite to the general public. Advances in remote sensing technologies, coupled with reductions in satellite production and launch costs, have enabled dozens of firms to deploy ever greater numbers of satellites, facilitating more frequent imagery collection across a growing number of locations (Johnson 2019). The commercial firm Planet, for instance, operates more than 150 satellites that capture "the entire Earth's landmass every day" (Planet 2019). Altogether, private firms have launched or plan to launch over 700 commercially-operated imagery satellites into orbit in a market that has grown from $15 million in 2015 to a projected $164 million in 2020 (Hallex and Cottom 2020). Moreover, incorporation

of satellite imagery into everyday applications like Google Maps has made encountering these images commonplace among the general public. This familiarity makes it likely that the public will internalize information disclosed using commercial imagery more easily than similar disclosures using other technologies that are less common among the public, like text-based analyses of communication intercepts (Perkins and Dodge 2009; Aday and Livingston 2009).[4]

The availability of satellite imagery, coupled with its accessibility to the public, has encouraged non-government entities to incorporate this imagery into their analyses on issues ranging from COVID-19 pandemic lockdowns to China's internment of ethnic minorities (Dou, Page, and Chin 2018; Gordon 2020). In some cases, news outlets purchase satellite imagery directly from private firms (Browne and Triebert 2019). In others, non-government actors include imagery in their reports or websites (Bermudez, Cha, and Collins 2018). The public is subsequently exposed to these images through headline stories in print newspapers, cable news, morning talk shows, and outlets ranging from *Time* to *Daily Mail.* Even what Baum (2003) calls "soft news" have incorporated satellite imagery into their coverage, with Comedy Central's *The Daily Show* using it to document North Korean nuclear activity and *Entertainment Tonight* showcasing actor George Clooney's campaign to deter atrocities in South Sudan using satellite imagery (Lewis 2005; Weiner 2012). Indeed, the number of media reports featuring the term "satellite imagery" climbed from just 100 in 2000 to over 3,000 in 2019.[5]

### *Verification, Revelation, and the Political Consequences of Privatizing the Disclosure Decision*

How might the proliferation of commercial imagery satellites affect foreign policymaking? Specifically, does commercial satellite imagery that verifies government statements or reveals

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[4] One recent analysis indicates there are over 154 million Google Maps users in the United States. ("Top U.S. Mapping Apps by Users 2018" 2018)

[5] LexisNexis search of newspaper articles, video reports, newswires, and web-based publications for the term "satellite imagery." Search results include mention of satellite imagery in any context, documenting an increase in coverage.

previously undisclosed information affect public support for decisionmakers and their policies? Does commercial satellite imagery move public attitudes more or less than government-supplied information?

We outline two related pathways that explain how the disclosure of satellite imagery by non-government actors affects public attitudes toward leaders and their foreign policies. In short, non-government actors can exercise the disclosure decision in two types of situations. First, they can verify claims made by government officials. We call this the *verification* mechanism. In some cases, non-government entities release imagery that comports with government claims. For example, media organizations and analysts used commercial satellite imagery to validate U.S. and Saudi government reports of a September 2019 attack on Saudi Arabian oil facilities (Brumfiel 2019). In other cases, non-government actors reveal commercial satellite imagery that directly refutes or fails to support the government's official statements, as when imagery raised doubts about Trump's post-summit claims regarding North Korea's weapons programs.

In a second category of situations, non-government actors divulge information that the government has not previously acknowledged. We call this the *revelation* mechanism. In some instances, governments hope to keep information about activities like covert operations hidden from public view, fearful that exposure could trigger hostile reactions from other states or anti-interventionist opposition domestically. In other cases, governments intentionally hide information about other state's capabilities or actions, fearful that revelation could mobilize demands for more aggressive or escalatory responses that the government would prefer to avoid (Carson 2018).

Under both the verification and revelation mechanisms, non-government actors serve as third-party information providers. What distinguishes the two mechanisms is when and how the non-government actors disclose information about particular foreign policy matters. "Verifiers"

validate a state's claims *after* a government or its leaders have publicly disclosed information about a foreign policy issue. By contrast, "revealers" publish information *before* a government has disclosed such information.

In both cases, non-government information providers supply informational cues that can shape public attitudes toward leaders and their policies. Members of the public are understood to be "rationally ignorant" in foreign policy matters (Downs 1957; Holsti 2004). They rely instead on cognitive shortcuts in the form of informational cues, which Bullock (2011, 497) defines as "message[s] that people may use to infer other information and by extension, to make decisions." The extent to which these cues shape public opinions, however, depends largely on the substantive content of the cue and perceptions of cue-givers as relevant and reliable sources of information on the issue at hand. Some scholars characterize the transmission of these cues as a top-down process in which information provided and positions taken by policy elites, non-government organizations, and international institutions serve as reference points for a citizen's decision about whether to support or oppose a particular policy.[6]

The proliferation of sources of policy-related information has made it easier for the public to receive these cues. Even individuals who are uninterested in foreign policy are now inundated with information, particularly about highly salient foreign policy crises (Baum 2005). As commercial satellite imagery proliferates in news coverage, social media, and the internet, the ground truth presented in satellite imagery may serve as an informational cue that bolsters or weakens confidence in a government leader's claims or in the cues of other elite sources. Indeed, several studies find that when non-government sources supply neutral policy information, the

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[6] On cue-taking from partisan elites, see Zaller 1992; Berinsky 2007; and Berinsky 2009; from military service members and veterans, see Golby, Feaver, and Dropp 2018; and Jost and Kertzer 2019; from international organizations see Chapman and Reiter 2004; Thompson 2006; Fang 2008; Chapman 2009; Grieco et al. 2011; Guardino and Hayes 2018; and Busby et al. 2019)

information can attenuate the effects of partisan elite cues (Bullock 2011; Boudreau and MacKenzie 2014; Guisinger and Saunders 2017).

Moreover, the extent to which satellite imagery affects public preferences is likely shaped by the perceived credibility of its source. Unsurprisingly, research suggests that high credibility sources have a greater impact on the attitudes and behaviors of information recipients than low credibility sources (Wilson and Sherrell 1993). The credibility of information sources is generally thought to be determined by perceptions of trust and competence (Peters, Covello, and McCallum 1997; Wathen and Burkell 2002). These perceptions are often contingent on how news reports frame the source in their coverage and the reputation of the media outlet more broadly (Baum and Potter 2008). When faced with competing cues, publics are expected to follow those from sources they consider more trustworthy (Hetherington 1998). Levi and Stoker (2000, 476) argue the attributes embodying trustworthiness vary along two general dimensions: 1) whether trustees act in ways that are ethical, fair, or honest; and 2) whether they retain competence in the domains where trust has been conferred. Among the factors shaping perceptions of ethicality and fairness are the independence and autonomy institutions enjoy when carrying out their functions (Thompson 2006). Sources are perceived as competent if they have the technical capacity and specialized expertise–in the form of physical assets, personnel, and processes—to generate reliable information (Carpenter and Krause 2012; Hafeez, Zhang, and Malak 2002).

Depending on their perceived autonomy from government influence and technical capabilities, non-government entities that release commercial satellite imagery should provide provide informational cues to the public. Whether satellite imagery confirms or contradicts a leader's claims about a foreign policy matter should shape public attitudes toward the leader and her policies for addressing the issue. Beyond the immediate case at hand, we expect confirmation

and contradiction to have follow-on effects on the public's willingness to believe the leader's future statements and their willingness to vote for the leader in future elections. To be sure, the public's assessment of a leader's claims may have little effect on voting behavior, particularly for non-issue publics that cast their ballots for multifaceted reasons that extend beyond foreign policy or for voters who care little about a leader's past inconsistencies (Krosnick 1990; Anand and Krosnick 2003; Snyder and Borghard 2011; Swire-Thompson et al. 2020). Some evidence, however, suggests the public's foreign policy preferences can sometimes influence voting behavior (Aldrich, Sullivan, and Borgida 1989; Aldrich et al. 2006). Moreover, some studies find voters are more inclined to vote for leaders they perceive as honest (Lenz 2012).

Specifically, we posit that:

H1$_A$: When commercial firms and other non-state actors release satellite imagery that *confirms* a government leader's statements, members of the public will be more likely to perceive these statements as accurate and will be more likely to support the leader and his future statements compared to statements not verified by satellite imagery. (When multiple entities release confirmatory information, public support and perceptions of accuracy will be at their highest.)

H1$_B$: When commercial firms and other non-state actors release satellite imagery that *confirms* a government leader's statements, members of the public will be more likely to support policies the leader proposes to address the issue at hand compared to statements not verified by satellite imagery. (When multiple entities release confirmatory information, public support will be at its highest)

H2$_A$: When commercial firms and other non-state actors release satellite imagery that *contradicts* a government leader's statements, members of the public will be less likely to perceive these statements as accurate and will be less likely to support the leader and his future statements compared to statements not verified by satellite imagery. (When multiple entities release contradicting information, public support and perceptions of accuracy will be at their lowest.)

H2$_B$: When commercial firms and other non-state actors release satellite imagery that *contradicts* a government leader's statements, members of the public will be less likely to support policies the leader proposes to address the issue at hand compared to statements not verified by satellite imagery. (When multiple entities release contradicting information, public support will be at its lowest.)

We also expect that if commercial satellite firms and other non-state actors reveal previously unacknowledged information about a rival state's aggressive activities, it could mobilize public opinion in favor of more assertive policies. Specifically,

> H3: When commercial firms and other non-state actors release satellite imagery that reveals previously unacknowledged information about a rival's aggressive activities, members of the public will support more assertive policies in response to these activities compared to situations without revelation by satellite imagery.

These predictions are premised on the notion that the satellite imagery released by commercial firms and other non-state actors is at least as persuasive to the public as similar imagery provided by government sources. There are reasons to doubt this proposition. Government intelligence agencies enjoy relatively high levels of public support, with an overwhelming majority viewing intelligence agencies as effective in accomplishing their missions (Slick, Busby, and Burns 2019). In contrast, recent polling suggests the public is far less likely to trust leaders of technology companies to provide fair and accurate information to the public, relative to military sources (Gecewicz and Rainie 2019). Concerns about a lack of accountability and profit-oriented motives have shaped public skepticism toward private firms involved in military matters (Ramirez and Wood 2019). Nevertheless, the publics' attitudes toward the use of force are more responsive to information from institutions—like international organizations—they perceive as more politically autonomous and less biased toward the preferences of a particular government (Chapman 2007; 2009; Grieco et al. 2011). We extend this logic to competing information providers within a single state, positing that the public may perceive a government intelligence agency as less autonomous from the executive it serves than a private company. The technical capability of commercial firms to collect information, coupled with their relative autonomy and independence from governmental interference, may lead the public to view them as credible

sources, even if they are perceived as lacking the level of collection or analytic capability resident in government intelligence agencies. We therefore posit that:

> H4: The information disclosed by commercial firms and similar non-state actors will move public opinion at least as much as the same information disclosed by government intelligence agencies.

## METHODOLOGY

We test these hypotheses using two original survey experiments. While experiments allow researchers to precisely identify the effects of variables of interest, scholars debate whether experimental findings are valid beyond the confines of tightly controlled settings that often feature hypothetical scenarios.[7] Despite the ongoing debate, we believe survey experiments remain useful tools for studying public preferences because experiments are grounded in the assumption that research subjects rely on the same cognitive processes as non-experimental subjects making judgments in the real world (Schelling 1961, 55; Levendusky and Horowitz 2012, 328).

We field our survey experiments on 2,067 adults across the United States in January 2020. Respondents were recruited using Lucid, an online sampling service. Researchers turn to online convenience samples as a cost-effective means of recruiting respondents, but these samples often lack the representativeness of national probability samples. Lucid, however, uses quota sampling to recruit samples that better align with U.S. Census demographics than other online convenience samples (Coppock and McClellan 2019). Lucid samples are not nationally representative across all dimensions. Our sample, for instance, overrepresents military veterans and underrepresents Hispanics and Americans with an annual household income over $75,000.[8] Nevertheless, any

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[7] On the benefits of experimental research see Gerber and Green 2012, 1–17; For limitations of experimental research see Hyde 2015.

[8] Appendix B, Section 4 compares the experimental sample to a nationally representative one.

argument that applies to the American population likely also applies to a subset of that population, making our sample useful for theory testing (Coppock and McClellan 2019).

In our experiments, we present hypothetical foreign policy crises that vary the role satellite imagery plays during an interstate crisis (e.g., confirms government claims, refutes government claims, or reveals information that had not been known publicly). Because different actors can release satellite imagery, we also vary the source of the imagery (e.g., commercial firms, government agencies, think tanks). The survey instrument then solicits respondents' opinions on the president and his proposed handling of the crises. The instrument also collects demographic data, assesses knowledge of international affairs, and includes manipulation checks to assess whether subjects internalized the treatment.[9]

**TESTING THE VERIFICATION LOGIC**

The first experiment assesses the political effects of verification. All respondents are told that in 2025, "the President of the United States announces that a rival country is accelerating development of nuclear weapons and is preparing to test a new missile capable of hitting the United States."[10] Respondents are then randomly assigned to one of eleven experimental conditions that vary whether an organization supports or refutes the president's claims, and whether the verifying organization is a U.S. government intelligence agency or a non-government actor armed with commercial satellite imagery (experimental design in Table I).

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[9] See Appendix B. We do not drop respondents who fail the manipulation check. Doing so may produce biased estimates of treatment effects (Aronow, Baron, and Pinson 2019).

[10] We set the scenario in 2025 – after the end of a potential second Trump administration – to minimize the likelihood that responses will be biased by anti-Trump sentiment. Although this introduces some ambiguity as to the president's identity, other recent studies have also adopted this approach (Tomz and Weeks 2019).

In the baseline condition, no entity supports or refutes the president's claims. In the other experimental conditions, respondents are told that shortly after the president's announcement an entity "released imagery of the rival's nuclear and missile research facilities." We vary whether the entity is "Planet Labs, a private U.S. firm that operates commercial satellites"; the "Central Intelligence Agency (CIA)"; or the "Brookings Institution, an independent public policy think tank." Including a think tank in our research design allows us to assess whether varying the nature of the non-government source of the imagery shapes public preferences. Think tanks are generally considered to have substantive expertise, which could make them more persuasive outside voices than firms that solely operate commercial satellites (McGann 2020; Shepard 2011). We then vary whether the imagery reveals activity that "supports" or "contradicts" the president's statement.

To better simulate real world complexity in which the public receives information from multiple—at times, contradictory—sources, we include four additional conditions in which respondents receive verification information from both the CIA and the commercial firm. In these treatments, the CIA and the commercial firm can be unified in supporting the president's statement; unified in contradicting the president's statement; or offer conflicting information regarding the president's statements. To better capture real world dynamics in which the media often mediates the flow of information to the public, all experimental conditions indicate the media reported information to the public, regardless of whether information originated from a government or non-government source.[11] Respondents are then asked to rate the accuracy of the president's statement; the president's trustworthiness; their willingness to support the president's

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[11] We present our treatments as short, descriptive vignettes. Although other researchers have used longer treatments that simulate media reports, recent studies find that responses across a range of substantive and manipulation check questions do not hinge on whether respondents receive treatments as short vignettes or simulated media reports (Kreps and Roblin 2019). Appendix A includes the full survey instrument.

proposed policy for dealing with the rival state; and their willingness to "vote for this president in the next election."

As with any experiment, our design features potential limitations to external validity that lead us to temper the conclusions we draw from our findings. Factors not captured in the vignettes might moderate the formation of public preferences during real world crises in ways that affect the ability of commercial satellite imagery to constrain policymaking.[12] Specifically, we leave unspecified the identity of the rival country, the president who is serving in the year 2025, and the news outlet that releases satellite imagery (e.g. its reputation and political leanings, and how it frames the confirming/disconfirming imagery). Although these hypothetical vignettes do not directly simulate how respondents would encounter a similar situation in the real world, we include treatment conditions where cues from non-government entities directly interact with those supplied by the president and government agencies in ways that more closely mirror real-world scenarios. Because the experiment randomizes assignment and holds constant all other elements of the scenario, differences in attitudes toward the leader and his policies can be attributed to the two factors we manipulate: 1) the source of the satellite imagery and 2) whether information confirms or contradicts the leader's statement.

**Table I. Experimental design (Verification)**[13]

| | POTUS Only | Government: CIA | | Commercial Firm: Planet Labs | | Think Tank: Brookings | |
|---|---|---|---|---|---|---|---|
| | *No Verification* | *Supports* | *Contradicts* | *Supports* | *Contradicts* | *Supports* | *Contradicts* |
| Single/No Verification | N=188 (Baseline) | N=180 | N=185 | N=187 | N=194 | N=193 | N=188 |
| Additional Verification: CIA Supports | | | | N=188 | N=189 | | |
| Additional Verification: CIA Contradicts | | | | N=192 | N=183 | | |

[12] We are grateful to an anonymous reviewer for highlighting this point.
[13] We do not include think tanks in the treatment conditions that feature multiple "verifiers," and focus instead on the effect of multiple verification by government and commercial entities.

*Findings*

We first examine how verification affects perceptions of the president's accuracy and truthfulness. Studies have shown that untruthful leaders can suffer political punishments and have trouble advancing their policy objectives (Fearon 1994; Gelpi and Grieco 2015). To measure perceived accuracy, the survey instrument asks respondents, "Based on the information in the scenario, how accurate or inaccurate would you consider the president's statement on the rival country's nuclear weapon and missile development?" Respondents provide inputs using a 5-point scale (Figure 1). Because the accuracy of a leader's statements might shape perceptions of the president's trustworthiness, the survey instrument also asks, "How trustworthy or untrustworthy would you consider the president to be based on this scenario?" (Figure 2) Respondents answer along a 5-point scale ranging from "very untrustworthy" to "very trustworthy."
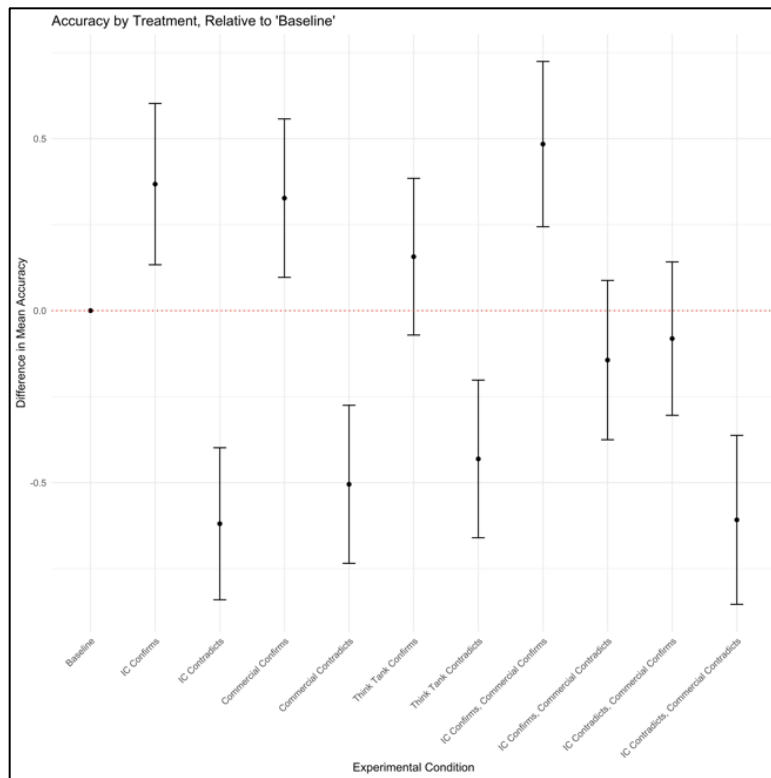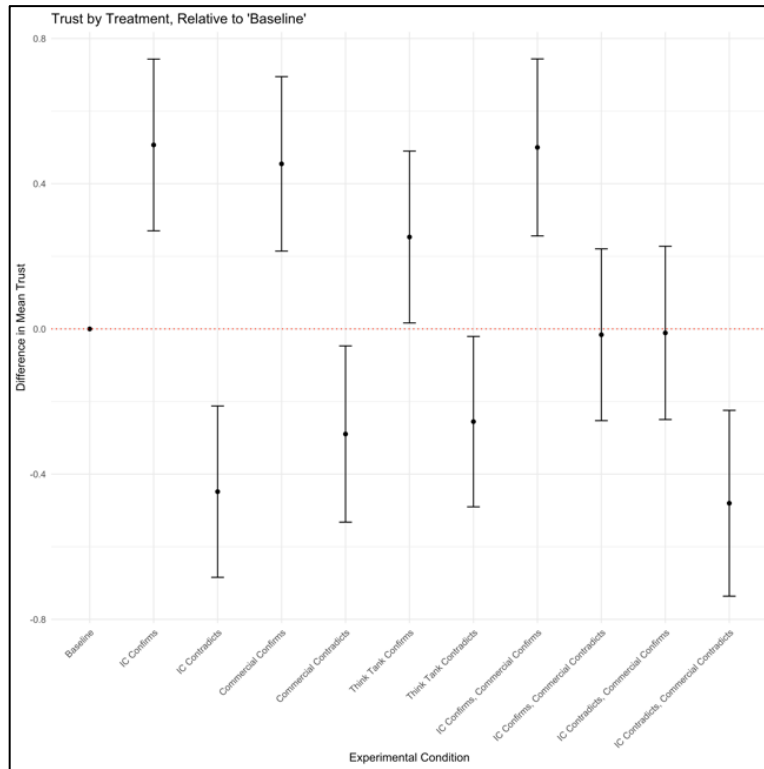
**Figure 1.**

**Figure 2.**



Trust by Treatment, Relative to 'Baseline'

Consistent with hypothesis H1$_A$, confirmation of the president's statements by the commercial satellite firm has a positive and statistically significant effect on perceived accuracy and trust, relative to the baseline condition of no verification.[14] The effect sizes of commercial confirmation on both accuracy and trust are similar in magnitude to the effect of confirmation by the CIA. The comparable effects sizes provide support for hypothesis H4, suggesting that private firms can offer just as significant of a cue as those from government agencies with specialized expertise. Confirmation by a think tank also generates a positive effect on perceived accuracy and trust, although the former falls short of statistical significance. Perceived accuracy is at its highest ($\mu_{accuracy}$=3.63) when both the CIA and the commercial firm confirm the president's statement. Confirmation by both the commercial firm and CIA has the same effect on perceived trust

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($\mu_{trust}$=3.53) as confirmation by the CIA alone, the highest perceived trust among the experimental conditions.

Consistent with hypothesis H2$_A$, contradiction has a negative and statistically significant effect on both perceived accuracy and trust, relative to the baseline. Contradiction by the government's intelligence agency generates, on average, a slightly larger substantive drop in perceptions of the president's accuracy and trustworthiness than contradiction by either commercial firms or think tanks. This likely reflects the fact that a dissenting view from the president's own intelligence agency, which presumably has access to the same information as the president does, would be especially surprising and therefore more likely to move opinion in a downward direction. When both the CIA and the satellite firm contradict the president's statement, the perceived mean trust ($\mu_{trust}$=2.55) and accuracy ($\mu_{accuracy}$=2.54) are roughly equivalent in magnitude to the condition where only the CIA contradicts the president ($\mu_{accuracy}$=2.53; $\mu_{trust}$=2.58).

Finally, in circumstances where the intelligence agency and satellite firm release conflicting information about the president's statement, perceived trust and accuracy is not distinguishable from the baseline condition. This suggests that information from commercial firms can offset cues from government entities, rendering the public unable to update their assessments in the face of conflicting signals. Across all treatments, respondents who report being more politically conservative, on average, view the president's statements as more accurate and the president as more trustworthy than liberal leaning respondents.[15] Additionally, more educated

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[15] Interaction between treatment conditions and political ideology fall short of standard thresholds of statistical significance. Politically active respondents (those who reported voting in the 2016 presidential election), on average, view the president's claims as more accurate than less politically active respondents. See Appendix B, Section 1.1-1.2.

respondents, wealthier, and male respondents are more likely to trust the president than less educated, less wealthy, and female respondents.

Beyond affecting perceptions of presidential accuracy and trust, verification may also affect public support for a leader's proposal to use force. Respondents are told, "A week after making his initial statement, the president announces that he is considering launching airstrikes against the rival country's nuclear weapon and missile research facilities[.]" Respondents are then asked to rate "how much [they] oppose or support this plan" along a five-point scale from strongly oppose to strongly support (Figure 3).

**Figure 3.**
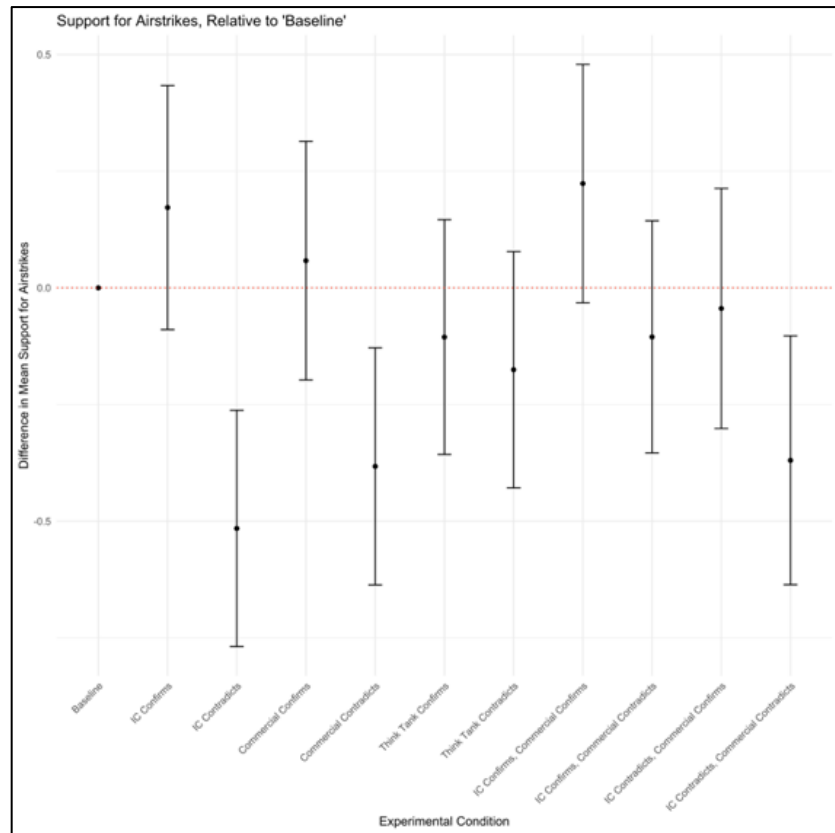


Consistent with hypothesis H1$_B$, confirmation of the president's statement by the CIA, the commercial firm, or both entities simultaneously, increases support for military action relative to the baseline condition. Although these effects are in the expected direction, they fall short of being

statistically distinguishable from mean support for strikes in the baseline condition. This suggests respondents, on average, may be hesitant to support the use of force, even with third party confirmation of the president's statements. Indeed, in line with hypothesis H2$_B$, support for strikes decreases considerably when the president's claims about the rival nation are contradicted by the commercial firm, the CIA, or both entities simultaneously.

Simultaneous disconfirmation by the CIA and satellite firm ($\mu_{strike\ support}$=2.50) decreases support for strikes to a level that is largely indistinguishable from treatments where either the CIA ($\mu_{strike\ support}$=2.36) or commercial firm ($\mu_{strike\ support}$=2.49) individually disconfirm the president's claims. When the commercial firm and CIA release conflicting information, the overall effects are attenuated and not statistically distinguishable from the baseline condition. As with the perceptions of trust and accuracy, commercial cues can offset conflicting ones from government sources. Across all treatment conditions, respondents who are conservative, males, and military veterans are, on average, more supportive of military strikes.[16]

The think tank treatments yield some puzzling results. A think tank's confirmation of the president's claims moves support for airstrikes in a negative direction. This is inconsistent with our intuition, although the finding is statistically indistinguishable from the baseline. Contradiction by a think tank yields results that point in the expected direction, but this too falls short of traditional thresholds of statistical significance. Additional analysis finds no interaction effect between the think tank treatment and covariates like political ideology that explain these findings. We return later to explore reasons that might explain these puzzling findings.

In addition to affecting public attitudes toward a leader's policies, confirmatory or contradictory verification may also have longer term political consequences. Specifically,

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[16] See Appendix B, Section 1.3 for means and significance testing.

information revealed by verification could affect the public's willingness to support the leader during future elections. To assess these potential political effects, the survey asks respondents, "If a similar scenario were to play out in the real world, how much more or less likely would you be to vote for this president in the next election?"

**Figure 4.**



Willingness to Vote by Treatment, Relative to 'Baseline'
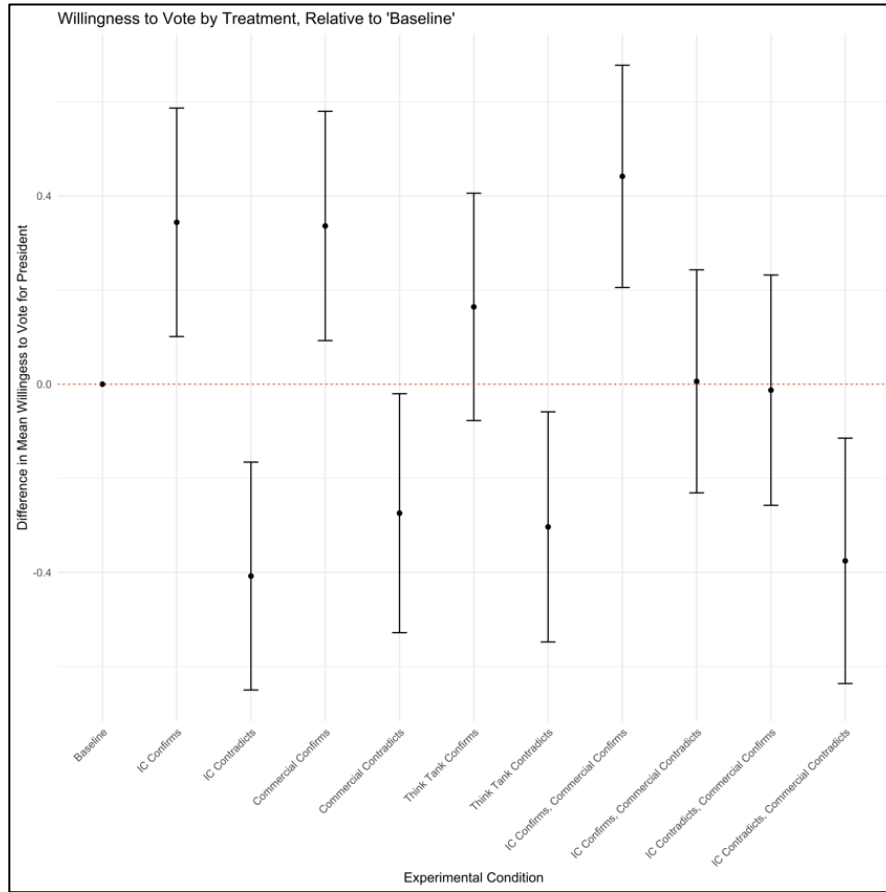
As Figure 4 illustrates, confirmation of the president's statements by a commercial source, the CIA, or both entities simultaneously has a positive and statistically significant effect on the willingness of respondents to vote for the president (H1$_A$).[17] When a think tank is the source of imagery confirming the president's claims, there is a positive, but not statistically significant, effect. The largest substantive effect is generated when both the CIA and the commercial satellite

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[17] See Appendix A, Section 1.4 for means and significance testing.

firm offer confirmatory evidence. Similarly, individuals who receive disconfirming information from all source types are, on average, less likely to vote for the president's reelection, with disconfirming information from the intelligence agency generating a slightly larger negative effect on respondents' likelihood to vote for the president. Finally, when a commercial firm releases images that conflict with information supplied by an intelligence agency, the firm once again negates the CIA's effect in moving public opinion. On average, respondents who are more conservative, wealthier, male, and veterans are more likely to cast a vote for the president in our experiment. In contrast, respondents who are more knowledgeable about foreign policy matters are less likely to vote for the president.[18]

These results conflict with some recent studies in sociology and political psychology that suggest voters will tolerate lying leaders, particularly if they are strongly motivated to vote for them at the ballot box (Swire-Thompson et al. 2020; Swire et al. 2017; Hahl, Kim, and Zuckerman Sivan 2018). This raises the possibility that overwhelmingly confirming or disconfirming evidence could shape public support toward leaders. Nevertheless, the effects we observe are likely more pronounced in the structured confines of our experiment, where exposure to confirming and disconfirming information is more immediate and forthright than it would be in real world settings.

**TESTING THE REVELATION LOGIC**

The second experiment provides support for the revelation logic. Respondents are told, "the Red Cross has reported that the Syrian government launched a chemical gas attack that killed over 250 civilians, primarily women and children." Respondents are also informed "the U.S. Secretary of State publicly announces that he cannot confirm whether the Syrian government is

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[18] In Appendix 1.4, we interact foreign policy knowledge and political ideology with the experimental treatments and find no systematic effect. We code 56.4 percent of respondents as "foreign policy informed" if they correctly identified a permanent member of the UN Security Council.

responsible for the attack." Respondents are then randomly assigned to one of four experimental conditions. In the baseline condition, respondents receive no additional information. In the three treatment conditions, respondents are told that the CIA, Planet Labs, or Brookings releases satellite imagery revealing that Syrian forces carried out the attack.

**Table II. Experimental design (Revelation)**

| No Revelation (Baseline) | Government Reveals | Private Firm Reveals | Think Thank Reveals |
|---|---|---|---|
| *No attribution* N=519 | *Attributed to Syria* N=505 | *Attributed to Syria* N=521 | *Attributed to Syria* N=522 |

*Findings*

To assess whether revelation of previously undisclosed information shapes public support for the use of force, we ask, "would you support or oppose a U.S.-led airstrike against the Syrian military unit that is reportedly responsible for launching the attack?" Respondents answer using a 5-point scale ranging from "strongly oppose" to "strongly support."

**Figure 5.**
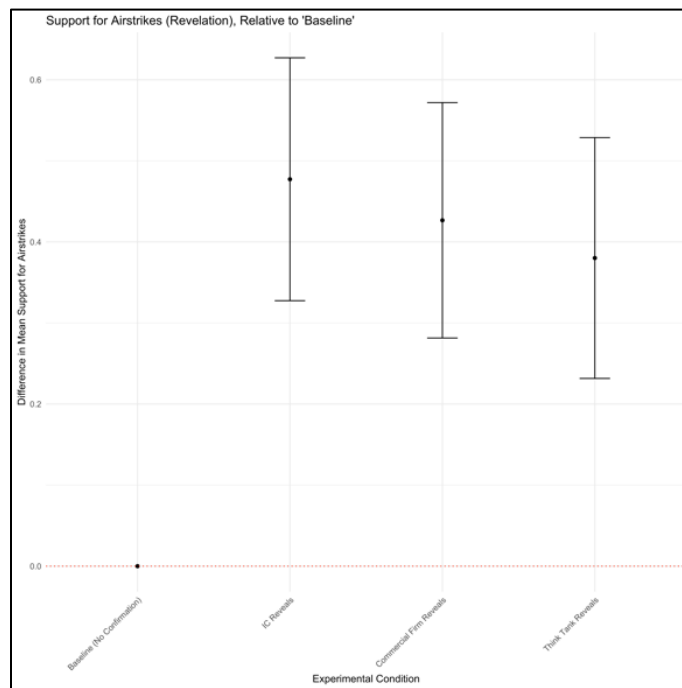
Consistent with hypothesis H3, the revelation of satellite imagery documenting Syrian military culpability increases support for airstrikes, relative to the baseline condition where the Secretary of State offers no information about the chemical attack's perpetrator. Revelation by the intelligence community generates the highest substantive increase in support (Figure 5), but other information sources have a similarly large effect, providing strong support for the revelation mechanism.[19]

Conservatives are, on average, most supportive of initiating military action, regardless of experimental condition.[20] From subsample analysis, revelation of Syrian culpability also appears correlated with a larger increase in support for military strikes among conservative respondents than liberal ones. For instance, exposure to imagery from a commercial firm boosts mean support for airstrikes among conservatives by .61 points (on a five-point scale), while the same exposure increases support among liberals by only .34 points.[21] This suggests that while liberals are more averse to the use of force in this scenario, information revelation can still shift their preferences on the use of force. Support for military strikes in this experiment is also, on average, higher among respondents who demonstrate greater knowledge of world affairs.[22]

**PERCEPTIONS OF IMAGERY SOURCES**

What explains why third-party verification and revelation affects public preferences? One parsimonious explanation is that public attitudes change in response to information from *any* source that confirms or contradicts the president or offers previously unknown information.[23] Yet, in our experiments, information provided by different entities often generated different effect sizes

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[19] See Appendix B, Section 2 for means and significance testing.
[20] See Appendix B, 2.1.
[21] This effect is in the expected direction given the hawkishness often associated with conservatives, but in OLS models falls short of statistical significance in the IC and commercial conditions.
[22] See Appendix B, 2.1.
[23] We thank an anonymous reviewer for highlighting this point.

on outcomes of interest. For instance, information from think tanks frequently led to smaller effects than information from the commercial firm or intelligence community. This suggests the cue source has at least some effect.

As a first step at assessing the mechanisms underpinning our findings, we examine respondents' perceptions of the politicization and capabilities of various information sources. We measure perceived politicization by having respondents rate how much the president can shape assessments offered by each entity, from "very little influence" (1) to "very high influence"(5). We assess perceptions of capability by having respondents rate how capable they perceive each entity to be in collecting and analyzing information on foreign countries, from "very not capable" (1) to "very capable"(5). We asked these questions post-treatment to avoid priming respondents and calculated mean scores for each entity across all respondents and across subsets based on political ideology.[24]

**Table III: Perceptions of Organizational Characteristics**

| Organization | Politicization | | | | Capability | | | |
|---|---|---|---|---|---|---|---|---|
| | Full Sample | Liberals | Moderates | Conservatives | Full Sample | Liberals | Moderates | Conservatives |
| Intelligence Community | 3.16 (0.026) | 3.23 (0.053) | 3.08 (0.036) | 3.20 (0.048) | 3.77 (0.027) | 3.77 (0.055) | 3.69 (0.039) | 3.88 (0.049) |
| Commercial Firm | 2.89 (0.025) | 3.02 (0.049) | 2.84 (0.036) | 2.83 (0.048) | 3.29 (0.024) | 3.29 (0.049) | 3.25 (0.034) | 3.34 (0.044) |
| Think Tank | 2.85 (0.024) | 2.99 (0.050) | 2.79 (0.034) | 2.81 (0.048) | 3.27 (0.023) | 3.31 (0.048) | 3.22 (0.033) | 3.30 (0.044) |

Across the full sample, respondents, on average, view the intelligence community as more politicized than commercial firms or think tanks, which have similar mean perceived politicization scores. Respondents, on average, hold similar perceptions regardless of ideological identification, viewing the intelligence community as most politicized and think tanks as least politicized. This perception that the intelligence community has less autonomy from presidential influence may

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[24] Because these questions were posed post-treatment, we report mean politicization and capability measures of all respondents, regardless of the treatment condition to which they were assigned.

account for the larger decreases in public support we observe for the president and his policies when intelligence agencies offered information disconfirming the president's claims. Put differently, a subordinate entity seen contradicting its political master should send a particularly unexpected signal.

Respondents also view intelligence agencies as more capable in information gathering and analysis than commercial firms and think tanks. Nevertheless, confirmatory verification and revelation by commercial firms often generated effects similar in magnitude to those generated by the intelligence community, despite the perceived superiority of government capabilities. This suggests that respondents may weigh a private firm's political autonomy more heavily than its capabilities when evaluating leaders and their policies. Although not definitive, these findings help explain the differences we encounter across treatment conditions. These organizational perceptions, however, do not explain the weaker findings often associated with verification by think tanks. Indeed, differences in perceived politicization and capability scores of think tanks and commercial firms are negligible, yet outcomes of interest often vary.

To assess whether these different perceptions of information sources drive results, we draw from qualitative data collected using an open-ended question that asked respondents to explain why they assessed the president's statement as accurate or inaccurate. We code responses into one of 17 categories based on whether and how respondents described the role of specific entities, evidence, or information.[25] Any inferences drawn from qualitative free responses are necessarily tentative; studies show individuals often do not know why they make the choices they do (Jervis 2017). This is likely especially true in survey experiments, where respondents receive only limited, hypothetical information.

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[25] See Appendix C for discussion of the free-response analysis.

Nevertheless, the open-ended responses reveal trends that help inform our interpretation of findings. Respondents assigned to experimental conditions where the CIA, Planet Labs, or both simultaneously supplied satellite imagery were more likely to specifically mention these organizations or the satellite imagery they released in their explanations relative to respondents assigned to think tank treatments. Some respondents viewed the CIA as less independent of presidential influence relative to the private company. "While my opinion on this topic is subject to my opinion of the president at the time, I would trust the privately owned establishment that has relatively nothing to gain by releasing those images," one respondent wrote. "The CIA has ties with the government and therefore might be biased toward the president's statements." Another respondent invoked the CIA's particular expertise as reason for its credibility: "The cia [*sic*] has much better intel then a [private] co[mpany]."

Respondents who were told that the Brookings Institution released satellite imagery were more likely to describe generic information proving or disproving the president's claim, without specifically mentioning satellite imagery or the name of the releasing entity. The greater salience of commercial firms and the CIA among respondents suggests that respondents may have been less familiar with think tanks compared to government agencies or private firms. This may have limited respondents' ability to evaluate the credibility of the information think tanks released, contributing to the smaller effect sizes associated with outcomes in the think tank conditions.

Respondents in treatment conditions where the commercial firm and CIA offer conflicting information were unsurprisingly more likely than respondents in other conditions to describe divergent intelligence prevented them from forming an opinion. We also find little systematic evidence of explicitly partisan ideological or partisan references across all treatment groups, including think tanks. Similarly, although some respondents questioned whether private firms

30

might have their own agendas or financial ties to government officials, we find no systematic evidence that respondents viewed commercial firms as having overtly partisan or political agendas.[26] Future research might more systematically test the underlying mechanisms associated with revelation and verification by fielding studies that vary information about the autonomy and capabilities of information-releasing entities.

**CONCLUSION**

This article extends research on the role of secrecy and technology in international relations by outlining two pathways by which emerging information technologies can influence public attitudes towards political leaders and their foreign policies. By verifying the claims of government leaders or revealing previously unacknowledged activities, non-government actors armed with data from commercial satellites can undermine – or, in some cases, bolster – government claims about national security affairs. In turn, this can affect public attitudes toward foreign policy decision-makers and their policies.

Original survey experiments provide support for the verification and revelation mechanisms. In our experiments, commercial satellite imagery can prove just as influential in shaping public attitudes as information supplied by government intelligence agencies. When non-government satellite imagery confirms the president's claims about a threat posed by a hypothetical rival, respondents are more likely to trust the president, more likely to support the president's policies to deal with the threat, and more willing to vote for the president in a future election compared to respondents who receive no such verification. In contrast, when commercial satellite imagery contradicts the president's claims, respondents are less likely to trust him, support his policies, and vote for his reelection than those who receive no verification. The decline in

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[26] A vast majority of responses within each treatment group (94.0 to 99.5 percent) makes no explicit mention of ideological or partisan factors. See Appendix C, Table II.

favorable attitudes generated by contradictory commercial verification is generally smaller in magnitude than the effect observed when the intelligence community releases disconfirming information.

When commercial imagery reveals previously unacknowledged information, it also has the ability to influence public preferences toward foreign policy. In our experiment, respondents exposed to satellite imagery that reveals a rival state's culpability in human rights violations are more likely to support military intervention than those in a baseline condition where no such information is revealed.

Although our survey experiments feature hypothetical scenarios that do not perfectly mirror the real world, our findings have important implications for theory and policy. For scholars, the experiments suggest new roles for non-governmental actors. International relations research has long examined the role of public opinion and information cues, but has largely overlooked the ways information cues from commercial firms using emerging technologies can shape public preferences, particularly when government and non-government entities offer competing cues. The findings also suggest that emerging technologies may leave states less able to manage the disclosure of sensitive information than many theories assume.

For policymakers, our findings suggest that non-state entities equipped with commercial satellite imagery can erode government control over the disclosure decision by generating public pressures that reduce a government's freedom of action in the foreign policy arena. As commercially-operated satellites proliferate, governments may find it harder to lie about or conceal their activities or those of other states. To be sure, technologies that reduce information asymmetries between the government and public are unlikely to entirely eliminate policymakers' freedom of action. In some cases, governments might be partially insulated from the constraining

effect of commercial information sources if an increasingly fragmented and siloed media environment prevents citizens from being sufficiently exposed to information that challenges their beliefs and contradicts official accounts (Baum and Potter 2019). However, even if dissemination is widespread, leaders may find workarounds to preserve their decision-making autonomy. Carson (2018, 302-304), for example, suggests leaders might adopt policies of open secrecy by not acknowledging information exposed by non-government sources or find more covert means of foreign policy implementation. Policymakers will still, however, need to consider third-party verification and revelation as they decide how to develop and disclose their foreign policies.

At the same time, non-government actors bear a formidable responsibility when disclosing information. Releasing inaccurate information has the potential to shift public preferences in a way that sows discord and hampers decision-making. The power of commercial satellite imagery to sway public opinion should also raise concerns that nefarious actors might manipulate imagery to cause confusion that complicates a state's ability to execute its foreign policy.

Our analysis suggests several avenues for future research that explore the generalizability of our theory and findings. Researchers, for instance, might test the verification and revelation logics with technologies beyond commercial satellites. While we expect our theoretical mechanisms to apply across a range of technologies, researchers might examine whether different verification and revelation technologies have different effects on public attitudes than satellite imagery. Researchers might also study how factors related to media framing, domestic political conditions, or crisis type modulate the effect of verification and revelation on public preferences. Researchers could also assess whether leaders adjust decisions to disclose information in light of these technologies. Or, researchers could explore cases beyond the United States. Citizens in different national contexts or regime types may react differently to the disclosure of sensitive

information by non-government actors. The public in some states may be more or less trusting of private sector firms or may be more or less willing to question the foreign policies of government officials. Finally, scholars might assess the role verification and revelation by commercial technologies play in issue areas beyond national security, such as environmental or immigration policies. Our research represents a first step in understanding how information technologies might influence foreign policymaking. Additional studies will expand our understanding of the relationship between information technologies, public opinion, and foreign policy.

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