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# Social media echo chambers and satisfaction with democracy among Democrats and Republicans in the aftermath of the 2016 US elections

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## Abstract

There is widespread evidence that individuals select information that supports their convictions and worldviews. This behavior yields the formation of echo chambers - environments in which an individual's own political beliefs are repeated and amplified and dissenting opinions are screened out. Recent research demonstrates that social networking sites (SNS) such as Facebook or Twitter can facilitate this selection into homogenous networks. Using data from a representative nationwide online survey, we consider the degree to which respondents' social media networks resemble virtual echo chambers. We then analyze the effect of these social media echo chambers on satisfaction with democracy among Democrats and Republicans in the aftermath of the 2016 U.S. elections. Our findings reveal that virtual echo chambers boost democratic satisfaction among Republicans but they do not have an effect on system support by self-identified Democrats. Our paper therefore adds to a growing literature linking online behaviors to mass attitudes about politics.

### Keywords

Satisfaction with democracy; social media echo chambers; ambivalence

## Introduction

Over the past few decades, studies on satisfaction with democracy have proliferated in the field of political science (Henderson 2008; Singh, Lago, and Blais 2011; Ezrow and Xezonakis 2011; Hollander 2014; Leiter and Clark 2015). The concept refers to individual-level assessments about how democracy works in practice and it is generally considered to lie between notions of diffuse support for democratic principles and specific support for political actors and institutions of the state (Norris 1999, 10). In Anderson's (1998, 583) words, satisfaction with democracy taps into "system support at a low level of abstraction."

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Previous studies have identified a number of important causal processes related to citizen-satisfaction with democracy (Anderson and Guillory 1997; Blais, Morin-Chasse, and Singh forthcoming; Craig et al. 2006). Interestingly however, none of the existing work in this area has thus far explored to what extent discourse dynamics on social media networks influence individual-levels of system support in the aftermath of major nation-wide elections. This is a potentially significant oversight. Social media networking sites (such as Facebook or Twitter) play an increasingly important role in the political discourse in many contemporary democracies.[1] Recent statistics show that a substantial proportion of users around the world rely on these sites in order to discuss politics and to consume news.[2] Put differently, social media platforms now shape the information environment for many politically active citizens (Lelkes, Sood, and Iyengar 2017, 5). As a result, there are good reasons to believe that conversations on these websites influence democratic system support (Ceron and Memoli 2016).

While social media networking sites have created an easily accessible venue for political engagement, scholars have warned that many of the political conversations that take place on Facebook or Twitter occur in "echo chambers." These are ideologically congruent and homogenous environments in which political views are not debated but instead reinforced and amplified thus paving the way to increased polarization (Barberá et al. 2015; Bakshy, Messing, and Adamic 2015). Empirical data on the prevalence of echo chambers are hard to come by. However, existing opinion polls from the United States find that about a quarter of U.S. citizens believe that most of their friends on Facebook have "similar political beliefs." [3]

The emergence of echo chambers on social media has significant implications. Re-enforcing social networks have been shown to reduce informational cross-pressures and thereby decrease attitudinal ambivalence (Rudolph 2011). This should have tangible effects on democratic system support. Un-ambivalent individuals are likely to have (1) absorbed fewer negative arguments and (2) developed stronger feelings about their preferred party than their ambivalent counterparts (Lavine 2001). At the same time, it is well known that electoral winners express higher levels of democratic satisfaction than other citizens, and that a number of attitudinal variables have the potential to mute or amplify these psychological consequences of electoral contests (Anderson and Guillory 1997; Singh 2014). Our central argument is that, given their ambivalence-reducing properties, social media echo chambers should further increase the observed satisfaction gap between supporters of victorious and non-victorious parties. More specifically, we expect echo chambers to boost satisfaction with democracy among electoral winners and we predict the opposite effect for supporters of unsuccessful parties.

Our statistical analysis is based on an original representative online survey among 1,001 U.S. citizens, collected in the aftermath of the 2016 U.S. elections. This approach has many

[1]For example, more than two-thirds of all U.S. citizens have a profile on at least one social media networking site. See: Pew Research Center: Social Media Fact Sheet. Available at: http://www.pewinternet.org/fact-sheet/social-media/ [accessed: February 18, 2017]

[2]According to the European Publisher's Council, more than 30 percent of all online users rely on social media sites to "share their opinion" and almost 40 percent of all users turn to social networking sites in order to "stay up to date with news and current events." See: European Publisher's Council. Global Social Media Trends 2015.

[3]See: Pew Research Center: American Trends Panel Poll (Wave: July 19, 2016). Available at: http://www.pewinternet.org/2016/10/25/politics-and-social-media-methodology/[accessed: February 18, 2017].

important advantages. First, public commentary in the U.S. has placed considerable emphasis on the phenomenon of "social media echo chambers."[4] This lends substantive and practical relevance to any findings obtained in this paper. Second, most of the existing scholarly work about discourse dynamics on social media has focused on the United States (Colleoni, Rozza, and Arvidsson 2014; Barberá et al. 2015; Bakshy, Messing, and Adamic 2015). Using the U.S. as our case study will therefore allow us to connect our findings with existing research. As predicted, our data analysis reveals that social media echo chambers amplify satisfaction with democracy among Republican voters (electoral "winners"). Contrary to our expectations however, reinforcing online networks do not seem to influence public attitudes among self-identified Democrats (electoral "losers") or Independents. By uncovering these empirical relationships, our paper adds to a growing literature linking online behaviors to mass attitudes about politics.

The remainder of this paper has five sections. In the first, we discuss previous work on democratic satisfaction. In the second, we lay out the theory in more detail. In the third section, we describe the survey that we used to capture individual-level attitudes about politics as well as the items employed to capture our variables of interest. In the fourth section, we test our hypotheses and discuss the results. The final section concludes with some avenues for future research.

## Previous Research on Satisfaction with Democracy

Previous research in political science has identified a number of factors that influence individual-levels of system support (Banducci and Karp 2003; Weatherford 1987; Lipset 1994). One of the most robust findings coming out of this literature is that elections have a major impact on satisfaction with democracy (Anderson et al. 2005). More specifically, supporters of "winning" parties have been found to score consistently higher on this dimension than their counterparts who supported losing parties (Singh, Karakoç, and Blais 2012; Henderson 2008; Listhaug, Aardal, and Ellis 2009; Anderson and Tverdova 2001; Norris 1999; Anderson and Guillory 1997). Recent scholarship has identified two complementary causal mechanisms that contribute to this observed winner/loser gap.

First, positive electoral outcomes boost satisfaction with democracy since voters believe that a given electoral result will lead to the provision of preferred policies. According to this explanation, a voter's increase in satisfaction after witnessing the win of his/her preferred party is directly tied to expectations about the policy output generated by the incoming government. There is some indirect evidence for this mechanism. Anderson and Guillory (1997) find that the difference between electoral winners and losers is larger in majoritarian political system than in non-majoritarian ones. Other studies suggest that winning at the national level creates bigger increases in democratic satisfaction than winning at the subnational level (Henderson 2008; Anderson and LoTempio 2002).[5] Combined, these

[4]For example: Claire Cain Miller: Social Media Deepens Partisan Divides. But not Always. In: The New York Times. Available at: https://www.nytimes.com/2014/11/21/upshot/social-media-deepens-partisan-divides-but-not-always.html [accessed: February 18, 2017].

[5]But note Blais and Gélineau (2007) whose findings suggest that local election results have as much of an impact on satisfaction with democracy as electoral outcomes on the national level.

findings support the idea that utilitarian considerations underlie the relationship between electoral outcomes and system support since both the electoral system and the nature of the election (national vs. local) modify the expected policy payoffs from electoral contests.

A second causal explanation for the winner/loser gap is psychological in nature. Existing research has demonstrated that winning creates a number of positive emotions in humans while losing has been shown to invoke negative responses (Thaler 1994; Wilson and Kerr 1999; Anderson et al. 2005). These dynamics then lead to different post-election attitudes among both voter groups. Empirically, this psychological interpretation is substantiated by (1) findings that suggest that electoral success at one geographic level creates satisfaction "spillover" at lower levels (Singh, Karakoç, and Blais 2012), and (2) research indicating that certain cognitive variables mediate the effect of winning/losing. Craig et al. (2006), for example, show that voter-interpretations of the meaning of an election condition the relationship between electoral success and public attitudes. Similarly, Curini et al. (2012) find that the perceived ideological distance between a voter and a governing party can mediate observed responses to winning/losing. Finally, an individual's degree of cognitive investment in a party or an election can amplify micro-level differences in the aftermath of democratic contests (Howell and Justwan 2013; Singh 2014).

In this paper, we argue that social media echo chambers further modify the existing relationship between election outcomes and satisfaction with democracy. Previous research has drawn attention to the fact that digital media in general, and social networking sites in particular, affect a wide range of variables that are of interest to political scientists (Swigger 2013; Ceron and Memoli 2016). Zhang et al. (2010), for instance, suggest that consumers of certain digital media sites are more civically engaged than other citizens. Related, Garrett et al. (2013) demonstrate that many digital media users experience increased exposure to *both* cross-cutting *and* re-enforcing political views. This means that – at least in the United States – "there is a broad population, which […] is exposed to a broad variety of online sources with different ideological perspectives" (Farrell 2012, 42). However, while this may be true, there are a number of important caveats that need to be considered.

*First*, people tend to be more drawn to ideologically congruent information than to attitudinally challenging material (Taber and Lodge 2006). This, in turn, implies that observed increases in exposure to re-enforcing digital media are more pronounced than simultaneously occurring increases in online exposure to cross-cutting political views. Lelkes et al. (2017) provide evidence for this claim. The authors find that access to broadband internet drives up individual-level consumption of both cross-cutting and re-enforcing partisan media. However, increases in the latter are significantly larger than surges in the former. As a result, affective polarization in the United States is higher among broadband users than among individuals with dial-up connections.

*Second*, not all digital media users are equally exposed to diverse political views (Farrell 2012, 42). People are increasingly relying on social media platforms (such as Facebook or Twitter) to consume news and engage in political conversations. As recent empirical investigations by Barberá et al. (2015) as well as Bakshy et al. (2015) demonstrate, a significant proportion of these political discussions on social media occur in environments

resembling echo chambers. Echo chambers are ideologically congruent and homogenous settings where individuals primarily converse with co-partisans. These online environments are a consequence of homophily – the tendency of like-minded/similar individuals to form social clusters (McPherson, Smith-Lovin, and Cook 2001). The emergence of echo chambers has wide-ranging implications. Re-enforcing social networks have been shown to solidify existing political beliefs and partisan identities (Rudolph 2011). As a result, social media echo chambers not only undermine genuine democratic discourse but also contribute to political polarization at the population level (Baumgaertner 2014).

Below, we build on these insights. Our key argument is that participation in reinforcing social media environments reduces ambivalence about one's preferred political party. This, in turn, should amplify the effect of electoral victory/defeat. As such, echo chambers do not only lead to *partisan* and *ideological* polarization, but they also divide citizens on the basis of their level of system support. On the following pages we will present this argument in greater detail.

## Social Media Echo Chambers and Satisfaction with Democracy among Republicans and Democrats

### Echo Chambers and Ambivalence

While "web 2.0" echo chambers are a fairly new empirical phenomenon, "reinforcing social networks" have received a considerable amount of scholarly attention (Rudolph 2011; Huckfeldt, Johnson, and Sprague 2004). Decades of research on this topic have demonstrated that homogenous and ideologically congruent social networks have important effects on public opinion by decreasing "attitudinal ambivalence" (Huckfeldt, Mendez, and Osborn 2004; Mutz 2002; Huckfeldt, Johnson, and Sprague 2004). Ambivalence can be defined as "an individual's endorsement of competing considerations relevant to evaluating an attitude object" (Lavine 2001, 915). A person is ambivalent about a given party if s/he concurrently holds both positive and negative views about it. Empirically, this is fairly common. People's political views are rarely exclusively positive or exclusively negative. Instead, many individual-level evaluations of issues, candidates, and parties are both positive and negative at the same time (Rudolph 2011). In this context, homogenous social networks have been shown to reduce ambivalence and solidify mass attitudes in either a favorable or unfavorable direction. We argue that the ambivalence-reducing effects of homogenous social networks are unlikely to be limited to offline environments. Instead, echo chambers on social media should lower voter ambivalence about a given political party for two separate reasons.

*First*, citizens in social media echo chambers are much less likely to encounter user-generated arguments critical of their preferred party and its platform than individuals participating in more diverse social networks. This means that echo chamber respondents should also be less likely to harbor both positive *and negative* views about their party. By contrast, the dynamics in ideologically diverse social media environments should be quite different. Here, "heightened exposure to competing arguments, particularly arguments that challenge one's initial position, has the potential to create internalized conflict in judgment

situations. This internalized conflict [will then] […] engender ambivalence toward a given set of political […] figures" (Rudolph 2011, 562). *Second*, in addition to different discussion dynamics, social media echo chambers will also expose individuals to different types of news stories and information on current events. Existing research has demonstrated that citizens are more likely to share ideologically congruent news stories with members of their social network than reports that challenge a user's previously held beliefs. This tendency is further compounded by the fact that many social media sites (such as Facebook) automatically filter out content that is likely to challenge a user's political attitudes (Bakshy, Messing, and Adamic 2015). The selective news exposure generated by social media sites further reduces the likelihood that an individual encounters new information that would lead him/her to internalize negative views about his/her preferred party.

## Ambivalence and Satisfaction with Democracy

Above, we have argued that social media echo chambers limit informational cross-pressures on citizens and thereby decrease levels of ambivalence about users' preferred political parties. There are strong reasons to believe that these dynamics should, in turn, amplify the effects of electoral outcomes for supporters of "winning" and "losing" parties. Recent empirical work by Singh & Thornton (2016) demonstrates that un-ambivalent "electoral winners" express higher levels of democratic system support than their ambivalent counterparts. While Singh & Thornton (2016) focus specifically on "coalition ambivalence" (a case in which a citizen strongly supports one governing party while holding negative views towards one of its coalition partners), more general ambivalence towards a person's preferred *party* should also influence democratic satisfaction. We base this expectation on two considerations.[6]

*First*, un-ambivalent winners in echo chambers are more likely to have stronger psychological attachments to their preferred party than individuals (outside of echo chambers) who simultaneously hold both positive *and negative* views. These strong psychological links have been demonstrated to generate "satisfaction boosts" for supporters of successful political parties and "satisfaction decreases" for supporters of losing parties. Singh (2014), for example, shows that electoral winners with close psychological ties to their voted-for party have higher levels of democratic system support than winners with looser cognitive attachments. Similarly, Curini et al. (2012) find that the ideological distance between voters and governing parties can mediate the link between democratic satisfaction and election outcomes. In other words, "greater (or less) distance between voters and the government can exacerbate (or alleviate) the winner/loser disparity in satisfaction with democracy" (p. 259). Considered jointly, these articles therefore suggest that greater psychological investment in a given party leads to greater emotional payoffs in cases of electoral victory, but also greater emotional costs in cases of defeat.

*Second*, echo chambers should also affect satisfaction with democracy by influencing the news stories and arguments that individuals draw from when they evaluate the functioning of their political system. Simply put, ambivalent citizens who have internalized various critical

[6]It is important to note that the main goal of this article is to examine the effect (if any) of virtual echo chambers on democratic system support. Given the nature of our data, we are unable to test specific causal mechanisms.

arguments and news stories about their preferred party are likely to consider this information when asked to evaluate their satisfaction with the democratic process. Ambivalent *winners* should therefore express lower levels of system support than their non-ambivalent counterparts, since they have internalized more negative arguments about the winning party. With regard to *losers*, the effects should be similarly polarizing. Supporters of non-victorious parties in echo chambers should have had particularly high expectations for their preferred party given the low salience and availability of critical information. Therefore, these voters should express the lowest levels of democratic satisfaction (Hollander 2014).

In sum, our argument builds on existing research in the field of political science. We theorize that social media echo chambers reduce attitudinal ambivalence about a person's preferred party. Furthermore, this change in ambivalence should polarize levels of system support among supporters of winning and losing parties. In the context of the 2016 U.S. federal elections, we have the following theoretical expectations:

**Hypothesis 1**: Democrats are less likely to be satisfied with democracy in the United States than Republicans (*winner / loser effect*).

**Hypothesis 2**: Republicans who are part of a social media echo chamber are more likely to be satisfied with democracy in the United States than Republicans outside of social media echo chambers (*positive amplification effect*).

**Hypothesis 3**: Democrats who are part of a social media echo chamber are less likely to be satisfied with democracy in the United States than Democrats outside of social media echo chambers (*negative amplification effect*).

## Data and Methods

### Data Source and Dependent Variable

In order to test the hypotheses formulated above, we rely on original data from a nationally representative online survey.[7] The survey was fielded by Survey Sampling International (SSI) in January 2017 – roughly two months after the 2016 U.S. elections. Our questionnaire was presented to 1,001 respondents and it contained a wide range of items about political attitudes and online behaviors, as well as a standard battery of demographic questions.[8]

Conceptually, our dependent variable describes the extent to which an individual is satisfied with democracy in the United States. In order to tap into this dimension, we rely on a standard survey question used in the literature on this subject matter (Blais, Morin-Chasse, and Singh forthcoming; Ceron and Memoli 2016; Henderson 2008). Specifically, we asked respondents "how satisfied [they are] with the way democracy works in the United States." There are four answer options: (1) not at all satisfied, (2) not very satisfied, (3) fairly satisfied, and (4) very satisfied. Given this four-point ordinal scale, the statistical analyses that follow below are estimated using ordered probit regression.

[7]The online Appendix contains a comparison of various sample statistics and population parameters obtained during the 2010 Census.
[8]Since our main independent variables (see below) only apply to social media users, the final number of observations in our statistical models is 669.

## Independent Variables

The main independent variable in this paper is whether an individual is situated in a social media echo chamber. This requires that a subject (1) actively participates in political conversations on social media and (2) that most of these conversations occur among like-minded individuals (Bakshy, Messing, and Adamic 2015; Barberá et al. 2015). In order to identify respondents satisfying these criteria we rely on two separate survey items. The first item (*Social Media Activity Level*) asks individuals to indicate how often they "comment, post, or discuss government and politics with others on social media." Answer options are (1) never, (2) hardly ever, (3) sometimes, and (4) often. The second item (*Social Media Network Homogeneity*) captures how often respondents "agree with the political opinions or political content [their] friends post on social media."[9] Response categories are (1) never, (2) only sometimes, (3) most of the time, and (4) always or almost always. In our statistical analysis below, we interact these two indicators with each other. Conceptually, a respondent is in a social media echo chamber if s/he scores highly on *both* Social Media Activity Level *and* Social Media Network Homogeneity.[10]

As discussed above, our theory posits a conditional effect of social media echo chambers and party ID. Our fully specified regression model thus contains a three-way interaction between Social Media Activity Level, Social Media Network Homogeneity, and Party ID. The latter is a nominal variable with three unordered categories: Republican, Democrat, and Independent.[11]

We use a standard set of control variables commonly employed in the literature on democratic satisfaction (Singh and Thornton 2016; Howell and Justwan 2013; Henderson 2008; Anderson and Guillory 1997). First, we account for an individual's ideology. Previous research has shown that a respondent's ideological distance to the government is negatively related to his/her level of democratic satisfaction (Singh and Thornton 2016). We therefore expect a positive relationship between ideology (measured on a 7-point scale ranging from "very liberal" to "very conservative") and our outcome variable. Second, we add a control for income to account for the possibility that depressed financial circumstances impact satisfaction with democracy (Ezrow and Xezonakis 2011, 1168). Income is an ordinal variable with 12 categories where higher values indicate higher levels of pre-tax household incomes. Third, we account for a respondent's level of political knowledge, given existing studies that suggest that this variable is an important predictor of democratic satisfaction (Hobolt 2012; Leiter and Clark 2015). This correlate is operationalized by presenting

[9]Our social media questions are adapted from Pew Research Center's American Trend Panel (http://www.pewresearch.org/methodology/u-s-survey-research/american-trends-panel/).

[10]We believe that both of these variables interact to generate echo chambers on social media. In other words, political "echo chambers" should only emerge for people who frequently rely on social media to engage with others about political matters. If citizens use these websites exclusively for other purposes (for example, to discuss music, sports, or other hobbies), we do not expect any effect on democratic satisfaction.

[11]In our dataset, about 88 percent of self-identified Republicans voted for Trump and 90 percent of Democrats voted for Clinton. We use party ID instead of vote choice in order to designate electoral "winners" since the Republican Party did not only win the Presidency but also majorities in both Houses of Congress as well as a number of additional governorships. In addition, (4) Donald Trump's victory also created expectations of conservative judicial appointments (most notably for the U.S. Supreme Court). Thus, there are good reasons to believe that even Republicans who did *not* vote for Trump still experienced some psychological boost in democratic satisfaction. Coding these individuals as electoral "losers" might therefore lead to incorrect conclusions about the attitudinal consequences of the 2016 election.

respondents with two objective knowledge questions about politics in the United States.[12] The "knowledge"-variable thus ranges from 0 (for individuals who answer both questions incorrectly) to 2 (for respondents who give correct answers to both questions). Fourth, we control for whether or not an individual is in an "offline echo chamber." We capture this concept with an interaction between two indicators: offline political activity and offline network homogeneity. The former variable is measured by asking respondents "how often [they] discuss government and politics with others offline." Answer options are (1) never, (2) hardly ever, (3) sometimes, and (4) often. The latter variable is based on a survey item in which individuals assess whether most people in their offline social network have (1) different political beliefs from them, (2) a mix of political beliefs, or (3) similar political beliefs to them.

Lastly, we also control for a number of standard demographic items: age, gender, education, and racial background.[13] All survey questions and descriptive statistics for the variables described above can be found in the online Appendix.

## Data Analysis and Results

In order to empirically test our hypothesized relationships on the effects of social media echo chambers and satisfaction with democracy, we estimated a series of three statistical models. The results can be found in Table 1. In Model 1, we introduce all of the covariates described above minus the interaction terms between our main independent variables (Social Media Network Homogeneity, Social Media Activity Level, and Party ID). The results show that – taken by themselves – neither Social Media Network Homogeneity (SMNH) nor Social Media Activity Level (SMAL) affect satisfaction with democracy. The coefficients for both of these variables are statistically insignificant which suggests that SMNH and SMAL do not have independent effects on our outcome variable. However, the results in Model 1 do demonstrate that self-identified Republicans are significantly more satisfied with democracy than political independents. Further tests (see Appendix Model A1) indicate that Republicans also express higher levels of system support than Democrats. These findings are in line with the first hypothesis of our paper and they corroborate the well-known claim that supporters of winning parties (here: Republicans) are more satisfied with democracy than other individuals (Anderson and Guillory 1997).

In Model 2, we now interact party ID with Social Media Network Homogeneity. Recall that Party ID is a nominal variable in which Independents serve as the reference category. As a result, Model 2 provides regression coefficients for SMNH, self-identified Republicans, Democrats, and two interaction terms (SMNHxRepublican and SMNHxDemocrat). We see that both of these interaction terms are statistically insignificant. Furthermore, a likelihood ratio test indicates that Model 2 does not constitute a meaningful improvement over Model

[12]Question 1: "For how many years is a United States Senator elected - that is, how many years are there in one full term of office for a U.S. Senator?" Question 2: "Is the U.S. federal budget deficit – the amount by which the government's spending exceeds the amount of money it collects – now bigger, about the same, or smaller than it was during most of the 1990s?" The wording of these questions is modeled after two items in the 2016 ANES Time Series Survey.

[13]In order to capture an individual's racial background, we add three dummy variables: a binary indicator for Asian or Asian-American, a binary indicator for African-American, and a binary indicator for individuals with some "Other" racial background.

1.[14] This, however, is not surprising given our expectation that the effect of SMNH depends on *both* Party ID *and* SMAL.

Model 3 is the fully specified regression model containing the three-way interaction between Party ID, SMNH, and SMAL. As expected, this procedure reveals that there is indeed a complex conditional relationship between our main variables of interest. The interaction between Republican, SMNH, and SMAL is positive and statistically significant, and a likelihood ratio test suggests that we can reject the null hypothesis that there is no difference between Models 2 and 3 ($p<0.04$).

Figure 1 plots the effect size of Social Media Network Homogeneity for Republicans at various levels of Social Media Activity. There are four separate panels – each of them provides a graphical illustration of the effect of SMNH on the probability that a respondent falls into one particular category of the dependent variable. In other words, the top left panel visualizes the effects of SMNH on the likelihood that a respondent is "not at all satisfied" with democracy in the United States (i.e. outcome 1). The other three panels provide analogous information for outcomes 2–4. This procedure reveals that SMNH has a statistically significant effect on democratic satisfaction among Republicans at high and very high levels of social media activity. For these individuals, political homogeneity on social media decreases the probability of being "not at all satisfied" or "not very satisfied" with democracy. Likewise, the variable has a positive impact on the probability that a Republican survey respondent is "fairly satisfied" or "very satisfied." At low levels of social media activity however, perceived network homogeneity does not appear to influence democratic satisfaction. In other words: Republicans who *rarely* discuss politics on social media are *not* affected by the homogeneity of their social media network. These results provide support for Hypothesis 2 since they demonstrate that politically active Republicans in ideologically homogenous online networks (i.e. individuals who we consider to be in virtual echo chambers) are more likely to be satisfied with democracy than other GOP supporters.

Next, the results in Table 1 reveal that the interaction between Democrat, SMNH, and SMAL is statistically insignificant. In Figure 2 and Figure A1 (provided in the online Appendix), we explore the substantive meaning of this finding by graphing the effect of Social Media Network Homogeneity for Democrats and Independents. Figure 2 shows that SMNH does *not* influence satisfaction with democracy among self-identified Democrats. This null-effect applies to all categories of the dependent variable and all levels of social media activity. Substantively, this means that our statistical results provide no evidence in support of Hypothesis 3 (a point to which we will return below). Similarly, as we show in Figure A1, SMNH does not influence democratic system support by Independents – regardless of the observed level of social media activity.[15]

[14]The p-value for the likelihood ratio test is $p=0.07$ which means that we cannot reject the null hypothesis that Models 1 and 2 are identical to each other in terms of model fit.

[15]Additional analyses and robustness checks can be found in the online Appendix. Among other things, we re-estimated the effect of echo chambers on self-identified Republicans (Model A2) and Democrats (Model A3) while also controlling for whether or not an individual self-identifies as a "strong" or "not very strong" Republican/Democrat. This analysis therefore constitutes another test of the interactive nature of our hypothesis, and it addresses the potential concern that our observed echo chamber effects are caused by strength of individual-level partisanship. The results from these two models corroborate the findings discussed above. First, while echo chambers do not affect levels of system support among Democrats (Model A3), they boost democratic satisfaction among Republicans

In order to further examine the findings presented in this section, we estimated predicted probabilities for four configurations of our main independent variables: a Republican/Democrat with a social media activity level of "1", and a self-reported social media network homogeneity level of "1"; and a Republican/Democrat with scores of "4" on both variables. The first two variable configurations correspond to Republicans/Democrats outside of social media echo chambers. The other two combinations capture major party supporters in virtual echo chambers. For the purposes of maximizing the clarity of the following presentation, we calculated the probability that a given respondent expresses some degree of satisfaction with the democratic process (i.e. that s/he falls into the upper half of our dependent variable).

Holding all other correlates at their observed values, the probability that a Republican respondent is "fairly satisfied" or "very satisfied" with democracy in the United States is 72.0 percent if this individual is outside of a social media echo chamber. For Republican respondents in echo chambers however, the predictive margin is 96.6 percent. As predicted by Hypothesis 1, the estimates for Democrats are generally lower. At low levels of SMNH and SMAL, the probability that a Democratic respondent falls into one of the two highest categories of our dependent variable is 58.1 percent. For respondents in echo chambers, the corresponding value is 55.5 percent. Put differently, the results in Table 2 show that social media echo chambers widen the satisfaction "gap" between supporters of both major parties in the United States.

What explains the null-effect for Democratic partisans? While this finding runs counter to our initial theoretical expectations, they may not be entirely surprising. Previous research has shown that individuals on the left side of the political spectrum are more likely to bridge ideological barriers and more likely to seek out other opinions than their counterparts on the right (Garrett 2009; Barberá et al. 2015). If Democrats are more prone to cross ideological barriers in their offline relationships (as suggested by these studies), this might negate any potential echo chamber effect on social media.

Two control variables are statistically significant as well. In particular, we see that men are more likely to be satisfied with democracy than women. Likewise, conservatives have higher levels of democratic satisfaction than liberals. More specifically, individuals who are "very liberal" have a 42.1 percent probability of being "fairly satisfied" or "very satisfied" with democracy while the corresponding value for "very conservative" citizens is 70.5 percent. These findings provide evidence for the idea that ideological proximity to the elected government boosts democratic system support independent of self-declared party ID (Anderson and LoTempio 2002). Interestingly, we find that *offline* echo chambers do *not* influence democratic satisfaction: the interaction term between offline political activity and offline network homogeneity is statistically insignificant, and a log likelihood test demonstrates that the inclusion of these two variables (and their interaction) does not improve the fit of the statistical model (p=0.10). Further tests (see Appendix Table E) also show that there is no interactive relationship between these two variables and Party ID. This, in turn, implies that offline echo chambers do not have the same substantive effect as echo

(Model A2). Second, this effect is not weakened by the inclusion of the partisan intensity variable which – by itself – is statistically insignificant in both models.

chambers on social media. In other words, our online and offline variables tap into conceptually distinct dimensions.

## Conclusion

The main goal of this paper was to evaluate the effect of social media echo chambers on satisfaction with democracy in Republicans and Democrats. Drawing on existing research in political science, we expected that individuals in social media echo chambers will experience an amplification of existing attitudinal effects resulting from the 2016 U.S. federal elections. In particular, we hypothesized that social media echo chambers decrease satisfaction with democracy among self-identified Democrats, and increase system support among self-identified Republicans. Our statistical analysis of original survey data collected among a national sample of U.S. adults in January 2017 provides evidence for one of these claims. We find that system support is indeed higher among Republican voters in social media echo chambers than among Republican voters outside of these social environments. Contrary to our expectations however, we find no causal effect of echo chambers for Democratic voters. While an explanation of this null-effect is beyond the scope of this article, we believe that it can at least be partially traced back to the fact that liberals in the United States are more likely to expose themselves to ideological diversity in their *offline* relationships.

Our study contributes to a growing research agenda in Comparative Politics on mass attitudes about democracy. Existing work in this area has placed a strong emphasis on the causal effect of institutional and election-specific variables (Anderson and LoTempio 2002; Anderson and Guillory 1997). This article suggests that scholars should also focus on the discourse environment of citizens and the factors that contribute to potential attitude amplifications (both in positive and negative ways). Furthermore, this article also contributes to the literature on attitudinal ambivalence. More specifically, our results corroborate findings by Singh & Thornton (2016) which demonstrate that individual-level ambivalence among electoral “winners” can dampen the psychological effects of election outcomes.

A few shortcomings need to be addressed. First, our operationalization of “social media echo chambers” relies exclusively on self-reported, and subjective, evaluations of user behaviors and perceived social network homogeneity. Future research should incorporate objective data on social media networks in order to investigate attitudinal effects of network homogeneity. Second, our study is exclusively based on data from one post-election period in one particular country. While we do expect social media echo chambers to generate similar effects in other political settings, the prevalence of echo chambers outside of the United States is not well-explored. Future research should address this point empirically and comparatively. Finally, echo chambers should also be investigated more carefully on the *left* side of the regression equation. While much public commentary has problematized this concept over the past few years, political science research as a whole has not sufficiently explained the factors that make people more/ less likely to self-select into homogenous environments on social media. As such, the literature regarding online behaviors and mass attitudes about politics constitutes fertile terrain for future research.

# Online Appendix for "Social Media Echo Chambers and Satisfaction with Democracy among Democrats and Republicans in the aftermath of the 2016 U.S. Elections"

This online Appendix contains six sections. For any questions regarding this research project, please contact – temporarily removed –.

Contents:



## Section 1: Comparison of Sample Statistics and Population Parameters

Our survey was conducted in January 2017 in cooperation with Survey Sampling International, a U.S.-based polling firm. The survey was designed to be representative of the U.S. population on five major dimensions: age, gender, income, ethnicity, and census region. Below is a comparison of cell percentages for our sample and the U.S. population as a whole (obtained from the 2010 Census). The table shows that our respondent pool closely matches the population distribution for each of these five variables.

**Appendix Table A:**

Sample Characteristics

| Variable | Population | Sample |
|---|---|---|
| *Age* | | |
| 18–24 | 13.08% | 11.19% |
| 25–34 | 17.51% | 17.48% |
| 35–44 | 17.51% | 17.48% |
| 45–54 | 19.19% | 19.39% |
| 55–64 | 15.55% | 16.18% |
| 65 or older | 17.17% | 18.28% |
| *Gender* | | |
| Male | 48.53% | 48.25% |
| Female | 51.47% | 51.75% |

| Variable | Population | Sample |
|---|---|---|
| *Income* | | |
| Less than 30,000 | 29.00% | 30.37% |
| 30,000 – 49,999 | 19.00% | 19.28% |
| 50,000 – 74,999 | 18.00% | 17.98% |
| 75,000 – 99,999 | 12.00% | 12.09% |
| More than 100,000 | 22.00% | 20.28% |
| *Ethnicity* | | |
| Hispanic or Latino | 16.30% | 16.38% |
| White Alone | 63.70% | 63.54% |
| African-American | 12.20% | 12.29% |
| Asian | 4.70% | 4.70% |
| *Region* | | |
| Northeast | 18.00% | 17.98% |
| Midwest | 22.00% | 22.28% |
| South | 37.00% | 36.57% |
| West | 23.00% | 23.18% |

## Section 2: Validity Tests for Constituent Variables of the Interaction Term

Below, we provide validity checks for the two constituent variables that make up the interaction term (SMNH and SMAL).

## Validity Tests for “Social Media Network Homogeneity” (SMNH)

**Operationalization of SMNH:** How often do you agree with the political opinions or political content your friends post on social media sites?

Never

Only sometimes

Most of the time

Always or almost always

– **Validity Test 1**: Respondents in homogenous social media environments should also be more likely to hold extreme political views. In order to test this claim, we compared political attitudes between (1) individuals who answered “never”/ “only sometimes” to the question above and (2) subjects who responded with “most of the time”/ “always or almost always.” More specifically, we compared the proportions of respondents who self-identified as either “very liberal” or “very conservative.” The results of this test provide evidence for the validity of the SMNH measure. The t-test shows that there are more ideologically extreme individuals in homogeneous social media networks than in diverse online environments (34.0 percent vs. 13.8 percent).

– **Validity Test 2:** Our second validity test assesses the claim that subjects in homogenous online environments are more resistant to opposite views. To that end, we rely on a variable in our dataset that captures whether a respondent has "ever blocked, 'unfriended', or hidden someone on a social media site because they posted something they disagreed with." Similar to above, we see that there is a statistically meaningful difference between response patterns across both groups. Almost 30 percent of subjects in homogenous online networks have blocked or unfriended someone due to opposing views about an issue. By contrast, the corresponding value for individuals with low social media network homogeneity is only 21.6 percent.

Combined, these two tests provide strong evidence for the validity of the SMNH measure.

| | **Low Social Media Network Homogeneity (R agrees "never" or "only sometimes")** | **High Social Media Network Homogeneity (R agrees "most of the time" or "always / almost always")** | **t-score** |
|---|---|---|---|
| Proportion of respondents who hold "extreme political views" (i.e. either "very liberal" or "very conservative") | 13.8% | 34.0% | 6.26 |
| Proportion of respondents who have "ever blocked, "unfriended", or hidden someone on a social media site because [they] posted something they disagreed with" | 21.6% | 29.9% | 2.32 |

## Validity Tests for "Social Media Activity Level" (SMAL)

**Operationalization of SMAL:** How often do you comment, post, or discuss government and politics with others on social media?

1. Never
2. Hardly Ever
3. Sometimes
4. Often

**Validity Test 1**: Respondents who are politically very active on social media should also be more invested in the outcome of the most recent presidential election. In order to test this claim, we compared political attitudes between (1) individuals who answered "never"/ "hardly ever" to the question above and (2) subjects who responded with "sometimes"/ "often." More specifically, we compared the proportions of respondents who reported that they "cared a good deal" about the outcome of the 2016 election (relative to respondents who said that they "did not care very much"). The results of this test provide evidence for the validity of the SMAL measure (see below). The t-test shows that there are more cognitively invested individuals in the "high social media activity" group than in the "low social media activity" group (92.8 percent vs. 86.1 percent).

**Validity Test 2:** Finally, respondents who are politically very active on social media should also be more likely to follow news on a day-to-day basis. In order to test this claim, we rely on a variable in our dataset that captures how many days per week a respondent "watch[es], read[s], or listen[s] to the news, not including sports." We see that there is a statistically meaningful difference between response patterns across both groups. On average, respondents who are *not* politically active on social media spend 6.02 days per week reading, watching, or listening to the news. The corresponding value for highly active social media users is 6.51.

Combined, these two tests provide strong evidence for the validity of the SMAL measure.

| | **Low Social Media Activity Level (R comments, posts, or discusses politics on social media "hardly ever" / "never")** | **High Social Media Activity Level (R comments, posts, or discusses politics on social media "sometimes" / "often")** | **t-score** |
|---|---|---|---|
| Proportion of respondents who "cared a good deal" about the election outcome. | 86.1% | 92.8% | 2.96 |
| Average number of days per week a respondent watches, reads or listens to the news (not including sports). | 6.02 | 6.51 | 3.26 |

## Section 3: Descriptive Statistics

**Appendix Table B:**

Descriptive Statistics

| **Variable** | **Min** | **Max** | **Mean / ratio** | **Std. Dev.** |
|---|---|---|---|---|
| *Dependent Variable* | | | | |
| Satisfaction With Democracy | 1 | 4 | 2.56 | 0.88 |
| *Independent Variables* | | | | |
| Social Media Network Homogeneity (SMNH) | 1 | 4 | 2.14 | 0.70 |
| Social Media Activity Level (SMAL) | 1 | 4 | 2.15 | 1.02 |
| Age | 18 | 97 | 46.5 | 16.4 |
| Education | 1 | 8 | 5.03 | 1.69 |
| Income | 1 | 12 | 6.17 | 3.41 |
| Ideology | 1 | 5 | 3.03 | 1.08 |
| Political Knowledge | 0 | 2 | 1.19 | 0.70 |
| Offline Network Homogeneity (ONH) | 1 | 3 | 2.21 | 0.62 |
| Offline Political Activity (OPA) | 1 | 4 | 2.78 | 0.86 |
| Gender (ratios) | | | | |
| Men | 0 | 1 | 0.47 | -- |
| Women | 0 | 1 | 0.53 | -- |
| Race (ratios)[16] | | | | |

[16]For our "race" question, individuals could check all boxes that applied to them. For this reason, the ratios reported in the table above do not round to 1.

| Variable | Min | Max | Mean / ratio | Std. Dev. |
|---|---|---|---|---|
| Caucasian | 0 | 1 | 0.75 | -- |
| African-American | 0 | 1 | 0.14 | -- |
| Asian or Asian-American | 0 | 1 | 0.06 | -- |
| Other | 0 | 1 | 0.09 | -- |
| Party ID (ratios) | | | | |
| Republicans | 0 | 1 | 0.23 | -- |
| Democrats | 0 | 1 | 0.36 | -- |
| Independents | 0 | 1 | 0.41 | -- |

## Section 4:

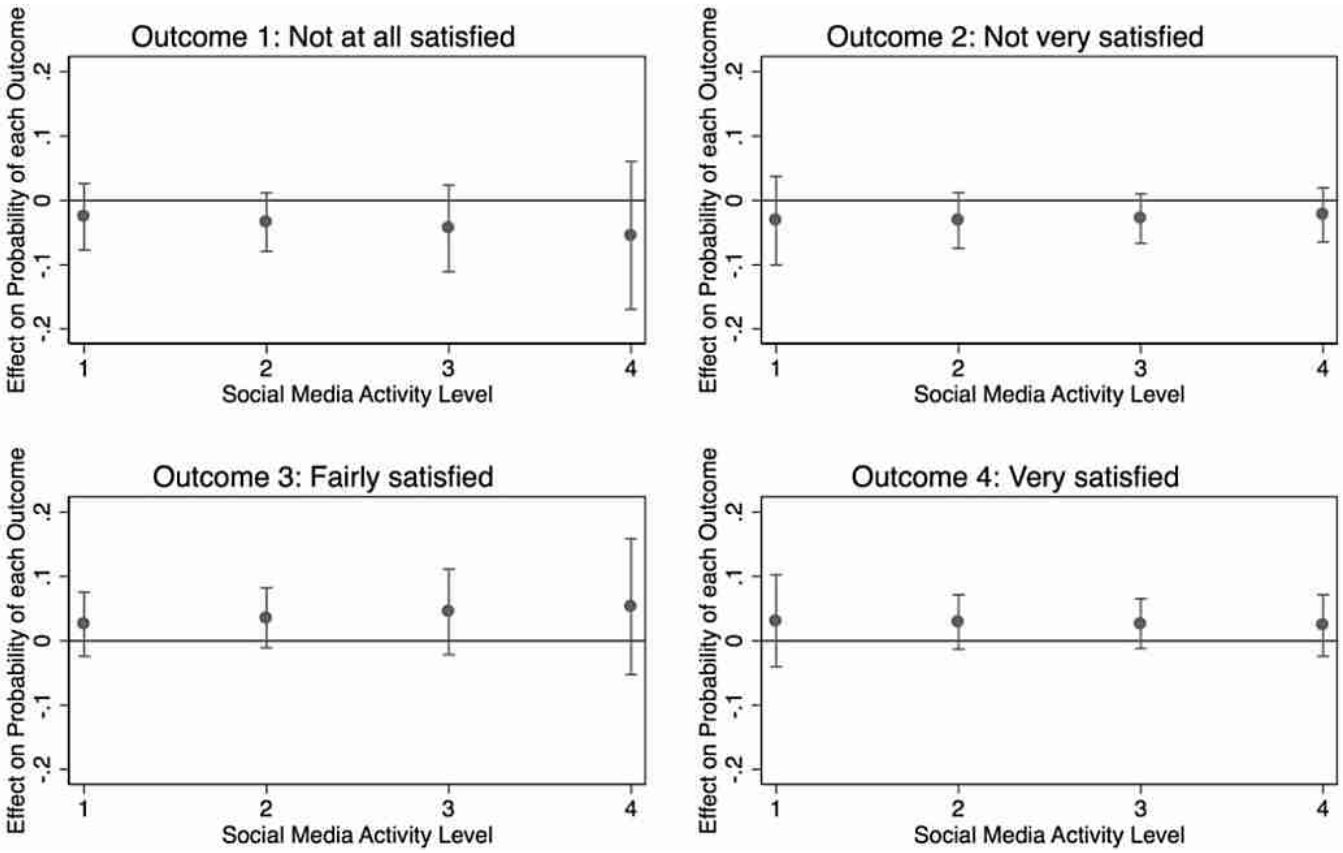


**Figure A1- Effect of SMNH on Democratic Satisfaction (Independents)**

Our manuscript includes two figures. Figure 1 plots the effect of social media network homogeneity (SMNH) for Republicans at various levels of social media activity. Figure 2 provides analogous information for Democrats. In Figure A1 (see below), we graph the effect of SMNH for Independents. As mentioned in the article, SMNH does not influence democratic system support by Independents – regardless of the observed level of social media activity

## Section 5: Additional Analyses and Robustness Checks

In order to assess the robustness of our findings, we conducted a number of additional statistical analyses. The results can be found below. In Model A1, we re-estimate Model 1 in the manuscript but we change the reference category for Party ID from “Independent” to “Democrat.” As reported in the manuscript, this analysis shows that Republicans are significantly more satisfied with democracy than Democrats.

**Appendix Table C:**

Model A1

| *Ordered Probit Regression* | **Model A1** | |
|---|---|---|
| **Republican** | 0.411 ** | (0.003) |

| *Ordered Probit Regression* | Model A1 | |
|---|---|---|
| **Independent** | − 0.023 | (0.105) |
| **SM Network Homogeneity (SMNH)** | 0.132 | (0.072) |
| **SM Activity Level (SMAL)** | − 0.043 | (0.048) |
| **Age** | − 0.001 | (0.003) |
| **Gender (Male = 1)** | 0.224** | (0.087) |
| **Education** | − 0.019 | (0.029) |
| **Income** | 0.021 | (0.014) |
| **Ideology** | 0.199** | (0.047) |
| **Political Knowledge** | − 0.035 | (0.065) |
| **African-American** | − 0.253 | (0.130) |
| **Asian or Asian-American** | 0.137 | (0.184) |
| **Other Race** | 0.052 | (0.162) |
| **Offline Network Homogeneity (ONH)** | − 0.131 | (0.280) |
| **Offline Political Activity (OPA)** | 0.089 | (0.211) |
| **ONH x OPA** | 0.032 | (0.092) |
| **Cut Point 1** | − 0.167 | (0.660) |
| **Cut Point 2** | 0.943 | (0.659) |
| **Cut Point 3** | 2.347 | (0.664) |
| **Number of Observations** | 669 | |
| **Log-Likelihood** | −784.25 | |

* = $p \leq 0.05$,
** = $p \leq 0.01$

In Models A2 and A3 (see below) we re-estimate the effect of echo chambers on self-identified Republicans (Model A2) and Democrats (Model A3) while also controlling for whether or not an individual self-identifies as a “strong” or “not very strong” Republican/Democrat. This analysis therefore constitutes another test of the interactive nature of our hypothesis, and it addresses the potential concern that our observed echo chamber effects are caused by strength of individual-level party ID. The results from these two models corroborate the findings discussed above.

*First*, social media network homogeneity (SMNH) has a statistically significant effect on democratic satisfaction among Republicans at high and very high levels of social media activity (i.e. among those individuals who we consider to be in social media echo chambers). More specifically, as we show in Figure A2 (below), SMNH decreases the probability that a digitally active Republican is unsatisfied with democracy and it increases the probability that s/he falls into the highest category of our dependent variable. *Second*, this effect is not weakened by the inclusion of the partisan intensity variable which – by itself – is statistically insignificant in both Models A2 and A3. *Third*, echo chambers do not appear to affect levels of system support among Democrats (Model A3). For this subsample, there is no interactive relationship between SMNH and SMAL. Furthermore, a likelihood-ratio test shows that the inclusion of SMNH and SMAL does not constitute an improvement of Model A3 (p=0.90).

In other words, the substantive interpretation of the results in Models A2 and A3 is identical to the findings reported in the manuscript.

**Appendix Table D:**

Models A2 and A3

| *Ordered Probit Regression* | **Model A2 (Republicans only)** | | **Model A3 (Democrats only)** | |
|---|---|---|---|---|
| **SM Network Homogeneity (SMNH)** | −0.545 | (0.352) | − 0.127 | (0.275) |
| **SM Activity Level (SMAL)** | − 0.707 | (0.278) | − 0.029 | (0.225) |
| **SMNH x SMAL** | 0.334** | (0.125) | 0.015 | (0.095) |
| **Partisan Intensity** | 0.065 | (0.191) | 0.032 | (0.152) |
| **Age** | 0.001 | (0.006) | − 0.003 | (0.005) |
| **Gender (Male = 1)** | − 0.166 | (0.190) | 0.539** | (0.147) |
| **Education** | 0.117 | (0.064) | − 0.080 | (0.048) |
| **Income** | 0.004 | (0.028) | 0.032 | (0.024) |
| **Ideology** | 0.057 | (0.111) | 0.131 | (0.079) |
| **Political Knowledge** | 0.017 | (0.164) | − 0.007 | (0.297) |
| **African-American** | − 0.165 | (0.423) | − 0.214 | (0.176) |
| **Asian or Asian-American** | 0.260 | (0.354) | − 0.066 | (0.297) |
| **Other Race** | 0.502 | (0.409) | − 0.535 | (0.287) |
| **Offline Network Homogeneity (ONH)** | 1.450** | (0.694) | − 0.405 | (0.405) |
| **Offline Political Activity (OPA)** | 1.205** | (0.224) | − 0.151 | (0.308) |
| **ONH x OPA** | − 0.428 | (0.224) | 0.125 | (0.133) |
| **Cut Point 1** | 2.015 | (1.763) | − 1.755 | (1.135) |
| **Cut Point 2** | 3.219 | (1.770) | − 0.466 | (1.133) |
| **Cut Point 3** | 4.660 | (1.759) | 0.925 | (1.133) |
| **Number of Observations** | 170 | | 257 | |
| **Log-Likelihood** | −180.15 | | −294.73 | |

* = $p \leq 0.05$,
** = $p \leq 0.01$

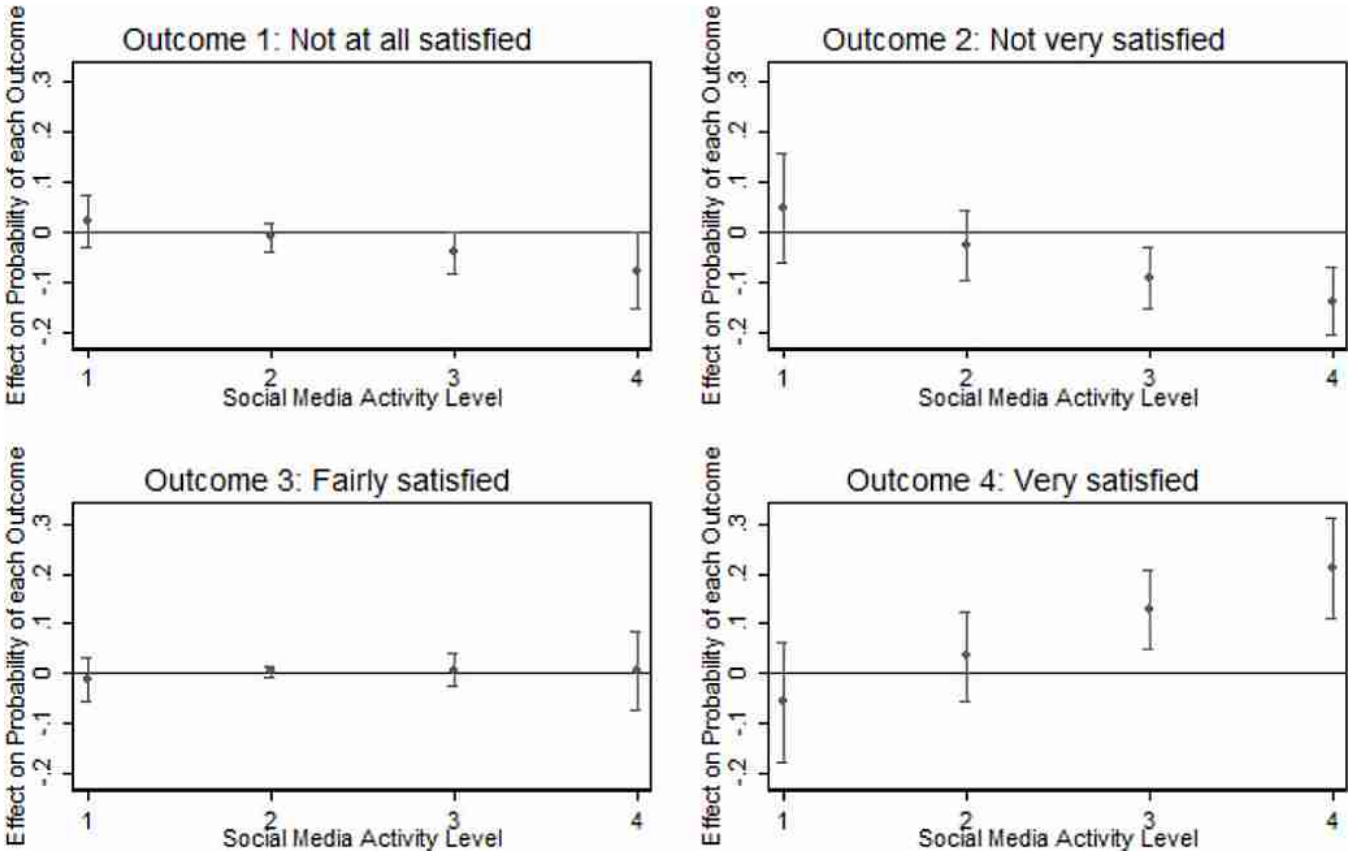


**Figure A2- Effect of SMNH on Democratic Satisfaction (Republicans)**

Finally, in Model A4 (see below), we introduce a three-way-interaction between party ID, offline network homogeneity, and offline political activity into the model. We see that this triple interaction is not statistically significant. Furthermore a likelihood-ratio test shows that this specification (i.e. the inclusion of the triple interaction) does not constitute a significant improvement of Model 3 in the manuscript (p=0.30). This leads us to conclude that offline echo chambers do not have the same substantive effect as echo chambers on social media. In other words, our online and offline variables tap into conceptually distinct dimensions.

**Appendix Table E:**

Model A4

| ***Ordered Probit Regression*** | **Model A4** | |
|---|---|---|
| **Republican** | − 2.535 | (2.076) |
| **Democrat** | 0.661 | (1.571) |
| **SM Network Homogeneity (SMNH)** | 0.156 | (0.252) |
| **SM Activity Level (SMAL)** | − 0.187 | (0.228) |
| **SMNH x Republican** | − 0.788 | (0.420) |
| **SMNH x Democrat** | − 0.323 | (0.368) |
| **SMAL x Republican** | − 0.546 | (0.346) |
| **SMAL x Democrat** | 0.099 | (0.317) |

| *Ordered Probit Regression* | Model A4 | |
|---|---|---|
| **SMNH x SMAL** | 0.019 | (0.100) |
| **SMNH x SMAL x Republican** | 0.321 * | (0.155) |
| **SMNH x SMAL x Democrat** | 0.029 | (0.137) |
| **Age** | − 0.001 | (0.003) |
| **Gender (Male = 1)** | 0.223 ** | (0.089) |
| **Education** | − 0.021 | (0.029) |
| **Income** | 0.022 | (0.014) |
| **Ideology** | 0.185 ** | (0.048) |
| **Political Knowledge** | − 0.042 | (0.066) |
| **African-American** | − 0.222 | (0.132) |
| **Asian or Asian-American** | 0.164 | (0.186) |
| **Other Race** | − 0.086 | (0.166) |
| **Offline Network Homogeneity (ONH)** | − 0.194 | (0.520) |
| **Offline Political Activity (OPA)** | 0.040 | (0.376) |
| **ONH x Republican** | 1.603 | (0.855) |
| **ONH x Democrat** | − 0.170 | (0.656) |
| **OPA x Republican** | 1.257 | (0.655) |
| **OPA x Democrat** | − 0.133 | (0.484) |
| **ONH x OPA** | 0.032 | (0.172) |
| **ONH x OPA x Republican** | − 0.463 | (0.279) |
| **ONH x OPA x Democrat** | 0.071 | (0.217) |
| **Cut Point 1** | − 0.669 | (1.196) |
| **Cut Point 2** | 0.452 | (1.196) |
| **Cut Point 3** | 1.890 | (1.198) |
| **Number of Observations** | 669 | |
| **Log-Likelihood** | −772.12 | |

* = $p \leq 0.05$,
** = $p \leq 0.01$

## Section 6: Survey Questions

**Dependent Variable**: Satisfaction with Democracy

On the whole, how satisfied are you with the way democracy works in the United States?

1. Not at all satisfied
2. Not very satisfied
3. Fairly satisfied
4. Very satisfied

## Main Independent Variables:

### Social Media Activity Level:

How often do you comment, post, or discuss government and politics with others on social media?

1. Never
2. Hardly ever
3. Sometimes
4. Often
99. I don't know[17]

### Social Media Network Homogeneity:

How often do you agree with the political opinions or political content your friends post on social media sites?

**1.** Never
**2.** Only sometimes
**3.** Most of the time
**4.** Always or almost always
**5.** I don't know[18]

### Party ID:

In politics TODAY, do you consider yourself a Republican, Democrat, or independent?

**1.** Republican
**2.** Democrat
**3.** Independent
**4.** No preference
**5.** Other party

## Control Variables

### Age:

What is your age?

[17]There were 4 respondents (0.4 percent of observations) who answered "I don't know" to the social media activity level question. These observations were dropped from the analysis

[18]There were 61 respondents (7.3 percent of observations) who answered "I don't know" to the social media network homogeneity question. These observations were dropped from the analysis

**Gender:**

Are you male or female?

- Male
- Female

**Education:**

What is the highest level of school you have completed or the highest degree you have received?

- Less than high school (Grades 1–8 or no formal education)
- High school incomplete (Grades 9–11 or Grade 12 with NO diploma)
- High school graduate (Grade 12 with diploma or GED certificate)
- Some college, no degree (includes some community college)
- Two year associate degree from a college or university
- Four year college or university degree/Bachelor's degree (e.g., BS, BA, AB)
- Some postgraduate or professional schooling, no postgraduate degree (e.g. some graduate school)
- Postgraduate or professional degree, including master's, doctorate, medical or law degree (e.g., MA, MS, PhD, MD, JD, graduate school)

**Income:**

Last year, that is in 2016, what was your total family income from all sources, before taxes?

- Less than $10,000
- Between $10,000 and $19,999
- Between $20,000 and $29,999
- Between $30,000 and $39,999
- Between $40,000 and $49,999
- Between $50,000 and $59,999
- Between $60,000 and $69,999
- Between $70,000 and $79,999
- Between $80,000 and $89,999
- Between $90,000 and $99,999
- Between $100,000 and $149,999
- More than $150,000

**Ideology:**

In general, would you describe your political views as...

1. Very liberal
2. Liberal
3. Moderate
4. Conservative
5. Very Conservative
6. I don't know

**Race:**

Which of the following describes your race? You can select as many as apply.

- White
- Black or African-American
- Asian or Asian-American
- Some other race

**Political Knowledge 1:**

For how many years is a United States Senator elected – that is, how many years are there in one full term of office for a U.S. Senator?

- Answer options: 1 – 20 years.

**Political Knowledge 2:**

Is the U.S. federal budget deficit – the amount by which the government's spending exceeds the amount of money it collects – now bigger, about the same, or smaller than it was during most of the 1990s?

- Bigger
- About the same
- Smaller

**Offline Network Homogeneity:**

Now thinking about your offline (face-to-face) social network: do most people have...

1. …different political beliefs from you.
2. …a mix of political beliefs.
3. …similar political beliefs to you.

**Offline Political Activity:**

How often do you discuss government and politics with other offline (face-to-face)?

1. Never
2. Hardly ever
3. Sometimes
4. Often

99. I don't know

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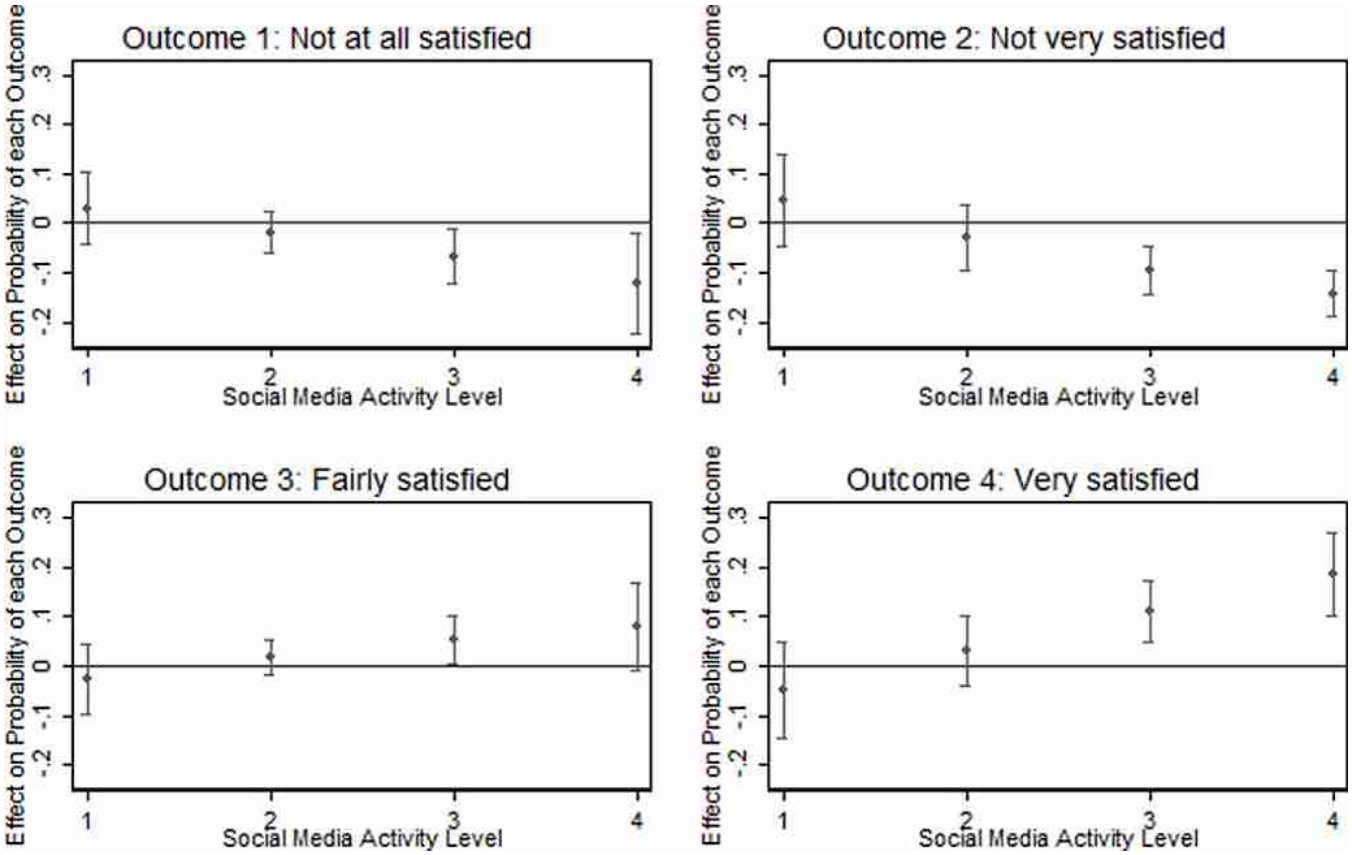


**Figure 1:**
Effect of SMNH on Democratic Satisfaction Republicans

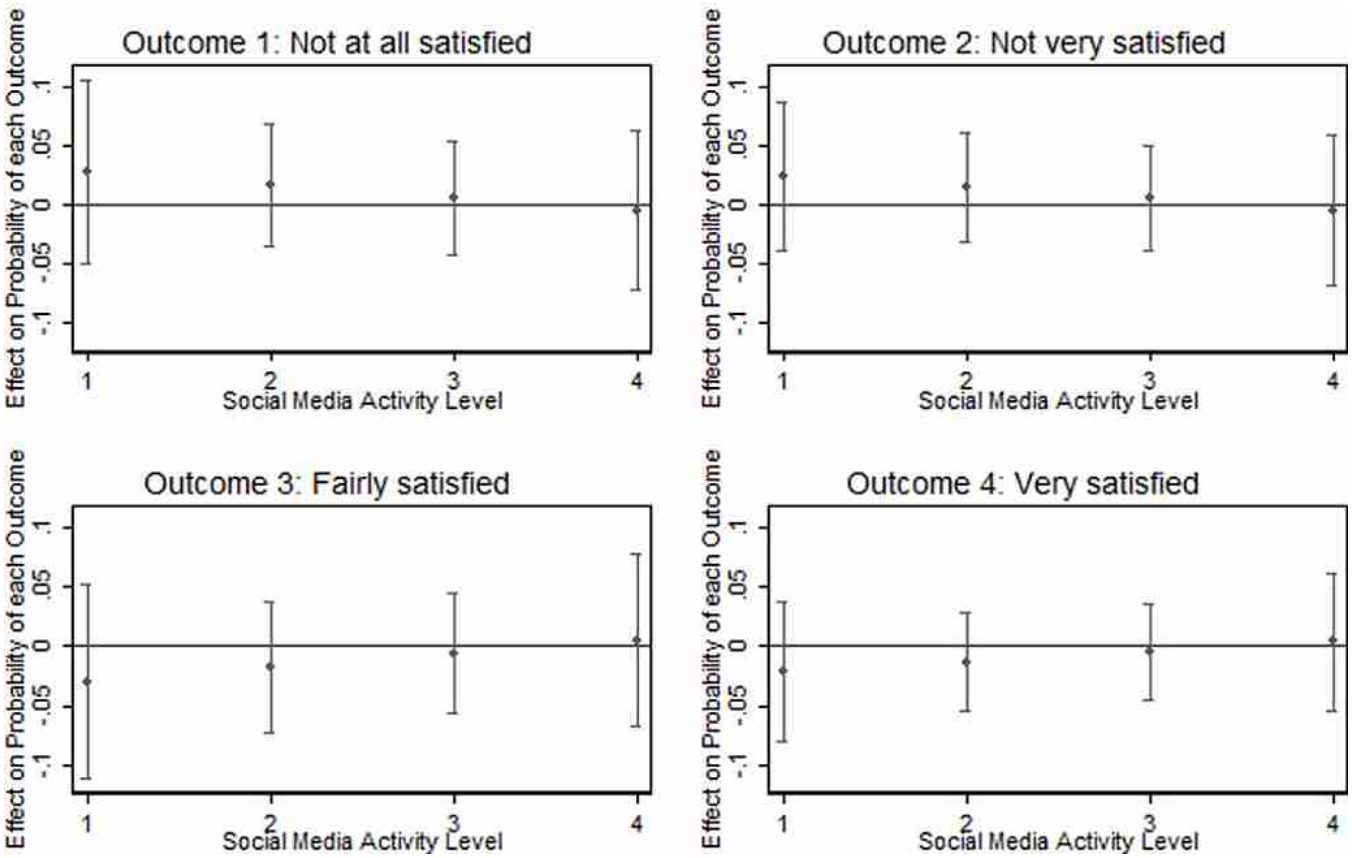


**Figure 2:**
Effect of SMNH on Democratic Satisfaction Democrats

**Table 1-**

Satisfaction with Democracy (Ordered Probit Regression Results)

| | Model 1 | | Model 2 | | Model 3 | |
|---|---|---|---|---|---|---|
| **Republican** | 0.433** | (0.119) | − 0.121 | (0.364) | 1.457 | (0.832) |
| **Democrat** | 0.022 | (0.105) | 0.283 | (0.341) | 0.354 | (0.764) |
| **SM Network Homogeneity (SMNH)** | 0.132 | (0.071) | 0.104 | (0.111) | 0.136 | (0.251) |
| **SM Activity Level (SMAL)** | − 0.043 | (0.048) | − 0.048 | (0.048) | − 0.191 | (0.227) |
| **SMNH x Republican** | --- | --- | 0.255 | (0.160) | − 0.689 | (0.417) |
| **SMNH x Democrat** | --- | --- | − 0.116 | (0.152) | − 0.325 | (0.366) |
| **SMAL x Republican** | --- | --- | --- | --- | − 0.543 | (0.346) |
| **SMAL x Democrat** | --- | --- | --- | --- | 0.089 | (0.316) |
| **SMNH x SMAL** | --- | --- | --- | --- | 0.018 | (0.100) |
| **SMNH x SMAL x Republican** | --- | --- | --- | --- | 0.325* | (0.155) |
| **SMNH x SMAL x Democrat** | --- | --- | --- | --- | 0.035 | (0.137) |
| **Age** | − 0.001 | (0.003) | − 0.001 | (0.003) | − 0.001 | (0.003) |
| **Gender (Male = 1)** | 0.224** | (0.087) | 0.227** | (0.088) | 0.228** | (0.088) |
| **Education** | − 0.019 | (0.029) | − 0.018 | (0.029) | − 0.016 | (0.029) |
| **Income** | 0.021 | (0.014) | 0.020 | (0.014) | 0.022 | (0.014) |
| **Ideology** | 0.199** | (0.047) | 0.193** | (0.047) | 0.195** | (0.048) |
| **Political Knowledge** | − 0.035 | (0.067) | − 0.036 | (0.065) | − 0.053 | (0.065) |
| **African-American** | − 0.253 | (0.131) | − 0.230 | (0.131) | − 0.235 | (0.132) |
| **Asian or Asian-American** | 0.137 | (0.184) | 0.167 | (0.185) | 0.177 | (0.186) |
| **Other Race** | 0.057 | (0.173) | − 0.047 | (0.163) | − 0.082 | (0.165) |
| **Offline Network Homogeneity (ONH)** | − 0.131 | (0.280) | − 0.130 | (0.280) | − 0.049 | (0.282) |
| **Offline Political Activity (OPA)** | 0.089 | (0.211) | 0.094 | (0.211) | 0.110 | (0.213) |
| **ONH x OPA** | 0.032 | (0.092) | 0.032 | (0.091) | 0.005 | (0.093) |
| **Cut Point 1** | − 0.145 | (0.661) | − 0.219 | (0.682) | − 0.240 | (0.813) |
| **Cut Point 2** | 0.966 | (0.660) | 0.895 | (0.681) | 0.878 | (0.813) |
| **Cut Point 3** | 2.370 | (0.665) | 2.305 | (0.686) | 2.303 | (0.817) |
| **Number of Observations** | 669 | | 669 | | 669 | |
| **Log-Likelihood** | −784.25 | | −781.49 | | −775.71 | |

* = $p \leq 0.05$,

** = $p \leq 0.01$

**Table 2-**

Predicted Probabilities

| | **Predicted Prob.: *Respondent is "Fairly Satisfied" or "Very Satisfied"*** |
|---|---|
| Republican / SMAL = 1 / SMNH = 1 (no echo chamber) | 72.0% |
| Democrat / SMAL = 1 / SMNH = 1 (no echo chamber) | 58.1% |
| Republican / SMAL = 4 / SMNH = 4 (echo chamber) | 96.6% |
| Democrat / SMAL = 4 / SMNH = 4 (echo chamber) | 55.5% |
| *Control Variables* | |
| Men | 60.7% |
| Women | 52.4% |
| "Very liberal" respondents | 42.1% |
| "Very conservative" respondents | 70.5% |

[a]All other variables are at their observed values.