

A Multivariate Time-Series Analysis of the Agenda-Setting Effects Among News Media, Twitter Elites, and Twitter Public in the Context of the U.S. Immigration Issue

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The U.S. immigration policy is one of the most long-standing, controversial sociopolitical issues, attracting significant attention from traditional news media and generating dynamic, intense interactions on social media. This study conducted a multivariate time-series analysis to measure the longitudinal agenda-setting effects between news media, Twitter elites, and the Twitter public in the context of the U.S. immigration issue. The four-month study period was divided into two time frames—one month before and three months after the 2016 U.S. presidential election—to observe any changes in the trends of these agenda-setting effects. Although there is only one significant agenda-setting effect before the election, 6 of 9 possible agenda-setting effects occur after the election. This study discusses both the direct and indirect effects of one time-series variable on another through the third variable, illustrated with impulse response function plots.

Keywords: opinion leadership, multivariate time-series analysis, impulse response function, immigration, Twitter

Immigration has long been one of the most controversial issues in U.S. history, dating back to before the Civil War in the 1860s (Zolberg, 2009). Over the years, immigration laws and policies have intensified this controversy, generating active debates and protests (Klobucista, Cheatham, & Roy, 2022). Putting immigration at the top of the list of campaign issues was an important factor contributing to Trump's win in the 2016 U.S. presidential election. Within the context of such concerns over immigration in the United States, it is generally accepted that opinion leaders—defined as individuals with elite status and major reputations who reproduce information from news media and disseminate it to the public (Katz & Lazarsfeld, 1955)—have played a significant role in shaping public opinion.

In the era of information technology, more diverse forms of information sources and information flows can be identified. Scholars have examined the active agenda-setting effects between traditional news media and technology blogs (Weiss-Blatt, 2015) and among online news sites, newspapers, and television news (Vonbun, Königslöw, & Schoenbach, 2016). Scholars have also found agenda-setting effects between news media and Twitter for specific issues, such as the ice bucket challenge (Jang, Park, & Lee, 2017), the 2016 presidential primary campaign issues (Conway-Silva, Filer, Kenski, & Tsetsi, 2018), and climate change

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(Su & Borah, 2019). Information flow can also occur within social media platforms like the Twittersphere, where two distinct user groups coexist: Twitter influencers (referred to as "Twitter elites," hereafter) and ordinary Twitter users (referred to as "Twitter public," hereafter).

For some Twitter elites, Twitter operates as both a source and a disseminator of information on issues like immigration (Van Haperen, Nicholls, & Uitermark, 2018) and gun control (Tremayne & Minoioie, 2013). Meanwhile, the Twitter public consumes relevant information to support their own stances on controversial issues or to criticize their opponents. This means that Twitter elites can initiate agenda-setting processes by focusing on controversial issues, interpreting them, and conveying their perspectives to their followers. To date, little research has focused on the role of Twitter elites in setting agendas on controversial issues. Moreover, few studies have examined Twitter's longitudinal agenda-setting effects among news media, Twitter elites, and the Twitter public.

This study focuses on Twitter conversations about U.S. immigration, which is a controversial topic both online and offline. Many Twitter influencers, including lawyers, authors, activists, and educators, are engaged in Twitter debates (Dubois & Gaffney, 2014). In the context of immigration controversies, this study hopes to answer the following questions: First, who initiates the agenda-setting process between news media, Twitter elites, and the Twitter public in the context of the U.S. immigration issue? Second, is the direction of agenda setting affected by a salient political event concerning the immigration issue, for example, the election of Donald Trump as the 45th President of the United States?

I conducted a longitudinal study to examine the agenda-setting effects among news media, Twitter elites, and the Twitter public about the U.S. immigration issue. First, I used Discovertext, a third-party Twitter vendor, to glean tweets and LexisNexis to collect news items. Using the keyword "immigration," I conducted Boolean searches.¹ Then, I constructed a retweet network, as the frequency of retweets can indicate the influence of a tweet (Stieglitz & Dang-Xuan, 2013). This enabled the identification of Twitter elites. Finally, using the retweet network, I conducted Granger causality tests on news media, Twitter elites, and the Twitter public to explore both intermedia (between news media and Twitter elites; between news media and Twitter public) and intramedia (between Twitter elites and Twitter public) agenda-setting effects.

Literature Review

Agenda-Setting Theory and Social Media

To explain the news media's effects on audiences in the 1968 presidential campaign, McCombs and Shaw (1972) hypothesized that "the mass media set the agenda for each political campaign, influencing the

¹ After reviewing the data sets, I discovered that some tweets and news articles irrelevant to my study mainly discussed immigration issues outside the United States. Therefore, I did Boolean searches to exclude them: (#)immigration - (brexit OR migrant OR france OR syria OR italy OR europe OR eu OR spain OR germany OR denmark OR UK OR greek OR macedonia OR pakistan OR india OR indo OR indonesia OR thailand OR russia OR assimilation).

salience of attitudes toward the political issues" (p. 177). Based on this theory, scholars have assumed that if traditional media cover and highlight specific issues frequently in their news presentations (the volume of news coverage), then the audience perceives these issues as important (the audience's perception of the issue; McCombs, 2005). At this level, a set of objects determine the public agenda so that the frequency of the object mentioned in the media agenda can explain the salience of an object for the public (McCombs, 2014, p. 52).

Intermedia agenda setting measures the influence of different news sources on each other, assessing the transfer of issue salience between multiple news sources, including traditional news media, online media, blogs, and social media (Golan, 2006; Meraz, 2011; Nygaard, 2020; Vargo & Guo, 2017). Media outlets tend to take clues about a specific issue from other media (Dearing & Rodgers, 1996). Traditionally, elite newspapers like the *New York Times* play a leading role in setting intermedia agendas of less elite media and television news (Lopez-Escobar, Llamas, McCombs, & Lennon, 1998; McCombs & Shaw, 1976). Technological development has led to the proliferation of online publications (Lee, Lancendorfer, & Lee, 2005), which have their own publishing routines. Some news media can be faster than others in publishing news coverage, especially for particular issues (Vliegenthart & Walgrave, 2008). Their lack of a fixed set of deadlines and publishing schedules allows them to post news stories as soon as they are ready. Some understaffed newsrooms might rely on other media outlets to find issues (Vonbun et al., 2016).

The emergence of social media has modified the direction of intermedia agenda setting. The decentralized and participatory nature of social media, characterized by its low entry barrier, enables users to participate in various discussions about ongoing issues. In particular, Jang et al. (2017) identified a cyclical agenda-setting process between traditional media and Twitter during the 2014 ice bucket challenge. These findings suggest the possibility of reverse intermedia agenda setting.

Social media participation can be far from egalitarian because of the nature of power law distribution, a disproportional distribution of connections among online actors (Hindman, 2009). Power law distribution can explain the small number of influential users on online discussion platforms, such as Usenet newsgroups (Himmelboim, 2008). Such a small number of influential social media users can develop their personal agendas, influencing mainstream media agendas through lively discussions of issues among the public that the news media may not cover. For example, although news organizations on Twitter keep in touch with their audiences by updating their websites with the latest news, Twitter influencers can also break news that others may retweet to distribute information. Reporters now keep their eyes on Twitter feeds, covering news gleaned from them if any of the news items broken will be of interest to their news organization's audience. Scholars have considered the influence of user-generated social media content on the agendas of elite news media (Conway-Silva et al., 2018). Freelon, McIlwain, and Clark (2018) found that the social media activities of political elites about Black Lives Matter (BLM) attracted media attention, providing evidence of reverse intermedia agenda setting.

On Twitter, officially "verified" or highly active users can be the ones who take on such opinion leadership roles, which can be characterized as an intramedia agenda-setting effect. McCorquodale (2020) coined the term social media influencers to refer to individuals who share information from traditional media but recreate user-generated content based on their perspectives. Fazekas, Popa, Schmitt, Barberá, and Theocharis (2021) pointed out that political elites can use Twitter as a tool to attract attention from the public, reporting that the use of Twitter to promote political issues can result in political elite-public

interactions. Like political elites, social media influencers can affect the dynamics of agenda setting between traditional news media and Twitter users.

Two-Step Flow of Information and Social Media

Lazarsfeld, Berelson, and Gaudet (1948) conceptualized the two-step flow of communication, arguing that the flow of information from mass media to the less active public is mediated by a small number of opinion leaders (or influential individuals), who pay closer attention to news media, receive the information, and pass on their interpretations to their followers. They transfer their personal opinions to the other members of their network in a controlled way (Katz & Lazarsfeld, 1955). Jung and Kim (2016) revisited the concepts of opinion leadership and followership and found that those who both give and seek opinions have more connections to various types of media and have higher curating skills than others.

The emergence of new media has raised the question of whether the traditional models of the two-step flow of information and theories about the role of opinion leaders remain valid in the new media environment. Feezell (2018) argued that incidental exposure to political information shared on social media can initiate an agenda-setting effect because such information can be filtered through the two-step flow of information. Several studies have confirmed the presence of opinion leaders on the Internet and on various social media platforms (Choi, 2014, 2015; Xu, Sang, Blasiola, & Park, 2014).

To mediate information flow, both traditional (Katz & Lazarsfeld, 1955) and online (Bodendorf & Kaiser, 2009) opinion leaders are located at the center of their network. Twitter studies have found strong evidence of the intermediary actions of opinion leaders or elites (Cha, Haddadi, Benevenuto, & Gummadi, 2010; Wu, Hofman, Mason, & Watts, 2011), who can be celebrities, political actors, and other influencers. Kurzman et al. (2007) noted that celebrities command attention and "are accorded the chance to speak publicly about political issues" (p. 358). The Twitter activities of celebrities about the U.S. immigration policy receive a lot of attention from news media and the public (Lang, 2017). Walter and Brüggemann (2018) suggested that political actors can spark Twitter conversations and interactions. Their examination of climate change debates found that political actors have a significant impact, as their tweets are often retweeted by other actors, including civil society actors, scientists, and journalists. In addition, ordinary citizens, activists, and political elites can shape networks and transmit relevant information, which leads to online social movements (González-Bailón & Wang, 2016; Isa & Himelboim, 2018; Jackson & Welles, 2015, 2016). Furthermore, social media influencers who are active on Twitter can grasp others' attention. McCorquodale (2020) argued that Twitter influencers' information-sharing activities reflect their own opinions and encourage other Twitter users to respond to their ideas. With respect to the U.S. immigration issue, Van Haperen et al. (2018) investigated engagement with digitally networked, politically contentious actions, known as the #not1more campaign against immigrant deportations from 2013 to 2014, finding that core organizers and activists (in other words, Twitter influencers) created this campaign.

Combination of Two-Step Flow of Information and Reverse Agenda-Setting

The theoretical background of this study rests on the role of social media influencers and multiple agenda-setting directions because of their presence. Brosius and Weimann (1996) highlighted the role of

early recognizers in mediating the public and the media, examining four models: (1) the classical two-step flow: Media Agenda → Early Recognizers → Public Agenda, (2) the reverse two-step flow: Public Agenda → Early Recognizers → Media Agenda, (3) initiating the classical agenda-setting process: Early Recognizers → Media Agenda → Public Agenda, and (4) initiating the reverse agenda-setting process: Early Recognizers → Public Agenda → Media Agenda. The reverse two-step flow model suggests that the public's interests and issues pass to the media through early recognizers, who serve as mediators between the news media and the public. Early recognizers can initiate agenda-setting processes in both the classical and the reverse two-step flow models in a longitudinal manner. It is noted that they examined only the models in which early recognizers precede either the general public or the media and identified the longitudinal flow of issues from the public to the media.

Communication technology facilitates the activation of the four models of Brosius and Weimann (1996), characterized by reverse agenda-setting effects between media agenda and public agenda in conjunction with the enhanced role of influential social media users in initiating both classical and reverse agenda-setting effects. McCombs (2014) suggested that in the reverse agenda-setting process, journalists first respond to perceived public interests, and hence news media report the public agenda. Then, Gruszczynski and Wagner (2017) proposed the agenda-uptake theory, which explained that the transfer of salience can be multidirectional and that the public can influence the agendas of news organizations. Furthermore, social media encourages marginalized populations to collectively voice narratives that mainstream media rarely cover (Jackson, Bailey, & Welles, 2020).

The U.S. Immigration Debate in News Media and Twitter

In the context of the U.S. immigration issue, this study examines opinion leadership and followership among traditional news media, Twitter elites, and the Twitter public. Abrajano, Hajnal, and Hassell (2017) found that as elite media portray immigration issues negatively, the public is more likely to lean toward the Republican Party that supports an anti-immigration stance. Their findings suggest that media coverage of immigration issues can influence how these issues are perceived by the public.

On Twitter, gatherings around hashtags can form a single or multiple ad hoc homogeneous group(s) brought about by breaking news or important current issues. Some of these groups may have discussions on specific issues and organize particular events. News media continually report the U.S. immigration policy (Gil de Zúñiga, Correa, & Valenzuela, 2012), and many interested Twitter users discuss issues derived from the U.S. immigration policy, thus shaping a politically homogeneous (issue) public (Himmelboim, McCreery, & Smith, 2013). Flores (2017) used more than 250,000 tweets to examine the effect of SB 1070—a high-profile anti-immigrant law passed by Arizona in 2010—on public attitudes and behaviors toward immigrants and found that this law had a negative impact on the average sentiment of tweets about Mexican immigrants.

Both presidential candidates, Donald Trump and Hillary Rodham Clinton, opined about immigration during the election campaign. While Clinton emphasized her commitment to keeping immigrant families together, Trump maintained an anti-immigration stance and wanted to raise the bar for refugees and asylum seekers to enter the country (Valverde, 2016). In July 2015, Trump openly made demeaning remarks about immigrants from Latin American countries by repeatedly claiming that the country needed to build a wall to keep Latin American immigrants out and that Mexico would be forced to pay for the wall (Valverde, 2016).

On the other hand, Hillary Clinton defended DACA, offering renewable deportation deferrals and work permits to undocumented immigrants who were brought to the United States as children, while Trump supported the rescinding of DACA.

On November 8, 2016, Donald Trump was elected as the 45th President of the United States. The media paid more significant attention to his pledges on immigration than before, triggering intense reactions from both supporters and opponents (Gimpel, 2017). Within a week of his inauguration, Trump issued three executive orders that affected the rights of immigrants and refugees, both in the U.S. and globally: (1) "Border Security and Immigration Enforcement Improvements," which called for the broader application of detention practices, restricted asylum access, and enhanced control measures along the United States-Mexico border; (2) "Enhancing Public Safety in the Interior of the United States," which emphasized cooperation between local and federal authorities in enforcing immigration laws; and (3) "Protecting the Nation from Terrorist Attacks by Foreign Nationals," which enacted a suspension on the entry of individuals from Muslim countries and on resettlement of refugees (Center for Migration Studies, 2017). Consequently, nationwide protests opposing these orders occurred throughout the year (Caren, Andrews, & Lu, 2020). Nevertheless, President Trump's negative tweets about immigration sparked a divisive contention characterized by themes of criminality, invasion, and threat on the Twittersphere (Coe & Griffin, 2020).

In fact, there are different views on the impact of elites in shaping public attitudes toward immigration issues, possibly depending on the period of the study. Flores (2018) analyzed the attitudinal effects of Trump's 2016 presidential campaign announcement speech referring to Mexican immigrants as "rapists" and "criminals." He argued that negative messages are consequential in shaping public opinion and that the power of political elite rhetoric lies in its capacity to reach the masses via the news media. Wagner and Boczkowski (2021) reported that people expressed a high level of emotionality when recalling their experiences of consuming political news, including immigration policy, after the 2016 presidential election. On the other hand, Kustov, Laaker, and Reller (2021) found that immigration attitudes are remarkably stable and that political elites' rhetoric is ineffective in converting attitudes.

Based on the literature review, I became motivated to examine whether there were any possible agenda-setting effects among news media, Twitter elites, and the Twitter public in the context of the United States immigration issue over the "transition period" encompassing the 2016 presidential election and, if so, whether there were any changes in the agenda-setting effects between the three possible agenda setters. In this examination, the transition period consists of two time frames, one in which the immigration debates and policies were made without a definite direction politically and the next one with a definite direction toward anti-immigration political leadership.

Against this backdrop, this study asks the following two research questions:

RQ1: Are there any agenda-setting effects among the news media, Twitter elites, and Twitter public in the context of the United States immigration issue before the 2016 election?

RQ2: Are there any agenda-setting effects among the news media, Twitter elites, and Twitter public in the context of the United States immigration issue after the 2016 election?

Methodology

Keyword Search and Data Collection

To address the research questions, I set the study period as four months—from October 1, 2016 to January 31, 2017—divided into two time frames: October 1 to November 8, 2016 and November 9, 2016 to January 31, 2017.

A total of 397,665 tweets containing “#immigration” and posted in the United States during this period were initially gleaned for the present analysis, using Twitter’s Open API (Application Programming Interface) in the DiscoverText Sifter—a cloud-based third-party data vendor that scrapes public posts from social media and offers them to the public. Hashtags allow users to easily search for and engage with content relevant to particular topics and to categorize different messages and posts. They also allow users to shape ad hoc groups related to specific issues or themes on a daily basis, thereby contributing to the formation of a larger information network (White, 2012). In this study, “#immigration” is used for the keyword search because it is the most inclusive hashtag for gleaning tweets in the context of the U.S. immigration issue. This study also sets the geographical origin of data as the United States using a Boolean search to gather tweets about the U.S. immigration issue only. Although there is a concern that #immigration alone might not fully cover all the Twitter discourses related to the United States immigration issue, it has been used most extensively by Twitter users across a broad spectrum of sociopolitical opinions on this issue. Moreover, using a single hashtag for social network analysis is preferable to using multiple hashtags to grasp the overall degree centrality of the network. Then, a retweet network ($N = 227,962$) is created because retweeting reveals how messages are disseminated to a person’s followers (Barash & Golder, 2011), indicating the influences of tweets (Dang-Xuan, Stieglitz, Wladarsch, & Neuberger, 2013).

LexisNexis, a database archive offering a news article search function, is then used to gather online coverage in the mainstream media about U.S. immigration issues. The keyword “immigration” within the four-month time period was applied to check and count the number of news articles from the news media outlets. This study used a Boolean search to gather news articles that covered only the U.S. immigration issue. After all, daily volumes of mainstream television and national news coverage (from the *New York Times*, *Washington Post*, *USA Today*, ABC, CBS, CNN, FOX, MSNBC, and NBC; $N = 4,981$), collected through the LexisNexis search, are used for the present analysis.

Creation of Agenda-Setting Groups

To create the groups that have set the agenda, the first step is to designate the mainstream media that cover the U.S. immigration issue through their news coverage as the “news media” group. Traditionally, the *New York Times* and the *Washington Post* are regarded as agenda setters for other media (McCombs, 2014). *USA Today* is considered a member of this group because it is a nationwide newspaper distributed throughout the United States. Then, ABC, CBS, and NBC are included because all are national news outlets, as are CNN, MSNBC, and FOX because these three cable news channels are devoted to television news broadcasts.

Next, I define "Twitter elites" as the "verified" Twitter accounts and the accounts recorded in the top 10% of the in-degree centrality score. Zhang, Peng, Zhang, Wang, and Zhu (2014) found that on microblogging sites, postings from verified users were more credible than those from unverified users. A Twitter account is officially verified if a "verified badge" is shown next to the user's display name. In this study, the verified Twitter accounts are meant for (1) immigration workers and organizations, (2) individual activists, and (3) users who are active in posting political tweets.² It is noted that tweets posted by (1) immigration workers and organizations and (2) individual activists mostly contain up-to-date U.S. immigration news, information for immigrants, and sometimes encouragement to participate in protests or actions. Earlier, Brosius and Weimann (1996) classified the upper 10% of all individuals involved in the network on the Strength of Personality (SP) scale as influential. I use in-degree centrality because it measures the number of inbound links sent to a node. In this study, a node is an individual Twitter account, and an edge is a link shaped by retweets between paired accounts. Each in-degree centrality is measured by the frequency with which an account is retweeted. I regard those Twitter users as Twitter elites whose accounts attain much higher in-degree centrality (so to speak, in the top 10%) than other nodes. In this study, some Twitter users who are not officially "verified" can thus become Twitter elites by attracting the attention of others by actively posting compelling immigration-specific tweets.

The remaining Twitter accounts that do not belong to the group of Twitter elites described above are categorized as the "Twitter public" group.

I do not include tweets posted by Donald Trump and public administrators ($N = 214$) because of their positions as policy makers who are interested in presenting and publicizing their immigration policies. Similarly, I remove tweets by news media ($N = 1,052$) because their presence on Twitter is a negligible extension of their status in the present analysis, simply broadcasting their hyperlinks to their content.

Multivariate Time-Series Analysis

To examine the dynamic interaction of agenda setting among the three agenda setters, I first create time-series variables, which are based on the number of news articles for news media and the number of tweets for Twitter elites and the Twitter public, respectively. Then, I use the vector autoregression (VAR) package to test causal relationships between the three agenda setters (Edwards & Wood, 1999). Essentially, VAR analysis allows us to make more accurate claims concerning the dynamics of the causal relationship (Wood, 2009).

This study uses VAR Granger tests (Granger, 1969) to identify causal patterns among the three agenda setters and determines the appropriate number of lagged independent variables, following the procedure outlined by Neuman, Guggenheim, Jang, and Bae (2014). In particular, it is considered that the lag between traditional news and online discussion varied from 1 to 7 days, with day 7 producing the most effects (Roberts, Wanta, & Dzwo, 2002). Thus, given the nature of the attention spans of daily news articles and Twitter posts, I conducted statistical tests to confirm the appropriate number of lags (in days) for the

² The Twitter accounts related to (1) immigration workers and organizations include U.S. Department of Homeland Security (n.d.); (2) individual activists, such as Marsha (n.d.) and New York State Higher Education PAC (n.d.); and (3) users actively posting political tweets, like Fraser (n.d.).

respective interconnected relationships between the agenda setters by applying Akaike's Information Criterion (AIC; Beckett, 2013). After the appropriate number of lags was determined, the Granger causality test was conducted, which uses χ^2 scores to measure the magnitude of the reduction in error term variance caused by the corresponding variables. Furthermore, impulse response functions were plotted to reveal the direction and magnitude of the relationships (Wood, 2009). The statistical analyses in this study were conducted using R computational packages "vars" and "tseries."

Results

This section consists of four parts. First, the descriptive statistics of the data show the number of tweets and Twitter accounts for the two time frames considered in this study. Second, the procedure for determining the appropriate time lag is explained. Third, the results of Granger causality tests illustrate the longitudinal agenda-setting effects among news media, Twitter elites, and the Twitter public. Fourth, plots of impulse response functions are provided to reveal the direct and indirect effects among the three time-series variables.

Among the 227,962 tweets on the retweet network, Twitter elites posted 21,060 tweets (9.2%), and Twitter public posted 206,902 (90.8%). Among a total of 156,785 accounts that posted tweets using #immigration, 15,726 belonged to Twitter elites (this number necessarily includes 9,502 verified Twitter accounts). The number of tweets in the retweet network during the first time frame (from Oct. 1 to Nov. 8, 2016) was 88,144 (N of Twitter elites = 8,183; N of Twitter public = 79,961), and during the second time frame (from Nov. 9, 2016 to Jan. 31, 2017) was 139,818 (N of Twitter elites = 12,877; N of Twitter public = 126,941). The trends and normalized trends of the news coverage and Twitter posts associated with the retweet network over the entire study period are shown in Figures 1 and 2, respectively.

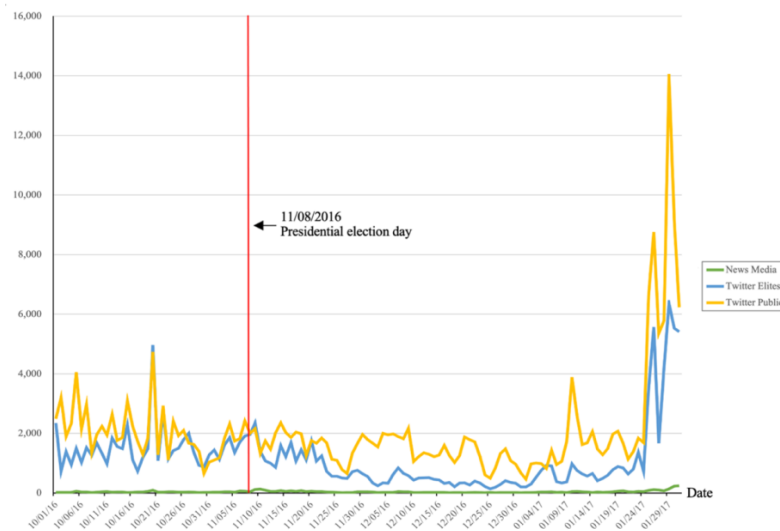


Figure 1. Trends in mainstream news coverage and Twitter activities about the United States immigration issue from October 1, 2016 to January 31, 2017, represented by the number of news articles and tweets.

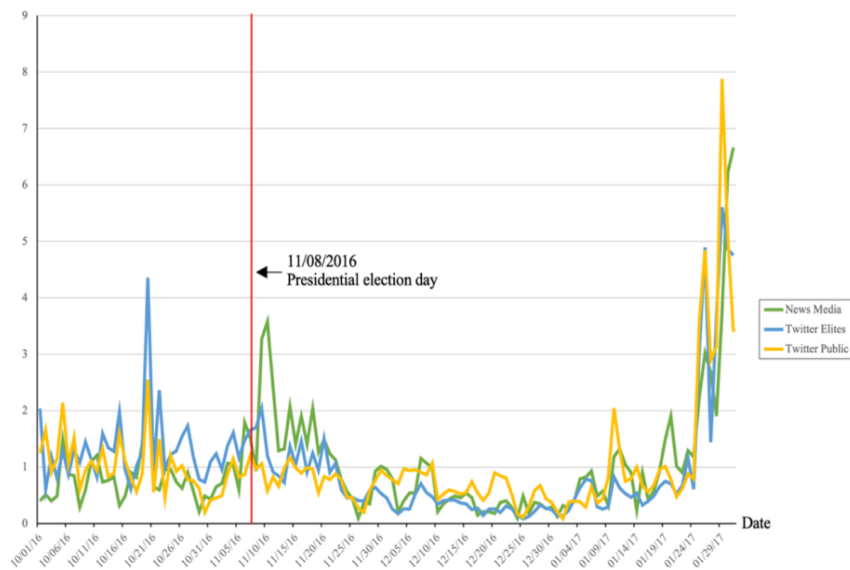


Figure 2. Trends in mainstream news coverage and Twitter activities about the United States immigration issue from October 1, 2016 to January 31, 2017, where the data are normalized, i.e., mean scaled from Figure 1.

Appropriate time lags can be determined based on the lowest AIC values. Before the presidential election, the appropriate time lag is one day for affecting the attention of the three agenda setters by themselves, while it is two days for the interconnected relationship between news media and Twitter elites, one day between news media and Twitter public, and one day between Twitter elites and Twitter public. After the presidential election, it is three days for affecting the attention of news media and Twitter elites, respectively, and two days for affecting the attention of Twitter public by oneself, while it is five days for the interconnected relationship between news media and Twitter elites, three days between news media and Twitter public, and three days between Twitter elites and Twitter public.

The research questions examined the intermedia and intramedia agenda-setting effects in a retweet network between news media, Twitter elites, and the Twitter public for the two time frames. Table 1 shows that in the first time frame, there is only one significant agenda-setting effect, while in the second time frame, six of nine possible agenda-setting effects are found between the three agenda setters. Before the election, only news media Granger-caused its own agenda ($df = 2$, $\chi^2 = 7.81$, $p < .001$, $\eta_p^2 = 0.18$). After the election, news media and Twitter elites Granger-caused Twitter public's agenda with statistics of ($df = 3$, $\chi^2 = 16.72$, $p < .001$, $\eta_p^2 = 0.17$) and ($df = 3$, $\chi^2 = 5.12$, $p < .005$, $\eta_p^2 = 0.06$), respectively, suggesting top-down agenda-setting effects. Furthermore, I found two reverse agenda-setting effects. Twitter elites and Twitter public Granger-cause news media's agenda with statistics of ($df = 5$, $\chi^2 = 17.19$, $p < .001$, $\eta_p^2 = 0.18$) and ($df = 3$, $\chi^2 = 19.21$, $p < .001$, $\eta_p^2 = 0.20$), respectively. Finally, Twitter elites and Twitter public Granger-cause their own agendas with statistics of ($df = 3$, $\chi^2 = 19.68$, $p < .001$, $\eta_p^2 = 0.20$) and ($df = 3$, $\chi^2 = 43.92$, $p < .001$, $\eta_p^2 = 0.36$, respectively).

Table 1. The Granger Causality Test for Examining the Agenda-Setting Effects Between News Media, Twitter Elites, and Twitter Public Over the 2016 Presidential Election.

Independent Variable	Before		After		Dependent Variable
	χ^2	Effect Size	χ^2	Effect Size	
News Media	7.81 → (0.00)	0.18	0.89 (0.35)	0.11	News media
Twitter Elites	1.76 (0.19)	0.05	17.19 → (0.00)	0.18	
Twitter Public	1.33 (0.26)	0.04	19.21 → (0.00)	0.20	
News Media	0.46 (0.50)	0.01	2.56 (0.11)	0.03	Twitter Elites
Twitter Elites	0.56 (0.46)	0.02	19.68 → (0.00)	0.20	
Twitter Public	0.07 (0.79)	0.01	0.23 (0.63)	0.01	
News Media	1.09 (0.30)	0.03	16.72 → (0.00)	0.17	Twitter Public
Twitter Elites	0.41 (0.52)	0.01	5.12 → (0.03)	0.06	
Twitter Public	2.10 (0.15)	0.05	43.92 → (0.00)	0.36	

Figure 3 shows the plots of impulse response functions, where the x-axis represents the timing and duration of the associated response over a 10-day period following the shock and the y-axis represents the percentage of one standard deviation response of the following series, initiated by a simulated one standard deviation shock to the leading series. The plots enable us to investigate the direct effects of one time-series variable on another and the indirect effects through the third time-series variable.

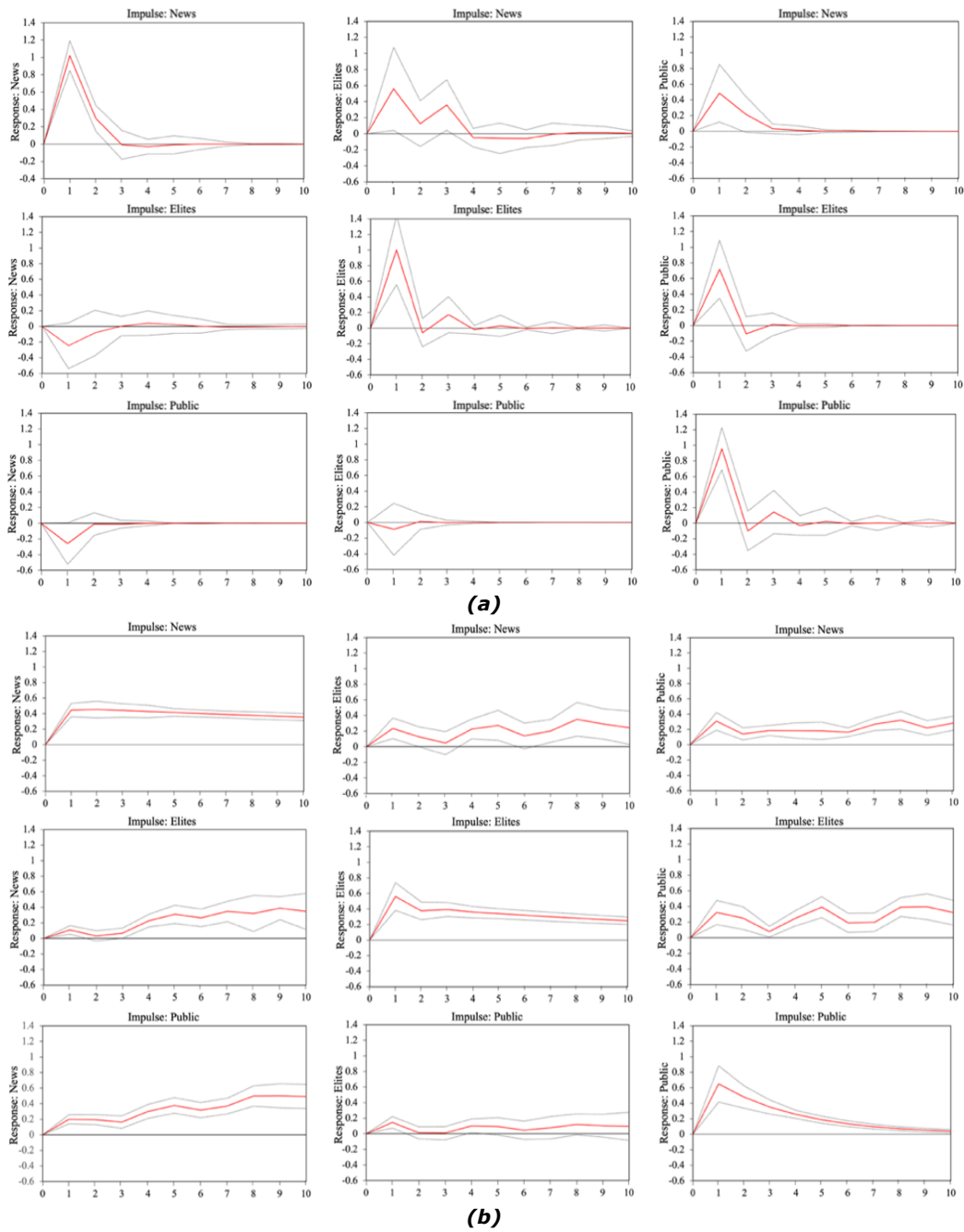


Figure 3. Impulse response functions between news media, Twitter elites, and Twitter public: (a) Before the election and (b) After the election. The dashed lines denote the 95% confidence level.

Before the election, I found that on day 1, a one standard deviation shock to news media led to a 0.5 standard deviation increase in the attention of Twitter elites. In addition, following a one standard deviation shock to Twitter elites, the attention of the Twitter public increased to 0.7 at day 1 (Figure 3(a)). These consecutive increases in responses to impulses indicate an indirect effect of news media on the Twitter public through Twitter elites and resemble model (1) of Brosius and Weimann (1996). However, the increase in public attention did not persist beyond day 1, as evidenced by two confidence intervals that crossed zero after day 2.

After the election, I found multiple indirect effects. First, on day 1, a shock to news induced an increase in the attention of Twitter elites (0.2 standard deviation). Then, Twitter elites produced a 0.3 standard deviation increase in the attention of the Twitter public. Here, an indirect effect of news media on the Twitter public through Twitter elites also exhibited model (1) of Brosius and Weimann (1996). Furthermore, the Twitter public directly affects news media while indirectly affecting news media ephemerally through Twitter elites (trace of model (2)).

In addition, a shock to Twitter elites leads to an increase in attention to news by 0.1 standard deviation, and a shock to news results in a 0.3 standard deviation increase in the attention of the Twitter public, emulating model (3). Finally, a shock to Twitter elites prompted a 0.3 standard deviation increase in the attention of the Twitter public, followed by a shock to the Twitter public, leading to a 0.2 standard deviation increase in the attention of the news media. This process resembles model (4).

Discussion

This study examines the intermedia and intramedia agenda-setting effects in the context of the U.S. immigration issue before and after the 2016 presidential election. The Granger causality tests reveal strongly contrasting results for the two time frames. While there appears to be only one significant agenda-setting effect before the 2016 presidential election, some top-down and bottom-up agenda-setting effects occurred after the election among news media, Twitter elites, and Twitter public. I posit that the conflict between the supporters and opponents of Trump's election pledges on hardline immigration policies became more intense after his victory over Clinton. Moreover, because Trump incessantly delivered sensitive and derogatory remarks, the election aroused the public, leading them to pay keen attention to immigration news covered by the media and interpreted by Twitter elites. On the part of journalists and Twitter elites, they were more likely to observe public opinion disclosed on social media to understand public reactions to the immigration issue.

Thus, before the 2016 presidential election (RQ1), I argue that news media coverage of immigration issues did not noticeably affect Twitter activities. Likewise, the news media did not have much to do with Twitter other than their usual journalistic activities about the immigration issue. A short-term indirect effect from news media to the Twitter public via Twitter elites, as shown in the impulse response functions, supports this finding.

After the election (RQ2), six cases of agenda setting were activated. Among them, three cases of intermedia agenda-setting were in line with those identified in previous studies (Meraz, 2011; Vonbun et al., 2016), asserting greater interdependence between traditional media and new media. Advocates of the hybrid media system argue that "broadcasters and newspapers themselves increasingly integrate non-elite actions and information from the online realm into their own production practices and routines" (Chadwick, Dennis, & Smith, 2015, p. 16) by showing a close association between traditional news organizations and social media. Rogstad

(2016) found that while both mainstream and new media platforms are consistent in the salience of many issues, Twitter pays attention to issues overlooked by mainstream media—initiating intermedia agenda setting. After the election, the news media and the public might anticipate potentially drastic changes in the immigration policy introduced by Trump, who consistently expressed a negative stance toward immigrants. They may seek out the most current information by themselves or from each other, as evidenced by an increased number of significant Granger causality effects and indirect effects appearing in impulse response functions.

I find one case of intramedia agenda setting within Twitter. That is, Twitter effectively serves as a tool with which to discuss U.S. immigration policies, where the Twitter public can observe any tweeting activities posted by Twitter elites. On encountering an unexpected election result, most Twitter users sought more verifiable information sources they could trust, including elites' discourses. The Twitter elites could thus be successful in attracting the attention of their followers. In addition, the Twitter public might be exposed to news in the form of hyperlinks in tweets combined with personal opinions presented by Twitter elites, which stimulates them to follow such elites on Twitter. This intramedia agenda-setting effect of Twitter proved the validity of the traditional concept of opinion leaders (Katz & Lazarsfeld, 1955).

Granger causality tests and impulse response functions reveal the active role played by Twitter elites. Specifically, Twitter elites initiate both top-down (Twitter elites → Twitter public) and bottom-up (Twitter elites → news media) agenda-setting effects. If I delve deeper, I find that Twitter elites initiate the two-step flow of information through two paths: one to Twitter public through news media and another to news media through Twitter public. Thus, I argue that these two paths reflect models (3) and (4) of Brosius and Weimann (1996), respectively.

I detected the classical two-step flow of information (model (1) of Brosius and Weimann, 1996) before and after the election, as evidenced by the impulse response functions. These findings support the steady and unchanging influence of news media on Twitter agendas (Conway-Silva et al., 2018). In fact, Besalú, Pont-Sorribes, and Martí (2021) found that news media remain credible in the digital public sphere. After the election, jointly considering model 2 (despite the indirect effect being short-lived) and model 4 of Brosius and Weimann (1996) could elucidate the bottom-up agenda setting between the Twitter public and news media. Above all, the dynamic agenda-setting activities found in the present study corroborate the cycling agenda-setting process between news media and Twittersphere (Jang et al., 2017) and agenda-uptake (Gruszczynski & Wagner, 2017), where the public interest can affect the mainstream media's agenda and the multidirectional transfer of saliences occurs depending on the issue.

Conclusion

Immigrants have long constituted a significant portion of the United States population and likewise the job market, so immigration policies have drawn the attention of many concerned families, parties, and stakeholders. Naturally, news media reports and comments from social media influencers on immigration issues significantly affect public attitudes. Conversely, in the current era of information overload, public responses might influence traditional news media and social media influencers. Therefore, it is meaningful to examine who influences whom in immigration issues.

The findings of this study reveal diverse and dynamic agenda-setting processes where each of the three agenda setters can influence the agendas of the others. While previous studies mainly focused on intermedia agenda-setting between traditional media and new media such as Twitter (Jang et al., 2017; Su & Borah, 2019), this study is the first to present the leading roles of Twitter elites, as evidenced by models (3) and (4) of Brosius and Weimann (1996). The finding that both Twitter elites and the Twitter public can be agenda setters suggests that journalists and traditional news media need to pay more attention to Twitter activities if they are to understand public opinions on certain sociopolitical issues, which can be further developed into potential news sources (Kim, Kim, Lee, Oh, & Lee, 2015). Furthermore, ordinary Twitter users need to recognize that posting compelling and persuasive tweets about issues like U.S. immigration policy can attract news media coverage. This awareness can help marginalized groups gain public attention and voice their concerns (Jackson et al., 2020).

This study may have limitations given the complexity and sensitivity of U.S. immigration issues and its reliance on Twitter and traditional media during the short period of the 2016 presidential election. First, if the duration of this study extended beyond the present four months, many subcategories of the U.S. immigration issue might be discussed differently by Twitter and traditional media, potentially shaping agenda-setting effects among the three agenda setters. Second, it is also true that the findings of this study might not be generalizable to the agenda-setting effects between traditional media and other social media platforms, such as Facebook and Instagram. Facebook may have different communication affordances—that is, more personal or close privacy settings (Bossetta, 2018)—while Instagram primarily focuses on posting visual images rather than sharing information (Shane-Simpson, Manago, Gaggi, & Gillespie-Lynch, 2018). Furthermore, since January 2017, there might have been multiple events that could have changed the attributes of the Twittersphere itself, such as Elon Musk’s acquisition and the consequent migration of Twitter users to Mastodon, the alternative platform (Zavarise, 2022). This shift implies possible changes in demographics between 2017 and 2023 and imposes a possible limit on the generalization of the present results, even though one of five U.S. adults (23%) used Twitter in 2021 (Dinesh & Odabas, 2023) and about 237 million Twitter users existed daily in 2022 (Clark, 2022).

Within the above-mentioned limitations, the findings of this study still advance and extend our understanding of the relations between opinion leaders and followers amid multiple interactions between traditional media and social media. The findings not only reinforce the validity of the two prominent theories in the field of communication, agenda setting, and the two-step flow of information but also confirm these theories’ explanatory potential in today’s digital media environment.

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