Do Anti-Immigrant Laws Shape Public Sentiment? A Study of Arizona's SB 1070 Using Twitter Data[1]

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Scholars have debated whether laws can influence public opinion, but evidence of these "feedback" effects is scant. This article examines the effect of Arizona's 2010 high-profile anti-immigrant law, SB 1070, on both public attitudes and behaviors toward immigrants. Using sentiment analysis and a difference-in-difference approach to analyze more than 250,000 tweets, the author finds that SB 1070 had a negative impact on the average sentiment of tweets regarding immigrants, Mexicans, and Hispanics, but not on those about Asians or blacks. However, these changes in public discourse were not caused by shifting attitudes toward immigrants but by the mobilization of anti-immigrant users and by motivating new users to begin tweeting. While some scholars propose that punitive laws can shape people's attitudes toward targeted groups, this study shows that policies are more likely to influence behaviors. Rather than placating the electorate, anti-immigrant laws may stir the pot further, mobilizing individuals already critical of immigrants.

INTRODUCTION

A long-standing literature in the social sciences has debated whether public policies have "feedback effects" (Skocpol 1992; Zaller 1992; Soss 2000;

[1] Kyla Thomas, Ariela Schachter, Abigail Weitzman, Edward Telles, Andreas Wimmer, Devah Pager, Deborah J. Schildkraut, Robert Vargas, Winston Chou, and Yossi Harpaz provided generous feedback and comments. Van Tran, Donna Granville, Han Zhang, Manish Nag, Jean Nava, Mariana Campos-Horta, Douglas Massey, Denia Garcia, Maria Abascal, Ilka Vari-Lavoisier, Scott Lynch, and Nicole Pangborn also offered helpful

0002-9602/2017/12302-0001$10.00

Campbell 2012). Scholars have argued that public policies, like welfare reform and social security, may have the power to shape people's fundamental attitudes.[2] Further, they may arouse or pacify constituencies, inspiring changes in people's behaviors that alter "basic features of the political landscape" (Soss and Schram 2007, p. 113).

Nevertheless, evidence of the feedback effects of laws is mixed. Qualitative researchers report some evidence of attitudinal change in response to the passage of laws among people directly affected by them (Nill 2011; Campbell 2012; Menjívar and Abrego 2012; Szkupinski Quiroga, Medina, and Glick 2014). It is not self-evident, however, whether these attitudinal effects extend to the general public. In a prominent article, Soss and Schram (2007) conducted one of the first quantitative studies of policy feedback effects on the general population using survey data. They found that the 1996 Welfare Reform Act did not have attitudinal effects on the population at large but rather only affected a small population directly targeted by the policy (i.e., welfare recipients). Still, cross-sectional survey data, like qualitative data, ultimately do not lend themselves to causal inference. We are left with the question, Can public policies causally affect public attitudes?

To address this question, I consider the empirical case of SB 1070, a high-profile anti-immigrant law passed by the state of Arizona in 2010. Using a counterfactual approach, I measure the effect SB 1070 had on both public attitudes *and* behaviors toward immigrants. By relying on social media data published by U.S. residents, I am able to follow the same individuals over time to examine their changing reactions to immigrants before and after the law was passed.

Nicknamed the "show me your papers" law, SB 1070 is a fitting case to explore attitudinal policy effects because it meets the criteria specified by legal scholars for laws to be socially consequential: it was endorsed by politicians, its message was clear and unambiguous, and it was widely publicized in the media (Berkowitz and Walker 1967; Sunstein 1996). Indeed, a small but growing qualitative literature has documented this law's likely impact on public opinion and on the lives of immigrants (Nill 2011; Menjivar and Abrego 2012; Santos, Menjívar, and Godfrey 2013; Szkupinski Quiroga et al. 2014). SB 1070 required police to check the immigration status of those arrested or stopped and made it a crime to transport or harbor unauthorized immigrants. Though a federal judge partially blocked this bill (Santos et al.

suggestions. I thank German Rodriguez, Chang Chung, Radhika Saksena, and Linds Panther for their generous statistical and computational assistance. Direct correspondence to René D. Flores, 224 Savery Hall, University of Washington, Seattle, Washington 98195. E-mail: renedf@uw.edu

[2] In this article, I am using the terms "public opinion," "attitudes," and "sentiment" as synonyms.

2013), it inspired more than a dozen states, including Alabama and Mississippi, to consider similar policies (Magaña 2013).

Immigration scholars argue that anti-immigrant laws like SB 1070 may harden public opinion toward immigrants (Calavita 1996; Chavez 2008; Flores 2014). Further, anti-immigrant policies may also affect public attitudes toward U.S.-born Hispanics, given the common associations made between Hispanics and immigrants (Jiménez 2010; Brown 2013). However, these hypotheses have not been assessed systematically.

Since no appropriate social science survey was conducted in Arizona to examine this law's attitudinal effects, I rely on social media data, a novel source of data that has been used in the past to study public opinion (DiGrazia et al. 2014). Using sentiment analysis, I analyze more than 250,000 immigration-related tweets published by Arizona residents to assess the law's impact on attitudes toward immigrants, Mexicans, and Hispanics. To provide a quasi-causal estimate of the law's public opinion effects, I employ a difference-in-difference estimation technique and rely on immigration-related tweets published in a neighboring state, Nevada. Since Nevada shares many similarities with Arizona and since no anti-immigrant laws were considered by Nevada politicians during this time period, this state is an ideal counterfactual case.

My findings suggest that the implementation of SB 1070 did negatively affect the average sentiment of English-language tweets about immigrants. Further, although the bill's supporters argued that SB 1070 only targeted unauthorized immigrants, the law also negatively shaped average sentiment toward Mexicans and Hispanics more generally. But was this change in average sentiment driven by a change in attitudes?

To account for the change in average sentiment I observe, I test four underlying mechanisms. I examine (1) whether the policy's impact was driven by attitudinal changes among Twitter users, (2) whether its impact was limited to immigration advocates or was also found in a wider segment of the general public, (3) whether individuals with preexisting attitudes became more prolific in their political behavior, and (4) whether the law incited new users to join the public discussion.

My analyses reveal that, contrary to the predictions of law and society scholars, the apparent hardening of sentiment toward immigrants, Mexicans, and Hispanics on Twitter was driven not by a change in the *attitudes* of all users but by a change in the *behaviors* of specific groups of users. SB 1070 shaped average sentiment by inciting anti-immigrant users to post more messages and by motivating a new, previously inactive, group of users to post negative messages about immigrants on Twitter.

Although a long-standing literature argues that laws have the power to influence people's attitudes toward targeted groups (Berkowitz and Walker 1967; Chavez 2008), I propose that public policies are more likely to shape

behaviors than *attitudes*, at least in the short term. Rather than placating the electorate, as some politicians intend them to do, anti-immigrant laws like SB 1070 stir the pot further, energizing and mobilizing sectors of the general public already critical of immigrants.

Findings from this study make a series of theoretical and empirical contributions to the study of punitive social policies, political behaviors, and public opinion. First, I provide quasi-causal estimates of the effect public policies have on public opinion dynamics. Second, I identify the mechanisms that underlie the apparent changes in public opinion I observe. I find that the perceived effects of SB 1070 on public sentiment are explained not by changes in attitude but by changes in behavior. Distinguishing between attitudinal and behavioral responses to laws may help us explain the divergent findings in the literature on policy feedback effects outlined earlier. It may be that, by only looking at attitudinal outcomes in survey data, previous quantitative studies overlooked the capacity of laws to produce behavioral changes. Additionally, my findings suggest that the changes in public sentiment observed in previous qualitative studies may have been driven not by attitudinal changes but by behavioral changes: an increased willingness among respondents to express critical views.

Third, as Jiménez (2010) has argued, my findings highlight the continued importance of immigration for Hispanics as I find that Arizona's SB 1070 shaped not only public discourse about immigrants but also discourse about Mexicans and Hispanics more generally. Lastly, this research shows how sentiment analysis, a computational methodology, can be used to analyze social media data and study public opinion in times and places where traditional surveys are not available.

CAN LAWS SHAPE PUBLIC OPINION?

Past scholars have studied whether public opinion can influence the design and implementation of public policies (Page and Shapiro 1983; Gilens and Page 2014). From this perspective, politicians respond to mounting public pressure by passing policies intended to pacify their constituents and secure their votes (Flores 2014). Nevertheless, a growing number of researchers are investigating the other side of the equation: whether policies produced by elites can affect public opinion (Zaller 1992; Beckett 1997).

Law and society scholars have argued that laws can have social consequences, not only through their direct enforcement mechanisms, such as fines and penalties, but also through more indirect or "symbolic" channels (Berkowitz and Walker 1967). According to these scholars, laws have "expressive" or "symbolic" effects by making implicit normative statements—"sending a message" about forbidden behaviors—that influence individuals' moral assessments of those behaviors (Berkowitz and Walker 1967; Sunstein 1996).

Hence, rather than acting in accordance with the law out of fear of legal punishment, as the rational actor approach would have it, individuals internalize the moral code that is implicit within the spirit of the law (Suchman 1997).

In this same vein, some scholars argue that laws have the potential to change social norms or "judgments of other people" by shifting the "reputational utility" of a particular behavior (Sunstein 1996, p. 2021). For example, a law that penalizes indoor smoking affects smoking behaviors, not only by imposing fines, but also by changing the social norms around smoking, imposing a "shaming cost" in terms of a damaged reputation on smokers who break this law. In this way, laws can have social consequences, even if they do not have clear enforcement mechanisms, especially when their message is clear and unambiguous, when they are widely publicized through newspapers and magazines, and when they are endorsed by public figures such as politicians (Sunstein 1996). However, while widely theorized, the expressive effects of laws have seldom been empirically tested (but see Berkowitz and Walker 1967; Albiston et al. 2012).

Similarly, scholars have noted that when politicians promote divisive public policies, they often use symbolic language that implicitly identifies vulnerable groups, such as racial minorities, immigrants, and poor families, as the source of social ailments (Edelman 1977; Calavita 1996; Beckett 1997). When elites' symbolic appeals connect with people's emotional predispositions that are acquired early in life, such as ethnocentrism and racial attitudes, the general public will often rally around controversial policies that target specific subgroups (Sears 1993; Stewart 2012). Beyond merely encouraging popular support for exclusionary policies, such symbolic political discourses may also shape public views of the targeted group (Calavita 1996; Santa Ana 2002; Chavez 2008). Social linguist Otto Santa Ana (2002) argues that the metaphors and images used by politicians and scholars to frame debates about immigration, which are heavily publicized in the media, could have a lasting impact on the general public's worldview. According to Santa Ana, California politicians' use of threatening metaphors like "brown tide rising," "army of invaders," and "burdens" to describe Latino immigrants has hardened public views of Latinos. Similarly, conservative politicians' public association of Latino immigrants with terrorism after 9/11 may have increased public support for punitive immigration laws in Utah (Stewart 2012).

Empirical research on the power of laws to shape public opinion is scant. Using cross-sectional survey data, Soss and Schram (2007) do not find that the 1996 welfare reform, enacted by the Clinton administration, affected public opinion toward welfare even when politicians designed it to do so. They theorize that policies are more likely to have opinion effects when they are both visible and "proximate," which they define as a law that directly affects the lives of many citizens. In this case, welfare reform was highly visible, but it only affected a small minority of individuals (i.e., welfare recipients).

Given this theoretical and empirical literature, we should expect anti-immigrant laws to affect public opinion toward immigrants, even if the laws are blocked by lawsuits, by signaling to the public that immigrants are illegitimate and undesirable since these laws tend to be highly visible and affect not only immigrants but also citizens who deal with them. These laws commonly use symbols and metaphors that trigger social anxieties, are widely publicized in the media, and are typically proposed and promoted by politicians themselves. Through these avenues, they promote a public image of immigrants as an illegitimate group that drains local resources and augments social problems. Consequently, they are likely to negatively influence people's moral assessments of immigrants and perhaps even Hispanics, as these categories are often perceived as overlapping. In short, this theoretical literature would cause us to expect to see that SB 1070 hardened citizens' attitudes toward immigrants, Mexicans, and Hispanics, which this study will test empirically.

CAN LAWS INFLUENCE POLITICAL BEHAVIORS?

In addition to affecting attitudes, policies may also arouse political actors and influence their behaviors (Skocpol 1992; Soss 2000; Campbell 2012). According to political behavior theorists, laws do so by gathering a constituency that has an incentive to protect the benefits granted by policies and programs (Pierson 1994). Researchers have identified three main pathways through which policies mobilize individuals to form such a constituency: modifying the availability of politically relevant resources; influencing the feelings of political engagement, such as political efficacy and political interest; and shaping the probability of political mobilization by interest groups and other political actors (Campbell 2012).

Most researchers in this literature have studied the impact of policies on political elites because elites are assumed to possess more information, have clearer goals, and have the ability to influence policy (Soss and Schram 2007). This framework suggests that punitive immigration laws could trigger the mobilization of elites or interest groups with a direct involvement in immigration matters, since these policies raise the stakes of their political participation and provide them with a specific target around which they can rally.

Some scholars, however, are beginning to study policy feedback effects on nonelites or "mass publics." These scholars have generally studied welfare policies, as they are some of the most salient laws for nonelites (Campbell 2012). For example, social security legislation helped to transform senior citizens, who were once the least politically active demographic group, into one of the most active groups. Social security legislation gave seniors financial resources and free time, increased their interest in political affairs,

tied their well-being to a government program, and created a social identity based on program participation, all of which facilitated the political mobilization of seniors (Campbell 2003).

In line with this literature, I investigate whether the passage of a restrictionist immigration law increases the political mobilization of nonelites, especially those who have nonneutral dispositions toward immigration. On the one hand, we might expect it to mobilize individuals who are already critical of immigrants, as these individuals may come to believe that the law will enhance their well-being by addressing immigration-related problems, like crime and social services abuse, that are commonly cited by restrictionist politicians (Calavita 1996; Flores 2015, 2016). On the other hand, we might expect it to mobilize individuals with preexisting proimmigrant attitudes, as these individuals may feel compelled to come to the defense of immigrants when a punitive immigration policy is proposed.

The law could also have mobilization effects on another group of individuals: those who had not voiced their opinion on immigration in public before the law was proposed. The common knowledge perspective argues that individuals may become politically active only when they believe others possess the same information as they do and share a symbolic system that allows them to know how to understand this information (Chwe 2001). This is so because "no one wants to act alone" (Sen 1967). A heavily advertised restrictionist law may signal to local residents that many others know about the law and the problems the law is meant to address. This perceived shared understanding may then motivate them to voice their opinion on immigration and become politically active.

In summary, the political behavior literature suggests that anti-immigrant laws will mobilize three groups of people: (1) elites and advocates with a direct interest in immigration policies, (2) individuals with preexisting opinions about immigration, either positive or negative; and (3) individuals who had not previously discussed immigration matters publicly but who might start voicing their opinions about the topic once they see that others share the same information as they do. I will test each one of these mechanisms in the empirical section of this article.

SUBNATIONAL IMMIGRATION LAWS: SB 1070 IN ARIZONA

In the mid-1990s, federal immigration officers set up blockades in California and Texas to avert the entry of immigrants. As a result, Arizona became the new entry point for Latino immigrants into the United States (Eschbach et al. 1999), which fueled a rapid increase in the local Latino population. By 2000, Hispanics amounted to 25.3% of Arizona's population, and by 2010 that figure would increase to 29.6%. In 2010, 30.2% of Latinos living in Arizona were born in Latin America (U.S. Bureau of the Census 2010).

The growth of the Latino population has gone hand-in-hand with the implementation of a series of statewide restrictionist policies in recent years, which eventually culminated in the passage of SB 1070 (Sáenz, Menjívar, and García 2013). During the 1990s welfare reform debate, anti-immigrant advocates played a prominent role in the ultimate decision to curtail welfare benefits. These advocates used highly racialized language, conflating U.S.-born Hispanics with illegal immigrants, and argued that Hispanics had a problem with welfare dependency (Brown 2013).

In 2004, a citizen's group called Protect Arizona Now successfully placed a ballot initiative mandating government workers to report suspected undocumented immigrants seeking benefits and requiring an identification card at polling places (Avalos, Magaña, and Pantoja 2010). In 2006, Arizona passed a series of punitive laws, including Proposition 100, which denies undocumented immigrants the right to bail, Proposition 102, which forbids unauthorized immigrants from bringing lawsuits or winning damages, Proposition 103, which makes English the official language of the state, and Proposition 300, which prohibits undocumented students from receiving financial aid and in-state tuition (Magaña 2013; Sáenz et al. 2013).

In 2010, Arizona state senator Russell Pearce argued that the federal government was obstructing Arizona's immigration enforcement efforts and introduced the Support Our Law Enforcement and Safe Neighborhood Act, or SB 1070. This bill was nicknamed the "show me your papers" law in the popular press because it makes the failure to carry immigration documents a crime and gives local authorities broad powers to detain anyone suspected of lacking documents (Magaña 2013). SB 1070 also makes it a crime to stop a vehicle to hire day laborers if it impedes traffic and prohibits Arizonans from transporting, harboring, or concealing an unauthorized immigrant. In addition, it strengthens sanctions against employers of immigrants.

Governor Jan Brewer signed the bill into law in front of television cameras in April 2010 (Santos et al. 2013). Brewer argued that the bill was necessary to deal with the "border-related violence and crime" caused by illegal immigration (Brewer 2010). Further linking immigrants with criminal behaviors she added, "We cannot sacrifice our safety to the murderous greed of drug cartels. We cannot stand idly by as drop houses, kidnappings and violence compromise our quality of life. We cannot delay while the destruction happening south of our international border creeps its way north" (Brewer 2010). Despite concerns over potential racial profiling, which prompted a federal judge to partially block SB 1070, Brewer continued to argue that the law only targeted undocumented immigrants, not individuals of a certain "skin color, accent, or social status" (Brewer 2010). The governor's threatening framing of immigrants as kidnappers and drug traffickers resonated among the general public even if there was little evidence of

undocumented immigrants' involvement with these crimes (Sáenz et al. 2013). After all, "stories rather than data make for effective policy transformation" (Stewart 2012, p. 61).

Even considering Arizona's prolific history of anti-immigrant legislation, SB 1070 was considered the "broadest and strictest immigration measure in generations" (Archibold 2010), and it set off a national and international controversy (Magaña 2013). Journalists documented heated demonstrations and bitter exchanges between bill supporters and immigrants (Robbins 2012). Cardinal Roger M. Mahony of Los Angeles referred to the authorities' ability to demand documents as "Nazism" (Archibold 2010). In addition, the Mexican government, along with several other Latin American countries, criticized the bill and cited concerns over racial profiling of Latin Americans (Booth 2010).

Ultimately, three of the four provisions of SB 1070 were struck down in court, but still the migration literature suggests that the very approval of restrictionist policies can have lasting effects on public sentiment (Sáenz et al. 2013). For example, in earlier work I found that the approval of an anti-immigrant ordinance in the town of Hazleton, Pennsylvania, solidified native white residents' perceptions that local immigrants were "illegal" and involved in criminal behaviors like drug dealing, robberies, and gang membership (Flores 2014). Whether the proposal of statewide laws like SB 1070 had a similar impact on residents, however, is unclear. In a southwestern state like Arizona, immigrants are hardly a novelty.[3] In such a setting, public attitudes toward immigrants may have solidified long ago and may be less susceptible to short-term changes.

Additionally, even if the law did impact public sentiment, it is unclear toward whom. Did it only influence attitudes toward its official target, undocumented immigrants? Or could its effects have spilled over into attitudes toward other types of immigrants and even U.S-born Hispanics? Scholars have noted that politicians may mobilize whites' racial resentment against minorities by embedding racial messages in allegedly race-neutral public policies. For example, a seemingly race-neutral discussion on crime or welfare policy could activate whites' racial fears of blacks if politicians use subtle words or imageries that identify African-Americans as crime prone or welfare dependent (Mendelberg 2001). Restrictive immigration bills may function in the same way for Hispanics by stoking whites' racial resent-

[3] Although Latinos may not be a novelty for longtime Arizona residents, this may not be the case for whites from other regions in the country. Indeed, Arizona has experienced significant inflows of whites from other regions that have less familiarity with Latinos. This may have contributed to the perception of Latinos as a significant threat. See McConnell (2013) and Sáenz et al. (2013) for a review on the relationship between demographic changes and SB 1070.

ments over demographic changes or access to resources. Therefore, SB 1070 could have primed whites' racial resentment of not only undocumented immigrants but also Hispanics more generally given Arizona's history of conflating Hispanics with immigrants (Brown 2013). Nevertheless, such spillover effect on public opinion is not guaranteed. Mendelberg (2001) argues that when racial priming becomes explicit, politicians' mobilization of racial resentment may fail because a norm of racial equality would become activated. In Arizona's case, Hispanic activists continuously made the case that SB 1070 was racially motivated (Archibold 2010; Booth 2010). This prompted pro–SB 1070 politicians, like Governor Brewer, to explicitly deny a racial element in the bill (Brewer 2010). Therefore, this awareness may have deactivated the bill's potential effect on public opinion toward all Hispanics.

According to the policy feedback effects literature, SB 1070 should have produced strong opinion effects since it was both highly visible and proximate (Soss and Schram 2007). In other words, not only did it receive heavy coverage in the local news but it also had the power to affect the lives of millions of Arizona residents, including not only immigrants and their families but also service providers, volunteers, public officials, police officers, teachers, and so on.

There is qualitative evidence that suggests that SB 1070 did have a negative effect on public attitudes toward immigrants. The law may have transformed public opinion about immigrants, and Hispanics more generally, by linking these groups to criminal activities (Sáenz et al. 2013). In doing so, qualitative scholars have claimed that SB 1070 "created a heightened sense of fear that has deepened anti-Latino sentiment and brought hate and extremism into the mainstream" (Nill 2011, p. 36). Using qualitative interviews, Menjívar and Abrego (2012) found that Central American immigrants in post–SB 1070 Arizona reported increased public harassment. In turn, immigrants' increased fear and anxiety may have affected their utilization of social services, which could have negatively affected their health (Hardy et al. 2012). Szkupinski Quiroga et al. (2014) found that after the passage of SB 1070, Arizona residents of Latino ancestry, even those who were U.S. born, reported more negative experiences with authorities and employers. Similarly, there is some evidence that SB 1070 may have negatively affected local Latino children's self-esteem (Santos et al. 2013).

Aside from this qualitative evidence, polls also documented a hardened public opinion toward immigrants in the post–SB 1070 period. A nationwide poll conducted in July 2010 found that a majority of U.S. residents (55%) supported SB 1070,[4] even though 54% believed that it would lead

[4] The same poll found large racial disparities among supporters of SB 1070. Although only 34% of non-Hispanic whites opposed the law, the number was 71% for Hispanics (CNN 2010).

to discrimination against Hispanics. A majority of respondents also supported building a fence along the Mexican border and sanctions against employers who hire undocumented immigrants (CNN 2010). Yet, because such surveys were conducted only after the law was proposed, not before, we still lack systematic evidence of whether the law had an independent effect on public sentiment toward immigrants in Arizona or whether it was merely a reflection of growing public animosity against undocumented immigrants.

In the next section, I examine empirically whether SB 1070 affected public sentiment toward immigrants in Arizona. Then I explore whether this perceived change in public opinion was the result of attitudinal changes of Arizona residents toward immigrants, as predicted by the expressive functions of law literature, or whether it was brought about by changes in the behaviors of specific Arizona residents, including advocates and common residents, who may have become emboldened after learning about the law, as predicted by policy feedback effects scholars.

SOCIAL MEDIA AND PUBLIC OPINION

For decades, surveys have been the primary tool used by social scientists to study public opinion (Zaller 1992). Surveys have several strengths including a high degree of control over sampling characteristics, detailed sociodemographic information of respondents, and the availability of multiple questions to measure public opinion. Despite their many advantages, surveys have also some limitations. As Lee (2002, p. 42) points out, surveys are ill-equipped to measure public opinion dynamics because surveys are "unlikely to anticipate or mirror groundswells in mass opinion" in response to unexpected social or political events such as the proposal of laws, public scandals, revolutions, and so on. In addition, launching new surveys in response to these unexpected events is a very costly and time-consuming enterprise for academics. Moreover, survey instruments may condition respondents to think about specific topics and express their opinion about them in unnatural or contrived ways. In addition, rates of nonresponse are rising in cross-sectional surveys, which may raise concerns about the validity of survey data (Massey and Tourangeau 2013).

Social media data, like the tweets published on Twitter, provide researchers with an alternative tool to study public opinion in times and places in which surveys are not available. Twitter is a microblogging website where users post text messages or "tweets" that are 140 characters or shorter. Twitter was founded in 2006 and has enjoyed a rapid expansion. By 2012, 500 million registered users across the world posted more than 300 million tweets per

day. During the same year, 80% of all U.S. adults regularly used the Internet, and 15% of them were Twitter users (Smith and Brenner 2012). Twitter data have several unique advantages. First, unlike traditional surveys and interviews, which are commonly designed based on researchers' own interests, social media data can provide analysts with spontaneous information generated by users themselves. Therefore, they offer a unique insight into individuals' mind-sets, the things they consider important, and the way they talk about them in a more inductive way. Second, social media provides real-time information on public opinion on rapidly evolving events. Third, traditional media outlets, such as TV news, increasingly broadcast live tweets, which may augment Twitter's social impact, even among nonusers. In summary, social media data like Twitter can offer an up-to-date, spontaneous, bottom-up wealth of information on a growing number of people.

Social researchers are beginning to explore the recent explosion in the data generated by millions of users of social media sites like Twitter and Facebook. Twitter data, in particular, have been used to predict election outcomes (DiGrazia et al. 2014), influenza outbreaks (Culotta 2010), and even criminal activity (Wang, Gerber, and Brown 2012). In this study, I analyze more than 250,000 Twitter messages, published by Arizona and Nevada residents, to measure whether the passage of SB 1070 had an impact on public sentiment toward immigrants. Although Twitter users are not responding to specific survey questions, the sentiment of their messages, which reflects their attitudes toward the topics they talk about, may be another way to examine public opinion on topics like immigration. One concern with Twitter data is that users may censor their opinions since their tweets may be accessible to others. Nevertheless, recent studies have uncovered a robust correlation between Twitter users' sentiments, as expressed in their messages, and traditional public opinion surveys (O'Connor et al. 2010). In addition, Bollen, Pepe, and Mao (2009) found that public mood, as expressed in tweets, is highly responsive to stock market performance, oil price indices, and major political events, such as elections. This has led some scholars to argue that Internet text streams, like Twitter, could substitute or at least supplement traditional polling (O'Connor et al. 2010; DiGrazia et al. 2014).

In this article, I take a more agnostic approach. I consider tweets to be specific types of speech acts that are produced in an online public arena that is part of a larger public sphere, where opinions are exchanged between individuals and groups. As such, tweets may not necessarily be representative of all discursive acts that occur in society but could nonetheless provide vital information about Twitter users' attitudes toward specific topics.

Another concern with Twitter data is that Twitter users are not representative of the entire U.S. population (DiGrazia et al. 2014), even if increasing numbers of U.S. residents use social media. Survey evidence shows that

Twitter users are indeed somewhat selective. While 26% of Internet users between the ages of 18 and 29 use Twitter, this figure is only about 4% for senior citizens age 65 and over. While 20% of urban Internet users tweet, only 8% of rural residents do. In addition, while 28% of African-American Internet users have Twitter accounts, this figure is 12% and 14% for non-Hispanic whites and Hispanics, respectively (Smith and Brenner 2012). Although such racial disparities are considerable, they are not a significant concern for this study, since this study compares the Twitter populations of Arizona and Nevada, both of which have small African-American populations (see table 1). Nevertheless, the conclusions of this study are limited to the population that uses Twitter, who are generally younger, more urban, more racially diverse, and perhaps more liberal than the U.S. population as a whole (Smith and Brenner 2012).

DATA AND METHODS

In this study, I compare all tweets related to immigrants published in the three-month period before April 2010, when SB 1070 was approved, with those posted in the three-month period after in order to estimate the impact

TABLE 1
Descriptive Characteristics of Twitter Messages and Users

Target Group	Arizona	Nevada
Immigrants:		
Messages (*N*)	79,999	10,230
Sentiment score (SD)	–.08 (.16)	–.08 (.16)
Users (*N*)	6,102	886
Mexicans:		
Messages (*N*)	38,388	11,566
Sentiment score (SD)	.00 (.17)	.01 (.17)
Users (*N*)	6,344	1,760
Hispanics:		
Messages (*N*)	6,669	1,871
Sentiment score (SD)	.00 (.13)	.00 (.13)
Users (*N*)	1,650	403
Asians:		
Messages (*N*)	6,796	3,522
Sentiment score (SD)	.03 (.18)	.03 (.17)
Users (*N*)	2,002	941
African-Americans:		
Messages (*N*)	18,341	6,785
Sentiment score (SD)	.01 (.16)	.00 (.18)
Users (*N*)	3,041	1,130

of this law on public discourse on immigrants. In addition, since public discourse on immigration could have changed in Arizona for reasons other than the passage of SB 1070 during this time period, I use tweets from Nevada, a southwestern state with comparable characteristics, as a counterfactual case to estimate how public discourse on immigrants would have looked in the absence of SB 1070. This research design allows me to address some of the limitations that are commonly found in cross-sectional research designs, including omitted variable bias.

I acquired these historical tweets through a subsidiary of Twitter. To test how the proposal of SB 1070 affected messages about most major ethnoracial groups in the United States, I obtained all tweets that mentioned immigrants, Mexicans, Hispanics, Asians, and African-Americans published in Arizona and Nevada during the first few months of 2010, when SB 1070 was approved (see the appendix for more details on the procedures for collecting tweets). Estimating the geographic location of Twitter users is not a simple task. Some researchers rely on geographic coordinates of each tweet. Unfortunately, such data were not available for this historic time period. Nevertheless, this is not necessarily a drawback for my study since such coordinate data would also capture users who live in other states but who may be traveling into Arizona or Nevada for a short amount of time such as tourists. Instead, in this article, I rely on the users' own reports of their geographic location. Although not all Twitter users report their location, this strategy is preferable since it captures permanent residents of these states, which are the population of interest for this study. Geolocated tweets may offer more precise indicators of users' location than users' self-reports. Nevertheless, past research has found that less than 1% of all tweets are geotagged. In contrast, more than 40% of Twitter users reported valid city-level locations in their profiles (Mahmud, Nichols, and Drews 2014). At the same time, geotagged tweets have increasingly become the gold standard in Twitter research as they contain information on users' precise location and as algorithms to impute the location of users who choose not to report their location have improved (Sloan and Morgan 2015).

In addition, there could be concerns that users who report their state of residence may be different from those who do not. This is certainly plausible, although the analytical approach that I employ in this study addresses this concern by using a difference-in-difference approach to compare a similar population of Twitter users across two different states. Indeed, this strategy has been recently incorporated in demographic research to deal with selectivity bias with Twitter data (Zagheni and Weber 2014). In addition, I also follow the same population over time, which effectively precludes concerns about changing selectivity in response to SB 1070. Still, the Twitter users I examine may not be representative of all Twitter users

(Leetaru et al. 2013).[5] The data set is composed of 24,467 users and 253,757 tweets. Since my primary interest is to detect the impact of SB 1070 on majority group members, English speakers in Arizona, I excluded all tweets written in languages other than English, including Spanish, from my primary analyses (although I do conduct some exploratory analysis of Spanish-language tweets as a comparison case).

To analyze these tweets, I relied on a text analysis technique known as sentiment analysis, which is used in computer science to estimate the sentiment polarity of texts, or whether a given text has a primarily negative or positive orientation based on the distribution of negative or positive terms in said text. More specifically, I used a lexicon-based approach and incorporated sentiment analysis techniques from computational linguistics. I used one of the most comprehensive sentiment lexicons available, which contains 2,006 and 4,783 positive and negative words, respectively (Liu, Hu, and Cheng 2005). This lexicon contains many colloquial terms and misspelled words as they appear frequently in social media sites like "beutifully" and "achievible."

Nevertheless, this lexicon has some limitations. First, lexicons are often domain specific (Liu 2012). In other words, terms used in the academic medical literature might be very different from words used by young adults in online chat rooms. This is a concern, given that many Twitter users use many context-specific words, including colloquial terms and slang words. They also often use cusswords, emoticons, hashtags, and other symbols not included in formal lexicons to express themselves.

In addition, Liu's dictionary does not capture differences in sentiment intensity but rates all negative and positive words as −1 and +1, respectively. Therefore, this lexicon could not capture differences between phrases such as: "I hate immigrants" and "I am skeptical of immigrants." Since both "skeptical" and "hate" are considered negative words, both sentences would receive exactly the same sentiment score, even if their sentiment intensities are clearly different. To address these limitations, I built a new lexicon that includes an intensity measurement for each word, which ranges from +4 (extremely positive) to −4 (extremely negative), provided by five native English speakers. It also includes many of the colloquial words and symbols used by Twitter users when talking about immigrants and ethnic and racial minorities (see the appendix for more information on how I constructed this lexicon).

[5] Another limitation is that my geocoding strategy cannot detect certain false positives. For example, Arizonans or Nevadans who travel to other states and tweet from those locations might be responding to their current stimuli but would be coded as "Arizona" or "Nevada" tweets.

A further challenge was that each tweet could contain multiple "opinion targets," which are defined as the entities about which the speaker has an opinion. For example, most sentiment scoring algorithms would rate the sentence "Migration is great for our country, but when it comes to homosexuality . . . now that's a practice that is nothing short of appalling" as neutral, since it contains a positive word (great: +1) and a negative word (appalling: −1), resulting in a sentiment score of zero. However, this sentence is more complex than that simple rating scheme implies. It contains a positive evaluation of "migration" and a negative assessment of "homosexuality." In other words, this sentence contains two different opinion targets with different sentiments for each one of them.

To account for this, researchers are beginning to incorporate the identification of opinion targets into their scoring algorithms. Identifying opinion targets is a difficult task. One technique to do so is to use noun phrases as proxies for opinion targets (Jiang et al. 2011). In our example, identifying both nouns ("migration" and "homosexuality") would correctly identify the opinion targets present in the sentence, although this is not always the case.

Based on this strategy, I developed a scoring algorithm that searches each individual tweet for sentiment words and then weighs its score, based on the distance from the nearest opinion target. In this way, sentiment words that are farther away from an opinion target will carry less weight in the overall sentiment score of each tweet than those that are closest. More formally, the sentiment function for each opinion target o_i is obtained with the following scoring function:

$$\text{score}\left(sw_j, \text{tweet}\right) = \sum_{sw_j \epsilon_i} \frac{sw_j, so}{\text{dist}\left(sw_j, o_i\right)}, \tag{1}$$

where sw_j is a sentiment word included in s, dist(sw_j, o_i) is the number of words between opinion target o_i and sentiment word sw_j in s, and sw_j so is the sentiment score of sw_j. As mentioned before, this distance weight reduces the influence of sentiment words that are further away from o_i. Finally, to calculate the final sentiment score for each tweet, I weighted score(sw_j, tweet) by the number of words in each tweet.

Table 1 shows the basic descriptive statistics from the resulting data set and includes the number of tweets collected for every target group by state, along with the average sentiment score each group received during the examined time period.

RESULTS

A simple comparison of the average sentiment score toward immigrants in Arizona before and after SB 1070s proposal would be a problematic method

of estimating the law's impact on public opinion because public sentiment on immigration in Arizona could have changed during this time period for reasons other than the passage of the law. Similarly, comparing post–SB 1070 public sentiment toward immigrants in Arizona with public sentiment in a different state could also be problematic, since any observed changes in public sentiment between both states could have been driven by unobserved differences between the states. Therefore, in this study, I relied on a difference-in-difference strategy. I used tweets from Nevada, a southwestern state with similar characteristics, as a counterfactual case to estimate how public discourse on immigrants would have looked in Arizona in the absence of SB 1070.

Table 2 shows basic sociodemographic, political, and economic characteristics of the two states. Both states have many similarities, including an almost identical ethnoracial composition (with Hispanic populations

TABLE 2
Basic Characteristics of Arizona and Nevada

	Arizona	Nevada
Sociodemographic characteristics:		
Total population	6,392,017	2,788,931
Median age	35.9	36.3
% non-Hispanic white	57.8	54.1
% non-Hispanic black	3.7	7.7
% Asian	.1	.2
% Hispanic	29.6	26.5
% Mormon	6.3	6.4
% foreign-born	13.4	19.2
Population growth (2000–2010)	24.6	35.1
Hispanic population growth (2000–2010)	46.2	81.8
% residents that are undocumented (2008)	7.5–8.5	7.5–8.5
Married couple family	48.1	46
Political characteristics:		
Party of governor	Republican	Republican
Obama vote 2008	45	55.1
Obama vote 2012	44.6	52.4
Economic characteristics:		
Annual unemployment rate	10.4	13.8
% residents below poverty line	17.4	14.9
Internet connectivity characteristics:		
% residents with broadband connection	64.0	64.4
% residents who use Twitter	11.5	11.1

Note.—Data are from the U.S. Census, Bureau of Labor Statistics, and Smith and Brenner (2012). All data are from 2010 unless otherwise noted. Information on Twitter use was estimated by merging three different nationally representative surveys conducted by the Pew Research Center: Search, Social, Networks, and Politics (February 2012), Civic Engagement Survey (August 2012), and Online Dating (Omnibus) (May 2013). Undocumented statistics obtained from Passel and Cohn (2009).

ranging between 26.5% and 29%) along with similar levels of foreign-born and undocumented residents (Passel and Cohn 2009). In addition, both states were governed by Republican politicians in 2010, had comparable economic indicators, and had similar levels of Internet connectivity and Twitter use. However, there are some differences. Nevada voters tend to vote somewhat more Democratic, although this difference decreased in the 2012 election. In addition, the Hispanic population has grown at a faster rate in Nevada since 2000.[6] If a faster increase in the size of this population is correlated with more restrictionist views toward immigration, my estimates of the law's effect would then be more conservative.

Still, Arizona and Nevada have many core demographic similarities, and no statewide anti-immigrant law was proposed or passed in Nevada during the relevant time period, which makes it a suitable counterfactual case. One of the requirements of the difference-in-difference approach is that the control case should not be contaminated by the treatment applied to the treated unit (Card and Krueger 1994; Imbens and Wooldridge 2007). Still, it is entirely plausible that Nevada residents could also have been affected by SB 1070's proposal, given their geographic proximity to Arizona and the substantial news coverage the law received. To examine this potential source of bias, I searched the four largest newspapers in these states, *Las Vegas Sun, Las Vegas Review-Journal, Arizona Republic*, and *Arizona Daily Star*, for mentions of SB 1070.[7] Figure 1 shows the number of news item published by each paper related to SB 1070 from January 2010 to December 2010. As expected, figure 1 shows that the bill received substantial news coverage in the two major Arizona newspapers but very little coverage in Nevada. I conclude that while the possibility of cross-state contamination cannot be discarded completely, there is little evidence of it, at least in the written news media.

Additionally, even if such cross-state contamination occurred, SB 1070 probably had a similar effect on Nevada residents as it did on their Arizona neighbors, given the states' relatively similar characteristics. If this were the case, the cross-state influence would downwardly bias my estimates and produce a conservative estimate of the true social effect of the law on Arizona residents. One possible way to address this cross-state influence would be to select a state that is further removed from Arizona. However, a more distant state would not be as comparable to Arizona.

[6] Given that both states have the same proportion of undocumented immigrants (between 7.5% and 8.5%), this means that the size of the undocumented immigrant population is about 500,000 in Arizona and 220,000 in Nevada.

[7] To identify these articles, I searched the entire text of the articles for the following terms: "Support Our Law Enforcement and Safe Neighborhoods Act," "Arizona Senate Bill 1070," and, the most commonly used, "SB 1070."

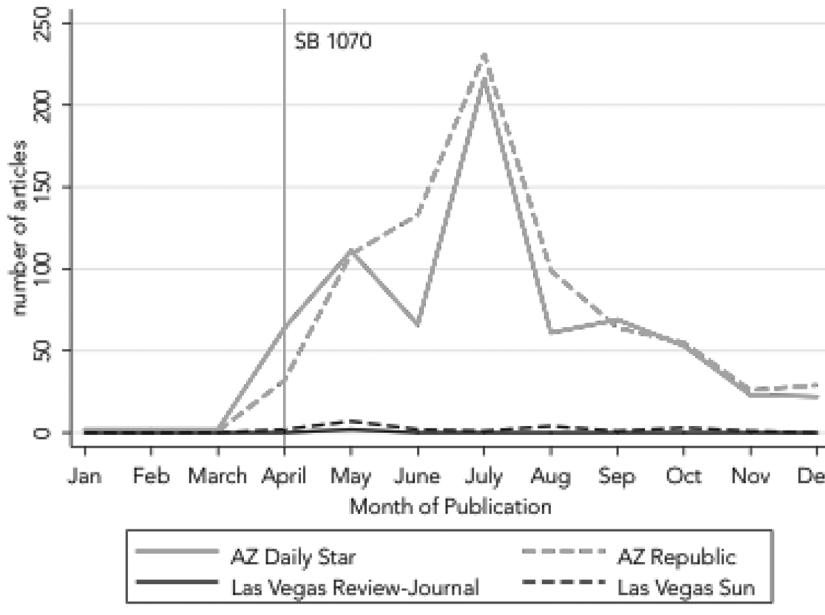

FIG. 1.—Newspaper coverage of Arizona's SB 1070 (January–December 2010). The graph shows the number of news items mentioning Arizona's SB 1070 published by the largest local newspapers in Arizona and Nevada, *Arizona Daily Star, Arizona Republic, Las Vegas Sun*, and *Las Vegas Review-Journal*, between January 2010 and December 2010. The vertical line on April 2010 indicates when SB 1070 was approved.

Another potential concern is that there could have been some event that only occurred in Arizona and not in Nevada in the post–SB 1070 period. This would be cause for concern if the event were also correlated with public sentiment on immigration since that would violate the parallel trends assumption of the difference-in-difference model (Imbens and Wooldridge 2007). A primary candidate for this event would be migration. If the flow of immigrants changed significantly in Arizona after SB 1070 was proposed, this could bias my results by making Arizona and Nevada less comparable. However, using data from the United States Border Patrol, I find no evidence of any significant change in the flow of undocumented immigrants into Arizona after SB 1070 was proposed (see the appendix).

SB 1070 was first introduced in the Arizona Senate in January 2010 by Senator Russell Pearce, who represented District 18 in Mesa, Arizona. Nevertheless, as figure 1 shows, the Arizona media did not focus on the law until April 2010, when Governor Jan Brewer signed it into law. According to the symbolic effects of laws literature, laws are only expected to be socially consequential when they are approved by lawmakers and are given substantial

media coverage. Therefore, in this study, I measure the effect of SB 1070 starting on April 2010 when it became an official law.

Figure 2 shows the number of tweets about immigrants posted by Arizona and Nevada Twitter users during this time period. A vertical line indicates that the bill was approved in April by the Arizona legislature. It shows that, before SB 1070 was approved in Arizona, users in both states posted a similar number of messages about immigrants per month. Nevertheless, figure 2 also shows that this parallel trend ended abruptly in April 2010 as the number of messages regarding immigrants by Arizonans soared after the approval of SB 1070.

Figure 3 shows the average sentiment score for tweets that mentioned immigrants before and after SB 1070 was passed in Arizona. The graph shows that the average sentiment toward immigrants in both states was negative even before SB 1070 was approved in Arizona. In addition, the confidence intervals of these two coefficients overlap, indicating that such sentiment was not statistically different in both states during the pre–SB 1070 period. In March, one month before the law was considered, the average sentiment toward immigrants expressed by Twitter users was virtually identical in both states. When the law was approved, in April 2010, these coefficients

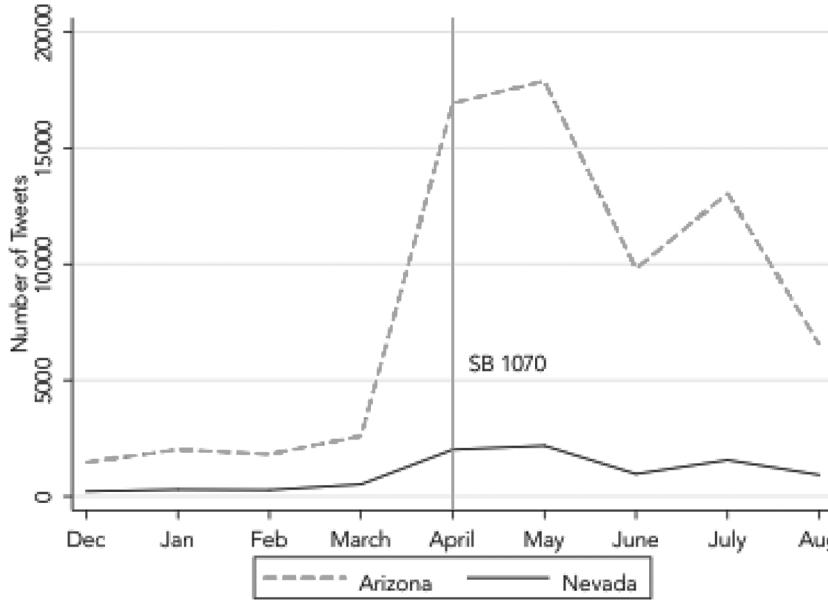

FIG. 2.—Number of Twitter messages related to immigrants per month in Arizona and Nevada (December 2010–August 2011). The vertical line on April 2010 indicates when the Arizona governor approved SB 1070.

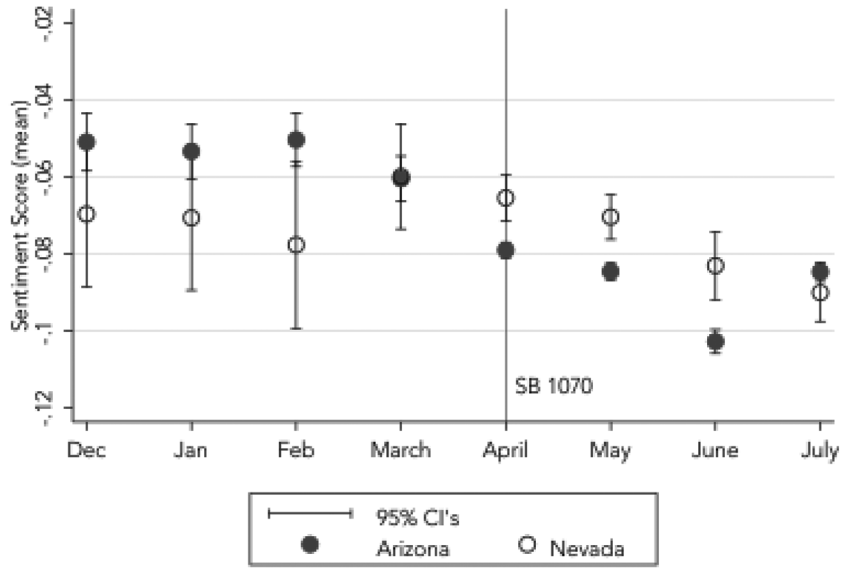

FIG. 3.—Average sentiment score of tweets about immigrants. The vertical lines represent 95% confidence intervals. The vertical line on April 2010 indicates when the Arizona governor approved SB 1070.

became statistically different for the first time. Although average sentiment of tweets about immigrants became more negative in both states, the decline was greater in Arizona. Such a gap in public sentiment toward immigrants persisted for several months. This gives descriptive evidence that SB 1070 negatively affected average public sentiment toward immigrants among Twitter users in Arizona. In fact, some Twitter users posted messages noting a perceived increase in public animosity against Hispanics in Arizona after SB 1070 was approved. Two weeks after the bill was signed into law, an Arizona resident posted, "ugh, horrible. people get very racist with hispanics around me lately, expect me to agree."[8]

The difference-in-difference approach compares the difference in public sentiment before and after the policy intervention—the proposal of SB 1070 in Arizona— to the same difference for the control group, Nevada, which was not "treated" by a similar policy. Average changes over time in public sentiment in Nevada are then subtracted from average changes over time in Arizona. This difference-in-difference approach removes biases stemming from permanent differences between the two states, as well as biases re-

[8] All tweets cited in this article were modified slightly to protect the anonymity of Twitter users.

sulting from changes over time in Arizona unrelated to SB 1070s proposal, thus significantly reducing the omitted variable bias that may afflict cross-sectional designs (Card and Krueger 1994; Parrado 2012). Formally, the specification is as follows:

$$\delta = \left(\bar{Y}_{C(\text{Post})} - \bar{Y}_{C(\text{Before})}\right) - \left(\bar{Y}_{T(\text{Post})} - \bar{Y}_{T(\text{Before})}\right), \quad (2)$$

where δ is the estimated causal effect of interest and $\bar{Y}$ is the average outcome in control (C) and treatment (T) groups in years after SB 1070 was proposed and before SB 1070 was proposed.

In the regressions shown in table 3, I assess whether the average tweet about immigrants became more negative as a result of SB 1070. It compares all tweets related to immigrants posted three months before SB 1070 was considered (January–March 2010) with tweets posted three months after SB 1070 was passed (April–June 2010). It includes an interaction term, AzXpost, which captures the statistical effect of SB 1070's passage in Arizona. Since my task is to assess whether SB 1070 affected the sentiment of the average Twitter message in Arizona, this model assumes each tweet is an independent observation. In subsequent models, I investigate whether changes in sentiment were clustered within specific groups.[9]

A statistically significant coefficient of −.025 indicates that tweets about immigrants posted by Arizona residents were 37% more negative than expected after the law's proposal (or about 15% of the dependent variable's standard deviation).[10] To provide a more qualitative interpretation, the estimated impact of SB 1070 on public discourse on immigrants would be equivalent to saying, "The immigrants moving to Arizona are *leeches*" instead of saying, "The immigrants moving to Arizona are *trespassers*." Although both terms were classified as negative by human raters, they considered "leeches" more negative, perhaps because besides signaling an illegitimate presence the word also conveys abuse toward the host.

The fact that the composition of messages about immigrants became more negative in Arizona as a result of SB 1070 is perhaps not entirely sur-

[9] Since my objective is to know whether the passage of SB 1070 had an effect on the sentiment of the average tweet about immigrants, in this first model I treat each message as an independent observation. In other words, in these initial models, I do not adjust the standard errors for clustering, but I do so in subsequent models where I investigate the causes of these apparent changes in sentiment. An alternative strategy would have been to adjust the standard errors for clustering by state and time period. In models not shown, I do so and all substantive results remain. The only exception is that the model predicting sentiment toward "Hispanics" is not statistically significant using this clustering strategy.

[10] I calculated this statistic based on the regression specification in table 3. I calculated the percentage growth represented by the coefficient of interest, which represents the effect of SB 1070 on average sentiment toward immigrants, relative to the constant value. In other words (–0.025*100)/–0.068 = 36.7%.

TABLE 3
OLS Regression Predicting Sentiment Score of Tweets

Variables	(1) Immigrant	(2) Mexican	(3) Hispanic	(4) Asian	(5) Black
Arizona	.01*	.00	−.00	.00	−.00
	(.00)	(.00)	(.00)	(.00)	(.00)
Post–SB 1070	−.00	−.00^{+}	−.00	−.00	−.00
	(.00)	(.00)	(.00)	(.00)	(.00)
AzXpost	−.02***	−.02***	−.02*	.00	.00
	(.00)	(.00)	(.00)	(.00)	(.00)
Constant	−.06***	.01***	.01*	.03***	.01***
	(.00)	(.00)	(.00)	(.00)	(.00)
Observations	58,948	29,924	5,149	5,942	13,994
R^2	.00	.00	.00	.00	.00

Note.—Heteroskedastic-robust SEs are in parentheses. The data consist of all geocoded immigration-related tweets published in Arizona and Nevada between January and June 2010.

$^{+}$ $P < .10$.
* $P < .05$.
** $P < .01$.
*** $P < .001$.

prising. After all, the bill explicitly targeted immigrants and portrayed them as a growing criminal threat that needed to be contained (Brewer 2010). In model 2, I tested whether the bill also had spillover effects on messages about Mexicans. The bill's authors consistently argued it was not intended to target any specific ethnic or racial group, but only undocumented individuals (Brewer 2010). Nevertheless, in model 2, I found that tweets mentioning Mexicans also became more negative after the bill was proposed. This finding directly contradicts the bill's drafters. In addition, model 3 shows that tweets about "Hispanics" posted by Arizona Twitter users also became significantly more negative after SB 1070 was proposed.

One could argue that the increased negativity of Twitter messages regarding immigrants, Mexicans, and Hispanics in Arizona after the proposal of SB 1070 could be capturing a growing concern with immigration in general. One might expect this concern to increase at a faster rate in Arizona than in Nevada, since the former is a border state that has become a major entry point for immigrants into the United States (Eschbach et al. 1999; Massey 2008). However, as table 2 shows, the immigrant population has actually grown at a faster rate in Nevada than in Arizona since 2000. In addition, population changes take years to unfold, and figure 2 shows a rapid hardening of public sentiment toward immigrants after the bill was approved. However, to further rule out any ongoing trend in animosity toward all immigrants in Arizona, I conducted another test. If the patterns

we observe in tweets about immigrants, Mexicans, and Hispanics reflect growing hostility toward all immigrants and not only people of Mexican/Hispanic origin, we would expect to see a similar pattern of growing hostility in tweets about other immigrant groups such as Asians. In model 4, I tested whether the average sentiment of tweets toward Asian immigrants also became more negative in the post–SB 1070 period. To do so, I analyzed all tweets related to the largest Asian immigrant groups in Arizona and Nevada, which include Chinese, Filipino, Vietnamese, Korean, and Japanese immigrants. Model 4 shows that messages mentioning Asians were unaffected by the implementation of SB 1070.

This may be the case because majority group members do not commonly perceive Asians as threatening. Perhaps SB 1070 only affected public discourse regarding seemingly undeserving minority groups, such as African-Americans and Mexican immigrants. African-Americans are a native minority group that is more often perceived as threatening or undeserving (Quillian and Pager 2001). Indeed, Arizona's refusal to recognize Martin Luther King Jr. Day as an official holiday was a national headline in the early 1990s (Berman 2014). So in model 5, I examine how the implementation of SB 1070 affected tweets about African-Americans. I find that the implementation of SB 1070 did not affect tweets about blacks, which undermines the hypothesis that the hardening of tweets toward immigrants, Mexicans, and Hispanics following the proposal of SB 1070 was driven by a general trend of growing animosity toward all minority groups in Arizona. We can therefore discard the hypotheses that the increasing negativity of Arizonans toward immigrants, Mexicans, and Hispanics reflected growing hostility toward immigrants more generally or "undeserving" minority groups more specifically.

Did SB 1070 also affect the average composition of tweets posted by Mexican immigrants in Arizona? This is an interesting empirical question. It is not entirely clear whether Mexican immigrants, the group primarily targeted by SB 1070, would react to this law in the same way as the majority group in Arizona. On the one hand, the law may have pushed them to defend immigrants and/or Mexicans by citing their positive attributes. This would have resulted in a positive effect of the law on tweets' average sentiment. On the other hand, SB 1070 could have had a negative effect on their tweets as they could have responded by internalizing some of the perceived attacks against them. Since this was not part of the original research design, I did not purposely collect Spanish-language tweets. However, using the same search terms, I captured a few hundred Spanish-language tweets. I captured 45 and 232 of these tweets that mentioned "immigrants" and "Mexicans," respectively, within this time framework. Unfortunately, there were not enough tweets about the other subgroups to analyze them. I use the same difference-in-difference model as the one used for analyzing English-language tweets in table 3. I find that the passage of SB 1070 did not have the same effect on

Spanish-language tweets as it did on English-language ones. SB 1070 led to slightly more positive Spanish-language tweets related to immigrants (.051) and did not affect tweets about Mexicans (–.009). Nevertheless, these results are not statistically significant, which might be due to their small sample sizes. Still, this provides some suggestive evidence that targeted populations react differently to exclusionary laws than the majority group.

But what, then, drove the observed effect of SB 1070 on English-language tweets? The law and society literature suggests it may reflect a widespread change in attitudes among Twitter users. However, there are three other mechanisms that could also explain this trend. First, this effect could have been driven by a small group of prolific activist users. Second, perhaps Arizona residents did not change their attitudes toward these groups, but residents who were already critical of immigrants became politically aroused and posted more messages after SB 1070 was made public. Third, new users, with a more negative attitude toward these groups, could have begun to post immigration-related tweets after the bill was proposed. In the next section, I assess each of these four mechanisms.

Mechanism 1: SB 1070 Affected Arizonans' Attitudes toward Immigrants

As discussed previously, law and society scholars argue that laws can have extralegal or symbolic functions (Berkowitz and Walker 1967; Sunstein 1996). When laws target specific groups, such as smokers or undocumented immigrants, individuals may internalize the moral code that is implicit in these laws. As such, individuals may become more hostile or critical toward the seemingly deviant groups that are targeted by the law. If this is the case, we should detect a change in sentiment toward immigrants *within* users after the law was passed. In my data set, 2,830 and 896 Arizona and Nevada residents, respectively, posted messages about these groups only in the pre–SB 1070 period. Finally, 10,203 Arizonans and 2,668 Nevadans only tweeted about these groups after the law had been approved, which amount to 54.4% and 50.8%, respectively, of the overall number of Twitter users in the data set. In addition, 5,173 Arizona users and 1,683 Nevada users posted messages regarding these groups before and after the law was implemented, which amount to 30.4% and 32.0% of each state's users' base, respectively. This allowed me to run a panel data model to estimate whether there were within-user changes in public sentiment toward immigrants.

To do so, I restricted my analysis to users who posted messages about these groups both before and after the law was implemented. I employed fixed effects models, which rule out potential differences across individuals because they only rely on within-subject information to estimate the statistical influence of the independent variables on the outcome variable (Allison 2009). By adding individual fixed effects, this model essentially demeans the

sentiment scores of each user and removes the effect of any time-invariant unobserved characteristic such as political ideology, social class, race, sex, culture, and so on. Detecting a within-user change in sentiment score after the passage of SB 1070 would provide evidence that the law affected how people talked about the examined groups.

More formally, my within-user model is

$$s_{it} = \beta_0 + \beta_1 \text{Post}_t + \alpha_i + \varepsilon_{it}, \quad (3)$$

where s_{it} is the sentiment score for user i at time t, Post_t takes a value of 1 during the post–SB 1070 period, α_i is a user fixed effect, and ε_{it} is a disturbance term. I first ran this model for all Arizona users who posted messages in both time periods and then I ran the same model for their Nevada counterparts.

Table 4 shows no significant change in the polarity of tweets about any of the groups, with the exception of tweets related to Mexicans in Arizona. Arizona residents who posted tweets about Mexicans before and after SB 1070 was passed posted tweets that were significantly more negative about Mexicans after the law was approved. In contrast, the sentiment of tweets related to Mexicans in Nevada did not change significantly. For the rest of the groups, no significant change in sentiment was detected. Once we take into account the initial attitude of users toward immigrants and Hispanics, the law did not appear to have hardened their views toward them.

Mechanism 2: SB 1070 Influenced Advocates and Interest Groups

If individual users did not change their attitude toward immigrants, how can we explain our earlier findings, displayed in table 3, which show that messages about immigrants, Mexicans, and Hispanics became significantly more negative in post–SB 1070 Arizona? The policy feedback literature suggests that policies could affect public opinion by mobilizing political elites or interests groups with a vested interest in those policies.

In this case, a plausible hypothesis is that SB 1070 affected the composition of tweets about immigrants, Mexicans, and Hispanics by influencing the behavior of activist individuals with a direct interest in immigration debates. Even a relatively small number of dedicated users could potentially make an impact on Twitter by posting multiple messages on the same topic. Indeed, the top five most prolific Twitter posters on the topic of migration are all from Arizona and include seemingly activist users such as "Border Action," which posted 2,351 tweets in the examined time period, "American Patrol" (2,559), "savetheusa" (2,704), and "US Citizen" (2,737). These numbers are significantly higher than the median number of immigration-related messages for all users in the same time period (127).

TABLE 4
FIXED EFFECTS REGRESSION PREDICTING WITHIN-USER CHANGE IN SENTIMENT SCORE OF TWEETS

	IMMIGRANT		MEXICAN		HISPANIC		ASIAN		BLACK	
Variables	AZ	NV	AZ	NV	AZ	NV	AZ	NV	AZ	NV
Post–SB 1070 . . .	.00	.00	−.01**	−.00	−.01	−.02	.01	.00	−.00	.001
	(.00)	(.00)	(.00)	(.00)	(.01)	(.01)	(.01)	(.01)	(.00)	(.0009)
Constant	−.07***	−.07***	.00*	.01*	.00	.02**	.02***	.03***	.01***	.015***
	(.00)	(.00)	(.00)	(.00)	(.00)	(.00)	(.00)	(.00)	(.00)	(.0004)
Observations	40,408	5,453	17,543	5,430	3,506	773	3,034	1,588	8,685	3,060
R^2	.159	.169	.337	.310	.451	.500	.466	.438	.285	.271

NOTE.—Absolute *t*-statistics calculated using robust SEs adjusted for clustering at the individual level are in parentheses. The data consist of all geocoded immigration-related tweets published in Arizona and Nevada between January and June 2010 for users who published tweets about each group before and after SB 1070 was implemented in April 2010.

+ $P < .10$.

* $P < .05$.

** $P < .01$.

*** $P < .001$.

In this section, I test whether my previous results are robust to the exclusion of the most active Twitter users or whether a small minority of activist users is driving the changes in public sentiment I detected earlier. To do so, I ranked all Twitter users in my data set by the number of messages posted in this period to identify the most prolific Twitter users. I define those users who posted the highest number of immigration-related tweets as "activist users." In table 5, I used the same regression specification as in table 3, but I first excluded the top 1% and then the top 5% most active users from the regression equation.

In line with my previous results, table 5 shows that Twitter messages regarding immigrants became more negative in Arizona after SB 1070's proposal, even after excluding the 1% most prolific users. This coefficient shrank slightly but remained significant when the top 5% of users were excluded. Similarly, the results for both Mexicans and Hispanics were equally robust to the exclusion of dedicated users, suggesting that the changes in the composition of tweets toward these groups after SB 1070 were more widespread and also involved posts by casual or nonactivist Twitter users. Finally, as expected, the exclusion of the most active users tweeting about Asians and African-Americans did not have an impact on the sentiment scores of these groups.

Mechanism 3: Anti-Immigrant Users Became More Prolific

If the estimated effect of SB 1070 on the sentiment of immigration-related tweets was not driven entirely by activist users or by attitudinal changes among users, how can we explain our original results, which show that the average tweet became more negative as a result of SB 1070? According to the policy feedback effects literature, policies can also influence public opinion by mobilizing nonelites, or the mass public (Campbell 2012). In the context of Twitter, SB 1070 could have incited a wider segment of users to become more outspoken about their position vis-à-vis immigrants, especially those with nonneutral stances, to varying effects. On the one hand, it could have energized anti-immigrant users to express their opposition to immigration; on the other hand, it could have energized proimmigrant users to counter the prevailing negative characterization of immigrants by becoming more vocal on Twitter. If users who were already critical of immigrants were emboldened by SB 1070 to post more immigration-related messages than their neutral or proimmigrant counterparts, this might explain the negative correlation shown in table 3 between public sentiment and this law's approval.

To test this, I restricted my analysis to users who posted messages in both time periods, in order to compare the average number of messages posted by users before and after the law was proposed. Then I divided all Twitter

TABLE 5
OLS Predicting Sentiment Score of Tweets Removing Prolific Twitter Users

	Immigrant		Mexican		Hispanic		Asian		Black	
Variables	Top 1%	Top 5%	Top 1%	Top 5%	Top 1%	Top 5%	Top 1%	Top 5%	Top 1%	Top 5%
Arizona	.01*	.01**	.00	.00	−.00	−.00	.00	.00	−.00	−.003
	(.00)	(.00)	(.00)	(.00)	(.00)	(.00)	(.00)	(.00)	(.00)	(.005)
Post	−.00	−.00	−.00+	−.00+	−.00	−.00	−.00	−.00	−.00	−.007
	(.00)	(.00)	(.00)	(.00)	(.00)	(.00)	(.00)	(.00)	(.00)	(.006)
AzXpost	−.02***	−.02***	−.01***	−.01***	−.02*	−.01*	.00	.00	.00	.005
	(.00)	(.00)	(.00)	(.00)	(.00)	(.00)	(.00)	(.00)	(.00)	(.007)
Constant	−.06***	−.06***	.01***	.01***	.01*	.01*	.03***	.03***	.01***	.018***
	(.00)	(.00)	(.00)	(.00)	(.00)	(.00)	(.00)	(.00)	(.00)	(.004)
Observations	55,771	54,291	29,587	29,484	5,117	5,115	5,936	5,936	13,987	13,987
R^2	.003	.003	.005	.004	.008	.008	.000	.000	.000	.000

Note.—Heteroskedastic-robust SEs are in parentheses. The data consist of all geocoded tweets published about each group in Arizona and Nevada between January and June 2010.

+ $P < .10$.

* $P < .05$.

** $P < .01$.

*** $P < .001$.

users in my data set who posted messages about immigrants into three groups according to the average polarity of their tweets before the law was implemented. If the average polarity of a user's messages fell below the 33d percentile, I classified her in the "anti-immigrant" or negative group, since most of her messages ranked in the lowest or most negative side of the sentiment spectrum. I classified a Twitter user as "neutral" when his average sentiment score lay between the 33d and 66th percentiles. Lastly, if a user's average sentiment score was higher than the 66th percentile, I classified her as "proimmigrant" or positive, since most of her messages were in the higher or most positive side of the sentiment distribution. I created this classification scheme for each target group: immigrants, Mexicans, Hispanics, Asians, and blacks. I then ran an ordinary least squares (OLS) regression, predicting the number of messages posted about immigrants, and included a dummy for each one of these groups by state.[11] I also interacted these dummies by period to assess whether the average number of messages posted by each group changed after SB 1070 was proposed. This resulted in 12 distinct terms: two states (Arizona and Nevada) × two time periods (before and after SB 1070) × three sentiment orientations (anti, neutral, and pro).

Full results, which include all 12 interaction terms, can be found in table A1 in the appendix. For simplicity, in table 6, I summarize these results by using a difference-in-difference technique to estimate the likely impact of SB 1070 on each group of users. For example, to estimate the impact of SB 1070 on the number of messages about immigrants posted by anti-immigrant users, I used the following equation:

$$\begin{aligned}\delta = &(\text{AZAnti}^{*}\text{Post} - \text{AZAnti}^{*}\text{Before}) \\ &- (\text{NVAnti}^{*}\text{Post} - \text{NVAnti}^{*}\text{Before}).\end{aligned} \tag{4}$$

I calculate the variance of each difference by summing up the variances minus twice the covariance:

$$\text{Var}(X - Y) = \text{Var}(X) + \text{Var}(Y) - 2\text{Cov}(X, Y). \tag{5}$$

Table 6 shows difference-in-difference estimates of the estimated impact of the law on the average number of messages posted by individuals from the three different groups. It shows that users classified as "anti-immigrant"

[11] Since the outcome of interest, number of messages, is a count, the most appropriate model would be a negative binomial regression. Nevertheless, I use a simple OLS model since its coefficients are easy to interpret and because all significant results are robust to the choice of model.

TABLE 6
ESTIMATED EFFECT OF SB 1070 ON NUMBER OF MESSAGES POSTED BY GROUP

	Immigrant (1)	Mexican (2)	Hispanic (3)	Asian (4)	Black (5)
Anti	36.01***	1.05^{+}	.93	−.05	2.01^{+}
	(8.88)	(.65)	(1.09)	(.36)	(1.20)
Neutral . . .	−11.94	2.66	.71	.23	1.26
	(9.82)	(1.85)	(2.48)	(.99)	(1.17)
Pro	−.59	−.10	.17	1.39*	1.72
	(3.12)	(.89)	(.90)	(.54)	(1.23)

NOTE.—SEs are in parentheses. The table shows the estimated impact of SB 1070's proposal on each user group for Twitter users who posted messages before and after SB 1070 was considered. These estimates were calculated using a difference-in-difference estimation technique for each group based on coefficients in table A1. The data consist of all geocoded immigration-related tweets published in Arizona and Nevada between January and June 2010 for users who published tweets about each group before and after SB 1070 was implemented in April 2010.

$^{+}$ $P < .10$.
* $P < .05$.
** $P < .01$.
*** $P < .001$.

posted 36 more messages as a result of SB 1070's proposal. In contrast, neutral and proimmigrant users posted fewer messages than expected, although these coefficients are not statistically significant. Model 2 shows that anti-immigrant users were also predicted to post one more message than expected about Mexicans. Model 3 also shows a positive coefficient for the number of messages posted about Hispanics for anti-immigrant users, but this coefficient cannot be distinguished from zero at the conventional significance levels.

Therefore, in line with mechanism 3, the evidence in this section shows that Twitter users who posted negative messages about immigrants and Mexicans in the pre–SB 1070 period became significantly more prolific after the law was proposed. Some of these newly mobilized users expressed their support for SB 1070 and referred to it as the "anti-invader" bill. Others denounced the "petty attacks" on the bill by "ethnic pimps" and civil rights groups.

Mechanism 4: New Twitter Users Began Discussing Migration

Yet another way in which SB 1070 could have affected the average sentiment of immigration-related tweets is by motivating new users to start posting messages about migration. The common knowledge perspective states that knowing that others possess the same information as one does may embolden a user to become more outspoken since "no one wants to act alone"

(Sen 1967; Chwe 2001). If this is the case, the law could have affected the overall composition of tweets about immigrants in Arizona, not by changing residents' minds about this topic, but by motivating a new group of residents to seek a public platform to voice concerns about immigration that seemed to be shared by many others.

In line with this proposition, I find that the number of unique users posting on immigration matters grew at a faster rate in Arizona (440%), relative to Nevada (287%), after the law was proposed.

Were these new users more critical of immigrants than users who tweeted about immigrants before the law was passed? To test this proposition, I used regression analysis. First, I divided all Arizona users into three categories: users who posted only *before* the law, users who posted only *after* the law, and users who posted in *both* time periods. I did not interact these three dummies by period, since only the third group posted messages before and after the law was proposed. Therefore, I only included an interaction term by period for this third group of users, which is labeled as "AZ Both X Post" in table 7.

The results, shown in table 7, provide evidence for the selectivity of users who posted about these groups across time. It shows that Arizona users who

TABLE 7
OLS Regression Predicting Sentiment Score of Tweets by First Message in Twitter

Variables	Immigrant (1)	Mexican (2)	Hispanic (3)	Asian (4)	Black (5)
Post	−.00	−.00^{+}	−.00	−.00	−.00
	(.00)	(.00)	(.00)	(.00)	(.00)
AZ Only Before	.03***	.01**	.00	.00	−.00
	(.00)	(.00)	(.01)	(.01)	(.00)
AZ Only After	−.03***	−.00	−.02**	.00	−.00
	(.00)	(.00)	(.00)	(.00)	(.00)
AZ Both	.01^{+}	.00	−.00	.00	−.00
	(.00)	(.00)	(.00)	(.00)	(.00)
AZ Both X Post	−.01**	−.02***	−.01*	.00	.00
	(.00)	(.00)	(.00)	(.00)	(.00)
Constant	−.06***	.01***	.01*	.03***	.01***
	(.00)	(.00)	(.00)	(.00)	(.00)
Observations	58,948	29,924	5,149	5,942	13,994
R^2	.008	.007	.008	.000	.000

Note.—Heteroskedastic-robust SEs are in parentheses. The data consist of all geocoded immigration-related tweets published in Arizona and Nevada between January and June 2010 for users who published tweets about each group before and after SB 1070 was implemented in April 2010.

$^{+}$ $P < .10$.
* $P < .05$.
** $P < .01$.
*** $P < .001$.

only published messages about immigrants after the law was implemented, which were labeled AZ Only After in the regression table, posted significantly more negative tweets than those who only posted before the law was passed. In the case of tweets related to Mexicans, the coefficient for users who only posted after SB 1070 is also negative but cannot be distinguished from zero. Nevertheless, when it comes to messages about Hispanics, the model also predicted that those users who joined Twitter after SB 1070 was approved published more negative messages about this group than other users. No significant results were found in the case of Asians or blacks, suggesting that there was no selectivity of users posting about these groups by time period. These results indicate that, as mechanism 4 states, new Arizona users who began to publish tweets about immigrants and Hispanics after SB 1070 was proposed were more critical of these groups than expected, which helps explain why the average immigration-related tweet published in Arizona in the post–SB 1070 period was significantly more negative than in Nevada.

DISCUSSION AND CONCLUSIONS

Based on a difference-in-difference estimation technique applied to more than 250,000 English-language tweets published in Nevada and Arizona in 2010, this study demonstrates that the implementation of SB 1070 had a significantly negative impact on the average sentiment of messages about immigrants in Arizona. Further, although the bill's supporters consistently argued that the law only targeted unauthorized immigrants, I find that the law also influenced tweets about Mexicans and, more generally, Hispanics. In contrast, the passage of the bill did not affect messages about other immigrant groups, such as Asians, or other native minorities, such as African-Americans. Together, these findings highlight the power of restrictive immigration policies to shape public discourse about Mexicans and Hispanics in the United States. Although previous scholars have documented the capacity of nonelites like grassroots activists and social movements to influence public opinion (Lee 2002), this study documents the power of political elites to set into motion changes in public discourse through legislative action as public opinion researchers have theorized (Zaller 1992; Soss and Schram 2007).

Previous studies have suggested that punitive immigration bills, such as Arizona's SB 1070, affect public discourse by hardening natives' *attitudes* toward immigrants (Menjívar and Abrego 2012; Flores 2014). Nevertheless, I do not find much evidence for this assertion. Instead, I find that two mechanisms, based on *behaviors*, drove the apparent changes in public sentiment. First, Arizona residents who were already critical of these groups began posting many more messages about them after SB 1070 was implemented. Second, a new group of users began posting messages about these

groups once the law was passed, and they were significantly more likely to post negative messages.

Prior evidence on the attitudinal effects of policies has been mixed. On the one hand, survey researchers have found little evidence for the capacity of laws to shape attitudes (Soss and Schram 2007). On the other hand, qualitative scholars have reported increased public animosity toward immigrants after punitive immigration laws have been approved (Menjívar and Abrego 2012; Flores 2014; Szkupinski Quiroga et al. 2014). My research could reconcile these seemingly contradictory findings. Although policies may not have the power to shape attitudes, as survey researchers have suggested, they do have the capacity to alter behaviors of some groups in ways that could create a perception of a generalized attitudinal change. In other words, the apparent changes in public opinion documented by ethnographers may have been the result of an increased willingness to act upon previously held attitudes in the postlaw period rather than of actual changes in attitudes. In my own ethnographic study of Hazleton, Pennsylvania, I found that the proposal of a high-profile anti-immigrant law by the local mayor did appear to stir anti-immigrant feelings among the native population (Flores 2014). After the law's proposal, many natives felt emboldened to take matters into their own hands by attending anti-immigrant rallies, participating in online forums, talking with their friends about the problems they associated with immigrants, and writing letters to elected officials. This increased level of anti-immigrant activism created the perception that natives' views toward immigrants had indeed hardened as a result of the policy.

Nevertheless, one significant limitation of this previous qualitative study was that I had to rely on my informants' own retrospective accounts about how they felt toward immigrants before the law was approved. Thus, recall bias hampered my ability to distinguish attitudinal from behavioral effects of the law. One key advantage of the present study is that, by relying on social media data, I have access to residents' individual attitudes toward immigrants *before* the law was passed. With these data, I am able to disentangle behavioral from attitudinal effects, which previous survey and qualitative researchers had not been able to do. I found that SB 1070 did not lead to attitudinal changes (at least within the examined six-month period). Instead, apparent changes in public discourse were driven by certain groups of Arizona residents, those with preexisting anti-immigrant views; they became more active on Twitter and posted more messages about immigrants, which I consider a behavioral change.

This research also illuminates the temporal dimension of this process as I find that the law's effect on political discourse toward immigrants lasted about three months. After this period, the average sentiment of tweets about immigrants in Arizona and Nevada became indistinguishable. This finding

is also consistent with my previous qualitative work in Hazleton (Flores 2014). Although the proposal of a strict anti-immigrant ordinance increased anti-immigrant activism and exacerbated interethnic hostility in the short term, such behavioral effects eventually dissipated, even if locals' attitudes toward immigrants remained unchanged. Based on this evidence, I propose that while the political behaviors of certain groups may be stirrable by elites, their activation is short-lived. On the other hand, political attitudes are less pliable and longer-lived.

A prominent literature in political science posits that the general public behaves like a "thermostat"—that is, they respond to increasingly conservative policies by becoming more liberal, and vice versa (Wlezien 1995; Johnson, Brace, and Arcenaux 2005; Soroka and Wlezien 2010). Such changes in public preferences then feed back into the political system affecting the new round of policies political elites will enact (Soroka and Wlezien 2010). Insofar as I do not find that public attitudes toward immigrants changed in response to SB 1070, my study appears to contradict this line of research. If the thermostatic model were correct, we would expect that Arizonans would have become more liberal toward immigrants after the passage of a restrictionist policy like SB 1070. Nevertheless, I do not find that the law had attitudinal effects and, if anything, conservative residents became mobilized after the passage of this conservative policy. Perhaps the explanation for this apparent discrepancy lies in the types of policies under consideration. While scholars in this literature have examined policies that provide rights and services to citizens in domains like welfare, education, and health (Soroka and Wlezien 2010), SB 1070 is a punitive policy that does not regulate access to benefits and social services. Instead, it is designed to identify and detain a population whose very presence is often regarded as illegitimate: undocumented immigrants. This suggests that the character of the policies under consideration, whether they are punitive or nonpunitive, may be an important moderator of the relationship between public policies and public opinion. In doing so, my findings help to identify the domains of policy within which a thermostat effect may be produced. Yet another possibility is that the thermostat effect takes a longer time to materialize, which future research could explore.

This finding raises new critical questions. For example, scholars could examine whether immigration policies that do regulate access to services to immigrants have attitudinal effects. For example, there is some suggestive evidence that Utah's decision to allow undocumented immigrants access to driver's licenses in 2002 may have activated anti-immigrant sentiments (Stewart 2012), which is consistent with the thermostatic model. In this vein, scholars have recently explored whether prominority policies could elicit an "opinion backlash" in terms of public opinion (Kriner and Howell 2012; Kreitzer, Hamilton, and Tolbert 2014; Bishin et al. 2016). In the future, schol-

ars could assess whether liberal immigrant policies that do extend services and benefits to immigrants lead to a hardening of public opinion.

This article makes four distinct theoretical, empirical, and methodological contributions to existing literatures. First, this study calls into question the theoretical assertion often made by law and society scholars that punitive immigration laws may shape people's attitudes toward the targeted group. According to my findings, individuals' opinions toward immigrants are fairly stable, at least in the short run. In line with the policy feedbacks literature, I find that political *behaviors* are more responsive to immigration policies than *attitudes* are (Morgan and Campbell 2011). Some scholars argue that political attitudes may be more deeply ingrained (Campbell 2012). However, it may also be that punitive laws take a longer period of time to change people's attitudes. For example, even before SB 1070 was proposed, Arizonans' sentiments toward immigrants were quite negative, which could reflect the accumulated effect of previous anti-immigrant laws considered by this state. The way politicians frame immigrants during a policy debate may influence future policy discussions by defining the semantic space within which these debates will take place or how immigrants will be talked about (Stewart 2012).

Second, this study contributes to the policy feedback effects literature by demonstrating (1) that immigration laws can have an impact beyond the target population and (2) that they can do so even if they do not provide direct benefits but are instead of a restrictionist character. While some politicians endorse punitive policies in an effort to placate the electorate, my findings suggest that these policies may actually stir the pot further and encourage individuals with preexisting critical views to become more politically active. In turn, the increased political participation of these dedicated individuals may raise the odds that a new round of punitive policies will be considered in the future. This feedback loop may explain why in recent years states like Arizona have implemented ever more punitive policies that target immigrants, racial minorities, and homosexuals. Future research could assess whether the energizing effects of punitive laws may also influence other political behaviors like voting, protesting, and participating in political groups.

Third, my findings highlight the continued importance of immigration for Hispanics, as I find that Arizona's SB 1070 shaped public discourse not only on immigrants but also on Mexicans and Hispanics more generally. Issues of citizenship and legal status, which do not affect African-Americans or even Asian immigrants, continue to impact the experiences of Mexican immigrants and their U.S.-born descendants, at least in Arizona.[12] This high-

[12] One possible explanation for the lack of an effect with regards to Asian immigrants is that the Asian community is still relatively small in Arizona. However, Latino immigrants have sometimes generated public opposition even in communities where their numbers are relatively small (O'Neil 2011).

lights the especially adverse circumstances faced by Hispanics in the United States even relative to other immigrant groups like Asians (Telles and Ortiz 2008). The continued use of subnational public policies by states and localities to target immigrants may hinder the capacity of Mexican immigrants and Hispanics to successfully incorporate into U.S. society by energizing local opposition to them (Tienda and Fuentes 2014).

Some scholars have argued that when politicians send racial messages through public policies that are too explicit, citizens may become aware of these laws' racial dimensions and reject them due to U.S. society's formal commitment to racial equality (Mendelberg 2001). Nevertheless, I find that SB 1070 still affected public discourse on Mexicans and Hispanics more generally even when the bill's racial elements were publicly discussed and denied by its proponents. This suggests that even relatively explicit racial messages, such as SB 1070, may have the power to stoke the flames of racial resentment.

Fourth, I show how sentiment analysis, a computational methodology, can be used to analyze social media data and study public opinion dynamics. As large bodies of text become available via the Internet and computer-based data collection techniques (i.e., the digitization of entire libraries), these "big data" could be used to study social processes when traditional sources of data, like surveys or interviews, are not available or their implementation would not be feasible. Therefore, social media data like Twitter can complement traditional data sources and offer a spontaneous, unstructured, bottom-up wealth of information on a growing number of people.

Some caveats are in order. Although I do not find evidence that the law changed the attitudes of users who were already posting messages about immigrants, it is entirely plausible that the bill did affect how other groups of people viewed immigrants, including people who do not use Twitter. For example, I find that the law motivated a significant number of Arizona residents to start posting messages about immigrants for the first time. It is possible that the law hardened this group's views toward foreigners. Unfortunately, I do not have data on this group's attitudes for the pre–SB 1070 period.

It is not entirely clear whether the conclusions from this study extend beyond Arizona. Arizona is a state with a long history of anti-immigrant legislation. Perhaps in areas where anti-immigrant laws are still a novelty and where the population is less polarized by immigration, punitive policies may have stronger attitudinal effects. Additionally, unlike traditional survey respondents, Twitter users choose the topics they want to discuss. Some Twitter users may choose not to tweet about politics or other controversial topics even if their underlying political attitudes are changing. Therefore, it is possible that certain types of attitudinal changes may go undetected in social media data, like Twitter.[13]

[13] I thank Devah Pager for this insight.

Further, the effect of SB 1070 on tweets about immigrants may have depended on users' ethnicity. Unfortunately, racial and ethnic data are not available for my historical Twitter data set. Although I excluded all non-English-language tweets from my main analyzes, I cannot rule out the presence of Hispanics, immigrants, or blacks in my data set. Investigating the effect of exclusionary laws on the target populations could be theoretically fruitful. Indeed, in this article, I find some suggestive evidence that SB 1070 did not produce the same effect on Spanish-language tweets as it did on English-language messages. Instead, it appeared to have had a positive effect on the average sentiment of Spanish-language immigration-related tweets (although differences are not statistically significant perhaps due to small sample sizes). This suggests that some immigrants may have come to the defense of immigrants by citing their positive attributes. More exhaustive research on this topic is needed.

Lastly, although Twitter membership is becoming increasingly common, Twitter users may still not be representative of the general population (Smith and Brenner 2012). These differences may lead non-Twitter users to respond differently to restrictionist laws, which limits the generalizability of this study. Still, if Twitter users are younger and more liberal than the population at large, it might be reasonable to expect that the effect of restrictionist laws may actually be larger among older and more conservative individuals.

The literature on social media data would benefit from future research on how online discourses and behaviors are connected to offline behaviors and attitudes. Although the proposal of SB 1070 had a significant impact on public discourse about immigrants on Twitter, it is not entirely clear whether this law also affected residents' everyday offline discourse and behaviors, which is an area where ethnographers and other qualitative researchers could shed light. Recent research suggests this could have been the case. McKelvey, DiGrazia, and Rojas (2014) argue that the online behaviors of nonelite Twitter users are correlated with offline political behaviors such as voting.

This research has important implications for public policy, as it shows the social consequences of punitive immigration laws. Rather than placating the electorate, this research shows that these policies may actually incite further mobilization against the targeted group and even affect native-born ethnic minorities. Hence, my study could help policy makers make more informed decisions on policies that affect both immigrants and native minorities.

APPENDIX

TABLE A1
OLS Predicting Number of Messages Posted by Group for Users Who Posted Both before and after SB 1070 Was Considered

Variable	Immigrant (1)	Mexican (2)	Hispanic (3)	Asian (4)	Black (5)
AZ Anti	7.92***	2.54***	2.07***	1.59***	3.25***
	(–1.87)	(–.12)	(–.18)	(–.07)	(–.21)
AZ Neutral	5.60***	6.26***	5.89*	2.68***	3.73***
	(–.88)	(–.60)	(–2.52)	(–.25)	(–.43)
AZ Pro	8.31^{+}	2.79***	2.35***	2.22***	3.44***
	(–4.52)	(–.15)	(–.29)	(–.31)	(–.28)
AZ Anti×Post	55.18***	7.19***	5.71***	2.67***	7.98***
	(–8.46)	(–.49)	(–.70)	(–.22)	(–1.06)
AZ Neutral×Post	33.95***	13.03***	9.38**	4.28***	7.69***
	(–6.44)	(–1.97)	(–2.85)	(–1.00)	(–.89)
AZ Pro×Post	17.25***	5.86***	4.02***	4.32***	6.03***
	(–3.60)	(–.73)	(–.45)	(–.85)	(–.72)
NV Anti	5.53***	2.66***	1.84***	1.95***	3.04***
	(–1.32)	(–.24)	(–.17)	(–.18)	(–.27)
NV Neutral	5.66***	8.28***	5.14***	2.87***	4.66***
	(–1.32)	(–1.87)	(–1.10)	(–.31)	(–.88)
NV Pro	2.68***	3.93***	2.08***	2.46***	4.15*
	(–.34)	(–1.11)	(–.26)	(–.24)	(–1.78)
NV Anti×Post	31.92**	6.36***	4.75***	3.09***	4.49***
	(–10.79)	(–.81)	(–.82)	(–.32)	(–.48)
NV Neutral×Post	33.60***	11.93***	16.12^{+}	4.48***	8.11***
	(–8.03)	(–2.92)	(–9.01)	(–.72)	(–2.13)
NV Pro×Post	12.16***	6.88***	3.85***	3.12***	4.38***
	(–2.04)	(–1.67)	(–1.07)	(–.33)	(–.57)
Observations	2,894	5,837	1,353	2,184	3,278
R^2	.07	.13	.22	.24	.14

Note.—Heteroskedastic-robust SEs are in parentheses. The data consist of all geocoded tweets published about each group in Arizona and Nevada between January and June 2010.

$^{+}$ $P < .10$.

* $P < .05$.

** $P < .01$.

*** $P < .001$.

Collecting Tweets

Table A2 shows the search terms I used to identify and collect tweets for each group. When searching for tweets about immigrants, I did not include any nationality term. Instead I searched for "immigrants," "illegal aliens," and other terms used to refer to immigrants without specifying an ethnic origin. For all ethnic or racial groups, I included the most common terms peo-

ple use to refer to them including slang terms and abbreviations.[14] For example, as table A2 shows, when searching for African-Americans, I also searched for "black people," "black ppl," "black guys," and so on. In the case of Asians, I searched for mentions of any of the largest Asian immigrant groups in Arizona and Nevada, which include Filipino, Korean, Japanese, and Vietnamese immigrants. I also include tweets that included panethnic references to "Asians." I excluded tweets that referred to ethnic food or restaurants (i.e., Mexican or Asian) since such establishments have become rather mainstream in the United States and may not be expressing an opinion about these ethnic groups. The total number of collected tweets was 253,757. Since my primary interest is to detect the impact of SB 1070 on majority group members, I excluded all tweets written in languages other than English, including Spanish, from my data set.

TABLE A2
Search Terms for Each Group

Group	Search Terms
Immigrants	Immigrant, illegals, illegal aliens, migrant, migration, undocumented youth, undocumented student, undocumented worker, illegal worker, undocumented women, undocumented men
Mexicans	Mexican
Hispanics	Hispanic, Latino
African-Americans	African-American, blacks, AfricanAmerican, black people, black ppl, black guy, black girl, black dude, black men, black female, black man, black male, black women
Asians	Asian-American, Asians, AsianAmerican, asian people, asian ppl, asian guy, asian girl, asian dude, asian men, asian female, asian women, asian man, asian male, chinese-American, chineseAmerican, chinese people, chinese ppl, chinese guy, chinese girl, chinese dude, chinese men, chinese female, chinese man, chinese male, chinese community, chinese women, Filipinos, filipino-American, filipinoAmerican, filipino people, filipino ppl, filipino guy, filipino girl, filipino dude, filipino men, filipino female, filipino man, filipino male, filipino women, vietnamese-American, vietnameseAmerican, vietnamese community, Vietnamese people, Vietnamese ppl, vietnamese guy, vietnamese girl, Vietnamese dude, Vietnamese men, Vietnamese female, Vietnamese man, Vietnamese male, Vietnamese women, Koreans, korean-American, koreanAmerican, korean people, korean community, korean ppl, korean guy, korean girl, korean dude, korean men, korean female, korean man, korean male, korean women, japanese-American, japaneseAmerican, japanese people, japanese ppl, japanese guy, japanese community, japanese girl, japanese dude, japanese men, japanese female, japanese man, japanese male, japanese women

[14] Although some individuals may use pejorative terms to refer to specific ethnic groups, I did not use these terms when searching for tweets to avoid selecting on the dependent variable but also due to the fuzzy boundaries of many of those terms. For example, it is unclear whether "wetback" refers only to Mexicans or also to other Latin American na-

Lexicon Construction

I built a new lexicon that includes an intensity measurement for each word and that includes many of the words used by Twitter users when talking about immigrants and ethnic and racial minorities. In addition, I added a list of common emoticons used by Twitter users in my data set. Emoticons are symbols found in 5%–10% of all tweets and are used to express emotions or moods (Brönnimann 2013). For example, while :) or =) express positive emotions, :(or >:(convey negative sentiments in Western countries.

First, I took a random sample of 10,000 tweets from my data set and listed the 600 most common words or emoticons found in them. I then employed five native English speakers from the United States, hired via Amazon's Mechanical Turk, to rate both the polarity (negative or positive) and also the intensity of each one of these words. The intensity scale included +4 (extremely positive), +3 (very positive), +2 (positive), +1 (somewhat positive), 0 (neutral), −1 (somewhat negative), −2 (negative), −3 (very negative), and −4 (extremely negative). I then incorporated these words into Liu's lexicon, replacing duplicate values with my new values. In general, there was a high level of agreement between the human raters especially regarding the sentiment polarity of words; 90.4% of all words had a variance of less than 1.5. Nevertheless, there were a handful of words with high levels of disagreement such as "toughest" or "dope," whose polarity depends on context.

I combined these different ratings into a single scale. I assessed the reliability of this summative rating scale by using Cronbach's alpha. The resulting alpha reliability coefficient was .9552, which is very high and indicates that the separate ratings measure the same underlying phenomenon.

Scoring Algorithm

In this section, I verified the effectiveness of the scoring algorithm. Table A3 shows some examples of how this algorithm classified several tweets. Tweets talking about immigration in an objective and dispassionate manner were given a sentiment score of 0. In contrast, tweets containing ethnic slurs or negative words such as "hate" or "criminals" were given negative sentiment scores. Similarly, as expected, tweets containing positive words like "awesome" and "love" received positive sentiment scores.

At the same time, the algorithm has some limitations. First, it struggled to correctly classify sarcastic messages, which is a common limitation of sentiment analysis (Liu 2012). Sarcasm is commonly defined as stating the op-

tionalities or whether it also applies to all U.S.-born Hispanics regardless of national ancestry. Although racial and ethnic terms were not used to identify tweets, they were used as sentiment words in the scoring algorithm. As expected, they were consistently rated as highly negative by human raters.

TABLE A3
Examples of Tweet Sentiment Classification

Sentiment Score	Message	Polarity
–1.65	URL illegal aliens are criminals . . .	Negative
–1.01	deport illegal aliens. what example are we giving our children? trespass invasion robbery cheat murder rape get amnesty	Negative
–.96	i detest playing soccer against beaners . . . dirty mexicans	Negative
0.	immigration and commerce with mexico. on both, arizona politicians should consider the broader economic impact	Neutral
0.	news service (via @*username*): immigration measures bring reactions from both sides, URL	Neutral
0.	advocacy groups say obama continues committed to immigration reform, groups . . . URL	Neutral
.51	it is great to see young successful black people . . . yo check out awesome writer @*username*	Positive
.75	Inlovewithimmigrants, i love soccer!	Positive
1.25	asians are awesome :)	Positive

Note.—Tweets were modified slightly to protect the anonymity of Twitter users.

posite of what we actually mean. For example, "Awesome news from AZ! Immigrants now can get licenses. Isn't it wonderful? I am sure politicians who approved this have the interest of U.S. citizens in their minds, right? We need SB 1070 now!" would be classified as positive toward immigrants because it contains several positive words like "awesome" and "wonderful" even if the author actually supports SB 1070. Fortunately, my estimation technique, based on a difference-in-difference approach, deals with this concern by design. If the level of sarcasm among users was consistently different in Arizona relative to Nevada, the Arizona dummy in the regression model in table 3 would absorb it. If sarcasm increased in both Arizona and Nevada after the passage of SB 1070, this would be controlled for by the post–SB 1070 dummy. The only case when sarcasm could be more of a concern is if it increased at a faster rate in only one of the states in the post–SB 1070 period. Nevertheless, as I show below, misclassification errors, which could have been produced by changing levels of sarcasm, did not vary by state in the post–SB 1070 period, which should assuage these concerns.

Second, the algorithm misclassified some messages that contain multiple opinion targets with contradicting sentiment evaluations. For example, the message "I hate SB 1070; support immigrants!" clearly implies that the Twitter user has a proimmigrant stance. Nevertheless, my scoring algorithm would classify this message as having a more neutral sentiment since the negative score of "hate" and positive score of "support" would partially cancel each other out. Still, such grammatical structures were not very common.

To have a more systematic assessment of how the algorithm performed in correctly classifying the sentiment polarity of messages, I randomly selected 200 messages from my data set. I then ran my algorithm using Liu's simple lexicon to classify their polarity. Next I employed my own lexicon, which contains topic-specific vocabulary, weights distance from opinion targets, and also incorporates a measure of sentiment intensity, to classify these messages' polarity. Finally, I employed human raters, hired via Amazon's Mechanical Turk, to also rate these tweets' sentiment. I found that Liu's lexicon correctly predicted 51% of the examined tweets. My own lexicon performed better, accurately predicting the sentiment of 68% of these tweets, which is about average for this sentiment classification methodology (Liu 2012). Further, the large majority of classification discrepancies occurred between contiguous categories. In other words, tweets were classified as either positive or negative by the scoring algorithm but as neutral by human raters. In only two cases, tweets belonged to opposite categories (i.e., they were classified as positive by scoring algorithm but negative by human raters). This might have resulted in attenuation bias, which would make my results more conservative.

More worrisome is the possibility that Arizona users writing negative tweets about immigrants may have used specific terms that made it more difficult for the algorithm to classify their messages correctly relative to Nevada users. This nonrandom source of classification error could have introduced bias into my scoring scheme. To test this, I compare the rate of misclassification of tweets as rated by the scoring algorithm with the sentiment classification of these 200 random tweets as classified by human raters.

Figure A1 shows there were no systematic patterns in the misclassification of tweets by the scoring algorithm. Negative tweets published in Arizona were not more likely to be misclassified than negative messages from Nevada. In addition, the rate of misclassification of negative tweets posted after the law was passed did not differ from that of negative messages published before SB 1070 was approved. Finally, this graph also shows that negative messages published in Arizona in the post–SB 1070 period had the same rate of correct classification than the rest. This evidence suggests that the misclassification of tweets was a largely random process that did not depend on the state, sentiment, or time period of tweets.

Immigrant Population Size

One potential concern about my research design is that there could have been some event that only occurred in Arizona and not in Nevada in the post SB–1070 period. This would be a cause for concern if such event were also correlated with public sentiment on immigration, since that would violate the parallel trends assumption of the difference-in-difference model

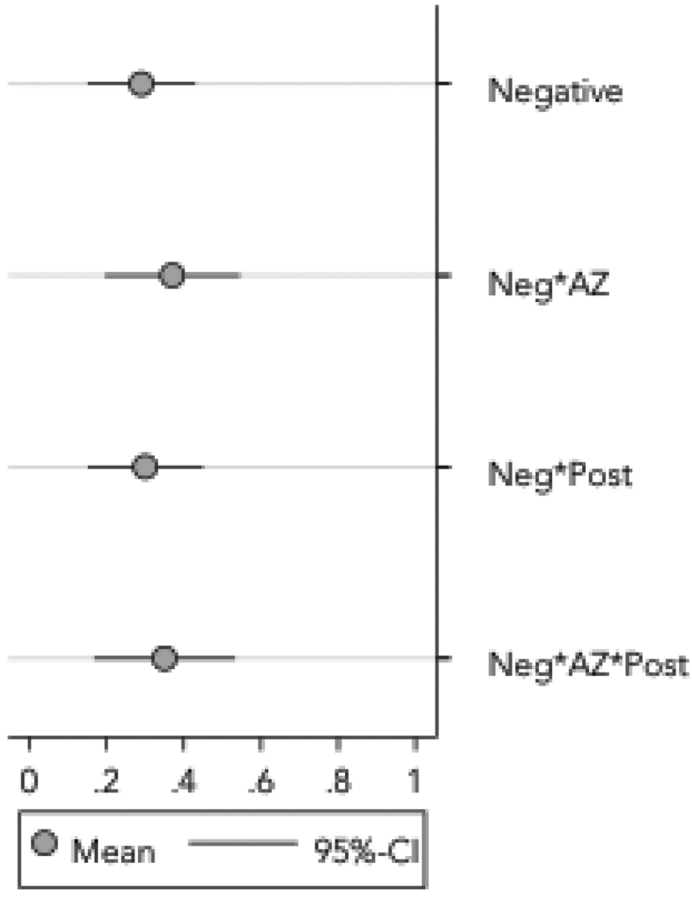

FIG. A1.—Predicting scoring algorithm classification errors. Graph shows the percentage of tweets that were not categorized correctly by the scoring algorithm by category.

(Imbens and Wooldridge 2007). A primary candidate for this event would be a significant change in the number of immigrants living in each state. If the number of immigrants varied significantly in Arizona after SB 1070 was proposed, this could potentially bias my results by making Arizona and Nevada less comparable.

To test this proposition, I would ideally examine the total number of immigrants living in each state before and after the law was considered. Unfortunately, such data are not available, since the U.S. Census produces only yearly population estimates and my period of study encompasses only the first few months of 2010.

Another way I could test this is by using the number of arrests of undocumented immigrants conducted by immigration authorities in Arizona. Such a figure could be a proxy for whether there was an increase in the size of the undocumented population in Arizona given that entry from Mexico is a primary source for this group.

Although no similar data exist for Nevada, since it is not a border state, the U.S. Border Patrol publishes monthly estimates of arrests conducted in Arizona, California, and Texas. Comparing undocumented flows to Arizona with those of neighboring states would tell us whether the flow into Arizona followed a different pattern after SB 1070 was considered.

Figure A2 shows the number of illegal alien arrests conducted by the U.S. Border Patrol in four different border areas between January 2008 and December 2010. To increase comparability, the data have been normalized to indicate changes in flows relative to January 2008. Overall, the graph shows that, as migration scholars have noted, the number of attempted crossings into the United States has decreased since the 2008 financial crisis (Massey and Sánchez 2010). More importantly, the number of attempted crossings

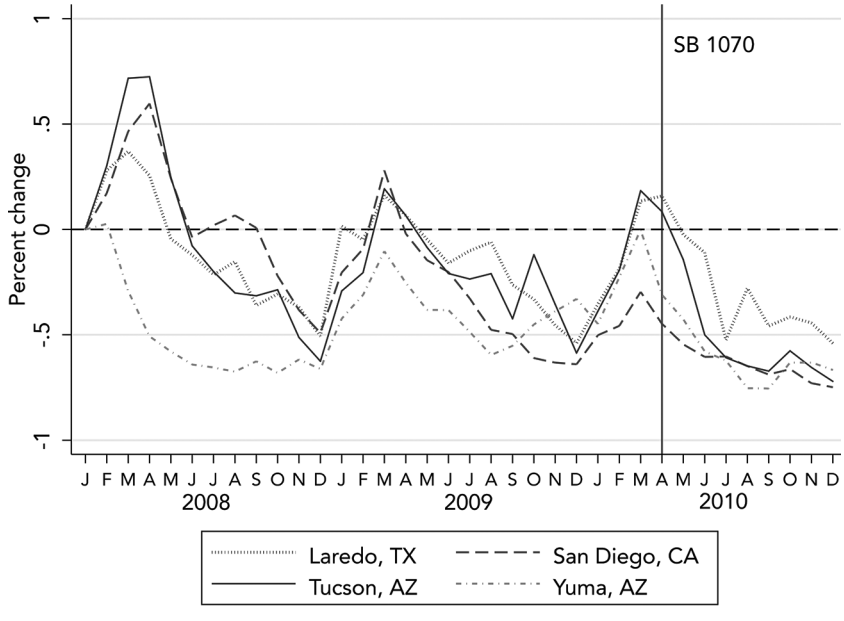

FIG. A2.—Changes in illegal alien apprehensions by month (baseline = January 2008). Data are from the U.S. Border Patrol. The graph shows the number of arrests of "illegal aliens" in four different border areas conducted by the U.S. Border Patrol between January 2008 and December 2010. Data have been normalized to represent percentage change in the number of these arrests relative to arrests that took place in January 2008. The vertical line indicates when SB 1070 was approved in Arizona.

through Arizona did not appear to have changed after SB 1070 was proposed. Indeed, the relative changes in undocumented immigrants' arrests in Arizona since 2008 follow a remarkably similar pattern to those in San Diego, California, and Laredo, Texas. This provides some evidence that the number of undocumented immigrants going into Arizona from Mexico did not deviate from normal patterns during the examined period.

Testing Competing Mechanisms

There are other mechanisms that could have driven the findings of this study. One possibility is that some users created multiple anonymous accounts in 2010 in response to SB 1070 to spread their more controversial views about immigrants. If a few users created multiple Twitter accounts after the passage of SB 1070 to express their discontent with immigrants, this could have affected my results by inflating the estimated effect of SB 1070 on attitudes toward immigrants. This would not invalidate my article's central claim, however, which is that the average tweet about immigrants became more negative in Arizona after SB 1070 was passed (as shown in table 3), but it constitutes a competing channel to the two main mechanisms that I believe explain the effect of SB 1070 on average sentiment toward immigrants.

To test whether this competing mechanism played a role in shaping the attitudinal dynamics I document, I assess the likely impact of this type of user on the estimated effect of SB 1070 on attitudes toward immigrants. I do so by identifying the year when users created their accounts and testing whether individuals who started their accounts in 2010, when SB 1070 was approved, drove the main results. If this is a legitimate concern, we should see that removing these users affects the estimated effect of the law on average sentiment of tweets toward the examined groups. In the first column of table A4, 1 replicate the same model as model 1 in table 3. In other words, it includes all Twitter users in the data set. In column 2, I predict average sentiment toward immigrants, but I remove those accounts that were created in 2010. Results indicate that the removal of these accounts does not affect the estimated effects of the law. The coefficient of interest, AzXpost, changes from −.025 (.005) to −.026 (.006). Similarly, removing 2010 accounts from the regression models predicting sentiment scores toward Mexicans and Hispanics in columns 5 and 8, respectively, does not significantly change the coefficients. These results indicate that the changes in average sentiment I find were driven by users with older accounts and not by individuals who could have created multiple accounts in response to SB 1070 in 2010.

TABLE A4
OLS Regression Predicting Sentiment Score of Tweets

Variables	Immigrant (1)	Immigrant-2010 (2)	Immigrant-News (3)	Mexican (4)	Mexican-2010 (5)	Mexican-News (6)	Hispanic (7)	Hispanic-2010 (8)	Hispanic (9)
Arizona	.01*	.01**	.02***	.00	.00	−.00	−.00	−.00	−.00
	(.00)	(.00)	(.00)	(.00)	(.00)	(.00)	(.00)	(.00)	(.00)
Post–SB 1070	−.00	−.00	−.00	−.00+	−.00+	−.00*	−.00	−.00	−.00
	(.00)	(.00)	(.00)	(.00)	(.00)	(.00)	(.00)	(.00)	(.00)
AzXpost	−.02***	−.02***	−.03***	−.02***	−.02***	−.01***	−.01*	−.01+	−.01+
	(.00)	(.00)	(.00)	(.00)	(.00)	(.00)	(.00)	(.01)	(.01)
Constant	−.06***	−.07***	−.07***	.01***	.01***	.02***	.01*	.01*	.01**
	(.00)	(.00)	(.00)	(.00)	(.00)	(.00)	(.00)	(.00)	(.00)
Observations	58,948	52,768	51,825	29,924	25,902	28,767	5,149	4,495	4,749
R^2	.00	.00	.00	.00	.00	.00	.00	.00	.00

Note.—Heteroskedastic-robust SEs are in parentheses. The data consist of all geocoded tweets about immigrants, Mexicans, and Hispanics published in Arizona and Nevada between January and June 2010.

+ $P < .10$.

* $P < .05$.

** $P < .01$.

*** $P < .001$.

In addition, critics could be concerned that some of these changes in sentiment in the post–SB 1070 period could be driven not by regular users but by media organizations. Perhaps newspaper and television coverage reproduced some of the more punitive language about immigrants used by politicians after the passage of the law, which could have driven my main results. Again, this would not invalidate my main findings, but it certainly provides a plausible competing hypothesis to explain them.

To test whether this was the case, I identify all Twitter accounts that belong to a news organization including TV channels, newspapers, and magazines by relying on users' account names (i.e., ABC News, ArizonaRepublic, etc.). These media users published 9,933 tweets about the five groups I examine (i.e., immigrants, Mexicans, Hispanics, Asians, and African-Americans). This represents 6.59% of all tweets in the sample. As expected, news outlets were more likely to tweet about immigrants than about the other groups. News organizations published 7,490 tweets about immigrants in the examined time period or 12.51% of all immigration-related messages.

In table A4, I test whether my previous results are robust to the exclusion of tweets posted by these news outlets. Column 3 shows that the removal of tweets by media organizations did not affect the estimated effect of SB 1070 on average sentiment toward immigrants. In actuality, removing these users results in a larger estimated effect of SB 1070 on tweets' sentiment. It went from −.025 (.005) when considering all users to −.033 (.006) when removing media outlets. Similarly, the regression models predicting average sentiment of tweets toward Mexicans and Hispanics did not significantly change when removing tweets from media sources, as columns 6 and 9 show. These results indicate that media outlets did not drive the changes in average sentiment toward these groups that I documented in my original analysis.

REFERENCES

Albiston, Catherine R., Shelley J. Correll, Traci Tucker, and Christina Stevens. 2012. "Law, Norms, and the Caretaker Penalty." Paper presented at the European Group for Organizational Studies. Helsinki, Finland, July 2–7.

Allison, Paul. 2009. *Fixed Effects Regression Models*. Thousand Oaks, Calif.: Sage Publications.

Archibold, Randal C. 2010. "Arizona Enacts Stringent Law on Immigration." *New York Times*, April 23.

Avalos, Manuel, Lisa Magaña, and Adrian P. Pantoja. 2010. "Battleground Voters in a Battleground State?" Pp. 159–70 in *Beyond the Barrio: Latinos in the 2004 Elections*, edited by Rodolpho O. de la Garza, Louis Desipio, and David L. Leal. Notre Dame, Ind.: Notre Dame University Press.

Beckett, Katherine. 1997. *Making Crime Pay: Law and Order in Contemporary American Politics*. New York: Oxford University Press.

Berkowitz, Leonard, and Nigel Walker. 1967. "Laws and Moral Judgments." *Sociometry* 30:410.
Berman, Mark. 2014. "Arizona's Experience with Controversial Laws and Boycotts." *Washington Post*, December 26.
Bishin, Benjamin G., Thomas J. Hayes, Matthew B. Incantalupo, and Charles Anthony Smith. 2016. "Opinion Backlash and Public Attitudes: Are Political Advances in Gay Rights Counterproductive?" *American Journal of Political Science* 60 (3): 625–48.
Bollen, Johan, Alberto Pepe, and Huina Mao. 2009. "Modeling Public Mood and Emotion: Twitter Sentiment and Socio-Economic Phenomena." Paper presented at the Proceedings of the Fifth International AAAI Conference on Weblogs and Social Media. Barcelona, Spain, July 17–21.
Booth, William. 2010. "Mexican Officials Condemn Arizona's Tough New Immigration Law." *Washington Post*, April 27.
Brewer, Jan. 2010. "Statement by Governor Jan Brewer." http://azgovernor.gov/dms/upload/PR_042310_StatementByGovernorOnSB1070.pdf. Accessed May 18, 2014.
Brönnimann, Lucas. 2013. "Multilanguage Sentiment Analysis of Twitter Data on the Example of Swiss Politicians." Working paper. University of Applied Science Northwestern Switzerland, Windisch, Switzerland.
Brown, Hana. 2013. "Race, Legality, and the Social Policy Consequences of Anti-Immigration Mobilization." *American Sociological Review* 78 (2): 290–314.
Calavita, Kitty. 1996. "The New Politics of Immigration: Balanced-Budget Conservatism and the Symbolism of Proposition 187." *Social Problems* 43:284–305.
Campbell, Andrea Louise. 2003. *How Politics Make Citizens: Senior Political Activism and the American Welfare State*. Princeton, N.J.: Princeton University Press.
———. 2012. "Policy Makes Mass Politics." *Annual Review of Political Science* 15:333–51.
Card, David, and Alan Krueger. 1994. "Minimum Wages and Employment: A Case Study of the Fast Food Industry in New Jersey and Pennsylvania." *American Economic Review* 84:772–93.
Chavez, Leo R. 2008. *The Latino Threat: Constructing Immigrants, Citizens, and the Nation*. Stanford, Calif.: Stanford University Press.
Chwe, Michael Suk-Young. 2001. *Rational Ritual: Culture, Coordination, and Common Knowledge*. Princeton, N.J.: Princeton University Press.
CNN Political Unit. 2010. "CNN poll: Most Back Arizona Law but Cite Concerns about Effects." http://www.cnn.com/2010/POLITICS/07/27/poll.immigration-discrimination/. Accessed May 17, 2014.
Culotta, Aron. 2010. "Detecting Influenza Outbreaks by Analyzing Twitter Messages." arXiv preprint.arXiv:1007.4748.
DiGrazia, Joseph, Karissa McKelvey, Johan Bollen, and Fabio Rojas. 2014. "More Tweets, More Votes: Social Media as a Quantitative Indicator of Political Behavior." *PloS One* 8 (11): e79449.
Edelman, Murray. 1977. *Political Language: Words That Succeed and Policies That Fail*. New York: Academic Press.
Eschbach, Karl, Jacqueline Hagan, Nestor Rodriguez, Ruben Hernandez, and Stanley Bailey. 1999. "Death at the Border." *International Migration Review* 33 (2): 430–54.
Flores, René D. 2014. "In the Eye of the Storm: How Did Hazleton's Restrictive Immigration Ordinance Affect Local Interethnic Relations?" *American Behavioral Scientist* 58:1743–63.
———. 2015. "Taking the Law into Their Own Hands: Do Local Anti-Immigrant Ordinances Increase Gun Sales?" *Social Problems* 62 (3): 363–90.
———. 2016. "Can Politicians Shape Public Attitudes towards Immigrants?: Evidence from the 2016 U.S. Presidential Election." Manuscript.
Gilens, Martin, and Benjamin Page. 2014. "Testing Theories of American Politics: Elites, Interest Groups, and Average Citizens." *Perspectives on Politics* 12 (3): 564–81.

Hardy, Lisa J., Christina M. Getrich, Julio C. Quezada, Amanda Guay, Raymond J. Michalowski, and Eric Henley. 2012. "A Call for Further Research on the Impact of State-Level Immigration Policies on Public Health." *American Journal of Public Health* 102 (7): 1250–53.

Imbens, Guido M., and Jeffrey M. Wooldridge. 2007. "Recent Developments in the Econometrics of Program Evaluation." Manuscript. Harvard University, Department of Economics.

Jiang, Long, Mo Yu, Ming Zhou, Xiaohua Liu, and Tiejun Zhao. 2011. "Target-Dependent Twitter Sentiment Classification." Paper presented at the Proceedings of the 49th Annual Meeting of the Association for Computational Linguistics. Portland, Ore., June 19–24.

Jiménez, Tomás R. 2010. *Replenished Ethnicity: Mexican Americans, Immigration, and Identity*. Berkeley: University of California Press.

Johnson, Martin, Paul Brace, and Kevin Arceneaux. 2005. "Public Opinion and Dynamic Representation in the American States: The Case of Environmental Attitudes." *Social Science Quarterly* 86 (1): 87–108.

Kreitzer, R. J., Allison J. Hamilton, and Caroline J. Tolbert. 2014. "Does Policy Adoption Change Opinions on Minority Rights? The Effects of Legalizing Same-Sex Marriage." *Political Research Quarterly* 67: 795–808.

Kriner, Douglas L., and William G. Howell. 2012. "Congressional Leadership of War Opinion? Backlash Effects and the Polarization of Public Support for War." Chapter 15 in *Congress Reconsidered*, 10th ed. Edited by Lawrence C. Dodd and Bruce I. Oppenheimer. Thousand Oaks, Calif.: CQ Press.

Lee, Taeku. 2002. *Mobilizing Public Opinion: Black Insurgency and Racial Attitudes in the Civil Rights Era*. Chicago: University of Chicago Press.

Leetaru, Kaley H., Shaowen Wang, Guofeng Cao, Anand Padmanabhan, and Eric Shook. 2013. "Mapping the Global Twitter Heartbeat: The Geography of Twitter." *First Monday* 18 (5).

Liu, Bing. 2012. *Sentiment Analysis and Opinion Mining*. London: Morgan & Claypool.

Liu, Bing, Minqing Hu, and Junsheng Cheng. 2005. "Opinion Observer: Analyzing and Comparing Opinions on the Web." Paper presented at the Proceedings of the 14th International World Wide Web conference. Chiba, Japan, May 10–14.

Magaña, Lisa. 2013. "Arizona's Immigration Policies and SB 1070." Pp. 19–26 in *Latino Politics and Arizona's Immigration Law SB 1070*, edited by Lisa Magaña and Erik Lee. New York: Springer.

Mahmud, Jalal, Jeffrey Nichols, and Clemens Drews. 2014. "Home Location Identification of Twitter Users." *ACM Transactions on Intelligent Systems and Technology* (TIST) 5 (3): 47.

Massey, Douglas S. 2008. *New Faces in New Places: The New Geography of American Immigration*. New York: Russell Sage Foundation.

Massey, Douglas, and Magaly Sánchez. 2010. *Brokered Boundaries: Creating Immigrant Identity in Anti-Immigrant Times*. New York: Russell Sage Foundation.

Massey, Douglas S., and Roger Tourangeau. 2013. "Where Do We Go from Here? Nonresponse and Social Measurement." *ANNALS of the American Academy of Political and Social Science* 645 (1): 222–36.

McConnell, Eileen Diaz. 2013. "Latinos in Arizona: Demographic Context in the SB 1070 Era." Pp. 1–18 in *Latino Politics and Arizona's Immigration Law SB 1070*, edited by Lisa Magaña, and Erik Lee. New York: Springer.

McKelvey, Karissa, Joseph DiGrazia, and Fabio Rojas. 2014. "Twitter Publics: How Online Political Communities Signaled Electoral Outcomes in the 2010 U.S. House Election." *Information, Communication and Society* 17 (4): 436–50.

Mendelberg, Tali. 2001. *The Race Card: Campaign Strategy, Implicit Messages, and the Norm of Equality*. Princeton, N.J.: Princeton University Press.

Menjívar, Cecilia, and Leisy J. Abrego. 2012. "Immigration Law and the Lives of Central American Immigrants." *American Journal of Sociology* 117 (5): 1380–1421.

Morgan, Kimberly J., and Andrea Louise Campbell. 2011. *The Delegated Welfare State: Medicare, Markets, and the Governance of Social Policy*. New York: Oxford University Press.

Nill, Andrea Christina. 2011. "Latinos and SB 1070: Demonization, Dehumanization, and Disenfranchisement." *Harvard Latino Law Review* 14:35.

O'Connor, Brendan, Ramnath Balasubramanyan, Bryan Routledge, and Noah Smith. 2010. "From Tweets to Polls: Linking Text Sentiment to Public Opinion Time Series." Paper presented in the Fourth International AAAI Conference on Weblogs and Social Media. Washington, D.C., May 23–26.

O'Neil, Kevin S. 2011. "Challenging Change: Local Policies and the New Geography of American Immigration." Dissertation. Princeton University.

Page, Benjamin, and Robert Shapiro. 1983. "Effects of Public Opinion on Policy." *American Political Science Review* 77:23–43.

Parrado, Emilio. 2012. "Immigration Enforcement Policies, the Economic Recession, and the Size of Local Mexican Immigrant Populations." *ANNALS of the American Academy of Political and Social Science* 641 (1): 16–37.

Passel, Jeffrey S., and D'Vera Cohn. 2009. "A Portrait of Unauthorized Immigrants in the United States." Pew Hispanic Center report. Washington, D.C.: Pew Research Center.

Pierson, Paul. 1994. *Dismantling the Welfare State? Reagan, Thatcher, and the Politics of Retrenchment*. New York: Cambridge University Press.

Quillian, Lincoln, and Devah Pager. 2001. "Black Neighbors, Higher Crime? The Role of Racial Stereotypes in Evaluations of Neighborhood Crime." *American Journal of Sociology* 107 (3): 717–67.

Robbins, Ted. 2012. "After Arizona Immigration Ruling, Panic and Protests." *National Public Radio*. http://www.npr.org/2012/06/27/155857872/after-arizona-immigration-ruling-panic-and-protests. Accessed May 17, 2014.

Sáenz, Rogelio, Cecilia Menjívar, and San Juanita García. 2013. "Arizona's SB 1070: Setting Conditions for Violations of Human Rights Here and Beyond." Pp. 165–80 in *Governing Immigration through Crime: A Reader*, edited by Julia A. Dowling and Jonathan Xavier Inda. Stanford, Calif.: Stanford University Press.

Santa Ana, Otto. 2002. *Brown Tide Rising: Metaphoric Representations of Latinos in Contemporary American Public Discourse*. Austin: University of Texas Press.

Santos, Carlos, Cecilia Menjívar, and Erin Godfrey. 2013. "Effects of SB 1070 on Children." Pp. 79–92 in *Latino Politics and Arizona's Immigration Law SB 1070*, edited by Lisa Magaña and Erik Lee. New York: Springer.

Sears, D. O. 1993. "Symbolic Politics: A Socio-Psychological Theory." Pp. 113–49 in *Explorations in Political Psychology*, edited by Shanto Iyengar and William J. McGuire. Durham, N.C.: Duke University Press.

Sen, Amartya. 1967. "Isolation Assurance and the Social Rate of Discontent." *Quarterly Journal of Economics* 80:112–24.

Skocpol, Theda. 1992. *Protecting Soldiers and Mothers: The Political Origins of Social Policy in the United States*. Cambridge, Mass.: Harvard University Press.

Sloan, Luke, and Jeffrey Morgan. 2015. "Who Tweets with Their Location? Understanding the Relationship between Demographic Characteristics and the Use of Geoservices and Geotagging on Twitter." *PloS One* 10 (11).

Smith, Aaron, and Joanna Brenner. 2012. "Twitter Use 2012." *Pew Research Internet Project Report*. http://www.pewinternet.org/2012/05/31/twitter-use-2012/. Accessed March 12, 2014.

Soroka, Stuart N., and Christopher Wlezien. 2010. *Degrees of Democracy: Politics, Public Opinion, and Policy*. Cambridge: Cambridge University Press.

Soss, Joe. 2000. *Unwanted Claims: The Politics of Participation in the U.S. Welfare System*. Ann Arbor: University of Michigan Press.

Soss J, Schram S. F. 2007. "A Public Transformed? Welfare Reform as Policy Feedback." *American Political Science Review* 101 (1): 111–27.

Stewart, Julie. 2012. "Fiction over Facts: How Competing Narrative Forms Explain Policy in a New Immigration Destination." *Sociological Forum* 27 (3): 591–616.
Suchman, Mark. 1997. "On Beyond Interest: Rational, Normative and Cognitive Perspectives in the Social Scientific Study of Law." *Wisconsin Law Review* 3:475–501.
Sunstein, Cass. 1996. "On the Expressive Function of Law." *University of Pennsylvania Law Review* 144:2021–53.
Szkupinski Quiroga, Seline, Dulce M. Medina, and Jennifer Glick. 2014. "In the Belly of the Beast: Effects of Anti-Immigration Policy on Latino Community Members." *American Behavioral Scientist* 58:1723–42.
Telles, Edward M., and Vilma Ortiz. 2008. *Generations of Exclusion: Mexican-Americans, Assimilation, and Race*. New York: Russell Sage Foundation.
Tienda, Marta, and Norma Fuentes. 2014. "Hispanics in Metropolitan America: New Realities and Old Debates." *Annual Review of Sociology* 40:499–520.
U.S. Bureau of the Census. 2010. "Arizona Demographic Statistics." https://www.census.gov/quickfacts/table/PST045216/04.
Wang, Xiaofeng, Matthew S. Gerber, and Donald E. Brown. 2012. "Automatic Crime Prediction Using Events Extracted from Twitter Posts." Paper presented at the International Conference on Social Computing, Behavioral-Cultural Modeling, and Prediction. Hyattsville, Md., April 2–3.
Wlezien, C. 1995. "The Public as Thermostat: Dynamics of Preferences for Spending." *American Journal of Political Science* 39:981–1000.
Zagheni, Emilio, and Ingmar Weber. 2014. "Demographic Research with Non-Representative Internet Data." *International Journal of Manpower* 36 (1): 13–25.
Zaller, John. 1992. *The Nature and Origins of Mass Opinion*. Cambridge: Cambridge University Press.