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Publication Date
2018

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Essays in Development Economics and Political Economy

By

Ceren Baysan

A dissertation submitted in partial satisfaction of the

requirements for the degree of

Doctor of Philosophy

in

Agricultural and Resource Economics

in the

Graduate Division

of the

University of California, Berkeley

Committee in charge:

Professor Elisabeth Sadoulet, Chair
Professor Frederico Finan
Professor Jeremy Magruder
Professor Edward Miguel

Spring 2018

Essays in Development Economics and Political Economy

Abstract

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In the first chapter, I discuss a study that uses experimental variation in a door-to-door information campaign to test for polarization in policy choice across the electorate in Turkey. The campaign took place before a landmark referendum that was initiated by the incumbent party in Turkey after the chaotic coup attempt in July 2016. The referendum was on institutional changes to weaken constraints on the executive branch in Turkey. I designed the implementation of the door-to-door campaign as a randomized experiment. In this campaign, the opposition party gave uniform information on poor economic performance and increased terrorist activity under the incumbent's leadership to more than 130,000 voters. I show that voters, despite being exposed to the same campaign, diverged further in their vote choice on aggregate, leading to a significant increase in political polarization. This is a unique result where polarization in vote choice at the aggregate level is driven by differences in reaction to the same door-to-door campaign.

In the second chapter, I investigate electoral competition in an illiberal democracy. To promote their electoral and policy goals, elected officials make investments in a "home style" – a strategy to learn about their voters and select their public platform accordingly. I consider a framework of home style grounded in perception: politicians better able to accurately assess voter preferences will more closely tailor their communications to those preferences. I conducted interviews with Members of Parliament establishing that the majority party regularly conducts polls to assess voter preferences while the opposition party does not. I then analyze nearly a million MPs' tweets and find that the majority party is more likely to communicate on the issues of most importance to their constituents than the opposition. Finally, I conduct a quasi-experiment and find that providing opposition MPs with polling increases their likelihood to communicate about their constituents' most important issues while there is no effect among majority MPs. This result supports the qualitative evidence that the incumbent invests more in learning about voters than the opposition.

The third chapter, co-authored with Marshall Burke, Felipe Gonzalez, Solomon Hsiang, and Edward Miguel, studies whether economic or non-economic factors better explain the well-established relationship between temperature and violence in a unique context where intergroup killings by drug-trafficking organizations (DTOs) and "normal" interpersonal homicides are separately documented. A constellation of evidence, including the limited influence of a cash transfer program

as well as comparison with both non-violent DTO crime and suicides, indicate that economic factors only partially explain the observed relationship between temperature and violence. We argue that noneconomic psychological and physiological factors that are affected by temperature, modeled here as a "taste for violence," likely play an important role in causing both interpersonal and intergroup violence.

Acknowledgements

The completion of this dissertation would not have been possible without the support of my advisors, dissertation committee members, friends, and family. Betty was incredibly encouraging and patient in her advising, regardless of the stage of my progress. Jeremy provided invaluable guidance in my research, especially during critical months. Ted provided infallible encouragement throughout the years and helped me mature as a researcher. Fred was an initial source of motivation for me to follow my instincts and take chances.

I would also like to thank Ernesto Dal Bo for providing critical feedback at all stages of my project in Turkey, setting high standards, and supporting my endeavors. I also received important advice and feedback from Kyle Emerick, Ethan Ligon, and Aprajit Mahajan throughout my time at Berkeley.

It was a privilege to be a student in such an intellectually stimulating and collegial environment at the Agricultural and Resource Economics department. I thank Maximilian Auffhammer, Peter Berck, Carmen Karahalios, Diana Lazo and Sofia Villas-Boas for providing tremendous support throughout my time at Berkeley. I would also like to thank my classmates and friends for the collaborative, supportive, earnest, and inquisitive environment they helped cultivate throughout the years. I cannot imagine another way to enjoy research. In particular, thank you to Fiona Burlig, Aluma Dembo, Joshua Fujino, Felipe Gonzalez, Zhimin Li, John Loeser, Tomas Monarrez, Louis Preonas, Andrew Stevens, Yotam Shem Tov, Juliana Londoño Vélez, and many more. A special thanks to Emily Eisner, Sandile Hlatshwayo, and Anne Karing for constantly inspiring me.

I want to thank everyone who supported me in implementing various parts of the project I have worked on: Manzoor Dar, Ibrahim Genç, Siman Hansdak, Dilara Su Müftüoğlu, Hilal Seven, Oltaç Unsal, everyone at KONDA, and countless others who gave me their time and expertise. Many of whom selflessly helped me despite the difficult circumstances they were facing. Without your dedication to others and progress, I would forget what it's all about.

Finally, I want to thank my family and relatives. My parents - regardless of any challenge, the days end easy because their love taught me what is important. My brother Can - despite never admitting when he is right, most of my smart life choices were made under his guidance. I dedicate this dissertation to my grandmothers: Ayten Turkmen, who opened her apartment to me for months during my research and kept me light with her contagious laughter, and Zehra Baysan whose strength I'll always admire.

Contents

Chapter 1

Can More Information Lead to More Voter Polarization? Experimental Evidence from Turkey

1.1   Introduction

Democratic norms are in decline - civil liberties and political rights around the globe have deteriorated for eleven consecutive years (Freedom House 2017). The erosion of these measures runs counter to a priori expectations that circumstances would improve: the number of democracies had doubled within the past five decades and information is increasingly available to voters due to a growing and diverse set of media sources. The availability of information on policy outcomes has been linked to improved political accountability, a fundamental factor of development (Dréze and Sen 1989; Besley and Burgess 2002). On the other hand, increased access to information has also been found to polarize voters, offering a possible explanation for the backsliding of democratic norms (Downs 1957).[1]

Recent research on political polarization analyzes whether self-segregation into different sources of information leads to divergent beliefs (Sunstein 2001; Gentzkow and Shapiro 2011). Other research on the interpretation of new information, however, relaxes the assumption of shared initial beliefs to show that disagreement can occur, increase, and persist in response to the *same* signal.[2]

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[1]For studies on increased access to information and ideological polarization see Gentzkow and Shapiro (2011), Mullainathan and Shleifer (2005), and Sunstein (2001).

[2]For example, in Piketty's (1995) model, people with different social origins can maintain different views on redistribution and the effectiveness of individual effort over the long-run, even if they experience the same income levels. Most of this literature is theoretical and provides both Bayesian, (Dixit and Weibull (2007); Andreoni and Mylovanov (2012); Acemoglu et al. (2016); Loh and Phelan (2017); Benoit and Dubra (2016)) and non-Bayesian

Whether voters interpret the same signal differently has policy implications for studies on information availability and political accountability. For example, in the case of India, Besley and Burgess (2002) theoretically and empirically show that government responsiveness to citizens after natural shocks is greater in areas where information is more available. In this study, I consider voters who self-report different views on whether worsened conditions in Turkey are attributable to the incumbent or external threats, like a coup attempt. In the latter case, voters may choose to weaken constraints on the executive so that the incumbent has sufficient power to counter external threats. In this example, voters do not converge to the same policy choice in response to new signals on poor policy outcomes, but become more polarized in their views over incumbent accountability.

In this paper, I document some of the first experimental field evidence that exposure to the same signal on policy outcomes increases political polarization. Moreover, the polarization is over an important vote choice to institutionalize weakened constraints on the executive branch during the April 2017 Turkish referendum. The signal that polarized voters was a door-to-door information campaign that was implemented by the party opposing the referendum, and which I designed. The campaign resulted in increased partisanship in moderate areas. This result also demonstrates that political elites among the main opposition party lack the knowledge on voters to effectively contest for votes.

Understanding the relationship between information availability and voter behavior is a salient issue in weak democracies, like Turkey, where media censorship is high. Weak democracies are also one of the most common forms of governance today (Bidner et al. 2015; Mukand and Rodrik 2017), but there is limited research on political accountability in these regimes, where administrative data is limited and fieldwork requires precaution.[3] For example, the experiment in this study was conducted during a period of conflict, high terrorist activity, and mass arrests. Despite the tumultuous period, the experiment in this study were strategically timed to take place during an important period of institutional change. It was conducted right before the referendum, which was scheduled with limited notice, just months after the attempted coup in July of 2016.[4] Therefore, the timing of this study provided an opportunity to measure the impact of an information campaign on an actual policy choice and using administrative vote share data. While the source of the common signal on policy outcomes is partisan in this study, any signal that does not come from a state-owned source can be viewed as oppositional in an environment where media censorship is high.

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mechanisms (Lord et al. (1979); Fryer et al. (2017)) to explain this behavior. There are also lab experiments in the psychology literature, such as the study by Lord et al. (1979), and the economics literature, Andreoni and Mylovanov (2012). Fryer et al. (2017) provide evidence using an online experiment.

[3]Turkey is a fitting context to study the relationship between information, political polarization, and the backsliding of democratic norms. Across countries, Turkey ranks second in absolute decline in an index of civil liberties and political rights over the past decade (Freedom House, 2017). Figure 1.1 shows the decline in civil liberty and political rights rankings globally and in Turkey over the past decade.

[4]The possibility of a referendum had been discussed for a number of years, but its timing was unknown. The coup attempt was viewed as a catalyst to hold the referendum.

In the voter experiment, volunteer canvassers from the opposition party implemented the door-to-door information campaign to a group of neighborhoods that I randomly selected. The opposition party's strategy in this campaign was to give voters information on poor economic performance and increased terrorist activity under the governance of President Recep Tayyip Erdoğan, the incumbent. Voters were also told to choose "No" in the referendum, against weakening constraints on the incumbent. A door-to-door campaign was a channel by which the party opposing the referendum could bypass media censorship and directly give information on policy outcomes to voters.

Though voters were exposed to the same information campaign, they could interpret it in different ways. I had access to a survey showing that Erdoğan supporters attributed poor conditions to factors they believed to be outside the leadership's control; such as, the attempted coup, the U.S. elections, and the global recession. Opposition supporters instead blamed the incumbent party. In this example, voters have different views on why conditions are poor, but they can have a similar noisy signal on policy outcomes, like the economy. When uncertainty is multidimensional, a negative signal about the economy can shift voters with identical preferences and priors on the level of economic conditions, but heterogeneous priors on why the economy is poor, to have either higher or lower support for the incumbent. Opposing vote choices in response to the same signal can then be explained in the following framework with rational Bayesian voters. Upon receipt of a signal that conditions have deteriorated, some voters who planned to vote "No," but had relatively more uncertainty on whether external factors are to blame, can switch to a "Yes" vote.[5] Upon receipt of the very same signal, some voters who planned to vote "Yes," but had relatively more uncertainty on whether leadership quality is to blame can switch to a "No" vote. Both types of voters converge their posterior beliefs to the signal on worsened policy outcomes, but make different policy choices. In this suggested framework, voters will change their planned vote choice in response to new information if they are moderate, as determined by a small differential in mean priors between the two factors affecting vote choice.

Before the randomization, I grouped neighborhoods by quartiles of the difference in vote share between Erdoğan's party and the opposition party in previous elections. This method ensured that both treatment and control groups had a mix of both moderately and strongly partisan neighborhoods. I could then test whether the campaign only had an effect where the concentration of moderate voters was highest. I also pre-specified a test of the treatment effect in each quartile to detect whether the campaign had both a positive and negative effect on the "No" vote share depending on past partisanship.

I find that the information campaign only changed vote choice in moderate areas. In moderate areas where the opposition was stronger, the information increased the "No" vote share by 1.8 percentage points (2.6 percent). In moderate areas where the opposition was weaker, the information *decreased* the "No" vote share by 3.7 percentage points (5.9 percent).

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[5]As an example, in this case, voters may choose weakened constraints so that policies can be implemented more intensely and quickly to improve conditions that are affected by external threats. This can explain the results from a survey showing voter support for actions that violate civil liberties; they may be viewed as a good policy for national security.

The effect of the information campaign on turnout was close to zero in each quartile of past vote share, providing strong evidence that the information worked through persuasion. In this case, the increase in the share voting "No" is driven by voters who would have voted "Yes" in the absence of the campaign; the campaign switched the policy choice among previously pro-incumbent voters living in moderately pro-opposition areas. The decrease in the "No" vote share is driven by voters who would have voted "No" in the absence of the campaign; the campaign switched the policy choice among previously pro-opposition voters living in moderately pro-incumbent areas. Since the voting behavior was changed among individual pro-opposition (incumbent) voters living in pro-incumbent (opposition) areas, the campaign resulted in divergence, or political polarization.

In summary, I provide experimental evidence of political polarization in response to a common signal on policy outcomes outside of a lab. Moreover, the effect is on vote choice over an actual policy that directly affects the long-term economic development of Turkey. In response to the same signal, voters further disagreed about whether the transition to authoritarianism is desirable.

In Turkey, religious beliefs determine partisanship to a large extent. Religious conservatives back the incumbent party, whereas secular liberals support the opposition. In this study, the results show that individual voters from both sides crossed partisan lines in response to the same information. On aggregate, however, this led to a larger difference in vote share between moderately pro-incumbent and pro-opposition areas. This result provides evidence that is in contrast to studies finding that more information moderates identity-based divisions (Casey 2015; Bidwell et al. 2016).[6]

The opposition failed to change the aggregate "No" vote share in this specific campaign because it did not target the information using individual level data to identify voter type. The opposition assumed that in an environment with high media censorship, a campaign on conditions under the incumbent would have a non-negative effect among voters who overestimate incumbent performance. The opposition might have succeeded with a more targeted information campaign.

Did they have enough data on voters to execute such a strategy? To answer this question, I conducted interviews with members of parliament (MPs) from both parties over a three-month period. To test MPs' knowledge of the electorate, I performed the following experiment. First, in January of 2016, I gave a subset of MPs information that was based on the voter survey I conducted after the attempted coup in mid-October of 2016, three months before the referendum.

Hypothetically, the information would only affect their public behavior if it was better than the voter information they had at the time. Analyzing approximately one million tweets across politicians from both parties, I find suggestive evidence that the information is only novel to the opposition. I estimate the effect of the information on the behavior of MPs from the opposition using a difference-in-difference strategy, where the level of treatment was at the constituency level and the

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[6]In the study by Bidwell et al. (2016), information on politicians is given to voters through debates. In this study, the information is given by a partisan source.

Twitter outcome data is at the MP level. The estimation strategy was different with the incumbent party; treatment was randomized at the individual level. I am unable to reject no effect on the incumbent.[7] These results corroborate the qualitative evidence from my interviews that the incumbent party invests heavily in acquiring high quality voter data. The finding from the door-to-door campaign suggests that marginal investments in contesting for votes are ineffective. Therefore, an incumbent resource advantage used to access high quality voter data can generate significant electoral returns.[8] This advantage is one factor that potentially contributed to weakened checks and balances becoming the majority policy choice among voters in Turkey.[9]

In this chapter, I provide a timeline of the two experiments, but focus on the effect of the campaign on polarization across the electorate. In the second chapter of this dissertation, I provide evidence that the opposition party did not have enough data on voters to target their campaign.

The remainder of this paper is organized as follows: Section 1.2 discusses the literature and the contributions of this study to existing research; Section 1.3 provides background information on democratization, the origins of the ideological divide in Turkey, the attempted coup, and the referendum; Section 1.4 provides a brief timeline of the two field experiments with politicians and voters; Section 1.5 outlines a model to interpret the empirical results of the voter experiment; Section 1.6 discusses the experimental design of the voter campaign and the results.

1.2   Connections and Contributions to the Literature

This study provides some of the first empirical evidence of polarization in response to a common signal outside of a lab setting. This behavior is distinct from ideological polarization driven by people selecting into different sources of information, often called "echo chambers" in the literature (Gentzkow and Shapiro 2011).[10] Autor et al. (2016) empirically show that the negative impact of trade-exposure on local labor markets results in ideological realignment, but not increased polarization. They find that voters in moderately Republican areas increase support for more conservative Republican legislators in response to a shock. They also find that voters in moderately Democratic

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[7]A randomized experiment had been planned with both the incumbent and the opposition parties. However, before the treatment was implemented, a subset of the MPs from the opposition party were arrested. In order to maintain sufficient statistical power for causal inference, I switched to a difference-in-difference design with MPs from the opposition party where the level of treatment is at the constituency level.

[8]In the case of Turkey, an incumbent resource advantage was institutionalized by the current incumbent party in 2003. The article that was reconstituted by the incumbent stipulates that state funding is proportional to vote share.

[9]In the referendum, 51% voted "Yes" and 49% voted "No."

[10]Mullainathan and Shleifer (2005) show theoretically that increasing the number of available sources can make it easier for consumers to self-segregate ideologically to different sources of information. The internet has been discussed as one channel that has increased access to information and ideological self-segregation (Sunstein 2001). In contrast to the conclusions in Sunstein (2001) and Mullainathan and Shleifer (2005), Gentzkow and Shapiro (2011) find that ideological segregation of online news consumption is higher than the segregation of most offline news consumption but low in absolute terms and lower than the segregation of face-to-face interactions.

areas increase support for both more liberal Democratic legislators and conservative Republican legislators. Since moderately Democratic areas diverge in their support for both more conservative and liberal legislators, the authors state that they are unable to conclude evidence of ideological polarization. A benefit of this study is that endogeneity concerns are mitigated; the common signal is randomly varied and it is randomly varied at different parts of the distribution of past vote share.

There are a couple of theoretical studies explaining why voters may support or tolerate weak constraints on the executive (Padró i Miquel (2007) and Acemoglu et al. (2013)). In Padró i Miquel (2007), followers of the ruling leader, with whom they share an identity, such as ethnicity or religiosity, tolerate rent extraction. They fear discrimination by the leader of the excluded group were the opposing leader to come into power. In applying this framework to the referendum in Turkey, followers of the ruling leader face counteracting forces. If they vote "Yes" in the referendum, then more rent can be extracted, but they also lower the probability that the leader of the excluded group can come into power in the future. In Turkey, religiosity predicts partisanship. However, results show that information on policy outcomes under the incumbent, does cause followers to cross party lines and vote against lowering constraints on the executive. On the other hand, we also see voters from the excluded group also cross partisan lines and choose to lower constraints in response to the same information. The results in this study cannot rule out that the fear of discrimination motivates some voters, but it does find that moderate voters cross partisan lines and made contrasting choices in the referendum. In addition, this study provides experimental evidence of the type of signal that can increase disagreement over weakened constraints on the executive.

This study also builds on the empirical literature that measures the effect of information availability on political accountability and voter behavior (Ferraz and Finan 2008; Besley and Burgess 2002; Strömberg 2004). I find that voters may respond to new information on policy outcomes in an unexpected manner and the same signal can increase or decrease support to weaken constraints on the executive. The explanation suggested in this study is that voters face uncertainty in whether changes in conditions can be attributable to the incumbent or not. In Turkey, threats from external factors are particularly salient to voters and empowering the incumbent may mitigate the influence of outside forces. Therefore, a negative signal about the economy can shift voters with common preferences and priors on the level of economic conditions, but heterogeneous priors on why the economy is poor, to have either higher or lower support for the incumbent. In this study, the information on policy outcomes is provided through a campaign and the campaign is from a partisan source. However, in a context where media censorship is so high, any information not coming from a state-owned source will be viewed as oppositional.

A number of studies estimate the effect of incumbent controlled or independent media on voter behavior in weak democracies (Enikolopov et al. 2011; Adena et al. 2015). Relative to these studies, I provide experimental evidence of an oppositional strategy to circumvent media control and affect voter behavior through one-on-one communication and a Facebook campaign.[11] The results show that being able to provide new information directly to voters can have unexpected

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[11]The Facebook campaign is described in Appendix A.

effects on vote share. I also highlight an alternative mechanism in which the incumbent can gain an electoral advantage if it has control over higher quality voter data to target its information (Boas and Hidalgo 2011; Ansolabehere et al. 2006). The heterogeneous effects of the door-to-door experiment suggest that marginal investments in contesting for votes are ineffective when the electorate is polarized. Therefore, an incumbent resource advantage used to access high quality voter data to target information can generate significant electoral returns.

This study adds to the literature investigating the effect of providing information on incumbent performance, including corruption, in lower and middle-income countries. The studies estimate whether or not voters punish the incumbent, consistent with a retrospective voter model (Banerjee et al. 2010; Humphreys and Weinstein 2012; Chong et al. 2015; Ferraz and Finan 2008; Cruz et al. 2017). This study contributes experimental results from a campaign conducted by a political party in a country where civil liberties and political inclusivity are very low. Turkey's Freedom House ranking was below Kenya, Pakistan, and Bangladesh at the time of this study. Studies that work with non-partisan companies are important for understanding political participation and the effects of increased transparency on voter behavior. The benefit of working with a specific political party, combined with the non-partisan politician experiment, is that the results have implications for electoral competition. There is limited evidence on oppositional behavior in illliberal democracies.

There is also a large body of literature on persuasion and the effectiveness of political campaigns.[12] According to a meta-analysis on 40 campaign experiments held before primary and ballot measure elections in the U.S., only four were found to be effective (Kalla and Broockman 2017). The majority of the studies cited in the meta-analysis use survey data to measure vote choice and do not have access to administrative data. On the other hand, two campaign experiments conducted in Europe, which have administrative outcome data on vote share, both find an effect of campaigns on changing vote share (Pons 2018; Kendall et al. 2015). In conclusion, the effectiveness of partisan political campaigns is mixed. In the first partisan campaign in an illiberal democracy, I show that information via a political campaign does affect vote share, but the effects are heterogeneous and opposite in sign.[13]

There is a more recent literature on targeting campaign information. Data analytical firms are playing a growing role in affecting major elections.[14] These firms collect detailed data on voters and assist in targeting campaign information to optimize vote share. Despite the increasing significance of these firms, research on the effectiveness of targeted political campaign information is limited.[15] In addition, the existing studies focus on targeting based on predicted voter responsiveness.[16] Vot-

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[12]See DellaVigna and Gentzkow (2010) for a review of the empirical literature on political persuasion.

[13]Zakaria (1997a) and Mukand and Rodrik (2017) label countries with elections, but low civil liberties as illiberal.

[14]Examples include the data analytics team that worked in the 2012 Obama campaign and the role of Cambridge Analytica in both Trump's campaign and recent presidential elections in Kenya.

[15]See Nickerson and Rogers (2014) for a review on this topic.

[16]An exception is evident in a political campaign that was meant to change "inaccurate" beliefs that voters may have had of a candidate who unexpectedly supported abortion in the state of Oregon. The campaign used a survey to identify and target voters based on whether they were pro-choice, but used self-reported survey data to measure the

ers may have different degrees of uncertainty, which affects their responsiveness to a signal. The studies do not take into consideration that voters may have different views and interpret the same information differently. This study contributes to the literature in its empirical design to allow for the fact that voters may have different interpretations of the same signal.

1.3 Institutional Background

1.3.1 Democratization in Turkey

The Republic of Turkey was founded in 1923. Mustafa Kemal Atatürk, an army officer, was the founder of both the Turkish Republic and the Republican People's Party (CHP). The CHP is currently the main opposition party. Atatürk immediately established a secular state, clamped down on the freedom of religious expression, and imposed a new language and culture on a majority pious population. The military played a significant role in politics and the country was under one-party rule for the first two decades. It is commonly believed that the political elite's transformation of Turkish society, by sharply reducing religious expression and imposing secularism, had modernizing effects on Turkey. However, it also instigated the ideological cleavage between liberal secular and religious conservatives, or rather, elites versus non-elites and the suppression of minority groups that continues today. Moreover, despite the important gains from Atatürk's modernizing of Turkey, the lack of inclusive founding institutions is regarded as creating a lasting impediment to Turkey's development.

1.3.2 Modern Turkey

Multi-party elections were introduced to Turkey in 1946 and since then Turkey has experienced periods of competitive elections. However, its strong military, weak state institutions, and the society's ideological cleavage led to long periods of economic and political instability. These periods of instability have resulted in a number of military interventions, including four outright coups. In 2001, there was a devastating economic recession and the country was under the unstable leadership of a multi-party coalition. The current ruling party, the Justice and Development Party (AK Party), was founded by Recep Tayyip Erdoğan in 2001 and first entered a general election in 2002. The AK Party came into power and the 2002 General Election marked the first time Turkey was ruled by a single party government since 1987. Only one other party, the CHP, also gained seats in parliament. The AK Party has had a majority in parliament since coming into power.

Under the AK Party, the ability of the military to intervene in politics weakened. The military had

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effectiveness of the campaign (Rogers and Nickerson 2013).

threatened the party because of its religious tendencies, but, with the help of an alliance with an Islamic cleric, Fethullah Gülen, and strong voter support, the party continued its rule uninterrupted. The party was also successful in expanding freedom of religious expression, such as allowing women to wear headscarves in public institutions, including universities and the parliament. During the peak of the party's alliance with the Gülenists, there were a series of controversial trials and arrests of military officials for the alleged coup plots named Operation Sledgehammer and Ergenekon. However, the alliance between the AK Party and Gülen soon dissolved.

In fact, while strong evidence on the details of the attempted coup is limited, there is consensus that some of the individuals involved in the 2016 coup attempt are Gülenists, who comprise a large and powerful international movement. Gülenists had infiltrated various institutions of Turkey for years, including the educational system, the military, judiciary, police force, etc. The coup attempt itself was poorly organized and failed rapidly, but was a catalyst in the calling of a referendum. Citizens were directly affected by the coup attempt; thousands took to the streets to prevent the coup and hundreds were killed. In addition, all leaders from the opposition parties publicly decried the coup attempt.

Voters in Turkey have mixed views on whether the coup attempt can partly be blamed on Erdoğan's past relationship with Gülen. Others do not place any blame on Erdoğan and view the coup attempt as an incident that was completely outside of his control. Following the attempted coup, a state of emergency was enacted and more than 150,000 civil servants, academics, and journalists were detained. Despite the arrests being internationally condemned, in a survey that I conducted, the majority of sampled voters self-reported as supporting these mass arrests. The arrests are viewed as a measure of national security.

1.3.3   2017 Referendum

The referendum was held in 2017, less than a year after the attempted coup. The referendum was on switching from a parliamentary system to a presidential system and on eighteen amendments to the constitution. Until the referendum, the highest level of leadership was the prime minister and the role of the president was largely viewed as ceremonial. Erdoğan served as prime minister from 2002 to 2014, stepping down just before his term limit. In 2007, Erdoğan called for a referendum that would change a law, allowing the president to be nationally elected in 2014. Therefore, in 2014, Erdoğan became the first nationally elected president of Turkey and was able to retain a leadership position before his term as prime minister ended. A number of the proposed amendments to the constitution would consolidate power under the president. For example, a new power granted to the president is the ability to bypass the parliament completely and introduce legislation by issuing decrees with the force of law (Jenkins 2016).

Aside from the coup attempt, Turkey was already on an unstable path. Terrorist activity had reached an unprecedented level, civil conflict had restarted, hundreds of thousands of civilians

from Kurdish-majority areas had been displaced, and the economy was doing poorly.[17] The AK Party argued that switching to a presidential system and the proposed amendments would bring more stability and increased national security. The opposition argued that the current leadership, who had already taken steps over the past few years to consolidate power, was to blame for the deteriorating conditions and increasing their power would only exacerbate the problems.

In Turkey, there are four parties with representation in parliament. Before the referendum, one of the small opposition parties, the Nationalist Movement Party (MHP), declared that it was in support of weakening constraints on the executive ("Yes" vote). The main opposition party and the minority pro-Kurdish party, the Peoples' Democratic Party (HDP), declared that they were against the constitutional changes that were being voted on ("No" vote). In the empirical section for the voter experiment, whether the analysis is conducted with all four parties or just between the main opposition party and the incumbent does not change any of the results. For the remainder of this paper, I will just refer the political parties as the incumbent party or the opposition party.

1.4   Timeline and Order of Experiments

A timeline and flowchart of the two field experiments are shown in Figure 1.3. I first conducted a voter survey in October 2016 with more than 1,770 voters. The survey identified policy issues most important to voters and their preferences regarding various policies. In the survey, voters reported that the economy and terrorism are policy issues most important to them. The purpose of the survey was twofold. First, I used the survey results to compile information on voters that would be used in the politician experiment. As part of the experiment, in mid-January, the MPs were sent a voter report based on the results from the survey. The results were sent right after they had voted in parliament to go to a referendum and three months before the referendum was held. At the time that the report was sent, the MPs faced uncertainty on the exact timing of the referendum, but knew that it would take place within six to twelve weeks.

The report discussed the sampling procedure, disclosed the funders of the survey, and included details on my background.[18] Then, it showed that terrorism and the economy are most important to voters and provided the survey results on voter policy preferences regarding those two issues.[19]

When the voter report was sent to the MPs, they were also asked whether they would be interested in conducting a voter experiment before the election. I followed up with everyone who responded.

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[17]Figure 1.2 shows the number of terrorist attacks in Turkey over time. It shows that the number of attacks had risen significantly even before the coup attempt.

[18]MPs were informed that UC Berkeley and MIT funded the survey that I conducted. Background information included that I am a PhD candidate at UC Berkeley and that the report was a part of a research project.

[19]The report was thirteen pages long and examples of two pages from the report are provided in Figure B1 in Appendix B.

This interaction is what created an opportunity to conduct a randomized door-to-door campaign. Specific individuals from the opposition party implemented the randomized door-to-door campaign in one province. This leads to the second objective of the voter report: the information provided on the economy and terrorist activity in the door-to-door campaign was informed by the fact that voters had reported these two issues as most important to them in the survey that I had conducted. However, the details of the information provided in the door-to-door campaign and the decision to use information from the voter survey was decided by individuals from the opposition.

The door-to-door campaign reflects the best strategy that individuals from the opposition had to increase their vote share. Simultaneously, I could test the effect of giving information on self-reported voter policy preferences through the door-to-door campaign and whether this is the best strategy the MPs had on average through the politician experiment.

1.5 Voter Model: Different Interpretations of a Common Signal

1.5.1 Motivation for Voter Model

Since 2013, when Turkey started experiencing significant instability, the value of the local currency in Turkey, the lira, has been falling. The rate of depreciation rapidly escalated toward the end of 2016, after the attempted coup. In January 2017, after a record drop in the value of the lira, a nationally representative survey was conducted in Turkey covering issues such as the referendum and the economy.[20] In the survey, voters were asked the degree to which the drop in the value of the Turkish lira had an impact on their personal life. Figure 1.4 shows that voters who self-report as either incumbent or opposition supporters both agree that the depreciation of the lira had a negative impact on their lives. However, we see in Figure 1.5 that voters have different views of why the value of the lira dropped, based on their party affiliation. Opposition voters predominantly blame the current leadership (president and parliament). Incumbent voters blame external factors outside the control of the leadership (coup attempt, global crisis, and the U.S. election).[21]

In the referendum, voters were choosing to weaken constraints on the executive. The survey results on the lira suggest that increased information on policy outcomes under the incumbent, such as economic conditions or terrorist activity, could have an ambiguous effect on voter choice. Consider voters who underestimate how poor the economy is and blame poor conditions on external

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[20]The survey was done by an American polling company, which cannot be identified in this study. I was not involved with the survey, but had access to the results.

[21]Voters in Turkey have mixed views on whether the coup attempt can be blamed partly on Erdoğan's past relationship with Gülen. Some do not place any blame on Erdoğan and view the coup attempt as an incident that was completely outside of his control.

factors. They may choose "Yes" in the referendum because they believe that less constrained efforts to increase national security, such as the mass arrests, will reduce a source of instability and subsequently improve the economy. More generally, they may support removing constraints from incumbent policies so that they can be more effective when external threats are high. On the other hand, voters who also underestimate the economy, but blame current leadership for poor economic policy, or for being the cause of threats to national security in the first place, will vote against increasing authoritarianism. Using the language in the literature on disagreement or polarization in response to a common signal, the information on policy outcomes provided in the campaign is an "equivocal signal" (Benoit and Dubra 2016). Voters are provided with a unidimensional signal to a multidimensional problem (Loh and Phelan 2017).[22] The effect on voter choice of giving voters more information on incumbent policy outcomes, i.e. the economy and terrorist activity, depends on views, and levels of uncertainty, over this ancillary issue, which is whether the incumbent is to blame or not (Benoit and Dubra 2016).

Before continuing to the model, consider an example on persistent polarization, or disagreement, among economists themselves. A stimulus package is implemented, but the GDP results are poor. Even sitting in the same room, a Keynesian and a Neoclassical will respond differently to the same results. A Keynesian will declare that the stimulus package should have been larger. In contrast, the Neoclassicist will believe more strongly that stimulus does not work.[23]

1.5.2 Voter Model

The purpose of the model outlined in this section is to provide a framework to interpret the results in the voter experiment. The framework explains (i) why we expect the voter information campaign to have an effect among moderate voters and (ii) why the campaign could have different effects on vote choice depending on voter type.

Consider that rational Bayesian voters have a signal, e, about the state of the economy, the noise of which has variance σ_E^2. Providing them with more information on economic conditions reduces the variance in the signal. The common assumption in the literature is that rational Bayesian voters will converge to the signal if they have common beliefs (Dixit and Weibull 2007). Similar to Dixit and Weibull (2007), Loh and Phelan (2017), Andreoni and Mylovanov (2012), Acemoglu et al. (2016), and Benoit and Dubra (2016), I also maintain rational Bayesian voters and relax the assumption of common beliefs. Here, the posterior beliefs of voters will converge to the signal on policy outcomes, but voters will diverge in their policy choice. They can make opposing policy choices because of differences in beliefs in the factors determining poor conditions.

Motivated by the survey evidence, let the state of the economy (e.g. value of the lira) be a function

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[22]This issue of uncertainty over an additional dimension is discussed in Andreoni and Mylovanov (2012). Fryer et al. (2017) provide a similar framework, but over one-dimension and people are non-Bayesian.

[23]Dixit and Weibull (2007) and Loh and Phelan (2017) provide similar examples.

of incumbent quality, Q, and external factors affecting the economy, like national security, S. When S is high, external threats are low. I assume that the economy is increasing and linear in both factors, $E(S, Q) = S + Q$. Let a higher A denote further weakening constraints on the executive, or increased authoritarianism, for brevity. I assume that the optimal value of A is increasing in incumbent quality and decreasing in external threats to national security; for example, the lower the external threats to national security, the lower the optimal level of authoritarianism. The signal that voters have about the economy affects a voter's optimal choice for A. In summary, I assume that $A^*(S, Q) = Q - S + \epsilon$ is a voter's optimal level of authoritarianism, where $\epsilon \sim N[0, 1]$.[24] The important assumptions here are that both S and Q are positively correlated with E, but S is inversely correlated with A^*, and Q is positively correlated with A^*. I will show that while voters receive information on the economy, their mean priors and relative certainty about S and Q determine their choice on optimal A, i.e. "Yes/No" in the referendum.[25]

I assume a voter has initial unbiased priors over S and Q distributed $N[\mu, V]$, where $\mu = \begin{pmatrix} \mu_S \\ \mu_Q \end{pmatrix}$ and $V = \begin{pmatrix} \sigma_S^2 & \sigma_{SQ} \\ \sigma_{SQ} & \sigma_Q^2 \end{pmatrix}$. Given the assumptions that E is increasing and a linear function of both S and Q, we have $E \sim N(\mu_S + \mu_Q, \sigma_S^2 + 2\sigma_{SQ} + \sigma_Q^2 + \sigma_E^2)$

The information in the campaign increases the precision of the signal and therefore lowers σ_E^2. A voter chooses "Yes", to increase authoritarianism, if $A^*(S, Q) \geq A$.

Under these assumptions, the standard result for the density $f(S, Q|E = e)$ holds. Let $(\mu_S)'$ and $(\mu_Q)'$ be the posterior means of this density. Despite receiving the same signal, people with the same priors and level of uncertainty on the economy can end up with different posterior means, $(\mu_S)'$ and $(\mu_Q)'$. Let $A'^*(S, Q) = (\mu_Q)' - (\mu_S)'$ be an individual's optimal level of authoritarianism based on the posterior means of $(\mu_S)'$ and $(\mu_Q)'$. The expressions for $(\mu_Q)'$ and $(\mu_Q)'$ are:

$$\begin{pmatrix} (\mu_S)' \\ (\mu_Q)' \end{pmatrix} = \begin{pmatrix} \mu_S \\ \mu_Q \end{pmatrix} + (e - \mu_S - \mu_Q) \begin{pmatrix} \frac{\sigma_S^2 + \sigma_{SQ}}{\sigma_S^2 + 2\sigma_{SQ} + \sigma_Q^2 + \sigma_E^2} \\ \frac{\sigma_{SQ} + \sigma_Q^2}{\sigma_S^2 + 2\sigma_{SQ} + \sigma_Q^2 + \sigma_E^2} \end{pmatrix}$$

Which then gives:

$$A'^*(S, Q) = \mu_Q - \mu_S + (e - \mu_S - \mu_Q) \frac{\sigma_Q^2 - \sigma_S^2}{\sigma_S^2 + 2\sigma_{SQ} + \sigma_Q^2 + \sigma_E^2}$$

The effect of providing more information on the economy, and therefore reducing σ_E^2, affects the

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[24] I am agnostic about the full model determining A, but an assumption made here is that $A^*(S, Q)$ and E are not perfectly collinear. Benoit and Dubra (2016) make the assumption that $A^*(S, Q)$ and $E(S, Q)$ are independent.

[25] This framework will generalize to the case where A^* and E are linear in Q and S, as long as A^* and E are increasing in Q, A^* is decreasing in S, and E is increasing in S.

voter's optimal level of authoritarianism through updating on relative priors on the factors that are correlated with the economy, S and Q, in the following way:

1. Whether the voter is "moderate" or "extreme." A voter is extreme in its support for the opposition if the difference $\mu_Q - \mu_S$ is very negative and "extreme" in its support for the incumbent if the difference is very positive. For moderates, the differential, $|\mu_Q - \mu_S|$, is small. Moderates will be the most responsive to the information.

2. A voter who is more (less) uncertain about incumbent quality relative to national security will vote "Yes" ("No") in the referendum after receiving the signal e through the information campaign. Therefore, the direction of the effect of the information campaign on an individual depends on whether $\sigma_Q^2 > \sigma_S^2$ or $\sigma_Q^2 < \sigma_S^2$.

It is necessary that the expression is written in terms of vote share because that is observable at the neighborhood level to all political parties, rather than individual vote choice. Assume there's a continuum of individuals in each location, g, with initial unbiased priors over S and Q. In this case, the vote share in location g is

$$P[A^*(S, Q) \geq A|g] = 1 - \Phi \left(A - \left[\left(\mu_Q^g\right)' - \left(\mu_S^g\right)' \right] \right)$$

The derivative of this expression with respect to σ_E^2 gives us the effect of the treatment and the same predictions as above. After going through the details of the treatment and experimental design, I will tie the individual voter model to the empirical estimation procedure.

Similar to Loh and Phelan (2017), Dixit and Weibull (2007), and Benoit and Dubra (2016), voters in this study are learning based on a multidimensional model after receiving unidimensional information, and have different beliefs. Under more traditional assumptions, voters would be given unidimensional information and updating on one dimension. Here, the vote choice depends on voters' relative certainty on each dimension in the learning model and the mean relative value of their priors for each dimension (i.e. how moderate they are). One can then wonder why the opposition would not just give information to voters that directly show whether or not the incumbent is to blame for the economy. The trouble here is that it is not possible to prove this relationship; therefore, in trying to persuade a voter who is leaning toward the incumbent, the voter will now face uncertainty about the source of the signal. Voters can also have different interpretations of the signal if they think the signals come from a biased source (Acemoglu et al. 2016).

1.6 Voter Campaign Experiment

1.6.1 Voter Campaign Experiment: Campaign Content

The intention of the opposition's door-to-door campaign was to increase the share voting "No" in the referendum, against weakening constraints on the executive. In the campaign, voters were provided with information describing the economic loss and increase in terrorist activity under the current leadership over the past few years. The party highlighted worsening conditions since 2014 because that is when Erdoğan transitioned from prime minister to president to extend his political leadership. The party also chose to omit issues of a deteriorating democracy and increasingly limited civil liberties from the door-to-door campaign because of the results in the voter report. The results from the survey show that the majority of citizens across party lines support the arrests conducted after the state of emergency.

The campaign was randomized at the neighborhood level, because this is the level at which administrative outcome data is available. Control neighborhoods did not receive campaign information. The information was conveyed to voters in treatment neighborhoods both orally, if they opened their door, and in a pamphlet. The pamphlets were left with every household in a treatment neighborhood regardless of whether they opened the door. The original print of the pamphlet can be seen in Figure 1.6. The canvassers also received training on how to give the same information provided in the pamphlet orally and personably. For example, in addition to giving the same facts as in the pamphlet, they were trained to convey the information by discussing personal accounts of how they were affected by the deteriorating economy or recent terrorist attacks.

The issues covered in the campaign were based on the voter survey I had conducted and I designed the campaign. The implementation, funding, and details of the content were determined by a campaign manager and staff from the opposition party. The experiments reflect the strategy of individuals from the opposition party.

1.6.2 Voter Experiments: Party Strategy

In terms of the voter model, the opposition party assumed that voters would only update their views on the quality of the incumbent in response to increased information on the economy. As in, they misspecified the model as $f(Q|E = e)$ rather than $f(Q, S|E = e)$. They did not take into consideration that voters could have different interpretations of the same information campaign on policy outcomes. Going back to the voter model, the party assumed that voters would behave

according to equation (1.1) rather than equation (1.2):[26]

$$A^{'*}(S,Q) = \mu_Q + (e - \mu_Q)\frac{\sigma_Q^2}{\sigma_Q^2 + \sigma_E^2} \tag{1.1}$$

$$A^{'*}(S,Q) = \mu_Q - \mu_S + (e - \mu_S - \mu_Q)\frac{\sigma_Q^2 - \sigma_S^2}{\sigma_S^2 + 2\sigma_{SQ} + \sigma_Q^2 + \sigma_E^2} \tag{1.2}$$

If voters have better information that the economy is poor and only attribute poorly performing economy to the incumbent, then they will vote against weakening constraints on the incumbent. This strategy is sensible. First, this is a common assumption in most campaign experiments designed by researchers. Second, particularly in Turkey, media censorship is high and voters may receive limited or selective information on performance indicators when conditions are poor.

Given these factors, the opposition party chose to use the campaign as an opportunity to disseminate information on negative changes in the economy and national security since President Erdoğan was voted into the presidency in 2014. Similar to the literature, the campaign strategy was consistent with the assumption that voters would respond to the information according to a retrospective voter model.[27]

1.6.3   Voter Campaign Experiment: Sampling

The door-to-door campaign was implemented in the third largest province in Turkey, Izmir.[28] Figure A1 shows the distribution of the share that voted "No" across the country and in the sample for this experiment, among the control group. We see that the experiment was conducted in an oppositional stronghold, but that there is a large overlap with the distribution across the country. Izmir was selected because it is a region in which the party could immediately organize group of party volunteers that were willing to canvass during a state of emergency. Recruiting volunteers during this period is difficult because a person could be detained without trial for three months.

The sampling procedure and implementation of the campaign were affected by a number of factors. First, since it was a state of emergency, it was possible that voters would be hesitant to open their door. Second, the party was constrained in terms of its budget available for transportation and the number of canvassers. To address the first issue, every household in a treated neighborhood was visited to increase the likelihood that a sufficient share of voters opened their doors and engaged

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[26]Please note that it is assumed, and empirically confirmed, that the effect is among both voter types who underestimate how bad conditions are.

[27]In Appendix A, I also describe a randomized online Facebook campaign that the opposition implemented and that I designed. This is an alternative campaign strategy that they also used.

[28]There are 81 provinces in Turkey. Each province is a constituency, except the larger provinces Izmir, Ankara, and Istanbul are split into two to three constituencies.

with the canvassers. In-person conversation is considered one of the most effective methods to affect voter behavior (Pons 2018). While a less salient method, the possibility of a low response rate to the door-to-door campaign explains the use of pamphlets. The pamphlets were left with every household that was visited regardless of whether the voter opened the door.

The second issue, the budget and capacity constraint, would also affect the power of the study. A sufficient number of neighborhoods needed to be reached and the compliance rate within each neighborhood needed to be sufficiently high. Therefore, before conducting the randomization I restricted the sample to neighborhoods based on whether they would be too difficult to reach or take too long to complete. There are 1294 neighborhoods and 30 districts in Izmir. I dropped districts and neighborhoods that were too rural. Rural areas were dropped because if neighborhoods were too far away, this would affect the sample size and, therefore, the power of the study. First, following the procedure of surveying companies in Turkey, I classified neighborhoods as "rural" if they had 500 or fewer registered voters in the most recent general election in 2015. Then, I classified a district as rural if more than 50% of the neighborhoods are rural. Then, I dropped neighborhoods where the number of registered voters was in the top 5% or bottom 5% of the distribution. Here, I also dropped large neighborhoods because, while they could be easy to reach, it would take too long to cover all households in a neighborhood. In the end, the experiment was conducted in 14 of the 30 districts and 498 out of 1294 neighborhoods. Over 130,000 registered voters were treated across 48 neighborhoods in Izmir and were compared to voters in 450 control neighborhoods.

In order to further increase efficiency and monitor whether the campaign could even be implemented during such a risky period, I geocoded every street in each neighborhood and provided the canvassers with an optimal route. Every couple of days, they sent me the number of people they spoke to per street and whether or not they canvassed all households in a street. All streets in every neighborhood were canvassed and it was reported that they visited the door of every household, or apartment. However, 20% of neighborhoods could not be canvassed because the party volunteers reported that they faced threats (aggressive behavior, threats to call the police, etc.). Table 1.3 provides the average number of registered voters reached per neighborhood among the full sample. Table 1.4 shows the same descriptive statistics for the subsample that does not include the neighborhoods that the party volunteers could not canvass. Importantly, we see that the average reach is similar across each quartile. None of the results change depending on whether I include or drop the neighborhoods where the reach was zero. Here, I show the results with all neighborhoods included.[29]

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[29]Table 1.11 shows the results for the sample where the "threatened" neighborhoods are dropped.

1.6.4 Voter Campaign Experiment: Design

Randomization was stratified by quartile of past neighborhood level vote share for the opposition.[30] The vote share and turnout data were scraped from the government website.[31]. It was specified in a submitted pre-analysis plan that a two-tailed test would be conducted in each quartile. This was pre-specified in case of heterogeneous treatment effects.[32] Below, Y_{nq} is neighborhood level "No" vote shares or turnout. T_{nq} is an indicator for whether the neighborhood is in the treatment group and γ_q are quartile fixed effects. X_{nq} includes past voter data from the past two general elections, which were both held in 2015. The regressions, including the randomization inference exercises, follow the pre-specified specifications.[33] β captures the treatment effect across quartiles and I also estimate β_q by estimating the treatment effect within each quartile.

$$Y_{nq} = \alpha + \beta T_{nq} + \gamma X_{nq} + \gamma_q + \epsilon_{nq} \tag{1.3}$$

Table 1.5 shows balance between the treatment and control groups across the quartiles. Tables 1.6 and 1.7 show balance within each quartile.

1.6.5 Predictions Based on the Voter Model and Results

Based on the voter model, we expect that voters will respond to the treatment if they are moderate ($|\mu_Q - \mu_S|$ is small). In addition, the direction of the vote depends on their relative certainty between each factor affecting the economy (i.e. the relative values of σ_Q and σ_S). We expect that we can reject the null of no effect on "No" vote share in quartiles of past vote share where the concentration of moderate voters is highest and where the number of neighborhoods with a high concentration of moderate voters is highest. We may expect that quartiles where the vote share differential is close to zero is where we will be able to reject no effect. To substantiate this claim, I use individual-level data.

The individual level data that I have on policy preferences is from the voter survey I conducted before the referendum in mid-October.[34] While the data on policy preferences were not collected in Izmir, they were collected in the other largest provinces of western Turkey. Importantly, individuals were randomly sampled within each neighborhood for the survey. Therefore, this allows me to use

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[30]This is the same as stratifying on the vote share differential between the opposition and the incumbent.

[31]https://sonuc.ysk.gov.tr/module/GirisEkrani.jsf

[32]Baysan, C. (2017, April) Canvassing in Turkey. osf.io/hhqej

[33]I show the results for both the unweighted and weighted regressions. Weighted regressions account for the number of registered voters per neighborhood. I did not pre-specify including weights; both results are provided, but the weighted version is my preferred specification. The results without weighting are provided in Tables A1 and A2

[34]It was not possible to do an additional voter survey immediately before the referendum for a variety of reasons. As an example of one the constraints, the major data collection companies were completely occupied with their main source of revenue, which was providing predictions for the referendum. The smaller firms could not organize a sufficient surveyors willing to work during the state of emergency.

the policy preference data and predict the likelihood that an individual self-reported as being a supporter of the incumbent or opposition party and merge it with neighborhood level vote share data. I take the distribution of these predicted values and label the top and bottom 25th percentiles of the distribution as "extreme." Within each neighborhood, I calculate the proportion of extreme voters. I then match the data with the administrative neighborhood level vote share data.

First, I find that the proportion of extreme voters in a neighborhoods is higher where the differential vote share between the two parties is higher. Moderate voters are concentrated where the vote share differential is low and therefore where I have more power to reject no effect. It is not surprising that moderates mostly live together and more partisan voters mostly live together. Table 1.1 shows the average proportion of extreme voters across the vote share distribution for the sampled neighborhoods in the survey. We see that the lowest mean shares are .55 and .59. In Table 1.1, I show seven of the deciles of the differential vote share distribution for the voter survey sample because they overlap with the distribution of vote share differentials for the experiment. Within these seven deciles, I count the total number of neighborhoods that have a proportion of extreme voters that is less than .55. The fourth and fifth deciles, where the vote share differential between the incumbent and opposition is .07 and .17 respectively, are where I am most likely to reject an effect and observe polarization. Table 1.2 shows the difference in vote share between the opposition and the incumbent. Therefore, we see that the fourth and fifth deciles for the voter survey sample are closest to the vote share differentials in quartiles 2 and 3 of the experiment. Among quartiles two and three, for the experiment, which correspond to the deciles with a larger number of neighborhoods with a high concentration of moderate voters, we are mostly likely to be able to detect an effect of the campaign on the vote share.

Table 1.8 shows the aggregate result: I cannot reject no effect across all quartiles and we see that the treatment had no effect on turnout across quartiles. Figure 1.8 shows the effect of the treatment by quartile of past vote share. However, I am able to reject no effect in quartiles 2 and 3. Recall that the campaign was meant to increase the "No" vote share. Instead, in quartile 2, we see that the "No" vote share decreased by 5.9% (3.7 percentage points). The campaign did have a positive effect of 2.6% (1.8 percentage points) in quartile 3. Therefore, we are able to detect population polarization between quartiles 2 and 3 (Benoit and Dubra 2016). The fact that partisanship (among moderates) is correlated with the relative certainty between the two factors is not a prediction of the model or something that I could have tested ex ante. However, this result is consistent with assumptions made in other studies on polarization where people have a lack of common beliefs.[35] Or, it may be the case that incumbent voters living with more opposition voters adopt the views of their neighbors once they have more information.

Next, I show that the effect of the campaign cannot be explained by turnout. In Table 1.10, we cannot reject no effect in quartiles 2 and 3. In addition, we can rule out an effect of between .8 and .5% in those quartiles, respectively. In Figures A2 and A3, I also show the results of conducting randomization inference within quartiles 2 and 3 to calculate an exact p-value under the sharp null

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[35] See Benoit and Dubra (2016) and Loh and Phelan (2017)

of no treatment effect, which also allows me to avoid making assumptions on the distribution of errors (Imbens and Rubin 2015). To implement randomization inference, I run 10,000 permutations of the treatment to the neighborhoods in the sample and estimate the coefficient. This generates a distribution of coefficients. In quartile 3, I find that the p-value is .09 and in quartile 2, I find that the p-value is .03.

1.6.6 Alternative Framework

It is possible that an alternative voter framework can explain the the results of the campaign experiment. For example, there may be voters in the incumbent stronghold who updated their beliefs on how strong the opposition is once they saw the party volunteers come to their neighborhood. Voters with strong ideological support for the incumbent may then put pressure on any moderate voters in their neighborhood to support the incumbent. Similarly, voters with strong ideological support for the opposition may have updated on the quality of the opposition. They also may have put pressure on moderate voters in their area to vote for the opposition. I am unable to rule out this type of a channel that operates through peer effects. Suggestive evidence against this channel is that we may have expected aggression and the inability of canvassers to speak to voters to be correlated with partisanship. Tables 1.3 and 1.4 suggest that this is not the case.[36] Under this alternative framework, it is still the case that the opposition would have to target voters in order to increase its vote share. The main distinction with this framework is that identity-based dynamics are driving the results rather than different beliefs about why conditions are poor.[37]

1.7   Conclusion

This study analyzes the impact of a randomized voter information campaign on vote choice to institutionalize weakened constraints on the executive branch in Turkey. The campaign, which was implemented by the opposition party, provided voters with a signal on poor economic conditions and increased terrorist activity under the incumbent. I find that the opposition party's efforts to reduce voter support for more authoritarianism instead polarized voters and they failed to change aggregate vote share. This is some of the first experimental evidence of ideological polarization in response to a common signal outside of a lab. I also provide suggestive evidence that the ruling party had higher quality voter information and data. Such data can be used to target voters that

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[36]Table 1.11 shows the results for the effect of the campaign on "No" vote share using the sample where the "threatened" neighborhoods are dropped.

[37]An example of identity-based dynamics can follow from the model in Padró i Miquel (2007). In Padró i Miquel (2007), followers of the ruling leader, with whom they share an identity, such as ethnicity or religiosity, tolerate rent extraction. They fear discrimination by the leader of the excluded group were the opposing leader to come into power. In the context of the referendum in Turkey, followers of the ruling leader face more rent extraction if they vote "Yes," but they also lower the probability that the leader of the excluded group can come into power in the future.

will interpret information in the incumbent's favor and choose increased authoritarianism as their preferred policy. This advantage is one factor that potentially contributed to weakened constraints on the executive becoming the majority policy choice among voters and the overall deterioration of democratic norms in Turkey. This is a particularly important outcome given the evidence that institutions are causal factors of economic development (Robinson et al. 2005).

This study also opens the question to understanding why some voters choose to weaken constraints on the executive after receiving a signal on poor conditions. This is an important issue considering the continued deterioration of democratic norms across the globe, which the Freedom House has described as "Democracy in Crisis" Freedom House (2018). In this study, I suggest that voters face an unidentified problem: they do not know why conditions are bad because of external threats. A common signal on poor policy outcomes then increases political polarization based on heterogeneous voter views on whether external factors are to blame or the incumbent. Those who blame external threats choose to weaken constraints on the executive so that the incumbent is more able to protect them and the economy.[38] This can help us understand why the ruling leader is able to violate civil liberties and political rights in democratic countries. Determining whether this heterogeneity in voter views explains the results from the voter experiment has implications for the traditional framework linking information availability and political accountability.

Finally, the limited literature on targeting and data intensive campaigning is at odds with the proliferation of data analytical firms providing consulting services for major elections. In Obama's campaign in 2012, "big data" was used to contest for votes (Issenberg 2012). More recently, attention has been given to the role of Cambridge Analytica in providing the strategic framework for Trump's campaign. In fact, it was recently reported that Cambridge Analytica was involved in efforts to re-elect President Uhuru Kenyatta in Kenya. More generally, to understand how a voter information advantage interacts with the context of lesser developed countries, consider the following quote from a former Cambridge Analytica employee: *"SCL Elections went on to be bought by Robert Mercer, a secretive hedge fund billionaire, renamed Cambridge Analytica. That was before we became this dark, dystopian data company that gave the world Trump... We were just doing it to win elections in the kind of developing countries that don't have many rules."* (Cadwalladr 2017).

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[38] In the political science literature, this type of voter has been described as "authoritarian." (Stenner 2005)

Figure 1.1: Density of Aggregate Scores for Civil Liberties and Political Rights Across Countries
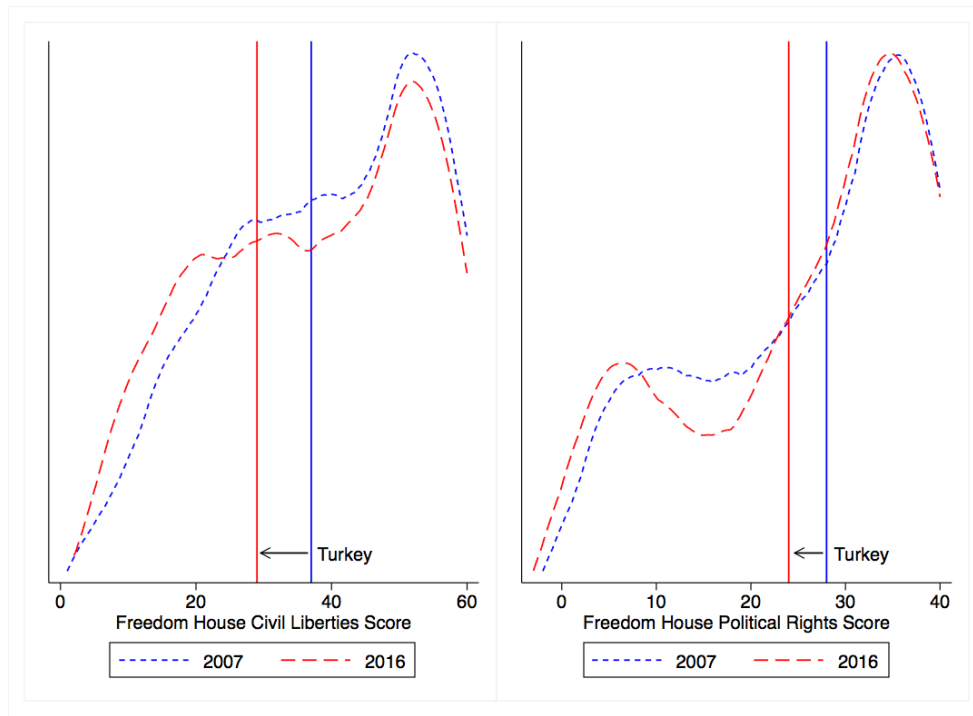
Freedom House aggregate scores across countries for civil liberties (0-60) and political rights (0-40) between 2007 and 2016. 193 countries are included in 2007 and 198 in 2016

Figure 1.2: Terrorist Attacks in Turkey
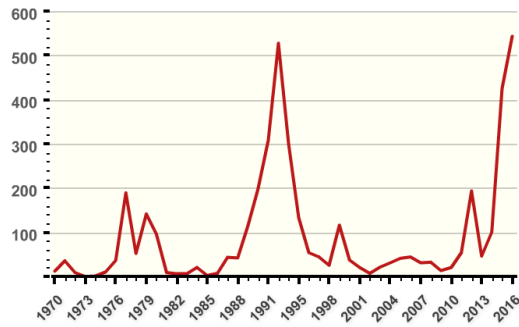
This figures shows the number of terrorist attacks in Turkey from 1970-2016. This figure was generated through via the Global Terrorism Database which, includes systematic data on domestic as well as international terrorist incidents. It shows that terrorist attacks in Turkey were already on the rise before the attempted coup in July 2016.

Figure 1.3: Timeline and Flow Chart of Study
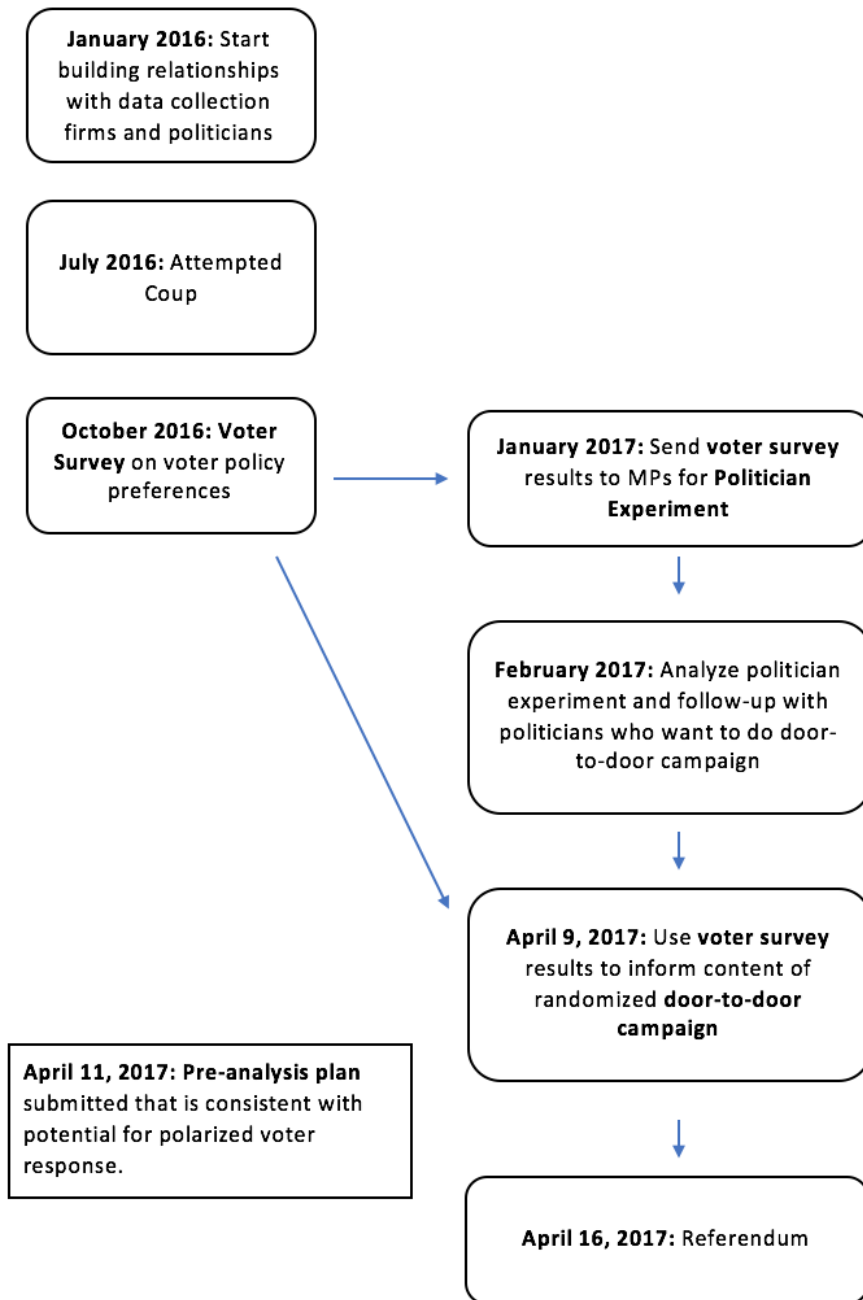
Figure 1.4: Does the drop in the value of Turkish Lira have any impact on your personal life?
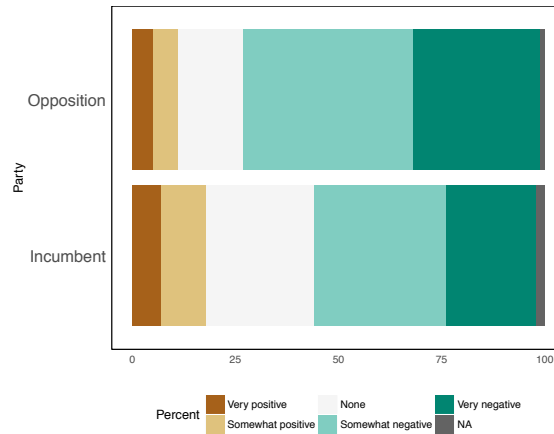
Figure 1.5: Who is most responsible for the latest devaluation of Turkish Lira?
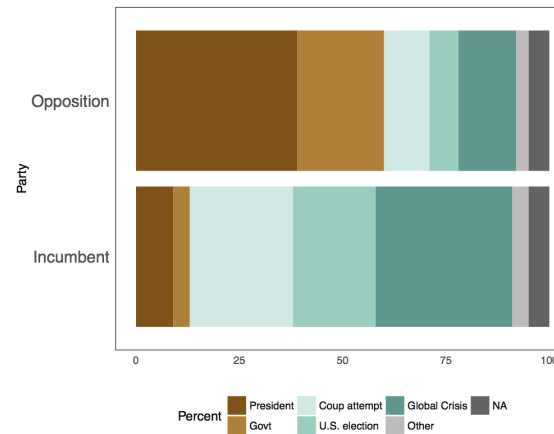
These figures are from a survey conducted by a U.S. based firm in Turkey with a sample of approximately 1,215 voters. [39] The survey is nationally representative. The survey was conducted in January of 2017 after the record low drop in the value of the local currency and before the referendum.

Figure 1.6: Pamphlet on Economy and Terrorism

- The pamphlet outlines the following:

    - Since 2014, there has been poor leadership
    - Under which 1 million citizens have lost their job
    - The per capita income has dropped by $1,000 in the past one year
    - The economy has contracted and inflation has increased
    - Turkey is losing under one leader
    - Since 2014, unprecedented level of terrorist activity
    - Terrorist organizations are more easily able to conduct attacks
    - Security is weak
    - More power should not be given if terrorism could not be reduced
    - The headlines state: "#NO Turkey will win," "NO to poor economic policy," "NO to terrorism."

Figure 1.7: Density of "No" Vote Share Across Country and Sample
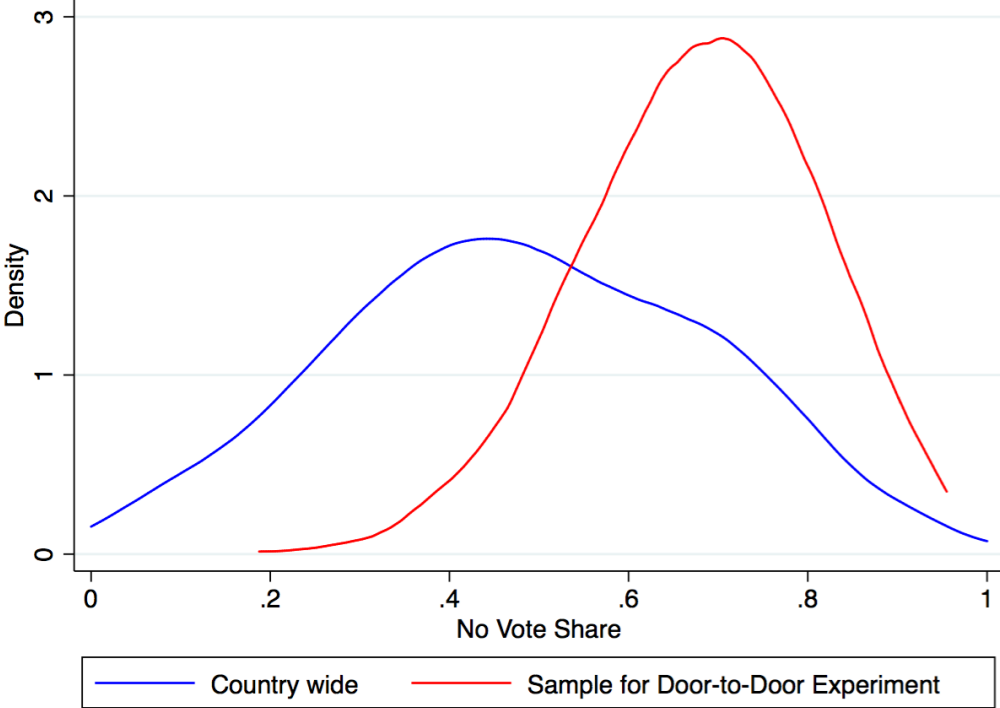
This table shows the density of "No" vote share across Turkey and across the sample for the voter experiment. The number of registered voters are included as weights.

Figure 1.8: Treatment Effect by Quartile and Polarization
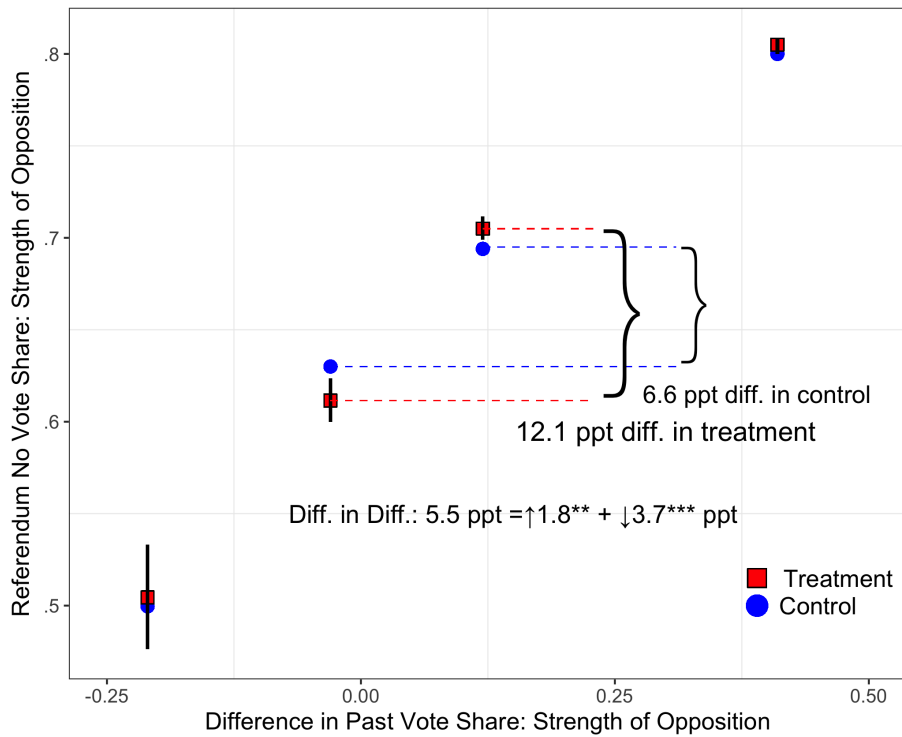
The y-axis shows the difference between the "No" and "Yes" vote share in the referendum. The x-axis shows the vote share differential between the incumbent and the opposition parties from the last general election in 2015. I stratified treatment on quartiles of this distribution. Polarization occurs in quartiles two and three, where the vote share differential is small. All pre-specified controls were included in each estimation; including, past voting and turnout data. The estimates can also be found in Table 1.9

Table 1.1: Individual Level Data Extreme Voter

Quartile	Decile	Share Extreme	Vote Share Diff
Q1	2	0.64	-0.33
Q1	3	0.75	-0.15
Q2	4	0.55	0.07
Q3	5	0.59	0.17
Q4	6	0.76	0.24
Q4	7	0.68	0.32
Q4	8	0.67	0.43

This table uses the individual level data from the survey I conducted with more than 1,770 voters. This data include voter policy preferences. I use the vector of policy preferences to predict whether someone self-reports that they support the incumbent or opposition. I then calculate the distributions of these predicted values and label the top and bottom 25th percentiles of the distribution as "extreme." Within each neighborhood, I calculate the proportion of extreme voters. I then match the data with the administrative neighborhood level vote share data. Decile corresponds to the distribution of the vote share differential between the incumbent and the opposition. Quartile corresponds to the distribution of vote share from the sample in the voter experiment. First, I find that the proportion of extreme voters in a neighborhoods is higher where the differential vote share between the two parties is higher. Moderate voters are concentrated where the vote share differential is low. Table 1.1 shows the average proportion of extreme voters across the distribution. We see that the lowest mean shares are .55 and .59. Within each of the 7 deciles, which overlap with the distribution of vote share differentials for the experiment, I count the total number of neighborhoods that have a proportion of extreme voters that is less than .55. The fourth and fifth deciles, where the vote share differential between the incumbent and opposition is .07 and .17 respectively, are where I am most likely to observe polarization.

Table 1.2: Past Vote Share by Party

Quartiles	No	Vote Share Diff
1	0.50	-0.21
2	0.63	-0.03
3	0.69	0.12
4	0.80	0.41
N	450	450

The second column includes the average "No" vote share across neighborhoods within each quartile. The third column shows the average vote share differential between the incumbent and opposition party by quartile. The first quartile is where the incumbent is strongest. The sample here only includes the control group.

Table 1.3: Neighborhood Average of People Reached per Street

Quartile	Mean Reach	SD Reach
1	0.12	0.04
2	0.18	0.13
3	0.15	0.13
4	0.17	0.23
N	48	48

Mean reach is the average number of registered voters who opened their door to the canvassers. SD is the standard deviation. Statistics are shown for each quartile separately.

Table 1.4: Neighborhood Ave of People Reached per Street, Excluding Dropped Neighborhoods

Quartile	Mean Reach	SD Reach
1	0.11	0.05
2	0.15	0.14
3	0.12	0.13
4	0.15	0.22
N	38	38

Mean reach is the average number of registered voters who opened their door to the canvassers. SD is the standard deviation. Statistics are shown for each quartile separately. Neighborhoods that the party volunteers could not reach because of the threat of arrest have been dropped.

Table 1.5: Balance Across Quartiles

	Aggregate	
	Control Mean	Coefficient
Num Reg Voters 2015 Nov	2719.938	7.871
Num Valid Casts 2015	2364.375	15.583
Num Opp Votes 2015 June	1102.021	85.431
Num Opp Votes 2015 Nov	1148.521	80.692
Opp Neigh Share 2015 June	0.442	0.007
Opp Neigh Share 2015 Nov	0.445	0.004
Turnout 2015 Nov	0.873	0.007

Balance test across the treatment and control groups across all pre-specified variables. Balance is tested across the whole sample and within each quartile. Asterisks indicate that coefficient is statistically significant at the 1% ***, 5% **, and 10% * levels.

Table 1.6: Balance Q1 and Q2

	Q1		Q2	
	Control Mean	Coefficient	Control Mean	Coefficient
Num Reg Voters 2015 Nov	2065.333	-450.791	2155.250	-553.723
Num Valid Casts 2015	1761.000	-399.796	1855.333	-493.256
Num Opp Votes 2015 June	448.667	-46.581	710.417	-179.182
Num Opp Votes 2015 Nov	454.333	-56.490	725.583	-201.685
Opp Neigh Share 2015 June	0.252	0.019	0.400	0.010
Opp Neigh Share 2015 Nov	0.247	0.018	0.397	0.003
Turnout 2015 Nov	0.852	-0.010	0.877	0.011

Balance test across the treatment and control groups across all pre-specified variables. Balance is tested across the whole sample and within each quartile. Asterisks indicate that coefficient is statistically significant at the 1% ***, 5% **, and 10% * levels.

Table 1.7: Balance Q3 and Q4

	Q3		Q4	
	Control Mean	Coefficient	Control Mean	Coefficient
Num Reg Voters 2015 Nov	3275.667	448.684	2155.250	587.330
Num Valid Casts 2015	2872.833	410.621	1855.333	544.780
Num Opp Votes 2015 June	1358.167	174.768	710.417	392.753
Num Opp Votes 2015 Nov	1411.167	165.264	725.583	415.723
Opp Neigh Share 2015 June	0.493	0.000	0.400	0.000
Opp Neigh Share 2015 Nov	0.495	-0.005	0.397	0.001
Turnout 2015 Nov	0.891	0.020*	0.877	0.006

Balance test across the treatment and control groups across all pre-specified variables. Balance is tests across the whole sample and within each quartile. Asterisks indicate that coefficient is statistically significant at the 1% ***, 5% **, and 10% * levels.

Table 1.8: Door-to-Door Results: All Quartiles No Share and Turnout (Weighted)

	(1)	(2)	(3)	(4)
	Share No	Share No Controls	Turnout	Turnout Controls
Treatment	-0.000	0.004	0.004	0.001
	(0.012)	(0.009)	(0.004)	(0.001)
Mean of Outcome	0.654	0.654	0.866	0.866
N Reg Voters	133389	133389	133389	133389
N Neighborhoods	498	498	498	498
R squared	.743	.868	.139	.831

The dependent variable in columns 1 and 2 is the share that voted "No" at the neighborhood level. The dependent variable in columns 3 and 4 is the turnout rate. Quartile fixed effects are included. The regression is weighted by the number of registered voters. Columns 2 and 4 include all pre-specified controls; including, past voting and turnout data. Asterisks indicate that coefficient is statistically significant at the 1% ***, 5% **, and 10% * levels.

Table 1.9: No Vote Share by Quartile (Weighted)

	(1)	(2)	(3)	(4)
	No Share Q1	No Share Q2	No Share Q3	No Share Q4
Treatment	0.010	-0.037***	0.018**	0.003
	(0.029)	(0.012)	(0.008)	(0.004)
Mean of Outcome	0.496	0.628	0.694	0.798
Weights	Yes	Yes	Yes	Yes
N Reg Voters	319166	341565	369172	357413
N Neighborhoods	125	124	125	124
R squared	.352	.626	.691	.834

The dependent variable is the share that voted "No" at the neighborhood level. Each column shows the estimation result for each quartile of the past vote share distribution. Regressions are weighted by the number of registered voters. All pre-specified controls are included in the regression; including, past voting and turnout data. Asterisks indicate that coefficient is statistically significant at the 1% ***, 5% **, and 10% * levels.

Table 1.10: Turnout Share by Quartile (Weighted)

	(1) Turnout Q1	(2) Turnout Q2	(3) Turnout Q3	(4) Turnout Q4
Treatment	0.004**	0.003	-0.000	-0.001
	(0.002)	(0.002)	(0.003)	(0.003)
Mean of Outcome	0.860	0.865	0.878	0.876
Weights	Yes	Yes	Yes	Yes
N Reg Voters	319166	341565	369172	357413
N Neighborhoods	125	124	125	124
R squared	.768	.82	.824	.868

The dependent variable is the turnout rate at the neighborhood level. Each column shows the estimation result for each quartile of the past vote share distribution. Regressions are weighted by the number of registered voters. All pre-specified controls are included in the regression; including past voting and turnout data. Asterisks indicate that coefficient is statistically significant at the 1% ***, 5% **, and 10% * levels.

Table 1.11: No Vote Share by Quartile (Weighted) and Threatened Neighborhoods Dropped

	(1) No Share Q1	(2) No Share Q2	(3) No Share Q3	(4) No Share Q4
Treatment	-0.029	-0.057**	0.029***	0.010
	(0.019)	(0.029)	(0.007)	(0.007)
Mean of Outcome	0.496	0.628	0.694	0.798
N Reg Voters	319166	341565	369172	357413
N Neighborhoods	115	114	116	115
R squared	.382	.578	.705	.831

The dependent variable is the share that voted "No" at the neighborhood level. In this specification, the neighborhoods that the party volunteers could not canvass because of aggression were dropped. Each column shows the estimation result for each quartile of the past vote share distribution. Regressions are weighted by the number of registered voters. All pre-specified controls are included in the regression; including, past voting and turnout data. Asterisks indicate that coefficient is statistically significant at the 1% ***, 5% **, and 10% * levels.

Chapter 2

Learning Constituent Opinion in an Illiberal Democracy: A Multi-Model Study on Home Style in Turkey

2.1   Introduction

Richard Fenno's pathbreaking book *Home Style* began the systematic study of how legislators communicate their priorities and accomplishments to their constituents in order to win re-election and gain policymaking influence (Fenno 1978). But what do these home styles look like in illiberal democracies?[1] To date, much of the research on representation in illiberal democracies has ignored an elected official's home style, instead focusing on issues such as cleavages and clientelism in explaining the relationship between constituents and elected officials. Missing from this literature is an examination of whether elected officials are responsive to their constituents by promoting the issues that their voters care most about.

In this paper, I present one of the first studies of elected officials' responsiveness to voters in an illiberal democracy by examining how they form and communicate their home styles. I study the public communications of Members of Parliament (MPs) in Turkey at a particularly tumultuous time for the state of Turkish democracy: in the months immediately after the failed July 2016 coup and before the April 2017 referendum. I conduct a multi-modal study where I first interviewed MPs, advisors, and political consulting firms to understand how Turkish MPs form perceptions of

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[1]Zakaria (1997b) originally differentiated between the democratic principles of "free and fair elections" on the one hand and the liberal principles of "the rule of law, a separation of powers, and the protection of basic liberties of speech, assembly, religion, and property" on the other. Thus, by illiberal democracies, I mean those countries that hold elections that are generally "free and fair" but generally lack civil liberties such as a free press, freedom of speech, and the rule of law. See also (Lindberg et al. 2014).

their constituents. Through these interviews, I uncover vast differences in how MPs of the two main parties approach learning about their constituents: the majority Justice and Development Party (AKP) invests heavily in the use of polling to understand constituent preferences and tailor their communications while the main opposition Republican People's Party (CHP) does not. Second, I conduct an observational study of the public statements of MPs where I compare the communication styles of AKP and CHP MPs in nearly a million tweets and find that AKP MPs are far more likely to publicly highlight the issues that are most important to their constituents than CHP MPs, confirming the findings from the structured interviews. Finally, I analyze a quasi-experiment in which MPs of both parties were exogenously given access to survey data on constituent preferences to measure how this information might change MPs' homestyles. Consistent with the interviews and observational study, I am unable to reject the null hypothesis that providing AKP MPs with this polling data has no effect on their public communications. AKP MPs have already adopted a home style that invests heavily in learning about, determining their position, and discussing issues salient to voters. On the other hand, providing CHP MPs this polling data makes them more likely to focus their public communications on the issues most salient to their constituents. When provided public opinion polling, CHP MPs tailored their communications accordingly. Overall, this suggests that even in a setting considered by many scholars to be an illiberal, clientelistic democracy (Freedom House 2016), MPs invest in learning about their voters, but that technology decisions – the decision to invest in a modern polling infrastructure – vary significantly across political parties, unlike in countries like the U.S.

Turkey, an illiberal democracy, provides an important case in my understanding of representatives' home styles. With few exceptions (e.g., Ingall and Crisp 2001), much of the extant research on home styles have focused on western, advanced democracies (Heitshusen et al. 2005; Grimmer 2013) while studies of representation in illiberal and developing democracies have overwhelmingly focused on distributive practices, such as clientelism, patronage, and vote buying (e.g., Stokes et al. 2013).

Yet, distributive practices alone cannot entirely explain the constituent-legislator relationship, even in illiberal democracies. Elected officials and incumbent parties are known to invest in media and other forms of direct communication with their voters (Djankov et al. 2003; Barberá and Zeitzoff 2017). Just recently it was reported that Cambridge Analytica was involved in efforts to re-elect President Uhuru Kenyatta in Kenya. Elected officials care about broadcasting their successes and priorities to their constituents, what Fenno (1978) would refer to as home style. Yet what is unstudied is how elected officials choose what to broadcast. How, in illiberal democracies, do elected officials perceive, represent and respond to their constituents? And how does this vary across parties?

As originally posited by Fenno (1978), the "key problem" in understanding a representative's home style is one of perception. But representatives' abilities to perceive their constituents vary greatly (Broockman and Skovron 2017) and, as Entman (2004, p. 123) notes "prior research into the impact of public opinion on public policy offers surprisingly little insight into exactly how elites figure out what the public is thinking." I might expect these problems of perceptions to be greater in

illiberal democracies with threats to press and academic freedom. One reason why representatives may differ in their home styles, even if they represent otherwise similar constituencies, is because they may differ in how they invest in perceiving their constituencies. A prerequisite for a representative to tailor her appeals to her constituents is to know what her constituents think and want from politics. But there are many ways in which a representative can learn this information, such as convening confidants, meeting with activists, seeking out interest group leaders, or commissioning public opinion polls. The decisions that representatives make in how they go about learning what they believe their constituents care about will then reflect itself in how they communicate back to their constituents through a home style.

In this paper, I focus on the home style of Turkish Members of Parliament. Despite enjoying competitive multi-party elections since 1946, Turkey is generally considered to be an illiberal democracy where civil liberties are limited and the minority group of an ideological cleavage is repressed (Freedom House 2016). For this precise reason, conducting research in these countries, where civil liberties are systemically violated, is difficult. Therefore, despite comprising one of the most common forms of governance, my knowledge on competitive authoritarian states is based on methods that are less comprehensive than those employed in liberal democracies. This study hopes to contribute to the literature by providing quasi-experimental evidence on whether voter preferences affect politician behavior and representative style. In the sections that follow, I first develop my framework of perception in determining a home style before presenting the empirical evidence using multiple research methodologies: in-depth qualitative interviews with Turkish MPs and political consultants, an observational study with millions of Turkish MPs' tweets, and an experiment in which I exogenously provide public opinion polling to MPs to observe how this information changes their public communications.

2.2 A Resource Theory of Perception and Home Style

Before beginning his exploration of homestyle, Fenno (1978, p. xiii) begins by asking "What does an elected representative see when he or she sees a constituency?" The act of looking at a constituency, what I refer to as perception, is a technological decision. When examining a landscape, an explorer might use her plain eyesight, binoculars, a telescope, or rely on first-hand accounts from others who have been there. Which technology she uses influences her perception of that landscape: while a telescope might lead the explorer to emphasize the fine details of the flora and fauna, her plain eyesight might have her focus more on the topography.

Similarly, elected officials can choose to invest in a number of technologies, used in a loose sense, to learn about their constituents. An elected official can read local news coverage, meet with business leaders, travel home to the constituency, or conduct polls. Different technologies to learn constituent opinion contain different biases in the constituency that a representative sees. For example, as Miler (2010) shows, members of the U.S. Congress are far more likely to "see" indi-

viduals who donate to their campaigns and contact the legislative office, which leads legislators to vote more in favor of these subsets of constituents.

Different elected officials choose to invest in different technologies for a number of reasons. In this paper, I build on Greene (2007) who presents a resource theory of single-party dominance. Greene presents a formal model where dominant parties, through their incumbency advantages, gain asymmetric resources not available to challenger parties. For example, because an incumbent party is dominant, private donors may be less willing to fund challenger parties who are viewed as having little chance of succeeding. This asymmetry may be in exacerbated in illiberal democracies where the threats of retribution from supporting challenger parties are non-trivial. Moreover, as discussed Baysan (2018), when voters are polarized, upfront investments are required to learn how to target voters.

Because of these resource asymmetries and threats of retribution, challenger parties in illiberal democracies may not be able to invest in access costly electoral technologies that the incumbent party can. Specifically, in this paper I focus on access to high-quality, public opinion polls. When it comes to formulating a homestyle that will have the most broad-based appeal, polling information is likely a necessary ingredient. Without access to polling, a party's communications must rely on other, more biased sources to approximate public opinion, such as newspaper coverage or conversations with activists.

In developed countries, like the U.S., the funds that are available to each party is public and the asymmetry is marginal. In the case of Turkey, an incumbent resource advantage was institutionalized by the current incumbent party in 2003 after a period of instability in which it swept into power. The article that was reconstituted by the incumbent stipulates that state funding is proportional to vote share. At the time, the incumbent had a large majority in the Parliament and could implement this policy without dissent. Therefore, since its first term in office starting 14 years ago, the incumbent has had double the state funding relative to the second largest party. Aside from the allocation of state funds, the AKP has had a reputation of engaging intimately with voters through a grassroots approach that other parties have not. It is outside the realm of this study to discuss the origins of the different approaches that political parties took in Turkey to affect voting behavior. Regardless, scholars and pundits in Turkey agree that the investments made by the incumbent party to learn about their constituents is significant. This is not necessarily a view that is corroborated by the literature in political science or political economy.

When it comes to constituent perceptions, the incumbent in Turkey is far more sophisticated than the main opposition party. In Study 1, I use in-depth interviews with Turkish political consultants and MPs of both parties to demonstrate that the incumbent regularly conducts their detailed polling of constituent preferences while the opposition does not. In Study 2, I use an observational study of millions of MPs' tweets to investigate the consequences of these differences in constituent preferences. I find that the incumbent MPs are far better at tailoring their public communications to those constituent preferences than opposition MPs. Finally, in Study 3, I exogenously provided MPs of both parties with detailed polling to measure how this information provision changes what

issues they focus on in their public tweets. Consistent with my framework of perception, I find that providing the incumbent MPs with this polling data has no effect because they are already communicating on the issues most important to their constituents. On the other hand, opposition MPs increase their frequency of tweeting on the issues most salient to their constituents after I provide them polling information.

2.3 Study 1: Interviews of Turkish MPs and Political Consultants

Starting in January 2016, relationships were built with local academics, journalists, and data collection companies. Conversations with both experts and voters contributed to the development of a voter survey conducted in October 2016, which is discussed in greater detail below. Having established these interviews before the coup attempt took place in July 2016 facilitated the ability to continue the survey as planned and to gain permission to enter the parliament.

In conducting this survey, I worked with KONDA, a polling and data collection firm based in Istanbul. KONDA is considered to be Turkey's leading polling organization.[2] KONDA, as well as other companies I spoke to, provided information on how frequently Turkey's political parties conduct surveys of voters. They noted that the main opposition party does not collect data on voter information and does not have personal relations with any of the polling companies. The incumbent, on the other hand, has working relationships with other polling companies, but also collects its own data.[3]

Interviews with MPs confirmed that the incumbent systematically conducts polling while the opposition does not. In January 2016, I conducted 40 formal interviews with MPs.[4] All MPs representing the same 11 constituencies were contacted and asked for an intervew.[5]

The specific purpose of the structured interviews was to learn the voter information that MPs already have access to, the funding sources for their voter information, their knowledge about their constituents, and their policy positions. In each interview, the MPs were asked the share of voters in their constituency that Completely Disagreed, Disagreed, Agree, and Completely Disagreed to various questions that had been asked in the voter survey. The average time of the interviews were

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[2]Yörük (2012, p. 521) describe KONDA as "one of the leading public opinion research institutes in Turkey" and Haynes (2010, p. 320) similarly note that KONDA is "one of Turkey's most respected polling organisations."

[3]Kuyucu (2017) notes that every month, the incumbent conducts its own systematic voter surveys."

[4]These interviews were disproportionately with the main opposition party. This is because of availability. It was easier to promptly get interviews the opposition. Only a small number of MPs from either party rejected an interview, but there was a greater delay in setting up appointments with the incumbent because of their intense schedule.

[5]At the time of the study, once inside the Parliament, it is permitted to knock on the doors of MPs' offices at random. However, to enter the Parliament, an appointment and citizen identification is required.

42 minutes, with the minimum being 20 minutes and maximum being close to 2 hours.

During these interviews, it became obvious that the incumbent party systematically and nearly monthly collects voter information at a geographically disaggregated level (province or district) while the opposition party does not. In some interviews, MPs from the incumbent AKP party were emphatic that surveying voter preferences is a fundamental part of democracy and aligned with the values of their party. One of the MPs, who has a relatively high leadership position and was a part of the committee that collects and sees the raw data, wanted to compare the results of their survey to the one conducted for this study. Not all of the MPs directly view the results of the survey conducted by their party, but know that their party collects them and that instructions on how to approach their constituents are based on this information.

Interviews with the opposition party were a stark contrast to those with the incumbent. It was clearly established that MPs from opposition party at best have access to surveys that are nationally representative (despite not even having representation in 38 out of 81 provinces.) In addition, these surveys mainly cover horse-race predictions for upcoming elections but not constituent policy preferences. Many of the MPs were enthusiastic about the survey in this study and it was clear that the results would be novel information to them. It was even arranged that I meet the party leader to share the survey information. It was unclear if the opposition did not have access to voter information because their leadership and other members of the party did not want to align their policies with the majority of voters for ideological reasons or because they faced a resource constraint.

Overall, the in-depth interviews with Turkish political consultants and MPs clearly established that the majority AKP regularly conducts detailed surveys of constituent preferences while the opposition does not. In the next two studies, I turn to the effects that access to data on constituent preferences has on elected officials' public communications.

2.4   Study 2: Observational Study of MPs' Communications

2.4.1   Voter Data

The voter survey conducted by KONDA took place three months after the attempted coup with a sample of 1,770 voters in 11 constituencies of Turkey. Voters were surveyed on their policy preferences. After responding to basic questions on demographics, respondents were asked to list the issues most important to them and were asked in an open format. Respondents were then asked on a 7-point Likert scale the degree to which they agreed or disagreed with various policies. Topics included the economy, religious freedom and practices, terrorism and national security, the state of

emergency and arrests, the Kurdish issue, and gender equality.[6] To construct the questionnaire, I referenced a number of resources: KONDA's database with all voter survey questions it has asked since its inception; the 2011 Turkish Election Study (TES); issues most mentioned in Tweets by MPs, focus groups with voters, and the interviews with MPs.

2.4.2 Politician Data

In developed countries, legislator voting behavior is observable to the public. In Turkey, many policy proposals are voted on secretly. In addition, the incumbent party has had a majority in Parliament since 2003. For this reason, the opposition rarely shows up to vote on policies. So, how do voters in countries like Turkey form preferences on their legislators? One possibility is that politicians inform their voters through the media. However, there is also high censorship in Turkey. Therefore, social media, like Twitter, provides an alternative platform for voters to form opinions of their politicians through social media. Even in the U.S., I have seen how Twitter is used to bypass traditional forms of communication with the public. In another example, a recent study provides evidence that joining Twitter increases contributions politicians receive from individual donors (Petrova et al. (2017)).

Twitter activity is high among politicians in Turkey. 95% of MPs in both the incumbent and opposition parties use Twitter. Over a ten month period in 2016, the average number of tweets per day among the opposition party is 3 and the median is .8. The average number of tweets per day for the incumbent was 2.4 and the median was .88 over the same period.

Figure 2.1 shows a measure of the most used words within each party. After scraping the tweets of all MPs, I dropped all words that were of length one and that were retweets.[7] I also dropped words that were in the top 3 percentile in terms of most used words. I then manually stemmed all words.[8] To construct Figure 2.1, I restricted the data to the most used words within each party. For the sake of providing information on what MPs tweet about, I removed words without substantial meaning, like "today."

The table shows that the incumbent tweets substantially about terrorism; words like "casualty" are also strongly associated with terrorist activity. The incumbent's Twitter behavior is consistent with the fact that in the voter survey, incumbent voters report terrorism as the issue of highest concern to them. Figure 2.1 shows that the opposition party does not discuss the economy that much. While they do discuss terrorism, they are more likely to use words related to human rights and the media.

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[6]During the interview, respondents were shown a colored Likert scale on a card where only the endpoints were labeled with "Completely disagree" and "Completely agree."

[7]Approximately 30% of tweets are retweets across both parties.

[8]I originally intended to use a package that conducts stemming in Turkish, but at the time of analysis, the stemmer under the Porter website performed poorly. However, a package in R called Resha came out later. I compared the manual stemming procedure to this one and find that the results do not change.

This is in contrast to the fact that even the majority of opposition party supporters do not disagree with the arrests. In addition, opposition voters report the economy as the most important issue to them. Overall, the opposition party's Twitter behavior is less consistent with the results from the voter survey and provides descriptive evidence of the asymmetry of voter knowledge across the two parties.

2.5   Study 3: Politician Experiment

To test whether the incumbency resource advantage translates into a voter information advantage, MPs were sent the voter report. The report was sent in mid-January 2016. The timing of the report was purposely after the proposal to go to a referendum had passed within the parliament. At the time that the report was sent, the MPs did not know the exact date of the referendum, but it was expected to be within 2-4 months. When the MPs were sent the report by e-mail they were asked to respond to two questions at the end of the report. With the help of a couple of staff members in parliament, all of the treated MPs' doors were knocked on to notify them that a voter report had been sent. MPs are rarely in their offices, since the plenary sessions are in a separate building, but their three advisors are in the office every day. Staff members and MPs are not necessarily responsive by e-mail and so knocking on the doors increased the likelihood that the report would be seen. If someone did not open their door, they received a follow-up phone call. The two questions at the end of the report asked if the MP would want additional voter information and the type of information they wanted. Importantly, 25% of MPs from the opposition party and only 1% of the incumbent MPs responded to the e-mail.

All MPs who responded to the first e-mail were eventually contacted and asked if they wanted to do a research project with their own resources. It is this interaction that led to the voter campaign experiment. Given the interviews and response rate to the e-mail with the voter report, it was not expected for the incumbent to express any interest and only a few party members from the opposition had an organized set of volunteers that could carry out a reasonable project. So, the opportunity to do a research project was non-partisan, but it became clear that only the opposition would take up the offer because they were not already investing in learning voter information.

2.5.1   Empirical Design

The first part of the voter report stated that MIT and UC Berkeley funded the survey, my affiliation, and that the survey had been implemented in partnership with KONDA. The sampling scheme was also outlined and the confidence intervals were provided for each result. The first result mentioned in the voter report was that the two issues most important to voters were reported as the economy and terrorism. The rest of the report then included voter preferences on policies regarding those

two issues; for example, voters were asked whether they supported the government funded large infrastructure projects, welfare programs are insufficient, the arrests made during the ongoing state of emergency were necessary, etc. MPs in the treatment group received the voter report and the control group received nothing. Figure B1 provides an example of the content in the report.

Randomization was conducted at the MP level for the incumbent party. Across 9 constituencies, 48 MPs were randomly selected into the treatment group and 48 were randomly selected into the control group.

Estimation for AKP follows the randomization design:

$$Y_{it}^j = \alpha + \beta T_{it} + \epsilon_{it} \tag{2.1}$$

Where Y_{it}^j is the number of times MP i said word j per week t. T indicates whether MP i is in the treatment group.

A series of arrests among members of the opposition party started at the end of October and this led to a reduction in sample size.[9] Since I wanted to estimate the treatment effect separately for the incumbent and opposition parties, I had to switch to a difference-in-differences experimental design with the opposition party. For this reason, instead of randomly selecting MPs from the opposition party into treatment or control within the 9 constituencies, as I did for the incumbent, all opposition MPs in the 9 constituencies were treated. In the end, there are 70 MPs from the opposition party in the 9 Treatment constituencies and 61 MPs in the 38 control constituencies.

Estimation for the CHP follows a difference-in-difference design:

$$Y_{irt}^j = \delta_i + \gamma_t + \sum_{-6}^{-1} \beta_{-t} D_{rt} + \sum_{1}^{5} \beta_t D_{rt} + \epsilon_{irt} \tag{2.2}$$

where D_{rt} is the interaction of the time dummies and the treatment; the lead coefficients (β_{-t}) are for the pre-intervention period and lag coefficients for post; Y_{irt}^j is the number of times MP i said word j per week t in constituency r; δ_i are MP fixed effects; γ_t are week fixed effects; standard errors are clustered at the province level. The words of interest, j, include "Ekonomi" (economy) and "Teror" (terrorism) since these are the words most used by respondents when reporting the issues most important to them.

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[9]Originally, MPs from both the HDP and the CHP were a part of the experiment as the opposition parties. Starting at the end of October, many MPs from the HDP were detained and so I could only conduct the experiment with the main opposition party, the CHP.

2.5.2 Results

I show the results for both parties in terms of figures and looking at the difference-in-difference between the treatment and control groups. However, in the figures, I include more leads than in the difference-in-differences specification in equation 2, which is shown in the results provided in Table B4. In Figure 2.3, I see that there is no discernible effect of the treatment on the number of times an incumbent MP used the word "terrorism," but I do see an increasing among the opposition in Figure 2.2. The spikes in the figure relate to actual terrorist attacks during this period. The treatment has a large effect on the number of times that an MP uses the word "economy." Since there are a small number of treatment clusters for the difference-in-differences estimate, I conducted randomization inference to correct the standard errors. The results of this exercise can be found in Figure B2 Again, I do not see any effect among the incumbent MPs. The balance test and estimation results for the incumbent are shown in Tables B1, B2, and B3.

It is worth noting that neither party discusses the economy that much. This could be because they use other words to describe the economy, but I see that the opposition party was most responsive to the word "economy." This may reflect that they realized it is more important to voters than issues like civil liberties. Moreover, it is not surprising that the incumbent discusses the economy infrequently because economic conditions are doing poorly and they are unable to implement successful policy when national security is so low. In contrast, they can have a successful platform on increasing national security to lower terrorist activity. This sort of platform is consistent with their desire to hold the referendum right after the attempted coup and argue that weakening constraints on the executive would increase stability. The voter survey also indicates that the majority of their core voters stated terrorism as their primary issue of concern.

2.6 A Discussion: Incumbent Resource Advantage in Voter Information Acquisition

Results from the politician experiment show that the opposition responds to basic information on voters, suggesting that, on average, they did not have high quality voter data to change any of the votes in the referendum. Hypothetically, they should only have responded to the information if it was better than what they had.[10] In contrast, I cannot reject that the incumbent responds to the same basic information on voters. Moreover, in the interviews, it was clear that the incumbent invests heavily in collecting voter data.

In this section, I summarize an explanation as to why the opposition does not have high quality voter data and why there is an asymmetry between the parties. First, the voter model, which

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[10]It should also be noted that they did not cite this study in their tweets. Instead, the tweets made in response to the voter report specifically increased discussion on the economy and terrorism.

is supported by the empirical evidence, clarifies that expensive voter data is necessary in order to target information. Moreover, the entire experiment that was conducted resulted in a monetary loss for the party because they could not increase the aggregate "No" vote share in the sampled areas. This implies that there is an upfront fixed cost required for a targeted door-to-door campaigning before one can expect to increase vote share. Without investing to learn through experimentation, the party would not know how to increase its vote share. In contrast, "blanket" door-to-door campaigning requires less information about voters, but any marginal investment will not increase vote share, as seen in the door-to-door campaign. The fact that only the opposition responds to basic voter information suggests that one reason they have been unable to learn how to effectively contest for votes is that they are resource constrained.

In the case of Turkey, an incumbent resource advantage was institutionalized by the current incumbent party in 2003 after a period of instability in which it swept into power. The article that was reconstituted by the incumbent stipulates that state funding is proportional to vote share. At the time, the incumbent had a large majority in the Parliament and could implement this policy without dissent. Therefore, since its first term in office starting 14 years ago, the incumbent has had double the state funding relative to the second largest party. In this case, they simply are able to use state financing to collect sophisticated voter information. In contrast, the opposition would have to supplement its state funding from private sources in order to be as competitive as the incumbent in contesting for non-ideological votes. In Section 4.3.1 of the Appendix, I describe this argument more formally and extend the argument under the consideration that the opposition could access private capital. I refer to theories of rational predation to explain a persistent competitive advantage even if private sources of capital were available (Bolton and Scharfstein 1990).

One final note on the design is the Stable Unit Treatment Value Assumption (SUTVA). Under both the difference-in-differences and randomized experiment, I assume that information given to a treated MP does not "spill over" to control MPs. Insofar as this assumption may be violated, my estimated treatment effects are nevertheless biased toward zero (Aronow and Samii 2017). My estimates of the effects of access to public opinion data on MPs' tweets can therefore be taken as conservative estimates.

2.7   Conclusion

This paper has provided novel evidence on how elected officials in an illiberal democracy develop their style of public communication. Building on my framework of constituent perception, I show first in my in-depth interviews that of Turkey's two main parties, only the incumbent regularly has access to detailed polling while the opposition does not. Then, analyzing tweets from MPs in these two parties, I show that the incumbent is significantly more likely to match their public communications to issues their constituents care about than the opposition. Finally, by exogenously providing MPs polling data, I find that elected officials are responsive. Opposition MPs, who

otherwise lack access to high-quality polling, became far more likely to tweet about the salient issue of the economy when provided with this information compared to control MPs.

Substantively, this paper demonstrates that even in an illiberal democracy, elected officials from both the incumbent and opposition parties are responsive to public opinion on policy issues. Elected officials in these contexts do more than appeal to pre-existing ethnic and religious cleavages or garner votes through distributive policies. Elected officials actively track public opinion and tailor their communications accordingly.

Left unanswered in these studies is the political and policy consequences of elected officials mirroring their communications to match their constituent concerns. Are elected officials merely employing cheap talk where they pay lip service to these issues but otherwise leave them unaddressed? Or are public communications a good proxy for legislative attention to an issue? My initial finding of responsiveness suggests that future research ought to consider these questions.

Figure 2.1: Stems

| AKP			CHP		
Stem	**Stem Share**	**Bigram**	**Stem**	**Stem Share**	**Bigram**
president	3,99%	president honorable	president	3,52%	president republic
casualty	3,07%	casualty done	republic	2,48%	republic democracy
terrorism	2,90%	terrorism organization	kilicdaroglu	2,37%	kilicdaroglu talking
republic	2,79%	republic erdogan	person	2,12%	human rights
god	2,64%	god mercy	nation	2,08%	country govern
mercy	2,48%	mercy injure	constitution	1,84%	constitution change
prime	2,37%	prime minister yildirim	terrorism	1,76%	terror attack
citizen	2,18%	citizen between	news	1,75%	#newspaperspokes
nation	2,06%	nation people	coup	1,62%	coup entry
district	1,90%	district head	democracy	1,60%	democracy secularism
july	1,69%	july coup	feto	1,45%	feto effort
attack	1,67%	attack casualty	casualty	1,45%	casualty one
feto	1,57%	feto coup	tbmm	1,33%	tbmm board
coup	1,48%	coup entry	attack	1,30%	attack casualty
unity	1,41%	unity together	parliament	1,26%	parliament president
person	1,37%	person thanks	children	1,25%	children come
minister	1,36%	minister honorable	district	1,14%	district organization
parliament	1,35%	parliament meet	citizen	1,09%	citizen holiday
work	1,28%	work about	state	1,08%	state govern
family	1,28%	family responsible	student	1,08%	student student
pkk	1,23%	pkk terror	ataturk	1,05%	ataturk his
turk	1,23%	turk people	organization	1,05%	organization unity
visit	1,21%	visit found	visit	1,02%	visit did
tbmm	1,12%	tbmm general	unity	0,99%	unity together
national	1,11%	national space/recipient	mercy	0,99%	mercy injured
democracy	1,09%	democracy casualty	struggle	0,99%	struggle continue
veteran	1,08%	veteran is	law	0,94%	law state
constitution	1,03%	constitution change	god	0,92%	god mercy
organization	1,02%	organization effort	media	0,90%	media follow
healing	1,01%	healing wish	director	0,89%	director board
state	1,01%	state people	freedom	0,84%	freedom democracy
injured	0,99%	injured urgent	arrest	0,80%	arrest journalist
erdogan	0,94%	#reppresterdogan terror	minister	0,80%	minister board
struggle	0,94%	struggle doer	rights	0,80%	rights day
province	0,91%	province head	blame	0,79%	blame not
traitor	0,90%	traitor attack	power	0,79%	power party
yildirim	0,84%	binali yildirim	education	0,76%	education student
municipality	0,81%	municipality head	work	0,76%	work continue
teacher	0,81%	teacher day	municipality	0,76%	municipality head
chp	0,80%	chp general	turk	0,74%	turk people
board	0,77%	board member	young	0,74%	young arm
urgent	0,77%	urgent healing	woman	0,74%	woman arm
holiday	0,76%	holiday celebrate	peace	0,71%	peace sibling
head	0,72%	head condolence	government	0,69%	government terror
opening	0,71%	opening ceremony	soldier	0,66%	soldier god
program	0,70%	program join	learn	0,66%	learn student
director	0,69%	director board	verdict	0,66%	verdict tie
woman	0,69%	women arm	holiday	0,63%	holiday cellebrate
young	0,69%	young arm	province	0,58%	province head
service	0,62%	service do	live	0,58%	live broadcast
soldier	0,60%	soldier god	economy	0,57%	economy crisis
committee	0,58%	commission meet	foreign	0,57%	foreign politics

Stem share ranks the most used words by party after the coup and before the experiment with voters. Bigram shows the most used subsequent word for each most used word. To construct this table, I restricted the data to the most used words within each party. For the sake of providing information on what MPs tweet about, I removed words without substantial meaning, like "today."

Figure 2.2: Terrorism tweets by Opposition
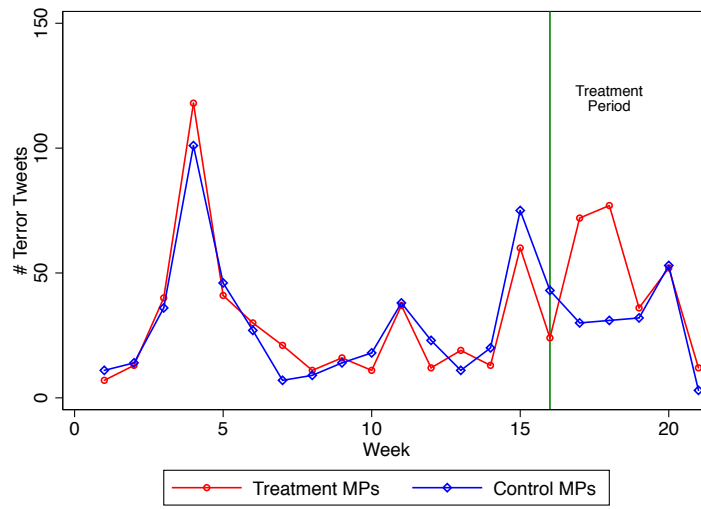
The outcome variable includes the total number of times that an MP from the incumbent tweeted the word Economy

Figure 2.3: Terrorism tweets by Incumbent
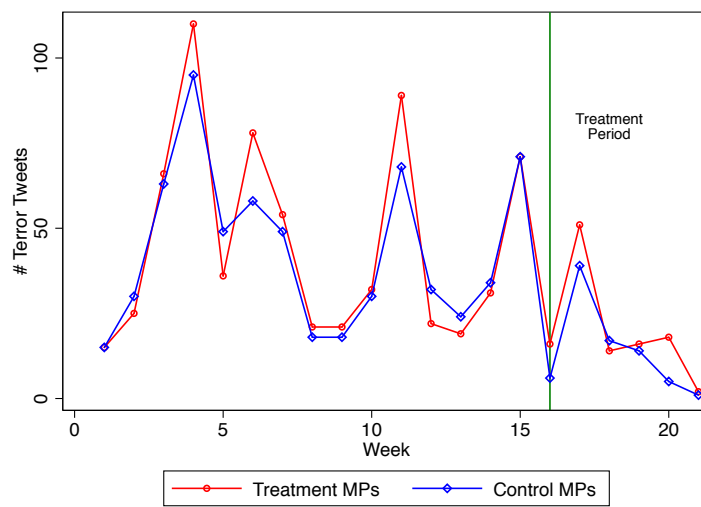
and Terrorism in a given word in a week. The green line marks when the voter information report was sent. The x-axis includes each week.

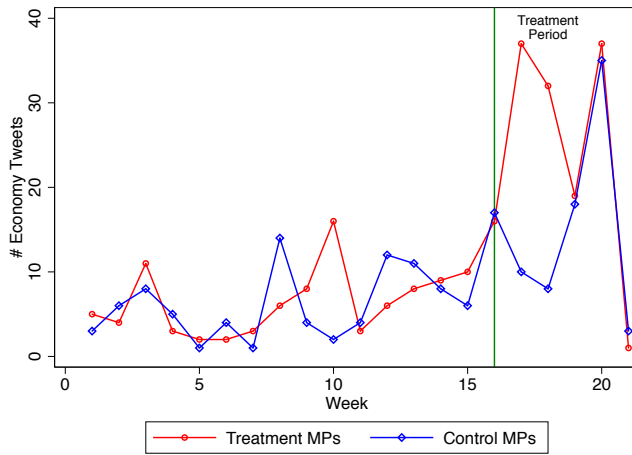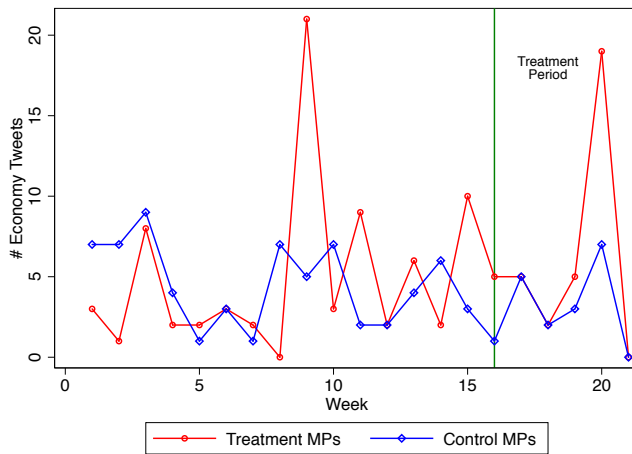**Figure 2.4:** Economy tweets by Opposition

Figure 2.5: Economy tweets by Incumbent

The outcome variable includes the total number of times that an MP from the opposition tweeted the word Economy and Terrorism in a given word in a week. The green line marks when the voter information report was sent. The x-axis includes each week.

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Chapter 3

Economic and Non-Economic Factors in Violence: Evidence from Organized Crime, Suicides and Climate in Mexico

3.1 Introduction

To date, economic models of violence treat interpersonal and intergroup violence as very different phenomena. Instances of interpersonal violence, such as assault and murder, are generally thought of as "crimes" that may have either an economic or emotional motivation—assaulting an individual in order to expropriate their assets is clearly economic, whereas "crimes of passion" are a commonsense notion reflecting emotional factors. In contrast, violence between groups of individuals is almost always modeled as a strategic calculation where the economic costs of conflict are weighed against potential gains. In many cases, this decision to focus on economic factors is well-motivated and generates sharp predictions that often agree with data (Collier and Hoeffler 1998; Miguel et al. 2004; Angrist and Kugler 2008; Berman et al. 2011; Besley and Persson 2011; Dube and Vargas 2013). Here we propose that noneconomic factors could also play an important role in causing intergroup violence, alongside known economic factors. This idea narrows the gap between models of interpersonal violence and intergroup violence, and accordingly we augment a standard model of strategic conflict by including noneconomic factors already accounted for in models of interpersonal violence. We then demonstrate that this richer model is better able to account for observed patterns of violence in Mexico, a unique context where we are able to study both interpersonal and intergroup homicide in a common setting and where levels of violence are high.

In an ideal experiment designed to test whether noneconomic factors influence intergroup vio-

lence, one might manipulate the psychological state of all the individuals within a group and observe whether the overall level of violence between that group and nearby groups changed. That experiment is clearly neither feasible nor desirable, so instead we leverage an emerging "stylized fact" in the environment-economy literature: the frequently observed positive relationship between changes in temperature and human conflict (Hsiang et al. 2013). This temperature-conflict relationship has now been documented across diverse geographic settings and for many types of human conflict, ranging from institutional collapse to civil war, riots, and crime, and estimate effect sizes in these studies are often large. For instance, recent meta-analyses report average effect sizes of a roughly 10% increase in intergroup violence per 1σ increase in temperature (Burke et al. 2015). This implies a large historical role for temperature variation in shaping conflict risk, and an even larger potential role for future climate change in shaping these outcomes, given the anticipated $>4\sigma$ increase in temperature expected across much of the tropics over the next century.

Why might changes in temperature induce violence and conflict, and what can this tell us about the broader economic and noneconomic underpinnings of violence? Economists often interpret the temperature-conflict relationship as an income effect: hotter temperatures and lower rainfall are known to lower incomes, particularly in agricultural areas, and this in turn could temporarily lower the opportunity cost of participation in violence. In an early study, Miguel et al. (2004) provide empirical evidence that rainfall shocks that lower economic growth also increase the likelihood of civil war in Sub-Saharan Africa. Chassang and Padró-i-Miquel (2010) explain this result by developing a bargaining model in which violence occurs when a shock to economic productivity temporarily lowers the opportunity cost to violence, but does not affect the future value of winning the contest.

This economic hypothesis about group-level violence, however, seems incomplete in that it does not account for the observed response of individual-level violence to daily or even hourly variations in temperature, as income is unlikely to change over these short periods (Jacob et al. 2007; Card and Dahl 2009; Larrick and et al 2011; Ranson 2014). Vrij et al. (1994) offer perhaps the clearest case, where police officers were observed utilizing more violence during a training exercise when temperature in the room was manipulated to be hotter, which clearly was unrelated to economic incentives. In another laboratory experiment, which is unfortunately poorly documented, Rohles (1967) reports,

> "When [participants] were subjected to high temperatures in groups of 48, there was continual arguing needling, agitating, jibing, fist-fighting, threatening, and even an attempted knifing. At lower temperatures or in small groups, this behavior diminished."

Thus, while inter-personal violence is often conceived in economics as an action with private costs and benefits that also imposes costs on others (Becker 1968), and which agents may apply rationally to affect the allocation of resources (Donohue and Levitt 1998, Chimeli and Soares 2011, Castillo et al. 2014), it is also understood that noneconomic factors may play a role and are likely partially responsible for generating the temperature-violence link.

Given that most instances of group-level violence are, at the most basic level, implemented by individuals, this then suggests a potential additional role for noneconomic factors in intergroup violence. Consider the group member on the front lines of a conflict who is personally implementing violence on behalf of a group's strategic objectives. There are many decision points where noneconomic psychological factors likely play an important role in this individual's decision making, with the individual having some discretion in exactly how much violence to employ when contact with the opponent actually occurs. If the agent enjoys violence they may employ more of it, and if the agent dislikes violence they may employ less. Should there be many ways for these types of noneconomic factors to influence the overall level of violence employed by individuals in the group, then these noneconomic factors must be considered important elements in intergroup conflict.

We propose a unified framework in which both interpersonal and intergroup violence are influenced by economic and noneconomic factors, although their relative influence may differ (making it ultimately an empirical question). We expand a standard economic model of violence to include a pure consumption value of violence to the aggressor, which we model as a positive or negative input into utility depending on an individual's "taste for violence."[1] Introducing this single noneconomic factor and allowing it to respond positively to temperature, as indicated by prior analyses, substantially improves the ability of the model to account for observed patterns of intergroup violence.

We then test multiple hypotheses generated by this unified model in Mexico, a context where exceptional levels of violence by drug-trafficking organizations (DTOs) motivated law enforcement to gather separate data on intergroup homicides. This allows us to observe variation in comparable group-level and individual-level acts of violence, i.e. homicides in both cases, in a single context where geographical, political, and institutional factors can be "held fixed." This provides a unique opportunity to sharply compare the effect of temperature on both interpersonal and intergroup violence without this comparison being confounded by these contextual differences that usually differ between studies.[2] Such comparisons allow us to more precisely consider whether these two types of violence share a common noneconomic mechanism.

Consistent with earlier meta-analyses, we show that higher monthly temperatures have a positive and significant effect on both killings by drug-trafficking organizations (DTOs) and "normal" homicides in Mexico. Effects in both cases are contemporaneous, large in magnitude, and gener-

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[1]In a similar vein, Tauchen et al. (1991), Farmer and Tiefenthaler (1997), Bowlus and Seitz (2006), and Aizer (2010) explain domestic violence as expressive behavior that provides positive utility to some men. Their partners tolerate it in return for higher transfers. Card and Dahl (2009) adopt this interpretation of family violence as motivation to consider the role for emotional cues (or "visceral factors") in precipitating violence. They use unexpected losses in football games as the trigger for emotional cues. A key contribution here is to extend this framework beyond domestic violence and to introduce these psychological factors into the rapidly growing literature on intergroup conflict.

[2]Hsiang et al. (2013) compare results from 60 studies and find that the average effect of temperature on interpersonal violence differs substantially from the effect on intergroup violence. However, each study only examined one form of violence and none were from comparable contexts (e.g. civil war in African countries vs. cases of domestic abuse in a town in Australia), so it is difficult to draw strong inferences from any cross-study differences.

alizable across regions in Mexico. We find that a one standard deviation increase in temperature is associated with a 28% increase in drug-related killings and 5% increase in regular homicides.

We next use a variety of approaches to look directly for evidence of an economic mechanism that might explain these results. We find that such a mechanism can only partially explain patterns in DTO killings, and it has almost no explanatory power in the case of general homicides. For instance, changes in temperature have no comparable effect on non-violent and clearly economic crimes committed by DTOs, such as extortion and car theft, which we would expect to respond similarly to temperature if both were caused by a single mechanism. Similarly, random variation in the level of government social assistance through the large scale Progresa/Oportunidades program has limited effect in dampening the effect of high temperatures on group conflict, growing season temperatures matter little for harvest season violence, and other measures of economic conditions and inequality have limited predictive power in explaining the temperature-violence relationship.

We then ask whether psychological factors better explain the link between temperature and violence. Because inducing experimental variation in these factors is not possible, our approach is to ask whether patterns in the temperature response of intergroup violence mirrors the response of an outcome known to be heavily influenced by psychological factors: suicide. By introducing data on suicides in Mexico, we layer a third form of violence (intrapersonal violence) onto our two parallel data sets on interpersonal and intergroup violence in this single context. We show that suicides also respond strongly to variation in temperature, and that the pattern of this response closely matches what is observed for group-level violence across numerous dimensions: the response is linear, contemporaneous, common across regions, not mediated by observable economic factors or Progresa/Opportunidades, and only barely affected by growing season temperatures. Because suicide is strongly linked to mental illness and depression in the medical literature, and because evidence (including laboratory studies) link high temperatures to psychological responses that govern aggressive and violent behavior, we consider it a "benchmark" phenomena and interpret this pattern-matching exercise as evidence that psychological factors likely play an important role in temperature's effect on group violence.

In addition to our primary contribution on the potential role of psychology in intergroup violence, our work also contributes to the rapidly growing literature linking climate and conflict (Burke et al. 2015). We do this by adding two novel outcomes to the "spectrum of violence" known to be affected by climatic events: gang killings and suicides. Gangs are smaller and less organized than armed militias but larger and more organized than spontaneous groups, such as mobs, both of which have been previously linked to the climate. Suicides have been largely unexplored in relation to climate in the economics literature. By further expanding and filling in this spectrum of social phenomena affected by climate, this work further strengthens our confidence and understanding that climatic conditions play a fundamental role in shaping the peacefulness of modern societies (Hsiang et al. 2013). Furthermore, by providing evidence on the factors mediating the temperature-conflict link, our work contributes to a broader understanding of how we might manage the potential societal impacts of a warming planet. Unfortunately for this particular setting, our results suggest that economic interventions might have little success in mitigating the impacts

of future warming on violence.

The next section discusses some background and non-economic factors in violence. Section 3 offers a simple theoretical framework that builds on previous research to highlight and operationalize the role of non-economic factors. Section 4 presents our data and discusses our empirical strategy. In Sections 5, 6, and 7 we present and discuss our main set of results. Finally, Section 8 offers some conclusions.

3.2 Understanding Violence

3.2.1 Drug trafficking in Mexico

Mexico has experienced a large increase in violence in recent years, in large part due to the activities of drug trafficking organizations and the government's response to these activities. Sophisticated organizations trafficking illegal drugs from Mexico to the U.S. first appeared in the 1990s (Grillo 2012) but have since grown in size and sophistication, and DTOs now constitute a powerful industry that earns between 14 and 48 billion USD annually (U.S. State Department, 2009). These organizations also carry out other criminal activities including extortion and kidnapping, especially in recent years (Rios 2014). The exact number of DTOs operating varies by year, but it is generally agreed that they rose from 6 in 2007 to approximately 16 in 2010 (Guerrero 2012a). Many of these new organizations are factions of older groups, an event that tends to occur after leaders are arrested or killed as a result of conflicts within and between organizations.[3]

Accompanying the large increase in DTOs was a large escalation of violence beginning in 2007, which has since claimed over 50,000 lives (Dell 2015) and which has been the focus of much media and academic attention. Following the presidential election of 2006, president Felipe Calderón declared war on the drug trafficking organizations. Shortly after this event, crackdowns spread through the country, and violence escalated to unprecedented levels (see Merino 2011, Guerrero 2011b, and Escalante 2011). Several factors have been offered as causes of this escalation: (1) Felipe Calderón's strategy against organized crime, i.e. direct crackdowns and captures of DTO leaders (Guerrero 2010, Calderón et al. 2013, Chaidez 2014, Dell 2015), (2) U.S.–Colombia efforts to reduce drug flows between both countries, a supply shock that affects drug markets in Mexico (Castillo et al. 2014), and (3) exogenous movements in the international price of corn, which is the main staple crop in Mexico and whose price affects the opportunity cost of joining the drug industry (Dube et al. 2014). The relative contribution of each of these factors is, however, a matter

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[3]In 2008, for example, the Sinaloa's leader was captured and, as a consequence, this organization split. Right after this event, a war between *Sinaloa* cartel and *La Famila Michoacana* began. The state of Guerrero, where both cartels operated in previous years, was the site for most of the violence associated with this fight (Guerrero 2012b and Rios 2013). Guerrero (2011a) discusses the issue of DTO fractionalisation in greater detail.

of ongoing debate among scholars. To our knowledge, this paper is the first to link DTO violence to climate shocks.

3.2.2 Non-economic factors in violence

A large body of economics research has dissected the economic logic for violence and documented the role that economic factors can play in violence in many settings (Miguel et al. 2004; Angrist and Kugler 2008; Berman et al. 2011; Besley and Persson 2011; Dube and Vargas 2013). This work would also seem to provide a *prima facie* explanation for the now well-documented role that changes in temperature appear to play in instigating violence and human conflict (Hsiang et al. 2013; Burke et al. 2015), given that changes in temperature are also known to induce variation in both agricultural and non-agricultural incomes (Dell et al. 2012; Hsiang 2010).

Accumulating scientific evidence, however, also points toward an important role for physiological and psychological factors in explaining certain types of human violence, and importantly (for our purposes) also the potential for temperature to shape these non-economic factors. For instance, the psychological roots of *intra*personal violence – i.e. suicide – have been well documented, and the role of temperature in this particular type of violence as well as in interpersonal human aggression have been explored since at least the 1930s.[4] While scientific understanding of temperature regulation in the human body remains imperfect (e.g., Hammel 1974, Werner 1980, Cooper 2002, and Mekjavic and Eiken 2006)), there is growing evidence that neural structures are directly involved in this process (Benzinger 1970; Morrison et al. 2008; Ray et al. 2011). This is important because particular nerotransmitters that have been shown to participate in body temperature regulation – in particular, serotonin – have also been linked to mood, emotion, and range of important human behaviors (National Institutes of Health 2011; Lovheim 2012). For serotonin specifically, there is growing consensus that decreased serotonergic neurotransmission in the brain may be an important neurobiological deficit that leads to aggressive behavior (Edwards and Kravitz 1997; Seo et al. 2008).

Thus there appears to be support in the medical literature for a physiological link between temperature and violent behavior: when ambient temperature increases, serotonin levels decrease, with attendant effects on impulsive and aggressive behavior. This link has thus far only been implicated in intrapersonal violence (suicide). Our goal is to understand whether these non-economic factors are important enough to also play a role in group-level violence in general, and more specifically to understand whether they could mediate the observed responsiveness of both interpersonal and group violence to changes in temperature.

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[4]See the Appendix for a review of the literature estimating the relationship between temperature and suicide and the seasonality of suicides. For example, Baron and Bell (1976) show that individuals were more likely to behave aggressively towards others when ambient temperature was higher.

3.3   Theoretical Framework

To understand how these non-economic physiological and psychological factors might comple-
ment the standard way in which economists have understood the logic of violence, we develop a
simple model of violence that builds on the framework in Chassang and Padró-i-Miquel (2010)
but incorporates a new potential mechanism affecting how high temperature can lead to violence.
In the model, two sides, $i \in \mathcal{I} = \{1, 2\}$, decide whether or not to engage in costly violence and
redistribution when bargaining fails. The players cannot commit to not engage in conflict for an
infinite number of periods, where time is indexed by t. Each player combines l units of labor,
which we normalize to $l = 1$, with productivity θ_t.

The sides can engage in two possible actions, namely being violent or peaceful, $a \in \mathcal{A} = \{V, P\}$,
which they choose simultaneously. Both groups want to maximize their economic output at the
end of the game. If one player attacks first, then it has a first strike advantage and captures all of
the opponent's output with probability $p > 0.5$. An attack costs both the aggressor and defender
a fraction $c \in (0, 1]$ of output. If both agents choose to attack simultaneously, they each win with
probability 0.5. Additionally, we assume there is common knowledge of a non-rival psychological
consumption value for violence, which is a function of temperature τ, i.e. $\gamma_t = \gamma_t(\tau)$ with $\frac{\partial \gamma_t(\tau)}{\partial \tau} >$
0, and $\gamma_t(\tau) \in \mathbb{R}$. If $\gamma_t(\tau) > 0$ then the player gains positive utility from violence. We omit the
argument, τ, in setting up the model, but return to it when discussing its role in explaining violence
through different channels.

We consider a dynamic model where the two groups interact in every period t. There is at most one
round of fighting and the winning group reaps the benefits of its prize into the future. If there is
no attack in the current period, then each agent expects a peaceful continuation value V^P, which is
the discounted (δ) per capita utility of expected future consumption from the player's initial assets
and which captures expectations of future values of all parameters. Similarly, if one side wins,
then they have a continuation value of winning V^V which is the per capita expected utility from
consumption of both their initial assets and the assets that they capture from their opponent.

We can write the condition for peace, incorporating the psychological consumption value for vio-
lence, γ_t, as:

$$\underbrace{\theta_t + \delta V^P}_{value\ of\ peace} \quad > \quad \underbrace{p(2\theta_t(1 - c) + \delta V^V) + \gamma_t}_{value\ of\ violence} \tag{3.1}$$

In interpreting the above, a player finds it privately beneficial to choose peace if the per capita
value of consuming all output with initial assets plus discounted expected utility under peace δV^P
(left hand side) exceeds the expected utility of consumption from both the player''s original assets
and captured assets, less expenditures on the conflict, plus the expected continuation value $p\delta V^sV$
and the psychological consumption value of violence (right hand side).

We then rearrange (3.1) so that the condition for peace becomes:

$$\theta_t(1 - 2p(1 - c)) - \gamma_t \quad > \quad \delta[pV^V - V^P] \tag{3.2}$$

where the left side of the inequality is the marginal value of peace in the current period weighed against the discounted marginal expected utility from attacking on the right side.

In considering the mechanism, the economics literature on conflict has focused on the impact of temperature on θ_t in explaining violence. The left hand side of (3.2) shows that if economic conditions are sufficiently bad (i.e., θ_t is sufficiently close to zero), and ignoring psychological factors for the moment, conflict will occur. For example, a drought has a contemporaneous effect on productivity, which reduces the current opportunity cost of conflict more than it alters the continuation value of peace (note that θ_t does not feature in the right hand side).

In the model above, we highlighted the importance of the non-rival psychological consumption value for violence, γ_t. If climatic conditions influence γ_t by increasing the utility (or decreasing the psychological cost) of acting violently, i.e., $\frac{\partial \gamma_t(\tau)}{\partial \tau} > 0$, then these changes may increase the likelihood that (3.2) does not hold and violence occurs.[5] That said if the sides have a general dislike of violence ($\gamma_t(\tau) < 0$), then there will be less conflict than that predicted by economic factors alone.

3.4 Empirical Framework

3.4.1 Data and descriptive statistics

We collected monthly information on reported homicides and suicides at the municipality level from Mexico's Bureau of Statistics (INEGI) for the period between January 1990 and December 2010.[6] This data corresponds to the universe of homicides and suicides officially reported. To avoid confounding with the Mexican Drug War, we split this time frame in a "pre-war" period between January of 1990 and December of 2006, and a "war" period between January of 2007 and December of 2010. Our empirical analysis focuses on the pre-war period when analyzing homicides and suicides, and on the war period when studying drug-related killings (henceforth DTO

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[5] An alternative is to introduce a physiological mechanism discussed in the literature on cognition. A number of studies have reported the importance of environmental factors, such as heat, on cognitive performance (Mackworth 1946, Fine and Kobrick 1978). Fine and Kobrick (1978) found that heat has significant effects on the ability of individuals to perform complex cognitive tasks involved in artillery fire and in which they were trained. In the above model, we can think of this effect as an additive error term, ϵ, whose variance increases with temperature, in which the players simply err in making their decision to fight, a decision they might not male at lower temperatures.

[6] In this section we discuss the main variables to be used in the empirical analysis. Additional data, and the corresponding descriptive statistics, can be found in the Online Appendix.

killings). In the pre-war period there were a total of 218,970 homicides and 55,206 suicides, with a monthly per municipality average (standard deviation) of 0.44 (2.49) and 0.11 (0.77), respectively.

The empirical analysis uses the total number of deaths per 100,000 inhabitants as the dependent variable, as is standard in the literature (see Hsiang et al. 2013). Figure **??** shows the time series and cross sectional variation for DTO killings and homicides for all municipalities. Table 3.1 presents descriptive statistics for these variables in the two periods of interest. We observe an average of 0.98 homicides and 0.21 suicides per 100,000 inhabitants per municipality-month in the pre-war period, and an average of 0.83 homicides and 0.26 suicides between years 2007 and 2010. The variation in these variables is substantial, as shown by the within standard deviations of 5.23 and 1.93 for homicides and suicides respecitvely. At the state level, some have as many as 6.2 homicides per 100,000 inhabitants – an extremely high homicide rate.[7]

Monthly data on DTO killings was compiled by a committee with representatives from all ministries that are members of the National Council of Public Security in Mexico. This data is available for the period starting in December 2006 to December 2010 at the municipality level. The characteristics of each killing occurring in this period were analyzed by the committee to determine whether it corresponded to a killing that was linked to some drug trafficking organization in Mexico. There were a total of 34,436 DTO killings between 2007 and 2010, with an average (standard deviation) of 0.29 (3.94) killings per municipality-month. The variation in this variable is striking, with roughly 20% of state-months having zero killings and some having as many as 452.[8] Panel B in Table 3.1 presents descriptive statistics for this variable. DTO killings rates are roughly half the size of homicides rate during this period, and the distribution is more skewed.

Figure **??** shows time averages (weighted by population) for DTO killings (2007-2010) and homicides (1990-2006) in all municipalities in Mexico. Homicides seem to be decreasing during this time period, something analyzed in more detail by Escalante (2011).[9]

Finally, we construct monthly temperature and precipitation for each municipality-month using data from Willmott and Matsuura (2014). This is a gridded dataset with monthly information for

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[7]Monthly rate of 6.2 homicides in our dataset implies a rate of 74.4 homicides per 100,000 per year. This is an extremely high homicide rate. To put this in perspective, the most violent country in the world in 2012 (Honduras) had a rate of 90.4 homicides per 100,000 inhabitants, and the second most violent (Venezuela) had a rate of 53.7. In the Appendix, we also compare rates of these types of violence to the US. Homicide rates in Mexico were twice as high in Mexico compared to the US in 2006 and have been rising every since. Suicide rates, however, are substantially higher in the US. Finally, and not surprisingly, organized crime killings are far higher in Mexico, a difference that has again been increasing since 2006.

[8]Our results are robust to excluding states with a large upward trend in DTO killings, i.e. Baja California, Chihuahua, Durango, Guerrero, Sinaloa, and Tamaulipas. Results are also robust to including state specific trends, as discussed below.

[9]Dube and Ponce (2012) study violence in Mexico before 2006. These authors find that an expiration that relaxed the permissiveness of gun sales caused an increase of roughly 239 deaths annually in municipalities close to the relevant state borders.

cells of size 0.5 degrees.[10] In order to transform this gridded dataset into a municipality-level dataset, we take the average of temperature and the sum of precipitation for all pixels inside the polygons that represent Mexican municipalities. Municipalities during our sample period have an average temperature of 20 degrees celsius, with a standard deviation of 5.0 degrees celsius. However, after removing municipality, year, and month fixed effects, following our econometric specification (below), the standard deviation of this variable at the municipality-month level is approximately 2.8 degrees celsius.

3.4.2 Econometric strategy

To estimate a causal link between temperature and our dependent variables of interest, we follow Deschenes and Greenstone (2007), and the preferred method employed by Hsiang et al. (2013) (see Dell et al. 2014 for a review). Accordingly, we control for unobservable time-invariant factors at the municipality level that could be correlated with both average temperatures and violence, unobserved shocks common to all municipalities within in a state in a given year, and average seasonal patterns in both temperature and violence. Specifically, in our preferred specification we estimate the following regression:

$$y_{nsmt} = \beta \text{Temp}_{nsmt} + \delta \text{Precip}_{nsmt} + \xi_m + \lambda_t + \zeta_n + \varepsilon_{nsmt} \qquad (3.3)$$

where y_{nsmt} is the number of DTO killings, homicides, or suicides per 100,000 inhabitants in municipality n, state s, month m, and year t; α is a constant term; ξ_m and λ_t are full sets of month and year fixed effects; ζ_n is a full set of municipality fixed effects, respectively; Temp_{nsmt} is average temperature, measured in degrees celsius; Precip_{nsmt} is total precipitation, measured in thousands of millimeters; and ε_{nsmt} is an error term clustered at the state level. In robustness tests, we also estimate equation (3.3) adding state-specific linear time trends (to account for differential state-level trends in, for instance, policies to fight violence), or replacing the month-of-year fixed effects ξ_m with state-by-month-of-year fixed effects ξ_{sm}—to account for state specific seasonality in violence and temperature; there is some evidence, for instance, in seasonality in suicides in particular (Ajdacic-Gross et al. 2010). Our main coefficients of interest are β and δ, which are identified through natural exogenous fluctuations in weather conditions, conditional on location and time effects. After demonstrating that our results are robust across specifications, we report results from (3.3) for most of the analyses.

We also present temperature response functions using the number of days in a set of bins and estimates of the effect of leads and lags of temperature on violence. The latter exercise is important

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[10]"Gridded weather datasets use interpolation across space and time to combine available weather station data into a balanced panel of observations on a fixed spatial scale or grid. This approach deals with the problem of missing observations at a given station or missing data because a station does/did not exist at a particular location. (...) Each "grid" approximates a weather measure for the spatial unit by interpolating the daily station data while accounting for elevation, wind direction, rain shadows, and many other factors.", (Auffhammer et al. 2013).

for a number of reasons. First, there may be temporal displacement: it may be the case that an event that would have occurred in the future anyway is triggered earlier by extreme climatic conditions. With full displacement, the contemporaneous and lagged effects would be of similar magnitude but opposite in sign, and there would be no overall effect of climate on violence. Even with partial displacement, a sole focus on contemporaneous impacts could overstate the total effect of a change in temperature.

Lags can also be useful in identifying delayed or persistent effects. For example, a negative temperature shock during the growing season in an agricultural based economy may increase violence during the harvest season when income for the farming season is realized (a delayed effect), or a weather shock could trigger a conflict that persists for multiple periods.

Finally, the temporal pattern of response to temperature shocks could also shed light on the mechanism underpinning the response. Given that we are using monthly data, certain income effects (such as the agricultural income story just told) might be expected to show up with a few-month lag. Physiological responses, on the other hand, would be expected to show up contemporaneously, given the immediacy with which the body's thermoregulatory function is employed.

To explore these temporal dynamics, we estimate the following regression:

$$y_{nsmt} = \sum_{k=t-6}^{k=t+6} \beta_k \text{Temp}_{nsmk} + \sum_{k=t-6}^{k=t+6} \delta_k \text{Precip}_{nsmk} + \xi_m + \lambda_t + \zeta_n + \varepsilon_{nsmt} \qquad (3.4)$$

where all variables are defined as before, and we include six monthly leads and six lags of temperature. Our interest lies in the parameters β_k and δ_k. In particular, a violation of our identification assumption would be reflected in any of the coefficients $(\beta_{t+1}, ..., \beta_{t+6})$ being statistically different from zero, i.e., future climate variation should not be correlated with past violence. Persistent effects or displacement would translate into the coefficients $(\beta_{t-6}, ..., \beta_{t-1})$ being statistically different from zero.

3.5   Climate and Violence

Figure 3.1 displays non-parametrically the relationship between temperature and our measures of group and interpersonal violence (DTO killings and homicides, respectively), with municipality-, year-, and month-fixed effects partialed out of both the dependent variables and temperature. The x-axis is interpreted as deviations (in degrees celsius) from the average temperature in a given municipality-month, and the y-axis is interpreted as percentage deviation from the municipality-month average. A one standard deviation in the temperature variable corresponds to 2.8 degrees celsius. The thick line corresponds to the non-parametric conditional mean, while lighter colors depict the 95 percent confidence interval. These temperature response functiones are clearly upward

sloping for both variables, and appear roughly linear through most of the temperature support.

Table 3.2 presents regression results from estimating equation (3.3) under various sets of fixed effects. To facilitate the interpretation of these coefficients, and comparison across outcomes and studies, standardized effects are presented in square brackets, which we express as percentage change in the dependent variable per one standard deviation change in the climate variable of interest. The first three columns show results using DTO killings per 100,000 inhabitants as dependent variable, and the last three show corresponding results for homicides in the pre-2007 period.

Several interesting patterns emerge. First, we observe a positive and significant effect of temperature on both intergroup and interpersonal violence, a result that is robust across all specifications. The magnitude of these estimates varies across columns, but is particularly large for DTO killings: in our base specification (Column 1), we find that a 1σ increase in temperature in a given month is associated with a 28% increase in the rate of DTO killings. This result is robust to inclusion of either state-specific time trends or state-month FE. Given the large level of killings during this period – over 34,000 DTO killings over the 2007-2010 period – a 22% increase is large in both percentage and absolute terms. The roughly 5% effect for homicides is smaller in magnitude, but is also substantial given again the high homicide rate in the country over the period (285,000 total homicides during the 1990-2010 period). We find no statistically significant effect of precipitation on either intergroup or interpersonal violence, and in all specifications we can confidently reject large effects of precipitation. The effects of climate on violence in Mexico appear to occur through temperature.

Anticipating our more formal treatment of treatment-effect heterogeneity below, in the Appendix we explore whether there are apparent spatial patterns in the responsiveness of DTO killings or homicides to temperature. We estimate state-specific responses of violence to temperature, and display these in the figure as the ratio of the state-specific estimate to the pooled country-wide estimate reported in Columns 1 or 4 of Table 3.2 – i.e. $\frac{\widehat{\beta}_{s,y}}{\widehat{\beta}_y}$. Although there is some apparent variation in estimated effects across states, results are remarkably homogenous: point estimates are positive in all states for DTO killings and positive in all but one state for homicides, the ratio of state-specific estimates to pooled estimates is near unity for most states, and in the case of DTO killings, in only 4 out of 32 states do confidence intervals on state-specific estimates not contain the pooled estimate (equivalent to 13% of states, only slightly higher than what sampling variability alone would predict). For homicide, there does appear to be somewhat more variation in effect sizes across states, with 38% of state-specific confidence intervals not containing the country-wide estimate (8 estimates are significantly larger than the pooled estimate, 4 are smaller). Below we explore more extensively whether economic factors can explain this heterogeneity.

Finally, as shown in Figure 3.2, our benchmark estimates of how intergroup and interpersonal violence respond to temperature in Mexico are remarkably consistent with other reported temperature-conflict estimates from the literature (none of which were from Mexico). Figure 3.2 plots the distribution of standardized coefficients from an earlier meta-analysis (Hsiang et al. 2013), showing in

the bottom two panels either the 24 studies from Hsiang et al. (2013) that examined intergroup conflict or the 12 studies that examined interpersonal conflict. The estimated effects for DTO killings and homicides from Mexico lie within the expected distributions for intergroup and interpersonal conflict, respectively.

3.6 Economic Factors

3.6.1 Less-violent DTO criminal activities

Can economic factors explain the strong and robust relationship between temperature and violence in Mexico? In the absence of a way to experimentally manipulate the income of drug-trafficking organizations, we approach the problem indirectly from a number of angles. Our first approach is to observe whether other less violent but plausibly economically-motivated DTO criminal activities also respond similarly to temperature. Besides killings, drug trafficking organizations are also known for other criminal activities such as kidnappings, extortion, and car thefts. These crimes appear to have a clear economic motivation, and so if economic factors such as income are what is mediating how DTO violence responds to temperature, a similar temperature response might be evident in these similarly economically-motivated activities.

We assembled administrative data on the monthly occurrence of kidnappings, extortion, and car thefts during the period between January of 2007 and December of 2010. Unfortunately these data is not available at the municipality level but at the state level instead. Table 3.4 present the estimates of interest, and include our main results on DTO killings and homicides for comparison. Strikingly, we do not observe any significant relationship between temperature and these other criminal activities. In fact, estimated coefficients have a negative sign in the case extortions and kidnappings, although not statistically significant, and the effect on car thefts is fairly small and not statistically significant. Temperatures appear to increase violent crime but not these less-violent but economically-motivated criminal activities.

3.6.2 Income, unemployment, and inequality

Our second approach is to look directly at whether municipality-level income variables mediate the temperature-violence relationship. To do this, we augment equation (3.3) and include an interaction term between temperature and various measures of income or income inequality at the municipality level. In particular, we examine interactions with municipality-level income and with the municipality-level Gini coefficient.

Results are shown in Table 3.5. We find little evidence that these municipality-level measures of income mediate the temperature-violence relationship. For the per-capita income measure, the interaction has the expected sign for DTO killings, but is statistically insignificant and the coefficient is small: a one standard deviation increase in log GDP per capita, which we think of as being a fairly large increase in income, attenuates the effect of temperature on DTO killings by 13 percent ($-0.008/0.063 \approx 0.13$). The interaction in the homicide regression is also statistically insignificant, and is of the opposite sign than expected.

Another economic measures is economic inequality, measured here with time-invariant municipality-level Gini coefficients (constructed by Jensen and Rosas (2007)). Income inequality has been argued in the literature to be an important driver of violence and conflict in different settings. But as shown in the table, it does not appear to substantially affect how either intergroup or interpersonal violence respond to temperature in Mexico. In the case of DTO killings, a one standard deviation in inequality decreases the effect of temperature on violence by roughly 12 percent, but it is not statistically significant.

Finally, we explore the mediating influence of two other variables that are typically correlated with income: the adoption of air conditioning (typically positively correlated with income), and municipality-level average temperature (negatively correlated with income across countries as well as across Mexican states). Air conditioning could be viewed as an income-related adaptation, and as such could represent an alternative pathway through which higher incomes could break the link between temperature and violence. The "mediating" effect of higher average temperatures on the response of violence to temperature deviations is perhaps more subtle. One the one hand, states with higher average temperatures might be more adapted to hot temperatures, and thus less effected by additional increases in temperature. On the other hand, if the underlying temperature response is non-linear (as in agricultural productivity), then additional heat exposure on top of an already high mean should induce a more negative response.

Results of including air conditioning penetration or average temperature as interaction variables are show in rows 3 and 4 of Table 3.5. Neither variable appears to explain how violence responds to temperature: coefficients in both cases are small in magnitude and statistically insignificant. Thus we find little additional evidence of income-induced adaptation (at least through the AC channel), nor strong evidence that hotter average temperatures reduce impacts (through adaptation) or worsen them (through non-linearities).

3.6.3 Quasi-experimental variation in monetary transfers

Our third approach to studying the role of economic factors is to exploit the roll-out of a large-scale cash transfer program, PROGRESA, which induced quasi-experimental variation in income across much of Mexico during our study period. PROGRESA is a very large program, with a budget of approximately 133 million USD in 1997 (roughly 0.03% of GDP), which has since expanded to

almost 5 billion USD in 2010 (roughly 0.5% of GDP). We observe bimonthly transfers to every municipality during the period between January 1998 and December of 2009 from administrative sources. Importantly, cash transfers in this program targeted women with children, and so we cannot be certain the extent of income variation that the program induced among the population likely to participate in DTO related activities (young men).[11] Nevertheless, we augment our main regression equation by including the logarithm of PROGRESA transfers as an additional independent variable, and an interaction term between this variable and temperature.

Results from this exercise are presented in Table 3.6. First, transfers alone seem to decrease the rate of DTO killings, although the effect is relatively modest and not statistically significant: an *increase* of 10 percent in transfers *decreases* killings by 0.1 percent. The effect is smaller in the case of homicides and not statistically significant. Regarding the interaction term, the coefficient is also negative and marginally significant in the case of DTO killings, which suggests transfers also modestly decrease the local sensitivity of violence to temperature, but it is again a fairly precise estimated zero in the case of homicides.

In additional exercises shown in the Appendix we have also incorporated an interaction term between leads and lags of PROGRESA transfers and temperature and we reach the same conclusion: transfers modestly decrease DTO killings, but only contemporaneously, these have no effect on homicides, and the interaction term is marginally significant and negative only for the case of DTO killings. Overall, it seems that even large monetary transfers to poor households in a very high-profile anti-poverty social assistance program can only slightly reduce levels of intergroup violence and have no effect in the case of interpersonal violence – again subject to the caveat that we cannot be sure how much of this income reached those individuals likely to participate in DTO activities.

3.6.4 Harvest and growing season effects

Our final approach to exploring the role of economic factors is to study whether temperature shocks during economically critical periods have a greater impact on violence compared to shocks at other times in the year. In particular, as a substantial portion of the Mexican labor force continues to earn their living in agriculture (roughly 15%), and as agricultural income has been one of the most salient variables emphasized in the literature as a potential mediating factor between climate and conflict, we examine the effect of temperature during the growing and harvest seasons relative to during non-agricultural seasons. More precisely, we construct an indicator variable that takes the value of one for the months of April to September, which is considered the rainy season for the majority of Mexico and includes both the canicula and pre-canicula period.[12] The harvest season

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[11]This is one reason our results likely diverge from Fetzer (2014), who shows that the relationship between monsoon shocks and insurgent conflict is largely eliminated in India after the introduction of a public employment program (NREGA) that guaranteed wage labor to everyone.

[12]Canicula is a mid-summer drought period in Mexico. Both the growing and harvest season were specified following Skoufias (2012), who examines the effect of weather shocks on household welfare in Mexico.

indicator variable, on the other hand, takes on a value of one during the months of October to December.

We perform two different analyses. In the first one, we simply augment our main regression equation with an interaction between temperature and the indicator variable for the growing season. Our expectation is that this interaction will be positive if agricultural income is a mediating factor and if agricultural incomes (e.g. wages) respond rapidly to changes in temperature. Given that these income shocks might occur with some lag, with hot temperatures during the growing season only showing up as negative incomes shocks after crops have been harvested a few months later, our second approach studies how violence in the harvest season reacts to temperature shocks during the growing season.

Results are shown in Table 3.7. We find that temperature shocks during the growing season appear to *reduce* DTO killings somewhat, the opposite of what the agricultural income story would suggest, with the coefficient on the interaction not significant at conventional levels. For the test on whether growing season shocks affect harvest season violence, point estimates for both DTO killings and homicides are positive, but standard errors are too large to be able to rule out either zero effect or large positive or negative effects. Finally, we also include interaction terms with the percentage of households living in rural areas and the percentage of workers in the agricultural sector, and find similar results. Taken as a whole, these results provide little evidence that agricultural income is the critical mediating factor.

3.7 The role of non-economic factors in violence

Overall, results from section 3.6 suggest that economic factors have only limited power to explain the observed effect between temperature and both intergroup and interpersonal violence in Mexico. We find that changes in temperature do not affect other economically motivated non-violent crimes, that other measures of economic conditions such as municipality-level income do not predict the temperature response, that random variation in governmental income assistance have only a modest dampening effect, and that growing season temperature shocks are not differentially harmful. None of these results is independently definitive, but together they suggest that economic factors are unlikely to be the driving force in explaining the large response of violence to temperature in this setting.

Could psychological factors instead explain the link between temperature and violence? Because inducing experimental variation in these factors is both impossible and likely highly undesirable, our approach to understanding their potential role is again indirect. In particular, our basic approach is a "pattern-matching" exercise, where we study whether the response pattern of group violence to temperature matches the response pattern of another type of violence that is almost certainly lined to psychological factors – *intra*personal violence, i.e. suicide.

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Suicide has long been understood to have a substantial psychological component. For instance, the medical literature tells us that psychiatric disorders are reported present in at least 90% of suicides (Mann et al. 2005), propensity toward suicidal behavior is strongly associated with genetic inheritance (Brent and Melhem 2008), and randomized controlled trials suggest that suicide risk can be substantially shaped both by medications and by psychotherapy (Mann et al. 2005). Researchers have also long recognized the role that changes in temperature might play in shaping suicide risk, although the literature is currently inconclusive as to whether stark seasonal patterns in suicide (which characteristically peak during warm spring and summer months) are due to temperature per se or to other factors that also vary seasonally (see appendix for a review of this literature).

Using an identical econometric strategy to that used for DTO killings and homicides above, we begin by showing that suicides in Mexico also respond strongly to deviations from average temperature. The non-parametric relationship between suicide and temperature is shown in Figure **??**, and corresponding regression results are given in the first column of Table **??**. As with DTO killings and homicides, the temperature-suicide relationship appears strongly linear, with an estimated standardized effect of a 7% increase in suicide per σ increase in temperature (Table **??**). This estimate falls between the estimated effects for DTO killings and homicides. As with these latter outcomes, the suicide response also appears fairly homogenous across states, with positive estimates in all but 2 states (see Appendix).

As with DTO killings and homicide, we then explore whether the temperature-suicide relationship is mediated by economic factors. This is, in essence, a further gut check on whether suicide is a fair "benchmark" for an outcome that we presume is mainly noneconomic in nature. Results from including interactions with income, inequality, Progresa transfers, and growing season temperature are shown in the remaining columns of Table **??**. Most coefficients on interactions are small and statistically insignificant, and the two interactions with statistical significance have signs that go in the opposite direction than what the typical income story would suggest: higher average incomes appear to slightly worsen the impact of hot temperatures, and hotter-than-average growing seasons appear to reduce the impact of temperature.

As a final "pattern matching" exercise, we study the temporal pattern of how intergroup, interpersonal, and intrapersonal violence respond to temperature, using the leads/lags approach described in equation 3.4. As discussed above, studying the temporal pattern of responses can help shed additional light on mechanism, since income effects might be expected to show up with some lag in monthly data but physiological effects should show up immediately. Studying lags also allows us to understand whether contemporaneous effects are simply "displacement", causing violence to occur earlier than it would have otherwise, but not changing the overall level of violence. Studying leads offers a simple placebo test, as future temperature should not affect current violence.

Results from estimating equation 3.4 on all three outcomes are shown in Figure 3.3, with point estimates and confidence intervals for contemporaneous effects, 6 lags, and 6 leads plotted for each outcome (for instance, a value of "-1" on the x-axis corresponds to the effect of temperature in month $t-1$ on violence in month t). Although estimates are again more imprecise for DTO killings

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due to the smaller sample size, a number of common patterns are apparent. First, statistically significant effects occur only in contemporaneous periods for all three outcomes. That is, the most robust predictor of violence in a given month is temperature in that month, suggesting that the primary effects of temperature are immediate. We interpret this as additional evidence in favor of physiological mechanisms, since these would be expected to respond immediately to temperature change.

We also find evidence of some displacement, with lagged coefficients for both homicide and suicides negative and (for suicides) significant. In absolute value, these coefficients are about 1/3rd the size of the contemporaneous effects, suggesting that roughly one-third of the temperature-induced increase in homicides and suicides were events that were likely to have occurred anyway. Interestingly, we do not see a similar pattern for DTO killings, although generally larger standard errors on the DTO estimates limit our ability to say anything very precise. Finally, results on the leads (our placebo test) are largely reassuring, with most point estimates of the 6 leads near zero and none statistically significant.

We thus have two imperfect but consistent pieces of evidence that non-economic factors could explain some of the temperature-violence relationship. The first is that a known psychologically-dependent outcome, suicide, responds strikingly similarly to changes in temperature. We view the extent of this similarity as unlikely if suicide did not share some underlying commonalities with these other forms of violence. The second is that the effect of temperature on all types of violence that we measure is immediate – i.e. that it occurs in the same month as the temperature shock – which is inconsistent with the most obvious income-related stories in which temperature reduces agricultural output, given that the period in which crops are sensitive to temperature is temporally disjoint from the period in which harvest income is realized. Again, each of these pieces of evidence on their own might not be convincing, but together they suggest a substantial role for noneconomic factors in explaining how both intergroup and interpersonal violence in Mexico respond to changes in temperature.

3.8 Conclusion

Using municipality by month variation in temperature, we find significant contemporaneous effects of temperature on DTO killings, homicides, and suicides in Mexico. Estimated effects are economically meaningful for each outcome, and imply that temperature can induce large additional increase in violence on top of already high baseline levels of both DTO killings and homicides. This is the first study to our knowledge to find such a similar relationship across a spectrum of violence outcomes in a single setting, and our estimated effects are surprisingly consistent with existing estimates in the literature from other settings.

Using a variety of approaches and data, we then study whether economic factors likely mediate this

observed link between temperature and violence, or whether noneconomic factors are more likely at play. A constellation of evidence, including the limited influence of a cash transfer program as well as comparison with economically-motivated non-violent DTO crimes, indicate that economic factors can at best only partially explain the observed relationship between temperature and violence. We present two pieces of evidence that suggest a role for non-economic factors in explaining the temperature-violence link for group- and interpersonal violence: the substantial similarity between how these outcomes respond to temperature and how suicide responds to temperature, and the immediacy of the response of these variables to changes in temperature.

We draw two tentative policy implications from our findings. The first is that, at least in this particular setting, economic interventions might not be an effective tool for shaping how violence responds to changes in climate. Second, our results are equally pessimistic on the role for adaptation in shaping this response, with neither higher average income levels nor specific interventions that alter how individuals experience climate (i.e. air conditioning) appearing to affect how violence responds to temperature. Reducing future temperature increases through emissions mitigation, rather than trying to induce adaptation through policy intervention (or hoping that it will occur on its own), thus unfortunately appears the most fruitful strategy in this setting for limiting the violent consequences of climate change.

Figure 3.1: Temperature and violence in Mexico
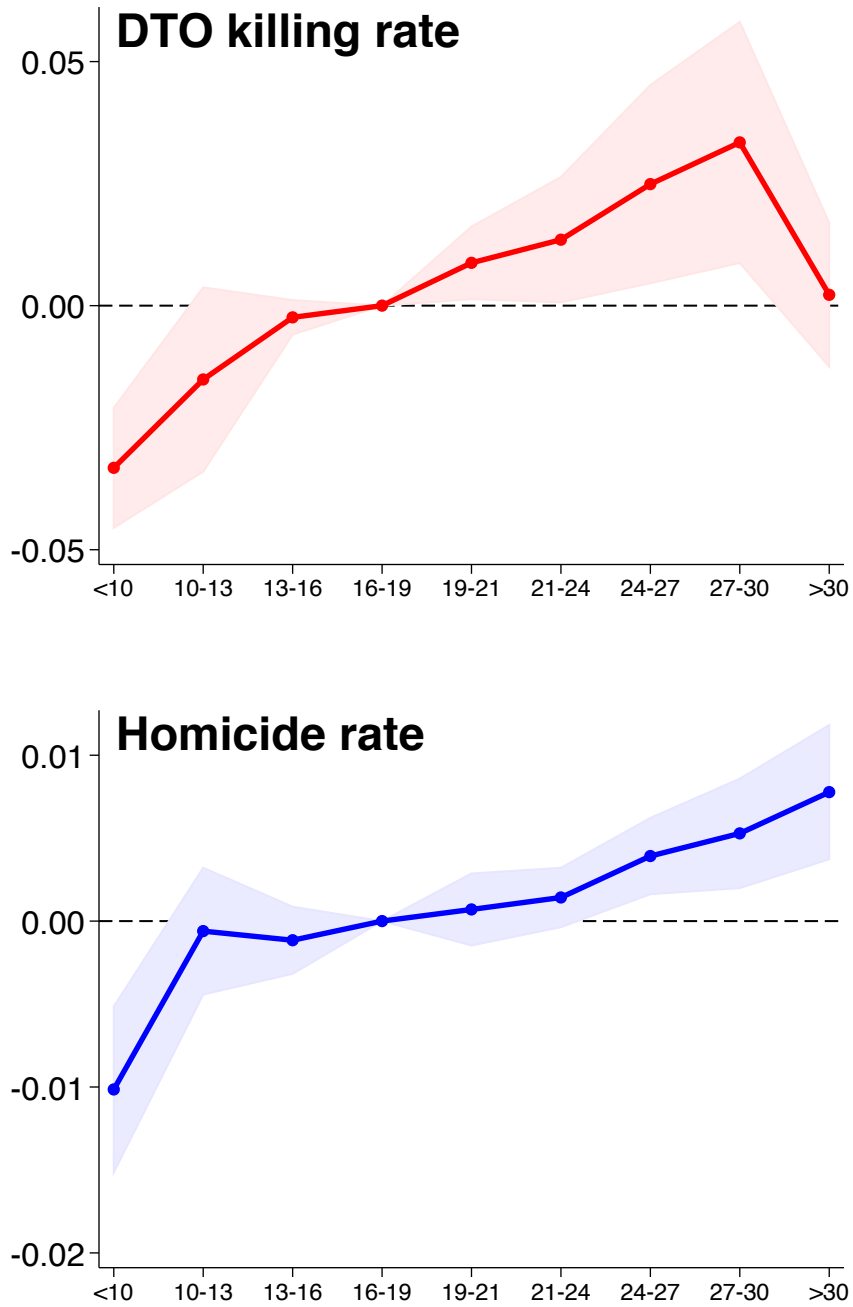
**Upper panels:** Temperature response functions for homicides and DTO killings using temperature bins of width 3°C

Figure 3.2: Meta-analysis
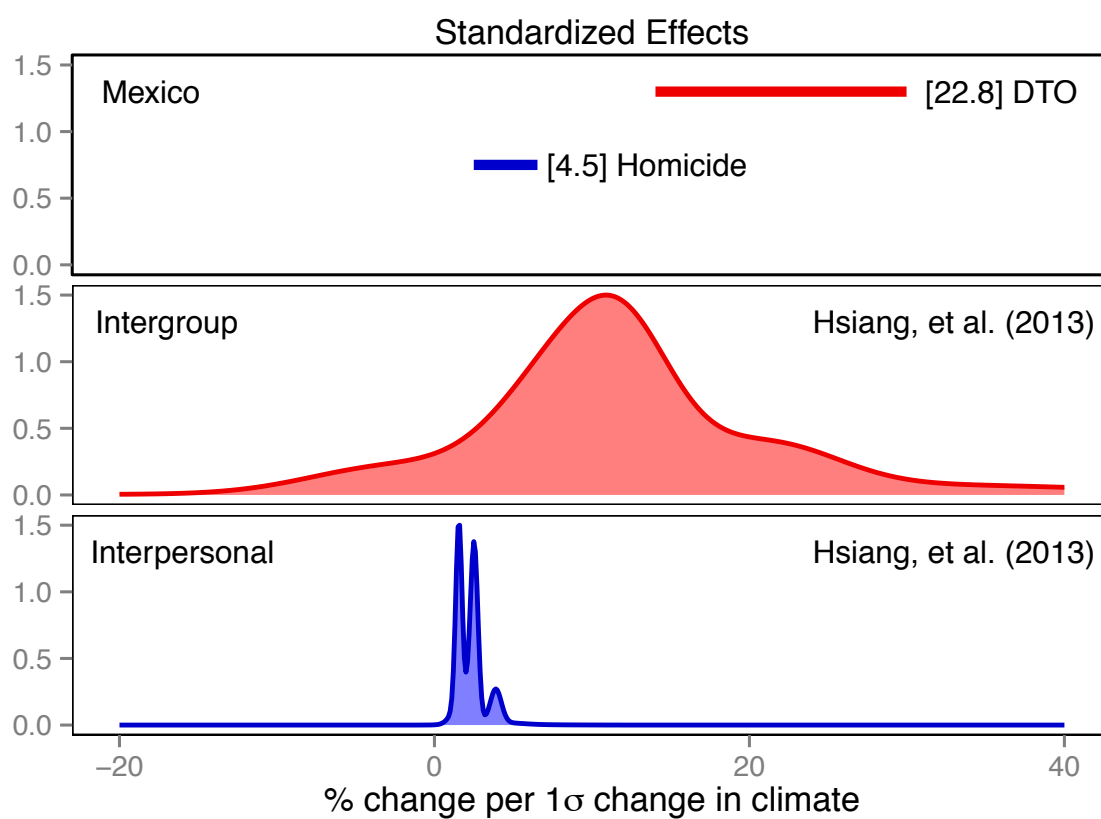
Top panel: estimated standardized effects and confidence intervals from this study. **Bottom panels**: Distribution of standardized effects of climate on interpersonal (e.g. rapes) and intergroup (e.g. civil conflict) outcomes from Hsiang et al. (2013).

Figure 3.3: Temporal distribution of estimates
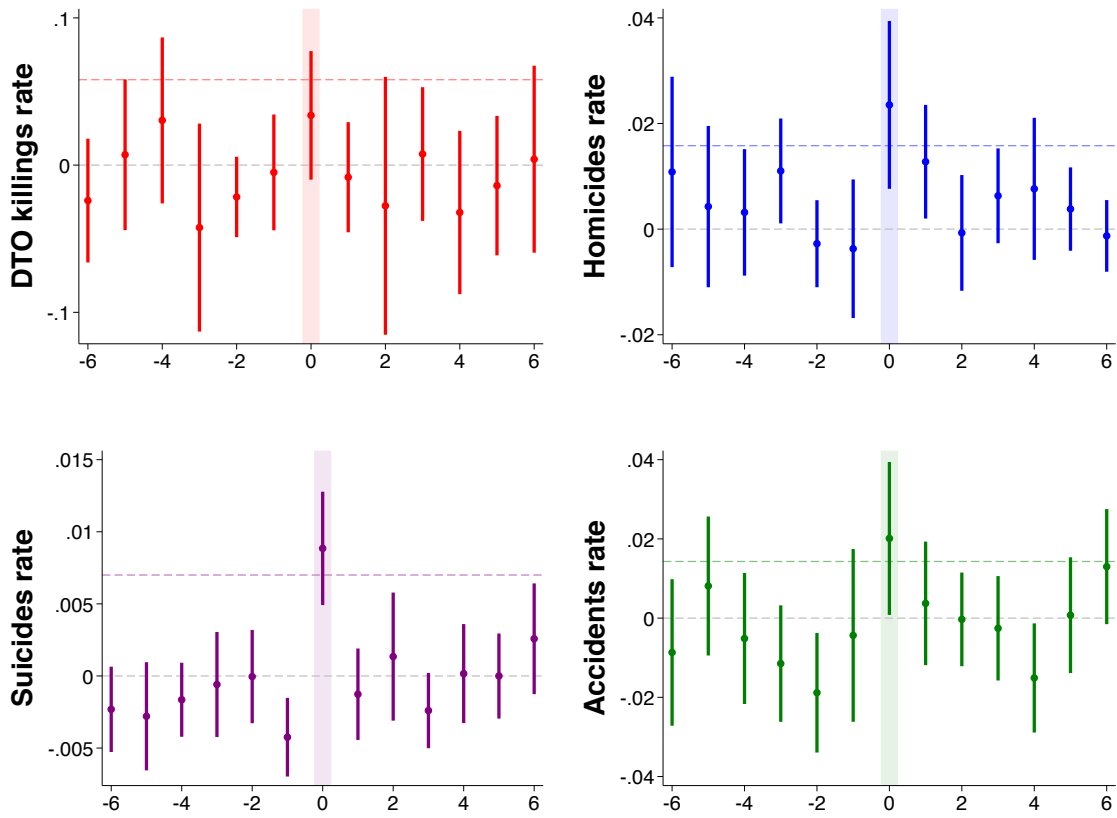
Notes: This figure shows regression estimates β_{t+k} of $y_{smt} = \alpha + \xi_m + \lambda_t + \zeta_s + \sum_{k=-6}^{6} \beta_{t+k} \text{Temp}_{sm,t+k} + \sum_{k=-6}^{6} \delta_{t+k} \text{Precip}_{sm,t+k} + \varepsilon_{smt}$, where y_{smt} is DTO killings, homicides, or suicides per 100,000 people, α is a constant term, ξ_m, λ_t, and ζ_s are month, year, and municipality fixed effects respectively, Temp_{smt} and Precip_{smt} are temperature (in degrees celsius) and precipitation (in millimeters) respectively, and ε_{smt} is an error term.

Table 3.1: Descriptive statistics

Period:	January 1990 – December 2006			January 2007 – December 2010		
	Mean	St. Dev.	St. Dev within	Mean	St. Dev.	St. Dev within
DTO killings per 100,000 inhabitants	–	–	–	0.59	7.88	7.67
Homicides per 100,000 inhabitants	0.98	5.23	5.02	0.83	4.14	3.71
Population	39,057	116,901	12,435	44,584	130,760	2,449
Temperature (°C)	20.10	5.00	2.83	20.05	5.09	2.97
Precipitation (millimeters)	92.87	111.83	99.48	80.70	107.09	95.18
Municipalities	2,456			2,456		
Observations	493,908			117,458		

Notes: Population is estimated using linear interpolations within municipalities with the 1990, 2000, and 2010 Census as reference numbers. Temperature and precipitation are weighted by population. The summary statistic **St. Dev within** is the standard deviation of the corresponding variable after removing municipality fixed effects.

Table 3.2: Temperature and violence in Mexico

Dependent variable:	DTO killings			Homicides		
	(1)	(2)	(3)	(4)	(5)	(6)
Temperature	0.058**	0.066**	0.053***	0.016***	0.023**	0.014***
	(0.022)	(0.030)	(0.019)	(0.004)	(0.011)	(0.003)
	[28.4]	[33.6]	[26.9]	[4.7]	[7.0]	[4.3]
Precipitation	0.016	-0.013	0.025	-0.004	-0.001	-0.009*
	(0.041)	(0.027)	(0.035)	(0.007)	(0.007)	(0.005)
	[2.7]	[-2.2]	[4.2]	[-0.4]	[-0.1]	[-0.9]
Municipality F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Year F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Month F.E.	Yes	No	Yes	Yes	No	Yes
Month–state F.E.	No	No	Yes	No	No	Yes
State trends	No	Yes	No	No	Yes	No
Observations	117,458	117,458	117,458	493,908	493,908	493,908

Notes. Estimates for all municipalities in Mexico in different periods (1990–2006 in columns 1–3, 2007–2010 in columns 2–6). **State trends** is a complete set of year indicators interacted with state indicators. Standard errors clustered at the state level in parenthesis. Standardized effects in brackets. All regressions are weighted by population. Levels of significance are reported as ***p<0.01, **p<0.05, *p<0.1.

Table 3.3: Drug-trafficking organizations

Dependent variable is DTO killings per 100,000 inhabitants (years: 2007–2010)

DTO variable:	None (benchmark)	Indicator some DTO operating	Number DTOs operating
	(1)	(2)	(3)
Temperature	0.058**	0.046**	0.024*
	(0.022)	(0.021)	(0.013)
$\times$ *DTO Variable*		0.013	0.014**
		(0.008)	(0.006)
DTO variable		-0.043	0.320
		(0.148)	(0.205)
Municipality F.E.	Yes	Yes	Yes
Year F.E.	Yes	Yes	Yes
Month F.E.	Yes	Yes	Yes
Observations	117,458	117,446	117,446

Notes. Presence of a drug-trafficking organization (DTO) at the municipality-year level comes from Coscia and Rios (2012). Standard errors clustered at the state level in parenthesis. Levels of significance are reported as ***p<0.01, **p<0.05, *p<0.1.

Table 3.4: Temperature and economically motivated crimes

Dependent variable:	DTO killings	Homicides	Car thefts	Extortions	Kidnappings
	(1)	(2)	(3)	(4)	(5)
Temperature	0.050**	0.050**	0.067	-0.005	-0.001
	(0.024)	(0.023)	(0.092)	(0.004)	(0.001)
	[22.8]	[13.7]	[1.7]	[-4.5]	[-3.1]
Precipitation	0.080	-0.285	-0.363	0.220	0.060
	(0.447)	(0.411)	(2.430)	(0.255)	(0.036)
	[0.8]	[-1.7]	[-0.2]	[3.9]	[6.2]
Mean of dep. variable	0.737	1.217	13.414	0.407	0.070
(Within st. dev.)	(0.962)	(0.827)	(5.600)	(0.360)	(0.088)
Municipality, year & month F.E.	Yes	Yes	Yes	Yes	Yes
Observations	1,536	1,535	1,535	1,535	1,534
R^2	0.649	0.714	0.886	0.603	0.392

Notes. Estimates for all municipalities in Mexico in the period 2007 – 2010. All dependent variables are rates per 100 thousand inhabitants. Source is *Secretariado Ejecutivo del Sistema Nacional de Seguridad Pública* (SESNSP). Standard errors clustered at the state level in parenthesis. Standardized effects in brackets. Levels of significance are reported as ***p<0.01, **p<0.05, *p<0.1.

Table 3.5: Interaction with economic variables

Dependent variable:	DTO killings				Homicides			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Temperature	0.063**	0.059**	0.082**	0.060**	0.014***	0.016***	0.021***	0.016***
	(0.024)	(0.023)	(0.038)	(0.023)	(0.004)	(0.004)	(0.005)	(0.004)
× **Income (1990)**	-0.008				0.003			
	(0.011)				(0.002)			
× **Gini (1990)**		-0.007				0.001		
		(0.007)				(0.003)		
× **Houses with air conditioning (2010)**			-0.007				-0.002*	
			(0.006)				(0.001)	
× **Average temperature (1990–2010)**				-0.006				0.000
				(0.008)				(0.002)
Municipality F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Month F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	114,384	113,616	28,752	117,458	486,132	482,868	121,056	493,908

Notes. Income and gini are own calculations using the 1990 Census. Houses with air-conditioning is data from *Encuesta Nacional de Ingresos y Gastos de los Hogares* in Mexico and it is available for 600 municipalities. Standard errors clustered at the state level in parenthesis. Levels of significance are reported as ***p<0.01, **p<0.05, *p<0.1.

Table 3.6: Progresa transfers

Dependent variable:	DTO killings			Homicides		
	(1)	(2)	(3)	(4)	(5)	(6)
Temperature	0.039**	0.039**	0.039**	0.012***	0.012***	0.012***
	(0.018)	(0.018)	(0.018)	(0.003)	(0.003)	(0.003)
Progresa transfers		-0.009	-0.009		0.003	0.004
		(0.013)	(0.013)		(0.012)	(0.012)
Progresa transfers × Temperature			0.001			-0.001
			(0.003)			(0.002)
Municipality F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Year F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Month F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Observations	88,092	88,092	88,092	262,992	262,992	262,992

Notes. Progresa transfers is the total amount of transfers to a municipality divided by total population. Estimates restricted to the period 1998–2009, in which the program Progresa/Oportunidades was being implemented. Standard errors clustered at the state level in parenthesis. Levels of significance are reported as ***p<0.01, **p<0.05, *p<0.1.

Table 3.7: Interaction with agricultural variables

Dependent variable	DTO killings				Homicides			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Temperature	0.058**	0.068***	0.060***	0.058***	0.016***	0.013**	0.015***	0.015***
	(0.022)	(0.020)	(0.016)	(0.017)	(0.004)	(0.005)	(0.005)	(0.005)
× **Growing season indicator**		-0.022				0.005		
		(0.043)				(0.006)		
× **Households in rural areas (1990)**			0.002				-0.000	
			(0.011)				(0.002)	
× **Workers in agricultural sector (1990)**				0.000				-0.000
				(0.009)				(0.002)
Municipality F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Month F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	117,458	117,458	115,008	115,008	493,908	493,908	488,784	488,784

Notes. Growing Season as an indicator for the months of April to September; this is considered the wet season for the majority of Mexico and includes both the canicula and pre-canicula period. Canicula is a mid-summer drought period in Mexico. The harvest season is during the months of October through December. We specified these months following Skoufias (2012) who look at the effect of weather shocks on household welfare in Mexico. All regressions control for **precipitation** and are weighted by population. Standard errors clustered at the state level in parenthesis. Levels of significance are reported as ***p<0.01, **p<0.05, *p<0.1.

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Appendix A: Can More Information Lead to More Voter Polarization? Experimental Evidence from Turkey

Figure A1: Density of "No" Vote Share Across Country and Sample
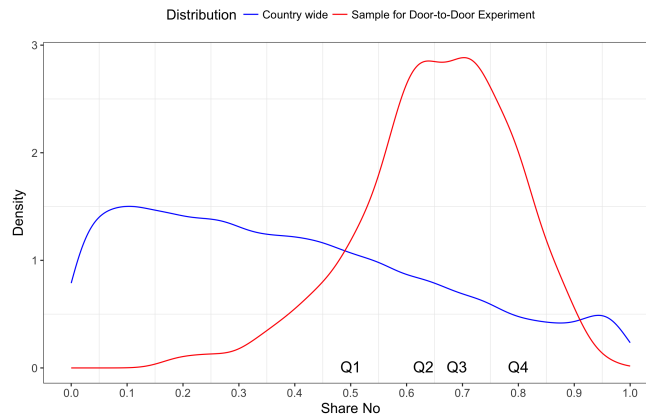
This table shows the density of "No" vote share across Turkey and across the sample for the voter experiment. Weights are not included.

Table A1: Door-to-Door Results: All Quartiles No Share and Turnout (Unweighted)

	(1)	(2)	(3)	(4)
	Share No	Share No Controls	Turnout	Turnout Controls
Treatment	0.011	0.014	0.008	0.002
	(0.011)	(0.010)	(0.005)	(0.002)
Controls	No	Yes	No	Yes
Mean of Outcome	0.654	0.654	0.654	0.654
N Reg Voters	133389	133389	133389	133389
N Neighborhoods	498	498	498	498
R squared	.642	.776	.0371	.751

The dependent variable in columns 1 and 2 is the share that voted "No" at the neighborhood level. The dependent variable in columns 3 and 4 is the turnout rate. Quartile fixed effects are included. Columns 2 and 4 include all pre-specified controls; including, past voting and turnout data. Asterisks indicate that coefficient is statistically significant at the 1% ***, 5% **, and 10% * levels.

Table A2: No Vote Share by Quartile (Unweighted)

	(1)	(2)	(3)	(4)
	No Share Q1	No Share Q2	No Share Q3	No Share Q4
Treatment	0.042	-0.035***	0.024*	0.007
	(0.029)	(0.012)	(0.012)	(0.009)
Mean of Outcome	0.496	0.628	0.694	0.798
N Reg Voters	319166	341565	369172	357413
N Neighborhoods	125	124	125	124
R squared	.396	.427	.519	.672

The dependent variable is the share that voted "No" at the neighborhood level. Each column shows the estimation result for each quartile of the past vote share distribution. All pre-specified controls are included in the regression; including, past voting and turnout data. Asterisks indicate that coefficient is statistically significant at the 1% ***, 5% **, and 10% * levels.

Table A3: Turnout Share by Quartile (Unweighted)

	(1)	(2)	(3)	(4)
	Turnout Q1	Turnout Q2	Turnout Q3	Turnout Q4
Treatment	0.002	0.012**	-0.004	-0.001
	(0.004)	(0.005)	(0.004)	(0.003)
Mean of Outcome	0.860	0.865	0.878	0.876
N Reg Voters	319166	341565	369172	357413
N Neighborhoods	125	124	125	124
R squared	.704	.795	.709	.786

The dependent variable is the turnout rate at the neighborhood level. Each column shows the estimation result for each quartile of the past vote share distribution. All pre-specified controls are included in the regression; including past voting and turnout data. Asterisks indicate that coefficient is statistically significant at the 1% ***, 5% **, and 10% * levels.

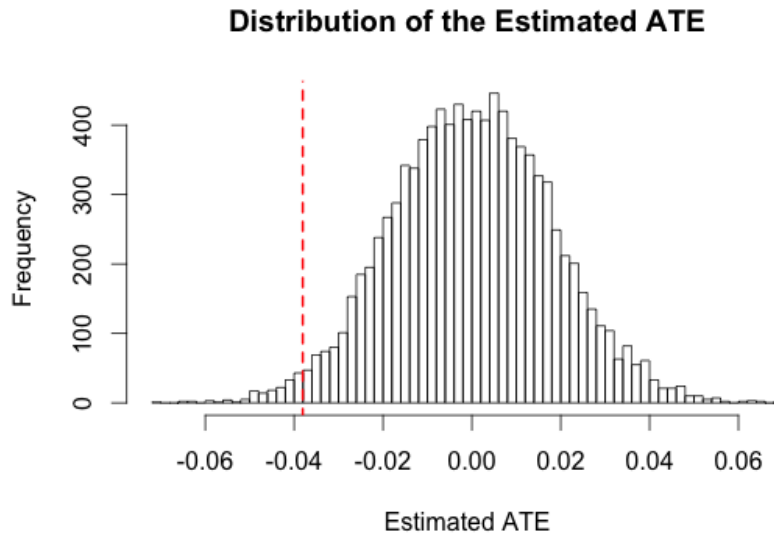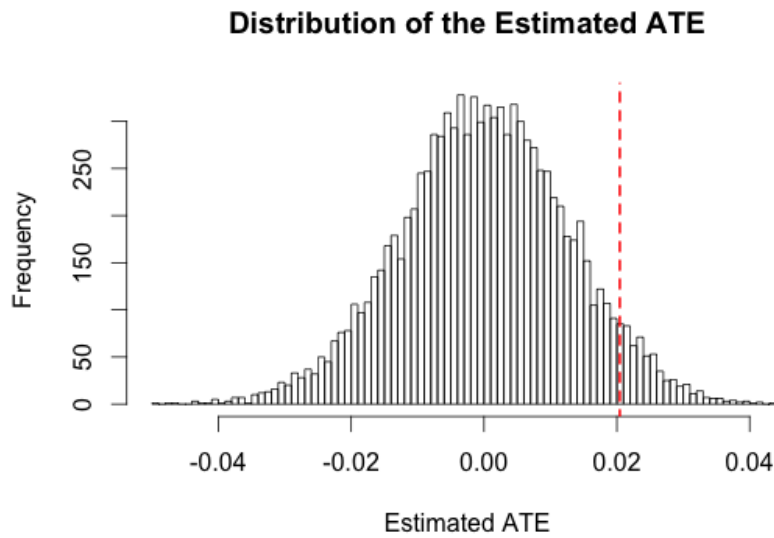**Figure A2:** Randomization Inference Quartile 2 for Voter Experiment

Figure A3: Randomization Inference Quartile 3 for Voter Experiment

Here I conduct randomization inference within quartiles 2 and 3 to calculate an exact p-value under the sharp null of no treatment effect. To implement randomization inference, I ran 10,000 permutations of the treatment to the neighborhoods in the sample and estimate the coefficient. This generates a distribution of coefficients. In quartile 3, I find that the p-value is .09 and in quartile 2, I find that the p-value is .03.

Voter Facebook Experiment

Finally, in considering the effectiveness of alternative strategies, I compare the results of the door-to-door campaign to a randomized, country-wide Facebook campaign that was also implemented by the opposition. It is claimed that advertisements shown through Facebook should only be exposed to a user if it is compatible with their user preferences. Relative to the door-to-door campaign, a user has full discretion to choose to click on a link or video.

The experimental design of the Facebook campaign was similar to that of the door-to-door campaign, but the sampled areas were more representative of the entire country. The finest level at which voters can be targeted through Facebook in Turkey is by zip code. The individuals from the opposition party faced a budget constraint and so wanted to focus on "moderate" areas defined by vote share differential. As in the case of the door-to-door campaign, administrative voter choice and turnout data is observed at the neighborhood leve. There are multiple neighborhoods within a zip code. Zip codes where any party had more than 60% of the vote share in the general elections in 2015 were dropped. Zip codes were randomly selected to be exposed to a set of videos on Facebook urging voters to vote "No."[13] Randomization was stratified by octiles of past vote share for the incumbent party at the zip code level. In this campaign, the content of the videos varied. Some of the videos showed experts discussing information on issues like the economy and terrorist activity and others showed regular citizens using various arguments to urge others to vote "No." The online campaign started two weeks before the referendum.

The equations below show the specification that were run at the zip code and neighborhood level. Y_z is neighborhood level "No" vote shares or turnout data aggregated up to the zip code and Y_{nz} is at the neighborhood level. T_z is an indicator for whether the zip code was in the treatment group and δ_o are octile fixed effects. X_z includes average vote shares for three out of four parties (so that rank condition is not violated) from the past two general elections that were both held in 2015.

$$Y_{zo} = \alpha + \beta_1 T_z + \delta_o + \gamma_1 X_z + \epsilon_{zo} \tag{3.5}$$

$$Y_{nzo} = \alpha + \beta_2 T_z + \delta_o + \gamma_2 X_{nz} + \epsilon_{nzo} \tag{3.6}$$

Equation (1) shows estimation at the zip code and equation (2) shows estimation at the neighborhood level; in the latter, standard errors were clustered at the zip code level. The estimates of both regressions are the same when the neighborhood level regression is weighted by the number of registered voters per neighborhood as shown in Table A4 and Table A5. However, an unweighted version of the latter estimates a negative effect of the campaign, indicating that small neighborhoods were negatively affected by the campaign. This result is shown in Table A6 and is shown by quartile of past vote share (the mean of the outcome shows that the quartiles are decreasing in the "No" vote share). This result is consistent with the fact that had less information beforehand were more responsive. The effects are in "moderate" areas, similar to the door-to-door campaign

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[13]On Facebook, the advertiser enters a daily budget for its ads/campaigns.

as shown in Figure A4. If anything, the Facebook campaign caused a small decrease in the "No" vote share. We conclude that the opposition party was again unsuccessful in changing vote share. In comparison to the door-to-door campaign, it is more difficult to interpret the Facebook results because the content in the videos varied and it is not possible to measure the effects by video. Moreover, I cannot provide a framework to explain why the campaign only decreased the "No" vote share. The main conclusion is that the targeted door-to-door campaigning is found to be the most effective strategy.

Table A4: Vote Share "No" at Zip Code Level

|	(1) All	(2) All With Controls
Treatment	0.001	0.002
	(0.004)	(0.002)
2015 MHP Vote Share		-0.277***
		(0.020)
2015 HDP Vote Share		-0.219***
		(0.016)
2015 AKP Vote Share		-1.086***
		(0.025)
2015 Turnout		0.165***
		(0.029)
Mean of Outcome	0.517	0.517
Number of Observations	1119	1119
R squared	.779	.943

The dependent variable is percent vote No. Column 1 shows the result across the distribution (octiles) without controls and column 2 shows the result with controls. Asterisks indicate that coefficient is statistically significant at the 1% ***, 5% **, and 10% * levels. Includes octile strata fixed effects. The mean outcome shows that quartile is decreasing in the "No" vote share.

Table A5: Vote Share "No" at the Neighborhood Level With Neighborhood Weights

	(1) All	(2) All With Controls
Treatment	0.001	-0.001
	(0.004)	(0.002)
2015 AKP Vote Share		-1.108***
		(0.008)
2015 MHP Vote Share		-0.296***
		(0.017)
2015 HDP Vote Share		-0.257***
		(0.012)
2015 Turnout		0.112***
		(0.029)
Mean of Outcome	0.521	0.521
Number of Observations	16297	16297
R squared	.518	.95

The dependent variable is percent vote No. Column 1 shows the result across the distribution (octiles) without controls and column 2 shows the result with controls. Asterisks indicate that coefficient is statistically significant at the 1% ***, 5% **, and 10% * levels. Includes octile strata fixed effects. The mean outcome shows that quartile is decreasing in the "No" vote share.

Table A6: No Pct Neighborhood Level By Quartile No Weights

	(1) Q1	(2) Q1 Controls	(3) Q2	(4) Q2 Controls	(5) Q3	(6) Q3 Controls	(7) Q4	(8) Q4 Controls
Treatment	-0.029*	-0.001	-0.046***	-0.019***	0.006	0.001	-0.010	-0.004
	(0.017)	(0.005)	(0.017)	(0.007)	(0.019)	(0.011)	(0.010)	(0.007)
2015 AKP Vote Share		-1.096***		-1.101***		-1.070***		-1.069***
		(0.015)		(0.014)		(0.024)		(0.015)
2015 MHP Vote Share		-0.235***		-0.281***		-0.202***		-0.324***
		(0.022)		(0.030)		(0.036)		(0.028)
2015 HDP Vote Share		-0.254***		-0.357***		-0.290***		-0.305***
		(0.046)		(0.030)		(0.031)		(0.078)
2015 Turnout		-0.005		0.012		-0.031		-0.017
		(0.033)		(0.063)		(0.054)		(0.031)
Octile F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mean of Outcome	0.625	0.625	0.512	0.512	0.424	0.424	0.347	0.347
Number of Observations	3228	3228	3778	3778	4257	4257	5034	5034
R squared	.0529	.882	.0267	.841	.00327	.792	.0229	.838

The dependent variable is percent vote No. Columns 2, 4, 6, and 8 show the results for each quartile with controls. Asterisks indicate that coefficient is statistically significant at the 1% ***, 5% **, and 10% * levels. Includes octile strata fixed effects. The mean outcome shows that quartile is decreasing in the "No" vote share.

Figure A4: Neighborhood Level Vote Share "No"
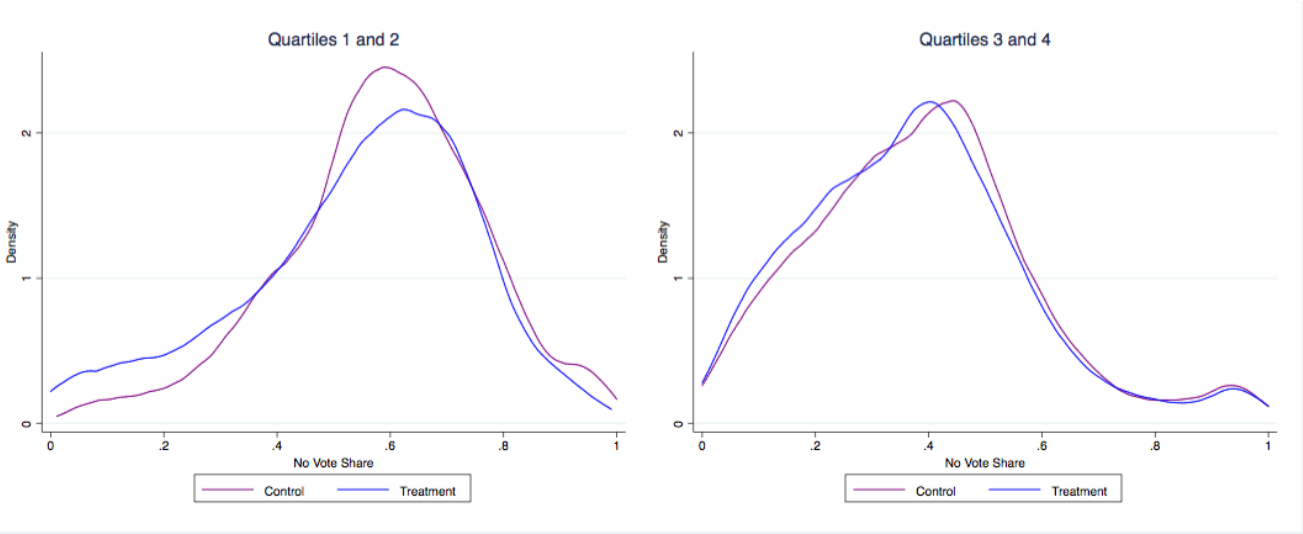
The dependent variable is the "No" vote share at the neighborhood level and each panel is split by the bottom and upper quartiles. Quartiles 1 and 2 correspond to zip codes where the "No" vote share was relatively higher.

Appendix B: Learning Constituent Opinion in an Illiberal Democracy: A Multi-Model Study on Home Style in Turkey

Report for Politician Experiment

Figure B1: Sample from Report Sent to MPs

This figure shows two sample pages from the voter report that was sent to the politicians. All results were shown by self-reported party and by region. The panel on the left shows the first figures that were provided on the issues that voters self-reported as most important to them. The figures on the right-hand side provide information on an issue that relates to terrorism. The attempted coup was widely regarded as a terrorist attack. The figures provide information on how voter responded to the statement: "I agree with the arrests made during the state of emergency." The reports were sent in Turkish.

Framework Details for Incumbent Resource Advantage in Voter Information Acquisition

Let there be two parties, one of which is the incumbent, I, and the other is the opposition, O. The parties can take two actions: low cost method of campaigning, which has a cost of 0, or the high cost method to campaigning, which has a cost $f \in (0,1)$ measured in vote shares (as an opportunity cost)[14]. Consider that the low cost method is just showing up and holding rallies, which guarantees that each party gets its ideological vote share. These are the voters who always vote for one party or the other. We normalize the vote share each party gets from the low cost method to 0. There is some uncertainty in the expected increase from implementing the high investment method, but both parties will increase their vote share to either $\frac{V_1}{2}$ or $\frac{V_2}{2}$ where $0 < V_1 < V_2$. Each party's payoff is their expected utility from investing f: $E(U) = p\frac{V_1}{2} + (1-p)\frac{V_2}{2} - f > 0$. In an extensive form game with perfect information and equal access to funding, where the party I chooses a method first, the unique subgame perfect equilibrium is for both parties to invest f and implement the high investment method. If party O does not have access to funds for f then it is disadvantaged and its payoff is 0.

If we assume that state funding cannot be a sufficient financial constraint for the opposition and that politicians in Turkey can access private capital, we can extend the argument further. Consider theories of rational predation that have been used to explain the persistence of competitive advantage among firms (Bolton and Scharfstein (1990)). In this literature, a company with more resources can maintain an advantage by using various methods to "prey" on its competitor. In this case, Party I has a "deep pocket" and can use state funds to increase its vote share through the high investment method, such as targeted door-to-door campaigning. Party O has to raise funding from private sources. The private source can be thought of as a lobbyist that wants to change legislation and so gives transfers based on expected electoral performance. An increase in vote share for Party O increases its representation and therefore the investor's ability to control legislation. Therefore, the utility of the private source is also a function of $p, V_1,$ and V_2. Between elections, at time period 0, the private investor gives a take-it-or-leave-it offer to the opposition party where the opposition party repays the investor if their vote share is not sufficiently high. The opposition party only takes the transfer if its expected vote share is above a certain threshold.

Suppose we further extend this framework. Party I can increase p for just party O, which we now denote p_O, by threatening to arrest their canvassers or the legislators themselves at a cost of t. If p_O if large enough relative to V_1 and V_2, then the opposition will only be able to engage in the low cost method because it will not be able to take the transfer.

This study was implemented during a state of emergency set by the incumbent party in which canvassers could be detained and jailed without trial for an extended period. Of the neighborhoods sampled for the randomized door-to-door campaign, 20% could not be completed because of the

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[14]State funding is allocated to the party headquarters and is therefore centralized. The opportunity cost could be thought of as personal gains the party leader gets that they cannot get from increased vote share

threat of arrest. This effectively increased the probability p_O that the door-to-door campaign yield a low payout in terms of voter share.

Politician Twitter Experiment: Twitter Analysis

Table B1: Balance for RCT with Incumbent

	(1) treat
Economy	-0.022
	(0.060)
Unemployment	-0.534
	(0.316)
Terror	0.004
	(0.015)
Casualty	0.002
	(0.012)
Democracy	-0.035
	(0.036)
Arrest	0.537
	(0.589)
N	86
R^2	.069
p-value	.77

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Covariate balance across treatment and control. A treatment indicator is regressed on the total number of each pre-treatment Tweets individuals had. In expectation, from random assignment, the covariates should be independent of treatment assignment. As a summary statistics, we also report the p-value from the F-statistic of this multivariate regression.

Table B2: Treatment Effect for RCT with Incumbent

	(1)	(2)	(3)	(4)	(5)	(6)
	Economy	Unemployment	Terror	Casualty	Democracy	Arrest
Treatment	-0.042	-0.023	-0.541	-0.346	-0.359	-0.021
	(0.151)	(0.023)	(0.517)	(0.791)	(0.371)	(0.024)
Outcome of Mean	0.34	0.01	1.66	3.15	0.70	0.01
N	86	86	86	86	86	86
R^2	.044	.084	.1	.067	.043	.026

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

The outcome variable includes the total number of times that an MP tweeted a given word in a week. The main outcomes are the number of times the MP tweeted the Economy and Terrorism. Other possible outcomes are included as a placebo check.

**Table B3:** Treatment Effect with Covariates for RCT with Incumbent

	(1) Economy	(2) Unemployment	(3) Terror	(4) Casualty	(5) Democracy	(6) Arrest
Treatment	-0.008	-0.026	-0.493	-0.422	-0.236	-0.021
	(0.142)	(0.023)	(0.430)	(0.581)	(0.346)	(0.024)
Baseline	Yes	Yes	Yes	Yes	Yes	Yes
Mean of Outcome	0.34	0.01	1.66	3.15	0.70	0.01
N	86	86	86	86	86	86
R^2	.17	.089	.38	.5	.19	.026

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

The outcome variable includes the total number of times that an MP tweeted a given word in a week. The main outcomes are the number of times the MP tweeted the Economy and Terrorism. Other possible outcomes are included as a placebo check. Covariates includes baseline tweets.

Figure B2: Randomization Inference for DiD with Opposition
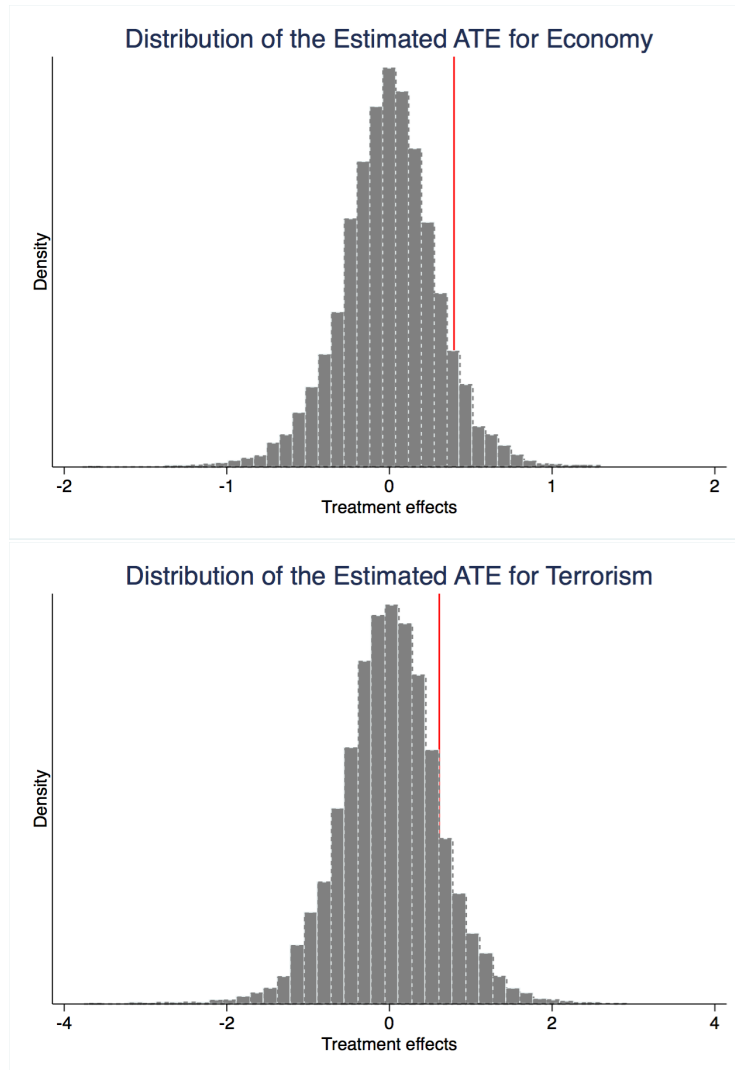
Here I conduct randomization inference for the difference-in-differences estimate for the total number of times the incumbent used the word economy. To implement randomization inference, I ran 10,000 permutations of the treatment to the MPs in the sample and estimate the coefficient. This generates a distribution of coefficients. I find that the p-value is .08 for the effect on the word economy and .14 for the effect on the word terrorism.

Table B4: Treatment Effect for DiD with Opposition

	(1) **Economy**	(2) Unemployment	(3) **Terror**	(4) Casualty	(5) Democracy	(6) Arrest
Lag 5	-0.096	-0.048	0.039	-0.044	-0.127	-0.115
	(0.138)	(0.054)	(0.134)	(0.244)	(0.196)	(0.198)
Lag 4	-0.145	-0.031	-0.251	0.121	-0.110	-0.027
	(0.238)	(0.072)	(0.207)	(0.354)	(0.224)	(0.147)
Lag 3	-0.118	-0.033	-0.119	0.349	-0.335**	0.085
	(0.172)	(0.049)	(0.201)	(0.251)	(0.157)	(0.191)
Lag 2	0.285**	-0.021	0.545	-0.100	-0.156	-0.040
	(0.115)	(0.049)	(0.372)	(0.216)	(0.196)	(0.131)
Lag 1	0.317	-0.188	0.483**	0.314	0.266	-0.015
	(0.229)	(0.193)	(0.224)	(0.203)	(0.396)	(0.210)
Lead 1	-0.005	0.017	-0.454	-0.103	0.153	0.089
	(0.104)	(0.018)	(0.606)	(0.254)	(0.131)	(0.144)
Lead 2	-0.055	-0.033	-0.188	-0.308	-0.061	0.183*
	(0.059)	(0.021)	(0.186)	(0.260)	(0.212)	(0.099)
Lead 3	-0.114	0.068	0.108	-0.149	-0.088	-0.017
	(0.138)	(0.121)	(0.125)	(0.225)	(0.219)	(0.169)
Lead 4	-0.188*	-0.219	-0.264	-0.166	-0.161	-0.029
	(0.097)	(0.149)	(0.166)	(0.247)	(0.213)	(0.154)
Lead 5	-0.060	-0.062	-0.156	0.075	-0.322*	-0.146
	(0.079)	(0.061)	(0.192)	(0.166)	(0.172)	(0.188)
Lead 6	0.182	0.004	-0.175	-0.191	-0.270	-0.035
	(0.157)	(0.064)	(0.149)	(0.182)	(0.174)	(0.122)
Mean of Outcome	0.232	0.106	0.577	0.528	0.702	0.146
Number of Observations	1326	1326	1326	1326	1326	1326
R squared	.0705	.088	.0765	.0903	.155	.0597

The outcome variable includes the total number of times that an MP tweeted a given word in a week. Every specification includes week and MP fixed effects. The main outcomes are the number of times the MP tweeted the Economy and Terrorism. Other possible outcomes are included as a placebo check. Lags include the weeks after the voter report was sent. Asterisks indicate that coefficient is statistically significant at the 1% ***, 5% **, and 10% * levels.