

Voter Waiting Times and Voter Turnout : Reneging Effect and Racial Disparity*

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Abstract

Do longer voter waiting times deter voters coming to polling stations from casting their votes? If so, which individuals are more susceptible to long waiting times? Even though the importance of voter waiting times as costs of voting is widely acknowledged, there has been a lack of studies demonstrating the influence of voter waiting times on voter turnout. Using the Cooperative Congressional Election Study (CCES) data in 2012, 2014, 2016, 2018, and 2020, our study finds that voters with longer waiting times are more likely to renege—leave polling stations without voting—than those with shorter waiting times. More interestingly, in contrast to the previous findings that the additional costs to voting disproportionately affect the turnout of racial minorities, minority voters are more patient in polling stations—they are more likely to stay in lines than white voters when they face the same amount of waiting times. Our results contribute to the literature on electoral participation by demonstrating that low voter turnout of racial minorities is resulting from inequalities in election administration, not from their lack of democratic citizenship.

Key words: Voter Waiting Times, Voter Turnout, Reneging, Cost of Voting, Patience

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I. Introduction

Promoting equal and convenient access to the ballot is one of the most important tasks for achieving political equality in democracies. In the 2020 elections in the U.S., approximately 18% of total voters waited more than thirty minutes to cast their votes. Even after the former president Barack Obama made comments on the long waiting lines in Florida in the 2012 General Election, the percentage of voters who suffered from waiting times longer than thirty minutes barely changed. With the consensus that long voter waiting times significantly raise the costs of voting and even decrease voters' political efficacy, the problem of long waiting times has been discussed widely over decades (Stein et al. 2020; Stewart III and Ansolabehere 2015; Stewart III 2012; Pettigrew 2017; Cottrell, Herron, and Smith 2021).

What makes the problem of voter waiting times more serious is the racial disparity in voter waiting times (Chen et al. 2019; Pettigrew 2017). In 2006, 2008, 2012, and 2014 elections, non-white voters are more likely to experience longer lines that prevent them from voting—non-whites are three times as likely to wait longer than 30 minutes, and six times as likely to wait longer than 60 minutes (Pettigrew 2017). In 2016, the racial disparity in waiting times had not been mitigated—residents of entirely black neighborhoods were 74% more likely to spend more than 30 minutes at their polling space compared to those of entirely white neighborhoods (Chen et al. 2019). In 2020, the disparity still sustained largely due to the lack of polling stations, especially in states like Georgia (Thrush and Saul 2020). It appears that disparity in voter waiting times has become a new mechanism that consolidates political inequality across different races.

Despite the increased scholarly attention to voter waiting times, the association between voter waiting times and voter turnout is still unclear in existing research. There have been some studies that analyzed how voter waiting times in the previous election affect the turnout of the following election (Cottrell et al. 2021; Pettigrew 2021). However, a more direct test for the relationship between voter waiting times and voter turnout would be whether longer voter waiting times force people to leave the polling station without voting. In other words, do long voter waiting times really prevent people from voting even when they go to polling stations with a clear voting intention? If yes, how sensitive are voters to voter waiting times? For example, are 30 minutes of voter waiting times enough to change voter turnout significantly? Moreover, are the effects of voter waiting times on voter turnout uniform across different racial groups? If not, which racial groups are more likely to be strongly affected by long waiting times than other

racial groups? To find out whether the current electoral administration provides equal and convenient access to political participation, these questions need to be answered with empirical evidence.

To fill this academic lacuna, this article using the Cooperative Congressional Election Study (CCES) data in 2012, 2014, 2016, 2018, and 2020 examines the impact of voter waiting times on voter turnout. The goal of this article is two-fold. First, we incorporate voter waiting times into explanatory models for voter turnout and evaluate whether the waiting times significantly affect voter turnout. In particular, by focusing on the problem of renegeing—leaving the check-in line after joining it at polling stations (Spencer and Markovits 2010; Stein et al. 2020)—we will explore the deterrent effect of long voter waiting times on citizens who came to the polling stations with strong willingness to vote but eventually gave up on voting. Second, this article also tests whether the influence of voter waiting times is augmented or marginalized by the race of voters. We expect that minority voters will be more strongly affected by longer voter waiting times because they do not have enough resources to put up with the increased costs of voting—longer waiting times.

With these aims, the rest of this article proceeds with the following orders. In the next section, the literature on voter waiting times will be presented and potential contributions of our study will be introduced. Then, theories and hypotheses related to the association between voter waiting times and voter turnout will be illustrated. In the empirical analysis section, variables and data employed in empirical models, modeling strategy to assess independent impacts of voter waiting times, and empirical results will be provided. Finally, we conclude with contributions and limitations of our study and policy implication on election administration.

II. The Literature on Voter Waiting Times

The literature on potential factors determining voter turnout and voting behavior is one of the capacious literatures in political science. Over decades, scholars have revealed what kinds of variables deter voters from exercising their rights to vote (for literature review, see Smets and van Ham (2013) and Cancela and Geys (2016)). For instance, educational attainment (Nagler 1991; Tenn 2007), union membership (Leighley and Nagler 2007; Lamare 2010), income (Galbraith and Hale 2008; Franko, Kelly, and Witko 2016), competitiveness of elections (Blais and Carty

1990; Eichhorn and Linhart 2021), ideological differences between candidates (Abramowitz and Stone 2006; Brockington 2009), and ways of registrations (Brians and Grofman 2001) have been regarded as crucial predictors of voter turnout. However, even though the previous literature on voter turnout has broadened our understanding of voting behaviors, there is still a non-negligible amount of variance unexplained with variables highlighted so far.

Contributing to the literature on electoral turnout, this article tries to improve previous explanatory models on voter turnout in terms of voter waiting times. Voting wait times have been recently regarded as one of the core components of equal access to voting (Chen et al. 2022). The studies of voter waiting times can be related to the vast literature on electoral laws—voter registration, early voting, absentee voting, and other administrative measures (Rosenstone and Wolfinger 1978; Berinsky 2005; Burden et al. 2014). The introduction of voter waiting times as a measure of cost of voting has enabled scholars to test the impact of electoral laws on voter turnout more directly. Rather than guessing the added cost of voting due to restrictive electoral laws, voter waiting times show the actual cost of voting that a voter pays at polling stations.

1. Determinants of Voter Waiting Times

While voter waiting times have been treated as an important factor because of their costs on voting behavior, the effects of voter waiting times rarely have been modeled in empirical models to explain the likelihood of casting votes. Rather, previous studies on voter waiting times have focused on the determinants of voter waiting times and inequalities or gaps of waiting times related to individual characteristics such as race. With a theoretical background rooted from a queueing theory (for information on queueing theory itself, see Cooper (1981), Adan and Resing (2002), and Newell (2013)), some scholars examine what factors determine voter waiting times (Grant III 1980; Stewart III 2012; Stewart III and Ansolabehere 2015; Stein et al. 2020; Coll 2022).

What increases voter waiting times? Against this question, several scholars have studied the effect of characteristics of polling stations. For instance, conducting a case study on the 2004 election in Franklin County, Allen and Bernshteyn (2006) showed that the allocation of voting machines is crucial to anticipate voter waiting times. Also, Spencer and Markovits (2010) demonstrated that the number of poll workers and voting technology determines the efficiency of polling station operations regarding line length, with data on thirty polling stations across three

counties in California. More recently, with data on twenty-eight election counties, Stein et al. (2020) examined the effects of the adoption of photographic voter identification requirements on voter waiting times. They found that the introduction of the new form of requirements has different effects according to the racial components of polling locations. While the new requirements speed up the check-in process in majority-white polling locations, the waiting times become longer in majority non-white places. More recently, Coll (2022) estimating multinomial logistic regression models demonstrated that the presence of Covid safety measures tends to increase voter wait times.

In addition to the above-mentioned operational factors at polling stations, the demographics of individuals also have received academic attention. Much of studies on the association between demographics and the waiting times demonstrated that non-white minority groups are more likely to suffer from long waiting times (Stewart III 2012; Pettigrew 2017; Fortier et al. 2018). Using the Cooperative Congressional Election Study (CCES) in four years: 2006, 2008, 2012, and 2014, Pettigrew (2017) showed that the average waiting times of white voters were 12:02, while non-white voters waited more than twenty-one minutes to cast their votes. Even earlier, a study from Barreto, Cohen-Marks, and Woods (2009) revealed that minority and low-income communities were likely to have “lower quality” precincts negatively affecting voter turnout in these communities. In addition, based on 12 Florida counties’ voting data from electronic pollbooks known as Electronic Voter Identification machines (EVID), Cottrell, Herron, and Smith (2021) estimated early voting check-in times and demonstrated that minority voters waited longer times to vote.

2. Two Effects of Voter Waiting Times :

Downstream Effect and Reneging Effect

Another question that has intrigued scholars is how and whether the length of waiting times affects voter turnout. Scholars have suggested two different effects of longer voter waiting times on voter turnout. The first effect is “the downstream effect” of long voter waiting times on turnout in the future (Pettigrew 2021). Studies found that voters who experienced long waiting times in an election are less likely to vote in the following election (Cottrell, Herron, and Smith 2021; Pettigrew 2021). Pettigrew (2021) suggested two psychological explanations for this effect. First, voting is like consumption, and thus negative customer service experience at the polling stations

makes consumers—voters—less likely to come back to the polling place in the future. Second, as negative experiences with political institutions, long waits can diminish a citizen’s political efficacy that is crucial for electoral participation. Pettigrew demonstrated that the voters who waited more than an hour in the 2012 election was 1.6 percentage points less likely to vote in 2014 than those with an average wait of less than fifteen minutes. Similarly, with election administrative data from the 2012 and 2016 General Election in Florida, Cottrell et al. (2021) found that in-person voters who experienced excessive voter waiting times in 2012 were less likely to vote in 2016, even though the size of the effect is small—approximately one percent.

The second effect is “the reneging effect” of long voter waiting times (Spencer and Markovits 2010; Stein et al. 2020). “Reneging” indicates that a citizen who arrived at a polling station, stood in line, but left the place without voting. Compared to the downstream effect, the reneging effect can capture the direct influence of voter waiting times on electoral participation. For the downstream effect, there is an inevitable time gap between the current election and the next election, and thus there might be other confounding factors that depress turnout. For the reneging effect, however, there is no time gap between long waits and the decision to leave the polling place.

There have been a few studies that explored the size of reneging rate and other factors that increase the reneging rate. With data on thirty polling stations in California, Spencer and Markovits (2010) found that 1.89 percent of voters who had stood in line reneged eventually, and argued that this rate of reneging is not small. Given that many election races have been decided by very small margins, 1.89 percent of reneging can change election results significantly especially if the rate of reneging is not equally distributed across racial groups or partisans. Also, with nationwide polling place data in the 2016 presidential election, Stein et al. (2020) showed that the number of persons in line at polling places has a significant effect on reneging, but this effect disappeared when they introduced fixed effects for counties.

Despite their valuable findings regarding the reneging effect, there are still several unanswered questions. Stein et al. (2020) tested the reneging effect with county-level data, but the relationship between voter waiting times and reneging is still unclear without individual-level data that includes each respondent’s actual waiting times and the rate of reneging. Moreover, given the persistent inequality of socio-economic resources across social groups—especially races—another important question to be answered is which individuals are more susceptible to the reneging effect. In other words, if all voters need to wait thirty minutes to vote, the effect of the thirty minutes of voter waiting times on reneging might not be universal across individuals. Lastly,

we still do not know whether the previous explanations for electoral turnout will be similarly applied to the renegeing effect. The previous literature on voter turnout has focused on voters who are more or less likely to *get out* to vote, but the renegeing effect shows that people might not cast a ballot even if they literally *get out* to vote. In this sense, the impact of explanatory variables such as socio-economic resources and political interests on voter turnout might be different if we focus on the renegeing effect. To answer these questions, we will theorize the effect of voter waiting times on renegeing based on “the calculus of voting (Downs 1957; Riker and Ordeshook 1968)” in the following chapter.

III. Why Renegeing Happens :

Differential Cost of Voting in American Elections

Why do some electorates leave the line at the polling stations? To explain this puzzle, we view the extended waiting times for voting as the increased cost of voting. Since Downs (1957) and Riker and Ordeshook (1968), based on the calculus of voting, many scholars have investigated how the cost of voting influences electoral participation. According to the model of the calculus of voting, the decision of voting is a cost-benefit calculation for voters. Voters obtain the reward (R) from voting, which is a function of the probability of influencing the outcome of the election (P), the difference in expected benefits from the policies of two candidates (B), the cost to the individual of the act of voting (C), and the sense of citizen duty (D). A voter votes only if R (reward) is larger than zero.

$$R = P * B - C + D$$

Even though there have been several criticisms on the model such as the “paradox of voting”, the model has inspired scholars to generate and test new hypotheses. For example, with respect to the P term, the impact of the competitiveness of elections on turnout has been tested (Stockemer 2015; Franklin 2004; Blais and Carty 1990), and the degree of ideological polarization between candidates has been employed for testing the effect of B term (Abramowitz and Stone 2006; Brockington 2009; Hirczy 1995).

Given that most democracies no longer require voters pay money for voting such as poll tax in the past, the cost of voting—the C term in the equation—is mostly related to the sense of opportunity costs, in other words, time. For electoral participation, voters inevitably need to spend their limited time and give up their free time. Time as a cost of voting can be affected by multiple factors, but largely those factors can be summarized as follows: 1) country-level, state-level, and district-level institutional factors, and 2) individual-level socio-economic factors. The United States, which has continuously suffered from low voter turnout, has demonstrated that institutional characteristics of the United States—registration laws and other electoral administration laws—can impose high costs of voting on voters and significantly hamper electoral participation. For example, voter registration in most democracies is “automatic” in the sense that the electorate is identified by a permanent voter list automatically updated with other government records (Martinez 2010). In contrast, in the United States, voter registration is voluntary, and still in some states, the same-day registration is not available for voters. In other words, some American voters are paying dual costs of voting: time for registration before the election day, and time for casting votes on the election day.

Even though we can test the impact of time on electoral participation indirectly with institutional factors, a more direct test is testing the relationship between voter waiting times and renegeing. In contrast to many democracies, election day is not a national holiday in the United States. This means that an American voter who has a job needs to make time for voting during her/his working hours, and thus long voter waiting times can impose unbearably high costs on voters. Still, in many US states, 1) time-off to vote is not required for employers, 2) time-off is unpaid, and 3) time-off is too short to vote (Workplace Fairness 2021). Even in some states with required time-off, employees are given just one or two hours to vote. Considering moving time from workplace to polling stations and time for same-day registration for some voters, long voter waiting times can lead voters to give up and to go back to work. Of course, the depressing effect of long waiting times on renegeing will be similar for stay-at-home parents and other groups of the population. For example, waiting at polling stations with their children would be much harder as voter waiting time increases. Our first hypothesis is as follows.

***Hypothesis 1:** Long voter waiting time leads voters to renege, while all other things being equal.*

The next question is whether the impact of voter waiting times on renegeing will be similar

across different social groups. Related to this question, some researchers have already found that the additional costs to voting disproportionately affect the turnout of racial minorities (Avery and Peffley 2005; Hajnal, Lajevardi, and Nielson 2017; Jackson, Brown, and Wright 1998). For example, using the data from the 2006-2014 Cooperative Congressional Election Studies, Hajnal et al. (2017) found that both in primary and general elections, racial minorities—Latinos, Blacks, and Asians—are less likely to turn out in states with strict voter ID laws than in states without strict ID laws, and this effect does not hold on to whites.

In a similar vein, we hypothesize that long voter waiting times can have a differential impact on racial minorities. Since Verba et al. (1993)'s influential work on political participation, it has been well known that there is a significant gap between whites and racial minorities in terms of their available resources, such as education, money, family structure, and civic skills (Brady, Verba, and Schlozman 1995; Niemi and Smith 2001; Shapiro, Meschede, and Osoro 2013; Kahne and Spote 2009; Verba et al. 1993; Williams and Baker 2021). Given that still a significant number of states do not require employers to provide paid-time-off to employees, the increased opportunity cost of voting due to long voter waiting times might be too expensive for racial minorities to withstand. In other words, racial minorities do not have enough socio-economic resources to endure added costs of voting.

Moreover, there are racial disparities with respect to workers' job stability (Wrigley-Field and Seltzer 2020). Using data from the Displaced Worker Survey from 1981 to 2017, Wrigley-Field and Seltzer found that black workers were nearly always more likely to be displaced than whites, and this disparity had grown over time. Job stability can be a buffer to put up with long voter waiting times. Let us assume that black voters employed in displacement-prone jobs are allowed to vote within two hours, with the permission of their employer. Encountered long lines of voting, these black voters need to take a risk to vote because they do not have a buffer. They cannot predict how long they will need to wait to vote, and they are unsure whether it is okay for them to be twenty-thirty minutes late for work. As a result, after waiting over an hour, they give up their rights to vote and go back to work. On the other hand, for white voters with job stability, long voter waiting times might not be a big obstacle for them: they can easily call their employer and their late arrival at work will be excused.

However, we expect that this differential relationship across races between voter waiting times and renegeing will also hold for minority voters who are not employed. As indicated above, caring their children on the election day is another important aspect of the cost of voting, and the extended voter waiting times pose a more serious challenge to minority parents than to whites.

Minority parents have fewer financial resources with which to purchase childcare services, thus they are more likely to bring their children to polling stations. Furthermore, Soboroff (2012) indicated, “if you are a single mother or a single father, you work two jobs... you don’t have the opportunity to cast an absentee ballot or vote early like so many of us today can, you’re basically out of luck and you don’t have an opportunity to vote.” According to Pew Research Center Report in 2019, solo motherhood is particularly common among black mothers (56%) and Hispanic mothers (26%), compared to white mothers (17%) (Geiger et al. 2019). This means that a significant number of minority parents barely make some free time to cast their votes, and we can expect that they might not be able to withstand extended waiting time at polling stations. In sum, the effect of long voter waiting times on reneging would be greater on for minority voters, regardless of their employment status.

Hypothesis 2: The deterrent impact of voter waiting times on reneging will be greater among minority voters, while all other things being equal.

IV. Empirical Analysis

This article relies on a survey-based approach to assess the impacts of the waiting times on voter turnout, following the academic tradition of measuring voter waiting times (e.g., see Herron and Smith (2016); Herron et al. (2017), Mukherjee (2009), Pettigrew (2017), and Stewart III (2012)). The CCES data of the last five waves (2012, 2014, 2016, 2018, and 2020) are employed to construct variables. The unit of analysis is a respondent-year.

1. Variables

1) Dependent variable :

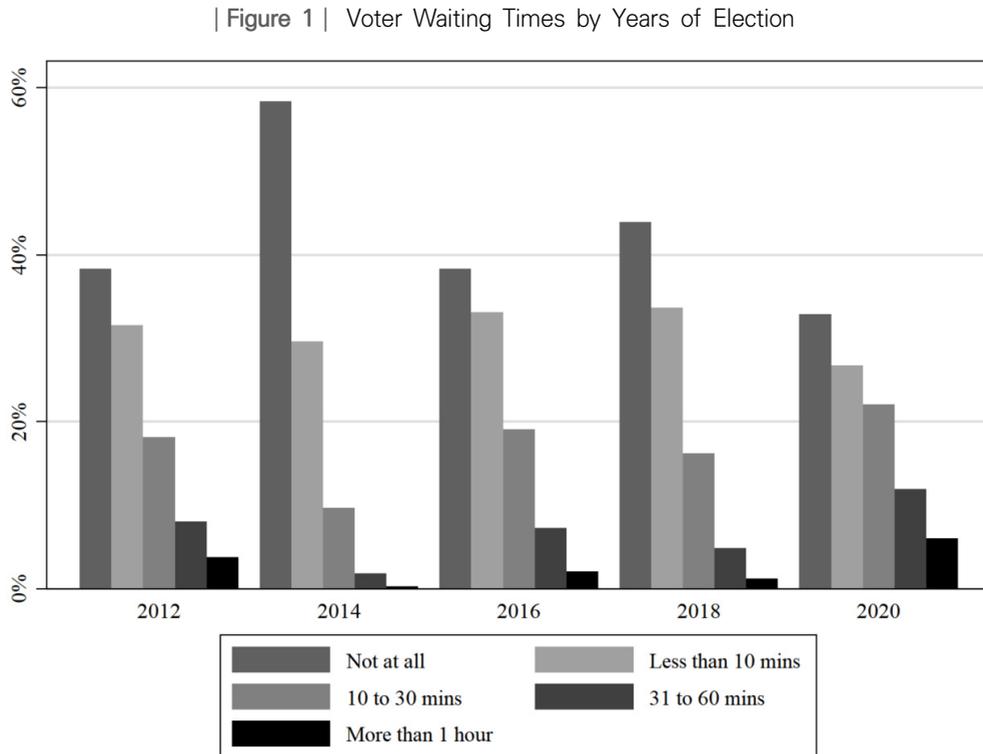
Reneging—Voting or Not Voting of Voters Coming to Polling Stations

As a dependent variable, this article uses a binary variable indicating whether a respondent votes in the election in the given year. Given that waiting is possible only if the potential voters come to their polling places, our dependent variable only includes individuals who went to their

polling places. In other words, individuals who did not visit their polling stations are excluded from our analysis. To be specific, we use the observations of respondents who report their waiting times at their polling places. On the contrary, we drop the observations of respondents who do not report their waiting times. Thus, observations with reported voter waiting times are included in our dataset. Then, we assign 0 to an individual observation who reneged; otherwise, 1 is assigned.

2) Independent variable: Voter Waiting Times

To operationalize voter waiting times, our study relies on a certain questionnaire asking respondents to answer, “Approximately how long did you wait in line to vote?” Respondents can select among five responses including “not at all,” “less than 10 minutes,” “10 to 30 minutes,” “31 minutes to an hour,” and “more than an hour.” Respondents selecting “more than an hour” were being asked to write down their waiting times on an open-ended questionnaire. Following the academic convention from previous studies measuring voter waiting times (e.g., see Pettigrew (2017), Stewart III (2012)), our study operationalizes voter waiting times in minutes by taking midpoints (0, 5, 20, and 45 minutes) of the first four possible answers. Furthermore, we translate the open-ended answers into minutes. It should be noted that voter waiting times of non-voters in our sample are the times from when they arrive at their polling stations until they left the stations. To reiterate, given that our article focuses on the relationship between voter waiting times and reneging, voter waiting times of potential voters who did not come to polling places are not considered in our study. Moreover, it is not empirically possible to accurately measure the expected voter waiting times of the non-comers.

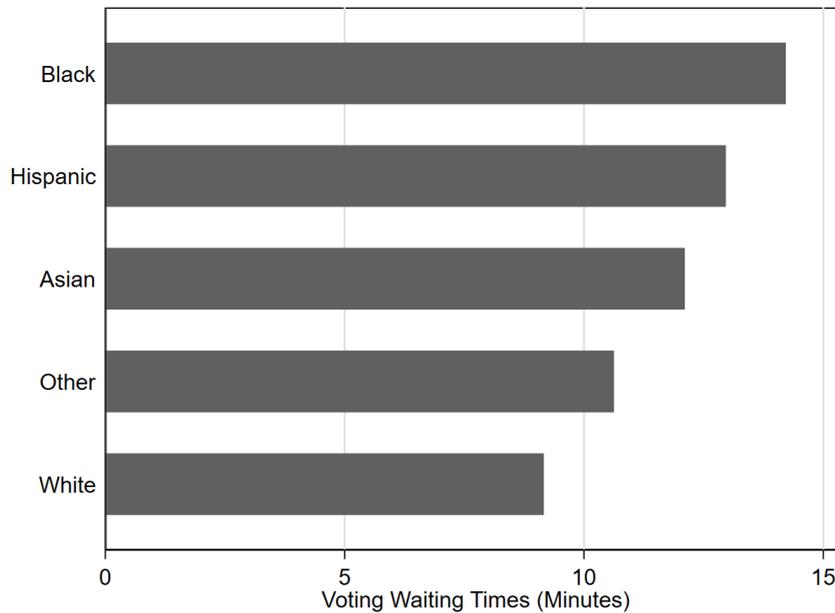


Note. The percentage is calculated with the total number of respondents who answered the questionnaire: “Approximately how long did you wait in line to vote?”

Figure 1 shows the percentage of each category. As illustrated, the percentage of respondents who waited more than 30 minutes was above 11% in the 2012 election and it reached over 18% in the 2020 election. Even though the percentages were below 10% in 2014, 2016, and 2018 elections, the problem of long waiting times to vote has not been alleviated but has been exacerbated in the most recent election. Considering that the CCES data is based on a nationally representative sample, approximately 41 million voters waited more than 30 minutes to vote.¹ Compared to the number in the 2012 election, the number of voters waiting over 30 minutes increased by 34 million (for the estimation in the 2012 election, see Pettigrew (2017)). To be specific, the mean voter waiting times was 10.7 minutes in the 2020 election.

¹ The number of voters waiting more than 30 minutes is calculated based on the total number of U.S. citizen 18 years and over. The total number of U.S. citizen is from the United States Census Bureau: <https://www.census.gov/data/tables/time-series/demo/voting-and-registration/p20-585.html>

| Figure 2 | Voter Waiting Times by Race



Note. The means of voter waiting times are calculated based on the elections in 2012, 2014, 2016, 2018, and 2020. The category named “Other” includes “Native American,” “Mixed,” and “Middle Eastern.”

Are there systematic differences in voter waiting times among different races? With the last five waves of the CCES data, we explore whether there is racial disparity related to voter waiting times. Figure 2 illustrates the averages of voter waiting times by race: White, Black, Hispanic, Asian, and Other. It should be noted that the waiting times in Figure 2 are based on self-reported waiting times of both all voters and non-voters visiting polling locations in the U.S. As Pettigrew (2017) did, our study finds that white voters enjoyed the shortest waiting times (9.16 minutes) while non-white voters needed to wait relatively longer times to vote (Black–14.22, Hispanic–12.96, Asian–12.11, and Other races–10.62). The *t*-statistics from two-sample *t*-tests comparing “White” to the other four racial categories are statistically significant at the level of 0.001, indicating that the differences of means of voter waiting times between white voters and other racial groups are statistically meaningful.

Also, we examine whether there is a statistically significant difference in voter waiting times between voters who cast their votes and voters who did not cast their votes. For voters, the average length of voter waiting times in the last five elections was 9.91 with a 95% confidence interval [9.80, 10.02]. For non-voters, on the other hand, the average length of voter waiting times was 26.40 [23.07, 29.74]. The difference in means between the two groups is statistically sig-

nificant at the level of $p < 0.001$, which forecasts the negative impact of voter waiting times on voter turnout.

3) Control variables

To isolate the influence of voter waiting times on voter turnout, a series of control variables are included in empirical analysis. First, based on previous studies on potential determinants of voter turnout, we control the respondents' individual characteristics including race² (e.g., see Xu (2005) and Fraga (2016)), age (e.g., see Lyons and Alexander (2000) and Campbell, Converse, Miller, and Stokes (1980)), gender (e.g., see Kostelka, Blais, and Gidengil (2019), and Wang (2014), and level of educations³ (e.g., see Burden (2009), Campbell and Converse (1972), and Tenn (2007)). In addition, family income and family structure in terms of the presence of a child under eighteen are included as control variables. This decision is based on the fact that some studies emphasize the role of these two variables on voter turnout (for family income, see Rosenstone (1982); for family structure, see Wolfinger and Wolfinger (2008)).

Moreover, our study controls for political ideology⁴, union memberships⁵, party identification⁶, and political interest of individual respondents. Political ideology is included as one of the control variables, given that some studies demonstrate the link between ideology and voting behavior (see Jacoby (2010)). Union membership is controlled based on the rationale from Verba, Schlozman, and Brady (1995) arguing that voters engaging in voluntary associations tend to have more knowledge and skills to participate in politics (see also, Radcliff and Davis (2000)). We control for party identification to isolate the influence of voter waiting times from partisan effects on voter turnout (see Nagel and McNulty (1996) and Nagel and McNulty (2000)). With an expectation that voters interested in politics are more likely to participate in politics, political interest is also controlled for. In addition, given that there might be year-specific effects on voter turnout, year-fixed effects are included as one of the control variables. Estimating models with year-fixed effects, our study parcels out the unobserved or unmeasured year-specific effects such as public interests in elections each year and the introduction of mail-in voting (also referred to as vote by mail and postal voting).⁷

² A categorical variable: White, Black, Hispanic, Asian, and others including Native American, Mixed, and Middle Eastern.

³ A categorical variable: no high school, high school graduate, some college, 2-year, 4-year, post-grad.

⁴ A categorical variable: very liberal, liberal, moderate, conservative, very conservative, and not sure.

⁵ A binary variable constructed based on a questionnaire asking, "Are you a member of a labor union?" We assign 0 for respondents answering, "I am not now, nor have I been, a member." Otherwise, 1 is assigned.

⁶ A categorical variable: democrat, republican, independent, other, and not sure.

The inclusion of the above-mentioned variables prevents the empirical results from being biased because of the omitted variable bias (OVB) leading to incorrect inferences (for problems caused by the OVB, see Clarke (2009)). Also, given that some previous studies have emphasized the importance of considering the probability of misreporting or overreporting of voter turnout (Ansolabehere and Hersh 2012; Campbell 2010; Ghitza and Gelman 2020; Katz and Katz 2010), we use the CCES vote validation post-election weights (“vvweight_post”). The CCES conducts the vote validation by matching individual records to the Catalist database which provides detailed registration information and voting records.⁸ Even though the use of vote validation weights is not a panacea, it allows us to mitigate the problem of self-reporting (Green and McElwee 2019).

2. Modeling Strategy and Empirical Results

Given the nature of the dependent variable and data in multiple years of our study, pooled logistic regressions are employed to assess the influence of voter waiting times on voter turnout. This decision is based on studies demonstrating that estimating ordinary least square (OLS) regressions with binary dependent variables biases estimated coefficients and standard errors, and gives non-sensical predictions (Wooldridge 2016). The mathematical expression of the pooled logistic regression models applied in this article is as follows:

where θ is the odds ratio of voter turnout, \mathbf{X} is K-dimensional row vector of independent and control variables except constant, β denotes the constant, and ϵ_i represents the individual error term. i and t indicate individual respondents and time of the CCES respectively.

| Table 1 | The Influence of Voter Waiting Times on Reneging

	Model 1	Model 2	Model 3	Model 4	Model 5
Voter waiting times	-0.012*** (0.001)	-0.011*** (0.002)	-0.011*** (0.002)	-0.011*** (0.002)	-0.014*** (0.002)
Race: White (Baseline)		0.000	0.000	0.000	0.000

⁷ In the 2020 Election, because of the spread of COVID-19, a significant number of states’ electoral administrations allowed voters to vote via mail-in voting or early voting, and thus the proportion of voters who chose either mail-in voting or early voting significantly increased. This institutional change is expected to possibly decrease voter waiting times, even though that possibility was not realized in the 2020 election yet.

⁸ For detailed information on how the CCES weights respondents based on the vote validation, see the following website: <https://cces.gov.harvard.edu>. Also, for in-depth explanations about Catalist database, refer Ghitza and Gelman (2020) and Ansolabehere and Hersh (2012).

	Model 1	Model 2	Model 3	Model 4	Model 5
		(.)	(.)	(.)	(.)
Black		-0.362*	-0.265	-0.278	-0.231
		(0.182)	(0.195)	(0.209)	(0.206)
Hispanic		-0.498*	-0.442	-0.438	-0.396
		(0.235)	(0.241)	(0.233)	(0.228)
Asian		-1.497***	-1.561***	-1.540***	-1.510***
		(0.359)	(0.359)	(0.364)	(0.363)
Other		-0.416	-0.428	-0.400	-0.357
		(0.279)	(0.279)	(0.270)	(0.263)
Age		0.047***	0.045***	0.044***	0.047***
		(0.005)	(0.006)	(0.006)	(0.006)
Female		-0.287*	-0.201	-0.169	-0.219
		(0.139)	(0.139)	(0.144)	(0.146)
Education		0.309***	0.263***	0.221***	0.254***
		(0.051)	(0.061)	(0.061)	(0.063)
Family Income			0.078*	0.071*	0.078*
			(0.031)	(0.032)	(0.032)
Child under 18			-0.412**	-0.381*	-0.383**
			(0.149)	(0.150)	(0.148)
Ideology: Very Liberal (Baseline)				0.000	0.000
				(.)	(.0)
Liberal				0.081	-0.084
				(0.279)	(0.279)
Moderate				-0.098	-0.248
				(0.277)	(0.274)
Conservative				-0.464	-0.669*
				(0.302)	(0.301)
Very Conservative				-0.177	-0.224
				(0.388)	(0.388)
Not Sure				-0.464	-0.550
				(0.344)	(0.338)
Union Member				-0.037	-0.056
				(0.179)	(0.178)
Party ID: Democrat (Baseline)				0.000	0.000
				(.)	(.)
Republican				0.072	0.103
				(0.225)	(0.224)
Independent				-0.179	-0.195
				(0.190)	(0.190)
Other				-0.497	-0.506

	Model 1	Model 2	Model 3	Model 4	Model 5
Interest in Politics				(0,488)	(0,491)
				0,244**	0,235**
				(0,075)	(0,076)
Year Fixed Effects	No	No	No	No	Yes
Constant	5,624***	3,150***	2,943***	2,833***	3,923***
	(0,070)	(0,371)	(0,409)	(0,508)	(0,574)
Number of Obs	146139	146139	146139	146105	146105
AIC	7943,229	7377,889	7333,595	7281,708	70002,289
BIC	7963,014	7466,920	7442,410	7489,442	7249,591

Note. * $p < 0.05$, ** $p < 0.01$, and *** $p < 0.001$. Robust standard errors in parentheses. Akaike Information Criterion (AIC) and Bayes Information Criterion (BIC) are presented for model comparisons (for more information see, Kuha (2004)).

Table 1 shows the results from pooled logistic regression models with the number of observations and statistics (Pseudo R², AIC, and BIC) for model comparisons. Model 1 is a simple bivariate model with our main variable of interest—voter waiting times—and Model 2 is a model with demographic variables and Model 3 is estimated with additional control variables. Both Model 4 and Model 5 are estimated with the full lists of control variables, while year-fixed effects are included as a control in Model 5. The variance inflation factor (VIF) tests are conducted to test whether there are multicollinearity problems across the five models estimated in Table 1. The individual VIFs according to explanatory variables in each model do not exceed 5, indicating that there is no problematic correlation in the models.

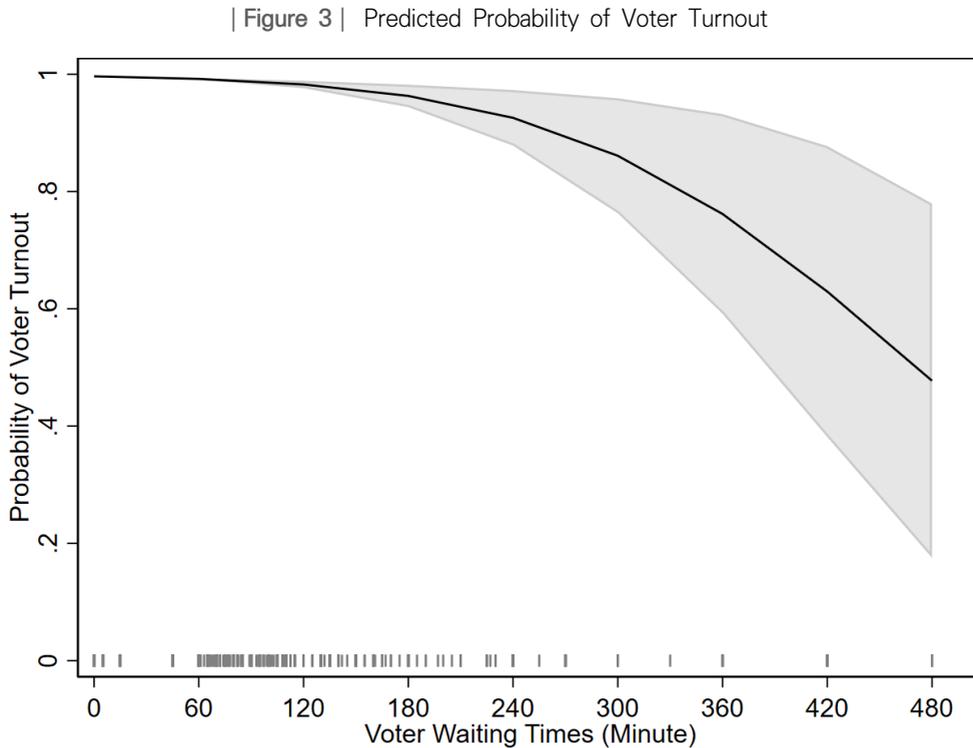
Voter waiting times, the key independent variable of this study, are statistically significant at the level of $p < 0.001$ across all five models presented in Table 1. Even though there are some changes in terms of the estimated coefficients, the coefficients of voter waiting times are still stable across all models—the coefficients in all models show negative effects on voter turnout. This finding supports our first hypothesis: long voter waiting times deter voters from casting their votes, while all other things being equal. Interestingly, the effect of voter waiting times is greater in Model 5 with year-fixed effects than in Model 4 without the effects.

Turning to control variables, respondents' political ideology except for conservative voters, gender, union membership, and party identification fail to reach the 95% significance level. On the other hand, there are some findings supporting arguments from previous studies on the determinants of voter turnout. First, race is revealed as an important factor affecting voter turnout. Even though neither *Black* nor *Hispanic* is statistically different from *White* in Model 5 with year-fixed effects, *Asian* voters are significantly less likely to vote than *White* voters, which is

on board with the findings from Xu (2005) and Fraga (2016). Second, *Age* turns out to be a significant predictor for voter turnout, elaborating empirical results that age is one of the most crucial variable explaining voter turnout (for general effects of age on voter turnout, see Lyons and Alexander (2000) and Campbell et al. (1980)).

In addition, we find that the level of education attainment is a crucial factor determining voter turnout. It supports the long-lasting theory from Campbell and Converse (1972) arguing a higher level of formal education leads to higher voter participation in politics. *Family Income* has a statistically significant positive relationship with voter turnout as expected from Rosenstone (1982) demonstrating that economic problem tends to suppress political participation. Also, the presence of a child aged under 18 is negatively correlated with the probability of voter turnout, which is in line with an argument that family structure is closely associated with voter turnout (Wolfinger and Wolfinger 2008). Lastly, as other studies on electoral behavior do (see Denny and Doyle (2008)), our study shows that respondents who are interested in politics are likely to vote.

These findings of control variables are interesting because they show that those variables can also explain who are more likely to *renege*. In particular, age, income, and education—the key variables of the resource model of political participation—show significant effects on renege. Older, more affluent, and more educated citizens are not only more likely to get out to vote, but also they are less likely to leave the waiting lines before they cast their ballots even if they need to wait long times. These findings demonstrate that citizens still need the resources to finalize their voting even after they arrived at their polling stations.



Note. The predicted probability of voter turnout is calculated based on the result from Model 5, because Model 5 has the lowest AIC and BIC, and highest Pseudo R2. All other control variables are fixed at their observed values. The rug plot shows the number of observations of voter waiting times.

Do voter waiting times have substantial effects on the probability of voter turnout? To evaluate the substantial impact of voter waiting times over the statistically significant relationship with voter turnout, we estimated predicted probabilities of voter turnout according to the lengths of voter waiting times. Again, the estimated predicted probability of voter turnout is high compared to the real voter turnout because the respondents answering the questionnaire of voter waiting times are the voters who went to their polling stations. Considering voters who did not go to polling places are not included in our sample, the size of the deterrent effects of voter waiting times on voter turnout illustrated in Figure 3 is not small. Also, if the rate of renegeing is not random across groups who have different political preferences, this effect is not small at all. As Spencer and Markovits (2010) suggested in their analysis of renegeing, there have been a handful of elections that were decided by a fraction of a percent. For example, the 2020 presidential race in Georgia was decided by 0.24%.

The predicted probability of voter turnout based on Figure 3 is 99.65% if there are no lines to vote. It decreases to 99.47% and 99.21%, if voters coming to their poll stations wait thirty

minutes and one hour respectively. When voter waiting times reach two hours and three hours, voters have a 98.26% and 96.31% predicted probabilities of voter turnout. The predicted probability of voter turnout decreases dramatically after waiting times exceed three hours. With four hours of waiting times, the predicted probability decreases to 92.57% and to 86.10% when voters wait five hours. After voters wait more than five hours, the predicted probabilities are under 85%. At the extreme, the predicted probability is 47.74% when voters wait eight hours. Of course, the percentage of voters who waited over one hour is not large, but, as shown in Figure 1, there is still a non-negligible percentage of voters in the categories from three hours to six hours. What makes it more problematic is that the percentage of voters who wait over hours at polling stations has increased in the latest election in 2020. These findings are consistent with our expectation that long voter waiting times can prevent electorates from voting even if electorates have strong patience to wait over hours to vote—Hypothesis 1 is confirmed.

The next question is whether the race of voter conditions the deterrent effects of voter waiting times on voter turnout. If voters are stuck in a line at polling places for three hours, not everyone has three hours. Some voters are forced to give up and to leave for work in the United States—one of the few countries where the election day is a weekday—and minority voters are more likely to be these *some voters* because they have lower job security than white voters have. In this vein, we hypothesize that the deterrent impacts of voter waiting times on voting abstention will be greater among minority voters. To examine the conditional relationship between race and voter waiting times, Model 5 in Table 1 is replicated with the interaction term of race and voter waiting times, as illustrated in Table 2.

| Table 2 | Estimation with the Interaction Term between Voter Waiting Times and Race

	Coef.	Robust Std. Err.	Z	P > z	[95% Conf. Interval]	
Voter waiting times	-0,181	0,003	-6,821	0,000	-0,023	-0,013
Race: White (Baseline)						
Black	-0,509	0,207	-2,461	0,014	-0,915	-0,104
Hispanic	-0,639	0,234	-2,735	0,006	-1,097	-0,181
Asian	-1,843	0,370	-4,989	0,000	-2,568	-1,119
Other	-0,283	0,302	-0,936	0,349	-0,875	0,309
Voter waiting times x Race						
Voter waiting times x Black	0,012	0,003	3,630	0,000	0,005	0,018
Voter waiting times x Hispanic	0,010	0,003	3,009	0,003	0,003	0,016
Voter waiting times x Asian	0,020	0,007	2,857	0,004	0,006	0,035

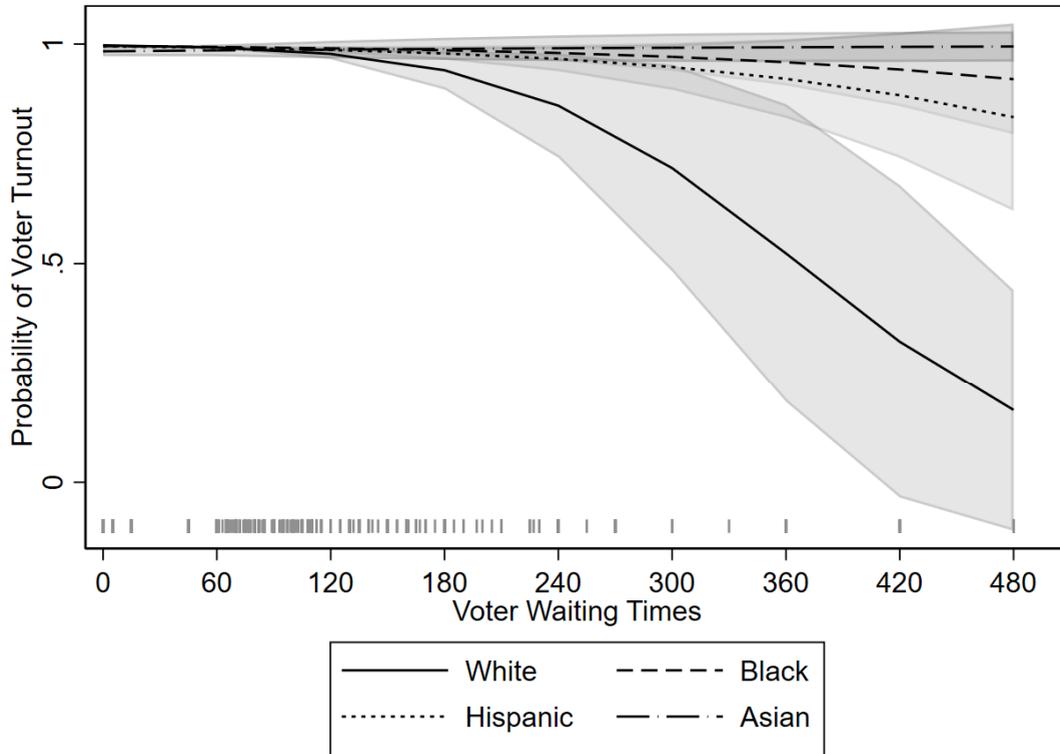
	Coef.	Robust Std. Err.	Z	P > z	[95% Conf. Interval]	
Voter waiting times x Other	-0,002	0,006	-0,338	0,735	-0,014	0,010
Age	0,046	0,006	7,896	0,000	0,035	0,058
Female	-0,211	0,145	-1,457	0,145	-0,496	0,073
Family Income	0,082	0,032	2,556	0,011	0,019	0,145
Education	0,256	0,061	4,167	0,000	0,135	0,376
Ideology: Very Liberal (Baseline)						
Liberal	-0,058	0,280	-0,207	0,836	-0,606	0,490
Moderate	-0,234	0,273	-0,859	0,390	-0,769	0,300
Conservative	-0,662	0,298	-2,221	0,026	-1,245	-0,078
Very Conservative	-0,222	0,387	-0,573	0,567	-0,981	0,537
Not Sure	-0,466	0,335	-1,390	0,164	-1,123	0,191
Union Member	-0,483	0,179	-0,270	0,787	-0,399	0,302
Child under 18	-0,391	0,147	-2,660	0,008	-0,679	-0,103
Party ID: Democrat (Baseline)						
Republican	0,084	0,223	0,377	0,706	-0,353	0,521
Independent	-0,212	0,189	-1,124	0,261	-0,582	0,158
Other	-0,525	0,492	-1,066	0,286	-1,490	0,440
Interest in Politics	0,241	0,074	3,239	0,001	0,095	0,386
Constant	3,900	0,567	6,880	0,000	2,789	5,011

Number of Obs: 146105, AIC: 6965,103, BIC: 7251,974

Note. **Bold** indicates that the variable is statistically significant at the level of $p < 0.05$. Akaike Information Criterion (AIC) and Bayes Information Criterion (BIC) are presented for model comparisons.

Table 2 illustrates the empirical result from the model with the interaction term. The estimated coefficient of the base term of voter waiting times increases from -0.014 to -0.181 and it is statistically significant at the level of $p < 0.001$. Also, the base terms of *Black*, *Hispanic*, and *Asian* show statistically significant effects on voter turnout. Among four interaction terms included in the model, three interaction terms—Voter waiting times x *Black*, Voter waiting times x *Hispanic*, and Voter waiting times x *Asian*—are statistically significant. This result reveals that the influence of voter waiting times on voter turnout is moderated by the race of respondents, as expected in Hypothesis 2. However, the direction of interaction effects is opposite to the expectation of Hypothesis 2. In Hypothesis 2, we expect that the impact of voter waiting times on voter turnout will be greater for minority voters. What we found in Table 2 is that White voters are more sensitive to longer voter waiting times than Black, Hispanic, and Asian voters.

| Figure 4 | Predicted Probability of Voter Turnout according to the Interaction between Voter Waiting Times and Race



Note. “Other” category is not presented in Figure 4 because the interaction term between voter waiting times and *Other* does not statistically significant. The rug plot shows the number of observations of voter waiting times.

To evaluate the conditional effects of race, we illustrated the predicted probabilities of voter turnout based on the values of voter waiting times by four different racial groups. Figure 4 reveals an interesting finding that White voters are most susceptible to long voter waiting times among other racial groups. On the other hand, the deterrent effects of voter waiting times on Black, Hispanic, and Asian voters were relatively small. To be specific, for Black and Hispanic voters, the differences in predicted probabilities between zero voter waiting time and 480 minutes of voter waiting time are less than 20%. The predicted probabilities for Black voters decrease from 99.55% to 92.00%, and for Hispanic voters from 99.49% to 83.66%. On the other hand, the predicted probabilities for White voters plummeted from 99.73% to 16.48%. Furthermore, even with regards to Asian voters, the average marginal effects (AMEs) of voter waiting times on voter turnout are not statistically significant at the level of $p < 0.05$. The confidence intervals of the predicted probabilities for White voters are not overlapped, which means

that the decreases of the predicted probabilities in terms of White voters are statistically meaningful.

Then, how can we interpret these results? In contrast to the expectation of Hypothesis 2, not racial minority groups but White voters are more strongly affected by the same length of voter waiting times. We interpret this as the result of *cultivated patience*. As scholars have continuously found, racial minority groups have experienced longer voter waiting times more frequently than White voters (Chen et al. 2019; Pettigrew 2021, 2017). Because of persistent racial disparity in the number of polling stations and in strict identification laws, racial minorities expect long waiting lines whenever they go to polling stations. Thus, they are more prepared for long lines to vote—the repeated experience of long voter waiting times has made them cultivate patience against tedious waiting times.

The latest research on *willingness* to wait in line to vote supports this argument. In his research during the 2020 presidential election, Panagopoulos (2021) asked voters how long they are willing to wait to vote in polling stations. In his 1,750 nationally representative samples, he found that Black voters are willing to wait for the longest to cast their ballots. On average, Black voters said that they were willing to wait more than three hours to vote, or 197 minutes. For Whites, that average was 177 minutes. For Asian voters, that average was 171 minutes, and for Latinos 146 minutes. Even though there are some differences between the actual patience observed in our data and the subjective patience in Panagopoulos’s survey data, Black voters show that they are most prepared for long voter waiting times, and they have that kind of strong patience.

3. Robustness Check

The importance of checking the consistency of empirical results with alternative model specifications has been emphasized continuously (Esarey and Danneman 2015; Casper and Tufis 2003). As a robustness check, we estimate models with state-fixed effects and ZIP code-fixed effects in addition to year-fixed effects. It enables us to isolate the influence of voter waiting times on reneging from potential state-level and ZIP code-level unobserved or unmeasured factors.

The inclusion of the state-fixed effect is based on previous studies demonstrating that there are significant variations in voter turnouts among states due to states’ idiosyncratic features such as racial demographics and income inequality (Brians and Grofman 2001; Slee and Desmond

2021; Kuk, Hajnal, and Lajevardi 2022; Galbraith and Hale 2008). Furthermore, some other studies have found neighborhood effects on voter turnout (Gerber, Green, and Larimer 2008; Gimpel, Dyck, and Shaw 2004; Cho, Gimpel, and Dyck 2006; Finan, Seira, and Simpser 2021). For instance, Finan, Seira, and Simpser (2021) demonstrated that people tend to vote more (less) when they move to blocks where people vote more (less). In addition, given that ZIP codes have been used to identify the average of voter waiting times across polling places (Stewart III and Ansolabehere 2015; Pettigrew 2021), the inclusion of the ZIP code-fixed effects along with state-fixed effects allows us to control the potential influence of polling locations, election practices, previous voter waiting times, and residential contexts.

| Table 3 | Robustness Check with State-Fixed and ZIP code-Fixed Effects

	Model 6	Model 7	Model 8	Model 9
Voter waiting times	-0.013*** (0,002)	-0.016*** (0,002)	-0.018*** (0,003)	-0.020*** (0,002)
Race: White (Baseline)	0 (.)	0 (.)	0 (.)	0 (.)
Black	-0.183 (0,224)	-0.251 (0,201)	-0.450* (0,224)	-0.519* (0,202)
Hispanic	-0.345 (0,241)	-0.205 (0,205)	-0.590* (0,256)	-0.379 (0,217)
Asian	-1.568*** (0,369)	-1.461*** (0,338)	-1.912*** (0,381)	-1.822*** (0,352)
Other	-0.347 (0,254)	-0.223 (0,284)	-0.334 (0,298)	-0.218 (0,313)
Voter waiting times x Race			0,000 (.)	0,000 (.)
Voter waiting times x Black			0,011*** (0,003)	0,013*** (0,003)
Voter waiting times x Hispanic			0,010** (0,004)	0,008** (0,003)
Voter waiting times x Asian			0,021** (0,007)	0,025** (0,008)
Voter waiting times x Other			0,000 (0,005)	0,000 (0,005)
Age	0,047*** (0,006)	0,049*** (0,005)	0,046*** (0,006)	0,049*** (0,005)
Female	-0.214 (0,143)	-0.172 (0,131)	-0.203 (0,141)	-0.164 (0,131)

	Model 6	Model 7	Model 8	Model 9
Education	0,246*** (0,063)	0,212*** (0,054)	0,247*** (0,061)	0,211*** (0,053)
Family Income	0,078* (0,032)	0,102*** (0,027)	0,081* (0,033)	0,105*** (0,028)
Child Under 18	-0,368* (0,150)	-0,470*** (0,139)	-0,376* (0,147)	-0,467*** (0,138)
Ideology: Very Liberal (Baseline)	0 (.)	0 (.)	0 (.)	0 (.)
Liberal	-0,036 (0,278)	-0,078 (0,247)	-0,018 (0,279)	-0,070 (0,245)
Moderate	-0,208 (0,272)	-0,199 (0,242)	-0,200 (0,271)	-0,187 (0,240)
Conservative	-0,638* (0,299)	-0,654* (0,268)	-0,636* (0,297)	-0,642* (0,265)
Very Conservative	-0,189 (0,386)	-0,212 (0,353)	-0,194 (0,385)	-0,200 (0,351)
Not Sure	-0,498 (0,333)	-0,552 (0,328)	-0,435 (0,335)	-0,52 (0,325)
Union Member	-0,115 (0,186)	-0,161 (0,159)	-0,108 (0,186)	-0,163 (0,158)
Party ID: Democrat (Baseline)	0,000 (.)	0,000 (.)	0,000 (.)	0,000 (.)
Republican	0,130 (0,225)	0,164 (0,209)	0,106 (0,224)	0,150 (0,208)
Independent	-0,185 (0,191)	-0,142 (0,171)	-0,201 (0,189)	-0,149 (0,170)
Other	-0,481 (0,486)	-0,410 (0,411)	-0,497 (0,487)	-0,407 (0,411)
Interest in Politics	0,238** (0,075)	0,279*** (0,069)	0,244** (0,074)	0,280*** (0,068)
Year-Fixed Effects	Yes	Yes	Yes	Yes
State-Fixed Effects	Yes	Yes	Yes	Yes
ZIP code-Fixed Effects	No	Yes	No	Yes
Constant	4,089*** (0,672)	5,182*** (0,623)	4,089*** (0,663)	5,182*** (0,619)
Number of Obs	146105	146105	146105	146105
AIC	6960,704	6231,352	6927,426	6214,974
BIC	7652,021	6932,545	7658,247	6955,671

Note. * $p < 0.05$, ** $p < 0.01$, and *** $p < 0.001$. Robust standard errors in parentheses. Akaike Information Criterion (AIC) and Bayes Information Criterion (BIC) are presented for model comparisons.

Table 3 presents the empirical results from the logistic regression models with the two additional fixed effects. Model 6 is estimated only with state-fixed effects, while Model 7 is estimated with both state-fixed and ZIP code-fixed effects. Compared to Model 5 in Table 1, the key independent variable—voter waiting times—is still statistically significant at the level of $p < 0.001$ with a negative sign.

In addition, the empirical results from Model 8 and Model 9 estimated with the interaction term are similar to those from Table 2. Despite some differences in parameter estimates, the three interaction terms—Voter waiting times \times Black, Voter waiting times \times Hispanic, and Voter waiting times \times Asian—are statistically significant with the same direction. It provides additional empirical evidence for the previous finding that White voters, compared to Black, Hispanic, and Asian voters, are less sensitive to longer voter waiting times. Even not visualized, the changes of predicted probabilities based on the values of voter waiting times and the interaction term between voter waiting times and race in Table 3 are similar to those presented in Figure 3 and Figure 4. It should be noted that the empirical results are consistently robust even in models estimated with the interaction term between year-fixed effects and state-fixed effects. Moreover, even not presented due to the lack of space, the additions of covariates including the strength in partisanship or satisfaction with current politics do not alter the empirical results.

To sum up the empirical results presented, our study finds that voter waiting times have not only statistically significant but also substantively significant negative impacts on voter turnout across various model specifications. Furthermore, the empirical results demonstrate that White voters, compared to other voters with different racial characteristics, are more likely to give up their rights to vote when they face long waiting lines.

V. Discussion and Conclusion

Starting from the question “Do long voter waiting times really prevent people from voting?”, this study has explored the relationship between voter waiting times and voter turnout. Our empirical results based on the CCES data in five waves of the latest elections (2012, 2014, 2016, 2018, and 2020) demonstrate that longer voter waiting times deter the voters who come to their polling places from casting votes by increasing the costs of voting significantly, which corroborates the argument that times are one of the essential elements in the costs of voting (Brady,

Verba, and Schlozman 1995; Riker and Ordeshook 1968; Blais, Young, and Lapp 2000). In addition, contrary to our expectation, the empirical results show that White voters are more sensitive to long voter waiting times compared to Black, Hispanic, and Asian voters. In other words, racial minorities were more patient when they face long voter waiting times.

There are several contributions from this study. First, we distinguished the renegeing effect of voter waiting times from the downstream effect, and empirically tested the renegeing effect with other individual-level control variables. Our findings provided stronger evidence for the deterrent effect of long voter waiting times on voter turnout than previous literature did. We found out that long voter waiting times can make a difference even among citizens who have enough socio-economic resources to visit their polling places. This finding suggests that there can be still significant obstacles to voting even after citizens get out to vote.

Second, even though our analysis is focusing on the costs of voting, our findings reveal that *patience* might be another important factor for electoral participation. Against long voter waiting times, Black, Hispanic, and Asian voters are more resistant than White voters. The resource model of electoral participation has explained the turnout gap between Whites and racial minority groups as the result of the inequality of socio-economic resources for participation. That might be true for explaining who are more likely to get out from their homes to vote. Once citizens have arrived at their polling stations, however, patience might matter more than resources.

Third, we found out the previous explanations for electoral turnout can be similarly applied to the renegeing effect. Because most previous studies of electoral turnout have made comparisons between voters at polling stations and non-voters at other places, there was a theoretical lacuna for explaining the differences between voters at polling stations and non-voters at polling stations. Our analysis of renegeing effect has demonstrated that the impact of those key explanatory variables—age, income, and education—on the renegeing effect is consistent with previous literature’s findings. In other words, we do not need a new theory for explaining the renegeing effect.

One limitation of this study is that our analysis is solely based on self-reported survey data. Surveys usually show higher rates of voting in an election than official turnout because respondents have a strong incentive to offer a socially desirable response (Holbrook and Krosnick 2010). Considering this limitation, we use vote validation weights that are constructed by the CCES data to minimize the potential problems of over-reported voter turnout. However, despite a high threshold of confidence in the CCES’s vote validation process, it should be noted that there are still some false-positives (Enamorado and Imai 2019). Given that there is a lack of

highly validated data on both voter turnout and voter waiting times, replicating the empirical analysis presented in this article with more nuanced data is a natural future direction. Also, the potential heterogeneities among minorities are not deeply examined in this article. Thus, it will be promising to replicate empirical analysis in this article with interaction terms between race and other socio-economic factors including income and education. Analyzing the conditional relationship between voter waiting times and other individual covariates will be also interesting.

In terms of policy implications, this study calls for the immediate reform of electoral administration. Even though this study has found strong patience of racial minorities against long voter waiting times, this study is not written to praise their strong patience. Dealing with long voter waiting times is not an easy task, and demanding patience for exercising a citizen's constitutional rights cannot be justifiable. The disparities regarding voter waiting times make citizens experience a new type of disenfranchisement (Arnsdorf 2018). However, racial minorities by themselves have found creative ways to deal with long voter waiting times. For example, in the latest election, grassroots organizations such as *Pizza to Polls and Election Defenders* handed out food and water and invited music performers to keep voters from getting tired and not turning away from the polls (Carlisle 2020). These efforts were successful in sustaining minority voters' patience against long voter waiting times, as the historic high turnout of racial minorities in the 2020 election demonstrated. These are all good civil efforts, but there should be a governmental response to the problem of long voter waiting times.

Unfortunately, the responses from many states are going the totally opposite way. In Georgia, the Republican state legislature passed and signed their new voting law. Rather than reducing the cost of voting, this law curtailed ballot access for voters and made it a crime to offer water and food to voters waiting in lines (Corasaniti and Epstein 2021). What we have found in this study indicates that American democracy has depended upon the exceptional patience of individual voters for sustaining their participatory nature. Now is the time for legislators to demonstrate that American democracy has not only participatory citizens but also a healthy electoral administration that reduces the cost of voting.

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투표대기시간과 투표율 : 투표포기현상과 인종불평등

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논문 요약

보다 긴 투표대기시간은 투표장에 참석한 유권자들로 하여금 투표를 포기하게 만드는가? 만약 그러하다면, 어떤 유권자들이 투표대기시간에 보다 취약한가? 투표를 위한 비용으로서 투표대기시간의 중요성이 지속적으로 강조되고 있음에도 불구하고, 아직까지 투표대기시간이 투표율에 미치는 실질적인 영향력은 실증적으로 검증되고 있지 않다. 본 논문은 2012, 2014, 2016, 2018, 그리고 2020년도에 실시된 Cooperative Congressional Election Study(CCES) 자료를 활용하여 투표대기시간과 투표포기현상 간의 상관관계를 실증적으로 분석하였다. 분석 결과, 투표대기시간이 증가하면서 유권자들의 투표포기현상이 증가하였다는 점을 발견하였다. 이에 더해, 백인들과 비교하여 흑인, 황인, 그리고 히스패닉 등의 소수인종이 오히려 투표대기시간이 길어지더라도 투표를 포기하지 않고 참을성 있게 기다린다는 점을 발견하였다. 본 논문의 발견은 소수인종의 저조한 투표율이 그들의 민주적 시민성에서 기인한 것이 아니라, 선거제도와 선거운영과정에서의 불평등에 기인하고 있다는 것을 의미한다. 본 논문은 투표대기시간이 투표포기현상에 미치는 영향력을 실증적으로 검증하였다는 점에서 투표참여에 대한 선행연구에 기여한다.

주제어: 투표대기시간, 투표율, 투표포기현상, 투표비용, 인내심
