

MEASURING THE EFFECT OF DEMOGRAPHIC, ECONOMIC, AND POLITICAL FACTORS ON VOTER TURNOUT IN THE 2016 PRESIDENTIAL ELECTION

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This research analyzes the determinants of voter turnout on a district level for the House of Representatives in the 2016 Presidential Election. To determine the impact of various demographic, economic, and political factors on voter turnout, an econometric model was specified and estimated using House-published election reports and 2016-2017 U.S. Census Bureau surveys for 376 Congressional Districts. The results show that several factors, including the voter's race, the number of ballot initiatives on the ballot, and education level, influenced the likelihood of an eligible voter participating in the election. This research also finds evidence that ballot initiatives' positive role in increasing electoral participation is not without bound, which is contrary to prior findings. In the end, results mostly confirm the expected direction of the impacts of the analyzed determinants of voter turnout in 2016, thus supporting the underlying theoretical factors most responsible for influencing voter participation rates at the district level.

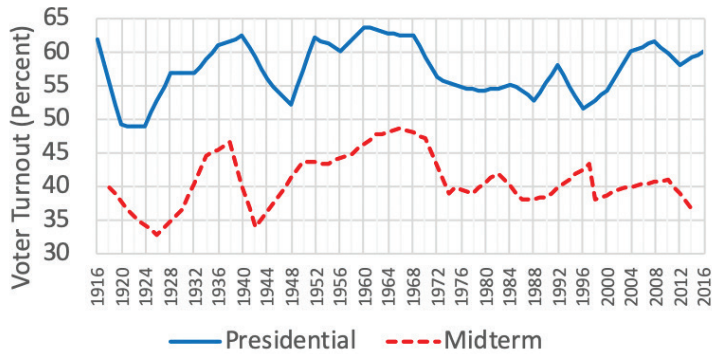
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I. Introduction

In the United States, voter turnout rates experience large fluctuations between midterm and presidential election years. Figure 1 displays voter turnout among eligible citizens for midterm and presidential elections, as recorded by Veracity Media (2018), from 1916 through 2016. On average, voter turnout rates have been approaching 57.36% of eligible voters in presidential elections and 40.91% of eligible voters in midterm elections. As illustrated, voter turnout has not been constant over the recorded years. The commonly observed 10 to 20 percent differences in voter turnout between midterm and presidential elections reflect changes in the electorate, as different socio-economic groups are more likely to vote in different types of elections.

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FIGURE 1
VOTER TURNOUT IN MIDTERM AND PRESIDENTIAL ELECTIONS (1916 – 2016)



Data source: Veracity Media (2018)

As seen in Figure 1, voter turnout in presidential and midterm elections follow very similar fluctuation patterns while maintaining a 10 to 20 percent difference in turnout. For example, the lowest voter turnout rate between 1916 and 2016 for both presidential and midterm elections occurred in 1924 (48.9%) and 1926 (32.9%), respectively. Similar fluctuation patterns are also observable in the highest voter turnout rate for presidential and midterm elections, which occurred in 1960 (63.8%) and 1966 (48.7%), respectively. The low and high in voter turnout followed a similar pattern and occurred within only a few years of each other.

Voter turnout may also vary by state and voting district depending on factors that vary across the country, such as state-specific election laws or district-level electoral competitiveness (“Voter Turnout”). For decades, understanding the factors responsible for changes in levels of voter turnout has been the subject of extensive research, as analyses of the determinants of voter turnout in different election years and over time can be of tremendous use to both politicians planning election campaigns and electoral scholars seeking a deeper understanding of the American electorate.

On a related note, since municipalities conduct elections, information regarding the determinants of voter turnout would be extremely useful for registrars of voters, the local elected officials responsible for overseeing elections. The ability to predict voter turnout based on the demographic, economic, and political landscape of the municipality would allow registrars to allocate sufficient resources to polling places and Election Day staff. Such information allows registrars to hire the appropriate number of poll workers at polling locations and order enough ballots for each election. This ensures that the polling places can run more smoothly, and avoid reverting to emergency procedures in the event of overcrowding at the polls or ballot shortages, which can depress voter turnout. Alternatively, registrars can use information on voter turnout in comparison with information on the residents of the municipality to determine what groups of residents are voting less than other groups. Then, registrars can conduct more

successful voter registration drives and outreach programs that target residents with specific characteristics, raising voter turnout.

In sum, the purpose of this research is to investigate what aggregate characteristics in the electorate and the American political system determine the likelihood that a representative eligible citizen would vote in the 2016 Presidential Election. This study will focus on the aggregate characteristics of voters and the electoral system in individual district-level contests for the House of Representatives in order to conduct a regression that will allow for the prediction of aggregate voter turnout in any congressional district.

II. Literature Review

Voter turnout is a well-established and significant factor in analyzing the outcomes of elections, and is thus a topic of great interest within the realm of political analysis. Anthony Downs's *An Economic Theory of Democracy* (1957) is the pioneering text in analyzing the importance of understanding the determinants of voter participation. In the context of voter turnout, Downs proposes a behavioral economic model, which theorizes that a voter's decision to vote hinges on whether, in the two-party system Downs studied, he or she can identify one party that he or she associates with more. If the voter can identify such a party, he or she will act rationally and cast his vote in the direction in which he or she believes will reward him or her the largest benefit, should that party win. While Downs's application of behavioral economic theory in order to explain voter turnout appears sound, his theory minimizes the impact of socioeconomic factors and other demographic information on voter turnout. According to Downs, the rational behavior of an elector is driven by preferences that exist on an individual level, rather than shared preferences of individuals belonging to the same socioeconomic, demographic, or political groups.

In the decades following Downs's publication, researchers' focus shifted away from individual rational voter behavior and towards measurable demographic characteristics' impact on a voter's likelihood to vote. For instance, Powell (1986) researched demographics' effects on voter turnout in the United States and 11 other industrialized democracies in an effort to explain why the United States has relatively low voter turnout, even though the United States' attitudinal environment is more favorable to all kinds of citizen participation, including voting.

Powell studied the American institutional setting, and specifically the two-party system and voter registration, voter turnout, and demographic information, using nearly three decades of election data. Powell found education level and age to be the most significant factors in determining voter turnout, with large gaps in participation rates between non-high school graduates, high school graduates, and college graduates, in addition to an exponential increase in participation rates with age. In contrast, Powell found that the American voter registration process, an institutional factor, to be the most significant hindrance to voter turnout because of America's unique policy among

comparison countries, using these countries as a baseline, to require its citizens to actively maintain their voter registration record in order to retain their ability to vote.

Opportunity costs for voting exist everywhere, and at a minimum, citizens have to take a significant amount of time out of their day to go to polling locations. However, the United States has an even higher opportunity cost than other countries because Americans have to complete specific actions periodically to maintain their voter registration records and their right to vote, which could depress voter turnout rates.

Powell conducted his research in a relatively new field, using data from the 1960s through the 1980s to identify significant variables effecting voter turnout. However, Powell only identified a handful of significant variables, and the researchers that followed gradually improved the model by adding variables representative of demographic factors to their voter turnout analyses. The analysis of additional variables focuses on one or two new demographic factors at a time, such as race, sex, or education level.

Tam Cho, Gimpel, and Dyck (2006) pursued a line of research in relation to voter turnout more closely related to Powell's research, as the team analyzed sociodemographic factors directly overlapping with those analyzed by Powell, such as education and income. Tam Cho, Gimpel, and Dyck found education and income to have a significant positive effect on voter turnout, which is similar to Powell's findings. However, their argument does little to address the potential issue of multicollinearity between education and income. Furthermore, multicollinearity is an issue because of the expected relationship of increasing income with additional years of education.

Powell and others' research, in part, establishes that education is one of the most important factors in determining the probability that an eligible citizen will vote. With that said, this work does little to differentiate the fluctuations in the effect of education on voter turnout while a voter is in school and its impact following graduation. Tenn (2007) investigates the hypothesis that education makes a voter more likely to vote. To do this, he differentiates the effect active enrollment in a high school or university and a degree from a high school or university have on voter turnout. Tenn found that being an 18 or older high school or college student has a significant positive impact on voter turnout and voter registration. However, he also finds that additional years of schooling had no significant effect on voter turnout or voter registration once the analysis addressed the issue of selection bias in education choice. Tenn finds, in direct contrast to Powell and Tam Cho, Gimpel, and Dyck's findings, that being in an educational environment increases the probability that an individual will turnout only while they are in that environment, and that the effect of education on voter turnout diminishes once the individual leaves school. Tenn's contributions are significant in identifying a possible increase in opportunity cost once the student graduates, but are also lacking in that his model cannot account for the impact of schooling below the eleventh grade, as students are not yet of voting age. The limitations on Tenn's findings results in his claim being questionable, because the model ignores the K through 10 years of an individual's educational career.

While demographic and economic factors, including education, income, and sex, affecting voter turnout rates are far greater in number and written about much more

frequently, institutional factors started to be examined in the literature review. Tolbert, Grummel, and Smith (2001) expanded on Powell's analysis of institutional factors with extensive research on the effect of ballot initiatives across various states on voter turnout. Tolbert, Grummel, and Smith compared voter turnout in states that allow citizen-initiated ballot initiatives to amend the state constitution and those who do not. Ballot measures' anticipated importance stems from its ability to allow citizens to vote directly on laws and amendments to the state constitution. Instead of voting for representatives to then vote on laws, citizens are able to participate in a direct democratic process, raising the perceived value of participating in an election. In this study, they found initiative states have a 7% to 9% higher voter turnout rate in midterm elections, and a 3% to 4.5% higher voter turnout rate in presidential elections in the 1990s. One of the most significant findings to come from their research was that, while increasing initiatives result in marginally higher turnout rates, one ballot measure per election is sufficient to stimulate significantly higher levels of voter turnout. This contradicted the previous belief that multiple ballot measures needed to be present on a ballot to have a substantial effect. Also highlighted in the study, was the lack of reduction in voter turnout, regardless of how many ballot measures were present on the ballot, which contradicted the belief that numerous ballot initiatives created ballot fatigue.

Gerber, et al. (2009) researched battleground states, a byproduct of the Electoral College in the United States, and their impact on voter turnout to join Powell and Downs in researching influential institutional factors. Gerber, et al. compared voter turnout for states both with and without battleground status, defined as a state where presidential and congressional contests are close. Under Gerber, et al.'s definition of battleground status, this factor is an institutional factor, because it is a byproduct of the two-party system and the Electoral College. They found the increase in voter turnout due to a state's battleground status is about one-eighth of the increase in voter turnout because of a presidential election year. This finding suggests that factors affecting the national electorate, such as a presidential election year, have a much larger impact on voter turnout than state-level factors, such as a state's battleground status. Battleground status can result in a small increase in voter turnout that is still significant, but its impact is small relative to demographic and other institutional factors.

O'Dell and Marks (2016) examine district-level data and conduct a comprehensive analysis on the determinants of voter turnout for the 2014 Midterm Election. In their model, they include demographic, economic and institutional variables to capture the effect of a wider array of factors that influence voter turnout. Specifically, demographic variables capture the makeup of the voting population's effect on voter turnout, economic variables capture the effect of education and income, and institutional variables capture the effect of voting procedures built into the election process, such as incumbent advantages and the ballot initiative process. O'Dell and Marks find racial composition of districts, margin of victory, battleground status, and ballot measures to be significant determinants in predicting voter turnout. Their findings support those of Downs: that age and sex, and specifically being male, are significant factors in deter-

mining a district's aggregate voter turnout. O'Dell and Marks also found that battleground status is significant, but the impact of battleground status was much larger in their model compared to the effect measured by Gerber, et al. (2009). Similarly, O'Dell and Marks's findings support Tolbert, Grummel, and Smith's (2001) initial analysis of the positive relationship between voter turnout and the number of ballot measures that appear on a state ballot in a midterm election.

III. Economic Theory

This research will construct a presidential election participation model to predict voter turnout using three main categories of explanatory variables. Equation 1 represents the general specifications central to the economic model. These variables will capture the effect that social demographics, the economic environment, and political systems have on voter turnout.

Equation 1: $Voter\ Turnout = F(D, E, P)$

Demographic variables (D) measure voter turnout's relationship with characteristics inherent to voters. For example, it will measure the change in the probability of voting as people age, their sex, and if they identify as white or a minority race. In contrast, economic environment variables (E) correspond to an individual's financial status and education level, and its effect on their likelihood to vote. Lastly, political variables (P) correspond to institutional frameworks in the American political system, such as what ballot characteristics and candidate vote shares affect overall voter turnout rates. What follows is a more detailed discussion of each of these factors and their theoretically expected impact on voter turnout.

DEMOGRAPHIC FACTORS

Powell's (1986) research is among a collection of existing literature that provides significant evidence of the importance of several demographic factors (D), including a positive relationship between age and voter turnout. Similar to Powell (1986) and O'Dell and Marks (2016), this research will use three factors to capture a district's demographic characteristics. To capture the effects of age, this research includes the population over 65. Theoretically, it is hypothesized that senior citizens exemplify the effect of increasing participation with age. The hypothesis suggests that this segment of the population exercises their right to vote more than any other age group. This is likely because many senior citizens are retired, and therefore have a lower opportunity cost associated with voting.

Tolbert, Grummel and Smith (2001) find a positive relationship between white eligible voters and voter turnout, and the negative relationship between minority eligible voters and voter turnout. According to the authors, white voters historically had greater

access to information outlets and mobilizing institutions, suggesting an increased voter turnout rate, accounting for this factor in the analysis. In sum, non-minority voters have had greater access to election information and resources. A positive relationship between voter turnout rates and an individual being white is predicted. Therefore, it is hypothesized that greater access to election information and resources has a positive effect on a district's voter turnout. However, general access to such information and resources has increased with racial equality since research on the determinants of voter turnout began in the last half of the 20th century. Moreover, it is possible that the positive relationship between voter turnout rates and individuals being white has lessened.

Powell (1986) also finds a positive relationship between males and voter turnout, although he classifies the relationship as insignificant once he takes into account interest and party identification. Additionally, O'Dell and Marks (2016) find a strong positive relationship between males and voter turnout. The strong male leadership of typical American households at the time of Powell's initial findings help explain the positive relationship between males and voter turnout. Furthermore, the model includes a variable corresponding to the percent of the population in a district that is male to test Powell (1986) and O'Dell and Marks' (2016) findings in 2016 and capture the effect of a historically major determinant of voter turnout.

ECONOMIC FACTORS

Two economic factors (E) are hypothesized to influence voter turnout at the district level. First, the model includes a variable representing the percent of the population in a district with a college diploma. There is a long-held belief that higher levels of education increase an individual's exposure to opportunities for civic involvement and their importance. Powell (1986), Tenn (2007) and Tam Cho, et al. (2006) find evidence that education and active involvement in an educational institution have significant impacts on an individual's likelihood of voting. Moreover, the expectation is that the more educated an individual, the more knowledge he or she possesses and he or she is more likely to vote. Meaningful research, including that of Tam Cho, et al. (2006) present evidence of a positive relationship between voter turnout and both education and income. The median income of households in each district is included in the model, as the more an individual earns, the more of a stake he or she has in economic and tax policies resulting from an election outcome.¹

¹ A strong relationship between education and income is expected because a higher level of education typically results in a higher income. Moreover, there is the possibility of multicollinearity between education and income, and the model will be refined as needed.

POLITICAL FACTORS

The model utilizes several variables to capture the effect of political factors (P) on an individual's decision to vote. One factor concerns whether the incumbent won in the specified congressional district. This factor indicates that in the model an incumbent victory likely signals a lack of competitiveness in a race. O'Dell and Marks (2016) found that an incumbent victory was associated with lower turnouts for that district.

Incumbent victory is measured to capture the voters' awareness of the competitiveness of the race, and whether a strong incumbent advantage discourages turnout. Similar to an incumbent victory, the intention of incorporating margins of victory in both a House of Representatives and Presidential contest is to measure their competitiveness and their effects on voter turnout. At the district level, a negative relationship between margin of victory for House contests and voter turnout rates is expected, as an increase in margin of victory indicates a less competitive contest. At the state level, a similar relationship for margin of victory in the presidential race is anticipated. The same margin of victory for president is applied to every district in the state because states do not count votes for president by district, but by municipalities, and district lines often divide individual municipalities into segments. Similar to the variable used by Gerber, et al. (2009), this variable is meant to measure the effect of battleground status by measuring the impact a shrinking margin of victory for president on a state level has on voter turnout. The expectation is that as the margin of victory for president nears zero, the positive effect the explanatory variable has on voter turnout increases.

The model also incorporates the number of ballot measures on a state ballot into the regression in the form of an explanatory variable. This variable is introduced because, as demonstrated by Tolbert, Grummel, and Smith (2001), increasing ballot measures on a ballot suggest higher levels of voter turnout with no ballot fatigue. In theory, the marginal increase in voter turnout from each additional measure on the ballot, for an unlimited number of ballot measures, should never be negative. Moreover, the opportunity for citizens to vote directly on legislation and state constitutional amendments is expected to have a positive effect on voter participation.

To summarize the theoretical expectations of each of the model's factors, Table 1 presents the factors being used in the analysis and a summary of each factor's hypothesized sign as to its impact on voter turnout.

TABLE 1
DEFINITIONS AND EXPECTED SIGNS

Variable	Definition	Expected Sign
Voter Turnout	Percent of 18+, eligible citizens, that voted in district <i>i</i>	Dependent Variable
Demographic Factors (D)		
Population over 65	Percent of the population over the age of 65 in district <i>i</i>	+
White	Percent of the population that is white in district <i>i</i>	+
Male	Percent of the population that is male in district <i>i</i>	+
Economic Factors (E)		
College Diploma	Percent of the population with a college diploma in district <i>i</i>	+
Median Income	Median income of the households in district <i>i</i>	+
Political Factors (P)		
Margin of Victory (House)	Percent difference in the share of votes received between the two major party candidates for the House of Representatives race in district <i>i</i>	-
Ballot Measures	Number of ballot measures appearing on the state ballot in which district <i>i</i> is located	+
Margin of Victory (President)	Percent difference in share of votes received between the two major party candidates for President in which district <i>i</i> is located	-
Incumbent Winner	Dummy variable that is equal to 1 if the winner of the district <i>i</i> House race was the incumbent	-

IV. Data and Economic Model

The goal of this analysis is to build on previous research, specifically O'Dell and Marks' (2016) district-level analysis of the determinants of voter turnout in the 2014 Midterm Election. Focusing on contests in the United States House of Representatives, the model will analyze select cross-sectional election data from the U.S. Census Bureau corresponding to the 2016 Presidential Election. Conducting a similar regression analysis with an updated data set will aid in determining what variables from the three categories of factors (D, E, and P) maintained a consistent finding from the 2014 Midterm Election. An analysis of the 2016 Presidential Election will also help identify any changes in the effects of demographic, economic, and political factors in a presidential election year versus a midterm election year.

The dependent variable used in this regression will be the rate of voter turnout, defined as persons eligible to vote in each congressional district who voted in 2016. Fifty-nine congressional districts were excluded from the dataset used for the analysis, resulting in a data set consisting of information from 376 congressional districts.²

Table 2 presents the basic descriptive statistics for the variables used in the analysis.

TABLE 2
BASIC DESCRIPTIVE STATISTICS

Variable	Obs.	Mean	Std. Dev.	Min	Max
Voter Turnout	376	58.4986	7.7493	38.3351	78.4897
Demographic Factors (D)					
Population over 65	376	20.2598	3.8049	12.0051	40.5082
White	376	77.1974	16.8324	17.5838	96.3859
Male	376	48.4675	1.3181	43.5795	53.4760
Economic Factors (E)					
College Diploma	376	27.7886	9.9906	9.8378	87.5939
Median Income (Thousands of Dollars)	376	63.4948	17.1104	28.0420	134.0770
Political Factors (P)					
Margin of Victory (House)	376	31.6447	17.7252	0.5226	92.8657
Incumbent Winner	376	0.8723	0.8723	0	1
Ballot Measures	376	3.9521	3.9521	0	17
Margin of Victory (Pres)	376	15.7113	15.7113	0.2353	51.4106

Data sources: United States Census Bureau (2016), Haas (2016a), Ballotpedia (2016), Haas (2016b), United States Census Bureau (2017).

The average turnout rate of the 376 congressional districts analyzed was 58.50 percent and ranged between 38.34 percent and 78.49 percent. Regarding demographic factors (D), the average congressional district senior citizens comprise 20.26 percent

² The excluded congressional districts lacked House contests, either being without a candidate from each major political party, consisting of a major party candidate versus a minor party candidate, or having two candidates from the same major party depending on state primary laws. The only exceptions were the contests in the congressional districts in Louisiana, which were excluded because the final vote count was of a series of runoff elections, rather than a single winner-take-all election held throughout the other 49 states in 2016.

of its eligible voting-age population (henceforth referred to simply as ‘population’). In conjunction, the average congressional district has a population that is 77.20 percent white and 48.47 percent male. However, the white proportion of a congressional district fluctuates greatly, ranging between 17.58 percent to 96.39 percent in 376 observations. Moreover, 22.80 percent of the average population are members of a minority race, and is the basis of investigating whether there is a significant difference in the likelihood that individuals of different races will vote.

As previously discussed, the impact of economic factors (E) are captured by measuring the percent of the population with college diplomas and the median income of each congressional district. The average congressional district has a population with a median household income of \$63,494.80 and 27.79 percent of that population holding a college degree. Both the percentage of the population holding a college degree and household median income varied widely, with the percent of college graduates ranging between 9.84 percent and 87.59 percent and median household income ranging between \$28,042.00 and \$134,077.00.

The impact of political factors (P) on voter turnout are captured through a variety of factors. They include margin of victory in contests for representatives and president, whether the winner is an incumbent, and the number of state ballot initiatives appearing on the ballot. On average, major party candidates for the House won a contest in a congressional district by a 31.64 percent margin of victory and presidential candidates won a state by an average margin of victory of 15.71 percent. The margin of victory in both the House and for president ranged from recount-eligible races to landslide victories. The margin of victory for the House and for president ranged from 0.52 percent to 92.87 percent and from 0.24 percent to 51.41 percent, respectively. Additionally, the incumbent won 87.23 percent of contests for a seat in the House and the average state ballot displayed 3.95 ballot initiatives for the voter to decide on directly.

To complete this analysis, this research will investigate two econometric model specifications in an attempt to predict a district’s voter turnout. Equation 2 forms the base model to estimate voter turnout and is estimated using Ordinary Least Squares (OLS).³

³ The OLS technique is not without problems, so potential violations of OLS assumptions will be investigated, and if discovered, corrective procedures will be utilized.

Equation 2:

$$Y_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_3 X_{3i} + \beta_4 X_{4i} + \beta_5 X_{5i} + \beta_6 X_{6i} + \beta_7 X_{7i} + \beta_8 X_{8i} + \beta_9 D_i + \epsilon_i$$

where:

Y_i = The voter turnout in district i

X_{1i} = The percent of the population over age 65 in district i , ($\beta_1 > 0$)

X_{2i} = The percent of the population that is white in district i , ($\beta_2 > 0$)

X_{3i} = The percent of the population that is male in district i , ($\beta_3 > 0$)

X_{4i} = The percent of the population with a college diploma in district i , ($\beta_4 > 0$)

X_{5i} = The median income of the households in district i , ($\beta_5 > 0$)

X_{6i} = The margin of victory for the House of Representatives race in district i , ($\beta_6 < 0$)

X_{7i} = The number of ballot measures appearing on the ballot in district i , ($\beta_7 > 0$)

X_{8i} = The margin of victory for president in the state where district i is located, ($\beta_8 < 0$)

$D_i = \begin{cases} 1 & \text{if the winner of district } i \text{ is the incumbent} \\ 0 & \text{otherwise} \end{cases}$, ($\beta_9 < 0$)

ϵ_i = The stochastic error in the model

Table 3 presents the OLS regression estimate of Equation 2.⁴ The Ramsey Test indicated a specification error (F-statistic = 4.10, p-value = 0.0070) and the Breusch-Pagan Test indicated severe heteroscedasticity ($\chi^2 = 43.18$, p-value = 0.0000). Corrective procedures were followed to address the issue of heteroscedasticity observed in the OLS regression estimates for the base model by calculating the OLS regression estimates with a robust standard error.

In general, the estimates presented in Table 3 are in agreement with the findings of O'Dell and Marks (2016) and others. Overall, 51.55% of variation in voter turnout is explained by the regression model. Statistically, at least one factor is important in explaining the variability. Specifically, a voter being white has a statistically significant positive impact on voter turnout. The model estimates that for every additional percentage point of a congressional district's population that is white, voter turnout increases by 0.13 percent.

⁴ Using the Variance Inflation Factor (VIF) method, correlation between the independent variables was assessed and there were no two variables with alarmingly high correlation. The mean VIF was found to be 1.85, which is acceptable and lessens the concern for severe multicollinearity. The variables measuring the percent of the population in a congressional district with a college degree and the population's median household income were the most highly correlated (correlation = 0.7891), but the correlation was still not severe enough to warrant corrective procedures.

TABLE 3
OLS REGRESSION ESTIMATES FOR BASE MODEL

Variable	Coefficient	Robust Standard Error	T-Stat	P> T
Demographic Factors (D)				
Population over 65 (X_{1i})	0.2566	0.0949	2.70	0.007***
White (X_{2i})	0.1348	0.0312	4.32	0.000***
Male (X_{3i})	-0.8563	0.3357	-2.55	0.011**
Economic Factors (E)				
College Diploma (X_{4i})	0.2028	0.0727	2.79	0.006***
Median Income (X_{5i})	0.1346	0.0337	3.99	0.000***
Political Factors (P)				
Margin of Victory (House) (X_{6i})	-0.0168	0.0211	-0.80	0.435
Incumbent Winner (D_i)	-1.1868	0.8703	-1.36	0.173
Ballot Measures (X_{7i})	0.0690	0.0576	1.20	0.231
Margin of Victory (Pres) (X_{8i})	-0.2119	0.02778	-7.63	0.000***
Constant	74.8326	15.8958	4.71	0.000

N = 376, F-Statistic = 43.33, $R^2 = 0.5155$

*=significant at 10%, **=significant at 5%, ***=significant at 1%

The percentage of the population over the age of 65 has a statistically significant positive effect, while the percentage of the population that is male has a statistically significant negative effect on a district's voter turnout. The marginal change for the proportion of the population over 65 and the percentage that is male is estimated to be 0.26 and -0.86 percent, respectively.

Notably, the estimated impact of a percentage increase in the male population of a congressional district on voter turnout is negative, which conflicts with the predicted positive sign and will be further discussed in the conclusion. However, O'Dell and Marks (2016) found the two variables' effects to be insignificant. In part, the difference in the effect of the male population on voter turnout between 2014 and 2016 is likely because of the unique matchup of the 2016 Presidential Candidates. When asked to pick between Trump and Clinton in an October 2016 Reuters/Ipsos poll, 44 percent of women chose Clinton while 29 percent chose Trump (Kahn, 2016). The combination of Hillary Clinton being the first female major party candidate and Donald Trump's controversial remarks about women likely mobilized a greater percentage of the eligible female population to vote, causing the effect of the male population on voter turnout to be negative.

The estimates for the base model also found both variables meant to capture the effect of economic factors on voter turnout to be significantly positive. The model

estimated that a percentage point increase in the percent of the population of a congressional district with a college degree results in a 0.20 percent increase in voter turnout. The increase in voter turnout per every thousand-dollar increase in median household income was estimated as 0.13 percent. O'Dell and Marks (2016) found both median household income and the percentage of the population with a college degree to have a positive impact on voter turnout, but median income was only found to be significant after removing their education variables. O'Dell and Marks considered the multicollinearity between median income and levels of education to be too severe to include both variables in the same regression, while this research indicates multicollinearity between these two factors are not an issue in the estimation of voter turnout.

Regarding political factors (P), this research found the margin of victory for the presidential race to be the only variable representing political factors to be statistically significant in its impact on voter turnout. The OLS regression estimate for the base model found that for every additional percent increase in the margin of victory between the two major party presidential candidates on a state level, voter turnout decreased by 0.21 percent. This research found the margin of victory between the two major party House candidates in a congressional district, whether the House incumbent won the contest, and the number of ballot measures that appear on a state ballot, to be insignificant. While sharing the finding that the effect of an incumbent winner is statistically insignificant, O'Dell and Marks (2016) found ballot measures to be significant at the 1, 5, and 10 percent significance levels. O'Dell and Marks only measured the margin of victory for House races and found it to be significant, while this research found the margin of victory for House races to be insignificant.⁵

Upon further analysis, the results of the Ramsey Test for Equation 2 indicates a possible specification issue with the model. In an attempt to address this issue, Equation 3 presents an alternative econometric model of a district's voter turnout. Equation 3 is the expanded model that tests a non-linear functional form as a better potential fit for the model. Specifically, variables of median income squared (X_{si}^2) and ballot measures squared (X_{7i}^2) are included in the model specification. Once again, a Ramsey Test and a Breusch-Pagan Test are conducted to test for specification error and heteroscedasticity. This research fails to reject the null hypothesis that the model has no specification bias in the Ramsey Test at the 10 percent significance level (F-statistic = 2.22), suggesting Equation 3 is preferable to Equation 2. However, the Breusch-Pagan Test indicates severe heteroscedasticity ($\chi^2 = 50.34$, p-value = 0.0000) and corrective procedures are taken by conducting a heteroskedastic-corrected regression estimate for the expanded model with a robust standard error. Table 4 presents the findings of the OLS regression estimate for Equation 3.

⁵ Given that 2014 was not a presidential election year, O'Dell and Marks did not directly measure the impact of the state-level margin of victory in presidential races on voter turnout.

Equation 3:

$$Y_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_3 X_{3i} + \beta_4 X_{4i} + \beta_5 X_{5i} + \beta_6 X_{5i}^2 + \beta_7 X_{6i} + \beta_8 X_{7i} + \beta_9 X_{7i}^2 + \beta_{10} X_{8i} + \beta_{11} D_i + \epsilon_i$$

TABLE 4
OLS REGRESSION ESTIMATES FOR EXPANDED MODEL

Variable	Coefficient	Robust Standard Error	T-Stat	P> T
Demographic Factors (D)				
Population over 65 (X_{1i})	0.2566	0.0949	2.70	0.007***
White (X_{2i})	0.1348	0.0312	4.32	0.000***
w (X_{3i})	-0.8563	0.3357	-2.55	0.011**
Economic Factors (E)				
College Diploma (X_{4i})	0.2028	0.0727	2.79	0.006***
Median Income (X_{5i})	0.1346	0.0337	3.99	0.000***
Political Factors (P)				
Margin of Victory (House) (X_{6i})	-0.0168	0.0211	-0.80	0.435
Incumbent Winner (D_i)	-1.1868	0.8703	-1.36	0.173
Ballot Measures (X_{7i})	0.0690	0.0576	1.20	0.231
Margin of Victory (Pres) (X_{8i})	-0.2119	0.02778	-7.63	0.000***
Constant	74.8326	15.8958	4.71	0.000

N = 376, F-Statistic = 38.26, R2 = 0.5490

*=significant at 10%, **=significant at 5%, ***=significant at 1%

There are no substantial changes in impact or significance for the variables found to be significant in the OLS regression estimates for the base model, except for median income and ballot measures. The addition of a variable representing median income squared in capturing the non-linear effect of median income on voter turnout in a congressional district suggests a better fit for the model. The expanded model estimation indicates that for every thousand-dollar increase in median household income, voter turnout increases by 0.39 percent, compared to the 0.13 percent increase estimated by the base model. However, given the negative sign coefficient for the variable median income squared (X_{5i}^2), increases in median income have limits on its positive relationship with voter turnout. Specifically, voter participation increases up to the point where household income equals \$123,468.75. Income levels higher than \$123,468.75 estimate a decrease in voter turnout.

Similar to a model estimation conducted by Tolbert, Grummel, and Smith (2001), ballot measures squared (X_{7i}^2) was incorporated into the standard model to both establish a better fit for the model and evaluate whether there is a point of ballot fatigue. Ballot fatigue is defined as a point where after including a specified maximum number

of ballot initiatives on a state ballot, additional ballot measures will begin to have a negative impact on voter turnout. Both O'Dell and Marks (2016) and Tolbert, Grummel, and Smith found no evidence of ballot fatigue. Similar to past research, this investigation finds ballot measures to have a significant positive impact on voter turnout, where each additional ballot measure included on the ballot results in a 0.91 percent increase in voter turnout. However, unlike Tolbert, Grummel, and Smith (2001) and O'Dell and Marks, this research finds a ballot fatigue point of 8.32 ballots. Instead of an infinite number of ballot initiatives on a state ballot resulting in a continuously positive marginal increase in voter turnout, this research finds that after an average 8.32 ballots, each additional ballot measure will have a statistically significant negative impact on voter turnout. The detection of ballot fatigue in the 2016 Presidential Election is a significant finding of this research and will be further discussed in the conclusion.

V. Conclusion

This research presents findings that partially confirm previous research, specifically that of Tolbert, Grummel, and Smith (2001) and O'Dell and Marks (2016). The significance of race, college education, median income, and ballot measures in both the 2014 Midterm and 2016 Presidential Elections suggests that these factors retain their significance regardless of a midterm or presidential year. However, the significance of senior citizen status and voters' sex in this research compared to statistical insignificance during a midterm election suggests that these demographic groups are among those who turnout in lesser numbers and contribute to the 10 to 20 percent gap in voter turnout between midterm and presidential elections.

For each percent increase in the male portion of the population in a congressional district, voter turnout was estimated to decrease by 0.90 percent in the expanded model. Despite the large decrease, this estimate would result in a small change in voter turnout because the difference between the size of the male and female population in a congressional district is seldom larger than a few percent. However, the statistically significant negative impact a percentage increase in the male population of a congressional district has on voter turnout contradicts prior research by Downs (1957), among others, and suggests a change in family roles since prior research was conducted in the last half of the 20th century. These findings also suggest the previously discussed effect the 2016 Presidential Candidates had on female voters, mobilizing them to vote, impacted the effect of the male population on voter turnout.

The most notable finding of this research is the discovery of a ballot fatigue point after 8.32 ballot initiatives are listed on the ballot. Tolbert, Grummel, and Smith (2001) find no ballot fatigue and O'Dell and Marks (2016) partially support this finding. However, O'Dell and Marks do not investigate the possibility of ballot fatigue for more than three ballot measures listed on a state ballot. Investigating only one through three ballot measures leads O'Dell and Marks to overlook a ballot fatigue point beyond eight ballot measures. This ballot fatigue point estimated in the research indicates that, on average, each additional ballot initiative begins to have a negative impact on voter turnout after 8.32 ballots.

While this research yields interesting results, the findings are limited by the data set and the uniquely polarizing nature of the 2016 Presidential Election. This research can benefit from conducting a similar analysis on other recent presidential elections. However, the results do have implications for registrars of voters and voter registration policies. A registrar of voters may be able to increase voter turnout by conducting voter registration drives in heavily populated minority areas in their district, if they exist, because minority populations turn out at lower rates than white voters do. Additionally, state legislatures may want to be more conscious of how many ballot initiatives are included on the ballot, because nine or more ballot measures will likely begin to have a negative effect on voter turnout rates.

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