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Lauren Huiet April 5, 2023

# Assessing the Impact of Changes in Voter Registration Law on Voter Turnout Rates: The Role of Partisanship in Georgia

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Abstract

Assessing the Impact of Changes in Voter Registration Law on Voter Turnout Rates: The Role of Partisanship in Georgia

By Lauren Huiet

This thesis examines how the relationship between costs and benefits associated with voting affects voter turnout and the two-party vote share in Presidential elections between 2000- 2012. Through examining Georgia-specific data on voter turnout at the county level, I assess the impact of Georgia's transition to no-excuse absentee ballots, photo-ID requirements, and online voter registration on voter turnout. I subsequently assess the partisan differential that arises from each of the aforementioned changes to electoral law. Through a series of regressions, results suggest that when an electoral law decreases the costs associated with voting, Georgia voters turnout at higher rates. While the majority of models regarding the partisan effects of these changes are not statistically significant, one model indicates that the adoption of online voter registration may have increased turnout for the Democratic presidential candidate. Further research is needed to determine the broader partisan patterns, but the findings suggest that when the costs of voting decrease, Democratic voters in Georgia are more likely to turn out to vote than their Republican counterparts.

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**Introduction:**

Voting is one of the most foundational aspects of a successful, stable democracy. Voting is designed to give eligible voters a voice in the policy decisions that affect their quality of life. By engaging in the democratic process via voting, individuals can now have a voice in policy decisions that govern the regulations, benefits, and restrictions residents must abide by.
As such, significant research surrounds voter registration laws and variations in voter turnout in federal, state, and local elections. Presidential voter turnout rates have been self-reported between 54.2% and 69.3% since 1964, and midterm turnout has been between 38.5% and 55.4%.[1] Various factors impact the 15 percent change in Census self-reported voter turnout over time, and changes in voter registration laws have historically been cited as a reason for turnout changes.

Research has produced conflicting findings on the degree of impact changes in voter registration laws may have on turnout rates. Some research has found that changes in voter ID requirements and changes in early voting hours or location do not produce a statistically significant effect on turnout, while other research supports that both have a meaningful impact (Cantini & Prons, 2021; Alvarez, Bailey & Katz, 2008). Studies stating a change in turnout most often theorize that a change in registration laws can shift the costs of voting to an acceptable or unbearable level (Downs, 1957; Riker & Ordershook, 1968). Standard costs associated with voting are information, transportation, time, effort, and mobilization costs. When these costs are increased past the threshold an individual deems acceptable, then they will not turn out to vote (Downs, 1957). The contrary is also theorized, as decreasing the costs of voting to an individual's acceptable threshold may result in them turning out to vote (Downs, 1957; Riker and Ordershook, 1968). There is no uniform threshold for voters- each person has their own point of what is acceptable and their own perception of the benefits of voting, which dictate if they turn

out to vote (Riker and Ordershook, 1968). Thus, any changes in voter registration laws may increase, decrease, or not affect the costs associated with voting and may subsequently affect voter turnout. The magnitude of effects, the effects of specific voter registration law changes, and the heterogeneous impact across different states and populations are additionally contested.

A change in voter registration laws may or may not significantly change voting costs or perceived costs. If a state shifted to only allowing government-issued photo IDs as a form of identification, those with a driver's license, passport, or military ID would experience no change in their cost of voting. They may only experience the informational costs of the law change if they were aware of the change. On the other hand, those without a photo ID would now have to endure the costs of obtaining one to be eligible to vote. If identification laws were liberalized and a state transitioned from photo IDs only to any form of ID, then the cost of voting would be reduced for individuals not holding a photo ID.

Scholars often operate under the assumption that one change in policy affects all states evenly. In reality, it is often dependent on the state or county. Research from Bright and Lynch (2017) indicates that local environments and local government actions do have an influence on civic engagement. After county election offices in Kansas were given discretion on the framing of messages regarding a change in voter ID, they found that the difference in counties' framing did statistically influence the rate of turnout by county (Bright & Lynch, 2017).

When considering the local political context and understanding that state-wide policies are not guaranteed to be uniformly implemented by local election officials, literature only addressing national turnout changes cannot reasonably be said to comprehensively explain the impact of voter registration law changes on voter turnout. It can be similarly said that federal

registration laws have a variety of effects across states, as states' interpretation and implementation of the law may also have variations.

Alongside this, the effects of governmental institutions and the partisan nature of the institutions creating registration laws are often unregarded in favor of looking at the impact of specific law changes on overall turnout. Research repeatedly looks at the effects of registration laws on turnout, often in a silo, and does not consider how registration changes affect the non-voters motivations and barriers (Bennett, 1990).

As such, I aim to fill the gap in the literature on the potential partisan effects of institutions when amending registration laws and examine the existing, conflicting literature on registration changes' impact on voter turnout. I consider both the expected increasing and decreasing voting costs to the average Republican voter, Democrat voter, and non-voter when registration laws are amended. I first examine *how do changes in voter registration laws influence the rates at which people turnout to vote? And then, if the law changes produce a response, how does historical county partisanship condition the effect of similar law changes?*

I consider the impact on non-voters, multiple registration law changes, and the partisan impact of institutions on various state and local voter turnout. I conduct a series of regression analyses and look specifically at district-level voter turnout data in Georgia to establish a relationship between voter registration changes and changes in voter turnout at the county level.

As the literature on the effects of voter ID, same-day registration, polling location changes, and registration deadlines all have a contested effect on turnout, I synthesize and compile varying viewpoints on the effects of specific law changes on turnout. I additionally investigate the claims made in prior research by testing the effects of changes in voter registration laws on voter turnout within Georgia. Each subset of registration laws has

disagreements on the validity of employing CPS data, the unit of analysis needed, and translating a state-level effect into a national effect. Given the tumultuous nature of registration research, I further contribute by testing an existing theory of how cost affects turnout and analyzing the effects of multiple registration law changes on voter turnout by county.

My proposed question also builds upon research suggesting that institutions matter in voting. My research aims to further understand how state institutions' partisanship may increase, decrease, or mediate similar voter registration policy changes across states. Identical registration law changes have produced different results by state, and I look to state partisanship to examine the heterogeneous effects. To my knowledge, research has examined the effect on partisan turnout when registration laws change in a state (CITE). However, none take a comparative view between counties. By examining the effects of registration law changes by state partisanship, I can suggest the expected impact on turnout when a historically Democratic or Republican state changes or adopts a registration law.

I examine law changes, partisanship data, and turnout at a country level within Georgia. By examining all of the counties within Georgia, I can hold state characteristics constant and examine counties' implementation of voter registration laws. By examining what voter registration laws have shifted and accounted for the political partisanship of each county, I can aggregate at the partisan level to examine if and how county partisanship influences turnout rates when specific registration laws have been amended. I use data from the years 2000- 2016 to prevent Covid-19 from being an external factor influencing turnout data. I begin in the year 2000 to create a sample size large enough to produce statistically significant results while still using available data.

Existing Explanations of Voter Turnout

Voting is regarded as a costly activity with inconsequential benefits (Downs, 1957). The Downs paradox of voting states that rational individuals turn out to vote and incur the time and informational costs associated with voting, yet the impact of one vote is minuscule on the election outcome and subsequently on their expected economic utility. He argues that the rational voter should follow the course of action that minimizes any cost to them as there is essentially no benefit- in this instance, remain politically ignorant and not vote.

Shortly after the Downs model, Riker and Ordershook (1968) expanded on Down's work to develop the calculus of voting model. Their model measures outcomes through expected utility-derived and assumes collective action. They theorize that a voter will turn out to vote if the reward for voting in the election (R) is greater than zero. Rewards are dependent on the probability (P) an individual's vote is pivotal to the election multiplied by the benefits derived if their desired candidate wins (B). They then add this product to (D) the sense of civic duty, goodwill feeling, and psychological benefits and subtract the cost of voting (C ). All put together, they offer the equation R=PB + D - C as a calculation of if a voter will turn out. A voter will turn out if R is positive, and not turn out when R is negative.

Contrary to the aforementioned model, Ferejohn and Fiorina (1974) proposed the minimax regret model. They state that Riker and Ordershook's calculus of voting model, an extension of Down's theory, does not consider individuals context and is invalid as a result (Aldrich, 1993). The minimax regret model suggests that an individual should take the action that yields the minimum amount of regret. The voter has three choices: vote for candidate A(their highest preference), vote for candidate B, or abstain. The maximum regret of an individual

enduring the costs of voting to support candidate A is a landslide win for candidate A. This instance renders their vote virtually meaningless as it did not affect the outcome.

The common component in all the above models attempting to understand turnout is the tradeoff between costs and benefits. As all theories state that voting is a costly activity, there are direct, indirect, and opportunity costs of participating or choosing not to partake in the voting process. Direct costs of voting include transportation to the polling site, gathering the materials to vote and register to vote, and time spent at the site. Indirect costs include the time and effort spent while educating yourself about the candidates, finding where your polling site is, and obtaining/bringing the type of ID needed (if needed). Further, there is an associated opportunity cost to enduring the direct and indirect opportunity costs of choosing to spend time engaging in the voting process rather than spending time doing an alternative task. The often-overlooked non-voter will likely have to endure the time and effort costs of making the conscious decision not to vote (Aldrich, 1993).

The process of registering to vote is a cost of voting that does increase the overall costs of voting (Wolfinger & Rosenstone, 1980). The cost of registration varies by state laws as laws are not uniform across each state, but each state does have a formal process that must abide by constitutional and federal requirements. Unlike voting, the registration process does not cause any immediate gratification (Wolfinger & Rosenstone, 1980). It is an additional process an individual must take and requires someone to possess the awareness, education, and effort needed to register in compliance with state laws (Wolfinger & Rosenstone, 1980). These steps and the lack of immediate benefit test a voter's interest in the election and their ability to abide by additional laws (Wolfinger & Rosenstone, 1980). If the costs surpass the threshold an individual is willing to endure, they will not continue the process and become a non-voter.

Benefits of Voting:

Given the magnitude of costs incurred, research has investigated the potential benefits of participating. Riker and Ordeshook offer the satisfaction of compliance, affirming allegiance, noting partisan preference, decision satisfaction, and affirming political allegiance as political benefits of voting. They use logic from their calculus of voting model to ultimately suggest that voters are most likely to vote when they believe the election will be closer (Riker & Ordeshook, 1968).

Duffy & Tavits (2008) state that voting has direct and perceived benefits. In a field experiment, they investigate the Pivotal Voter Model- a theory hypothesizing that individuals believe their vote influences the outcome of an election. Using a proper scoring model, they found that those who believed their vote was pivotal were more likely to turn out and vote. They additionally suggest that people can adjust their expectations over time to believe their vote is less pivotal; however, many still overestimate the impact of their vote. Thus, individuals place more value on the effects of their vote, which may influence the personal benefit they feel they gain.

Who Votes:

Why people vote is pivotal, but understanding who votes is equally as important when understanding the impact of registration policy on turnout. Every voter must endure similar direct and indirect costs, but personal factors may reduce the time and effort costs an individual endures. The cost of voting may be lowered when an individual has formal education if it decreases the time and effort costs of correctly understanding registration laws and processes (Wolfinger & Rosenstone, 1980). For this reason, education is widely regarded as an indicator

of voter turnout (Sondheimer & Green, 2010 ). The direct causality of this relationship is contested, but Sondheimer and Green's (2010) randomized experimental studies support the presence of a causal link. Similarly, prior engagement is also understood as a strong indicator of an individual's likelihood of becoming a voter. Research supports that if an individual does become successfully mobilized to vote in one election, they are significantly more likely to vote in future elections (Gerber et al., 2003; Green & Scharar, 2000)

Who decides to vote may be impacted by increased or decreased costs in voter registration requirements. Registration costs are shown to negatively impact voter turnout (Ansolabehere & Konisky, 2006). Through examining New York's and Ohio's dual registration systems, Ansolabehere and Konisky (2006) suggest a 3% decrease when counties transitioned from no registration requirements to baseline requirements similar to surrounding counties (Ansolabehere & Konisky, 2006). Alongside understanding the general effects of voter registration on turnout, the costs of voting for some individuals may depend on specific components of voter registration law. Same-day registration, voter ID requirements, polling place locations, registration deadlines, and early voting sites are frequently referenced as components influencing turnout.

Same-Day Registration

Same-day registration allows individuals to vote on election day instead of specifying that voters must register in a specific time window before election day. The National Conference of State Legislatures (NCSL, 2021) reports that 21 states and Washington D.C. currently allow for same-day registration. Proponents of same-day registration argue that the relaxation of strict voting windows enables last-minute voters to turn out, while proponents argue that increases the administrative and financial burden of election season. Brains and Grofman (2001) estimate a

7% average boost in a state's turnout when same-day registration (SDR) is facilitated. Beyond the effects of SDR, a public opinion survey framing same-day registration as a partisan issue suggests an asymmetric relationship between individuals' support for the law (McCarthy, 2019). When SDR was framed as an electoral law that hurt turnout within political parties, individuals identified as survey respondents indicated they did not support SDR - for both Democrats and Republicans (McCarthy, 2019). When told it would help their political party, there was little evidence of respondents' opinions being swayed to support or oppose SDR (McCarthy, 2019). The asymmetric relationship of support, when framed by partisanship, uncovers an interesting layer to the effects of partisanship on turnout. If there is more support for changes that are not expected to hurt their party's turnout but little support when it may help a person's party, these sentiments may be reflected in responses to registration changes.

Voter ID

Voter ID requirements vary by state, and the acquisition of a photo ID when necessary may be an additional cost of voting. Since July of 2022, 18 states actively require a photo ID, and 17 states require an ID that does not have to have a photo (NCSL, N.D). Proponents of photo ID requirements argue that it increases public trust in elections by preventing voter impersonation. In contrast, opponents argue that there is such a low level of fraud that it is not necessary (NCSL, N.D.). Opponents of voter ID additionally highlight concerns that the cost of identification unevenly affects those in poorer and/or rural areas as they may not have access to public transportation to obtain an ID or the funds necessary to travel to obtain one. There is no additional cost to vote even in the strictest states when individuals already hold a state driver's license, state ID, or passport, but an individual without one would endure additional transportation, information, and time costs to obtain one. While a voter ID is free from all

DMVs, other forms of IDs have a monetary fee. All forms incur informational costs of knowing to bring multiple documents as proof of citizenship and residency (Hershey, 2009).

Voter ID has increasingly become a partisan issue, with Republican majority governments being more likely to implement photo ID legislation than a democratic majority (Rocha & Matsubayashi, 2014), and there is little evidence that the addition of a photo ID significantly reduces turn out when looking at aggregate data (Rocha & Matsubayashi, 2014; Alvarez, Bailey & Katz, 2008). At the individual level, research suggests conflicting results. Alvarez, Bailey & Katz (2008) suggest that lower socioeconomic levels at the individual level may result in a slightly reduced turnout, but there was no effect on the turnout for African American and Hispanic voters. Cantini & Prons (2021) suggest no effect on registration rates and turnout rates by any ethnic or social group when requiring a photo ID. Vercelloti & Anderson (2006) state the opposite results to suggest that African American, Asian American, and Hispanic voters were slightly less likely to turn out when states shifted from a signature requirement to a non-photo ID requirement in the 2004 election (Vercelloti & Anderson, 2006). The conflicting results between aggregate and individual-level data, along with the reliance on CPS self-reported data in multiple studies, suggest that there needs to be a more clear consensus on the effects of voter ID requirements on turnout.

Alongside conflicting results on ID requirements on turnout, the framing of messages communicating a change in voter ID requirements has been shown to influence turnout (Bright & Lynch, 2017). Bright and Lynch (2017) find that advertising messages emphasizing that all votes count via the provisional ballot process, regardless of the new ID changes, did increase turnout in Kansas. The opposite effect also held true as advertising emphasizing that ID is necessary to vote

did reduce voter turnout. Their results suggest that the local officials providing the information on ID campaigns do have an effect and may influence turnout data at the county level.

Changing Polling Locations

The proximity of a polling location influences the degree of transportation costs an individual assumes when voting. Logically, it can be assumed that a polling location near a voter's residence would have fewer time costs than a polling location that is further from their residence. Yet, the addition or subtraction of time costs through poll location changes has differing results by county (Walker, Herron & Smith, 2019). The 2003 LA county gubernatorial recall election included polling location changes which increased transportation and search costs and resulted in a slight reduction in turnout by 1.85 percentage points (Brady & Mcnulty, 2011). However, in North Carolina, there was little evidence of uniform effects of changing early voting locations and hours (Walker, Herron & Smith, 2019). The non-uniform effects in certain counties suggest that the level of variation depends on the local conditions within the county (Walker, Herron & Smith, 2019). Research supports no significant partisan effect of location change in the 2003 LA election (Brady & Mcnulty, 2011). Democrats were slightly more sensitive to changes in electoral location than those registered as Republicans, but the effects were small enough to suggest that there are no significant partisan effects of polling locations changing (Brady & Mcnulty, 2011).

Registration Deadlines:

Within the voting process, most states require individuals to register to vote in a predefined window prior to election day. The window depends on each state; some windows are long enough to encompass same-day registration. Similar to same-day registration, it is assumed

that the costs of voting are lowered when individuals have a larger window near election day to register to vote, thereby increasing voter turnout. Vonnahme (2012) supports the theoretic argument and states that closer deadlines positively and indirectly affect voter registration. Through the social contagion process, a window of registration closer to election day allows individuals to register to vote themselves and gives them time to spread knowledge about registration to their social network (Vonnahme, 2012). In cases when the registration window is still open, these individuals now have the opportunity to vote and experience social pressure to vote as their peers have already done so (Vonnahme, 2012). Similarly, Patel (2015) reaffirms the positive relationship between a closer registration window and turnout by quantifying the time, frequency, and number of web searches on voter registration. He estimates that 3-4 million Americans would have registered to vote if the window was closer to election day (Patel, 2015).

**Theory**

As literature supports that changing the costs of registration influences voter registration, I assume that the pattern will likely be upheld when examining voter turnout rates at the county level in Georgia. When voter registration laws change, it can increase the transactional and informational costs of voting. Turnout rates may decrease in response as the cost increase may surpass the threshold an individual is willing to endure. In instances where the costs of voting decrease, there is still an information cost of understanding the change, but the overall cost of voting may now reach an acceptable threshold. In theory, the reduction in the costs of voting may result in some individuals turning out to vote; however, literature has shown that the motivations and reasoning for a non-voter cannot be viewed in a silo of one change.

The changes in registration law must be done by state or federal legislative bodies. The legislatures have the power to add, remove, or modify the magnitude of change within voter

registration laws as long as they abide by federal guidelines. State governments are composed of senators and representatives elected by their constituents, and as such, they must consider their constituent's response when enacting registration changes if they desire re-election. The state legislature's power cannot reach beyond federal laws and, to a certain degree, public opinion.

State partisanship may influnce voters' responses to policy changes and, in turn, total turnout rates may indicate that state institutions decisions on voter registration may have an unequal effect in each county. It additionally indicates that state institutions acting in a partisan matter may be able to influence turnout rates in their favor. Suppose a historically Republican-governed county is less or more sensitive to additional costs of voting than a Democratically-governed voting county. In that case, a state institution acting in a partisan manner can restrict or liberalize registration policies that increase costs to produce a more favorable turnout response for their party.

The changes enacted will directly affect the voting-eligible population in Georgia. Individuals endure the addition or subtraction of costs as a direct response to registration changes. If the change lowers the costs to a threshold deemed manageable by eligible voters, they will turn out to vote. If the change does not impact their costs, it may not affect their decision to cast their ballot. Independent factors constrain each individual, but common constraints include the previously established costs of voting.

$H_1$: Changes in registration laws that reduce the costs of voting will not increase county-level voter turnout

$H_2$: Changes in registration laws that increase the costs of voting will decrease county-level turnout.

When an eligible voter experiences an increase in voting costs, they have to decide if the change in voter cost surpasses the threshold they are willing to accept. If voting costs get too high, an individual will not turn out to vote if they do not perceive the benefit to be more significant. I argue that this relationship will only hold true when costs are added but not when costs are reduced. The non-voter does not vote for various reasons, and there are still costs associated with the turnout, even if a change in registration law decreases the cost associated with voting. When costs are added, it may push people over their acceptable threshold, but when costs of registration are reduced, it may not be enough to motivate the non-voter to turnout, given the other costs of turnout out to vote. Therefore, I hypothesize that changes that reduce the costs of voting will not increase overall voter turnout, but a change in registration laws that increases the costs of voting will decrease overall turnout.

Partisanship Theory

In McCarthy (2019), it is demonstrated that individuals from both parties have stronger opposition to a policy decision that may produce an unfavorable result for the party they identify with than policies that may produce favorable results for their party. It is additionally argued that Republicans are more likely to implement stricter voter policies (Rocha & Matsubayashi, 2014). If we assume that members of each party hold shared values, Republicans are more likely to oppose a policy that may help Democrats' turnout than they are to support policies that increase their turnout- the same vise-versa. As Republicans are more likely to implement voter registration laws and each party is more inclined to introduce laws that hurt their opposing party than to introduce a policy that is self-serving, I hypothesize that there will be a partisan response. Regardless of the party introducing the laws, the asymmetric effects on policy attitudes will

produce a partisan response when there is a change in voter registration law.

$H_3$: When the costs of voting increase, Republican turnout and Democratic turnout will have an inverse relationship on turnout.

The historical partisanship of each county reflects the party the majority of individuals in that county identify with. As each party holds a platform of views, the individuals voting for a candidate associated with a party must have values more aligned with that party than another. The shared values may breed common characteristics within individuals of their preferred party, leading the traditional Democratic and Republican voters to have similar responses to law changes as their fellow party members. The commonalities of party members may produce common behaviors that may indicate how partisan voters will respond to changes in the costs of voting.

The average Democratic voter within Georgia is of a lower socioeconomic status and of a more diverse racial composition than their average Republican counterpart. Due to this, the democratic response may be shifted as individuals of a lower socioeconomic status face higher barriers to voting if they are more constrained by potential financial limitations and time limitations.

If a person has a lower income, they may not be able to easily afford the expenses of child care if they have a child too young to wait in long lines to vote and they may not have the flexibility to take off work if needed to vote without losing vital income. An individual of a lower socioeconomic status may have higher opportunity costs associated with voting as the time to vote may take up space from doing another activity in a time constrained schedule. As such, the lower socioeconomic voter - statistically most likely to be a Democratic voter- has higher

percieved costs to voting as they may not have flexibility in their daily schedule to turnout out and vote.

This thoerized assumption does not imply that high income voters do not face barriers to voting. They may be as time-constrained as there lower income counterparts, however, a discrepancy lies in thier financial limitations. An individual with more financial resources likely has more freedom to make decisions on how they spend their time- whether at work, home or elsewhere. An individual with higher income does not have the same need to work as they have the financial resources and financial security to easily afford basic necessities. They have the opportunity to chose to work during the time it takes to vote rather than the requirement to work during the time taken to vote. And as the democratic voter has less income on average in comparison to their republican counterparts, democratic voters may turnout at lower levels when costs are high due to social economic constraints that limit their ability to take the time, resources, and energy to register to vore and turnout to vote.

McCarthy demonstrates that individuals oppose a policy decision that may produce an unfavorable result for the party they identify with, yet there is less support for policies that may produce favorable results for their party (McCarthy, 2019). In addition to responses on decision framing, Rocha and Matsubayachi (2014) suggest that Republicans are more likely to implement less liberal policies and suggest that Republicans are less sensitive to I.D laws becoming less liberalized than Democrats. This will likely result in a heterogeneous effect on turnout by a party

$H_4$: When the costs of voting increase, turnout will be higher for the Republican presidential candidate and lower for the Democratic presidential candidate.

I hypothesize that registered Republicans will be less sensitive to law changes increasing

the cost of voting as Republicans were less sensitive to changes in electoral locations in Brady and Mcnulty's (2011) research. Given that Republicans were less sensitive to increased costs associated with transportation costs, I infer that Republicans will be less sensitive than Democrats to any increase in the costs associated with voting. As stated prior, a reduction in costs may not be enough to push the costs of voting to an acceptable level, and this may produce no significant effect on turnout or partisan turnout.

## Methods

### Voter Turnout

Voter turnout is known as the number of individuals that successfully vote in an election. Individuals can vote via absentee, early, on election day, or provisionally to have their vote counted in an election. There are multiple elections each year, varying from local races to federal races, but for the purposes of this thesis, only turnout in presidential elections will be considered.

I use the National Neighborhood Data Archive (NaNDA) on total ballots cast, voter turnout percent, democratic presidential ratio, and republican presidential ratio by county in the United States from 2000-2018 (ICPSR 38506) to measure voter turnout. The NaNDA was created through the social, environmental, and health programs carried out by the University of Michigan and funded by the United States Department of Health and Human Services (Chenoweth et al., 2022). The popular data set for state and county-level voter activity measures voter registration and voter turnout with information regarding the total number of registered individuals in a county, the total number of votes cast in the general election every year, and the voting population via the Citizen Voting Age Population (CVAP) method employed by the US

Census Bureau. With this information, two-party vote share, voter turnout, and registered voter turnout are measured.

Through the NaNDA dataset, the turnout for both presidential and midterm elections is available for each county in Georgia and additionally aggregated by partisanship. It provides the total number of votes in each county for a Democratic presidential candidate, Republican presidential candidate, Democratic senator candidate, and Republican senator candidate. Researchers additionally provide a figure for the aforementioned candidates to calculate a presidential democratic ratio, presidential Republican ratio, senator democratic ratio, and Republican senator ratio.

The dataset is comprehensive but is limited by the accuracy of the information collated. The data on each presidential election comes from the MIT Election Data and Science Lab and midterm race data comes from the Harvard Election Data archive. Data on turnout between 2004-2018 comes from the United States Election Assistance Commission from the Election Administration and Voting Survey (EVAS) dataset (United States Election Assistance Commission, 2000-2018). EVAS data is collected every two years after a federal election from local election officials at the state and county level. All later regressions are anchored in data from within the NaNDA dataset and come from well-established organizations or agencies within the U.S. government which indicates that the data is highly reliable and accurate.

I additionally include data on population growth, racial composition, and median income at the county level in Georgia from the U.S. Census Bureau and American Community Survey. The U.S. Census Bureau is a government agency tasked with maintaining and collating information pertaining to the demographic and social indicators within the United States. I utilize

the intercensal datasets on population growth - a variation of the highly recognized decennial census (Census Bureau Population Division, 2020; Census Bureau, N.D).

I use the social explorer database to filter the American Community Survey to evaluate the racial composition and median income at the county level for regressions on the partisan differential. The American Community Survey is conducted by the U.S Census Bureau and has been conducted every three years since 2005 in order to more frequently gauge county to national-level data on social indicators and demographics. As it began after 2005, I collected only the income and racial composition data from 2008 and 2012 for my analysis (Social Explorer, 2008; Social Explorer, 2012).

Changes in Voter Registration Laws

A change in voter registration law is clearly outlined in legislation put forth by the state legislature. Each change in registration law must be denoted in writing and is evident through the removal, addition, or revision of a previous set of registration laws. Michigan State University Correlates of State Policy provides a comprehensive data set on the presence of legislation changes for each state. It provides relevant information such as voter ID requirements, year changes, same-day registration, auto-registration via driver's license,  and adoption of by-mail voting.

The data is expressed in boolean expressions (0 for no, 1 for yes) and in integers. Relevant to Georgia, the data set shows that Georgia has required a form of ID since the beginning of its data collection, in 2000, and transitioned to a photo ID requirement in 2005. They denote that Georgia adopted an unrestricted absentee voting policy in 2003.

I cross-checked the information within the Correlates of State Policy with information published by the National Conference from State Legislatures. The NCSL is a 3rd party website

that publishes a synopsis of state legislation and has up-to-date information on election bills that have failed, been adopted, or enacted by a state. The database provides information from 2000-2020, but I only had access to the database encompassing 2010-2020. Due to the limits on restriction, I did additional cross-checking with publications from Pew's Trust and American Enterprise Institute to ensure that Georgia switched their absentee voting policy in 2003 (Bullock et al.,2009; Fortier, 2009).

The Michigan State University database also denoted that the Photo-ID requirement changed in 2005. To double-check this information, I located the published bill instituting the requirement named House Bill 244 through an online search. The bill clearly introduced the requirement of photo IDs from previous non-photo identification requirements (Representative Burmeister of the 119th, 2005). The last aspect of data I cross-checked was Georgia's switch to no-excuse absentee ballots in 2003. No-excuse absentee ballots allow a voter to request an absentee ballot without providing a reason for why they will not be voting in person at the polls on election day. The change allowed voters to cast a ballot at the registrar's office or absentee office all weekdays in the week preceding the election. This law was amended in 2008 to allow absentee ballots to be cast up to 45 days prior to the election (GAO-13-90R, 2012). The time frame for absentee voting was later amended again in 2011 to prescribe a shorter time frame for early voting and require particular hours, including hours for voting on a Saturday (GAO-13-90R, 2012).

The Michigan State University database did not denote the change to online voter registration in 2012. I supplement their database with additional research from a publication from Common Cause and confirmation of their findings by the NCSL (Gnaedinger, 2019;

NCSL, 2023). Both sources unequivocally recognize the implementation of online voting in Georgia in 2012.

When examining the impact of voter registration changes, an additional aspect to consider is the magnitude of change within the law. A change in voter registration could be as small as allowing a relatively uncommon form of voter ID to be permitted in addition to the previously established forms of ID. In this case, legislation allowing one uncommon form of ID to register to vote would not have the same impact as adopting same-day registration laws. For this reason, I examine law changes that I consider of similar magnitude.

All changes in voter registration laws within the state are expected to be adopted by each county uniformly. The Georgia Secretary of State website serves as a state-wide resource for voting information that each county's elections office refers to or provides a link to. Although there is a utilized state-wide resource, the degrees of the information displayed on each county's elections website varied in detail. I examined each county's voter registration page on October 20th, 2022, to examine the word tone and level of detail within each homepage. The detail of information loosely correlated to the population size of each county. However, each page did provide the information to the Georgia Votes page to check the validity of an individual's registration status and information of the more pertinent voter information i.e. requesting an absentee ballot, poll locations, and drop bow locations.

I examined the tone of each homepage in response to Bright and Lynch's (2017) piece on the effects of messaging in Kansas on changes in voter ID requirements that likely did cause an effect on turnout. The concern of framing effects was largely negated as the tone for all county homepages was largely neutral. My examination of tone may likely be representative of how counties publicize information as it occurred after the implementation of recent changes in

election law via Senate Bill 202. While each home page largely did display the same sentiments, there was some variation in visibility on ways to report election concerns and complaints. However, each homepage did have the contact information for each county's office that any individual could call to place a concern or inquire about a question.

Some limitations on my examination in county election homepages are apparent. I only have access to the most current version of their page and do not have knowledge of when it was last updated, how often it gets updated, and how much information was displayed in prior years. I also only looked at the homepage of each site given time constraints which may not have been representative of the tone and detail of information given by each county's website. Given these limitations and the seemingly identical information given on each page, I consider each county to have implemented each voter registration change uniformly.

County Partisanship Turnout

I use the existing measure of the presidential democratic ratio and presidential republican ratio from the NaNDA dataset to determine partisan differential effects. The developers of the dataset create the ratio by dividing the number of ballots cast for the Democratic candidate by the presidential vote count for both parties. The exact process is completed to calculate the republican presidential ratio by using the republican presidential vote count in place of the democratic vote count. In doing so, it creates the percentage vote share for either political party and subsequentlya proxy variable on the partisan turnout for each presidential election. The NaNDA dataset reports all variables at the county level, so all counties receive a corresponding presidential democratic ratio to capture their turnout.

Both ratios add to equal 1 and each partisan ratio can be subtracted from 1 to find the other partisan ratio measure. Due to this, I only utilize the presidential democratic ratio in the

following regressions in my research design when capturing partisan differential effects. When doing both a series of regressions on either partisan differential, the results are identical aside from the contrasting presidential ratio producing the inverse result. For example, a regression that yields a correlation coefficient of 0.2 for the Democratic presidential vote ratio will produce a correlation coefficient of -0.2 for the Republican vote ratio when the same variables are used in a regression with the other ratio.

**Research Design**

I investigate the effects of changes in Georgia voter registration laws on voter turnout from 2000-2018. In order to do this, I used data from the State of Correlates dataset on what changes in Georgia voter registration laws occurred and when they occurred. I then examined data on voter turnout by county and votes by partisanship from NaNDA to begin to examine the correlation between the two. With this information, I ran a series of regression models evaluating the effect on overall voter turnout and partisan voter turnout after the introduction of the following Georgia registration laws: no-excuse absentee, photo-ID requirement, and online voter registration.

A regression design produces a quasi-experimental environment when there is no possibility for random assignment. I chose to employ a series of regressions analyzing interventions at specific t times as registration change occurs in a specific year. The law changes are implemented in a specific year which means that it was not present before but are present in that year. The clear delineation between when laws are implemented provides a threshold on time for each registration change. In the case of absentee ballots, Georgia did not allow for no-excuse absentee ballots prior to 2003 but was allowed after 2003 and to the present. The effect from absentee ballots would be measurable in voter turnout results after 2003.

I first examine how voter registration laws change overall turnout in Georgia. To do so, I extracted all of the data from NaNDA with a fips code aligned with Georgia (13) in Python. The new data set produced turnout by Georgia county where each county is coded as a 5-digit Identification number in the pattern 13XXX. For example, Appling county is coded as 13001. With that information, I aggregated all county values for Georgia turnout prior to a voter registration change and then the turnout for the corresponding election year after. I then saved the file on Georgia-specific turnout in Python to my desktop and transitioned further coding work into R studio. Appendix 8 displays all of the code used within Python.

I began first by examining the interaction between the years of presidential elections prior to and after a change in voter registration law. I examined 3 changes in voting registration law: no excuse absentee voting in 2003, the transition to photo ID requirement from nonphoto ID requirements in 2005, and the introduction of online voter registration in 2012. These three changes in voter registration laws occur independently in a year between presidential elections. Therefore, in models 1-3, I adopt year as my independent variable to designate a change in voter registration law.

I first loaded the data on Georgia-specific voter turnout data in R studio. I created an additional variable to group the information within the data frame for each time frame between presidential elections of interest. I created three separate periods to correspond with the three separate changes in voter registration laws. The first period denoted as P1 in my R-studio code, included information between 2000 and 2004 as the change to no excuse absentee ballots occurred in 2003 and the prior and subsequent presidential elections occurred in 2000 and 2004. I did the same process for each time period, so I created P2 to collate information from 2004 to 2008 and created P3 to collect information from 2008 to 2012.

I then ran a series of interactions between periods (P1, P2, and P3) and the variable "Voter_turnout_PCT" from the NaNDA dataset I loaded into R, but ran into issues of singularity in the code. I transitioned to taking the log of voter turnout percentage in order to better scale and maintain results on ballots cast.. I ran the summary function for each regression to collect results on if there was a change in ballots cast after the change in legislation.

The variable voter turnout percentage is used in order to control for changes in the citizen voting age population. The turnout percentage is measured by the total amount of ballots cast divided by the Citizen Voting age population. By doing so, I mediate the effects of population growth as they could cause confounding effects within the study by influencing both voter turnout and voter registration laws.

After running the three regressions, I transitioned to implementing regressions on partisan-specific impacts. With voter turnout as my dependent variable, I run a regression specific to the desired time period previously defined for models 1-3 and interact that with the presidential democratic ratio while controlling for county fixed effects using the as.factor function. The as.factor function transitioned the variable for FIPS codes to a categorical factor variable in order for the model to recognize each FIPS code was a fixed value. The code for model 4 is shown below.

```
Model4 <- lm(VOTER_TURNOUT_PCT ~ P1 * PRES_DEM_RATIO + as.factor(FIPS.y), data
= df7)
summary(Model21)
```

I conducted identical regressions for period 2 (2004-2008) and period 3 (2008-2012) using the same code, but with the appropriate time period specified for each analysis. The code for all regressions can be examined in Appendix 9.

## Results

As outlined in the aforementioned methods section, I first conducted a set of regressions on if changes in voter registration influenced the total ballots cast between presidential elections. The statistical analysis was conducted first in python and re-written in R-studio to add confidence in the coding skills needed to produce accurate results. The results indicate that the time period change resulted in an increase in the total voter turnout percentage. These results likely provide significant insights into the relationship between voter registration policy and voter turnout to offer implications for election officials and policymakers on influencing voter turnout. This section first details the results from regressions indicating the relationship between voter registration changes and ballots cast then subsequently discusses results on the differential effects of county partisanship.

### Voter Legislation Changes on Total Ballots Cast

The results from my first analysis suggest that there are varying effects on voter turnout percentage after the change in voter registration law between 2000 and 2004, 2004-2008, and 2008-2012.

Model 1: lm(formula = log(VOTER_TURNOUT_PCT) ~ P1, data = df7)

| COEFFICIENTS | ESTIMATE | STANDARD EFFOR | T-VALUE | PR(>\|T\|) |
|---|---|---|---|---|
| (intercept) | -0.83521 | 0.00878 | -95.131 | 2e-16*** |
| 2000-2004 | 0.15255 | 0.02483 | 6.143 | 1.08e-09*** |

| | |
|---|---|
| Residual Standard error | 0.292 on 1262 degrees of freedom |
| Multiple R- Squared | 0.02904 |
| Adjusted R- Squared | 0.02827 |
| F-Statistic | 37.74 on 1 and 1262 DF |
| | p-value: 1.081e-09 |

In the 2004 election, there was a 15% increase in voter turnout when there was a increase in years. This means that in comparison to 2000 and while controlling for changes in the citizen voting age population, there was a significant increase in turnout after the introduction of no-excuse absentee ballots. The regression resulted in a positive t-value of 6.143, which indicates that years strongly effect turnout, and is deemed statistically significant based on the p-value of 2 $e^{-16}$.

The model appears to poorly explain the proportion of variance in voter tunout due to time changes. Both the R-squared and adjusted r-squared are low and indicate that the existing model fits the data marginally. The adjusted R-squared value of 0.02827 is lower than the initial R-squared value 0.02904. The adjusted R-squared suggests that including population increases by county did not necessarily increase the accuracy of the model. The F-statistic of 37.74 is

statistically significant and signifies that the overall regression is significant and that the overall model does contain valuable information.

Model 2: lm(formula = log(VOTER_TURNOUT_PCT) ~ P2, data = df7)

| COEFFICIENTS | ESTIMATE | STANDARD EFFOR | T-VALUE | PR(>\|T\|) |
|---|---|---|---|---|
| (intercept) | --0.81824 | 0.010542 | -77.619 | 2e-16*** |
| 2004-2008 | 0.005612 | 0.017215 | 0.326 | 0.744 |

| | |
|---|---|
| Residual Standard error | 0.2963 on 1262 degrees of freedom |
| Multiple R- Squared | 8.43e-05 |
| Adjusted R- Squared | 0.0007 |
| F-Statistic | 0.1064 on 2 and 1262 DF |
| | p-value: 0.7443 |

The 2008 presidential election experienced a new change in voter ID laws enacted in 2005 - after the federal election tested in model 1. The new law mandated that all individuals attempting to vote needed a form of photo identification rather than accepting alternate forms of ID that did not have a picture. To investigate if this change in the voting process affected voter turnout percentage, I carried out an identical regression to data relating to period 1 (2000-2004) with data from 2004-2008.

The time period has an extremely high p-value of .744, so the effects on turnout after the transition to a photo-ID requirements cannot be estimated. I do no further analysis of this predictor variable for this model.

Model 2 has an R-squared of 8.43 e-05 and an adjusted R-squared of 0.0007. Both of the values are similar to model 1 and denote that almost none of the variation in voter turnout is captured by examining the period change. The model cannot accurately reflect the directionality or magnitude of period change as the coefficient for 2004-2008 is not statistically significant. This likely means that there is some variation caused by the period change, but the exact effects of the year change cannot be examined. The lower adjusted R-squared denotes that controlling for citizen voting age population did not increase the fit of the regression.

Model 2 has a fairly similar intercept coefficient at -0.81924 that denotes the state of ballots cast when the population change and year is equal to zero. Like in Model 1, the T-value of the intercept in Model 2 is high, measuring at -77.619. This further indicates that the low intercept is an important component in the regression, and when the values given for year are held constant at zero, voter turnout will be close but slightly higher than zero.

Unlike Model 1, Model 2 suggests that the overall regression is not significant via F-statistic. The F-statistic in model 2 is 0.1064 with a p-value of 0.7443. The high P-value indicates that the regression does not fit the data better than a regression that does not contain the independent variable of years while the F-statistic provides reason to reject the notion that the year does influence ballots cast. Overall, Model 2 does not provide evidence that the implementation of a photo-ID requirement resulted in any significant variation in voter turnout or identify the specific factors that could have influenced any potential changes in voter turnout.

Model 2 may be too simplistic to capture the multitude of factors that influence voter turnout. Model 2 produces a a comparable intercept coefficient, intercept t-value, and intercept p-value to Model 1. However, the F-statistic, R-squared, and adjusted R-squared are significantly lower in Model 2, suggesting that its overall regression may be inferior in comparison to the more statistically significant Model 1

In 2012 online voter registration became available in Georgia. Through online registration, residents of Georgia with a Georgia driver's license or Georgia-issued ID could now register without needing to request registration forms, fill them out, and mail them out to the correct address. This addition was prior to the 2012 presidential election, so model 3 does a regression examining its effects on ballots cast from the presidential election prior to the change (2008) in comparison to 2012 while controlling for population growth. The overall sentiment of the results on the intercepts from Model 1 and Model 2 largely remain similar in model 3, but there is a large difference in F-statistic, period 3 outputs, and population growth outputs.

Model 3: lm(formula = log(VOTER_TURNOUT_PCT) ~ P3, data = df7)

| COEFFICIENTS | ESTIMATE | STANDARD EFFOR | T-VALUE | PR(>\|T\|) |
|---|---|---|---|---|
| (intercept) | -0.85172 | 0.01041 | -81.781 | 2e-16*** |
| 2008-2012 | 0.09487 | 0.01701 | 5.578 | 2.97e-08*** |

| | |
|---|---|
| Residual Standard error | 0.2927 on 1262 degrees of freedom |
| Multiple R- Squared | 0.02329 |
| Adjusted R- Squared | 0.02329 |
| F-Statistic | 31.12 on 1 and 1262 DF |
| | p-value: 2.2e-16 |

The intercept coefficient for model 3 varies from model 1 and model 2 by .003 and .028, respectively. The -0.85172 coefficient echoes the previous results demonstrating that there is a minute effect of ballots cast when both population growth and the year is held at 0. The intercept coefficient is deemed statistically significant by its p-value as well as all other outputs rendered from model 3. The intercept has the most moderate t-value at -81.781 between all three models. The t-value indicates that this intercept has a strong inverse effect on the voter turnout percentage and that it is important to consider the non-zero intercept within the analysis.

The coefficient given for period 3 indicates that as one year passes, the number of ballots cast will increase by 9.34% when all other variables are held constant. The coefficient is statistically significant and emphasizes the positive coefficient given from period one in model one and contrasts the statistically insignificant coefficient resulting from model 2. The t-value for

period 3 is 5.578 which indicates that the time period is strong enough to determine there is a relationship between the year and voter turnout percentgae. Thus, Model 3 suggests a notable positive increase in ballots cast after the change in voter registration policy in 2012.

The R-squared and adjusted R-squared of model 3 are almost identical to models 1 and 2 at .02392 and .0.02329, respectively. The relatively low R-squared and adjusted R-squared both suggest that model 3 fits the data to a similar degree as models 1 and 2. Alike model 1, model 3 additionally has a high positive F-statistic that is statistically significant. With the value of 31.1, it indicates that the year change influences the voter turnout percentage.

All three models produced varying results with differing levels of statistical significance that each suggested different relationships. While there is variation across all models, the positive f-statistic, low r-squared, and intercept coefficient averaging 0.8 remained the same across results. Evan as model 2 does not constrain statistical significance, both models 1 and 3 suggest an increase in voter turnout after the transition to no-excuse absentee ballots and online voter registration. Both of these statistically significant results, alongside a positive t-value and f-statistic, indicate that there direct effects on voter turnout when either of the legislation changes were implemented.

As all three models had a relatively low r-squared, the results suggest that all of the variation is not captured simply through the change in years. This assumption makes logical sense as other factors such as educational attainment, racial composition, urbanization, political discourse, and political attitude, are not emcompassed within the regressions but likely effect the change in voter turnout and election policy.

Although that is a limitation, the directionality and magnitude of each coefficent from year change are still valid measures on the impact between legislation changes and voter turnout. The respective coefficients for each year serve as a proxy for change due to voter legislation, and represents a piece of the puzzle on voter turnout rather than the entire picture. For these reasons, I accept the positive relationship between years and voter turn out and continue my analysis on the effects of partisanship on voter turnout at the county level.

## Voter Turnout by Partisanship

I conducted a similar series of regression analyses with data on the Republican Presidential ratio and the Democratic Presidential ratio. Both variables are more deeply outlined within the methods section and clarify that they represent the percentage of votes given to either the republican or democratic presidential nominee in each presidential election. I interchangeably refer to both as their respective two-party vote share.

The regressions presented below use voter turnout percentage as the dependent variable, rather than the total number of ballots cast. In each regression, voter turnout percentage is interacted with the presidential democratic ratio prior to the year the registration law occurred while holding county-fixed effects. In the joint regression, denoted at Period X: Presidential Democratic Ratio, all the effects on voter turnout percentage by Democratic vote share and the time period are to be estimated.

## Partisanship in 2000-2004 Presidential Election

### Model 4: Voter Turnout On Democratic Candidates From 2000-2004 With Fixed County Effects

Model 4:Partisan Voter Turnout in 2000-2004 Election with County Fixed Effects

| COEFFICIENTS | ESTIMATE | STANDARD EFFOR | T-VALUE | PR(>\|T\|) |
|---|---|---|---|---|
| (intercept) | 0.49143 | 0.05938 | 8.276 | 7.93e-16*** |
| 2000-2004 | 0.0377151 | 0.02848 | 1.324 | 0.185915 |
| Presidential Democratic Ratio | 0.0130092 | 0.1656766 | 0.079 | 0.937439 |
| Period 1: Presidential Democratic Ratio | -0.0545204 | 0.0761187 | -0.716 | 0.474106 |

| | |
|---|---|
| Residual Standard error | 0.09255 on 616 degrees of freedom |
| Multiple R- Squared | 0.4828 |
| Adjusted R- Squared | 0.3485 |
| F-Statistic | 3.595 on 160 and 616 DF |
| | p-value: <2.2e-16 |

Code: Model20 <- lm(VOTER_TURNOUT_PCT ~ P1 * PRES_DEM_RATIO + as.factor(FIPS.y), Data = df7)

Model 4 suggests how the change to no-excuse absentee ballots impacted the vote share for the Democratic and Republican presidential candidates in the 2004 election. The overall model has considerable concerns of validity in measuring the effects of the time period, vote share per candidate, and the joint effect between the presidential partisan ratio in the period 2000 to 2004 on voter turnout percentage. All values associated with the effects due to year change, presidential democratic ratio, and their joint effects were not statistically significant. The only values of significance relate to the intercept, R-squared, and F-statistic.

The intercept has a coefficient of 0.491, t-value of 8.276 and p-value of 7.93 e-16. This denotes that while the time period and population growth is held at zero, there is potentially a

minor effect on Democratic presidential votes. The t-value is fairly high and positive which indicates that the intercept has a minimal impact on the overall regression. Both the coefficient and t-statistic values are deemed statistically significant by the p-value.

The R-squared and adjusted R-squared are estimated to be 0.4828 and 0.3485 respectively. The moderate values demonstrate that the time period does explain some of the variations in the amount of vote share percentage for the Democratic presidential candidate within the total voting age population. The decrease in the adjusted r-squared suggests that the inclusion of the time period, presidential democratic ratio, and the joint interaction between the two did not increase the fit of the model.

The F-statistic of the model is 3.595 on 160 and 616 degrees of freedom. It indicates that although the effects of time period, presidential democratic ratio, and the joint effects of the two on voter turnout percentage may not be available, at least one of the independent variables impacts the voter turnout percentage.

Partisanship in 2004-2008 Presidential Election

Model 5: Partisan Voter Turnout in 2004-2008 Election with County Fixed Effects

| COEFFICIENTS | ESTIMATE | STANDARD EFFOR | T-VALUE | PR(>\|T\|) |
|---|---|---|---|---|
| (intercept) | 0.47915 | 0.0544468 | 8.800 | <2e-16*** |
| 2004-2008 | 0.0380085 | 0.019626 | 1.937 | 0.05318 |
| Presidential Democratic Ratio | -0.0029028 | 0.1481316 | -0.020 | 0.98437 |
| Period 2: Presidential Democratic Ratio | 0.0496544 | 0.0493526 | 1.006 | 0.31475 |

| | |
|---|---|
| Residual Standard error | 0.0875 on 616 degrees of freedom |
| Multiple R- Squared | 0.5377 |
| Adjusted R- Squared | 0.4176 |
| F-Statistic | 4.478 on 160 and 616 DF |
| | p-value: <2.2e-16 |

Code: Model22 <- lm(VOTER_TURNOUT_PCT ~ P2* PRES_DEM_RATIO + as.factor(FIPS.y), Data = df7)

The issue of insignificant coefficients in capturing partisan differential effects is perpetuated by another lack of statistical significance within model 5. The coefficients for Period 2, Presidential Democratic ratio, and subsequently the joint effect between the period and the presidential democratic ratio cannot be analyzed due to a lack of statistical significance. Similarly to model 4, all coefficients aside from the intercept, r-squared and F-statistic are not statistically significant. The intercept coefficient is valued at 0.47915 and like in model 4, it suggests that the average value when both the year and presidential democratic ratio are zero will be 0.47915. The corresponding t-value of 8.80 suggests that the intercept may influence the amount of democratic presidential votes that year.

The R-squared value and slightly lower adjusted R-square value are both positive and round ranging around 0.5. The moderate R-squared follows a similar pattern as the previous time period to further indicate that the year change and vote share for each partisan candidate explains a moderate level of variation in voter turnout.

The F-statistic is slightly higher than model 4 with a value of 4.478. It indicates that the time period, presidential democratic ratio, and/or the joint effects of the two likely affect voter turnout.

Partisanship in 2008-2012 Presidential Election

Prior to the 2012 presidential election, online voter registration was introduced. In order to capture the potential partisan effect of online voter registration, I conducted an identical regression analysis to models 4 and 5 with information pertaining to partisan vote share from 2008-2012. It yielded a higher R-squared value and F-statistic, as well as the complete statistical significance of all parameters, unlike all prior regressions on the partisan differential. The full output given from the regression is shown below and the original R-studio output is shown in appendix 9.

Model 6: Partisan Voter Turnout in 2008-2012 Election with County Fixed Effects

| COEFFICIENTS | ESTIMATE | STANDARD EFFOR | T-VALUE | PR(>\|T\|) |
|---|---|---|---|---|
| (intercept) | 6.537e-.01 | 5.079E-02 | 12.870 | <2e-16*** |
| 2008-2012 | 5.418E-02 | 1.701E-01 | 3.186 | 0.001515* |
| Presidential Democratic Ratio | -7.246E-01 | 1.423E-01 | -5.091 | 4.73E-07*** |
| Period 3: Presidential Democratic Ratio | 9.489E-02 | 4.168E-02 | 2.276 | 0.0231166* |

| | |
|---|---|
| Residual Standard error | 0.07993 on 616 degrees of freedom |
| Multiple R- Squared | 0.6142 |
| Adjusted R- Squared | 0.514 |
| F-Statistic | 6.13 on 160 and 616 DF |
| | p-value: <2.2e-16 |

Code: Model24 <- lm(VOTER_TURNOUT_PCT ~ P3* PRES_DEM_RATIO + as.factor(FIPS.y), Data = df7)

The regression suggests that as both the time period and presidential democratic vote share increase, the voter turnout percentage increases slightly as well. That joint effect, denoted as Period 3: Presidential Democratic Ratio in the chart, demonstrated a .09489 increase in the Presidential Democratic Ratio between 2008 and 2012. In turn, it displayed that the Republican vote share decreased by .09489 under the same joint effects. The T-value on the joint effect was estimated at 2.279. It conveys that the variation in voter turnout percentage can be attributed to the joint effects between period and partisan vote share.

Like prior models examining partisan differential, the intercept coefficient and corresponding values indicate that voter turnout is 0.6537 when the year and presidential democratic vote ratio are 0. Although the t-value indicates the intercept may contain meaningful information, the intercept likely is not relevant as the time period and presidential vote ratio could both never be zero.

The coefficient given for the years 2008-2012 suggests that for one unit increase in a year within the period 2008 to 2012, the voter turnout percentage will increase slightly by 0.0541 when all other variables are constant. This value is statistically significant and its t-value of 3.186 indicates that some variation in voter turnout percentage can be attributed to the change in time period.

The output additionally suggests there is a slight negative linear relationship between the presidential democratic ratio and voter turnout percentage. This indicates that a 1 unit increase in the presidential democratic ratio will result in a .07246 decrease in voter turnout percentage. The corresponding t-value of -5.091 indicates that the democratic ratio's inverse relationship strongly attributes to the variation within voter turnout percentage.

Between all models on the partisan differential, Model 6 exhibits the largest F-statistic value, as well as the highest R-squared and adjusted r-squared, with values of 6.13, 0.614, and 0.514, respectively. The elevated F-statistic illustrates that model 6 best fits the data and that voter turnout is impacted by the time period, presidential democratic vote share, and/or the joint effects of the two. Identical to all other models on presidential vote share, the decrease in the adjusted r-squared suggests that the inclusion of the years between 2008 and 2012, the presidential demarcation ratio, and the joint interaction between the two did not increase the fit of the model.

Additional Controls

The model presented below is similar to Model 6, but it incorporates additional controls for county median income and racial composition.

Model 7: Partisan Voter Turnout in 2008-2012 Election with County Fixed Effects & Controls

| COEFFICIENTS | ESTIMATE | STANDARD EFFOR | T-VALUE | PR(>\|T\|) |
|---|---|---|---|---|
| (intercept) | 0.517206 | 0.568978 | 0.909 | 0.365428 |
| 2008-2012 | 0.058485 | 0.043311 | 1.350 | 0.179802 |
| Presidential Democratic Ratio | -0.425833 | 0.234887 | -1.813 | 0.0727207 |
| Period 3: Presidential Democratic Ratio | 0.101247 | 0.087997 | 1.151 | 0.252521 |

| | |
|---|---|
| Residual Standard error | 0.08516 on 105 degrees of freedom |
| Multiple R- Squared | 0.5905 |
| Adjusted R- Squared | 0.4735 |
| F-Statistic | 5.046 on 30 and 105 DF |
| | p-value: <2.2e-16 |

Code: Model24 <- lm(VOTER_TURNOUT_PCT ~ P3* PRES_DEM_RATIO + Income2008 + PercentWhite + as.factor(FIPS.y), Data = df7)

Unlike all previous models, Model 7 does not provide any coefficients of statistical significance. The intercept, time period, presidential democratic ratio, and joint effects from the time period and presidential democratic ratio all have a P-value below the threshold of significance. Due to this, only the R-squared, adjusted r-squared, and F-statistic can be evaluated and contrasted to prior models.

Both the r-squared and adjusted r-squared remain moderately high at 0.5905 and 0.4735, indicating that the majority of the variation in voter turnout percentage is due to the time period, presidential democratic ratio, the joint effects of the two, and/or the controls. The prior model on the same time period without the additional controls has a higher adjusted r-squared than the current model. The lower adjusted r-squared value in comparison to the previous model indicates that the addition of the variables actually decreased the amount of variance within the voter turnout percent that is explained by the time period, presidential democratic ratio, and/or the joint effects of the two.

The F-statistic of 5.046 echoes a similar sentiment of that one of the aforementioned variables likely does influence voter turnout percentage. The coefficients for each variable are not present to express the directionality and magnitude of each variable's relationship to voter turnout percentage, however the overall regression still suggests that variation is explained by the variable's input.

## Discussion

### Implications

There are clear effects on how changes in voter registration influence voter turnout when the cost of voting decreases. After the no-excuse absentee ballot law was implemented in 2003, turnout increased when holding the population constant. The same occurred in 2012 as voter turnout increased after the transition to online voter registration. The effect due to photo-ID requirements cannot be determined due to a lack of statistical significance.

In 2003, the change to no-excuse absentee voting correlated with a decrease in the costs of voting. The initial law required individuals to have a valid excuse for needing to vote

absentee rather than at the polls. By removing this law, voters who had to request their ballots did not have to go through the additional information costs of knowing what excuses were valid or the transactional costs of providing an excuse to receive their absentee ballots. The cost of voting likely decreased for voters after this change, and in the 2004 presidential election voter turnout increase by 15% in comparison to the voter turnout in 2000 per Georgia county.

In 2012, the same correlation occurred. After Georgia transitioned from solely paper registration to allowing online as well as paper registration, the costs of voting decreased by eliminating transportation and mailing costs associated with paper registering. With this decrease in the cost of voting, there was an increase in voter turnout in the election later that year by 9%.

In the 2008 election, a new law was implemented that required voters to show an ID with a photo on it. This change in voter registration law likely increased the costs of voting as voters now had to acquire a photo ID if their form of ID did not include a picture. This increase in the costs of voting yielded insufficient results and cannot be used to make conclusions of the effects of increasing voter costs.

The first three regressions evaluating voter turnout before and after voter registration changes while holding population growth constant yielded similar results when the costs of voting decreased. I initially hypothesized that a decrease in voting costs would not result in an increase in voter turnout as the decrease in cost is only one factor influencing the non-voters threshold to turnout. Both online voter registration and no excuse absentee lowered costs, and increased voter turnout in the following presidential election.

The consistent responses in voter turnout to changes in voter registration law imply that the introduction of new laws does change voter turnout. Regardless of the law change, each

election following a change in law saw an increase in voter turnout. While it appears there is a clear connection to its effects based on the cost of voting associated with the three registration laws changes, more research beyond the three registration changes needs to be done to comprehensively examine how an increase and decrease in costs affect voter turnout.

It is important to note that decreasing and increasing costs of voting is not a binary concept. The costs of voting are on a continuous scale and each individual has their own threshold that they deem tolerable enough to take the time and resources to vote. When examining photo ID changes, non- excuse absentee ballot requirements, and online voter registration, they all fall on a sliding scale of how much the change decreases or increases individuals' costs to voting. The introduction of online registration could decrease the costs of voting more than the introduction of no-excuse absentee voting for some individuals. The changes may also not affect the costs of voting for some individuals. For example, a voter who already had a driver's license, at the residence they registered to vote, and already registered, faces no additional costs to voting from all three law changes.

Each individual's circumstances also impact their threshold, as one who has more income may not have the binding schedule that prohibits some lower-income individuals from voting. I control for changes in county level median income in Model 7, but income disparities are likely more convoluted than the counties' mean income in a given year. Moreover, each individual's perception of how much a change increases or decreases their cost of voting will be unique to them. For these reasons, my research suggests that a change in the three voting registration costs examined does not produce a uniform effect on the total ballots cast.

Implications: Partisan Effects

As 2 of the 3 regressions do not produce statistically significant coefficients on the joint interaction between time period and presidential democratic vote share on voter turnout percentage, there are no conclusive results on the partisan effect from each change in voter registration law. Model 6 on the effects of online voter registration imply there may be a partisan differential; however, the absence of results from model 4 and 5 speak greater volumes of that there is not enough information to suggest the changes in partisan vote share.

Model 6 may indicate that there may be a 10% increase in favor of the democratic vote share after the introduction of online voter registration. The shift to online voter registration reduced the cost to voting, and as such, it suggests that a decrease in voting costs may increase the democratic vote share. This correlation that Democratic voters may be less sensitive to changes in registration law contradicts my initial hypothesis and the research by Mcnulty (2011) that suggests Republican voters are less sensitive to changes. This pattern of democratic voters resisting increases to costs may hold true, but for the purposes of this study, it can not be reliably held as true given that this is simply one instance. Further research is needed in order to accept or refute any larger pattern on the partisan differential resulting from changes in voter registration law.

Implications: Georgia

As the entirety of my thesis focuses on county level data within Georgia, its results provide implications and insights to election officials, politicians, and voters on Georgia specific effects when reducing the costs of voting. It suggests that as the costs of voting decrease, Georgia residents are able to overcome previous barriers to voting in order to turnout. It shows

that Georgia voters are positively receptive to changes in electoral policies that make it easier to vote. While it cannot be said how Georgia voters respond to an increase in the costs of voting, the results are still highly relevant to Georgia law makers as it provides a foundation for how to increase voter turnout throughout the state.

In 2022, Georgia adopted SB-202- a Republican led bill designed to increase electoral integrity and deter voter fraud. The bill passed completely along party lines as democratic opponents argued it unnecessarily increased the costs on voting for a minimal benefit as the rate of known fraud in undeniably low at around 3%. SB 202 does increase the costs of voting on a informational and transactional level as there are new requirements for voter IDs, ballots drop offs, and smaller windows to register to vote. It directly prohibits any third party from sending residents a copy of a voter registration form if they did not explicitly request one. In doing so, any of these changes likely increase the costs of voting for the average Georgia voter.

Despite conducting regressions on partisanship, I could not determine the partisan differential resulting from an increase in the costs of voting. However, model 6 did indicate that democratic voters showed less sensitivity to cost reductions when online voter registration was introduced. Model 6 does not directly correlate to the effects of costs rising, such as in SB 202, but it may suggest a broader pattern that Georgia Democratic voters possess a less sensitive disposition to changes in electoral law. If this is the case, my research supports that there will be an increase in Democratic voters in the impending 2024 presidential election.

Limitations

When producing each regression, I had to merge multiple tables based on FIPS codes and county names. There may have been redistricting and/or human error in merging the data frames that confounded the results of each regression. This would have prohibited the county-level data from reflecting an accurate amount of ballots cast, voter turnout percentage, and presidential democratic ratios for the correct FIPS code and year.

In the same vein, a potential limitation likely occurred due to merging datasets from multiple different sources. The supplementary data on population growth, income, and race all originate from the U.S Census Bureau, but each file did not have every county and did not download in the same format. The tables from the Census Bureau did not produce clean data which resulted in manual transposing, additions of columns for merging, and editing of data cells to match the language in outputs across different tables. The resulting data frame after merging all tables produced around 90,000 data cells. The size of the dataset prohibited me from manually checking all data and limited the amount of cleaning I could do within the set.

The study is further limited by the accuracy of the data used from the NaNDA dataset and the Census Bureau datasets. The NaNDA dataset on voter turnout is considered to be a valid estimation in academia, however there are potential concerns within each model if the NaNDA dataset does not accurately reflect county level data. There are additional limitations due to the limited range of data the American Community Survey dates back to. The ACS only reports information at the county level after 2005, so I could not locate racial and income data for the years prior to 2005. Due to this, I could not run my intended last set of regressions to uncover partisan differential by county while controlling for median income and race in between the introduction of no-excuse absentee ballots and the implementation of a photo-ID requirement. I

only had data to complete the county differential with all controls for the 2012 introduction of online voter registration. Therefore, there is a limit to the number of findings arising from the partisan differential by county fixed effects while controlling for income and racial composition.

It is also important to recognize my personal limitations within coding in R-Studio. I began my process in Python to subset the NaNDA dataset to only counties within Georgia and intended to do the rest in Python as well. I quickly learned that I did not have the complete knowledge to confidently produce accurate regressions, so I made a late switch to R-studio to complete the rest of the coding. Prior to this study, my coding skills were entirely in different programming languages, so there may be minor issues within the final R-studio code.

Aside from coding issues, the validity of the study is limited by my inability to control for all outside factors that may have influenced voter turnout and voter registration law changes. I chose to not examine years after 2018 due to the unpredictable effects of Covid-19, but multiple major county events have occurred throughout the years included in my regressions. For example, the 2000 to 2004 voter turnout may have been greatly impacted by 9/11 and I had no form of control for those anticipated effects. The political climate and attitude towards politics likely also influence the threshold of costs voters are willing to endure and I could not account for time-specific sentiment toward voting in my analysis.

## Further Research

Further research is needed in order to determine the partisan effects of Georgia's transition to no-excuse absentee voting, photo-ID requirements, and online voter registration. The majority of my regressions on the partisan differential for those registration changes were not statistically significant, so a new series of regressions controlling for income, race, and

educational attainment should be conducted to further examine the effects. Further, more registration changes within Georgia should be examined to determine the overall pattern of if changes increasing or decreasing the cost of voting produce a partisan differential or a general effect on voter turnout. I examine only Georgia due to the limited scope of an undergraduate thesis; however, the research design is applicable to other states to determine state-level effects or national level effects. Further research should also be conducted to determine the baseline response by each U.S state and territory on voter registration changes in voting costs.

## Contribution

Although further research is needed to clarify and strengthen the conditions between changes to the cost of voting and partisan voter turnout, the findings within this thesis contribute to the multitude of research suggesting the contested turnout response after a specific change in voting laws. Previous research on the effects of photo-ID changes, same-day registration, changing of the polling location, and other common changes are disputed within the literature. My study builds upon and further validates work suggesting that the change to absentee ballots increases turnout and the allowance of online voter registration increases voter turnout. It further suggests that democratic voters were more receptive to the introduction of online voter registration.

Appendix 1

```
Call:
lm(formula = log(VOTER_TURNOUT_PCT) ~ P1, data = df7)

Residuals:
     Min       1Q   Median       3Q      Max
-1.62632 -0.19187  0.03933  0.21870  0.63429

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept) -0.83521    0.00878 -95.131  < 2e-16 ***
P1           0.15255    0.02483   6.143 1.08e-09 ***
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.292 on 1262 degrees of freedom
  (314 observations deleted due to missingness)
Multiple R-squared:  0.02904,   Adjusted R-squared:  0.02827
F-statistic: 37.74 on 1 and 1262 DF,  p-value: 1.081e-09
```

Appendix 2

```
Call:
lm(formula = log(VOTER_TURNOUT_PCT) ~ P2, data = df7)

Residuals:
     Min       1Q   Median       3Q      Max
-1.64328 -0.19447  0.06341  0.21865  0.61733

Coefficients:
             Estimate Std. Error t value Pr(>|t|)
(Intercept) -0.818247   0.010542 -77.619   <2e-16 ***
P2           0.005615   0.017215   0.326    0.744
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.2963 on 1262 degrees of freedom
  (314 observations deleted due to missingness)
Multiple R-squared:  8.43e-05,  Adjusted R-squared:  -0.000708
F-statistic: 0.1064 on 1 and 1262 DF,  p-value: 0.7443
```

---

Appendix 3

```
Call:
lm(formula = log(VOTER_TURNOUT_PCT) ~ P3, data = df7)

Residuals:
     Min       1Q   Median       3Q      Max
-1.67485 -0.19513  0.05529  0.21038  0.65080

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept) -0.85172    0.01041 -81.781  < 2e-16 ***
P3           0.09487    0.01701   5.578 2.97e-08 ***
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.2927 on 1262 degrees of freedom
  (314 observations deleted due to missingness)
Multiple R-squared:  0.02407,   Adjusted R-squared:  0.02329
F-statistic: 31.12 on 1 and 1262 DF,  p-value: 2.966e-08
```

Appendix 4:

```
Call:
lm(formula = VOTER_TURNOUT_PCT ~ P1b * PRES_DEM_RATIO + as.factor(FIPS.y),
    data = df7)

Residuals:
      Min        1Q    Median        3Q       Max
-0.305468 -0.008941  0.031622  0.052511  0.152800

Coefficients: (2 not defined because of singularities)
                          Estimate Std. Error t value Pr(>|t|)
(Intercept)               0.500338   0.057510   8.700  < 2e-16 ***
P1b                             NA         NA      NA       NA
PRES_DEM_RATIO           -0.004631   0.154910  -0.030 0.976160
as.factor(FIPS.y)13003    0.003182   0.059702   0.053 0.957506
as.factor(FIPS.y)13005   -0.036076   0.059012  -0.611 0.541209
as.factor(FIPS.y)13309   -0.188375   0.061498  -3.063 0.002286 **
as.factor(FIPS.y)13311   -0.009101   0.059425  -0.153 0.878325
as.factor(FIPS.y)13313   -0.070017   0.058788  -1.191 0.234110
as.factor(FIPS.y)13315   -0.102814   0.059906  -1.716 0.086614 .
as.factor(FIPS.y)13317    0.065790   0.065957   0.997 0.318933
as.factor(FIPS.y)13319    0.105911   0.069293   1.528 0.126912
P1b:PRES_DEM_RATIO              NA         NA      NA       NA
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.09278 on 618 degrees of freedom
  (801 observations deleted due to missingness)
Multiple R-squared:  0.4786,    Adjusted R-squared:  0.3453
F-statistic:  3.59 on 158 and 618 DF,  p-value: < 2.2e-16
```

Note: the as.factor(FIPS.y) does not include all FIPS codes as they were not relevant to the study. All as.factor results are available upon request.

Appendix 5

```
Call:
lm(formula = BALLOTS_CAST/CVAP ~ P2 * PRES_DEM_RATIO + as.factor(F
    data = df7)

Residuals:
     Min       1Q   Median       3Q      Max
-0.28233 -0.03577  0.01948  0.06058  0.18023

Coefficients:
                          Estimate Std. Error t value Pr(>|t|)
(Intercept)              0.4791514  0.0544468   8.800  < 2e-16 ***
P2                       0.0380085  0.0196202   1.937  0.05318 .
PRES_DEM_RATIO          -0.0029028  0.1481316  -0.020  0.98437
as.factor(FIPS.y)13003   0.0021438  0.0563691   0.038  0.96968
as.factor(FIPS.y)13005  -0.0349854  0.0556927  -0.628  0.53011
```

```
as.factor(FIPS.y)13305 -0.0612695  0.0553866  -1.106  0.26907
as.factor(FIPS.y)13307  0.0040501  0.0650232   0.062  0.95035
as.factor(FIPS.y)13309 -0.1907476  0.0582208  -3.276  0.00111 **
as.factor(FIPS.y)13311 -0.0076122  0.0561189  -0.136  0.89215
as.factor(FIPS.y)13313 -0.0701038  0.0554492  -1.264  0.20660
as.factor(FIPS.y)13315 -0.1039421  0.0565732  -1.837  0.06665 .
as.factor(FIPS.y)13317  0.0619550  0.0627477   0.987  0.32385
as.factor(FIPS.y)13319  0.1011913  0.0661265   1.530  0.12646
P2:PRES_DEM_RATIO       0.0496544  0.0493526   1.006  0.31475
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.0875 on 616 degrees of freedom
  (801 observations deleted due to missingness)
Multiple R-squared:  0.5377,    Adjusted R-squared:  0.4176
F-statistic: 4.478 on 160 and 616 DF,  p-value: < 2.2e-16
```

Note: the as.factor(FIPS.y) does not include all Fips codes as they were not relevant to the study.

All as.factor results are available upon request.

## Appendix 6

```
Call:
lm(formula = VOTER_TURNOUT_PCT ~ P3 * PRES_DEM_RATIO + as.factor(FIPS.y),
    data = df7)

Residuals:
      Min        1Q    Median        3Q       Max
-0.265164 -0.022656  0.009146  0.051499  0.193599

Coefficients:
                         Estimate Std. Error t value Pr(>|t|)
(Intercept)             6.537e-01  5.079e-02  12.870  < 2e-16 ***
P3                      5.418e-02  1.701e-02   3.186 0.001515 **
PRES_DEM_RATIO         -7.246e-01  1.423e-01  -5.091 4.73e-07 ***
as.factor(FIPS.y)13003  5.162e-02  5.154e-02   1.001 0.316993
as.factor(FIPS.y)13005 -6.354e-02  5.088e-02  -1.249 0.212161
```

```
as.factor(FIPS.y)13311 -5.029e-02  5.128e-02  -0.981 0.327126
as.factor(FIPS.y)13313 -5.449e-02  5.066e-02  -1.076 0.282559
as.factor(FIPS.y)13315 -4.939e-02  5.174e-02  -0.955 0.340177
as.factor(FIPS.y)13317  1.984e-01  5.756e-02   3.447 0.000606 ***
as.factor(FIPS.y)13319  2.683e-01  6.075e-02   4.417 1.18e-05 ***
P3:PRES_DEM_RATIO       9.489e-02  4.168e-02   2.276 0.023166 *
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.07993 on 616 degrees of freedom
  (801 observations deleted due to missingness)
Multiple R-squared:  0.6142,    Adjusted R-squared:  0.514
F-statistic:  6.13 on 160 and 616 DF,  p-value: < 2.2e-16
```

Note: the as.factor(FIPS.y) does not include all Fips codes as they were not relevant to the study.

All as.factor results are available upon request

Appendix 7:

```
Call:
lm(formula = BALLOTS_CAST/CVAP ~ P3 * PRES_DEM_RATIO + PercentWhite +
    Income2008 + as.factor(FIPS.y), data = final_data)

Residuals:
      Min        1Q    Median        3Q       Max
-0.193709 -0.017506  0.008363  0.045123  0.127265

Coefficients: (28 not defined because of singularities)
                         Estimate Std. Error t value Pr(>|t|)
(Intercept)              0.517206   0.568978   0.909 0.365428
P3                       0.058485   0.043311   1.350 0.179802
PRES_DEM_RATIO          -0.425833   0.234887  -1.813 0.072701 .
PercentWhite             0.212886   0.618905   0.344 0.731555
Income2008$36,692        0.137467   0.235920   0.583 0.561355
Income2008$37,796        0.083968   0.176268   0.476 0.634804
Income2008$40,223        0.041760   0.161793   0.258 0.796829
Income2008$41,581        0.107585   0.170445   0.631 0.529280
Income2008$41,618       -0.139254   0.047926  -2.906 0.004471 **
Income2008$42,834       -0.080397   0.112635  -0.714 0.476944
Income2008$43,529       -0.179865   0.048860  -3.681 0.000368 ***
Income2008$45,081        0.052584   0.119330   0.441 0.660365
Income2008$46,357        0.235757   0.246997   0.954 0.342025
Income2008$47,203       -0.096846   0.055416  -1.748 0.083451 .
Income2008$52,825       -0.107094   0.054152  -1.978 0.050587 .
Income2008$54,982        0.282757   0.194698   1.452 0.149404
Income2008$55,506        0.068461   0.109492   0.625 0.533157
Income2008$55,567       -0.042557   0.073787  -0.577 0.565336
Income2008$57,464       -0.062698   0.050835  -1.233 0.220196
Income2008$58,523        0.081311   0.108007   0.753 0.453235
Income2008$58,578       -0.016849   0.088770  -0.190 0.849828
Income2008$58,742        0.153538   0.154112   0.996 0.321405
Income2008$60,565       -0.032237   0.053391  -0.604 0.547283
Income2008$62,354        0.099796   0.111110   0.898 0.371148
Income2008$63,819        0.168595   0.141859   1.188 0.237332
Income2008$64,462       -0.000158   0.055058  -0.003 0.997715
Income2008$66,373        0.074160   0.136839   0.542 0.588998
Income2008$67,320       -0.031631   0.058984  -0.536 0.592907
```

```
Income2008$70,472       0.117456   0.094496   1.243 0.216646
Income2008$81,068       0.203265   0.064971   3.129 0.002274 *
Income2008$87,904             NA         NA      NA       NA
as.factor(FIPS.y)13045        NA         NA      NA       NA
as.factor(FIPS.y)13051        NA         NA      NA       NA
as.factor(FIPS.y)13057        NA         NA      NA       NA
as.factor(FIPS.y)13059        NA         NA      NA       NA
as.factor(FIPS.y)13063        NA         NA      NA       NA
as.factor(FIPS.y)13067        NA         NA      NA       NA
as.factor(FIPS.y)13073        NA         NA      NA       NA
as.factor(FIPS.y)13077        NA         NA      NA       NA
as.factor(FIPS.y)13089        NA         NA      NA       NA
as.factor(FIPS.y)13095        NA         NA      NA       NA
as.factor(FIPS.y)13097        NA         NA      NA       NA
as.factor(FIPS.y)13113        NA         NA      NA       NA
as.factor(FIPS.y)13115        NA         NA      NA       NA
as.factor(FIPS.y)13117        NA         NA      NA       NA
as.factor(FIPS.y)13121        NA         NA      NA       NA
as.factor(FIPS.y)13127        NA         NA      NA       NA
as.factor(FIPS.y)13135        NA         NA      NA       NA
as.factor(FIPS.y)13139        NA         NA      NA       NA
as.factor(FIPS.y)13151        NA         NA      NA       NA
as.factor(FIPS.y)13153        NA         NA      NA       NA
as.factor(FIPS.y)13185        NA         NA      NA       NA
as.factor(FIPS.y)13215        NA         NA      NA       NA
as.factor(FIPS.y)13217        NA         NA      NA       NA
as.factor(FIPS.y)13223        NA         NA      NA       NA
as.factor(FIPS.y)13245        NA         NA      NA       NA
as.factor(FIPS.y)13247        NA         NA      NA       NA
as.factor(FIPS.y)13313        NA         NA      NA       NA
P3:PRES_DEM_RATIO       0.101247   0.087997   1.151 0.252521
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.08516 on 105 degrees of freedom
  (1442 observations deleted due to missingness)
Multiple R-squared:  0.5905,    Adjusted R-squared:  0.4735
F-statistic: 5.046 on 30 and 105 DF,  p-value: 2.93e-10
```

Note: all Values from the regression output are included

## Appendix 8: Python Code

```
#Loading and checking NaNDA data
import pandas as pd
df=pd.read_csv("thesis.tsv", sep='\s+' )
engine='python'
```

```
print(df)
df

#creating CSV file for just Georgia
df2=df.loc[(df['STCOFIPS']> 13000) & (df['STCOFIPS'] < 14000)]
df2.to_csv("georgia.tsv", sep="\t", index=False)

#dataframe for the year 2000, isolation by year
df3=df2.loc[(df2['YEAR']==2000)]
df3['total_ballots'] = df3['BALLOTS_CAST'].sum()
Df3['total_ballots']
```

Appendix 9: Full R-Studio Code

```
#Loading Data
#Ballots and Partisanship Data
df <- read.table("~/Desktop/georgia.tsv", sep="\t", header=TRUE)

#loading data on population growth from 2000-2009
df2<- read.csv(file = "~/Desktop/00-10.csv")
df2_ga <- df2[df2$STNAME == "Georgia", ]
df2<- read.csv(file = "~/Desktop/00-10.csv")
# Excluding the first row in df2
df2 <- df2[-1,]

#loading data on population growth
df2<- read.csv(file = "~/Desktop/00-10.csv")
df2_ga <- df2[df2$STNAME == "Georgia", ]

#Loading data on population growth from 2010-2019
library(readxl)
CountyPoP2010_19 <- read_excel("Desktop/CountyPoP2010-19.xls",
                               col_types = c("text", "numeric", "numeric",
                                             "numeric", "numeric",
"numeric",
                                             "numeric", "numeric",
"numeric",
                                             "numeric", "numeric",
"numeric",
                                             "numeric", "numeric",
"numeric", "numeric"))
```

```
#merging population data from 2000-2009 by FIPS code
df3 <- merge(df, df2, by.x = "STCOFIPS", by.y = "FIPS")

#merging population data from 2010-2019 by FIPS
df3 <- merge(CountyPoP2010_19, df3, by.x = "FIPS", by.y = "STCOFIPS")

# Create dummy variables for the three time periods
df$P1 <- ifelse(df$YEAR >= 2004 & df$YEAR < 2012, 1, 0)
df$P2 <- ifelse(df$YEAR >= 2004 & df$YEAR < 2012, 1, 0)
df$P3 <- ifelse(df$YEAR >= 2012, 1, 0)

#df5 <- read.table("~/Desktop/df5.xlsx", sep="\t", header=TRUE)
library(readxl)
df5 <- read_excel("Desktop/df5.xlsx")

#Inserting Race Data
#1996
Race96 <- read_excel("Desktop/Race-1996.xls")
#2000 and 2004
Race0004 <- read_excel("Desktop/Race-0004.xls")
#2008
Race008 <- read_excel("Desktop/2008-Race%.xlsx")

Race08 <- read_excel("Desktop/2008-Race.xlsx")

#Inserting Income Data
#2008
Income08 <- read_excel("Desktop/2008-income.xlsx")
#2012
Income12 <- read_excel("Desktop/income-2012.xlsx")

#Merging
colnames(df6)
colnames(df5)[colnames(df5) == "...2"] <- "county"
df6  <- merge(df2_ga, df5, by.x = "CTYNAME", by.y = "county")
colnames(df5)[colnames(df5) == "county"] <- "CTYNAME"
df7 <- merge(df2_ga, df5, by = "CTYNAME")

#Cleaning
df7$`ball/CVAP` <- df7$BALLOTS_CAST / df7$CVAP
```

```
#defining variables
#2000-2004
P1 <- ifelse(df7$YEAR >= 2000 & df7$YEAR <=2004, 1, 0)
#2004-2008
P2 <- ifelse(df7$YEAR >= 2004 & df7$YEAR <= 2008, 1, 0)
#2008-2018
P3 <- ifelse(df7$YEAR >= 2008 & df7$YEAR <= 2012, 1, 0)


# Fit separate regression models for each time period
# Period 1 (2000 - 2004)
model1 <- lm(log(BALLOTS_CAST) ~ P1b + df7$POPESTIMATE2004, data = df7)
summary(model1)

# Period 2 (2004 - 2008)
model2 <- lm(log(BALLOTS_CAST) ~ P2b + df7$POPESTIMATE2008, data = df7)
summary(model2)

#Period 3 (2008-2012)
model3 <- lm(log(BALLOTS_CAST) ~ P3b + df7$'2012', data = df7)
summary(model3)


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  #Regressions for presidential dem and rep votes (INCORRECT, NOT USED)

  #P1 (2000-2004)
model4 <- lm(log(PRES_DEM_VOTES) ~ P1b + df7$POPESTIMATE2004, data = df7)
summary(model4)

model5 <- lm(log(PRES_REP_VOTES) ~ P1b + df7$POPESTIMATE2004, data = df7)
summary(model5)

#P2 (2004-2008)
model6 <- lm(log(PRES_DEM_VOTES) ~ P2b + df7$POPESTIMATE2008, data = df7)
summary(model6)

model7 <- lm(log(PRES_REP_VOTES) ~ P2b + df7$POPESTIMATE2008, data = df7)
summary(model7)

#P3 (2008-2012)
model8 <- lm(log(PRES_DEM_VOTES) ~ P3b + df7$"2012", data = df7)
```

```
summary(model8)

model9 <- lm(log(PRES_REP_VOTES) ~ P3b + df7$"2012", data = df7)
summary(model9)
-------------------------------------------------------------------------
-----


#removing values in wrong form to N/A
df7$CVAP <- as.character(df7$CVAP)
df7$CVAP <- ifelse(grepl("e-01$", df7$CVAP), NA, df7$CVAP)
df7$CVAP <- gsub("\\..*", "", df7$CVAP)
df7$CVAP[df7$CVAP == 0] <- NA

#Regressions with citizen voting age population
df7$`votes/CVAP` <- df7$BALLOTS_CAST / df7$CVAP
df7$BALLOTS_CAST <- as.numeric(df7$BALLOTS_CAST)
df7$CVAP <- as.numeric(df7$CVAP)

#period 1 (2000-2004)
model13 <- lm((VOTER_TURNOUT_PCT) ~ P1, data = df7)
summary(model13)

# Period 2 (2004 - 2008) with CVAP
model11 <- lm((VOTER_TURNOUT_PCT) ~ P2b, data = df7)
summary(model11)

# Period 3 (2008 - 2012) with CVAP
model12 <- lm((VOTER_TURNOUT_PCT) ~ P3b, data = df7)
summary(model12)

#by county
#model13 <- lm(log(BALLOTS_CAST) ~ P1b + df7$POPESTIMATE2004 +
as.factor(FIPS.x), data = df7)
summary(model3)

#By county with Income and Race # Ignore
model13 <- lm(log(BALLOTS_CAST) ~ P1b + df7$POPESTIMATE2004 +
Race96+Income96 as.factor(FIPS.y), data = df7)

#county fixed effects
#Creating data frame
df7_subset <- select(df7, YEAR, PRES_DEM_RATIO, PRES_REP_RATIO, FIPS.y,
```

```
CVAP, BALLOTS_CAST, CTYNAME)
merged_data <- left_join(df7_subset, Race008, by = c("CTYNAME" =
"Counties"))
final_data <- left_join(merged_data, Income08, by = c("CTYNAME" =
"COUNTY"))
#Redefining period 3 due to length differences
P3c <- ifelse(final_data$YEAR >= 2008 & final_data$YEAR < 2012, 1, 0)
#renaming columns
print(colnames(final_data))
final_data <- rename(final_data, Income2008 = `Median Household Income (In
2008 Inflation Adjusted Dollars)`)
final_data <- rename(final_data, PercentWhite = `Percent White`)


---- #Partisan Differential -------------------------------------


####Creating Lagging Presidential Ratio variable
#2000-2004
model4 <- lm(VOTER_TURNOUT_PCT  ~ P1b * PRES_DEM_RATIO + as.factor(FIPS.y),
data = df7)
summary(model4)
Model14 <- lm(VOTER_TURNOUT_PCT ~ P1 * PRES_REP_RATIO + as.factor(FIPS.y),
data = df7)
summary(Model14)

#2004-4008
model5 <- lm(BALLOTS_CAST/CVAP ~ P2 * PRES_DEM_RATIO + as.factor(FIPS.y),
data = df7)
summary(model5)
Model15 <- lm(BALLOTS_CAST/CVAP ~ P2 * PRES_REP_RATIO + as.factor(FIPS.y),
data = df7)
summary(Model15)

#2008-2012
model6 <- lm(VOTER_TURNOUT_PCT ~ P3 * PRES_DEM_RATIO + as.factor(FIPS.y),
data = df7)
summary(model6)
Model16 <- lm(BALLOTS_CAST/CVAP ~ P3 * PRES_REP_RATIO + as.factor(FIPS.y),
data = df7)
summary(Model16)

#with controls
```

```
model7 <- lm(BALLOTS_CAST/CVAP ~ P3 * PRES_DEM_RATIO + PercentWhite +
Income2008 + as.factor(FIPS.y), data = final_data)
model8 <- lm(BALLOTS_CAST/CVAP ~ P3 * PRES_DEM_RATIO + PercentWhite +
as.factor(FIPS.y), data = final_data)
summary(model7)
summary(model8)
```

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