A Data-Driven Analysis of Youth Turnout Impact

on

U.S. Presidential Elections

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ABSTRACT

Youth voters between 18 and 29 years of age have consistently had the lowest turnout among all age groups in U.S. presidential elections.

This research was designed to study whether the number of votes from this age group would make a difference on the election results, had young voters participated more actively. An original method was devised to do so by simulating higher-than-actual youth voter turnout using various voting scenarios – combinations of voting rates and voter choices derived from past elections. The findings are:

- When 18- to 29-year olds participate in the election as actively as the entire voting population, they are definitely a formidable force in influencing the presidential election results.
- If either party energizes those young voters to participate and earns their votes with the margin it saw in its past wins in key states, the party stands a much better chance to win the election.

KEYWORDS

Youth voter turnout; Presidential elections; United States; Battleground states; Voting rate; Quantitative analysis

I. INTRODUCTION

A. Background and Objective

As the 2020 election is now behind us, a new 4-year presidential election cycle starts. There are many factors that will sway the voters and affect the next election's results: politics, economy, society,

technology, healthcare, and others. These factors have played important roles in candidates' and political parties' campaign strategies in modern era elections.

In the end, however, it all comes down to the voters.

With the Census Bureau data of the presidential elections from 1980 to 2016^[I-1], Diagram I-A-1 below illustrates that younger Americans, i.e. 18- to 29-year olds, always had much lower voting rates when compared to older age groups. Although, according to estimates^[I-2] by the Center for Information and Research on Civic Learning & Engagement (CIRCLE), youth voter turnout in the 2020 election was about 10% higher than that of the 2016 presidential election, this age group was still the least participating and hence a much less influential population on the nation's political stage.



Common beliefs attribute the situation to inadequate civic education, complex registration and voting, and political apathy, among others. Scholars have also discussed various theories about the cause of the stubbornly low youth turnout, including, for examples:

- Young people are habitual nonvoters and develop into habitual voters, according to Professor Eric Plutzer's article, "Becoming a Habitual Voter: Inertia, Resources, and Growth in Young Adulthood"^[I-3].
- While not lacking interest in politics and motivations, young voters need the skills related to

self-regulation to overcome internal and external barriers to vote, detailed in the book "Making Young Voters: Converting Civic Attitudes into Civic Action" by Professor John Holbein and Professor D. Sunshine Hillygus^[1-4].

• The mutual neglect between politicians and young adults widens "the age bias in electoral participation", and changes in media habits have led to the situation in which young people are far less likely to be exposed to news about public affairs, stated in the book, "Is Voting for Young People", by Professor Martin P. Wattenberg^[I-5].

In recent decades, the 18- to 29-year-old age group has had 50 million or so eligible voters. While that accounts for about 20% of all legal voters, several factors need to be considered when trying to understand the role of youth in presidential elections:

- Are the number of votes from this group enough to make a significant impact on election results if they choose to participate more actively, and,
- If so, how do we better work with these young people, starting before they become eligible to vote, in order to improve their turnout?

This research was designed to study and answer the first question in particular. The objective was to determine the effects the young voters would have on one of the nation's most important political decisions. (A separate paper, "A Study for Improving Youth Voter Participation", details the research focused on the second question above.)

B. Methodology and Approach

This is a data-driven research with quantitative analysis of the hypothetical impact from youth voters on every presidential election since 1980. This project used a scenario-based method to conduct the quantitative analysis (this method was entirely original and, to the researcher's knowledge, unused by any other research). The details of the method are as follows:

• Obtaining key metrics from data of presidential elections since 1976, for every of the 50 states and the District of Columbia, including:

- General voting rate, i.e. total votes divided by voting age population, in each election
- Highest, second highest, and median general voting rate among the last twelve elections
- Percentage of votes received by each party's candidate, i.e. votes received by a candidate divided by all votes cast, in each election
- Highest and second highest percentage of votes received by each party's candidate in the last twelve elections
- Youth voting rate, i.e. votes from 18- to 29-year olds divided by their population, in each election
- For every presidential election from 1980 to 2020:
 - For each state, applying certain voting rate metrics, based on various higher-than-actual youth turnout scenarios, to the then 18- to 29-year-old population data to calculate the hypothetical additional youth votes
 - With the hypothetical additional votes, using certain metrics of percentage of votes received by each party's candidate, based on various youth voting decision scenarios, to calculate how many of these votes each of the candidates would get
 - Adding each candidate's additional youth votes to their actual votes from the election to determine how it would change the results for each state, as well as the results of the overall election when all states' electoral votes are added up
- Reviewing the results of all eleven elections modeled with the above steps together, upon which the research derives certain findings and then conclusions.

This method allowed the project to reach its research goal by more definitively demonstrating the significance of the young voters, by looking at how additional youth votes alone could change known election results, had the young people voted more.

II. QUANTITATIVE ANALYSIS OF YOUTH TURNOUT IMPACT

A. Data Gathering

A significant amount of time was spent on gathering reliable and multifaceted presidential election and population data spanning from 1976 to the present. While many organizations and websites have provided such data, it was difficult to arrive at a dataset that is complete, original, current, reliable, and consistently organized. After reviewing many sources with these data accessible to the public, a large volume of data was retrieved from a list of trustworthy and authoritative organizations and institutions, including:

- United States Census Bureau
- Federal Election Commission
- United States House of Representatives
- MIT Election Data and Science Lab
- Atlas of US Presidential Elections
- Kaiser Family Foundation
- Federal Register
- United States Election Project

The following key data elements, among others, were obtained:

- Population
- Voting age population
- Votes cast
- Democratic and Republican candidates
- Votes received by Democratic and Republican candidates respectively
- Electoral vote count
- Electoral votes received by Democratic and Republican candidates respectively
- Population of 18- to 29-year-old

Each of the data elements above was obtained for every of the last twelve elections and every of the 50 states and the District of Columbia. In total, there were over 16,000 data points making up the input

datasets for the next step study. These datasets were then used to calculate the key metrics needed for the scenario-based analysis.

B. Scenario Development

The purpose of this research was to study the impact of voting by the 18- to 29-year-old age group, had they had a more active participation in the presidential elections. The research designed and used a scenario-based approach, or a what-if approach, to tackle the task at hand.

Four scenarios were developed, each representing a hypothetical situation of higher-than-actual youth turnout and their voting decisions. Every such scenario was constructed by using a combination of the options of the variables detailed below:

- The level of youth participation in terms of 18- to 29-year olds voting rate at state level, with the following options:
 - Youth voting rate is the same as the highest voting rate of the state's entire population since 1976.
 - Youth voting rate is the same as the 2nd highest voting rate of the state's entire population since 1976.
 - Youth voting rate is the same as the median voting rate of the state's entire population since 1976.
- The portion of the hypothetical additional youth votes received by a party in a state, with the following options:
 - The portion of the hypothetical additional youth votes received by a party is calculated with the highest percentage of votes the party ever received since 1976 in that state.
 - The portion of the hypothetical additional youth votes received by a party is calculated with the 2nd highest percentage of votes the party ever received since 1976 in that state.
- The states used to model the impact of hypothetical additional youth votes on their election results, with the following options:

- The battleground states or swing states only
- The states that were not carried by a candidate who lost the election
- All states
- The party that would be favored in voting decision among the hypothetical additional youth voters, with the following options:

with the following options.

- \circ The party that lost the election
- The party that won the election
- Both parties

Chart II-B-1 below illustrates the combinations of these options, as well as how they make up the four scenarios and their variations.

Scenario	Variation	Level of Participation - Voting Rate			Portion of Votes Received		States			Party	
		Highest	2nd Highest	Median	Highest	2nd Highest	Battleground	Lost	All	Lost	Won
1	а	х			х		Х			Х	
	b	х				х	Х			Х	
	с		x		х		Х			Х	
	d		x			х	Х			х	
	е			х	х		Х			х	
	f			Х		х	Х			Х	
2	а	х			х		x				Х
	b	х				х	Х				Х
	с		x		х		Х				х
	d		x			х	Х				х
	e			Х	х		х				Х
	f			Х		х	Х				х
3	а	х			х			Х		Х	
	b	х				х		Х		Х	
	с		x		х			х		Х	
	d		x			х		Х		Х	
4	а	x			x				x	х	х
	b	x				x			X	х	х
	с		X		х				Х	Х	х
	d		X			х			х	х	х

Described in details below are the what-if situations represented by the four scenarios that were used to analyze the impact on the past presidential election results:

Scenario 1:

• For the elections that the Democratic Party lost, adding the additional youth votes, resulting from their turnout being the same as the highest, the 2nd highest, or the median level turnout of the entire population the state has ever seen, into the actual votes of all battleground states, with the

Democratic Party gaining a portion of these votes at a magnitude the same as the most or the 2nd most votes in percentage the Democratic Party has ever had in that state

• For the elections that the Republican Party lost, adding the additional youth votes, resulting from their turnout being the same as the highest, the 2nd highest, or the median level turnout of the entire population the state has ever seen, into the actual votes of all battleground states, with the Republican Party gaining a portion of these votes at a magnitude the same as the most or the 2nd most votes in percentage the Republican Party has ever had in that state

Scenario 2:

- For the elections that the Democratic Party won, adding the additional youth votes, resulting from their turnout being the same as the highest, the 2nd highest, or the median level turnout of the entire population the state has ever seen, into the actual votes of all battleground states, with the Democratic Party gaining a portion of these votes at a magnitude the same as the most or the 2nd most votes in percentage the Democratic Party has ever had in that state
- For the elections that the Republican Party won, adding the additional youth votes, resulting from their turnout being the same as the highest, the 2nd highest, or the median level turnout of the entire population the state has ever seen, into the actual votes of all battleground states, with the Republican Party gaining a portion of these votes at a magnitude the same as the most or the 2nd most votes in percentage the Republican Party has ever had in that state

Scenario 3:

For each election a party lost, adding the additional youth votes, resulting from their turnout being the same as the highest or the 2nd highest turnout of the entire population the state has ever seen, into the actual votes of all the states the party didn't carry, with the party gaining a portion of these votes at a magnitude the same as the most or the 2nd most votes in percentage the party has ever had in that state

Scenario 4:

• In every election, for each state that the Democratic Party didn't carry, adding the additional youth

votes, resulting from their turnout being the same as the highest or the 2nd highest turnout of the entire population the state has ever seen, into the actual votes of that state, with the Democratic Party gaining a portion of these votes at a magnitude the same as the most or the 2nd most votes in percentage the Democratic Party has ever had in that state

• In every election, for each state that the Republican Party didn't carry, adding the additional youth votes, resulting from their turnout being the same as the highest or the 2nd highest turnout of the entire population the state has ever seen, into the actual votes of that state, with the Republican Party gaining a portion of these votes at a magnitude the same as the most or the 2nd most votes in percentage the Republican Party has ever had in that state

Every such scenario was repeatedly played out for every presidential election since 1980, and then a collective assessment was made on all these modeled election results. The objective was to understand how many of these elections would see the results changed when each of the hypothetical scenarios was applied, which would then support the conclusion about the potential impact the youth could levy on the nation's biggest political event when they participate actively.

C. Data Transformation

The raw data from multiple sources were transformed into datasets that were ready for analysis and extrapolation. The data transformation process is visualized with a flow diagram, Diagram II-C-1, below.

The details of the activities that were included in the transformation process are available in Supplementary Information II.

While this research focused specifically on the modern era presidential elections, i.e. the twelve elections from 1976 to 2020, the models were built with reusability and scalability in mind. A reusable and scalable model in this case allowed:

• Processing data from multiple elections from before 1976, providing an opportunity to compare and contrast the difference of key metrics between modern day elections and those from almost half a century ago

- Plugging in additional data from new elections when they become available, enriching the dataset to produce more reliable results for analysis and opportunity for ongoing study
- Simulating the impact of young voters on past elections with other hypothetical or survey data based youth voting patterns



D. Data Results Analysis

The processed data presented information that not only enabled the research to meet its fundamental objective – determining the effects the young voters could have on the presidential elections – but also demonstrated the level of youth turnout that would be needed to have such effects on the election results.

The following activities were involved in data results analysis, in order to identify useful information and form conclusions:

• Ascertain how data results contribute to the research objective, through comparative study among

scenarios, over-the-time trend review on multiple factors, probability and statistical analysis, etc.

- Decipher and interpret the meaning of the data, to determine if the results supported or refuted the hypothesis that young voters of 18- to 29-year-old can impact the election results in a meaningful way
- Assess the consistency, or lack thereof, of the data results and their meaning across all data points used in this research

Results analysis went through several rounds, as the successive iterations saw improved selection of data, further clarity on the information derived from the data results, and more definitive conclusions.

The outcome of this step brought forward the key findings of the research discussed later.

E. Other Considerations

There were items taken note of throughout the initiation, definition, execution, and conclusion phases of the research. Those items reflect the areas of imperfection that were given specific considerations, concerning data accuracy, exception process, trade-off, etc. Details are available in Supplementary Information III.

F. Key Findings

1. If they participate more actively, youth voters have the potential to make a significant difference in presidential elections.

Diagram II-F-1 below illustrates the difference between the population of 18- to 29-year-old and the popular vote margin in each election. Other than Reagan's landslide win in 1984, most of the popular vote margins are much smaller than the youth population. Similarly, at state level, vote count differences are also considerably smaller than the state's youth population.

Also in the diagram, the trend lines indicate that the margin of victory has been on a downward trajectory since the 1990s, while the population of 18- to 29-year-old has been upticking. This is a clear indication that the possibility of youth voters changing the overall election results is increasing, as long as they participate in the elections actively.



While the popular vote differences between the two parties have been decreasing over the years, the voting age population and the actual presidential votes cast have both been increasing, as illustrated in Diagram II-F-2 below.



The fact that these metrics are moving in opposite directions proves that the elections are becoming more competitive. In the paper, "Reinterpreting the 2016 Election and Presidential Election Competition"^[II-1], using the Presidential Competition Index, the study scored all 48 presidential elections from 1828 to 2016 to define the list of top ten most competitive elections. Three of the elections from the scope of this research, i.e. 1992, 2000 and 2016, made the list, also proving that the races for the White

House are becoming more closely-contested in recent decades.

In increasingly competitive elections, a smaller vote difference decides the election results. With youth being the least active voting group, they have the votes with the most potential to overcome the margin and make a difference to the election results.

However, because of the Electoral College system, the popular vote at the country level does not determine the winner of the election. Knowing that, the research focused on studying youth voting at state level to assess the impact on overall election outcomes. Diagram II-F-3 below illustrates the parties, Democratic or Republican, that won each state in each presidential election from 1976 to 2020.



While there are a handful of states that consistently voted for the same party over the years, most of the states had varied results in different elections. To identify the states that are more likely to have different outcomes, the research used the election data from 1976 to 2020 to define the list of battleground states, or swing states. They are Colorado, Florida, Iowa, Michigan, Minnesota, Nevada, New Hampshire, North Carolina, Ohio, Pennsylvania, Virginia, and Wisconsin.

Battleground states have changed over time. These states made the list of this research for meeting one or more of the following criteria:

- They gave the winning candidates the least amount of vote count margins, based on the results over the years.
- They were carried by each of the two parties in close to half of the last twelve elections.
- They had back-to-back-to-back changes of presidential election winners in the last decade.

The following two diagrams demonstrate why the battleground states are critical in the elections.



Diagram II-F-4 shows that, in each election except 1976, the losing party always lost more battleground states than it won.

Diagram II-F-5 is more telling, showing that the losing party in every election lost significantly more electoral votes among the battleground states than it won.



The following two findings focus on youth voter turnout impact in battleground states.

2. In battleground states, the youth voting population can meaningfully influence the election results with their votes, especially in tight races.

This finding was drawn from the data results of Scenario 1. As shown in both Diagram II-F-6 and II-F-7, the hypothetical additional young voters' participation and their candidate choices notably changed the election results in these battleground states. Based on the modeled results, seven of the eleven elections since 1980 saw that the losing party carried more swing states than they actually did in the elections. Consequently, the losing party won more electoral votes in the model than in the actual elections.





Furthermore, Scenario 1 data also shows that the changed results in battleground states affected the outcomes of the presidential elections: those won with comfortable margins became tight races, and those already tight races saw winners changed. The diagram below illustrates the two elections that were most significantly impacted in Scenario 1:

- the 2000 election, one of the most competitive elections in recent history, and
- the 2016 election, the only election since 1888, other than 2000, that the popular vote winner didn't win the election.



Based on the modeled results, in the 2000 election, Republicans won 25 less electoral votes in these battleground states, and in the 2016 election, 46 less, which were enough to flip the results of both

elections. All it needed for that to happen was the youth voting rate being the same as the highest general voting rate these battleground states have ever had, and the Democratic Party gaining a portion of these youth votes at a magnitude the same as the most votes, percentage-wise, the party has ever had in those battleground states.

3. Motivating youth in battleground states and earning their votes are of essential importance for both winning and losing parties.

Scenario 2 modeled the what-if situation in which the winning party earns more votes from the additional 18- to 29-year-old voters. In this model, the winner gained slightly more electoral votes from battleground states in five of the eleven elections, while keeping the same already large margins in the other six elections. Based on the results from both Scenario 1 and Scenario 2, it is evident that the amount of untapped youth votes in battleground states could either flip enough electoral votes for the trailing candidate, or solidify a convincing win for the leading candidate.

Moreover, when comparing the modeled results of Scenario 1 and 2, it shows that these additional youth votes would provide a bigger boost to the losing party than they would to the winning party in terms of electoral vote gain, as shown in below diagram.



4. In the states that the opposing party is likely to win, improving youth turnout and being favored by the untapped voters will benefit the trailing party in a substantial way.

Diagram II-F-10 below illustrates the winners and the electoral vote differences of both the actual results and Scenario 3 modeled results in each election.



Here are several key observations from the diagram:

- For all eleven elections from 1980, the modeled results showed reductions in electoral vote deficit for the losing party. Some of the reductions were big enough to make the winning party's comfortable victories into very competitive races.
- Two out of the eleven elections, 2000 and 2016, saw different winners, the same as the modeled result from Scenario 1.

• Even Reagan's 1984 decisive victory lost some electoral votes in this scenario. Although Reagan had a big 18% margin of popular vote at the country level, his wins in some states, e.g. Massachusetts, were smaller and were flipped with hypothetical youth votes in the modeled results.

It can be concluded that had more youth voters come out to vote and voted more for the losing party in the states it lost, the losing party would have a better chance of winning these presidential elections.

Built on the outcome of Scenario 3, Scenario 4 continued to model the situation that both the winning and losing parties campaigned for and gained additional youth votes in the states they each lost in the elections. The diagram below illustrates electoral vote split between the two parties for both the actual election results and modeled results of Scenario 4, side by side, in the last eleven elections.



The diagram shows that although there were slight differences in each party's electoral vote count between the actual and the modeled results, none of the election outcome was changed and the level of competitiveness was mostly unchanged as well.

It proves that, had the party that won the election energized additional youth to vote for it in the states it lost, the party would hold onto its overall advantages and victories, even if the opposing party had managed to flip some of the states.

The conclusion drawn from the analysis of Scenario 3 and Scenario 4 is that both the leading and the

trailing party can benefit substantially from winning the untapped youth voters in opposing party's territories.

5. In addition to battleground states, higher youth voter turnout can also affect the election results of the states that are not considered strongholds.

Chart II-F-12 below shows a list of states, based on Scenario 4, that would have a different state winner with the hypothetical additional youth voters in each presidential election from 1980 to 2020.

Election Year	States	Actual State Winner	Modeled State Winner	Battleground	Electoral Votes
	Alabama	Republican	Democratic	No	9
	Arkansas	Republican	Democratic	No	6
	Delaware	Republican	Democratic	No	3
1980	Massachusetts	Republican	Democratic	No	14
	North Carolina	Republican	Democratic	Yes	13
	South Carolina	Republican	Democratic	No	8
	Tennessee	Republican	Democratic	No	10
1984	Massachusetts	Republican	Democratic	No	13
	California	Republican	Democratic	No	47
1099	Illinois	Republican	Democratic	No	24
1900	Maryland	Republican	Democratic	No	10
	Vermont	Republican	Democratic	No	3
	Georgia	Democratic	Republican	No	13
1992	New Hampshire	Democratic	Republican	Yes	4
	North Carolina	Republican	Democratic	Yes	14
	Arizona	Democratic	Republican	No	8
	Colorado	Republican	Democratic	Yes	8
1006	Georgia	Republican	Democratic	No	13
1330	Kentucky	Democratic	Republican	No	8
	Nevada	Democratic	Republican	Yes	4
	Tennessee	Democratic	Republican	No	11
	Florida	Republican	Democratic	Yes	25
	lowa	Democratic	Republican	Yes	7
2000	New Mexico	Democratic	Republican	No	5
	Oregon	Democratic	Republican	No	7
	Wisconsin	Democratic	Republican	Yes	11
	New Hampshire	Democratic	Republican	Yes	4
2004	New Mexico	Republican	Democratic	No	5
	Wisconsin	Democratic	Republican	Yes	10
	Indiana	Democratic	Republican	No	11
2008	Missouri	Republican	Democratic	No	11
	North Carolina	Democratic	Republican	Yes	15
2012	Florida	Democratic	Republican	Yes	29
	Michigan	Republican	Democratic	Yes	16
	Neveda	Democratic	Republican	Yes	6
2016	New Hampshire	Democratic	Republican	Yes	4
	Pennsylvania	Republican	Democratic	Yes	20
	Wisconsin	Republican	Democratic	Yes	10
2020	Arizona	Democratic	Republican	No	11
2020	Georgia	Democratic	Republican	No	16

The following was observed from the chart:

• Among the eleven elections, based on the model, there were 40 instances that the hypothetical additional youth votes changed the state election results, and 23 of them were not in battleground

states.

• For 21 times, the modeled results showed a state flipped to the Democratic Party, and, for 19 times, to the Republican Party.

This is evident that higher young voter turnout can influence the election results in more states than those typically considered as battleground states. Elections in the last four decades have presented almost the same amount of opportunities for both parties to win over a competitive state with the votes from young voters, had they been sufficiently motivated to cast their ballots.

III. CONCLUSION

The historical data and the modeled scenarios prove that youth of 18- to 29-year-old make a truly formidable force, as they have enough votes to make a decisive difference in close races. When they show up in a presidential election with the same voting rate as other age groups, the party that wins their support stands a much better chance to win the White House for the next four years.

As the next step, other youth voting patterns, derived from publicly available survey data of nonvoters' opinion and demographic characteristics, will be plugged into the models developed in this project to assess the effect of additional young voters on past election results. Together with the findings of this research, which was based on scenario-driven, hypothetical youth voting patterns, the combined results will be more conclusively defining youth impact on U.S. presidential elections.

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Supplementary Information

Here is additional information not shown in the main paper: the data, data models, modeling results in Section I, the details of data transformation process in Section II, other considerations on the data and process in Section III, the study for improving youth participation in Section IV, and the study of key factors impacting youth turnout in Section V.

I. THE FULL SET OF DATA, DATA MODELS, AND MODELING RESULTS

Please contact the research and author of this paper for a complete copy of data, data models, and modeling results.

II. DATA TRANSFORMATION ACTIVITIES

The following are the activities that were included in the data transformation process:

- Data cleansing: to ensure the accuracy and completeness of source data being used
- Data joining: to join different data points based on certain criteria and common keys
- Initial calculation: to derive key metrics to be used for what-if scenarios
- Model development: to establish data processing models that represent the what-if scenarios, and to verify and improve the models in multiple iterations
- Model application: to run data through the models
- Validation and iteration: to review the data results for accuracy and completeness, and to iterate as necessary

III. OTHER CONSIDERATIONS ON THE DATA AND PROCESS

Considerations made in the areas concerning data accuracy, exception process, trade-offs, and etc:

- Maine and Nebraska do not award all electoral votes to the state-level winner; rather, some of the votes are awarded based on the congressional district level results. This would make it difficult to analyze as it requires the youth voting scenarios to be applied at the congressional district level. However, other than 2008 for Nebraska, 2016 for Maine, and 2020 for both of the two states, the winners at the state level actually carried all congressional districts in all other elections from 1976, hence producing a de facto winner-take-all situation. Given that, the research decided to merely mirror how electoral votes were actually awarded for its modeled calculation, instead of allocating based on the congressional district level modeled results, as this discrepancy would not impact the findings.
- As discussed above, the research used historical voting participation rate and percent of votes received to perform scenario-based analysis. Due to the fact that there were candidates that carried landslide victories in some of the elections since 1976, the research paid attention to its data use so potential distortion caused by outliers was mitigated.

- As the presidential elections are on the first Tuesday after the first Monday in the month of November, the most accurate way to count the population of 18- to 29-year-old would be using that election day as the birthday cutoff. However, the best available data is the July 1st estimates based on the then most recent decennial census data from the Census Bureau's Population Estimates Program. The variance between July and November was determined to be acceptable to the purpose of this research, as fluctuation of birth rates between July and November is not significant enough to impact the findings.
- The 2016 presidential election is the only one, among the twelve elections in this study, to have faithless voting, so 7 electoral votes were allocated to neither the Republican candidate nor the Democratic candidate. To reflect this, the 7 votes were excluded from the analysis.
- The population of the 18- to 29-year-old age group for most of the presidential election years were directly available in the data files published by the Census Bureau. Except that:
 - For 1976, the Census Bureau only published data by age groups 15-19, 20-24 and 25-29. To obtain the 18-29 population, the research added two fifths of the 15-19 population, representing the 18-19 population, to the 20-24 and 25-29 population. It is believed that the possible fluctuation of population caused by the use of indirect data is not big enough to impact the findings.
 - At the time of the data analysis in late 2020, the Census Bureau had not yet released population estimates by state and by age for 2020. Because of this, the 17-28 population from the 2019 data published by the Census Bureau was used in place of the 18-29 population when modeling and analyzing the 2020 election. It is believed that the possible fluctuation of population caused by the use of indirect data is not big enough to impact the findings.

While each of these items alone had minimum to no impact on the overall findings of the research, the project still took additional steps to verify the collective effect of those items. This was done using synthetically enlarged data variances caused by those items in both directions and rerunning the data models, which yielded no change to the data results until the variances were unreasonably larger than realistically possible, thus proving that the collective effect of the various imperfections had no impact on the findings either.

IV. THE STUDY FOR IMPROVING YOUTH PARTICIPATION

Please contact the research and author of this paper for a copy of the research paper, "A Study for Improving Youth Voter Participation".

V. THE STUDY OF KEY FACTORS IMPACTING YOUTH TURNOUT

Please contact the research and author of this paper for a copy of the research paper, "A Study of Key Factors Influencing Youth Voter Turnout".