



DEPARTMENT OF POLITICAL SCIENCE

## Shift in Opinion or Change of Expression

### Public Reaction on Twitter to Abortion Policy Changes

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Master's Thesis: 30 credits  
Programme: Master's Programme in International Administration  
and Global Governance  
Date: 2020-05-25  
Supervisor: Anders Sundell  
Word Count: 13 684

## Abstract

In 2019, nine US states voted on drastic policy changes to restrict access to abortion. Did the American population react to these policy changes, and if so how? Theory suggests that if the public disagrees with the policy changes, public opinion moves in the opposite direction of the policies. This is referred to as the Thermostat theory. Public opinion is commonly measured with public opinion polls, but these polls are not always available or used. Instead people use other channels of information, for example social media. On social media platforms people are not asked on their opinion but provide it voluntarily. This means that people can mobilise and express themselves differently. The study uses Twitter to answer three research questions. The first is whether the American public reacted to the policy changes. The second is if sentiment on Twitter changed. The third is if a sentiment change was a shift in public opinion or a change of expression. The analysis find that people reacted to the policy changes and that sentiment on Twitter increased for a short period. The results indicate that the sentiment change was a result of new people joining the debate who has a more liberal view on abortion. The results show that the Thermostat theory is not at play but instead there is a mobilisation of opinions. If this change of expression is mistaken for a shift in public opinion, politicians risk working for further policy changes of which the public disapproves.

# Table of Contents

- 1 Introduction** **1**
  
- 2 Theory** **3**
  - 2.1 Shift in public opinion . . . . . 4
    - 2.1.1 The Thermostat Theory . . . . . 5
  - 2.2 Change of expression . . . . . 6
    - 2.2.1 Mobilisation . . . . . 7
  - 2.3 Abortion policies in the USA . . . . . 8
  - 2.4 Theoretical expectation . . . . . 12
  
- 3 Data** **14**
  - 3.1 Twitter data . . . . . 14
  - 3.2 Data collection . . . . . 16
  - 3.3 Sentiment . . . . . 16
    - 3.3.1 Positive . . . . . 17
    - 3.3.2 Negative . . . . . 18
    - 3.3.3 Neutral . . . . . 19
  
- 4 Variables** **20**
  
- 5 Results** **23**
  - 5.1 Question 1: Reaction to the abortion policy changes? . . . . . 23
  - 5.2 Question 2: Sentiment change as a result of the policy changes? . . . . . 25
  - 5.3 Question 3: Shift in opinion or change of expression? . . . . . 30
    - 5.3.1 User activity . . . . . 30
    - 5.3.2 Individual fixed effects model . . . . . 32
  - 5.4 Who writes on Twitter . . . . . 34
    - 5.4.1 State by state . . . . . 35
    - 5.4.2 Democrats vs. Republicans . . . . . 39
  
- 6 Conclusion** **42**
  
- 7 References** **46**
  
- A Appendix** **49**

# 1 Introduction

On the 15<sup>th</sup> of May in 2019, the state of Alabama voted on a policy change which would make abortion practically illegal. Not even in the case of rape or incest would abortion be permitted, making the policy stricter than they were in Ceaușescu Romania in the 1980's. Although Alabama can be considered an extreme case, it was not the only state that voted on policy changes to restrict access to abortion that year. Several other US states also decided to restrict abortion during the spring and summer of 2019. This trend does not only go against the increasingly liberal attitude towards abortion around the world, but it also goes against *Roe v. Wade*. *Roe v. Wade* is a legal case after which it was decided that US states are not allowed to deny a woman abortion before viability. These abortion policy changes are extraordinary and if implemented they will change the life of many. With such drastic changes in society, citizens are likely to react. The starting point for this study is therefore to ask whether the American public reacted to these drastic policy changes or not.

Whenever a society is faced with a significant change in policy, the public is expected to react. In fact, a democratic country is quite dependant on the reaction of its people because it tells policy makers how to best represent the public. Hence, public reaction to policy is important for a democracy, but people do not react to every policy that is voted on. Theory suggests that people only react when they disagree with the policy change. If the policy change is not to their liking they express this. In situations when people are specifically asked what they think about a certain policy, it is easy to determine the true public opinion. There are however many times when people express their opinion without being asked, for example on social media. Such channels of information are often used by both citizens and policy makers to gain an understanding of what people think. Are these sources of information, where people can express themselves at will, representative to the general public opinion?

When using social media to investigate public reaction to policy change, theory states that one additional aspect which must be taken into consideration. When people can express themselves at will they have the capability to mobilise. A mobilisation of people

can potentially change the opinion on whatever platforms that is being used. This change is then only a result of more people of the same opinion joining the debate. The change can then appear as a shift in public opinion, but do not necessarily represent the average public opinion in society.

Hence, this study will investigate public reaction to abortion policy changes using a forum where people are allowed to express themselves at will. The forum that will be used is the micro-blogging site Twitter. Public reaction theory states that public opinion changes if the people disagree with the policy changes. Theory also states that when people can share their opinion freely there is the possibility of a mobilisation. A mobilisation can make it appear as if public opinion has shifted, when it is in fact a change of how people express themselves.

As of today, no study exists which investigates public reaction to policy using a forum where people can express themselves voluntarily, that additionally considers the mobilisation effect. Previous research has failed to lift public reaction research from a stylised scenario and instead apply it to a real world situation.

What the study finds is that US citizens did react to the abortion policy changes on Twitter and that public opinion became more positive to liberal abortion views around the same time. This positive public opinion however, was found to be the result of an inflow of new people who all had a more liberal opinion on abortion. Therefore it can be concluded that there is no shift in opinion but rather a change of expression. Although the study can not fully explain who the people that mobilised were, the results present important insight into how public opinion appears in information channels where people share their opinion voluntarily. An individual who observes the debate of abortion on Twitter at the time of the policy changes are at risk of believing that the public have had a true change of heart when it is in fact a change in who expresses themselves. If a policy maker were to act according to how people express themselves on Twitter at the peak of a discussion, the chance is that they will not act in agreement with the true public opinion. If the public perceive that policy makers do not listen to the people, this is likely to cause frustration and undermine the representative democratic system.

To present how the study came to this conclusion, the remainder of the text is divided into five larger parts. The first part explains the theory on how public opinion can be expected to shift as a result of policy changes but, also examines the additional risk of observing a mobilisation and change of expression. The theory section also discusses the case of abortion policy changes in the USA during 2019 and finally present three research questions. The second part discusses the data that is used. It explains advantages and disadvantages with Twitter data, as well as how the data was collected and processed. The third part deals with the independent variable, the abortion policy changes in the USA. The fourth section discusses the results in where the three research questions are answered with the help of the data and the variables discussed. It additionally tries to answer who it is that writes on Twitter. The final section concludes what impact the results can have on society as well as presents suggestions for future research.

## 2 Theory

This first section will present the theory relevant to investigate public reaction on Twitter to the abortion policy changes. There are two main aspects to consider. The first aspect is what people actually think regarding an issue, in other words their true opinion. The answer to this is found in randomised public opinion polls where people are asked to share their opinion on different matters. This however is not the only time when people share their opinions. Citizens also have the possibility to express themselves on all matters at times when they are not directly asked to. This can for example be during discussions on TV, in articles in the newspaper or on social media platforms. During a time of a policy change, new people can decide to express their opinion. This change of who expresses themselves can appear as if public opinion has shifted. The first part of this theory section will consider these two scenarios and the mechanisms behind what causes a shift in opinion versus what creates a change of expression.

## 2.1 Shift in public opinion

This section will consider the mechanisms behind a true shift in public opinion as a result of a policy change. When a policy is changed in society, citizens can react and this reaction is measured with a change in public opinion (Diamanti, 2011). Public reaction to policy changes is essential for a representative democracy. By reacting to policy, citizens can hold their elected politicians responsible for their politics in between elections (Soroka and Wlezien, 2010; Page and Shapiro, 1983). When a politician decides on a policy change, they might not always know beforehand whether this policy is desired or not by the people. Hence, the reaction of citizens to this policy will indicate to politicians whether or not they should work towards more policies of a similar nature. Their decision can at a later stage impact their chances of being reelected (Bendz, 2015).

In order for people to react they must be reasonably well-informed about the policy changes and what they entail (Wlezien, 1995; Baumgartner and Jones, 2002). If they are not aware of the policy changes, they cannot react to them (Williams and Schoonvelde, 2018; Cochran and Chamlin, 2005). Even if information is available, the public might still not respond. According to theory, people are assumed to act reasonably and award politicians for making good decisions and punish them otherwise. It might be unreasonable to expect such a response from the public. Studies indicating that people are in fact quite uninterested in politics and policies (Achen and Bartels, 2017). Additionally, voters have been found to blame the government for things over which it has no control, for example the weather (Achen and Bartels, 2016, 2017). Hence, theory assumes that people are reasonable but in reality they potentially lack both interest and commitment to make informed choices.

If it is assumed that people react to policy changes in a reasonable fashion, what is then to be expected regarding a public opinion shift after a policy change? Although there are many potential explanations for the mechanisms behind the process, the predominant theory is the Thermostat theory.

### 2.1.1 The Thermostat Theory

The Thermostat theory regards the public as a collective of individuals whose policy preferences are distributed along a dimension. The public's collective opinion is then the median of this dimension. The median represents the "ideal" situation on a specific issue and policies should correspond to this ideal (Wlezien, 1995). If policies which differ from the ideal public opinion are introduced, then the public will react.

Much like a thermostat self-corrects to maintain a certain temperature, society self-corrects when the public reacts to policy changes. If a policy is introduced that suggests more changes than what the median citizen wants, the public will send a signal to policy makers stating its disapproval. Politicians who notice disapproval in society will stop enforcing new policies in the same way that a thermostat shuts off when the temperature in the room is above the preferred settings. The signal that the citizens send to the policy makers is a change in public opinion.

Take for example military spending. If the current military spending is less than the ideal spending according to the public, people will ask for more military spending. If a policy is introduced which then allowed for more military spending, the demand for more military spending will reduce. Hence, fewer people will ask for more spending. If the policy would allow for more military spending than what the public deems as ideal, the reaction would change and more people would instead argue for less military spending (Wlezien, 1995). The process then resembles that of a thermostat. A signal in policy change creates a reaction in the public opinion. When this opinion has been heard by policy makers, the signal stops (Wlezien, 1995).

The Thermostat theory explains the importance of public reaction in relation to policy change.(Bendz, 2015; Soroka and Wlezien, 2005, 2010; Wlezien, 2004, 1995). The mechanisms behind the theory suggest that public opinion functions as a self-correcting process of which public opinion serves as a counter balance to potential changes. By this, the public can maintain some level of control over politicians and policymakers. The counter balance allows for stability which is essential in a society. (Baumgartner and Jones, 2002).



The procedure additionally hinders changes to occur too quickly (Baumgartner and Jones, 2002). Considering how the public always strive for the median or ideal opinion, it is difficult for policymakers to introduce policies which would offer a substantial change to society.

## 2.2 Change of expression

This second section will discuss the mechanisms behind a change in how people express their opinion. What is important to note is that if people have a genuine change of mind and public opinion changes, then people will additionally change the way they express themselves. What this section considers is the case when people express themselves differently, even if there is no true change of opinion.

Situations when this is likely to occur is when people who have not previously taken part in the discussion become active or when people start expressing their opinion more forcefully. Why would people all of the sudden become more active in a debate? Certain events can create an increased interest regarding the specific topic being discussed. When interest in a topic increases, the dimension of the issue can change. Any type of issue always has several dimensions. However, it is quite common in the public debate that one specific dimension dominates at a given time (Baumgartner and Jones, 2002). Take the example of nuclear power (Baumgartner and Jones, 2002). When it was first introduced the public image was overwhelmingly positive. However, as time passed the world observed what consequences a nuclear power plant accident can have on both people and the environment. These events changed the debate completely which became almost exclusively negative. The multiple dimensions to the issue always existed but were never discussed simultaneously in a balanced manner. Instead, only one dimension was presented at a time.

The reason why the interest for a topic is expected to increase is usually the result of an extraordinary event. An extraordinary event can be the extreme case of a nuclear power plant accident, but it can also be a drastic policy change. When such an extraordinary event takes place, new actors who's opinions correspond with the rising dimension will

become involved in the public debate. As these new actors gain more influence over the topic, it inspires even more actors to get involved. The more actors who get involved, the stronger the new dimension will take hold (Baumgartner and Jones, 2002). This inflow of people that joins the debate due to the reaction of the extraordinary event, can be termed as the mobilisation effect.

### **2.2.1 Mobilisation**

A social mobilisation is a situation where people put their own individual benefits aside to profit the collective group (Rogers, Goldstein and Fox, 2018). Social movements can take on many forms, but they are all defined by four crucial aspects. The first aspect is a collective challenge. A collective challenge is a contentious issue where a group of people disagrees with the view held by another group in society. The collective challenge is usually the core element of a mobilisation used to recruit new members. It can also be one of the few things the movement can use to their advantage. When lacking in other resources, the possibility to interrupt and question the actions of the opposing group creates a disturbance which gives the mobilisation some influence over the situation (Tarrow, 2011).

The second aspect that is required is that people have a common purpose to mobilise. Hence, disagreement with another group in society is not enough to create a social movement. There must also be some overlapping interests. If for example a group in society opposes governmental influence of banks they have a collective challenge. If however one part of the group thinks the solution is that banks should be privatised, whereas the other part of the group wants to introduce crypto currencies, they do not have a common purpose and it will be difficult to mobilise people. Hence, there needs to be a common goal of how to face the collective challenge. The clearer the goal, the easier it is for people to find a common purpose. Therefore, people are more likely to mobilise around issues which are heavily polarised. A polarised issue is more likely to form two sides and create a sense of "we" and "them" (Tarrow, 2011).

This leads to the third aspect, which is solidarity. If the sense of "we" is strong, it is easier to find solidarity within the group. Solidarity between people is not necessarily constant. People can feel a temporary solidarity with others and when the challenge the group is facing has passed the solidarity can vanish. The fourth and final aspect required for a mobilisation is a continuous interaction with the opposing group, hence the action of the mobilisation (Tarrow, 2011). If there is no interaction the mobilisation is unlikely to see any results and reach their goal. The interaction can be in the form of debates, protests or verbal and written communication.

### **2.3 Abortion policies in the USA**

The policy change this study will investigate is the heavily restrict right to abortion in the USA. In 2019, a total of nine American states passed bills to restrict the right to abortion. Five of the nine states have passed bills which are referred to as "fetal heartbeat bans" or "the-six-week-abortion-ban" (Glenza, 2019). The five states in question are Georgia, Kentucky, Louisiana, Mississippi and Ohio (Lai, 2019). Utah and Arkansas limited the abortion until week 18 of pregnancy and Missouri until the 8<sup>th</sup> week. The harshest bill was passed in Alabama which introduced a complete ban on abortion in almost all circumstances, including rape and incest. The only time abortion is permissible is when the mother's life is in great danger and nothing else can be done to save her, or if the fetus is carrying a deadly affliction.

These policy changes serve as a good case for this study. First of all, they are current and therefore the results of this study are relevant in order to predict future policy efforts in the US. Second of all, the policy changes are considered drastic and extraordinary. The more drastic and extraordinary the policy changes are, the more likely it is that the public will be informed about the changes and react to them.

The reason why the policy changes are considered drastic and extraordinary is because they all go against the so called Roe v. Wade. Roe v. Wade is a landmark case when it comes to abortion in the USA. In 1973 a woman in Texas (who used the pseudonym

Jane Roe) wanted an abortion, but was not permitted one because at the time abortion in Texas was only legal if the mother's health was in danger. The lawyers of this woman filed a case and it was eventually taken to the Supreme Court. The Supreme Court decided that it was unconstitutional for states to restrict access to abortion before the third trimester of pregnancy. They referred to the Fourth Amendment and the "Right to Privacy", which they claimed protected women's right to choose to have an abortion during the early weeks of pregnancy.

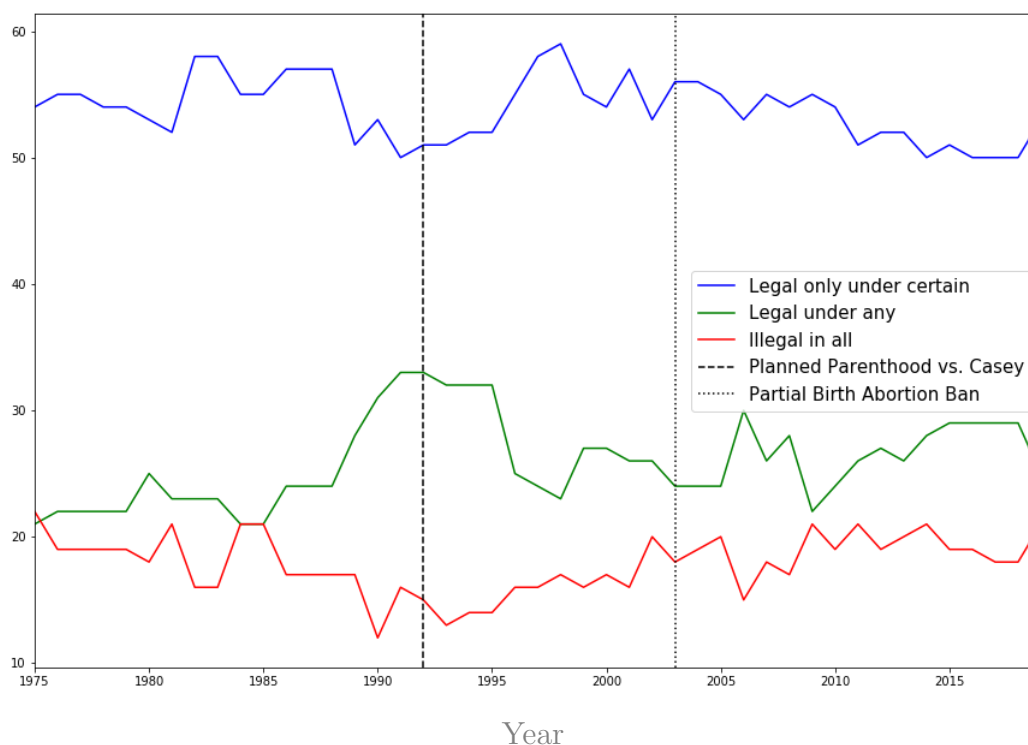
This means that all the policy changes made in the nine different states go against the rulings of *Roe v. Wade*. These nine states were fully aware that the stricter abortion policies would most likely be challenged in court. Still they decided to vote in favor of them. One of the main goals with these policies was not only to bring about actual change regarding abortion, but also to provoke a national debate and ultimately revoke *Roe v. Wade* (Chute, 2019; Lai, 2019; Kendall, 2019).

The debate on abortion in the US has commonly been divided into two distinct camps. The first is the pro-choice side which advocates for legal abortion. The other is the pro-life side which argues for the fact that a fetus is a human being and hence abortion is equivalent to murder (Marquis, 1989). Despite these two very distinct camps, public opinion on abortion is not as polarized as might be expected and has remained relatively stable over the years. The majority of the US citizens is of the opinion that abortion should be legal only under certain circumstances. The other two groups who think it should always be either legal or illegal are around 20% (Caspani, 2019; Pew Research Center, 2019; Gallup, 2019a). There are three historical cases which would be deemed similar to the current situation and are relevant to take a closer look at.

The first is the ruling of *Roe v. Wade* in 1973. Unfortunately, public opinion polls only started to ask questions on abortion in 1975. Therefore, there is no easily accessible data to investigate how the public responded to this case. The other two situations however took place after 1975. These two are the *Planned Parenthood v. Casey* case from 1992 and the Partial Birth Abortion Ban Act from 2003, both represented in graph 1. In the *Planned Parenthood v. Casey*, the strict trimester rule was abandoned and instead states

were not allowed to ban abortions before viability of the fetus. The Partial Birth Abortion Ban Act does not deal with restriction or right to abortion in total, but rather about a specific abortion method. It was however, the first ban to be enforced after *Roe v. Wade*.

**Graph 1: Public opinion on abortion in the USA (Gallup, 2019a)**



Looking at the time around *Planned Parenthood v. Casey* case in graph 1 it becomes clear that the number of people who thought abortion should be legal under any circumstances increased the months before the case. Proportionately, the number of people who thought abortion should be illegal at all times decreased and reached its lowest a few months before the case was brought up in the Supreme Court. As the amount of people who thought abortions should always be illegal reached an all time low, the number of people who thought abortion should always be legal reached an all time high. Public opinion remained at this level for almost a year after the case had closed. Although the opinion did not change indefinitely, the case does appear to have had an impact on public opinion on abortion that stretches over a significant time period.

Considering the number of people who were of the opinion that abortion should be illegal at all times, a drastic drop can be observed a few months before the case was brought up in the Supreme Court. However, after this initial drop the number of people who thinks abortion should be illegal starts to increase again. This increase reaches its top just before the case is discussed in the Supreme Court and thereafter starts to slowly decrease again. This sudden increase followed by a slower decrease can potentially be the result of mobilisation. People who are of the opinion that abortion should be illegal mobilise before the case has been decided on. As the outcome of the case became clear, this mobilisation stops and the number of people who thinks abortion should be illegal decreases again.

During the time of the Partial Birth Abortion Ban, no change in public opinion can be observed. This indicates that the public might not react at all to policy changes, even if they are made on a national level. These two cases do not offer any consistent view as what public reaction to expect in light of the current policy changes. Rather they show that policy changes can cause public opinion to shift, people to mobilise and that people might not react at all.

The historical cases and the Partial Birth Abortion ban share similar features with the current policy changes. All of them gained national attention and the previous cases resulted in a policy change on a national level, which is what the current policy changes are striving for. Therefore, the outcome for these previous situations are interesting in order to analyze what can be expected for the current situation. However, there are some significant differences as well. Both *Roe v. Wade* and *Planned Parenthood v. Casey* can be directly referred to one specific legal case were the Supreme Court issued their ruling. The Partial Birth Abortion Ban Act was a governmental decision, but this ban was also the result of legal cases, for example *Stenberg v. Carhart* or *Gonzales v. Carhart*. The current situation is not a legal case which eventually can turn into a national policy or law. Instead, several state policies are pushing for national change. There is reason to believe that citizens will react differently to drastic state policies compared to court cases. Policies at state level are much closer to the citizens and therefore they are more likely to react to the changes.

## 2.4 Theoretical expectation

This section will combine the presented theory of public opinion change and mobilisation with the case of abortion policy changes in the USA. To investigate public reaction, the study will use data from the social media site Twitter. This is a platform where users can choose to express their opinion. Using Twitter enables this study to investigate whether any change in public opinion is in fact a true public opinion shift or a change in public expression. In order to investigate public reaction on Twitter, three research questions will be considered.

The first is whether or not people reacted to the policy changes that took place. This question is essential to the study. It cannot be assumed that the public did react despite the fact that there was information available. The policy changes gained both national and international media coverage (Associated Press in Montgomery, 2019; Gagliardo-Silver, 2019; BBC News, 2019; Svenska Dagbladet, 2019; Le Monde, 2019; Chute, 2019; Lai, 2019; Kendall, 2019). Despite information being available, theory states that people might be unresponsive and uninterested (Achen and Bartels, 2017).

*Question 1: Did the citizens of the US react to the abortion policy changes on Twitter?*

Only if the answer to the first question is that people did in fact react to the policy changes, does the second question become relevant. Even if a reaction is observed, it does not necessarily mean that the sentiment regarding abortion changes. However, the second question needs to be asked and answered before posing the final question.

*Question 2: Did the average sentiment on Twitter among the US population change as a result of the policy changes?*

If the average sentiment has changed as a result of the policy changes the third and final question can be posed. Is the sentiment change a result of a shift in public opinion or a change of expression? For a true change in public opinion, the relevant theory to use is the Thermostat theory. As mentioned, the Thermostat theory states that the public

wants policies to correspond to the median opinion of the people. When new policies are presented the public will react accordingly. Applying this to the case of abortion policies in the USA, there has been no visible change in public opinion before these policies were enforced. This would then indicate that the policies are more drastic than what the median public opinion ideal is. This in turn means that the expected response from the public is that more people express their support for more liberal abortion policies. Hence, reviewing public opinion after the policies have been enforced compared to before would show a more positive view on liberal abortion. In other words, the opinion is expected to go in the opposite direction of the policies.

However, a sentiment change does not necessarily need to be a result of a shift in public opinion. It could also be the result of a mobilisation. Considering the four aspects required for a mobilisation to occur, the situation of abortion policies in the USA fulfills all of these aspects. The abortion policies themselves pose a collective challenge and the strive to stop them serve as a common purpose. People are additionally likely to find a common purpose due to the heavily polarised debate regarding abortion in the USA with the pro-life vs. pro-choice. The third aspect of solidarity is present among the pro-choice supporters. This is because pregnancy unites women since many can relate to a situation of an unwanted pregnancy and imagine the consequences of it. Lastly, interaction between the opposing groups of pro-life versus pro-choice has been present for some time. The interaction has taken place in debates and on online forums. If the suggested policies serve as a collective challenge that mobilise people the opinion is expected to go in the opposite direction of the policies. Unlike the Thermostat theory however, when the policies have been voted on the collective challenge disappears which would put an end to the mobilisation. The opinion would then be expected to return to the level it had before the mobilisation started.

*Question 3: Is an observed sentiment change on Twitter a result of a shift in opinion or change of expression?*



## 3 Data

This study will investigate public reaction to policy changes using a medium where people can express their opinion as they see fit. The traditional data used when investigating public reaction to policy is public opinion polls. Because public opinion polls ask a random sample from the population about their opinion, such a poll is capable of capturing a true shift in public opinion. If public opinion polls were the only outlet where people expressed their opinion, the true opinion of the public would always be known, disregarding any flaws in survey methodology. However, people do not only share their opinion when asked to. They can voluntarily express their opinions on a daily basis. Who expresses themselves and when is not random since people have different types of incentives to speak for or against certain topics at different times. Hence, the main difference then between scientific polls and social media is that in public opinion polls people are asked on their opinion. On social media platforms no one is asked to share their opinion but people do anyways.

Public opinion polls are scientific polls and most commonly used by researchers or policy makers. Normal citizens do not always have easy access to these polls and they can additionally be complicated to understand. Instead, people use everyday channels of information to gain understanding of public's reaction to policy. Such a channel is for example social media platforms. Even scientists, politicians and policy makers have increasingly started to use social media to investigate public opinion. Because of this, the current study will use a more realistic output to answer the question of whether the American public reacted to the abortion policy changes. If they did react, the study will also consider whether or not the reaction was a true public opinion shift or a change of expression.

### 3.1 Twitter data

In order to investigate the most realistic output of public reaction to policy this study will use data from Twitter. On Twitter, users can share their opinion as they see fit. Therefore it serves as a good option because if a reaction to the abortion policy changes is observed, it is possible to determine whether the reaction is an opinion change or a

mobilisation.

Studies have shown that although Twitter data is not a representative sample of the population, sentiments displayed on Twitter correlates with behaviour and actions of people and provide similar results as a traditional public opinion poll (Cody et al., 2016; Akcora et al., 2010; O'Connor et al., 2010). Therefore, Twitter can be used to measure a shift in public opinion (O'Connor et al., 2010; Barberá, 2016). These findings are a big advantage for public opinion research since Twitter data enables the possibility to collect information on a day to day basis. This is unlike public opinion polls which usually takes weeks or even months to collect and lacks the possibility of observing the daily development. At best, large scale public opinion polls can provide data on a monthly basis but more often on a yearly (McCormick et al., 2017).

The possibility to observe public opinion change on a daily basis additionally enables the possibility to investigate a mobilisation of opinion. This in combination with the fact that people who use Twitter do so voluntarily and can write multiple tweets a day. Hence, it is not a random selection of people from the population.

Although this study benefits from the fact that Twitter does not display a random selection of people, it is important to acknowledge that the selection bias can be a disadvantage. Some people are more likely to be active on Twitter compared to others. Over 60% of all users on Twitter are men and 80% are so called affluent millennials, which are people born between 1981 and 1997 and have at least \$100 000 in assets excluding real estate. Additionally, the demographic data available for each user is extremely limited. This prevents additional analysis between groups and the ability to control for known sample bias which exist on Twitter (Cody et al., 2016). Consequently, Twitter users does not make up a representative sample of the US population since for example the older generation, people with a low income and certain nationalities are underrepresented.

## 3.2 Data collection

The only demographic data that can be collected on the users on Twitter is the geographical location from where the tweet was sent. With this information it is possible to collect data from specific locations. The data set used in this study is a collected sample of data from each state in the US resulting in a data set with over 32 000 observations. The reason as to why each state has been sampled instead of collecting it on a national level is so that comparisons can be made between the states. The fact that tweets can be collected by state provides an opportunity for additional analysis to be conducted.

## 3.3 Sentiment

To measure public opinion on Twitter, tweets are categorised according to sentiment. This can be done with the help of sentiment analysis. A sentiment analysis categorises tweets and indicate if they are either positive, negative or neutral in their sentiment based on the words contained within each tweet.

In order to predict the sentiment of each tweet, a random sample of 1 000 tweets were categorized by hand. They were given a sentiment value of either 1 (indicating a more liberal view on abortion), 0 (a neutral view) or -1 (indicating a more conservative view on abortion). This sample was used to train a model which in turn predicted the sentiment of the remaining tweets. The method used to train the model is called Term Frequency-Inverse Document Frequency (TF-IDF). The core idea of this method is that each word is given a weight. This weight is calculated by looking at the number of times that specific word appears in a tweet, relative to the number of tweets the word appears in total in the data set. Words that appear in many tweets are given a weight closer to zero. This method allows the model to calculate how important a word is in each tweet and thereby be able to identify important words. The more unique and important words the model can identify, the easier it is for the model to make a reasonable prediction of the sentiment behind the tweet. Before the method was applied to the data, all so called stopwords were removed. Stopwords are for example "in", "are" or "is". These words do not contain any information but occur frequently. By removing the stopwords it is easier for the model

to distinguish which words that are important. The trained model acquired an accuracy score of 0.92, meaning that it correctly classified 92% of all the tweets.

### 3.3.1 Positive

To get a clearer view of what type of tweets are classified into each category, some examples will be presented. All the examples are tweets which have been categorised by the model and thereby provides some insight to what types of tweets the model has placed in the separate categories. As previously mentioned, a sentiment score of 1 indicates a more liberal view towards abortion. Looking at the different tweets classified as more liberal towards abortion, the message in the tweets varies.

A number of tweets reference the fact that decreasing access to abortion will most likely not lead to a decrease in actual abortion rates. These people might want to decrease the number of abortions occurring, but they clearly state that they do not approve of the way proposed to getting there and therefore oppose the current policy changes.

Other users disagree with the statement that a fetus should be treated as a child with rights. What is more important for them is to keep abortion legal and accessible because many who seek abortion do not have the financial means to care for a child. The case of *Roe v. Wade* references the right to privacy for all people and this is also frequently brought up as an argument against banning abortion. This might also be people who in principal do not approve of abortions but consider the right to have a choice more important. Other tweets classified as being more liberal towards abortion claimed that the debate was about more than just abortion and rather about men's control over women.

### Positive tweet examples

*This is not the way to decrease the number of abortion, which has actually been very low. Proper sexual education, access to contraception, and proper sexual and reproductive health care is but women should still be able to have an abortion if needed. For any reason.*

Alabama  
10<sup>th</sup> of May

*Yup, people of privilege never consider how abortion bans will disproportionately affect those of lower socioeconomic status and women of color. Typical self centered BS.*

Washington  
17<sup>th</sup> of October

*Glad you mentioned abortion. I also consider freedom a major value. How free is a woman if she cannot even choose what legal medical care to obtain? And all because someone else's religious/moral beliefs are being forced on her.*

Washington  
17<sup>th</sup> of May

*Nothing pisses me off more than seeing MEN stand outside planned parenthood with signs about abortion telling WOMEN what we should do with our bodied. Lol go get a vasectomy then come talk to me.*

Kansas  
11<sup>th</sup> of April

### 3.3.2 Negative

The tweets categorised as -1 were those that indicated a more conservative view on abortion. Unlike the tweets classified as 1, there is one clear opinion that dominates among the conservative tweets. This is that a fetus is a human being and therefore abortion is essentially murder. Amongst the conservative tweets there are many religious references as well as political. The political references does appear amongst the more liberal tweets as well, but not as often.

### Negative tweet examples

<i>Subjects like this can't be discussed at length because of twitter restrictions. It is inaccurate to state that pro-life individuals are against Medicaid, food stamps and free lunches. I am not a hater of the impoverished. As a pro-lifer, I'm against murder. Abortion is murder.</i>	Alabama 19 <sup>th</sup> of May
<i>Abortion is not a right plain and simple, it's the murder of babies. If you don't want a baby then keep youf legs closed.</i>	New Mexico 22 <sup>th</sup> of May
<i>God will condemn America for our liberal stand on abortion.. every child has the right to life</i>	California 18 <sup>th</sup> of June
<i>Democrats want to abort the kids. Abortion is murder .</i>	Arkansas 31 <sup>st</sup> of October

### 3.3.3 Neutral

A large portion of the tweets are classified as 0, meaning they are neither liberal or conservative in their view of abortion. Some of them are people who take part of the debate but are neutral in their opinion. This can for example be in the form of questions. Others simply state that, although they acknowledge that a debate is ongoing they do not wish to participate. Some users on Twitter are dedicated to simply report news and are thereby a neutral party.

Some tweets include links, pictures or other forms of media. The analysis however cannot take into consideration these other types of media, but simply the text. Even if the tweet in its entirety might indicate a clear statement in the abortion debate, if the text is not clear it might be categorized as neutral. The same applies to tweets which are answers to other users tweets. There is also a number of tweets which contain the word abortion, but are irrelevant to the abortion debate.

### Neutral tweet examples

<i>Tell me again, what is your stance on abortion?</i>	Pennsylvania 24 <sup>th</sup> of July
<i>Imma sit out on the abortion talk</i>	North Carolina 18 <sup>th</sup> of December
<i>HF1108 [NEW] Physicians required to allow viewing of ultrasound imaging prior to abortion. <a href="http://bitly.com/XY8J3y">http://bitly.com/XY8J3y</a>.</i>	Minnesota 22 <sup>th</sup> of February
<i>John Legend is an abortion !</i>	New Mexico 30 <sup>th</sup> of October

Since the accuracy score of the model is at 92%, a number of tweets are wrongly classified. Reviewing the data set, it does not appear that the error is structural and hence it will not affect the analysis. What is apparent is that a number of tweets which should be classified as either 1 or -1, have instead been classified as 0. This means that the results from the analysis might be underestimated.

## 4 Variables

This section will discuss the two main variables used in the analysis. Since the study investigates public reaction to policy changes, the abortion policies are expected to have an impact on public reaction. This means that the dependent variable is public reaction and the independent variable is the policies on restriction of abortion.

Starting with the dependent variable which is public reaction. Public reaction is observed with public opinion and in the current analysis public opinion is measured through sentiment on Twitter. The analysis will consider if and how the sentiment has changed after the time when the policies were voted on, compared to before. The change, or lack of change, will indicate how the public has responded to the policy changes.

The independent variable is the abortion policy changes. The policy changes made in the USA during 2019 are presented in table 1, which shows that nine states in total all made policy changes regarding abortion. It should be noted that other states also made changes to policies on abortion apart from the nine mentioned. The nine states have been selected based on two criteria. The first is that they all propose a ban of abortion after a certain week of pregnancy and this week is before viability. Therefore the states oppose *Roe v. Wade* which forbids states from banning access to abortion before viability. An example of a state which also changed its legislation on abortion but was not included in this study is North Dakota, where doctors were banned from performing abortions in the second-trimester using some specific instruments (Al Jazeera, 2019). The policy change in North Dakota is clearly in line with the other nine policy changes, it is however not as clearly against *Roe v. Wade*. The other criteria on which the policies have been selected is that they have all been voted on within a close proximity with each other. Other states have discussed or suggested similar measures, but they have not been voted on.

Graph 2 additionally show up to which week it is permitted to get an abortion without any special permission. Note that the week presented are the weeks which the states are striving for but not necessarily enforced as of yet. Many states which proposed a restriction of abortion are still to pass these changes legally. Most states permit abortion before viability and therefore do not have a specific week. However, viability commonly occurs around the 24<sup>th</sup> week of pregnancy. The map in graph 2 illustrates that there are very few states apart from the nine presented in table 1 which oppose *Roe v. Wade*. Hence, a majority of the states which have suggested changed abortion policies did so during the short time period of 2019. Graph 2 also clearly shows that Alabama proposes a unique policy on abortion being the only state in the USA which wishes to prohibit it altogether.

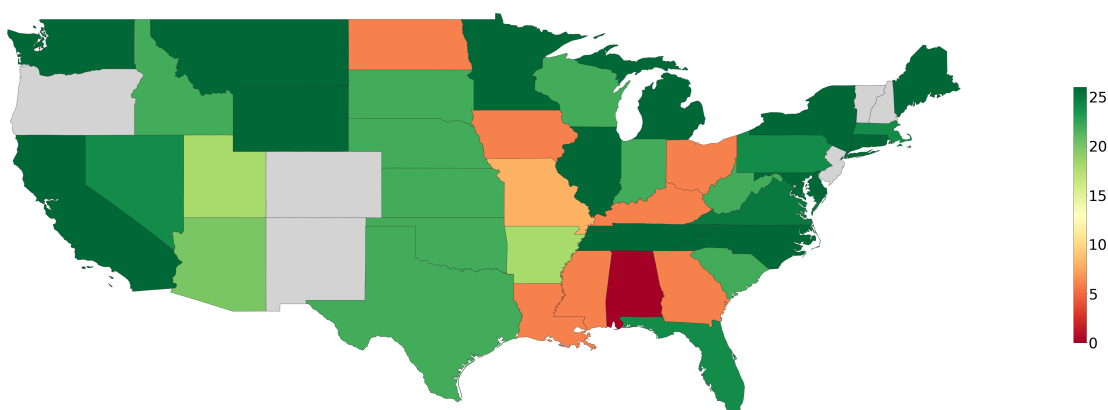
The variable in the analysis which represent these policies is referred to as *After policy change*. The variable is a dummy variable coded with either 0 or 1, where 0 indicates the time before the policy changes and 1 the time after the policy changes.



**Table 1: States which have passed restrictive laws on abortion in 2019**

State	Date	Previous last week of abortion	New last week of abortion
Arkansas	March 15	22	18
Kentucky	March 15	22	6
Mississippi	March 21	20	6
Utah	March 25	~ 24	18
Ohio	April 11	22	6
Georgia	May 7	22	6
Alabama	May 15	22	0
Missouri	May 24	~ 24	8
Louisiana	May 30	22	6

**Graph 2: Last week of permissible abortion without special circumstances  
(as proposed by the states)**  
grey = no time restriction



Alaska: no time restriction Hawaii: 26

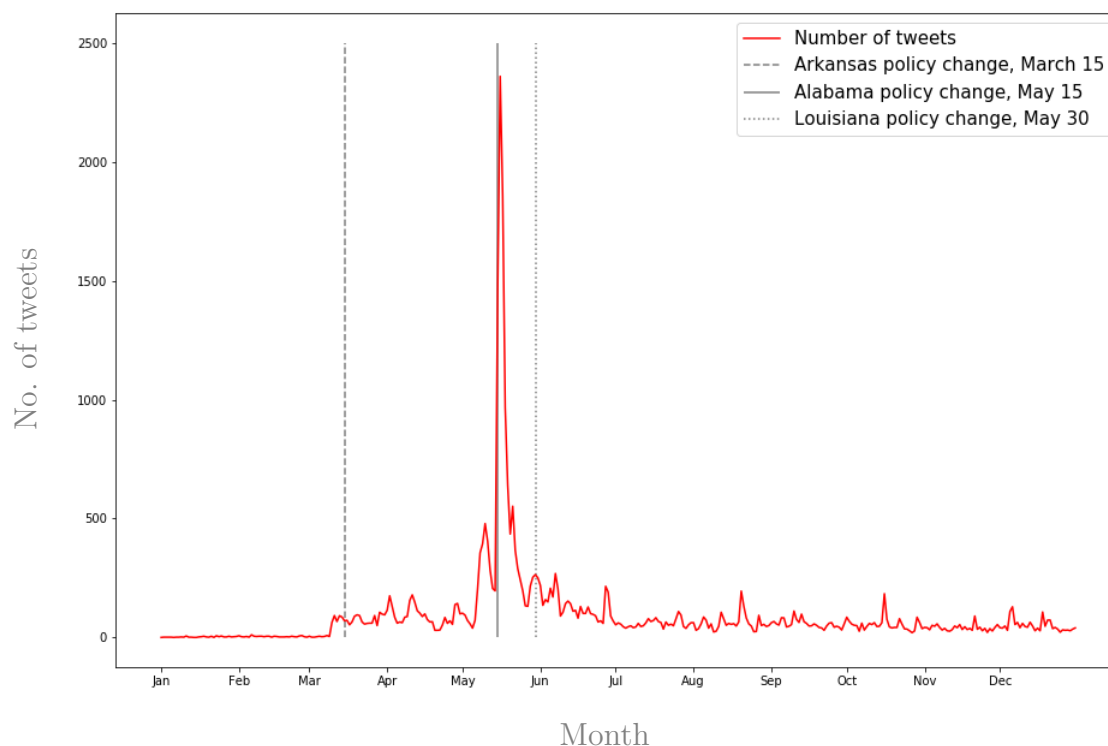
## 5 Results

Having reviewed the data and discussed the variables that are used for the analysis, this section presents the answers for the three research questions. The first three parts of the result section discuss one research question each. There is however a fourth part to this section. This fourth part considers the additional question of who it is that writes on Twitter.

### 5.1 Question 1: Reaction to the abortion policy changes?

This section will aim to answer the first research question, which is if the public reacted to the policy changes at all. The best way to answer this is by simply looking at the activity on Twitter. Graph 3 presents the number of tweets that contain the word "abortion" that were sent each day during 2019 in the USA.

**Graph 3: No. of tweets containing the word abortion**



From January until March the activity is extremely low with only a few tweets sent each day. In March however, the activity on Twitter regarding abortion takes off. This correlates well with the first state that voted on new policies to restrict access to abortion which was Arkansas on the 15<sup>th</sup> of March. The clear peak occurs on the 16<sup>th</sup> of May when the number of tweets sent was well over 2 000. This peak coincides with the ban in Alabama on the 15<sup>th</sup> of May.

It would then appear as if people are specifically reacting to the ban in Alabama which can be confirmed when looking at the content of the tweets. 16 % of all tweets sent on the 15<sup>th</sup> and 16<sup>th</sup> of May specifically mention Alabama. Comparing this to the other eight states which made policy changes, they are only mentioned in between 0 - 2 % of all tweets at the same time. It then becomes clear that the ban in Alabama really made people react. This is not surprising considering how the ban in Alabama was by far the strictest policy change, basically making abortion completely illegal. The more extreme a change is, the more likely it is that people will react to it.

The last out of the nine states which voted on policy changes regarding abortion was Louisiana on the 30<sup>th</sup> of May. Shortly after this time, Twitter activity regarding abortion decreases and stabilises around 100 tweets per day. Hence, from graph 3 it becomes clear that the engagement on Twitter regarding abortion is triggered by the abortion policies. The activity increases drastically around the Alabama ban, but this interest does not last for more than a day or two. After this time the activity drops to around one hundred tweets per day. Although the activity is limited from July and onward, it is not completely eliminated. Hence, the policy changes created a debate that appears to have lasted even after the last policy was introduced in Louisiana.

Graph 3 answers the question if the public reacted to the policy changes made, and the answer is clearly yes. The public did react to the policy changes on abortion and especially to the Alabama abortion ban. Having established that the public did react the study can continue onward to consider the second research question: Did the average sentiment change after the policies?

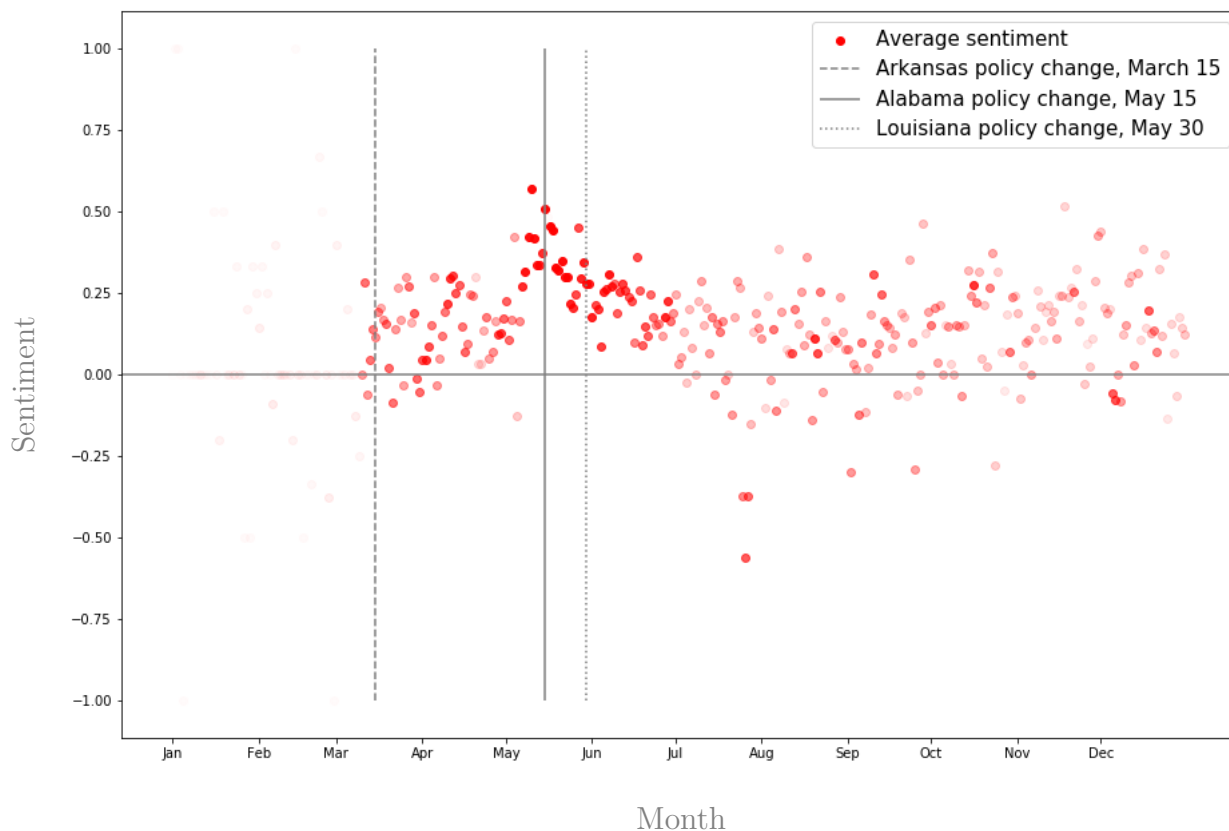
## 5.2 Question 2: Sentiment change as a result of the policy changes?

This section aims to answer the second research question, which is if the average sentiment changed after the policies compared to before. If the sentiment did change, theory suggests two possible scenarios. The first is the Thermostat theory. According to the Thermostat theory, sentiment should change to become more positive after the policies compared to before. This would indicate that people become more liberal towards abortion to counterbalance the conservative policies. The second scenario is a mobilisation effect. If a mobilisation has occurred, again sentiment would be expected to increase because more people will engage to face their collective challenge of opposing the policy changes. However, unlike the thermostat theory the sentiment would not be expected to last any longer period after the policy changes. This is because when the policies have been voted on, the collective challenge cease to exist and the mobilisation ends. Therefore, a temporary sentiment change would indicate that a mobilisation has taken place.

Sentiment change is observed by plotting the average sentiment per day over time. The average sentiment per day is calculated by taking all the tweets which were sent in a specific day and then taking the average sentiment for all these tweets. For example, if five tweets were sent on January 1<sup>st</sup> and they had the sentiments of 0, 0, 1, -1 and 1 the average sentiment for the 1<sup>st</sup> of January would be 0.2. The results are presented in graph 4.

In graph 4 it is possible to determine that the average sentiment reaches its highest point in May. This indicates that the majority of the people who tweeted about abortion in May had a more liberal view on abortion. The markers in the graph are more opaque on days when more tweets were sent. The more tweets sent, the more reliable the data can be considered. The dates where the markers have the lowest opacity is the time between March until July. This is the time when the most tweets were sent and therefore the prediction is more accurate during this period. January and February has big fluctuation due to the sparse data, which also means that the markers are extremely transparent to the point were they are barely visible. When regrading average sentiment per month instead of day by day the results confirms the trend in graph 4. In January and February the

Graph 4: Average sentiment per day



average sentiment per month is around 0. It then increases gradually in March and April and spikes in May with an average sentiment of 0.4. From May to July the sentiment again drops to a value just above zero.

Looking at graph 4 it becomes clear that as the policies are introduced the sentiment increases. This means that the more policies suggesting restriction of access to abortion, the public opinion on Twitter becomes increasingly more liberal towards abortion. This would then provide support for the Thermostat theory. If the Thermostat theory is at play it would mean that the general public in the US do not wish for more policy changes restricting access to abortion. This in turn could potentially suggest that *Roe v. Wade* is unlikely to be overturned and no national policy change will occur. However, looking at the time period just after the Alabama abortion ban the sentiment drops. Therefore, when considering the whole picture, graph 4 indicates that although the sentiment ap-

pears to increase before the Alabama ban and thereafter decrease again, no long term change has taken place. Instead, sentiment changes only for a short period. This might indicate that a mobilisation of opinion has occurred.

Graph 4 point towards the fact that something occurs around the time of the Alabama ban. To determine the details of the change that occurred, a statistical analysis is required. Therefore, table 2 presents a regression analysis with three models. Considering the first model, this one tests whether the average sentiment changes from the time period before the policy changes compared to after. Since the Alabama abortion ban on the 15<sup>th</sup> of May appears to be the most influential of all the policy changes, this specific ban serve as a breaking point. This means that the values in the *After policy change* variable are coded as 0 indicating the time from January 1<sup>st</sup> to just before the Alabama ban, and 1 indicating the time directly after the Alabama ban. To balance the data before and after the policy changes, the time period after the 15<sup>th</sup> of May has been reduced and therefore the regression only considers tweets sent between January until September.

**Table 2: Regression Analysis***Dependent variable: Sentiment on Twitter (-1 - 1)*

	Model 1 Bivariate	Model 2 Only states with policy changes	Model 3 Discussion period
After policy change (0 - 1)	-0.01	-0.04	
Arkansas		-0.11*	
Georgia		0.11*	
Kentucky		-0.15	
Louisiana		0.02	
Mississippi		-0.03	
Missouri		-0.06	
Ohio		0.06*	
Utah		0.02	
Discussion period (0 - 1)			0.26*
Intercept	0.27*	0.28*	0.10*
N	27 617	6 916	27 617
R <sup>2</sup> (adjusted)	0.00	0.01	0.03

\* Significance level  $p < 0.05$ *After policy change model 1: 1 = Time after 15<sup>th</sup> of May**After policy change model 2: 1 = Time after each state's respective policy change**Discussion period model 3: 1 = Time between May - June*

In model 1 the coefficient is -0.01 which means that going from time period 0 (time before the Alabama ban) to time period 1 (time after the Alabama ban), the sentiment changes -0.01 units. The intercept in model 1 is 0.27 which means that at time 0, the mean sentiment is overall positive and in time period 1 the sentiment is 0.26. Hence, the sentiment change is extremely small and the change is not significant.

Model 1 includes all tweets from all states and they all have the cutting point at the time of the Alabama ban. There are however nine states which have made policy changes at different times. To take this into consideration, model 2 includes only the nine states which have made policy changes and set the *After policy change* variable to correspond

to the date of the policy change in the respective states. Therefore, the value 0 for the *After policy change* variable means all tweets sent before the 16<sup>th</sup> of May in Alabama, but in Arkansas it instead means all tweets sent before the 16<sup>th</sup> of March.

In model 2, all states are compared against Alabama. This means that the intercept of 0.28 in the average sentiment in Alabama at time 0. The coefficient of Arkansas is -0.11 which means that the average sentiment in Arkansas is -0.11 less than the average sentiment in Alabama. Most importantly however is the *After policy change* variable. The coefficient of the *After policy change* variable decreases to -0.04 compared to -0.01 in model 1. The effect remains small and statistically insignificant. This means that even when accounting for the individual policy changes the average sentiment does not change significantly.

From graph 4 it can be observed that sentiment does change around the time of the policy changes, but the regression analyses indicates that the change is equal to zero. This is most likely due to the fact that sentiment rises before the breaking point on the 15<sup>th</sup> of May, but afterwards the sentiment declines. The rise and fall of the sentiment cancel itself out when the regression breaks at the peak. To confirm that sentiment does change during the time of the policy changes, the independent variable is again changed. In model 3 the *Discussion period* variable is coded so that 1 represents the discussion period from May - June. 0 indicates the remaining months from January until March and July until September. Model 3 confirms that sentiment is significantly more positive during this time period with an increased sentiment from 0.10 at time 0, to 0.36 at time 1. These numbers provide accurate figures to the pattern seen in graph 4.

The results in this section present the following answer to the research question if the average sentiment changes after the policy changes: There is no significant change of sentiment after the policy changes compared to before. This remains true also when controlling for the individual policy changes. With this it can be concluded that the Thermostat theory is not at play. What is observed however is a temporary sentiment change around the time of the policy changes. This observation leads to the third research question, which is whether any sentiment change is a change of opinion or a change in the way people



express themselves regarding abortion on Twitter. Hence, did people become increasingly more liberal towards abortion during a short period or is it a mobilisation of opinions?

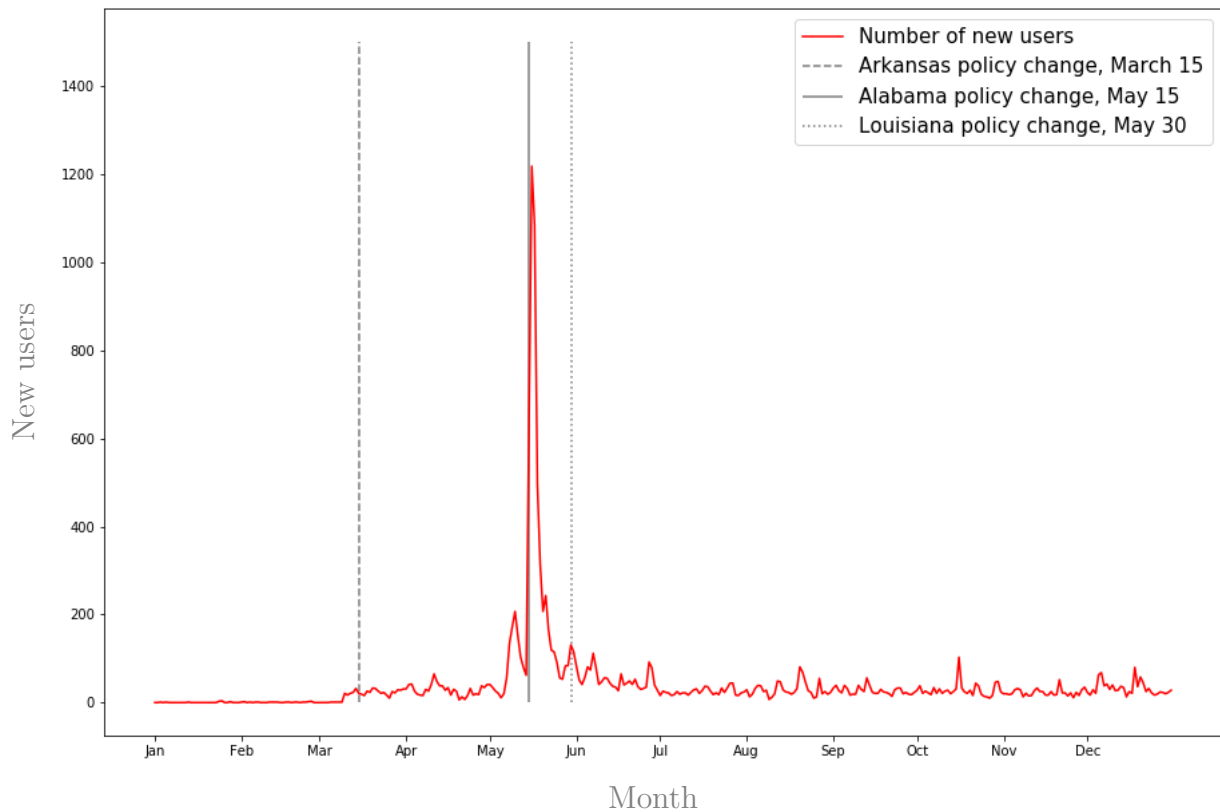
### **5.3 Question 3: Shift in opinion or change of expression?**

This section investigates whether the change that appear around the time of the policy changes does in fact mean that people temporally changed their opinion to be more liberal towards abortion, or if the change is a result of new people entering the debate on Twitter.

#### **5.3.1 User activity**

To establish whether public opinion has actually changed or if sentiment changes due to mobilisation of opinion is more difficult than for example to determine if people have reacted to the policy changes. A good place to start is to consider the people who tweet. It has been established that the activity on Twitter increases drastically around the time of the Alabama ban. This however does not necessarily mean that new people have entered the debate. Since every user is permitted to send up to 2 400 tweets per day, the increased activity could be a result of the same users simply sending more tweets. If this is the case, the sentiment change is more likely to be a display of a true public opinion change rather than a mobilisation. Graph 5 shows the number of new users who enters the debate per day. Every user is only counted once, at the time of the first tweet they send.

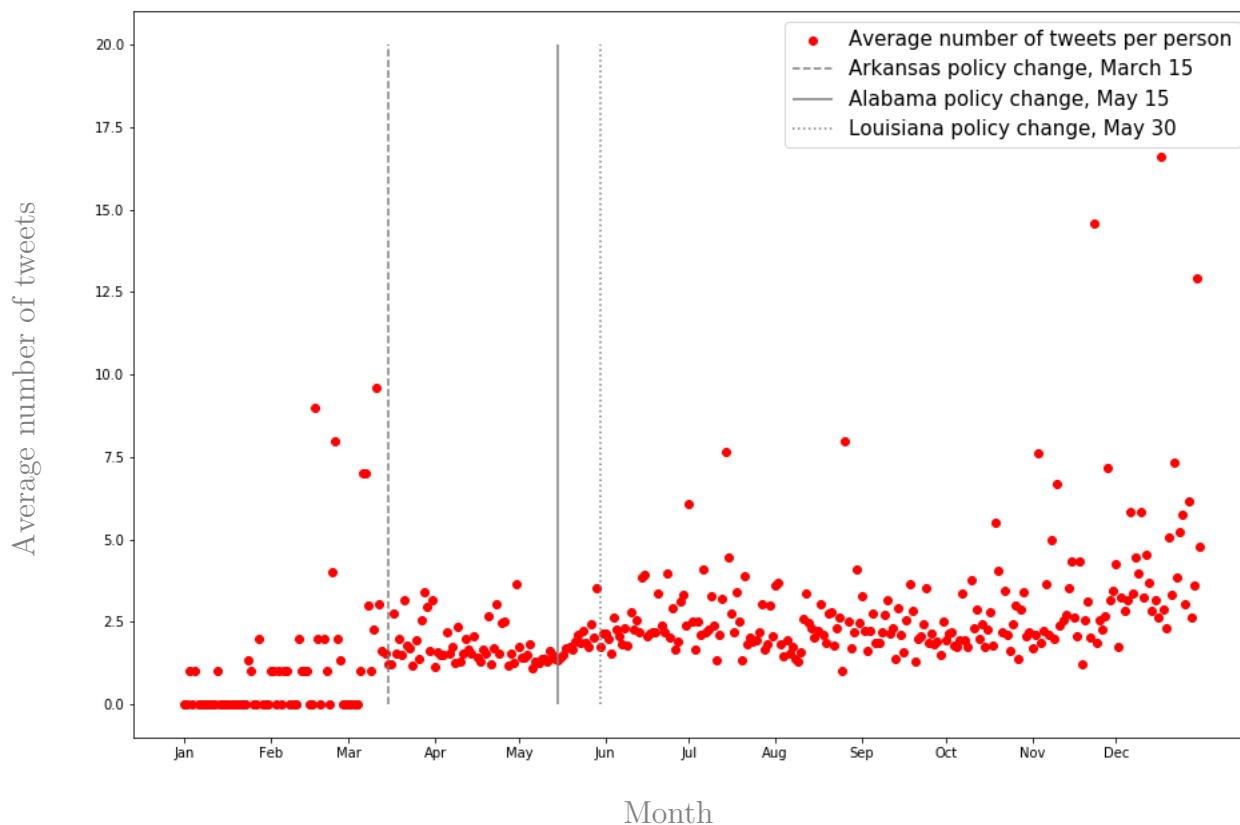
Graph 5: Number of new users per day



Graph 5 is almost identical to graph 3. There are very few new users from January until March, but at the time of the first policy change on the 15<sup>th</sup> of March more people start tweeting. It clearly spikes around the time of the Alabama abortion ban in May with almost 1 200 new users tweeting on the 15<sup>th</sup> of May. This indicates that the increased activity around the policy changes is not a result of the same people sending more tweets, but rather new people joining the debate.

To compliment the results in graph 5, graph 6 shows the average number of tweets sent per person and day. The results in graph 6 further supports the fact that the increased activity is a result of an inflow of new users, who on average send between 1 - 2 tweets per person.

Graph 6: Average number of tweets per person and day



### 5.3.2 Individual fixed effects model

One additional approach to investigate whether people have changed their mind regarding abortion or if the change in sentiment is a result of new people joining the debate, is to look at the people who tweeted more than once. If people who have tweeted several times start changing their sentiment in their tweets, this would point towards the fact that people have changed their mind.

The method to investigate sentiment change for only those who tweeted more than once is with a regression model with fixed effects. With a fixed effects model it is possible to observe the variation in sentiment compared to the mean sentiment for each person. People who have only sent one tweet will have no variation around their mean sentiment and what is then observed is any sentiment change for people who tweeted more than once.

Table 3 presents three models. The first model shows the difference in sentiment for those who tweeted more than once after the 15<sup>th</sup> of May compared to before. As in previous models the change in sentiment from the time before the Alabama ban to the time after is very small and also not significant. Model 5 only looks at the nine states that made policy changes were the 0 signifies the time before the states respective policy change and 1 the time after. The effect is slightly bigger compared to model 4 but remains insignificant.

The third model tests whether the sentiment changes in the period May - June compared to the rest of the time. The results show that in the time from January until March and July until September, the average sentiment is 0.22. In May and June the sentiment increases with 0.08 and the change is significant. This means that people who tweeted more than once writes significantly more positive during the time of the policy changes. This is contradictory as to what would be expected if the sentiment change is only a result of more people joining the debate and instead suggest that people do change their opinion on abortion. Also when conducting an additional analysis which only includes people who have tweeted before and during the policy changes does the effect remain at the same level.

Although model 6 suggests that people become significantly more positive towards abortion during the time of the policy changes, the change could also be a result of how people express themselves. People who tweeted before the policy bans can have expressed themselves in such a way that they have been classified with the sentiment 0. When the policy bans were under discussion on May and June, these people expressed themselves more forcefully which then made it easier for the sentiment analysis to categorize them with a sentiment of 1. Additionally, in the previous model 3 it can be observed that the sentiment increases with 0.26 during the discussion period. However, since people only on average express themselves 0.08 units more positively during the same time, the increased sentiment observed in graph 4 cannot be fully explained by the more positive expression. Therefore, the significant result in model 6 does not necessarily mean that the overall public opinion has changed. However, the results in model 6 shows that the sentiment change that occurred in May and June is partly a result of new people joining the debate but additionally that people express themselves more positively.

**Table 3: Fixed effects model analysis**  
*Dependent variable: Sentiment on Twitter (-1 - 1)*

	Model 4 Bivariate	Model 5 Only states with policy changes	Model 6 Discussion period
After policy change (0 - 1)	0.01	0.04	
Discussion period (0 - 1)			0.08*
Intercept	0.26*	0.25*	0.22*
N	27 617	6 916	27 617
R <sup>2</sup> within	0.00	0.00	0.00
R <sup>2</sup> overall	0.00	0.00	0.03

\* Significance level  $p < 0.05$

*After policy change model 4: 1 = Time after 15<sup>th</sup> of May*

*After policy change model 5: 1 = Time after each state's respective policy change*

*Discussion period model 6: 1 = Time between May - June*

The results presented has established that the increased volume of tweets is in fact a result of an inflow of new people who all send a few tweets per person. Although this points towards sentiment change being a result of mobilisation of opinions and not that public opinion became more liberal towards abortion for a short time, the results cannot conclusively say that this is the case. All the new people who have joined the debate may very well have changed their opinion on abortion and the fact that more people write on Twitter is simply a product of an increased interest. Therefore, further analysis is required in order to try to answer the question of who it is that writes on Twitter during this time of policy change.

## 5.4 Who writes on Twitter

The results presented have answered the three research questions and come to the conclusion that the US population did react to the policy changes and even though the Thermostat theory is not at play, the sentiment changed during the time of the policy changes. This sentiment change is not a result of a true public opinion shift but rather new people who previously did not share their opinion decided to join the debate. Hence the sentiment change is the result of mobilisation. An additional question which then

arises is: Who are these people? Who are the people who collectively manage to change the entire Twitter sentiment in just a few days? It could for example be possible that people in the nine states that voted on abortion policies are more likely to mobilise since people who are directly affected by a policy have a higher incentive to react. This section will try to investigate this a bit further.

#### 5.4.1 State by state

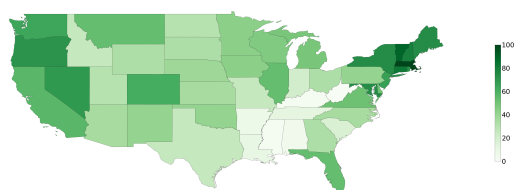
In the regression analyses that only include the nine states, the sentiment change for each of these nine states is presented. In these models it is clear that sentiment seems to differ depending on the state. In some states sentiment becomes more positive after their respective policies have been introduced, but in others the sentiment becomes more negative. Therefore, it is possible that there are differences between states which do not become apparent when considering all tweets collectively. Since location of the tweets origin is one of the few demographic features that are known about the users, looking at state differences is a good place to start to try to get a better picture of who the new Twitter users are.

In graph 7 and 8, the public opinion on abortion in each state is presented (Pew Research Center, 2014). Graph 7 shows percentage of people in each state who thinks abortion should be legal in most or all cases. A darker greens means a higher percentage. Graph 8 shows the percentage of people who thinks abortion should be illegal in most or all cases. The states where a higher percentage thinks abortion should be illegal are on average the same states that has proposed new policies restricting access to abortion.

If the sentiment on Twitter is representative to previous public opinion polls, a similar pattern should appear when considering the percentage of tweets sent from each state that were coded as positive versus negative. Looking at graph 9 and 11 which shows the distribution of positive and negative tweets it becomes clear that this is not the case. For example, Arizona is responsible for a high number of positive tweets but also for a high number of negative tweets. Overall, the states seem to on average send the same number

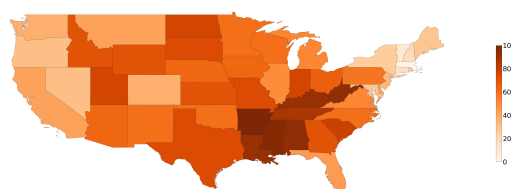
of positive and negative tweets. Hence, states which are more liberal towards abortion does not send more positive tweets compared to states who are more conservative towards abortion and vice versa.

**Graph 7: % of people who thinks abortion should be legal sometimes or always**  
(Pew Research Center, 2014)



Alaska: 63% Hawaii: 66%

**Graph 8: % of people who thinks abortion should be illegal sometimes or always**  
(Pew Research Center, 2014)



Alaska: 34% Hawaii: 29%

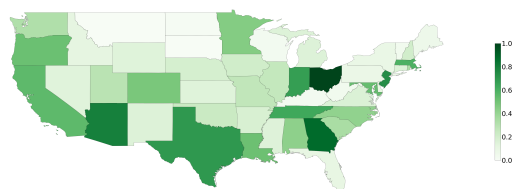
Graph 10 and 12 additionally show if the number of tweets sent from each state is proportional to the US population. If the percentage on tweets sent from a state is the same as the percentage of inhabitants compared to the entire US population, the value would become 1 which then means perfect representation. A value over 1 mean that the state is overrepresented in the data and a value under 1 means that it is underrepresented. Ideally, these maps would therefore be one single color, but it might be expected that the states that have voted on policy changes are somewhat overrepresented since the people in these states are directly affected by the policies and therefore have a stronger incentive to speak their mind. The maps show that a large number of states are overrepresented in the data but these states are not necessarily the states that have voted on policy changes. For example, Wyoming and Rhode Island are extremely overrepresented among the positive tweets. This can partly be explained by the fact that these are two states with small populations.

These maps considers the entire time period from January until December. What has been established however is that the people who are responsible for the sentiment change enter the Twitter debate in May, but then exits again after June. Maybe the representation looks different during this time period?

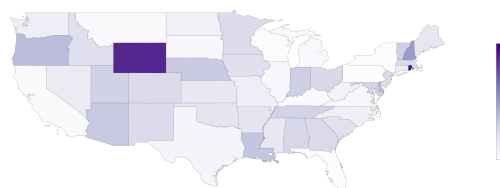
## Number of tweets from January - December

Excluding Alaska and Hawaii

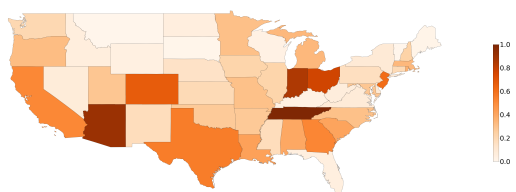
Graph 9: % of positive tweets



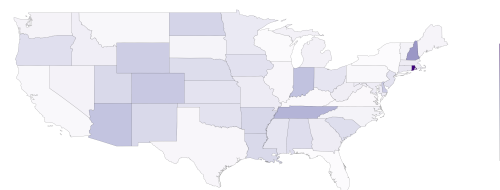
Graph 10: % of positive tweets in relation to population



Graph 11: %. of negative tweets



Graph 12: % of negative tweets in relation to population



Zooming in on only the two months May and June there is not much difference compared to the entire time period. The states which think abortion should be legal do not on average send more positive tweets than the states which think abortion should be illegal. Again many states are overrepresented in the Twitter data set and these are not the states that have voted on policy changes.

What if only new users in May and June are considered and those who already tweeted before May are excluded. Where do the new users come from? Graph 17 shows the distribution of new users in May and June. A high percentage of users came from Georgia which is one of the states which voted on restricted access to abortion. Apart from that however there is no clear pattern showing that people in the nine states that voted on policy changes were more inclined to join the debate in May or June compared to other states.

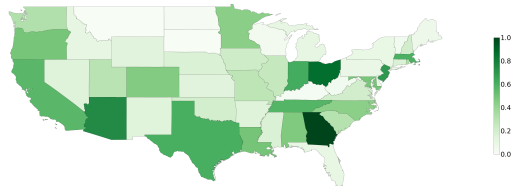
There is also no clear pattern showing that people from states that think abortion should



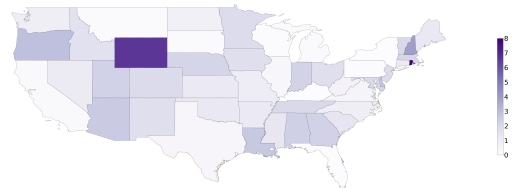
## Number of tweets from May - June

Excluding Alaska and Hawaii

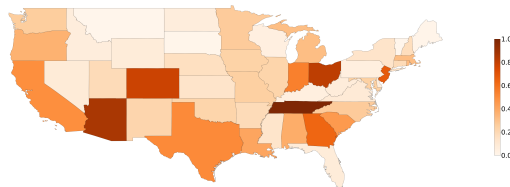
Graph 13: % of positive tweets



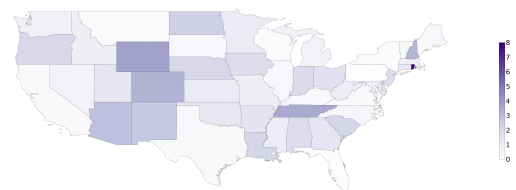
Graph 14: % of positive tweets in relation to population



Graph 15: % of negative tweets



Graph 16: % of negative tweets in relation to population

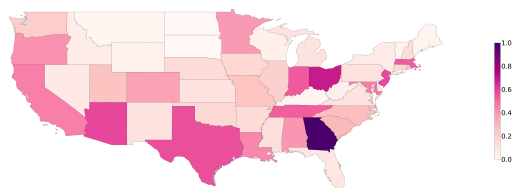


be legal are more inclined to join the debate in May or June compared to states who thinks abortion should be illegal. Graph 18 additionally shows that when comparing to the proportion of the US population, the distribution of new users in May and June is not representative.

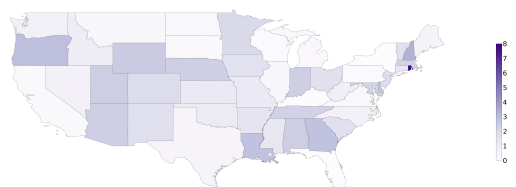
## New users from May - June

Excluding Alaska and Hawaii

Graph 17: % of new users



Graph 18: % of new users in relation to population



So far it has become clear that people that come from states that on average think abortion should be legal are not more inclined to tweet positively about abortion compared to people in states that on average think abortion should be illegal and vice versa. The distribution of positive and negative tweets remains practically unchanged when considering only the time period when sentiment changed the most, May and June, compared to the entire time period from January until December. In May and June a large portion of new users come from Georgia which is one of the nine states that voted on policy changes. Because the people in Georgia are directly affected by the policy changes in the state, the fact that people from Georgia engages more than people from other states seems reasonable. This pattern is however not visible in any of the other eight states that voted on policy changes. Considering the number of new users in relation to the population there is again no clear pattern that can be reasonably explained.

#### **5.4.2 Democrats vs. Republicans**

What has not been discussed previously in this study is the correlation between opinion on abortion and partisanship. People who think abortion should be legal in most or all cases tend to sympathise with the Democratic party and people who think abortion should be illegal in most or all cases tend to sympathise with the Republican party (Gallup, 2019*b*). Therefore, it can be hypothesised that new users in May and June more often come from Democratic states.

Looking at graph 19 however, it becomes clear that the average number of new users per day is approximately the same for democratic and republican states, but slightly more new users from republican states. As has previously been established the number of new users increases drastically around the 15<sup>th</sup> of May. At this peak it appears as if there are more new users from republican states compared to democratic states. Taking into consideration that there are more US citizens who come from republican states compared to democratic. Approximately 43% of the US inhabitants live in democratic states compared to 57% in republican. Graph 20 presents the weighted average number of new users from democratic and republican states. Even though the difference at the peak around

the 15<sup>th</sup> of May evens out slightly, there are still more new users from republican states.

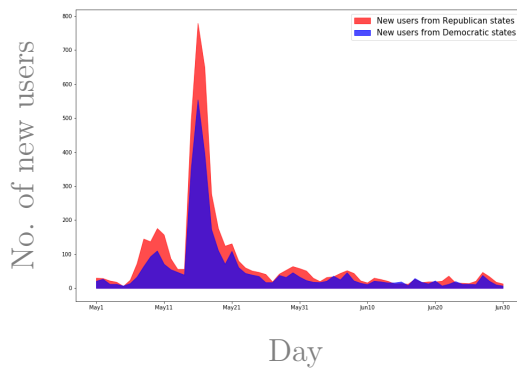
Graph 19 and 20 shows that there are not more new users from democratic states during the time of the biggest sentiment change on Twitter. Instead there are more users from republican states. It should be taken into considering that the graphs do not present partisanship, but simply the governing party in the states from which they sent the tweet. This means that the sentiment change could be a result of people who have a liberal stance on abortion but live in republican states. This would then mean that the average sentiment in May and June would be higher for tweets sent from republican states compared to democratic. Graph 21 displays the average sentiment per day from the different states. At the time of the Alabama abortion ban the sentiment appears to be higher for people who come from democratic states.

Since there are more new users from republican states but a higher sentiment for users from democratic states, maybe the sentiment change can be explained by the fact that people from democratic states send more tweets on average compared to users in republican. Graph 22 however shows that people from all states tweet on average one tweet per day during the time of the Alabama abortion ban.

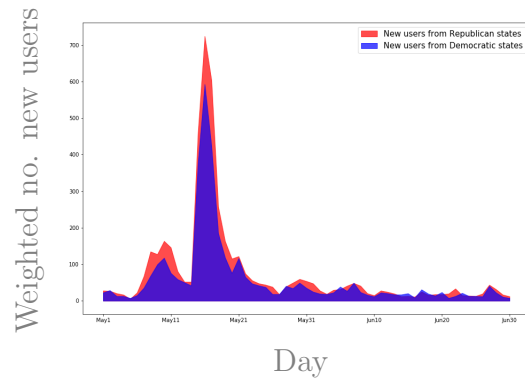
In conclusion the data conveys that Twitter users who live in states that have a higher percentage of people who thinks abortion should be legal does not tend to send more positive tweet regarding abortion. The same applies for negative tweets on abortion. People who come from states with a higher percentage who thinks abortion should be illegal, do not portray a more negative sentiment on Twitter. The distribution of positive and negative tweets in relation to the US population also does not follow the pattern that would be expected. For example, states that have not introduced new policies or where a high percentage of people think abortion should be illegal are overrepresented among the negative tweets. There is little to no difference in these patterns when looking more closely to the time period of the sentiment change, May and June. Neither does the inflow of new users during this period coincide with the expected pattern. What also becomes clear is that new users are disproportionately distributed across the states in relation to the US population.

## Democrats vs. Republicans

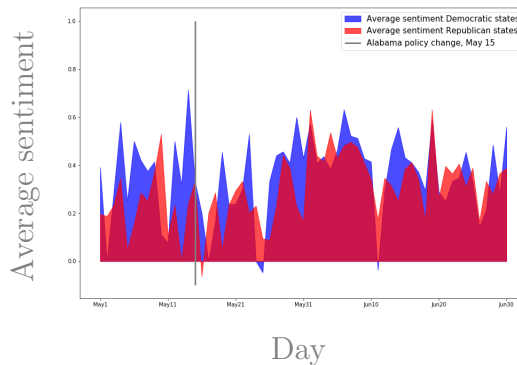
Graph 19: Number of new users  
May - June



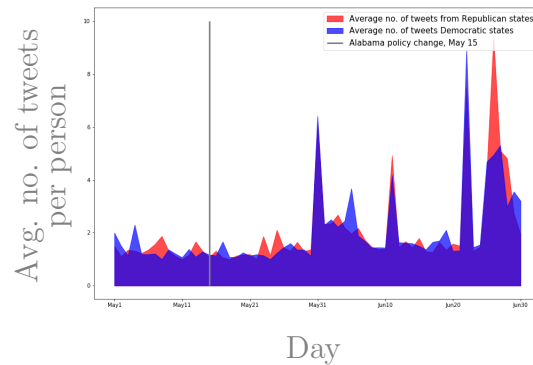
Graph 20: Weighted number of new users  
May - June



Graph 21: Average sentiment  
May - June



Graph 22: Average number of tweets  
per person May - June



Finally, the new users more often come from republican states but the average sentiment is overall higher for people in democratic states at the time of the Alabama abortion ban. During this time new users send on average one tweets no matter what state they come from. All of these findings result in the knowledge that the inflow of new users during the time of the sentiment change are not representative to the US population. More people from republican states engage during this time period but at the peak of the sentiment on the 15<sup>th</sup> of May, people from democratic states have a higher sentiment. What has also become clear from these findings is that the question of who writes on Twitter can not be sufficiently answered with the information available.

The results presented in this section can be concluded as follows: During the time of the abortion policy changes there is a mobilisation of people who are more liberal towards abortion. A substantial amount of new people join the debate and people who were already on Twitter usually write with a more positive sentiment. Although it is possible to see which states the new people come from, this information alone has not provided sufficient insights to determine who the people that mobilise during this period are. Overall people who are more liberal towards abortion appear to mobilise from all over the USA.

## 6 Conclusion

This study set out to investigate whether the American public reacted to the policy changes that dealt with restricting access to abortion in nine states during 2019. It used the medium Twitter where people are free to express themselves as they wish. A sentiment change on Twitter could then be the result of a true shift in public opinion or a change of expression. Theory states that public reaction to policy changes is crucial for any democracy. It is a tool that citizens can use in order to hold their elected representatives accountable for their actions in between elections. As long as the citizens have access to information regarding the policy changes, they have every opportunity to react to them. However, studies indicate that despite information being available people can be uninterested and therefore do not react. There is also the risk of people not acting as reasonably as theory would suggest.

Assuming that people do react reasonably to policy changes, this reaction can either be a shift in opinion or a change of expression when people can choose to share their opinion rather than being asked for it. If a shift in opinion has occurred, the most predominant theory to explain this shift is the Thermostat theory. This theory states that if new policies are introduced that differ from the public's perception of an ideal policy, public opinion will sway in the opposite direction of the newly introduced policies. On Twitter, there is also the possibility that a change of expression has taken place. A change of expression is most likely explained by a mobilisation of opinions, with new users entering

the debate and additionally people expressing themselves more forcefully. The difference between a public opinion shift and a change of expression is that for a public opinion shift, people have changed their mind regarding a certain issue. If there is a change of expression people have simply changed their way of talking or writing about the topic, but they have not necessarily changed their mind.

To investigate people's reaction to policy changes, the policy made in the USA during 2019 which restricted access to abortion were used. The abortion policies serve as a good case study because they are recent, but also drastic. This makes it more likely to observe a reaction in society. Three questions were posed to investigate if the people reacted to these policy changes. The first was whether the citizens of the US react to the abortion policy changes at all. The second if the average sentiment among the US population change as a result of the policy changes and the third if an observed sentiment change was a result of a shift in opinion or change of expression.

Since the study set out to examine public reaction the way it appears in a medium where people can express their opinion even if they have not been asked to, Twitter data was used. Sentiment on Twitter has been found to correlate with people's behaviours and actions and thereby it can be used to study public opinion. Additionally, Twitter is a platform where people express their opinions voluntarily unlike public opinion polls where they are specifically asked to. This makes it a good choice to investigate public reaction in a more realistic setting.

The analysis provided answers to the three research questions. First of all, it can be established that the public did react to the policy changes. Secondly, sentiment on Twitter increased temporarily as a result of the policy changes and especially around the time of the Alabama abortion ban. Thirdly, the Thermostat theory was rejected because no true shift in public opinion had occurred. Instead, the sentiment change was a result of a mobilisation of opinions. This mobilisation consisted of a vast amount of new people joining the debate as well as people expressing themselves significantly more positive during this time. The results made it clear that a fourth question had to be asked, namely who these people that mobilised are, or more specifically where they come from. There is no clear

pattern as to where the new people come from, rather people from all over the country join in the mobilisation and express their support for more liberal abortion policies.

What do these results tell us? They convey that even though public opinion can appear to shift on Twitter, people's true opinion on the matter does not necessarily change. Considering the fact that there are many people who are passive information seekers, the perception of a shift in public opinion can potentially become a problem. People who do not actively look up public opinion polls but still want a perception of what the public thinks regarding a certain issue, will inevitably turn to different and easily accessible channels of information. Such a channel is for example Twitter. If they have not previously followed the debate but enter when the policy changes are taking place, people will get the perception that the view on abortion is much more liberal than what the true public opinion actually is. This can become an even bigger problem when considering the fact that both politicians and policymakers sometimes have to turn to social media to gain an understanding of what the public think. At the peak of a political debate there are not always public opinion polls or other scientific studies available that can with certainty say what the true public opinion is. Not only is there a risk of people observing a skewed view of public opinion but additionally there is an disproportional distribution of people who are active during the time of the debate. Some states are clearly overrepresented and others are underrepresented.

The fact that people mobilise around an issue of abortion in the USA is not completely surprising. During the *Planned Parenthood vs. Casey* case there is a similar trend of a temporary increase in the number of people who thinks abortions should be legal under any circumstances. The abortion debate in the USA is in general prone to mobilisation because it is heavily polarised and additionally a sensitive topic, likely to evoke strong emotions with people. Hence, mobilisation might not only be observed in outlets where people can express their opinion voluntarily, but also in public opinion polls. This however needs to be further researched. Since this study finds that public opinion did not shift, theory indicates that the general public do not on average disagree with the policy changes. What this means for the future of American abortion policies is that other states might consider enforcing the same restrictive policies and that *Roe v. Wade* can

possibly be overturned. As long as the majority of the public appears to agree and public opinion does not change to counterbalance the new policies, politicians have an incentive to continue to enforce them.

In conclusion, when people can choose themselves whether or not they want to convey their opinion on an issue it can appear as if there has been a shift in public opinion when it is in fact a change of expression. If this is not kept in mind when considering sentiment on social media at a time when a debate is at its most intense, there is a risk of politicians, policymakers and other authorities incorrectly interpreting a mobilisation as a changed public opinion. If this false perception is acted on, policies might be enforced that are not in line with what the people wish for and desire. This in turn risks an increased discontent in society and can in the worst case undermine the democratic system.

Future research should look closer at who the people that mobilised are. With a data set that provides more demographic information on each individual it would be possible to dig deeper into the question of who writes on Twitter which could provide a better understanding of the mobilisation effect which is observed. Additionally, future research should investigate if these results are applicable to other channels of information where people state their opinion voluntarily. Social media and Twitter is an outlet where anyone with an internet connection and a computer or phone can write what they think. It provides a bottom-up perspective of public opinion. Other channels, such as newspaper articles or televised debates offers a different perspective which is more top-down. Not everyone can publish an article in a renowned newspaper or take part in televised debates. The people who do these things are usually influential people such as experts, politicians or people with special insight or knowledge. Are these outlets also prone to mobilisation effects or do they more accurately portray the true public opinion in society?



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## A Appendix

### Descriptive statistics

State	N	n	Party	Mean sentiment	Mean sentiment Jan - May	Mean sentiment May - Sep	Sentiment difference
Total	32059	27617	Rep	0.266	0.271	0.264	-0.007
Alabama	912	822	Rep	0.258	0.231	0.276	0.045
Alaska	11	11	Rep	0.000	0.000	0.000	0.000
Arizona	1674	1410	Rep	0.217	0.188	0.230	0.042
Arkansas	497	417	Rep	0.134	0.134	0.134	0.001
California	1112	962	Dem	0.291	0.263	0.303	0.040
Colorado	1058	920	Dem	0.165	0.248	0.136	-0.112
Connecticut	372	325	Dem	0.222	0.248	0.208	-0.040
Delaware	252	218	Dem	0.289	0.355	0.263	-0.092
Florida	240	211	Rep	0.374	0.376	0.373	-0.003
Georgia	1780	1534	Rep	0.349	0.463	0.300	-0.163
Hawaii	402	369	Dem	0.176	0.024	0.253	0.229
Idaho	261	239	Rep	0.368	0.372	0.366	-0.005
Illinois	558	498	Dem	0.279	0.259	0.290	0.031
Indiana	1540	1331	Rep	0.181	0.090	0.227	0.137
Iowa	476	408	Rep	0.267	0.337	0.245	-0.092
Kansas	374	302	Rep	0.205	0.126	0.242	0.115
Kentucky	127	96	Rep	0.094	0.205	0.000	-0.205
Louisiana	1080	913	Rep	0.286	0.278	0.288	0.011
Maine	122	115	Dem	0.504	0.447	0.544	0.097
Maryland	1050	877	Dem	0.368	0.381	0.363	-0.017
Massachusetts	1125	961	Dem	0.385	0.365	0.397	0.032
Michigan	450	376	Rep	0.003	0.079	-0.031	-0.109
Minnesota	874	766	Dem	0.351	0.374	0.340	-0.034
Mississippi	399	331	Rep	0.208	0.283	0.173	-0.110
Missouri	695	560	Rep	0.211	0.146	0.236	0.091
Montana	44	37	Rep	0.135	0.059	0.200	0.141
Nebraska	408	361	Rep	0.285	0.322	0.267	-0.056
Nevada	281	251	Dem	0.402	0.413	0.395	-0.019
New Hampshire	451	390	Dem	0.238	0.225	0.245	0.020
New Jersey	1533	1330	Dem	0.283	0.305	0.273	-0.033
New Mexico	391	312	Dem	0.247	0.245	0.248	0.003
New York	225	193	Dem	0.202	-0.033	0.311	0.343
North Carolina	812	697	Rep	0.346	0.300	0.373	0.073
North Dakota	118	111	Rep	-0.063	0.000	-0.099	-0.099
Ohio	1969	1699	Rep	0.311	0.353	0.280	-0.073
Oklahoma	552	475	Rep	0.185	0.222	0.169	-0.053
Oregon	982	844	Dem	0.378	0.372	0.382	0.010
Pennsylvania	248	217	Rep	0.111	-0.154	0.259	0.413
Rhode Island	758	682	Dem	0.199	0.116	0.238	0.122

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South Carolina	786	642	Rep	0.212	0.296	0.197	-0.099
South Dakota	54	48	Rep	0.125	0.000	0.316	0.316
Tennessee	1532	1319	Rep	0.122	0.119	0.123	0.004
Texas	1368	1189	Rep	0.315	0.299	0.325	0.026
Utah	594	544	Rep	0.259	0.345	0.227	-0.117
Vermont	113	106	Dem	0.406	0.443	0.356	-0.087
Virginia	300	264	Dem	0,420	0,465	0,394	-0.071
Washington	579	459	Dem	0.366	0.290	0.410	0.120
West Virginia	146	138	Rep	0.130	0.229	0.078	-0.151
Wisconsin	118	98	Rep	0.204	0.167	0.221	0.054
Wyoming	256	239	Rep	0.515	0.495	0.531	0.035

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