

# Women in Politics

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It all started in Montana. In 1916, Jeannette Rankin, a peace activist focused on social issues and a strong advocate for women's suffrage, broke down centuries-long barriers by becoming the first woman elected to Congress. Since then, 366 women have served in U.S. Congress, and thousands more in various elected and executive offices at the state-level.

In this post, I will analyze the Women in Politics dataset published by the [Eagleton Institute of Politics' Center for American Women and Politics](#). CAWP, the nation's leading source of scholarly research and current data about women's political participation in the United States, has done a tremendous job gathering tens of thousands of records of women holding political (both elected and appointed) office across the United States, dating back to the late 1800s, and putting everything into their central Women Elected Officials Database. Using this data, I will employ a variety of exploratory and modeling techniques to answer the following questions:

- How many women have held political office by level of Government?
- Is one political party more apt to be represented by women?
- Does race add a layer of complexity to gender representation for political office?
- How long do women serve in office?
- When will the U.S. House of Representatives and Senate achieve full gender parity?
- Is there a geographic component to equitable gender representation? Are there more female politicians in certain states?

Let's start by applying some basic data cleaning/manipulation techniques, dealing with missing (NA) values, and touching up our dataset.

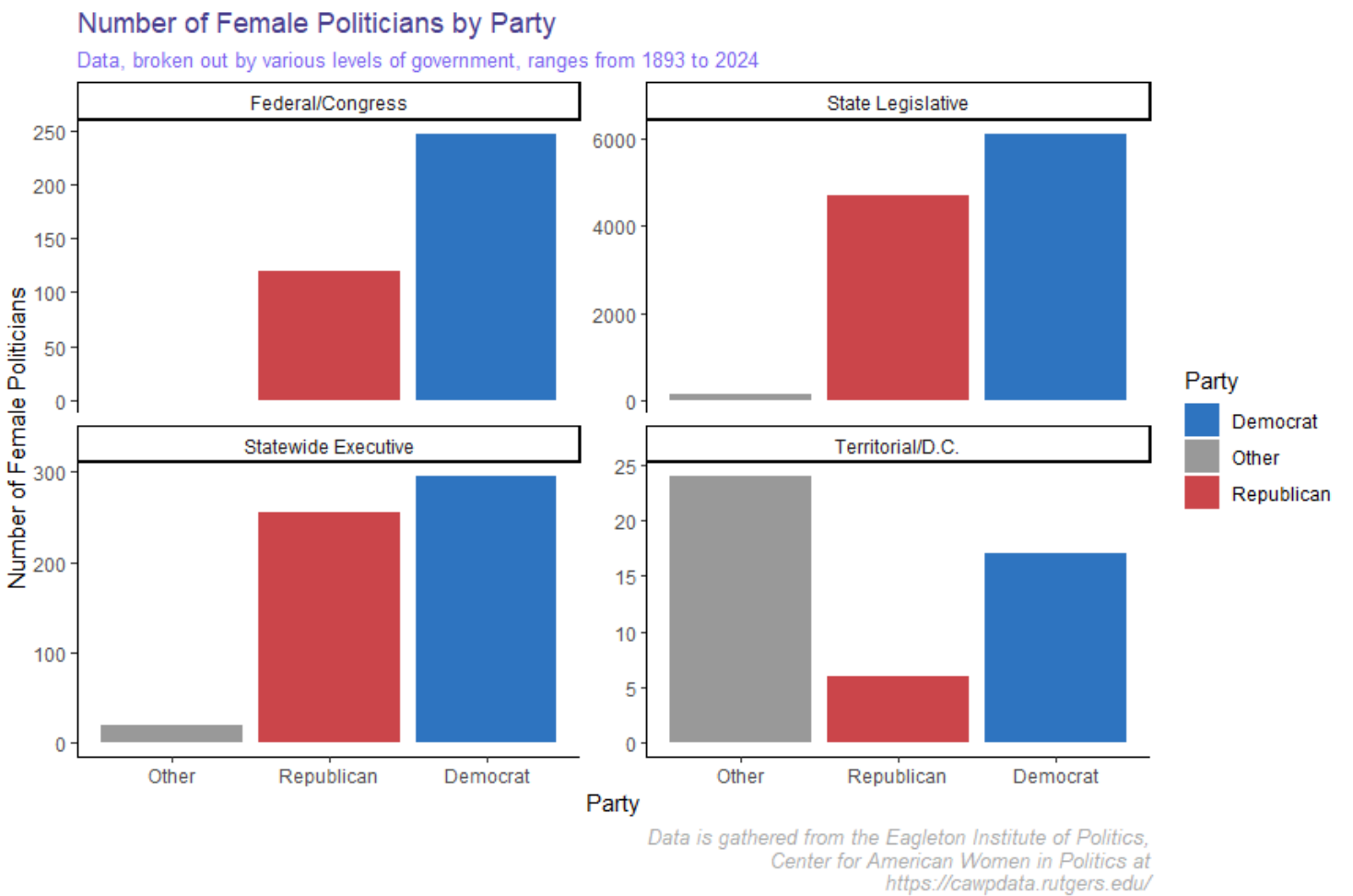
Id	First Name	Middle Name	Last Name	Full Name	Year	Min Year	Max Year	Years Of Service	Years In Office	State	State Abb	Party	Level
10002c	Terri	Lynn	Land	Terri Lynn Land	2003	2003	2010	7	2003-2010	Michigan	MI	Republican	Statewide Executive
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After cleaning up the data a bit and imputing some new columns, we have our dataset! In it, one row corresponds to a woman holding political office for one year. If an individual has held a specific political office for, say, five years, they will appear as five separate rows in the dataset.

As part of my set-up, I took a look at the number of missing values for each variable. Based on this, I removed the “District” column, which is entirely blank in the dataset I downloaded. Middle name, which is about 1/3 null (blank), is fine since that’s not an essential variable.

Now that we have our data, let’s start to explore it.

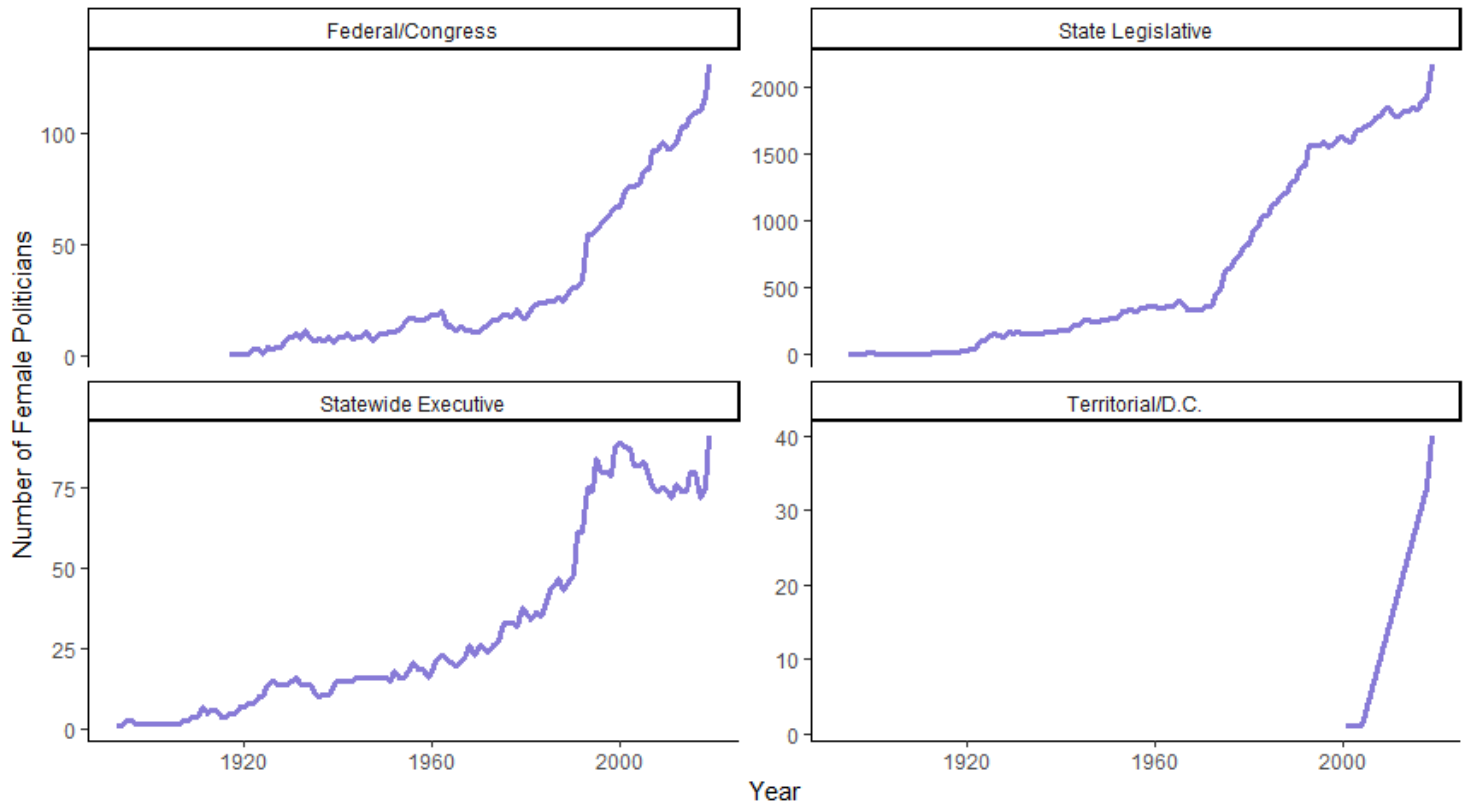


Quite clearly, most of the women who have held office have done so at the state legislative level. Interestingly enough, most of the women who have held office at the state legislative or Federal/Congress level have been members of the two major parties. In D.C., a lot of women outside the two major parties have won office.

This is great to see total numbers, but our data spans nearly 130 years! Let's breakout our totals over time to look for trends.

### Number of Female Politicians at Various Levels of Government over Time

Data ranges from 1893 to 2024



Data is gathered from the Eagleton Institute of Politics,  
Center for American Women in Politics at  
<https://cawpdata.rutgers.edu/>

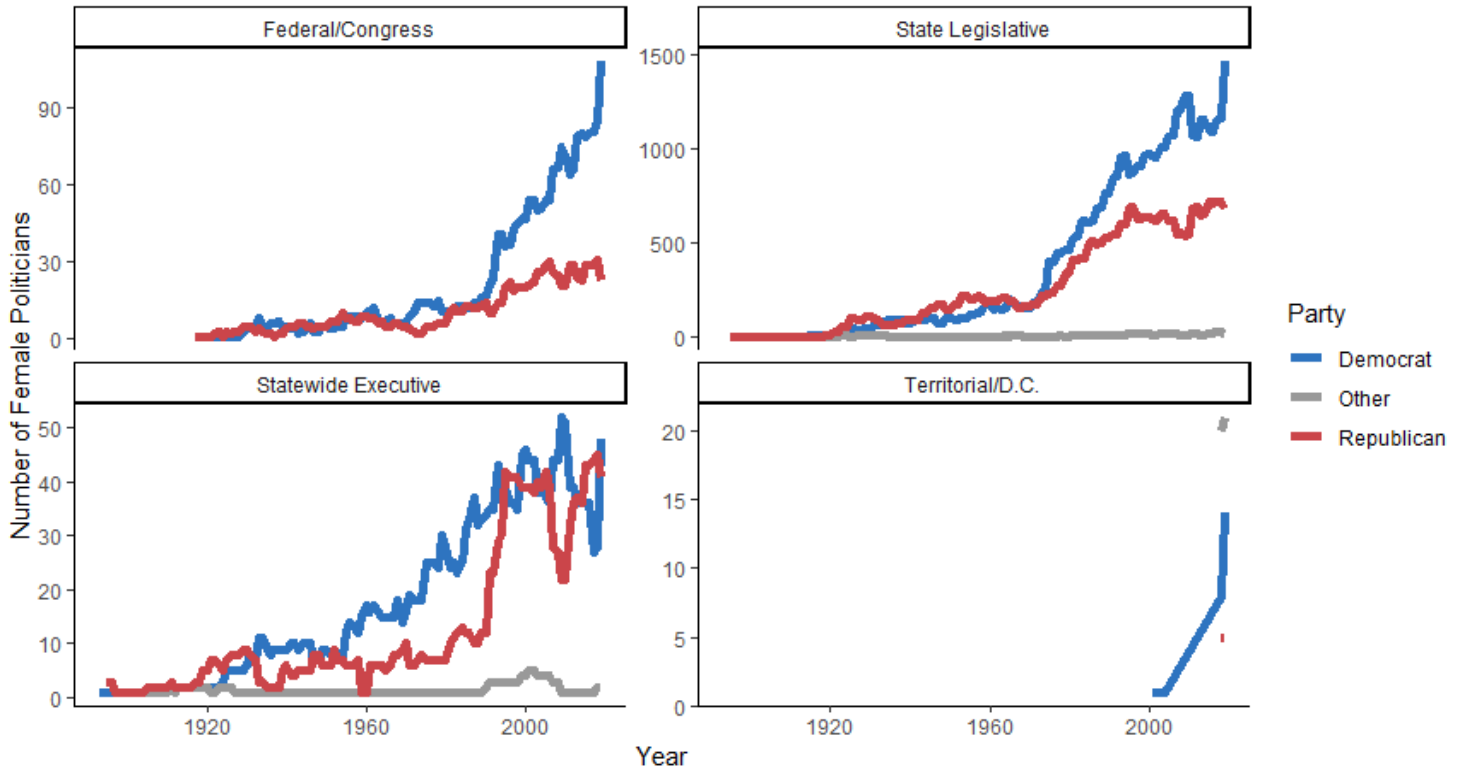
Here are some key takeaways:

1. The number of women holding political office has been growing incredibly fast over the past few decades.
2. Most of the positions held are at the State Legislative level, which makes sense given the greater number of positions open at that level.

Let's look to see if these trends have differed based on political party.

## Number of Female Politicians at Various Levels of Government over Time

Data ranges from 1893 to 2024



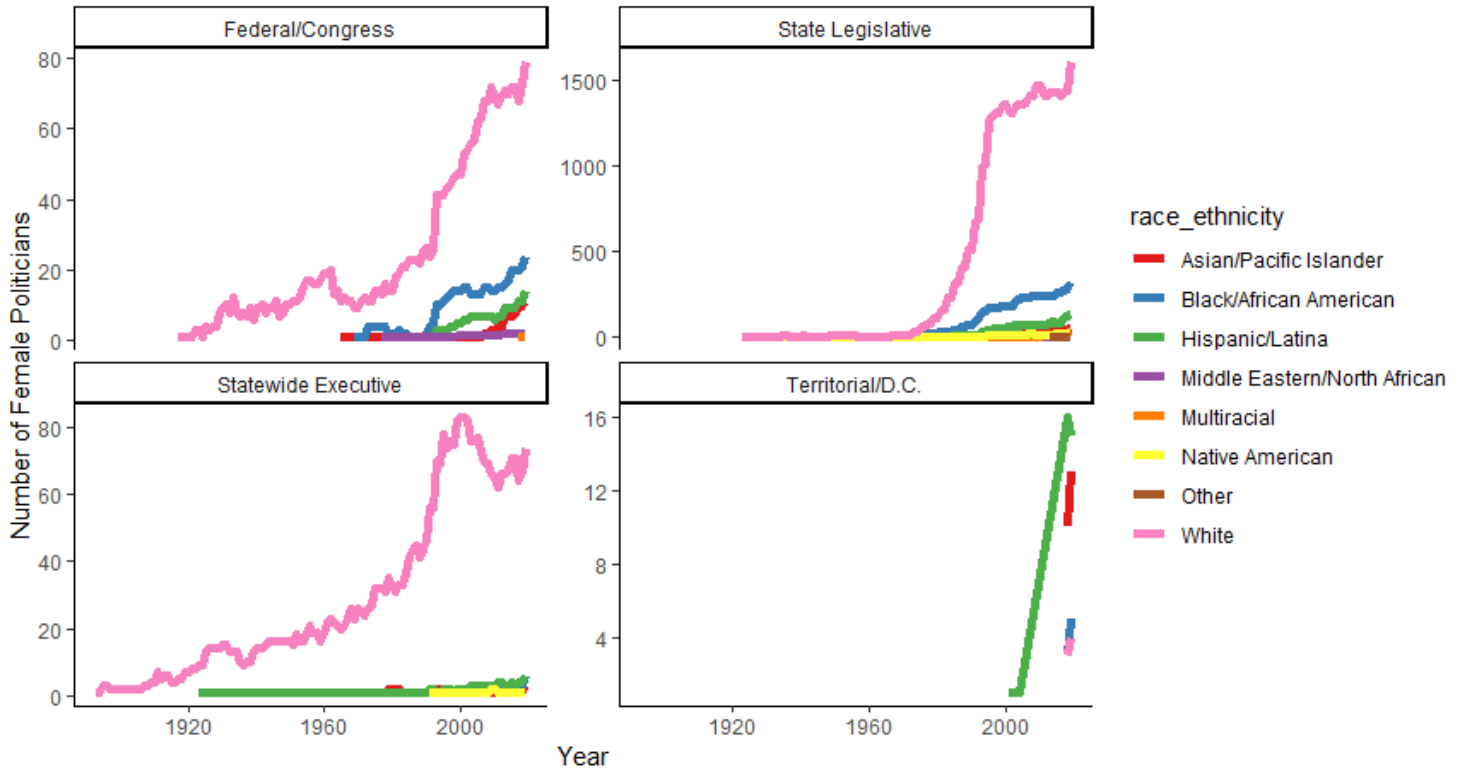
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For female politicians in Congress, Democrats and Republicans held lock-step until 1990, when Democrats took off at a much faster rate.

How does gender representation in political office change not by political party, but by race? Let's take a look.

## Number of Female Politicians at Various Levels of Government over Time

Data ranges from 1893 to 2024



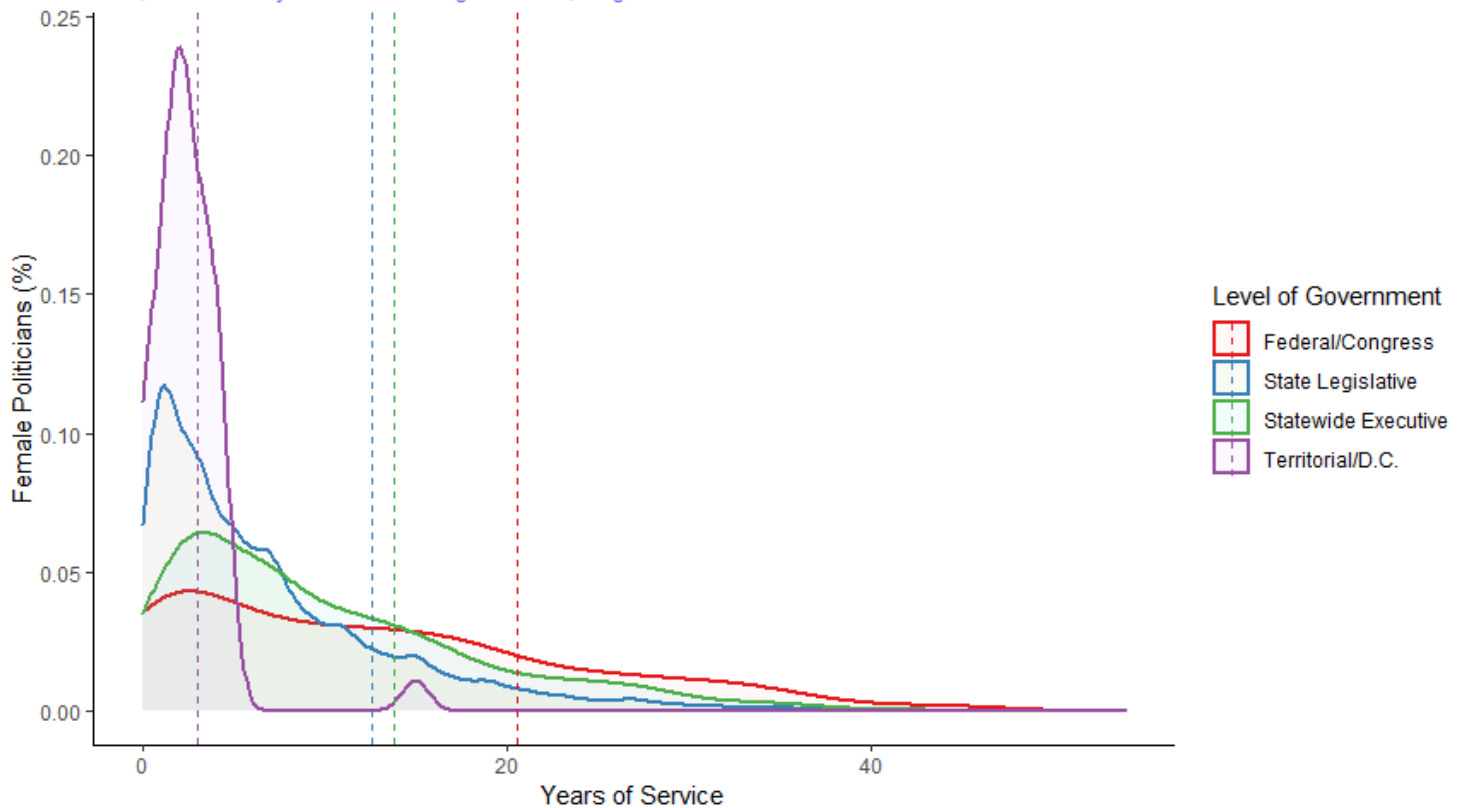
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We can see rather clearly that white women dominate across the board (except in D.C., which is dominated by women of Hispanic/Latina ethnicity). The difference is clearest in Statewide Executive positions, which are often not elected (Secretary of State, Treasurer, Superintendent of Public Instruction, Lt. Governor, etc.) and instead appointed.

Let's take a look at how long individual female politicians have spent holding respective office. We'll do so by utilizing a density plot, which shows the distribution of the number of years a given politician has served in their respective office.

## Years of Service of Female Politicians

Data, broken out by various levels of government, ranges from 1893 to 2024



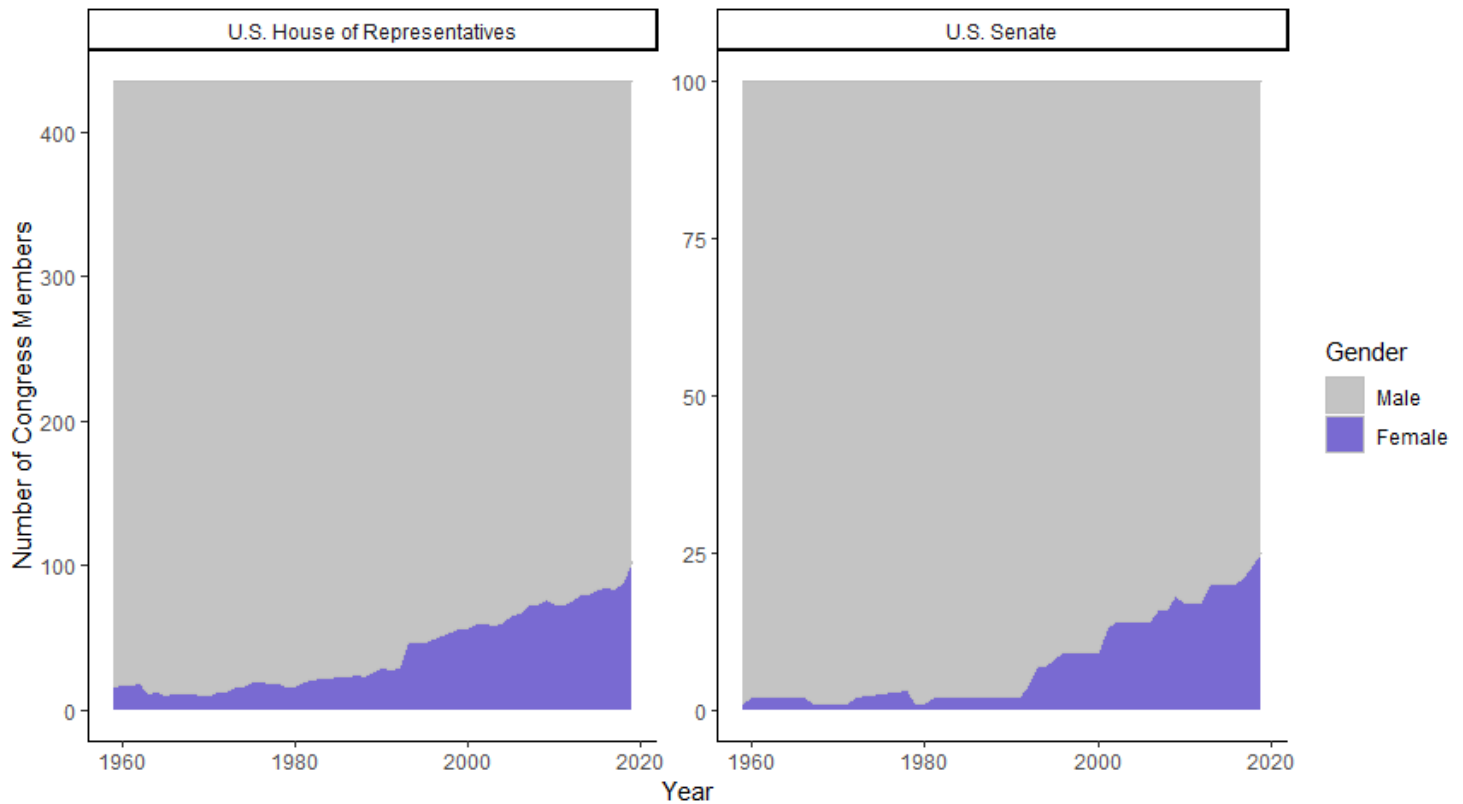
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From this, we can see the distribution of the number of years a given politician has held their respective office over the past 120 years, broken out by different levels of government. In particular, we can clearly see that the women who have held office in D.C. have done so for a very short period of time: **3 years**. This makes sense given how women have only been holding office in D.C. since the early 2000's. On the other end of the spectrum, women in Congress have held their positions for a much more uniform amount of time, averaging about **21 years** years in office!

Now let's hone in on the Federal/Congress piece of the puzzle. Specifically, let's look at the proportion of women who have been members of the U.S. Senate/House of Representatives over time. Unfortunately our dataset only includes the number of women who have held political office over time, so it's difficult to compare that to the number of men who have held office over time at all the levels of government, except for the U.S. Senate, which has had 100 members since 1959, and the U.S. House of Representatives, which has had 435 members since 1959. Thus, we'll focus our analysis to 1959 and after.

## Number of U.S. Congress Members by Gender

Data ranges from 1959 to 2019



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From this, we can see that in both chambers of Congress, the share of female representatives has increased steadily, with a significant bump in the 1990s and a steady increase from there on out. The next question that comes to my head is:

*When will we achieve a 50-50 parity in each chamber of Congress?*

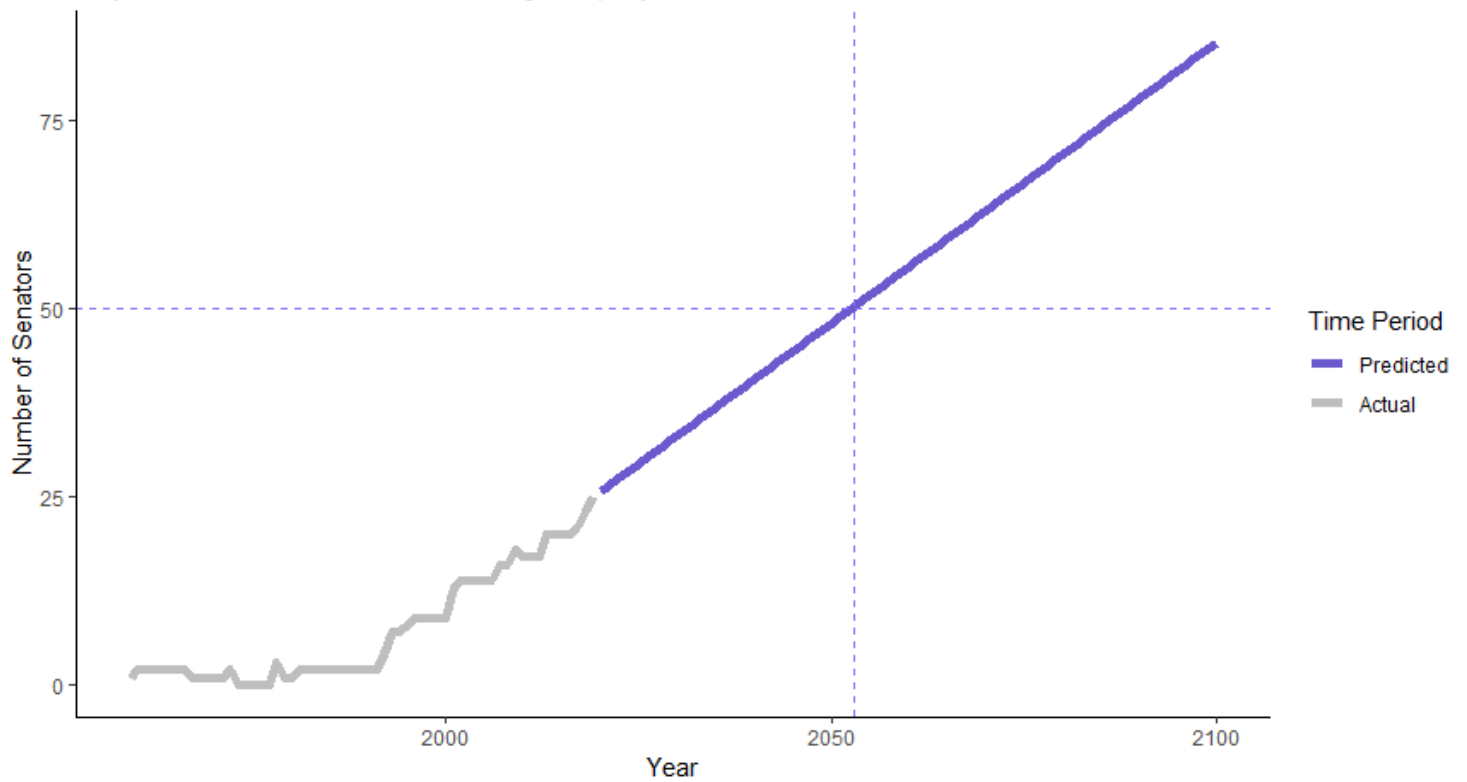
## Time Series Analysis (ARIMA)

In this next section, I'd like to use an ARIMA time forecasting model to determine when each chamber of the U.S. Congress will achieve full gender parity. What does that mean in plain English? Can we use data science methods to determine when the Senate will have 50 female members and the House 217 ( $435/2$ ) female members?

By building an ARIMA model with a trend component, we can see the increase in the number of female politicians in Congress over the next 80 years:

## Number of Female U.S. Senators over Time

Data ranges from 1959 to 2100. The dashed lines represent the year in which each chamber achieves full gender parity.



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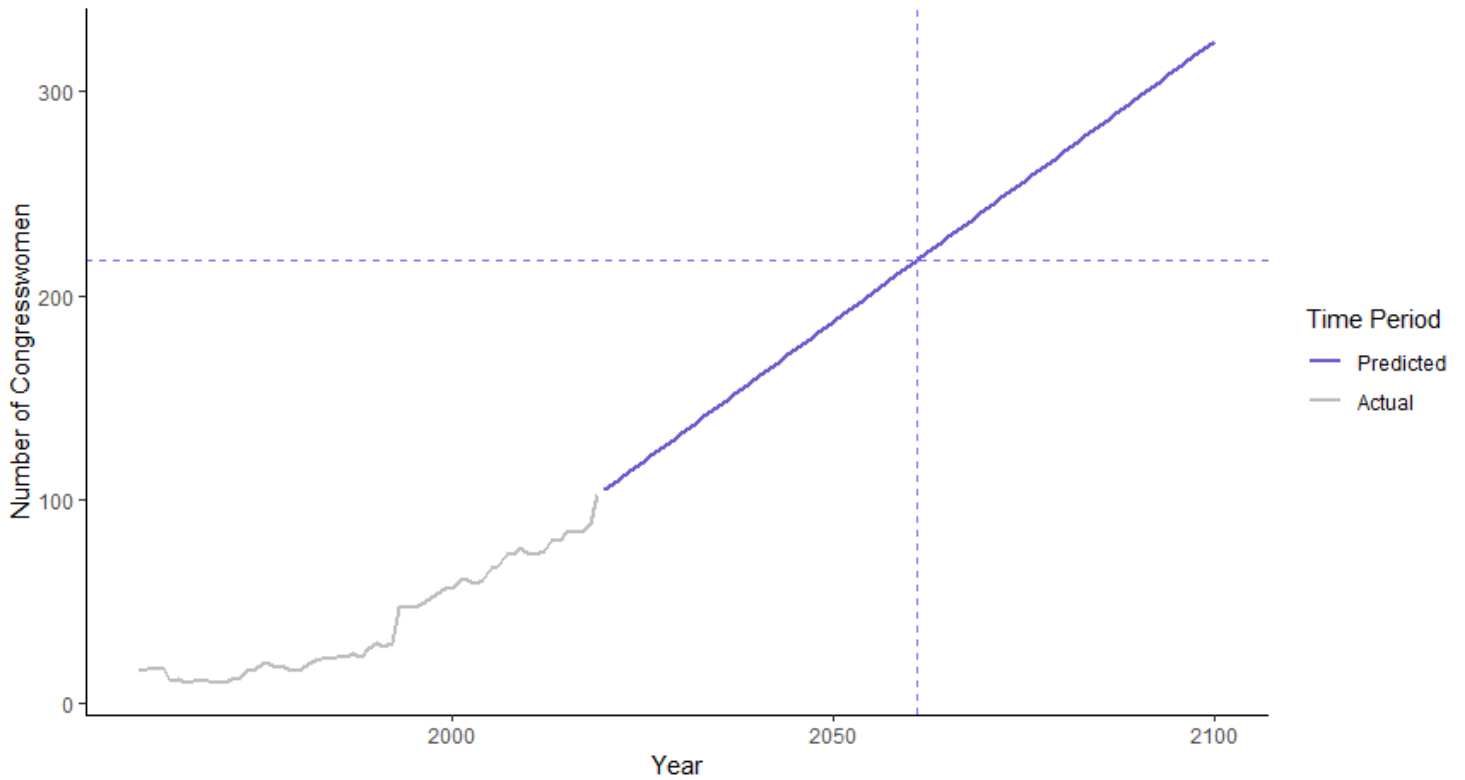
According to the Senate ARIMA model built, the U.S. Senate will first achieve full gender parity in the year **2053**.

Let's now do the same thing for the House.



## Number of Female U.S. House Reps over Time

Data ranges from 1959 to 2100. The dashed lines represent the year in which each chamber achieves full gender parity.



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Thus, according to the House ARIMA model built, the U.S. House of Representatives will first achieve full gender parity in the year **2061**.

Let's plot the Senate and House graphs side-by-side, just to get a better view of the whole picture.

## Number of U.S. Congresswomen over Time

Data ranges from 1959 to 2100. The dashed lines represent the year in which each chamber achieves full gender parity.



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From these graphs, we can see that both ARIMA models took a rather linear approach, assuming a steady increase over time. This makes sense, because ARIMA usually looks for seasonality trends (which our data does NOT have) on top of the general trends (which our data does have). Obviously, this assumes that the rate of increase is steady over time and doesn't plateau as women in Congress hit a certain threshold. Assuming the rate of increase is generally linear, the **Senate** will achieve full parity **8** years before the **House**.

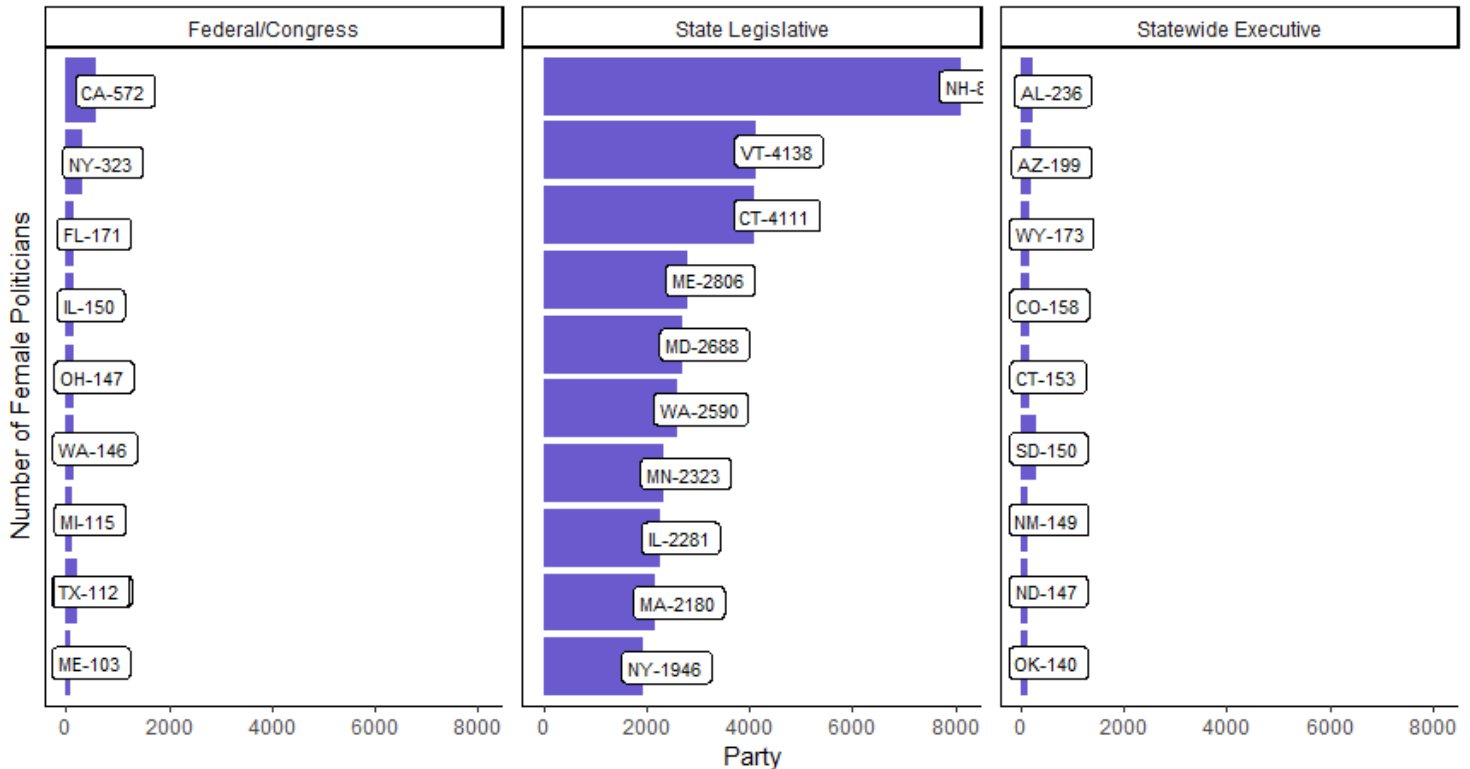
## Geographic Analysis

Next, we'll look into how the number of women holding certain political office varies based on location (state). This will help us understand if there are certain areas of the country where women holding office are taking off, and others where it's lagging.

First, let's take a look at our all-time leaders. Which states have had the most women representatives/executives in the past 120 years?

## Number of Female Politicians at Various Levels of Government by State

Data ranges from 1893 to 2024



Data is gathered from the Eagleton Institute of Politics,  
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From this we can see that certain states have more women in Congress than others. This isn't wholly helpful because certain states that dominate at the Federal level (like California, New York, and Florida), generally have *more* representatives compared to smaller states (like Rhode Island, Wyoming, and Delaware). This visualization would be much more representative if I were to normalize by state population.

## Conclusion

Thanks for reading! I hope you were able to learn a bit more about the data behind women in political office across the United States. If you felt like the article was educational, interesting, or if you just want to support me, feel free to follow me on any social media platform (all are listed as icons on the homepage of my website) and stay tuned for the next post. If you have ideas on public policy/political topics that could use some data expertise, please send me your suggestions – the more ideas, the better!

## Additional Resources

The original blog post can be found here:

Interested in seeing my original code? Go to my GitHub repository here:

<https://github.com/jschulberg/Women-in-Politics>

Interested in learning more on the subject or on the Center for American Women and Politics? Go to:  
<https://cawp.rutgers.edu/facts/milestones-for-women/>

Interested in seeing the the Eagleton Institute of Politics, Center for American Women and Politics  
Women Elected Officials Database? Go to:  
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