

Research Project

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Introduction

“What affects a member’s legislative effectiveness in Congress?”

In the United States, Congress holds significant powers according to the Constitution, where it serves as a third of the co equal branches of government. It contributes to the government by possessing the unique power of the introduction of new laws or revision of existing ones (White House 17). Congress has the ability to control significant changes within the country by passing specific laws. Within Congress, the two chambers: House of Representatives and the Senate unify to represent the People. Specifically, the 2018 midterm congressional elections resulted in “The congressional freshman class of 2019 is perhaps best described in superlatives. It is the most racially diverse and most female group of representatives ever elected to the House, whose history spans more than 200 years”(Edmonson 1). The 116th Congress may inevitably shift how the effectiveness of Congress runs in the near future.

With such a large influence in the decision-making process of the country, our group is interested in exploring what constitutes an effective congressperson and whether the genetic makeup of Congress may shift legislative effectiveness and what variables affect these. We first look to answer how the previous service in the state legislature has a correlation in their legislative effectiveness at the federal level and another measure of experience, which is seniority, to determine if there is a correlation between a member's tenure in the House and their ability to be effective lawmakers. This policy question is important to address because we want to explore how experience in state legislation affects their legislative effectiveness once they're in Congress and how Seniority plays a role once they are in Congress. By figuring out whether these variables have a relationship, this would help voters determine which candidates are more qualified to serve in Congress.

Data Description

The dataset that will be utilized for this project is provided by the Center for Effective Lawmaking. CEL "is a joint partnership between the Frank Batten School of Leadership and Public Policy and Vanderbilt University"(CEF). What began as a project regarding legislative effectiveness has become a mission which "seeks to advance" our generation's means of communicating and understanding the "effectiveness of individual lawmakers and legislative institutions in Congress"(CEL). As the goal of our project is to conclude what makes an effective Congressperson, this group's dataset is the perfect fit. LEPData93to115Congress is a data set with 8017 columns and 54 rows that provide various scores and information for each observation for the 93rd to the 115th Congress. We will be conducting this analysis at the Congress-person level.

Key variables that will appear in our analysis include our expected outcome variable which is the "les" Legislative Effectiveness Score, according to the Center for Effectiveness, the methodology of calculating this score is "we identify the number of bills that each member of the House of Representatives sponsored (BILL); and the number of those bills that received any action in committee (AIC), or action beyond committee (ABC) on the floor of the House. For those bills that received any action beyond committee, we also identify how many of those bills subsequently passed the House (PASS), and how many became law (LAW)"(CEL). Further, we are interested in the variables that we believe would affect a legislator's effectiveness during their various terms. These variables include race, seniority, majority, power, gender, and state-leg.

les:	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
Legislative	0.0000	0.1598	0.4678	1.0000	1.1909	18.6864
Effectiveness	SD: 1.536238					
Score (1-5-10)						

state_leg: 1 = served in state legislature	Min. 1st Qu. Median Mean 3rd Qu. Max. NA's 0.0000 0.0000 0.0000 0.4911 1.0000 1.0000 2 NA
majority: 1 = majority party member	Min. 1st Qu. Median Mean 3rd Qu. Max. 0.0000 0.0000 1.0000 0.5662 1.0000 1.0000 SD: 0.4956212
Female: 1 = female	Min. 1st Qu. Median Mean 3rd Qu. Max. 0.0000 0.0000 0.0000 0.1099 0.0000 1.0000 SD: 0.312792
afam: 1 = African-American	Min. 1st Qu. Median Mean 3rd Qu. Max. 0.00000 0.00000 0.00000 0.07279 0.00000 1.00000 SD: 0.2597971
Power: 1 = Member of Appropriation, Rules, or Ways and Means	Min. 1st Qu. Median Mean 3rd Qu. Max. NA's 0.000 0.000 0.000 0.247 0.000 1.000 1 SD: NA
seniority: Seniority, number of terms served counting current	Min. 1st Qu. Median Mean 3rd Qu. Max. 1.000 2.000 4.000 5.282 7.000 30.000 SD: 4.113711

Description of Statistical Methods

In order to explore how experience plays a role, we first must consider the analytical method which will allow us to find a relationship between our main variable and the legislative effectiveness score. For the purpose of this exercise, we will be using a linear regression model that will include controls. By using regression analysis, we will be able to describe relationships between our input independent variables and the dependent variable.

$$Y_{\text{legislative-effectiveness}} = \beta_0 + \beta_{\text{state-leg}}$$

Producing this equation gives us a set of coefficients that represent the relationship between each independent variable and the dependent variable. In this case the dependent variable we are looking to find insight on is legislative effectiveness. Our main explanatory variable in the regression will be legislative experience, as we theorize that previous experience in the State Legislature gives representatives the necessary skills and connections to be successful in all aspects of law-making.

When searching for statistical significance, it is also important to consider possible confounding variables that could skew our outcomes. In any experiment, one measure taken is to control for variables that we assume would affect our results. The regression model allows us to

control for other variables by simply adding them in after our main explanatory variable as seen below:

$$Y_{\text{legislative-effectiveness}} = \beta_0 + \beta_{\text{state-leg}} + \beta_{\text{control}}$$

Further, we will make use of fixed effects to account for omitted variable bias. If the omitted variable is observable this bias can be addressed by including it as a “control” variable in our regression. However, this is not always the case, so we address it by looking at the source of bias through unobserved variables by running a regression with fixed effects as they will allow us to control for variables that are constant across individuals. Making this adjustment is necessary as we assume that variables that are constant throughout time can interact with one another, changing our results such that we may believe we are seeing a relationship that does not actually exist. In this dataset, the variable we will be using as a fixed effect is the icps variable, which is a members identification. The reason for this fixed effect is that members who have served multiple times appear in our dataset as different observations, meaning when we take the regression as is without the effect we are treating the observation as a unique person, even though it is the same person for multiple observations. Essentially, the ID number for each Congressperson stays the same each year, over time, meaning we need to account for repeated observations.

$$Y_{\text{legislative-effectiveness}} = \beta_0 + \beta_{\text{state-leg}} + \beta_{\text{control}} \mid \text{factor(icpsr)}$$

Lastly, we will be creating an interaction term between the variables seniority and state-leg. An interaction term is created by taking the product of the two variables and treating them as another independent variable as seen below. In regression, we can see that the effect exists when “the effect of an independent variable on a dependent variable changes, depending on the value(s) of one or more other independent variables” (StatTrek). Once we run the interaction term between state-leg and seniority, we will be able to draw conclusions on the statistical significance of both variables within the regression, differentiating which one if any has an effect on legislative effectiveness.

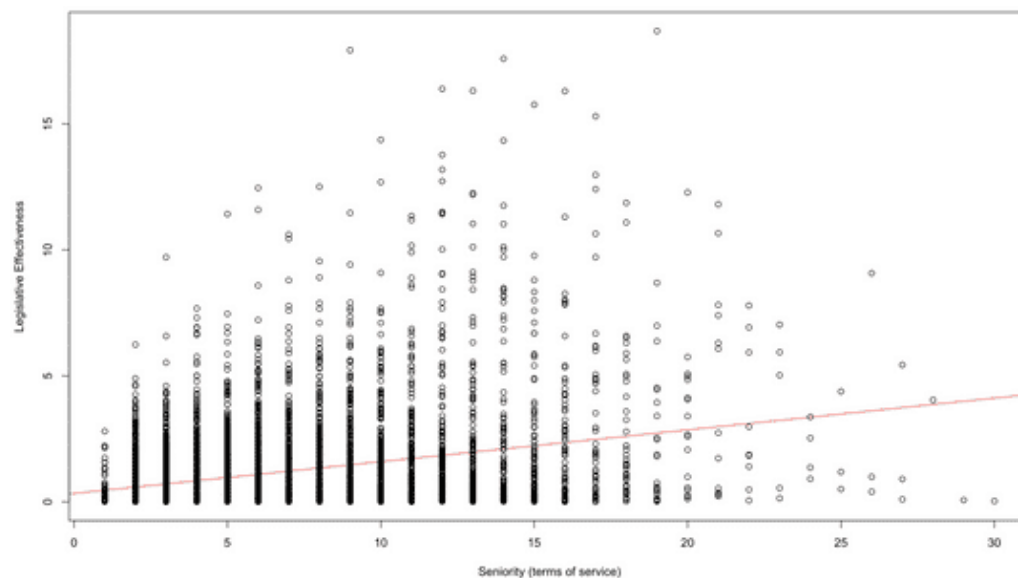
$$Y_{\text{legislative-effectiveness}} = \beta_0 + \beta_{\text{state-leg}} + \beta_{\text{control}} + \text{seniority: state - leg}$$

Data

Positive Relationship between State Legislature Service and Effectiveness Score (not significant)



Positive Relationship between Seniority and Legislative Effectiveness Score



OLS Regression w/ Controls

We are performing a regression on the Legislative Effectiveness Score (LES) on seniority. We are controlling for previous state legislative service, being in the majority party, gender, race and power. Report the intercept, the estimated coefficient, and note whether the estimated coefficients are statistically significant.

Call:

```
lm(formula = les ~ state_leg + majority + female + afam + power +
```

```

seniority, data = house)

Residuals:
    Min       1Q   Median       3Q      Max
-4.0807 -0.7447 -0.1348  0.3527 15.8561

Coefficients:
              Estimate Std. Error t value Pr(>|t|)
(Intercept) -0.225992   0.030739  -7.352  2.1e-13 ***
state_leg    0.041743   0.026474   1.577  0.114882
majority     1.029560   0.026903  38.269 < 2e-16 ***
female       0.073791   0.043133   1.711  0.087152 .
afam        -0.174441   0.051715  -3.373  0.000746 ***
power       -0.472524   0.031534 -14.984 < 2e-16 ***
seniority    0.140849   0.003314  42.498 < 2e-16 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```

Based on our results, after controlling for our different variables such as previous state legislative service, majority party member, gender, race and power, we find that our estimated coefficient is still statistically significant. We find that there is a positive relationship between a member's Legislative Effectiveness score (LES) and their Seniority.

Adding an Interaction Term:

$$Y = \beta_{stateleg} + \beta_{majority} + \beta_{female} + \beta_{afam} + \beta_{power} + \beta_{seniority} - 0.190860$$

$$Y = \beta_{stateleg} + \beta_{majority} + \beta_{female} + \beta_{afam} + \beta_{power} + \beta_{seniority} - 0.190860$$

```

fit6 <- lm(les ~ state_leg + majority + female + afam + power +
seniority + seniority:state_leg, data=House)

```

```

Call:
lm(formula = les ~ state_leg + majority + female + afam + power +
    seniority + seniority:state_leg, data = house)

```

```

Residuals:
    Min       1Q   Median       3Q      Max
-4.2285 -0.7439 -0.1346  0.3505 15.8822

```

```

Coefficients:
              Estimate Std. Error t value Pr(>|t|)
(Intercept) -0.190860   0.034994  -5.454 5.04e-08 ***

```

```

state_leg          -0.029668    0.043100   -0.688  0.491244
majority           1.028137    0.026907   38.211  < 2e-16 ***
female            0.075978    0.043139    1.761  0.078225 .
afam              -0.172033    0.051720   -3.326  0.000883 ***
power             -0.472455    0.031529  -14.985  < 2e-16 ***
seniority          0.134200    0.004584   29.278  < 2e-16 ***
state_leg:seniority 0.013515    0.006438    2.099  0.035803 *
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```

Served in State Legislature

```

-0.029668(state_leg) + 0.134200(seniority) +
0.013515(stateleg:seniority)
-0.029668(1) + 0.134200(seniority) + 0.013515(seniority)
= -0.029668 + 0.147715(seniority)

```

For every one unit increase in seniority and having served in the state legislature there is a 0.147715 increase in the legislative effectiveness score.

Did Not Serve in State Legislature

```

-0.029668(0) + 0.134200(seniority) + 0.013515(0:seniority)
= 0.134200(seniority)

```

For every one unit increase in seniority and having not served in the state legislature there is a 0.134200 increase in the legislative effectiveness score.

In order to investigate the possible effect of seniority on a Legislator's effectiveness in the House, we are running a regression analysis. By making LES the outcome variable and seniority the main explanatory variable we are able to use historical data on the effectiveness of past legislators to create statistically significant coefficients.

Adding an Interaction Term:

$Y = mx + b$

$Y = \beta_{stateleg} + \beta_{majority} + \beta_{female} + \beta_{afam} + \beta_{power} + \beta_{seniority} - 0.190860$

$Y = \beta_{stateleg} + \beta_{majority} + \beta_{female} + \beta_{afam} + \beta_{power} + \beta_{seniority} - 0.190860$

```

-0.029668(state_leg) + 0.134200(seniority) +
0.013515(stateleg:seniority)
-0.029668(1) + 0.134200(seniority) + 0.013515(seniority)
= -0.029668 + 0.147715(seniority)

```

For every one unit increase in seniority and having served in the state legislature there is a 0.147715 increase in the legislative effectiveness score.

```
-0.029668(0) + 0.134200(seniority) + 0.013515(0:seniority)
= 0.134200(seniority)
```

For every one unit increase in seniority and having not served in the state legislature there is a 0.134200 increase in the legislative effectiveness score.

Adding Fixed Effects

Member-level fixed effects

We are adding member-level fixed effects: we regress the Legislative Effectiveness score (LES) on seniority, using the same controls as previously, and including member-level fixed effects.

Call:

```
felm(formula = les ~ seniority + state_leg + majority + female +
afam + power + seniority | factor(icpsr), data = house2)
```

Residuals:

	Min	1Q	Median	3Q	Max
	-7.6658	-0.4726	-0.0267	0.3545	15.2250

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)	
seniority	0.107380	0.005264	20.398	< 2e-16	***
state_leg	-0.388140	0.953700	-0.407	0.684	
majority	1.373259	0.039541	34.730	< 2e-16	***
female	NA	NA	NA	NA	
afam	NA	NA	NA	NA	
power	-0.382358	0.075531	-5.062	4.26e-07	***

By adding member-level fixed effects in our linear regression it allows us to control for differences between members that are constant. We find that estimated coefficients are statistically significant even after adding the member-level fixed effects.

District-level fixed effects

We continue to add more fixed effects, this time district-level fixed effects.

Call:

```
felm(formula = les ~ seniority + state_leg + majority + female +
afam + power + seniority | factor(icpsr) + factor(cd), data = house2)
```

Residuals:

	Min	1Q	Median	3Q	Max
	-7.6601	-0.4695	-0.0276	0.3516	15.1690

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)	
seniority	0.113072	0.005367	21.067	< 2e-16	***
state_leg	-0.280450	0.981095	-0.286	0.775	
majority	1.350180	0.039842	33.888	< 2e-16	***
female	NA	NA	NA	NA	
afam	NA	NA	NA	NA	
power	-0.373561	0.076135	-4.907	9.5e-07	***

By adding district-level fixed effects to the regression it allow us to control for differences across districts that are constant overtime. We still find that our estimated coefficients are statistically significant even after adding the member-level and district-level fixed effects.

Congress-level fixed effects

Our last fixed effect that we are interested in adding are congress-level fixed effects.

Call:

```
felm(formula = les ~ seniority + state_leg + majority + female +
      afam + power + seniority | factor(icpsr) + factor(cd) +
      factor(congress),      data = house2)
```

Residuals:

	Min	1Q	Median	3Q	Max
	-7.5978	-0.4680	-0.0184	0.3405	15.0612

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)	
seniority	0.04524	0.02868	1.577	0.115	
state_leg	-0.26358	0.98882	-0.267	0.790	
majority	1.37302	0.03975	34.543	< 2e-16	***
female	NA	NA	NA	NA	
afam	NA	NA	NA	NA	
power	-0.36744	0.07578	-4.849	1.27e-06	***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

By adding congress-level fixed effects it allow us to control for differences across time that remain constant across units. Shockingly, we find that our estimated coefficients are not statistically significant after adding an extra layer by including the member-level, district-level AND congress-level fixed effects. Alternatively, we ran regressions with the different levels of

fixed effects separately and found significance. By running the regression with all three level fixed effects, this may affect our observations and it may have been too small to be statistically significant.

Conclusion

Our results provide insight into the effect of experience on a Congressperson's ability to be effective in the House. Specifically, we theorized that having previously served in the State Legislature would provide legislators with advantages that would allow them to propel themselves and their bills forward. We began with a simple regression including the Legislative Effectiveness score as the dependent variable, along with our independent variable state-leg. We were surprised to see that there appeared to be no statistical significance in the relationship between previous state legislature experience and the LE score. After hitting this wall, we went back to our dataset to reevaluate, and we realized that there exists more than one measure of experience. Seniority was another variable that functions as a measurement of the experience of a legislator, specifically once they are in the house. Once we identified the potential of seniority to function as our main explanatory variable, we reran the regression controlling for the same set of variables previously used and keeping the LES as the outcome. Results from the summary indicate that seniority does have a positive effect on the LES. After establishing this relationship, we sought to add fixed effects to our regression model to control for differences across time that remained constant over units. We tested three different fixed effects we believed could have skewed our data.

Finally, to control for possible confounding variables, we added interaction terms as an added checkpoint in exploring the possible relationship between experience and effectiveness. Returning to our set of variables, we decided to consider how serving in the state legislature could have affected seniority, as one comes sequentially after the other. However, after interacting with the two we saw no significant changes in the coefficients of state_leg and seniority. If adding the interaction would have caused the significance to disappear, it would have meant that one variable was causing the other to change the outcome of the les. This result is relevant because the lack of change when adding the interaction helps to strengthen the original relationship which suggests that there is a relationship between seniority and one's ability to be more effective in the House.

Having set out to explore the hypothesis that experience was a deciding factor in the success of a Congressperson, we came to several conclusions. Our initial results confirm that having previously served in the State-legislature has little to no impact on performance during a representative's term. Running the linear model with controls allowed us to identify seniority as another measure of experience that increased one's effectiveness. Adding in fixed effects ensured we were controlling for unobserved variables that change over time but remain constant over units. The results revealed no significant changes in the statistical significance until three fixed effects were included, leading us to believe that the change occurred because we subsetting our data too narrowly. Our interaction variable results confirmed that seniority played a larger role

than state legislature and neither affected one another. In the end, this exploration has led us to believe that a Congressperson's success is not determined by any one variable. Instead, we see that a Congressperson's continual service leads to seniority that comes with the ability to receive more action on their bills, pass more bills, further their agendas and ultimately become better representatives to the people they serve in their respective districts. These findings can help inform voters in looking at a member's seniority to better determine whether or not they are effective in congress but not necessarily weighing a member's previous state legislative experience. Finally, when helping voters better navigate what qualifications they should look for in their candidates, we recommend that they look at candidates through a holistic approach, not necessarily just weighing experience as the main factor in their possible effectiveness.

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