Procedure

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Importing Data

Data was collected from three sources: The Federal Election Commission, MIT Election Lab, and CQ Voting and Elections Center. The data from the MIT Election lab, which contained the results of all of the senate races from 1976 to 2018, was filtered down to include only regular general elections. Write in candidates were removed. The state_po column was renamed to match the FEC and unnecessary columns were removed.

```
RS <<- read.csv("./Code/Research and Analysis/Data/Results/1976-2018-senate.csv")
RS <<- RS%>% filter(candidate!="") %>%
  filter(special=="FALSE") %>%
  filter(stage=="gen")%>%
  filter(writein=="FALSE")
RS <<- RS[ -c(2,4,5,6,8,7,9,10,14,17,18)]
RS <<- RS%>%
  mutate(state=state_po)
RS <<- RS[ -c(2)]
RS <<- RS[,c(1,7,3,2,4,5,6)]
```

FEC Data was imported for all elections from 1990 to 2010.

```
# Import FEC Data
F90S <<- readxl::read_xlsx("./Code/Research and Analysis/Data/Fundraising/1990_Senate.xlsx", skip=3)
F92S <<- readxl::read_xlsx("./Code/Research and Analysis/Data/Fundraising/1992_Senate.xlsx", skip=3)
F94S <<- readxl::read_xlsx("./Code/Research and Analysis/Data/Fundraising/1994_Senate.xlsx", skip=3)
F96S <<- readxl::read_xlsx("./Code/Research and Analysis/Data/Fundraising/1996_Senate.xlsx", skip=3)
F98S <<- readxl::read_xlsx("./Code/Research and Analysis/Data/Fundraising/1998_Senate.xlsx", skip=3)
F00S <<- readxl::read_xlsx("./Code/Research and Analysis/Data/Fundraising/2000_Senate.xlsx", skip=3)
F02S <<- readxl::read_xlsx("./Code/Research and Analysis/Data/Fundraising/2002_Senate.xlsx", skip=3)
F04S <<- readxl::read_xlsx("./Code/Research and Analysis/Data/Fundraising/2004_Senate.xlsx", skip=3)
F06S <<- readxl::read_xlsx("./Code/Research and Analysis/Data/Fundraising/2006_Senate.xlsx", skip=3)
F08S <<- readxl::read_xlsx("./Code/Research and Analysis/Data/Fundraising/2008_Senate.xlsx", skip=3)
F10S <<- readxl::read_xlsx("./Code/Research and Analysis/Data/Fundraising/2010_Senate.xlsx", skip=3)
```

Data cleaning

State names were replaced with abbreviations in order to more easily match this data with MIT data.

```
# Correct Row Names
janitor::row_to_names(F90S,1, remove_row = TRUE)
janitor::row_to_names(F92S,1, remove_row = TRUE)
janitor::row_to_names(F94S,1, remove_row = TRUE)
janitor::row_to_names(F96S,1, remove_row = TRUE)
janitor::row_to_names(F98S,1, remove_row = TRUE)
janitor::row_to_names(F00S,1, remove_row = TRUE)
janitor::row_to_names(F02S,1, remove_row = TRUE)
janitor::row_to_names(F04S,1, remove_row = TRUE)
janitor::row_to_names(F06S,1, remove_row = TRUE)
```

```
janitor::row_to_names(F08S,1, remove_row = TRUE)
janitor::row_to_names(F10S,1, remove_row = TRUE)
# Change State Names to Abbreviations
F90S <<- F90S%>%mutate(state=state.abb[match(F90S$State,state.name)])
F92S <<- F92S %>%mutate(state=state.abb[match(F92S$State,state.name)])
F94S <<- F94S %>%mutate(state=state.abb[match(F94S$State,state.name)])
F96S <<- F96S %>%mutate(state=state.abb[match(F96S$State,state.name)])
F98S <<- F98S %>%mutate(state=state.abb[match(F98S$State,state.name)])
F00S <<- F00S %>%mutate(state=state.abb[match(F00S$State,state.name)])
F02S <<- F02S %>%mutate(state=state.abb[match(F02S$State,state.name)])
F04S <<- F04S %>%mutate(state=state.abb[match(F04S$State,state.name)])
F06S <<- F06S %>%mutate(state=state.abb[match(F06S$State,state.name)])
F08S <<- F08S %>%mutate(state=state.abb[match(F08S$State,state.name)])
F10S <<- F10S %>%mutate(state=state.abb[match(F10S$State,state.name)])
```

Since FEC Data for senate races is grouped in two year cycles, candidates, particularly incumbents, often have multiple fundraising rows on the table. New tables were created from the FEC data and grouped by candidate. The fundraising totals for each candidate in each six year cycle were calculated, and the tables were re-joined. The fundraising tables for each cycle were subsequently combined.

```
# Create new Tables grouped by candidate
C90S <<- F90S %>%group_by(Candidate)
C92S <<- F92S %>%group_by(Candidate)
C94S <<- F94S %>%group_by(Candidate)
C96S <<- F96S %>%group_by(Candidate)
C98S <<- F98S %>%group_by(Candidate)
C00S <<- F00S %>%group_by(Candidate)
C02S <<- F02S %>%group_by(Candidate)
C04S <<- F04S %>%group_by(Candidate)
C06S <<- F06S %>%group_by(Candidate)
C08S <<- F08S %>%group_by(Candidate)
C10S <<- F10S %>%group_by(Candidate)
# Remove Unnecessary Columns
C90S<<-C90S[ -c(1,2,6,7,8,9,10,11,12,13,14)]
C92S<<-C92S[ -c(1,2,6,7,8,9,10,11,12,13,14)]
C94S<<-C94S[ -c(1,2,6,7,8,9,10,11,12,13,14)]
C96S<<-C96S[ -c(1,2,6,7,8,9,10,11,12,13,14)]
C98S<<-C98S[ -c(1,2,6,7,8,9,10,11,12,13,14)]
C00S<<-C00S[ -c(1,2,6,7,8,9,10,11,12,13,14)]
C02S<<-C02S[ -c(1,2,6,7,8,9,10,11,12,13,14)]
C04S<<-C04S[ -c(1,2,6,7,8,9,10,11,12,13,14)]
C06S<<-C06S[ -c(1,2,6,7,8,9,10,11,12,13,14)]
C08S<<-C08S[ -c(1,2,6,7,8,9,10,11,12,13,14)]
C10S<<-C10S[ -c(1,2,6,7,8,9,10,11,12,13,14)]
# Get Fundraising totals for candidates
F90S <<- F90S %>%
  group_by(Candidate) %>%
  summarise(
    raised=sum(Receipts),
    spent=sum(Disbursements))%>%
  mutate(year=1990)
F92S <<- F92S %>%
  group_by(Candidate) %>%
```

```
  summarise(
    raised=sum(Receipts),
    spent=sum(Disbursements))%>%
  mutate(year=1992)
F94S <- F94S %>%
  group_by(Candidate) %>%
  summarise(
    raised=sum(Receipts),
    spent=sum(Disbursements))%>%
  mutate(year=1994)
F96S <- F96S %>%
  group_by(Candidate) %>%
  summarise(
    raised=sum(Receipts),
    spent=sum(Disbursements))%>%
  mutate(year=1996)
F98S <- F98S %>%
  group_by(Candidate) %>%
  summarise(
    raised=sum(Receipts),
    spent=sum(Disbursements))%>%
  mutate(year=1998)
F00S <- F00S %>%
  group_by(Candidate) %>%
  summarise(
    raised=sum(Receipts),
    spent=sum(Disbursements))%>%
  mutate(year=2000)
F02S <- F02S %>%
  group_by(Candidate) %>%
  summarise(
    raised=sum(Receipts),
    spent=sum(Disbursements))%>%
  mutate(year=2002)
F04S <- F04S %>%
  group_by(Candidate) %>%
  summarise(
    raised=sum(Receipts),
    spent=sum(Disbursements)) %>%
  mutate(year=2004)
F06S <- F06S %>%
  group_by(Candidate) %>%
  summarise(
    raised=sum(Receipts),
    spent=sum(Disbursements))%>%
  mutate(year=2006)
F08S <- F08S %>%
  group_by(Candidate) %>%
  summarise(
    raised=sum(Receipts),
    spent=sum(Disbursements))%>%
  mutate(year=2008)
F10S <- F10S %>%
```

```
  group_by(Candidate) %>%
  summarise(
    raised=sum(Receipts),
    spent=sum(Disbursements))%>%
  mutate(year=2010)
# Join tibbles
F90S<<-inner_join(F90S,C90S)
F92S<<-inner_join(F92S,C92S)
F94S<<-inner_join(F94S,C94S)
F96S<<-inner_join(F96S,C96S)
F98S<<-inner_join(F98S,C98S)
F00S<<-inner_join(F00S,C00S)
F02S<<-inner_join(F02S,C02S)
F04S<<-inner_join(F04S,C04S)
F06S<<-inner_join(F06S,C06S)
F08S<<-inner_join(F08S,C08S)
F10S<<-inner_join(F10S,C10S)
# Combine Fundraising Lists
FS1<<-full_join(F90S,F92S)
FS2<<-full_join(FS1,F94S)
FS3<<-full_join(FS2,F96S)
FS4<<-full_join(FS3,F98S)
FS5<<-full_join(FS4,F00S)
FS6<<-full_join(FS5,F02S)
FS7<<-full_join(FS6,F04S)
FS8<<-full_join(FS7,F06S)
FS9<<-full_join(FS8,F08S)
FS<<-full_join(FS9,F10S)
```

One of the biggest challenges associated with FEC data is the lack of standardized candidate names. In order to correct this, the Candidate names were then divided into first and last names. This will simplify the process of joining these tables with the MIT results Data.

```
# Standardizing candidate names ------------------------------------------------------------------
FS <<- FS%>%mutate(last_name=Candidate)
FS <<- FS%>%mutate(first_name=Candidate)
FS <<- FS%>%mutate(first_name=sub('.*,\\s*','', FS$first_name))
FS <<- FS%>%mutate(last_name=sub('\\s*,.*','', FS$last_name))
FS <<- FS%>%mutate(first_name=sub("\\s+\\S+$", '', FS$first_name))
FS <<- FS%>%mutate(first_name=sub("\\s+\\S+$", '', FS$first_name))
FS <<- FS%>%mutate(first_name=sub("\\s+\\S+$", '', FS$first_name))
FS <<- FS%>%mutate(first_name=sub("\\s+\\S+$", '', FS$first_name))
FS<<-FS%>%mutate(candidate=paste(FS$first_name,FS$last_name))
FS <<- FS[ -c(1)]
FS <<- FS[,c(3,6,4,9,5,1,2,8,7)]
#Save this as a new tibble to save time
FSN<<-FS
```

The FEC Data also contained party names which were inconsistent with those in the MIT results tables. Certain states, such as minnesota, have state parties with slightly different names than the national parties with which they are affiliated. This was corrected to simplify the process of joining these tables with the MIT results Data.

```
# Standardizing Party Names ------------------------------------------------
FS <<- FS %>%
  mutate(Party=sub(" Party", '', FS$Party))%>%
  mutate(party=Party)
FS <<- FS[ -c(3)]
FS <<- FS[,c(1,2,9,3,4,5,6,7,8)]
FS <<- FS %>%mutate(party=sub("Democratic-Farm-Labor", 'democrat', FS$party))
FS <<- FS %>%
  mutate(party=sub("Democratic", 'democrat', FS$party))%>%
  mutate(party=tolower(party))
#Some Duplicates were created during this process, likely due to running joins more than once. The dist
FS <<- distinct(FS)
FS <<- FS[,c(1,2,3,9,5,6,7,8)]
```

The MIT Data also needed work before it could be joined with the FEC Data. First, candidates who belonged to third parties or to no party were removed. The time frame was narrowed to the period between 1990-2010. A new column was created with each candidate's share of the vote. Candidates who recieved less than ten percent, or greater than ninety percent of the vote were removed as these races are particularly non-competative and could produce outliers which artificially skew the data. As with FEC data, new columns were made with the candidates' last names. Finally, states with jungle primaries were removed, as these states can have elections in which both candidates belong to the same party. Analyzing such elections would require intensive research in order to determine the ideological factors at play, as well as the development of new methods to quantify said factors.

```
# Results Name Matching ----------------------------------------------------
RS <<- distinct(RS)
RSALL<<-RS
RSR <<-RS%>%filter(party =="republican")
RSD <<-RS%>%filter(party =="democrat")
RS<<-full_join(RSR,RSD)
RS<<-RS%>%
  filter(year >=1990)%>%
  filter(year <=2010)
RS<<-RS%>%mutate(percentage=candidatevotes/totalvotes)
RS<<-RS%>%filter(percentage >=.1)
RS<<-RS%>%filter(percentage <=.9)
#Create new column with candidate last names
RS <<- RS %>%mutate(last_name=candidate)
RS <<- RS %>%mutate(last_name=sub(".*? ", "", RS$last_name))
RS <<- RS %>%mutate(last_name=sub(".*? ", "", RS$last_name))
RS <<- RS %>%mutate(last_name=sub(".*? ", "", RS$last_name))
RS <<- RS %>%mutate(last_name=sub(".*? ", "", RS$last_name))
RS <<- RS %>%mutate(last_name=sub(".*? ", "", RS$last_name))
RS <<- RS %>%mutate(last_name=sub(".*? ", "", RS$last_name))
RS <<- RS %>%mutate(last_name=toupper(last_name))
#Remove un-necessary and redundant columns
RS <<- RS[,c(1,2,3,9,4,5,6,7,8)]
# Remove states with jungle primaries
RSNJ<<-RS%>%
  filter(state !="AK")%>%
  filter(state !="WA")%>%
  filter(state !="CA")%>%
  filter(state !="LA")
```

```
Senate1<<-left_join(RSNJ,FS)
Senate1<<-distinct(Senate1)
```

In order to get a better idea of a candidate's performance, the previous election results are calculated.

```
# Add Pervious Election Data ------------------------------------------------
RSREF<<-full_join(RSR,RSD)
RSREF<<-RSREF%>%mutate(previous_percentage=candidatevotes/totalvotes)
RSREF<<-RSREF%>%
  filter(state !="AK")%>%
  filter(state !="WA")%>%
  filter(state !="CA")%>%
  filter(state !="LA")
RSREF<<-RSREF[ -c(4,5,6,7)]
RSREF<<-RSREF%>%mutate(year=year+6)
Senate2<<-left_join(Senate1,RSREF)
# Calculate Demonstrated PVI's from previous results and current r
Senate3 <<- Senate2%>%
  mutate(Previous_RPVI=previous_percentage-.5)%>%
  mutate(Previous_RPVI=2*Previous_RPVI)%>%
  mutate(RPVI=percentage-.5)%>%
  mutate(RPVI=2*RPVI)
Senate3<<-unique(Senate3)
Senate3<<-Senate3[ -c(6,13)]
```

Some duplicate data was created when the results and fundraising data was joined. The fundraising totals were re-calculated to ensure that no duplicate data remains.

```
# Re-divide fundraising into years ------------------------------------------
R90S<<-Senate3%>%filter(year==1990)
R92S<<-Senate3%>%filter(year==1992)
R94S<<-Senate3%>%filter(year==1994)
R96S<<-Senate3%>%filter(year==1996)
R98S<<-Senate3%>%filter(year==1998)
R00S<<-Senate3%>%filter(year==2000)
R02S<<-Senate3%>%filter(year==2002)
R04S<<-Senate3%>%filter(year==2004)
R06S<<-Senate3%>%filter(year==2006)
R08S<<-Senate3%>%filter(year==2008)
R10S<<-Senate3%>%filter(year==2010)
# Group By Candidate again --------------------------------------------------
C90S <<- R90S %>%
  group_by(candidate)%>%
  summarise(
    rcpt=sum(raised),
    disb=sum(spent))
C92S <<- R92S %>%
  group_by(candidate)%>%
  summarise(
    rcpt=sum(raised),
    disb=sum(spent))
C94S <<- R94S %>%
  group_by(candidate)%>%
```

```
  summarise(
    rcpt=sum(raised),
    disb=sum(spent))
C96S <<- R96S %>%
  group_by(candidate)%>%
  summarise(
    rcpt=sum(raised),
    disb=sum(spent))
C98S <<- R98S %>%
  group_by(candidate)%>%
  summarise(
    rcpt=sum(raised),
    disb=sum(spent))
C00S <<- R00S %>%
  group_by(candidate)%>%
  summarise(
    rcpt=sum(raised),
    disb=sum(spent))
C02S <<- R02S %>%
  group_by(candidate)%>%
  summarise(
    rcpt=sum(raised),
    disb=sum(spent))
C04S <<- R04S %>%
  group_by(candidate)%>%
  summarise(
    rcpt=sum(raised),
    disb=sum(spent))
C06S <<- R06S %>%
  group_by(candidate)%>%
  summarise(
    rcpt=sum(raised),
    disb=sum(spent))
C08S <<- R08S %>%
  group_by(candidate)%>%
  summarise(
    rcpt=sum(raised),
    disb=sum(spent))
C10S <<- R10S %>%
  group_by(candidate)%>%
  summarise(
    rcpt=sum(raised),
    disb=sum(spent))
# Re-join with results ------------------------------------------------
R90S<<-left_join(R90S,C90S)
R92S<<-left_join(R92S,C92S)
R94S<<-left_join(R94S,C94S)
R96S<<-left_join(R96S,C96S)
R98S<<-left_join(R98S,C98S)
R00S<<-left_join(R00S,C00S)
R02S<<-left_join(R02S,C02S)
R04S<<-left_join(R04S,C04S)
R06S<<-left_join(R06S,C06S)
```

```
R08S<<-left_join(R08S,C08S)
R10S<<-left_join(R10S,C10S)
# Re-name fundraising columns ---------------------------------------------
R90S<<-R90S%>%
  mutate(raised=rcpt)%>%
  mutate(spent=disb)
R92S<<-R92S%>%
  mutate(raised=rcpt)%>%
  mutate(spent=disb)
R94S<<-R94S%>%
  mutate(raised=rcpt)%>%
  mutate(spent=disb)
R96S<<-R96S%>%
  mutate(raised=rcpt)%>%
  mutate(spent=disb)
R98S<<-R98S%>%
  mutate(raised=rcpt)%>%
  mutate(spent=disb)
R00S<<-R00S%>%
  mutate(raised=rcpt)%>%
  mutate(spent=disb)
R02S<<-R02S%>%
  mutate(raised=rcpt)%>%
  mutate(spent=disb)
R04S<<-R04S%>%
  mutate(raised=rcpt)%>%
  mutate(spent=disb)
R06S<<-R06S%>%
  mutate(raised=rcpt)%>%
  mutate(spent=disb)
R08S<<-R08S%>%
  mutate(raised=rcpt)%>%
  mutate(spent=disb)
R10S<<-R10S%>%
  mutate(raised=rcpt)%>%
  mutate(spent=disb)
# Remove un-necessary columns ---------------------------------------------
R90S<<-R90S[ -c(15,16)]
R92S<<-R92S[ -c(15,16)]
R94S<<-R94S[ -c(15,16)]
R96S<<-R96S[ -c(15,16)]
R98S<<-R98S[ -c(15,16)]
R00S<<-R00S[ -c(15,16)]
R02S<<-R02S[ -c(15,16)]
R04S<<-R04S[ -c(15,16)]
R06S<<-R06S[ -c(15,16)]
R08S<<-R08S[ -c(15,16)]
R10S<<-R10S[ -c(15,16)]
# remove duplicate data ---------------------------------------------------
R90S<<-unique(R90S)
R92S<<-unique(R92S)
R94S<<-unique(R94S)
R96S<<-unique(R96S)
```

```
R98S<<-unique(R98S)
R00S<<-unique(R00S)
R02S<<-unique(R02S)
R04S<<-unique(R04S)
R06S<<-unique(R06S)
R08S<<-unique(R08S)
R10S<<-unique(R10S)
```

The fundraising totals from each state are calculated and the candidate's share of the spending was calculated from these totals.

```
# Get totals for each state ------------------------------------------------
#Create new tibbles for each year
S90S<<-R90S
S92S<<-R92S
S94S<<-R94S
S96S<<-R96S
S98S<<-R98S
S00S<<-R00S
S02S<<-R02S
S04S<<-R04S
S06S<<-R06S
S08S<<-R08S
S10S<<-R10S
# Get totals for each state
S90S <<- S90S %>%
  group_by(state) %>%
  summarise(
    total_raised=sum(raised),
    total_spent=sum(spent))
S92S <<- S92S %>%
  group_by(state) %>%
  summarise(
    total_raised=sum(raised),
    total_spent=sum(spent))
S94S <<- S94S %>%
  group_by(state) %>%
  summarise(
    total_raised=sum(raised),
    total_spent=sum(spent))
S96S <<- S96S %>%
  group_by(state) %>%
  summarise(
    total_raised=sum(raised),
    total_spent=sum(spent))
S98S <<- S98S %>%
  group_by(state) %>%
  summarise(
    total_raised=sum(raised),
    total_spent=sum(spent))
S00S <<- S00S %>%
  group_by(state) %>%
  summarise(
```

```
    total_raised=sum(raised),
    total_spent=sum(spent))
S02S <<- S02S %>%
  group_by(state) %>%
  summarise(
    total_raised=sum(raised),
    total_spent=sum(spent))
S04S <<- S04S %>%
  group_by(state) %>%
  summarise(
    total_raised=sum(raised),
    total_spent=sum(spent))
S06S <<- S06S %>%
  group_by(state) %>%
  summarise(
    total_raised=sum(raised),
    total_spent=sum(spent))
S08S <<- S08S %>%
  group_by(state) %>%
  summarise(
    total_raised=sum(raised),
    total_spent=sum(spent))
S10S <<- R10S %>%
  group_by(state)%>%
  summarise(
    total_raised=sum(raised),
    total_spent=sum(spent))
#Remove duplicates
S90S <<- distinct(S90S)
S92S <<- distinct(S92S)
S94S <<- distinct(S94S)
S96S <<- distinct(S96S)
S98S <<- distinct(S98S)
S00S <<- distinct(S00S)
S02S <<- distinct(S02S)
S04S <<- distinct(S04S)
S06S <<- distinct(S06S)
S08S <<- distinct(S08S)
S10S <<- distinct(S10S)
#Join tibbles
R90S<<-left_join(R90S,S90S)
R92S<<-left_join(R92S,S92S)
R94S<<-left_join(R94S,S94S)
R96S<<-left_join(R96S,S96S)
R98S<<-left_join(R98S,S98S)
R00S<<-left_join(R00S,S00S)
R02S<<-left_join(R02S,S02S)
R04S<<-left_join(R04S,S04S)
R06S<<-left_join(R06S,S06S)
R08S<<-left_join(R08S,S08S)
R10S<<-left_join(R10S,S10S)
```

The data was filtered again to include only races in which a Democrat and a Republican are running. This

will ensure that candidates running without a major party opponent do not skew the data. The table was exported.

```
# Two candidates only ----------------------------------------------------
#Create new tibbles to count number of candidates in each state
CN90S<<-R90S%>% count(state)
CN92S<<-R92S%>% count(state)
CN94S<<-R94S%>% count(state)
CN96S<<-R96S%>% count(state)
CN98S<<-R98S%>% count(state)
CN00S<<-R00S%>% count(state)
CN02S<<-R02S%>% count(state)
CN04S<<-R04S%>% count(state)
CN06S<<-R06S%>% count(state)
CN08S<<-R08S%>%count(state)
CN10S<<-R10S%>%count(state)
#Join number of candidates column
R90S<<-left_join(R90S,CN90S)
R92S<<-left_join(R92S,CN92S)
R94S<<-left_join(R94S,CN94S)
R96S<<-left_join(R96S,CN96S)
R98S<<-left_join(R98S,CN98S)
R00S<<-left_join(R00S,CN00S)
R02S<<-left_join(R02S,CN02S)
R04S<<-left_join(R04S,CN04S)
R06S<<-left_join(R06S,CN06S)
R08S<<-left_join(R08S,CN08S)
R10S<<-left_join(R10S,CN10S)
#Only look at states with a republican and a democrat running
R90S<<-R90S%>%filter(n==2)
R92S<<-R92S%>%filter(n==2)
R94S<<-R94S%>%filter(n==2)
R96S<<-R96S%>%filter(n==2)
R98S<<-R98S%>%filter(n==2)
R00S<<-R00S%>%filter(n==2)
R02S<<-R02S%>%filter(n==2)
R04S<<-R04S%>%filter(n==2)
R06S<<-R06S%>%filter(n==2)
R08S<<-R08S%>%filter(n==2)
R10S<<-R10S%>%filter(n==2)
#get rid of N column
R90S<<-R90S[-c(17)]
R92S<<-R92S[-c(17)]
R94S<<-R94S[-c(17)]
R96S<<-R96S[-c(17)]
R98S<<-R98S[-c(17)]
R00S<<-R00S[-c(17)]
R02S<<-R02S[-c(17)]
R04S<<-R04S[-c(17)]
R06S<<-R06S[-c(17)]
R08S<<-R08S[-c(17)]
R10S<<-R10S[-c(17)]
# JOIN SECTIONS ----------------------------------------------------------
S4A<<-full_join(R90S,R92S)
```

```
S4B<<-full_join(S4A,R94S)
S4C<<-full_join(S4B,R96S)
S4D<<-full_join(S4C,R98S)
S4E<<-full_join(S4D,R00S)
S4F<<-full_join(S4E,R02S)
S4G<<-full_join(S4F,R04S)
S4H<<-full_join(S4G,R06S)
S4I<<-full_join(S4H,R08S)
Senate4<<-full_join(S4I,R10S)
# Fundraising Wrangling ----------------------------------------------------
Senate4 <<- Senate4%>%mutate(share_of_spent=spent/total_spent)
#Export Data
write.table(Senate4, "./Tables/Senate.csv", sep="\t")
```

The years were changed to not include the 2010. The rise of citizens united made it much more challenging to accurately depict fundraising based on what a candidate raises.

```
library("tidyverse")
Senate5<<- read.csv("./Tables/Senate.csv", sep="\t")
Senate5<<-Senate5%>%
  filter(year<=2008)
#Export Data
write.table(Senate5, "./Tables/Senate.csv", sep="\t")
```

The national congressional popular vote was imported from CQ election center. A new column was added to the table showing the national popular vote six years prior. This will make it easy to factor in the change in a national political environment over the course of a Senate term.

```
yp18 <- read.csv("./Code/Research and Analysis/Data/export copy 4.csv", skip=55)
yp16 <- read.csv("./Code/Research and Analysis/Data/export-2 copy 3.csv", skip=55)
yp14 <- read.csv("./Code/Research and Analysis/Data/export-3 copy 3.csv", skip=54)
yp12 <- read.csv("./Code/Research and Analysis/Data/export-4 copy.csv", skip=55)
yp10 <- read.csv("./Code/Research and Analysis/Data/export.csv", skip=54)
yp08 <- read.csv("./Code/Research and Analysis/Data/export-2.csv", skip=54)
yp06 <- read.csv("./Code/Research and Analysis/Data/export-3.csv", skip=56)
yp04 <- read.csv("./Code/Research and Analysis/Data/export copy.csv", skip=55)
yp02 <- read.csv("./Code/Research and Analysis/Data/export-2 copy.csv", skip=55)
yp00 <- read.csv("./Code/Research and Analysis/Data/export-3 copy.csv", skip=54)
yp98 <- read.csv("./Code/Research and Analysis/Data/export-4.csv", skip=54)
yp96 <- read.csv("./Code/Research and Analysis/Data/export-5.csv", skip=55)
yp94 <- read.csv("./Code/Research and Analysis/Data/export-6.csv", skip=54)
yp92 <- read.csv("./Code/Research and Analysis/Data/export-7.csv", skip=55)
yp90 <- read.csv("./Code/Research and Analysis/Data/export-8.csv", skip=55)
yp88 <- read.csv("./Code/Research and Analysis/Data/export copy 3.csv", skip=55)
yp86 <- read.csv("./Code/Research and Analysis/Data/export-2 copy 2.csv", skip=55)
yp84 <- read.csv("./Code/Research and Analysis/Data/export-3 copy 2.csv", skip=54)
#Remove un-necessary columns
yp18<-yp18[ -c(1:14)]
yp16<-yp16[ -c(1:14)]
yp14<-yp14[ -c(1:14)]
yp12<-yp12[ -c(1:14)]
yp10<-yp10[ -c(1:14)]
yp08<-yp08[ -c(1:14)]
```

```
yp06<-yp06[ -c(1:14)]
yp04<-yp04[ -c(1:14)]
yp02<-yp02[ -c(1:14)]
yp00<-yp00[ -c(1:14)]
yp98<-yp98[ -c(1:14)]
yp96<-yp96[ -c(1:14)]
yp94<-yp94[ -c(1:14)]
yp92<-yp92[ -c(1:14)]
yp90<-yp90[ -c(1:14)]
yp88<-yp88[ -c(1:14)]
yp86<-yp86[ -c(1:14)]
yp84<-yp84[ -c(1:14)]

yp18<-yp18%>%mutate(year=2018)
yp16<-yp16%>%mutate(year=2016)
yp14<-yp14%>%mutate(year=2014)
yp12<-yp12%>%mutate(year=2012)
yp10<-yp10%>%mutate(year=2010)
yp08<-yp08%>%
  mutate(year=2008)
yp06<-yp06%>%
  mutate(year=2006)
yp04<-yp04%>%
  mutate(year=2004)
yp02<-yp02%>%
  mutate(year=2002)
yp00<-yp00%>%
  mutate(year=2000)
yp98<-yp98%>%
  mutate(year=1998)
yp96<-yp96%>%
  mutate(year=1996)
yp94<-yp94%>%
  mutate(year=1994)
yp92<-yp92%>%
  mutate(year=1992)
yp90<-yp90%>%
  mutate(year=1990)
yp88<-yp88%>%
  mutate(year=1988)
yp86<-yp86%>%
  mutate(year=1986)
yp84<-yp84%>%
  mutate(year=1984)

yp1<-full_join(yp90, yp92)
yp2<-full_join(yp1, yp94)
yp3<-full_join(yp2, yp96)
yp4<-full_join(yp3, yp98)
yp5<-full_join(yp4, yp00)
yp6<-full_join(yp5, yp02)
yp7<-full_join(yp6, yp04)
yp8<-full_join(yp7, yp06)
```

```
yp9<-full_join(yp8, yp08)
yp11<-full_join(yp9, yp10)
yp13<-full_join(yp11, yp12)
yp15<-full_join(yp13, yp14)
yp17<-full_join(yp15, yp16)
yp19<-full_join(yp17, yp18)
yp20<-full_join(yp88, yp19)
yp21<-full_join(yp86, yp20)
yp<<-full_join(yp84, yp21)

ypp<-yp%>%
  mutate(year=year+6)%>%
  mutate(YPPVI=0.01*(DemVotesMajorPercentAll-RepVotesMajorPercentAll))
ypp<-ypp[ -c(1:2)]
yp<<-yp%>%
  mutate(YPVI=0.01*(DemVotesMajorPercentAll-RepVotesMajorPercentAll))

yp<<-yp[ -c(1:2)]
yp<<-full_join(yp, ypp)
yp<<-yp%>%
mutate(YPM=(YPVI-YPPVI))

write.table(yp, "./Tables/ypvi.csv", sep="\t")
#The data is then joined to the master table
Senate7<-full_join(Senate4,yp)
Senate7<-Senate7%>%
  mutate(YPVI2=ifelse(party=="republican",YPM*-1,YPM*1))
#Update incumbency name
names(Senate7)[9]<-"ICO"
Senate7<<-Senate7
Senate7<<-Senate7%>%
  mutate(Inc=ifelse(ICO == "Incumbent",TRUE,FALSE))%>%
  mutate(Open=ifelse(ICO == "Open",TRUE,FALSE))
Senate7<<-Senate7%>%
  mutate(AInc=ifelse(Inc == FALSE & Open ==FALSE,TRUE,FALSE))
write.table(Senate7, "./Tables/Senate.csv", sep="\t")
```