

Rose's Work for Final Report

Rose Evard

2023-04-27

```
# make kable table with consistent formatting
make_table <- function(..., title = "", col_names = c("")) {
  df <- as.data.frame(...)
  title <- paste0("<center><span style = 'font-size:150%;color:black'><b>",
                 title,
                 "</span></b><center>")
  as_tibble(df) %>%
  kbl(caption = title,
      col.names = col_names) %>%
  kable_material() %>%
  row_spec(row=0, background = "#43494C", color = "white", bold = TRUE)
}
```

```
#####
# CREATE BIG PALETTE WITH MANY COLORS
#####
pal1 <- viridis_pal(option="mako", end = .9)(12)
pal2 <- viridis_pal(option="rocket", end = .8)(12)
pal3 <- viridis_pal(option="magma", end = .9)(12)
pal4 <- viridis_pal(option="inferno", end = .8)(12)
set.seed(123)
pal <- c(pal1, pal2, pal3, pal4)
indexes <- sample.int(length(pal), replace=FALSE)
pal <- pal[indexes]
```

```
## Loading in data
endowment_data <- read_rds(here("data", "endowments_by_most_recent_filings.RDS"))
names <- readRDS(here("data", "companies.RDS"))
names <- names %>%
  mutate(organization_name = ifelse(
    organization_name == "Ballet Hispanico",
    "Ballet Hispánico",
    organization_name))
```

Calculating Percent Change

Including Investments

(End Year Balance - Beginning Year Balance) / Beginning Year Balance * 100

If EYB is larger, positive result. Meaning there was a INCREASE in total funds.
 If BYB is larger, negative result. Meaning a DECREASE in total funds.
 If result is above 100, the fund was at least DOUBLED.

```
#### USE THIS
## (EYB - BYB)/BYB * 100
## Rose has notes on her choice for this calculation
pct_change_ds <- endowment_data %>%
  filter(!is.na(BeginningYearBalanceAmt)) %>%
  mutate(change = EndYearBalanceAmt - BeginningYearBalanceAmt,
         pct_change = change/BeginningYearBalanceAmt * 100) %>%
  arrange(desc(pct_change)) %>%
  left_join(names, by = "EIN")
```

REMOVING Investments

$$\frac{(\text{End Year Balance} - \text{Investment Earnings or Losses Amount} - \text{Beginning Year Balance})}{\text{Beginning Year Balance}} * 100$$

Positive result: INCREASE in total funds.
 Negative result: DECREASE in total funds.
 If result is above 100, the fund was at least DOUBLED.

```
#### USE THIS
## (EYB - INV - BYB)/BYB * 100
## Rose has notes on her choice for this calculation
pct_change_inv_ds <- endowment_data %>%
  filter(!is.na(BeginningYearBalanceAmt)) %>%
  mutate(InvestmentEarningsOrLossesAmt = ifelse(is.na(InvestmentEarningsOrLossesAmt), 0, InvestmentEarningsOrLossesAmt),
         change = EndYearBalanceAmt - InvestmentEarningsOrLossesAmt - BeginningYearBalanceAmt,
         pct_change = change/BeginningYearBalanceAmt * 100) %>%
  arrange(desc(pct_change)) %>%
  left_join(names, by = "EIN")
```

Summarizing Information

With investments

```
# Basic summary stats
pct_change_ds %>%
  filter(!is.na(pct_change) & pct_change != Inf) %>%
  summarize(avg_pct_change = mean(pct_change),
            median_pct_change = median(pct_change),
            sd_pct_change = sd(pct_change))
```

```
## # A tibble: 1 x 3
##   avg_pct_change median_pct_change sd_pct_change
##   <dbl>           <dbl>           <dbl>
## 1      30.6         2.07           201.
```

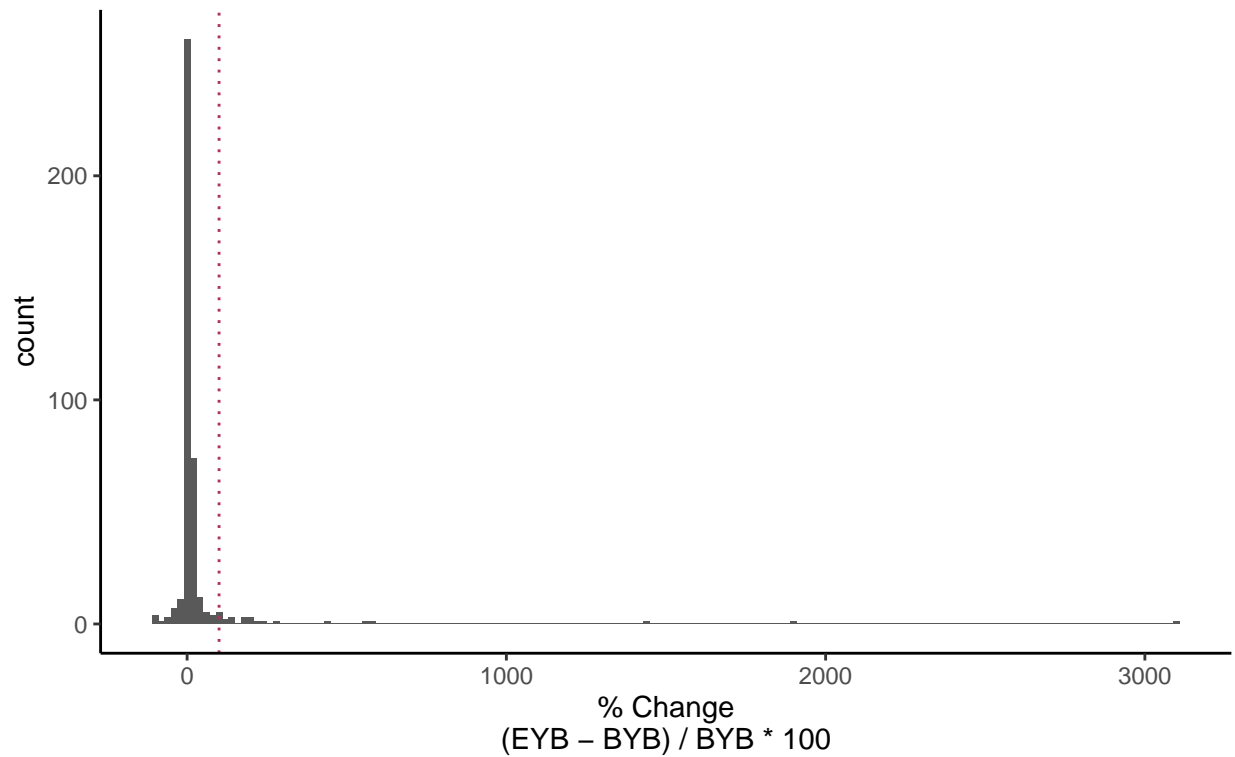
```
pct_change_ds %>%
  filter(!is.na(pct_change) & pct_change != Inf) %>%
  group_by(EIN) %>%
  summarize(avg_pct_change = mean(pct_change),
            median_pct_change = median(pct_change),
            sd_pct_change = sd(pct_change))
```

```
## # A tibble: 46 x 4
##   EIN      avg_pct_change median_pct_change sd_pct_change
##   <chr>          <dbl>          <dbl>          <dbl>
## 1 042312734      9.68            7.33           10.4
## 2 131882106      4.66            3.91            6.48
## 3 132584273      7.02            7.46            7.71
## 4 132642091       0              0              0
## 5 132685755     45.4            1.54          129.
## 6 132947386      4.08            4.07            8.90
## 7 210732575     14.3              0             22.9
## 8 231629970     -0.685           0.0719          5.43
## 9 237101094      3.84            5.84           12.0
## 10 237247909     11.8            6.39           15.0
## # i 36 more rows
```

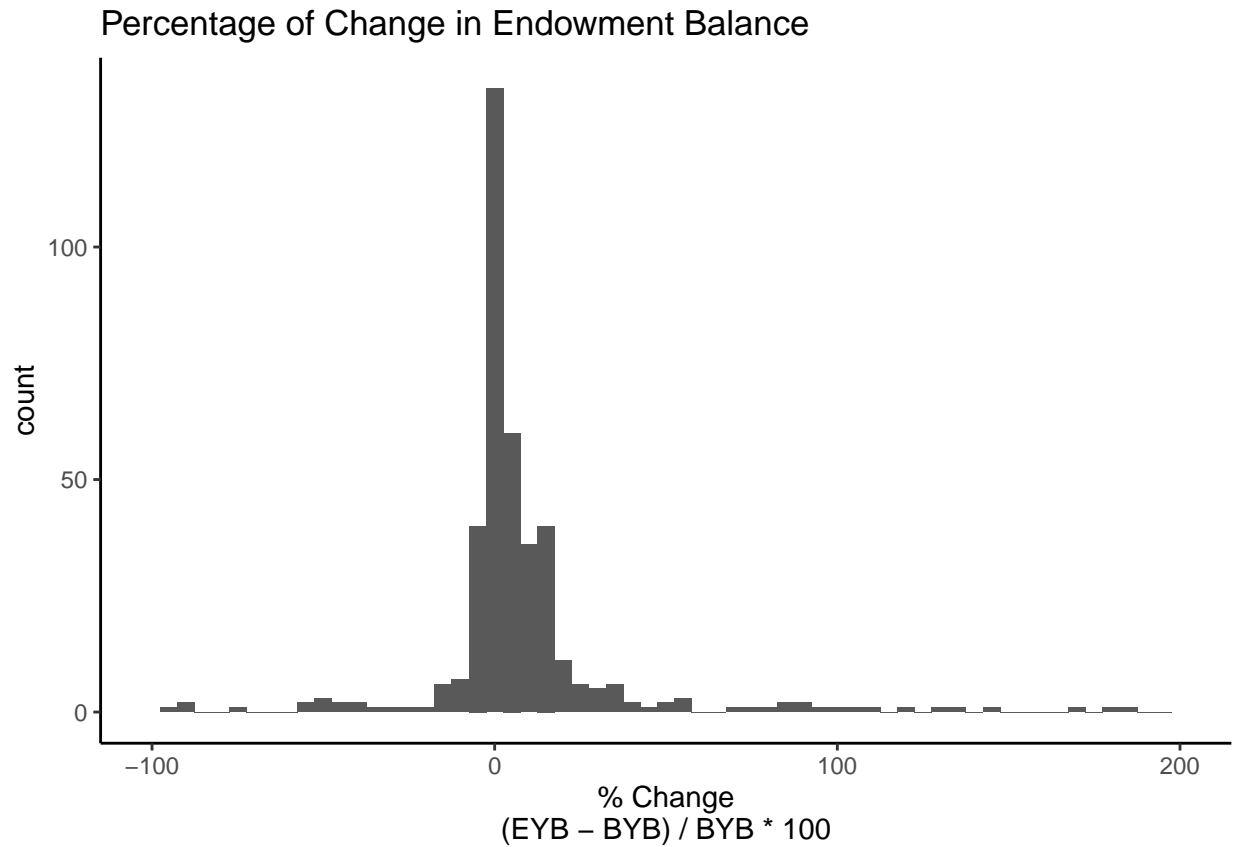
```
# Basic histogram summarizing it
ggplot(pct_change_ds, aes(x = pct_change)) +
  geom_histogram(binwidth = 20) +
  xlab("% Change\n(EYB - BYB) / BYB * 100") +
  ggtitle(label = "Percentage of Change in Endowment Balance", subtitle = "Red Line indicates 100%") +
  theme_classic() +
  geom_vline(xintercept = 100, color = "maroon", linetype = "dotted")
```

Percentage of Change in Endowment Balance

Red Line indicates 100%



```
## Histogram with cutoff of 200%
ggplot(pct_change_ds, aes(x = pct_change)) +
  geom_histogram(binwidth = 5) +
  xlab("% Change\n(EYB - BYB) / BYB * 100") +
  xlim(-100, 200) +
  ggtitle(label = "Percentage of Change in Endowment Balance") +
  theme_classic()
```



```
pct_change_ds %>%
  filter(pct_change != Inf) %>%
  select(organization_name, fiscal_year, pct_change) %>%
  make_table(title = "Percentage of Change in Endowment Balance", col_names = c("Name", "Fiscal Year", "Pct Change"),
    scroll_box(height = "450px"))
```

```
\begin{table}
\caption{
Percentage of Change in Endowment Balance
```

```
}
```

Name	Fiscal Year	% Change
Joffrey Ballet	2015	3091.4016854
Fort Wayne Ballet	2014	1897.2429619
First State Ballet Theatre	2012	1448.0762683
Ballet Arizona	2016	586.1374894
Orlando Ballet	2017	552.8554949
Ballet Hispánico	2021	432.1555786
Nashville Ballet	2011	288.7391599
First State Ballet Theatre	2020	242.6848638
Milwaukee Ballet	2011	212.5546600
Atlanta Ballet	2017	207.7002614
Orlando Ballet	2018	206.9063832
Nashville Ballet	2016	206.2101382
Grand Rapids Ballet	2015	186.0427033
Richmond Ballet	2016	178.0161483
Charlotte Ballet	2013	171.7520288
Joffrey Ballet	2019	146.9046722
Texas Ballet Theater	2015	133.5240000
The Charleston Ballet	2013	132.1823138
Dayton Ballet	2018	118.1185754
Ballet Austin	2013	111.9610260
Miami City Ballet	2021	103.3796951
Ballet Memphis	2018	100.3575811
Ballet Memphis	2012	94.1089954
Joffrey Ballet	2020	90.8216917
Ballet Austin	2017	90.2783217
Texas Ballet Theater	2018	85.8401625
BalletMet	2018	85.0249761
Atlanta Ballet	2016	81.8387443
The Tallahassee Ballet	2011	74.5093458
First State Ballet Theatre	2019	69.9900000
Richmond Ballet	2018	57.4030070
Ballet Hispánico	2014	54.7692390
First State Ballet Theatre	2016	53.2556470
American Repertory Ballet	2014	51.6506759
Atlanta Ballet	2012	47.7865882
Dayton Ballet	2019	47.3628143
Ballet Des Moines	2018	40.4800000
Richmond Ballet	2020	39.8449675
The Sarasota Ballet	2016	36.6266667
Boston Ballet	2014	36.2295633
Eugene Ballet	2021	35.3676599
The Tallahassee Ballet	2014	35.2860183
Richmond Ballet	2019	34.8263002
American Repertory Ballet	2013	34.4003625
First State Ballet Theatre	2017	32.2270270
Nashville Ballet	2013	31.9611808
Ballet Memphis	2014	29.0814635
New Mexico Ballet Company	2019	28.7289611
Aspen Santa Fe Ballet	2017	27.9853981
Richmond Ballet	2017	27.4751409
Miami City Ballet	2018	26.9869980
Ballet Memphis	2017	26.3332143
BalletMet	2014	25.3577272
Kansas City Ballet	2011	23.4046965
BalletMet	2019	22.9766213
Ballet Memphis	2011	21.9748193
Joffrey Ballet	2016	20.8230683

\end{table}

```
pct_change_ds %>%
  filter(pct_change != Inf) %>%
  select(organization_name, fiscal_year, pct_change) %>%
  group_by(fiscal_year) %>%
  summarize(total = n(),
            avg = mean(pct_change),
            med = median(pct_change),
            sd = sd(pct_change)) %>%
  make_table(title = "Percentage of Change in Endowment Balance By Year", col_names = c("Fiscal Year",
  scroll_box(height = "450px")
```

\begin{table}

\caption{

Percentage of Change in Endowment Balance By Year

}

Fiscal Year	Total Companies	Average % Change	Median % Change	Standard Deviation
2010	1	0.3281092	0.3281092	NA
2011	31	23.2042543	8.9183455	64.52232
2012	36	39.5711928	-1.2328310	242.88805
2013	40	14.4544304	4.8542974	38.48890
2014	40	56.4432194	8.2586243	299.10443
2015	41	83.4793525	0.0000000	482.88546
2016	43	24.2872831	-0.7510343	98.50785
2017	43	27.5778232	8.6823347	89.08538
2018	44	15.9080630	4.8267305	46.13128
2019	43	5.6928617	1.1650569	32.37300
2020	39	7.2725415	0.2184921	44.93623
2021	6	98.6421536	27.8120030	167.76683

\end{table}

REMOVING investments

```
# Basic summary stats
pct_change_inv_ds %>%
  filter(!is.na(pct_change) & pct_change != Inf) %>%
  summarize(avg_pct_change = mean(pct_change),
            median_pct_change = median(pct_change),
            sd_pct_change = sd(pct_change))
```

```
## # A tibble: 1 x 3
##   avg_pct_change median_pct_change sd_pct_change
##   <dbl>             <dbl>             <dbl>
## 1      25.7         -0.685             199.
```

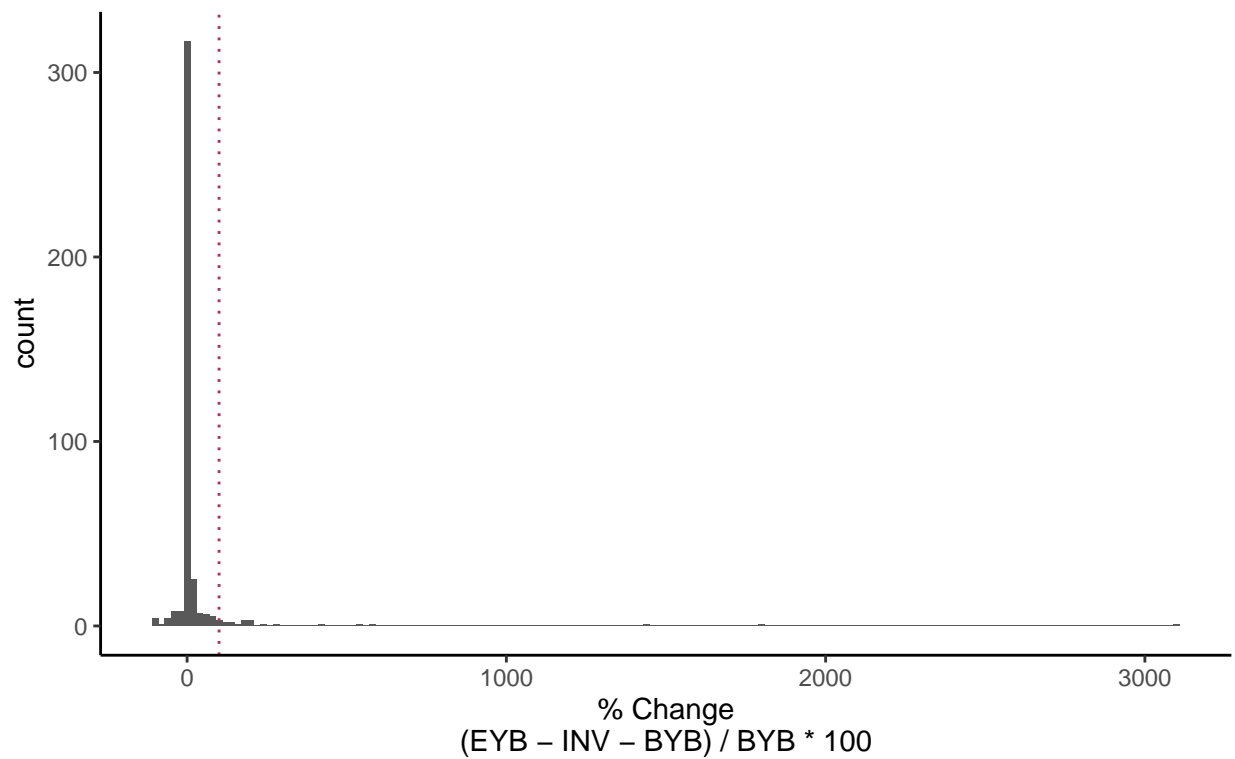
```
pct_change_inv_ds %>%
  filter(!is.na(pct_change) & pct_change != Inf) %>%
  group_by(EIN) %>%
  summarize(avg_pct_change = mean(pct_change),
            median_pct_change = median(pct_change),
            sd_pct_change = sd(pct_change))
```

```
## # A tibble: 46 x 4
##   EIN      avg_pct_change median_pct_change sd_pct_change
##   <chr>          <dbl>          <dbl>          <dbl>
## 1 042312734      1.83          -0.0413        7.19
## 2 131882106     -3.40          -3.70         4.03
## 3 132584273      1.27          -0.347        5.45
## 4 132642091     -0.0116         0          0.0187
## 5 132685755     39.3          -3.54       129.
## 6 132947386     -2.10          -3.28         3.68
## 7 210732575     14.3           0         22.9
## 8 231629970     -6.02          -3.99         6.15
## 9 237101094     -4.36          -6.15         5.04
## 10 237247909      6.51          -0.708        12.8
## # i 36 more rows
```

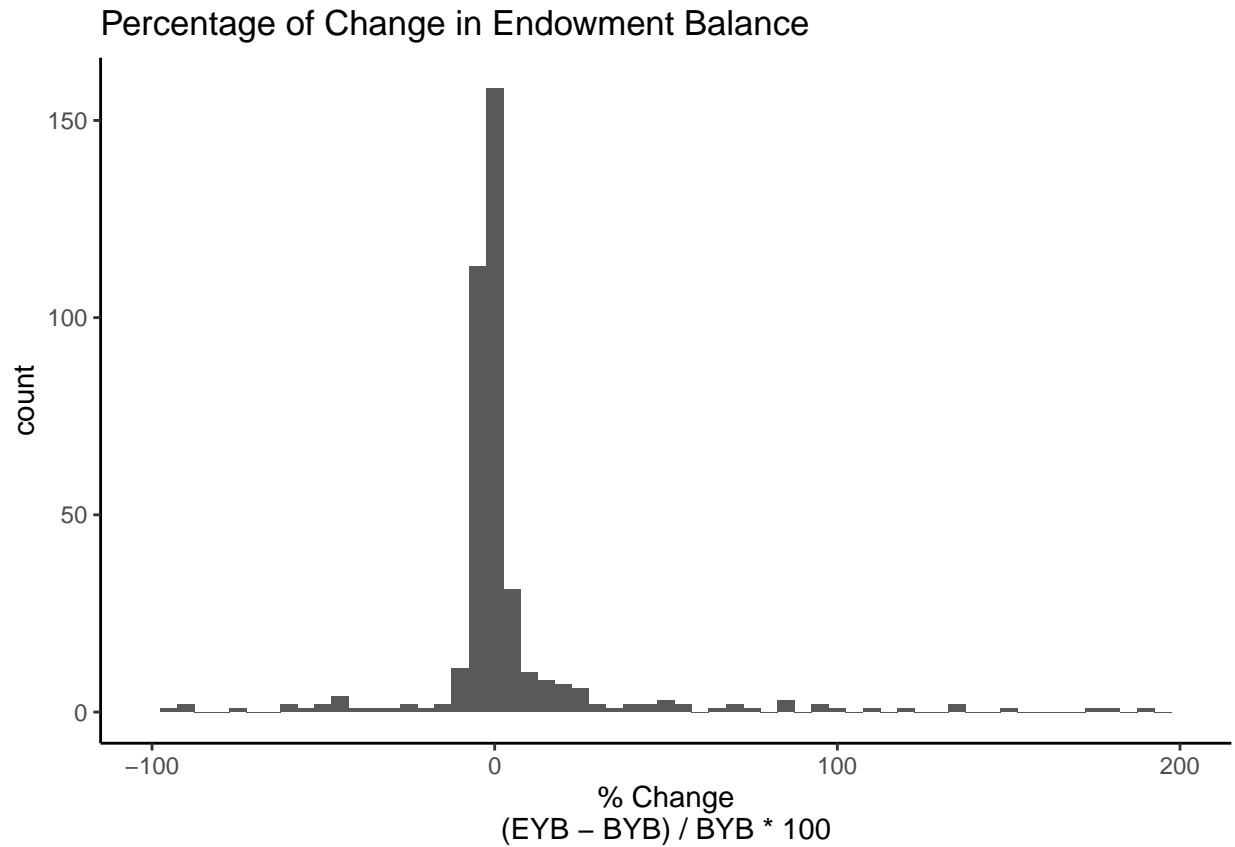
```
# Basic histogram summarizing it
ggplot(pct_change_inv_ds, aes(x = pct_change)) +
  geom_histogram(binwidth = 20) +
  xlab("% Change\n(EYB - INV - BYB) / BYB * 100") +
  ggtitle(label = "Percentage of Change in Endowment Balance", subtitle = "Red Line indicates 100%") +
  theme_classic() +
  geom_vline(xintercept = 100, color = "maroon", linetype = "dotted")
```


Percentage of Change in Endowment Balance

Red Line indicates 100%



```
## Histogram with cutoff of 200%
ggplot(pct_change_inv_ds, aes(x = pct_change)) +
  geom_histogram(binwidth = 5) +
  xlab("% Change\n(EYB - BYB) / BYB * 100") +
  xlim(-100, 200) +
  ggtitle(label = "Percentage of Change in Endowment Balance") +
  theme_classic()
```



```
pct_change_inv_ds %>%
  filter(pct_change != Inf) %>%
  select(organization_name, fiscal_year, pct_change) %>%
  make_table(title = "Percentage of Change in Endowment Balance", col_names = c("Name", "Fiscal Year", "Pct Change"),
  scroll_box(height = "450px"))
```

```
\begin{table}
\caption{
Percentage of Change in Endowment Balance
}
```

Name	Fiscal Year	% Change
Joffrey Ballet	2015	3091.4016854
Fort Wayne Ballet	2014	1803.3224138
First State Ballet Theatre	2012	1448.0762683
Ballet Arizona	2016	586.1374894
Orlando Ballet	2017	547.7003508
Ballet Hispánico	2021	426.7571012
Nashville Ballet	2011	275.0123756
First State Ballet Theatre	2020	242.6848638
Orlando Ballet	2018	206.4099099
Atlanta Ballet	2017	202.3164983
Milwaukee Ballet	2011	197.6406871
Nashville Ballet	2016	187.7731485
Grand Rapids Ballet	2015	181.5004969
Richmond Ballet	2016	175.9261036
Charlotte Ballet	2013	151.2357429
Joffrey Ballet	2019	133.5419677
Texas Ballet Theater	2015	133.3333333
The Charleston Ballet	2013	118.3461667
Dayton Ballet	2018	111.2870455
Ballet Memphis	2012	99.9715525
Ballet Austin	2013	96.8010136
Ballet Memphis	2018	95.9769923
Joffrey Ballet	2020	86.1363009
Texas Ballet Theater	2018	85.6027576
BalletMet	2018	85.0249761
Atlanta Ballet	2016	76.1344084
Ballet Austin	2017	72.1291716
First State Ballet Theatre	2019	69.9900000
Miami City Ballet	2021	65.4636289
The Tallahassee Ballet	2011	56.0747664
First State Ballet Theatre	2016	53.2556470
American Repertory Ballet	2014	51.6506759
Richmond Ballet	2018	51.2753402
Atlanta Ballet	2012	47.9686134
Dayton Ballet	2019	45.1776417
Richmond Ballet	2020	43.9335422
Ballet Hispánico	2014	41.4922805
The Sarasota Ballet	2016	37.6855000
American Repertory Ballet	2013	34.4003625
First State Ballet Theatre	2017	32.2270270
Aspen Santa Fe Ballet	2017	27.9853981
Richmond Ballet	2019	26.8630003
BalletMet	2014	25.3577272
Ballet Des Moines	2018	25.2500000
Joffrey Ballet	2016	24.4935699
BalletMet	2019	22.9766213
Richmond Ballet	2017	22.7958845
Kansas City Ballet	2012	21.4853681
New Mexico Ballet Company	2019	21.2777356
Miami City Ballet	2018	20.0147230
Ballet Memphis	2014	19.3704481
Boston Ballet	2014	18.6852707
Nashville Ballet	2013	18.4613232
The Tallahassee Ballet	2014	18.0748529
Ballet Memphis	2017	16.5882353
The Tallahassee Ballet	2015	15.7290896
Oregon Ballet Theatre	2013	15.5103005

\end{table}

```
pct_change_inv_ds %>%
  filter(pct_change != Inf) %>%
  select(organization_name, fiscal_year, pct_change) %>%
  group_by(fiscal_year) %>%
  summarize(total = n(),
            avg = mean(pct_change),
            med = median(pct_change),
            sd = sd(pct_change)) %>%
  make_table(title = "Percentage of Change in Endowment Balance By Year", col_names = c("Fiscal Year",
  scroll_box(height = "450px")
```

\begin{table}

\caption{

Percentage of Change in Endowment Balance By Year

}

Fiscal Year	Total Companies	Average % Change	Median % Change	Standard Deviation
2010	1	-7.337498	-7.3374978	NA
2011	31	13.177900	-1.5332290	62.57769
2012	36	39.939578	-1.1673363	242.90538
2013	40	7.060537	-1.6824371	35.57750
2014	40	45.612283	-0.1755000	285.55196
2015	41	81.554256	-0.2569099	483.16993
2016	43	24.154434	-0.4368254	97.43600
2017	43	19.912496	0.0000000	89.40665
2018	44	11.162350	-0.4508906	46.15232
2019	43	1.888381	-2.4754845	31.06880
2020	39	5.044147	-1.0929032	45.02615
2021	6	81.164577	0.2636754	171.41046

\end{table}

Range of Endowment Percent Change

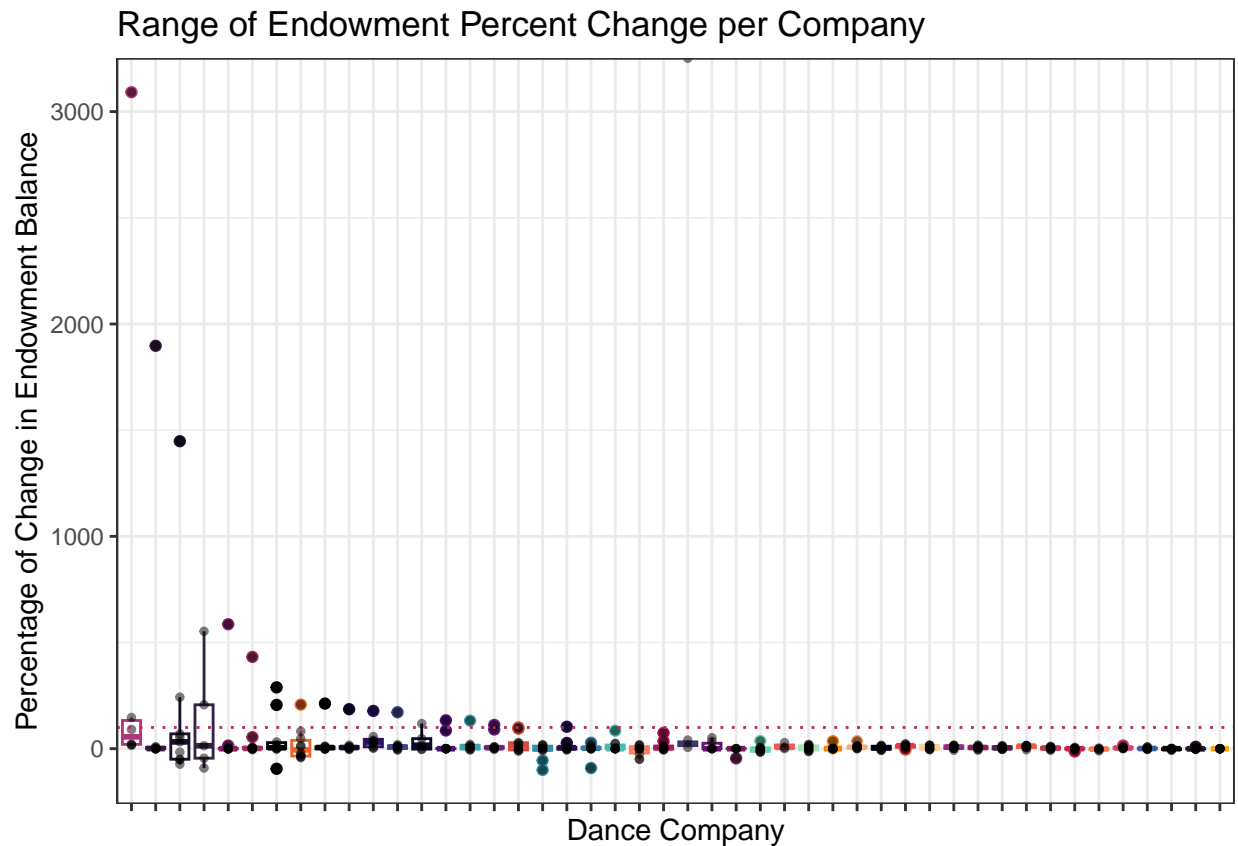
WITH investments

```
## Ranges of different percent change
# Reordering by standard deviation of pct_spend down
pct_change_ds_box <- pct_change_ds %>%
  group_by(organization_name) %>%
  filter(pct_change != Inf) %>%
  summarize(sd = sd(pct_change, na.rm = TRUE)) %>%
  right_join(pct_change_ds, by = "organization_name") %>%
  select(organization_name, EIN, pct_change, sd) %>%
  mutate(organization_name = reorder(organization_name, -sd, na.rm = TRUE))
## Unlimited
box_plot <- ggplot(pct_change_ds_box, aes(x = organization_name, y = pct_change)) +
```

```

geom_boxplot(aes(color = organization_name), show.legend = FALSE) +
geom_point(size = 1, alpha = 0.5, show.legend = FALSE) +
theme_bw() +
labs(title = "Range of Endowment Percent Change per Company",
      x = "Dance Company",
      y = "Percentage of Change in Endowment Balance") +
theme(axis.text.x = element_blank()) +
geom_hline(yintercept = 100, linetype = "dotted", color = "maroon") +
scale_colour_manual(values = pal)
box_plot

```

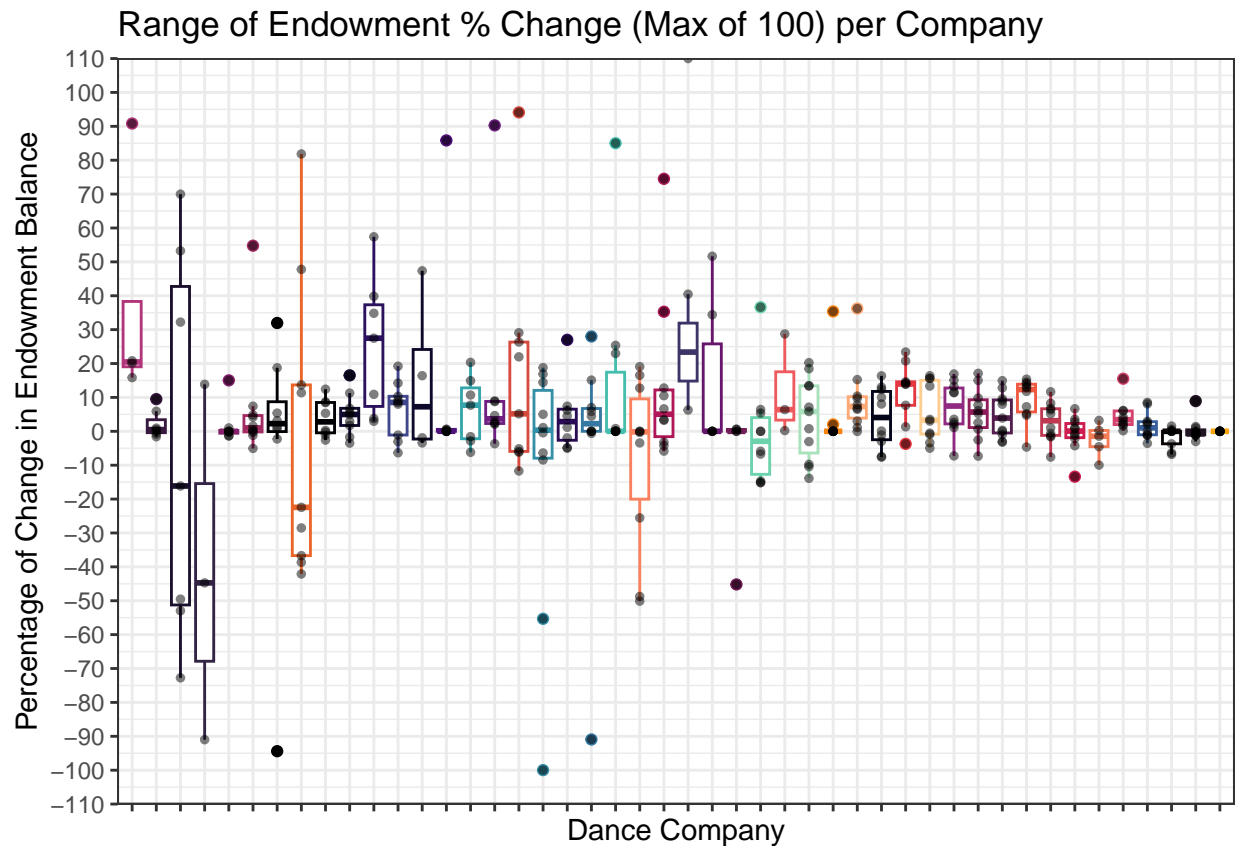


```

#ggplotly(box_plot) %>%
# layout(showlegend = FALSE)
##Limited to 100 for visibility
box_plot_lim <- ggplot(pct_change_ds_box, aes(x = organization_name, y = pct_change)) +
  geom_boxplot(aes(color = organization_name), show.legend = FALSE) +
  geom_point(size = 1, alpha = 0.5) +
  theme_bw() +
  labs(title = "Range of Endowment % Change (Max of 100) per Company",
        x = "Dance Company",
        y = "Percentage of Change in Endowment Balance") +
  theme(axis.text.x = element_blank()) +
  scale_y_continuous(breaks = scales::breaks_pretty(n = 20),
                     limit = c(-100, 100)) +
  scale_colour_manual(values = pal)

```

```
box_plot_lim
```



```
#ggplotly(box_plot_lim) %>%
#layout(showlegend = FALSE)
```

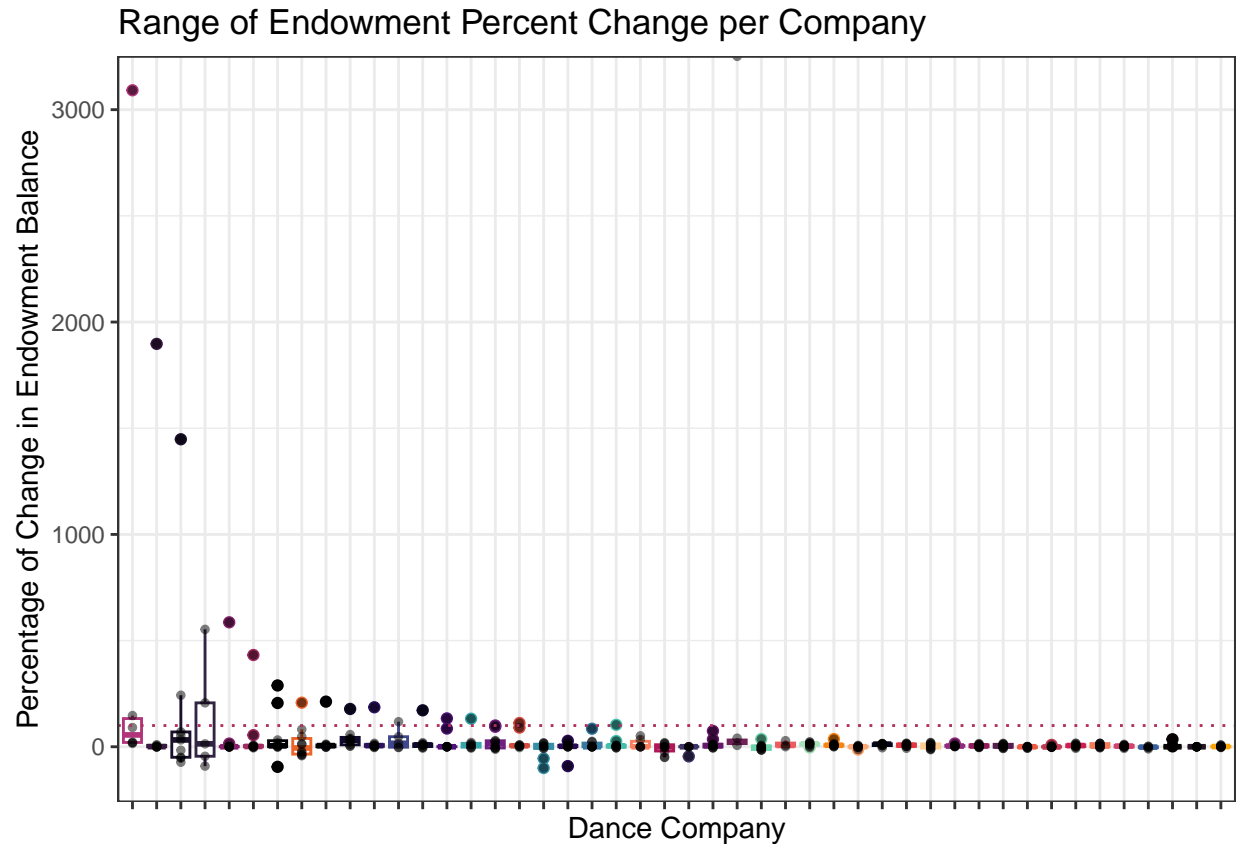
WITHOUT investments

```
## Ranges of different percent change
# reorder(organization_name, pull(summarize(spend_down, sd = sd(group_by(spend_down, pct_change))))), na
# Reordering by standard deviation of pct_spend down
pct_change_inv_box <- pct_change_inv_ds %>%
  group_by(organization_name) %>%
  filter(pct_change != Inf) %>%
  summarize(sd = sd(pct_change, na.rm = TRUE)) %>%
  right_join(pct_change_ds, by = "organization_name") %>%
  select(organization_name, EIN, pct_change, sd) %>%
  mutate(organization_name = reorder(organization_name, -sd, na.rm = TRUE))
## Unlimited
box_plot_inv <- ggplot(pct_change_inv_box, aes(x = organization_name, y = pct_change)) +
  geom_boxplot(aes(color = organization_name), show.legend = FALSE) +
  geom_point(size = 1, alpha = 0.5) +
  theme_bw() +
  labs(title = "Range of Endowment Percent Change per Company",
```

```

x = "Dance Company",
y = "Percentage of Change in Endowment Balance") +
theme(axis.text.x = element_blank()) +
geom_hline(yintercept = 100, linetype = "dotted", color = "maroon") +
scale_colour_manual(values = pal)
box_plot_inv

```



```

#ggplotly(box_plot_inv) %>%
  #layout(showlegend = FALSE)
##Limited to 100 for visibility
box_plot_inv_lim <- ggplot(pct_change_inv_box, aes(x = organization_name, y = pct_change)) +
  geom_boxplot(aes(color = organization_name), show.legend = FALSE) +
  geom_point(size = 1, alpha = 0.5) +
  theme_bw() +
  labs(title = "Range of Endowment % Change (Max of 100) per Company",
        x = "Dance Company",
        y = "Percentage of Change in Endowment Balance") +
  theme(axis.text.x = element_blank()) +
  scale_y_continuous(breaks = scales::breaks_pretty(n = 20),
                     limit = c(-100, 100)) +
  scale_colour_manual(values = pal)
#ggplotly(box_plot_inv_lim) %>%
  # layout(showlegend = FALSE)

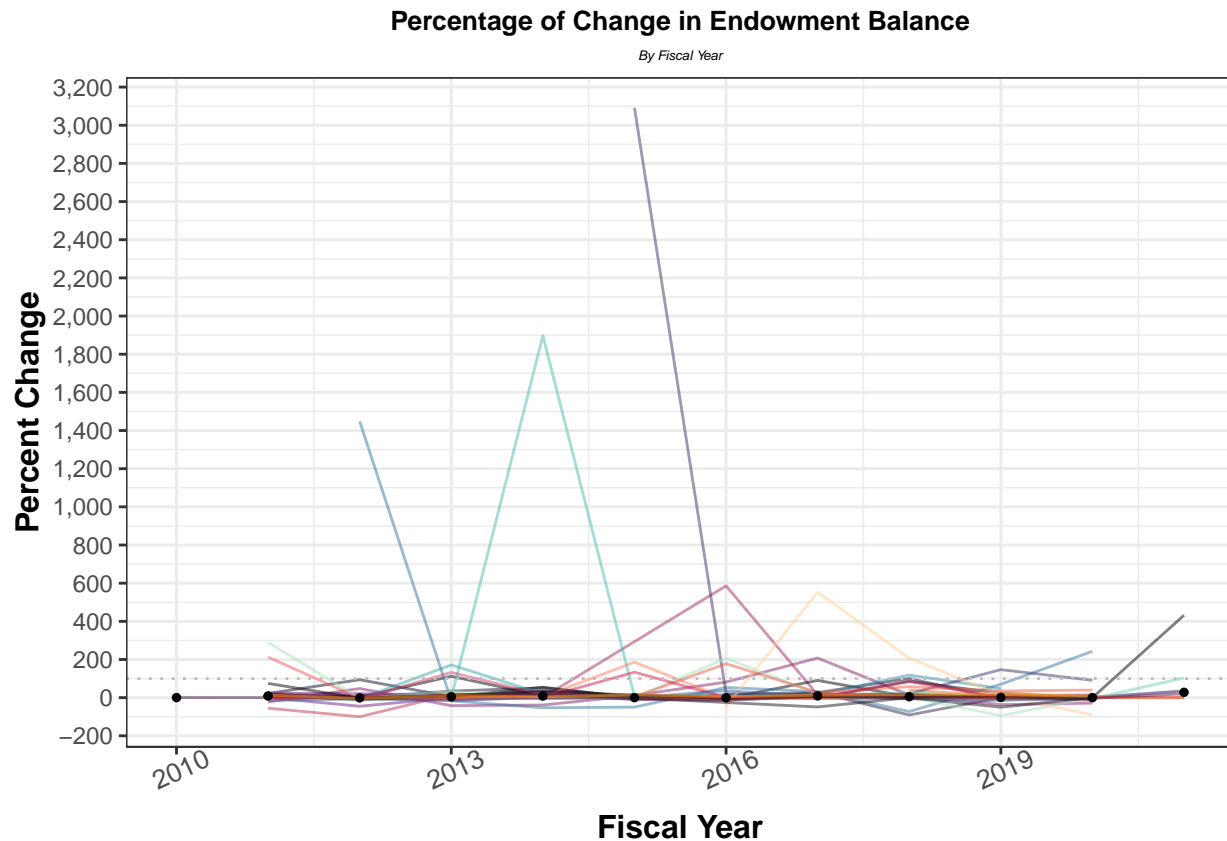
```

Percent Change over Time

WITH investments

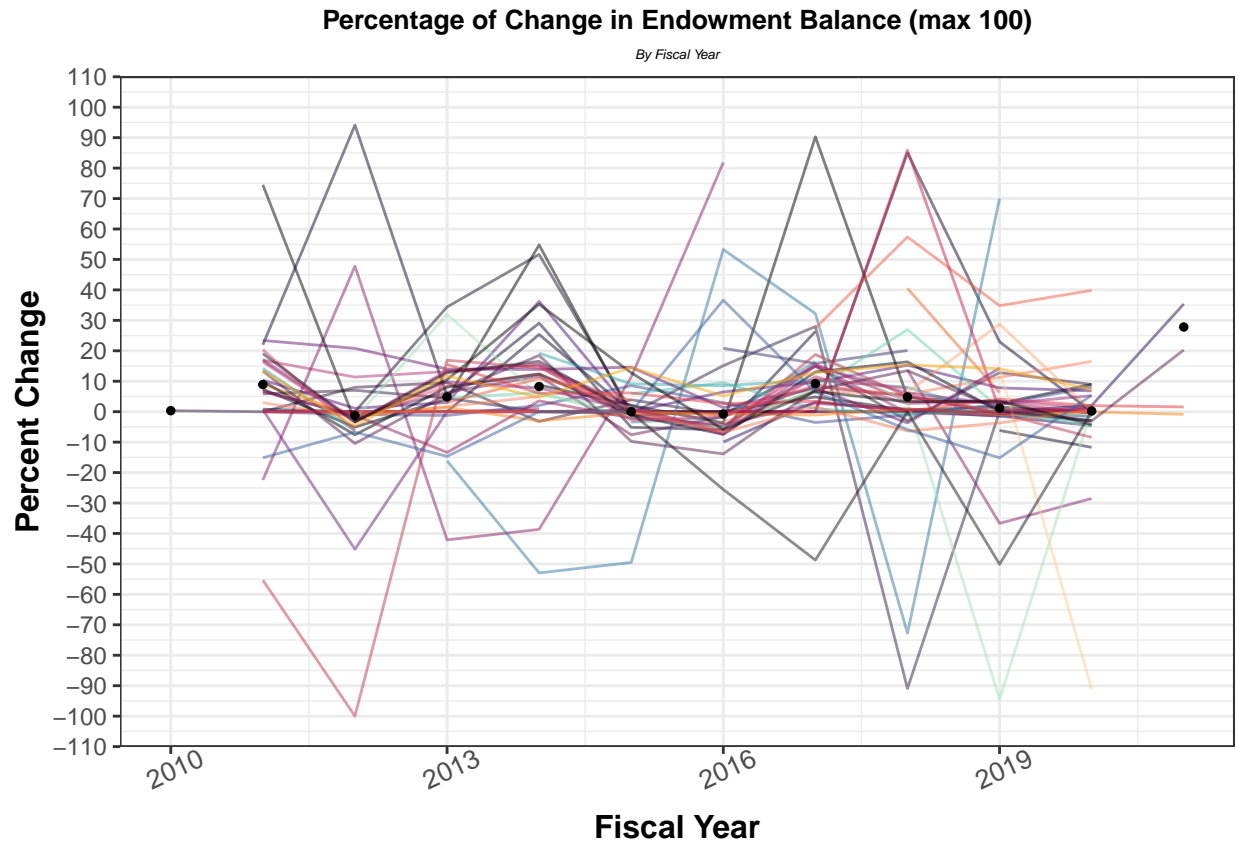
```
## Retrieving median values
pct_change_med <- pct_change_ds %>%
  group_by(fiscal_year) %>%
  summarize(median = median(pct_change, na.rm = TRUE)) %>%
  mutate(organization_name = "Median",
         fiscal_year_dt = paste(fiscal_year, "-01-01", sep = ""))
pct_change_med$fiscal_year_dt = as.Date(pct_change_med$fiscal_year_dt, format = "%Y-%m-%d")

## Spend Down over Time
pct_change_plot <- pct_change_ds %>%
  filter(pct_change != Inf) %>%
  ggplot(aes(x = fiscal_year, y = pct_change,
             group = organization_name, color = organization_name)) +
  geom_line(alpha = 0.5, show.legend = FALSE) +
  theme_bw() +
  scale_colour_manual(values = pal) +
  labs(y = "Percent Change",
       x = "Fiscal Year",
       title = "Percentage of Change in Endowment Balance",
       subtitle = "By Fiscal Year") +
  theme(plot.title = element_text(size = 10, face = "bold", hjust = .5),
        axis.title = element_text(size = 12, face = "bold"),
        plot.subtitle = element_text(size = 5, face = "italic", hjust = .5),
        axis.text.x = element_text(size = 10, angle = 25),
        strip.text = element_text(face = "bold", size = 5),
        legend.key.size = unit(1, 'mm'),
        legend.text = element_text(size = 7)) +
  scale_y_continuous(labels = scales::comma_format(),
                    breaks = scales::pretty_breaks(n = 20)) +
  geom_hline(yintercept = 100, linetype = "dotted", color = "gray") +
  geom_point(data = pct_change_med, aes(x = fiscal_year, y = median), color = "black", size = 1)
pct_change_plot
```

```
#ggplotly(pct_change_plot)
```

```
##Plot with Y scale between -100 and 100
limited_scale <- pct_change_ds %>%
  filter(pct_change != Inf) %>%
  ggplot(aes(x = fiscal_year, y = pct_change,
             group = organization_name, color = organization_name)) +
  geom_line(show.legend = FALSE, alpha = 0.5) +
  theme_bw() +
  scale_colour_manual(values = pal) +
  labs(y = "Percent Change",
       x = "Fiscal Year",
       title = "Percentage of Change in Endowment Balance (max 100)",
       subtitle = "By Fiscal Year") +
  theme(plot.title = element_text(size = 10, face = "bold", hjust = .5),
        axis.title = element_text(size = 12, face = "bold"),
        plot.subtitle = element_text(size = 5, face = "italic", hjust = .5),
        axis.text.x = element_text(size = 10, angle = 25),
        strip.text = element_text(face="bold",size = 5),
        legend.key.size = unit(1, 'mm'),
        legend.text = element_text(size=7)) +
  scale_y_continuous(labels = scales::comma_format(),
                    breaks = scales::pretty_breaks(n = 20),
                    limits = c(-100, 100)) +
  geom_point(data = pct_change_med, aes(x = fiscal_year, y = median), color = "black", size = 1)
limited_scale
```



```
#ggplotly(limited_scale)
```

WITHOUT investments

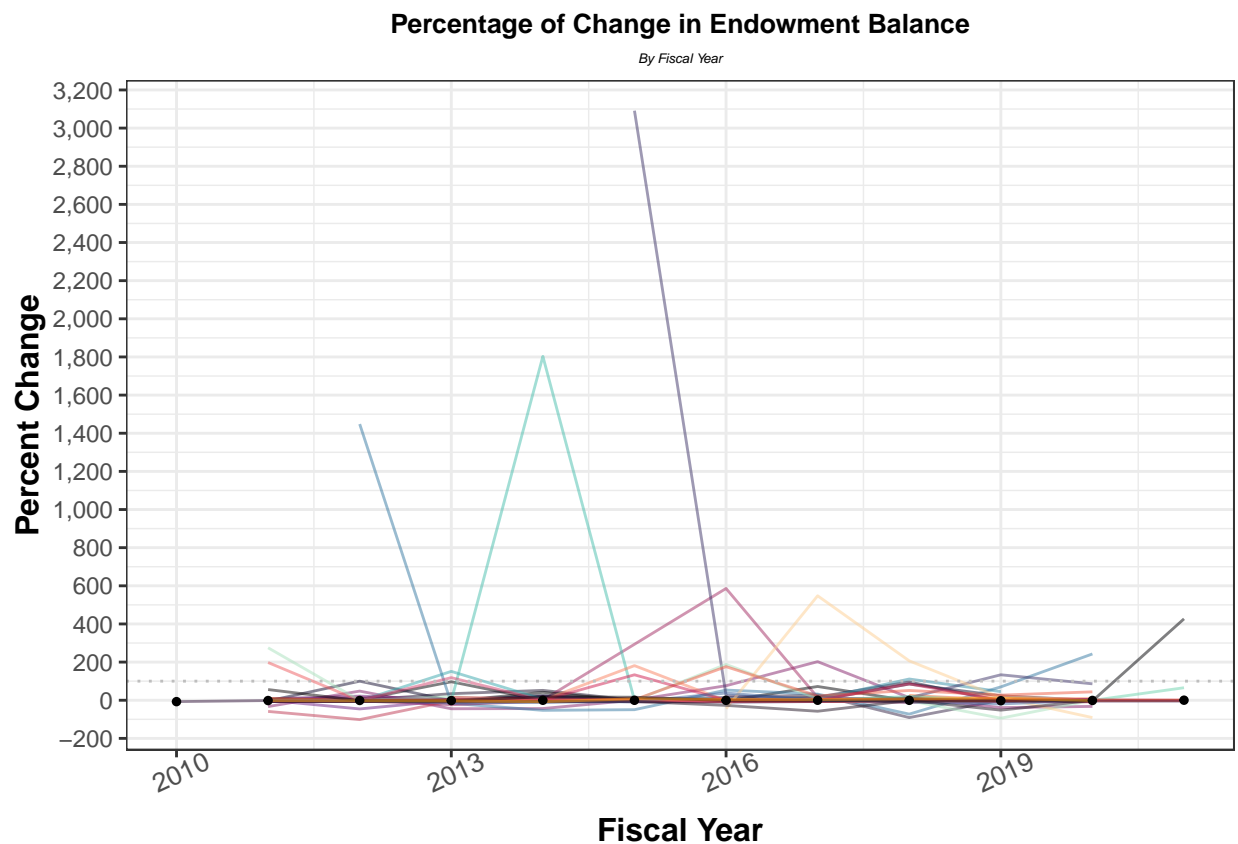
```
## Retrieving median values
pct_change_inv_med <- pct_change_inv_ds %>%
  group_by(fiscal_year) %>%
  summarize(median = median(pct_change, na.rm = TRUE)) %>%
  mutate(organization_name = "Median")
```

```
## Spend Down over Time
pct_change_inv_plot <- pct_change_inv_ds %>%
  filter(pct_change != Inf) %>%
  ggplot(aes(x = fiscal_year, y = pct_change,
             group = organization_name, color = organization_name)) +
  geom_line(alpha = 0.5, show.legend = FALSE) +
  scale_colour_manual(values = pal) +
  theme_bw() +
  labs(y = "Percent Change",
       x = "Fiscal Year",
       title = "Percentage of Change in Endowment Balance",
```

```

    subtitle = "By Fiscal Year") +
  theme(plot.title = element_text(size = 10, face = "bold", hjust = .5),
        axis.title = element_text(size = 12, face = "bold"),
        plot.subtitle = element_text(size = 5, face = "italic", hjust = .5),
        axis.text.x = element_text(size = 10, angle = 25),
        strip.text = element_text(face="bold",size = 5),
        legend.key.size = unit(1, 'mm'),
        legend.text = element_text(size=7)) +
  scale_y_continuous(labels = scales::comma_format(),
                    breaks = scales::pretty_breaks(n = 20)) +
  geom_hline(yintercept = 100, linetype = "dotted", color = "gray") +
  geom_point(data = pct_change_inv_med, aes(x = fiscal_year, y = median), color = "black", size = 1)
pct_change_inv_plot

```



```
#ggplotly(pct_change_inv_plot)
```

```

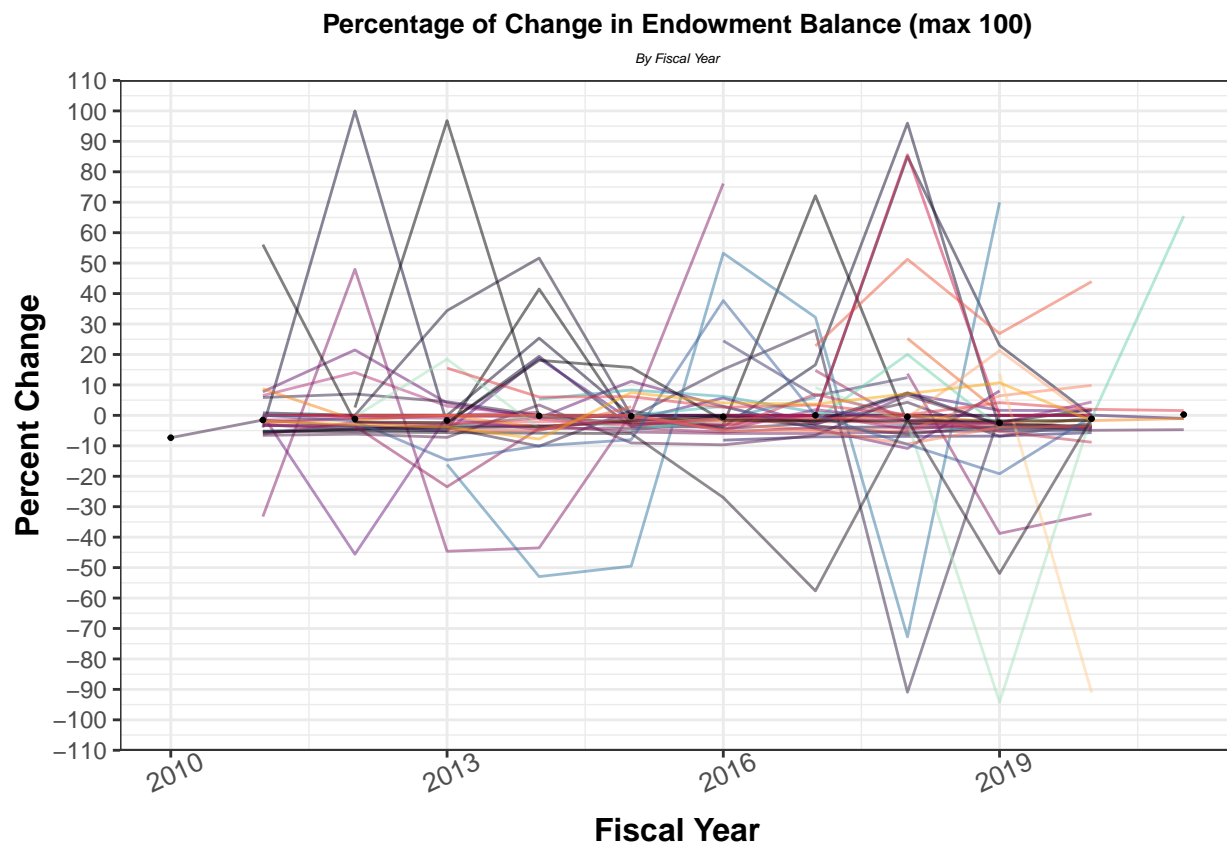
##Plot with Y scale between -100 and 100
limited_scale_inv <- pct_change_inv_ds %>%
  filter(pct_change != Inf) %>%
  ggplot(aes(x = fiscal_year, y = pct_change,
             group = organization_name, color = organization_name)) +
  geom_line(show.legend = FALSE, alpha = 0.5) +
  scale_colour_manual(values = pal) +
  theme_bw() +
  labs(y = "Percent Change",

```

```

x = "Fiscal Year",
title = "Percentage of Change in Endowment Balance (max 100)",
subtitle = "By Fiscal Year") +
theme(plot.title = element_text(size = 10, face = "bold", hjust = .5),
axis.title = element_text(size = 12, face = "bold"),
plot.subtitle = element_text(size = 5, face = "italic", hjust = .5),
axis.text.x = element_text(size = 10, angle = 25),
strip.text = element_text(face="bold",size = 5),
legend.key.size = unit(1, 'mm'),
legend.text = element_text(size=7)) +
scale_y_continuous(labels = scales::comma_format(),
breaks = scales::pretty_breaks(n = 20),
limits = c(-100, 100)) +
geom_point(data = pct_change_inv_med, aes(x = fiscal_year, y = median), color = "black", size = 0.5)
limited_scale_inv

```



```
#ggplotly(limited_scale_inv)
```

Comparing within-year percent change to S&P 500

```
## Adding end date
source(here("GET_VARS.R"))
```

```

##Specifically reading in Tax Period End Date
files <- dir( here("ballet_990_released_20230208"),
             full.names = TRUE)
taxperiod_data <- map_df(files, ~
  get_df(variables = c("//Return//ReturnHeader//TaxPeriodEndDt"),
         filename = .x
       ))
taxperiod_data$fiscal_year = as.numeric(as.character(taxperiod_data$fiscal_year))
pct_change_ds <- pct_change_ds %>%
  left_join(taxperiod_data, by = c("EIN", "fiscal_year"))
pct_change_inv_ds <- pct_change_inv_ds %>%
  left_join(taxperiod_data, by = c("EIN", "fiscal_year"))
## Imputing return_date from N/A
# Assuming that month/day is the same, fiscal year is one year prior
pct_change_ds <- pct_change_ds %>%
  group_by(EIN) %>%
  arrange(desc(EIN), desc(fiscal_year)) %>%
  mutate(TaxPeriodEndDt= ifelse(is.na(TaxPeriodEndDt),
                                paste(fiscal_year, substring(lag(TaxPeriodEndDt), 5, 10), sep = ""),
                                as.character(TaxPeriodEndDt)))
pct_change_inv_ds <- pct_change_inv_ds %>%
  group_by(EIN) %>%
  arrange(desc(EIN), desc(fiscal_year)) %>%
  mutate(TaxPeriodEndDt= ifelse(is.na(TaxPeriodEndDt),
                                paste(fiscal_year, substring(lag(TaxPeriodEndDt), 5, 10), sep = ""),
                                as.character(TaxPeriodEndDt)))
#Produces some NAs due to vectorization

# Rids all '2010NA' etc.
# Only have 11 years, so at max will run 11 times
for (i in 1:11) {
  pct_change_ds <- pct_change_ds %>%
    mutate(TaxPeriodEndDt= ifelse(grepl("NA", TaxPeriodEndDt),
                                  paste(fiscal_year, substring(lag(TaxPeriodEndDt), 5, 10), sep = ""),
                                  as.character(TaxPeriodEndDt)))

  pct_change_inv_ds <- pct_change_inv_ds %>%
    mutate(TaxPeriodEndDt= ifelse(grepl("NA", TaxPeriodEndDt),
                                  paste(fiscal_year, substring(lag(TaxPeriodEndDt), 5, 10), sep = ""),
                                  as.character(TaxPeriodEndDt)))
}
pct_change_ds$TaxPeriodEndDt = as.Date(pct_change_ds$TaxPeriodEndDt, format = "%Y-%m-%d")
pct_change_inv_ds$TaxPeriodEndDt = as.Date(pct_change_inv_ds$TaxPeriodEndDt, format = "%Y-%m-%d")
pct_change_ds <- ungroup(pct_change_ds)
pct_change_inv_ds <- ungroup(pct_change_inv_ds)

```

WITH investments

```

## GETTING PERCENT CHANGE OF FISCAL YEARS THAT EXIST IN THE DATASET
## Year wise PCT change for S&P 500
sp_end <- read_csv(here('data', 'SP500.csv')) %>%

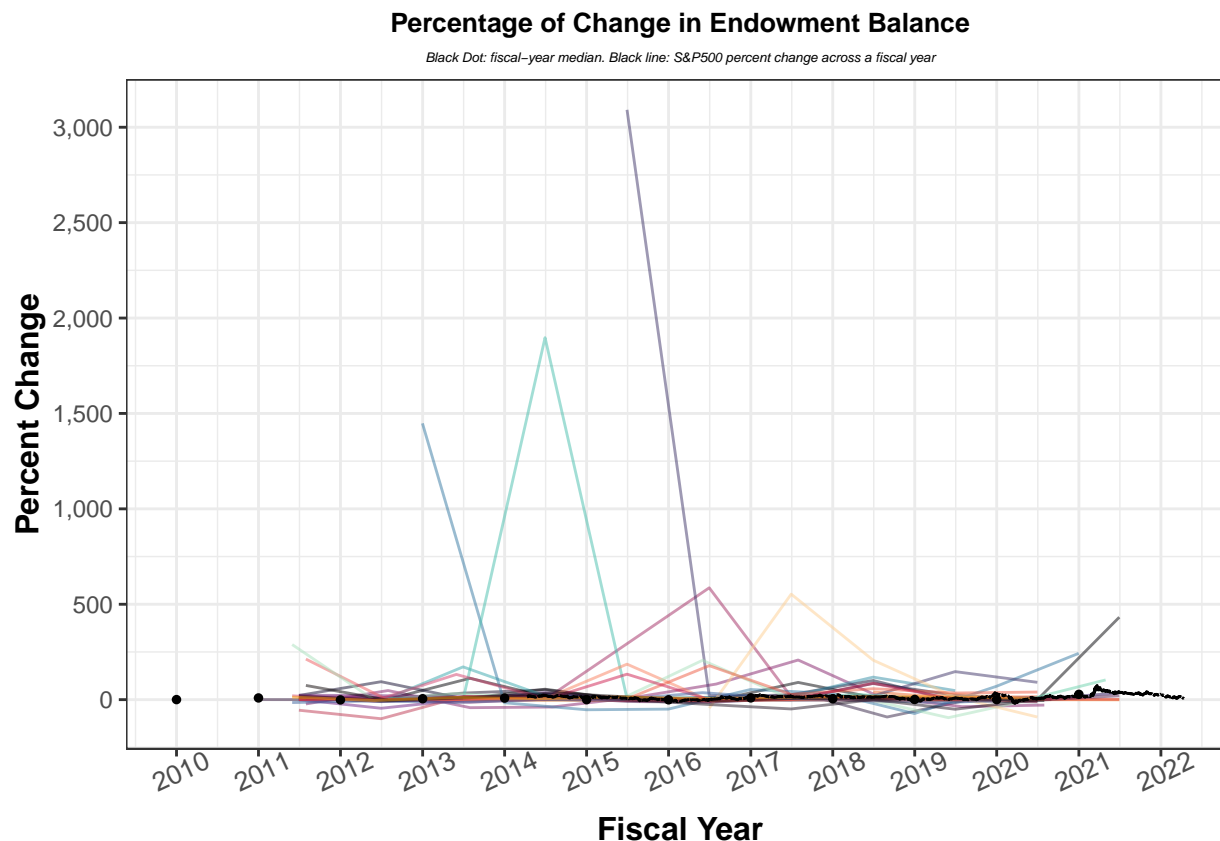
```

```

rename_with(tolower) %>%
mutate(sp500 = as.numeric(sp500)) %>%
filter(!is.na(sp500)) %>%
select(date_end = date, sp500_end = sp500) %>%
mutate(month = month(date_end),
       year = year(date_end),
       # Weekend / National holiday detection
       date_last = case_when(
         wday(date_end - 365) == as.factor("1") ~ date_end - 367, #Sunday
         wday(date_end - 365) == as.factor("7") ~ date_end - 366, #Saturday
         TRUE ~ date_end - 365
       ))
## All 'starting' fiscal year values
sp_start <- read_csv(here('data', 'SP500.csv')) %>%
  rename_with(tolower) %>%
  mutate(sp500 = as.numeric(sp500)) %>%
  filter(!is.na(sp500)) %>%
  select(date_start = date, sp500_start = sp500) %>%
  mutate(month = month(date_start),
         year = year(date_start))
#Change over the fiscal year
sp_change_years <- sp_end %>%
  left_join(sp_start, by = c("date_last" = "date_start")) %>%
  mutate(pct_change_yr = (sp500_end - sp500_start)/sp500_start * 100)

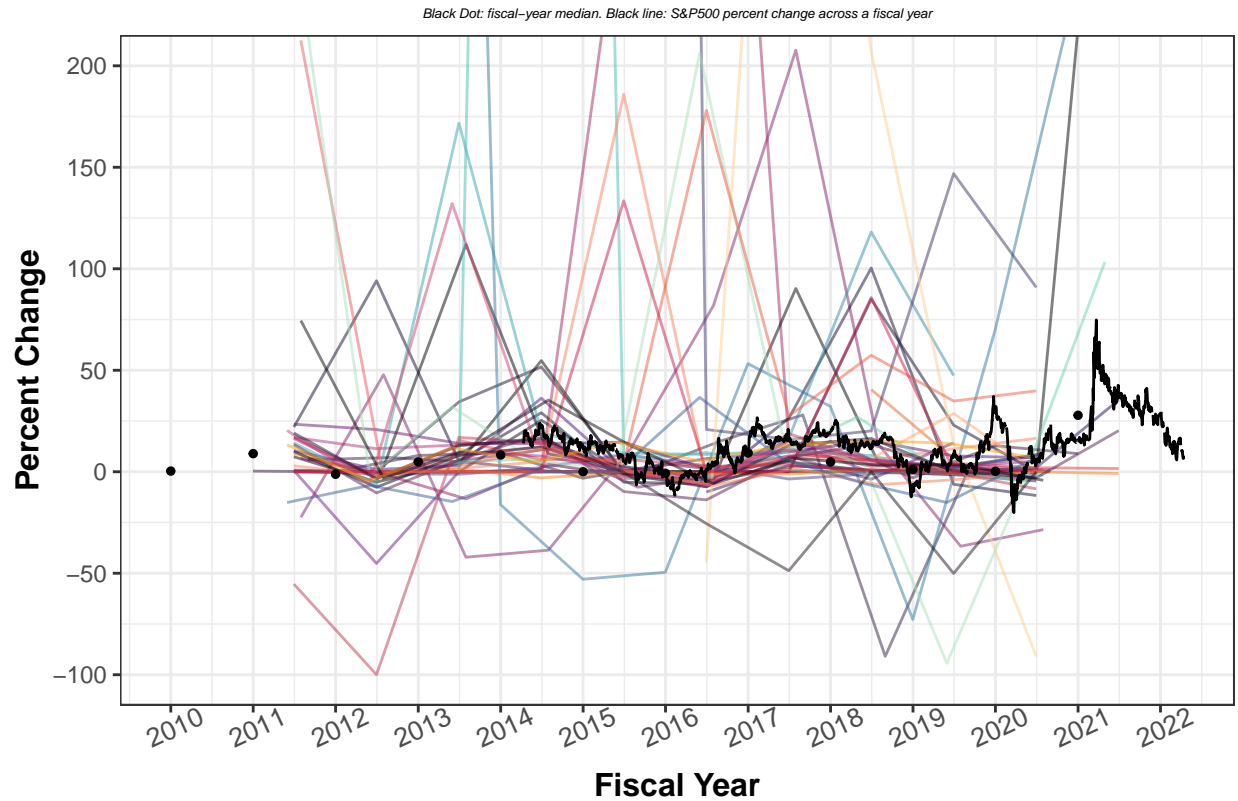
## Spend Down over Time
## With year-wise pct change for S&P 500
pc_endow_sp_fr <- pct_change_ds %>%
  filter(pct_change != Inf) %>%
  ggplot(aes(x = TaxPeriodEndDt, y = pct_change)) +
  geom_line(aes(group = organization_name, color = organization_name), alpha = 0.5, show.legend = FALSE) +
  theme_bw() +
  labs(y = "Percent Change",
       x = "Fiscal Year",
       title = "Percentage of Change in Endowment Balance",
       subtitle = "Black Dot: fiscal-year median. Black line: S&P500 percent change across a fiscal year")
  theme(plot.title = element_text(size = 10, face = "bold", hjust = .5),
        axis.title = element_text(size = 12, face = "bold"),
        plot.subtitle = element_text(size = 5, face = "italic", hjust = .5),
        axis.text.x = element_text(size = 10, angle = 25),
        strip.text = element_text(face="bold",size = 5),
        legend.key.size = unit(1, 'mm'),
        legend.text = element_text(size=7)) +
  scale_y_continuous(labels = scales::comma_format(),
                    breaks = scales::pretty_breaks(n = 10)) +
  scale_color_manual(values=pal) +
  scale_x_date(breaks = scales::pretty_breaks(n = 20)) +
  geom_point(data = pct_change_med, aes(x = fiscal_year_dt, y = median), color = "black", size = 1) +
  geom_line(data = sp_change_years, aes(x = date_end, y = pct_change_yr), color = "black", show.legend = FALSE)
pc_endow_sp_fr

```



```
##Limited to 200
pc_endow_sp_fr_200 <- pct_change_ds %>%
  filter(pct_change != Inf) %>%
  ggplot(aes(x = TaxPeriodEndDt, y = pct_change)) +
  geom_line(aes(group = organization_name, color = organization_name), alpha = 0.5, show.legend = FALSE) +
  theme_bw() +
  labs(y = "Percent Change",
       x = "Fiscal Year",
       title = "Percentage of Change in Endowment Balance, Zoomed in to 200%",
       subtitle = "Black Dot: fiscal-year median. Black line: S&P500 percent change across a fiscal year")
  theme(plot.title = element_text(size = 10, face = "bold", hjust = .5),
        axis.title = element_text(size = 12, face = "bold"),
        plot.subtitle = element_text(size = 5, face = "italic", hjust = .5),
        axis.text.x = element_text(size = 10, angle = 25),
        strip.text = element_text(face="bold",size = 5),
        legend.key.size = unit(1, 'mm'),
        legend.text = element_text(size=7)) +
  scale_y_continuous(labels = scales::comma_format(),
                    breaks = scales::pretty_breaks(n = 10)) +
  scale_color_manual(values=pal) +
  coord_cartesian(ylim=c(-100, 200)) +
  scale_x_date(breaks = scales::pretty_breaks(n = 20)) +
  geom_point(data = pct_change_med, aes(x = fiscal_year_dt, y = median), color = "black", size = 1) +
  geom_line(data = sp_change_years, aes(x = date_end, y = pct_change_yr), color = "black", show.legend = FALSE)
pc_endow_sp_fr_200
```

Percentage of Change in Endowment Balance, Zoomed in to 200%



```
pct_change_ds %>%
  filter(pct_change != Inf) %>%
  left_join(sp_change_years, by = c("TaxPeriodEndDt" = "date_end")) %>%
  select(organization_name, TaxPeriodEndDt, pct_change, pct_change_yr) %>%
  arrange(desc(abs(pct_change))) %>%
  make_table(title = "Percentage Change of Endowment and S&P 500",
             col_names = c("Organization Name", "Fiscal Year End Date", "Endowment Percent Change", "S&P 500 Percent Change"),
             scroll_box(height = "450px"))
```

\begin{table}

\caption{

Percentage Change of Endowment and S&P 500

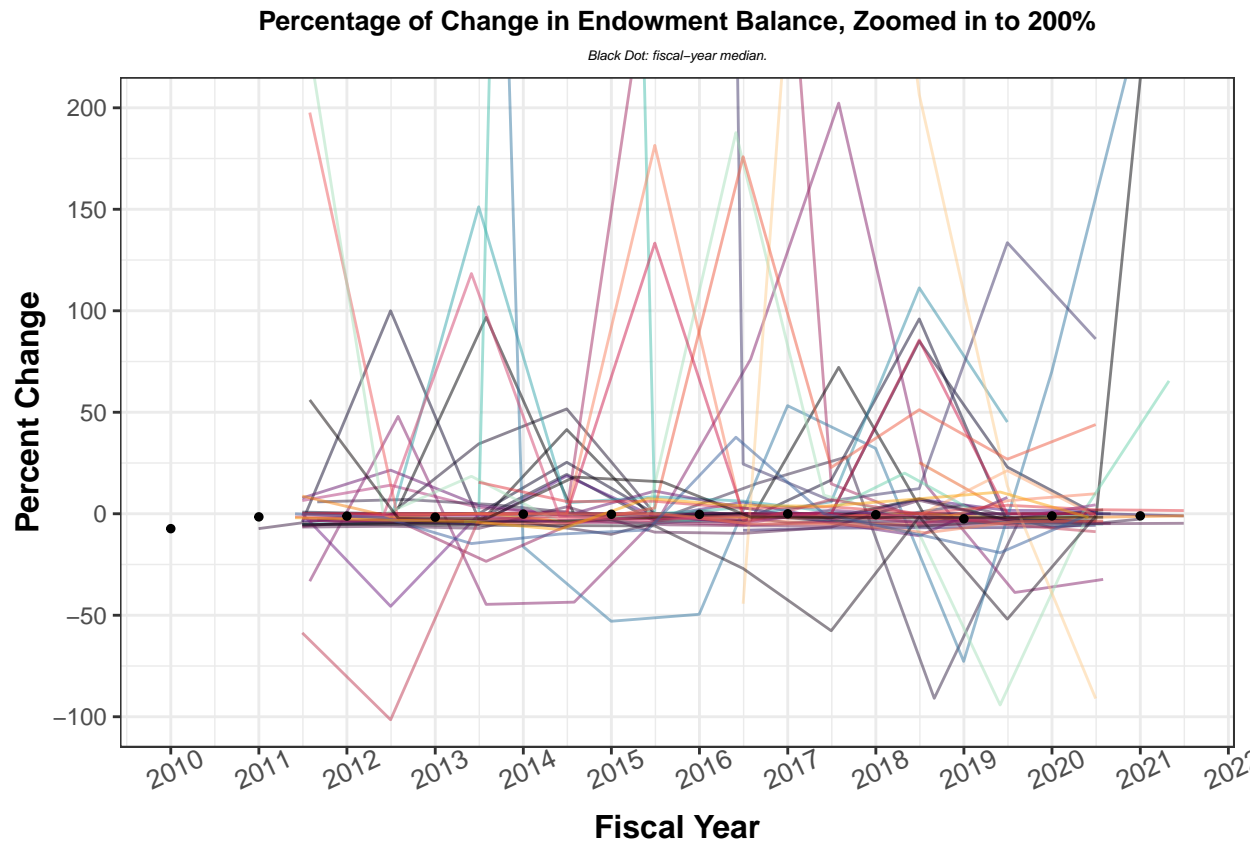
}

Organization Name	Fiscal Year End Date	Endowment Percent Change	S&P 500 Percent
Joffrey Ballet	2015-06-30	3091.4016854	
Fort Wayne Ballet	2014-06-30	1897.2429619	2
First State Ballet Theatre	2012-12-31	1448.0762683	
Ballet Arizona	2016-06-30	586.1374894	
Orlando Ballet	2017-06-30	552.8554949	1
Ballet Hispánico	2021-06-30	432.1555786	3
Nashville Ballet	2011-05-31	288.7391599	
First State Ballet Theatre	2020-12-31	242.6848638	
First State Ballet Theatre	2020-12-31	242.6848638	
Milwaukee Ballet	2011-07-31	212.5546600	
Atlanta Ballet	2017-07-31	207.7002614	1
Orlando Ballet	2018-06-30	206.9063832	
Nashville Ballet	2016-05-31	206.2101382	-
Grand Rapids Ballet	2015-06-30	186.0427033	
Richmond Ballet	2016-06-30	178.0161483	
Charlotte Ballet	2013-06-30	171.7520288	
Joffrey Ballet	2019-06-30	146.9046722	
Texas Ballet Theater	2015-06-30	133.5240000	
The Charleston Ballet	2013-05-31	132.1823138	
Dayton Ballet	2018-06-30	118.1185754	
Ballet Austin	2013-07-31	111.9610260	
Miami City Ballet	2021-04-30	103.3796951	4
Ballet Memphis	2018-06-30	100.3575811	
San Francisco Ballet	2012-06-30	-99.9832016	
Nashville Ballet	2019-05-31	-94.4004512	
Ballet Memphis	2012-06-30	94.1089954	
Orlando Ballet	2020-06-30	-90.9983829	
Aspen Santa Fe Ballet	2018-08-31	-90.9315940	1
Joffrey Ballet	2020-06-30	90.8216917	
Ballet Austin	2017-07-31	90.2783217	1
Texas Ballet Theater	2018-06-30	85.8401625	
BalletMet	2018-06-30	85.0249761	
Atlanta Ballet	2016-07-31	81.8387443	
The Tallahassee Ballet	2011-07-31	74.5093458	
First State Ballet Theatre	2018-12-31	-72.7468454	-
First State Ballet Theatre	2019-12-31	69.9900000	2
Richmond Ballet	2018-06-30	57.4030070	
San Francisco Ballet	2011-06-30	-55.3267726	
Ballet Hispánico	2014-06-30	54.7692390	2
First State Ballet Theatre	2016-12-31	53.2556470	
First State Ballet Theatre	2014-12-31	-52.9562948	1
American Repertory Ballet	2014-06-30	51.6506759	2
The Washington Ballet	2019-06-30	-50.1144953	
First State Ballet Theatre	2015-12-31	-49.5289330	-
The Washington Ballet	2017-06-30	-48.7379222	1
Atlanta Ballet	2012-07-31	47.7865882	
Dayton Ballet	2019-06-30	47.3628143	
Colorado Ballet	2012-06-30	-45.1865576	
Orlando Ballet	2016-06-30	-44.7242762	
Atlanta Ballet	2013-07-31	-42.0972020	
Ballet Des Moines	2018-06-30	40.4800000	
Richmond Ballet	2020-06-30	39.8449675	
Atlanta Ballet	2014-07-31	-38.6514489	1
Atlanta Ballet	2019-07-31	-36.6916144	
The Sarasota Ballet	2016-05-31	36.6266667	-
Boston Ballet	2014-06-30	36.2295633	2
Eugene Ballet	2021-06-30	35.3676500	

\end{table}

WITHOUT investments

```
## SPend down over time with new X axis
## Median by year
pct_change_inv_med <- pct_change_inv_ds %>%
  mutate(fiscal_year_dt = paste(fiscal_year, "-01-01", sep = ""),
         fiscal_year_dt = as.Date(fiscal_year_dt, "%Y-%m-%d")) %>%
  group_by(fiscal_year_dt, fiscal_year) %>%
  summarize(median = median(pct_change, na.rm = TRUE)) %>%
  mutate(organization_name = "Median")
## Spend Down over Time
pc_endo_ft <- pct_change_inv_ds %>%
  filter(pct_change != Inf) %>%
  ggplot(aes(x = TaxPeriodEndDt, y = pct_change)) +
  geom_line(aes(group = organization_name, color = organization_name), alpha = 0.5, show.legend = FALSE) +
  scale_colour_manual(values = pal) +
  theme_bw() +
  labs(y = "Percent Change",
       x = "Fiscal Year",
       title = "Percentage of Change in Endowment Balance, Zoomed in to 200%",
       subtitle = "Black Dot: fiscal-year median.") +
  theme(plot.title = element_text(size = 10, face = "bold", hjust = .5),
        axis.title = element_text(size = 12, face = "bold"),
        plot.subtitle = element_text(size = 5, face = "italic", hjust = .5),
        axis.text.x = element_text(size = 10, angle = 25),
        strip.text = element_text(face="bold",size = 5),
        legend.key.size = unit(1, 'mm'),
        legend.text = element_text(size=7)) +
  scale_y_continuous(labels = scales::comma_format(),
                    breaks = scales::pretty_breaks(n = 10)) +
  coord_cartesian(ylim=c(-100, 200)) +
  scale_x_date(breaks = scales::pretty_breaks(n = 20)) +
  geom_point(data = pct_change_inv_med, aes(x = fiscal_year_dt, y = median), color = "black", size = 1)
pc_endo_ft
```



```
pct_change_inv_ds %>%
  mutate(month = as.numeric(substring(TaxPeriodEndDt, 6, 7))) %>%
  filter(pct_change != Inf) %>%
  left_join(sp_change_years, by = c("TaxPeriodEndDt" = "date_end")) %>%
  select(organization_name, TaxPeriodEndDt, pct_change, pct_change_yr) %>%
  arrange(desc(abs(pct_change))) %>%
  make_table(title = "Percentage Change of Endowment and S&P 500",
             col_names = c("Organization Name", "Fiscal Year End Date", "Endowment Percent Change", "S&P 500 Percent Change"),
             scroll_box(height = "450px"))
```

```
\begin{table}
\caption{
Percentage Change of Endowment and S&P 500
}
```

Organization Name	Fiscal Year End Date	Endowment Percent Change	S&P 500 Percent
Joffrey Ballet	2015-06-30	3091.4016854	
Fort Wayne Ballet	2014-06-30	1803.3224138	2
First State Ballet Theatre	2012-12-31	1448.0762683	
Ballet Arizona	2016-06-30	586.1374894	
Orlando Ballet	2017-06-30	547.7003508	1
Ballet Hispánico	2021-06-30	426.7571012	3
Nashville Ballet	2011-05-31	275.0123756	
First State Ballet Theatre	2020-12-31	242.6848638	
First State Ballet Theatre	2020-12-31	242.6848638	
Orlando Ballet	2018-06-30	206.4099099	
Atlanta Ballet	2017-07-31	202.3164983	1
Milwaukee Ballet	2011-07-31	197.6406871	
Nashville Ballet	2016-05-31	187.7731485	-
Grand Rapids Ballet	2015-06-30	181.5004969	
Richmond Ballet	2016-06-30	175.9261036	
Charlotte Ballet	2013-06-30	151.2357429	
Joffrey Ballet	2019-06-30	133.5419677	
Texas Ballet Theater	2015-06-30	133.3333333	
The Charleston Ballet	2013-05-31	118.3461667	
Dayton Ballet	2018-06-30	111.2870455	
San Francisco Ballet	2012-06-30	-101.4981454	
Ballet Memphis	2012-06-30	99.9715525	
Ballet Austin	2013-07-31	96.8010136	
Ballet Memphis	2018-06-30	95.9769923	
Nashville Ballet	2019-05-31	-94.2002001	
Orlando Ballet	2020-06-30	-91.0428942	
Aspen Santa Fe Ballet	2018-08-31	-90.9315940	1
Joffrey Ballet	2020-06-30	86.1363009	
Texas Ballet Theater	2018-06-30	85.6027576	
BalletMet	2018-06-30	85.0249761	
Atlanta Ballet	2016-07-31	76.1344084	
First State Ballet Theatre	2018-12-31	-72.7468454	-
Ballet Austin	2017-07-31	72.1291716	1
First State Ballet Theatre	2019-12-31	69.9900000	2
Miami City Ballet	2021-04-30	65.4636289	4
San Francisco Ballet	2011-06-30	-58.6702757	
The Washington Ballet	2017-06-30	-57.6457603	1
The Tallahassee Ballet	2011-07-31	56.0747664	
First State Ballet Theatre	2016-12-31	53.2556470	
First State Ballet Theatre	2014-12-31	-52.9562948	1
The Washington Ballet	2019-06-30	-51.9275920	
American Repertory Ballet	2014-06-30	51.6506759	2
Richmond Ballet	2018-06-30	51.2753402	
First State Ballet Theatre	2015-12-31	-49.5289330	-
Atlanta Ballet	2012-07-31	47.9686134	
Colorado Ballet	2012-06-30	-45.6020434	
Dayton Ballet	2019-06-30	45.1776417	
Atlanta Ballet	2013-07-31	-44.6403251	
Orlando Ballet	2016-06-30	-44.3305946	
Richmond Ballet	2020-06-30	43.9335422	
Atlanta Ballet	2014-07-31	-43.5400727	1
Ballet Hispánico	2014-06-30	41.4922805	2
Atlanta Ballet	2019-07-31	-38.7833870	
The Sarasota Ballet	2016-05-31	37.6855000	-
American Repertory Ballet	2013-06-30	34.4003625	
Atlanta Ballet	2011-07-31	-33.2349745	
Atlanta Ballet	2020-07-31	32.3480884	

\end{table}

Rank plots about how they perform relative to the S&P 500? ## Looking at Companies who Drop at Any Point Below 40%

```
## Table for less than 40%
low_forty <- pct_change_inv_ds %>%
  filter(pct_change < -40) %>%
  select(organization_name, pct_change, BeginningYearBalanceAmt, EndYearBalanceAmt, fiscal_year)
##Table
low_forty %>%
  arrange(organization_name) %>%
  kbl(caption = "Endowment Percent Change Dropping Below 40% Of Beginning Year balance",
      col.names = c("Company Name", "Percent Change", "Beginning Balance", "End Balance", "Fiscal Year"),
      format="latex",
      booktabs=TRUE,
      escape=FALSE,
      linesep = "\\addlinespace",
      digits = 1) %>%
  kable_styling(latex_options = c("hold_position"))
```

\begin{table}[!h]

\caption{Endowment Percent Change Dropping Below 40% Of Beginning Year balance}

Company Name	Percent Change	Beginning Balance	End Balance	Fiscal Year
Aspen Santa Fe Ballet	-90.9	6065013	550000	2018
Atlanta Ballet	-43.5	1706513	1046921	2014
Atlanta Ballet	-44.6	2947203	1706513	2013
Colorado Ballet	-45.6	182437	100000	2012
First State Ballet Theatre	-72.7	36693	10000	2018
First State Ballet Theatre	-49.5	35876	18107	2015
First State Ballet Theatre	-53.0	76261	35876	2014
Nashville Ballet	-94.2	1095624	61350	2019
Orlando Ballet	-91.0	7732855	696082	2020
Orlando Ballet	-44.3	613186	338943	2016
San Francisco Ballet	-101.5	1035814	174	2012
San Francisco Ballet	-58.7	2318646	1035814	2011
The Washington Ballet	-51.9	621423	310000	2019
The Washington Ballet	-57.6	1212247	621423	2017

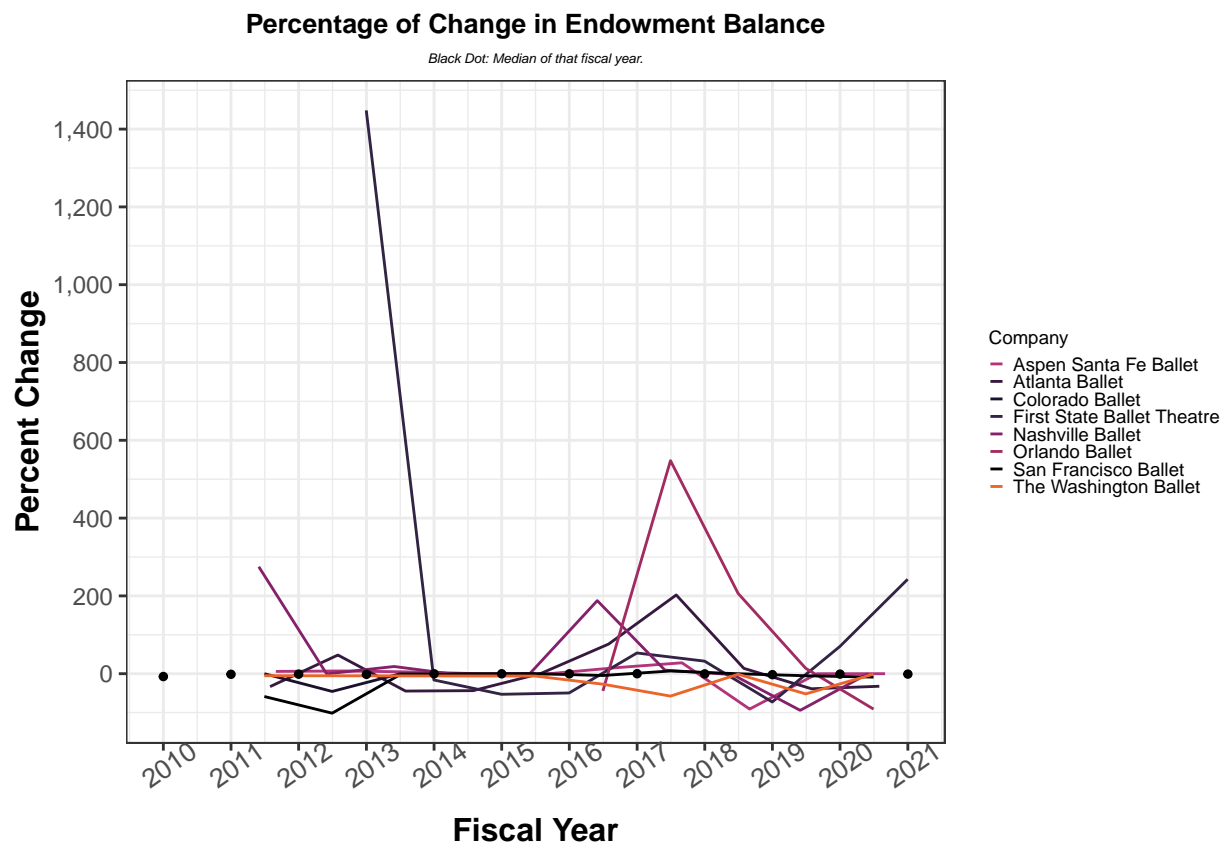
\end{table}

```
##Plotting and labeling only those with dips below 40
below_40_fr <- pct_change_inv_ds %>%
  filter(pct_change != Inf) %>%
  filter(organization_name %in% low_forty$organization_name) %>%
  ggplot(aes(x = TaxPeriodEndDt, y = pct_change)) +
```

```

geom_line(aes(group = organization_name, color = organization_name), show.legend = TRUE) +
scale_colour_manual(values = pal) +
theme_bw() +
labs(y = "Percent Change",
     x = "Fiscal Year",
     title = "Percentage of Change in Endowment Balance",
     subtitle = "Black Dot: Median of that fiscal year.",
     color = "Company") +
theme(plot.title = element_text(size = 10, face = "bold", hjust = .5),
      axis.title = element_text(size = 12, face = "bold"),
      plot.subtitle = element_text(size = 5, face = "italic", hjust = .5),
      axis.text.x = element_text(size = 10, angle = 35),
      strip.text = element_text(face="bold",size = 5),
      legend.key.size = unit(2, 'mm'),
      legend.text = element_text(size=7),
      legend.title = element_text(size = 7)) +
scale_y_continuous(labels = scales::comma_format(),
                   breaks = scales::pretty_breaks(n = 10)) +
scale_x_date(breaks = scales::pretty_breaks(n = 10)) +
geom_point(data = pct_change_inv_med, aes(x = fiscal_year_dt, y = median), color = "black", size = 1)
below_40_fr

```



Looking at Companies who Grow above 200% At Any Point

```
## Table for higher than 200%
high_200 <- pct_change_inv_ds %>%
  filter(pct_change >200) %>%
  filter(pct_change != Inf) %>%
  select(organization_name, pct_change, BeginningYearBalanceAmt, EndYearBalanceAmt, fiscal_year)
high_200 %>%
  arrange(organization_name) %>%
  kbl(caption = "Endowment Percent Change Increasing Beyond 200% Of Beginning Year balance",
      col.names = c("Company Name", "Percent Change", "Beginning Balance", "End Balance", "Fiscal Year"),
      format="latex",
      booktabs=TRUE,
      escape=FALSE,
      linesep = "\\addlinespace",
      digits = 1) %>%
  kable_classic()
```

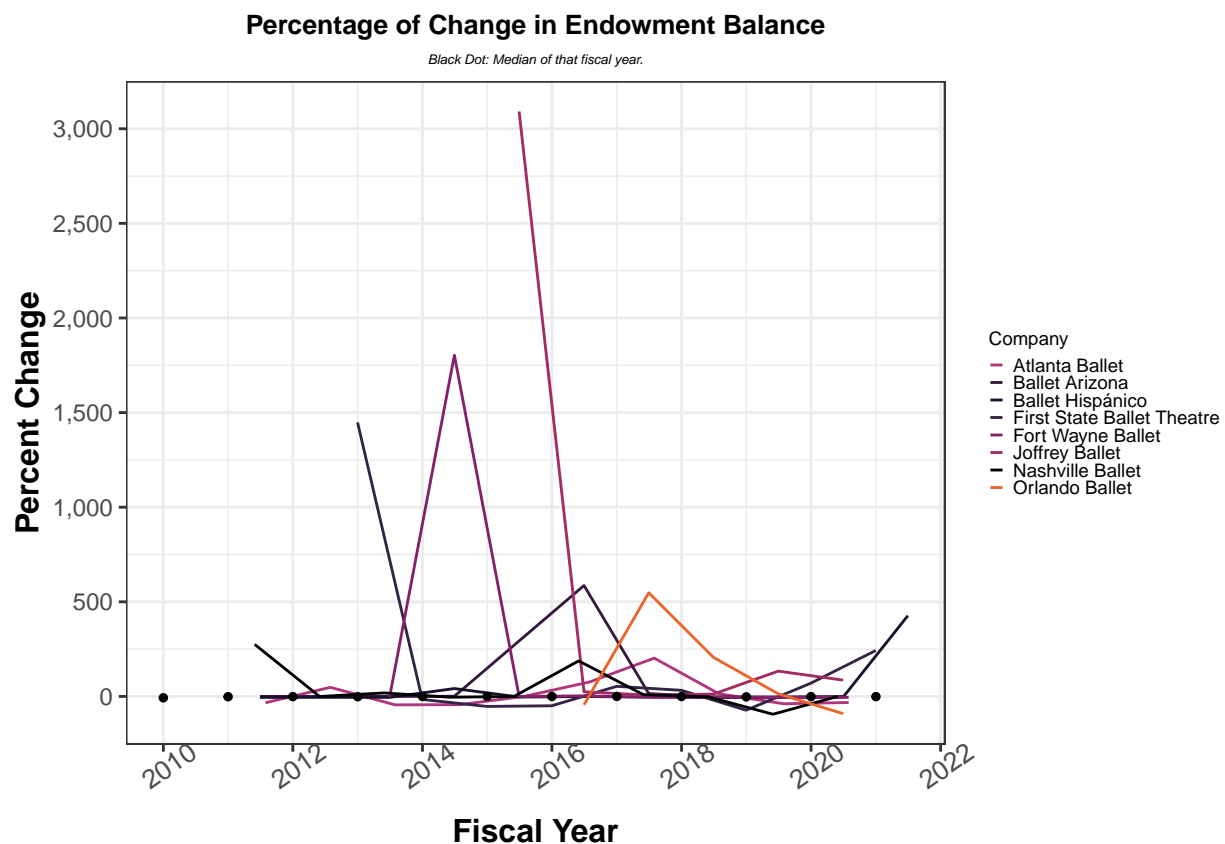
\begin{table}				
\caption{Endowment Percent Change Increasing Beyond 200% Of Beginning Year balance}				
Company Name	Percent Change	Beginning Balance	End Balance	Fiscal Year
Atlanta Ballet	202.3	2119967	6523144	2017
Ballet Arizona	586.1	601399	4126424	2016
Ballet Hispánico	426.8	1405952	7481852	2021
First State Ballet Theatre	242.7	16999	58253	2020
First State Ballet Theatre	242.7	16999	58253	2020
First State Ballet Theatre	1448.1	5874	90934	2012
Fort Wayne Ballet	1803.3	60137	1201082	2014
Joffrey Ballet	3091.4	35600	1136139	2015
Nashville Ballet	275.0	54543	212030	2011
Orlando Ballet	206.4	2212808	6791249	2018
Orlando Ballet	547.7	338943	2212808	2017
\end{table}				

```
##Plotting and labeling only those with dips below 40
above_200_fr <- pct_change_inv_ds %>%
  filter(pct_change != Inf) %>%
  filter(organization_name %in% high_200$organization_name) %>%
  ggplot(aes(x = TaxPeriodEndDt, y = pct_change)) +
  geom_line(aes(group = organization_name, color = organization_name), show.legend = TRUE) +
  scale_colour_manual(values = pal) +
  #scale_color_viridis_d(option = "D") +
  theme_bw() +
  labs(y = "Percent Change",
       x = "Fiscal Year",
```

```

title = "Percentage of Change in Endowment Balance",
subtitle = "Black Dot: Median of that fiscal year.",
color = "Company") +
theme(plot.title = element_text(size = 10, face = "bold", hjust = .5),
axis.title = element_text(size = 12, face = "bold"),
plot.subtitle = element_text(size = 5, face = "italic", hjust = .5),
axis.text.x = element_text(size = 10, angle = 35),
strip.text = element_text(face="bold",size = 5),
legend.key.size = unit(2, 'mm'),
legend.text = element_text(size=7),
legend.title = element_text(size = 7)) +
scale_y_continuous(labels = scales::comma_format(),
breaks = scales::pretty_breaks(n = 10)) +
scale_x_date(breaks = scales::pretty_breaks(n = 10)) +
geom_point(data = pct_change_inv_med, aes(x = fiscal_year_dt, y = median), color = "black", size = 1)
above_200_fr

```



```

##Table
pct_change_inv_ds %>%
  filter(pct_change >200) %>%
  filter(pct_change != Inf) %>%
  select(organization_name, BeginningYearBalanceAmt, EndYearBalanceAmt, pct_change, fiscal_year) %>%
  make_table_pdf(title = "c", col_names = c("a","a","a","a","a"))

```


Investments and S&P 500 specifically

Asking the question: How much of the change in endowment balance is specifically due to investments.

Calculation:

$$\frac{\sum(Investments)}{(NewestEYB - OldestBYB)} \times 100$$

```
## (INV - BYB)/BYB * 100
## Rose has notes on her choice for this calculation
endowment_data %>%
  filter(!is.na(BeginningYearBalanceAmt)) %>%
  mutate(InvestmentEarningsOrLossesAmt = ifelse(is.na(InvestmentEarningsOrLossesAmt), 0, InvestmentEarningsOrLossesAmt))
  group_by(EIN) %>%
  summarize(inv_sum = sum(InvestmentEarningsOrLossesAmt))
```

```
## # A tibble: 46 x 2
##   EIN      inv_sum
##   <chr>    <dbl>
## 1 042312734 8411412
## 2 131882106 17043423
## 3 132584273 31904350
## 4 132642091      39
## 5 132685755 721059
## 6 132947386 101146818
## 7 210732575      0
## 8 231629970 1831526
## 9 237101094 7298768
## 10 237247909 3528
## # i 36 more rows
```

```
inv_sum <- endowment_data %>%
  filter(!is.na(BeginningYearBalanceAmt)) %>%
  mutate(InvestmentEarningsOrLossesAmt = ifelse(is.na(InvestmentEarningsOrLossesAmt), 0, InvestmentEarningsOrLossesAmt))
  group_by(EIN) %>%
  summarize(inv_sum = sum(InvestmentEarningsOrLossesAmt))
## Earliest beginning year balance
begin <- endowment_data %>%
  filter(!is.na(BeginningYearBalanceAmt)) %>%
  group_by(EIN) %>%
  arrange(EIN, desc(fiscal_year)) %>%
  slice_min(n=1, order_by = fiscal_year) %>%
  ungroup() %>%
  select(EIN, BeginningYearBalanceAmt, begin_bal_year = fiscal_year)
## Latest EYB
end <- endowment_data %>%
  filter(!is.na(BeginningYearBalanceAmt)) %>%
  group_by(EIN) %>%
  arrange(EIN, desc(fiscal_year)) %>%
  slice_max(n=1, order_by = fiscal_year) %>%
  ungroup() %>%
```

```

select(EIN, EndYearBalanceAmt, end_bal_year = fiscal_year)
inv_change <- inv_sum %>%
  left_join(begin, by = "EIN") %>%
  left_join(end, by = "EIN") %>%
  mutate(inv_ch_pct = inv_sum/(EndYearBalanceAmt - BeginningYearBalanceAmt))

```

Where do I go next with this? How do I compare it to the market? # Breaking Companies up by Behavior

Using only the dataset normalized for investments, as that has more consistency.

```

# Adding var for "Consistency"
## Between mean +/- SD
#inv_consist <- pct_change_inv_ds %>%
#  group_by(organization_name) %>%
#  filter(pct_change != Inf & pct_change != -Inf) %>%
#  summarize(mean = mean(pct_change),
#            sd = sd(pct_change)) %>%
#  mutate(consistent = ifelse(between(mean + sd, -7, 7) | between(mean - sd, -7, 7), TRUE, FALSE))
## Checking if any value is outside of -7:7, can do with min/max
inv_consist <- pct_change_inv_ds %>%
  group_by(organization_name) %>%
  filter(pct_change != Inf & pct_change != -Inf) %>%
  summarize(min = min(pct_change),
            max = max(pct_change),
            sd = sd(pct_change)) %>%
  mutate(consistent = ifelse(between(min + sd, -7, 7) & between(max - sd, -7, 7), TRUE, FALSE),
        #Manual inspection showed BQC should be marked as consistent but just didnt quite make it math
        consistent = ifelse(organization_name == "Ballet Quad Cities", TRUE, consistent),
        rank = rank(sd))
## Adding consistency
inv_consist_ds <- inv_consist %>%
  select(organization_name, consistent, rank) %>%
  right_join(pct_change_inv_ds, by = "organization_name") %>%
  filter(pct_change != Inf & pct_change != -Inf)

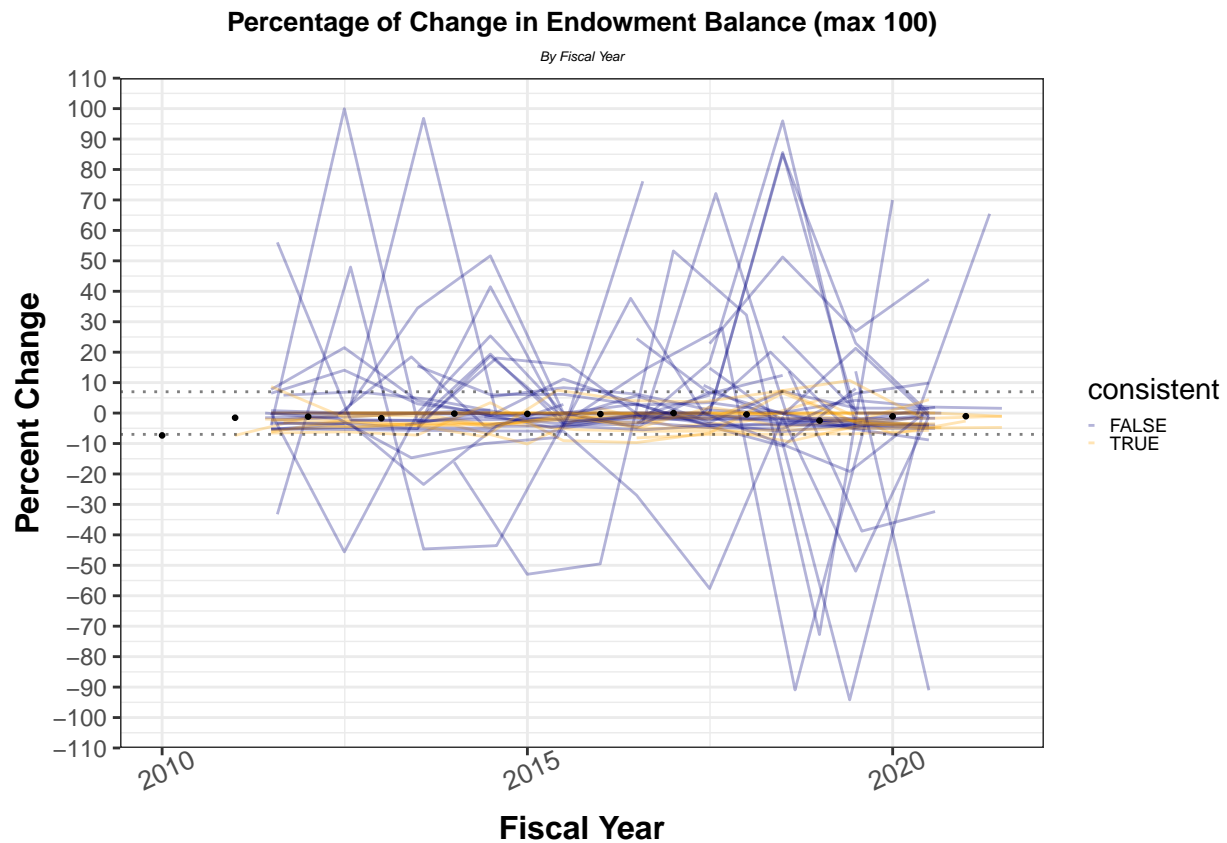
##plotting
consist_plot <- ggplot(inv_consist_ds, aes(x = TaxPeriodEndDt, y = pct_change,
                                           group = organization_name, color = consistent)) +
  geom_line(show.legend = TRUE, alpha = 0.3) +
  theme_bw() +
  labs(y = "Percent Change",
       x = "Fiscal Year",
       title = "Percentage of Change in Endowment Balance (max 100)",
       subtitle = "By Fiscal Year") +
  theme(plot.title = element_text(size = 10, face = "bold", hjust = .5),
        axis.title = element_text(size = 12, face = "bold"),
        plot.subtitle = element_text(size = 5, face = "italic", hjust = .5),
        axis.text.x = element_text(size = 10, angle = 25),
        strip.text = element_text(face="bold",size = 5),
        legend.key.size = unit(1, 'mm'),
        legend.text = element_text(size=7)) +

```

```

scale_y_continuous(labels = scales::comma_format(),
                   breaks = scales::pretty_breaks(n = 20),
                   limits = c(-100, 100)) +
scale_color_manual(values = c("navy", "orange")) +
geom_point(data = pct_change_inv_med, aes(x = fiscal_year_dt, y = median), color = "black", size = 0.1) +
geom_hline(yintercept = 7, alpha = .5, linetype = "dotted") +
geom_hline(yintercept = -7, alpha = .5, linetype = "dotted")
consist_plot

```



```

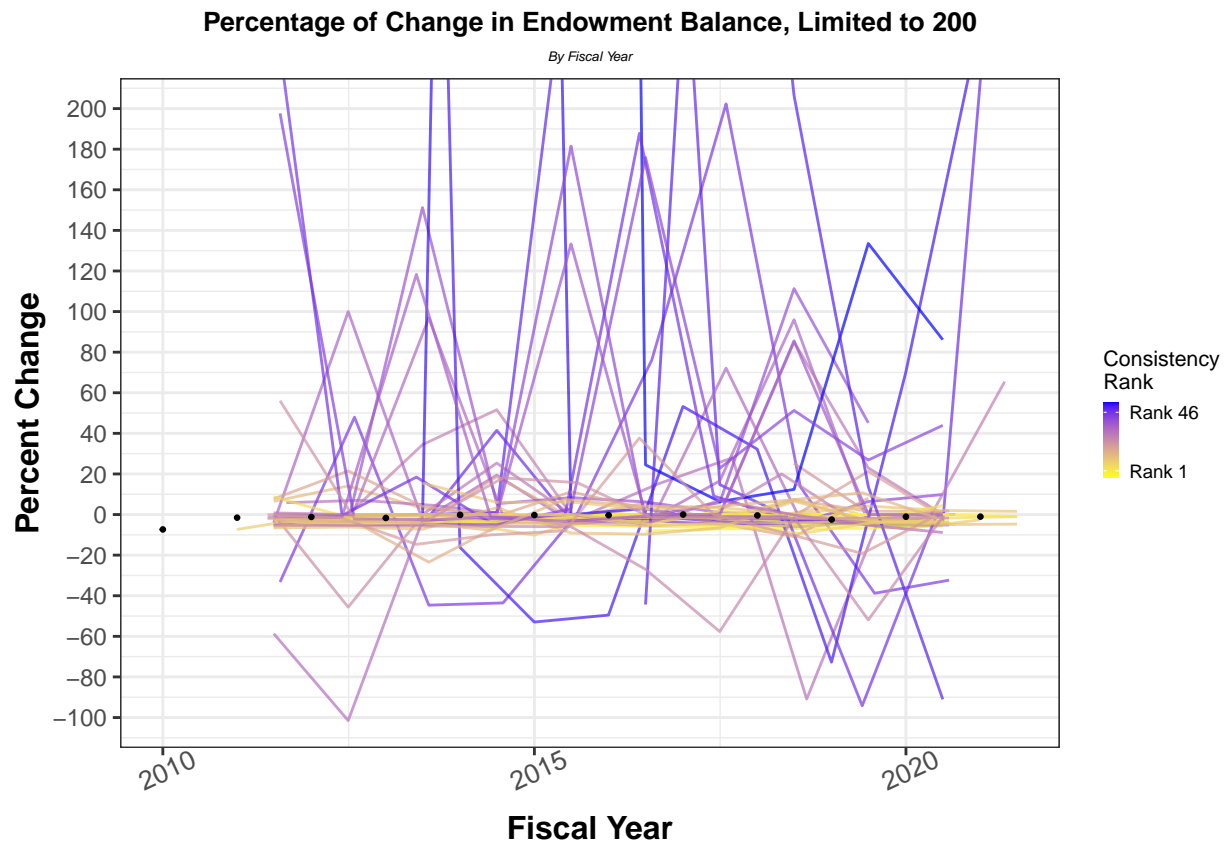
#ggplotly(consist_plot)
## Consistent by standard deviation ranking
consist_sd <- ggplot(inv_consist_ds, aes(x = TaxPeriodEndDt, y = pct_change,
                                         group = organization_name, color = rank)) +
  geom_line(show.legend = TRUE, alpha = 0.7) +
  theme_bw() +
  labs(y = "Percent Change",
       x = "Fiscal Year",
       title = "Percentage of Change in Endowment Balance, Limited to 200",
       subtitle = "By Fiscal Year",
       color = "Consistency\nRank") +
  theme(plot.title = element_text(size = 10, face = "bold", hjust = .5),
        axis.title = element_text(size = 12, face = "bold"),
        plot.subtitle = element_text(size = 5, face = "italic", hjust = .5),
        axis.text.x = element_text(size = 10, angle = 25),
        strip.text = element_text(face = "bold", size = 5),

```

```

    legend.key.size = unit(2, 'mm'),
    legend.text = element_text(size=7),
    legend.title = element_text(size = 8)) +
  scale_y_continuous(labels = scales::comma_format(),
                     breaks = scales::pretty_breaks(n = 20)) +
  scale_color_gradient(low = "yellow", high = "blue",
                      breaks = c(5,40),
                      labels = c("Rank 1", "Rank 46")) +
  geom_point(data = pct_change_inv_med, aes(x = fiscal_year_dt, y = median), color = "black", size = 0.1) +
  coord_cartesian(ylim=c(-100, 200))
consist_sd

```



```

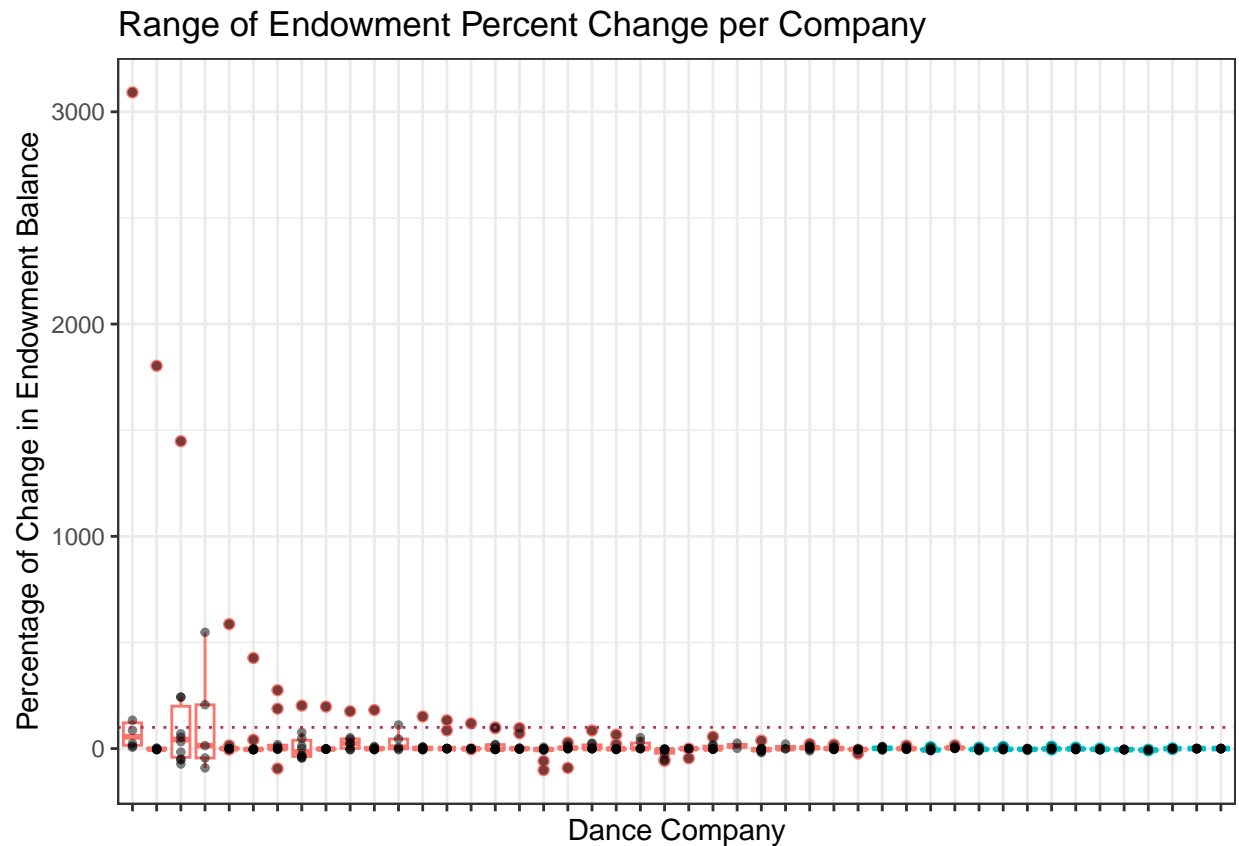
inv_box <- inv_consist_ds %>%
  group_by(organization_name) %>%
  filter(pct_change != Inf) %>%
  summarize(sd = sd(pct_change, na.rm = TRUE)) %>%
  right_join(inv_consist_ds, by = "organization_name") %>%
  select(organization_name, EIN, pct_change, sd, consistent) %>%
  mutate(organization_name = reorder(organization_name, -sd, na.rm = TRUE))
## Unlimited
box_plot <- ggplot(inv_box, aes(x = organization_name, y = pct_change)) +
  geom_boxplot(aes(color = consistent), show.legend = FALSE) +
  geom_point(size = 1, alpha = 0.5, show.legend = FALSE) +
  theme_bw() +
  labs(title = "Range of Endowment Percent Change per Company",

```

```

x = "Dance Company",
y = "Percentage of Change in Endowment Balance") +
theme(axis.text.x = element_blank()) +
geom_hline(yintercept = 100, linetype = "dotted", color = "maroon")
box_plot

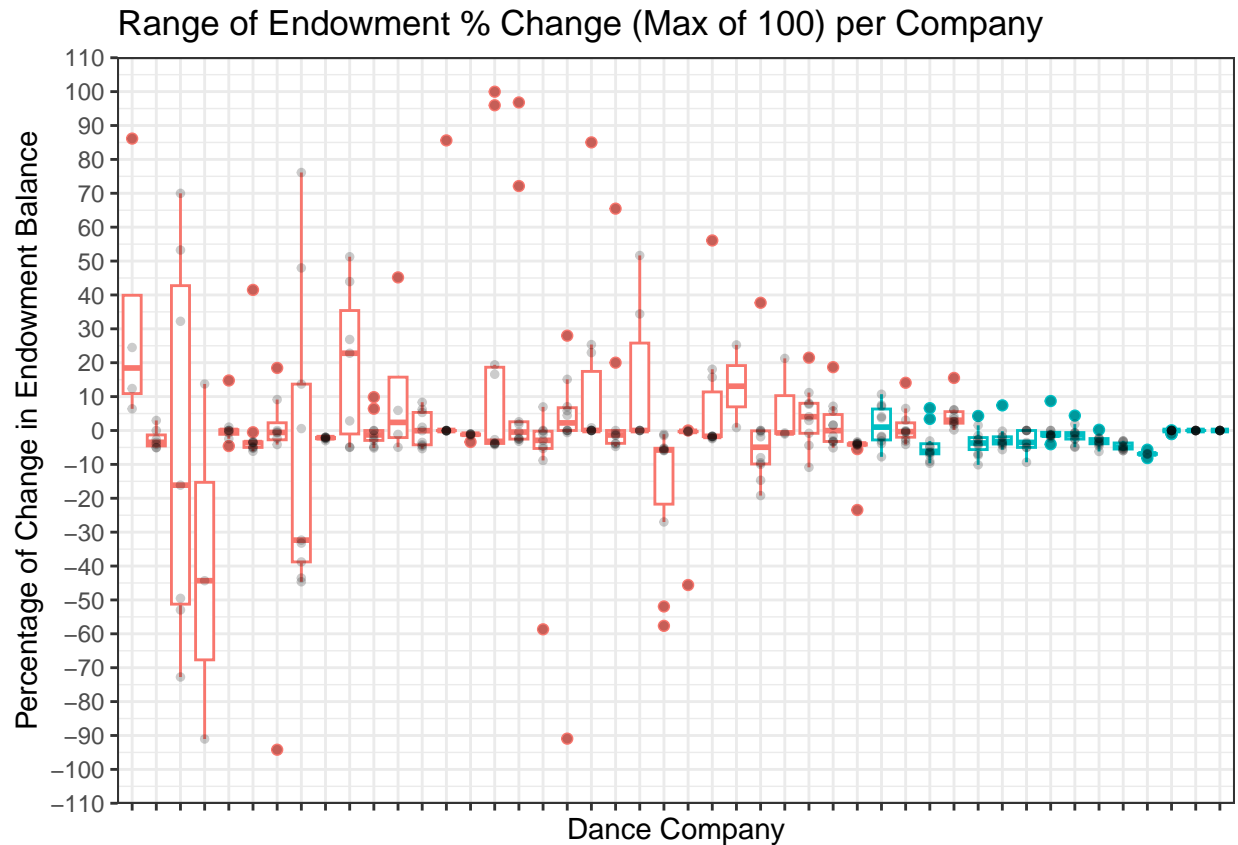
```



```

##Limited to 100 for visibility
ggplot(inv_box, aes(x = organization_name, y = pct_change)) +
  geom_boxplot(aes(color = consistent), show.legend = FALSE) +
  geom_point(size = 1, alpha = 0.2) +
  theme_bw() +
  labs(title = "Range of Endowment % Change (Max of 100) per Company",
       x = "Dance Company",
       y = "Percentage of Change in Endowment Balance") +
  theme(axis.text.x = element_blank()) +
  scale_y_continuous(breaks = scales::breaks_pretty(n = 20),
                    limit = c(-100,100))

```



Examining the Two Classes

Lists of Companies within Each Class

```
## Names in a table
# CONSISTENT ones
inv_consist %>%
  filter(consistent == TRUE) %>%
  select(-consistent) %>%
  make_table(title = "Companies with Consistent Endowment Changes", col_names = c("Organization Name",
  scroll_box(height = "450px")
```

```
\begin{table}
\caption{
Companies with Consistent Endowment Changes
}
```

Organization Name	Minimum Change	Maximum Change	Standard Deviation	Rank
American Ballet Theatre	-10.1384374	4.2860828	4.0324901	11
Ballet Quad Cities	-8.1500000	-5.6644880	0.8835432	4
Ballet West	0.0000000	0.0000000	0.0000000	1
Dance Theatre of Harlem	-0.0388002	0.0000000	0.0187423	2
Eugene Ballet	-1.0345879	0.0688889	0.4221077	3
Houston Ballet	-6.2005177	0.2170576	1.6879328	6
Madison Ballet	-5.9572663	-3.0421945	1.1388038	5
Nevada Ballet Theatre	-4.0666759	8.6980699	3.2556331	8
New York City Ballet	-5.6655590	7.4146906	3.6785695	10
Pacific Northwest Ballet	-4.9507177	4.3953178	2.8264344	7
Pittsburgh Ballet Theatre	-9.6760767	6.5959063	5.0398509	13
The Alabama Ballet	-9.3608502	0.0000000	3.2690717	9
Tulsa Ballet	-7.7686509	10.7046483	5.9757380	15

\end{table}

There are 13 companies which have ‘consistent’ endowment percent change.

```
## Names in a table
# INCONSISTENT ones
inv_consist %>%
  filter(consistent == FALSE) %>%
  select(-consistent) %>%
  make_table(title = "Companies with Inconsistent Endowment Changes", col_names = c("Organization Name"
  scroll_box(height = "450px"))
```

\begin{table}

\caption{

Companies with Inconsistent Endowment Changes

}

Organization Name	Minimum Change	Maximum Change	Standard Deviation	Rank
Alvin Ailey American Dance Theater	-4.1243918	14.081909	5.448452	14
American Repertory Ballet	0.0000000	51.650676	22.878143	25
Aspen Santa Fe Ballet	-90.9315940	27.985398	32.123542	28
Atlanta Ballet	-44.6403251	202.316498	77.865045	39
Ballet Arizona	-4.5855094	586.137489	195.120766	42
Ballet Austin	-3.1962055	96.801014	38.214646	30
Ballet Des Moines	0.8898064	25.250000	17.225258	21
Ballet Hispánico	-6.1313369	426.757101	129.225939	41
Ballet Memphis	-4.2013624	99.971553	41.557976	31
BalletMet	0.0000000	85.024976	27.080277	27
Boston Ballet	-5.1204623	18.685271	7.187359	17
Charlotte Ballet	-5.3581636	151.235743	47.968535	34
Colorado Ballet	-45.6020434	0.000000	20.295490	23
Dayton Ballet	-4.9439121	111.287046	48.991355	35
First State Ballet Theatre	-72.7468454	1448.076268	456.341757	44
Fort Wayne Ballet	-5.0721240	1803.322414	638.452734	45
Grand Rapids Ballet	-5.1685752	181.500497	57.603893	36
Joffrey Ballet	6.3995664	3091.401685	1241.573466	46
Kansas City Ballet	-10.8708252	21.485368	9.369251	18
Miami City Ballet	-4.7185994	65.463629	22.940589	26
Milwaukee Ballet	-2.9985679	197.640687	66.634896	38
Nashville Ballet	-94.2002001	275.012376	108.069064	40
New Mexico Ballet Company	-1.0439065	21.277736	12.791467	19
Oregon Ballet Theatre	0.1654999	15.510390	4.322099	12
Orlando Ballet	-91.0428942	547.700351	261.257026	43
Pennsylvania Ballet	-23.4542637	-3.339976	6.153578	16
Richmond Ballet	-4.9885620	175.926104	59.163609	37
San Francisco Ballet	-101.4981454	6.966102	34.689496	29
Texas Ballet Theater	-0.1453333	133.333333	47.525613	33
The Charleston Ballet	-3.3875824	118.346167	42.371447	32
The Sarasota Ballet	-19.1999386	37.685500	15.618410	20
The Tallahassee Ballet	-2.4204703	56.074766	18.732869	22
The Washington Ballet	-57.6457603	-1.092903	21.377074	24

\end{table}

There are 33 companies which have ‘inconsistent’ endowment percent change.

Size of Companies in Each Class

```
##Getting employee data
source(here("GET_VARS.R"))
##Specifically reading in employee data
files <- dir( here("ballet_990_released_20230208"),
             full.names = TRUE)
employ_data <- map_df(files, ~
  get_df(variables = c("//Return//ReturnData//TotalEmployeeCnt"),
          filename = .x
        )) %>%
  mutate(TotalEmployeeCnt = as.numeric(TotalEmployeeCnt)) %>%
  left_join(names, by = "EIN")
```



```
## Most recent years for each company
employ_data$fiscal_year = as.numeric(as.character(employ_data$fiscal_year))
most_recent_yrs <- employ_data %>%
  group_by(organization_name) %>%
  summarize(recent_year = max(fiscal_year, na.rm = TRUE)) %>%
  left_join(employ_data, by = c("organization_name", "recent_year" = "fiscal_year"))
## Limiting to ONLY most recent year
most_recent_ds <- inv_consist_ds %>%
  left_join(most_recent_yrs, by = "organization_name") %>%
  filter(fiscal_year == recent_year)
```

```
## Table of Consistent
most_recent_ds %>%
  filter(consistent == TRUE) %>%
  select(organization_name, TotalEmployeeCnt, EndYearBalanceAmt, recent_year) %>%
  make_table("Size of Consistent Companies, by Employees and Endowment", col_names = c("Organization Name", "Total Employee Count", "End Year Balance Amount", "Fiscal Year"))
  scroll_box(height = "450px")
```

```
\begin{table}
\caption{
}

```

Organization Name	Total Employee Count	End Year Balance Amount	Fiscal Year
American Ballet Theatre	493	26365262	2020
Ballet Quad Cities	4	8764	2020
Ballet West	541	2127314	2020
Dance Theatre of Harlem	149	33505	2020
Eugene Ballet	72	62150	2021
Eugene Ballet	NA	62150	2021
Eugene Ballet	72	62150	2021
Eugene Ballet	NA	62150	2021
Houston Ballet	535	80123432	2020
Madison Ballet	41	932750	2020
Nevada Ballet Theatre	80	2470253	2021
New York City Ballet	1451	214442196	2020
Pacific Northwest Ballet	514	20779107	2020
Pittsburgh Ballet Theatre	235	10758728	2021
The Alabama Ballet	102	432673	2020
Tulsa Ballet	97	10614630	2020

```
\end{table}
```

```
## Table of Inconsistent
most_recent_ds %>%
  filter(consistent == FALSE) %>%
  filter(!is.na(TotalEmployeeCnt)) %>%
  select(organization_name, TotalEmployeeCnt, EndYearBalanceAmt, recent_year) %>%
  make_table("Size of Inconsistent Companies, by Employees and Endowment", col_names = c("Organization Name", "Total Employee Count", "End Year Balance Amount", "Fiscal Year"))
  scroll_box(height = "450px")
```

```
\begin{table}
```

\caption{
}

Organization Name	Total Employee Count	End Year Balance Amount	Fiscal Year
Alvin Ailey American Dance Theater	856	71754853	2020
Aspen Santa Fe Ballet	81	550000	2020
Atlanta Ballet	181	3356278	2020
Ballet Arizona	207	4606871	2020
Ballet Austin	283	8859387	2020
Ballet Des Moines	14	29858	2019
Ballet Hispánico	111	7481852	2021
Ballet Memphis	73	9982568	2020
BalletMet	209	535225	2020
Boston Ballet	664	18135662	2020
Charlotte Ballet	119	5670206	2020
Dayton Ballet	333	4108434	2019
First State Ballet Theatre	32	58253	2020
First State Ballet Theatre	32	58253	2020
Grand Rapids Ballet	63	2171052	2020
Joffrey Ballet	348	8999109	2020
Kansas City Ballet	209	11847916	2019
Miami City Ballet	333	2949392	2021
Milwaukee Ballet	179	588056	2019
New Mexico Ballet Company	1	28897	2020
Oregon Ballet Theatre	235	65023	2021
Orlando Ballet	113	696082	2020
Pennsylvania Ballet	300	3290362	2020
Richmond Ballet	240	2301816	2020
San Francisco Ballet	731	113923812	2020
Texas Ballet Theater	406	329418	2020
The Sarasota Ballet	109	734309	2020
The Tallahassee Ballet	34	12524	2020
The Washington Ballet	235	310000	2020

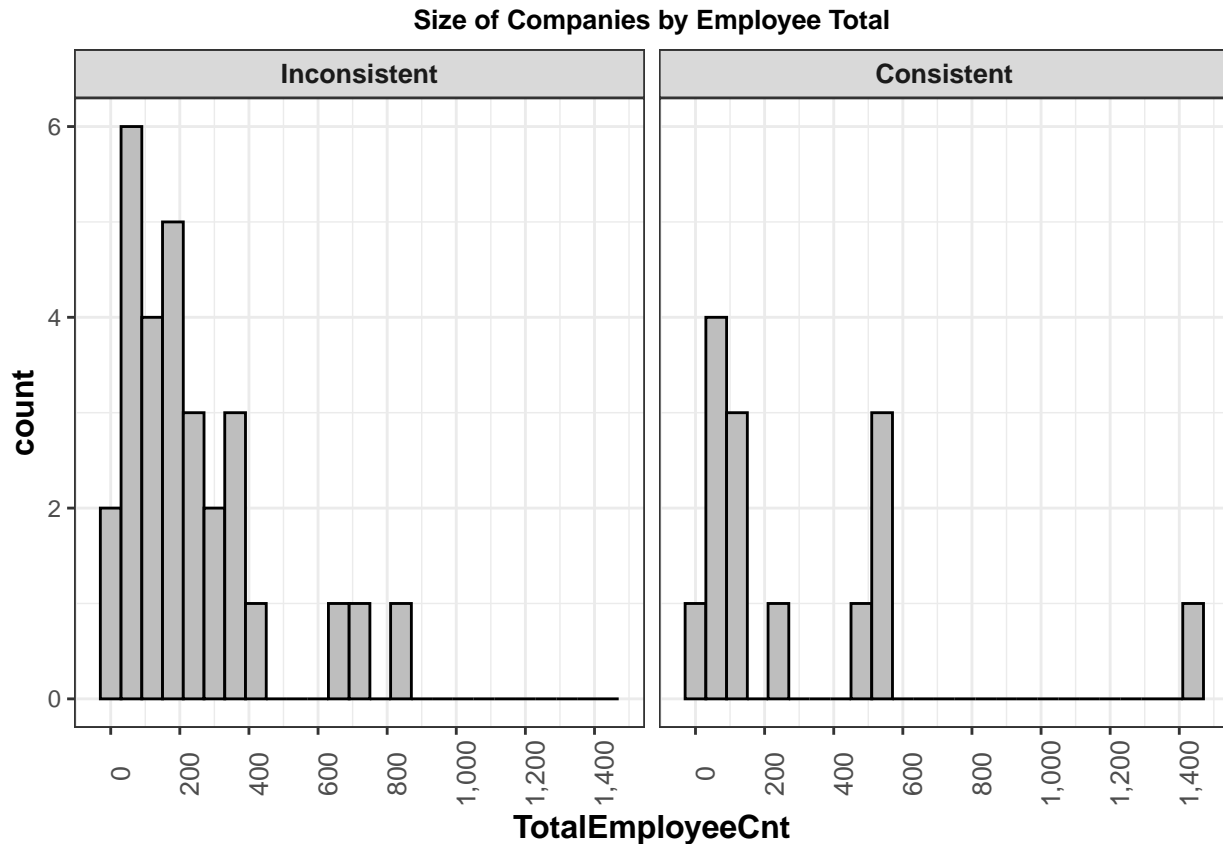
\end{table}

```
##Plotting based on consistent/inconsistent language
## Labels for facet
consistent_labels <- c(
  `TRUE` = "Consistent",
  `FALSE` = "Inconsistent"
)
##Histograms
most_recent_ds %>%
  ggplot(aes(x = TotalEmployeeCnt)) +
  geom_histogram(binwidth = 60, color = "black", fill = "gray") +
  facet_wrap(~consistent, labeller = as_labeller(consistent_labels)) +
  theme_bw() +
  theme(plot.title = element_text(size = 10, face = "bold", hjust = .5),
        axis.title = element_text(size = 12, face = "bold"),
        plot.subtitle = element_text(size = 5, face = "italic", hjust = .5),
        axis.text.x = element_text(size = 10, angle = 90),
        strip.text = element_text(face="bold",size = 10),
```

```

legend.key.size = unit(1, 'mm'),
legend.text = element_text(size=7)) +
scale_x_continuous(labels = scales::comma_format(),
                    breaks = scales::pretty_breaks(n = 10)) +
labs( title = "Size of Companies by Employee Total")

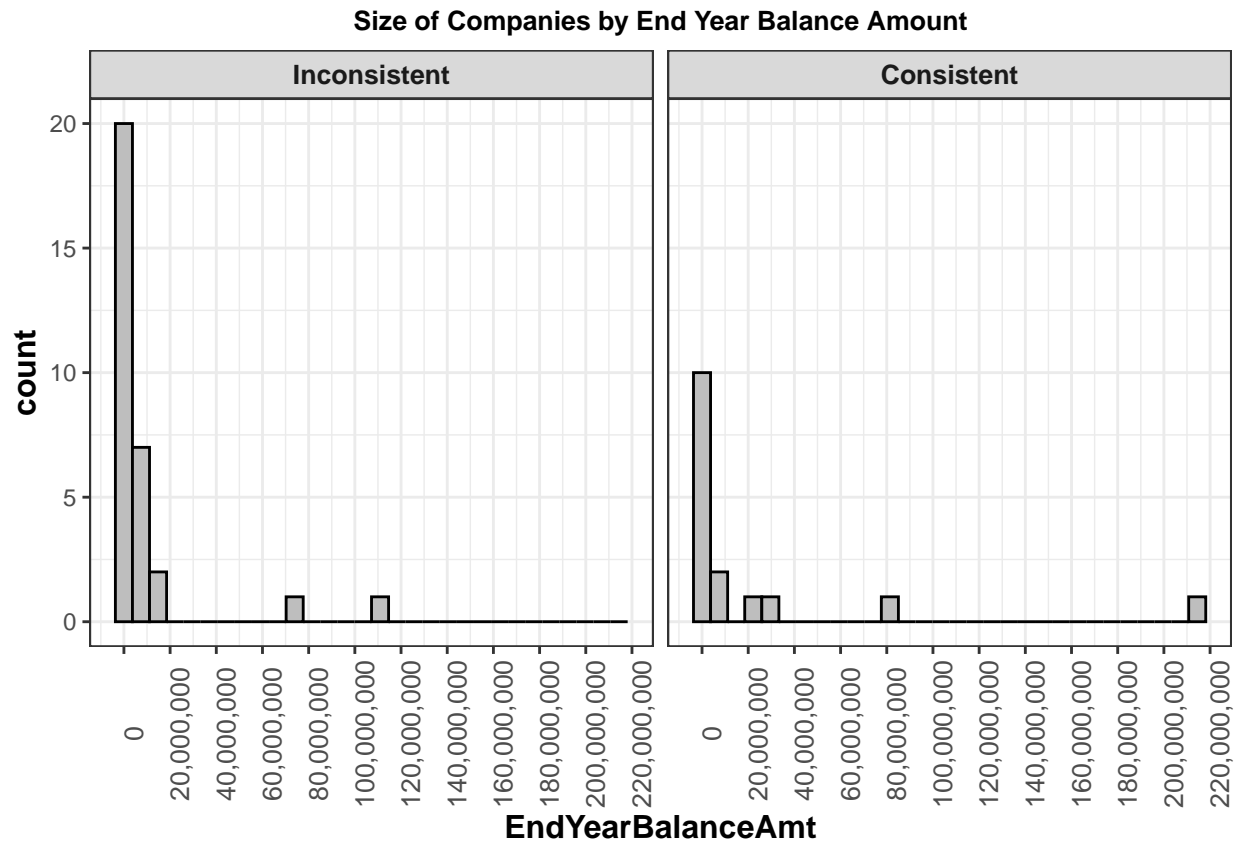
```



```

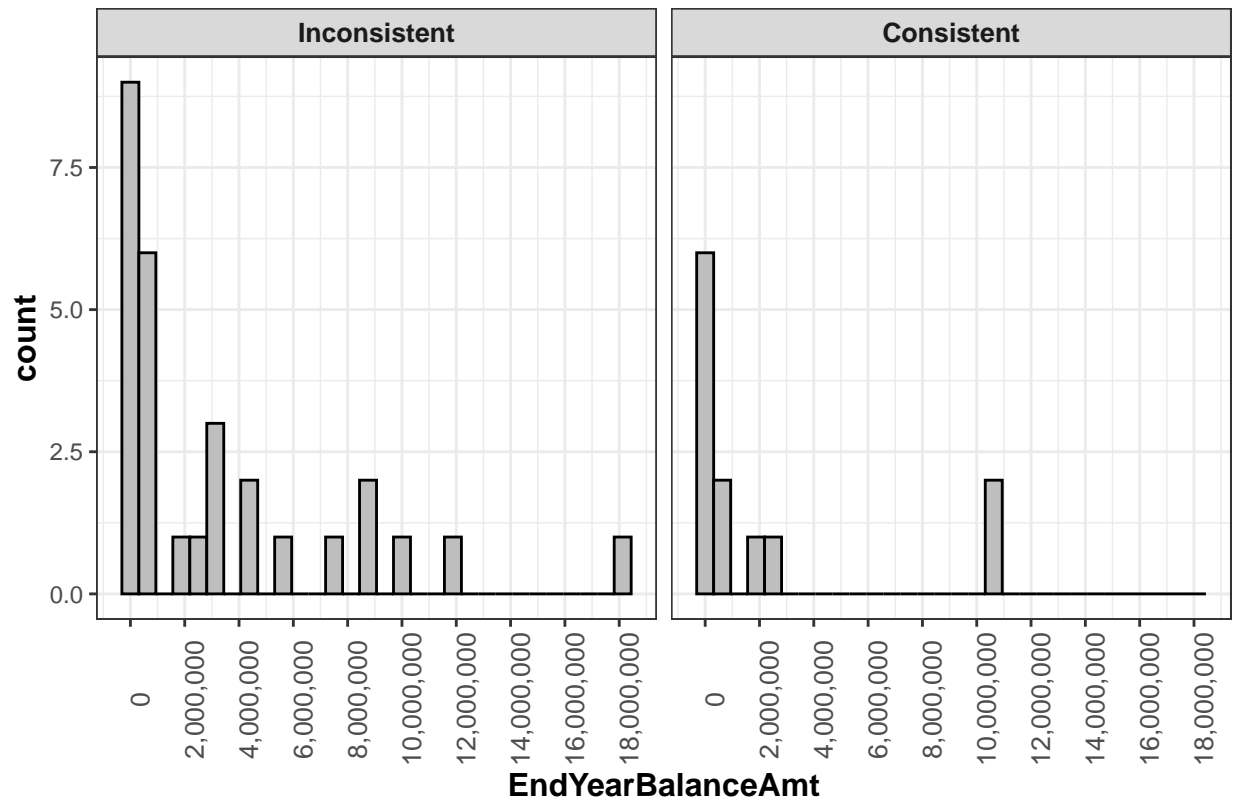
most_recent_ds %>%
  ggplot(aes(x = EndYearBalanceAmt)) +
  geom_histogram(color = "black", fill = "gray") +
  facet_wrap(~consistent, labeller = as_labeller(consistent_labels)) +
  theme_bw() +
  theme(plot.title = element_text(size = 10, face = "bold", hjust = .5),
        axis.title = element_text(size = 12, face = "bold"),
        plot.subtitle = element_text(size = 5, face = "italic", hjust = .5),
        axis.text.x = element_text(size = 10, angle = 90),
        strip.text = element_text(face="bold",size = 10),
        legend.key.size = unit(1, 'mm'),
        legend.text = element_text(size=7)) +
  scale_x_continuous(labels = scales::comma_format(),
                    breaks = scales::pretty_breaks(n = 10)) +
  labs( title = "Size of Companies by End Year Balance Amount")

```

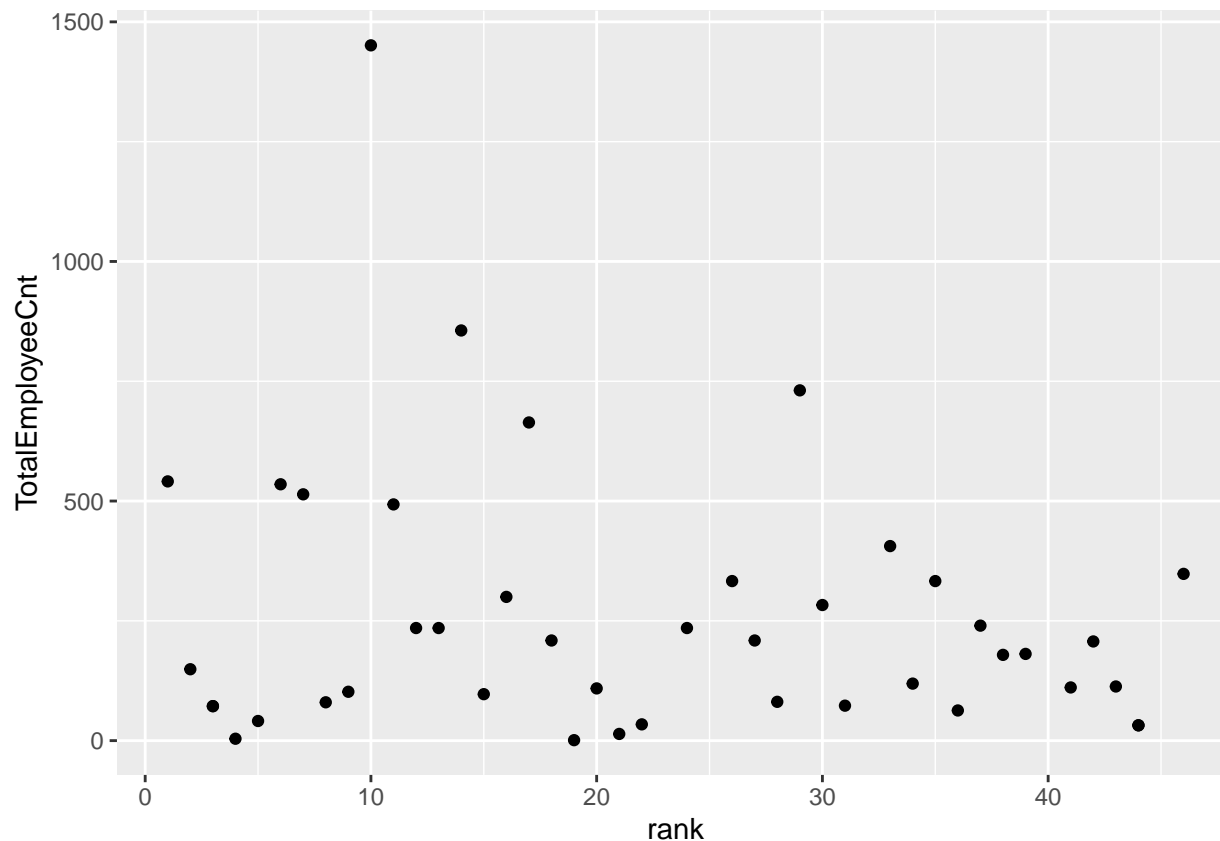


```
most_recent_ds %>%
  filter(EndYearBalanceAmt < 200000000) %>%
  ggplot(aes(x = EndYearBalanceAmt)) +
  geom_histogram(color = "black", fill = "gray") +
  facet_wrap(~consistent, labeller = as_labeller(consistent_labels)) +
  theme_bw() +
  theme(plot.title = element_text(size = 10, face = "bold", hjust = .5),
        axis.title = element_text(size = 12, face = "bold"),
        plot.subtitle = element_text(size = 5, face = "italic", hjust = .5),
        axis.text.x = element_text(size = 10, angle = 90),
        strip.text = element_text(face="bold",size = 10),
        legend.key.size = unit(1, 'mm'),
        legend.text = element_text(size=7)) +
  scale_x_continuous(labels = scales::comma_format(),
                    breaks = scales::pretty_breaks(n = 10)) +
  labs( title = "Size of Companies by End Year Balance Amount, Limit $20,000,000")
```

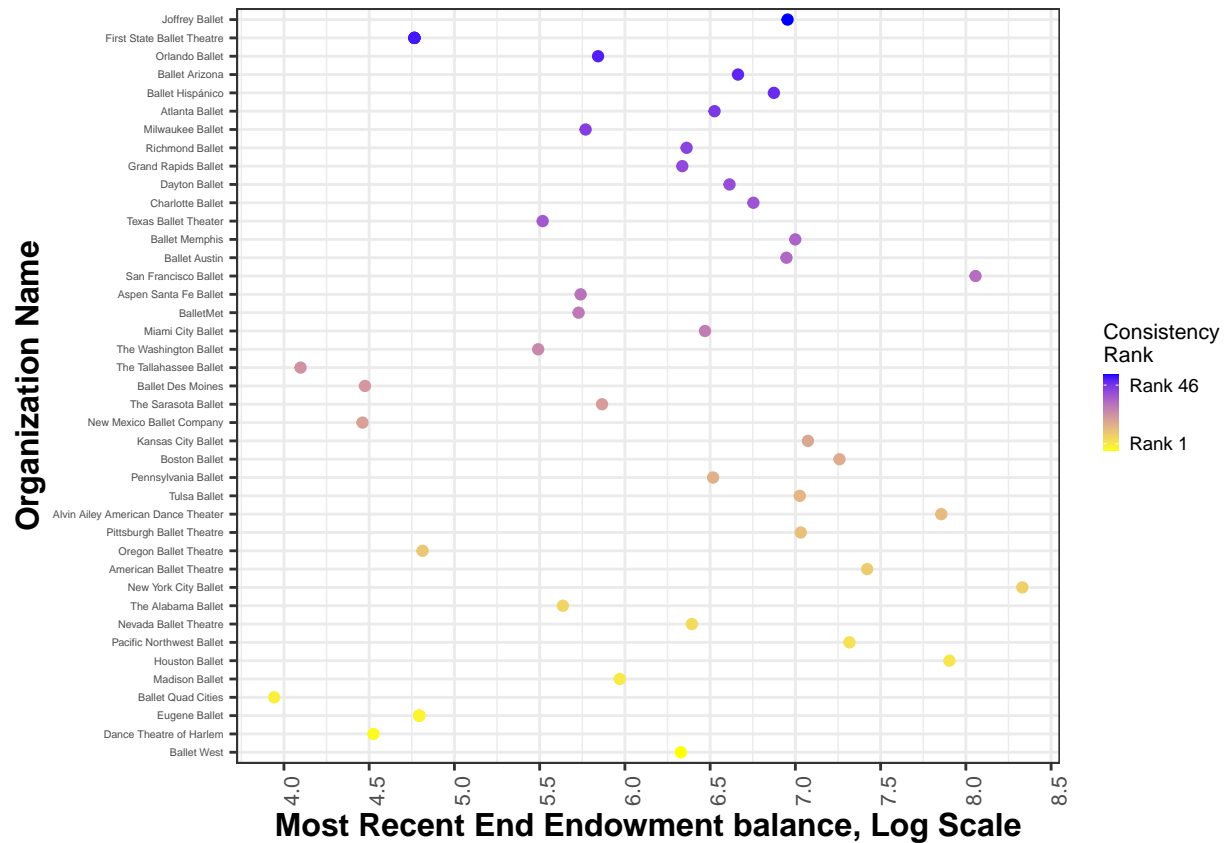
Size of Companies by End Year Balance Amount, Limit \$20,000,000



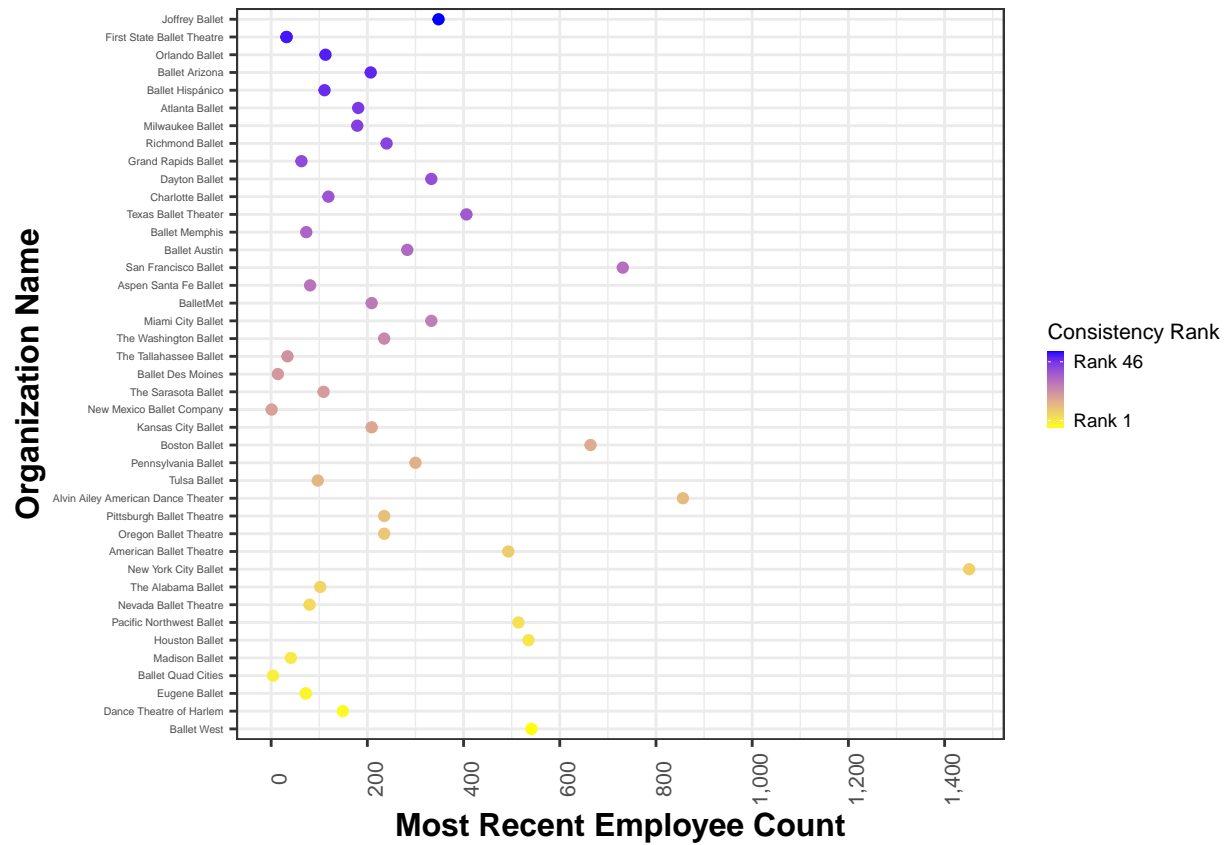
```
## Looking at size by standard deviation ranking
most_recent_ds %>%
  ggplot(aes(x = rank, y = TotalEmployeeCnt)) +
  geom_point()
```



```
##Scatter plot log scale for endowment balance
endo_size_consist_fr <- most_recent_ds %>%
  ggplot(aes(y = reorder(organization_name, rank), x = log10(EndYearBalanceAmt), color = rank)) +
  geom_point() +
  theme_bw() +
  labs(y = "Organization Name",
       x = "Most Recent End Endowment balance, Log Scale",
       color = "Consistency\nRank") +
  theme(plot.title = element_text(size = 10, face = "bold", hjust = .5),
        axis.title = element_text(size = 12, face = "bold"),
        plot.subtitle = element_text(size = 5, face = "italic", hjust = .5),
        axis.text.x = element_text(size = 8, angle = 90),
        axis.text.y = element_text(size = 4),
        legend.key.size = unit(2, 'mm'),
        legend.text = element_text(size=7),
        legend.title = element_text(size = 8)) +
  scale_x_continuous(labels = scales::comma_format(),
                    breaks = scales::pretty_breaks(n = 10)) +
  scale_color_gradient(low = "yellow", high = "blue",
                    breaks = c(5,40),
                    labels = c("Rank 1", "Rank 46"))
endo_size_consist_fr
```



```
## Scatter plot employee count
employ_size_consist_ft <- most_recent_ds %>%
  ggplot(aes(y = reorder(organization_name, rank), x = TotalEmployeeCnt, color = rank)) +
  geom_point() +
  theme_bw() +
  labs(y = "Organization Name",
       x = "Most Recent Employee Count",
       color = "Consistency Rank") +
  theme(plot.title = element_text(size = 10, face = "bold", hjust = .5),
        axis.title = element_text(size = 12, face = "bold"),
        plot.subtitle = element_text(size = 5, face = "italic", hjust = .5),
        axis.text.x = element_text(size = 8, angle = 90),
        axis.text.y = element_text(size = 4),
        legend.key.size = unit(2, 'mm'),
        legend.text = element_text(size=7),
        legend.title = element_text(size = 8)) +
  scale_x_continuous(labels = scales::comma_format(),
                    breaks = scales::pretty_breaks(n = 10)) +
  scale_color_gradient(low = "yellow", high = "blue",
                    breaks = c(5,40),
                    labels = c("Rank 1", "Rank 46"))
employ_size_consist_ft
```



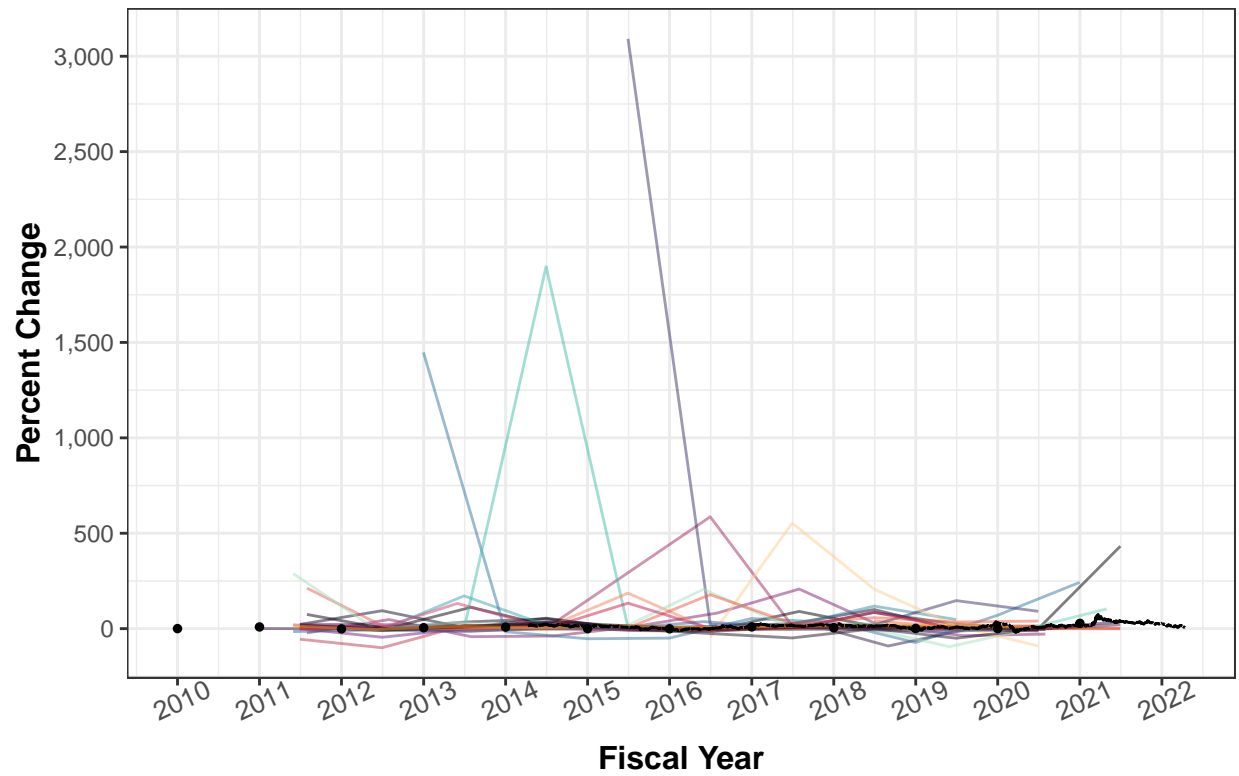
Saving Relevant Images For Report

Spend Down

pc_endow_sp_fr

Percentage of Change in Endowment Balance

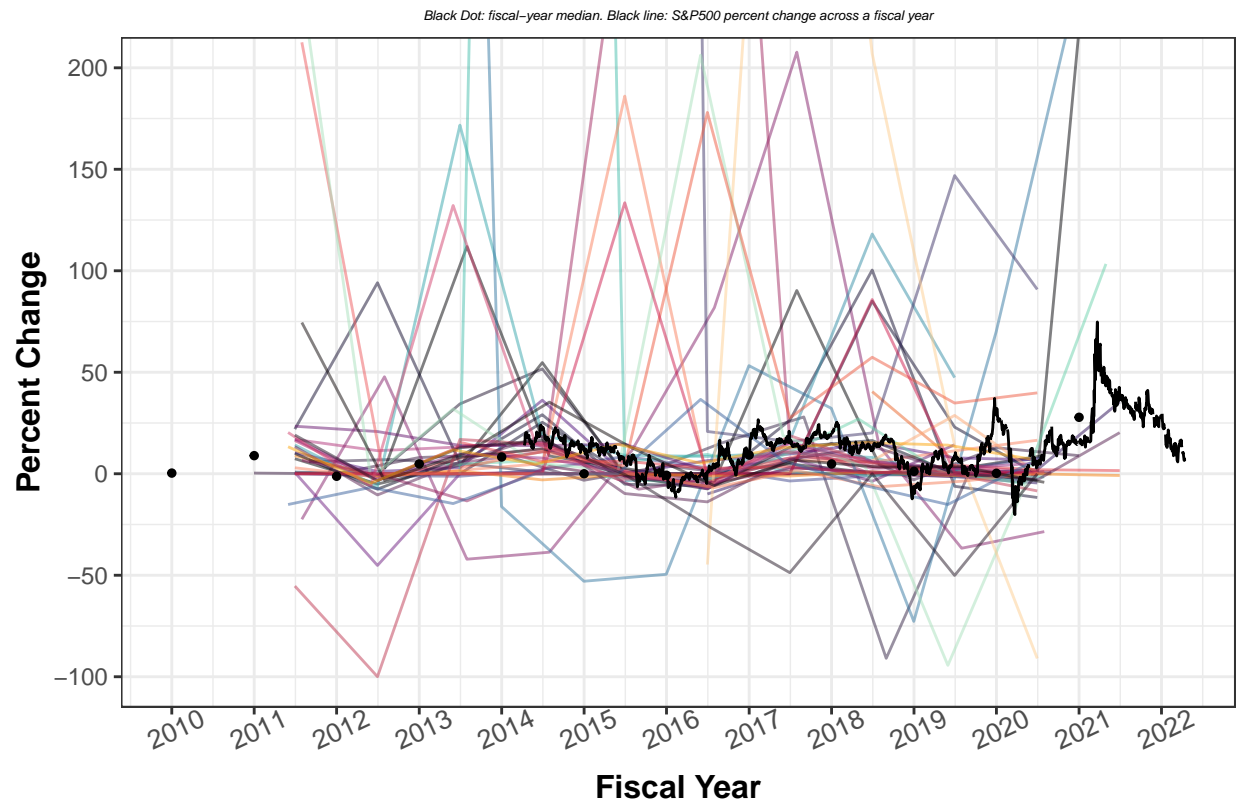
Black Dot: fiscal-year median. Black line: S&P500 percent change across a fiscal year



```
ggsave("pc_endow.png", path = here("final_report", "images"))
```

```
pc_endow_sp_fr_200
```

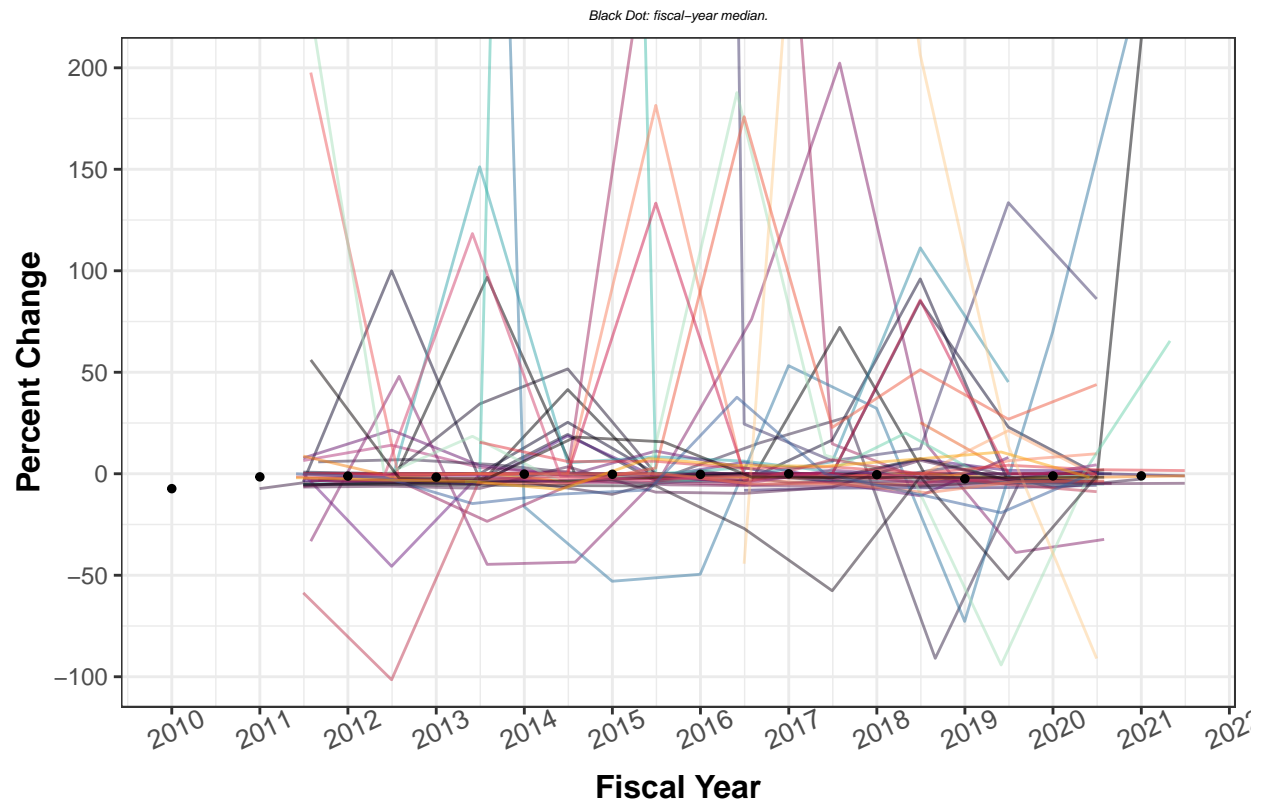
Percentage of Change in Endowment Balance, Zoomed in to 200%



```
ggsave("pc_endow_zoom.png", path = here("final_report", "images"))
```

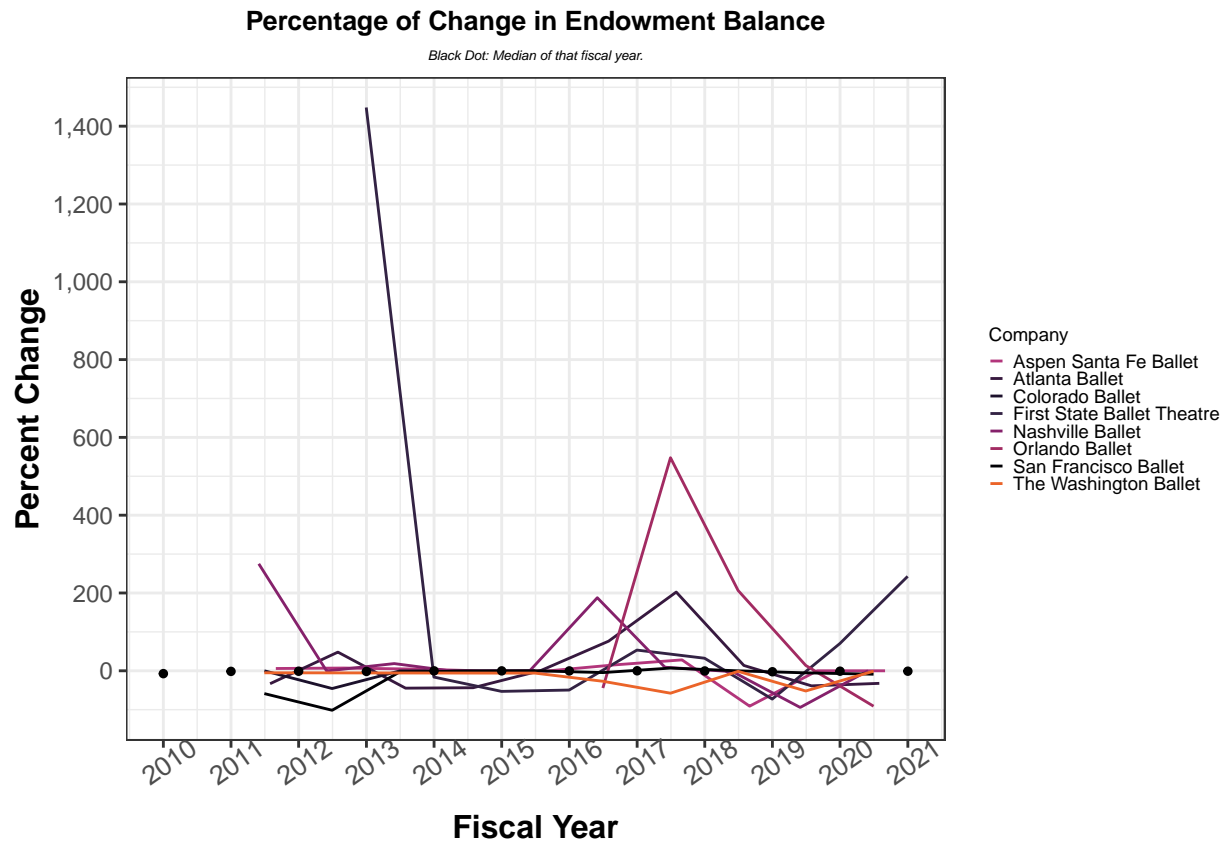
```
pc_endo_ft
```

Percentage of Change in Endowment Balance, Zoomed in to 200%



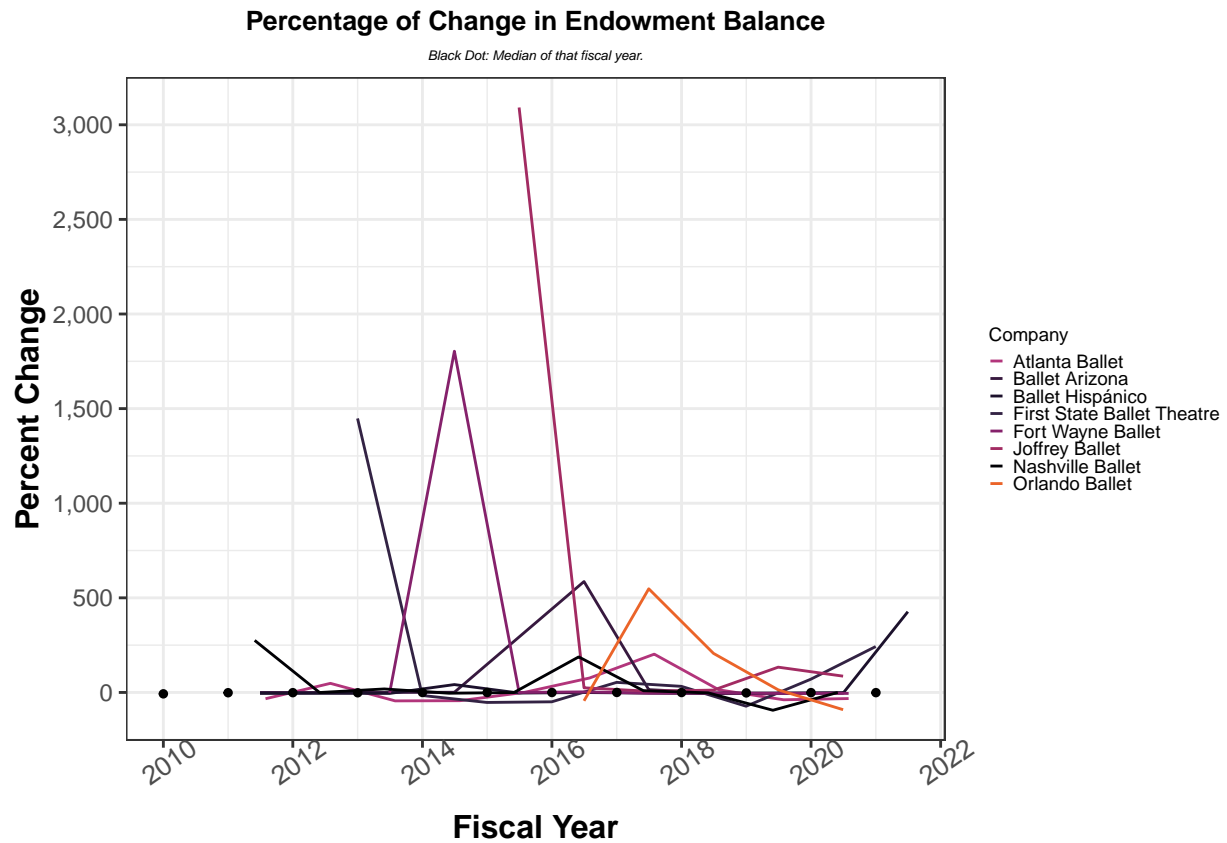
```
ggsave("pc_endow_flat.png", path = here("final_report", "images"))
```

```
below_40_fr
```



```
ggsave("pc_below_40.png", path = here("final_report", "images"))
```

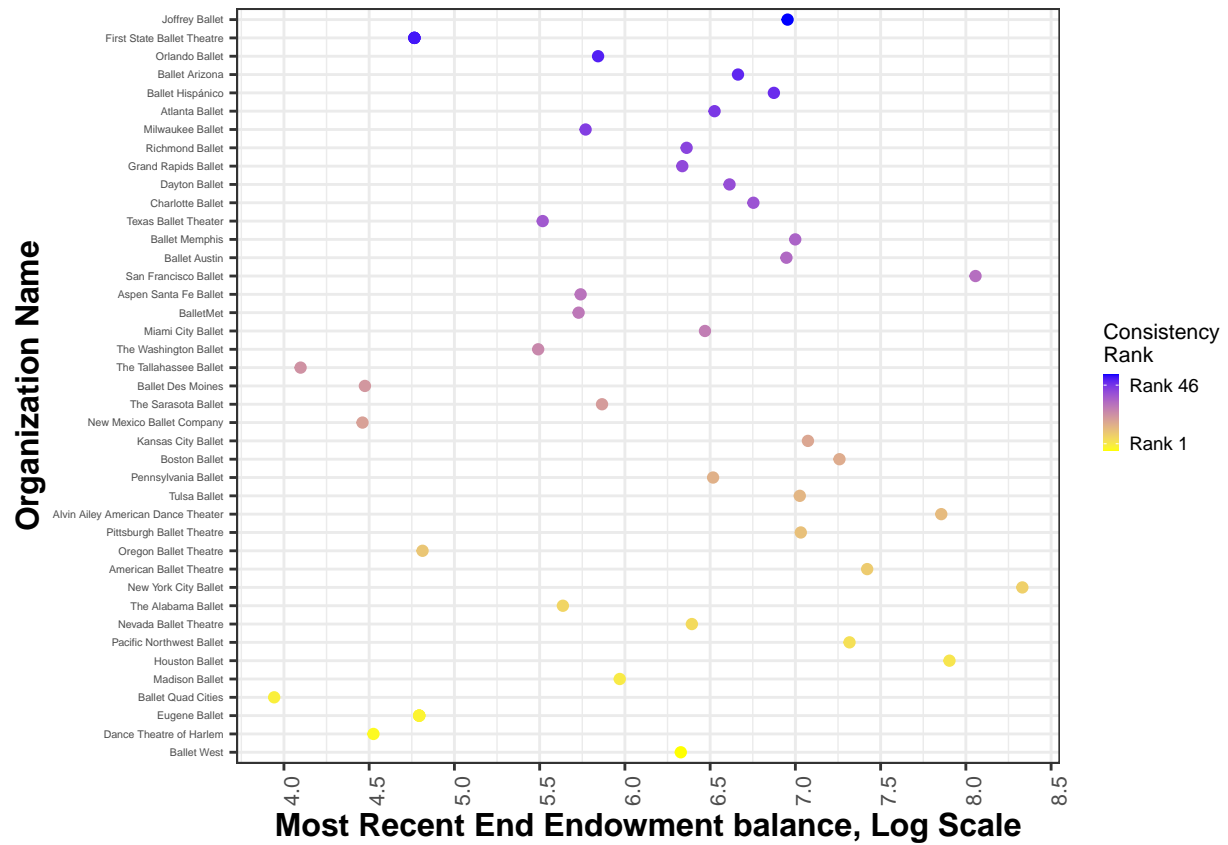
```
above_200_fr
```



```
ggsave("pc_above_200.png", path = here("final_report", "images"))
```

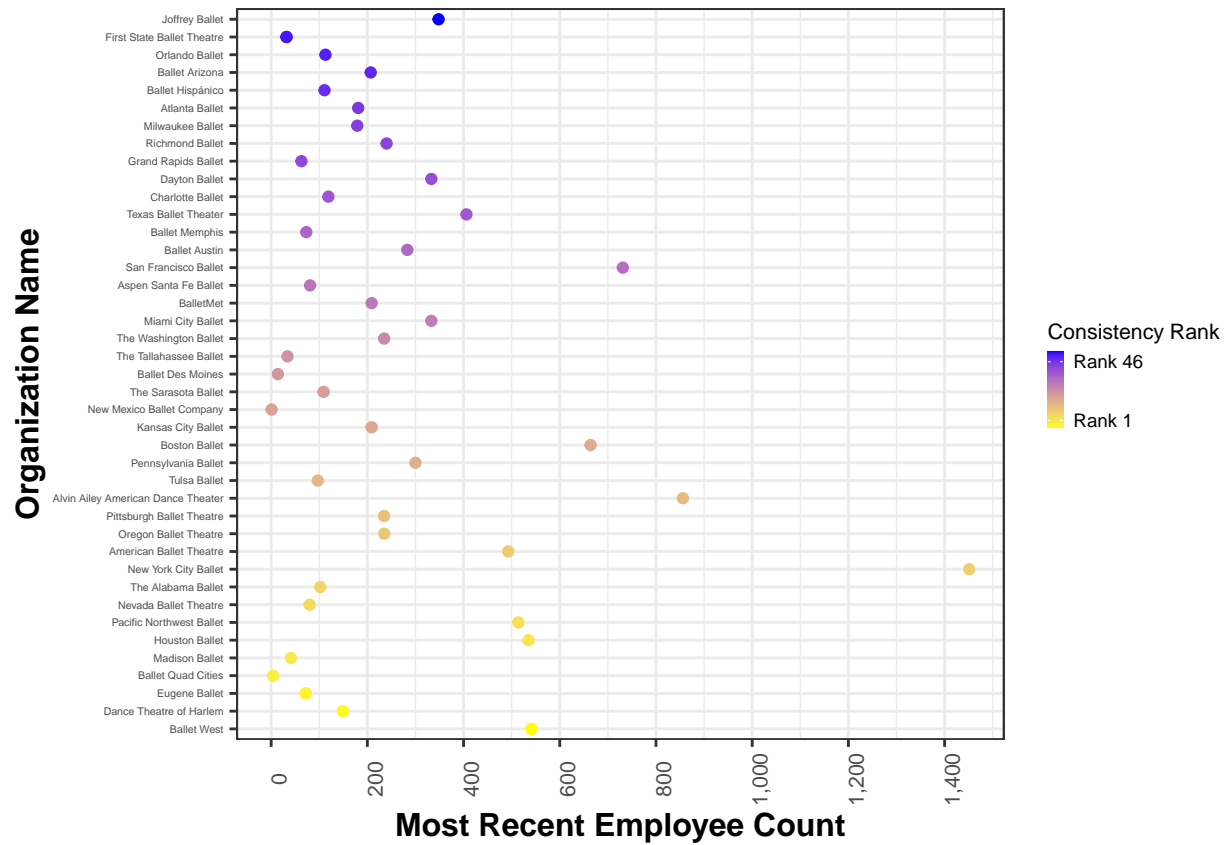
Consistency

```
endo_size_consist_fr
```



```
ggsave("consist_by_endo_size.png", path = here("final_report", "images"),width=4, height=6)
```

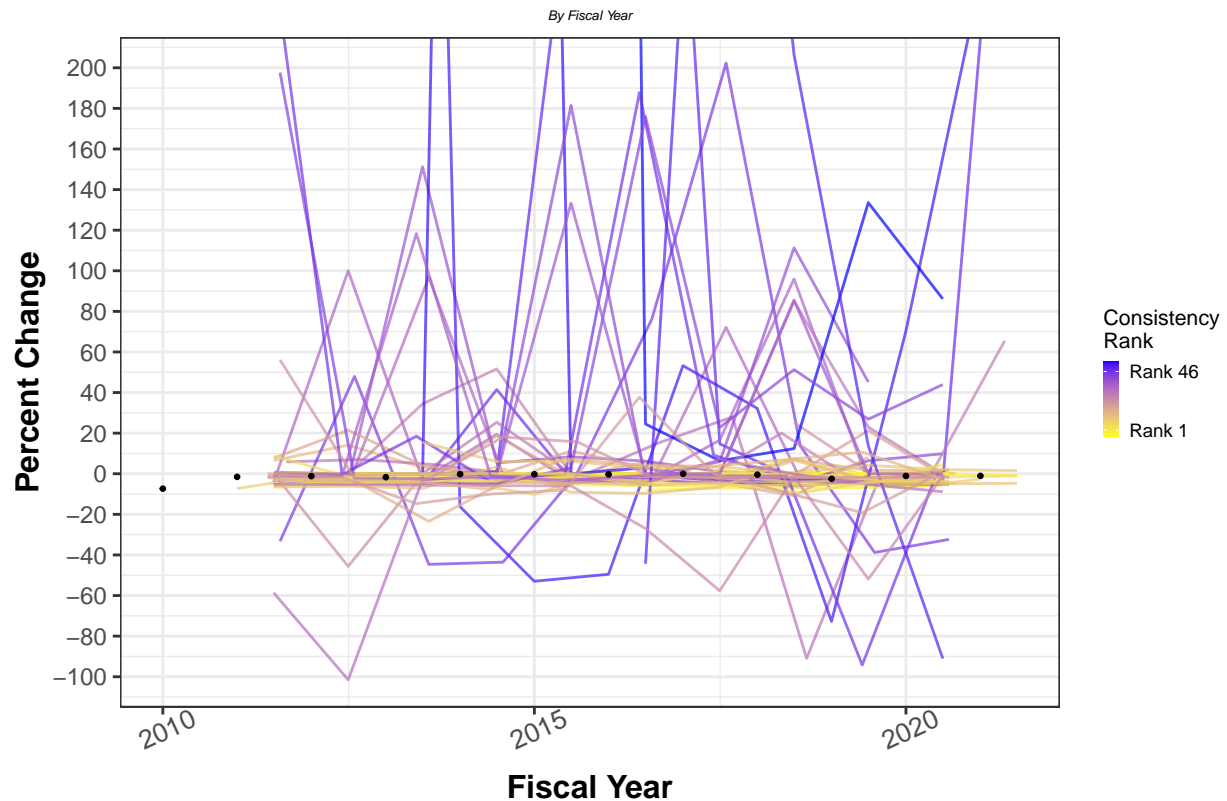
```
employ_size_consist_ft
```



```
ggsave("consist_by_employ_count.png", path = here("final_report", "images"), width=4,height=6)
```

```
consist_sd
```

Percentage of Change in Endowment Balance, Limited to 200



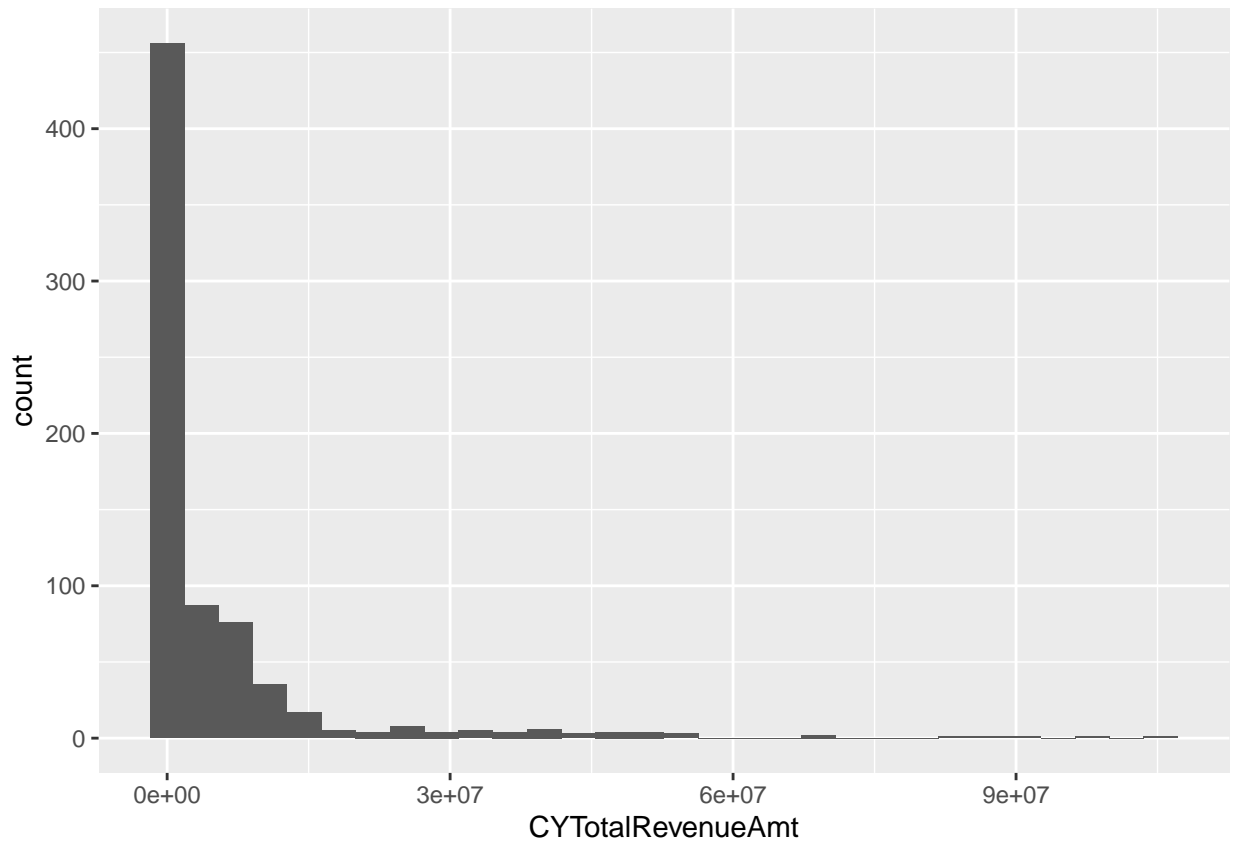
```
ggsave("pc_consist.png", path = here("final_report", "images"))
```

Total Revenue

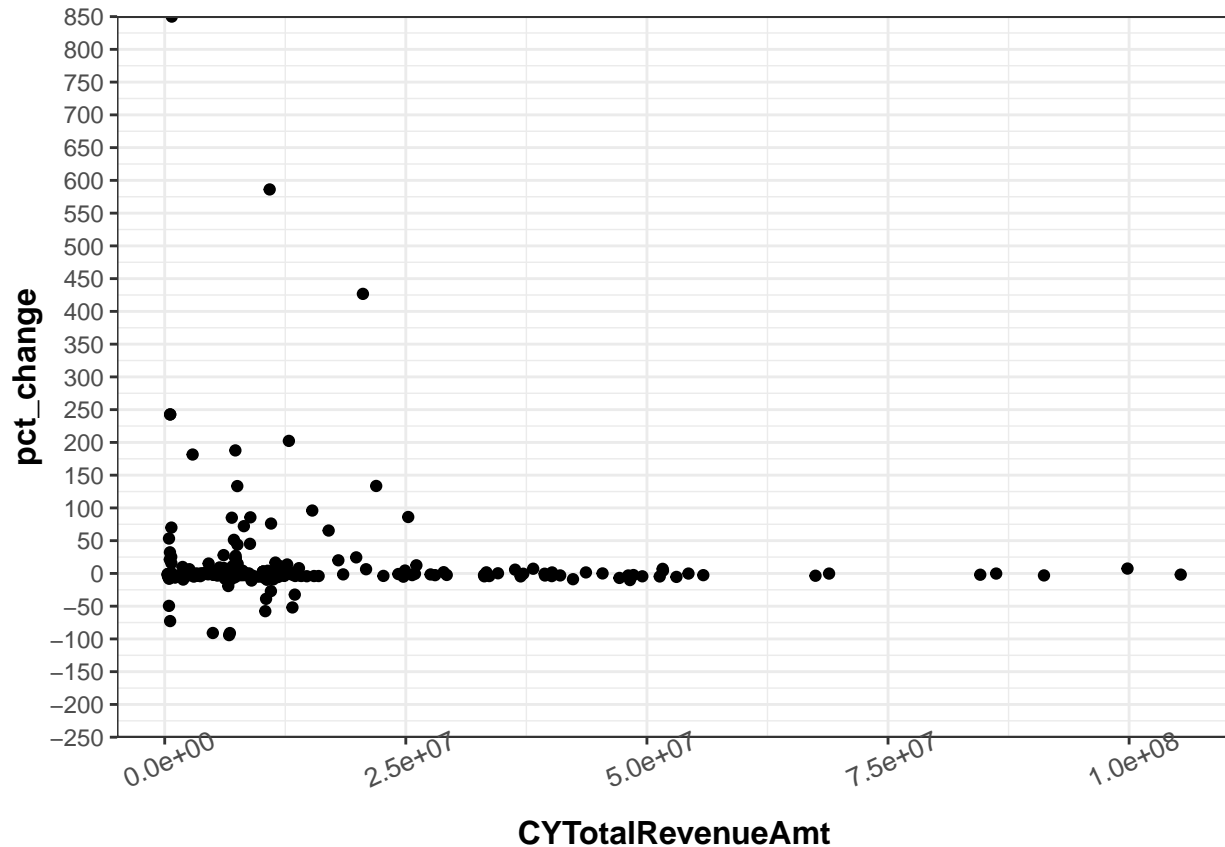
```
##Getting Total Revenue data
source(here("GET_VARS.R"))
##Specifically reading in employee data
files <- dir( here("ballet_990_released_20230208"),
              full.names = TRUE)
revenue_data <- map_df(files, ~
  get_df(variables = c("//Return//ReturnData//CYTotalRevenueAmt"),
          filename = .x
        )) %>%
  mutate(CYTotalRevenueAmt = as.numeric(CYTotalRevenueAmt)) %>%
  left_join(names, by = "EIN")
revenue_data$fiscal_year = as.numeric(as.character(revenue_data$fiscal_year))
```

Total Revenue vs Pct Change- any pattern?

```
ggplot(revenue_data, aes(x = CYTotalRevenueAmt)) +
  geom_histogram()
```

```
pct_change_inv_ds %>%
  left_join(revenue_data, by = c("EIN", "fiscal_year", "organization_name")) %>%
  ggplot(aes(x = CYTotalRevenueAmt, y = pct_change)) +
  geom_point() +
  theme_bw() +
  theme(plot.title = element_text(size = 10, face = "bold", hjust = .5),
        axis.title = element_text(size = 12, face = "bold"),
        plot.subtitle = element_text(size = 5, face = "italic", hjust = .5),
        axis.text.x = element_text(size = 10, angle = 25),
        strip.text = element_text(face="bold",size = 5),
        legend.key.size = unit(1, 'mm'),
        legend.text = element_text(size=7)) +
  scale_y_continuous(labels = scales::comma_format(),
                    breaks = scales::pretty_breaks(n = 20),
                    limits = c(-200, 800))
```



Percent Change Within the Pandemic

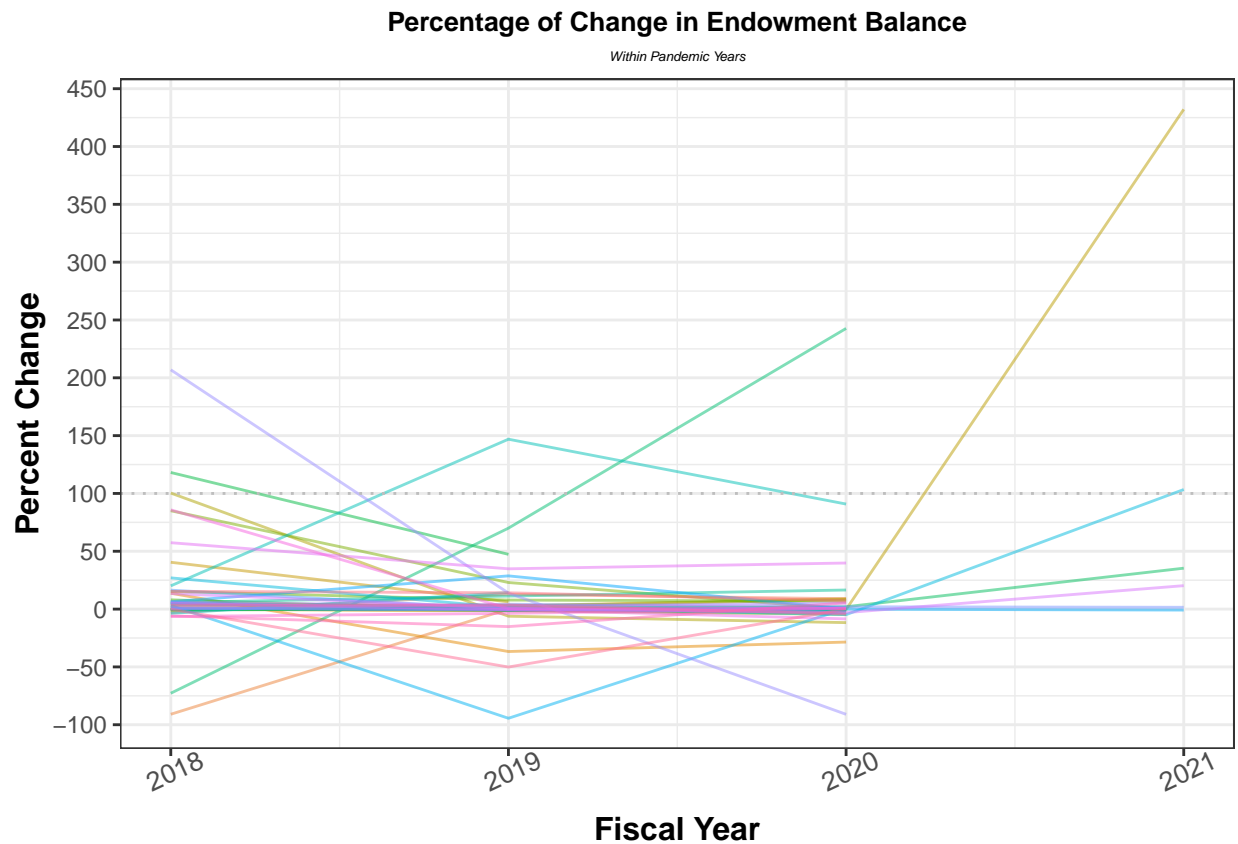
WITH investments

```
## Pandemic Years
pct_change_plot <- pct_change_ds %>%
  filter(fiscal_year %in% c("2018", "2019", "2020", "2021", "2022")) %>%
  ggplot(aes(x = fiscal_year, y = pct_change,
             group = organization_name, color = organization_name)) +
  geom_line(show.legend = FALSE, alpha = 0.5) +
  theme_bw() +
  labs(y = "Percent Change",
       x = "Fiscal Year",
       title = "Percentage of Change in Endowment Balance",
       subtitle = "Within Pandemic Years") +
  theme(plot.title = element_text(size = 10, face = "bold", hjust = .5),
        axis.title = element_text(size = 12, face = "bold"),
        plot.subtitle = element_text(size = 5, face = "italic", hjust = .5),
        axis.text.x = element_text(size = 10, angle = 25),
        strip.text = element_text(face="bold",size = 5),
        legend.key.size = unit(1, 'mm'),
        legend.text = element_text(size=7)) +
  scale_y_continuous(labels = scales::comma_format(),
```

```

      breaks = scales::pretty_breaks(n = 20)) +
    geom_hline(yintercept = 100, linetype = "dotted", color = "gray")
pct_change_plot

```



```
#ggplotly(pct_change_plot)
```

```

## Table of available in-pandemic data
pct_change_ds %>%
  filter(fiscal_year %in% c("2019", "2020", "2021", "2022")) %>%
  select(organization_name, pct_change, fiscal_year) %>%
  arrange(desc(fiscal_year)) %>%
  make_table(title = "Percentage of Change in Endowment Balance within Pandemic Years", col_names = c("Organization", "2019", "2020", "2021", "2022"))
  scroll_box(height = "450px")

```

```

\begin{table}
\caption{
Percentage of Change in Endowment Balance within Pandemic Years
}

```

Name	% Change	Year
Nevada Ballet Theatre	-0.8682968	2021
Oregon Ballet Theatre	1.5619387	2021
Eugene Ballet	35.3676599	2021
Eugene Ballet	35.3676599	2021
Miami City Ballet	103.3796951	2021
Pittsburgh Ballet Theatre	20.2563462	2021
Ballet Hispánico	432.1555786	2021
Nevada Ballet Theatre	-0.0958192	2020
San Francisco Ballet	-8.4597794	2020
Oregon Ballet Theatre	1.9913020	2020
Eugene Ballet	2.0266667	2020
Pacific Northwest Ballet	5.2552006	2020
Ballet West	8.0887426	2020
Ballet Arizona	-1.3712710	2020
Texas Ballet Theater	0.5742863	2020
Aspen Santa Fe Ballet	0.0000000	2020
Ballet Austin	8.9689362	2020
Houston Ballet	-0.5394078	2020
Tulsa Ballet	7.2630153	2020
The Sarasota Ballet	5.3797096	2020
The Alabama Ballet	0.5951924	2020
Ballet Memphis	-11.6985509	2020
Miami City Ballet	-4.8106966	2020
Nashville Ballet	0.6340668	2020
Charlotte Ballet	-3.0415463	2020
Atlanta Ballet	-28.5158513	2020
Richmond Ballet	39.8449675	2020
The Washington Ballet	0.0000000	2020
First State Ballet Theatre	242.6848638	2020
First State Ballet Theatre	242.6848638	2020
Ballet Quad Cities	-4.5315904	2020
Madison Ballet	1.0503166	2020
Grand Rapids Ballet	16.5116257	2020
Joffrey Ballet	90.8216917	2020
Fort Wayne Ballet	-1.6147683	2020
BalletMet	0.0000000	2020
Orlando Ballet	-90.9983829	2020
The Tallahassee Ballet	-4.1994951	2020
New Mexico Ballet Company	0.2184921	2020
Pittsburgh Ballet Theatre	-3.0426410	2020
Pennsylvania Ballet	0.9848159	2020
New York City Ballet	-2.9450705	2020
Ballet Hispánico	-0.2921837	2020
Dance Theatre of Harlem	0.0000000	2020
Alvin Ailey American Dance Theater	1.1173579	2020
American Ballet Theatre	8.9365465	2020
Boston Ballet	6.8383787	2020
Ballet Des Moines	6.2713554	2019
Nevada Ballet Theatre	-0.9524021	2019
San Francisco Ballet	-0.4505953	2019
Oregon Ballet Theatre	4.1823644	2019
Eugene Ballet	0.0000000	2019
Pacific Northwest Ballet	2.5299841	2019
Ballet West	2.5020351	2019
Ballet Arizona	-1.3078878	2019
Texas Ballet Theater	0.5813097	2019
Aspen Santa Fe Ballet	0.0000000	2019

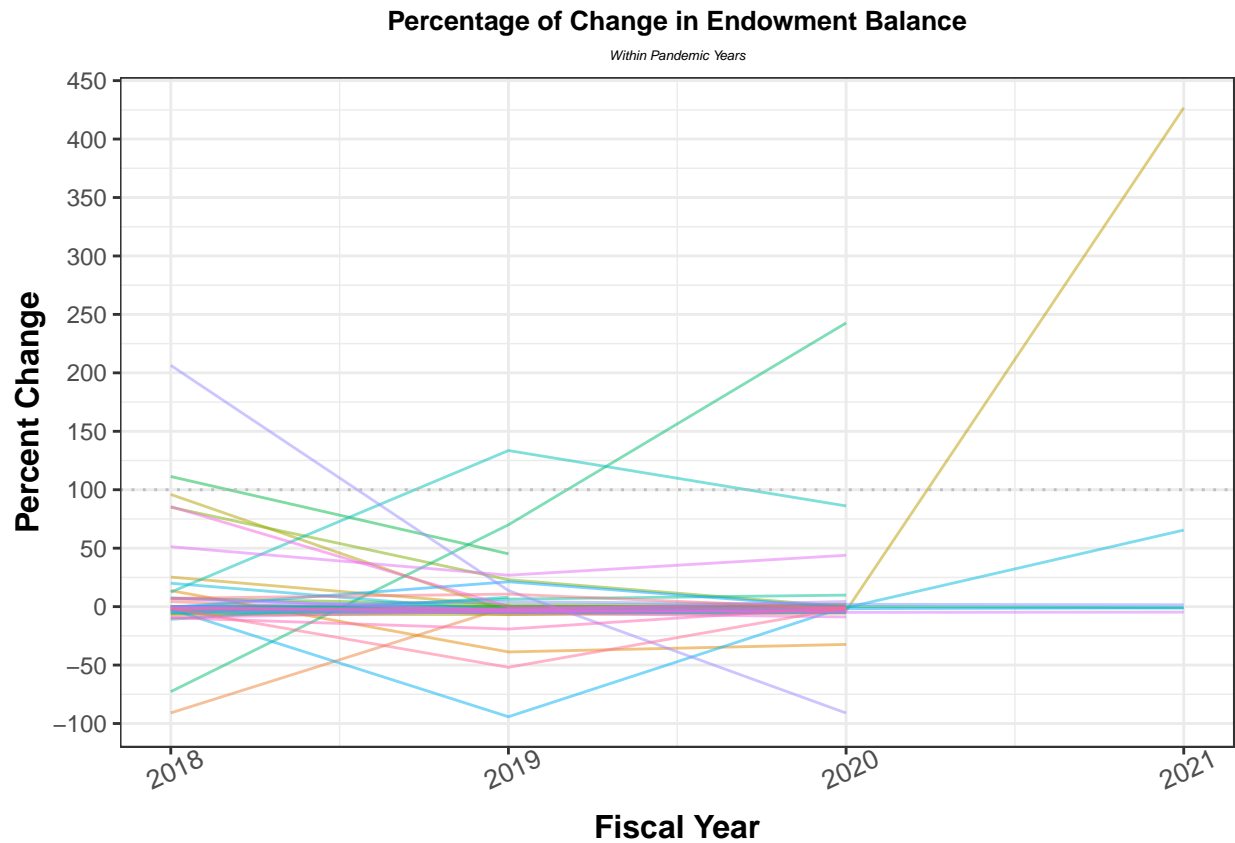
\end{table}

```
pct_change_ds %>%
  filter(fiscal_year %in% c("2019", "2020", "2021", "2022")) %>%
  select(organization_name, pct_change, fiscal_year) %>%
  group_by(fiscal_year) %>%
  summarize(total_in_year = n())
```

```
## # A tibble: 3 x 2
##   fiscal_year total_in_year
##       <dbl>         <int>
## 1      2019             43
## 2      2020             40
## 3      2021             7
```

WITHOUT investments

```
## Pandemic Years
pct_change_plot_inv <- pct_change_inv_ds %>%
  filter(fiscal_year %in% c("2018", "2019", "2020", "2021", "2022")) %>%
  ggplot(aes(x = fiscal_year, y = pct_change,
             group = organization_name, color = organization_name)) +
  geom_line(show.legend = FALSE, alpha = 0.5) +
  theme_bw() +
  labs(y = "Percent Change",
       x = "Fiscal Year",
       title = "Percentage of Change in Endowment Balance",
       subtitle = "Within Pandemic Years") +
  theme(plot.title = element_text(size = 10, face = "bold", hjust = .5),
        axis.title = element_text(size = 12, face = "bold"),
        plot.subtitle = element_text(size = 5, face = "italic", hjust = .5),
        axis.text.x = element_text(size = 10, angle = 25),
        strip.text = element_text(face="bold",size = 5),
        legend.key.size = unit(1, 'mm'),
        legend.text = element_text(size=7)) +
  scale_y_continuous(labels = scales::comma_format(),
                    breaks = scales::pretty_breaks(n = 20)) +
  geom_hline(yintercept = 100, linetype = "dotted", color = "gray")
pct_change_plot_inv
```



```
#ggplotly(pct_change_plot_inv)
```

```
## Table of available in-pandemic data
```

```
pct_change_inv_ds %>%
  filter(fiscal_year %in% c("2019", "2020", "2021", "2022")) %>%
  select(organization_name, pct_change, fiscal_year) %>%
  arrange(desc(fiscal_year)) %>%
  make_table(title = "Percentage of Change in Endowment Balance within Pandemic Years", col_names = c("Organization", "2019", "2020", "2021", "2022"))
  scroll_box(height = "450px")
```

```
\begin{table}
\caption{
Percentage of Change in Endowment Balance within Pandemic Years
}
```

Name	% Change	Year
Nevada Ballet Theatre	-1.0575507	2021
Oregon Ballet Theatre	1.5619387	2021
Eugene Ballet	-1.0345879	2021
Eugene Ballet	-1.0345879	2021
Miami City Ballet	65.4636289	2021
Pittsburgh Ballet Theatre	-4.7030709	2021
Ballet Hispánico	426.7571012	2021
Nevada Ballet Theatre	-1.7139215	2020
San Francisco Ballet	-8.8273535	2020
Oregon Ballet Theatre	1.9913020	2020
Eugene Ballet	0.0688889	2020
Pacific Northwest Ballet	4.3953178	2020
Ballet West	0.0000000	2020
Ballet Arizona	-0.6848327	2020
Texas Ballet Theater	0.0000000	2020
Aspen Santa Fe Ballet	0.0000000	2020
Ballet Austin	1.8896472	2020
Houston Ballet	-4.0352545	2020
Tulsa Ballet	-1.7067692	2020
The Sarasota Ballet	-0.4168927	2020
The Alabama Ballet	-3.5193077	2020
Ballet Memphis	-3.8335615	2020
Miami City Ballet	-0.9255126	2020
Nashville Ballet	0.0000000	2020
Charlotte Ballet	-4.6291277	2020
Atlanta Ballet	-32.3489884	2020
Richmond Ballet	43.9335422	2020
The Washington Ballet	-1.0929032	2020
First State Ballet Theatre	242.6848638	2020
First State Ballet Theatre	242.6848638	2020
Ballet Quad Cities	-5.6644880	2020
Madison Ballet	-4.7836803	2020
Grand Rapids Ballet	9.8477067	2020
Joffrey Ballet	86.1363009	2020
Fort Wayne Ballet	-5.0721240	2020
BalletMet	0.0000000	2020
Orlando Ballet	-91.0428942	2020
The Tallahassee Ballet	-1.7058059	2020
New Mexico Ballet Company	-1.0439065	2020
Pittsburgh Ballet Theatre	-4.9093733	2020
Pennsylvania Ballet	-3.8933190	2020
New York City Ballet	-3.5223075	2020
Ballet Hispánico	-3.6378284	2020
Dance Theatre of Harlem	0.0000000	2020
Alvin Ailey American Dance Theater	-4.1243918	2020
American Ballet Theatre	-2.6235825	2020
Boston Ballet	1.5323016	2020
Ballet Des Moines	0.8898064	2019
Nevada Ballet Theatre	-2.2385659	2019
San Francisco Ballet	-5.3065465	2019
Oregon Ballet Theatre	4.1823644	2019
Eugene Ballet	0.0000000	2019
Pacific Northwest Ballet	-2.5450559	2019
Ballet West	0.0000000	2019
Ballet Arizona	-4.5855094	2019
Texas Ballet Theater	0.0000000	2019
Aspen Santa Fe Ballet	0.0000000	2019

\end{table}

```
pct_change_inv_ds %>%  
  filter(fiscal_year %in% c("2019", "2020", "2021", "2022")) %>%  
  select(organization_name, pct_change, fiscal_year) %>%  
  group_by(fiscal_year) %>%  
  summarize(total_in_year = n())
```

```
## # A tibble: 3 x 2  
##   fiscal_year total_in_year  
##       <dbl>         <int>  
## 1      2019             43  
## 2      2020             40  
## 3      2021              7
```