CDS-101 Checkpoint #2

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#GHG = Greenhouse Gases #FJO = Female Job Occupation

Organizing Dataset (Hyunwoo Kang)

```
colnames(Group_dataset)<- c("Year", "Birth_GR", "GHG_GR", "Inflation_GR", "FJO_GR")

view(Group_dataset)
```

Summarize

```
summary(Group_dataset)
```

```
##       Year         Birth_GR          GHG_GR         Inflation_GR
##  Min.   :1991   Min.   :-5.870   Min.   :-17.080   Min.   :-6.7000
##  1st Qu.:1998   1st Qu.:-3.555   1st Qu.:  1.065   1st Qu.:-0.9900
##  Median :2006   Median :-2.450   Median :  2.540   Median : 0.0800
##  Mean   :2006   Mean   :-2.499   Mean   :  3.181   Mean   :-0.1968
##  3rd Qu.:2014   3rd Qu.:-1.305   3rd Qu.:  6.940   3rd Qu.: 0.8650
##  Max.   :2021   Max.   : 1.080   Max.   : 11.860   Max.   : 3.0700
##      FJO_GR
##  Min.   :-7.000
##  1st Qu.: 1.000
##  Median : 2.000
##  Mean   : 1.581
##  3rd Qu.: 3.000
##  Max.   : 5.000
```

Select

```
Envo_ft <- Group_dataset %>%
 select(Year, Birth_GR, GHG_GR)
```

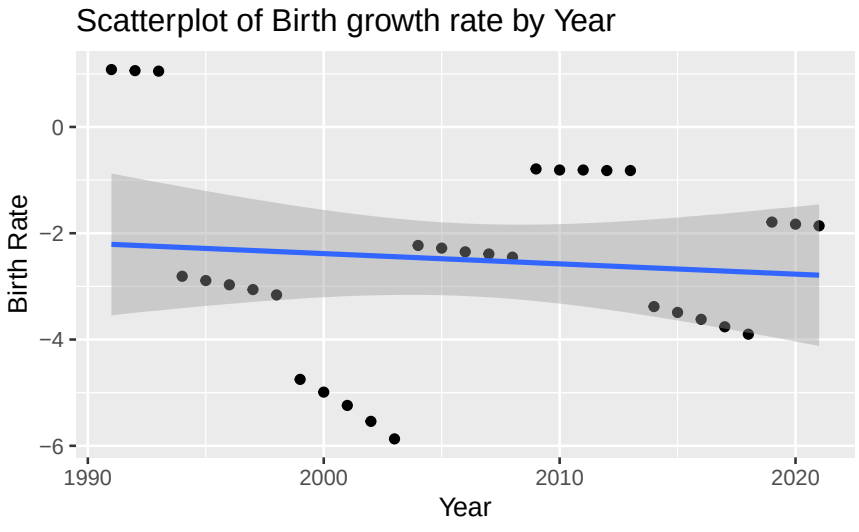
```
Econ_ft <- Group_dataset %>%
  select(Year, Birth_GR, Inflation_GR)
```

```
Soci_ft <- Group_dataset %>%
   select(Year, Birth_GR, FJO_GR)
```

Variation of Birth Growth rate by Year (Hyunwoo Kang)

```
Group_dataset %>%
 ggplot() +
 geom_point(mapping = aes(y = Birth_GR, x= Year))+
 geom_smooth(mapping = (aes(y = Birth_GR, x = Year)), method ='lm') +
 labs(title = "Scatterplot of Birth growth rate by Year",
      y = "Birth Rate",
      x = "Year")
```

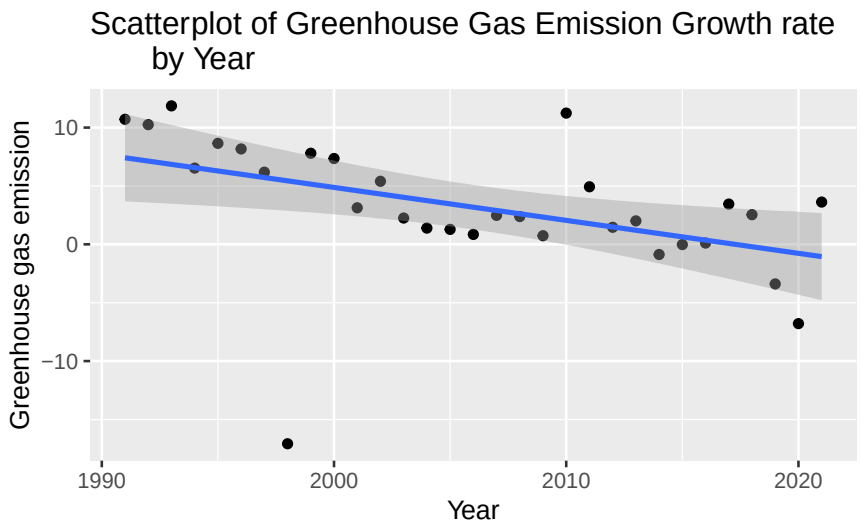
```
## `geom_smooth()` using formula = 'y ~ x'
```



Variation and Covariation - Envo_ft (Songlee Jun)

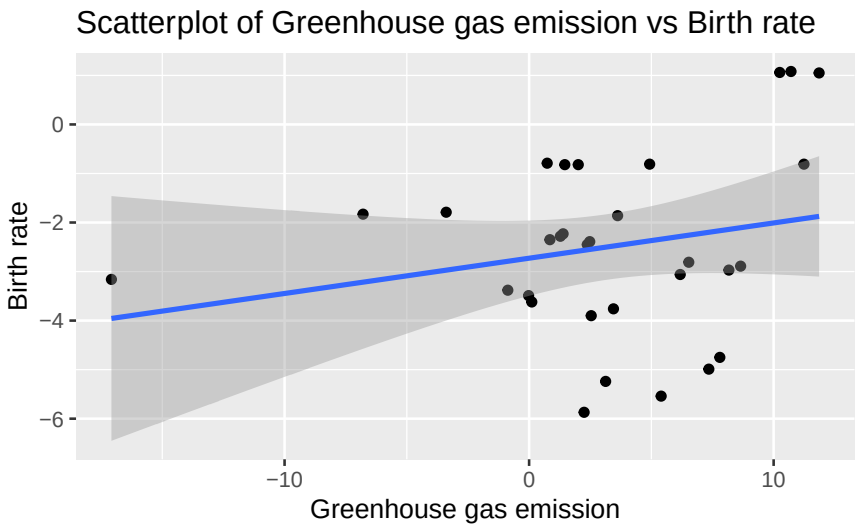
```
Envo_ft %>%
 ggplot() +
 geom_point(mapping = aes(x = Year, y = GHG_GR)) +
 geom_smooth(mapping = aes(x = Year, y = GHG_GR), method = "lm") +
  labs(title = "Scatterplot of Greenhouse Gas Emission Growth rate
       by Year",
       x = "Year",
       y = "Greenhouse gas emission")
```

```
## `geom_smooth()` using formula = 'y ~ x'
```



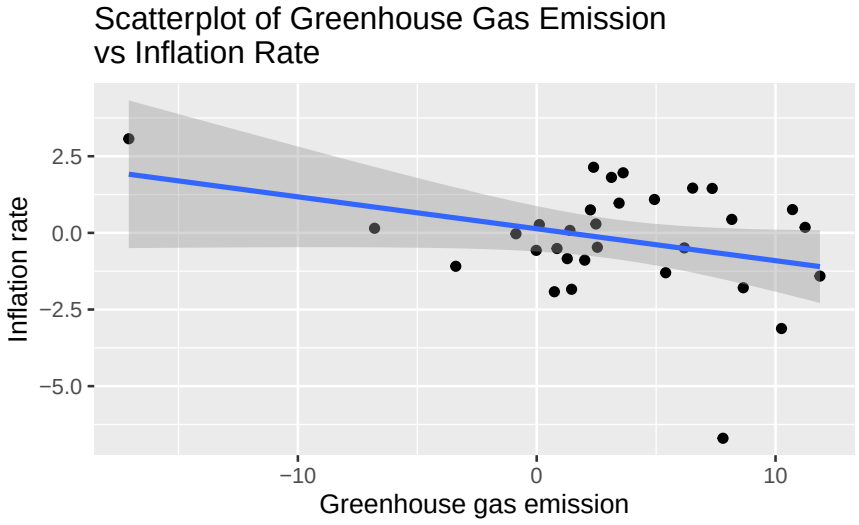

```
Envo_ft %>%
   ggplot()+
   geom_point(mapping = aes(x  = GHG_GR, y = Birth_GR)) +
   geom_smooth(mapping = aes(x  = GHG_GR, y  = Birth_GR), method="lm")+
  labs(
    title = "Scatterplot of Greenhouse gas emission vs Birth rate",
    x = 'Greenhouse gas emission',
    y = "Birth rate")
```

```
## `geom_smooth()` using formula = 'y ~ x'
```




```
Group_dataset %>%
  ggplot() +
  geom_point(mapping = aes(x = GHG_GR, y = Inflation_GR))+
  geom_smooth(mapping=aes(x = GHG_GR, y = Inflation_GR), method="lm")+
  labs(
    title = "Scatterplot of Greenhouse Gas Emission
vs Inflation Rate",
    x = "Greenhouse gas emission",
    y = "Inflation rate")
```

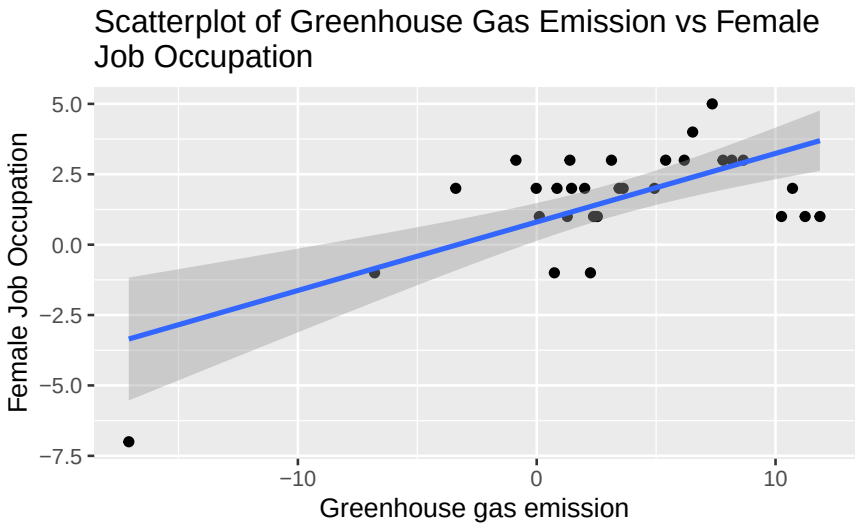
```
## `geom_smooth()` using formula = 'y ~ x'
```




```
Group_dataset%>%
  ggplot() +
```

```
  geom_point(mapping = aes(x = GHG_GR, y = FJO_GR)) +
geom_smooth(mapping=aes(x = GHG_GR, y = FJO_GR), method="lm")+
  labs(
    title = "Scatterplot of Greenhouse Gas Emission vs Female
Job Occupation",
    x = "Greenhouse gas emission",
    y = "Female Job Occupation")
```

```
## `geom_smooth()` using formula = 'y ~ x'
```



Modeling & Hyphothesis test- Envo_ft (Byungwook Oh)

```
# Model
Envo_ft_model <- lm(Birth_GR ~ GHG_GR, data = Envo_ft)
```

```
# Tidy model
Envo_ft_model %>%
  tidy()
```

term	estimate	std.error	statistic	p.value
(Intercept)	-2.7278213	0.3752186	-7.269953	0.0000001
GHG_GR	0.0719243	0.0580149	1.239755	0.2250047

```
# Null distribution
Envo_null_distribution <- Envo_ft %>%
  specify(Birth_GR ~ GHG_GR) %>%
```

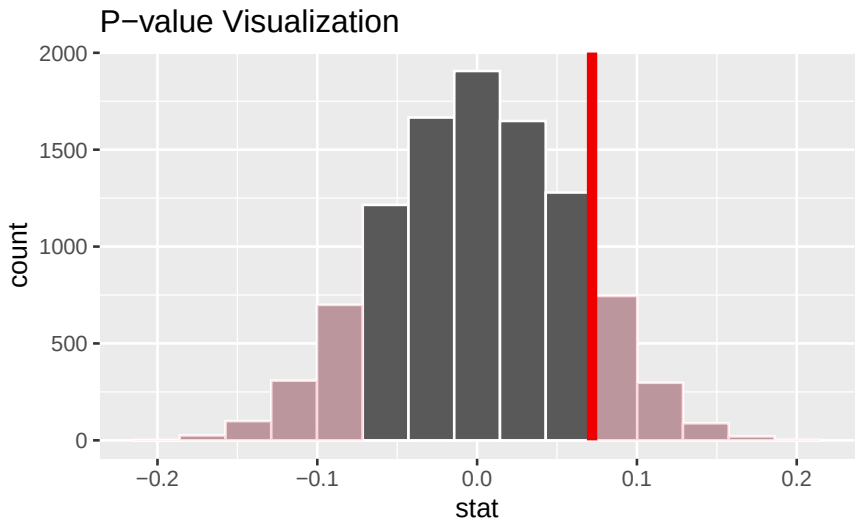
```
  hypothesize(null="independence") %>%
  generate(reps=10000, type="permute") %>%
  calculate(stat="slope")
```

```
# Observed stat
Observed_stat <- Envo_ft %>%
  specify(Birth_GR ~ GHG_GR) %>%
  calculate(stat="slope")
```

```
# P-value
Envo_null_distribution %>%
  get_p_value(obs_stat=Observed_stat, direction="both")
```

p_value
0.2276

```
# P-value visualization
Envo_null_distribution %>%
  visualize() +
  shade_p_value(obs_stat=Observed_stat, direction= "both") +
  labs(title = "P-value Visualization")
```

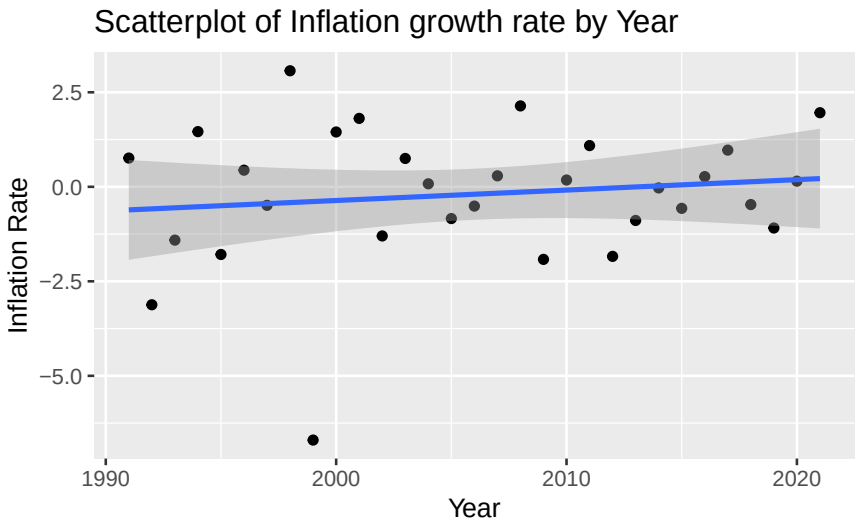


Variation and Covariation - Econ_ft (Dawon Kyoung)

```
Econ_ft %>%
  ggplot() +
```

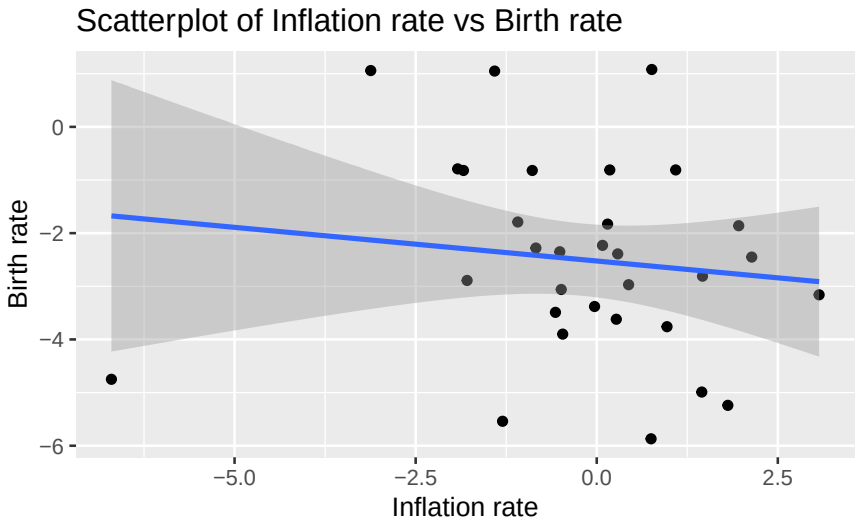
```
  geom_point(mapping = aes(y = Inflation_GR, x= Year))+
  geom_smooth(mapping = (aes(y = Inflation_GR, x = Year)), method ='lm') +
  labs(title = "Scatterplot of Inflation growth rate by Year",
       y = "Inflation Rate",
       x = "Year")
```

```
## `geom_smooth()` using formula = 'y ~ x'
```



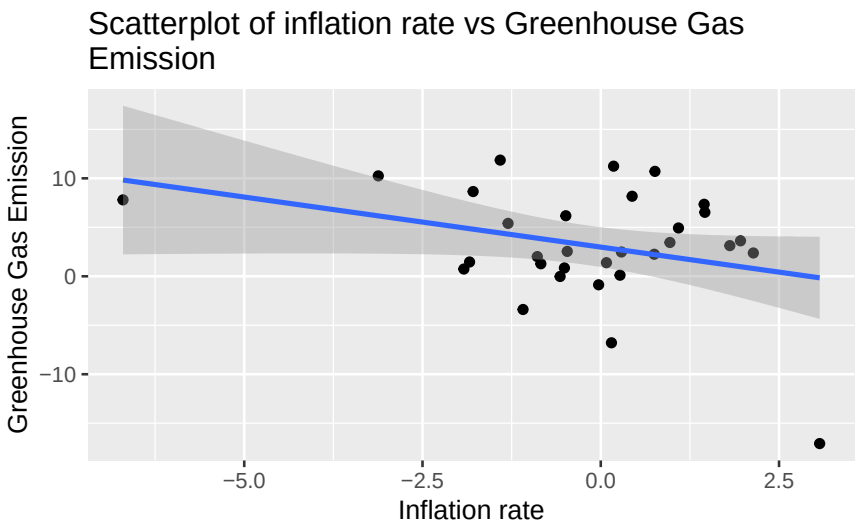

```
Econ_ft %>%
  ggplot() +
  geom_point(mapping=aes(x = Inflation_GR, y = Birth_GR))+
  geom_smooth(mapping=aes(x = Inflation_GR, y = Birth_GR), method='lm')+
  labs(
    title= 'Scatterplot of Inflation rate vs Birth rate',
    x= 'Inflation rate',
    y= "Birth rate")
```

```
## `geom_smooth()` using formula = 'y ~ x'
```



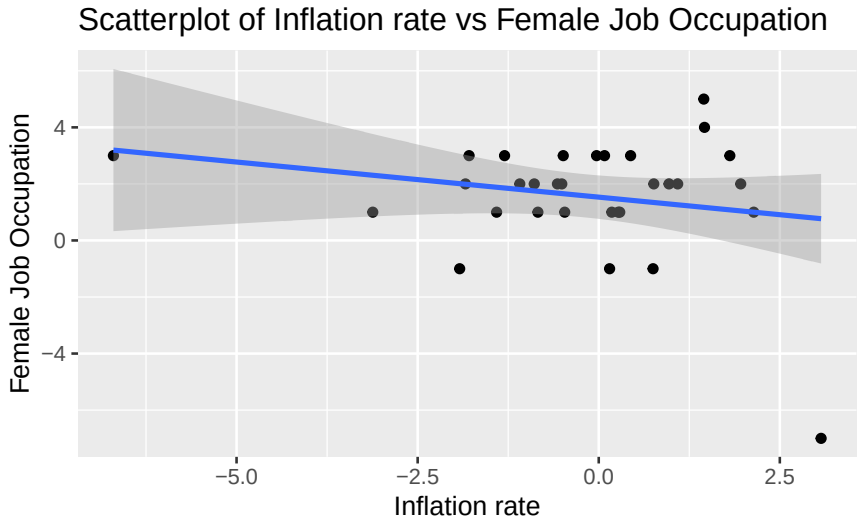

```
Group_dataset %>%
   ggplot() +
   geom_point(mapping= aes( x =Inflation_GR, y = GHG_GR))+
   geom_smooth(mapping=aes(x = Inflation_GR, y = GHG_GR),
method= 'lm')+
   labs(
     title= 'Scatterplot of inflation rate vs Greenhouse Gas
Emission',
     x= 'Inflation rate',
     y= 'Greenhouse Gas Emission')
```

```
## `geom_smooth()` using formula = 'y ~ x'
```



```
Group_dataset %>%
   ggplot() +
   geom_point(mapping = aes(x= Inflation_GR, y= FJO_GR))+
   geom_smooth(mapping=aes(x= Inflation_GR, y= FJO_GR),
method= 'lm')+
   labs(
     title= 'Scatterplot of Inflation rate vs Female Job Occupation',
     x= 'Inflation rate',
     y= 'Female Job Occupation')
```

```
## `geom_smooth()` using formula = 'y ~ x'
```



Modeling & Hyphothesis test- Econ_ft (Daeun Choi)

```
# Model
Econ_ft_model <- lm(Birth_GR ~ Inflation_GR, data=Econ_ft)
```

```
# Tidy model
Econ_ft_model %>%
  tidy()
```

term	estimate	std.error	statistic	p.value
(Intercept)	-2.5239630	0.3345546	-7.5442476	0.0000000
Inflation_GR	-0.1266971	0.1850287	-0.6847431	0.4989426

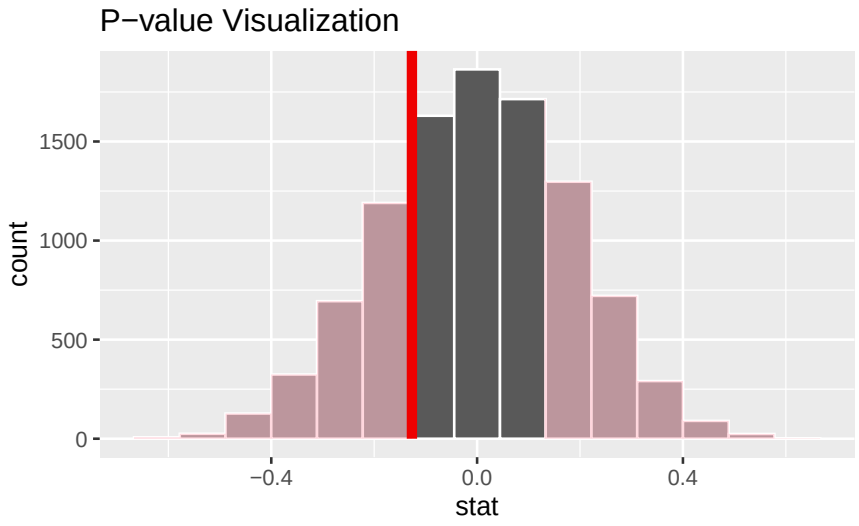
```r
# Null distribution
Econ_null_distribution <- Econ_ft %>%
  specify(Birth_GR ~ Inflation_GR) %>%
  hypothesize(null="independence") %>%
  generate(reps=10000, type="permute") %>%
  calculate(stat="slope")
```

```r
# Observed stat
Observed_stat <- Econ_ft %>%
  specify(Birth_GR ~ Inflation_GR) %>%
  calculate(stat="slope")
```

```r
# P-value
Econ_null_distribution %>%
  get_p_value(obs_stat=Observed_stat, direction="both")
```

p_value
0.4968

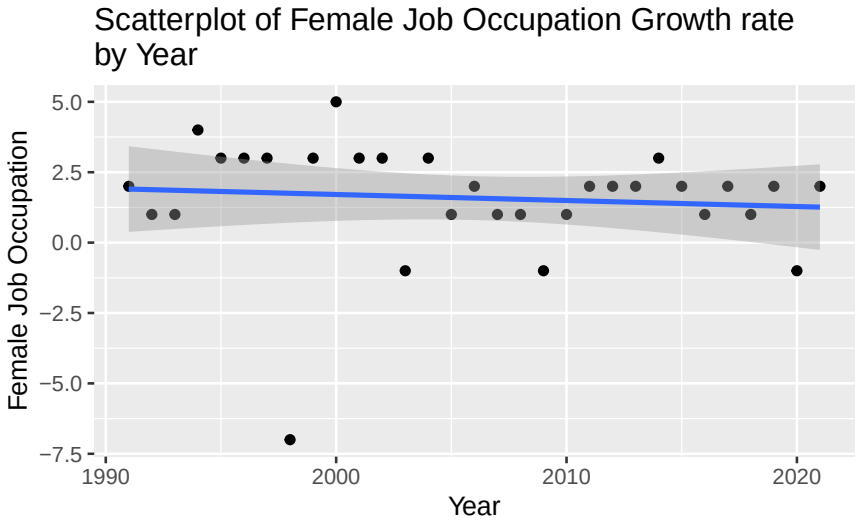
```r
# P-value visualization
Econ_null_distribution %>%
  visualize() +
  shade_p_value(obs_stat=Observed_stat, direction= "both") +
  labs(title = "P-value Visualization")
```



Variation and Covariation - Soci_ft (Eunho Cha)

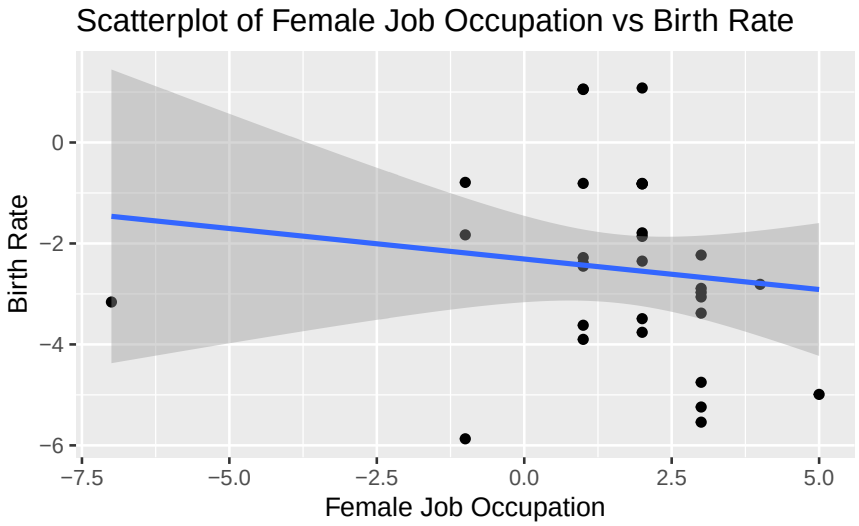
```
Soci_ft %>%
  ggplot() +
  geom_point(mapping = aes(y = FJO_GR, x = Year)) +
  geom_smooth(mapping = aes(y = FJO_GR, x = Year), method = 'lm') +
  labs(title = "Scatterplot of Female Job Occupation Growth rate
by Year",
       y  = "Female Job Occupation",
       x = "Year")
```

```
## `geom_smooth()` using formula = 'y ~ x'
```



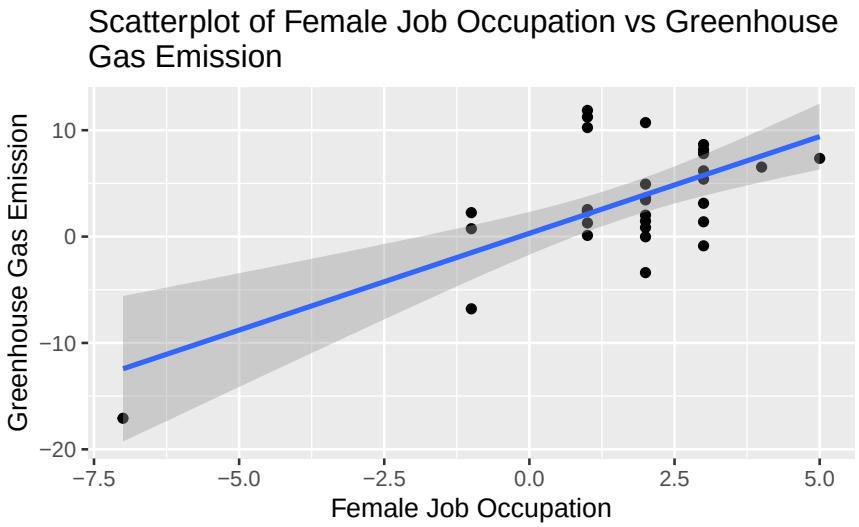

```
Soci_ft %>%
   ggplot() +
   geom_point(mapping = aes(x= FJO_GR, y= Birth_GR))+
   geom_smooth(mapping=aes(x = FJO_GR, y = Birth_GR), method="lm")+
   labs(
     title="Scatterplot of Female Job Occupation vs Birth Rate",
     x= "Female Job Occupation",
     y= "Birth Rate"
   )
```

```
## `geom_smooth()` using formula = 'y ~ x'
```



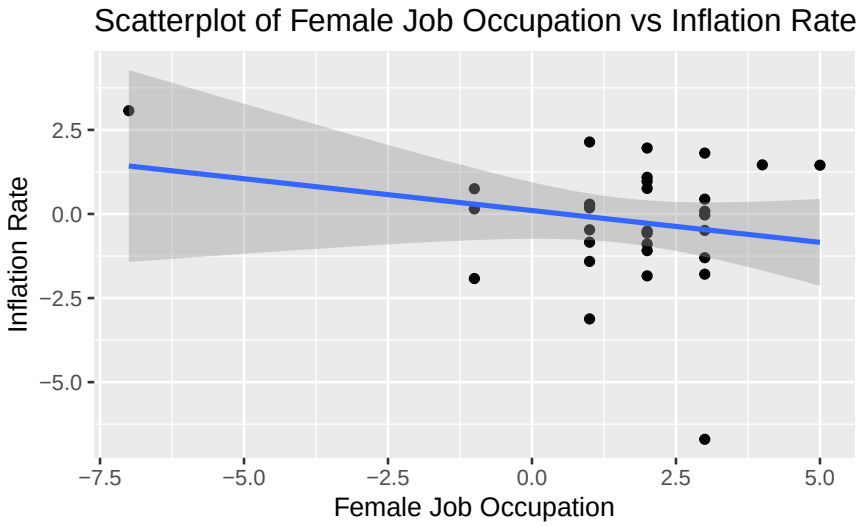

```
Group_dataset %>%
   ggplot() +
   geom_point(mapping= aes (x= FJO_GR, y= GHG_GR)) +
   geom_smooth(mapping=aes (x= FJO_GR, y=GHG_GR), method="lm")+
   labs(
     title= "Scatterplot of Female Job Occupation vs Greenhouse
Gas Emission",
     x= "Female Job Occupation",
     y= "Greenhouse Gas Emission"
   )
```

```
## `geom_smooth()` using formula = 'y ~ x'
```



```r
Group_dataset %>%
   ggplot() +
   geom_point(mapping= aes (x= FJO_GR, y=Inflation_GR)) +
   geom_smooth(mapping=aes (x= FJO_GR, y=Inflation_GR), method="lm")+
   labs(
     title= "Scatterplot of Female Job Occupation vs Inflation Rate",
     x= "Female Job Occupation",
     y= "Inflation Rate"
   )
```

```
## `geom_smooth()` using formula = 'y ~ x'
```



Modeling & Hypothesis test - Soci_ft (Duy Tran)

```r
# Model
Soci_ft_model <- lm(Birth_GR ~ FJO_GR, data = Soci_ft)
```

```r
# Tidy model
Soci_ft_model %>%
  tidy()
```

term	estimate	std.error	statistic	p.value
(Intercept)	-2.3081339	0.4185330	-5.5148199	0.0000061
FJO_GR	-0.1207724	0.1611897	-0.7492564	0.4597376

```r
# Null distribution
Soci_null_distribution <- Soci_ft %>%
  specify(Birth_GR ~ FJO_GR) %>%
  hypothesize(null="independence") %>%
  generate(reps=10000, type="permute") %>%
  calculate(stat="slope")
```

```r
# Observed stat
Observed_stat <- Soci_ft %>%
  specify(Birth_GR ~ FJO_GR) %>%
  calculate(stat="slope")
```

```r
# P-value
Soci_null_distribution %>%
  get_p_value(obs_stat=Observed_stat, direction="both")
```

p_value
0.453

```r
# P-value visualization
Soci_null_distribution %>%
  visualize() +
  shade_p_value(obs_stat=Observed_stat, direction="both") +
  labs(title ="P-value visualization")
```