Data Translation Challenge

Calista Rodi, Kaitlyn Au, Kyle Hoang, Nicole Nagata, Reyn Okinaga

Our Task

FRAME SITUATION
- Working for company in retail sector
- Want to find effects on COVID has been on the rest of the retail sector and the rest of the economy
- Using IPUMS and Current Population Survey (CPS) data to conduct our analysis.

Data

IPUMS-CPS

Comprehensive dataset that combines over 50+ years of the US Current Population Survey (CPS), which is a monthly survey by the US Census Bureau and the Bureau of Labor Statistics. It measures unemployment, featuring standard labor force and demographic questions asked every month.

Samples

We picked basic monthly data from Jan 2018-Apr 2022 from IPUMS-CPS

Data extracted

YEAR and MONTH (preselected)
AGE, SEX, RACE, EMPSTAT, LABFORCE, IND (picked)

Data Cleaning

Select data time frame
January 2018 - April 2022

Filter for CPS data
CPS data was collected monthly, while ASEC data was collected yearly

Join CPS data with Industry Name file
Match the industry code with the industry name from the csv file

Variables

RetailEmployment
5790 < IND & IND > 4670

DateCentered
Centered around March 2020
- Positive = after
- Negative = before

before_covid
Between 2018 and March 1, 2020

after_covid
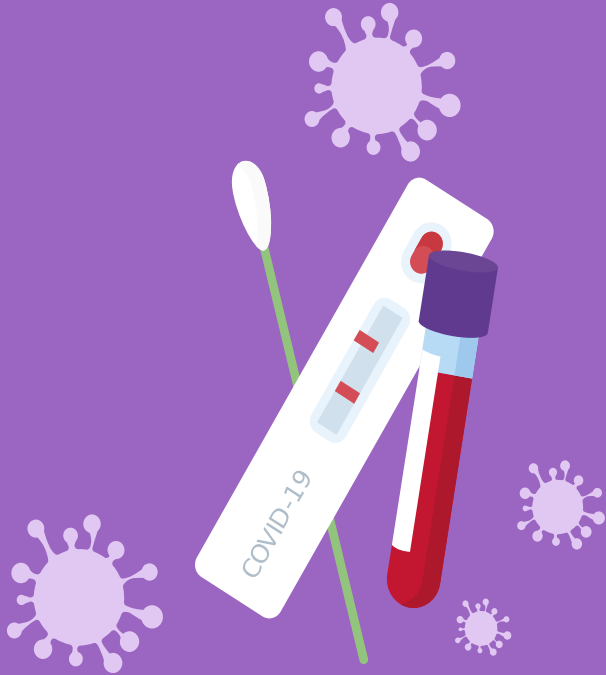After March 1, 2020
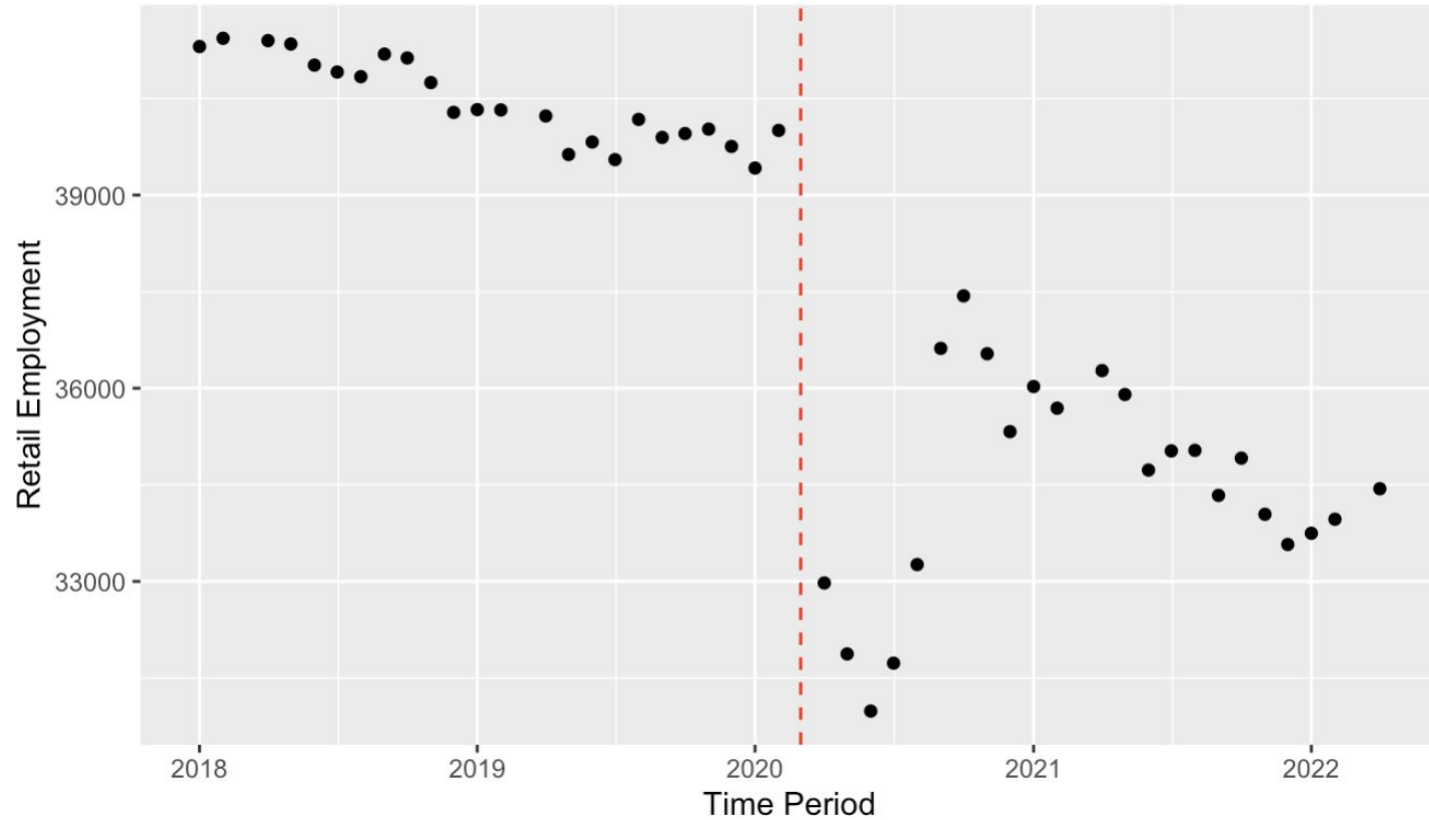
employment
Employed = 0
Unemployed = 1

Question #1

How has COVID affected the health of the retail industry, as measured by employment?

Impact of COVID-19 on Retail Employment

Creating New Variables

- **RetailEmployment**: (binary variable) whether or not an individual is employed in the retail industry
  - TRUE if employed in retail
  - FALSE is not employed in retail
    - ** ASSUMPTION: high employment = success in industry

- **Assigned**: (binary variable) whether or not COVID occurred
  - TRUE if date is after March 2020
  - FALSE is date is before March 2020

- **dateCentered**: centered date around March 2020

Interrupted Time Series Model

RetailEmployment ~ Assigned * dateCentered

- **Interaction term**: how the treated variable differs across the cut off point
- **Coefficient on AssignedTRUE**: want to know how individuals in retail employment are affected after COVID, and how that varies around the cut off point

Interrupted Time Series Model: Analysis

RetailEmployment ~ Assigned * dateCentered

- Retail Employment decreased by 0.0112 units after COVID compared to before
- 99.9% significance

*** COVID had a negative impact on retail industry

```
                                                      m1
Dependent Var.:                      RetailEmployment

Constant                         0.3386*** (0.0006)
AssignedTRUE                    -0.0112*** (0.0008)
dateCentered                     0.0003*** (3.7e-5)
AssignedTRUE x dateCentered     -0.0002** (5.67e-5)
_____    _____
S.E. type                        Heteroskedast.-rob.
Observations                            5,314,036
R2                                       5.32e-5
Adj. R2                                  5.27e-5
---
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05
```

Interrupted Time Series Model: Narrowing Window

Impact of COVID-19 on Retail Employment

Goal: Capture the true effect of COVID by randomizing around the cut-off

- Blue: line of best fit from 01/2018 – 03/2020
- Purple: line of best fit from 08/2019 – 03/2020

Interrupted Time Series Model: Narrowing Window

RetailEmployment ~ Assigned * dateCentered

- Change dates from 08/2019 - 10/2020
- Retail Employment decreased 0.0139 units more after COVID compared to before

** COVID had larger negative impact than expected
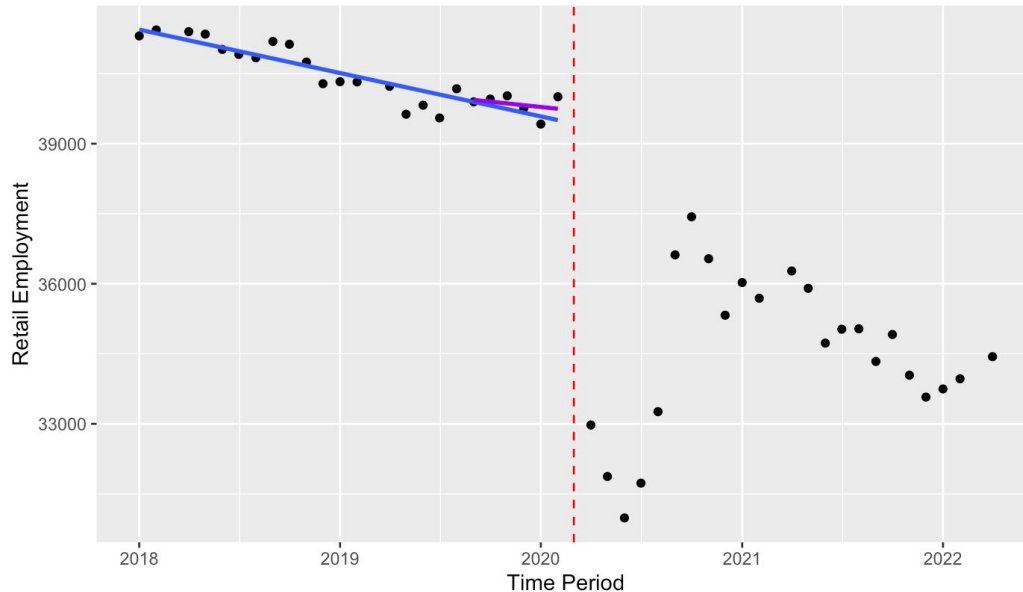
```
                                                                m2
Dependent Var.:                             RetailEmployment

Constant                             0.3386*** (0.0013)
AssignedTRUE                        -0.0139*** (0.0019)
dateCentered                         0.0003 (0.0003)
AssignedTRUE x dateCentered          0.0010* (0.0005)
_____       _____
S.E. type                            Heteroskedast.-rob.
Observations                                   1,307,769
R2                                               8.36e-5
Adj. R2                                          8.13e-5
---
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05
```

The Big Picture

How has COVID affected the health of the retail industry, as measured by employment?

- COVID had a negative impact on retail
  - Employment drastically decreased
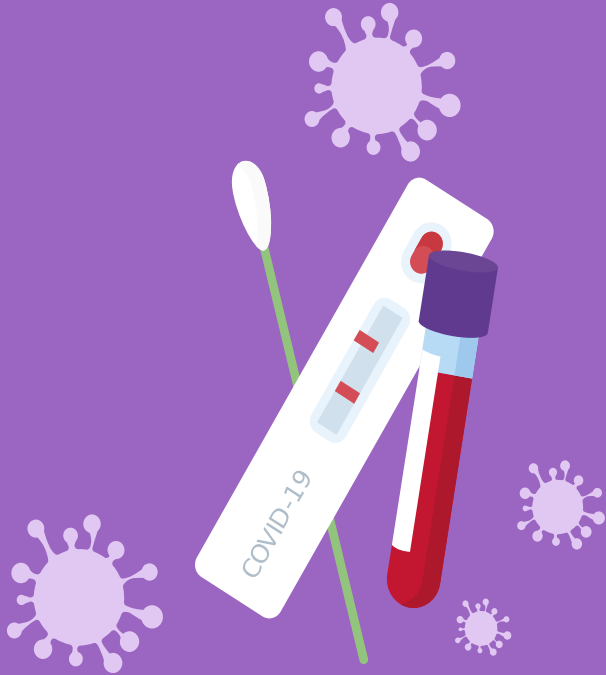 - Specifically, -0.0139 units

So what?

- Layoffs/ job loss in retail during COVID

- BUT we know there was a push to help recover the economy
  - Take advantage ! ! !

Question #2

How has retail fared relative to other industries?

Interaction Regression Model

employment ~ before_covid * i(indname, ref = 'Retail Trade')

- **employment**: whether the person in the observation is employed or not
    - Binary variable, 1 is employed and 0 is unemployed
- **before_covid**: time before COVID started
    - Binary variable, TRUE is before COVID and FALSE is after COVID
- **indname**: industry name
    - Set reference group to retail since we are comparing by retail
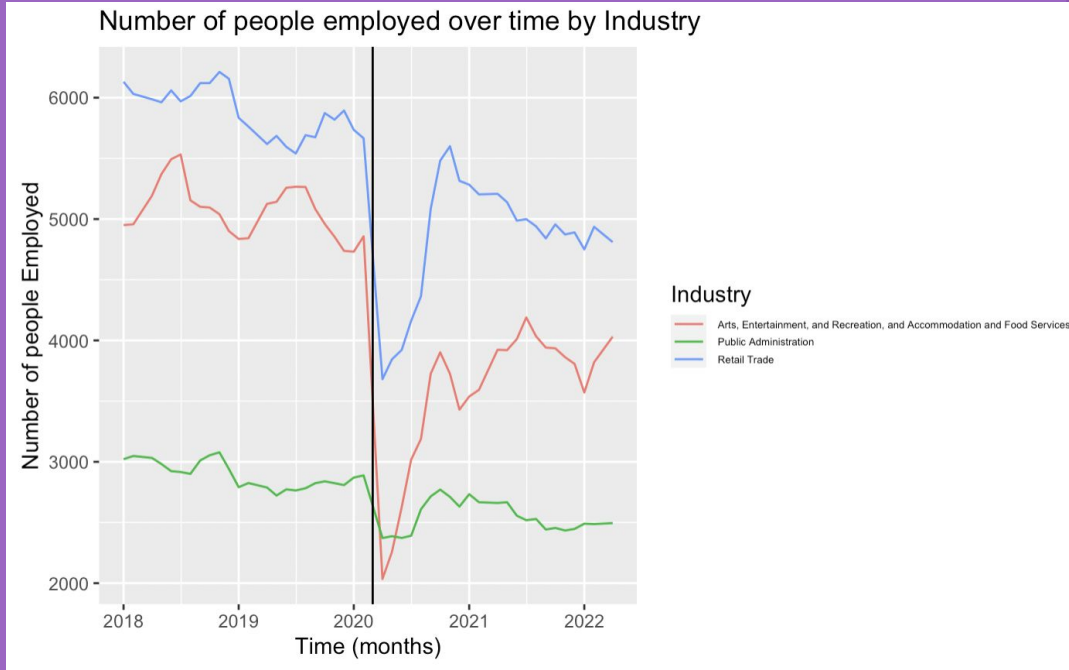
Regression Model: Analysis

employment ~ before_covid * i(indname, ref = 'Retail Trade')

- Employment of each industry changed after COVID by the interaction coefficient with each industry compared to "Retail"
  - before _covidFALSE x indname = _____

```
                                                                                                       retail_relative
Dependent Var.:                                                                                            employment

Constant                                                                                             0.9301*** (0.0006)
before_covidTRUE                                                                                     0.0259*** (0.0008)
indname = Agriculture,Forestry,Fishing,andHunting,andMining                                             0.0016 (0.0012)
indname = Arts,Entertainment,andRecreation,andAccommodationandFoodServices                          -0.0114*** (0.0008)
indname = Construction                                                                              -0.0040*** (0.0009)
indname = EducationalServices,andHealthCareandSocialAssistance                                       0.0185*** (0.0007)
indname = FinanceandInsurance,andRealEstateandRentalandLeasing                                       0.0230*** (0.0009)
indname = Information                                                                                0.0092*** (0.0014)
indname = Manufacturing                                                                              0.0127*** (0.0008)
indname = Military                                                                                  -0.9560*** (0.0165)
indname = OtherServices,ExceptPublicAdministration                                                   0.0132*** (0.0010)
indname = Professional,Scientific,andManagement,andAdministrativeandWasteManagementServices          0.0073*** (0.0007)
indname = PublicAdministration                                                                       0.0257*** (0.0010)
indname = TransportationandWarehousing,andUtilities                                                  0.0125*** (0.0009)
indname = WholesaleTrade                                                                             0.0162*** (0.0013)
before_covidFALSE x indname = Agriculture,Forestry,Fishing,andHunting,andMining                      0.0107*** (0.0018)
before_covidFALSE x indname = Arts,Entertainment,andRecreation,andAccommodationandFoodServices      -0.0598*** (0.0012)
before_covidFALSE x indname = Construction                                                              0.0018 (0.0013)
before_covidFALSE x indname = EducationalServices,andHealthCareandSocialAssistance                   0.0072*** (0.0010)
before_covidFALSE x indname = FinanceandInsurance,andRealEstateandRentalandLeasing                   0.0145*** (0.0013)
before_covidFALSE x indname = Information                                                               -0.0025 (0.0022)
before_covidFALSE x indname = Manufacturing                                                          0.0054*** (0.0012)
before_covidFALSE x indname = Military                                                                  0.0259 (0.0249)
before_covidFALSE x indname = OtherServices,ExceptPublicAdministration                              -0.0131*** (0.0015)
before_covidFALSE x indname = Professional,Scientific,andManagement,andAdministrativeandWasteManagementServices  0.0065*** (0.0011)
before_covidFALSE x indname = PublicAdministration                                                   0.0212*** (0.0014)
before_covidFALSE x indname = TransportationandWarehousing,andUtilities                             -0.0109*** (0.0014)
before_covidFALSE x indname = WholesaleTrade                                                         0.0091*** (0.0019)
_____                                            _____
S.E. type                                                                                                          IID
Observations                                                                                                 2,515,365
R2                                                                                                             0.01558
Adj. R2                                                                                                        0.01556
---
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

Interactive Regression Model Graph

Number of people employed over time by Industry

Goal: Capture the true effect of COVID of employment of different industries compared to Retail

- Red: Arts showed the greatest negative change after COVID
- Blue: Retail industry is the baseline of the change we are comparing to
- Green: Public Administration showed the greatest positive change after COVID

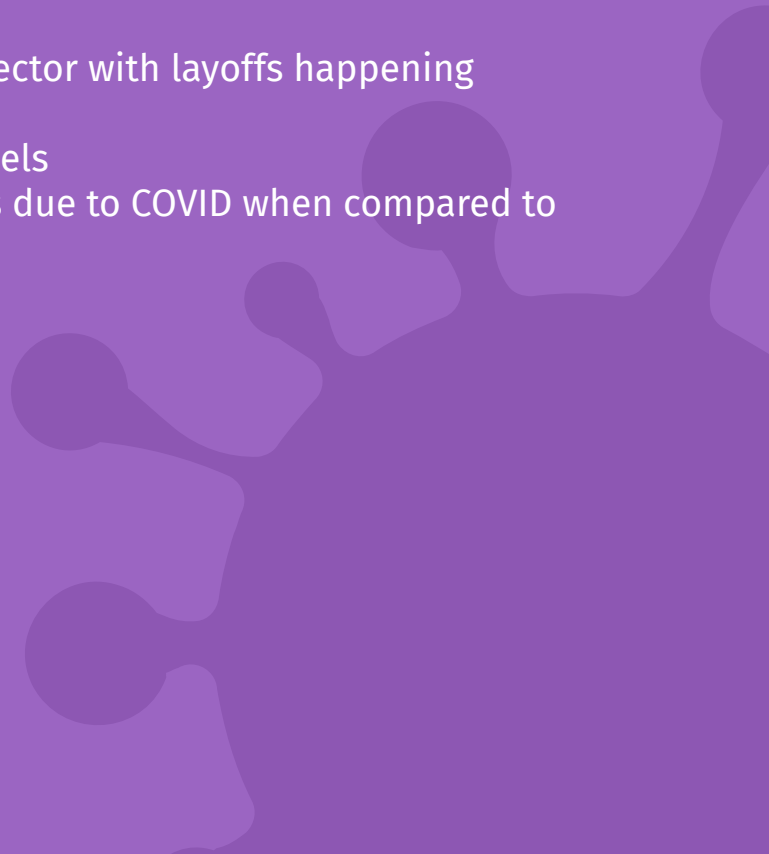# The Big Picture

How has retail fared relative to other industries?

- Compared to the retail industry, COVID had a negative impact on some industries, while a positive impact on others
  - Employment increased for Public Administration
  - Employment decreased for Arts

So what?

- Layoffs/ job shifts in different industries during COVID

CONCLUSION

- COVID had an overall negative impact on the retail sector with layoffs happening throughout the industry
- Employment has not fully recovered to pre-Covid levels
- Most of the other industries experienced less layoffs due to COVID when compared to the retail industry

Thank you!