

DATA 3320



Data Translation Project

Adam Kikuta, Kevin Bennett, Tina Chau, Tao Squires

Data Science Questions to Answer:

- ▷ How has retail fared relative to other industries?
- ▷ Retail needs to worry about who has money to spend - what has changed about who is working and earning money?

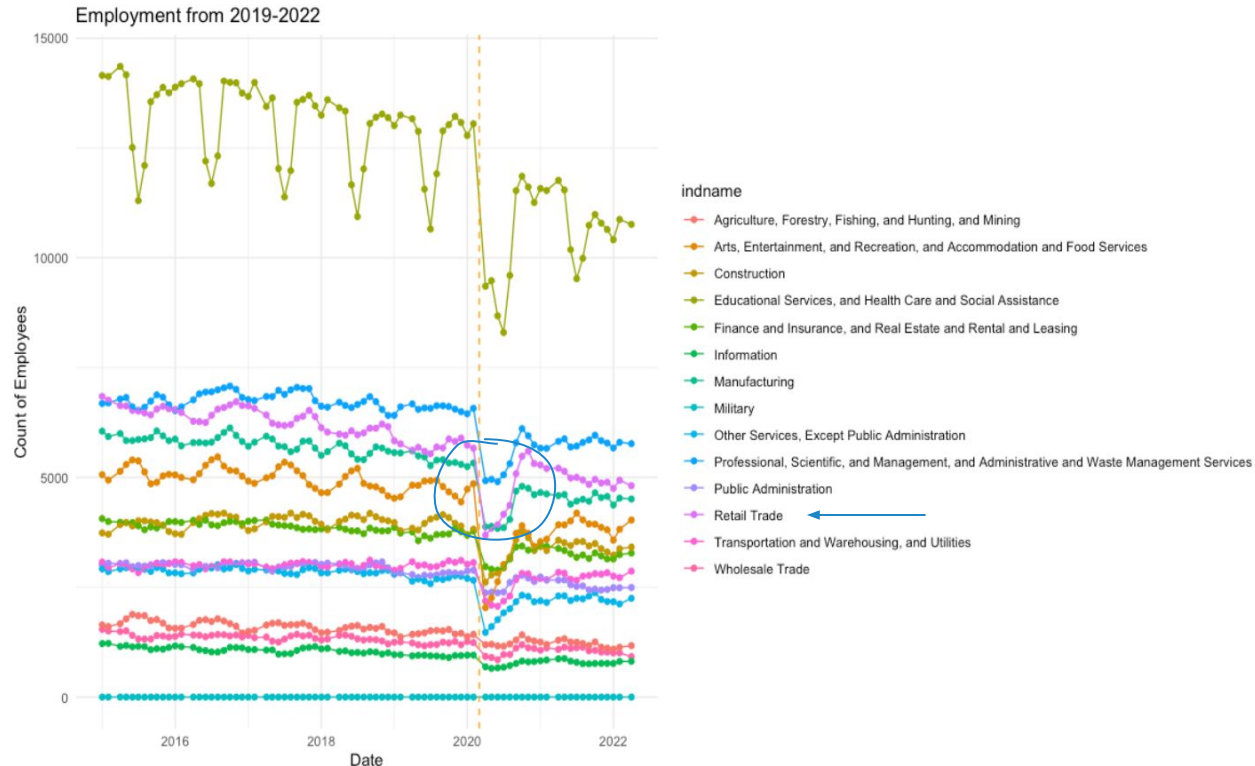
Source of Data

- ▷ IPUMS: IPUMS provides census and survey data from around the world integrated across time and space. IPUMS integration and documentation makes it easy to study change, conduct comparative research, merge information across data types, and analyze individuals within family and community context. Data and services available free of charge.
- ▷ Some data variables we extraction are:
 - AGE, SEX, RACE, EMPSTAT, LABFORCE, IND and more...

How has retail fared relative to other industries?

(Retail vs. IND Plot on Employment)

- ▷ Data visualization: Number of employees per month across different industries
- ▷ Line plot generated using ggplot2 package
- ▷ Each industry represented by a different color
- ▷ Dashed orange vertical line marks the start of significant event (e.g., COVID in March 2020)



How has retail fared relative to other industries?

(Regression analysis: Q2.reg)

- ▷ Relationship between employment status and variables (COVID-19 period, retail trade employees, center date)
- ▷ Coefficients and p-values indicating the impact on employment
- ▷ The coefficient on covid.pre.postAFTER, -0.0868, represents the decline in employment share in the Retail Industry of 8.68%.

Q2.reg
Dependent Var.:
Employment.Status.numeric

```
covid.pre.postAfter  
-0.0868*** (1.28e-12)  
indnameEducationalServices,andHealthCareandSocialAssistance x covid.pre.postAfter  
0.0215*** (1.28e-12)  
indnamePublicAdministration x covid.pre.postAfter  
0.0677*** (1.28e-12)  
indnameFinanceandInsurance,andRealEstateandRentalandLeasing x covid.pre.postAfter  
0.0520*** (1.29e-12)  
indnameOtherServices,ExceptPublicAdministration x covid.pre.postAfter  
-0.0417*** (1.28e-12)  
indnameProfessional,Scientific,andManagement,andAdministrativeandWasteManagementServices x  
covid.pre.postAfter 0.0308*** (1.29e-12)  
indnameArts,Entertainment,andRecreation,andAccommodationandFoodServices x covid.pre.postAfter  
-0.1692*** (1.29e-12)  
indnameConstruction x covid.pre.postAfter  
0.0128*** (1.29e-12)  
indnameManufacturing x covid.pre.postAfter  
0.0189*** (1.28e-12)  
indnameWholesaleTrade x covid.pre.postAfter  
0.0355*** (1.28e-12)  
indnameTransportationandWarehousing,andUtilities x covid.pre.postAfter  
-0.0105*** (1.28e-12)  
indnameInformation x covid.pre.postAfter  
0.0001*** (1.28e-12)  
indnameAgriculture,Forestry,Fishing,andHunting,andMining x covid.pre.postAfter  
0.0516*** (1.28e-12)  
indnameMilitary x covid.pre.postAfter
```

How has retail fared relative to other industries?

(Regression analysis: Q2.reg)

- ▷ Interaction terms capture changes in employment share relative to retail
- ▷ Coefficients and p-values for industries with significant changes in employment share
- ▷ Example: Arts, Entertainment, and Recreation, and Accommodation and Food Services (-0.1692, $p < 0.001$) had lower employment share compared to retail
- ▷ Retail industry experienced a decline in employment relative to other sectors

Q2.reg
Dependent Var.:
Employment.Status.numeric

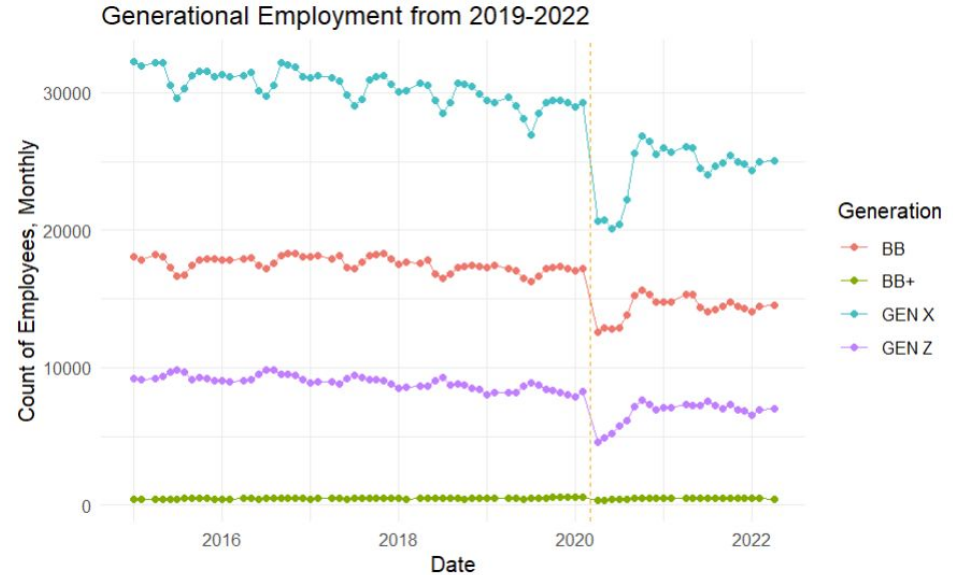
```
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-0.0868*** (1.28e-12)
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-0.0105*** (1.28e-12)
indnameInformation x covid.pre.postAfter
0.0001*** (1.28e-12)
indnameAgriculture,Forestry,Fishing,andHunting,andMining x covid.pre.postAfter
0.0516*** (1.28e-12)
indnameMilitary x covid.pre.postAfter
```

Who is working and earning money?

Q3. Age. reg
Dependent Var.:
Employment.Status.numeric

covid.pre.postAfter (0.0049)	-0.0828***
GenerationGENX x covid.pre.postAfter (0.0050)	0.0078
GenerationBB x covid.pre.postAfter (0.0050)	0.0063
GenerationGENZ x covid.pre.postAfter (0.0051)	-0.0401***
Center.Date x covid.pre.postAfter (9.84e-6)	0.0001***
GenerationGENX x Center.Date x covid.pre.postAfter (9.91e-6)	-3.9e-5***
GenerationBB x Center.Date x covid.pre.postAfter (9.98e-6)	-2.87e-5**
GenerationGENZ x Center.Date x covid.pre.postAfter (1.01e-5)	4.16e-5***

S.E. type
IID
Observations
4,529,040
R2
0.01235



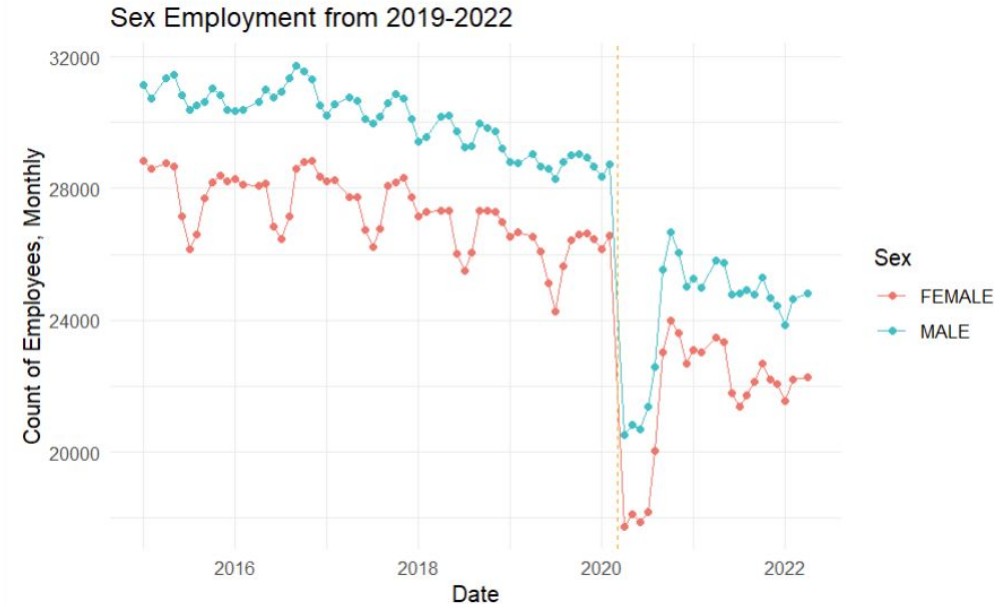
Who is working and earning money?

Q3.Sex.reg
Dependent Var.:
Employment.Status.numeric

covid.pre.postAfter (0.0006)	-0.0767***
SexFEMALE x covid.pre.postAfter (0.0009)	-0.0148***
Center.Date x covid.pre.postAfter (1.22e-6)	9.95e-5***
SexFEMALE x Center.Date x covid.pre.postAfter (1.79e-6)	3.04e-5***

S.E. type
IID
Observations
4,529,040
R2
0.00810
Adj. R2
0.00810

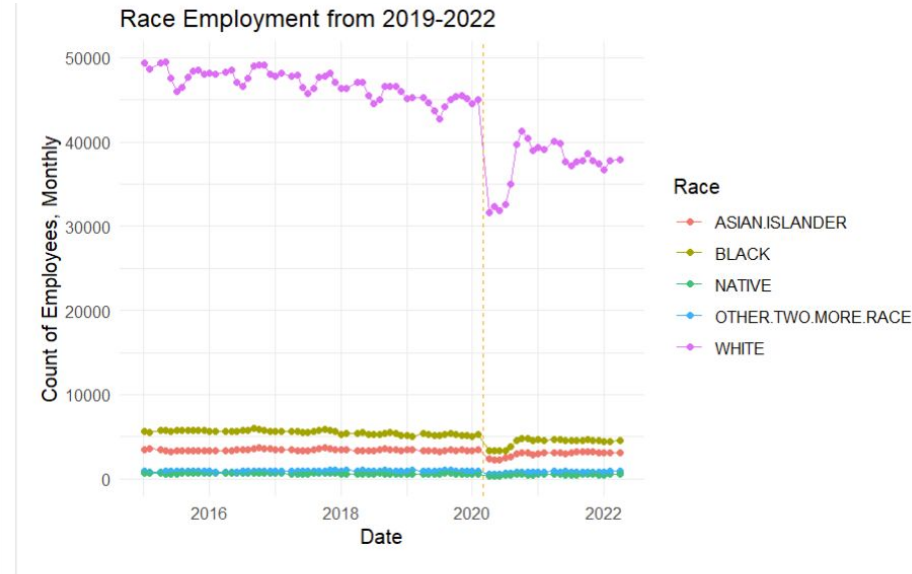
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1



Who is working and earning money?

Q3.Race.reg
Dependent Var.:
Employment.Status.numeric

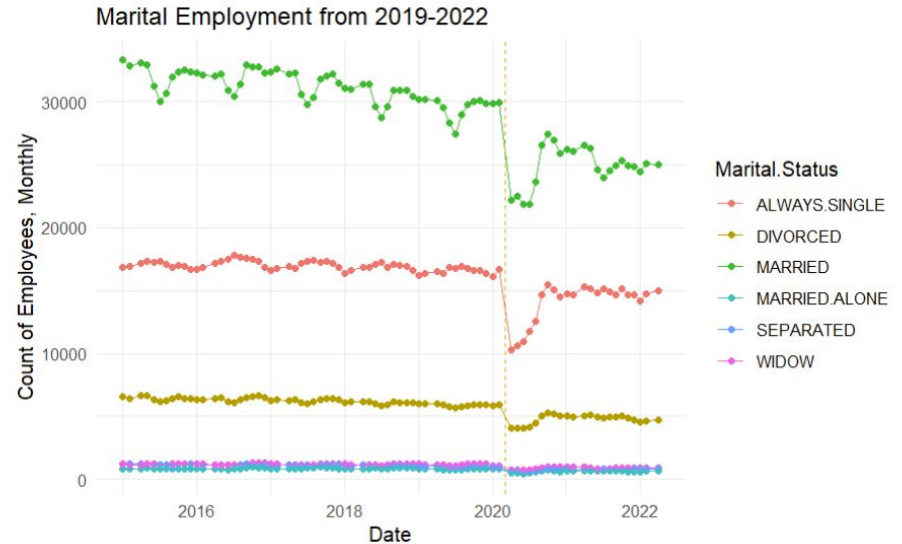
covid.pre.postAfter
-0.0774*** (0.0005)
RaceBLACK x covid.pre.postAfter
-0.0271*** (0.0014)
RaceASIAN.ISLANDER x covid.pre.postAfter
-0.0259*** (0.0018)
RaceOTHER.TWO.MORE.RACE x covid.pre.postAfter
-0.0379*** (0.0031)
RaceNATIVE x covid.pre.postAfter
-0.0322*** (0.0043)
Center.Date x covid.pre.postAfter
0.0001*** (1.01e-6)
RaceBLACK x Center.Date x covid.pre.postAfter
1.27e-5*** (2.7e-6)
RaceASIAN.ISLANDER x Center.Date x covid.pre.postAfter
3.59e-5*** (3.54e-6)
RaceOTHER.TWO.MORE.RACE x Center.Date x covid.pre.postAfter
2.4e-5*** (6.17e-6)
RaceNATIVE x Center.Date x covid.pre.postAfter
2.28e-5** (8.5e-6)



Who is working and earning money?

Dependent Var.:	Q3.Marital.reg
	Employment.Status.numeric
covid.pre.postAfter	-0.0897*** (0.0034)
Marital.StatusALWAYS.SINGLE x covid.pre.postAfter	-0.0216*** (0.0035)
Marital.StatusDIVORCED x covid.pre.postAfter	0.0101** (0.0037)
Marital.StatusMARRIED x covid.pre.postAfter	0.0239*** (0.0034)
Marital.StatusMARRIED.ALONE x covid.pre.postAfter	-0.0082 (0.0050)
Marital.StatusSEPARATED x covid.pre.postAfter	-0.0196*** (0.0047)
Center.Date x covid.pre.postAfter	0.0001*** (6.71e-6)
Marital.StatusALWAYS.SINGLE x Center.Date x covid.pre.postAfter	1.71e-5* (6.88e-6)
Marital.StatusDIVORCED x Center.Date x covid.pre.postAfter	-3.35e-5*** (7.3e-6)
Marital.StatusMARRIED x Center.Date x covid.pre.postAfter	-3.86e-5*** (6.83e-6)
Marital.StatusMARRIED.ALONE x Center.Date x covid.pre.postAfter	-7.59e-6 (1e-5)
Marital.StatusSEPARATED x Center.Date x covid.pre.postAfter	7.48e-6 (9.38e-6)
S.E. type	IID
Observations	4,529,040
R2	0.01631
Adj. R2	0.01631

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



Conclusion

- ▷ Retail industry employment significantly lowered by 0.0831 ($p < 0.001$) during the post-COVID period.
- ▷ Impact of COVID on retail industry employment is evident.
- ▷ The decline in Retail employment share was not statistically significantly different than the aggregate decline in employment share experienced by all other industries.
- ▷ Retail industry should target the demographic backgrounds of Generation X, Male, White, and Married.