

Low-Income Jobs Lost to COVID-19

Presentation #5

By: Yarra Abozaed, Zach Johansen,
Janelle Acob, Tim Chen
DAT 4500



TABLE OF CONTENTS

01
RECAP

02
HYPOTHESIS
TESTING –
PART 2

03
PRINCIPAL
COMPONENT
ANALYSIS

04
VISUALS

05
CHALLENGES

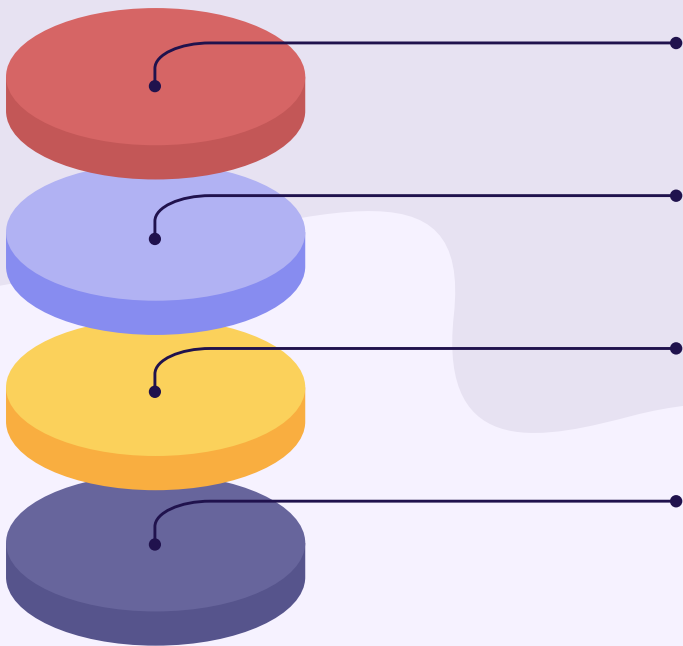
06
NEXT WEEKS
PLANS

RECAP

Last Presentation:

- **Research Question:** How do different states respond to the covid pandemic and how does that affect the workforce?
- Conducted hypothesis testing to confirm the existence of a mathematically meaningful relationship between each variable and low-income jobs (LIJs) lost

OUR PROGRESS



Since last week we...

1

Revisited some variables and redid the hypothesis testing to better fit what the variable was measuring

2

Finished the necessary prep for principal component analysis

3

Created visualizations that showcase the patterns and relationships in some of the 9 variables we're using

4

Worked on GitHub organization and documentation



OUR HYPOTHESIS TESTING – PART 2

Metrics to Measure COVID-19 Regulations

- Rate of vaccinations
- Length of Vaccine Availability
- Length of Masking Requirement
- Gathering Restrictions (Max Length)
- ~~Income Tax 2015~~ → **Income Tax 2020**
- ~~Average Salary Per State~~ → **Change in Income Per State (2018 & 2021)**
- Health Ranking by State
- ~~Political Standing~~ → **Proportion of Republican Voters (2020)**
- Rate of Jobs that Went Remote

Hypothesis Testing 1: Change in Income Per State

The relationship between the proportion of low-income jobs lost per state (by population) and change in income per state (between 2018 and 2021) →

H₀ : There is no correlation between the proportion of low-income jobs lost per state (by population) and change in income per state (between 2018 and 2021)

H_a : There is a correlation between the proportion of low-income jobs lost per state (by population) and change in income per state (between 2018 and 2021)

Results: With a p-value of 0.47, we cannot reject the null hypothesis and conclude that there is no correlation between the proportion of low-income jobs lost per state (by population) and change in income per state (between 2018 and 2021).

Hypothesis Testing 2: Proportion of Republican Voters

The relationship between the proportion of low-income jobs lost per state (by population) and the proportion of Republican voters per state (by population) →

H₀ : There is no correlation between the proportion of low-income jobs lost per state (by population) and the proportion of Republican voters per state (by population)

H_a : There is a correlation between the proportion of low-income jobs lost per state (by population) and the proportion of Republican voters per state (by population)

Results: With a p-value of 1.934×10^{-10} we reject the null hypothesis and conclude that there is a moderate positive correlation between the proportion of low-income jobs lost per state (by population) and the proportion of Republican voters per state (by population). Furthermore, the 95% confidence interval of $(-0.851, -0.601)$ does not include 0, which further supports the conclusion that there is a relationship between these variables.

Hypothesis Testing 3: Income Tax 2020

The relationship between the proportion of low-income jobs lost per state (by population) and the proportion of Republican voters per state (by population) →

H₀ : There is no correlation between the proportion of low-income jobs lost per state (by population) and the proportion of Republican voters per state (by population)

H_a : There is a correlation between the proportion of low-income jobs lost per state (by population) and the proportion of Republican voters per state (by population)

Results: With a p-value of 0.4336 we cannot reject the null hypothesis and conclude that there is no association between the proportion of low-income jobs lost per state (by population) and the income tax per state. Furthermore, the 95% confidence interval of (-0.1722997, 0.3833032) does include 0, which further supports the conclusion that there is no relationship between these variables.

Updated Summary

Variable	P-Value	Correlation Coefficient	Relationship With PLIJs Lost
Rate of Vaccination	1.497×10^{-5}	0.57	Moderate & Positive (PLIJs Lost ↑, Rate of Vaccination ↑)
Length of Vaccine Availability	6.24×10^{-6}	0.60	Moderate & Positive (PLIJs Lost ↑, Length of Vaccine Availability ↑)
Length of Masking Requirement	1.929×10^{-7}	0.70	Strong & Positive (PLIJs Lost ↑, Length of Requirements ↑)
Gathering Restrictions (Max Length)	0.0009606	0.45	Moderate & Positive (PLIJs Lost ↑, Length of Gathering Restrictions ↑)
Income Tax by Base State Income Tax (2015)	0.03623	0.204	Weak & Positive (Higher Income Tax, More LIJ Lost)
Income Tax by State Average (2020)	0.4336	0.11	No Association
Average Salary (per state, 2021)	0.00113	0.45	Moderate & Positive (PLIJs Lost ↑, Average Salary ↑)
Change in Income Per State (2018 to 2021)	0.47	0.10	No Association
Healthcare Rank (2021)	0.001125	-0.50	Moderate & Negative (PLIJs Lost ↑, Healthcare rank ↓)
Political Standing	0.259	-0.163	No Association
Proportion of Republican Voters (2020)	1.934×10^{-10}	-0.75	Strong & Negative (PLIJs Lost ↑, Prop. of Republican Voters ↓)
Rate of Jobs that went Remote	0.04745	0.29	Weak & Positive (PLIJs Lost ↑, Rate of Jobs that went Remote ↑)

Final Metrics to Measure COVID-19 Regulations

- Rate of vaccinations
- Length of Vaccine Availability
- Length of Masking Requirement
- Gathering Restrictions (Max Length)
- ~~Income Tax 2015 → Income Tax 2020~~
- Average Salary Per State → ~~Change in Income Per State (2018 & 2021)~~
- Health Ranking by State
- ~~Political Standing~~ → Proportion of Republican Voters (2020)
- Rate of Jobs that Went Remote

PRINCIPAL COMPONENTS ANALYSIS



WHAT IS PRINCIPAL COMPONENT ANALYSIS (PCA), AND WHAT IS OUR PLAN?

- Turning our data from eight interrelated variables into two independent axes that should cover most of our data
- Combining the data sets into one set
- Going through the process of the r script to go through the required math

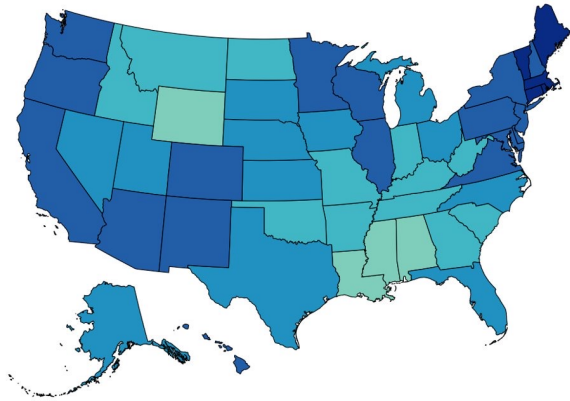


VISUALIZING THE DATA

VISUAL 1: Rate of Vaccination

Total Doses Administered Reported to the CDC by State/Territory and for Select Federal Entities per 100K of the Total Population

100,000 - 150,000 150,001 - 175,000 175,001 - 200,000 200,001 - 250,000 250,000 +

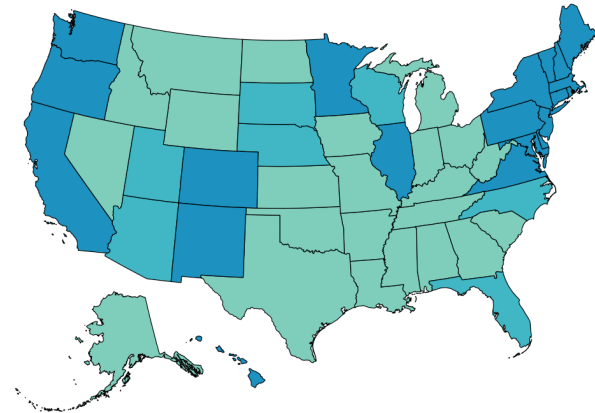


"Despite economies rebounding from the depths of their pandemic lows and quick action by governments to pass much-needed fiscal stimulus, the pandemic-induced shortfall in jobs is estimated to remain at 75 million in 2021, and fall to 23 million in 2022."

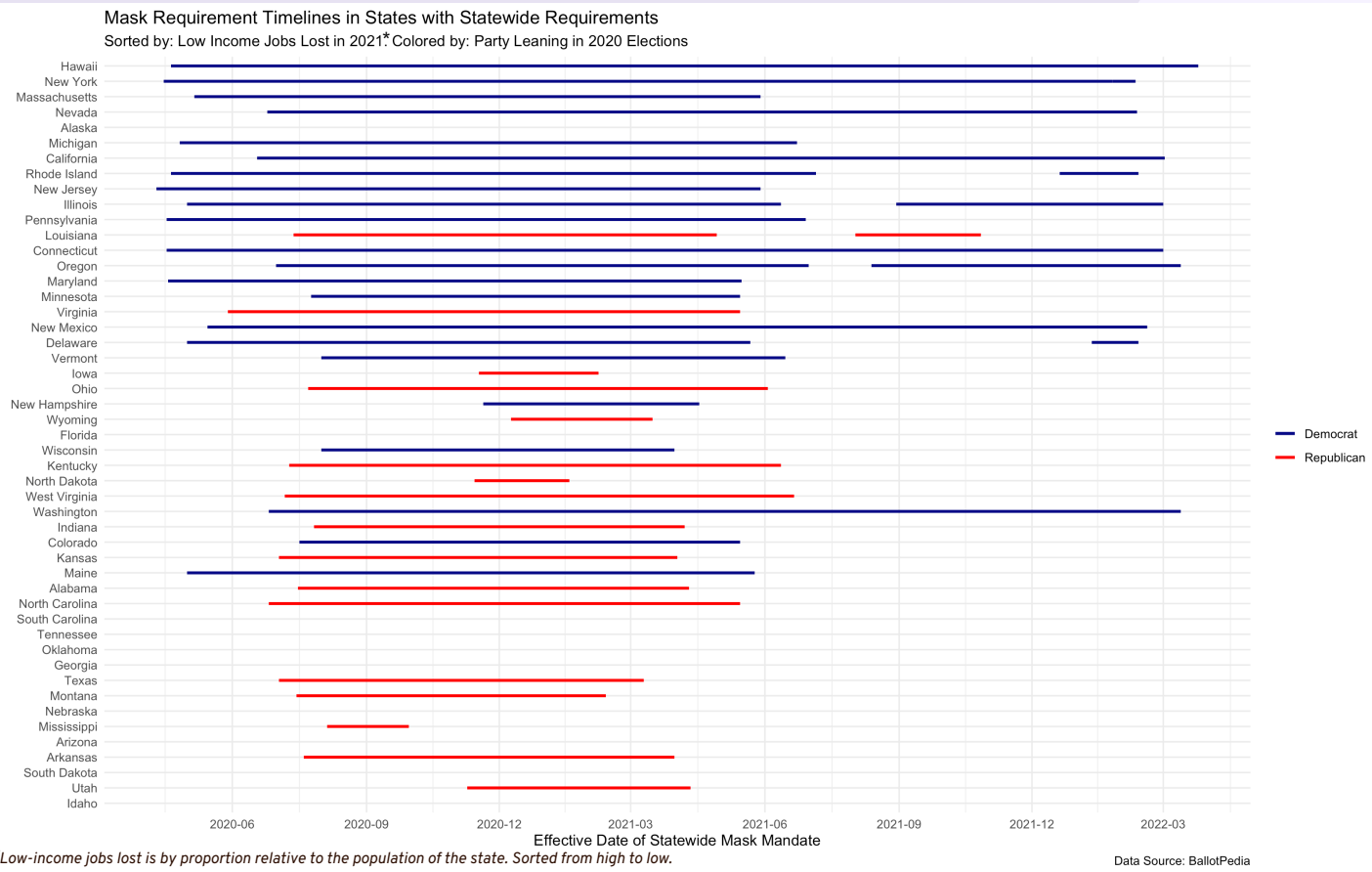
"Slower-than-expected vaccine rollouts and a resurgence of coronavirus variants in early 2021 have dampened the global jobs recovery forecast, with losses in both working hours and employment remaining high throughout this year and into 2022, the International Labour Organization (ILO) warned."

Percent Total Population with Completed Series reported to the CDC by State/Territory and for Select Federal Entities

50 - 65% 65 - 70% 70 - 90% 90% +



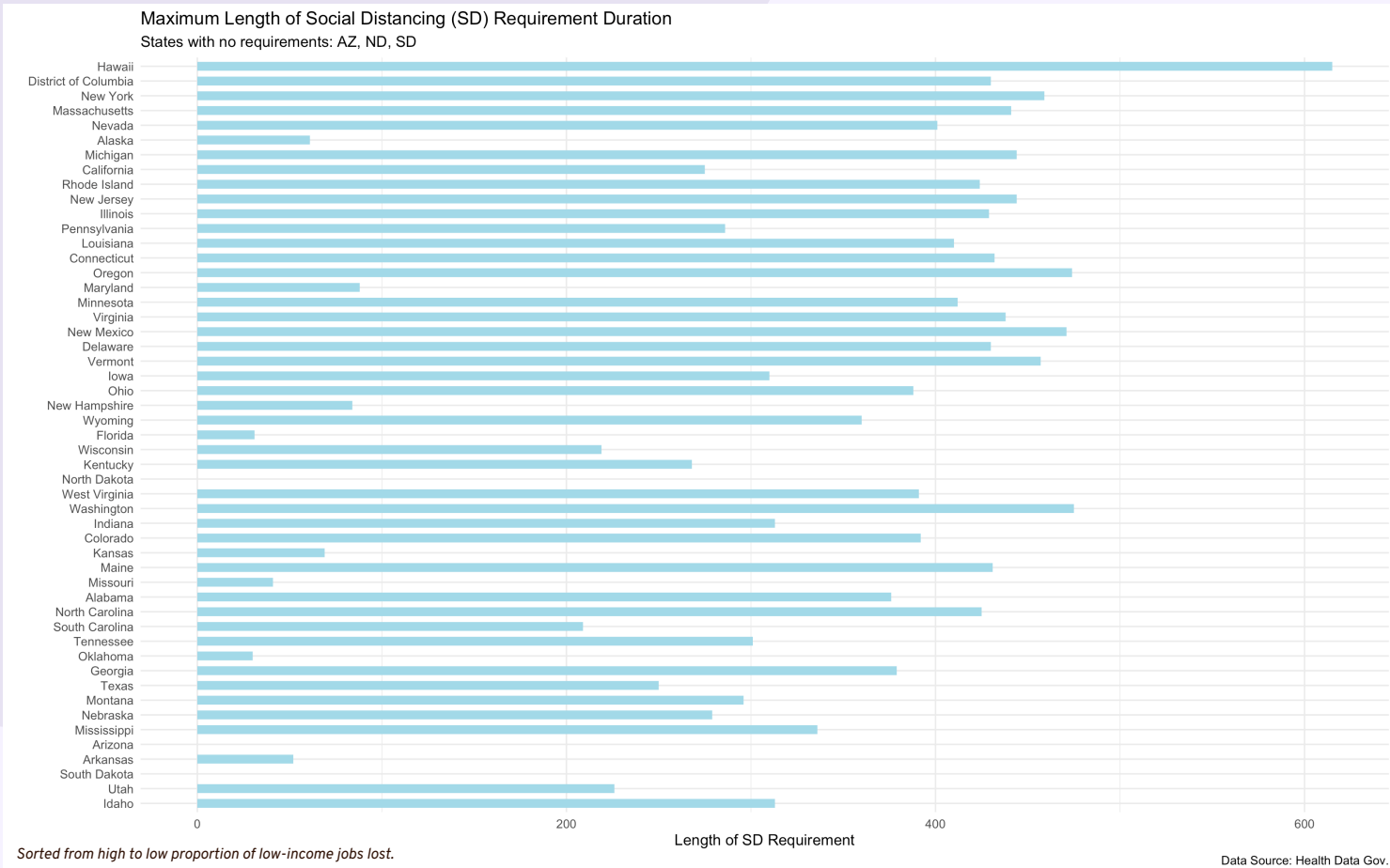
VISUAL 2: Length of Masking Requirement



"It determines [state-wide masking requirement] reduced 480 infections per million consumers per day (equivalent to a reduction of 56%), yet they also **reduced** customer satisfaction by 2.2%, **consumer spending by 7.5%** and GDP by 5.4%, **and increased unemployment by 2% per average state.**" (*Lockdown Without Loss? A Natural Experiment of Net Payoffs from COVID-19 Lockdowns*)

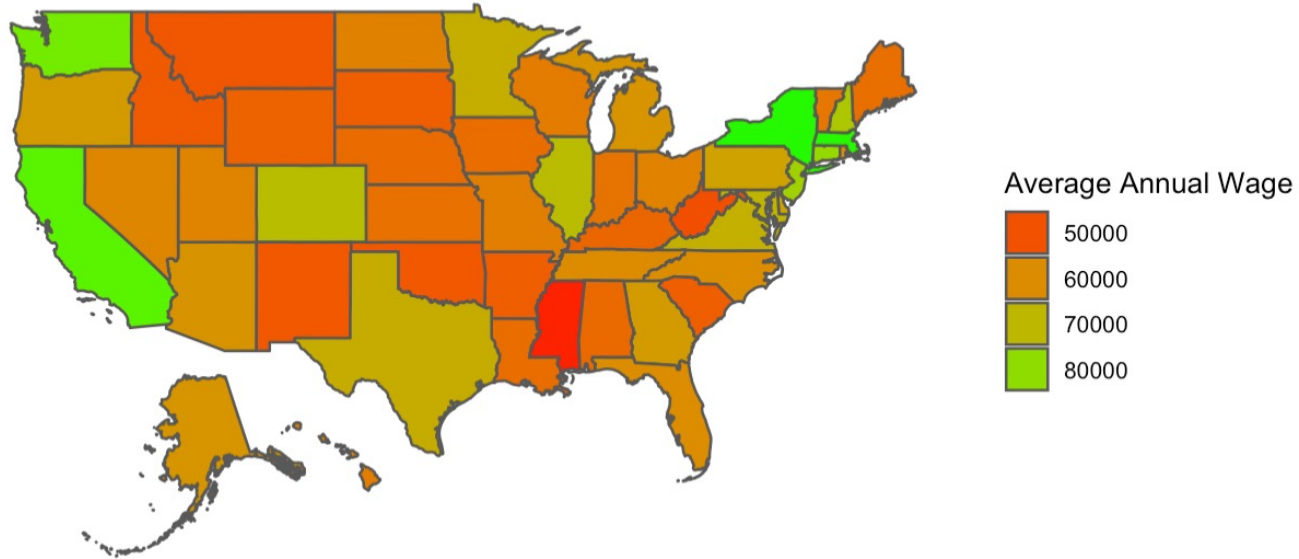
VISUAL 3: Gathering Restrictions (Max Length)

"Our results imply that **most of the short-run increase in own-state unemployment was not directly due to the state-level NPIs** that we consider. State-level restaurant and bar limitations, non-essential business closures, **stay-at-home orders, large-gatherings bans**, school closures, and emergency declarations **collectively account for 12.4% of the increase in UI claims...**" *(Disentangling policy effects using proxy data: Which shutdown policies affected unemployment during the COVID-19 pandemic?)*



VISUAL 4: Average Salary Per State

Average Annual Wage Across States in 2021



OUR CHALLENGES



Dataset Findings

- Creating our visualizations to show patterns/relationships & some struggles with data wrangling for our variables



Metrics

- Struggles with conducting the principal component analysis with the metrics we have & combining them into one measure



Our Goal

- Figuring out how to use all these variables & combining them into one measure with PCA

OUR NEXT STEPS



Visualizing the Results

Create visuals that get the story we're trying to tell across well.



Putting the Pieces Together

Start testing linear regression models with multiple variables



External Research

Can we find external resources that will help us tell a story through the data and results we have? (articles, research papers, journals...)

UPDATED LIST OF REFERENCES (data)

Variable	Dataset
Length of masking requirement	https://ballotpedia.org/State-level mask requirements in response to the coronavirus (COVID-19) pandemic, 2020-2022
Healthcare rank (2021)	https://www.usnews.com/news/best-states/rankings/health-care
Gathering Restrictions (Max Length)	https://healthdata.gov/dataset/U-S-State-and-Territorial-Gathering-Bans-March-11-/8tfm-md2h/data?no_mobile=true
Rate of Vaccination	https://covid.cdc.gov/covid-data-tracker/#vaccinations vacc-total-admin-count-total
Length of Vaccine Availability	https://covid.cdc.gov/covid-data-tracker/#vaccinations vacc-total-admin-count-total
Rate of Jobs that went Remote	https://www.teamflowhq.com/blog/states-where-the-most-people-worked-remote-because-of-covid-19
Political Standing	https://ballotpedia.org/Election results, 2020: State trifectas and the 2020 presidential vote
Average Salary (per state, 2021)	https://www.statista.com/statistics/243850/private-industry-wages-per-employee-in-the-us-by-state/
Income Tax	https://www.irs.gov/statistics/soi-tax-stats-individual-income-tax-statistics-2020-zip-code-data-soi
Total Income per state (2018 – 2021)	https://apps.bea.gov/iTable/?reqid=70&step=1&acrdn=2#eyJhcHBpZCI6NzAsInN0ZXBzIjpBMWwNCwyOSwyNSwzMswyNiwyNywzMwczMF0slmRhdGEiOltbIIRhYmxlSWQilCI2MDAiXSxbIkNsYXNzaWZpY2F0aW9uliwiTm9uLUluZHVzdHJ5Il0sWyJJNYWpvclI9BcmVhliwiMCIJdFsiU3RhdGUiLFsiMCJdXSxbIkFyZWElFsiWFgiXV0sWyJTdGF0aXN0aWMiLCIxIlIsWyJVbmI0X29mX21lYXN1cmUiLFI2JCJdZWZlbnMiXSxbIIIiYXliFsiMjAyMSIsIjlmWmJiAilCImDE5liwiMjAxOCJdXSxbIIIIYXJlCWdpbilslI0xIl0sWyJJZZWFyX0VuZCIsIi0xIl1dfQ==
Party Affiliation Proportion (2020)	https://www.pewresearch.org/religion/religious-landscape-study/compare/party-affiliation/by/state/

LIST OF REFERENCES (articles)

Title	Link
<i>Disentangling policy effects using proxy data: Which shutdown policies affected unemployment during the COVID-19 pandemic?</i>	https://www.sciencedirect.com/science/article/pii/S0047272720301213
<i>Lockdown Without Loss? A Natural Experiment of Net Payoffs from COVID-19 Lockdowns</i>	https://journals.sagepub.com/doi/abs/10.1177/07439156221143954?journalCode=ppoa
<i>Jobs loss to remain high due to slow vaccines, COVID variants: ILO</i>	https://www.aljazeera.com/economy/2021/6/2/job-loss-to-remain-high-due-to-slow-vaccines-covid-variants-ilo
<i>Unpacking the State and Local Tax Toolkit: Sources of State and Local Tax Collections (FY 2020)</i>	https://taxfoundation.org/state-local-tax-collections/



QUESTIONS?