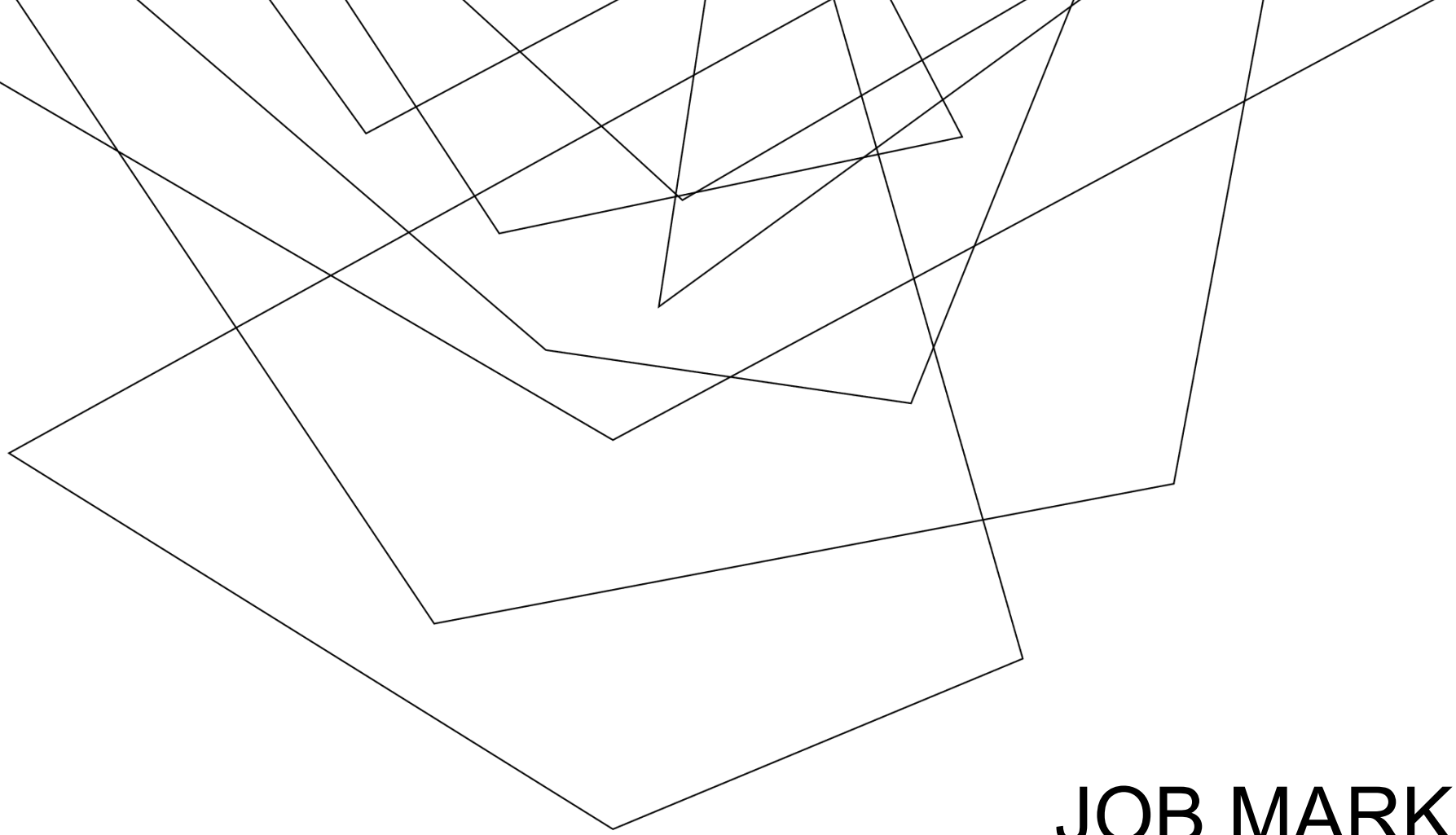


JOB MARKET ANALYSIS IN THE US

Brandon Wong, Chi-Lin Hung, and Dian Wang

393986: Exploratory Data Analysis and Visualization

COM SCI X 450.2 (Fall 2023)

AGENDA

Introduction

Research Question

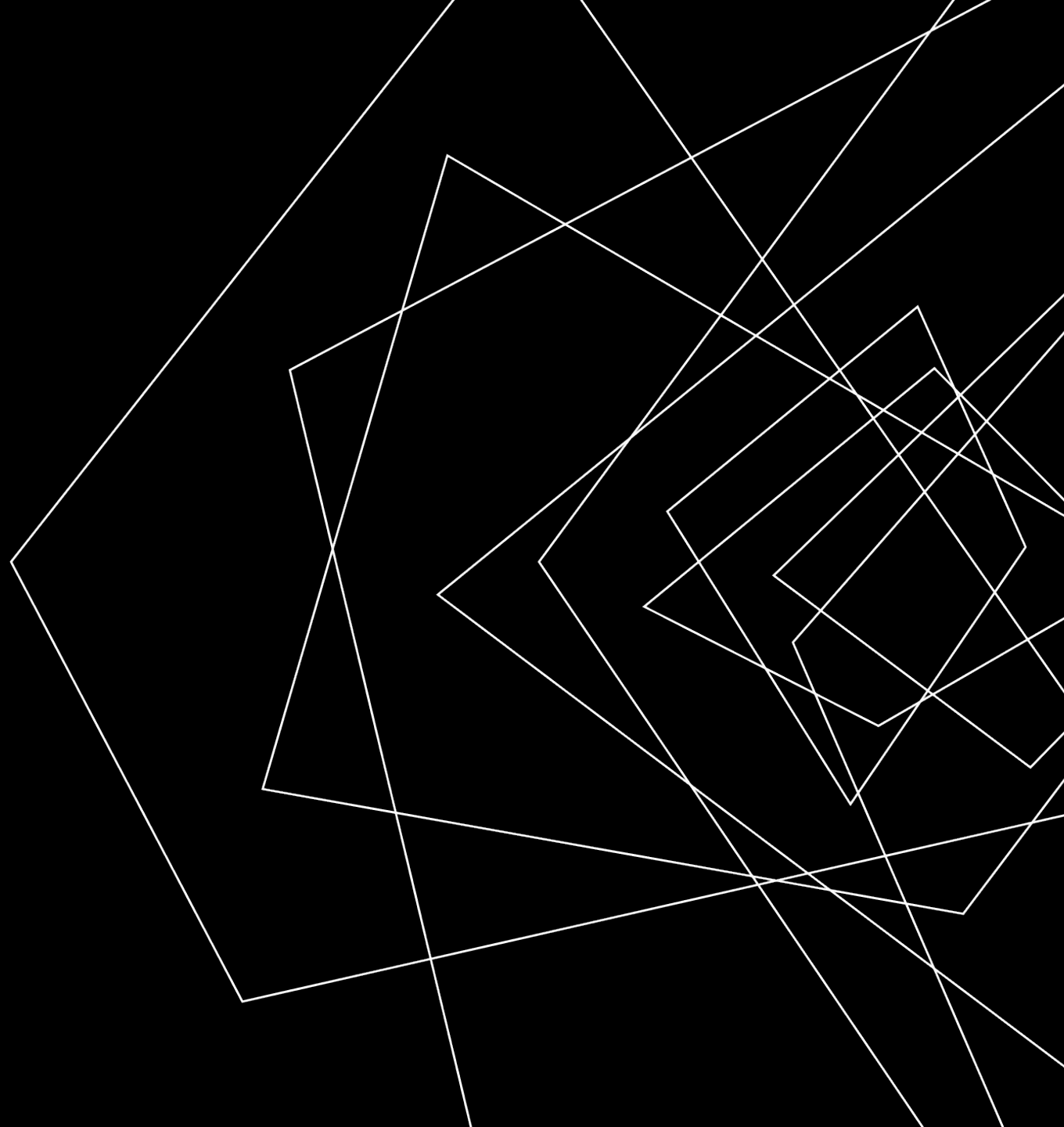
Data Set and Source

Data Cleaning

Summary Statistics

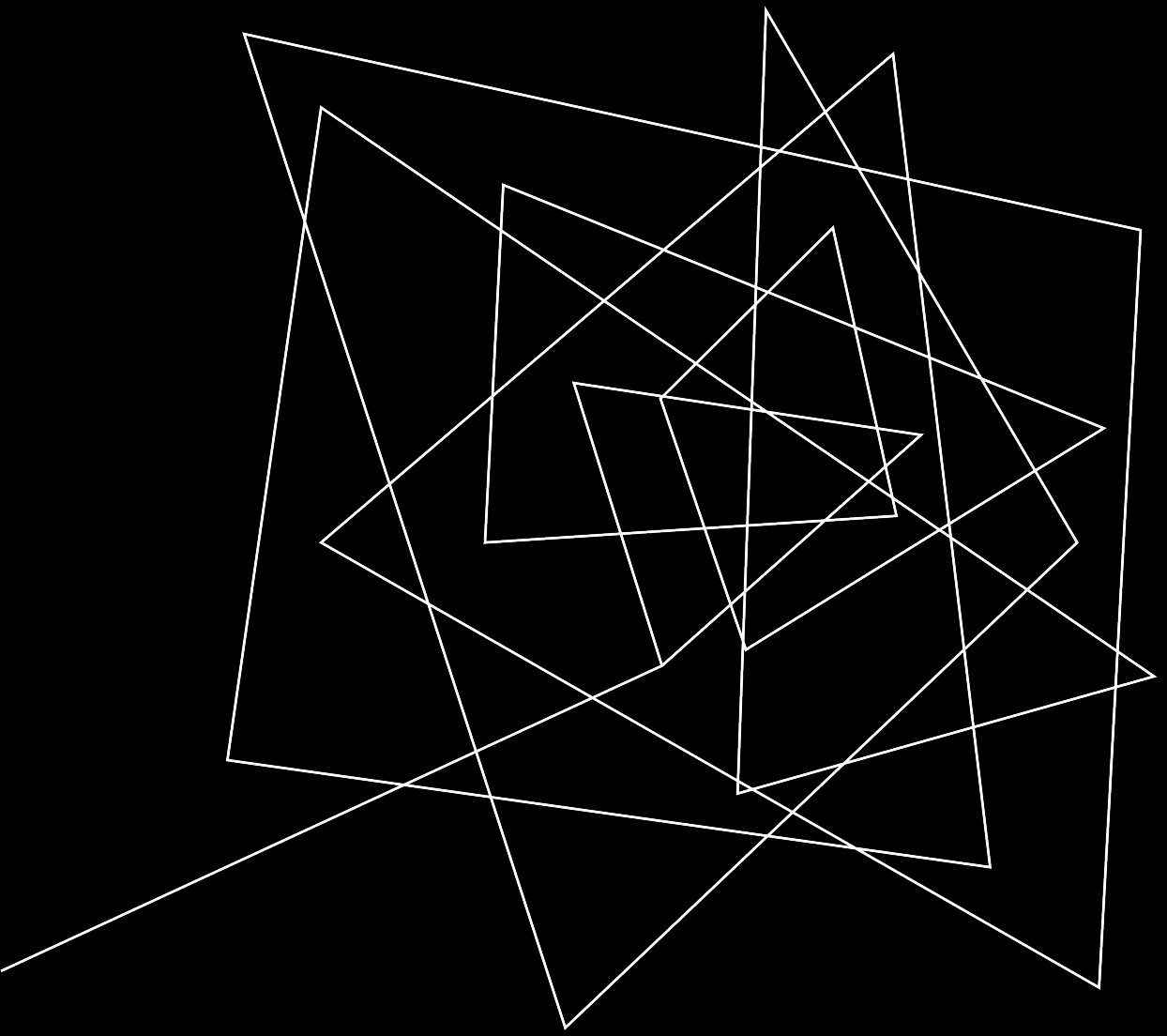
Results and Findings

Conclusion and Future Steps



INTRODUCTION

In this project we are trying to understand the fluctuations in job opportunities to unemployment rate in the US by State. Seeing if there is any correlation between the two. Then cross referencing the cost of living, and average income per state.



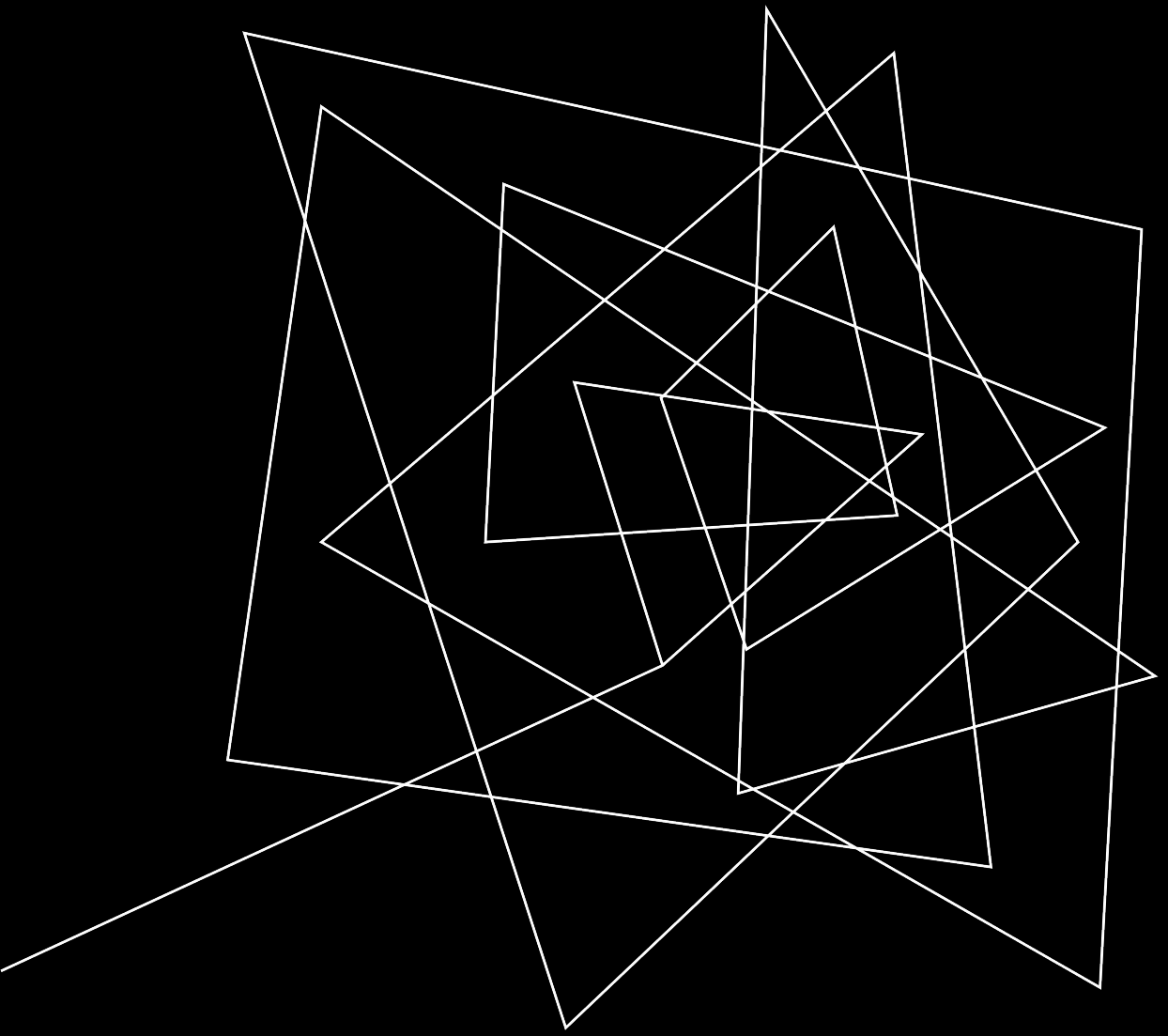
RESEARCH QUESTION

The question to answer

Research Question

- **What are the definitive factors for unemployment in the US?**

  - *Job Growth*
  - *Location or State*
  - *Cost of Living*

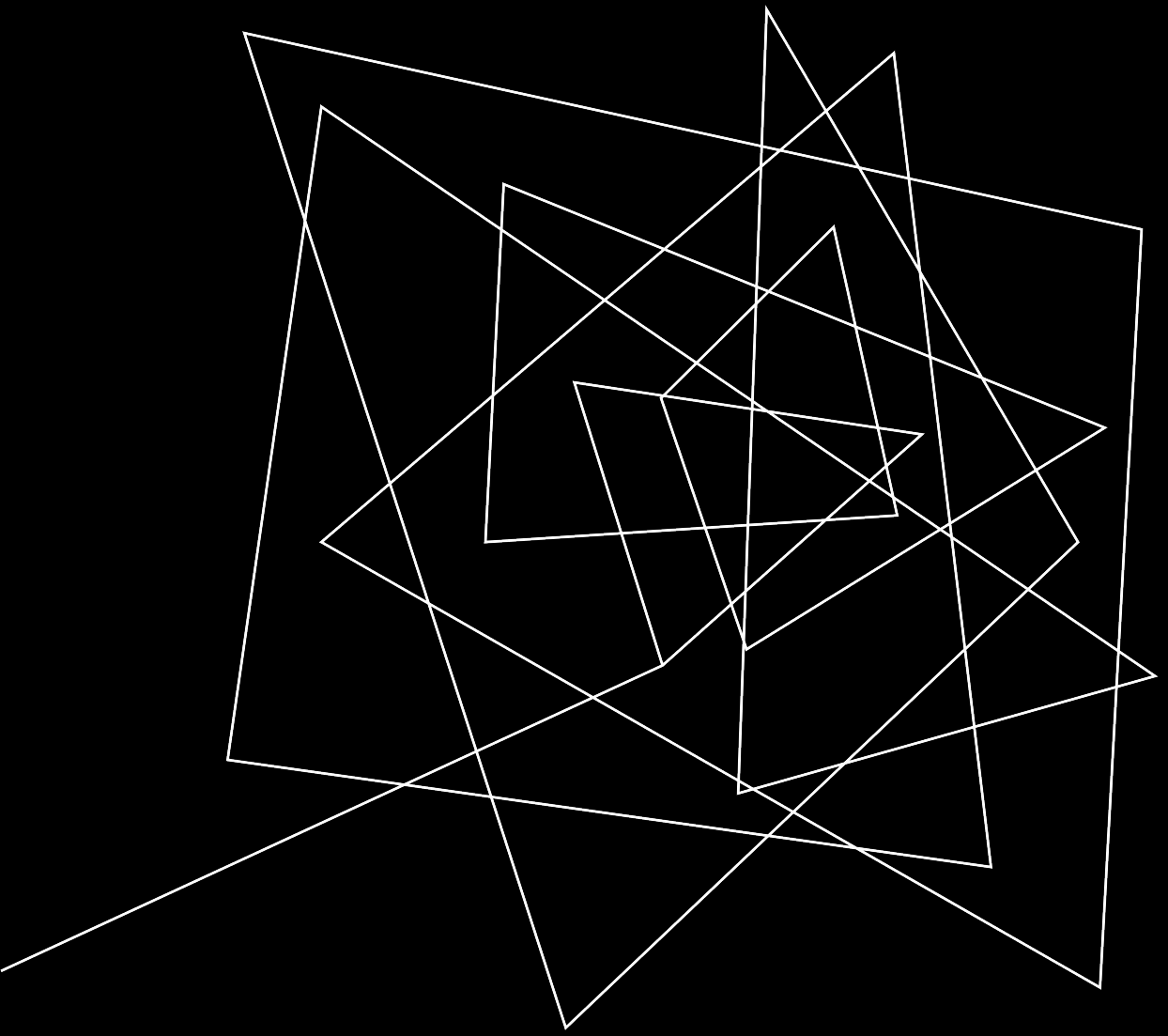


DATA SOURCE & ORIGINAL DATA SET

Where we sourced our data from

DATA SOURCES

Data Set Name	Data Source	Link
cost-of-living	WPR	https://worldpopulationreview.com/state-rankings/cost-of-living-index-by-state
job-growth-by-state	WPR	https://worldpopulationreview.com/state-rankings/job-growth-by-state
unemployment-rate	Kaggle	https://www.kaggle.com/datasets/guillemservera/us-unemployment-rates



DATA CLEANING

Removing and restructuring unnecessary values

DATA CLEANING PROCEDURE

1. Select datasets
2. Remove columns that were duplicated or irrelevant to our research question
3. Modify column names on Excel and R
4. Sum the separate rows of the same categorical variables
5. Merge the three datasets: we use the function ***merge()*** to merge datasets, the proofs are in line 373 and 395 of R code

Unemployment Data in the US

	FIPS Code	State/Area	Year	Month	Total Civilian Non-Institutional Population in State/Area	Total Civilian Labor Force in State/Area	Percent (%) of State/Area's Population	Total Employment in State/Area	Percent (%) of Labor Force Employed in State/Area	Total Unemployment in State/Area	Percent (%) of Labor Force Unemployed in State/Area
1											
2	1	Alabama	1976	1	2,605,000	1,484,555	57	1,386,023	53.2	98,532	6.6
3	2	Alaska	1976	1	232,000	160,183	69	148,820	64.1	11,363	7.1
4	4	Arizona	1976	1	1,621,000	964,120	59.5	865,871	53.4	98,249	10.2
5	5	Arkansas	1976	1	1,536,000	889,044	57.9	824,395	53.7	64,649	7.3
6	6	California	1976	1	15,621,000	9,774,280	62.6	8,875,685	56.8	898,595	9.2

	State.Area	Year	sTotalEmployment	sTotalUnemployment	sTotalCivNonIns	sTotalCivLabor
1						
2	Alabama	1976	16797385	1205731	31592000	18003116
3	Alabama	1977	17431846	1340714	32267000	18772560
4	Alabama	1978	18207821	1246188	32941000	19454009
5	Alabama	1979	18494203	1440984	33487000	19935187
6	Alabama	1980	18378547	1777370	33951000	20155917

	State.Area	Year	sTotalEmployment	sTotalUnemployment	sTotalCivNonIns	sTotalCivLabor
1						
2	Alabama	2022	26720248	712065	48164293	2743231
3	Alaska	2022	4108677	172472	6562010	428114
4	Arizona	2022	41709574	1656705	70317266	4336627
5	Arkansas	2022	15887086	544195	28554412	1643128
6	California	2022	221255470	9648188	373125022	2309036

Job Growth in the US 2023

	fips	state	densityMi	pop2023	pop2022	pop2020	pop2019	pop2010	growthRate
1									
2	1	Alabama	100.6762	5098746	5074296	5031362	5006199.4	4779736	0.00482
3	2	Alaska	1.28449	732984	733583	732923	730653.8	710231	-0.00082
4	4	Arizona	65.61541	7453517	7359197	7179943	7101150.4	6392017	0.01282
5	5	Arkansas	58.86715	3063152	3045637	3014195	3004367.3	2915918	0.00575
6	6	California	249.81347	38915693	39029342	39501653	39276883.3	37253956	-0.00291

growth	growthSince	JobGrowthTotalJobsFeb2023	JobGrowthYoYNetGrowthIn1000s	JobGrowthYoYNetGrowthPerc
24450	0.06674	2139400	41.5	2
-599	0.03204	326500	9.7	3.1
94320	0.16607	3147800	78.8	2.6
17515	0.05049	1354600	32.5	2.5
-113649	0.04461	17969600	486.5	2.8

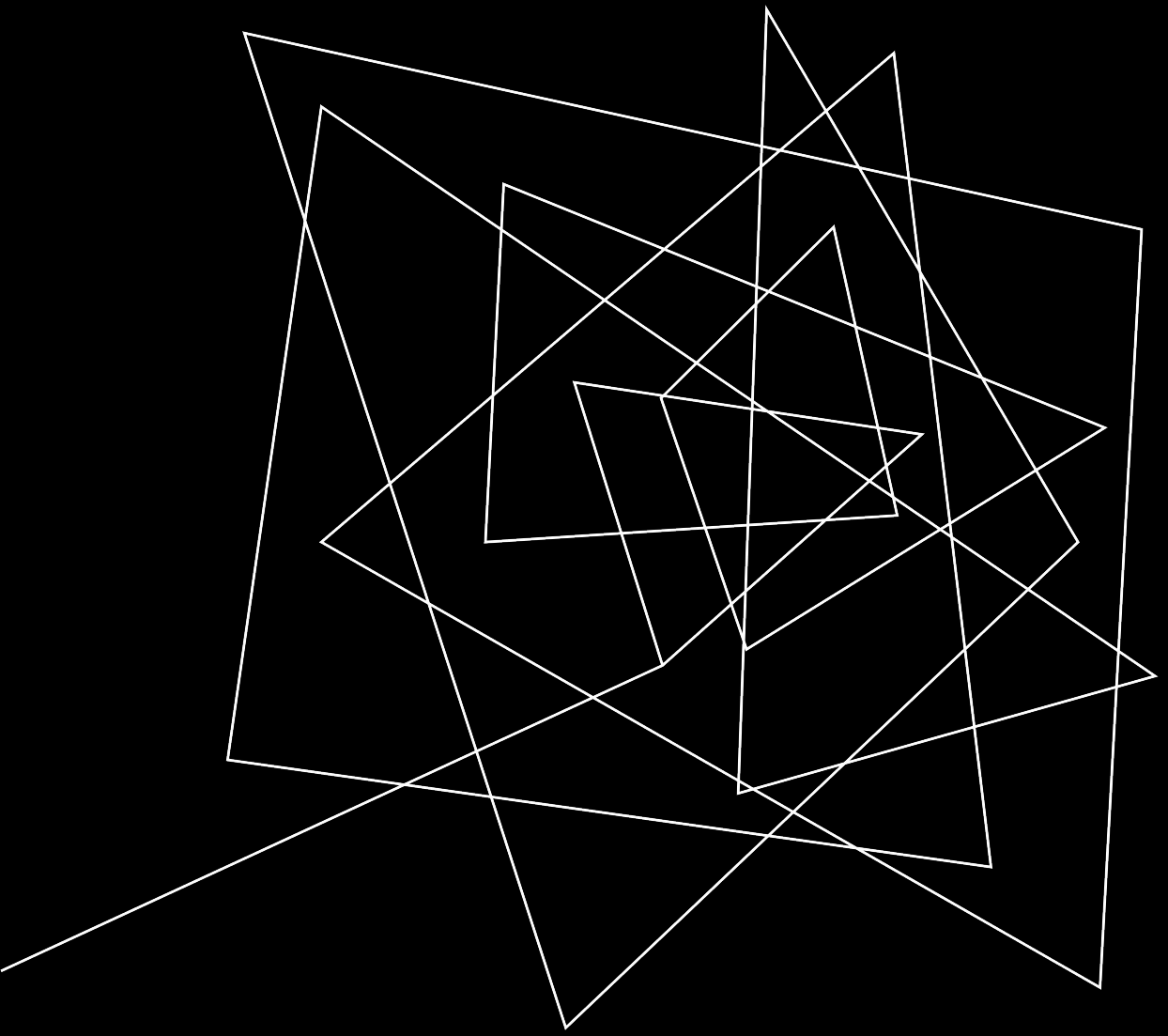
	state	densityMi	pop2022	pop2023	TotalJobsFeb2023	YoYNetGrowthIn1000s	YoYNetGrowthPerc
1							
2	Alabama	100.6762	5074296	5098746	2139400	41.5	2
3	Alaska	1.28449	733583	732984	326500	9.7	3.1
4	Arizona	65.61541	7359197	7453517	3147800	78.8	2.6
5	Arkansas	58.86715	3045637	3063152	1354600	32.5	2.5
6	California	249.81347	39029342	38915693	17969600	486.5	2.8

Cost of Living in the US 2023

	fips	state	densityMi	pop2023	pop2022	pop2020	pop2019	pop2010	growthRate
2	1	Alabama	100.6762	5098746	5074296	5031362	5006199.4	4779736	0.00482
3	2	Alaska	1.28449	732984	733583	732923	730653.8	710231	-0.00082
4	4	Arizona	65.61541	7453517	7359197	7179943	7101150.4	6392017	0.01282
5	5	Arkansas	58.86715	3063152	3045637	3014195	3004367.3	2915918	0.00575
6	6	California	249.81347	38915693	39029342	39501653	39276883.3	37253956	-0.00291

growth	growthSince	CostOfLiving	GroceryCosts	HealthCostsI	HousingCost	MiscCostsInc	Transportati	UtilityCostsIndex
24450	0.06674	88.8	96.4	86.9	70.4	96.2	92	103.6
-599	0.03204	124.4	127.4	149.8	118.1	118.8	121.9	148.1
94320	0.16607	107.2	101.8	93.5	125.3	102.1	99.2	94.3
17515	0.05049	90.3	95.4	87.2	76.3	99.1	92.2	91.8
-113649	0.04461	134.5	112.3	106.4	186.5	110.9	124.1	124.8

	state	CostOfLiving	GroceryCostsIndex	HealthCostsIndex	HousingCostsIndex	MiscCostsIndex	TransportationCostsIndex	UtilityCostsIndex
2	Alabama	88.8	96.4	86.9	70.4	96.2	92	103.6
3	Alaska	124.4	127.4	149.8	118.1	118.8	121.9	148.1
4	Arizona	107.2	101.8	93.5	125.3	102.1	99.2	94.3
5	Arkansas	90.3	95.4	87.2	76.3	99.1	92.2	91.8
6	California	134.5	112.3	106.4	186.5	110.9	124.1	124.8



DATA SETS IN USE

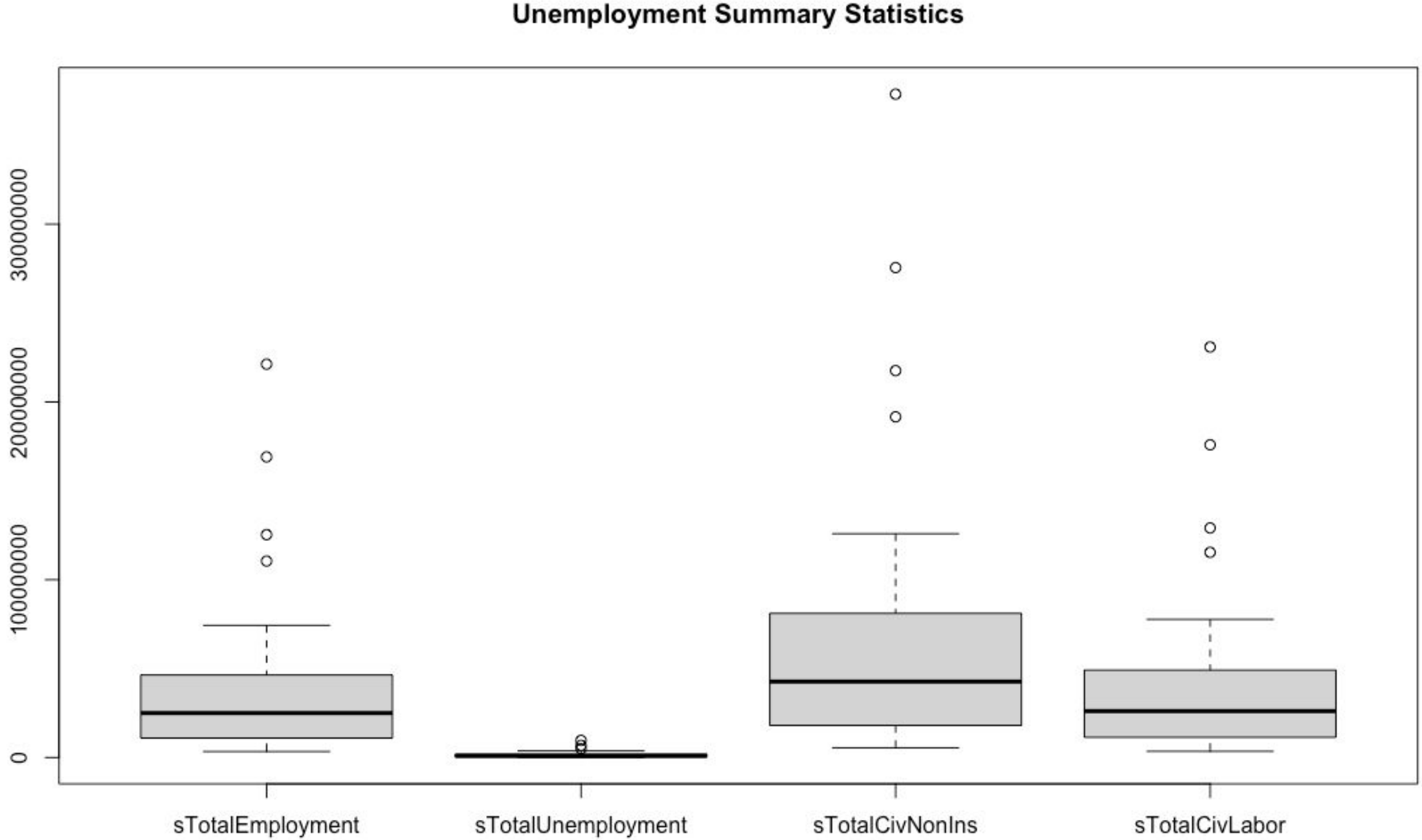
Graphs for our data

UNEMPLOYMENT RATE DATASET

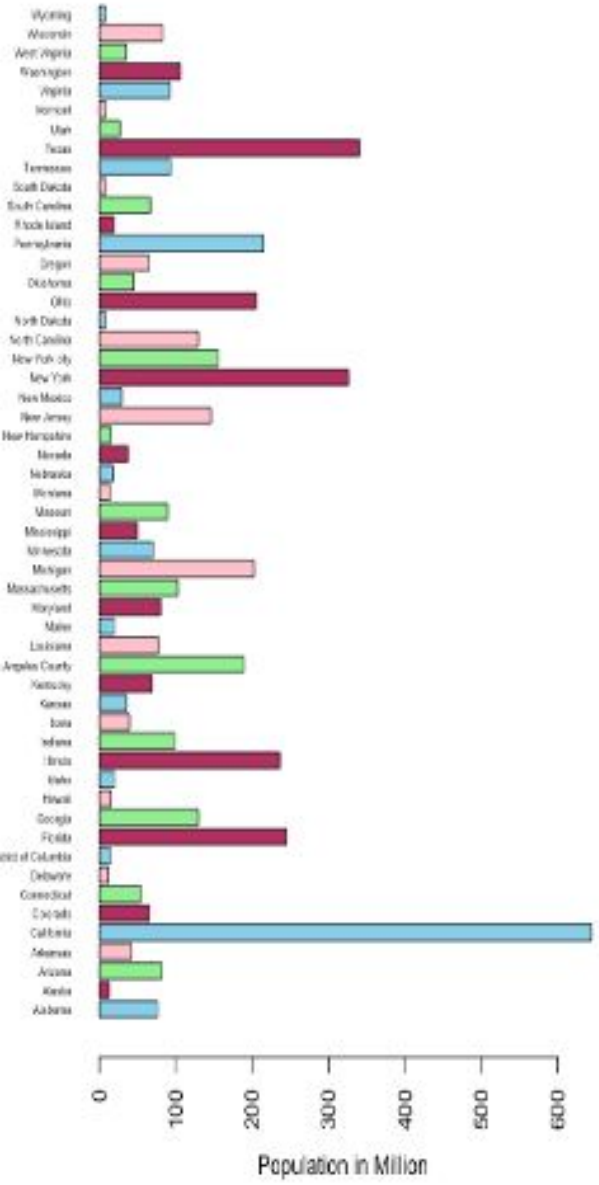
Explanation of the Unemployment rate data

Summary Statistics (unemployment data)

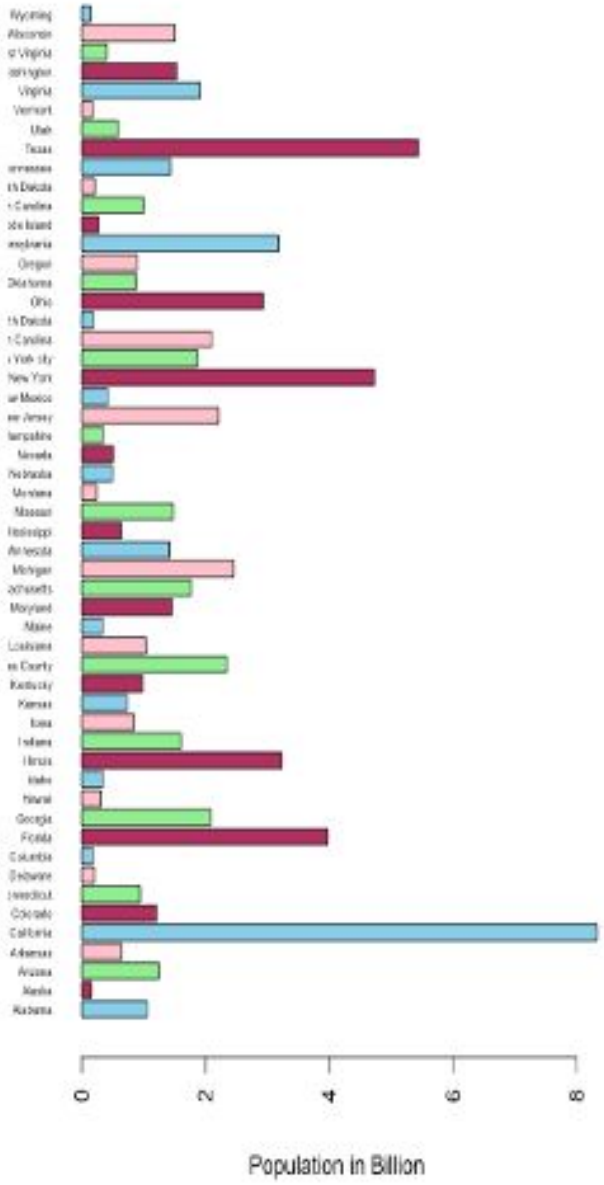
Metrics	State Area	Year	Month	Total Civilian Non Institutional Population in State Area	Total Civilian Labor Force in State Area	Percent of State Area's Population	Total Employment in State Area	Percent of Labor Force Employed in State Area	Total Unemployment in State Area	Percent of Labor Force Unemployed in State Area
Min.	Length:29892	1976	1	232000	160022	51	148718	41.6	4980	1.9
1st Qu.	Class	1987	3.75	1103986	731894	62.8	679592	58.6	37371	4.3
Median		1999	6.5	2934918	1878042	65.9	1750450	61.8	103942	5.5
Mean		1999	6.5	4235528	2734826	65.52	2565279	61.67	169547	5.921
3rd Qu.	.	2011	9.25	5390502	3417254	68.5	3230634	65.1	210245	7.1
Max.		2022	12	31236439	19600700	75.7	18754316	73.1	3018611	30.6


Unemployment Summary Statistics
300000000
200000000
100000000
0
sTotalEmployment
sTotalUnemployment
sTotalCivNonIns
sTotalCivLabor

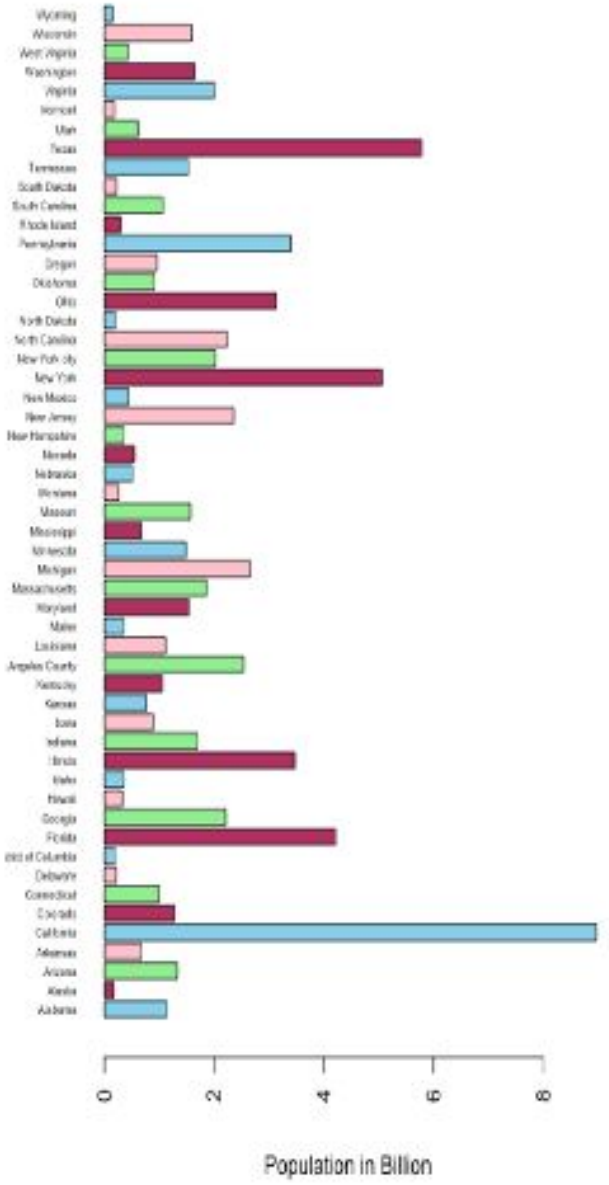
1976-2022 Total Unemployed Population



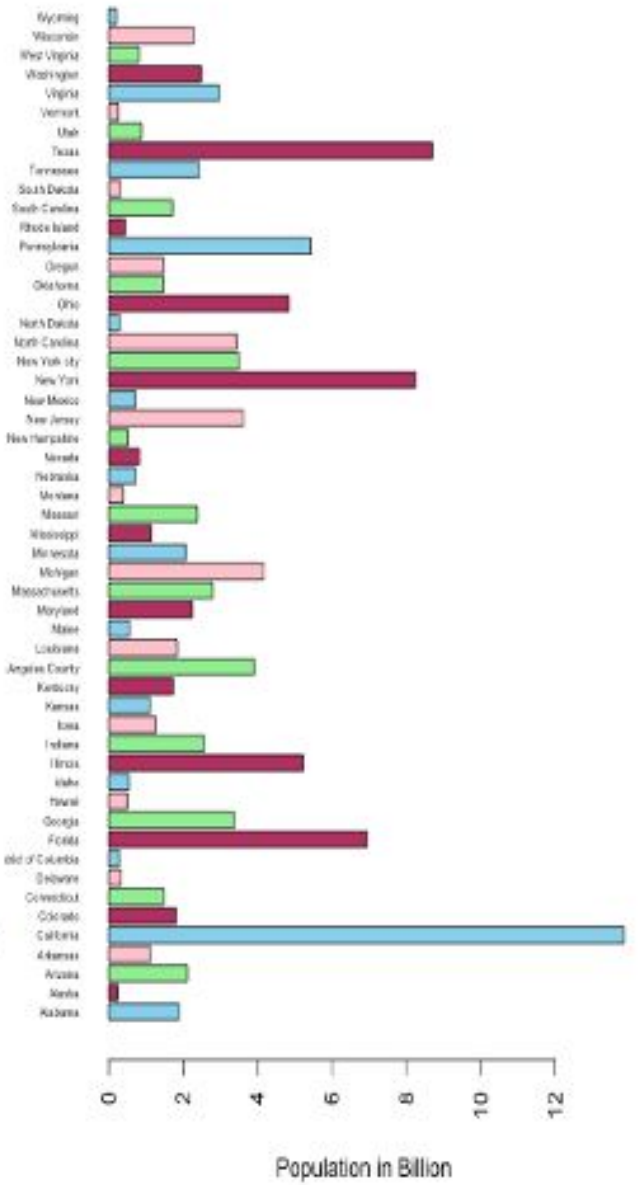
1976-2022 Total Employed Population



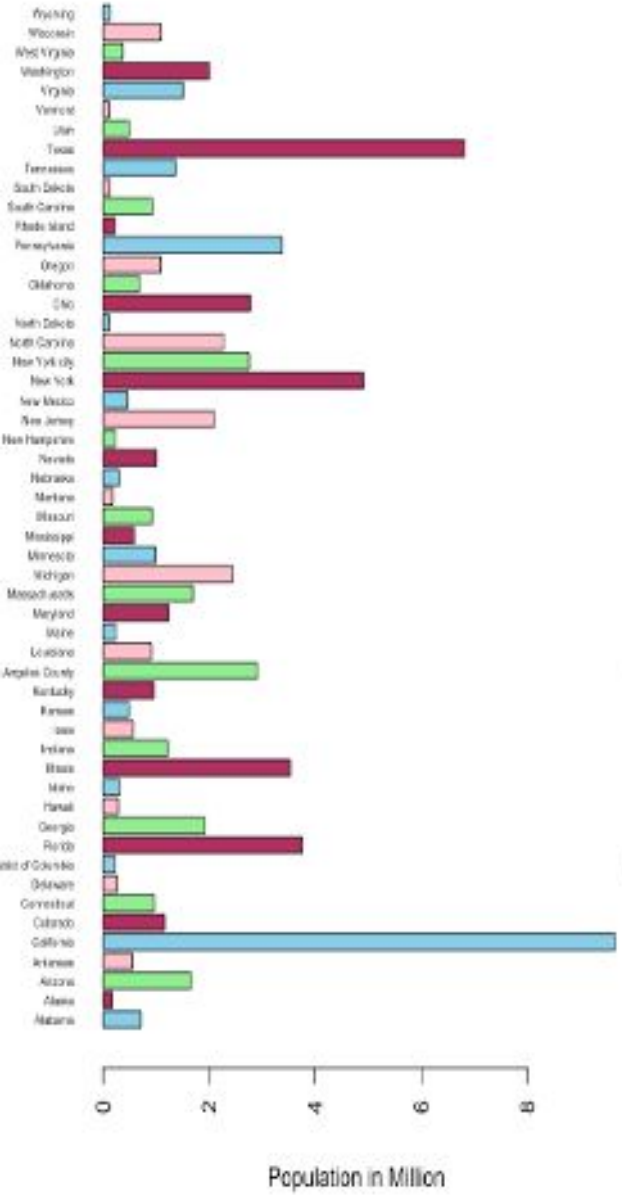
1976-2022 Total Civilian Labor Force



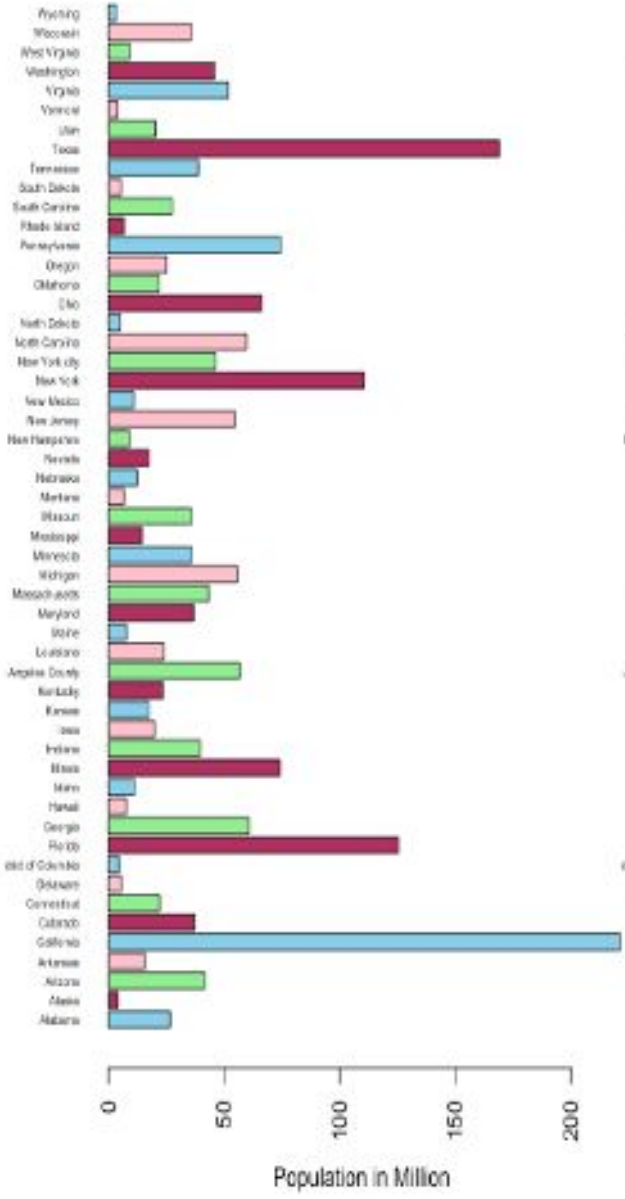
1976-2022 Total Civilian Non-Institutional Population



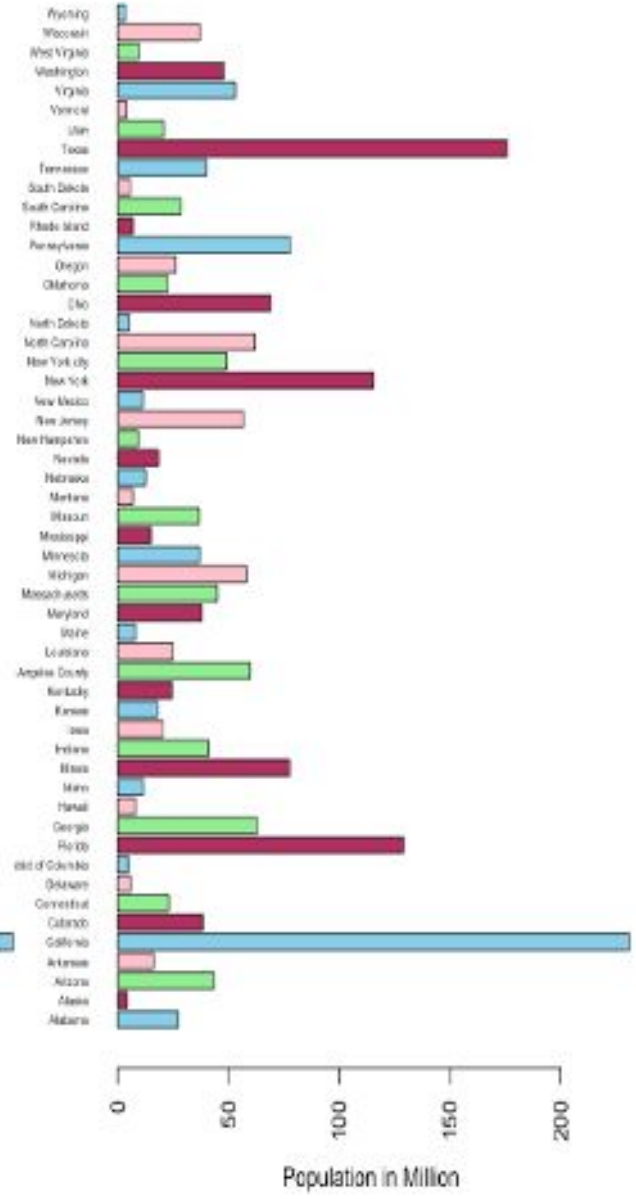
2022 Unemployed Population



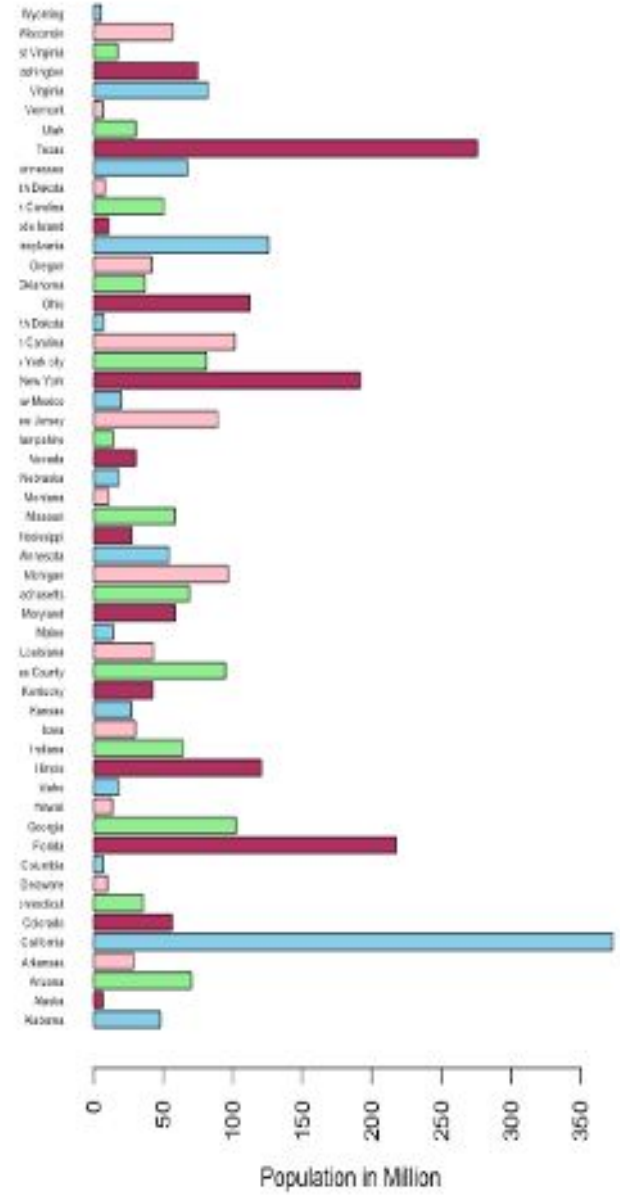
2022 Employed Population



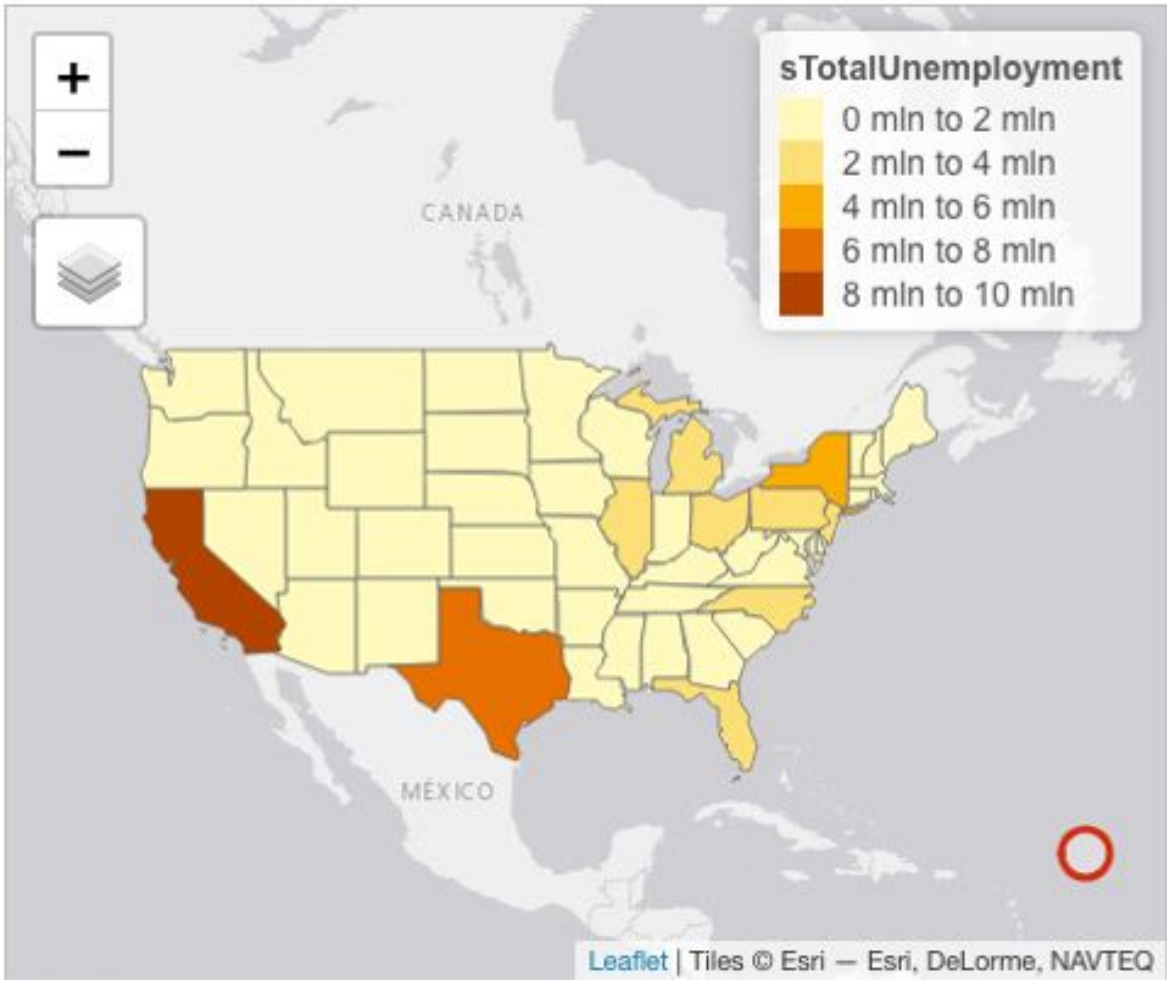
2022 Civilian Labor Force

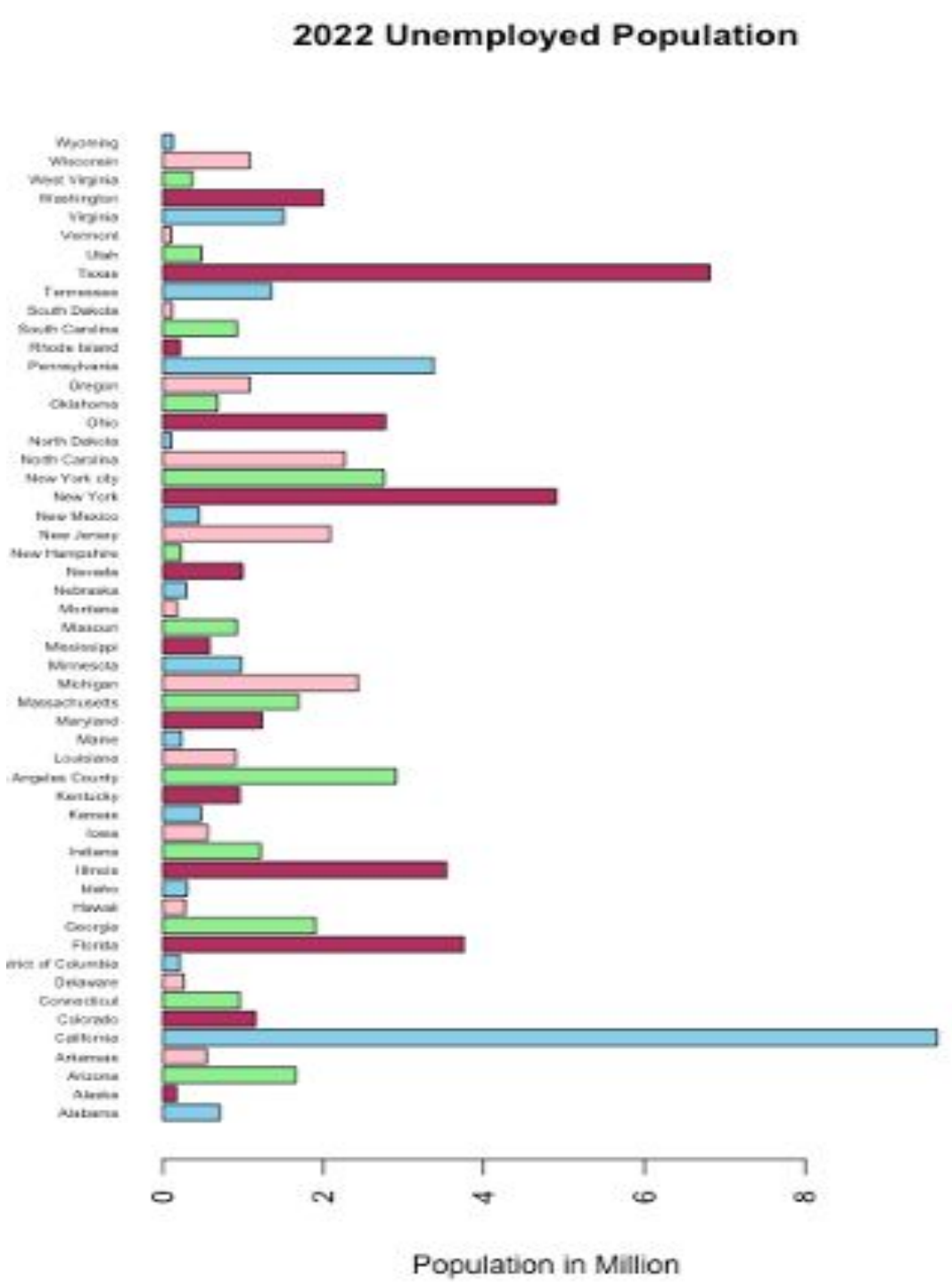


2022 Civilian Non-Institutional Population

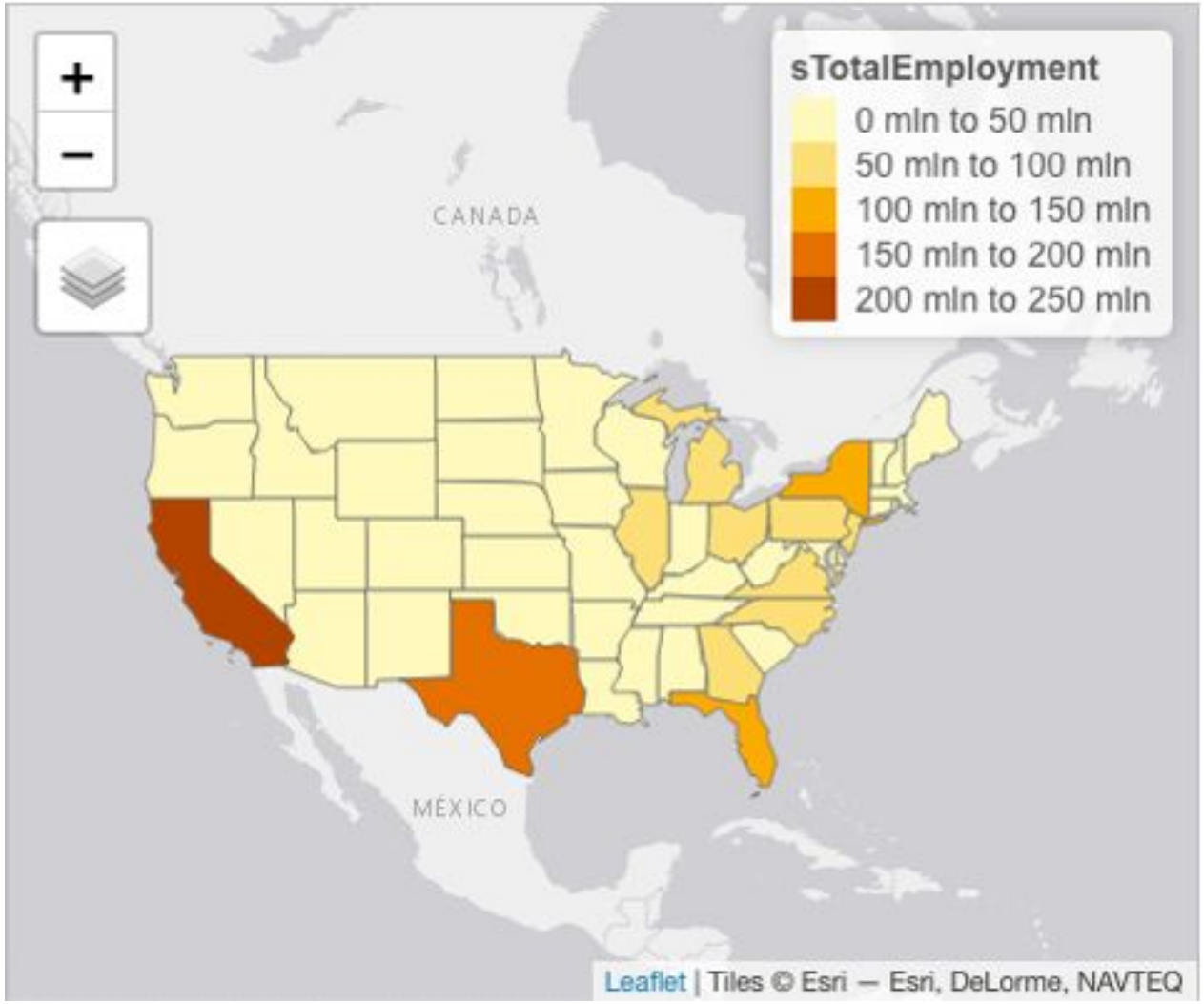


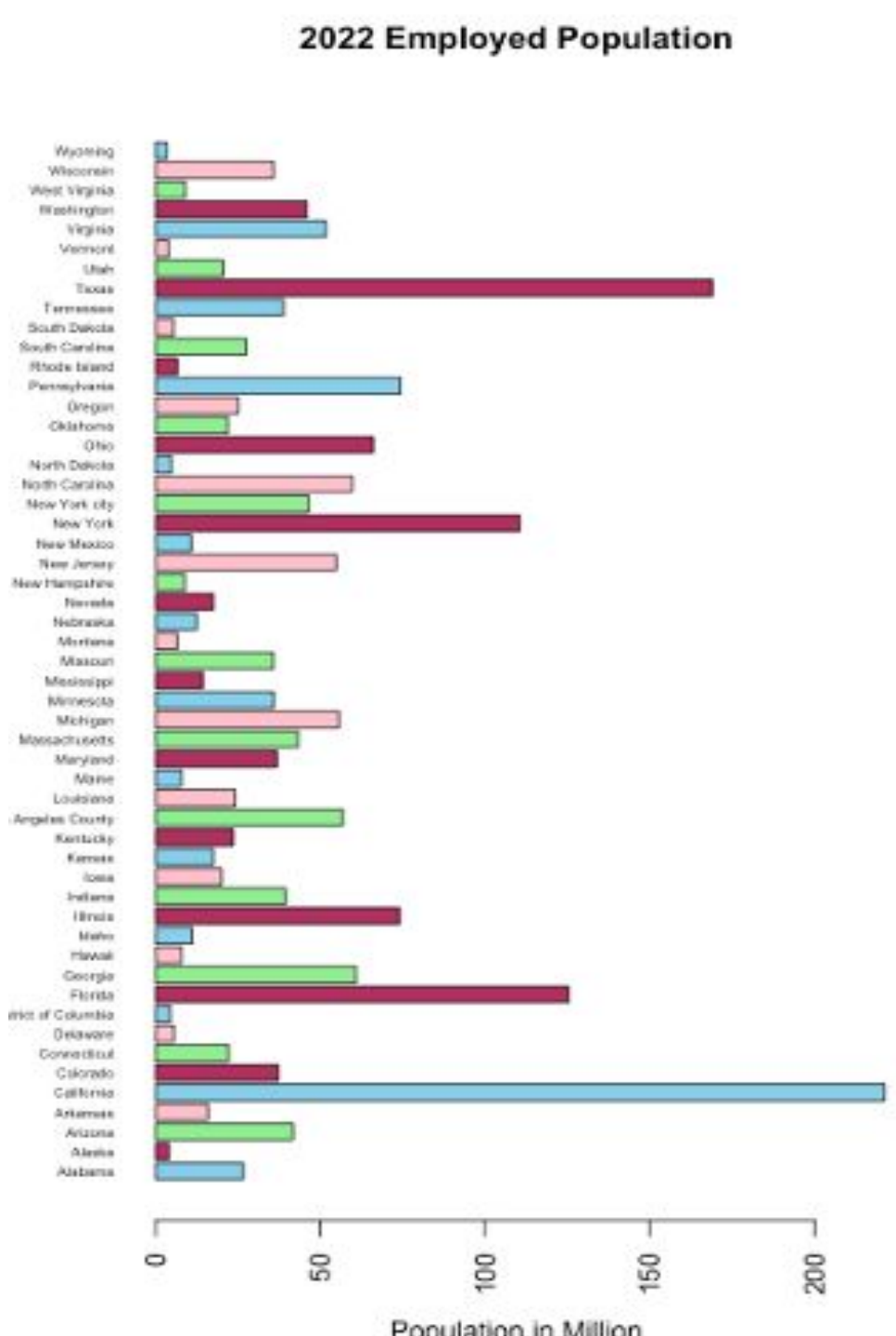
UNEMPLOYED POPULATION BY STATE



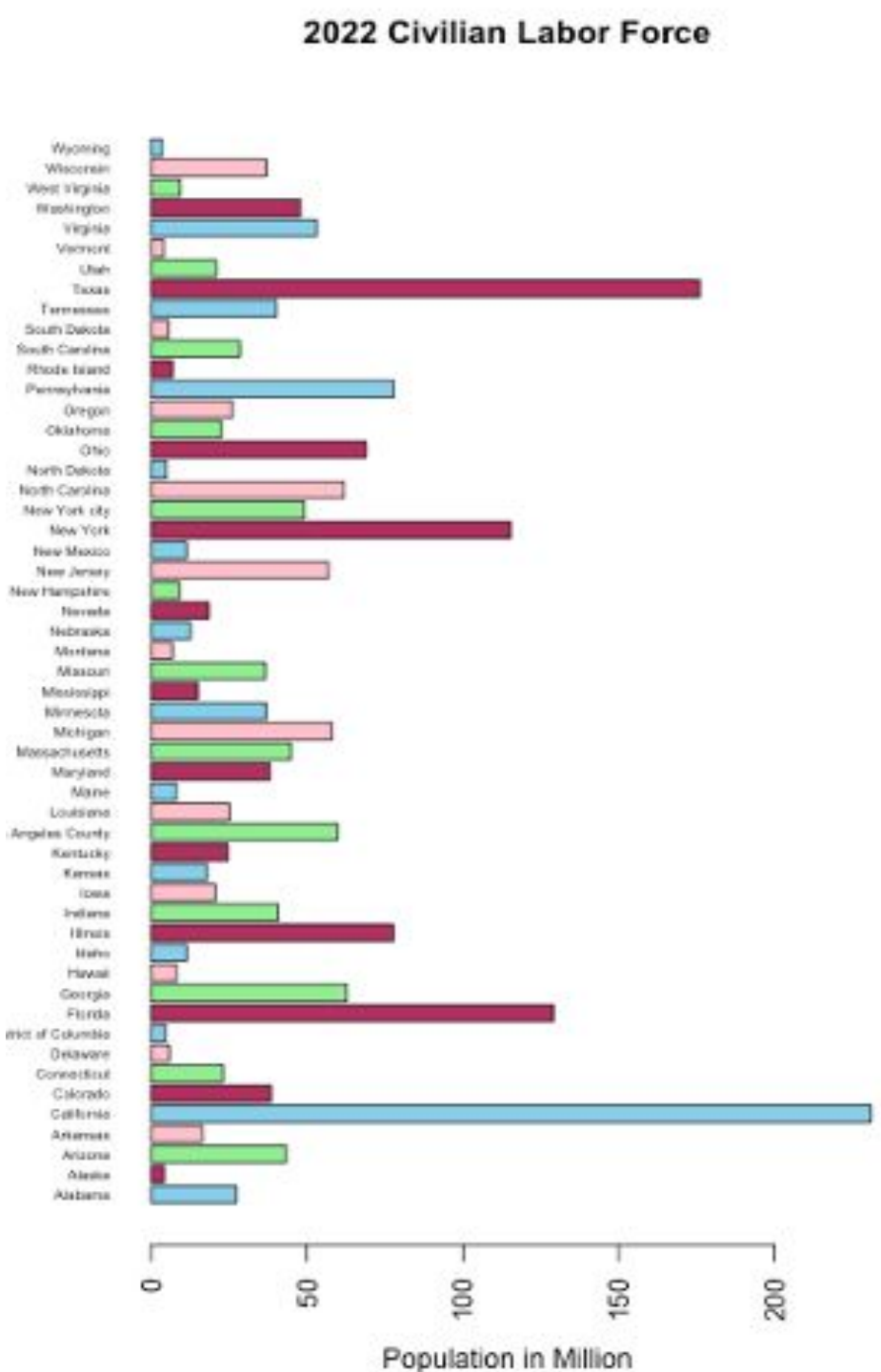


EMPLOYED POPULATION BY STATE

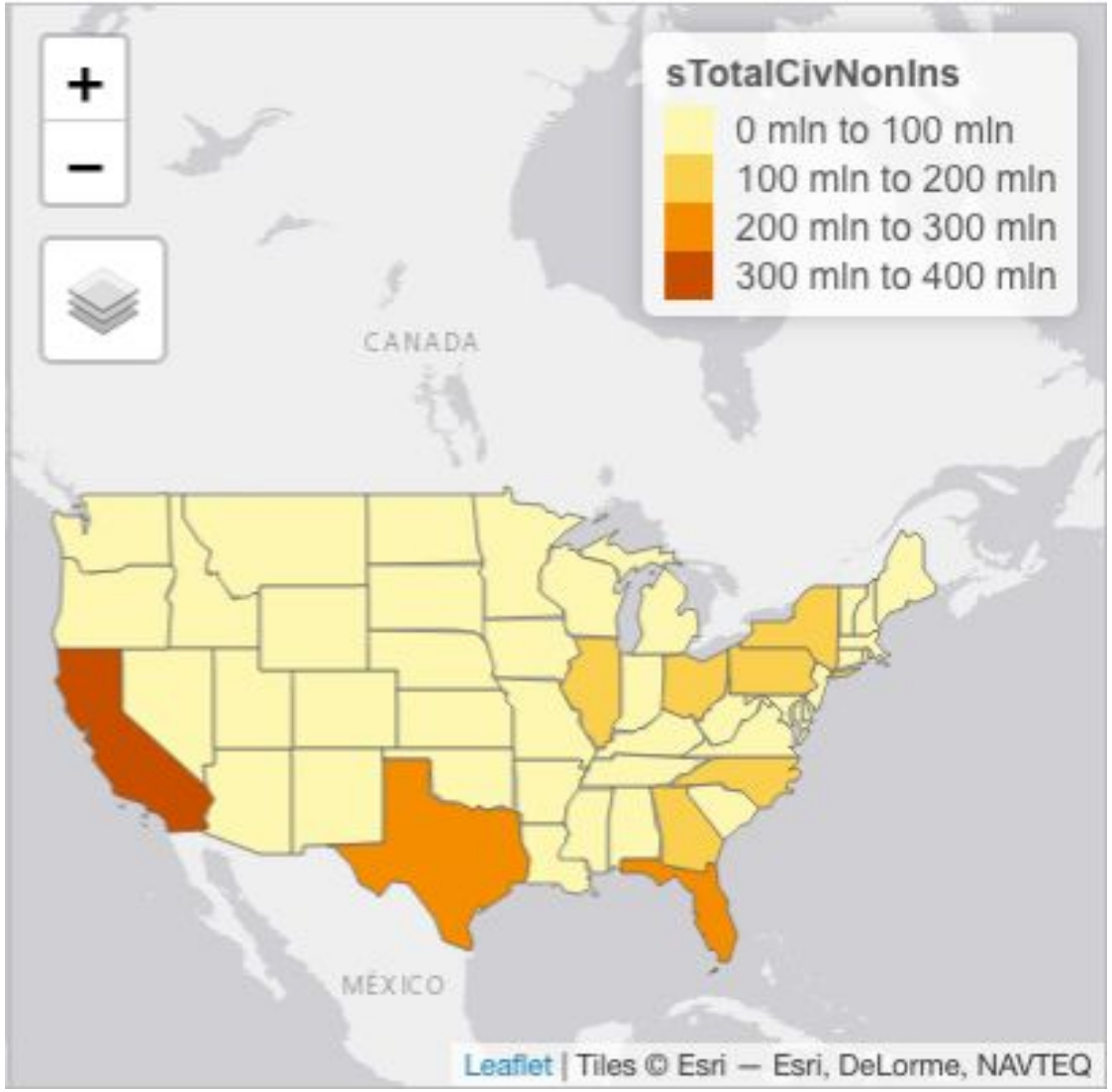


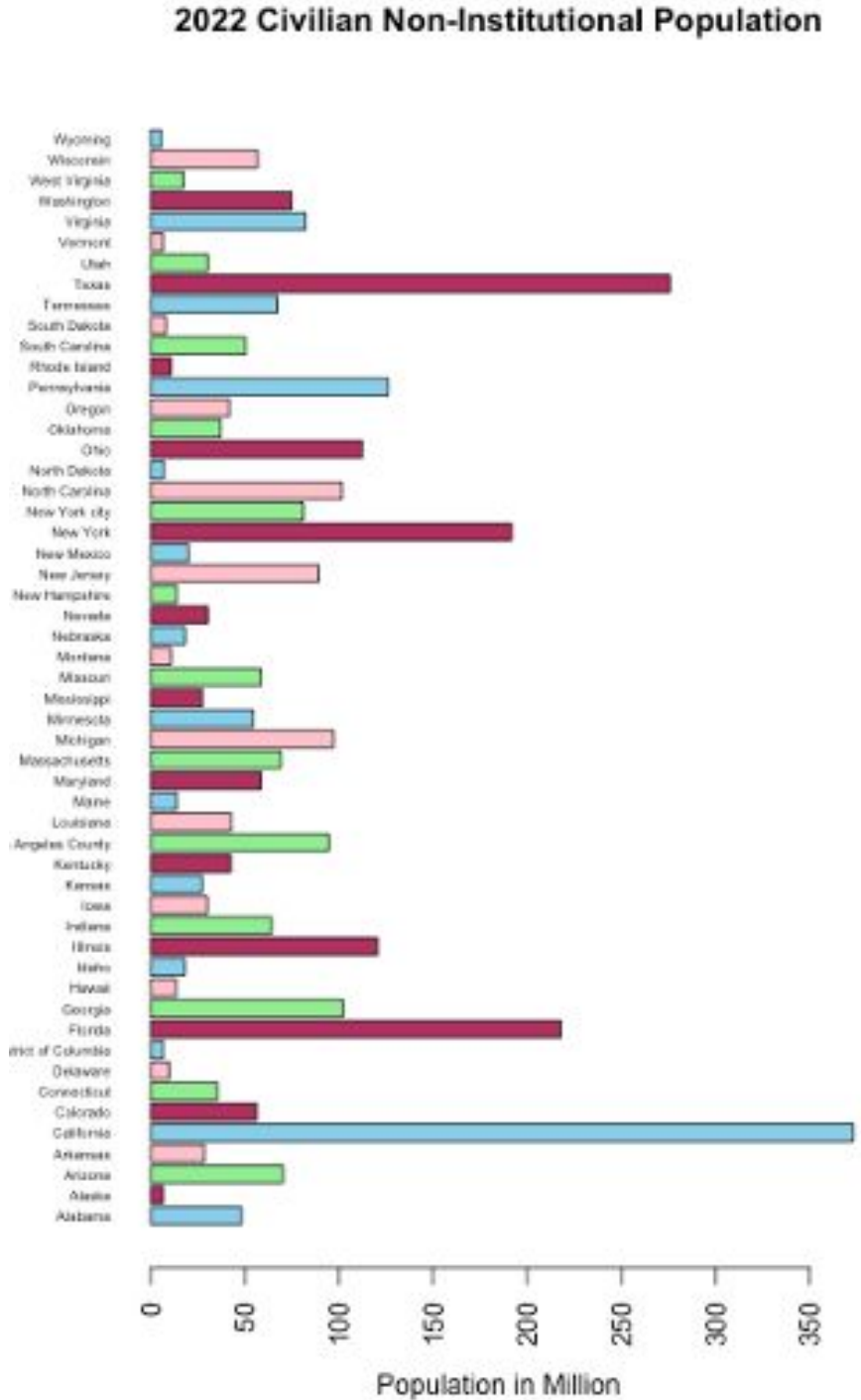


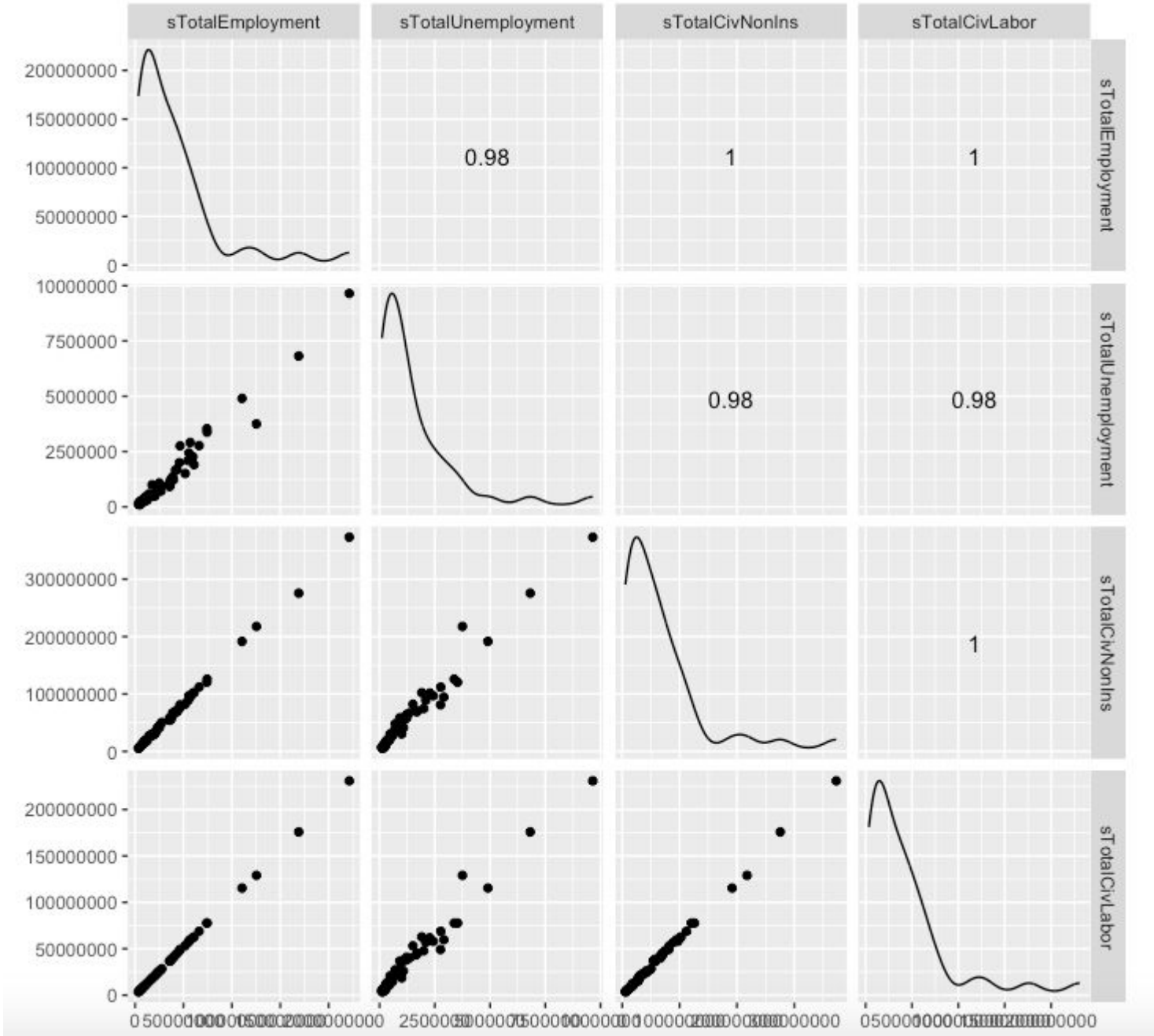
TOTAL CIVILIAN LABOR FORCE BY STATE



CIVILIAN NONINSTITUTIONAL POPULATION BY STATE



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sTotalCivNonIns
sTotalCivLabor
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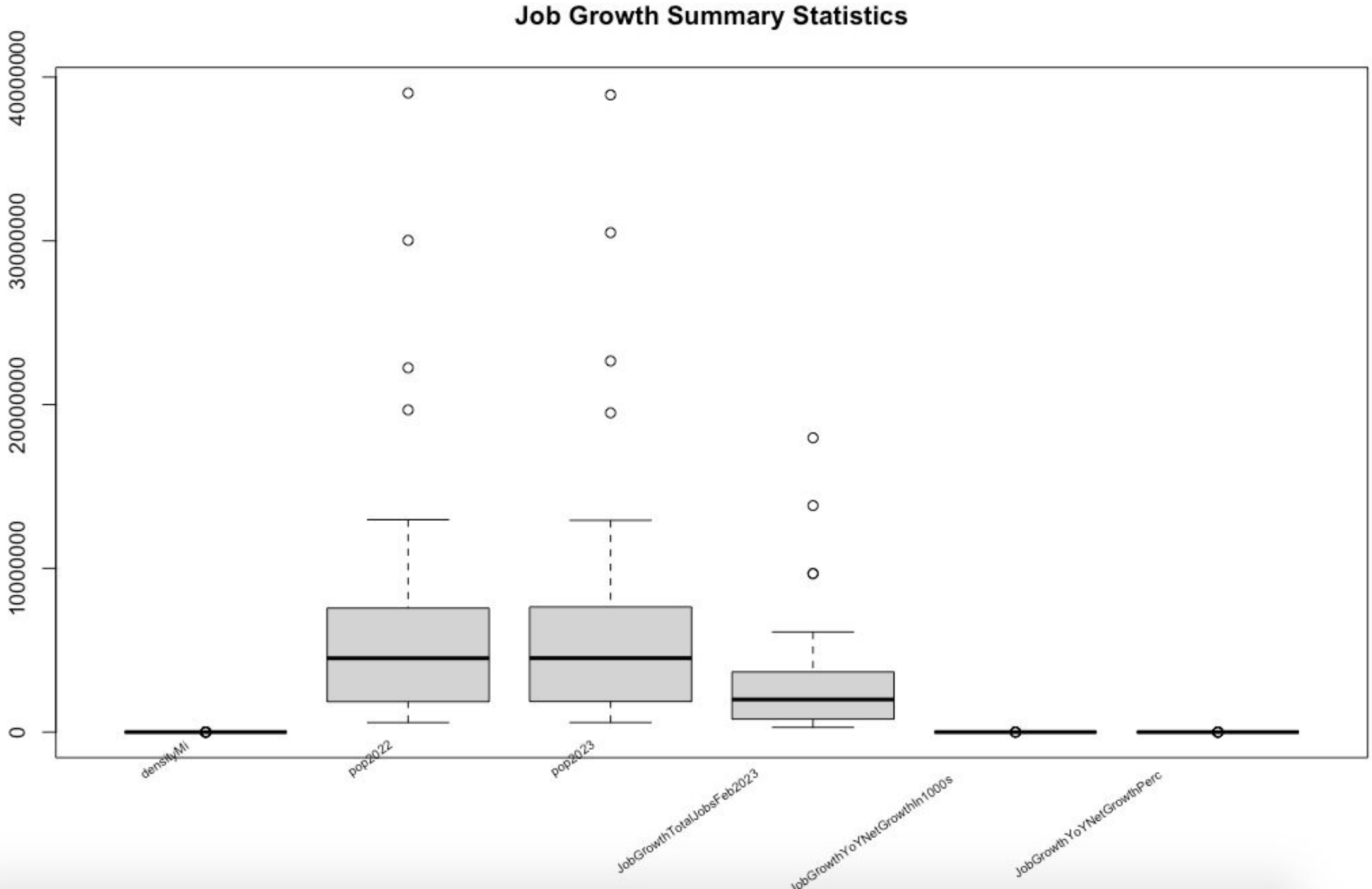
1
0.98
0.98
1
200000000
150000000
100000000
50000000
0
10000000
7500000
5000000
2500000
300000000

JOB GROWTH DATASET

Summary Statistics (job growth)

Metric	Density (Mi)	Population 2022	Population 2023	Total Jobs Feb 2023	YoY Net Growth in 1000s	YoY Net Growth Percent
Min	1.284	581381	583279	288700	2.5	0.400
1st Qu.	50.901	1857094	1868539	794500	18.3	2.000
Median	109.032	4512310	4518031	1989600	45.4	2.500
Mean	420.331	6535050	6559678	3044163	83.04	2.488
3rd Qu.	223.943	7572492	7642172	3674650	91.7	2.850
Max	11062.541	39029342	38915693	17969600	611.4	5.100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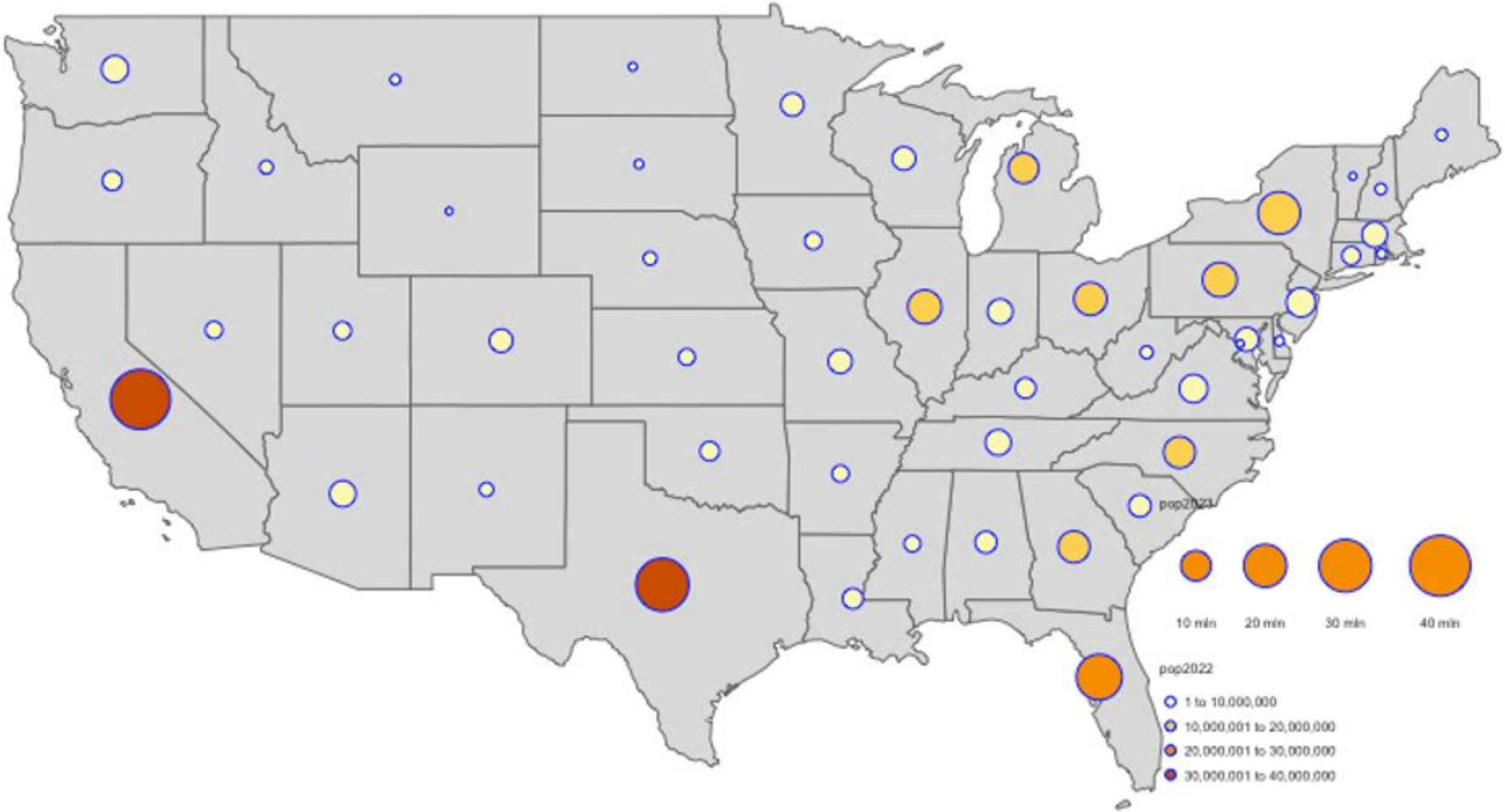
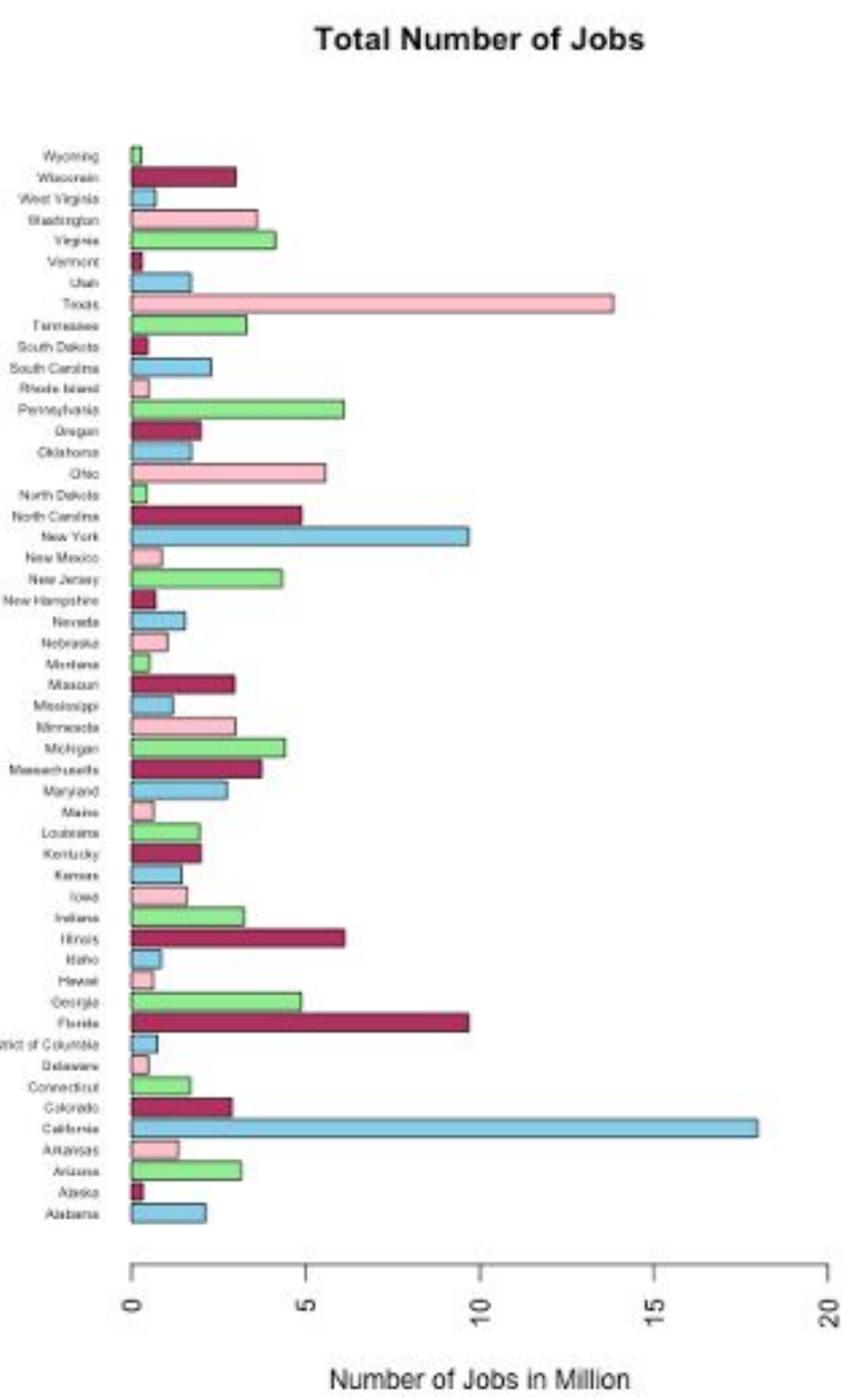
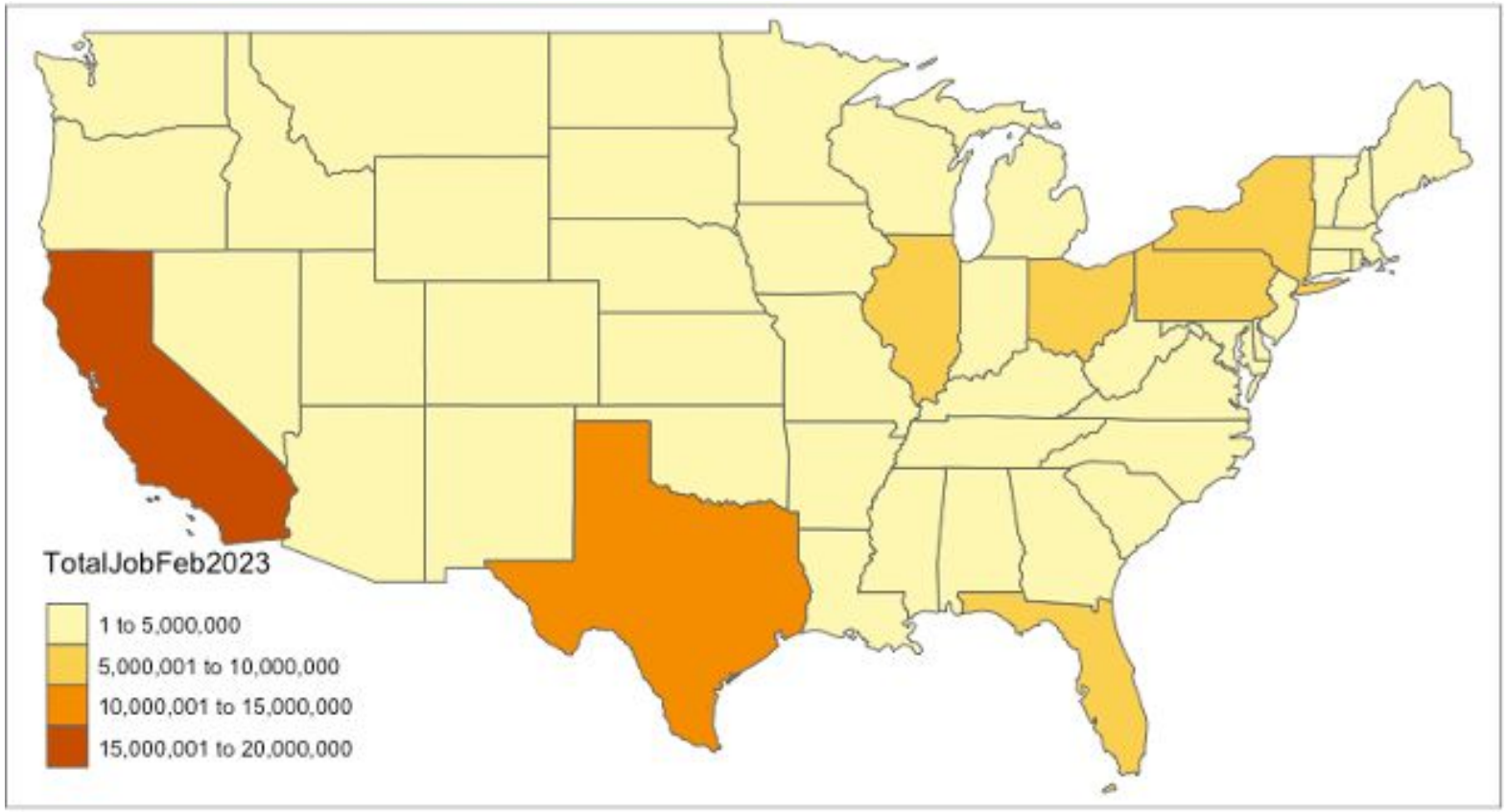
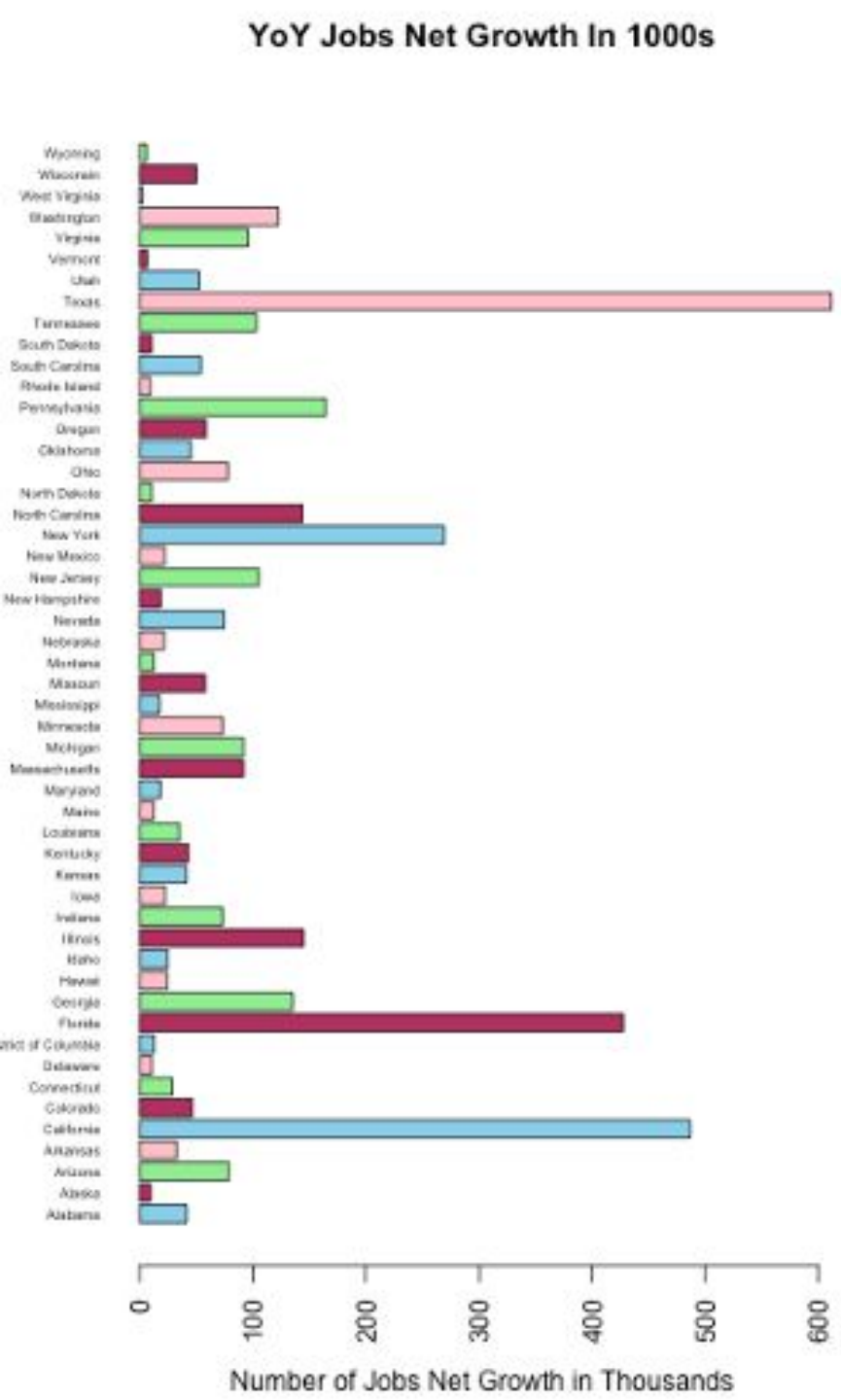
30000000
20000000
10000000
0
densityMi
pop2022
pop2023
JobGrowthTotalJobsFeb2023
JobGrowthYoYNetGrowthIn1000s
JobGrowthYoYNetGrowthPerc


pop2022
10 min
20 min
30 min
40 min
pop2022
1 to 10,000,000
10,000,001 to 20,000,000
20,000,001 to 30,000,000
30,000,001 to 40,000,000

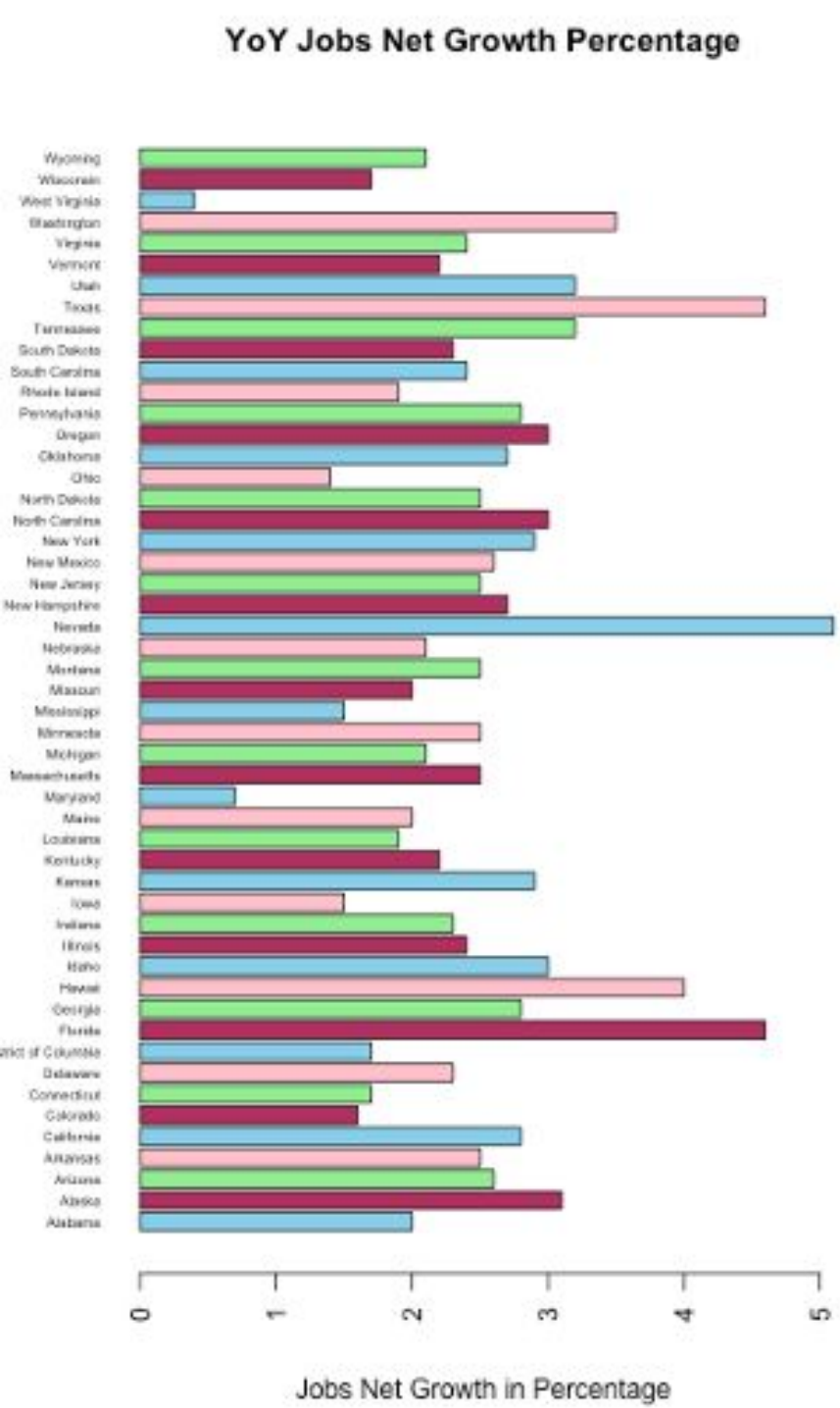


TOTAL NUMBER OF JOBS BY STATES

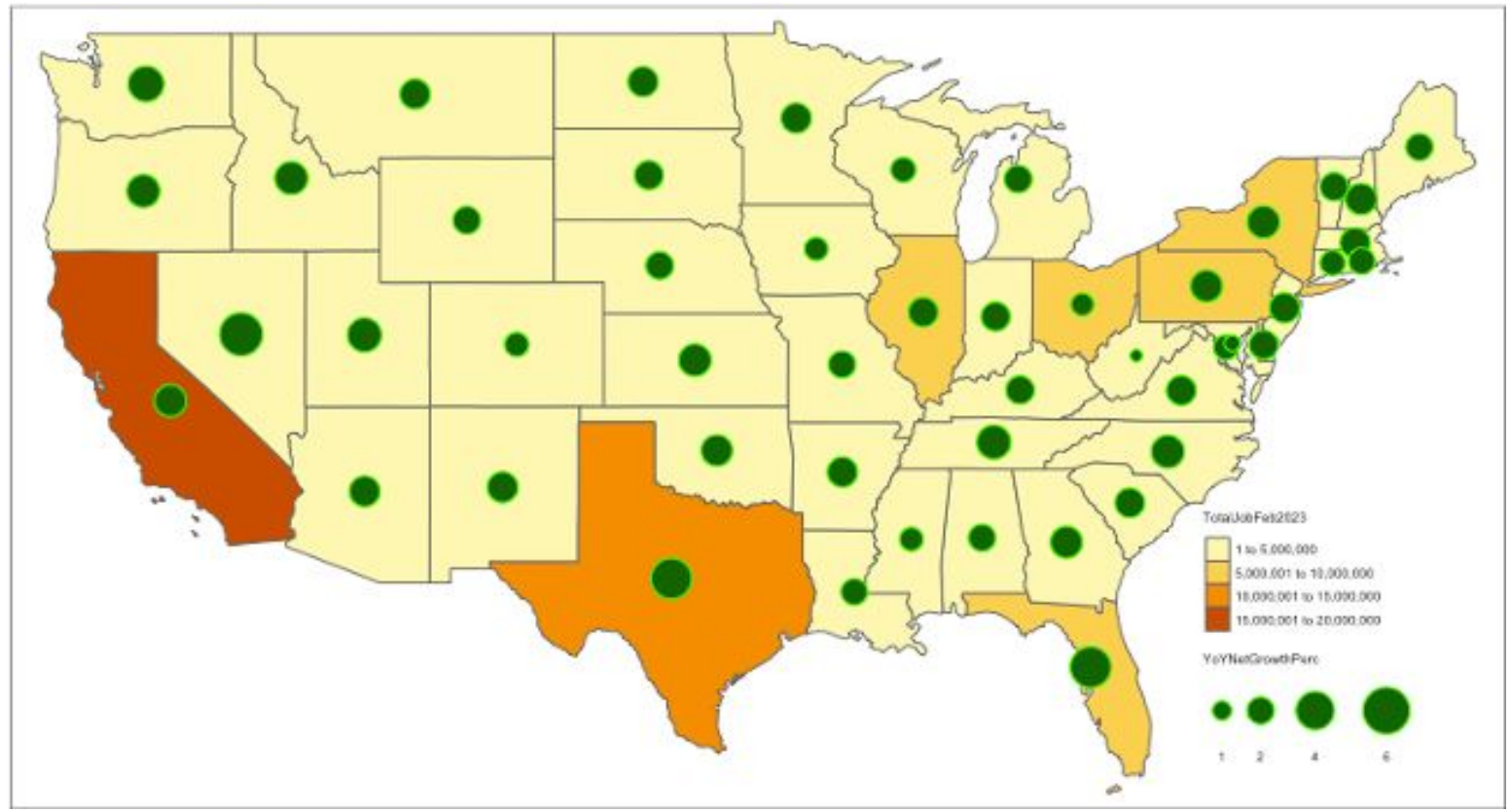


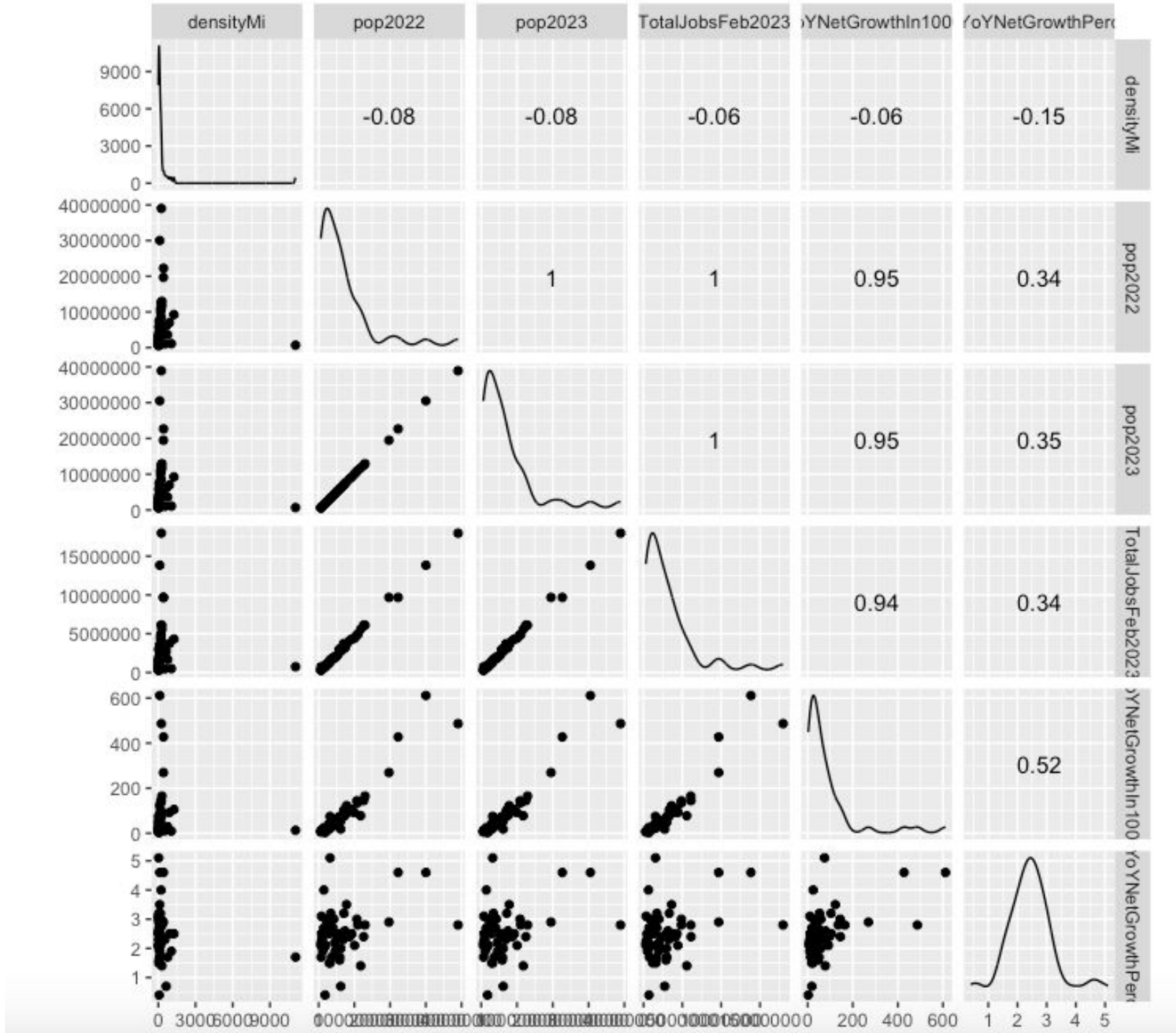


YoY JOBS NET GROWTH IN 1000s BY STATES



YoY JOBS NET GROWTH PERCENTAGE BY STATES

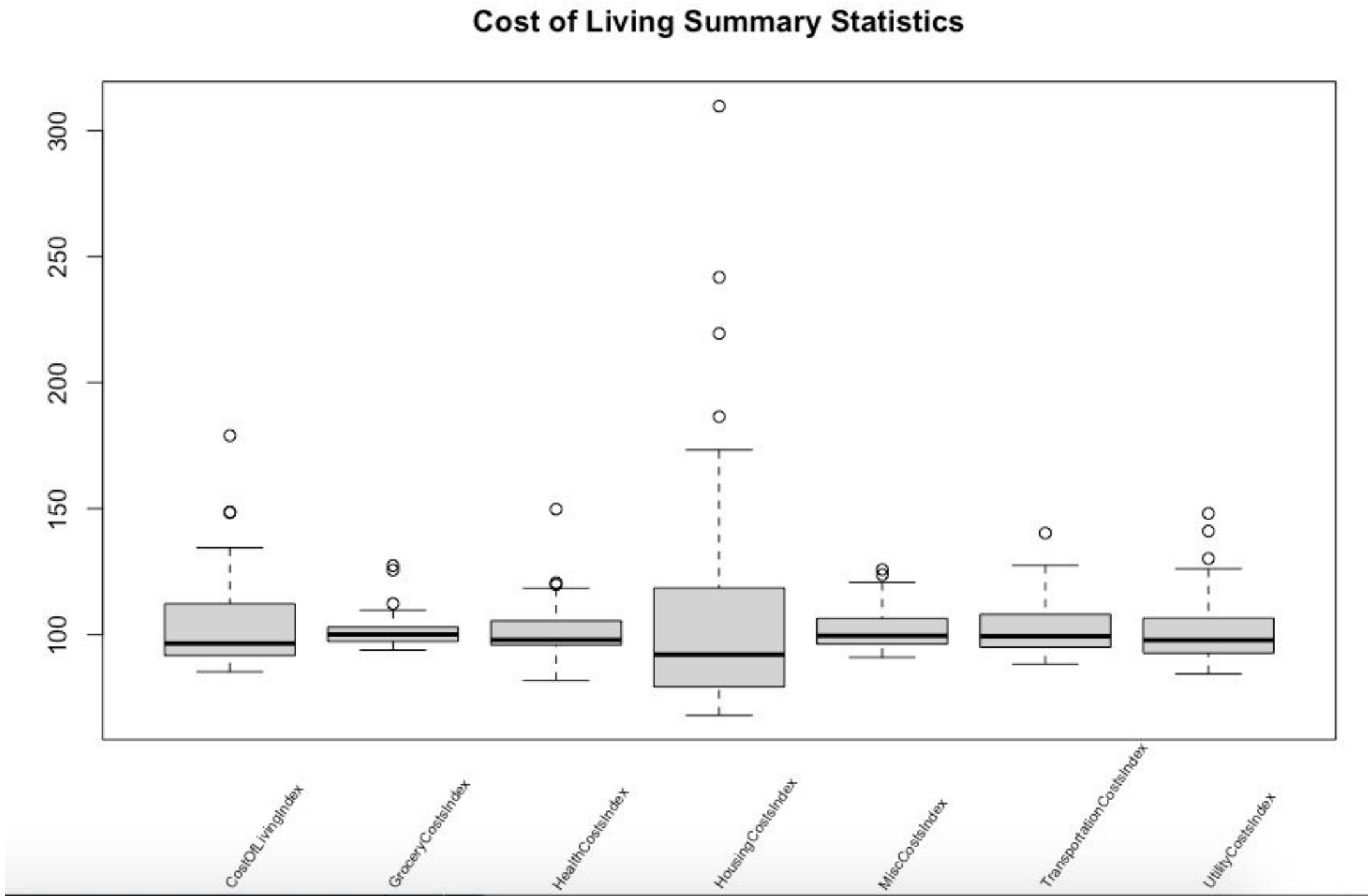


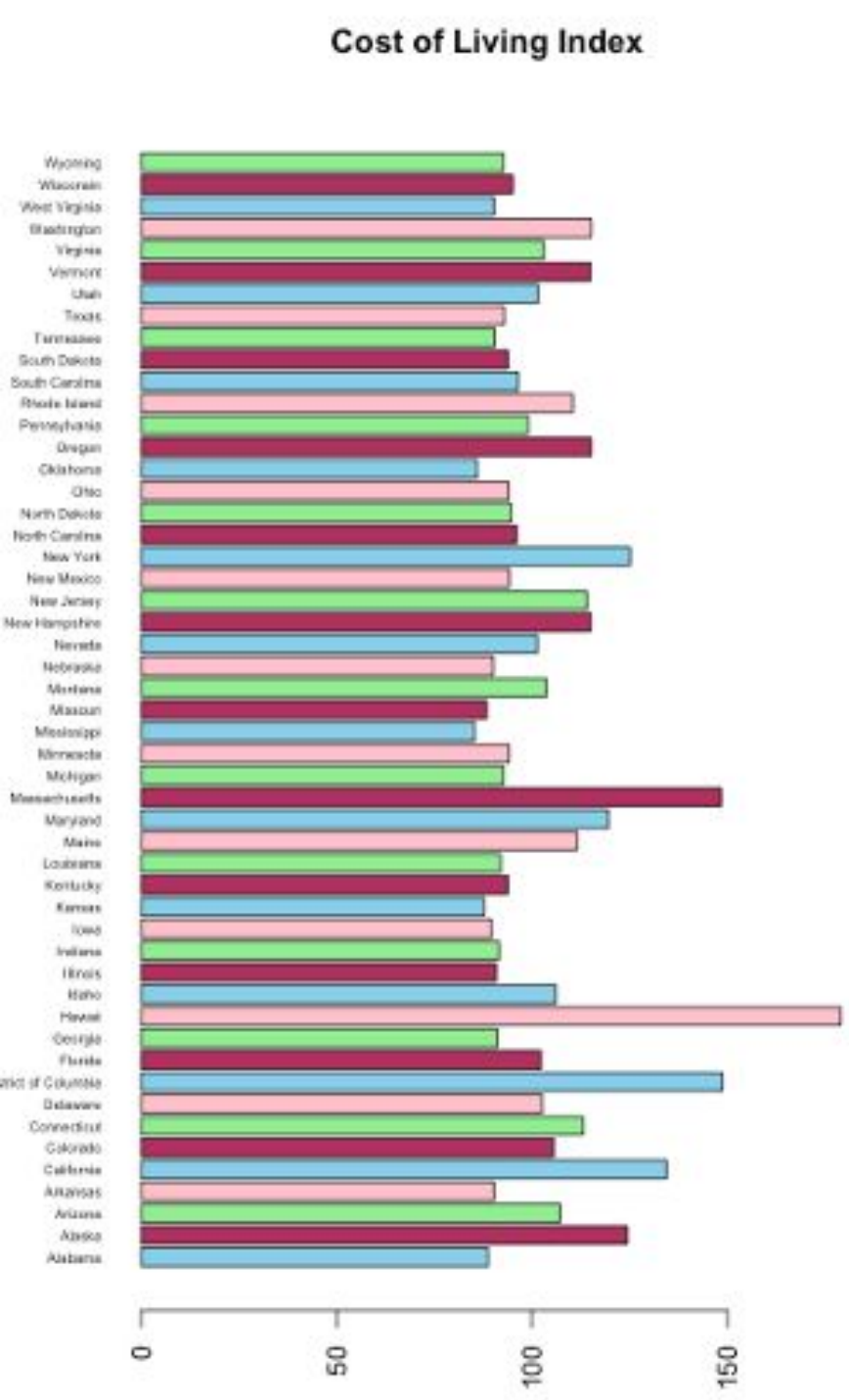

densityMi
pop2022
pop2023
TotalJobsFeb2023
YNetGrowthIn100
oYNetGrowthPer
-0.08
-0.08
-0.06
-0.06
-0.15
1
1
0.95
0.34
1
0.95
0.35
0.94
0.34
0.52

COST OF LIVING DATASET

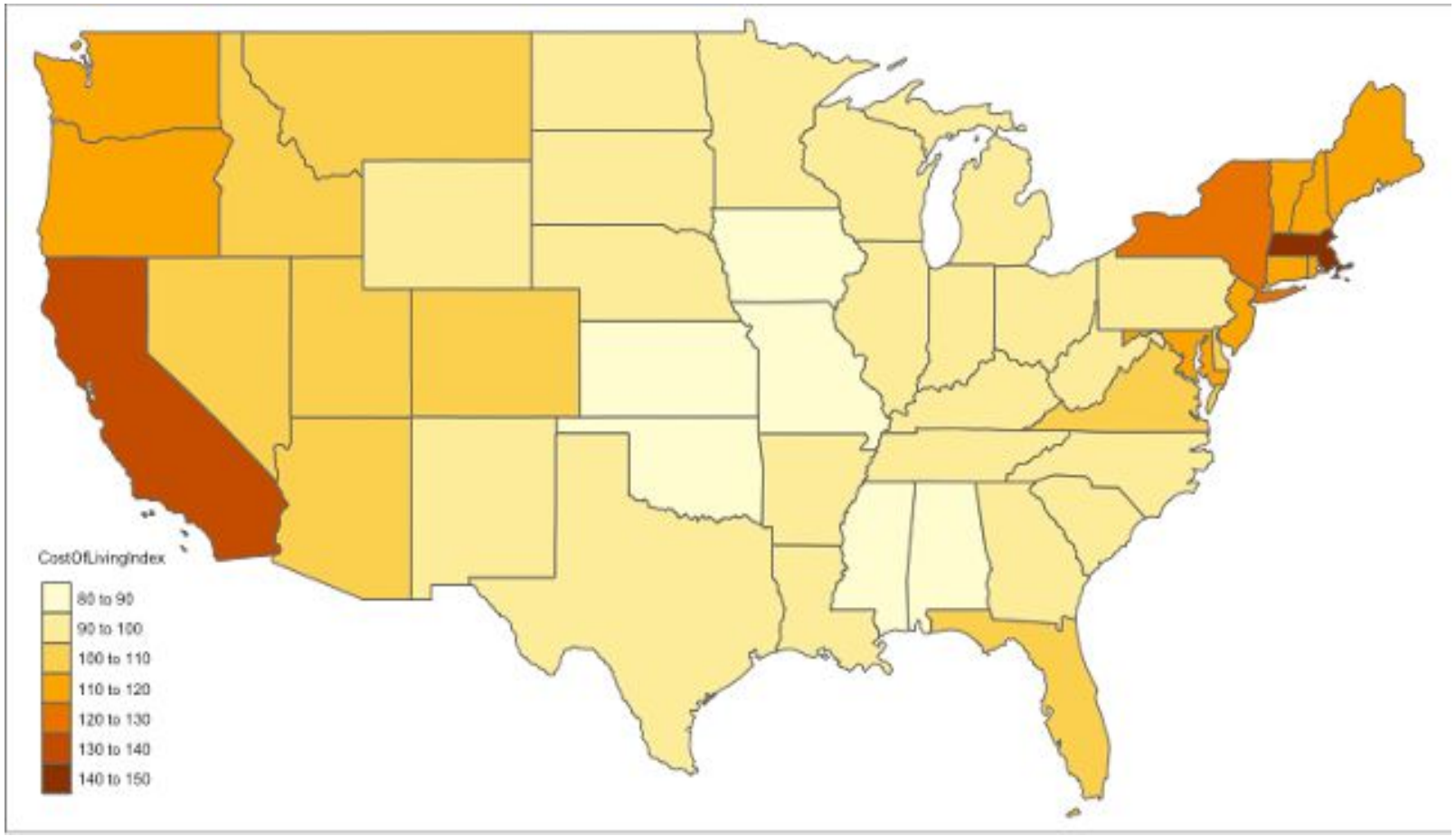
Summary Statistics (cost of living)

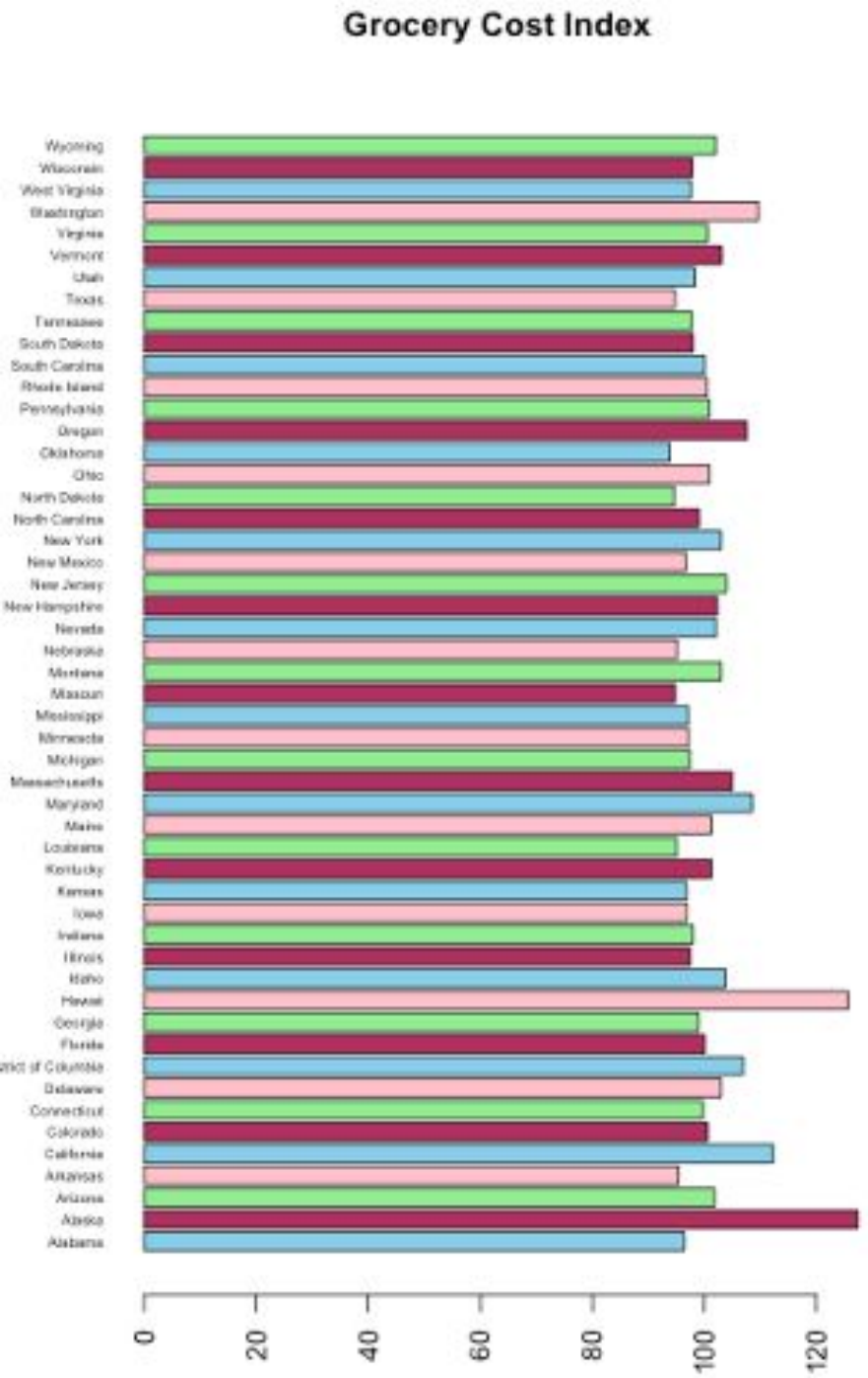
Metric	Cost Of Living Index	Grocery Costs Index	Health Costs Index	Housing Costs Index	Misc Costs Index	Transportation Costs Index	Utility Costs Index
Min	85.30	93.8	81.8	68.0	91.00	88.30	84.4
1st Qu.	91.75	97.3	95.9	79.3	96.25	95.05	92.7
Median	96.50	100.1	97.9	92.1	99.60	99.40	97.8
Mean	104.00	101.2	101.1	109.0	102.48	102.61	101.7
3rd Qu.	112.30	103.0	105.5	118.5	106.45	108.05	106.5
Max	179.00	127.4	149.8	309.7	125.80	140.30	148.1


Cost of Living Summary Statistics
300
250
200
150
100
CostOfLivingIndex
GroceryCostsIndex
HealthCostsIndex
HousingCostsIndex
MiscCostsIndex
TransportationCostsIndex
UtilityCostsIndex

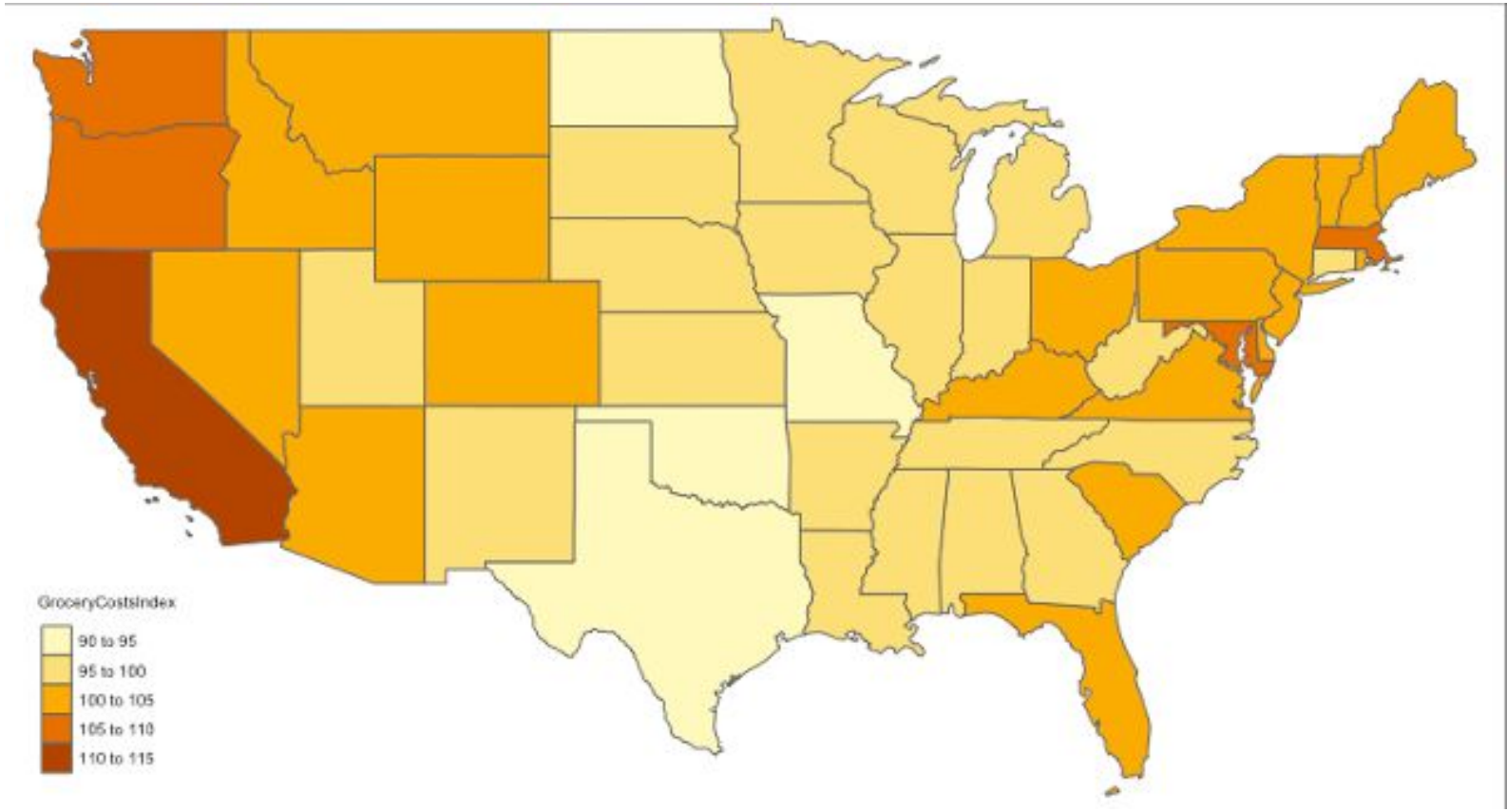


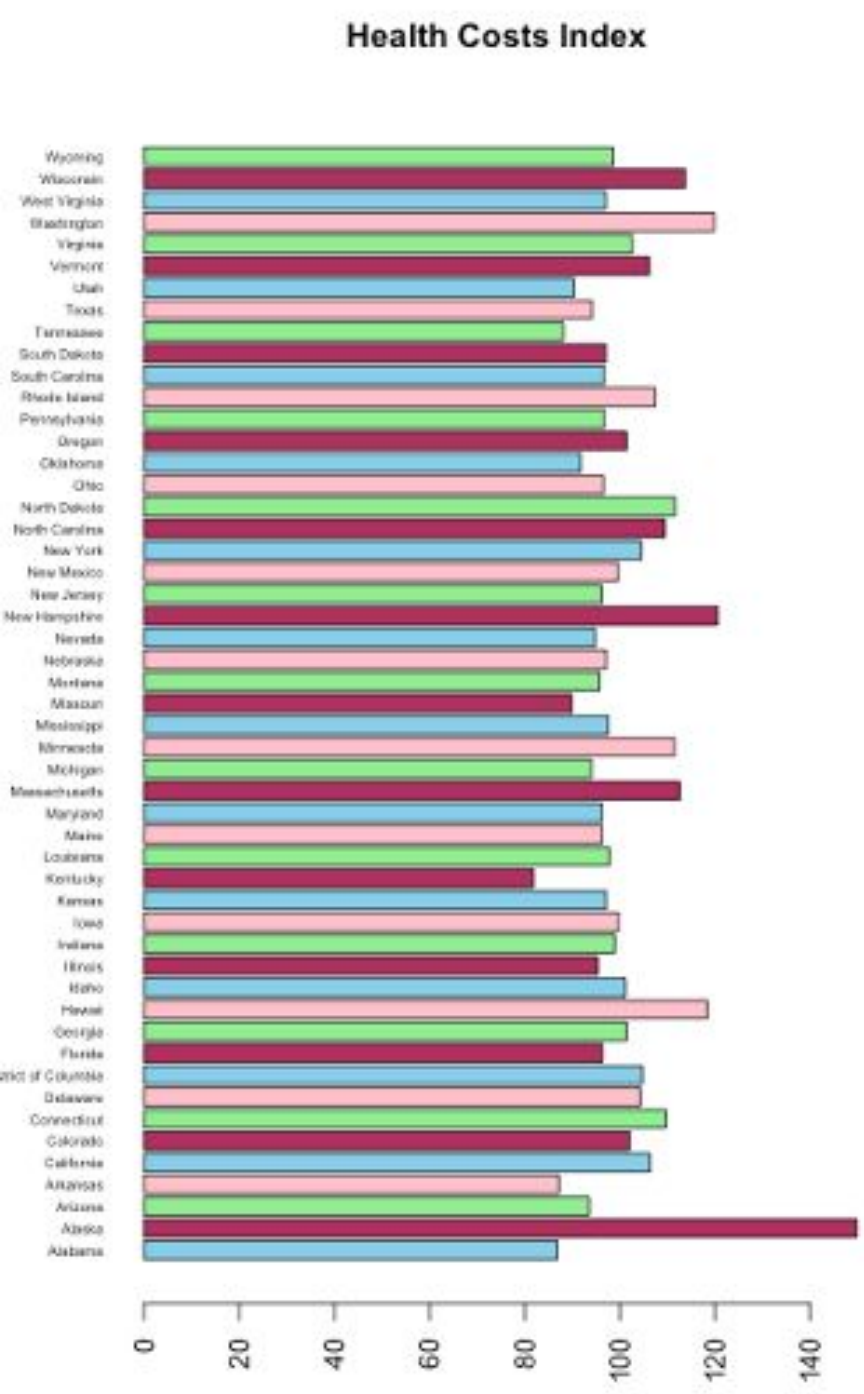
COST OF LIVING INDEX BY STATES



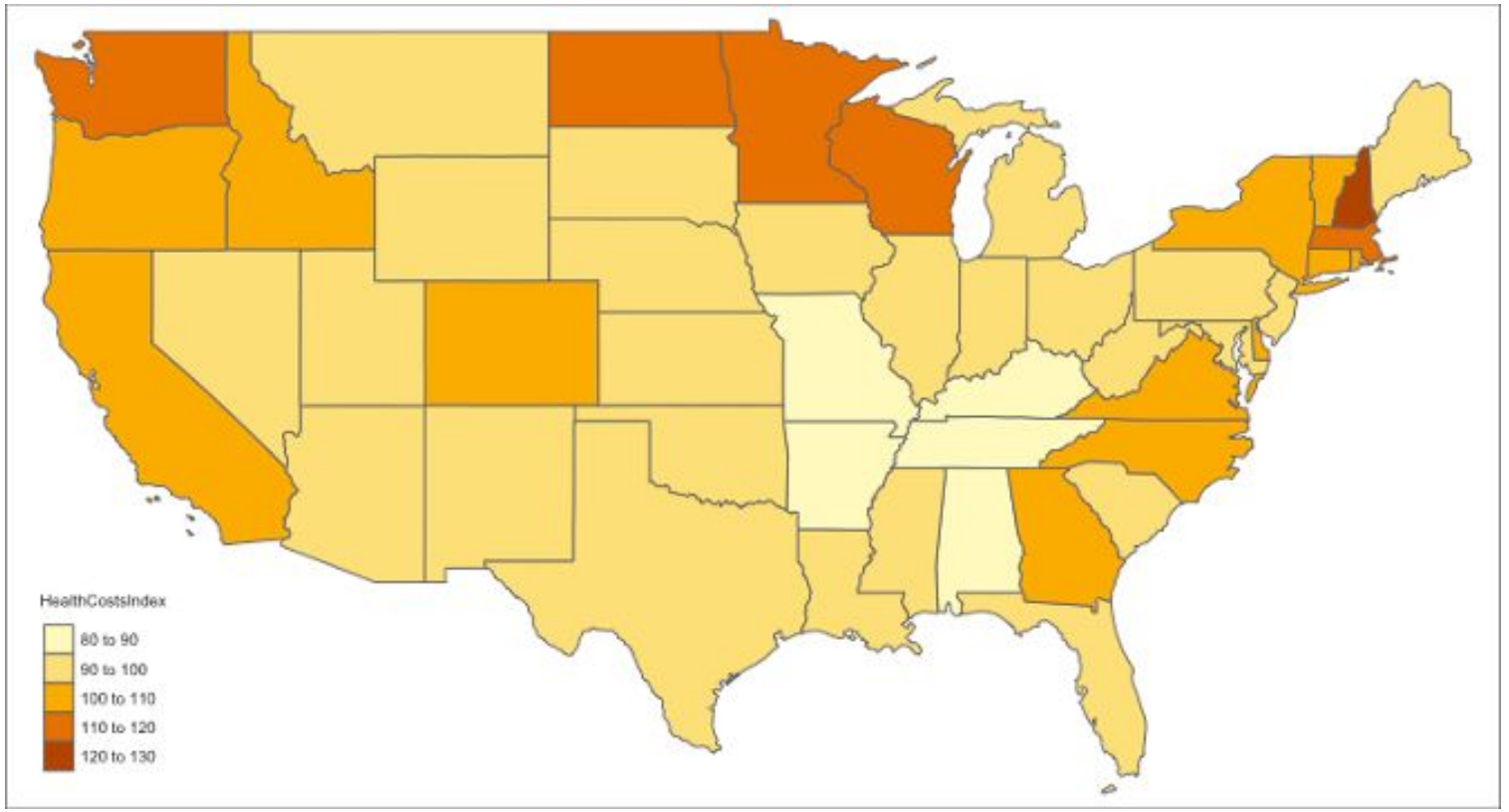


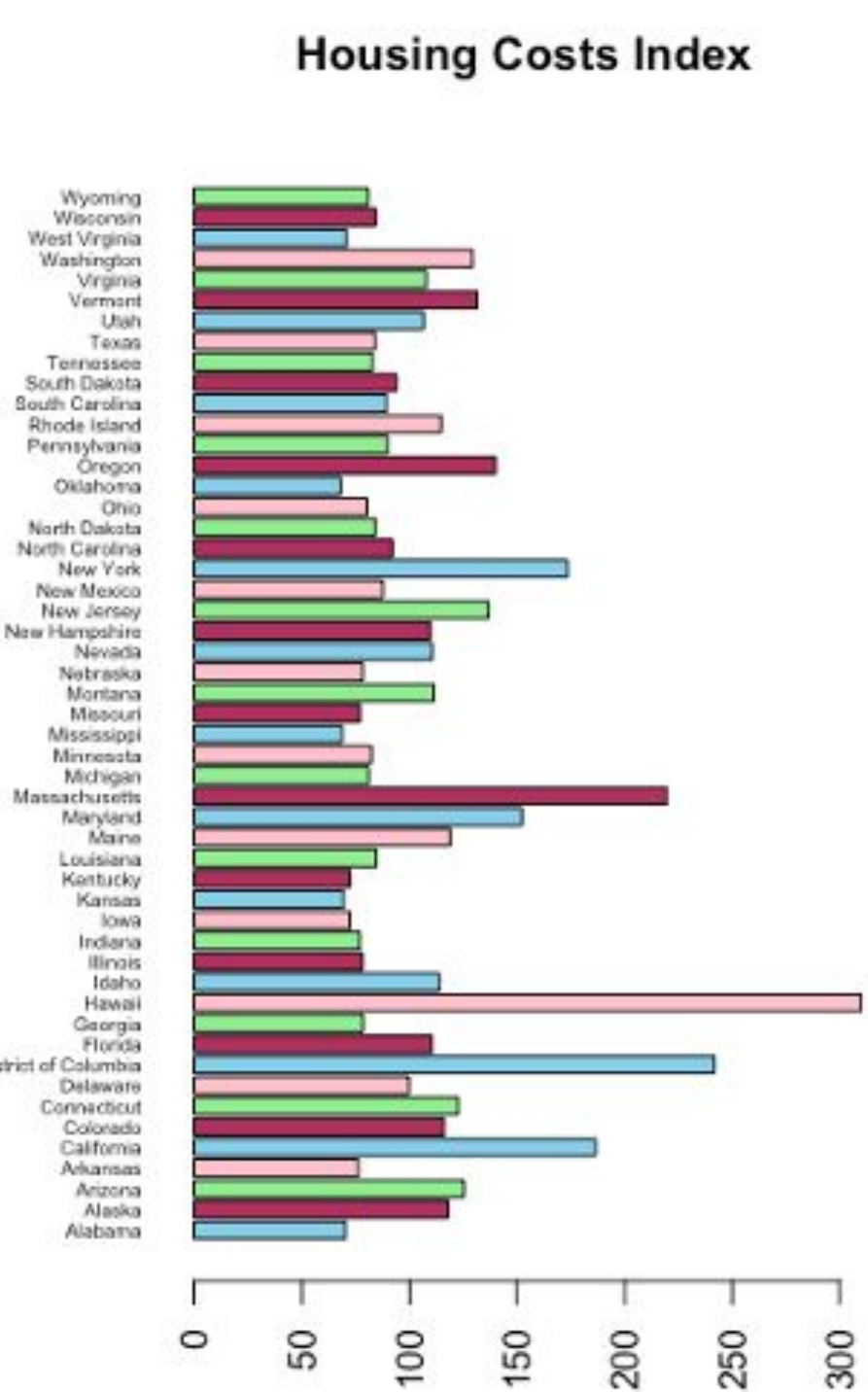
GROCERY COST INDEX BY STATES



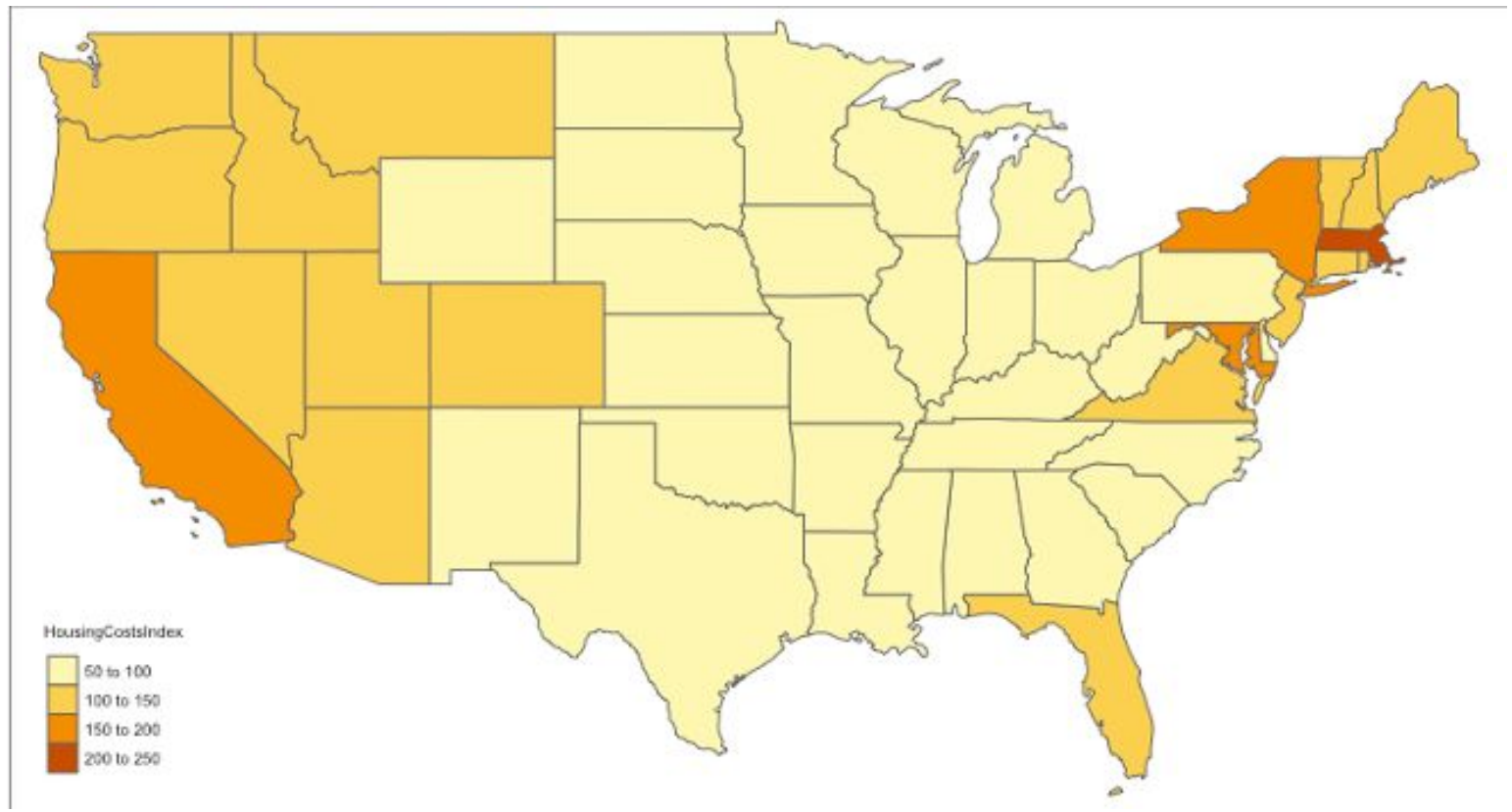


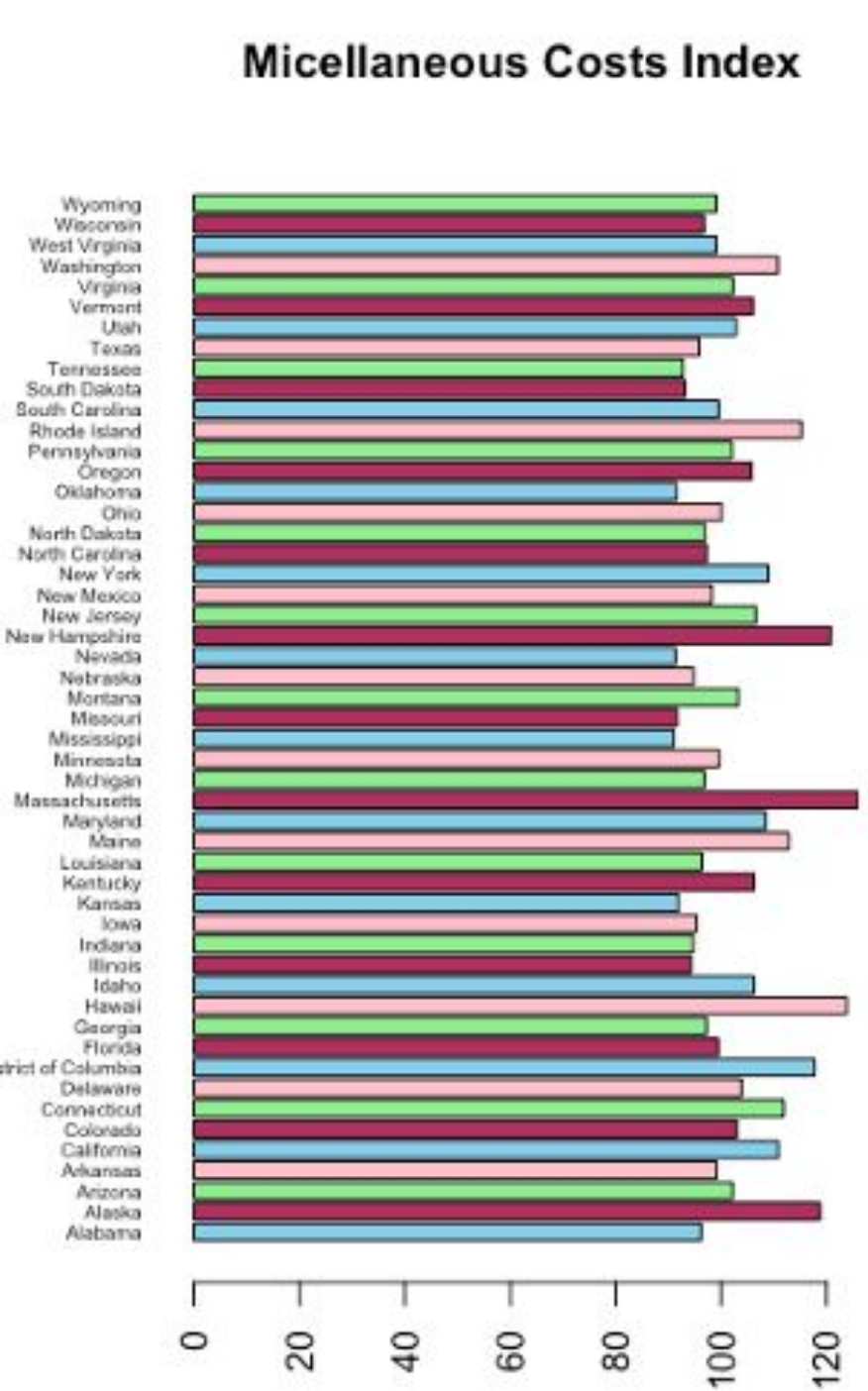
HEALTH COST INDEX BY STATE



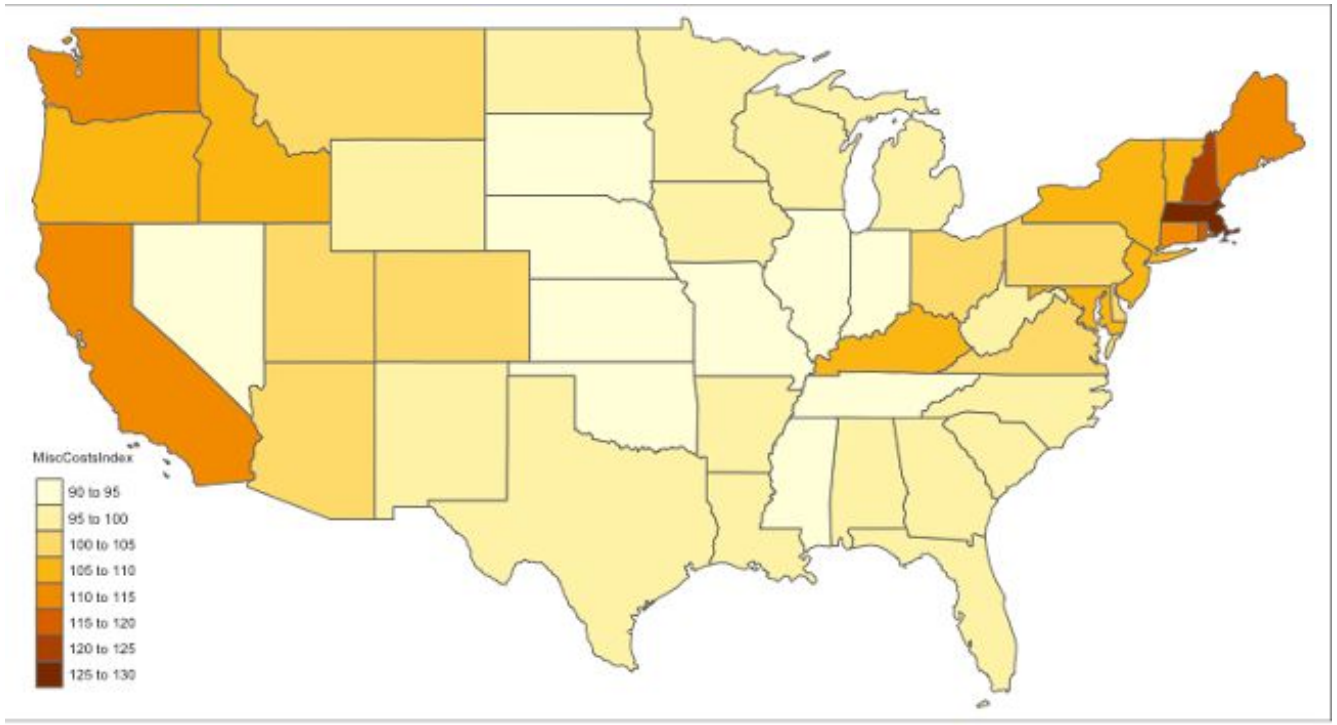


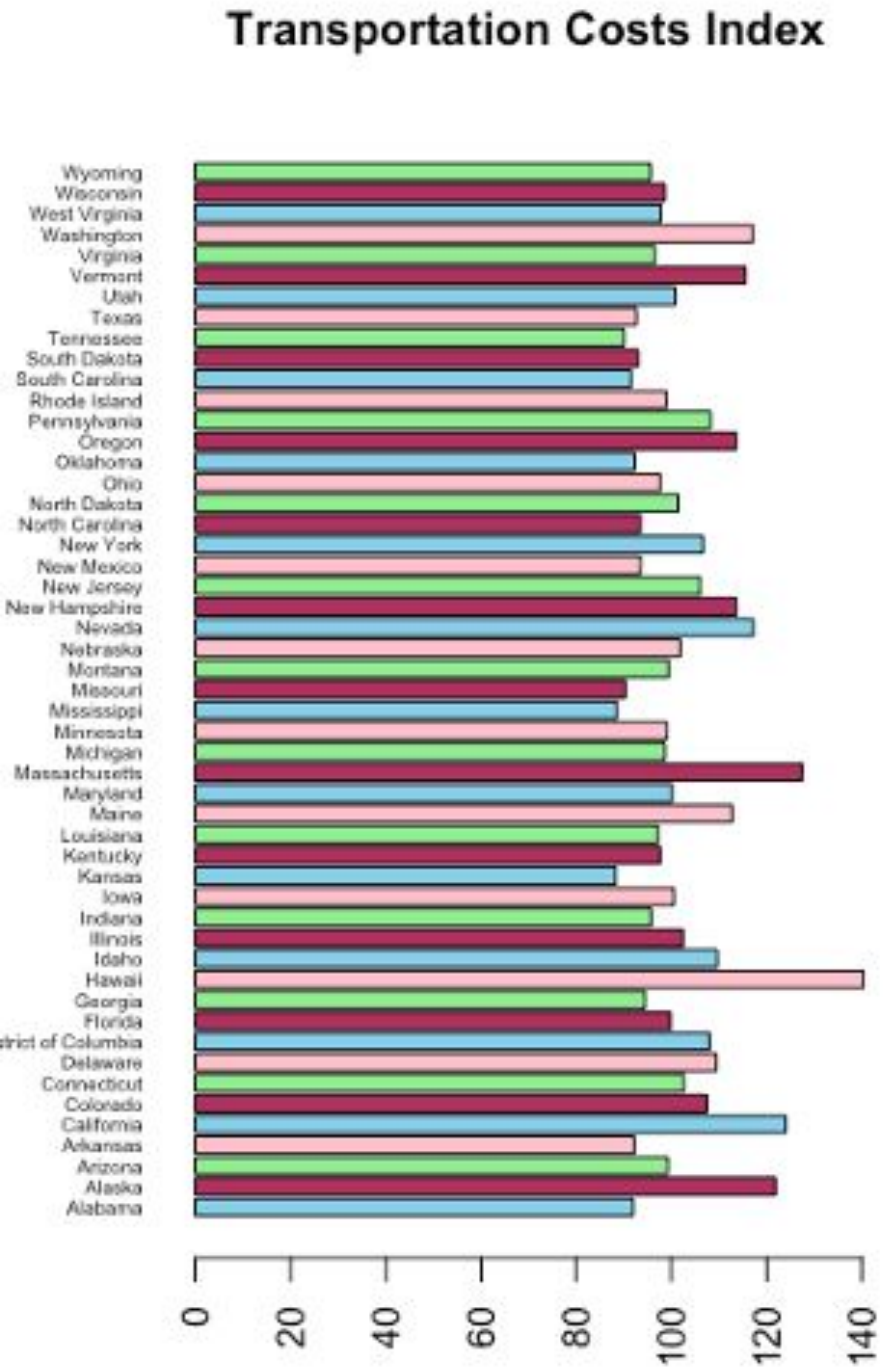
HOUSING COST INDEX BY STATE



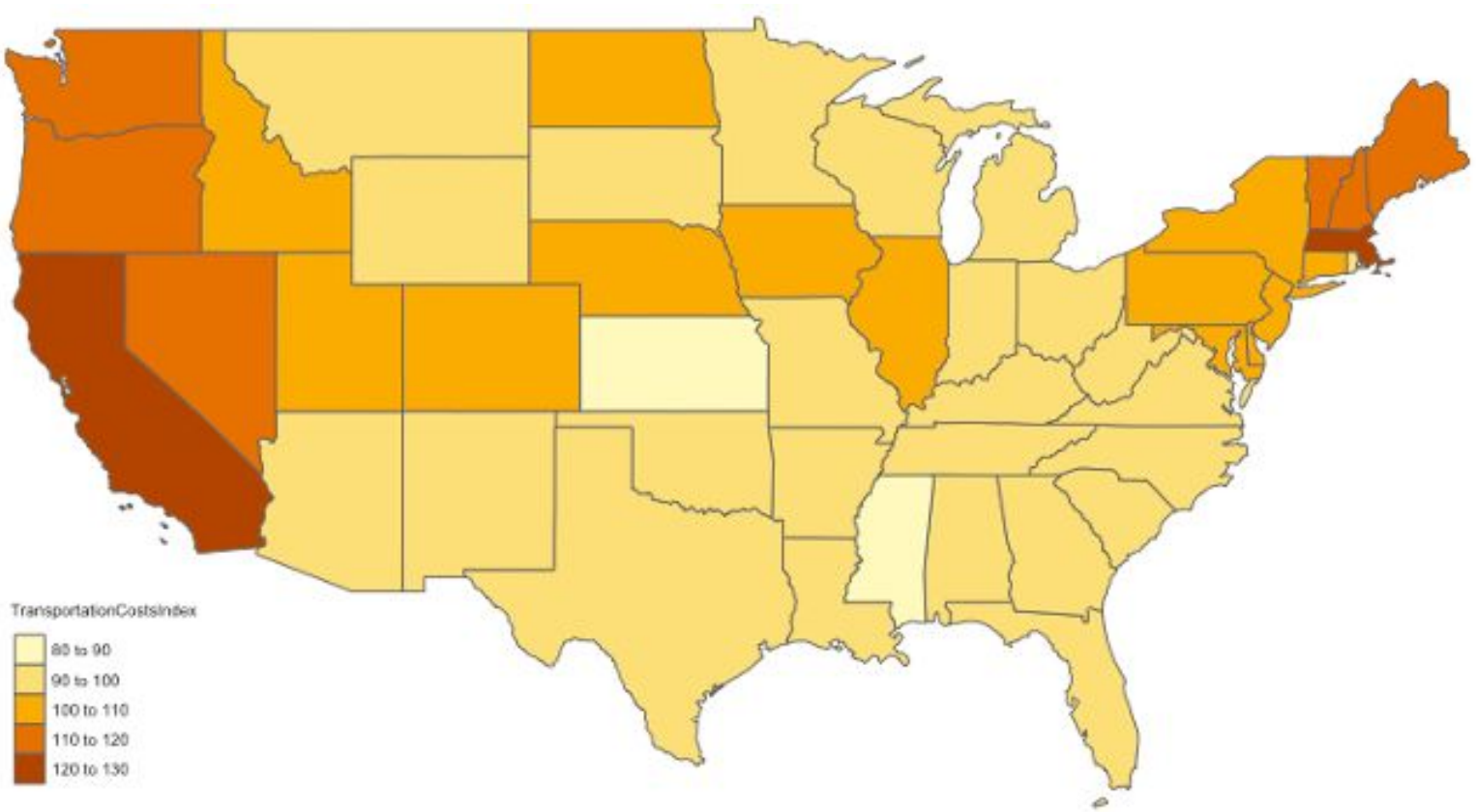


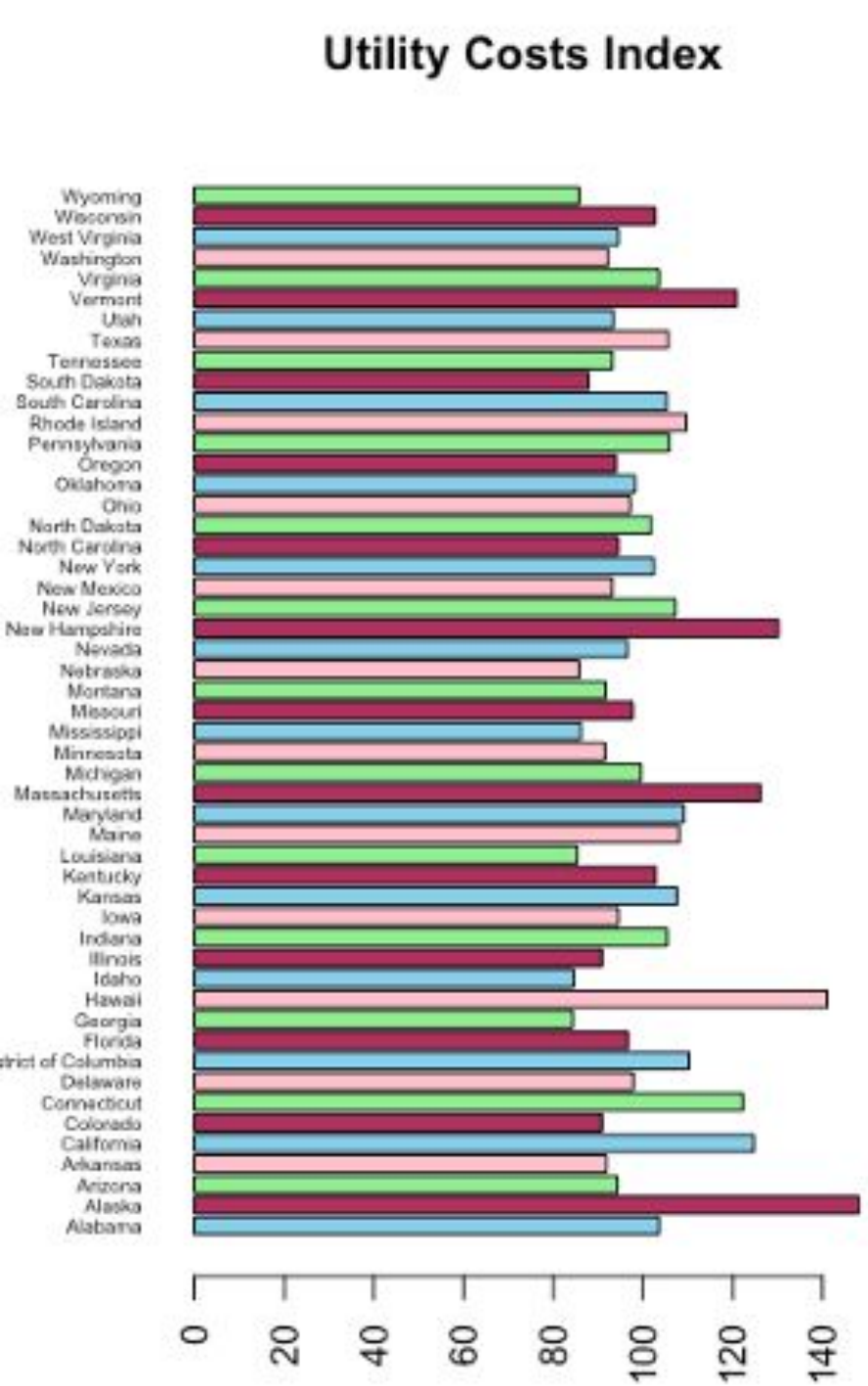
MISCELLANEOUS COST INDEX BY STATES



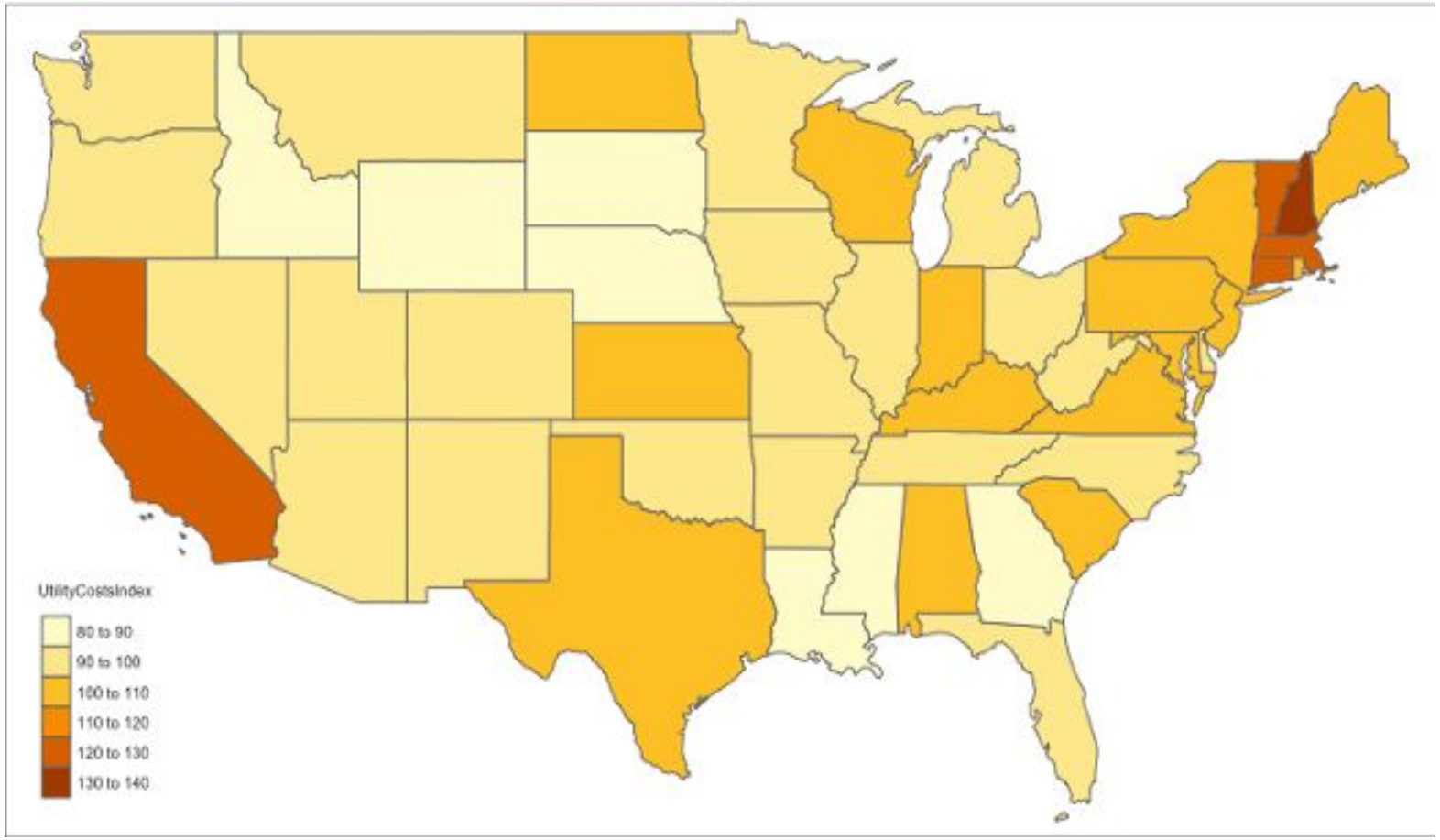


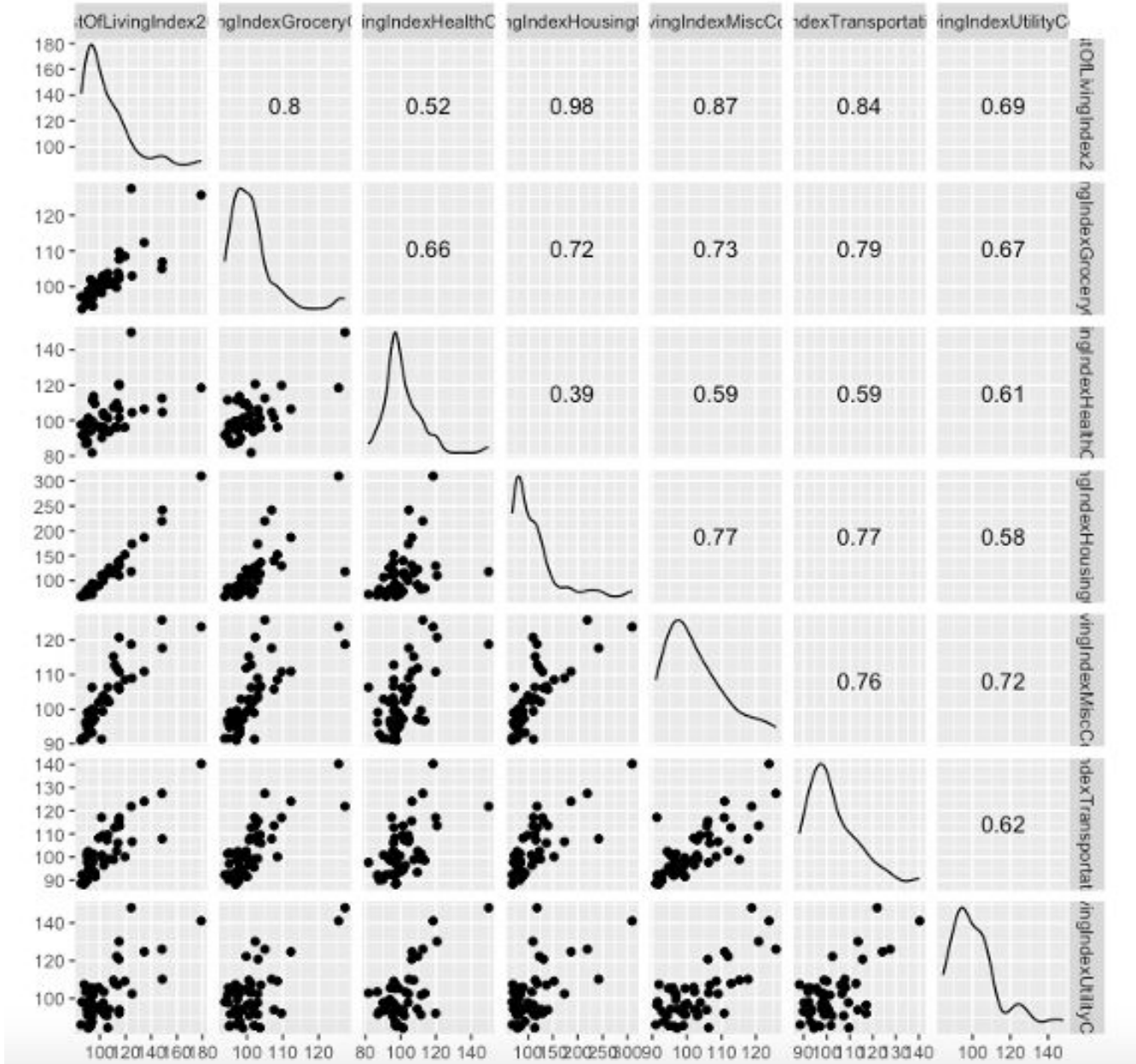
TRANSPORTATION COSTS INDEX





UTILITY COSTS PER STATE




tOfLivingIndex2
ngIndexGrocery
ingIndexHealthC
ngIndexHousing
vingIndexMiscC
ndexTransportati
ingIndexUtilityC
0.8
0.52
0.98
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0.72
0.73
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0.77
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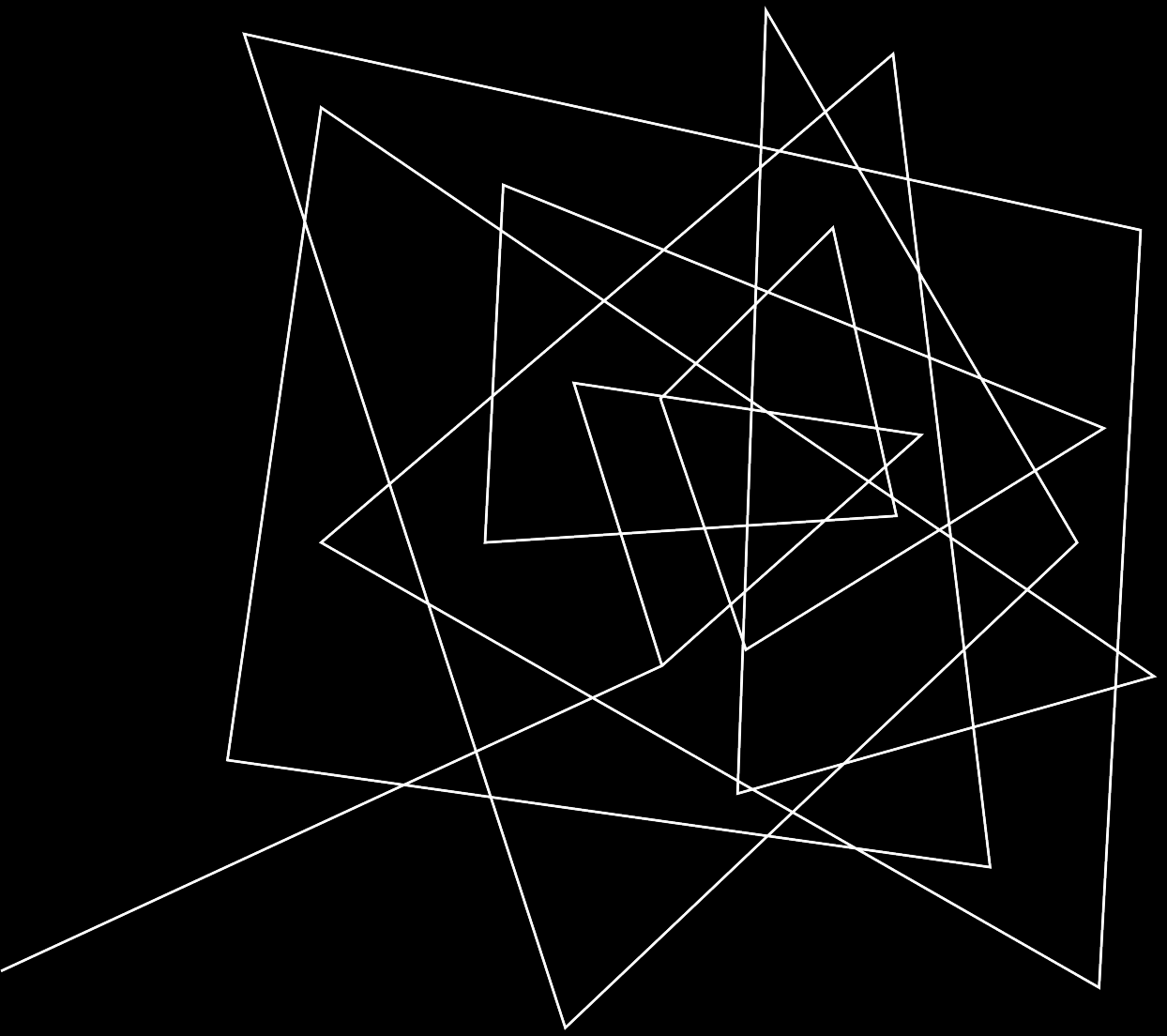
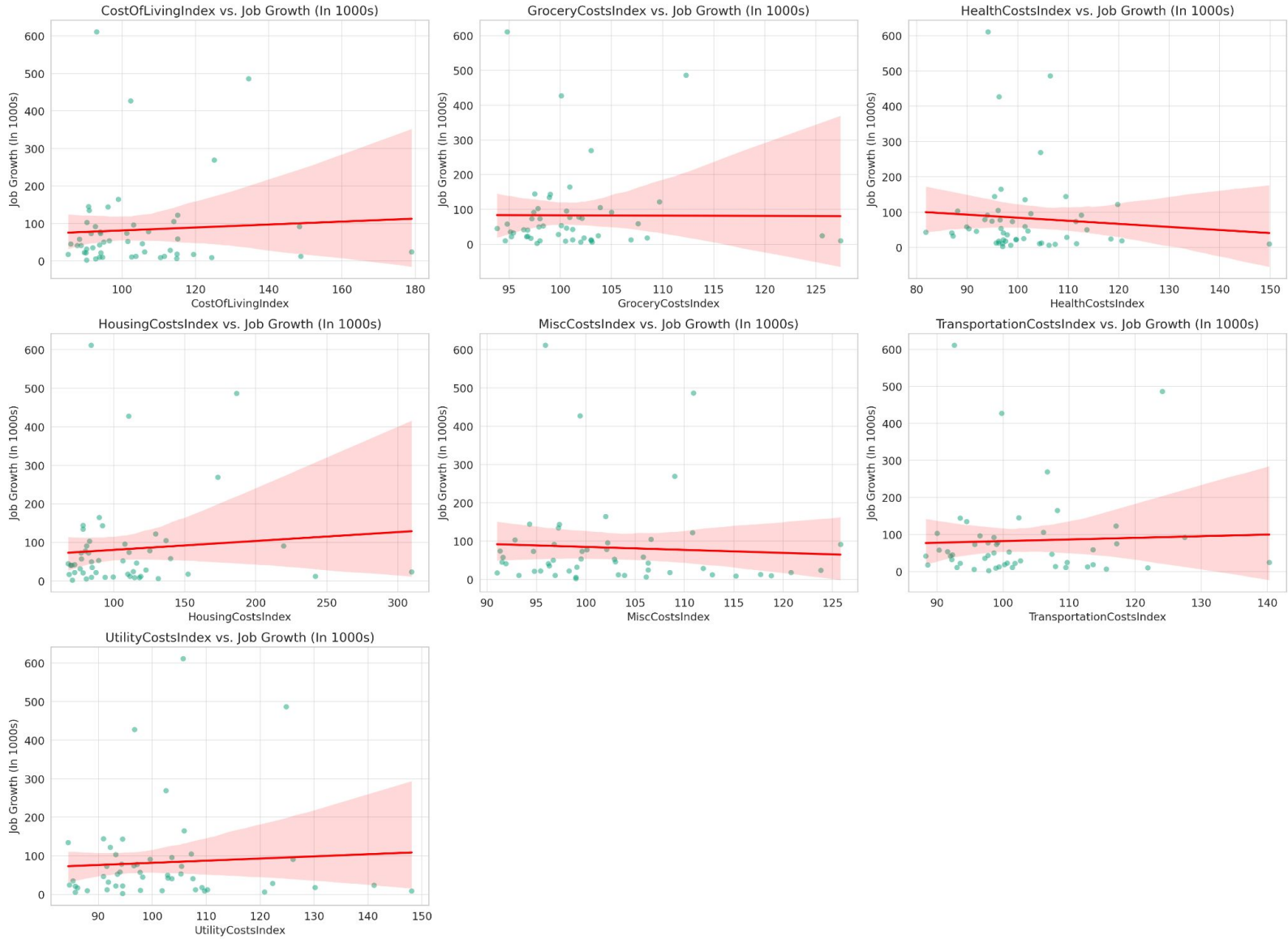
0.62



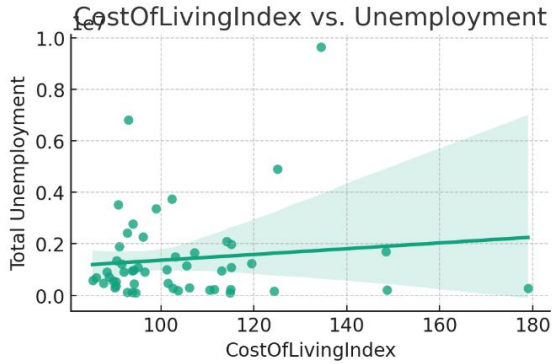
RESULTS & FINDINGS

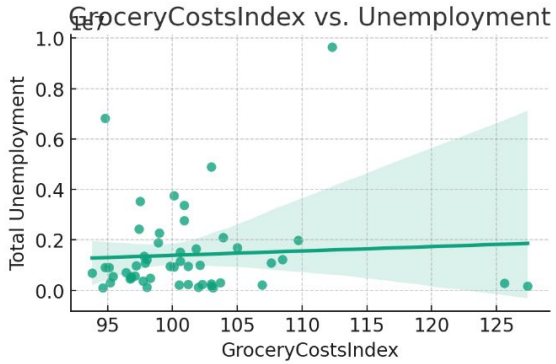
What we found

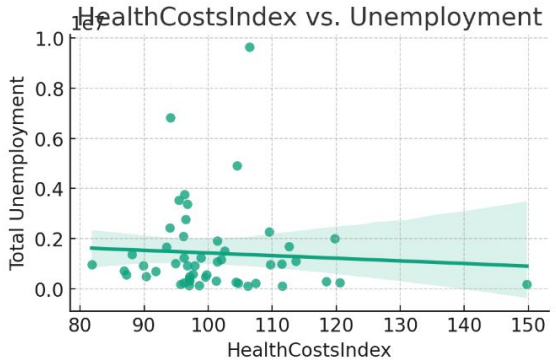
SCATTER PLOTS CROSS REFERENCING JOB GROWTH

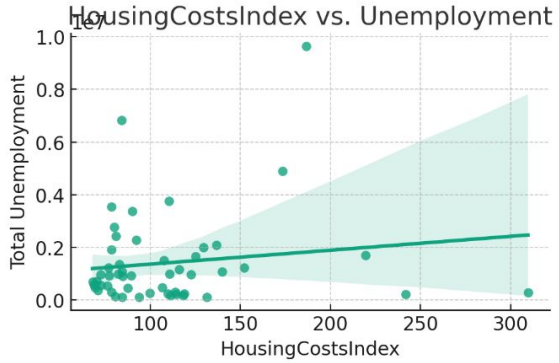


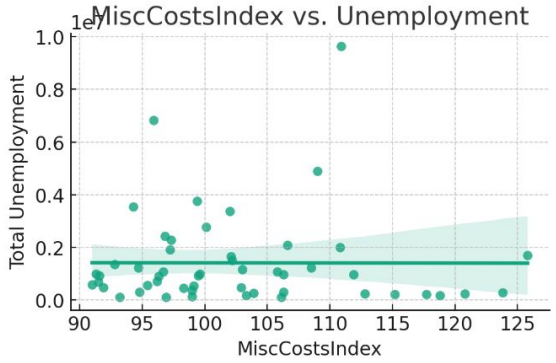
SCATTER PLOTS CROSS REFERENCING UNEMPLOYMENT

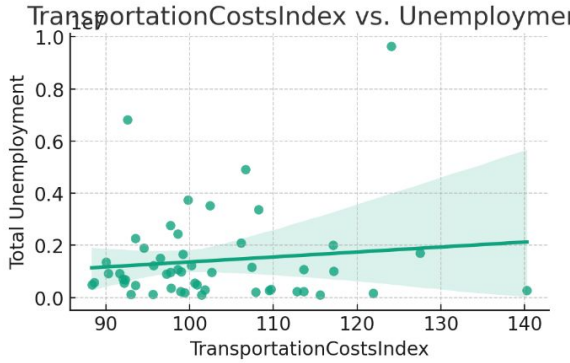


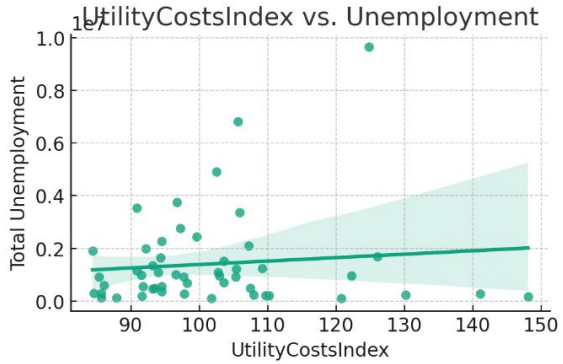








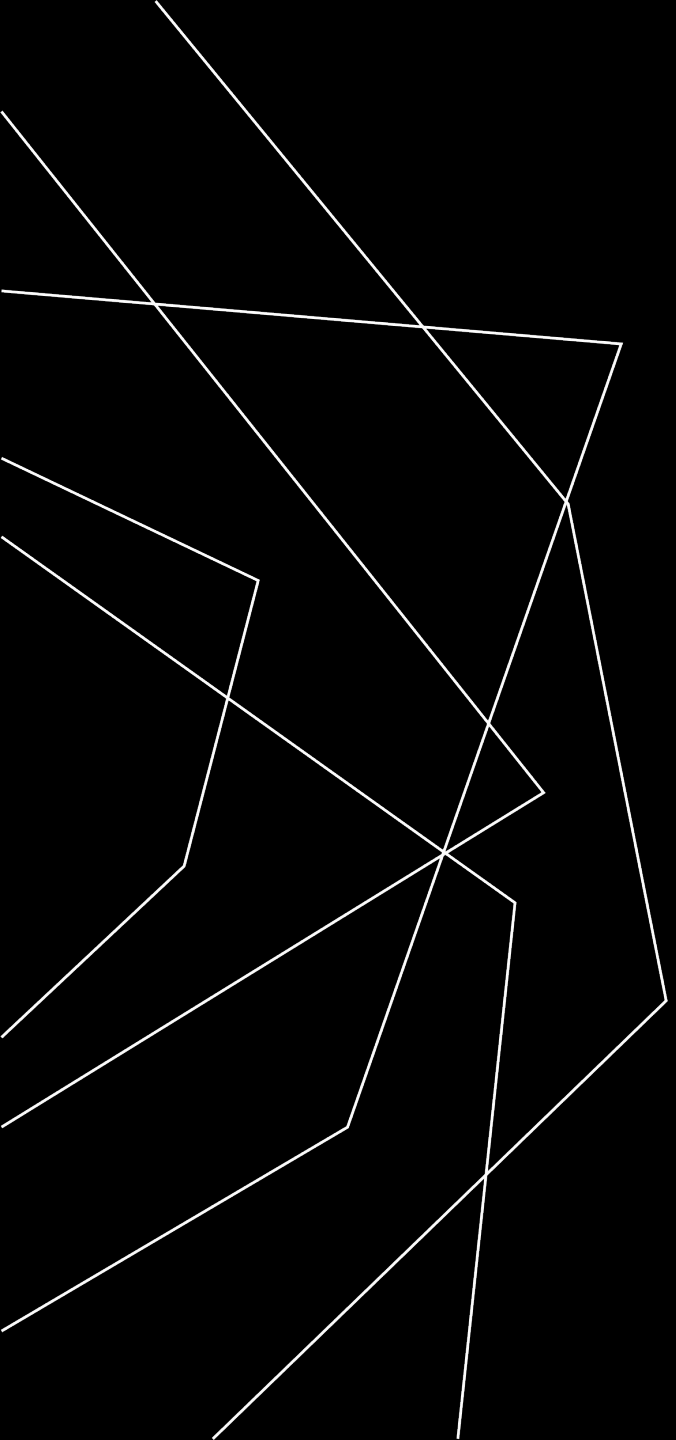




CONCLUSION & FUTURE STEPS

In our findings we see a strong relationship and correlation with Cost of Living and Unemployment, moreso for housing, groceries and other essential categories. Where as for most states the correlation is in misc and transportation costs.

Future steps would be to find GDP data per state and see if that has any impact on job growth and unemployment.



THANK YOU!