Today's Agenda

Introduce Dataset 1

- Brainstorm models
- Begin univariate analyses

Justin Leinaweaver (Spring 2022)

Scientific models are:

- Neither true nor false
- Limited in their accuracy
- Partial representations
- Useful for only some uses
- A reflection of the interests of the designer

Dataset 1: The Motivating Problem

What drives economic investment in US states?

Why do some states attract greater investment by companies and individuals than others?

Dataset 1: The Motivating Problem

What drives economic investment in US states?

1. Literature Review
2. Exploratory Data Analysis

Dataset 1: Literature Review

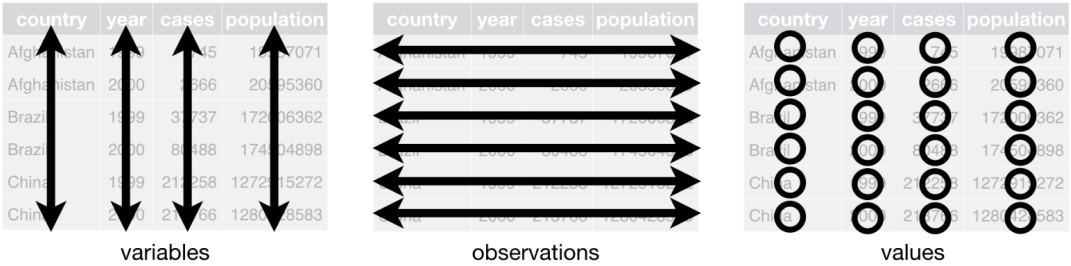
What are the important causal mechanisms that explain business investment in states?

1. The Young Entrepreneur Council. (2017, Nov 1). 9 Things to Remember Before Relocating Your Business. *Small Business Trends*.
2. Gonzales, C., Kerlin, M., Schaf, R., and Tucker-Ray, S. (2019). How state and local governments win at attracting companies. McKinsey & Company.

Dataset 1: The Economies of the US States

	A	B	C	D	E	F	G	H
1	State	abbrev	year	min_wage	gdp_millions	unemployment	population_thousands	rental_vacancy_rate
2	Alabama	AL	2020		224870.6	6	4921.532	13.6
3	Alaska	AK	2020	10.19	50246.7	7.9	731.158	7
4	Arizona	AZ	2020	12	372461	7.9	7421.401	5.5
5	Arkansas	AR	2020	10	129073.9	6.1	3030.522	8.4
6	California	CA	2020	12	3091871.5	10.2	39368.078	4
7	Colorado	CO	2020	12	390098.7	7.3	5807.719	4
8	Connecticut	CT	2020	12	280900.3	7.9	3557.006	5.6
9	Delaware	DE	2020	9.25	75512.5	7.9	986.809	6.1
10	Florida	FL	2020	8.56	1095888.2	7.9	21733.312	7.3
11	Georgia	GA	2020	7.25	619240	6.6	10710.017	7.1
12	Hawaii	HI	2020	10.1	89856.2	11.8	1407.006	7.5
13	Idaho	ID	2020	7.25	84032.2	5.4	1826.913	4.4
14	Illinois	IL	2020	10	863516.7	9.6	12587.53	7.9
15	Indiana	IN	2020	7.25	372636.7	7.2	6754.953	9.3
16	Iowa	IA	2020	7.25	192710.2	5.3	3163.561	8.9
17	Kansas	KS	2020	7.25	173298.3	5.9	2913.805	12.1
18	Kentucky	KY	2020	7.25	210024.2	6.6	4477.251	6.1

"Three Rules of Tidy Data"



Source: Wickham (2018) R for Data Science. O'Reilly.

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Dataset 1: The Motivating Problem

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Dataset 1: The Economies of the US States

	A	B	C	D	E	F
1	State	abbrev	year	gdp_millions	gdp_category	gdp_rate
2	Alabama	AL	2020	224870.6	Under $1 trillion	-0.0143
3	Alaska	AK	2020	50246.7	Under $100 billion	-0.0761
4	Arizona	AZ	2020	372461	Under $1 trillion	0.0063
5	Arkansas	AR	2020	129073.9	Under $1 trillion	-0.0144
6	California	CA	2020	3091871.5	Above $1 trillion	-0.0131
7	Colorado	CO	2020	390098.7	Under $1 trillion	-0.0073
8	Connecticut	CT	2020	280900.3	Under $1 trillion	-0.0240
9	Delaware	DE	2020	75512.5	Under $100 billion	-0.0204
10	Florida	FL	2020	1095888.2	Above $1 trillion	-0.0096
11	Georgia	GA	2020	619240	Under $1 trillion	-0.0103
12	Hawaii	HI	2020	89856.2	Under $100 billion	-0.0615
13	Idaho	ID	2020	84032.2	Under $100 billion	0.0044
14	Illinois	IL	2020	863516.7	Under $1 trillion	-0.0249
15	Indiana	IN	2020	372636.7	Under $1 trillion	-0.0186
16	Iowa	IA	2020	192710.2	Under $1 trillion	-0.0100
17	Kansas	KS	2020	173298.3	Under $1 trillion	-0.0181

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[243] 169 180 196 127 210 240 123 141 203 128 203
[254] 218 110 176 114 139 144 183 192 154 116 225
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- The middle?
- The range?
- The variation?

Defining Statistics: Level 1

Statistics is a set of tools we use to summarize data

Summarize: "give a brief statement of the main points of (something)" (Oxford Dictionary).

Defining Statistics: Level 2

"The practice or science of collecting and analyzing numerical data in large quantities, **especially for the purpose of inferring proportions in a whole from those in a representative sample**" (Oxford Dictionary).

Descriptive Statistics (Johnson 2012)

Measures of Central Tendency

- Mean
- Median

Deviations from Central Tendency

- Standard deviation

Measures of Variability

- Range
- IQR

Descriptive Statistics (Johnson 2012)

Measures of Central Tendency

- Mean
- Median

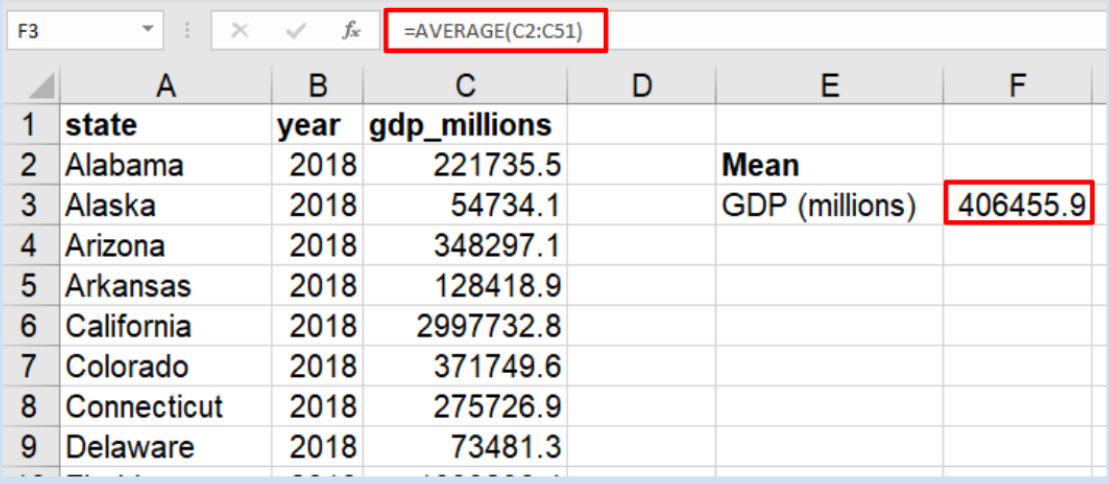
Deviations from Central Tendency

- Standard deviation

Measures of Variability

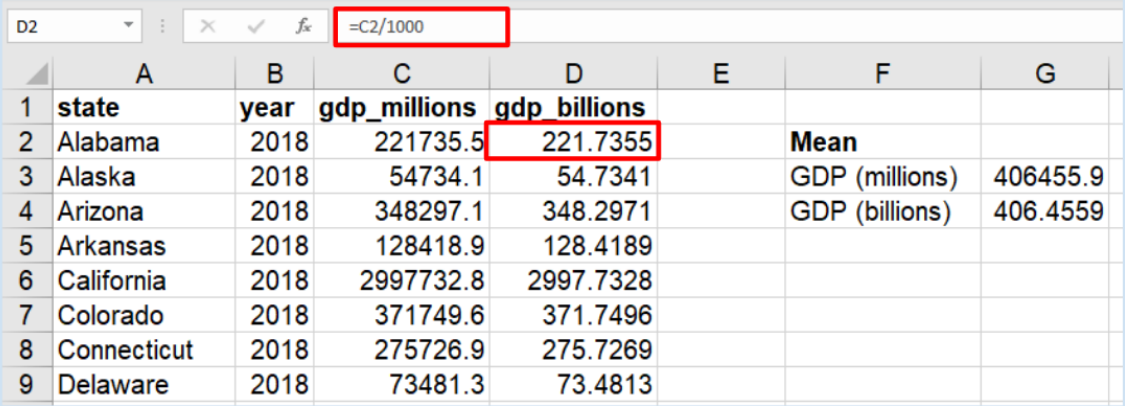
- Range = Maximum - Minimum
- IQR = 75th - 25th percentile

Descriptive Statistics in Excel: Using Functions



	A	B	C	D	E	F
1	**state**	**year**	**gdp_millions**			
2	Alabama	2018	221735.5		**Mean**	
3	Alaska	2018	54734.1		GDP (millions)	406455.9
4	Arizona	2018	348297.1			
5	Arkansas	2018	128418.9			
6	California	2018	2997732.8			
7	Colorado	2018	371749.6			
8	Connecticut	2018	275726.9			
9	Delaware	2018	73481.3			

Descriptive Statistics in Excel: Using Functions



D2 =C2/1000

	A	B	C	D	E	F	G
1	**state**	**year**	**gdp_millions**	**gdp_billions**			
2	Alabama	2018	221735.5	221.7355		**Mean**	
3	Alaska	2018	54734.1	54.7341		GDP (millions)	406455.9
4	Arizona	2018	348297.1	348.2971		GDP (billions)	406.4559
5	Arkansas	2018	128418.9	128.4189			
6	California	2018	2997732.8	2997.7328			
7	Colorado	2018	371749.6	371.7496			
8	Connecticut	2018	275726.9	275.7269			
9	Delaware	2018	73481.3	73.4813			

For Thursday

Variables

- Minimum wage
- Unemployment
- Population
- Homeowner Rate
- Manufacturing

Descriptive Statistics

- Mean
- Median
- Standard deviation
- Minimum
- Maximum
- 25th Percentile
- 75th Percentile

For Thursday

Predictors to Analyze (5): Min wage, unemployment, population, homeowner rate and manufacturing

Mean	= AVERAGE
Median	= MEDIAN
Standard deviation	= STDEV.S
Minimum	= MIN
Maximum	= MAX
25th Percentile	= QUARTILE.EXC (quart = 1)
75th Percentile	= QUARTILE.EXC (quart = 3)