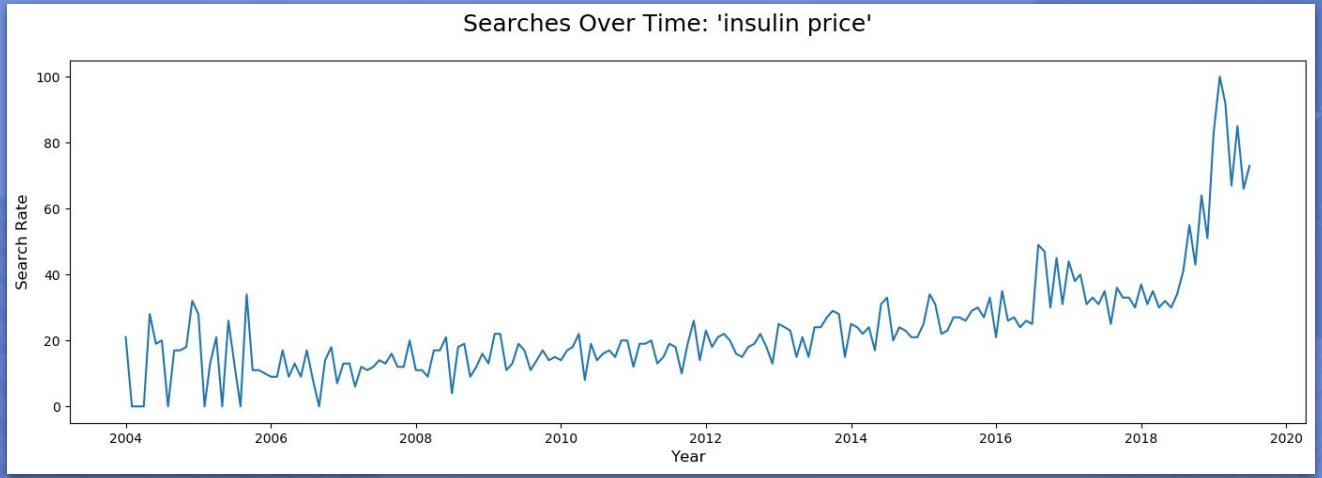
The Impact of Outrage:

Measuring public opinion's effect on Insulin pricing

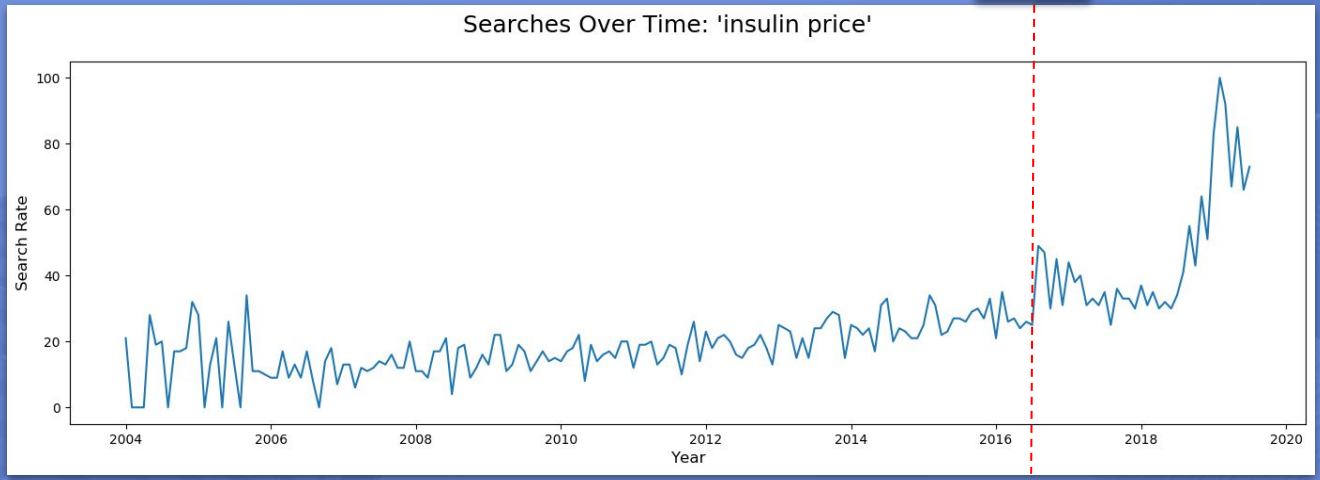
OBJECTIVE

- To examine the impact of public criticism on insulin pricing

A BRIEF HISTORY

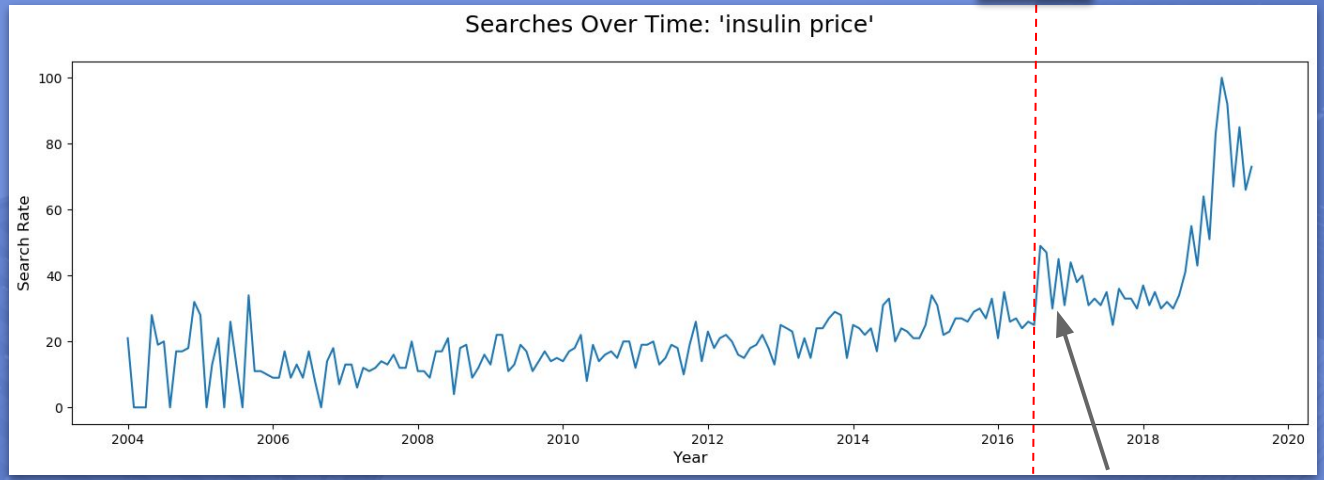


A BRIEF HISTORY



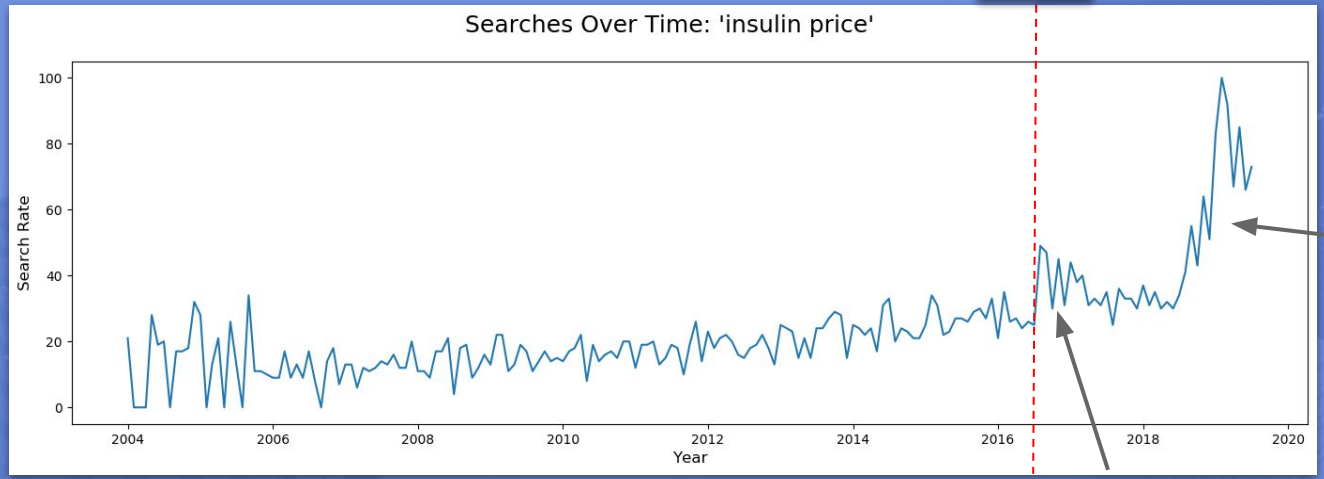
1. JAMA Study

A BRIEF HISTORY



1. JAMA Study
2. PBS breaks the story

A BRIEF HISTORY



1. JAMA Study
2. PBS breaks the story
3. Senate Hearing & Coverage

METHODOLOGY

Data:

Center for Medicare/Medicaid Services

Part D. Drug Spending Database

Google Trends

Models:

Linear Regression (Elastic Net)

Tools:

METHODOLOGY

Data:

Center for Medicare/Medicaid Services

Part D. Drug Spending Database

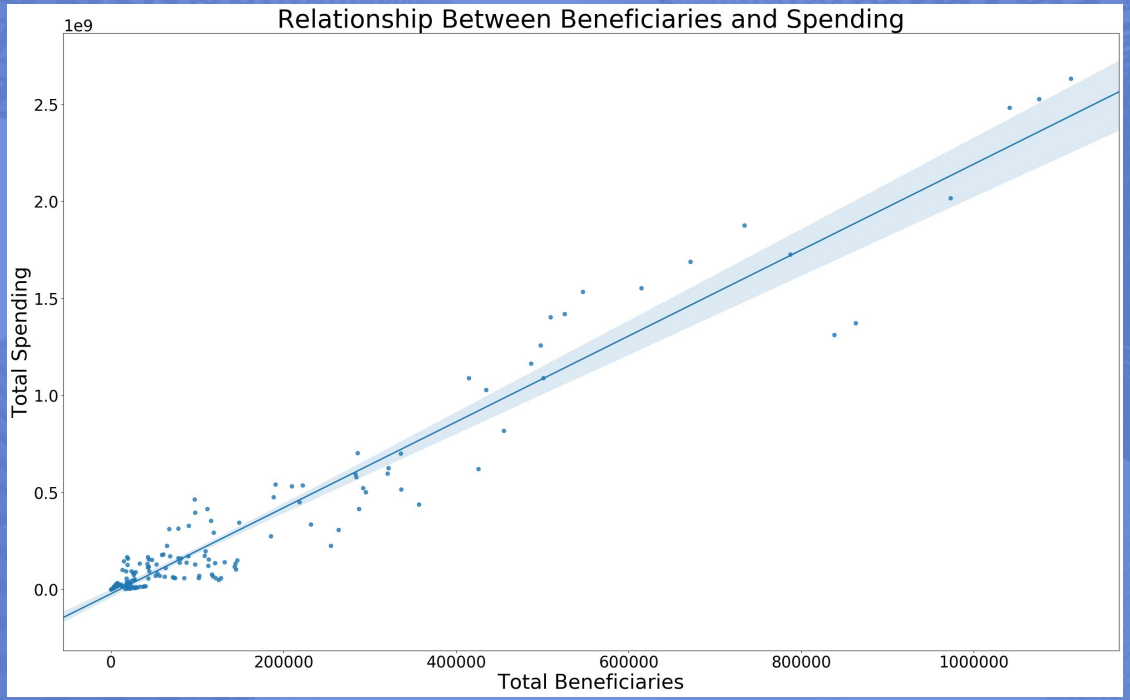
Target Variables:

- **Total Spending**

Features:

- **Total Beneficiaries**
- **Total Claims**
- **Total Dosage**

OBSERVATIONS:


Relationship Between Beneficiaries and Spending
1e9
2.5
2.0
1.5
1.0
0.5
0.0
Total Spending
0
200000
400000
600000
800000
1000000
Total Beneficiaries

Flg A

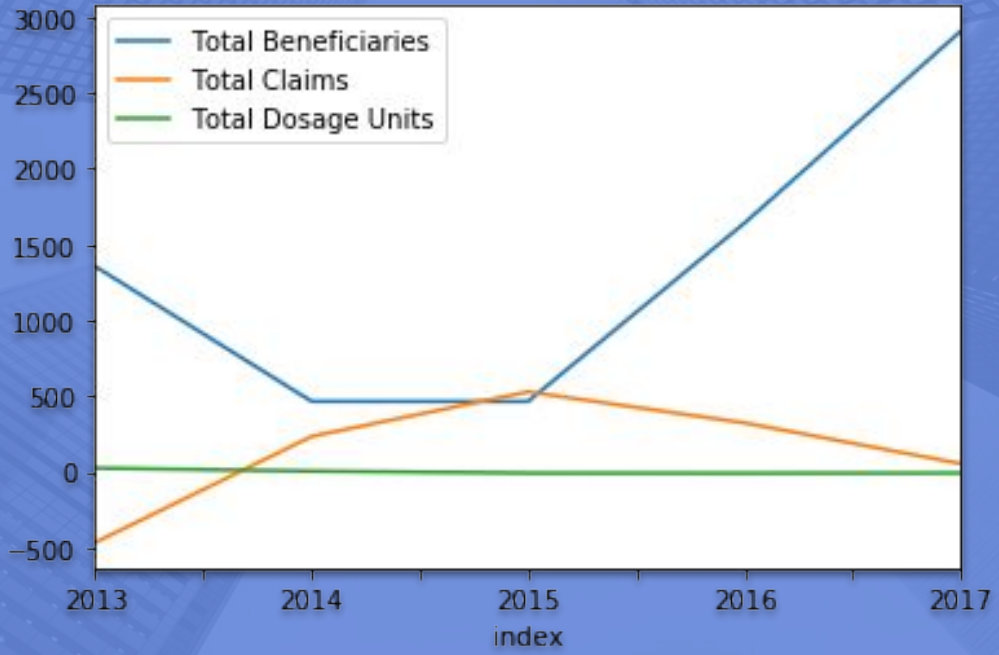

Total Beneficiaries
Total Claims
Total Dosage Units
3000
2500
2000
1500
1000
500
0
−500
2013
2014
2015
2016
2017
index

Fig B

RECOMMENDATIONS

- Awareness alone won't stop the inflation of patented drug pricing in a non-competitive market
- Evidence of price increase despite steady cost and production should be presented to governing bodies
- Further study is warranted regarding the 2019 Senate hearings

SOURCES

- https://ncss-wpengine.netdna-ssl.com/wp-content/themes/ncss/pdf/Procedures/NCSS/Ridge_Regression.pdf
- https://www.businessinsider.com/diabetes-insulin-banting-history-2016-11
- http://www.natap.org/2019/newsUpdates/022719_01.htm
- https://jamanetwork.com/journals/jama/fullarticle/2510902
- https://trends.google.com/trends/explore?date=all&geo=US&q=insulin%20price
- https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/Information-on-Prescription-Drugs/MedicarePartD.html
- https://www.pbs.org/newshour/health/whats-behind-skyrocketing-insulin-prices
- https://www.nytimes.com/2019/02/26/us/politics/prescription-drug-prices.html

Appendix:

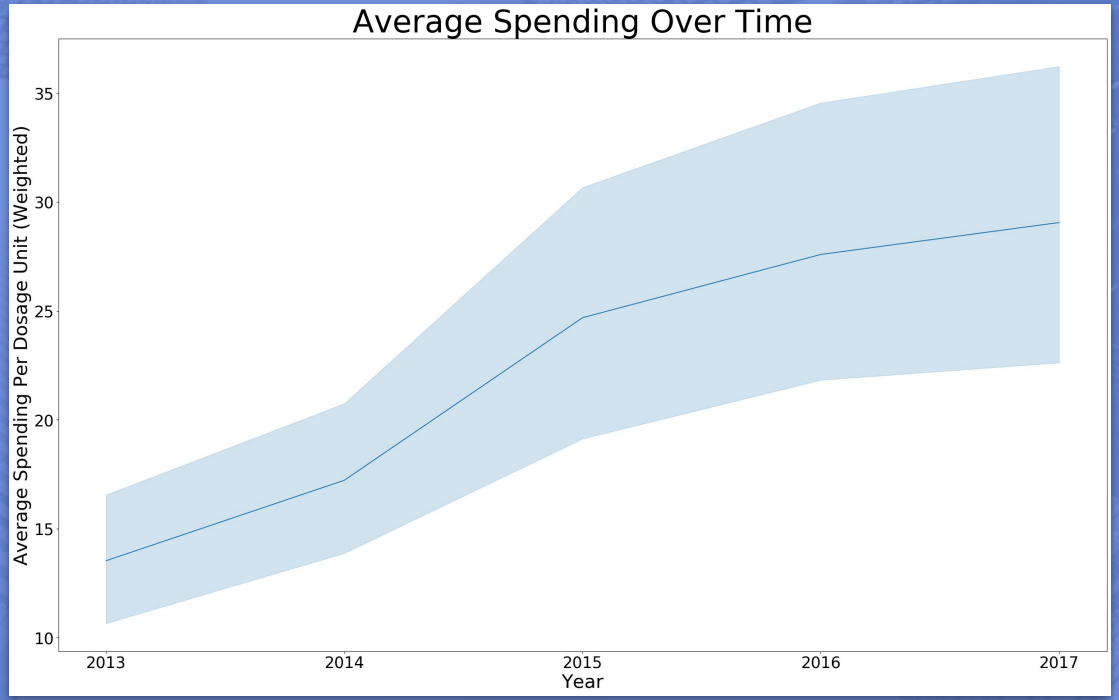
Drug Metric Definitions

Drug Metric Definitions:

- **Total Spending:**
  Aggregate drug spending for the Part D program during the benefit year.
  How much medicare paid
- **Total Dosage Units:**
  The sum of the dosage units of medication dispensed across the calendar year (e.g. number of tablets, grams, milliliters or other units). Unit refers to the drug unit in the lowest dispensable amount.
- **Total Claims:**
  Number of prescription fills for each drug. Includes original prescriptions and refills.
- **Total Beneficiaries:**
  Number of Medicare Part D beneficiaries utilizing the drug during the benefit year.
  How many medicare patients used the drug
- **Average Spending per Dosage Unit:**
  Part D drug spending divided by the number of dosage units, which is weighted by the proportion of total claims.
  Total spending divided by number of units, weighted per claim
- **Average Spending per Beneficiary:**
  Total Part D drug spending divided by the number of unique beneficiaries utilizing the drug during the benefit year.
- **Change in Average Spending per Dosage Unit (2016-2017)**
  The percent change in average spending per dosage unit from the prior year.
- **Annual Growth Rate in Average Spending per Dosage Unit (2013-2017):**
  The constant average change in spending per dosage unit over the most recent five years of data availability, calculated using the compound annual growth rate (CAGR).

Appendix:

Average Spending Over Time



Appendix:

R-squared v.s. Adjusted R-squared

	R-squared	Adj R-squared
OLS	.876	.872
Ridge	.889	.885
LASSO	.876	.872
Elastic Net	.889	.885

Appendix:

Coefficients For Total Dataset

	Total Beneficiaries	Total Claims	Total Dosage Units
Total Dataset	**676**	**84**	**12**

Appendix:

Coefficients by Year

	Total Beneficiaries	Total Claims	Total Dosage Units
2013	1356	-466	25
2014	465	234	5
2015	465	528	-8
2016	1642	324	-9
2017	2909	55	-8

Appendix:

Correlation Heatmap