

## Motivation

The goal of this project is to gather insight into the SNAP Benefits program while showcasing my data wrangling, statistic calculation, data visualization, and data analysis skills.

## Initial Questions

To guide my project I have decided to answer the following questions.

How has the national SNAP participation changed over time?

How has SNAP participation changed in each state over time?

How has the national average SNAP benefit changed over time?

How has the average SNAP benefit in each state changed over time?

Which states provide the largest SNAP benefit?

Which states have the highest SNAP participation

How did each state's SNAP participation change during 2008-2013?

How did each state's average SNAP benefit change during 2008-2013?

## Data Sources

1. SNAP Benefits: **ZIP File: FY 1969 - FY 2021** <https://www.fns.usda.gov/pd/supplemental-nutrition-assistance-program-snap>
2. State Population Data: [Annual Estimates of the Population for the U.S. and States, and for Puerto Rico](#)
3. US Population Data Monthly: [Population](#)
4. US Food Prices by Region [BLS](#)

### Series Names and IDS

Food at home in Northeast urban, all urban consumers, not seasonally adjusted, CUUR0100SAF11

Food at home in Midwest urban, all urban consumers, not seasonally adjusted, CUUR0200SAF11

Food at home in South urban, all urban consumers, not seasonally adjusted, CUUR0300SAF11

Food at home in West urban, all urban consumers, not seasonally adjusted, CUUR0400SAF11

5. US National Food Prices [Consumer Price Index for All Urban Consumers: Food in U.S. City Average](#)

6. Food Regions <https://www.bls.gov/cpi/regional-resources.htm>

## Goal of Data Visualization

## National Participation (Number of People) by Year and Month

50M

40M

30M

20M

10M

0M

National Participation (Number of People)

1970

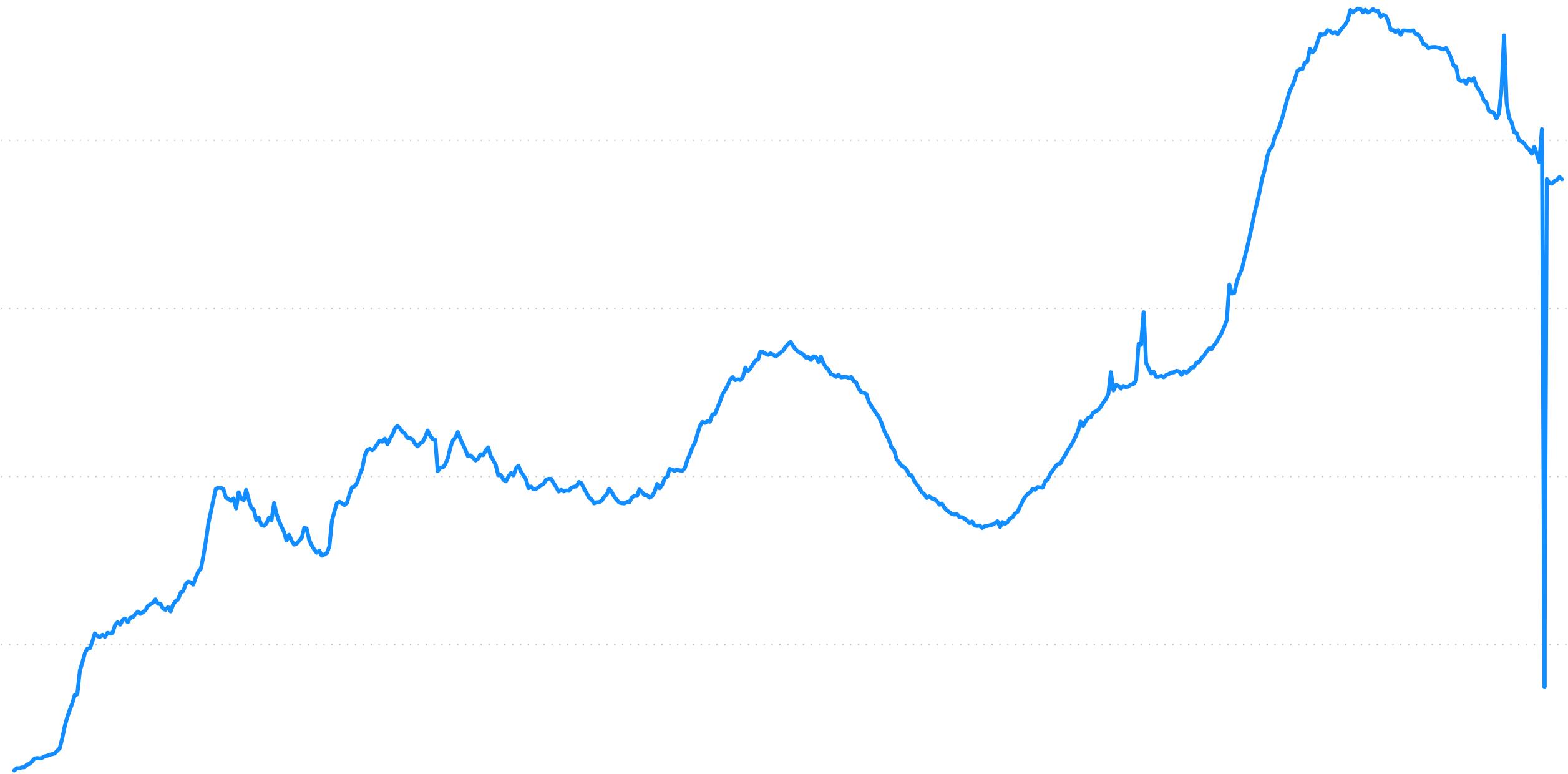
1980

1990

2000

2010

Year



## Analysis

### Spike in 2019

The most noticeable feature of the above graph is the large downward spike in 2019. This spike is caused by a government shutdown. In January 2019 many states handed out their SNAP benefits for February 2019 because of a coming government shutdown. Thus, participation spiked in January 2019 as a lot of people received benefits and then spiked downward during February because the government shutdown limited how many people had access to SNAP benefits.

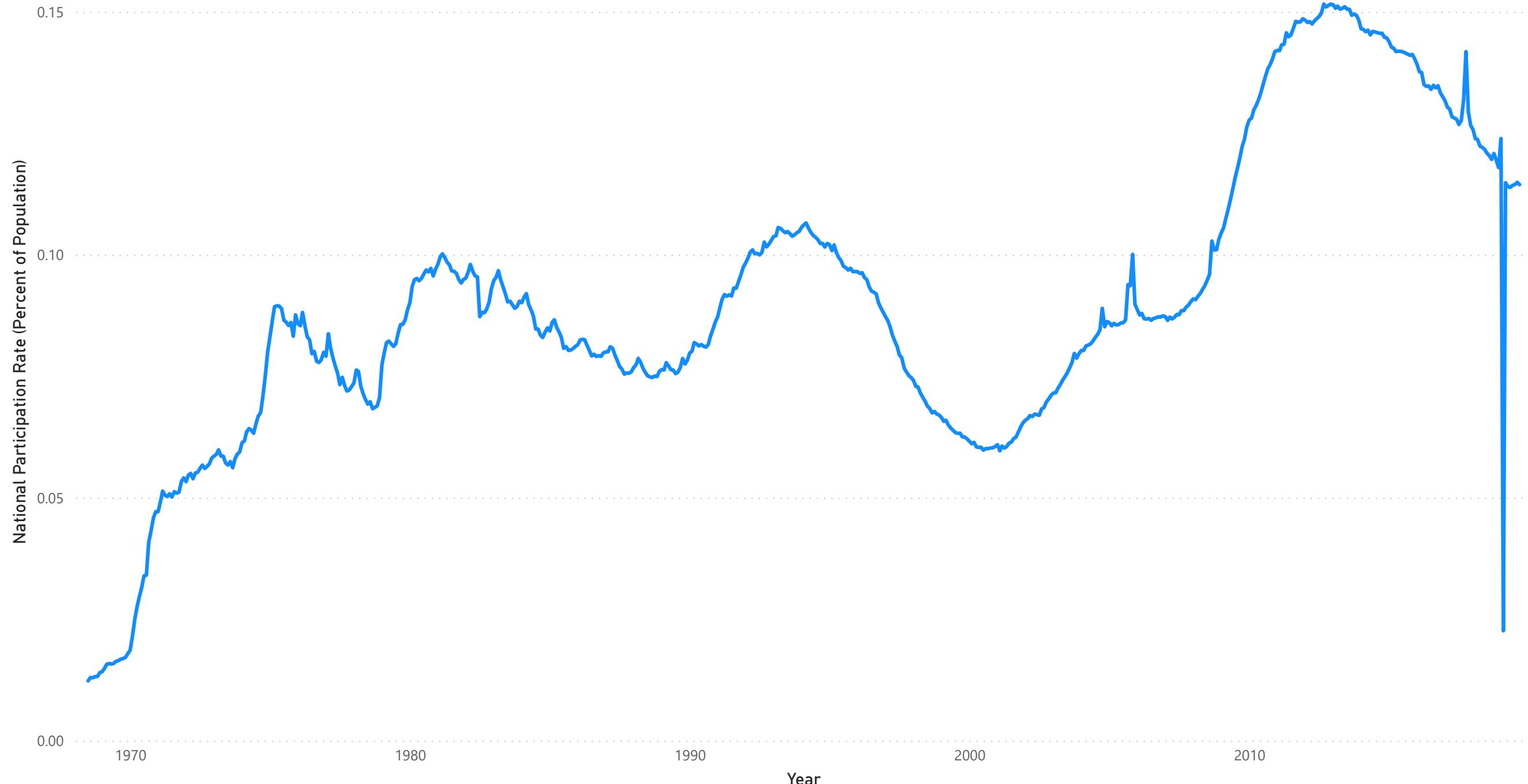
### Spike in 2005

Another noticeable feature of the above graph is the large spike during the last half of 2005. This spike is the result of Hurricane Katrina. The change in participation as a result of the hurricane is about 4.3 million people.

### Max and Average Values

National participation peaked around January 2013 with a max of **47 million** people participating in the SNAP programs. The SNAP program began in 1964. From the graph we can see participation climbed rapidly from 1968 to 1975. The average participation from 1975 to 2019 is **26.6 million** people.

## National Participation Rate (Percent of Population) by Year and Month



## **Analysis**

### **Spikes in Graph**

Again, the most noticeable feature of the above graph is the large downward spike in 2019 and the large spike in 2005. See the above analysis for more information.

### **Hurricane Katrina**

The change in national participation rate as a result of hurricane Katrina was 1.4 percentage points.

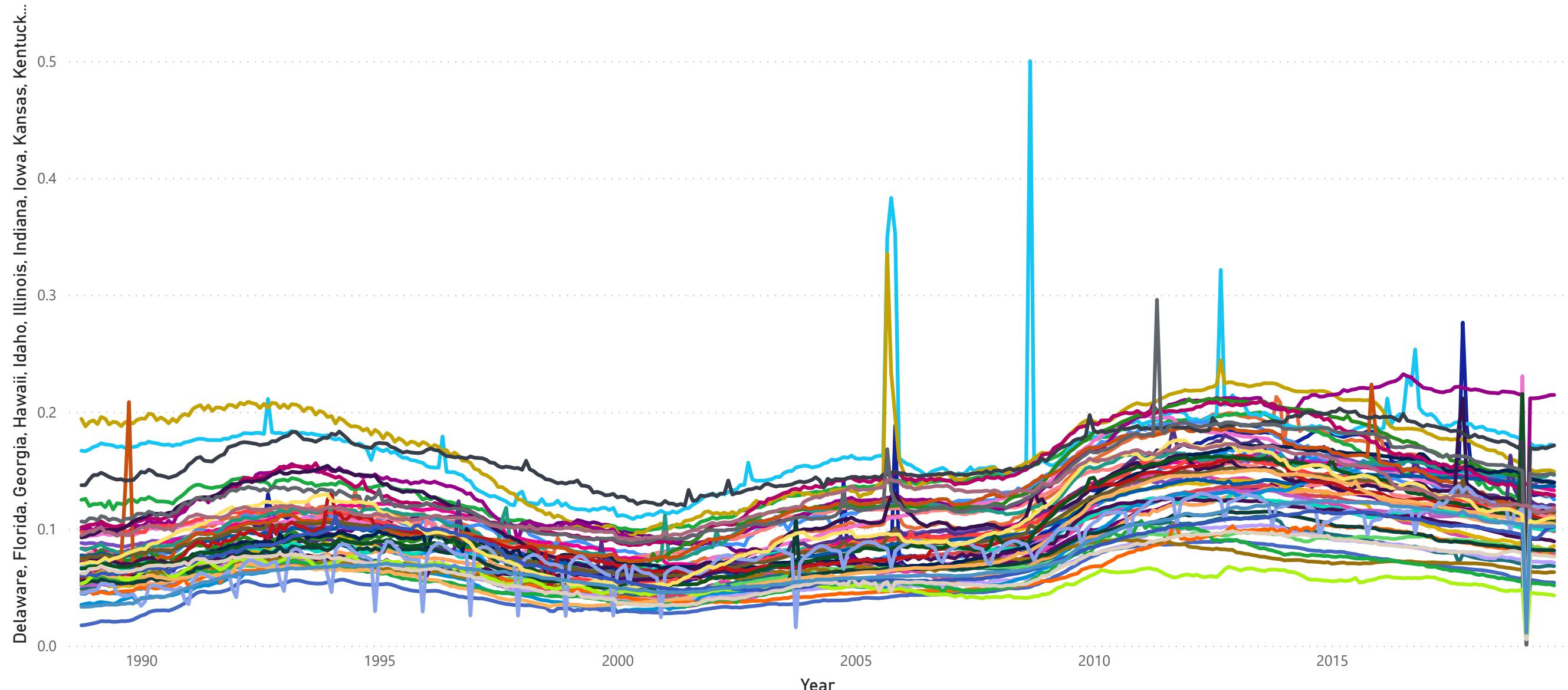
### **Max and Average Values**

The national participation rate peaked around September 2012 with a max of **15.16%** of the population participating in the SNAP programs. The average participation from 1975 to 2019 is **9.62%** of the population.

# State Participation Rate (Percent of State Population)

Delaware, Florida, Georgia, Hawaii, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, Nevada, New Hampshire, New Jersey, New Mexico, New York, North Carolina, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Texas, Average of United States, Utah, Vermont, Virginia, Washington, West Virginia, Wisconsin, Wyoming, Alabama, Alaska, Ari...

Delaware ● Florida ● Georgia ● Hawaii ● Idaho ● Illinois ● Indiana ● Iowa ● Kansas ● Kentucky ● Louisiana ● Maine ● Maryland ● Massac... ● Michigan ● Minnes... ● Mississi... ● Missouri ● Montana



## **Analysis**

### **Spikes in Data**

There are multiple large spikes in the data during 1989, 2003, 2005, 2008, 2011, 2012, 2016, and 2017. These spikes are for South Carolina, Virginia, Texas, Louisiana, Mississippi, Alabama, and Florida which are all Coastal states. Each of these spikes corresponds with a major tropical storm or hurricane. The most surprising spike is in Louisiana in 2008 during hurricane Gustav when half of the population of Louisiana (2.2 million people) participated in SNAP.

### **Alaska Participation Rate Oscillation**

I am still working on finding an explanation for the oscillation in the Alaska data. One clear pattern that stands out is the bottom of each oscillation occurs between October and December which are the coldest months in Alaska. Perhaps these oscillations are caused by people requiring food assistance to combat high food prices in the winter. Perhaps these oscillations are caused by people requiring food assistance because they cannot collect from sources such as home gardens and hunting, so they must turn to buying food.

### **High Gulf Coast Participation Rates in the Early 90s**

<https://www.latimes.com/archives/la-xpm-1990-05-13-mn-82-story.html>

This is a link to an interesting news article from the 90s about third world like conditions in Mississippi. The article describes the "poisionous disease" of illiteracy and the lack of jobs in the Mississippi delta.

## National Benefit Per Peson Adjusted for Food Price Inflation by Year and Month

National Benefit Per Peson Adjusted for Food Price Inflation

0.8

0.6

0.4

0.2

1970

1980

1990

2000

2010

Year

0.8  
0.6  
0.4  
0.2  
0.0

1970 1980 1990 2000 2010

Year

## **Analysis**

### **Spikes in Data**

These spikes in 2019 are caused by changes in the distribution of SNAP benefits due to a pending government shutdown. See analysis for Q1 for more information.

### **Rapid Increase in Benefit Per Person at the Onset of the Financial Crisis**

The rapid increase in the benefit per person is caused by two changes.

1. The nominal benefit per person increased (i.e the government gave out more money)
2. The price of food decreased as a result of the financial crisis.

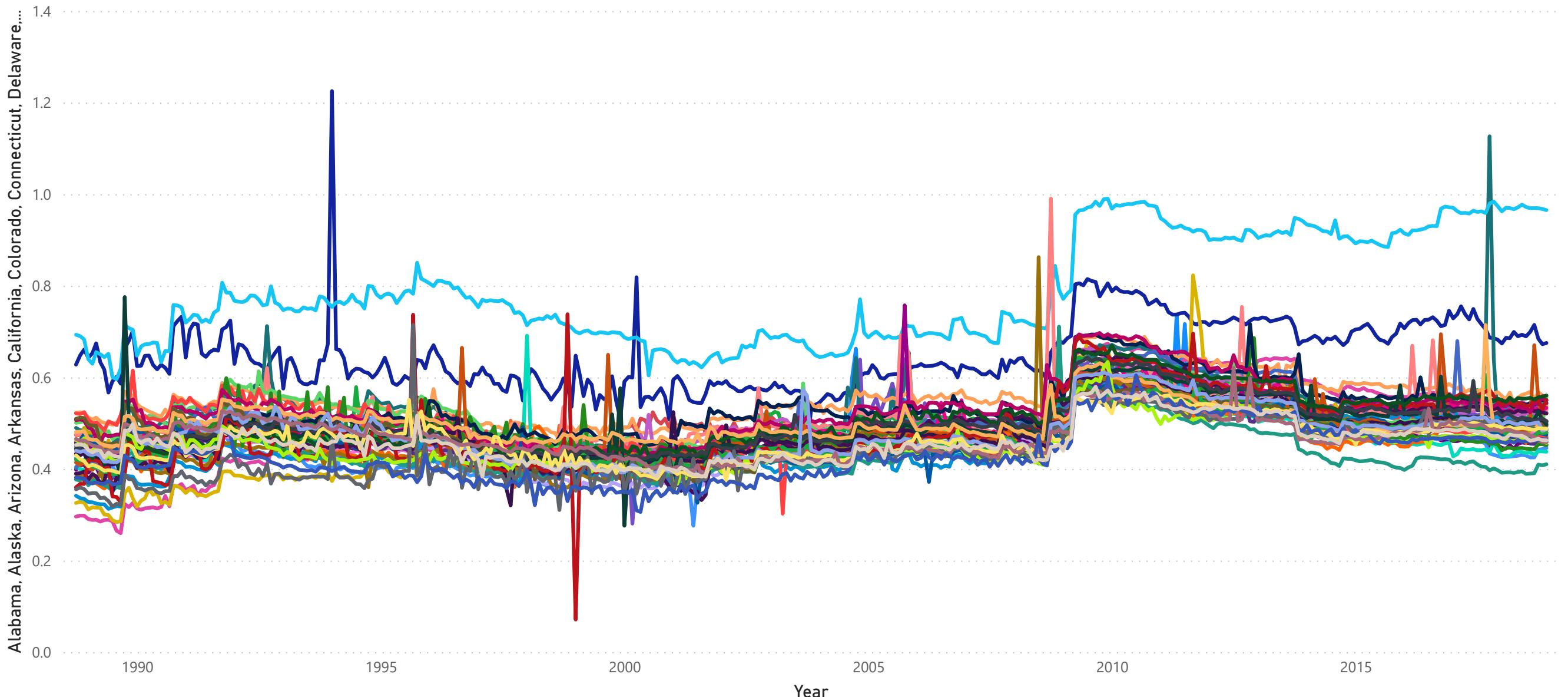
### **General Trend in Benefit Per Person**

Based on food price data used in the statistics calculation notebook (see [github python notebooks](#)), the price of food has increased 6 fold since 1968. Despite this massive increase in price, the US government has generally increased the amount of real benefit per person over time and even given more benefit during times of dire need such as the financial crisis.

# State Benefit Per Person Adjusted for Food Price Inflation

Alabama, Alaska, Arizona, Arkansas, California, Colorado, Connecticut, Delaware, Florida, Georgia, Hawaii, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, Nevada, New Hampshire, New Jersey, New Mexico, New York, North Carolina, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Texas, Utah, Vermont, Virginia, Washington, West Virginia, ...

Alabama ● Alaska ● Arizona ● Arkansas ● California ● Colorado ● Connecticut ● Delaware ● Florida ● Georgia ● Hawaii ● Idaho ● Illinois ● Indiana ● Iowa ● Kansas ● Kentucky ● Louisiana ● Maine ●



## **Analysis**

### **Hawaii and Alaska High Benefit Per Person**

The benefit per person adjusted for the price of food for Hawaii and Alaska is most likely overstated. These states are considered to be apart of the "West" region of the BLS data. These two places have very high costs of living, thus their food costs are most likely much higher than the average food cost of the "West" region.

### **Spikes in Data**

Many of the spikes in the data correspond with the hurricane years mentioned in the analysis for Q2. Based on data used in the statistics calculation notebook, the price of food did not fall during these hurricanes. Thus, the hurricane affected states drastically increased their benefits per person during these times. The Alaska spike in 1994 appears to be caused by erroneous data.

### **Financial Crisis Increase in Benefit Per Person**

See the Q3 analysis for an explanation on the increase in benefit per person during the financial crisis.

## **Q5 and Q6 Analysis**

### **States with Highest Participation Rate**

The states with the highest participation rate are as follows:

Mississippi	0.168232
Louisiana	0.166691
West Virginia	0.161833
New Mexico	0.147681
Tennessee	0.141531

The top two states experienced large spikes in participation rate during several hurricanes, thus this affects their ranking in the above list. However, even during non-hurricane times Louisiana and Mississippi still have some of the highest participation rates (see graph for Q2)

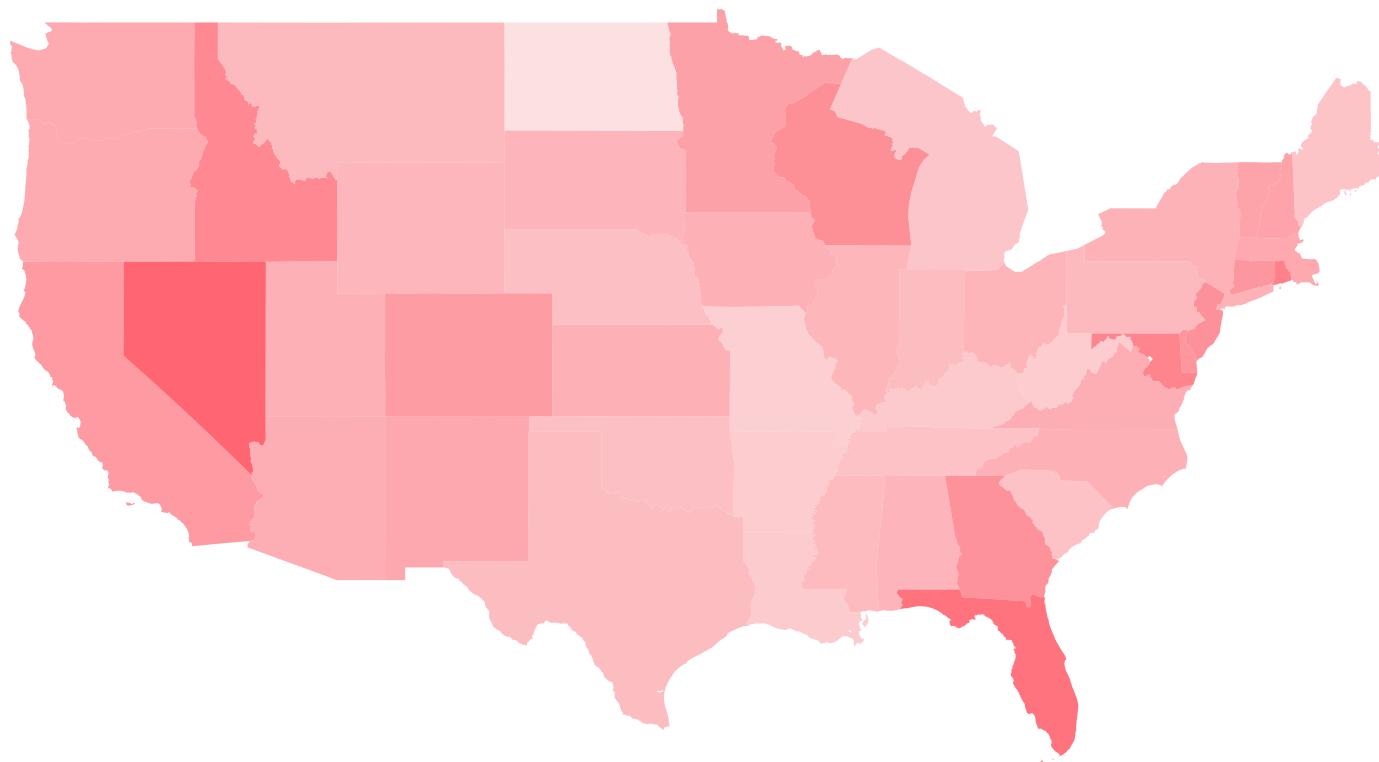
### **States with Highest Benefit Per Person**

The states with the highest benefit per person are as follows:

Hawaii	0.794656
Alaska	0.650418
Illinois	0.556779
Ohio	0.546941
New York	0.530200

Again, the top two states may have a high ranking because their costs of food are much higher than their regional average.

## Change in Participation Rate 2008-2013 by State



## **Analysis**

### **Florida and Nevada Large Changes in Participation Rate**

<https://eml.berkeley.edu/~yagan/Hysteresis.pdf> page 20

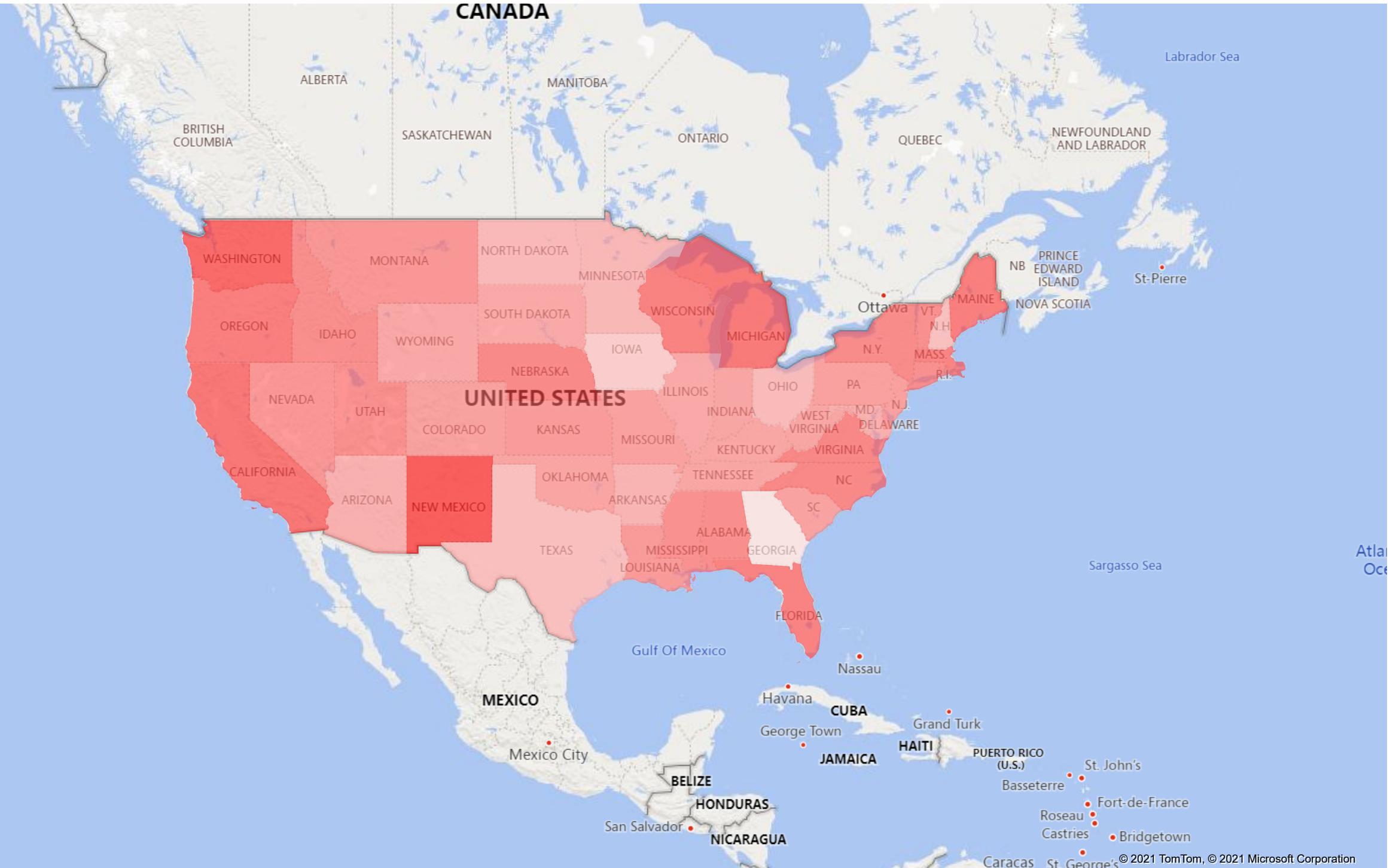
The above link is to a research paper written by Danny Yagan of Berkeley. In this paper Yagan shows that Florida and Nevada both experienced the largest shocks to employment as a result of the financial crisis. When people become unemployed they require assistance to purchase food, hence the increase in participation rates in these states.

### **Relationship with Employment Shocks**

After inspecting the map on page 20 of the above link, it is clear there is a strong relationship between a state's shock to employment and that same state's change in participation rate for SNAP. Again, this relationship is expected as unemployed individuals are more likely to need assistance to purchase food.

## Change in Benefit Per Person 2008-2013 by State

## Gulf of Alaska



## **Analysis**

### **Correlation between Change in Participation Rate and Change in Benefit Per Person**

The correlation between the change in the participation rate by state and the change in the benefit per person by state was lower than expected. In fact, in the change in the participation rate in Georgia from 2008-2013 was 100%, however, the change in the benefit per person was -5%. This negative change in benefit per person was caused by food prices increasing faster than the monetary value of the benefit.

## **Further Questions**

The prior 8 analysis have led to some interesting questions that deserve further exploration.

1. Do states increase benefits during times of disaster (i.e. hurricanes and financial crises)?
2. What causes the Alaska participation rate oscillation?
3. Why were there third-world like conditions during the 90s in Mississippi and possibly neighboring Gulf Coast States?
4. Is the government required to maintain or increase SNAP benefits in relative to food inflation?
5. Was the change in the price of food during the financial crisis caused by a lack of demand, speculation in futures markets, or another source?
6. What determines a state's benefit per person?
7. For the states that had low changes in benefit per person from 2008-2013, were these changes low because the benefit provided was already adequate for the average person? Is there another reason?
8. For the states that had high changes in benefit per person from 2008-2013, were these changes high because the benefit provided at the onset of the financial crisis was not adequate? Is there another reason?