STAT515 – USA MINIMUM WAGE BY STATES

GROUP 10

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Introduction:

Data Visualization is a graphical portrayal of data and information. By utilizing visual components like graphs, charts and maps, data visualization tools give us an available method to see and get patterns, exceptions, and examples in information. Our eyes are attracted to tones of visual. Our way of life is visual, including everything from workmanship and commercials. Information Visualization is another type of visual workmanship that snatches our advantage and keeps our eyes on message. At a point when we see a diagram, we rapidly see patterns and anomalies. This project is about visualizing and analyzing the USA minimum wage by State from 1968 – 2020. The supreme purpose to standardize the minimum wage was to ensure that workers would practice a minimum quality of living which would protect their health and well-being. Minimum wage is set by federal and state government and an employee who is subject to both state and federal minimum wage laws, is entitled to receive the higher among the two minimum wages. Our team would like to explore how minimum wage defined by both federal and state government has changed over the years in different states of United States (Department of Labor, 2020).

About the Dataset:

The source for the dataset is from Kaggle website. The dataset consists of minimum wages from the year 1968 to 2020 for all the states. The dataset also includes data like State Minimum wage, State Minimum wage 2020 dollars, Federal Minimum wage, Federal Minimum wage 2020 dollars, Effective Minimum wage, Effective Minimum wage 2020 Dollars, Consumer Price Index average, Department of labor low and high values, Department of labor low and high values 2020 dollars and foot notes to add more context to the minimum wage as the law varies to each state. This dataset is a CSV file (Joem, 2020).

Data Selection and Cleaning:

Our team has analyzed the dataset and found few unnecessary data in the dataset sheet. So, we have done some data cleaning by removing unnecessary data variables which have no impact on the output variable i.e. we have dropped Effective Minimum wage 2020 Dollars, Federal Minimum wage 2020 dollars, Department of labor low and high value 2020 dollars. To get proper visualization we selected the State minimum wage, federal minimum wage, Effective minimum wage, and CPI average for all the states through 1968 – 2020 years, also we created minimum hour worked by a person per month.

SOFTWARE AND PACKAGES:

We have used R studio, R Markdown as software. In R Studio, R Markdown we have installed and loaded packages like micromapST, tidyverse, plotly and many more in order to produce visualizations. Firstly, we cleaned the dataset and read into R Studio as data frame and then by implementing necessary code we get the required visualizations.

Data Visualization:

Our key factor to visualize the data is to find out how the minimum wage of each state is being changed year by year. Also, to find which factors are impacting the minimum wage for each state. Firstly, we have plotted a complete US map (Figure 1) for minimum wage in the year 2020. This map is not audience friendly as the map shows only variation in colors (min_wage) for each state without labels, title, wage value representation for each state. It makes the cognitive processing difficult.

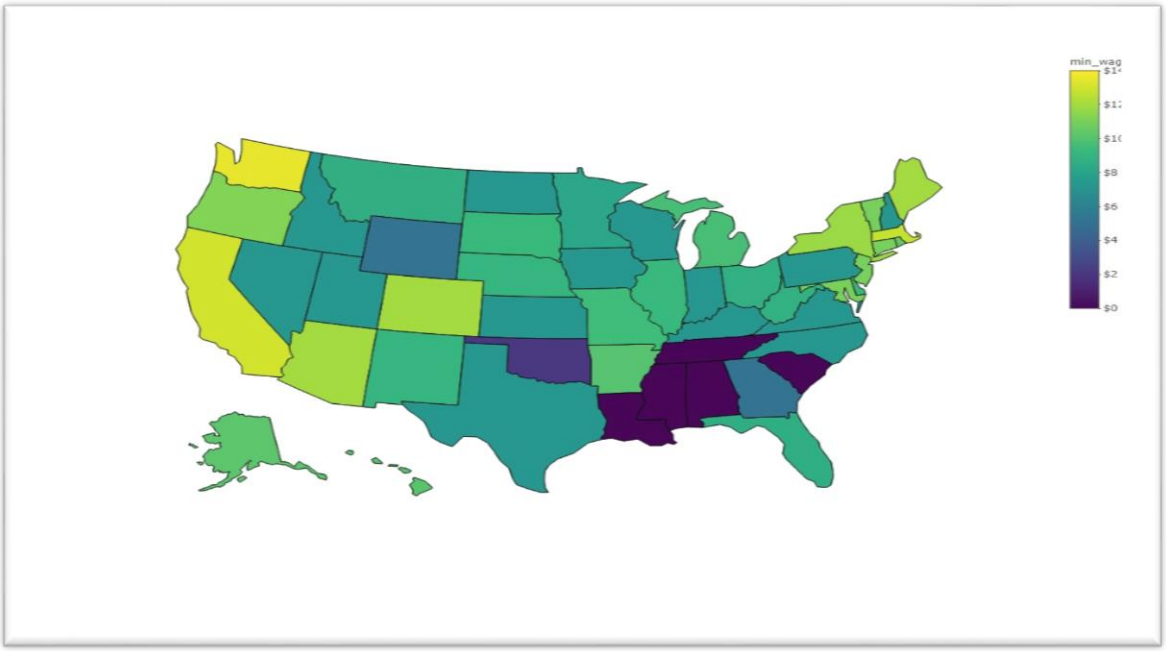

Figure 1: Original Visualization Created

(Washington post, n.d.)

A summary of our group's specific tasks in context of the STAT 515 criteria are presented in the simplified appearance, which supports interpretation to facilitate hypothesis generation, and to attract and engage the reader/analyst sections below.

Visualization using Linked MicroMap for all states for 1968 and 2020 years:

The connected micromap designs bundle gives a simple and snappy methods for making connected micromaps for any assortment of geologically related zones. The micromapST bundle utilizes the standard illustrations and RColorBrewer bundles to quickly make profoundly intelligible connected micromap plots. This enables the user to investigate various perspectives of their information rapidly. The micromapST utilizes the boundary and name data contained in line bunch datasets to characterize the geological territories utilized in making the connected micromaps.

The main aim of redesigning the graph is to make it understandable by anyone who is not aware of the content. The linked micromap is the best package to represent the data without confusing. The below figure represents the Analysis of how much effective minimum wage has changed in 1968 and 2020 for all the states in USA. Also used, rowNamesCol argument that indicates column with the region names, along with rowName and Plot name arguments. For easy understanding at the first counter, we have used the map type called ‘map’. This plot enables us to make accurate comparisions between 1968 and 2020 by simplifying the appearance with the help of bar plots and engaging the audience with less cognitive processing.

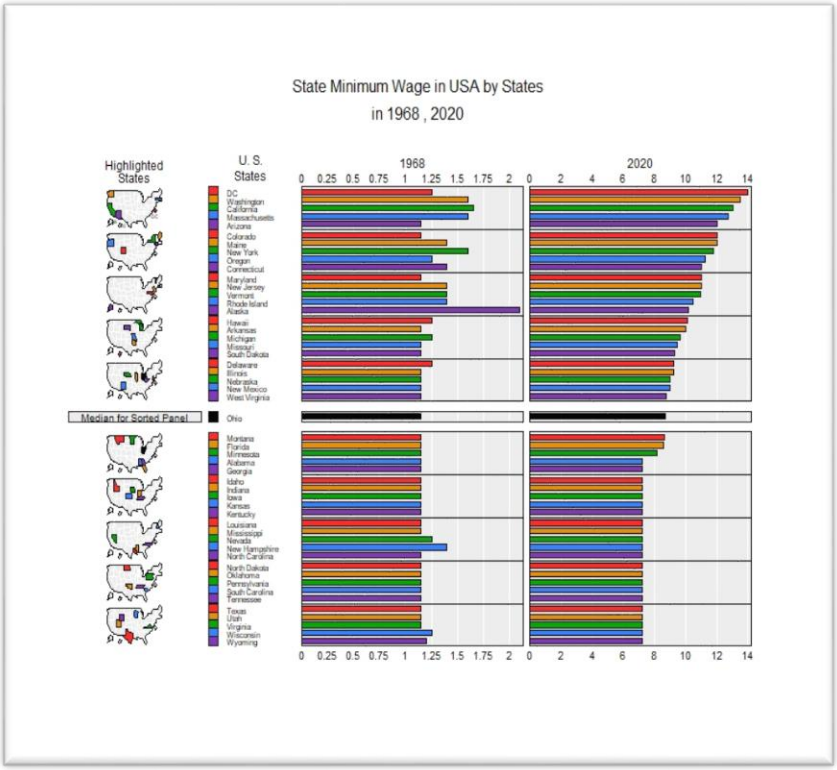

Figure 2: Linked MircroMap Bar Plot

Choropleth Map representing states of USA whether their effective minimum wage is either federal or state:

Effective minimum wage refers to the minimum wage adapted by a state and is the higher one among the minimum wage set by state and federal. In 1968, around 15 states were following effective minimum wage which was defined by their own states. The federal minimum wage in the year 1968 was 1.15 dollars and 15 states had higher minimum wage than the federal minimum wage.

Whereas, by the year 2020 few more states were added to the list of states whose effective minimum wage is the one set by the state and also, we notice that 15 states flipped from federal to state minimum wage. As a result, more than 20 states are currently having the effective minimum wage defined by their own state. The federal minimum wage has risen from 1.15 dollars to 7.5 dollars since 1968 to 2020 respectively.

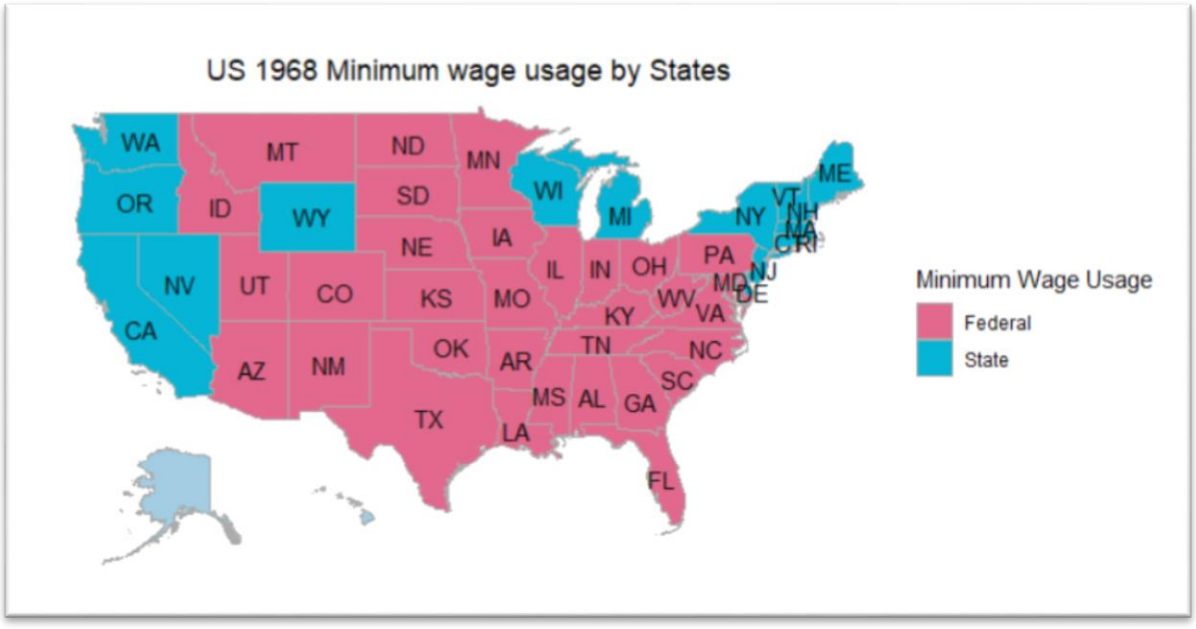

Figure 3: State Choropleth – 1968

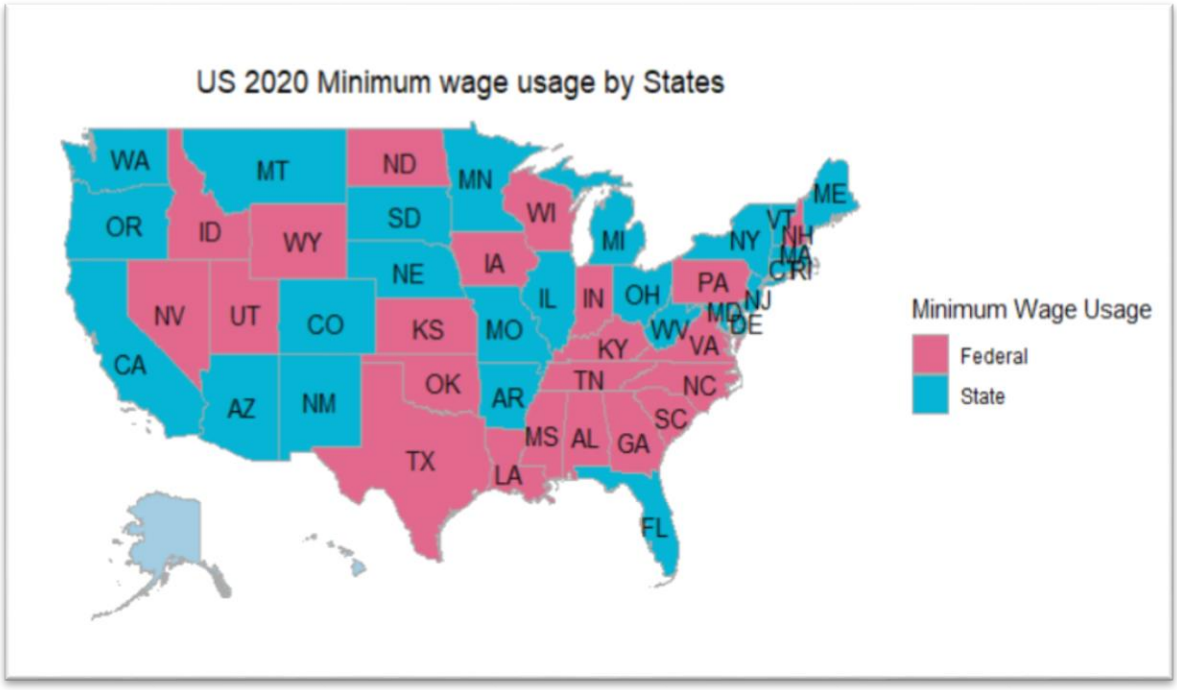

Figure 4: State Choropleth – 2020

Top 5 States with Highest Minimum Wage in (1968-1995) and (1995-2020):

The intention for creating this visualization is to find out how the effective minimum wage increased from 1968-1995 and 1995-2020. We have chosen these top 5 states of 1995 with high effective minimum wage to watch the trend. In 1968-1995, the top 5 states with high effective minimum wage are namely Alaska, Hawaii, Lowa, New Jersey, Oregon with effective minimum wage less than 5$. From 1995-2020, the top 5 states with high effective minimum wage are namely Arizona, California, District of Columbia, Massachusetts, Washington with effective minimum wage greater than 4 and touched almost range of 12-15 in 2020.

We are using functions namely ggplot(), geom_line(), geom_point() to show the shift of effective minimum wage from 1968-1995. Function ggplot() takes each component of a graph i.e., axes, scales, colors, objects, etc., and allows us to build graphs up sequentially one component at a time. When components are unspecified, it uses sensible defaults. This makes this function flexible and powerful for creating all kind of graphs in R.

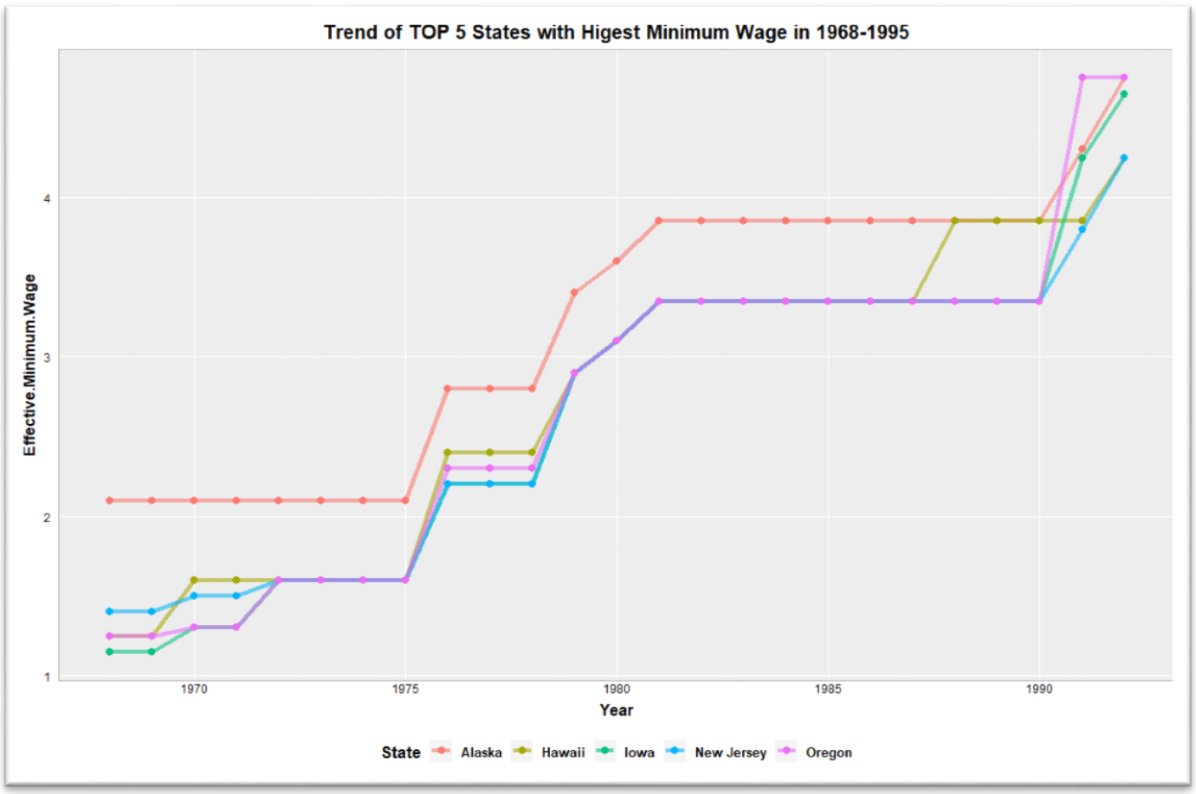

Figure 5: Top 5 States – 1995

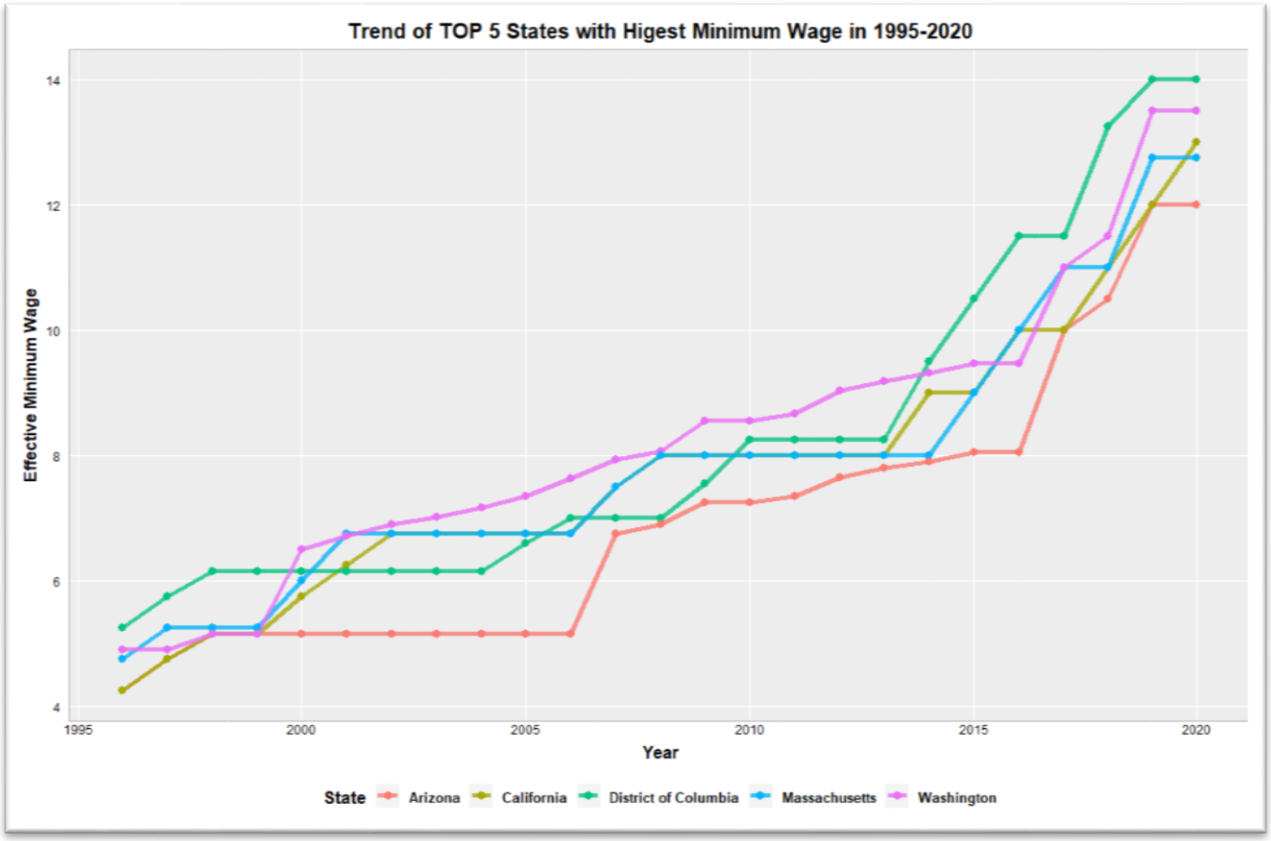

Figure 6: Top 5 States – 2020

Bottom 5 Effective Minimum Wage VS CPI Average:

From the below visualization, we are trying to find out if the states having lowest minimum wage in 1968 can cover the CPI Average with the Minimum Wage, they are provided on a monthly basis in three distinct years namely, 1968, 1995, 2020. CPI Average is nothing but the total of basic living, food and transport charges. In 1968, the minimum wage is 92$ and 34.8$ as the CPI Average for Alabama, which says they are just left out with balance of only 57.2$ per month. By 2020, the minimum wage is 580$ and 258.66$ as the CPI Average for Alabama, and this says they are left out with balance of 321.34$ per month, which portrays that Quality of Employee living is hugely grown. We have used Grouped Column Chart here because all the columns have the same baseline, so it is much easier to compare the heights of CPI Average and Effective Minimum wage in each State Column in comparison with the Dollar amount on y-axis. We have used ggplot(), geom_bar(), geom_text(), facet_wrap() to compare whether bottom five states average monthly effective minimum wage is balanced with CPI avg.

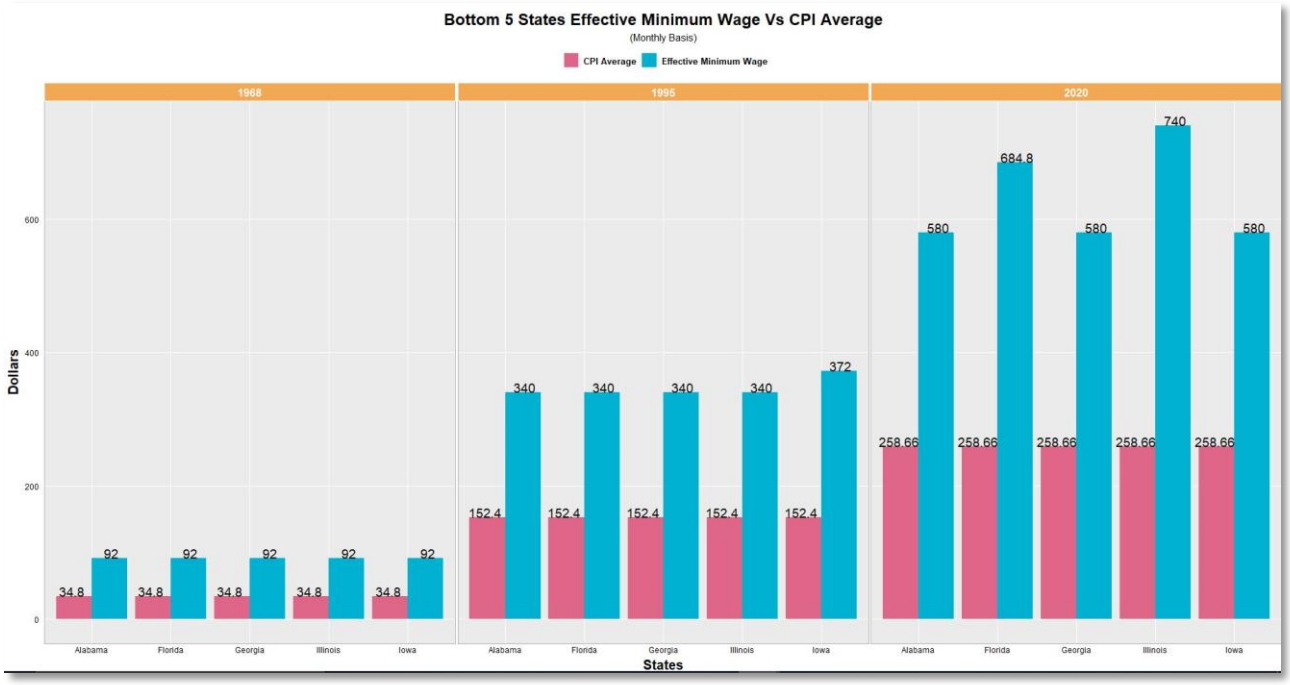

Figure 7: Effective Min Wage VS CPI Avg.

(Doyle, 2021)

Conclusion:

After redesigning an incomplete graph and adding additional visualization to analyze and get an in-depth insight on how minimum wage is varying across states in USA over a span of 52 years, with the following understanding that minimum wage has constant change over the years due to increase in the consumer expenditure and basic standard of living. In the year 2004 there was a tremendous change in states that flipped from using federal minimum wage to state minimum wage. Finally, we can conclude that there was a massive spike in USA economy after the year 1995, which lead to an increase in effective minimum across the states.

References

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