

Covid-19 and the Economy

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Overview:

In 2020, the Covid-19 virus plagued the world, triggering lockdowns and public restrictions, causing impacts to global economies never before seen. While the effects of this pandemic are well known, we will look at prevalence of the disease and reactions by the government in order to examine the impact to air travel,

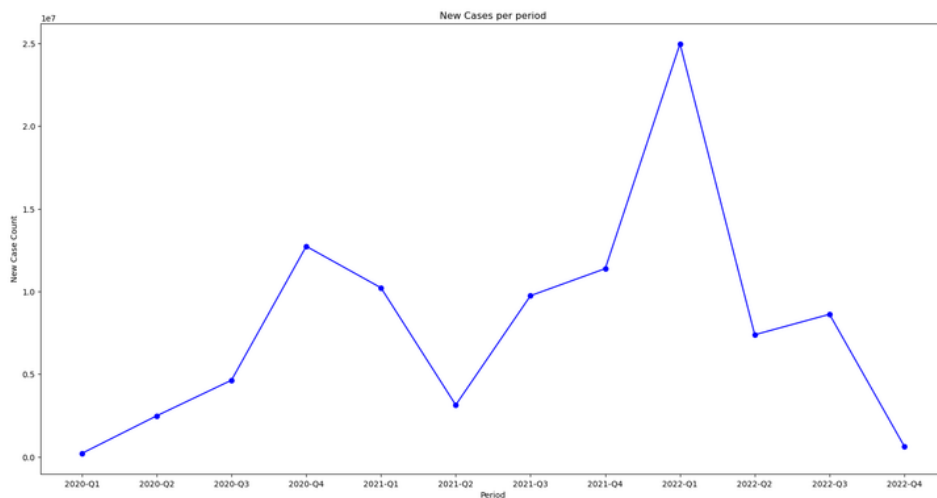
economic performance, and how recovery efforts are progressing. Using data from various sources, we will review trends leading up to and through the pandemic (2019-2022). We will also analyze 2020 across different milestones that occurred in the US response to the ongoing pandemic.

Questions:

- How was air travel impacted overall and regionally by the pandemic?
- Were there defining moments in time that had the biggest effect positively or negatively?
- Did government actions have an impact on the disease and did those impacts translate to changes in economic performance?
- Were there areas within industries that helped to buoy or drag down that sector more than others?
- Which industries and areas have experienced the most change since the pandemic?
- Were there differences in performance regionally across the US?

Covid Cases

In order to establish the covid impact for our analysis, we decided to determine the number of new cases being reported to the CDC per period of time. We believe that the number of new cases is representative of the spread of the virus and by sectioning the data into quarters we are able to see the trend without incorporating the less significant swings seen in smaller units of time. The use of quarters also made the data more comparable to other data used in our analysis.

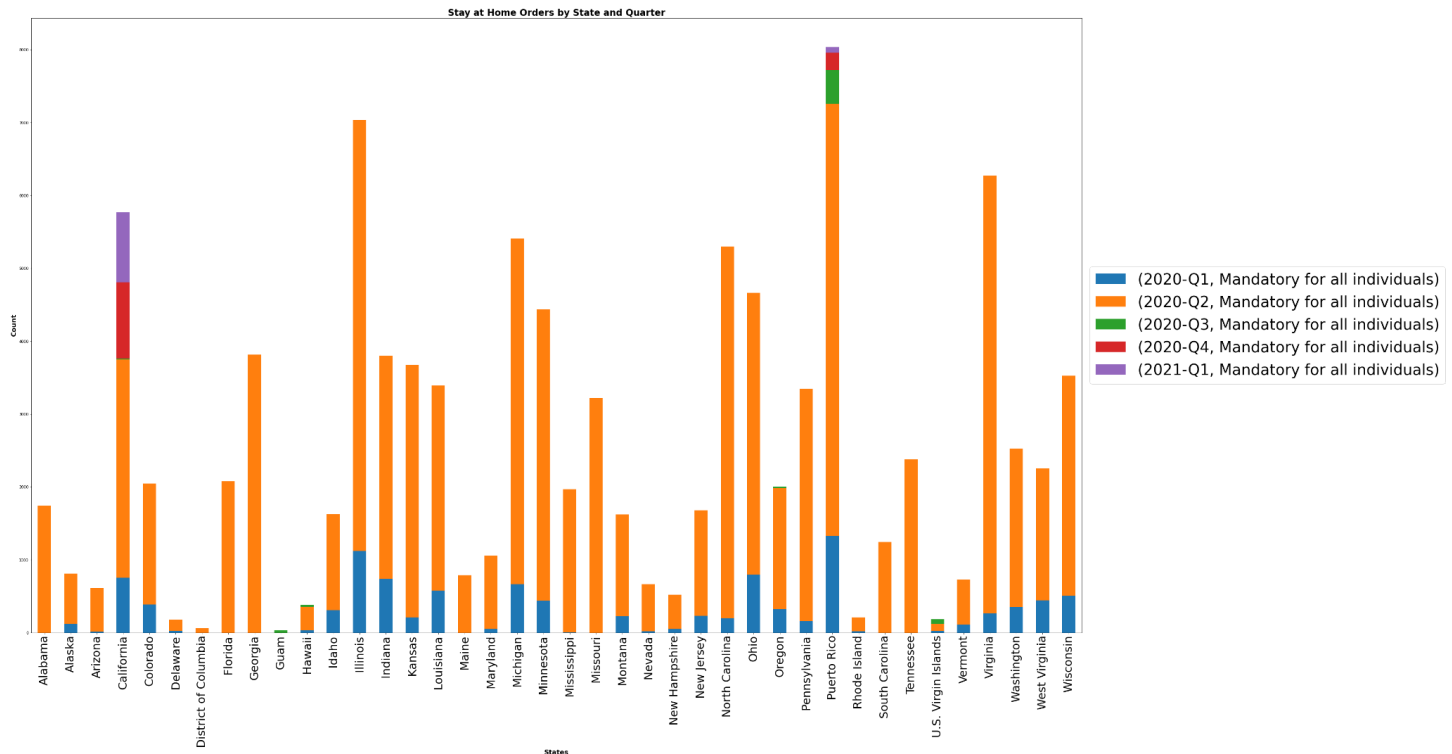


Quarter	Sum of New Case Count	% Change
2020-Q1	212,138	
2020-Q2	2,482,590	1070%
2020-Q3	4,635,040	87%
2020-Q4	12,733,265	175%
2021-Q1	10,224,559	-20%
2021-Q2	3,137,306	-69%
2021-Q3	9,746,680	211%
2021-Q4	11,383,831	17%
2022-Q1	2,497,034	-78%
2022-Q2	7,385,358	196%
2022-Q3	8,622,030	17%
2022-Q4	641,828	-93%

After examining the data, we were able to recognize the steady increase of covid cases during 2020. There is a decline in the beginning of 2021 as vaccines are made widely available then a sharper increase towards the beginning of 2022 and end of 2021, This increase in infections could possibly be due to the increase in holiday travel which will be explored in our later analysis on air travel. There is a decline in 2022 which may indicate more immunity but could also be a result of the distribution of at-home test kits to the public (announced March 2022). With greater access to at-home testing and a decrease in severity of symptoms due to immunity and vaccinations, the reporting of covid cases may be underrepresented in the following periods. We recognize this as a limitation of the data and chose to focus our following analysis on the years prior to 2022.

State and Government Response

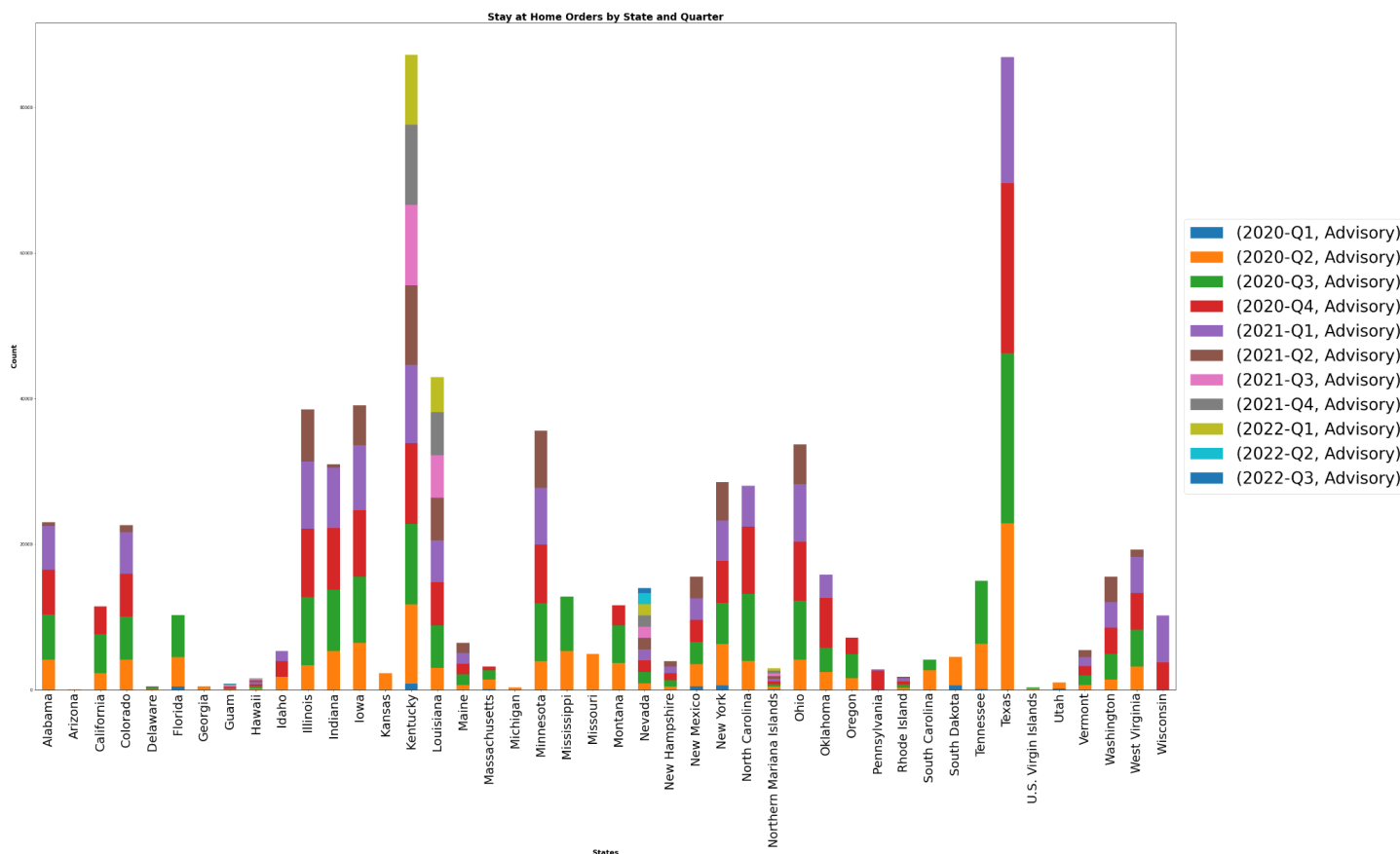
In response to increasing Covid-19 cases the states and the U.S Government implemented stay-at-home orders. This data provides information on the stay-at-home-orders and is divided into quarters for a better understanding of when the orders were implemented.



The above bar graph shows the number of **mandatory** stay-at-home orders implemented in each state and territory during each quarter of the pandemic.

Overall, the graphs demonstrate that there was a significant increase in the number of mandatory stay-at-home orders implemented in the **second quarter** of 2020, represented with the orange color.

It also shows that the number of mandatory stay-at-home orders decreased significantly after the third quarter of 2020, with **only** California and Puerto Rico implementing new mandatory orders during the fourth quarter of 2020 and the first quarter of 2021.



The second bar graph shows that there were still a significant number of **advisory** stay-at-home orders implemented in many states and territories in the **third** and **fourth** quarters of 2020, with Texas and Kentucky having the most advisory orders overall. Although, these two states did not have any mandatory stay-at-home orders at all.

In summary, the dataset and bar graphs provide valuable information on the stay-at-home orders implemented in the US during the Covid-19 pandemic and demonstrate the shift from mandatory to advisory orders. We notice that different states had different approaches to stay-at-home orders, with some implementing more orders than others, and with different timelines for implementing and ending orders.

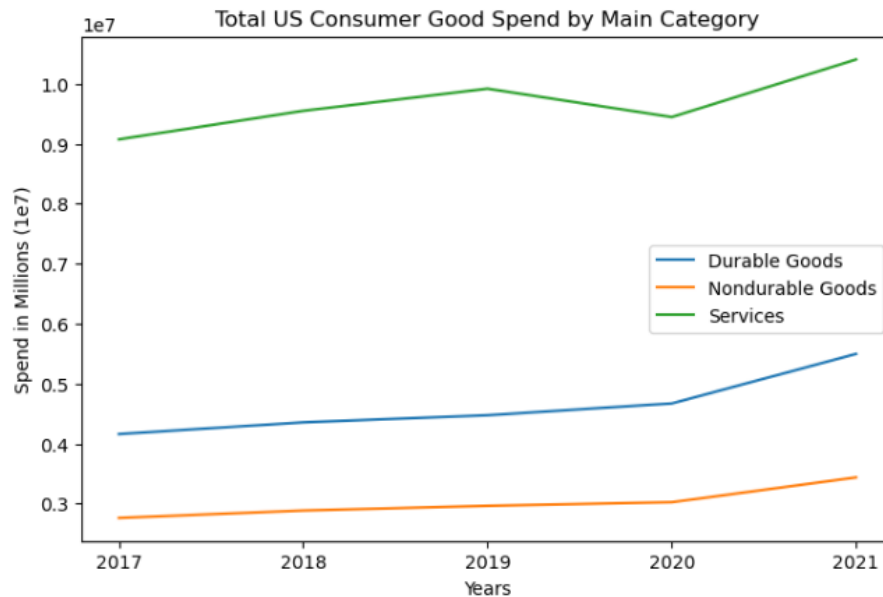
(Overall, the analysis suggests that stay-at-home orders were a common response to the Covid-19 pandemic, but the specific approach varied by state and over time.)

Next we will see the impact of the stay-at-home-orders in different sections of the U.S. economy.0

US Consumer Spending Patterns

Looking at consumer spending, we analyzed three main categories at the total United States level, broken down by region and then at lower-level categories of interest, identifying which areas fell the most during the pandemic and which rebounded the most following pandemic.

Total US Performance



Category definitions:

- Durable goods: Goods not meant for immediate use that can be kept over time, including things like vehicles, appliances, sporting goods, books, jewelry and more.
- Nondurable goods: Also called soft goods, have a shorter life expectancy or are for near-term use, including food, alcohol, clothing and footwear, household supplies and similar items.
- Services: a non-tangible good or work that someone purchases, including household utilities, healthcare, memberships, transportation and travel.

US spend in all categories had been on a rising trend heading into the pandemic. Even into the pandemic, the only category that dropped was Services (dropping 5% annually), while both Durable and Nondurable goods continued to increase. All three categories increased at a higher rate following the pandemic, recovering the slower pace or loss experienced during the pandemic. Durable goods led the way with a 25% year-over-year increase, while nondurable goods increased 14% and services increased 10%.

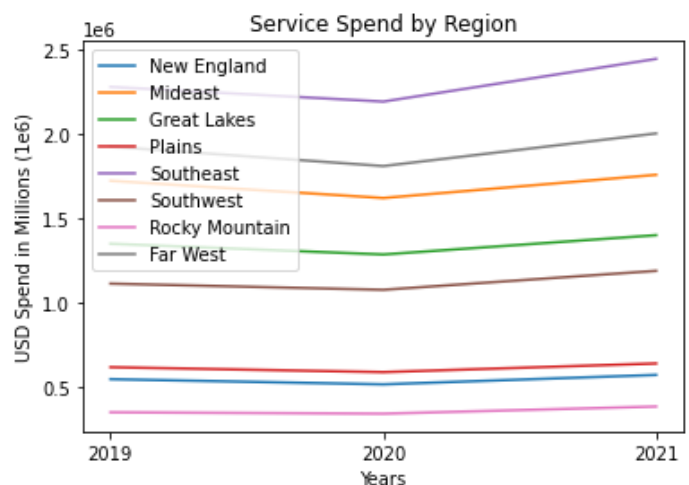
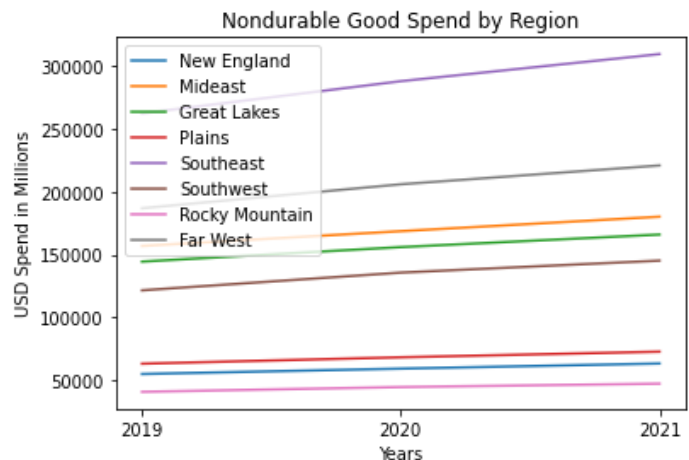
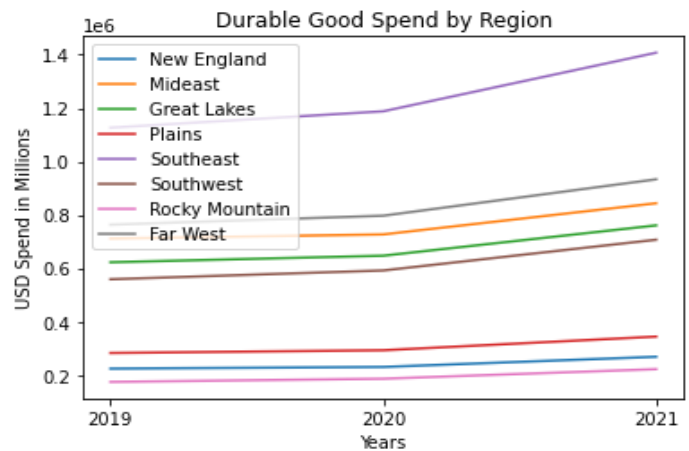
Regional Consumer Spending Patterns

When looking at the regional spend over the same macro categories, no discernable outliers were detected. The overall year-over-year trends remained similar to the overall decreases and increases over the timeframe of 2019-2021

Even though the Southeast appears to have outpaced other regions in its increase, the annual year-over-year breakdown for durable goods was:

The Regional Change 2020-2021 for Durable Goods

- New England:17%
- Mideast:16%
- Great Lakes:18%
- Plains:17%
- Southeast:18%
- Southwest:19%
- Rocky Mountain:19%
- Far West:17%



US Spend by Sub-Categories

While the major categories did not seem to take a major hit due to the pandemic, not every category was a winner. Looking within select sub-categories, some sank significantly while others have made incredible rebounds.

Durable Goods

Within this category, eight sub-categories were selected: New motor vehicles, Net purchases of used motor vehicles, Furniture and furnishings, Household appliances, Video, audio, photographic, and information processing equipment and media, Sporting equipment, supplies, guns, and ammunition, Therapeutic appliances and equipment, Telephone and related communication equipment.

When analyzing annual performance:

- 2020 Covid Impact
 - Telephone and related communication equipment dropped the most during Covid by **-16.9%** YoY
 - Sporting equipment, supplies, guns, and ammunition gained the most during Covid by **27.7%** YoY
- 2021 Covid Recovery
 - Household appliances recovered the least by **17.6%** YoY
 - Net purchases of used motor vehicles recovered the most by **50.6%** YoY

Nondurable Goods

Within this category, seven sub-categories were selected: Food and nonalcoholic beverages purchased for off-premises consumption, Alcoholic beverages purchased for off-premises consumption, Womens and girls clothing, Mens and boys clothing, Clothing and footwear, Personal care products, and Tobacco.

When analyzing annual performance:

- 2020 Covid Impact
 - Womens and girls clothing dropped the most during Covid by **-11.4%** YoY
 - Alcoholic beverages purchased for off-premises consumption gained the most during Covid by **12.8%** YoY
- 2021 Covid Recovery
 - Tobacco recovered the least by **3.5%** YoY
 - Womens and girls clothing recovered the most by **29.4%** YoY

Services

Within this category, nine sub-categories were selected: Water supply and sanitation, Electricity and gas, Outpatient services, Physician services, Dental services, Membership clubs, sports centers, parks, theaters, and museums, Gambling, Telecommunication services, and Internet access.

When analyzing annual performance:

- 2020 Covid Impact
 - Membership clubs, sports centers, parks, theaters, and museums dropped the most during Covid by **-47.3%** YoY
 - Internet access gained the most during Covid by **3.2%** YoY
- 2021 Covid Recovery
 - Water supply and sanitation recovered the least by **5.1%** YoY
 - Gambling recovered the most by **37.3%** YoY

It's no surprise that memberships took as big of a hit as they did with the stay-at-home orders as well as some public aversion to crowds coming out of the pandemic. Internet access rising also correlates to the rise of work-from-home situations for many employers.

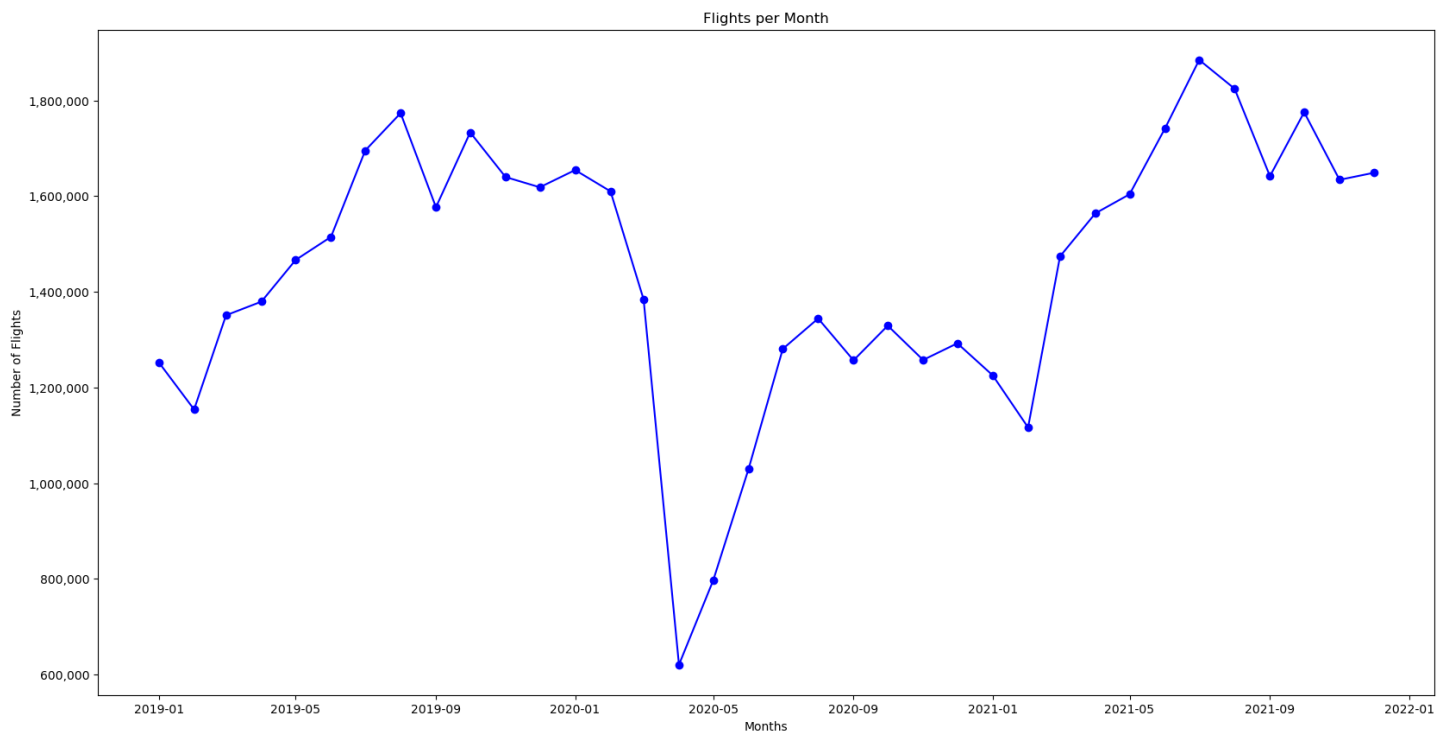
Travel Impacts

Within this category, five sub-categories were selected: Ground, water and air transportation as well as foreign travel by US residents and expenditures in the US by non-US residents.

When analyzing annual performance:

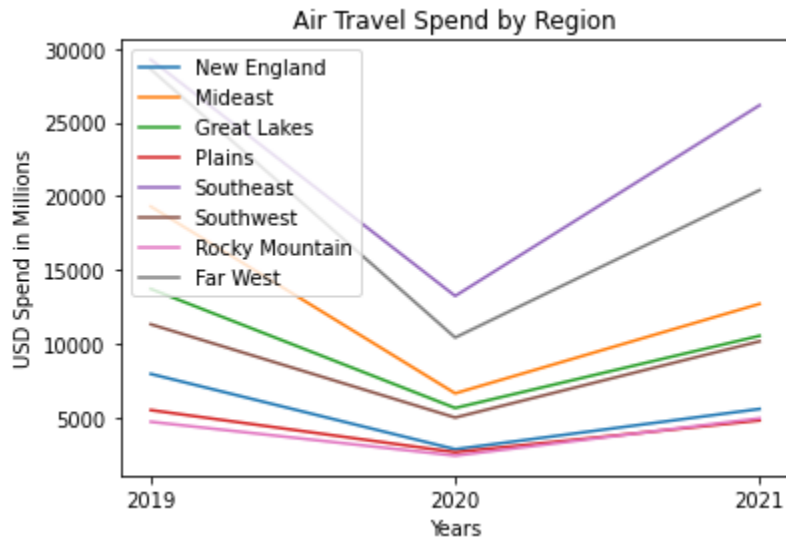
- 2020 Covid Impact
 - Foreign travel by U.S. residents dropped the most during Covid by **-71.8% YoY**
 - Water transportation gained the most during Covid by **-39.3% YoY**
- 2021 Covid Recovery
 - Less: Expenditures in the United States by nonresidents recovered the least by **-2.8% YoY**
 - Air transportation recovered the most by **94.9% YoY**

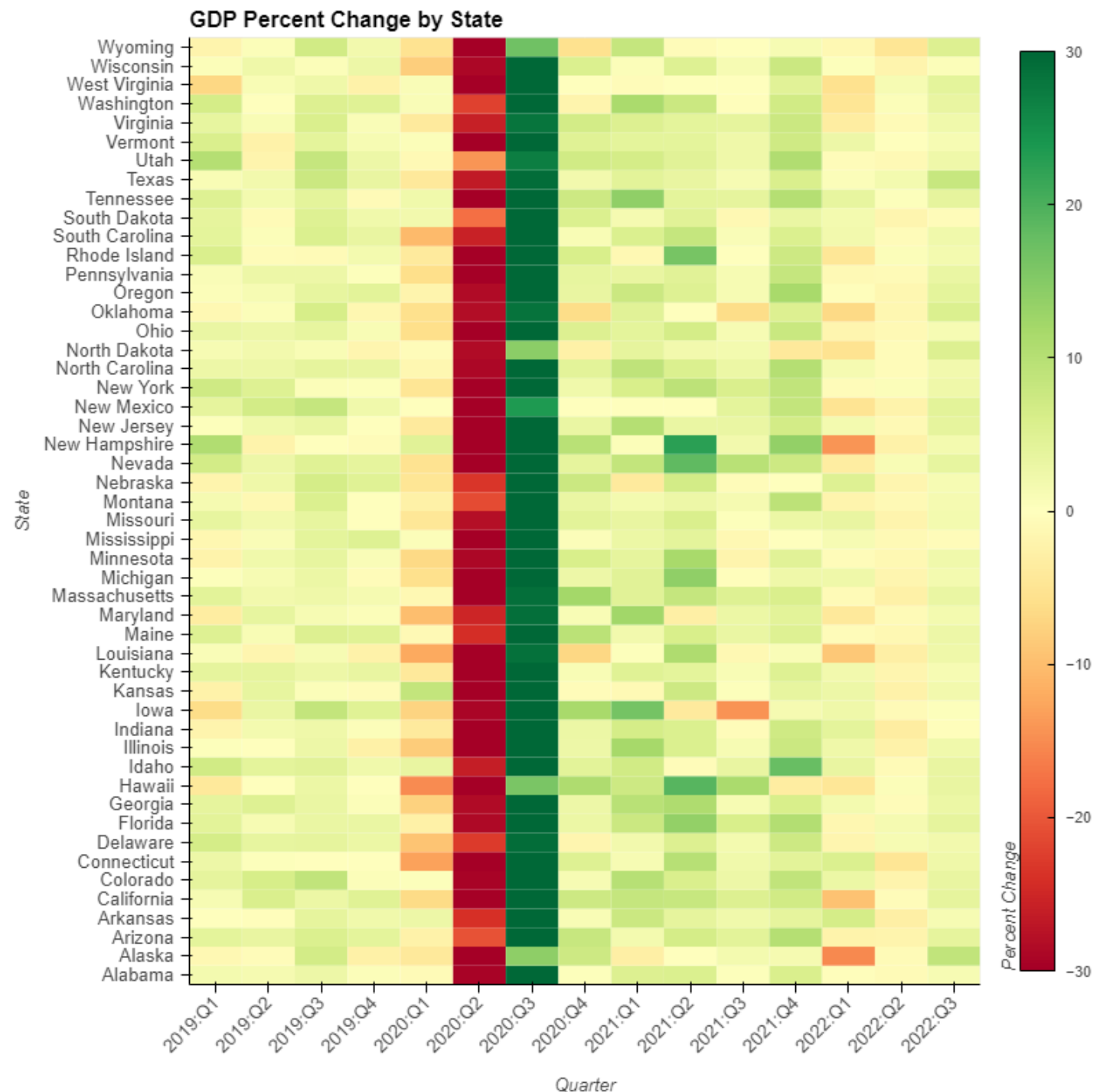
Air Travel



- 2020 Covid Impact
 - Around April to May of 2020 flights dropped from over 1.5 million per month around January to a little over 600,000 flights which relates to the time of stay at home orders and travel hesitancy.

- Regions that saw the greatest spending (Far West - 64% and Southeast - 55%), include popular travel destinations such as Las Vegas, Hawaii and Florida.
- 2021 Covid Recovery
 - Flights seemed to return to around normal levels of over a million flights per month by around June 2020 then rose during Q4 in 2020 to Q1-2 in 2021 even to peak at almost 2 million flights per month which may relate to the spike in covid cases around the same time.





GDP by Industry

Industries that were heavily impacted in Q2 of 2020 were Food Services and Drinking Places, Accommodations, Amusements & Gambling, Arts & Entertainment, Motion Picture & Sound Recording, Water-Truck-Rail-Air & Passenger Transportation, Motor Vehicles & parts, Petroleum products, and Mining & Extraction.

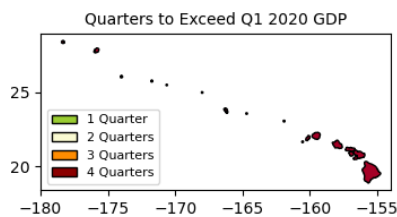
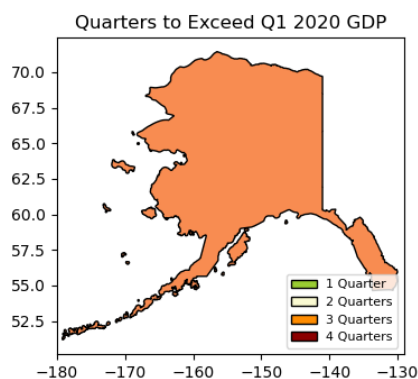
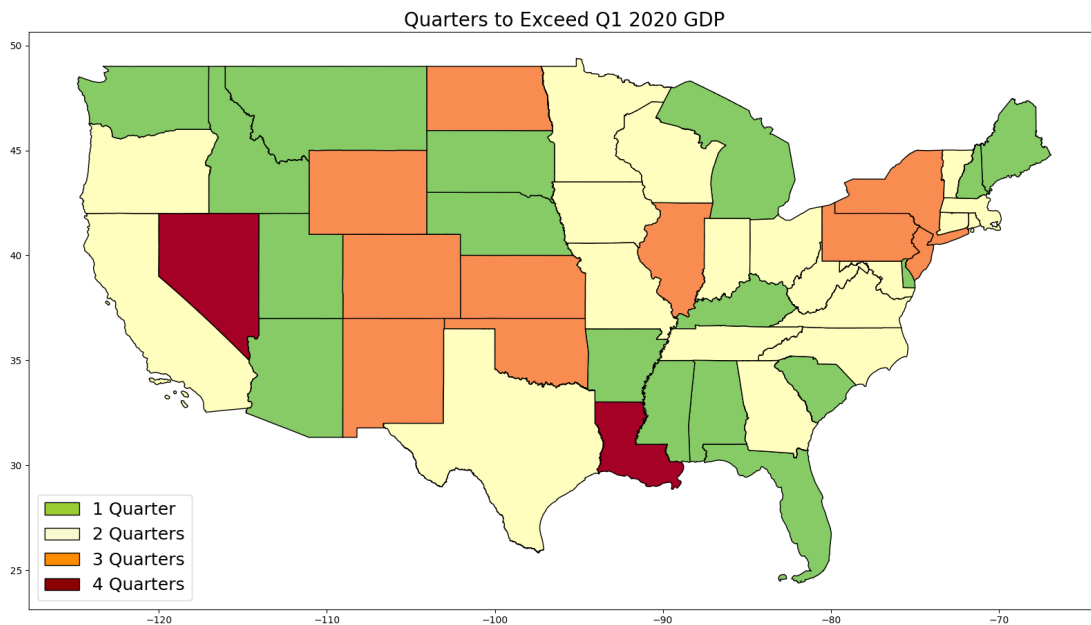
NonDefense Spend rose the most in Q2 of 2020 by 21.2% while Air Transportation declined the most in Q2 of 2020 by -71.1%. Q2 results for NonDefense Spend and Air Transportation are likely due to the need to secure income and basic needs for those not working during mandatory shutdowns and the travel restrictions put in place during that time.

Accommodation rebounded the most in Q3 of 2020 by 78.3% while NonDefense Spend declined the most in Q3 of 2020 by -8.8%. Q3 results for Accommodation and NonDefense are likely due to the lifting of travel restrictions allowing for workers to resume operations.



GDP Recovery time in quarters by State

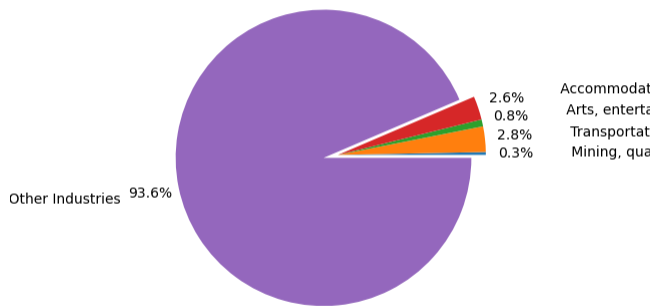
Nevada, Hawaii, and Louisiana all took 4 quarters for GDP to exceed Q1 of 2020 while 17 states recovered in only 1 quarter's time. This slow recovery is likely due to the economy in those states' reliance on industries that were heavily impacted by COVID-19 restrictions such as travel, accommodation, entertainment, food service and drinking places, and mining/oil/gas extraction and related products and services.



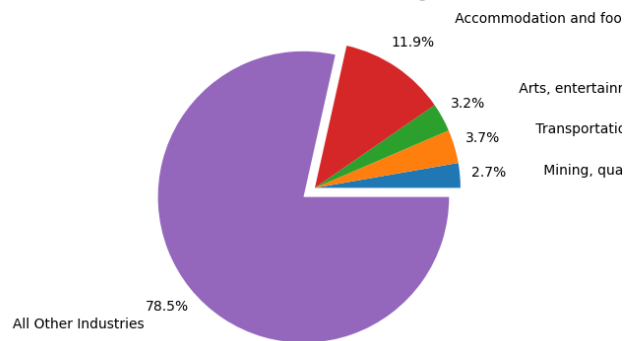
Industry Composition of Slow Recovering Economies

Michigan was one of the quickest recovering states and also showed the largest rebound in Q3 of 2020. The composition of Michigan's economy consists of only 6.4% of industries heavily impacted by COVID-19. In contrast, heavily impacted industries make up 21.5% of Nevada's economy.

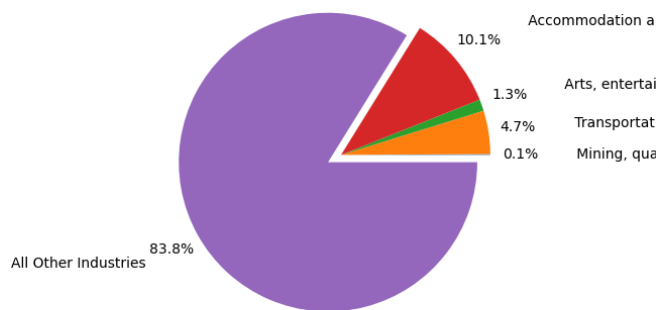
Michigan % of GDP for Slow Recovering Industries



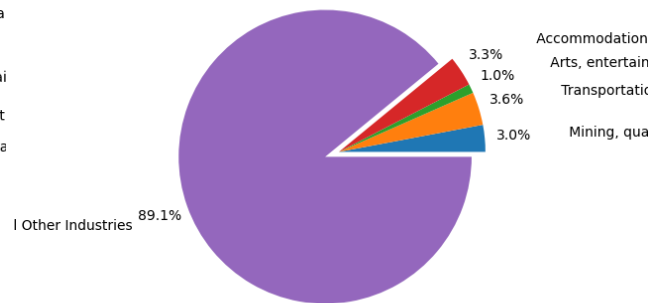
Nevada % of GDP for Slow Recovering Industries



Hawaii % of GDP for Slow Recovering Industries



Louisiana % of GDP for Slow Recovering Industries



Data Sources:

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