Research on Predicting the next U.S. recession

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Introduction

With the COVID-19 situation continuing to escalate, more and more countries have issued "lock-down" orders. A slew of data showed just how much the coronavirus pandemic and lockdowns to curb the spread of disease have damaged the US economy. While such drastic order is necessary for mitigating the virus, this has also imposed serious concerns for the world's economy, making investors concerned about a potential recession. Many economic indicators released recently posted record slumps, fell to lows not seen in years or decades, or surpassed data from the Great Recession of 2007-2009. Our research will explore questions about recession forecasting and try to see if a recession is coming via analyzing several economic indicators related with job, bond rate, consumer behavior etc. We wish to analyze economic indicators, predict the probability of recession happening in 2020, make a comparison of this recession with the Great Recession of 2007-2009, and to predict several indicators' development tendency. As a result, we found out that there is a high probability of economic recession occurs in the near future.

Analysis

Description of data:

We plan to use the following data to answer the questions but not limited to them.

- Yield Spread (10-Year Bond rate - 3-Month Bond rate)
- Initial claims
- Probability of U.S. Recession (developed by Federal Reserve Bank of New York)
- Unemployment rate changes by each state
- Consumer confidence indexes
- Gross Domestic Product

The main source for data will be from the St. Louis Fed's database, but data from University of Michigan, Federal Reserve Bank of New York and other research institutions will also be used. Those data are subject to change because of changes of economic indicators over time.

Methodology:

We will be looking at several different economic indicators that reflect various trends and compare the trend from 2018-2020 with the trend during the last recession (2007-2009) if necessary. If we are indeed slipping into a recession, the data may show some similarities. The main method I have used to visualize data is line plot, it is an efficient way to look at the indicators change during time. Also, I will use map, and bar plot to do data visualization to see what have been changed during time since the coronavirus broke out globally.

Result

1. The Yield Curve & Treasury Term Spread

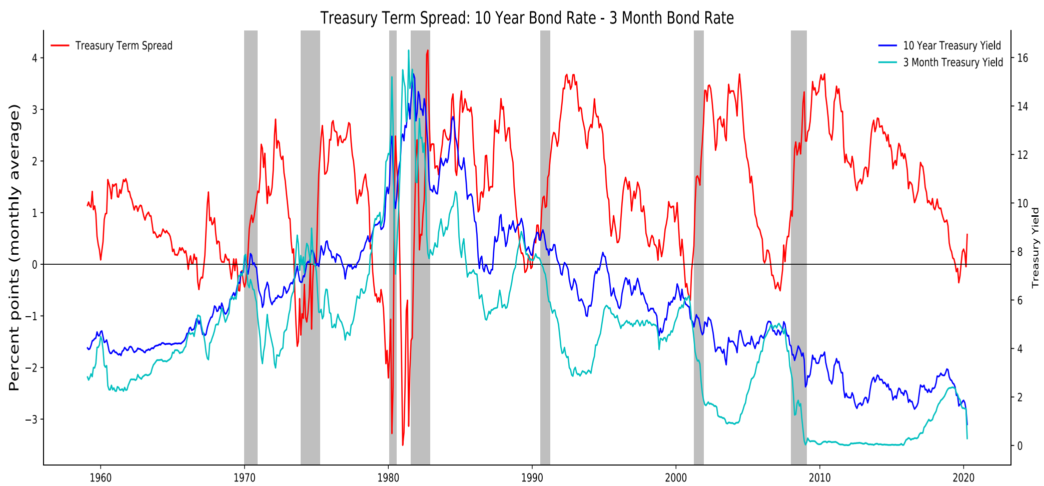

Figure 1:The Yield Curve & Treasury Spread

The U.S. yield curve plots Treasury securities with maturities ranging from 4 weeks to 30 years. When the spread between the yield on the 10-year Treasury bill and that of the 3-month Treasury note slips zero, as it did earlier this year, it points to investors accepting a lower yield for locking money up for a longer period of time. A yield curve inversion occurs when the spread is negative—when the long-term yield is less than the short-term yield. We can see from Figure 1, at the beginning of this year (2020), the yields on bonds with a shorter duration (3-month) are higher than the yields on bonds that have a longer duration (10-year). It is an abnormal situation that often signals an impending recession.

As recession signals go, this inversion in the yield curve has a solid track record as a predictor of recessions. But it can take as long as two years for a recession to follow a yield curve inversion. The closely followed yield spread between U.S. 2-year and 10-year notes has also narrowed - marking the smallest difference since at 2007.[1]

2. Unemployment

[1] According to Refinitiv data: https://www.refinitiv.com/en/financial-data/economic-data.

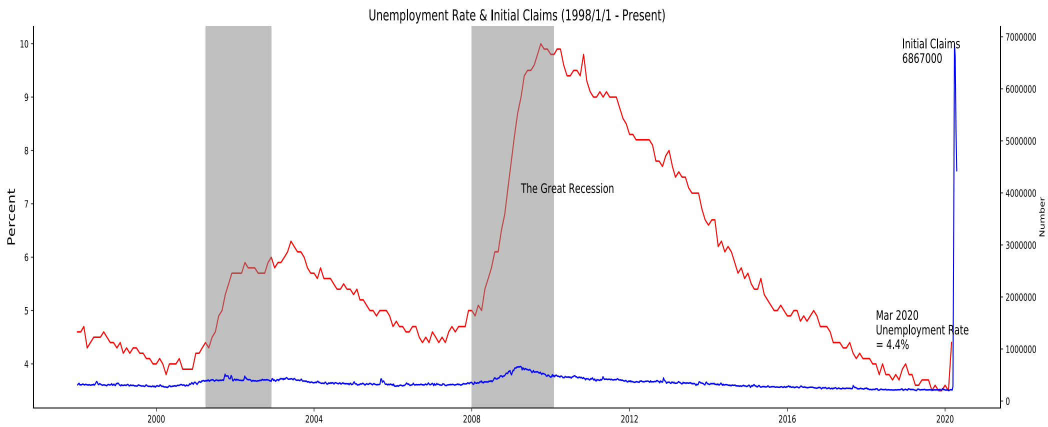

Figure 2: Unemployment Rate & Initial Claims

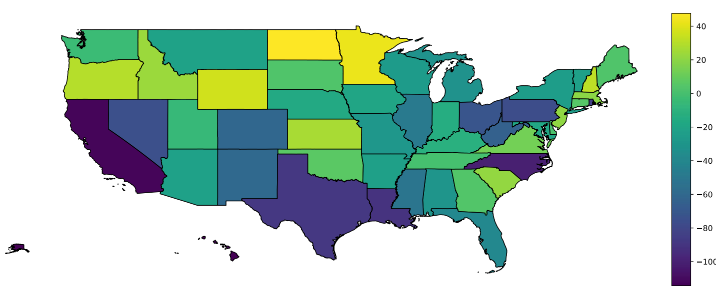

Figure 3: Unemployment Rate One-month Net Change by State, February - March

Because of the COVID-19, the unemployment rate and initial jobless claims ticked the highest point since the Great Recession. The employment rate for March 2020 is 4.4%, rose by 0.9% compared with February 2020. We can see from the Figure 3, the darker the color, the worse the unemployment rate has risen, the COVID-19 has negative impact on most states' employment. Unemployment continues to rise in many states, especially for those states with serious outbreak of COVID-19 like California (5.3%), Pennsylvania (6.0%) and New York (4.5%) and so on. Over the past five weeks, more than 26.5 million Americans have filed for unemployment, the initial claims had reached 6867000 on March 28, 2020, the highest point since the Great Recession of 2008.

Speaking to reporters on the White House lawn on Sunday morning, Hassett said the unemployment rate could hit 16% and "the next couple of months are going to be terrible" for economic data.[2]

3. Probability of U.S. Recession (developed by Federal Reserve Bank of New York)

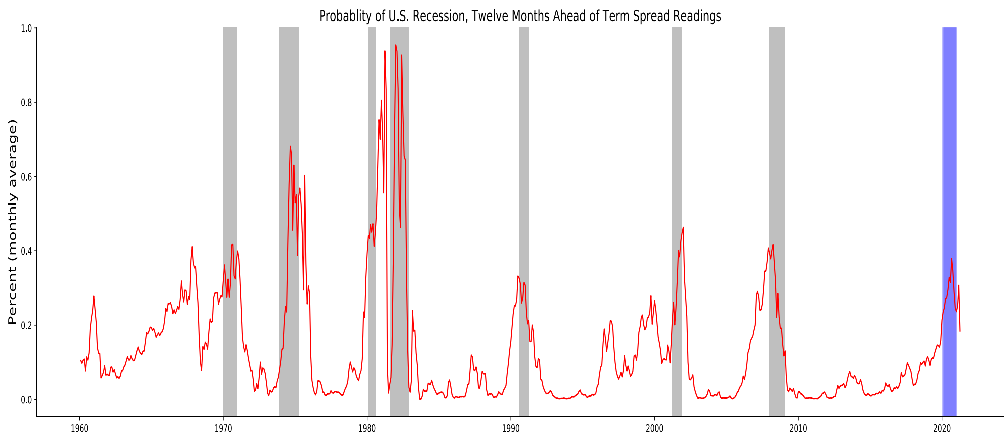

Figure 4: Probability of U.S. Recession

The New York Federal Reserve's probability model, which predicts the probability of a US recession in the next 12 months, delivered a reading of 27% in March. In Figure 4, this model predicts that in August, the probability that a recession occurs will rise to 37%, which means there is a high probability there will be a recession. Considering this measure has breached he 30% threshold before every recession since 1960, there will be a tough time ahead. The probability of recession in 2020 is almost as the same level as the Great Recession in 2009.

4. Stock Market & Crude Oil Price

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[2] CNBC News: *White House economic advisor Kevin Hassett says unemployment rate will approach Great Depression*

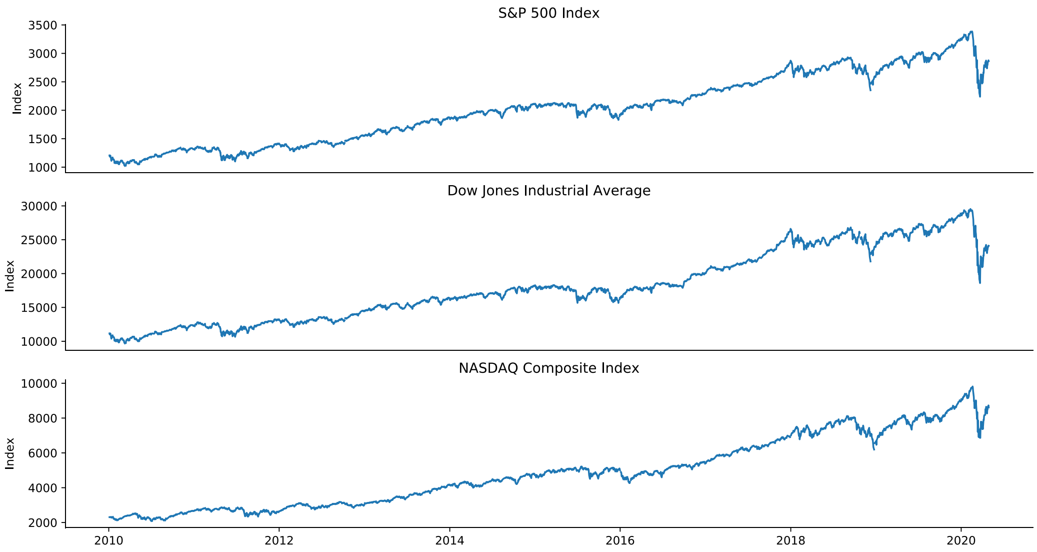

Figure 5: Stock Indexes

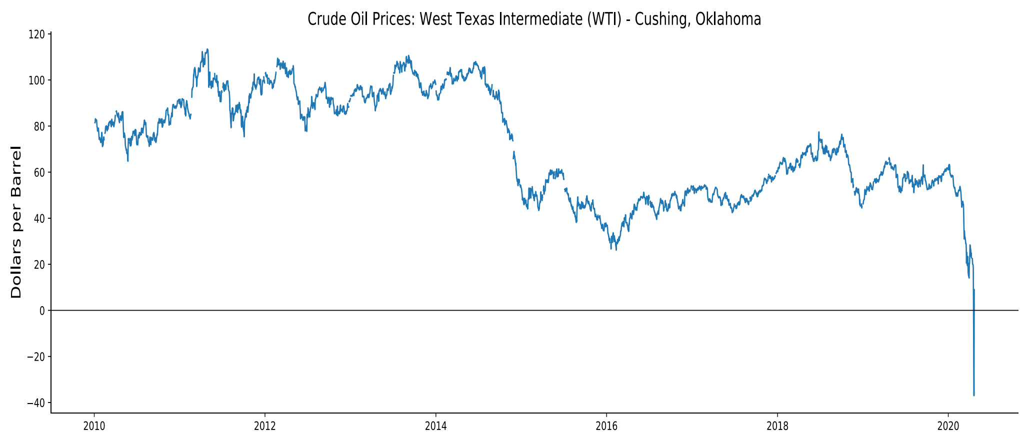

Figure 6: Crude Oil Price

On February, the Dow Jones Industrial Average, the NASDAQ Composite, and S&P 500 Index all finished at record highs. Then stocks tumbled more than 4% to a low level, continue to slump. From 24 to 28 February, stock markets worldwide reported their largest one-week decline since the 2008 financial crisis. The Dow Jones Industrial Average, the NASDAQ Composite, and S&P 500 Index continue to decline, triggered the trading curb for 4 times in 10 days in March. The Fed restarts commercial paper facility to help market, the fed previously used the tool during the 2008 financial crisis and the Great Depression. Although the market is said to forward looking but it doesn't mean that it will predict the future will enter a recession. "Investors are much quicker to act than consumers, so a decline in stocks doesn't always lead to a slowdown in the economy. It's possible that we will enter a recession, or that we're in one already, but we probably won't find out until we're already in the eye of the storm."[3]

In Figure 6, oil plummeted to a 17-year low this on April. On April 20th, the crude oil price has declined under 0 dollars per barrel. According to historical experience, the oil price has significant impact on the economy and directly related to a recession.

5. Consumer Sentiment

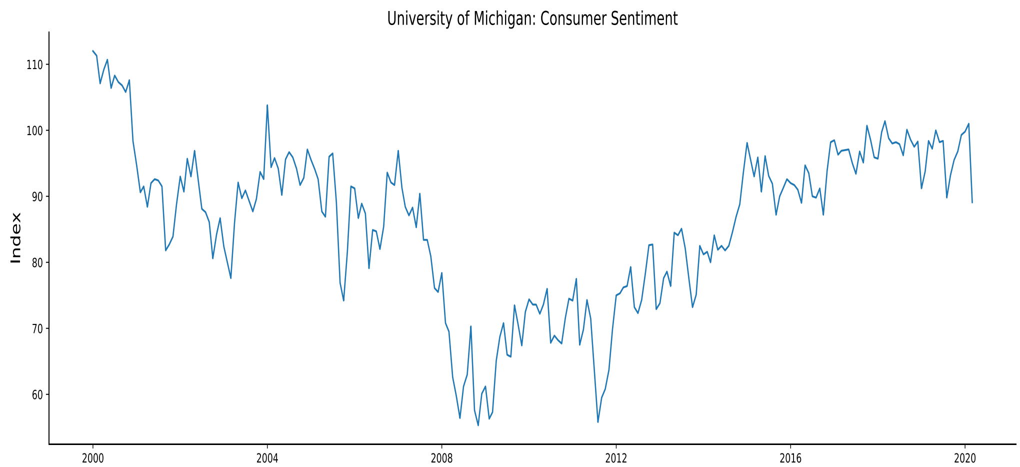

Figure 7: Consumer Sentiment

Consumer sentiment is often portrayed as a fundamental driving force in the economy. When consumers are confident, the economy surges, and when consumers are timid, they pull the economy down with them. We can see from the Figure 7, when there is a recession occurs, consumer confidence always gets low about the economy. In the 2008 financial crisis, consumer confidence in the United States hit a historic low in February 2009. In 2020, the consumer sentiment for April dropped 12% compared with March. In the long run, we may see the consumer sentiment declined a lot more. Americans are increasingly pessimistic about the outlook, with one measure of consumer sentiment plunging last month by the most since October 2008.

6. Gross Domestic Product

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[3] *Is the Stock Market Predicting a Recession?* The Irrelevant Investor: https://theirrelevantinvestor.com/2020/03/10/is-the-stock-market-predicting-a-recession/

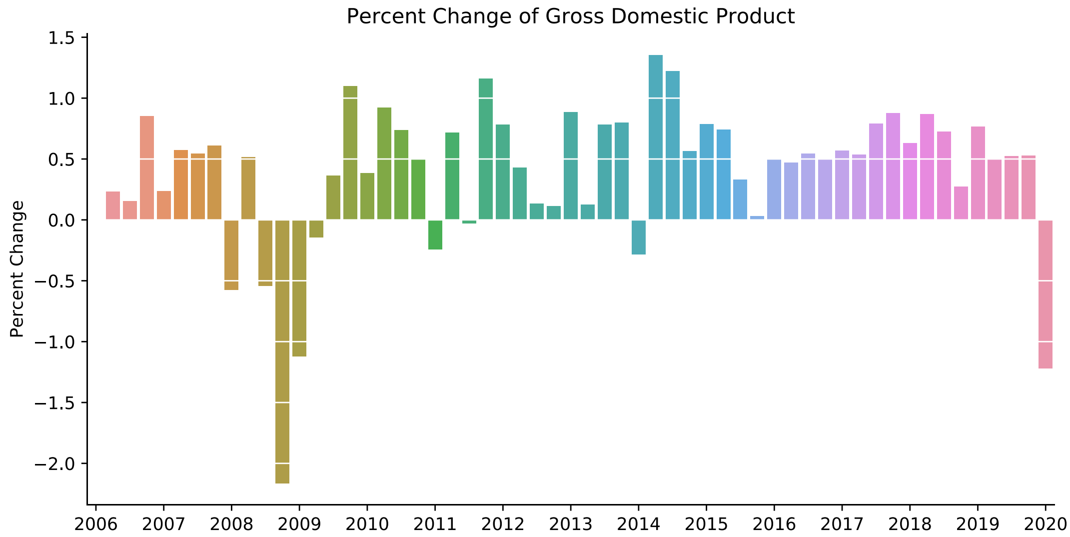

Figure 8: Percent Change of Gross Domestic Product

U.S. gross domestic product, the broadest measure of goods and services produced in the economy, fell at a 4.8 percent annual rate in the first quarter of the year, ending the longest economic expansion on record. This is the first decline since 2014 and the worst decline since the Great Recession. The U.S. economy contracted by the most since the great recession. The slump in the first quarter reflects the sharp economic impact of countrywide shutdowns because of the spread of COVID-19. In March, most of the states in US ordered businesses deemed nonessential to close. The sharp decline of GDP shows a powerful sign of recession. In addition, GDP is expected to fall at an even sharper rate in the following quarter, economists expect worse slumps, including Bank of America's 30% estimate[4] and JPMorgan's 40% forecast[5].

Conclusions

The U.S. economy began to recovery from the 2008 financial crisis and experienced a record-long expansion. Because the coronavirus pandemic inflicts ruinous damage, the economy screeched to a sudden halt. In just a few weeks, businesses across the country shut down and

[4] Business Insider: *'The deepest recession on record': Bank of America slashes forecasts, now sees up to 20 million jobs lost, 15.6% unemployment, and a shrinking economy for 3 straight quarters*
https://www.businessinsider.com/economic-forecasts-bofa-slashes-us-coronavirus-unemployment-gdp-recession-jobs-2020-4

[5] CNBC News: *JPMorgan now sees economy contracting by 40% in second quarter, and unemployment reaching 20%*
https://www.cnbc.com/2020/04/09/jpmorgan-now-sees-economy-contracting-by-40percent-and-unemployment-reaching-20percent.html

millions of people lost their jobs. Based on the analysis we made above, unemployment rate continues to rise in many states and across the country, the inversion in the yield curve occurs more frequently and probability of recession rise as the similar level as the 2008 financial crisis. The stock market crashed at the beginning of this year, and the crude oil price continues to drop. Consumers have less and less confidence on the market. All of these indicators show that there is a recession coming. Many forecasters predicting the economy will experience its largest-ever contraction in the future. We have to prepare for the coming of the recession. The novel coronavirus has spurred what will likely be the worst recession in generations.

Directions for future research

There are a lot of indicators that will predict a recession, we just choose some major indicators to have a glimpse at the economy right now. We may use more indicators to have a more precise forecast about the economy development. Also, we mainly used a short-term data to make a prediction, but precise prediction will need to use a long-term data to analyze the trend. We may improve on that.