

Macroeconomic Forecasts, 3Q2020
Domestic Metrics



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Table of Contents

Summary 4

The K-Shaped Recovery 5

Recent Changes to the Federal Reserve’s Monetary Policies 40

Prospects for 2020 US Federal Elections..... 41

Disruptive (“Black Swan”) Events..... 48

Data Analysis..... 49

 Correlations 50

 Real & Nominal GDP Growth, Real & Nominal Disposable Income Growth, and CPI Inflation Rate
 51

 Unemployment Rate..... 53

 Treasury Yields (1, 3, & 6-month; 1, 3, 5, 7, 10, 20, & 30-year series) 54

 30-year Mortgage Rate 59

 Moody’s AAA & BAA Rates; BofA BBB Corporate Yield; and the Market Volatility Index (VIX)... 60

 Prime Rate..... 63

 US Average Retail Gasoline Price 64

 Federal Funds (Primary Credit) Rate..... 65

 House and Commercial Real Estate Price Indexes..... 66

 Dow Jones Total Stock Market Index (end-of-quarter) and S&P 500 (quarterly average)..... 68

 Regression Analyses..... 70

 Real & Nominal GDP Growth, Real & Nominal Disposable Income Growth, and CPI Inflation Rate
 72

 Unemployment Rate..... 88

 Treasury Yields (1, 3, & 6-month; 1, 3, 5, 7, 10, 20, & 30-year series) 92

 30-year Mortgage Rate 109

 Moody’s AAA & BAA Rates..... 111

 BBB Corporate Yield 114

 Prime Rate..... 116

 US Average Retail Gasoline Price 117

- Cost of Federal Funds (Primary Credit Rate).....119
- Dow Jones Total Stock Market Index (end-of-quarter) and S&P 500 (quarterly average)..... 121
- House and Commercial Real Estate Price Indexes..... 125
- Market Volatility Index.....129
- Appendix A: Data Sources..... 130
- Appendix B: Methodologies 137
 - Section I: General Forecasting Methodology..... 137
 - Section II: Exponentially Smoothed State Space Representations & Generic “ETS” Methodology 140
 - Section III: Regression Construction141
- Appendix C: Variable Correlations.....144
- References 152

Summary

The economic condition of the United States has changed significantly in the last 9 months. On March 1, 2020 the US had roughly 100 confirmed cases of COVID-19 – by April 1, 2020 there were more than 200,000 confirmed cases, and there are now (as of early July, 2020) approximately 3 million confirmed cases¹. The nation is currently grappling with massive societal, economic, and political issues, both domestically and abroad.

As we do come to grips with the way in which we live, several new aspects of the changing economy are coming into play. First, given the current path of discussions between President Trump and Congressional representatives, it does not appear that a substantial amount of federal aid will be flowing down to individuals or businesses until after the November federal election (and possibly not until January of 2021); the effects of these issues have been discussed significantly in the issues surrounding growing unemployment, evictions of renters, foreclosures on homeowners & landlords, and the dichotomy of these failures in light of Wall Street's growth. Second, while the Federal Reserve (through Chairman Powell) has announced that they will be helping to support the markets in the form of debt and equity purchases on the open market (and then reselling those instruments on the open market), it seems that some new concerns have been raised regarding the amount of aid and the thresholds or guidance that should drive this program. Third, while many individuals have had their income dramatically cut after years of economic growth, there is a segment of the population that has all but completely recovered from the universal lockdowns of this past spring; this schism in the economy will resonate in the country for years to come. Fourth, many of these societal issues are playing out globally with each country's different process for addressing the pandemic trying to both protect its citizens and trade without necessarily regarding the same concerns in other countries. And, fifth, all of this unease is playing out with the contentious US November elections as a backdrop.

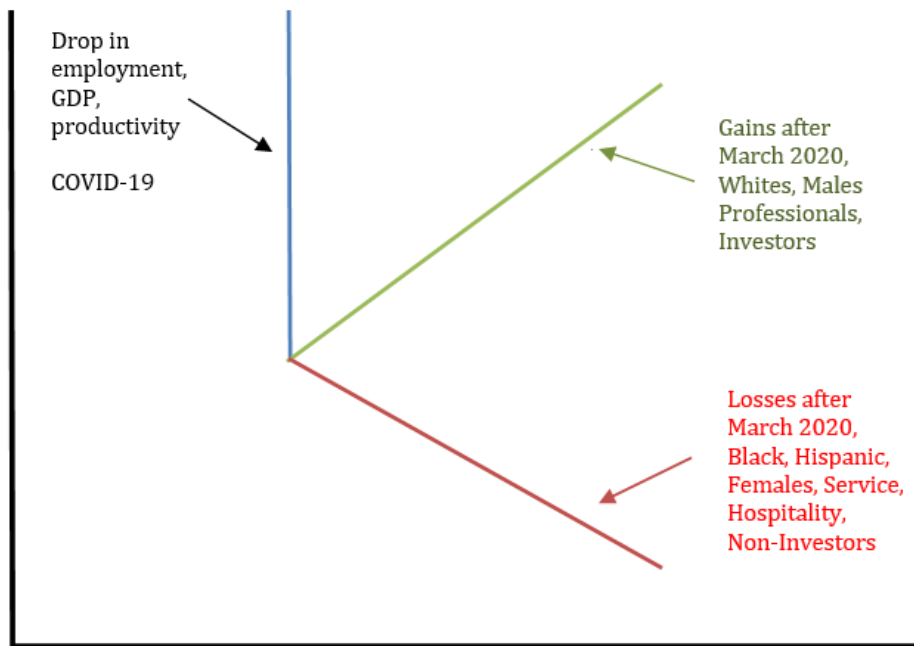
In the following, we discuss the most significant domestic economic issues with a view towards the impact on local economies, industries, and prospects over the next 3 to 60 months.

¹ <https://www.worldometers.info/coronavirus/country/us/>

The K-Shaped Recovery

Analysts and economists (and Chris Wallace² during the first presidential debate) have been talking about the K-shaped recovery. What does the K-shape mean and how is it tracked? Figure 1 outlines the general idea of a K-shaped recovery. After the US was shocked into a recession because of COVID-19 and the shelter-in-place orders, the economy experienced a huge disruption (the downward path of the economy represented by a vertical line). After the initial shock, many workers (professional and other workers who were able to work at home) picked-up where they left off and continued business-as-usual (or mostly business as usual) – the green up-ward trend after the initial shock. Employees in the service sector and hospitality sector, however, continued to have high unemployment rates, fewer hours worked and considerably less traction in the economy – the red downward trend after the initial shock. The divergence of the ‘haves’ and the ‘have-nots’ creates an economic trend where parts of the economy have rebounded while other parts are experiencing continued hardship and looks like a “K”.

Figure 1: The K-Shaped Recovery



² <https://www.usatoday.com/story/money/2020/09/30/trump-vs-biden-is-economic-recovery-v-or-k/5871204002/>

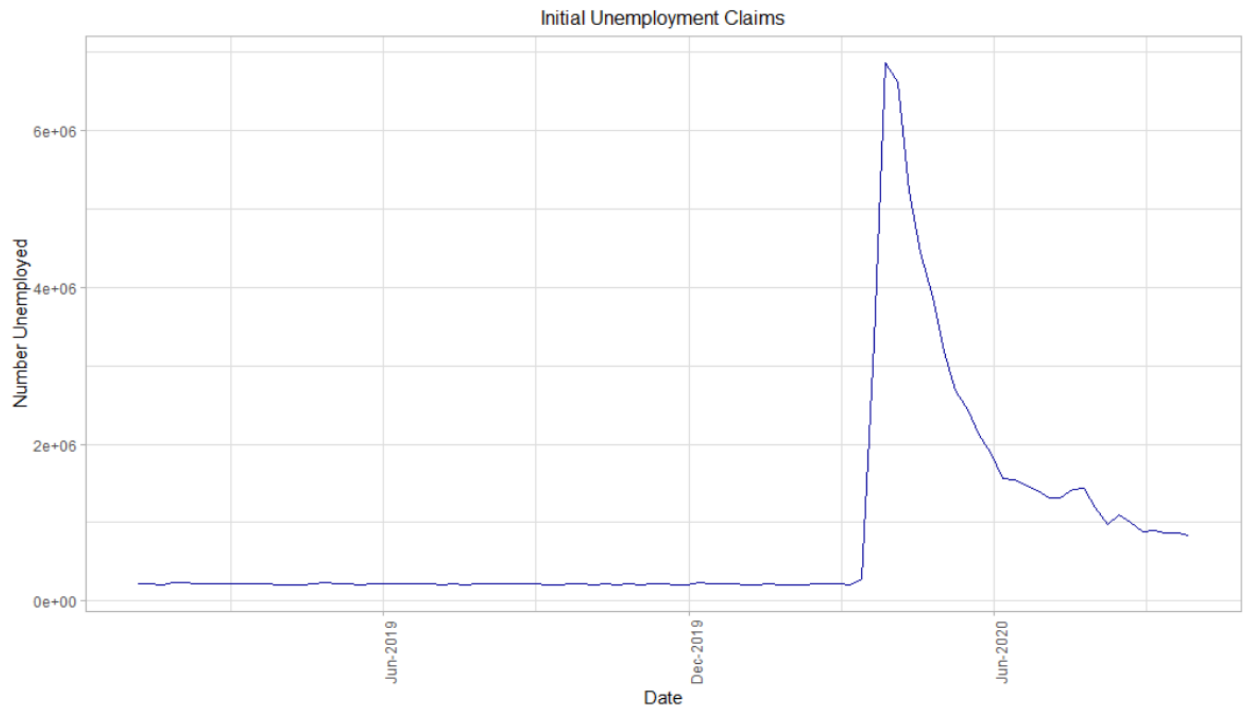
Figure 2: US Unemployment Rate (Jan 2015-Sept 2020)



Source: Federal Reserve Bank of St. Louis Economic Data, <https://fred.stlouisfed.org>

The national unemployment rate increased substantially in March 2020 – from lows of 3.4% to above 14%. The trend the last two months, however, have seen the unemployment rate fall to just below 8% nationally. (See Figure 2.) Job gains slowed in September 2020. With slower gains and 800,000 newly unemployed workers per week, it is likely the unemployment rate will bounce between 7% and 9% for the remainder of 2020. Loans from PPP funds are running out for many small businesses and many temporary furloughs are becoming permanent job losses.

Figure 3: US Number of Initial Unemployment Claims (Mar 2019-Sept 2020)

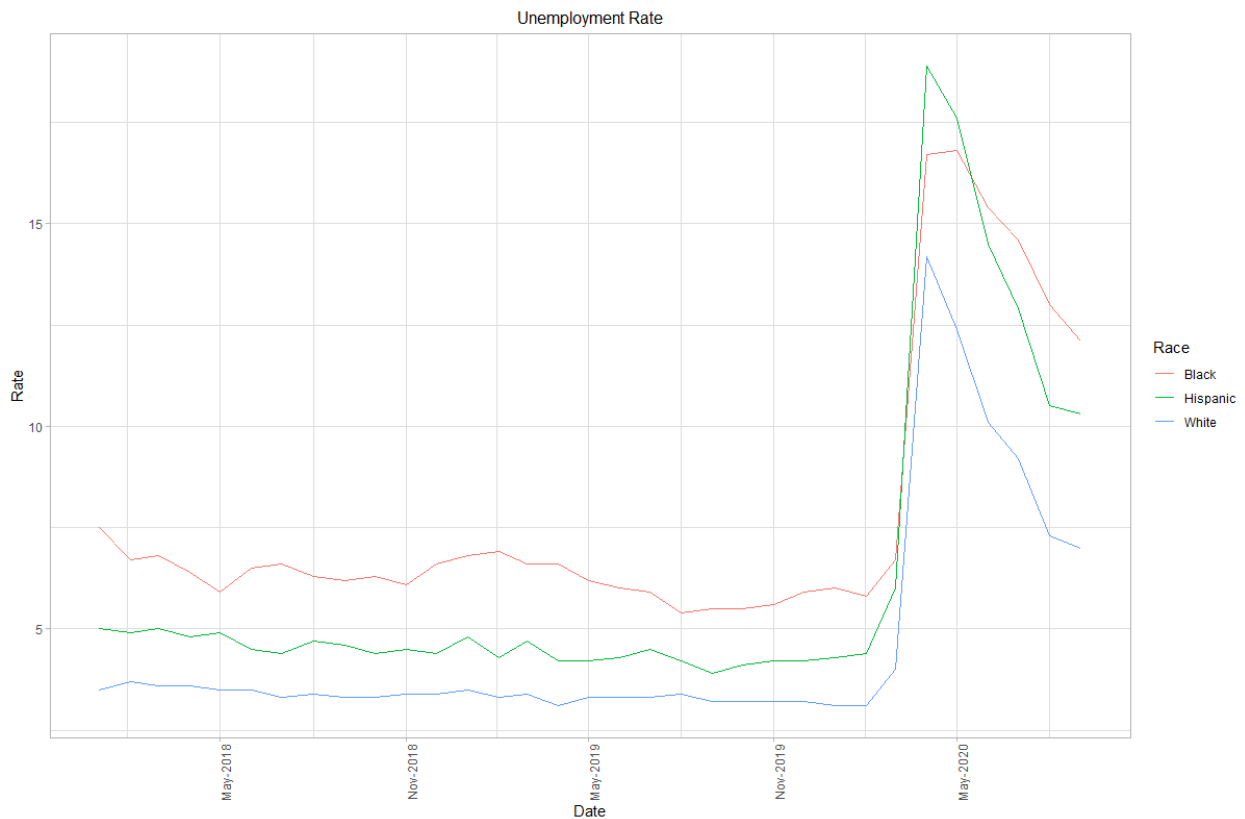


Source: Federal Reserve Bank of St. Louis Economic Data, <https://fred.stlouisfed.org>

The initial unemployment claims sky-rocketed in early March, 2020 (over 6 million persons filing for initial unemployment insurance). The numbers fell to below 2 million by June, 2020 and have now settled around 1 million initial unemployment claims per week. Further, the BLS has reported approximately 800,000 initial unemployment claims per week. Although the US is gaining jobs (nearly 661,000 new jobs in September³), it is not clear that the US can continue to sustain nearly 1 million initial unemployment claims per week.

³ <https://www.bls.gov/news.release/empsit.nr0.htm>

Figure 4: US Unemployment Rate by Race (Jan 2018-Sept 2020)



Source: Federal Reserve Bank of St. Louis Economic Data, <https://fred.stlouisfed.org>

Consider the following from Dr. Nicholas Bloom, the William D. Eberle Professor of Economics in Stanford’s School of Humanities and Sciences and a senior fellow at the Stanford Institute for Economic Policy Research (SIEPR):

“... this is generating a time bomb for inequality. Our results show that more educated, higher-earning employees are far more likely to work from home – so they are continuing to get paid, develop their skills and advance their careers. At the same time, those unable to work from home – either because of the nature of their jobs, or because they lack suitable space or internet connections – are being left behind. They face bleak prospects if their skills and work experience erode during an extended shutdown and beyond.”⁴

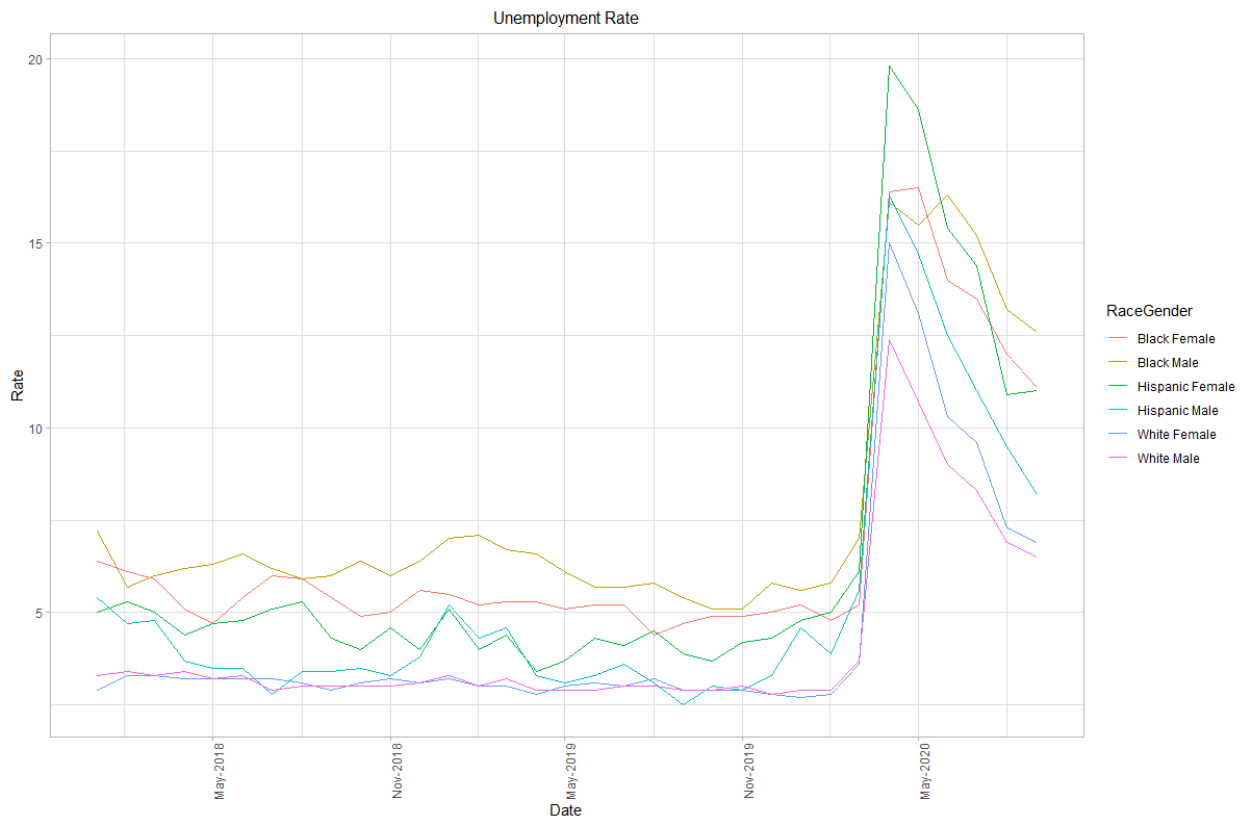
Looking at which portions of the economy have been affected the most, though, is the key to understanding the impact of the “K” recovery. The unemployment rate of Hispanics and Blacks spiked higher than Whites after the March lock-down. (See Figure 4.) The unemployment rate of Hispanics and Blacks has continued at significantly higher rates than Whites during the recovery – Whites have reduced unemployment rates (relative to the highs in April) by nearly 50% while Blacks and Hispanics

⁴ From <https://news.stanford.edu/2020/06/29/snapshot-new-working-home-economy/>

have decreased unemployment rates by 25-30%. Blacks currently have an unemployment rate around 12.5%, Hispanics have an unemployment rate at 10.3% and whites have an unemployment at 7.4%.

Further breaking down the impact by race and gender in Figure 5, white males saw the smallest “spike” in unemployment and currently have the lowest unemployment rate relative to other race and gender groups. Black men, however, entered the current recession with the highest unemployment rate but were surpassed during the lock-down by Black females and Hispanic females. After the initial lock-down, however, the unemployment rate of Black and Hispanic females recovered and have now fallen below the unemployment rate of Black men.

Figure 5: US Unemployment Rate by Race & Gender (Jan 2018-Sept 2020)

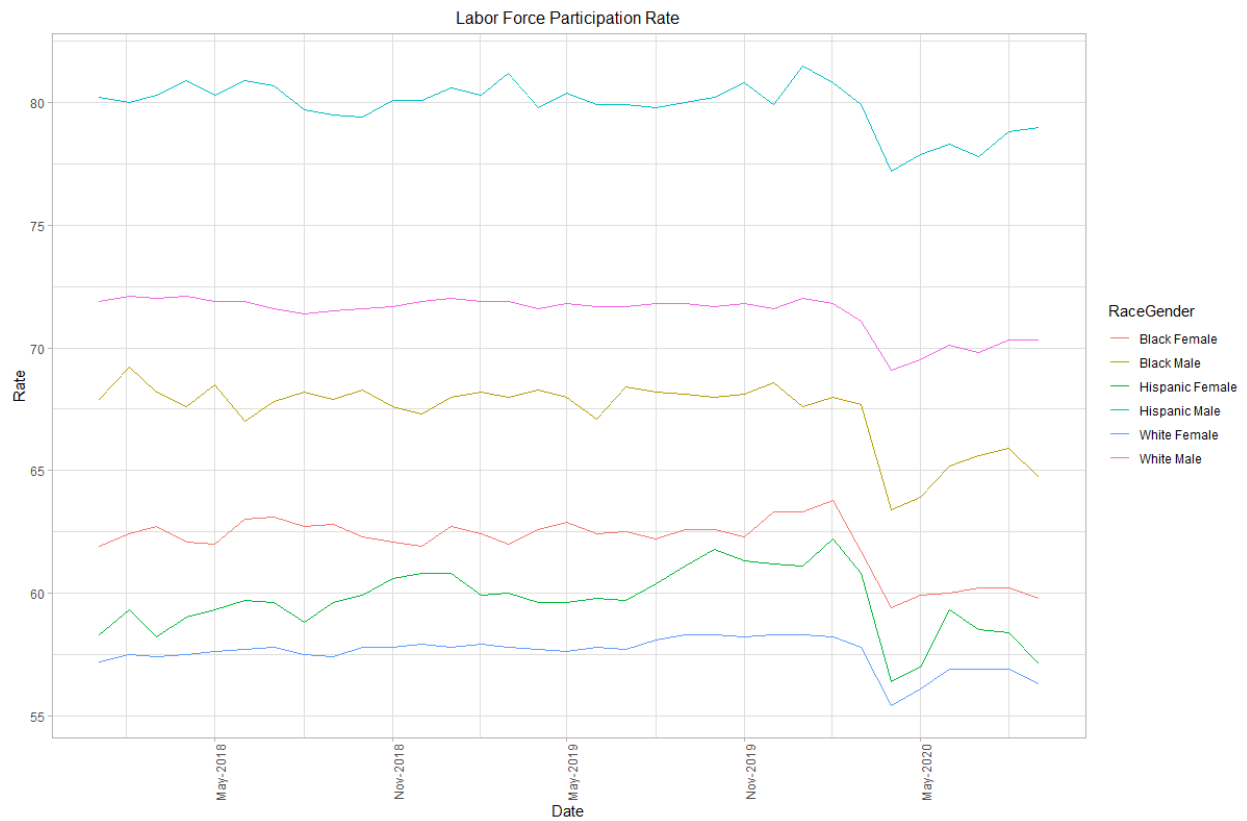


Source: Federal Reserve Bank of St. Louis Economic Data, <https://fred.stlouisfed.org>

The labor force participation rates of the same groups (white men, white women, black men, black women, Hispanic men and Hispanic women) are shown in Figure 6. Each of these groups saw a decrease in participation rates during the March and April. The smallest drops in labor force participation was felt by white men and white women, while Hispanic men, black men and Hispanic women saw the largest drops in labor force participation. Although white men, white women and Hispanic men have made some progress during the summer months and into the fall, black men and Hispanic females have a seen a second decrease in labor force participation at the start of the Fall. White women are also experiencing a small second decrease. The decrease in labor force participation for females is likely tied to the larger role they play in household production and child-rearing, and they are more likely than men to be responsible for home schooling children who are unable to return to school due to COVID.

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Figure 6: US Labor Force Participation Rate by Race & Gender (Jan 2018-Sept 2020)

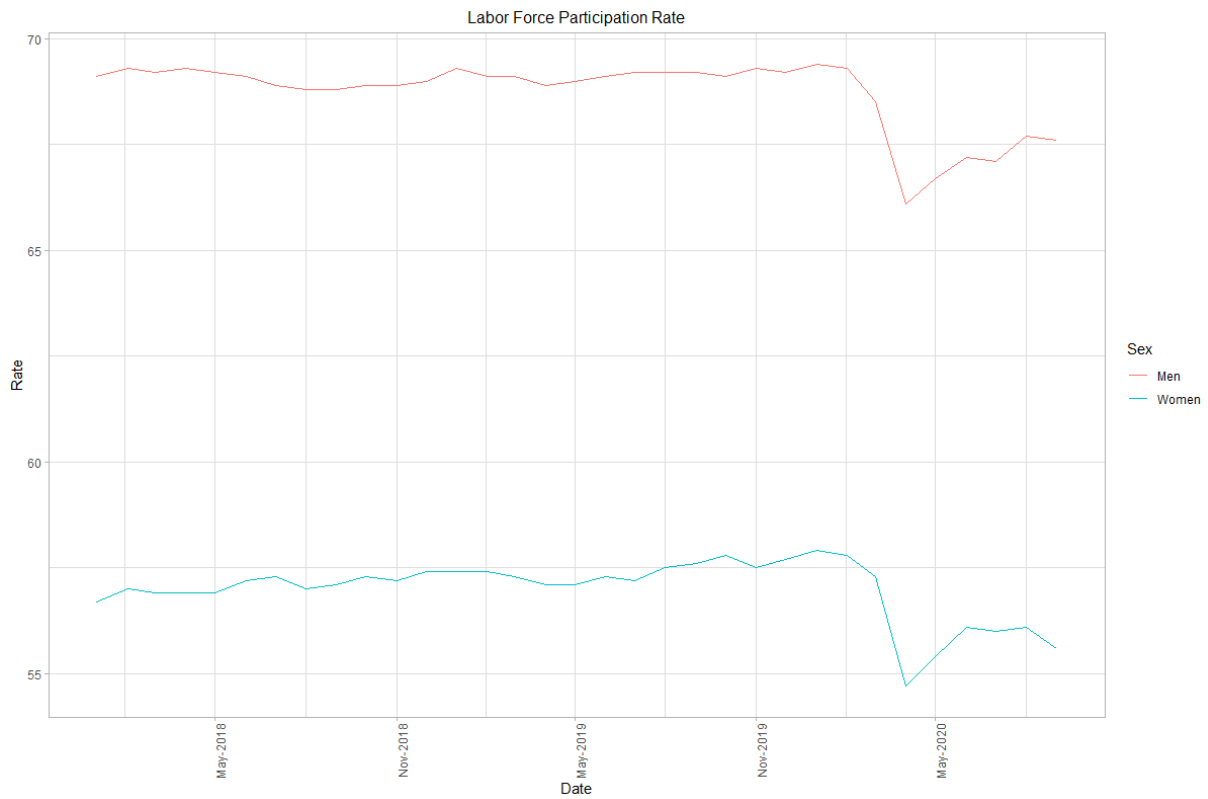


Source: Federal Reserve Bank of St. Louis Economic Data, <https://fred.stlouisfed.org>

The labor force participation rates between all men and all women highlight the downward trend for women getting back into the labor force after the March/April shut-down. The latest trends show that women started leaving the labor force again in September. (See Figure 7.)

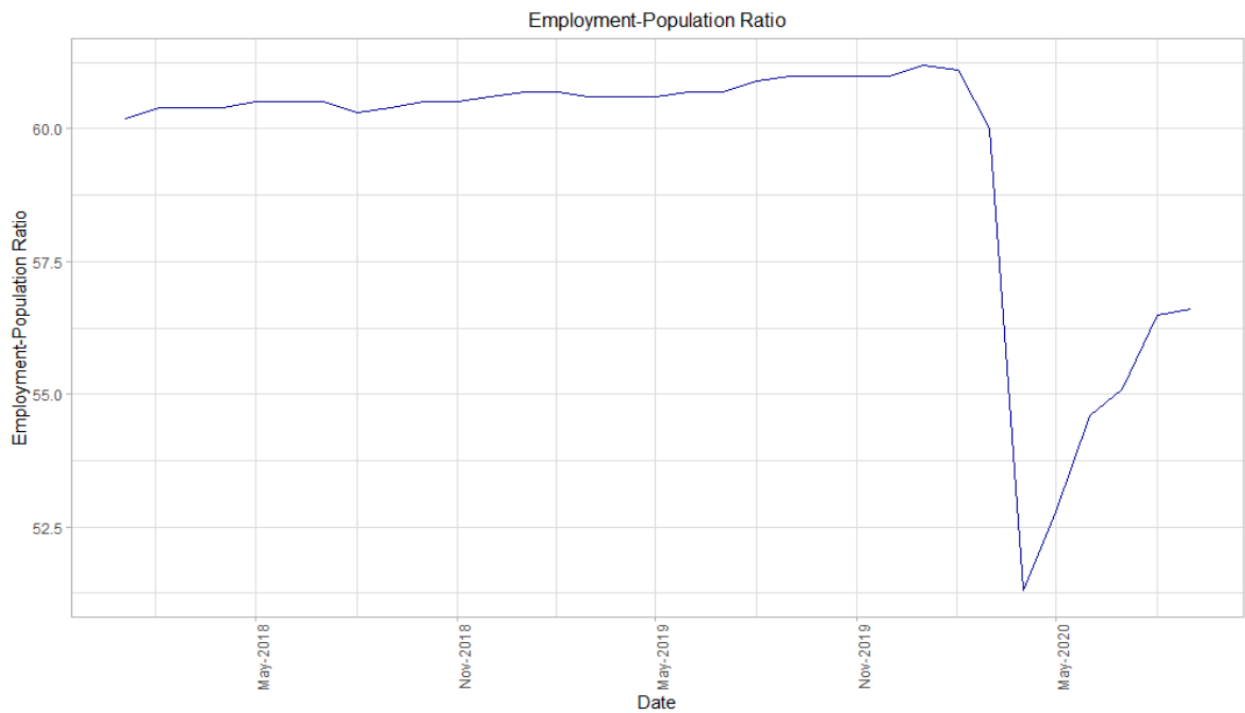
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Figure 7: Labor Force Participation Rate by Sex (Jan 2018-Sept 2020)



Source: Federal Reserve Bank of St. Louis Economic Data, <https://fred.stlouisfed.org>

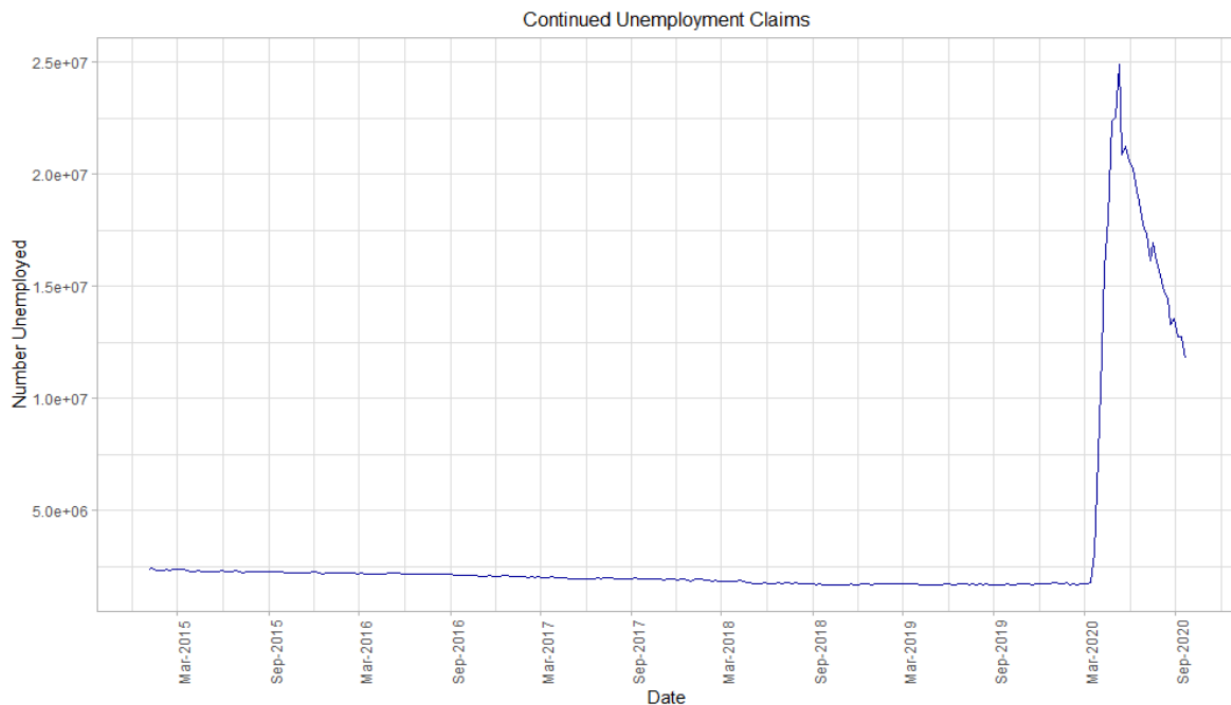
Figure 8: US Employment-Population Ratio (Jan 2018-Sept 2020)



Source: Federal Reserve Bank of St. Louis Economic Data, <https://fred.stlouisfed.org>

The employment-population ratio (number employed as a ratio of total US population) shows a significant drop during the March/April shutdown. (See Figure 8.) The number of people employed has made gains since late spring. However, we are seeing these gains slowing; the leveling-off of this metric in September is a signal that the market is starting to slow down. Although the economy did add a large number of jobs in July and August, the economy added few jobs in September. With an increase in the number of firms that are engaging in large scale lay-offs and permanent job reductions⁵ (e.g., Disney⁶, Shell Oil⁷, and Cineworld⁸), we are likely to see this metric level off or, perhaps, dip further in the next quarter.

Figure 9: US Continued Unemployment Claims (Jan 2015-Sept 2020)



Source: Federal Reserve Bank of St. Louis Economic Data, <https://fred.stlouisfed.org>

The overall employment picture shows the spike in continued unemployment claims during March & April followed by a recovery. (See Figure 9.) There is little doubt that the \$3T stimulus package – providing direct stimulus to workers as well as an increase in the unemployment insurance level for individuals on the unemployment rolls – has played a large role in reducing the unemployment rate during the late-spring and early summer. However, the trend has not been consistent across all metropolitan areas.

⁵ See <https://www.businessinsider.com/coronavirus-layoffs-furloughs-hospitality-service-travel-unemployment-2020>

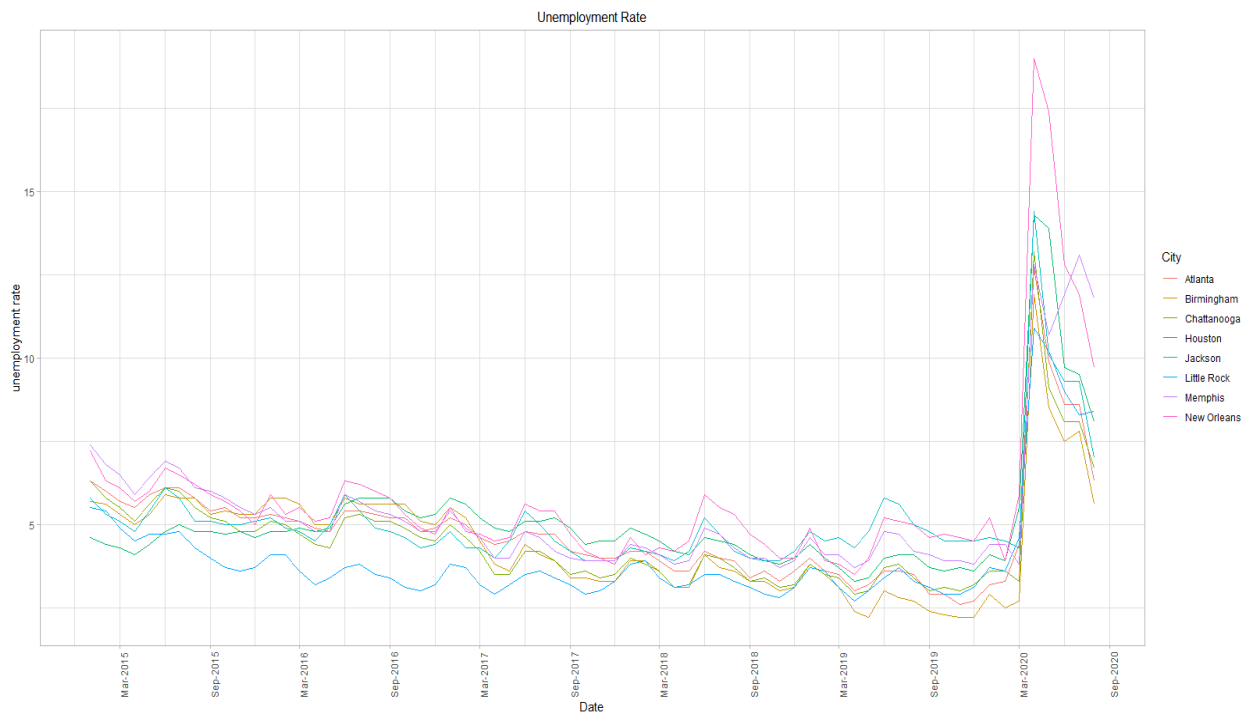
⁶ See <https://www.cnn.com/2020/09/29/media/disney-parks-layoffs/index.html>

⁷ See <https://www.cnn.com/2020/09/30/business/shell-job-cuts/index.html>

⁸ See <https://www.nbcnews.com/business/business-news/regal-cinemas-close-down-temporarily-impacting-45-000-jobs-n1242096>

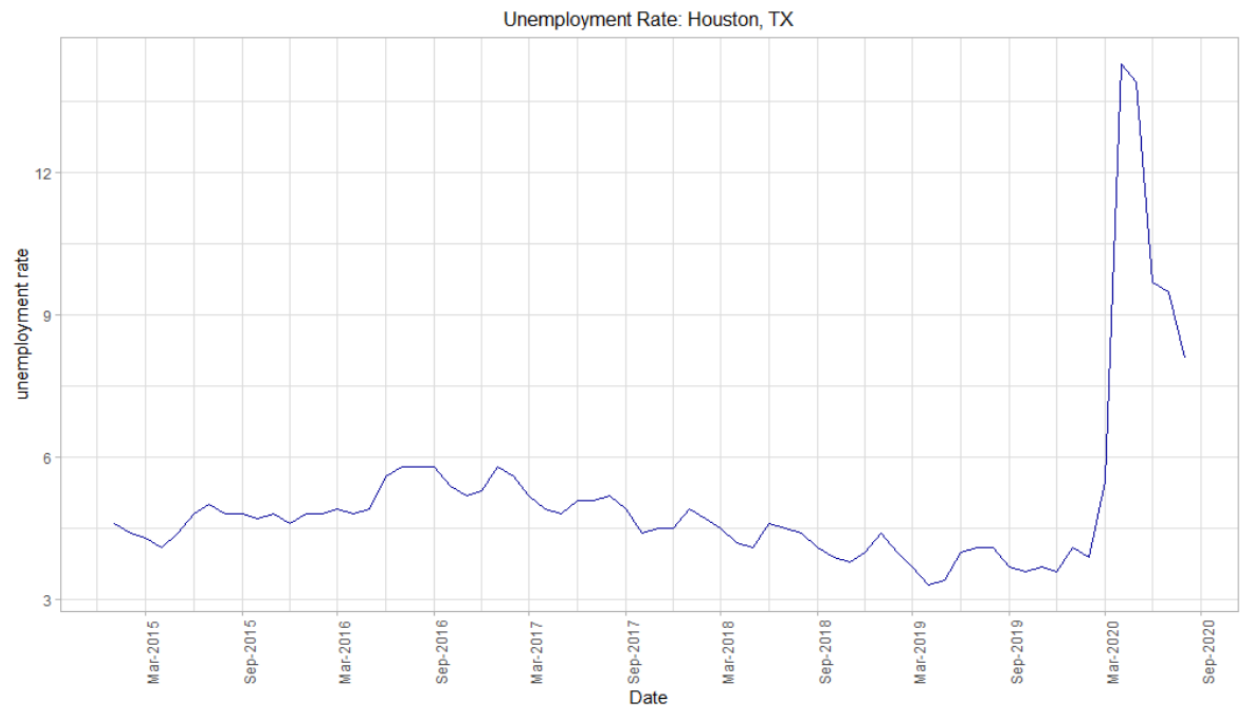
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Figure 10: Unemployment Rate for Selected MSAs (Jan 2015-Sept 2020)



Source: Federal Reserve Bank of St. Louis Economic Data, <https://fred.stlouisfed.org>

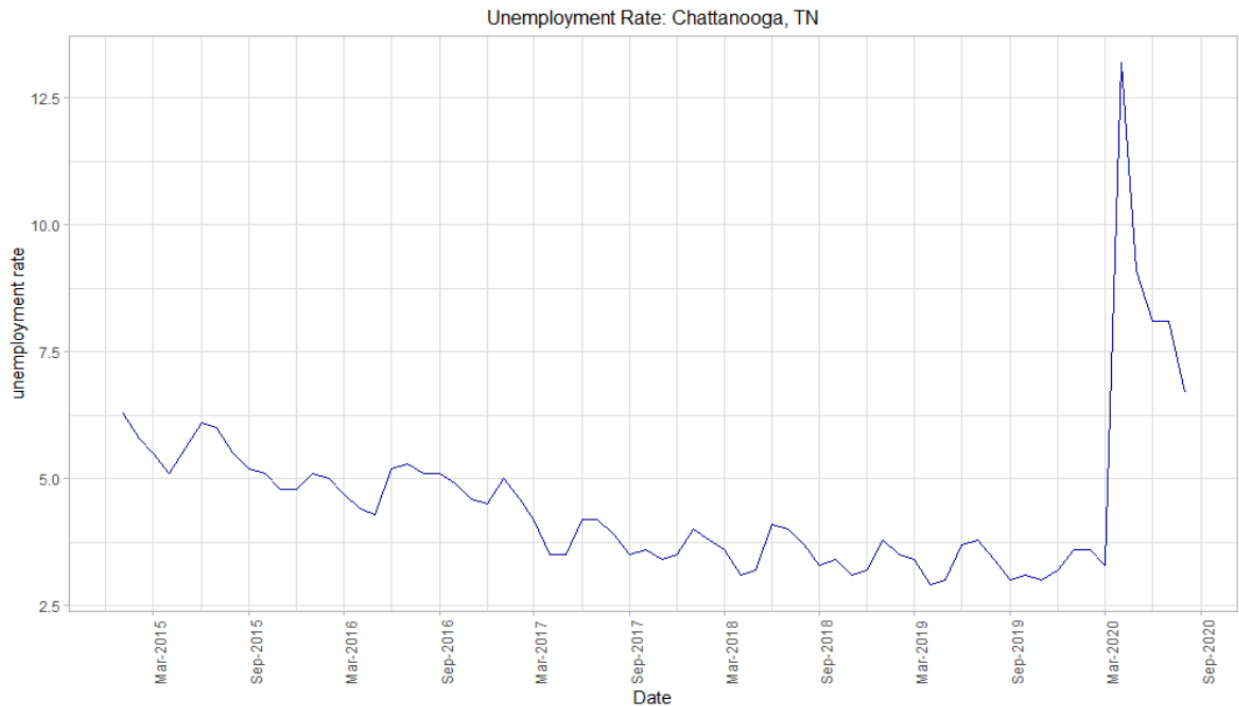
Figure 11: Unemployment Rate for Houston, TX (Jan 2015-Sept 2020)



Source: Federal Reserve Bank of St. Louis Economic Data, <https://fred.stlouisfed.org>

Figure 10 shows eight MSAs that have experienced differing variations of the recovery. Of these metro areas, Atlanta saw the largest increase in unemployment. Some metropolitan areas, such as Birmingham and Chattanooga, have been able to recover to within a few hundred basis-points of where they were prior to the pandemic. Other cities, such as Atlanta, GA and Memphis, have had less recovery.

Figure 12: Unemployment Rate for Chattanooga, TN (Jan 2015-Sept 2020)



Source: Federal Reserve Bank of St. Louis Economic Data, <https://fred.stlouisfed.org>

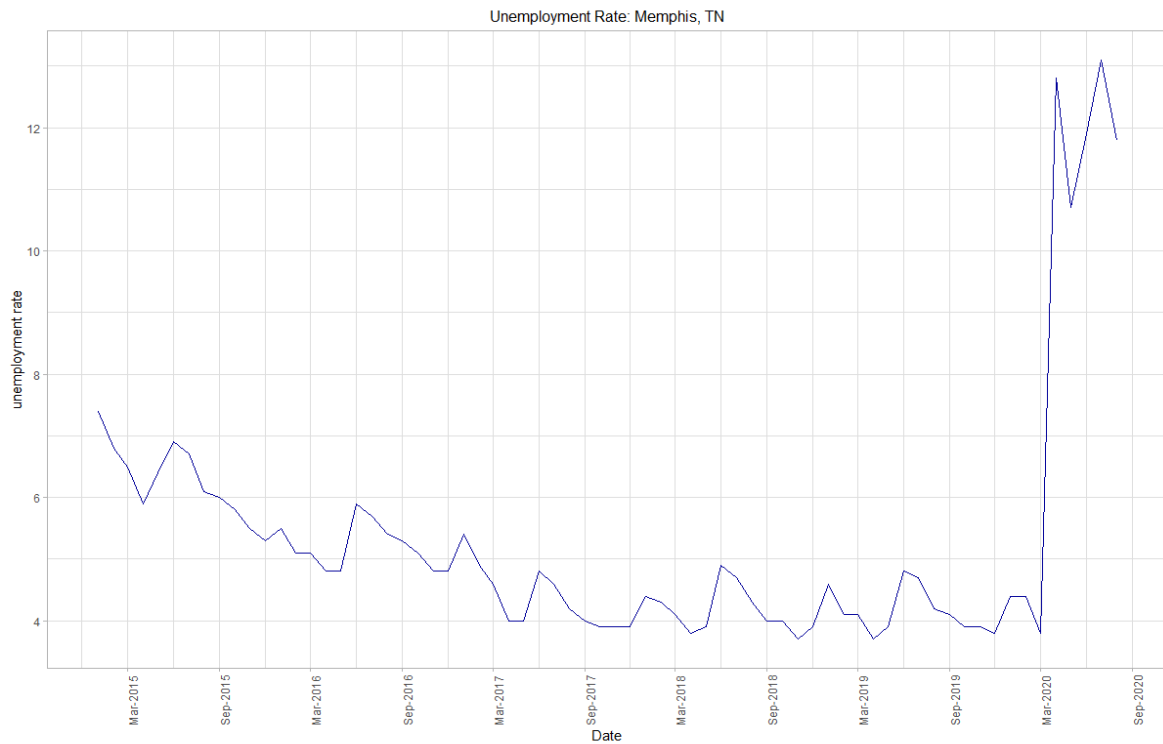
Notice that Houston, TX (Figure 11) and Chattanooga, TN (Figure 12) both have shown reductions in the unemployment rate in the same pattern. Some cities (e.g., Memphis, TN per Figure 13) have not been able to recover and might actually be headed towards a second spike in unemployment. Since the hospitality and entertainment industries are particularly susceptible to the depressed consumer spending or changes in spending habits (again, see the recent the lay-offs at Disney and Cineworld), it is not clear if the second spike (or lack of recovery) is a function of Memphis’ heavy orientation towards entertainment and hospitality.

Initial unemployment claims saw a similar spike to the unemployment rate. (See Figure 14.) There have been significant spikes in Tennessee, Alabama and Louisiana with smaller spikes in Mississippi and Arkansas. While the national numbers for initial unemployment have dropped consistently, some states are seeing some “fluttering” in the last few months. Louisiana, in particular, has seen several drops followed by additional spikes. As COVID cases are waxing and waning within a state, we are seeing some states re-instituting shut-down rules or modifications of the “shelter in place” orders that were put in place during March and April.

We are showing the initial unemployment claims in Texas (Figure 15) separate from other states because the number of initial unemployment claims is considerably higher than the other states. Texas has shown startling improvements and, given the initial claims that were in March and April, initial unemployment claims in that state have decreased considerably.

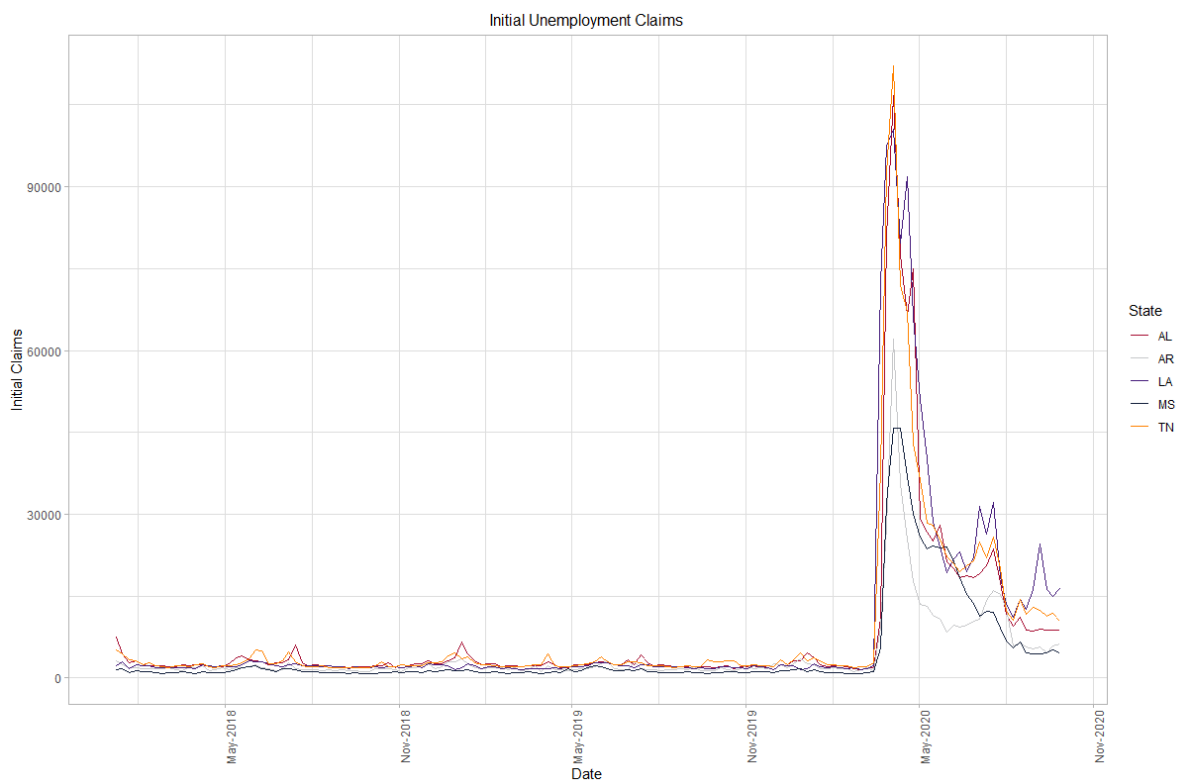
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Figure 13: Unemployment Rate for Memphis, TN (Jan 2015-Sept 2020)



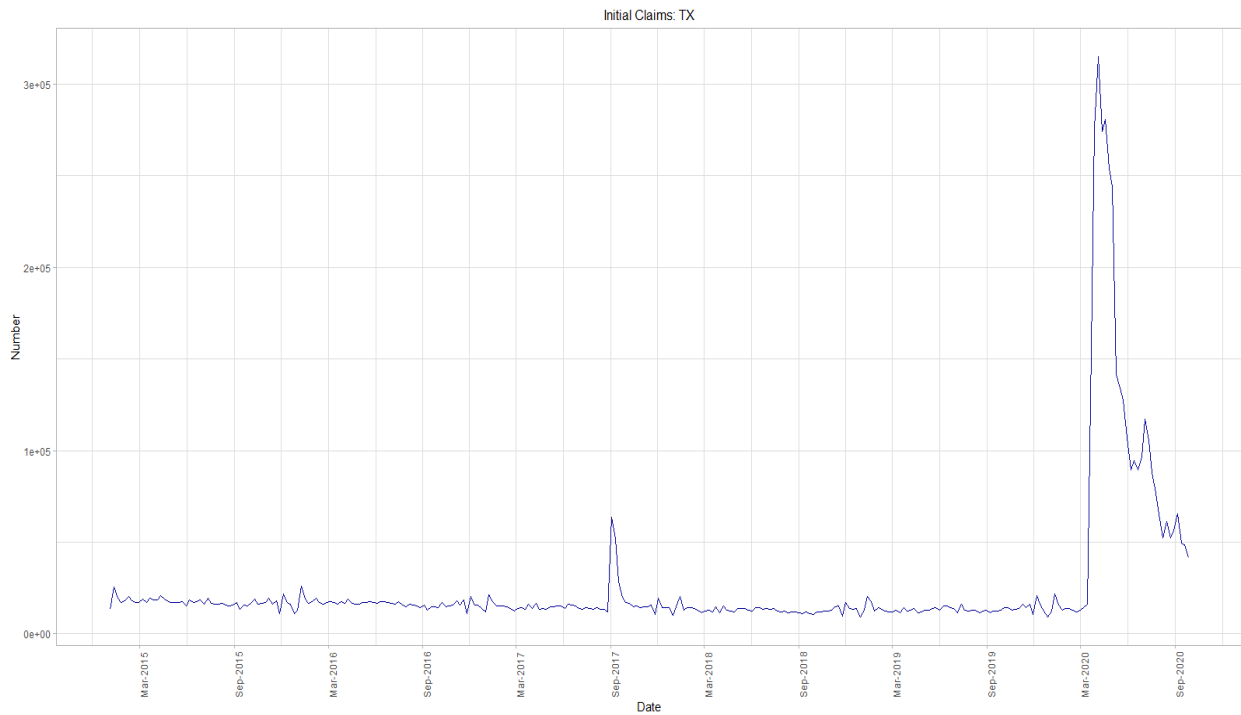
Source: Federal Reserve Bank of St. Louis Economic Data, <https://fred.stlouisfed.org>

Figure 14: Initial Unemployment Claims for Selected States (Jan 2018-Sept 2020)



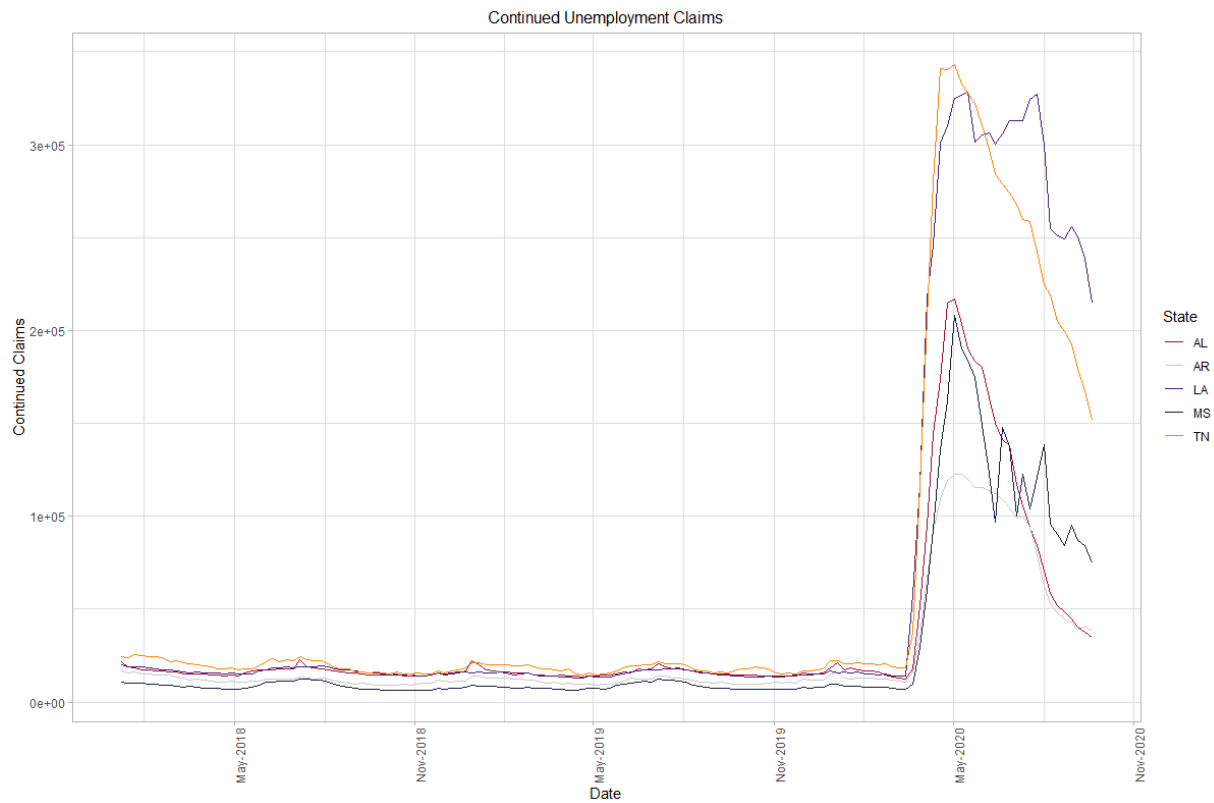
Source: Federal Reserve Bank of St. Louis Economic Data, <https://fred.stlouisfed.org>

Figure 15: Initial Unemployment Claims for TX (Jan 2015-Sept 2020)



Source: Federal Reserve Bank of St. Louis Economic Data, <https://fred.stlouisfed.org>

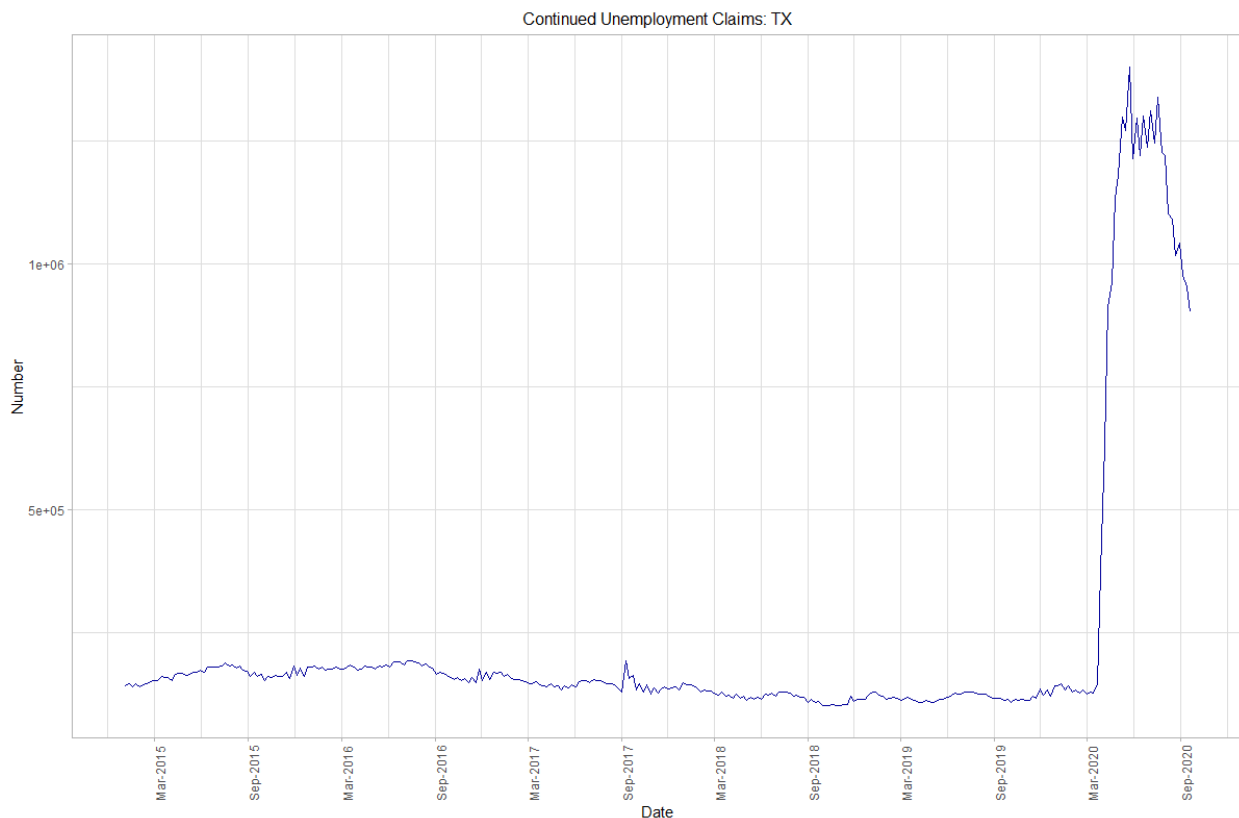
Figure 16: Continued Unemployment Claims for Selected States (Jan 2018-Sept 2020)



Source: Federal Reserve Bank of St. Louis Economic Data, <https://fred.stlouisfed.org>

We now turn our attention to Figure 16; the continued unemployment claims in the shown states (AL, AR, LA, MS and TN) are not presenting as “consistent” a pattern as we are seeing with respect to the trend in initial unemployment claims. Some states – e.g., AL, AR and TN – saw spikes in continued unemployment followed by general improvements. Louisiana and Mississippi are showing periods of improvement followed by additional losses in employment, even though the trends for those two states have shown improvements in the last two months. However, it is possible that we will see additional upward movement in the continued unemployment claims for these states. Although Tennessee has made some improvements, it is a state that was hit very hard by the COVID recession. As mentioned, it could be that major metropolitan areas – Nashville, Chattanooga and Memphis – were very susceptible to unemployment related to COVID because of its industry mix (hospitality, leisure and entertainment).

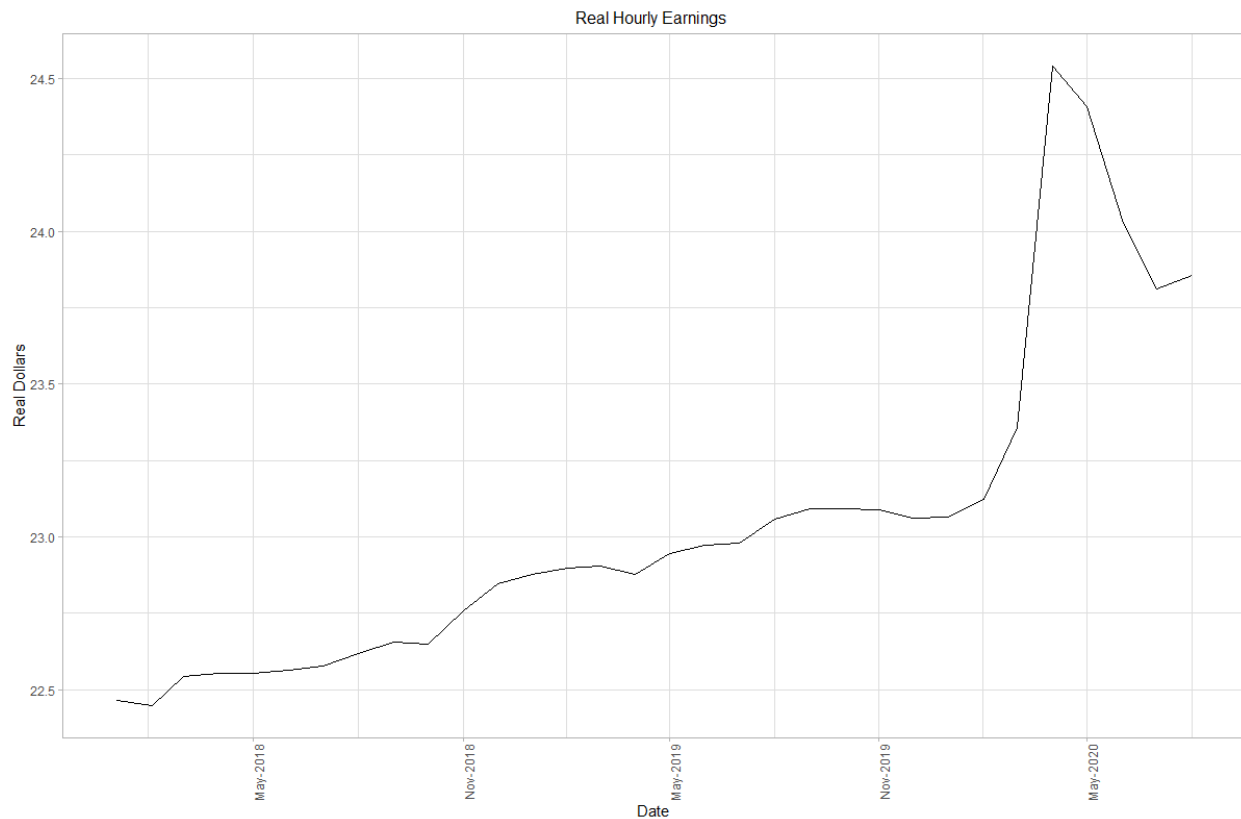
Figure 17: Continued Unemployment Claims for TX (Jan 2015-Sept 2020)



Source: Federal Reserve Bank of St. Louis Economic Data, <https://fred.stlouisfed.org>

The trend of continued unemployment in Texas is more similar to Louisiana than Alabama. (See Figure 17.) Texas’ continued claims have remained high, and are likely a function of its heavy reliance on oil and energy – sectors that were hit particularly hard in 1Q2020 during Russia and Saudi Arabia’s oil price “skirmish”. As a result of increased production – and falling international oil prices – a large number of oil companies filed for bankruptcy in the late Spring and early Summer. The recovery in Texas was likely impacted by these filings.

Figure 18: US Real Hourly Wages (Jan 2018-Sept 2020)



Source: Federal Reserve Bank of St. Louis Economic Data, <https://fred.stlouisfed.org>

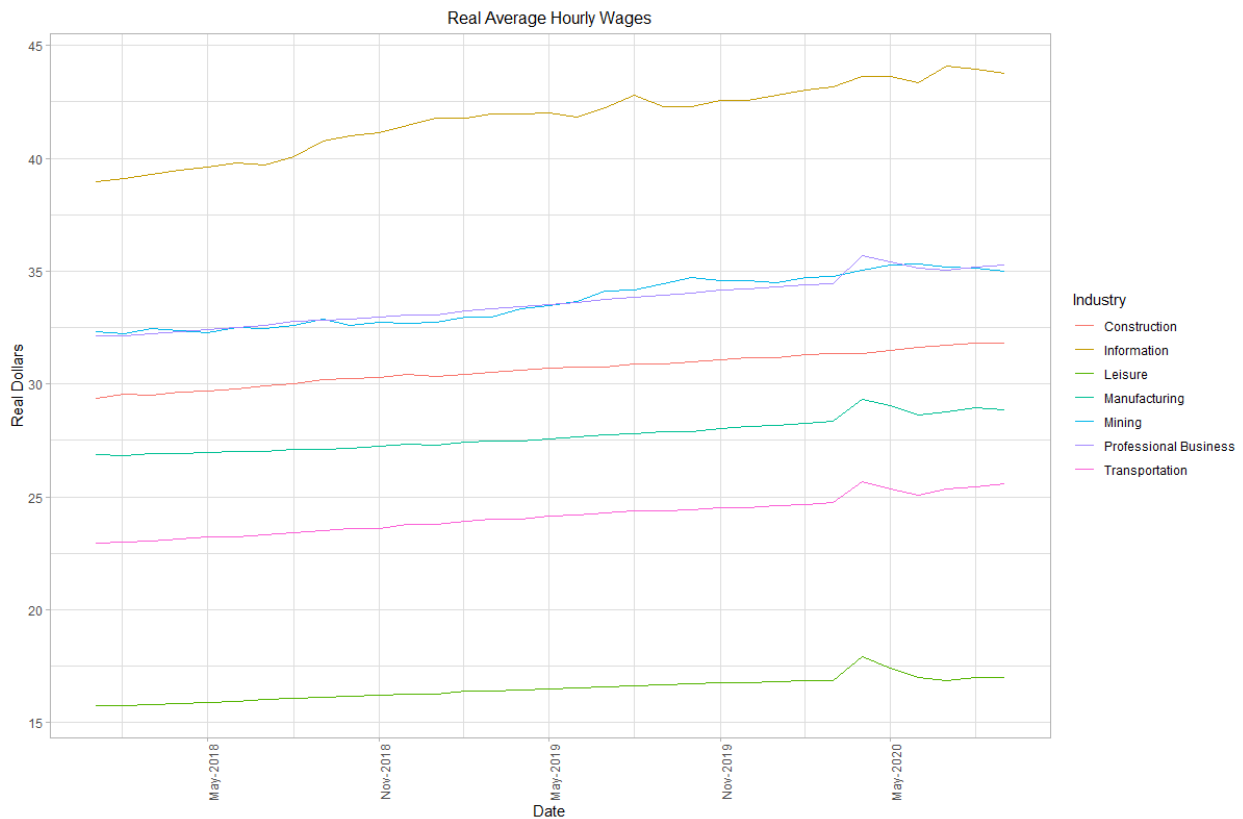
One particularly interesting trend is the dramatic spike in real (inflation-adjusted) wages that was seen in April, 2020. (See Figure 18.) Typically, an economic recession would be highlighted by a decrease in personal wages and a dramatic decrease in real GDP. The US did suffer the worst quarterly drop in GDP during the second quarter of this past year -- a 32.9% annualized decrease⁹. But, US workers had more income to use during that drop. This increase came about because of two events. First, the COVID-19 closure of non-essential businesses in April decreased the supply of workers more than the decrease in the demand for workers (i.e., firms were having difficulties filling jobs¹⁰). Second, the Congress passed the CARES Act which included additional \$600 stipends for the unemployed, Small Business Association loans (Payroll Protection Plan) that many companies used to pay workers, and direct stimulus checks to individuals. The fiscal stimulus directly added to the wages of employed workers.

Workers in different industries, however, did not see the same bump. (See Figure 19.) Although most industries saw some bump in wages, some industries – such as construction wages – saw little or no adjustment to wages. And, for manufacturing, the trend in the last month is a slight decrease in real wages. Because of the demographics of these jobs (i.e., construction has a large share of Hispanic workers, while transportation has a larger share of black workers), there are divergent paths in the recovery of different groups.

⁹ See <https://www.cnbc.com/2020/07/30/us-gdp-q2-2020-first-reading.html>

¹⁰ See <https://spectrumnews1.com/oh/columbus/news/2020/08/26/businesses-struggle-to-fill-jobs-despite-high-unemployment-rate>

Figure 19: Real Hourly Wages for Selected Industries (Jan 2018-Sept 2020)



Source: Federal Reserve Bank of St. Louis Economic Data, <https://fred.stlouisfed.org>

Table 1 and Table 2 highlight one of the more pressing issues with respect to the current recession. The lack of a national policy on evictions is causing a wave homeless individuals and families in the middle of a recession that could see an increase in unemployment and a decrease in average wages. Table 2 shows the percentage of households that are NOT CURRENT on rent payments relative to their household income. The trend at the end of August shows a startling U-shape, with high rates of non-payment at both the lowest and highest level of income. The U-shaped delinquencies (high at the lowest and highest income levels) is still present but somewhat less pronounced at the end of September. Families with incomes between \$100,000 and \$149,000 have the lowest delinquency rates for both August and September. It is likely that the lowest income levels are unable to make payments while the highest income levels may be leveraging their position and, perhaps, renegotiating rates or securing “lump-sum” payments.

MACROECONOMIC FORECASTS, 3Q2020 – FINAL VERSION

Table 1: Percentage of Tenants NOT Making Rent Payments, US & from Selected States (May 2020-Aug 2020)

Date	% Renters NOT Making Payment (US Total)	% Renters NOT Making Payments (AL)	% Renters NOT Making Payments (TX)	% Renters NOT Making Payments (LA)	% Renters NOT Making Payments (MS)	% Renters NOT Making Payments (TN)	% Renters NOT Making Payments (AR)
5/5/2020	14.31%	19.00%	18.16%	26.40%	16.33%	11.21%	17.97%
5/12/2020	16.28%	24.20%	15.95%	28.20%	31.75%	11.72%	15.88%
5/19/2020	15.46%	9.11%	16.31%	21.13%	20.37%	22.25%	17.24%
5/26/2020	14.86%	14.46%	19.48%	17.30%	18.16%	13.64%	20.21%
6/2/2020	15.21%	16.69%	10.29%	13.59%	19.02%	11.88%	24.15%
6/9/2020	15.99%	20.24%	13.80%	20.57%	20.24%	14.83%	14.87%
6/16/2020	14.71%	15.62%	15.53%	15.85%	21.73%	8.62%	29.04%
6/23/2020	16.47%	18.11%	16.71%	20.98%	17.94%	13.07%	17.90%
6/30/2020	17.38%	14.11%	18.83%	30.70%	21.67%	13.36%	18.74%
7/7/2020	15.76%	26.13%	16.60%	20.81%	18.48%	17.53%	22.57%
7/14/2020	17.47%	30.10%	21.73%	21.40%	21.78%	18.92%	13.18%
7/21/2020	18.26%	24.93%	22.32%	24.43%	21.78%	30.82%	16.61%
8/31/2020	14.39%	22.07%	13.56%	24.10%	13.44%	11.45%	12.86%
9/14/2020	16.47%	19.09%	17.25%	21.85%	14.56%	15.12%	19.09%

Source: <https://www.census.gov/programs-surveys/household-pulse-survey/data.html>

Table 2: Percentage of US Households Not Current on Rental Payments (by Income Level)

Household income	8/31/2020	9/28/2020
	% of Households NOT current on Rent	% of Households NOT current on Rent
Less than \$25,000	54.74%	49.44%
\$25,000 - \$34,999	49.28%	44.41%
\$35,000 - \$49,999	45.23%	43.79%
\$50,000 - \$74,999	60.02%	28.49%
\$75,000 - \$99,999	27.92%	35.93%
\$100,000 - \$149,999	13.92%	13.98%
\$150,000 - \$199,999	14.88%	31.15%
\$200,000 and above	64.80%	28.39%

Source: <https://www.census.gov/programs-surveys/household-pulse-survey/data.html>

Table 3 shows the percentage of home owners that are NOT current with current mortgage payments by week (May through September). With the exception of Alabama, the trends in delinquencies is alarming – the trend for mortgage delinquencies of families with children hit double-digits in mid-Summer and has remained high into the Fall while mortgage delinquencies for families without children have started to tick-up in the September. We do not believe it is a coincidence that average wages are starting to trend downward (see Figure 19) for many industries and mortgage delinquency rates are starting to trend upwards; as real wages continue to fall we could see an increase in mortgage delinquencies for families (both with and without children). Table 4 through Table 8 show the overall

MACROECONOMIC FORECASTS, 3Q2020 – FINAL VERSION

delinquency rates for several states and their included MSAs as a function of the number of units in the mortgaged property.

Table 3: Percentage of Home Owners Not Current on Mortgage Payment for Selected States

Date	US Total		AL		TX		LA	
	Owners without Children	Owners with Children	Owners without Children	Owners with Children	Owners without Children	Owners with Children	Owners without Children	Owners with Children
5/5/2020	3.70%	7.60%	2.90%	4.60%	5.90%	12.00%	1.40%	10.00%
5/12/2020	3.60%	6.90%	0.70%	4.70%	2.10%	5.00%	4.00%	7.10%
5/19/2020	3.60%	7.00%	2.90%	4.20%	3.10%	7.10%	1.30%	6.70%
5/26/2020	3.50%	7.10%	2.40%	10.80%	5.50%	6.50%	7.50%	6.20%
6/2/2020	3.30%	7.50%	2.80%	9.10%	3.80%	6.10%	2.40%	9.90%
6/9/2020	3.20%	8.00%	4.20%	16.60%	5.40%	10.90%	1.10%	10.60%
6/16/2020	3.50%	7.60%	1.00%	11.20%	2.60%	11.60%	6.10%	5.80%
6/23/2020	3.20%	7.70%	4.60%	6.50%	2.90%	8.30%	7.90%	19.10%
6/30/2020	3.90%	8.50%	4.60%	10.70%	2.10%	12.30%	6.70%	8.70%
7/7/2020	3.82%	8.56%	6.36%	12.93%	4.41%	8.24%	7.35%	12.05%
7/14/2020	4.31%	8.51%	5.33%	18.55%	3.96%	6.34%	2.18%	15.42%
7/21/2020	3.58%	9.02%	3.70%	15.32%	4.65%	10.36%	3.12%	14.65%
9/14/2020	4.97%	9.35%	2.63%	11.25%	6.24%	10.14%	2.95%	11.08%
9/28/2020	4.71%	9.41%	4.48%	4.78%	4.68%	15.77%	4.45%	11.81%
Date	TN		AR		MS			
	Owners without Children	Owners with Children	Owners without Children	Owners with Children	Owners without Children	Owners with Children		
5/5/2020	3.80%	12.00%	2.90%	4.60%	5.90%	12.50%		
5/12/2020	2.50%	8.00%	0.70%	4.70%	2.40%	21.40%		
5/19/2020	1.90%	5.70%	2.90%	4.20%	2.70%	21.20%		
5/26/2020	2.70%	5.80%	2.40%	10.80%	4.00%	13.10%		
6/2/2020	1.40%	6.80%	2.80%	9.10%	2.70%	6.00%		
6/9/2020	1.80%	7.80%	4.20%	16.60%	3.70%	7.70%		
6/16/2020	4.10%	22.00%	1.00%	11.20%	2.80%	7.90%		
6/23/2020	4.00%	19.70%	4.60%	6.50%	3.20%	5.80%		
6/30/2020	3.30%	3.00%	4.60%	10.70%	4.80%	19.30%		
7/7/2020	6.46%	9.33%	5.18%	13.90%	7.90%	11.38%		
7/14/2020	7.48%	9.95%	9.78%	4.10%	4.47%	7.87%		
7/21/2020	5.10%	10.08%	6.9%	11.8%	3.91%	10.53%		
9/14/2020	7.75%	6.27%	2.90%	5.61%	8.79%	8.33%		
9/28/2020	5.85%	12.44%	3.25%	8.46%	4.90%	11.00%		

Source: <https://www.census.gov/programs-surveys/household-pulse-survey/data.html>

Table 4: Percentage of Freddie Mac Mortgages by Status (Current, 30 dpd and 30 + dpd) as of June 2020: Alabama & SMSAs

		Total	Current	30-59 dpd	60-89 dpd	90-119 dpd	120+ dpd	% 30dpd	% >30dpd	% >=30dpd
Alabama	1 unit	72939	70872	546	244	252	1025	0.75%	2.09%	2.83%
	2 units	143	137	2	1	0	3	1.40%	2.80%	4.20%
	3+ units	69	69	0	0	0	0	0.00%	0.00%	0.00%
Anniston-Oxford, AL	1 unit	950	915	7	5	5	18	0.74%	2.95%	3.68%
	2 units	2	2	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	4	4	0	0	0	0	0.00%	0.00%	0.00%
Auburn-Opelika, AL	1 unit	3560	3450	28	18	8	56	0.79%	2.30%	3.09%
	2 units	20	17	2	0	0	1	10.00%	5.00%	15.00%
	3+ units	1	1	0	0	0	0	0.00%	0.00%	0.00%
Birmingham-Hoover, AL	1 unit	23579	22912	160	85	96	326	0.68%	2.15%	2.83%
	2 units	17	17	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	9	9	0	0	0	0	0.00%	0.00%	0.00%
Columbus, GA-AL	1 unit	288	274	5	0	2	7	1.74%	3.13%	4.86%
	2 units	5	5	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	0	0	0	0	0	0	0.00%	0.00%	0.00%
Daphne-Fairhope-Foley, AL	1 unit	5736	5571	37	17	16	95	0.65%	2.23%	2.88%
	2 units	10	10	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	2	2	0	0	0	0	0.00%	0.00%	0.00%
Decatur, AL	1 unit	1695	1653	19	2	3	18	1.12%	1.36%	2.48%
	2 units	4	4	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	5	5	0	0	0	0	0.00%	0.00%	0.00%
Dothan, AL	1 unit	1678	1633	19	3	9	14	1.13%	1.55%	2.68%
	2 units	1	1	0	0	0	0	0.00%	0.00%	0.00%

MACROECONOMIC FORECASTS, 3Q2020 – FINAL VERSION

	3+ units	2	2	0	0	0	0	0.00%	0.00%	0.00%
Florence-Muscle Shoals, AL	1 unit	2172	2111	20	3	5	33	0.92%	1.89%	2.81%
	2 units	2	2	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	0	0	0	0	0	0	0.00%	0.00%	0.00%
Gadsden, AL	1 unit	1016	967	10	4	2	33	0.98%	3.84%	4.82%
	2 units	1	1	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	0	0	0	0	0	0	0.00%	0.00%	0.00%
Huntsville, AL	1 unit	10711	10498	53	23	23	114	0.49%	1.49%	1.99%
	2 units	14	14	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	30	30	0	0	0	0	0.00%	0.00%	0.00%
Mobile, AL	1 unit	4334	4188	31	20	18	77	0.72%	2.65%	3.37%
	2 units	11	11	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	4	4	0	0	0	0	0.00%	0.00%	0.00%
Montgomery, AL	1 unit	4843	4714	33	11	15	70	0.68%	1.98%	2.66%
	2 units	13	13	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	7	7	0	0	0	0	0.00%	0.00%	0.00%
Tuscaloosa, AL	1 unit	3894	3796	31	16	10	41	0.80%	1.72%	2.52%
	2 units	4	4	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	0	0	0	0	0	0	0.00%	0.00%	0.00%
Outside all MSAs, AL	1 unit	8483	8190	93	37	40	123	1.10%	2.36%	3.45%
	2 units	39	36	0	1	0	2	0.00%	7.69%	7.69%
	3+ units	5	5	0	0	0	0	0.00%	0.00%	0.00%

Data: STACR Freddie Mac

MACROECONOMIC FORECASTS, 3Q2020 – FINAL VERSION

Table 5: Percentage of Freddie Mac Mortgages by Status (Current, 30 dpd and 30 + dpd) as of June 2020: Florida & SMSAs

		Total	Current	30-59 dpd	60-89 dpd	90-119 dpd	120+ dpd	% 30dpd	% >30dpd	% >=30dpd
Florida	1 unit	433942	412147	3887	2323	2596	12989	0.90%	4.13%	5.02%
	2 units	3013	2775	46	17	29	146	1.53%	6.37%	7.90%
	3+ units	1165	1074	7	8	8	68	0.60%	7.21%	7.81%
Cape Coral-Fort Myers, FL	1 unit	20651	19861	158	96	101	435	0.77%	3.06%	3.83%
	2 units	249	225	7	1	2	14	2.81%	6.83%	9.64%
	3+ units	33	31	1	0	0	1	3.03%	3.03%	6.06%
Crestview-Fort Walton Beach-Destin, FL	1 unit	5496	5279	27	28	36	126	0.49%	3.46%	3.95%
	2 units	13	13	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	17	17	0	0	0	0	0.00%	0.00%	0.00%
Deltona-Daytona Beach-Ormond Beach, FL	1 unit	14342	13854	124	61	59	244	0.86%	2.54%	3.40%
	2 units	110	97	0	0	4	9	0.00%	11.82%	11.82%
	3+ units	39	37	0	0	0	2	0.00%	5.13%	5.13%
Fort Lauderdale-Pompano Beach-Sunrise, FL	1 unit	40662	37223	513	350	399	2177	1.26%	7.20%	8.46%
	2 units	407	346	12	11	6	32	2.95%	12.04%	14.99%
	3+ units	217	193	1	3	3	17	0.46%	10.60%	11.06%
Gainesville, FL	1 unit	4603	4505	14	11	14	59	0.30%	1.82%	2.13%
	2 units	17	17	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	13	11	0	0	0	2	0.00%	15.38%	15.38%
Homosassa Springs, FL	1 unit	2384	2346	14	5	5	14	0.59%	1.01%	1.59%
	2 units	17	17	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	3	3	0	0	0	0	0.00%	0.00%	0.00%
Jacksonville, FL	1 unit	30517	29508	204	127	121	557	0.67%	2.64%	3.31%
	2 units	147	134	2	0	0	11	1.36%	7.48%	8.84%
	3+ units	84	79	0	1	0	4	0.00%	5.95%	5.95%
Lakeland-Winter Haven, FL	1 unit	11592	11121	120	58	56	237	1.04%	3.03%	4.06%

MACROECONOMIC FORECASTS, 3Q2020 – FINAL VERSION

	2 units	74	70	0	0	1	3	0.00%	5.41%	5.41%
	3+ units	26	24	0	0	0	2	0.00%	7.69%	7.69%
Miami-Miami Beach-Kendall, FL	1 unit	34077	30615	534	285	417	2226	1.57%	8.59%	10.16%
	2 units	401	366	1	2	4	28	0.25%	8.48%	8.73%
	3+ units	119	107	1	0	1	10	0.84%	9.24%	10.08%
Naples-Marco Island, FL	1 unit	9827	9419	69	28	64	247	0.70%	3.45%	4.15%
	2 units	35	31	0	0	0	4	0.00%	11.43%	11.43%
	3+ units	14	13	0	0	1	0	0.00%	7.14%	7.14%
North Port-Bradenton-Sarasota, FL	1 unit	24211	23364	169	94	84	500	0.70%	2.80%	3.50%
	2 units	138	124	9	0	2	3	6.52%	3.62%	10.14%
	3+ units	20	18	1	1	0	0	5.00%	5.00%	10.00%
Ocala, FL	1 unit	5921	5764	39	21	23	74	0.66%	1.99%	2.65%
	2 units	16	16	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	12	9	0	0	0	3	0.00%	25.00%	25.00%
Orlando-Kissimmee-Sanford, FL	1 unit	56151	53082	485	338	327	1919	0.86%	4.60%	5.47%
	2 units	242	235	2	0	1	4	0.83%	2.07%	2.89%
	3+ units	80	76	0	2	0	2	0.00%	5.00%	5.00%
Palm Bay-Melbourne-Titusville, FL	1 unit	14834	14349	105	76	50	254	0.71%	2.56%	3.27%
	2 units	37	34	0	0	2	1	0.00%	8.11%	8.11%
	3+ units	19	17	0	0	0	2	0.00%	10.53%	10.53%
Palm Coast, FL	1 unit	182	178	2	1	0	1	1.10%	1.10%	2.20%
	2 units	4	4	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	0	0	0	0	0	0	0.00%	0.00%	0.00%
Panama City-Lynn Haven-Panama City Beach, FL	1 unit	3628	3532	31	9	11	45	0.85%	1.79%	2.65%
	2 units	33	33	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	12	12	0	0	0	0	0.00%	0.00%	0.00%
Pensacola-Ferry Pass-Brent, FL	1 unit	7502	7244	72	36	25	125	0.96%	2.48%	3.44%
	2 units	57	56	1	0	0	0	1.75%	0.00%	1.75%

MACROECONOMIC FORECASTS, 3Q2020 – FINAL VERSION

	3+ units	37	35	0	0	0	2	0.00%	5.41%	5.41%
Port St. Lucie, FL	1 unit	12031	11520	92	61	80	278	0.76%	3.48%	4.25%
	2 units	45	42	1	0	0	2	2.22%	4.44%	6.67%
	3+ units	12	11	0	0	0	1	0.00%	8.33%	8.33%
Punta Gorda, FL	1 unit	5635	5472	24	22	20	97	0.43%	2.47%	2.89%
	2 units	21	20	1	0	0	0	4.76%	0.00%	4.76%
	3+ units	5	5	0	0	0	0	0.00%	0.00%	0.00%
Sebastian-Vero Beach, FL	1 unit	4459	4329	34	14	14	68	0.76%	2.15%	2.92%
	2 units	10	9	0	0	0	1	0.00%	10.00%	10.00%
	3+ units	4	3	0	0	0	1	0.00%	25.00%	25.00%
Sebring, FL	1 unit	1483	1435	15	10	5	18	1.01%	2.23%	3.24%
	2 units	10	10	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	3	3	0	0	0	0	0.00%	0.00%	0.00%
Tallahassee, FL	1 unit	7235	7020	56	25	26	108	0.77%	2.20%	2.97%
	2 units	42	42	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	28	28	0	0	0	0	0.00%	0.00%	0.00%
Tampa-St. Petersburg-Clearwater, FL	1 unit	71117	68221	582	315	356	1643	0.82%	3.25%	4.07%
	2 units	372	356	5	2	0	9	1.34%	2.96%	4.30%
	3+ units	210	195	0	0	3	12	0.00%	7.14%	7.14%
The Villages, FL	1 unit	1917	1883	13	3	0	18	0.68%	1.10%	1.77%
	2 units	0	0	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	0	0	0	0	0	0	0.00%	0.00%	0.00%
West Palm Beach-Boca Raton-Boynton Beach, FL	1 unit	35789	33622	327	220	267	1353	0.91%	5.14%	6.05%
	2 units	191	173	1	1	5	11	0.52%	8.90%	9.42%
	3+ units	109	100	2	1	0	6	1.83%	6.42%	8.26%
Outside all MSAs, FL	1 unit	7696	7401	64	29	36	166	0.83%	3.00%	3.83%
	2 units	325	305	4	0	2	14	1.23%	4.92%	6.15%
	3+ units	49	47	1	0	0	1	2.04%	2.04%	4.08%

MACROECONOMIC FORECASTS, 3Q2020 – FINAL VERSION

Data: STACR Freddie Mac

MACROECONOMIC FORECASTS, 3Q2020 – FINAL VERSION

Table 6: Percentage of Freddie Mac Mortgages by Status (Current, 30 dpd and 30 + dpd) as of June 2020: Louisiana & SMSAs

		Total	Current	30-59 dpd	60-89 dpd	90-119 dpd	120+ dpd	% 30dpd	% >30dpd	% >=30dpd
Louisiana	1 unit	63832	60701	744	352	392	1643	1.17%	3.74%	4.91%
	2 units	1633	1489	20	9	16	99	1.22%	7.59%	8.82%
	3+ units	489	428	8	0	10	43	1.64%	10.84%	12.47%
Alexandria, LA	1 unit	1278	1239	8	5	8	18	0.63%	2.43%	3.05%
	2 units	0	0	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	0	0	0	0	0	0	0.00%	0.00%	0.00%
Baton Rouge, LA	1 unit	15847	15233	152	81	72	309	0.96%	2.92%	3.87%
	2 units	47	43	2	0	2	0	4.26%	4.26%	8.51%
	3+ units	50	43	0	0	2	5	0.00%	14.00%	14.00%
Hammond, LA	1 unit	1526	1460	22	10	7	27	1.44%	2.88%	4.33%
	2 units	10	9	0	0	0	1	0.00%	10.00%	10.00%
	3+ units	4	4	0	0	0	0	0.00%	0.00%	0.00%
Houma-Bayou Cane-Thibodaux, LA	1 unit	2708	2585	40	17	14	52	1.48%	3.06%	4.54%
	2 units	5	5	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	4	4	0	0	0	0	0.00%	0.00%	0.00%
Lafayette, LA	1 unit	6760	6423	69	42	41	185	1.02%	3.96%	4.99%
	2 units	9	9	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	23	18	1	0	0	4	4.35%	17.39%	21.74%
Lake Charles, LA	1 unit	2911	2756	44	13	19	79	1.51%	3.81%	5.32%
	2 units	11	11	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	6	4	0	0	2	0	0.00%	33.33%	33.33%
Monroe, LA	1 unit	1948	1855	33	6	6	48	1.69%	3.08%	4.77%
	2 units	2	2	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	0	0	0	0	0	0	0.00%	0.00%	0.00%
New Orleans-Metairie-Kenner, LA	1 unit	20962	19742	250	127	155	688	1.19%	4.63%	5.82%

MACROECONOMIC FORECASTS, 3Q2020 – FINAL VERSION

	2 units	1086	992	14	9	9	62	1.29%	7.37%	8.66%
	3+ units	299	258	6	0	4	31	2.01%	11.71%	13.71%
Shreveport-Bossier City, LA	1 unit	5310	5053	52	32	45	128	0.98%	3.86%	4.84%
	2 units	4	4	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	7	7	0	0	0	0	0.00%	0.00%	0.00%
Outside all MSAs, LA	1 unit	4582	4355	74	19	25	109	1.62%	3.34%	4.95%
	2 units	459	414	4	0	5	36	0.87%	8.93%	9.80%
	3+ units	96	90	1	0	2	3	1.04%	5.21%	6.25%

Data: STACR Freddie Mac

MACROECONOMIC FORECASTS, 3Q2020 – FINAL VERSION

Table 7: Percentage of Freddie Mac Mortgages by Status (Current, 30 dpd and 30 + dpd) as of June 2020: Georgia & SMSAs

		Total	Current	30-59 dpd	60-89 dpd	90-119 dpd	120+ dpd	% 30dpd	% >30dpd	% >=30dpd
Georgia	1 unit	212434	204525	1545	858	1022	4484	0.73%	3.00%	3.72%
	2 units	949	911	5	5	4	24	0.53%	3.48%	4.00%
	3+ units	347	323	4	0	4	16	1.15%	5.76%	6.92%
Albany, GA	1 unit	1177	1135	11	6	5	20	0.93%	2.63%	3.57%
	2 units	10	10	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	1	1	0	0	0	0	0.00%	0.00%	0.00%
Athens-Clarke County, GA	1 unit	4635	4540	17	14	10	54	0.37%	1.68%	2.05%
	2 units	34	31	0	1	1	1	0.00%	8.82%	8.82%
	3+ units	7	7	0	0	0	0	0.00%	0.00%	0.00%
Atlanta-Sandy Springs-Marietta, GA	1 unit	151280	145166	1109	634	789	3582	0.73%	3.31%	4.04%
	2 units	565	533	4	4	3	21	0.71%	4.96%	5.66%
	3+ units	238	225	3	0	4	6	1.26%	4.20%	5.46%
Augusta-Richmond County, GA-SC	1 unit	5638	5461	45	28	39	65	0.80%	2.34%	3.14%
	2 units	42	42	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	8	6	0	0	0	2	0.00%	25.00%	25.00%
Brunswick, GA	1 unit	2039	1991	14	3	9	22	0.69%	1.67%	2.35%
	2 units	12	12	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	0	0	0	0	0	0	0.00%	0.00%	0.00%
Chattanooga, TN-GA	1 unit	2238	2160	14	12	8	44	0.63%	2.86%	3.49%
	2 units	7	7	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	2	2	0	0	0	0	0.00%	0.00%	0.00%
Columbus, GA-AL	1 unit	2786	2697	18	15	10	46	0.65%	2.55%	3.19%
	2 units	12	12	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	21	18	0	0	0	3	0.00%	14.29%	14.29%
Dalton, GA	1 unit	1279	1234	13	3	4	25	1.02%	2.50%	3.52%

MACROECONOMIC FORECASTS, 3Q2020 – FINAL VERSION

	2 units	6	5	1	0	0	0	16.67%	0.00%	16.67%
	3+ units	0	0	0	0	0	0	0.00%	0.00%	0.00%
Gainesville, GA	1 unit	4854	4681	48	9	24	92	0.99%	2.58%	3.56%
	2 units	18	18	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	2	2	0	0	0	0	0.00%	0.00%	0.00%
Hinesville-Fort Stewart, GA	1 unit	342	323	6	3	2	8	1.75%	3.80%	5.56%
	2 units	0	0	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	0	0	0	0	0	0	0.00%	0.00%	0.00%
Macon, GA	1 unit	2312	2228	25	4	19	36	1.08%	2.55%	3.63%
	2 units	6	6	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	5	5	0	0	0	0	0.00%	0.00%	0.00%
Rome, GA	1 unit	1532	1492	13	2	6	19	0.85%	1.76%	2.61%
	2 units	31	30	0	0	0	1	0.00%	3.23%	3.23%
	3+ units	4	4	0	0	0	0	0.00%	0.00%	0.00%
Savannah, GA	1 unit	7531	7288	52	38	33	120	0.69%	2.54%	3.23%
	2 units	85	84	0	0	0	1	0.00%	1.18%	1.18%
	3+ units	31	26	0	0	0	5	0.00%	16.13%	16.13%
Valdosta, GA	1 unit	1253	1217	6	2	5	23	0.48%	2.39%	2.87%
	2 units	6	6	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	0	0	0	0	0	0	0.00%	0.00%	0.00%
Warner Robins, GA	1 unit	2256	2205	11	9	2	29	0.49%	1.77%	2.26%
	2 units	2	2	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	3	3	0	0	0	0	0.00%	0.00%	0.00%
Outside all MSAs, GA	1 unit	21282	20707	143	76	57	299	0.67%	2.03%	2.70%
	2 units	113	113	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	25	24	1	0	0	0	4.00%	0.00%	4.00%

Data: STACR Freddie Mac

MACROECONOMIC FORECASTS, 3Q2020 – FINAL VERSION

Table 8: Percentage of Freddie Mac Mortgages by Status (Current, 30 dpd and 30 + dpd) as of June 2020: Texas & SMSAs

		Total	Current	30-59 dpd	60-89 dpd	90-119 dpd	120+ dpd	% = 30dpd	% > 30dpd	% >= 30dpd
Texas	1 unit	524582	501881	4788	2724	2879	12310	0.91%	3.41%	4.33%
	2 units	2950	2859	18	9	9	55	0.61%	2.47%	3.08%
	3+ units	1151	1100	5	3	5	38	0.43%	4.00%	4.43%
Abilene, TX	1 unit	2804	2720	26	13	7	38	0.93%	2.07%	3.00%
	2 units	10	10	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	1	1	0	0	0	0	0.00%	0.00%	0.00%
Amarillo, TX	1 unit	3174	3053	28	6	19	68	0.88%	2.93%	3.81%
	2 units	10	10	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	2	2	0	0	0	0	0.00%	0.00%	0.00%
Austin-Round Rock-San Marcos, TX	1 unit	69526	67091	514	267	260	1394	0.74%	2.76%	3.50%
	2 units	854	828	4	1	1	20	0.47%	2.58%	3.04%
	3+ units	174	169	0	0	0	5	0.00%	2.87%	2.87%
Beaumont-Port Arthur, TX	1 unit	4069	3903	48	24	25	69	1.18%	2.90%	4.08%
	2 units	1	1	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	6	5	0	0	0	1	0.00%	16.67%	16.67%
Brownsville-Harlingen, TX	1 unit	1885	1773	23	14	11	64	1.22%	4.72%	5.94%
	2 units	29	29	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	25	24	0	0	0	1	0.00%	4.00%	4.00%
College Station-Bryan, TX	1 unit	5060	4903	33	15	17	92	0.65%	2.45%	3.10%
	2 units	73	71	0	1	0	1	0.00%	2.74%	2.74%
	3+ units	46	40	2	0	2	2	4.35%	8.70%	13.04%
Corpus Christi, TX	1 unit	5192	4952	56	43	36	105	1.08%	3.54%	4.62%
	2 units	8	8	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	13	13	0	0	0	0	0.00%	0.00%	0.00%
Dallas-Plano-Irving, TX	1 unit	134316	128757	1095	618	735	3111	0.82%	3.32%	4.14%

MACROECONOMIC FORECASTS, 3Q2020 – FINAL VERSION

	2 units	338	324	4	2	3	5	1.18%	2.96%	4.14%
	3+ units	92	84	0	1	0	7	0.00%	8.70%	8.70%
El Paso, TX	1 unit	4456	4203	45	37	50	121	1.01%	4.67%	5.68%
	2 units	49	48	0	0	0	1	0.00%	2.04%	2.04%
	3+ units	25	25	0	0	0	0	0.00%	0.00%	0.00%
Fort Worth-Arlington-Grapevine, TX	1 unit	57115	54800	512	284	294	1225	0.90%	3.16%	4.05%
	2 units	301	294	0	0	2	5	0.00%	2.33%	2.33%
	3+ units	80	79	0	0	0	1	0.00%	1.25%	1.25%
Houston-Sugar Land-Baytown, TX	1 unit	135491	128452	1402	855	909	3873	1.03%	4.16%	5.20%
	2 units	223	212	3	0	2	6	1.35%	3.59%	4.93%
	3+ units	194	184	2	1	0	7	1.03%	4.12%	5.15%
Killeen-Temple-Fort Hood, TX	1 unit	4552	4415	34	22	21	60	0.75%	2.26%	3.01%
	2 units	161	158	0	2	0	1	0.00%	1.86%	1.86%
	3+ units	140	136	0	0	0	4	0.00%	2.86%	2.86%
Laredo, TX	1 unit	1348	1257	15	17	8	51	1.11%	5.64%	6.75%
	2 units	2	1	1	0	0	0	50.0%	0.00%	50.0%
	3+ units	6	6	0	0	0	0	0.00%	0.00%	0.00%
Longview, TX	1 unit	1889	1805	26	12	13	33	1.38%	3.07%	4.45%
	2 units	9	9	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	2	2	0	0	0	0	0.00%	0.00%	0.00%
Lubbock, TX	1 unit	5851	5652	58	23	14	104	0.99%	2.41%	3.40%
	2 units	58	56	0	0	0	2	0.00%	3.45%	3.45%
	3+ units	11	11	0	0	0	0	0.00%	0.00%	0.00%
McAllen-Edinburg-Mission, TX	1 unit	3059	2822	42	24	28	143	1.37%	6.37%	7.75%
	2 units	15	10	2	2	0	1	13.3%	20.0%	33.3%
	3+ units	112	108	0	1	0	3	0.00%	3.57%	3.57%
Midland, TX	1 unit	4445	4209	34	38	26	138	0.77%	4.54%	5.31%
	2 units	13	12	1	0	0	0	7.69%	0.00%	7.69%

MACROECONOMIC FORECASTS, 3Q2020 – FINAL VERSION

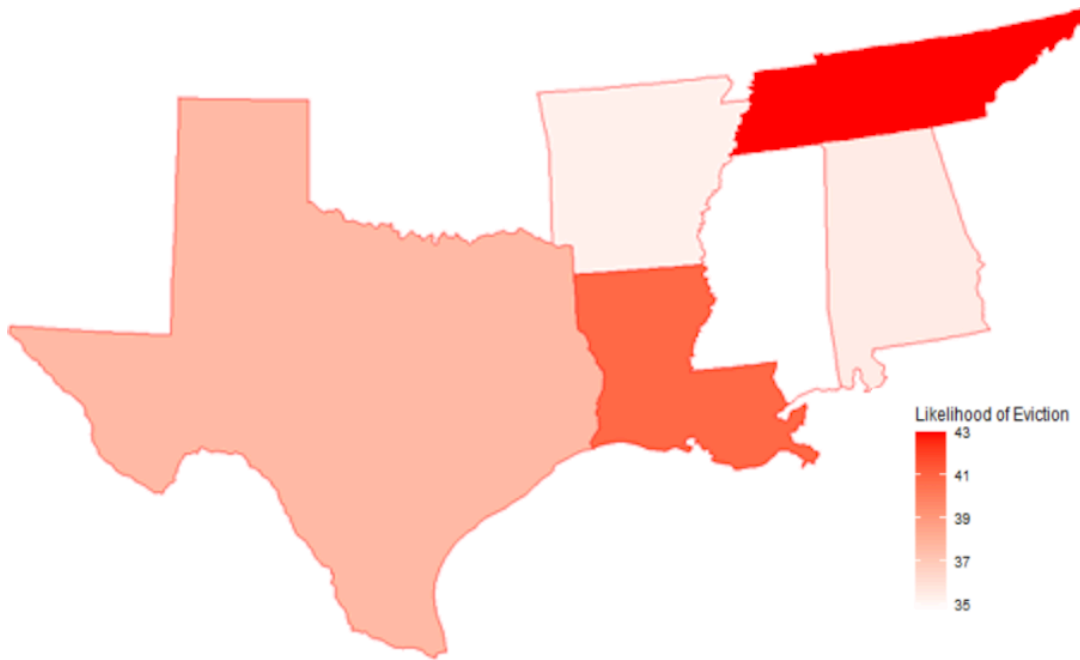
	3+ units	1	0	0	0	0	1	0.00%	100.0%	100.0%
Odessa, TX	1 unit	1622	1503	26	19	10	64	1.60%	5.73%	7.34%
	2 units	3	3	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	0	0	0	0	0	0	0.00%	0.00%	0.00%
San Angelo, TX	1 unit	1819	1749	23	14	5	28	1.26%	2.58%	3.85%
	2 units	5	5	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	3	3	0	0	0	0	0.00%	0.00%	0.00%
San Antonio-New Braunfels, TX	1 unit	38206	36607	345	193	217	844	0.90%	3.28%	4.19%
	2 units	261	255	2	0	0	4	0.77%	1.53%	2.30%
	3+ units	159	150	1	0	3	5	0.63%	5.03%	5.66%
Sherman-Denison, TX	1 unit	3217	3120	29	13	15	40	0.90%	2.11%	3.02%
	2 units	24	24	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	0	0	0	0	0	0	0.00%	0.00%	0.00%
Texarkana, TX-AR	1 unit	881	858	8	2	0	13	0.91%	1.70%	2.61%
	2 units	6	6	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	4	4	0	0	0	0	0.00%	0.00%	0.00%
Tyler, TX	1 unit	3294	3173	28	17	12	64	0.91%	2.82%	3.67%
	2 units	7	7	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	1	1	0	0	0	0	0.00%	0.00%	0.00%
Victoria, TX	1 unit	800	763	8	2	8	19	1.00%	3.63%	4.63%
	2 units	2	2	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	0	0	0	0	0	0	0.00%	0.00%	0.00%
Waco, TX	1 unit	3543	3430	40	16	11	46	1.13%	2.06%	3.19%
	2 units	36	35	0	0	1	0	0.00%	2.78%	2.78%
	3+ units	1	1	0	0	0	0	0.00%	0.00%	0.00%
Wichita Falls, TX	1 unit	1017	972	11	8	5	21	1.08%	3.34%	4.42%
	2 units	5	5	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	2	2	0	0	0	0	0.00%	0.00%	0.00%

MACROECONOMIC FORECASTS, 3Q2020 – FINAL VERSION

Outside all MSAs, TX	1 unit	25951	24939	279	128	123	482	1.08%	2.82%	3.90%
	2 units	447	436	1	1	0	9	0.22%	2.24%	2.46%
	3+ units	51	50	0	0	0	1	0.00%	1.96%	1.96%

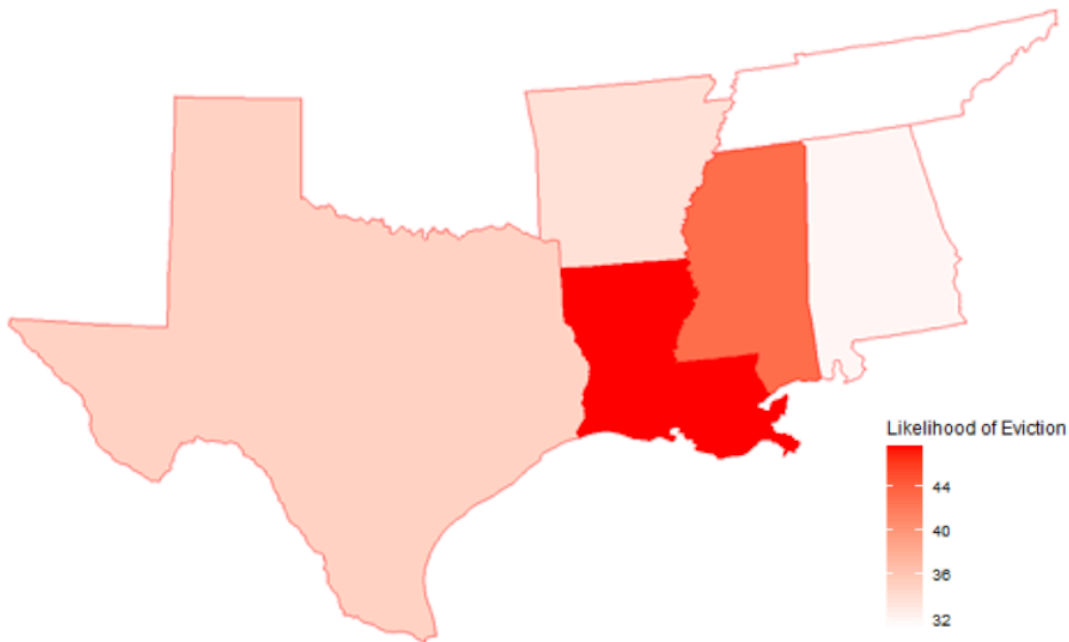
Data: STACR Freddie Mac

Figure 20: Percentage of Households Indicating Eviction or Foreclosure is Somewhat or Very Likely in Next Two Months (as of Aug 31, 2020)



Source: <https://www.census.gov/programs-surveys/household-pulse-survey/data.html>

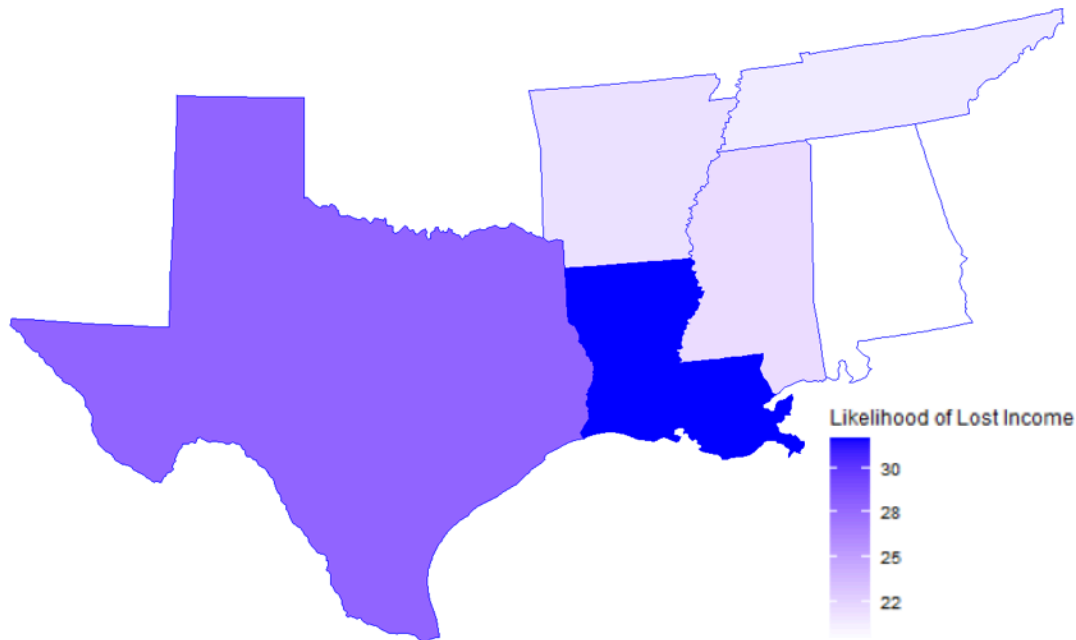
Figure 21: Percentage of Households Indicating Eviction or Foreclosure is Somewhat or Very Likely in Next Two Months (as of Sept 30, 2020)



Source: <https://www.census.gov/programs-surveys/household-pulse-survey/data.html>

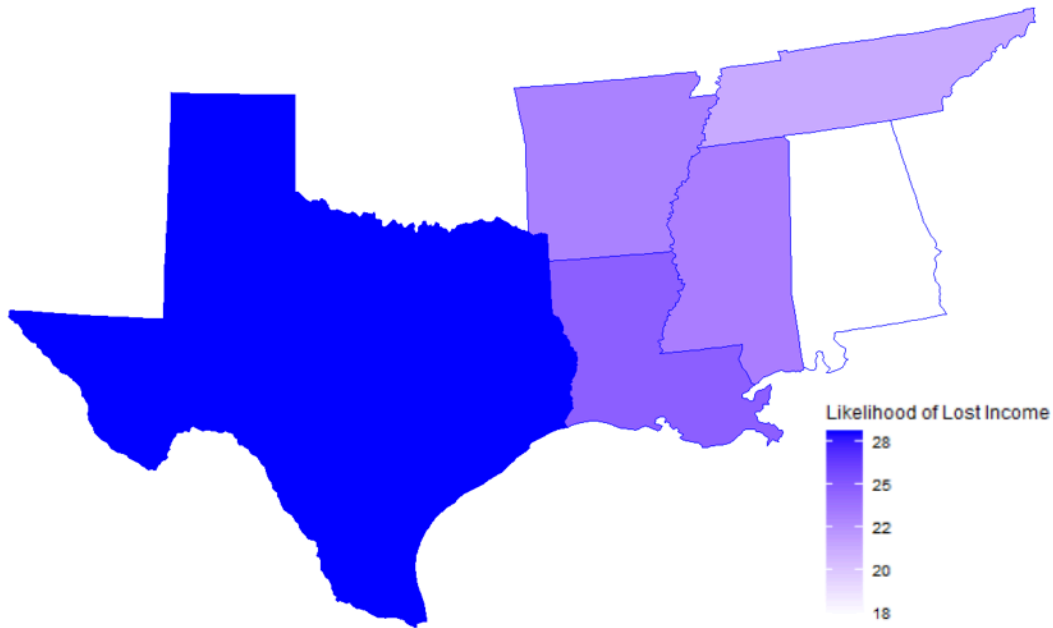
Figure 20 and Figure 21 show the percentage of households indicating that they are somewhat or very likely to lose their home to an eviction or foreclosure in the next two months; the two figures are from 8/31/2020 and 9/28/2020, respectively. The trend here shows that households in Tennessee are becoming less likely to be foreclosed on while households in Mississippi and Louisiana re becoming more likely to be foreclosed on (the changes in Texas, Arkansas and Alabama are minimal relative to these other states). It is startling that more than 1 in 3 households in Mississippi, Louisiana, Texas and Arkansas feel that they are at least ‘somewhat’ likely to lose their homes in the next few months.

Figure 22: Percentage of Household That Expect a Loss in Employment Income Next 4 months (as of Aug 31, 2020)



Source: <https://www.census.gov/programs-surveys/household-pulse-survey/data.html>

Figure 23: Percentage of Household That Expect a Loss in Employment Income Next 4 months (as of Sept 30, 2020)

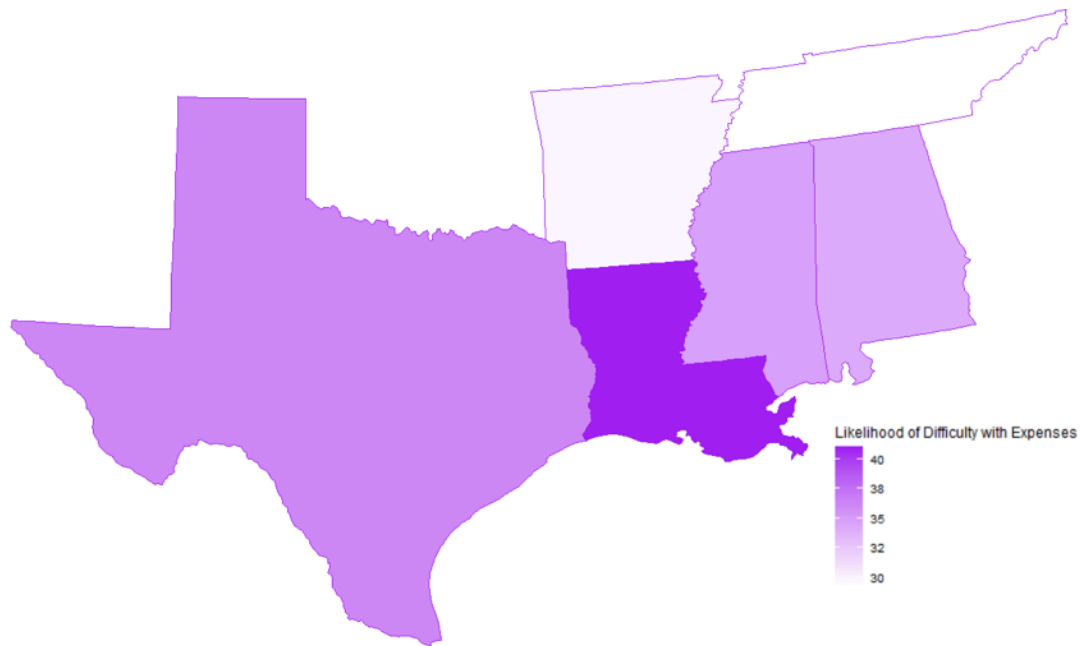


Source: <https://www.census.gov/programs-surveys/household-pulse-survey/data.html>

Looking now at Figure 22 and Figure 23, there has been a shift in the percentage of households that feel they will lose employment income in the next four weeks. Households in Louisiana are reporting slightly more optimism regarding keeping income while there is a slight increase in the percentage of households in Texas that are fearful of losing income. The trend we are seeing in Texas is not completely surprising given the trend we've seen with respect to oil prices and an increase in the number of oil company bankruptcies¹¹.

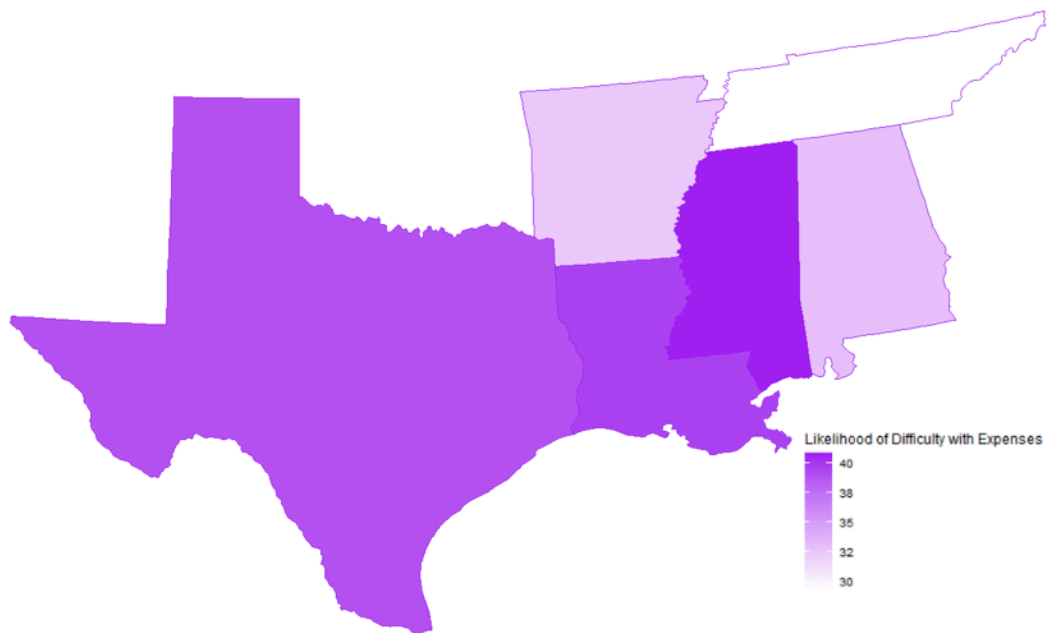
¹¹ See https://www.thecentersquare.com/texas/texas-leads-u-s-in-oil-and-gas-bankruptcies-job-losses-are-a-bloodbath/article_d6957a14-acb-11ea-9a66-5f52818d3f8e.html

Figure 24: Percentage of Households Identifying **Somewhat or Very Difficult** to Pay for Usual Expenses (as of Aug 31, 2020)



Source: <https://www.census.gov/programs-surveys/household-pulse-survey/data.html>

Figure 25: Percentage of Households Identifying **Somewhat or Very Difficult** to Pay for Usual Expenses (as of Sept 30, 2020)



Source: <https://www.census.gov/programs-surveys/household-pulse-survey/data.html>

Figure 24 and Figure 25 show how households reveal their inability to keep up with regular monthly expenses. At the end of August (8/31/20), we saw approximately 40% of households say they were “somewhat or very” likely to miss payments on regular monthly expenses. By September 28, 2020, we see nearly 40% of households in Alabama and Texas report this same fear. Arkansas also showed an

increase in households that were fearful of missing monthly payments. Unlike the trends for evictions and employment earnings, all the states in this footprint are showing an increase in likely default. The take-away here is that although some states might be improving in some economic indicators, households in general are fearful that they will start missing payments for regular expenses.

Recent Changes to the Federal Reserve’s Monetary Policies

In late August, Federal Reserve Chairman Jerome Powell announced a change in the Federal Reserve’s monetary policy. This change was prompted by the Fed’s recent inability to manage the US’ inflation rate to a level that would be “healthy” and productive; in essence, the issue is that, with unusually low unemployment, low inflation, and falling global interest rates, the Fed’ was not able to generate sufficiently motivating inflation by increasing short-term rates¹².

In his statement, Chairman Powell said that the Fed’ would try to raise inflationary pressure greater than 2 percent “for some time” in order to achieve “average inflation targeting”; in other words, the Fed’ said that it would be willing to let inflation run higher than the 2% target given that the US has experienced persistently low inflation and low unemployment for so long¹³. Given that managing unemployment, prices, and interest rates are all part of the mandate of the Federal Reserve (imbued to it by Congress), the Federal Reserve’s Federal Open Market Committee (FOMC) determines the appropriate level to set the Federal Funds Rate, the rate that banks use for borrowing money overnight¹⁴. The members of the FOMC periodically meet and vote to change rates based on their knowledge and observations of the economy in order to ensure the stability of the economy¹⁵.

The implications of the changes that Chairman Powell announced are simply that the FOMC (and, hence, the Fed’) will not simply raise or lower the Fed’ Funds Rate in *immediate* response to changes in unemployment and prices. Based on this statement, along with Chairman Powell’s statements based on the US’ economy given the COVID-19 pandemic, leads many to believe that rates will not change until 2024¹⁶.

The Fed’ also stated that it would not adjust its target for inflation (2%), nor would it consider other alternative targets such as a goal for GDP, or an acceptable “band” for the inflation rate¹⁷. Additionally, the Fed’ said that, by using “forward guidance” to the public about the near-term goals for short-term interest rates, and “quantitative easing” (to purchase assets in order to shore up confidence in the market in extraordinary times), did not exhaust them of tools for managing rates. Further, the Fed’ has specifically stated that it does not want to follow European Central Banks in implementing negative interest rates.

However, it should be noted that there is some disagreement about the new strategy: most notably, it has been reported that the members of the FOMC had expected a stronger and faster recovery than has

¹² See <https://www.cnbc.com/2020/08/27/powell-announces-new-fed-approach-to-inflation-that-could-keep-rates-lower-for-longer.html>

¹³ See <https://www.federalreserve.gov/monetarypolicy/guide-to-changes-in-statement-on-longer-run-goals-monetary-policy-strategy.htm>

¹⁴ Per <https://www.federalreserve.gov/monetarypolicy/fomc.htm>

¹⁵ See https://www.federalreserve.gov/monetarypolicy/files/FOMC_LongerRunGoals.pdf

¹⁶ See <https://www.newyorkfed.org/medialibrary/media/markets/survey/2020/jul-2020-spd-results.pdf>

¹⁷ See <https://www.bostonfed.org/news-and-events/speeches/2018/considering-alternative-monetary-policy-frameworks.aspx>

actually occurred, based on the assumption that President Trump and Congress would have provided more aid to the country than has, in fact, happened.

In terms of what this new strategy means in the near term, regardless of the administration that is in office during 2021, **a multi-trillion-dollar economic stimulus plan is a strong likelihood**. While we have speculated that government spending will continue to increase, given that the budget is subject to spending caps and it has yet to be approved given the COVID-19 pandemic¹⁸, it will likely be executed via an executive order to the US President, and will require a significant appropriation of funding. Essentially, **we expect that the Fed’ will not immediately react** to this diversion of funding by adjusting rates, and will try to aid the WH in the national recovery. The Fed’s stated benchmark (before it will raise rates) is “ ... evidence of a tight labor market and inflation reaches 2% ‘and is on track to moderately exceed 2% for some time.’”¹⁹

Prospects for 2020 US Federal Elections

We have mentioned previously that the high infection rates of COVID-19, and corresponding high initial unemployment claims, might be a significant hurdle to Donald Trump in his re-election bid. Since 1960, there we’ve seen a downward relationship between the election margin of the incumbent President (and President’s party) and the unemployment rate. We show the relationship between these two variables for elections between 1960 and 2016 and for elections between 1988 and 2016. (See Table 9.)

Using the most recent elections as a guide for a model, we could forecast the required Republican margin for re-election in November under different prevailing unemployment rates.

Table 9: Incumbent Reelection Margin and Prevailing Unemployment Rate

Incumbent General Election Margin	Unemployment Rate
2.885	5
1.378	6
-0.129	7
-1.636	8
-3.143	9
-4.65	10
-6.157	11
-12.185	15

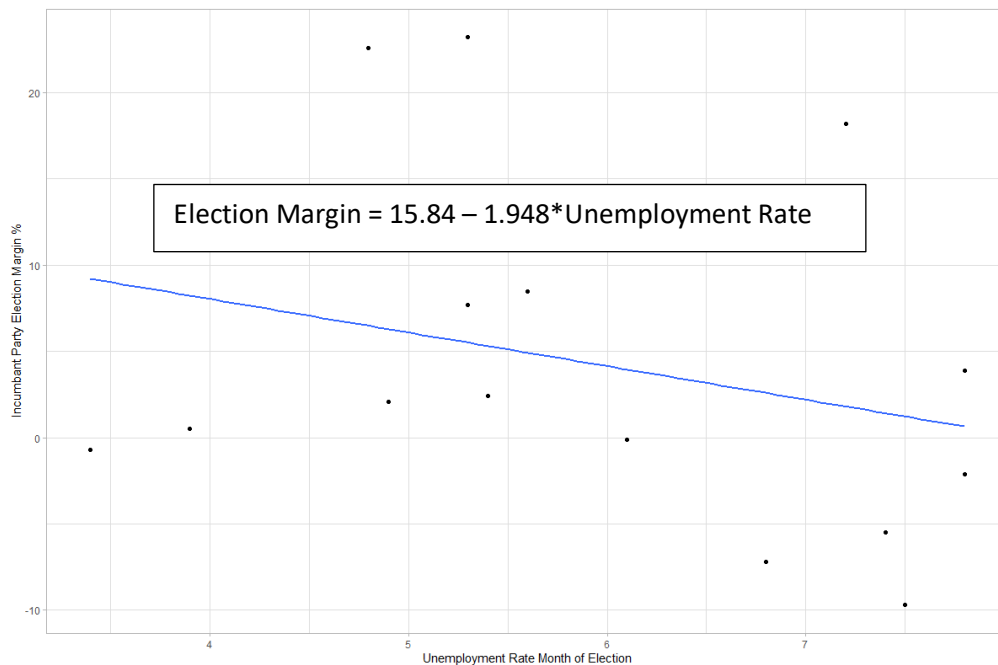
¹⁸ See https://www.gsa.gov/cdnstatic/FY_2021_GSA_OPM_Budget_Summary.csv

¹⁹ Per <https://www.wsj.com/articles/fed-signals-interest-rates-to-stay-near-zero-through-2023-11600279214>

-19.72	20
-42.325	35
-64.93	50

Using this information to build an appropriate model (Figure 26 and Figure 27), President Trump might be able to win re-election with an electoral college victory if the unemployment rate falls between 6 and 7 percent. With the national unemployment rate currently at 7.9%²⁰, and the states’ unemployment rates given in Figure 28, this does tend to lend itself towards the possibility of President Trump being re-elected.

Figure 26: Linear Relationship Between Unemployment Rate and Election Margin (Incumbent Party, 1960 – 2016)



Source: Author’s calculation

Current polls have former **Vice President Biden leading President Trump by between 7% and 14% of the Electoral College**.²¹ A recently projected electoral map, reflecting the perceived “battleground states” is shown in Figure 29. Additionally, after the 2020 federal election, recent predominant polls indicate that the Senate will be controlled by the Democratic Party in 2021, and the House of Representatives will be

²⁰ <https://www.bls.gov/news.release/pdf/empst.pdf>

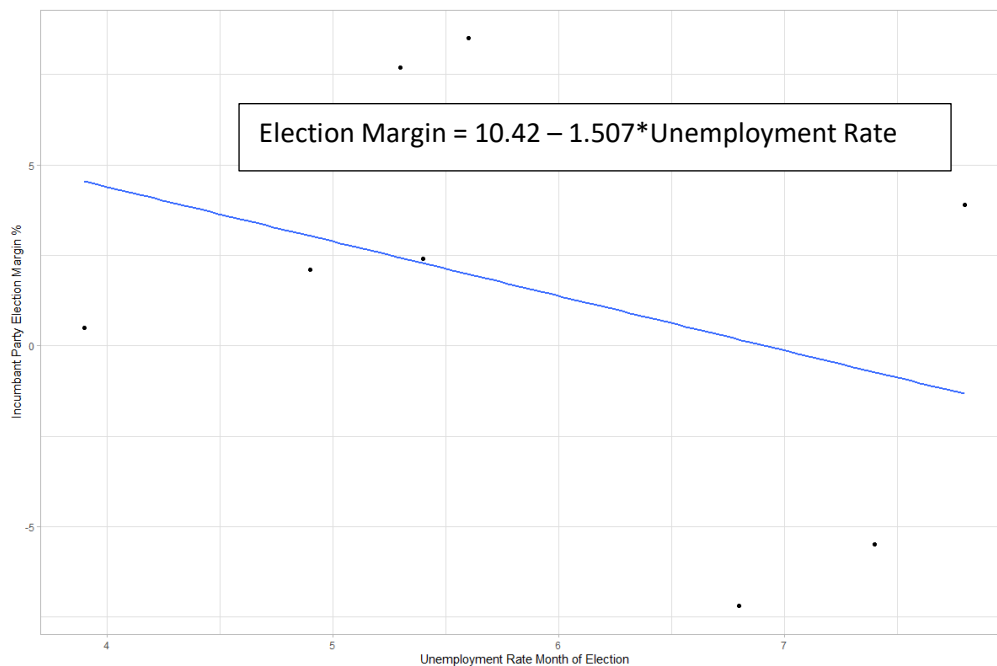
²¹ See, e.g., <https://www.270towin.com/2020-polls-biden-trump/national/>

too evenly split to call a clearly dominating agenda.²² The impact on the long-term economy of a Biden administration has yet to be determined, particularly knowing that it will initially be saddled with

- the aftermath of the COVID-19 pandemic & recovery;
- recent social upheavals; and
- an agenda including targeting highly liquid companies that may not be considered as contributing appropriately towards their tax burden.²³

This analysis is not intended to be a commentary on either of the two discussed candidates, nor a statement supporting or opposing any candidate. However, we are focusing on Biden at this point given his currently perceived position in the polls, and based on the fact that the world has had the past 3½ years of exposure to Trump’s policies and practices as President (and, hence, one may better extrapolate from that history to what his future positions might be). In contrast, Biden has been relatively absent from the political landscape for the past three years (despite his previous experience in politics), and how he is positioning his potential administration may not be as easy to infer under the current circumstances.

Figure 27: Linear Relationship Between Unemployment Rate and Election Margin (Incumbent, 1988-2016)



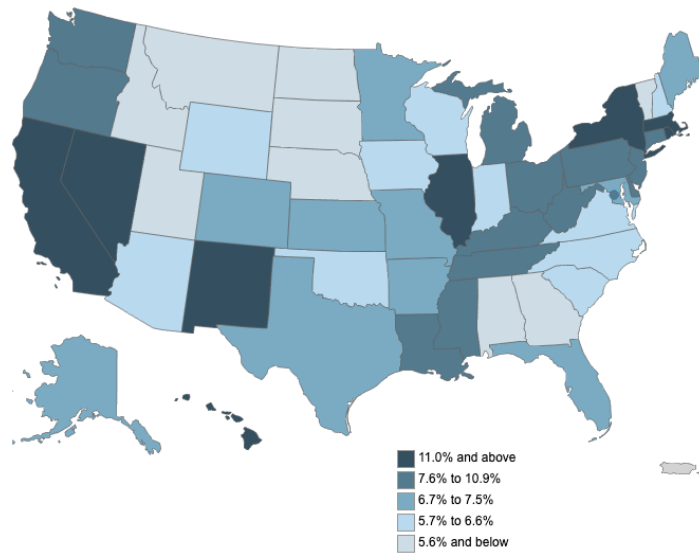
Source: Author’s calculation

Figure 28: Unemployment Rate by State (August 2020)

²² See https://www.realclearpolitics.com/epolls/2020/president/us/general_election_trump_vs_biden-6247.html.

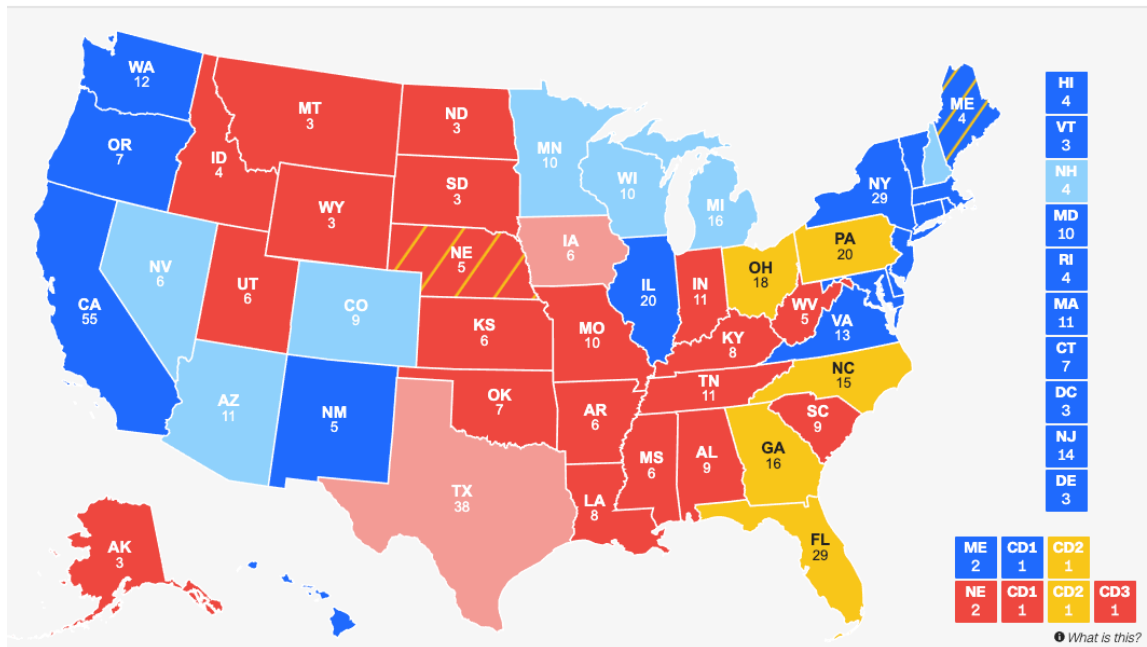
²³ See, e.g., <https://www.barrons.com/articles/how-to-position-your-portfolio-for-a-joe-biden-presidency-51593217473>

State unemployment rates, August 2020, seasonally adjusted



Source: Bureau of Labor Statistics

Figure 29: Current Electoral College Estimates for Trump & Biden election of 2020



Source: cnn.com

Publicly, Biden is calling for significantly increased spending and support (over that which was allocated as part of The CARES Act) in order to resolve the COVID crisis²⁴. He also is calling for government funding to support individuals needing healthcare, and to aggressively build new R&D capabilities domestically, and steer US government steering to domestic products. His **total new spending budget is reported to be \$4-\$7+ trillion**²⁵ over various time horizons.

In line with that prioritization, James Freeman wrote in the Wall Street Journal, “One reason stocks haven’t tanked as Mr. Biden has built a polling lead over President Donald Trump is a Wall Street consensus that Biden could bring some benefits along with much higher governmental costs. Specifically, the hope has been that while a President Biden would ramp up taxes, spending and regulation, he would also reduce trade tensions and tariffs. It’s getting harder to cling to this belief.”²⁶ **Biden’s call to “Buy American” is also concerning to global partners**, as it harkens back to President Trump’s original trade agenda.²⁷

If Biden were to ascend to the White House in January 2021, the US’ relationship with Saudi Arabia would likely see some changes. Biden has stated that he believes that Saudi Arabia engineered Jamal Khashoggi’s murder, and he has vowed to stop selling arms to Saudi Arabia, and we infer that he (Biden) would work to strengthen Washington-Riyadh relations.²⁸ **The result of those relationships will not only affect the US’ military presence globally, but also global energy prices.**

On the other hand, Biden has agreed with Trump’s philosophy regarding China, but not Trump’s handling of relations with the country. Biden has framed China’s rise as a “serious challenge,” criticized its “abusive” trade practices, and warned that China may pull ahead of the United States in new technologies. Biden agrees with Trump that China is breaking international trade rules, unfairly subsidizing Chinese companies, and stealing U.S. companies’ intellectual property, but Biden also rejects China’s assurances about the coronavirus pandemic. Biden intends to increase the U.S.’ naval presence in the Asia-Pacific and improve U.S. ties with countries including Australia, Indonesia, Japan, and South Korea.²⁹

Anticipated International Reactions

Virtually every country in the world that has been affected by COVID has also been affected by unemployment attributable to “lock down” orders, changes to consumers’ spending, and overall lifestyle impacts. As Americans double down on saving (and cut the fat from personal budgets), the root cause of changes in CPI recently have been difficult to track.³⁰ In the US, significant drops in fuel prices (due to the OPEC+ production dispute and a drop in demand over the past four months) have caused

²⁴ See <https://www.marketwatch.com/story/with-trump-postponing-a-stimulus-package-heres-what-joe-bidens-coronavirus-relief-plan-would-prioritize-11602089318> and <https://money.yahoo.com/joe-bidens-7-trillion-spending-121104380.html>

²⁵ <https://www.wsj.com/articles/bidens-bigger-government-11594315921>

²⁶ <https://www.wsj.com/articles/bidens-bigger-government-11594315921>

²⁷ See <https://www.nytimes.com/interactive/2020/us/florida-coronavirus-cases.html>

²⁸ See https://www.youtube.com/watch?v=5_3F2h_FT98

²⁹ See <https://www.cfr.org/election2020/candidate-tracker/joe-biden>

³⁰ See <https://qz.com/1848393/inflation-numbers-are-meaningless-due-to-covid-19/>

the appearance of deflation, even though the cost of food and similar lifestyle products have actually increased.³¹ Britain, for instance, has seen similar issues.³²

Additionally, travel restrictions for Americans are starting to enter the commonplace, with ***travel restrictions being levied for travel into seventeen states and several countries, including Canada, Mexico, much of the European Union, and several other countries***^{33,34}. Ireland and Great Britain are allowing US citizens (who are not dual citizens, and do not have family or another relationship to a European country) to enter at this time, but are requiring Americans to submit to 14-day quarantines; fines for not doing so are £1,000.³⁵ Further, travel to China is still limited.³⁶

Just as the isolation of “stay-at-home” orders had a chilling effect on economic activity, the hampering travel restrictions internationally cannot be completely mitigated by video calls and electronic communication.

The current COVID-19 pandemic has already significantly hampered domestic output, including international travel, imports & exports, and related industries. We have previously discussed unemployment filings, and recent personal consumption, savings, and retail sales figures, and expect that government stimulus (already passed its planned amounts) will continue to be debated, and some amount will likely be provided during the fall and after the next inauguration.

Finally, we expect ***net trade to gradually increase given the demand for American food supplies globally***. Mortgage rates have remained extremely low, and are not expected to recover in the near future (i.e., at least 24 months). Given this mixture of factors, we still expect that the ***nominal GDP growth rate will be between -3.0% and -7.0% (Y/Y) for 2020, and will gradually rise to as much as 2% annually through 2022***. Inflation is the “wild card”; while it will likely remain neutral for the rest of 2020, depending on the steps taken by the White House in 2021, ***it has the potential to spike dramatically at any point through 2022***. Disposable income and capital investment will likely shrink for the next several years. To be honest, the short-term implications of another round of government stimulus is extremely concerning, but the alternative does not seem appealing either.

³¹ See <https://www.bls.gov/news.release/pdf/cpi.pdf>

³² See <https://www.economist.com/graphic-detail/2020/04/23/are-covid-19-lockdowns-distorting-inflation>

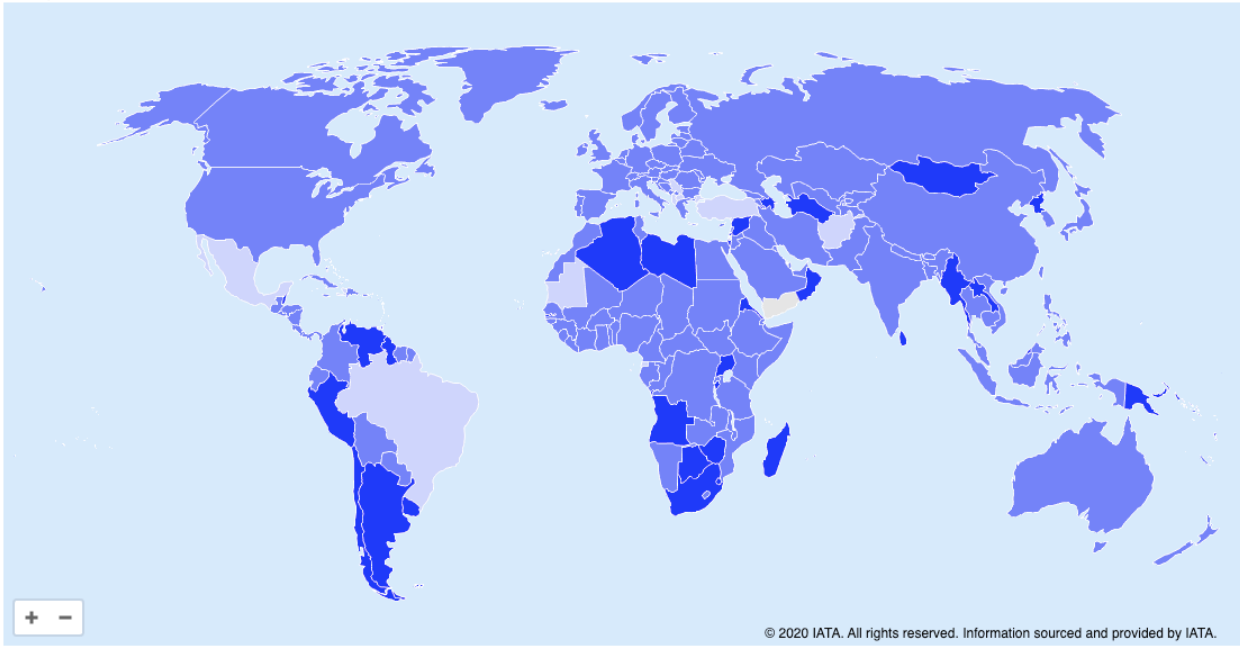
³³ See <https://www.nytimes.com/article/coronavirus-travel-restrictions.html>

³⁴ Per <https://www.iatatravelcentre.com/international-travel-document-news/1580226297.htm>

³⁵ See <https://www.nytimes.com/article/eu-travel-ban-explained-usa.html>

³⁶ Ibid.

Figure 30: Countries with Travel Restrictions (as of Sept 29, 2020)



- Totally Restrictive
- Partially Restrictive
- Not Restrictive
- Latest updates currently under review

Source: IATA

Disruptive (“Black Swan”) Events

The past five years have seen several unusual events that had a substantial impact on the national and/or global events that warrant mentioning. We mention them from the perspective of considering whether any of these types of events could occur again in the near future, and planning for their potential impact on the economy and or business operations would seem prudent.

1. Biological Events: The world has seen a number of new “Influenza-Like Illnesses” (ILI), with the latest now directly affecting virtually every country on the global in a crippling fashion.
 - A. SARS (2002 & 2004)
 - B. “Swine flu” (H1N1, 2009)
 - C. “Avian flu” (H5N1 in 1997; H7N9 in 2013; H5N6 in 2014; H5N8 in 2016)
 - D. COVID-19 (2019-2020)
2. Disinformation Campaigns: A staple of international conflicts (both military and otherwise), organized campaigns based on disinformation or propaganda have been around for hundreds of years. Most recently, the US has made allegations against foreign governments that there has been interference in federal elections (and caused social unrest) by using freely available social networks³⁷. It is expected that the same types of propaganda that was made noteworthy in 2016 will be seen in the upcoming (2020) election and beyond.
3. Disruptive Malware and Ransomware: Malware has been an issue for computers for decades, dating back to the initial hypothesized versions of “worms” in US universities of the 1960s and 1970s (as “thought exercises”). More recently, however, sophisticated attacks on businesses has (literally) become a business for some entities, foreign and domestic. “Ransomware” is the latest version of malware that “... [locks and encrypts] a victim’s computer or device data, then demand a ransom to restore access.”³⁸ There is currently 1 attack every 11 seconds (during 2020 according to the FBI), with an average cost of about \$4M per breach globally (as of YE 2019)³⁹. And, just to add an interesting twist, ransomware is now even offered as a *service* in which a criminal may sell a *license* to a (software) ransomware variant to another criminal, who will then infect a system and demand a fee for the decryption key.
4. Societal Unrest, including Domestic Social Changes and Terrorism: The events of 9/11 resoundingly affected market activity for years following the attacks on the US. More recently, the social justice movements that have, in some cases, turned violent, have significantly affected communities (e.g., Portland, OR and Minneapolis, MN) and caused leaders to reconsider the frameworks on which their cities are based. Without warning, these movements have caused rapid and unexpected upheavals in social climates, and upended assumptions on which financial decisions were made.

³⁷ See <https://www.nytimes.com/2020/09/01/technology/facebook-russia-disinformation-election.html>

³⁸ See <https://us.norton.com/internetsecurity-malware-ransomware-5-dos-and-donts.html>

³⁹ See <https://security.berkeley.edu/faq/ransomware/> and <https://securityintelligence.com/articles/6-ransomware-trends-2020/>

Data Analysis

As part of the Dodd-Frank Act, larger banking institutions in the United States are required to use government specified variables, and approved proprietary processes, to determine if they are adequately prepared for unexpected “systemic failures”. Some banking institutions are also incorporating portions or components of their forecasting processes to estimate future profitability; in order to do so, however, realistic forecasts (as opposed to extremes) are required.

While arguments could be made about the variables included in this study, as stated in Jiang, et al., “... a conclusion that can be made for ... US data is that there is little to no improvement in forecast accuracy when the number of predictors is expanded beyond 20-40 variables.”

Caplalytics provides the results of a rigorous analysis of every variable that is included in our quarterly macroeconomic study. These variables include the following⁴⁰:

1. Real GDP growth
2. Nominal GDP growth
3. Real disposable income growth
4. Nominal disposable income growth
5. Unemployment rate
6. CPI inflation rate
7. 1-month Treasury yield
8. 3-month Treasury yield
9. 6-month Treasury yield
10. 1-year Treasury yield
11. 3-year Treasury yield
12. 5-year Treasury yield
13. 7-year Treasury yield
14. 10-year Treasury yield
15. 20-year Treasury yield
16. 30-year Treasury yield
17. BBB corporate yield
18. Mortgage rate
19. Prime rate
20. US Average Retail Gasoline Price (\$/gal; all grades, all formulations)
21. S&P 500 Stock Price Index
22. Cost of Federal Funds (Primary Credit Rate)
23. Moody’s AAA Rate
24. Moody’s BAA Rate
25. Dow Jones Total Stock Market Index
26. House Price Index
27. Commercial Real Estate Price Index
28. Market Volatility Index (VIX)

⁴⁰ This study is motivated by the Federal Reserve Board’s Dodd-Frank Act, which includes requirements to consider various international factors; however, those factors will not be discussed extensively in this particular report based on the target use and audience of this report.

Our procedure is as follows:

1. Data is collected per the information in Appendix A, “Data sources”.
2. Correlations between variables are identified to determine which variables are may be considered as “dependent” (upon other variables, i.e., highly correlated with other variables as part of their nature).
3. Multiple forecast analyses are performed per the procedure in Section I of Appendix B for all variables, with the results of corresponding forecasts aggregated.
4. Regressions are performed per the procedure in Section III of Appendix B for all variables.
5. The rationale for these analyses, modifications, and the conclusions thereto are documented in the following section of this report, “Data Series Conclusions”.

Correlations

Part of Capitalytics’ analysis of macro-economic variables entails computing the correlation between variables, in order to establish the existence and level of interdependence of variables.

In Appendix C of this document, we document the 174 pairs of variables that showed absolute correlation values greater than or equal to 0.6. As part of this portion of the study, Capitalytics identified the following sets of strong dependencies (correlations with magnitudes greater than 0.95) between variables that were subsequently validated as significant, long-term, recurring correlations as part of the nature of the variables; these pairings of variables are viewed as extremely significant based on the respective definitions of the variables and will be leveraged as discussed in Section I of Appendix B.

Table 14: Variable Dependencies

Regression (Dependent) Variable		Independent Variable ⁴¹
6-month Treasury yield	... depends on ...	3-year Treasury yield*
Prime rate		3-month Treasury yield
1-month Treasury yield		1-year Treasury yield
3-year Treasury yield		1-year Treasury yield
7-year Treasury yield		3-year Treasury yield*
10-year Treasury yield		5-year Treasury yield
20-year Treasury yield		7-year Treasury yield*

⁴¹ It should be immediately apparent that some of the variables that are listed as “independent” are, in fact, dependent on other variables; these “independent” variables that actually have dependencies are noted by a trailing “*”.

30-year Mortgage rate		5-year Treasury yield*
30-year Treasury yield		20-year Treasury yield*
S&P 500 Stock Price Index		Dow-Jones Total Index
US Residential Home Price Index		Commercial Real Estate Price index
Primary Credit rate		3-year Treasury yield*

Due to the unexpected impact of the COVID pandemic, and the requirements to address the pandemic, the results of many of our quantitative algorithms will not match our reported expectations for what will occur over the next several months and/or years. We will note these deviations where they occur.

Further, based on the Fed’s comments that “... they expect to keep rates near zero at least through next year, and 13 projected rates would stay there through 2023 ...”⁴², we are modifying our quantitative forecasts so as to maintain T-bill yields and other key indicators at or close to their current rates through 4Q2023, before gradual realistic adjustments. We caution that the previous statement is a matter of policy, and not of law, and may not be in fact what occurs; in other words, ***it is possible for interest rates to rise prior to 2024 based on market conditions, and the opinions of the members of the FOMC.***

Real & Nominal GDP Growth, Real & Nominal Disposable Income Growth, and CPI Inflation Rate

Analysis

Our analysis showed that US’ real GDP decreased (Q/Q) by 1.26% during 1Q2020, and then decreased (Q/Q) by almost 9.0% during 2Q2020. While our quantitative algorithm shows indefinitely continued declines, we do believe that GDP will be on par to slightly lower during 3Q (our algorithms predict +/-7% decline Q/Q), and may show slight gains to slight losses until a medical treatment for the COVID-19 virus is able to be distributed. We have previously estimated that a vaccine/treatment will be publicly available during 1H2021, and widespread distribution will occur in 2H2021, and we have not seen anything to alter that forecast.⁴³

The path that the US takes until business conditions are able to be effectively restored will be the key to estimating future GDP, and there are several potential turning points that can be anticipated. The most obvious decision point are the upcoming federal elections. Prior to the next inauguration, a least one aid & stimulus package is being/will be hotly discussed.⁴⁴ Both US Presidential candidates have presented options for packages that they would like implemented, with President Trump’s \$1.6T package under

⁴² See <https://www.wsj.com/articles/fed-signals-interest-rates-to-stay-near-zero-through-2023-11600279214>

⁴³ See <https://www.nytimes.com/interactive/2020/science/coronavirus-vaccine-tracker.html> and <https://www.nytimes.com/2020/09/17/health/covid-vaccine-when-available.html>

⁴⁴ See <https://www.cnn.com/2020/10/01/coronavirus-stimulus-update-house-passes-democratic-relief-bill.html>

current consideration, and former Vice President Biden has proposed a stimulus package totaling around \$7T.

Ordinarily, GDP is driven by several factors:

- Personal consumption;
- Retail sales;
- Government spending;
- Net trade; and
- Mortgage rates.

The current COVID emergency is expected to continue significantly hampering domestic output in the near term, starting with international travel, imports & exports, and related industries, which affect the pricing of products & services that can be offered for sale; specifically, we have already also seen dozens of producers bankrupted by the current pandemic⁴⁵. We have previously discussed unemployment filings⁴⁶, and recent personal consumption⁴⁷, savings⁴⁸, and retail sales figures⁴⁹.

Our conclusion is that, while **government spending will increase** based on and eventually accepted stimulus plan prior to YE2020, we expect **personal consumption to hold steady or slightly decline Q/Q (in lieu of savings), and retail sales will remain somewhat lower in 3Q2020, as buyers prepare for the Christmas season**. Further, if Q4 results in weak sales figures, we anticipate bankruptcy filings to continue at a record pace, resulting in additional unemployment.

Finally, we expect **net trade to drop and then very gradually increase given the demand for American food supplies globally**. Mortgage rates have remained extremely low, and are not expected to recover in the near future (i.e., at least 24-36 months). Given this mixture of factors, we still expect that **inflation will be essentially neutral, rising at a rate of no more than 0.5% (Q/Q)**, and the **real and nominal GDP growth rates will be between 1.0% and -2.0% (Q/Q) for 3Q2020**. Disposable income spiked around 9% for 2Q2020 due to white collar workers staying home for the summer; employers will gradually adjust salaries to adapt to the new working conditions, but these cultural changes will affect automobile and housing purchase choices, along with tax revenue and deployment strategies in smaller and mid-sized cities. At this point, we believe that **inflation will likely be very low for 2020 (possibly as high as 1.0% annualized)**, but **we are concerned about the potential for inflation to rise suddenly through 2022**, with the Federal Funds rate remaining tightly bridled.

⁴⁵ See <https://www.wsj.com/articles/u-s-retail-bankruptcies-store-closures-hit-record-in-first-half-11601371800>

⁴⁶ See <https://www.cnbc.com/2020/10/02/massively-concerning-jobs-report-sends-a-signal-that-the-economic-recovery-could-be-fading.html> and <https://seekingalpha.com/article/4377375-jobs-disappoint-unemployment-rate-declines-labor-force-declines-trouble-ahead>

⁴⁷ See <https://www.advisorperspectives.com/dshort/updates/2020/10/01/pce-price-index-august-headline-core>

⁴⁸ See <https://time.com/nextadvisor/banking/savings/us-saving-rate-soaring/>, <https://www.cnbc.com/2020/05/29/us-savings-rate-hits-record-33percent-as-coronavirus-causes-americans-to-stockpile-cash-curb-spending.html>, and <https://www.barrons.com/articles/average-personal-savings-rate-hits-10-as-consumers-return-to-spending-51598864401>

⁴⁹ See <https://www.kiplinger.com/economic-forecasts/retail-sales>, and <https://www.wsj.com/articles/us-economy-august-retail-sales-coronavirus-recovery-11600200513>

Other Commentary

- “Third-quarter GDP should rise 18% or so at an annual rate. But a sustained rebound will depend on continued progress against the novel coronavirus.” (see <https://www.kiplinger.com/article/business/t019-c000-s010-gdp-growth-rate-and-forecast.html>; Aug 27, 2020)
- “The overall inflation rate will stay moderate, ending the year at 1.2%, far below last year’s 2.3%. Core inflation, which excludes the costs of food and energy, will continue to run higher than the headline rate, at about 2% over the course of this year.” (see <https://www.kiplinger.com/article/business/T019-C000-S010-inflation-rate-forecast.html>; Sept 11, 2020)

Unemployment Rate

Analysis

In our previous reports, we compared the COVID pandemic to Hurricane Katrina, and we estimated that unemployment would settle above 15%, and possibly as high as 35% by YE2021. The Congressional Budget Office agreed, stating that unemployment would peak as high as 14%, and then gradually decline to 4.5% by 2028⁵⁰.

We believe that the tenuousness of the economy for the next 12-18 months will result in industry taking an extremely conservative position, driving efficiencies (i.e., downsizing employment counts, and investing in prioritized fixed-cost automations) wherever possible in an effort to preserve cash. Smaller businesses have been decimated over the past six months, and will continue to walk a fine line in an effort to find its footing.

For retail, in particular, we view ***the upcoming 4Q period to be critical to the survival of these businesses***. The traditional model of making between 30% and 50% of annual revenues during 4Q will be extremely difficult to realize with end consumers not spending, and not being motivated to have a memorable holiday season. Additionally, depending on the amount of savings that these businesses have accumulated, and their projected revenue (which may be a function of their ability to meet buyers where their products are desired, and in an acceptable manner), investors may determine that reorganizing the company via bankruptcy, or simply exiting the market, is the wisest move. These decisions will be what drives high-level unemployment numbers nationwide^{51,52}.

Finally, several sectors will find themselves “re-inventing” how they meet customers. For example, the food service/restaurant businesses, bar, casino, and other social venues will need to continue to quickly

⁵⁰ See <https://www.cbo.gov/publication/56442> and <https://www.pgpf.org/blog/2020/07/see-how-the-coronavirus-has-impacted-10-year-projections-for-unemployment-gdp-inflation-and-interest-rates>

⁵¹ See <https://www.businessinsider.com/stores-closing-in-2020-list-2020-1>, <https://www.wsj.com/articles/u-s-retail-bankruptcies-store-closures-hit-record-in-first-half-11601371800>, and, e.g., <https://news.yahoo.com/fashion-retailer-h-m-35-182051285.html>

⁵² See <https://www.cnbc.com/2020/10/02/massively-concerning-jobs-report-sends-a-signal-that-the-economic-recovery-could-be-fading.html>

try new ways to approach and serve consumers, or face dire circumstances⁵³. The alternatives for these industries are bleak⁵⁴.

Other Commentary

- “Employers added 661,000 jobs, far fewer than August’s 1.5 million. It appears that many of the businesses that had been recalling furloughed workers in large numbers as the economy reopened have finished doing so, removing a tailwind from the labor market. The unemployment rate fell to a still-painful 7.9%, and it could stay stubbornly high for a while. Some employers, particularly airlines, are starting to announce major layoffs.” (per <https://www.kiplinger.com/article/business/t019-c000-s010-unemployment-rate-forecast.html> Oct. 2, 2020)
- “Commenting on August’s reading and the outlook ahead, analysts at Goldman Sachs, noted: ‘A 3.2 million surge in household employment lowered the jobless rate to 8.4%, and the six million workers still on *temporary layoff* suggest scope for additional large gains later this year if public health circumstances allow. We expect the unemployment rate to continue to decline over the remainder of 2020.’ ” (per <https://www.focus-economics.com/country-indicator/united-states/unemployment>)

Treasury Yields (1, 3, & 6-month; 1, 3, 5, 7, 10, 20, & 30-year series)

Analysis

The Federal Reserve and the FOMC have announced that they will no longer simply manage the economy towards a short-term goal of 2% inflation and 3% unemployment, but will now try to take a “longer term” view towards these objectives. This new goal means that inflation, unemployment, and other metrics will be consciously allowed to deviate from their targets in the “short term” in order to potentially allow other objectives to be achieved, and the current strategy of purchasing equities and “quantitative easing” is expected to be continued for the foreseeable future⁵⁵; the net result of this strategy is (hopefully) that confidence in the economy is maintained, and a chain reaction of defaults (which could spiral out of control) can be avoided. Similarly, limiting the maximum yields that may be demanded by the market for US Treasuries in order to control inflation, debt and returns is noted as being a potentially dangerous side effect⁵⁶.

We have previously discussed that we believe ***inflation will remain essentially flat through 2020, and could rise quickly to 3.0% (annualized) during 2021***. We are assuming that ***the Federal Funds Rate will***

⁵³ See <https://www.prnewswire.com/news-releases/100-000-restaurants-closed-six-months-into-pandemic-301130280.html>

⁵⁴ See <https://markets.businessinsider.com/news/stocks/yelp-business-closures-permanent-covid-report-2020-9-1029598577>, and, e.g., <https://www.theverge.com/2020/10/3/21500538/regal-cineworld-theaters-shut-down-james-bond-us-uk>

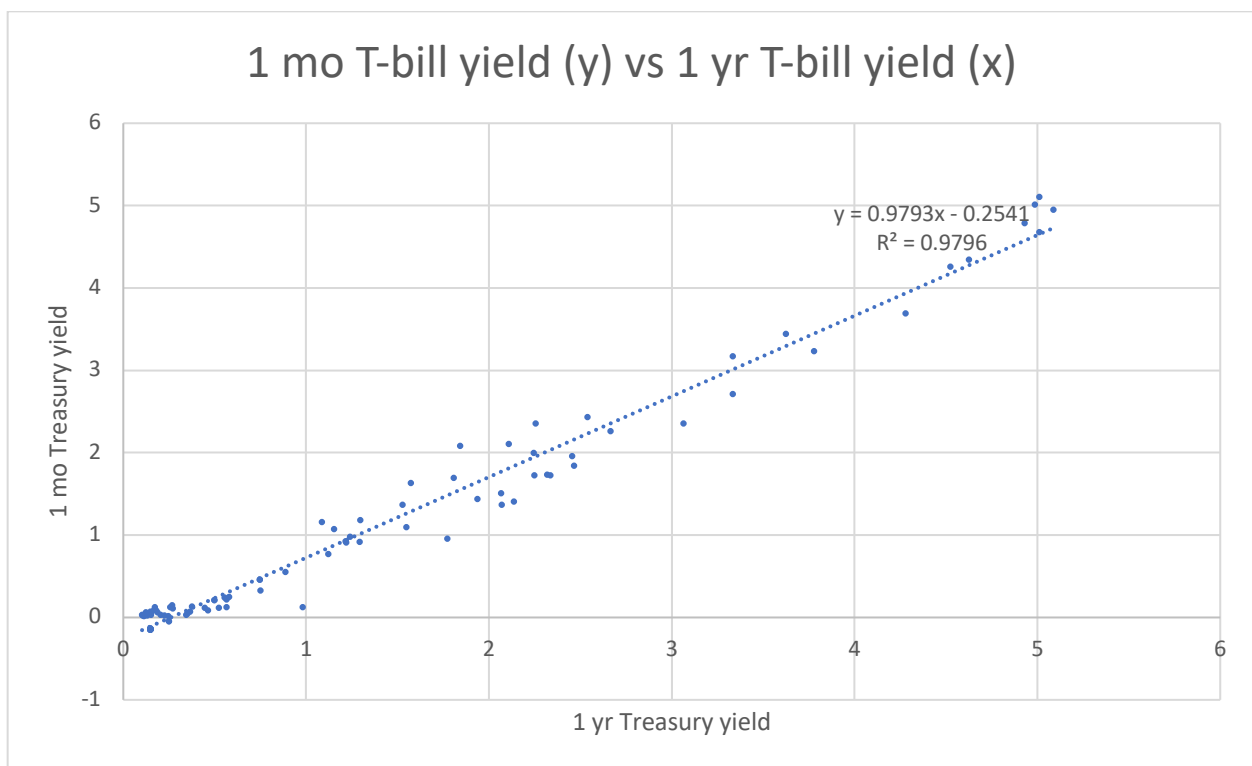
⁵⁵ See <https://www.politico.com/news/2020/06/15/fed-to-start-buying-debt-from-corporations-in-expansion-of-rescue-effort-320772>

⁵⁶ See <https://www.marketwatch.com/story/the-fed-has-been-buying-etfs-what-does-it-mean-11600704182>

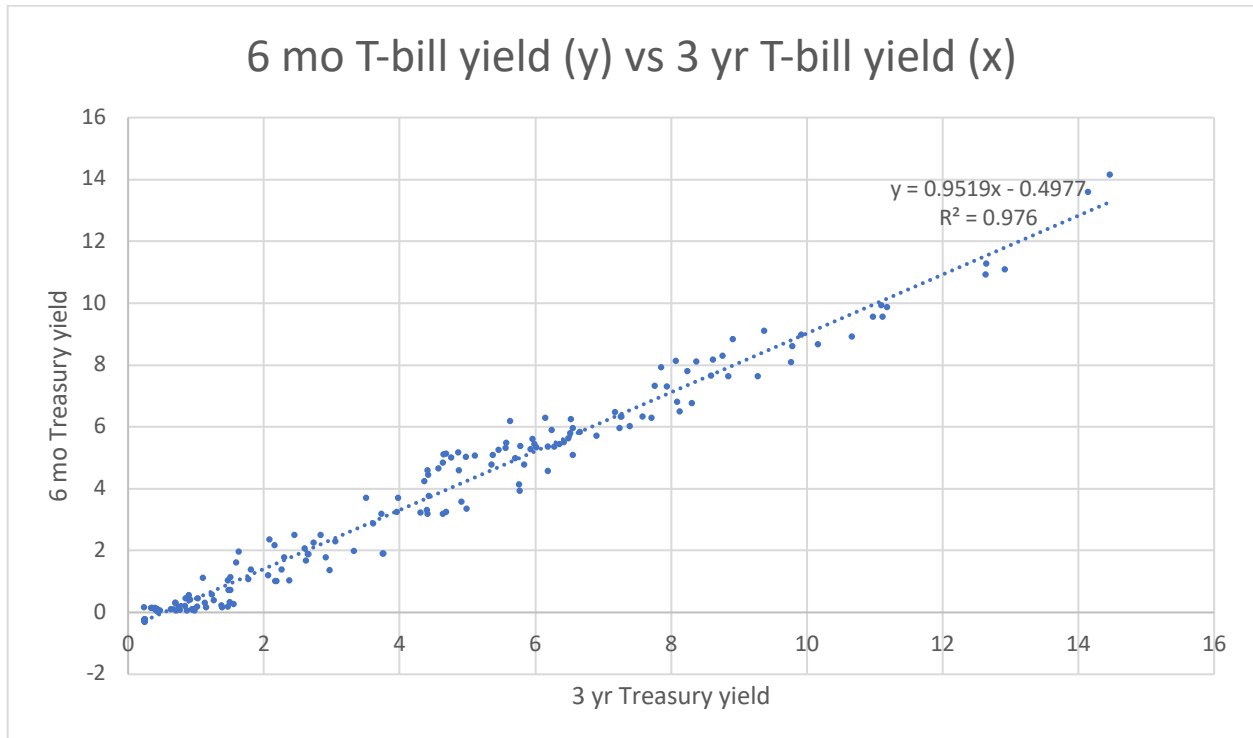
stay below 0.5% through at least 2022 (and possibly through 2023), and will only grow slowly several years after the end of the crisis, once investor confidence returns. Further, based on Vice President Biden’s announced platform, we expect that **the general tax rate on businesses and individuals will likely increase in 2021 under a Biden administration** (businesses going from 21% to 28%, and the highest individual tax rate going to 39%) and stimulus to be fast-tracked if he is elected with a Democratic Senate.

Other Commentary

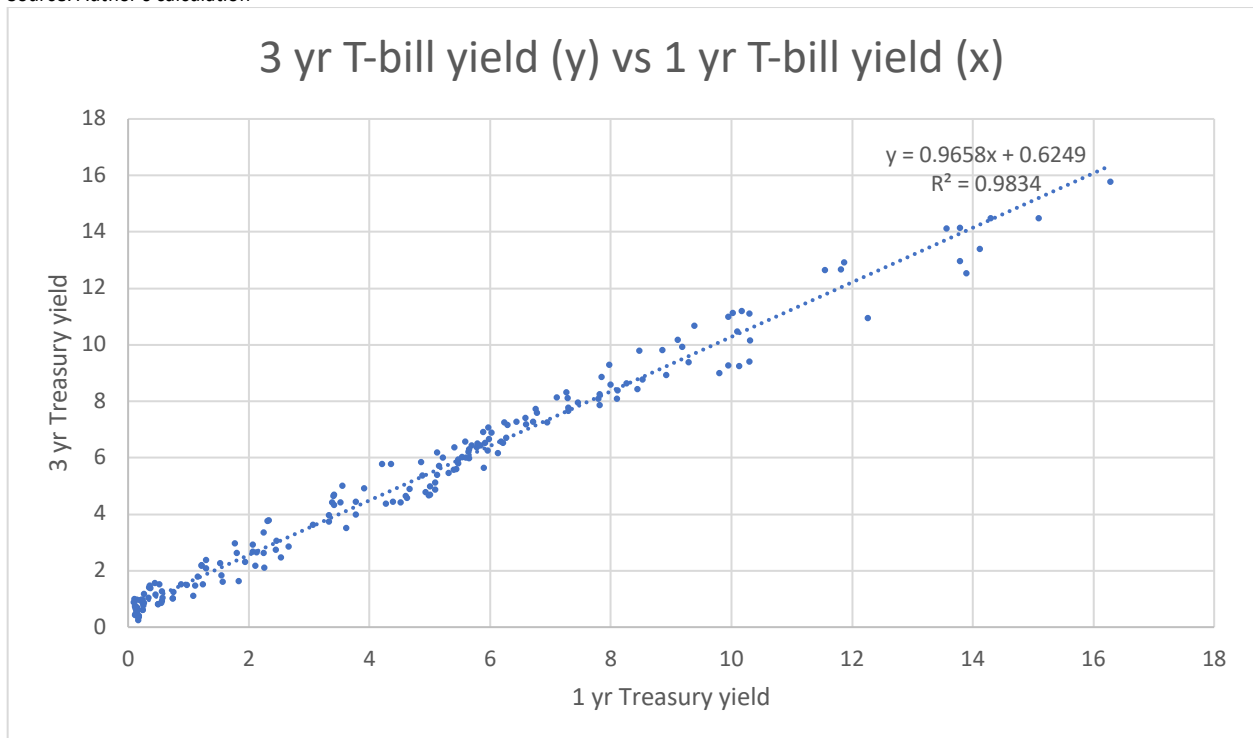
- “The Fed is ‘all in’ to do whatever it takes to support the economy. Its leaders even added a statement to the meeting report that they will be willing to tolerate inflation levels above 2% for a time. That means that they will not raise short-term rates even if inflation begins to pick up, but left unspecified when they would act to curb inflation.” (see <https://www.kiplinger.com/economic-forecasts/interest-rates>; Sept 17, 2020)



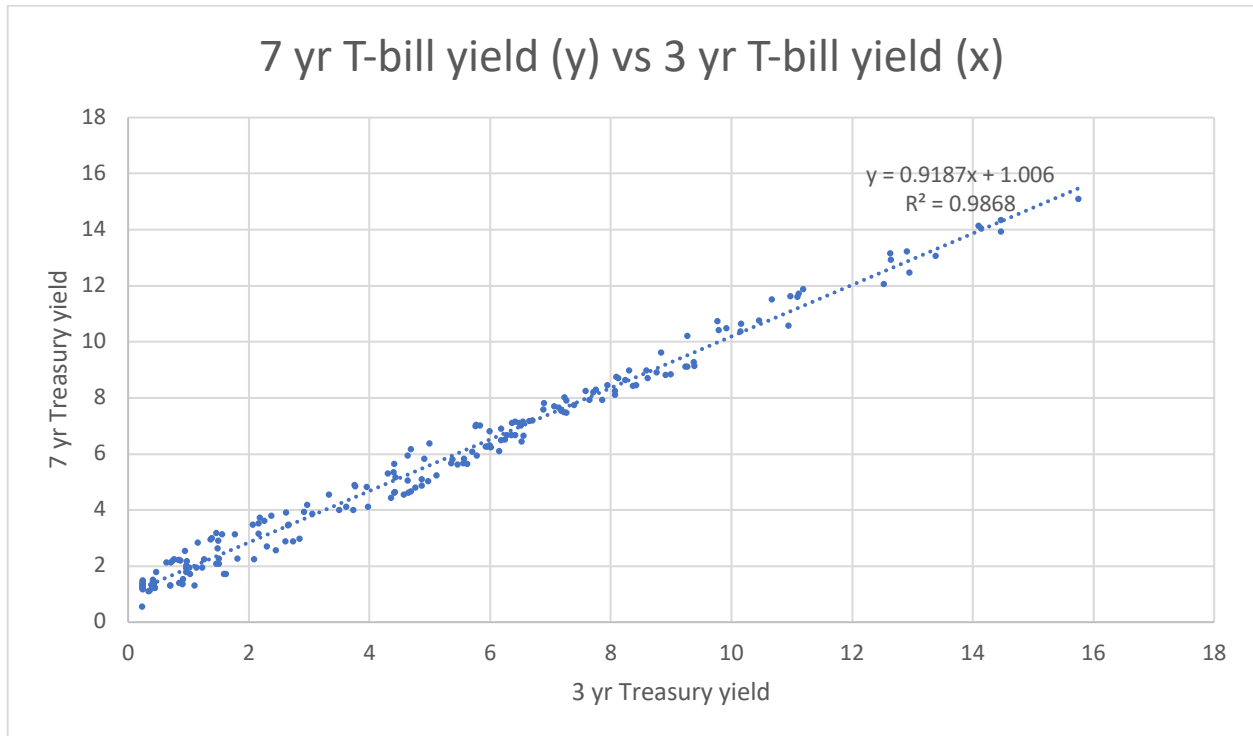
Source: Author’s calculation



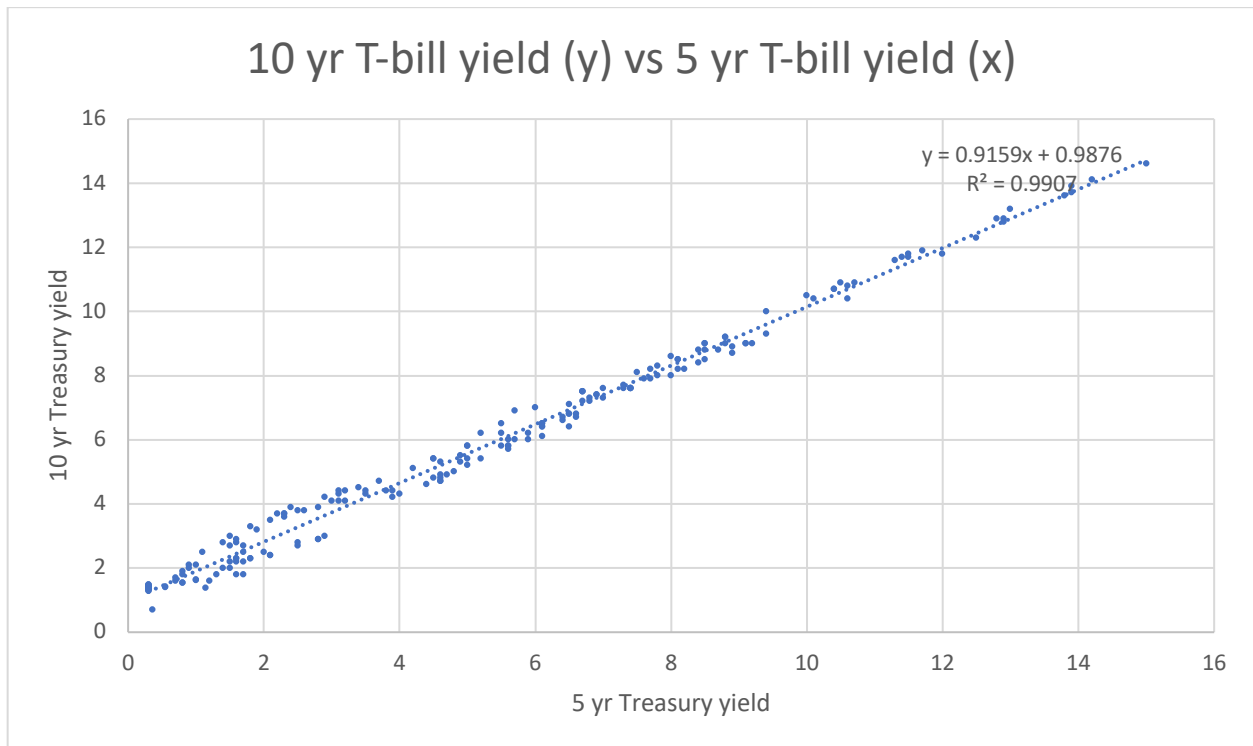
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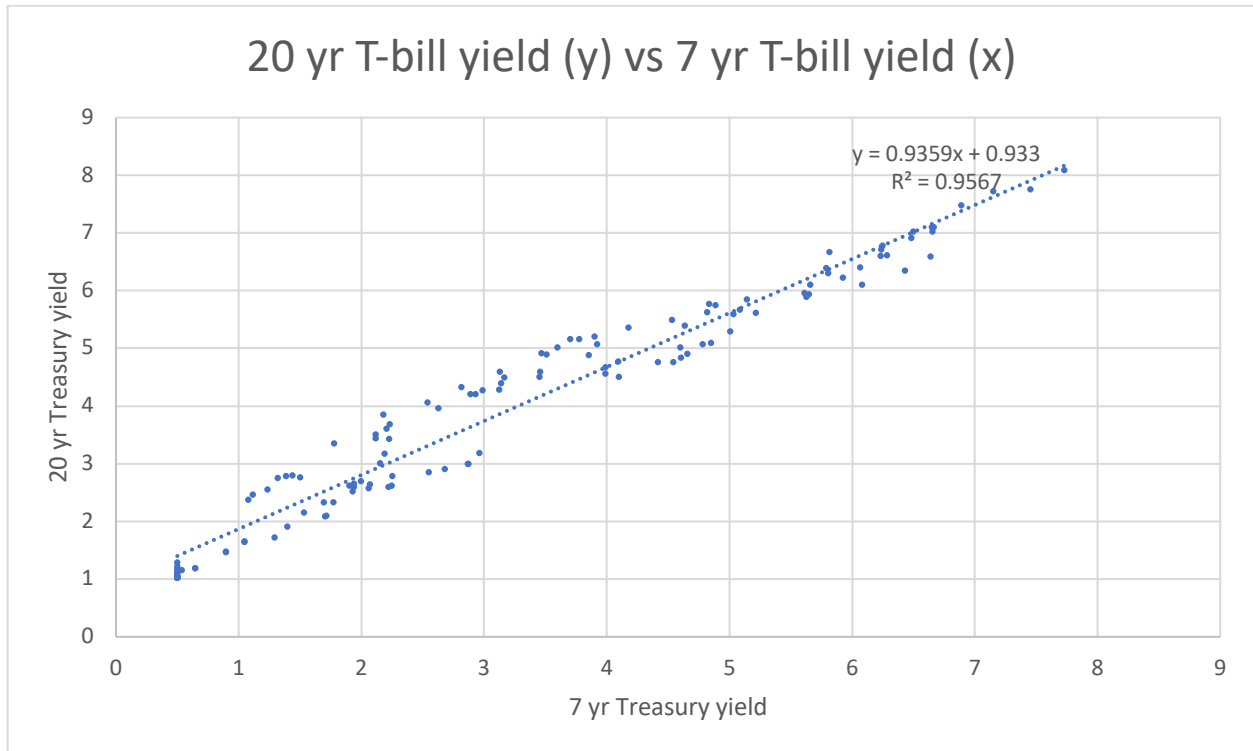
Source: Author's calculation



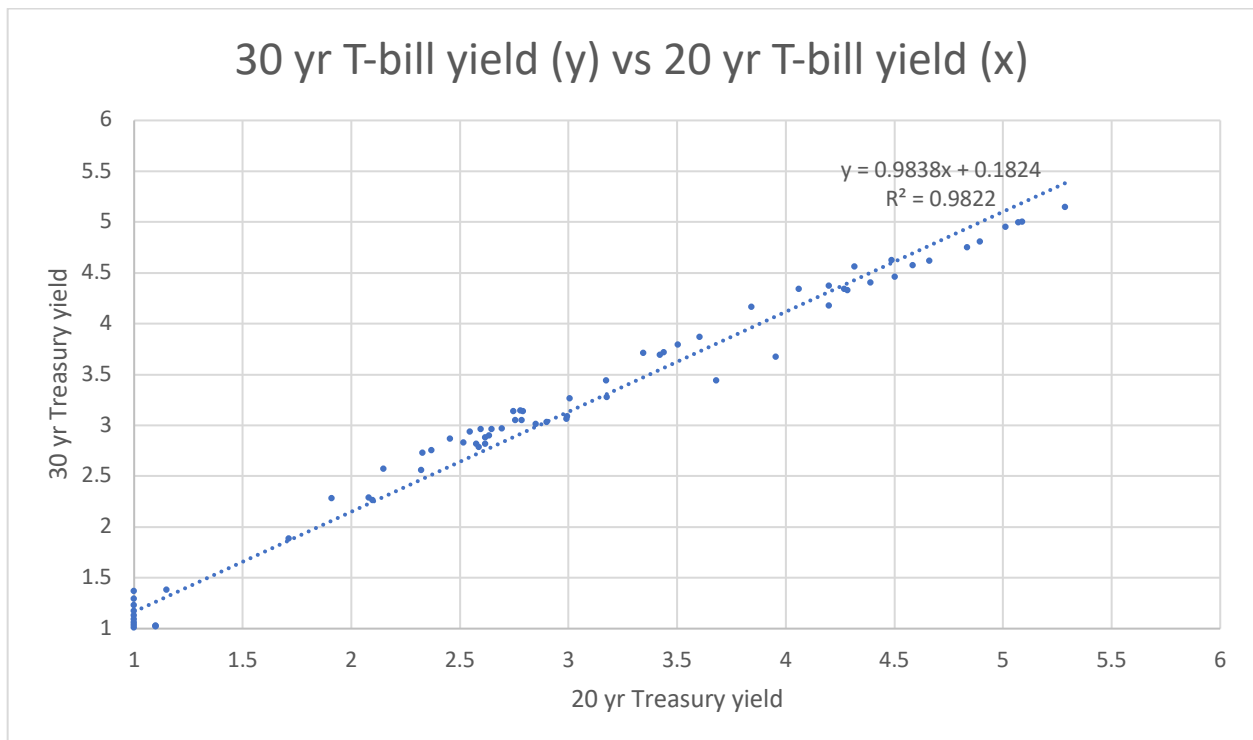
Source: Author's calculation



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Source: Author's calculation



Source: Author's calculation

30-year Mortgage Rate

Analysis

Prior to the COVID-19 emergency, our models reflected the 30-year fixed mortgage rate stabilizing between 3.8% and 3.9% for the foreseeable future. As of this writing, though, rates have continued to drop to as low as 2.5%-3.2%. That demand has been curbed only by the credit requirements imposed by banks, and the 0.5% fee on refinancing's that has been imposed by the FHFA (as of Dec 2020).

Looking forward, though, as unemployment stabilizes at the higher levels that we have quoted earlier, we expect for the frothiness of the retail market to settle and **expect 30-year fixed rate mortgages to remain as low as 2.5% (with 3.0% being much more prevalent) during 2021 and 2022** before they rebound. When rates do start to recover, we expect them to recover extremely slowly, much as was seen in 2014.

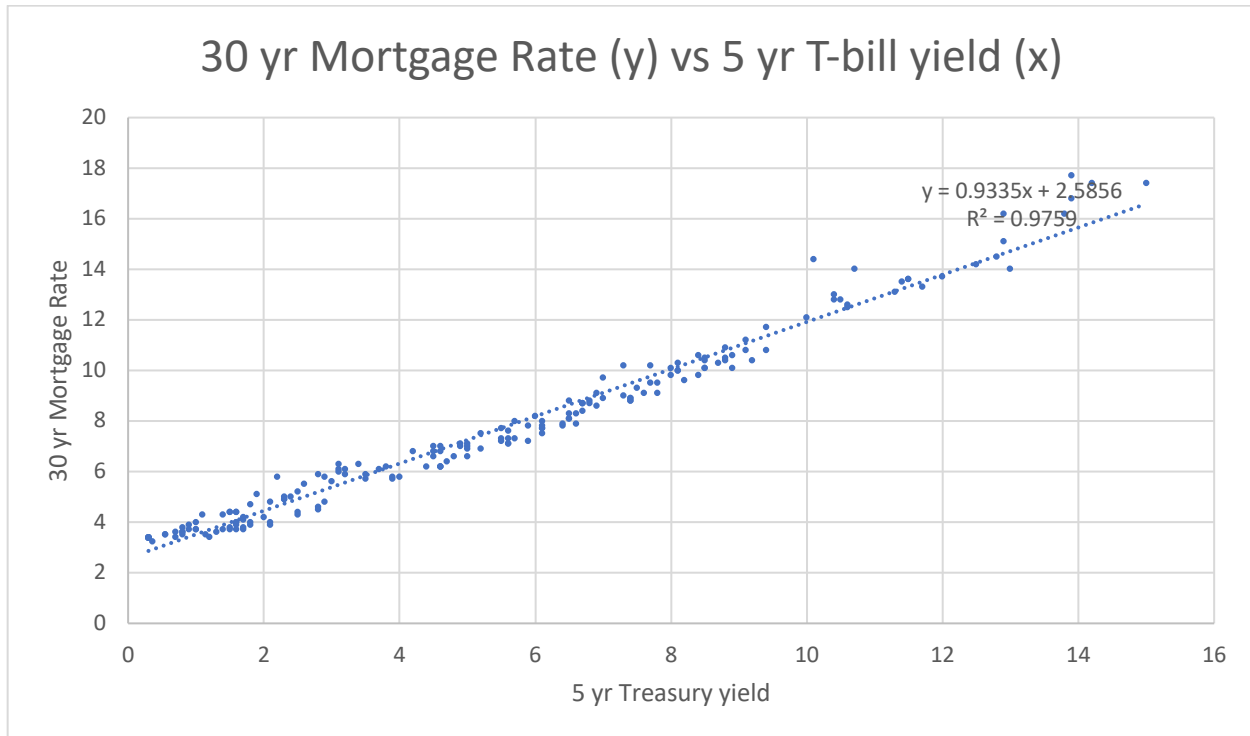
Additionally, we expect that entrepreneurial lenders to become more of a competitive force for traditionally regulated banks, and for their lower-cost offerings to become more commonplace in the coming years⁵⁷. Zillow, Fiserv, and others are offering competitive options that are becoming more mainstream; these companies are using technology to generate efficiencies originating and servicing loans which are either backed by debt and/or equity offerings, or by non-FHFA backed banks. By providing this service, another set of CMOs (or similar instruments) can be offered to the market for investment, but they also are providing an alternative to FHFA, FNMA, etc. quasi-government entities. With the conservatorship of Fannie Mae and Freddie Mac approaching a decision point in 2024, these types of commercial alternatives will place some interesting pressure on the FHFA entities⁵⁸.

Other Commentary

- "Average 30-year mortgage rates are likely to stay slightly below 3% for a while, and 15-year rates, a bit below 2.5%. Rates have been edging down closer to their normal relationship with the 10-year Treasury rate, now that refinancing applications have declined and lenders have to offer lower mortgage rates to attract more business. However, the gap with Treasuries is still nearly half a percentage point above its historical norm." (see <https://www.kiplinger.com/economic-forecasts/interest-rates>; Sept 17, 2020)

⁵⁷ See <https://diangostars.com/blog/lending-fintech-startups/> and <https://www.investopedia.com/investing/fintech-real-estate/>

⁵⁸ See <https://www.americanbanker.com/news/fannie-and-freddie-will-likely-exit-conservatorship-by-2024-calabria-says>



Source: Author's calculation

Moody's AAA & BAA Rates; BofA BBB Corporate Yield; and the Market Volatility Index (VIX)

Analysis

Moody's AAA bond rates tend to track in conjunction with mid-duration T-bill. Moody's BAA rates tend to be higher yield (corresponding to higher risk), and more volatile, than AAA rates. Both were also dependent on consumer/investor confidence in the organizations that were reflected in the securities. The BBB Corporate Yield is generally tied to Moody's indices (particularly the Moody's BAA bond yield), CPI, and the 30-year Mortgage Rate, even though these bonds are generally 10 years in duration. Capalitytics' analysis showed that the VIX was usually tightly coupled to the BBB corporate yield.

Through the coronavirus pandemic, the markets have seen significant amounts of debt downgraded due to the risk associated with the new operating environment; Ford⁵⁹, Kraft-Heinz⁶⁰, and Occidental Petroleum⁶¹ are three examples of "fallen angels" that have been downgraded due to COVID-19. Unfortunately, we still expect a significant number of defaults of bonds that are currently held at every risk grade to occur within the next two years as a global slowdown sets in. Along those lines, we now expect **substantial downgrading of corporate debt to/below "junk" status, and many more companies will be pulled into bankruptcy in the coming months.** (We hope that, per

⁵⁹ See <https://www.fool.com/investing/2020/04/09/ford-shares-surge-after-the-fed-backstops-new-debt.aspx> and <https://www.barrons.com/articles/the-fed-is-buying-more-auto-makers-bonds-than-wall-street-expected-51593446342>

⁶⁰ See <https://www.cnbc.com/2020/05/05/the-market-is-getting-excited-as-the-fed-prepares-to-buy-corporate-bonds.html>

⁶¹ Per <https://www.forbes.com/sites/nathanvardi/2020/03/23/the-federal-reserve-moves-to-buy-corporate-debt/#787dcb044c47>

<https://www.barrons.com/articles/the-federal-reserve-is-buying-fewer-junk-bonds-51599748335>, the Fed’s debt purchase program thoroughly vets its purchases prior to any downgrading that may occur⁶². It should be noted that the FOMC had intended for the WH and Congress to provide more aid than has occurred in 2020 when they had initially planned their debt purchase program, and there are now concerns about their willingness to continue the program to any specific standard⁶³.) This change in the landscape will affect otherwise highly rated bonds as markets potentially start to dry, and ***we advise the preservation of any liquidity possible in order to weather the next 24 months***. Note that, in April 2020, there was approximately \$1.3T of non-investment grade debt in the US economy⁶⁴ (dominated by energy-related debt); since that time, offerings and investments have both been heavy as corporations and investors are appealing to the Fed’s programs for purchasing corporate debt⁶⁵. With that frothiness, several are calling for caution and maintaining that the underlying risks associated with the notes will cause that excitement to eventually fuel a “chain of dominoes” when defaults do occur⁶⁶.

Capitalytics’ (original) quantitative models saw AAA rates gradually dropping over the next several years (through 2024) from 3.06% (to 3.0% by YE2020) to 2.9% by 2024. These figures continued to show reductions from our previous models. BAA rates were expected to drop from 4.0% to 3.85% over the next 5 years. Given the effects of the currently projected freeze on rates through 2023, though, ***we now see AAA rates dropping to 2.11% by YE2023, and slowly returning to 2.2% by mid-2025***. Moody’s ***BAA investments will yield an additional 1.5%-1.75%*** through this period (with BofA BBB bonds accruing 50-70 bp less than BBB).

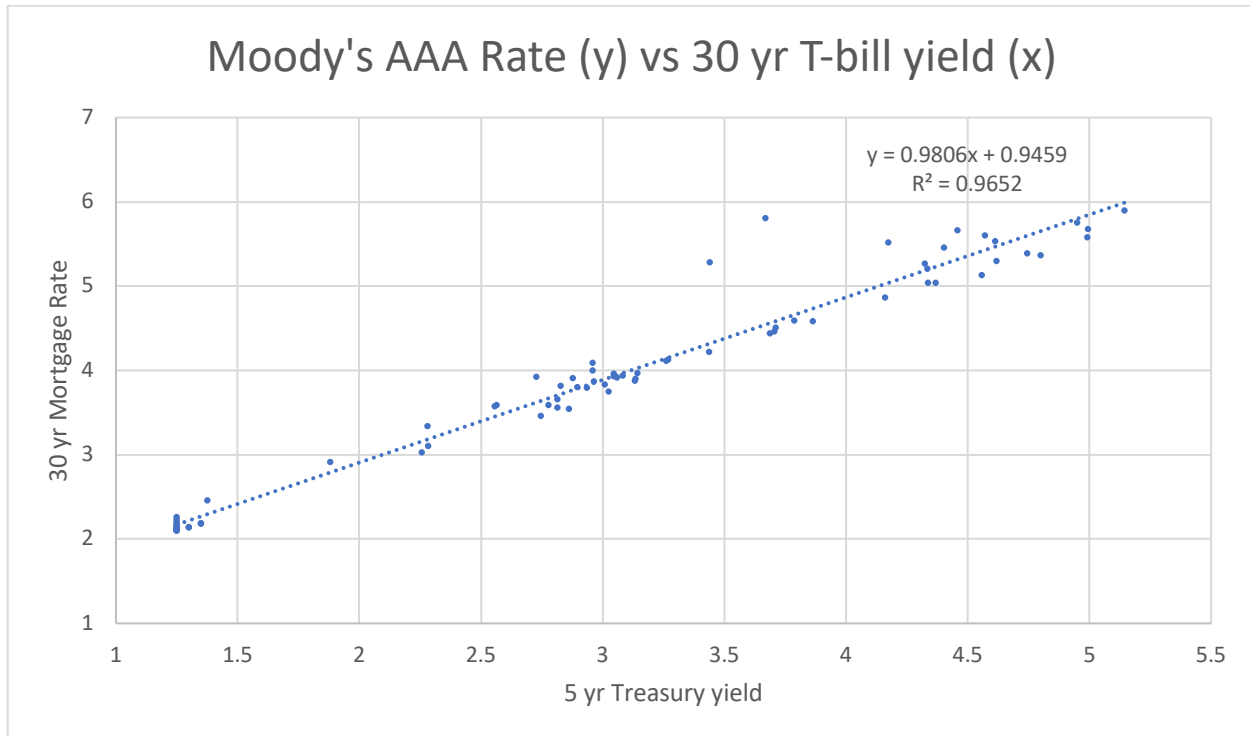
⁶² Note, also, the valuable point of view expressed at <https://www.nytimes.com/live/2020/07/31/business/stock-market-today-coronavirus#fitch-ratings-downgrades-its-outlook-on-us-debt>

⁶³ See <https://www.wsj.com/articles/fed-ramped-up-deliberations-over-low-rate-promises-11602093600>

⁶⁴ See <https://www.forbes.com/sites/mayrarodriguezvalladares/2020/04/13/us-junk-bond-default-rate-will-be-at-its-highest-level-in-more-than-three-years/#7748c9eb7c1b>

⁶⁵ See <https://wolfstreet.com/2020/09/11/junk-bond-frenzy-sets-records-as-everyone-tries-to-front-run-the-fed/>

⁶⁶ See, e.g., <https://www.bloombergquint.com/markets/gundlach-says-high-yield-bond-defaults-may-almost-double> and <https://wolfstreet.com/2020/09/11/junk-bond-frenzy-sets-records-as-everyone-tries-to-front-run-the-fed/>



Source: Author's calculation

Finally, at this point, there are very few sectors of the US Economy that are “stable”. We have commented previously on the impact of the pandemic on real estate-heavy operations that are dependent on lease payments (consider CBRE, Simon, and GPG) – and those organizations that lease substantial amounts of real estate (large distributed organizations such as IBM are sure to write down noteworthy losses to break leases -- where possible – as their employees adapt to working from their residences). We have discussed the implications for commercial/retail space landlords, and how they are being manipulated by “credit tenants”, and impacted by the COVID pandemic. Many professional organizations are expected to maintain a much higher number of partially or fully remote employees in the future (e.g., Morgan Stanley⁶⁷, Shopify⁶⁸, and Nationwide Insurance⁶⁹)⁷⁰ as a cost-management measure. This point will likely fuel the residential real estate (and home improvement) industry for the near future as buyers look to add home offices, etc.

Market instability due to concerns about the COVID-19 issues and the likelihood of no inoculation for a 12- to 18-month period (and the steps that companies will take to maintain their productivity in the interim) means that the VIX will remain at a heightened level for the near term (currently 30, with recent spikes at 80), and trading policies based on the VIX will continue to be fueled. ***The next most likely milestone that will assuage the market's volatility is confidence in the development of successful preventative measures and/or cures; currently, this objective is expected in the next three to nine months, with distribution following in another six months.***

⁶⁷ See https://www.morganstanley.com/about-us-2020ams/pdf/2020_Letter_to_Shareholders.pdf

⁶⁸ See <https://twitter.com/tobi/status/1263483496087064579>

⁶⁹ See <https://radio.wosu.org/post/nationwide-moves-smaller-regional-offices-permanent-remote-work#stream/0>

⁷⁰ See <https://globalworkplaceanalytics.com/work-at-home-after-covid-19-our-forecast>

Other Commentary

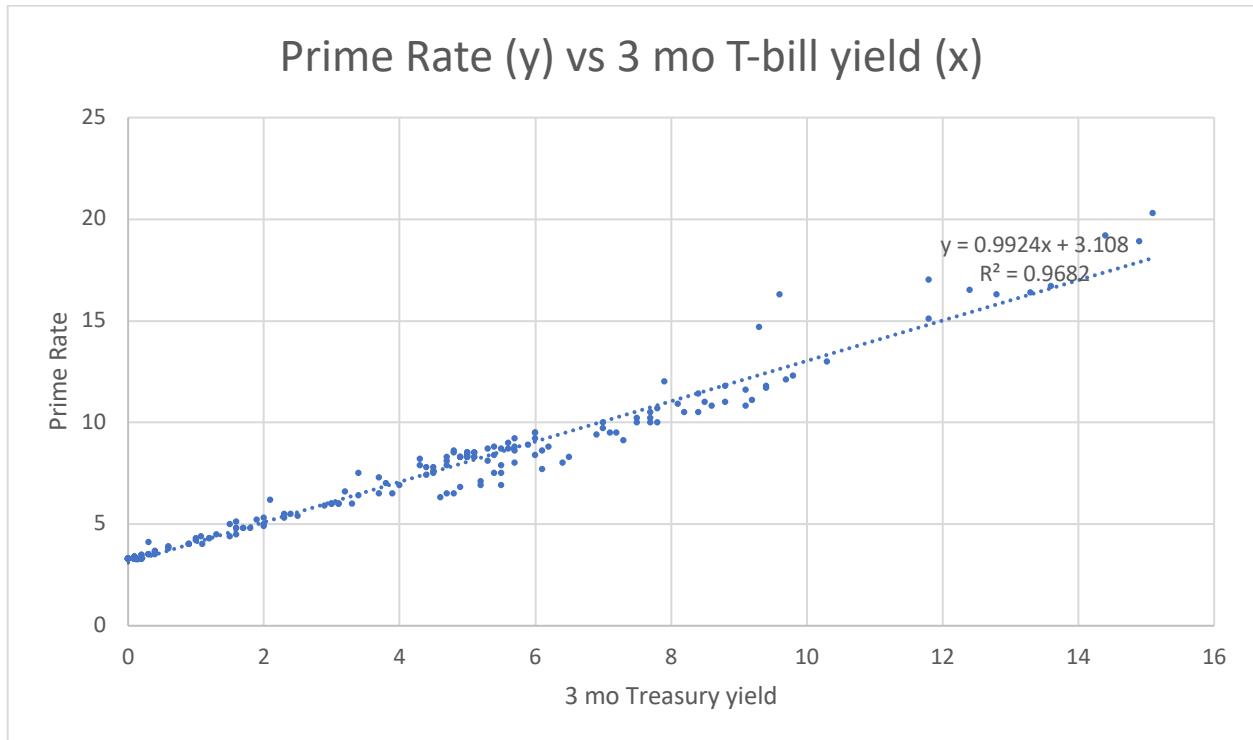
- “Chapter 11 bankruptcy filings totaled 747 last month, up from 420 a year earlier and from 525 in August, legal services firm Epiq said in a monthly report. Year-to-date filings total 5,529, a third higher than in the first three quarters of 2019. ... ‘These commercial filings are primarily small businesses that do not have access to capital or stimulus,’ Deirdre O’Connor, managing director of corporate restructuring at Epiq, said in a statement. ‘Unfortunately, those bankruptcies will continue to rise in the current economic environment.’ ... ‘Regulatory programs have effectively kicked the can down the street by injecting liquidity into the market, delaying new bankruptcy filings,’ said Chris Kruse, senior vice president of Epiq AACER.” (per <https://www.reuters.com/article/us-health-coronavirus-usa-bankruptcy/u-s-commercial-bankruptcies-up-33-year-to-date-idUSKBN26QZF>; Oct. 5, 2020)

Prime Rate

Analysis

The Prime Rate has historically been very tightly coupled to very short-term Treasury Bills (specifically, 3-month yields). Caplalytics’ models anticipate that trend continuing, and the Prime Rate remaining very close its current level of 3.25% for the foreseeable future (through 2024). However, given the Fed’s stance regarding rates, ***we feel that it is possible that the Prime Rate could drop to as low as 3.0% by 2024.***

The accompanying chart shows the tight relationship that has existed historically between the Prime Rate and the 3-month T-bill yield.



Source: Author's calculation

Other Commentary

- "... the Fed isn't going to do anything with short-term rates any time soon, and is probably going to be on hold into 2022 (only two FOMC members see the Fed raising rates at some point during 2022 ...)" (see <http://primerate.fedprimerate.com/>; June 12, 2020)

US Average Retail Gasoline Price

Analysis

While the OPEC+ countries agreed to cut production (and are now planning to release the agreed upon limits), the effects of the Coronavirus on travel have already entrenched themselves. Demand for airplane fuel (approximately 10% of consumption) has been substantially affected for the long-term, and road travel (for pleasure and commuting) has been impacted.

AAA expects that road travel will be down by approximately 3% from 2019, whereas air travel will be down (expectedly) by 74%, and other forms of travel will be down by 85% since 2019.⁷¹ In line with that forecast, EIA anticipated Brent crude to be approximately \$41/barrel during 2H2020 and to reach

⁷¹ See <https://newsroom.aaa.com/2020/06/aaa-forecasts-americans-will-take-700-million-trips-this-summer/>

\$47/barrel in 2021, translating to their expectation of regular grade **automotive fuel staying near \$2/gallon through 2020 and diesel fuel remaining at about \$2.50/gallon**⁷².

Other Commentary

- “Crude oil prices have retreated several dollars in recent weeks. Benchmark West Texas Intermediate, which opened the month trading near \$43 per barrel, recently sold for \$39. Again, worldwide petroleum demand is down due to reduction in travel caused by the coronavirus pandemic. Markets are amply supplied, given the low level of consumption. And the possibility of virus cases spiking as cooler weather arrives is making traders nervous that oil demand could weaken further.” (see <https://www.kiplinger.com/economic-forecasts/energy>; Sept 29, 2020)
- “Brent crude oil spot prices averaged \$41 per barrel (b) in September, down \$4/b from the average in August. The decrease in oil prices coincided with slowing increases in global oil demand.” (per <https://www.eia.gov/outlooks/steo/>; Oct 6, 2020)

Federal Funds (Primary Credit) Rate

Analysis

When a depository institution has a shortfall and need for liquidity, it may borrow funds on a short-term basis from the Federal Reserve. The “discount rate” is the interest rate charged to commercial banks and other depository institutions on loans they receive from their regional Federal Reserve Bank’s “discount window”. The Federal Reserve Banks offer three discount window programs to depository institutions: Primary Credit, Secondary Credit, and Seasonal Credit, each with its own interest rate. Under the Primary Credit program, loans are extended for a very short term (usually overnight) to depository institutions in generally sound financial condition. (Secondary Credit & Seasonal Credit may be available to institutions that do not meet the “sound financial condition” criteria.) The discount rate charged for primary credit (the primary credit rate) is set above the usual level of short-term market interest rates.

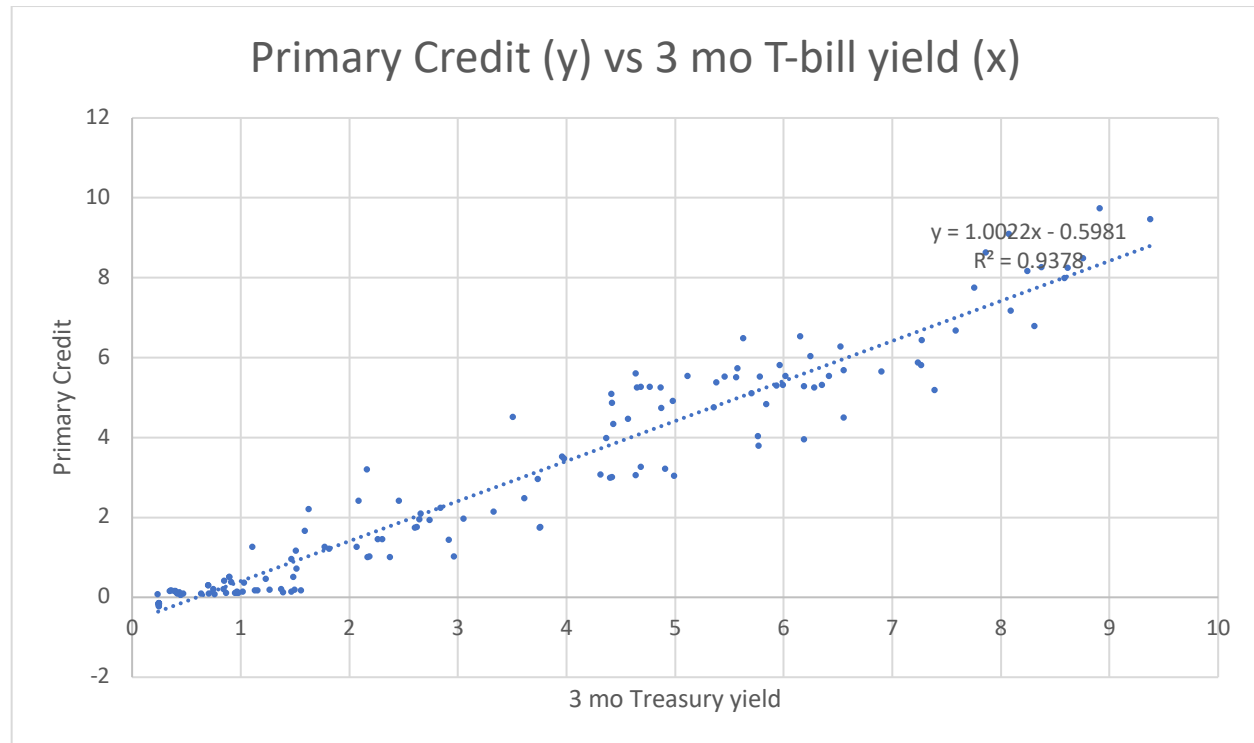
As we have mentioned, ***the Federal Reserve is currently expecting to maintain the Federal Funds rate at “essentially zero” (0 bp to 25 bp)***⁷³ ***through 2021, and potentially as long as through 2023.*** Looking at history, the Federal Funds rate has generally been slow to recover. During the 2001 recession, the rate went from 5.5% to 1.6%, and in the recession of 2008, the rate went from 4.66% to 0.1%. But it took 2 full years (mid-2004 to mid-2006) for the rate to be raised from 1.00% to 5.25%, and it also took 2 more years (Oct 2016 to Dec 2018) for the rate to go from 0.4% to 2.4%.

While the duration of the Coronavirus epidemic isn’t known, speculation in medical circles is that the world is still 6- to 18-months from a cure being widely available. Based on those numbers, and the

⁷² See <https://www.eia.gov/outlooks/steo/report/prices.php>, as of July 7, 2020

⁷³ See <https://www.federalreserve.gov/newsevents/pressreleases/monetary20200916a1.htm>

announcements of expected stimulus packages that will be considered, ***we now expect the Federal Funds Rate to remain at or less than 25bp for at least 36-48 months.***



Source: Author's calculation

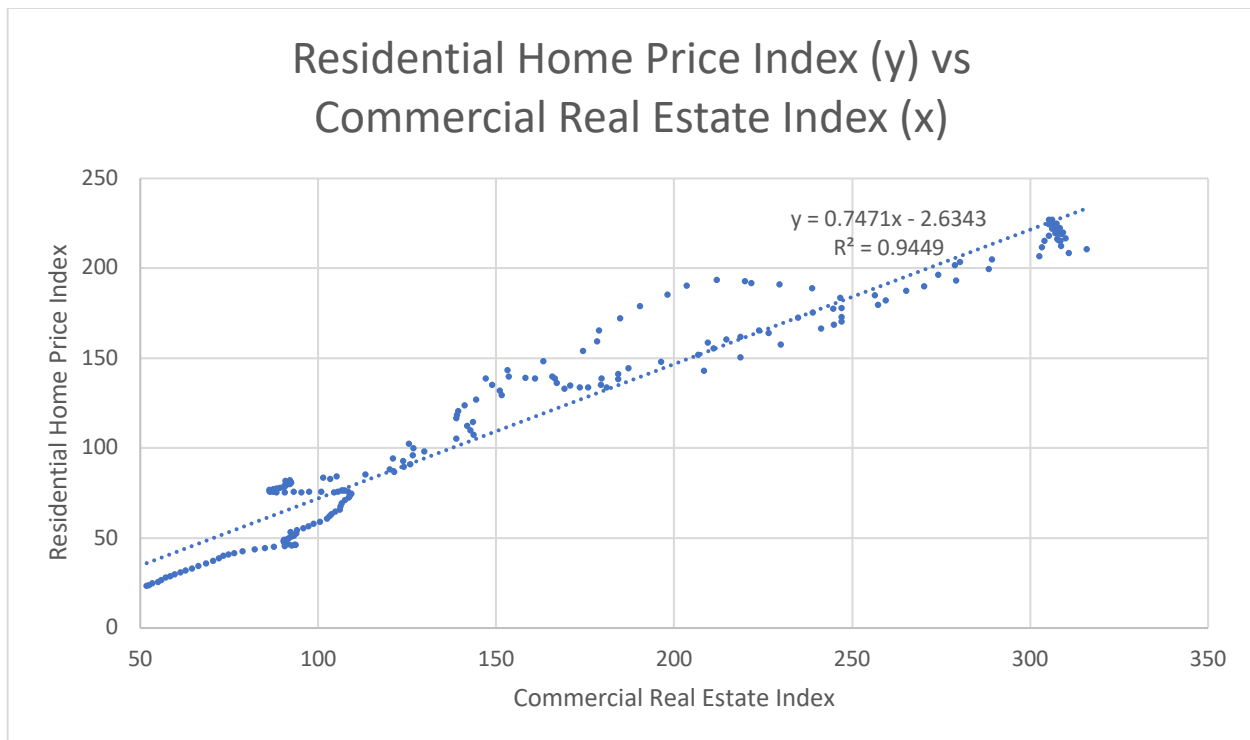
House and Commercial Real Estate Price Indexes

Analysis

New home-construction and home sales (both new- and existing-home sales) have dropped dramatically since the end of 2018. These trends will be reflected in the Home Real Estate Price Index as it has slowed, but is still to grow by as much as 2% per quarter nationally over the next several quarters (from 211.5 in 4Q2019, to 220.2 at YE2020, to 234 at YE2022). However, growth that was already slowing is now expected to slow even further; while mortgage rates will bottom out during 2020 and stay through 2021, ***mortgage originators will be very selective of new mortgagees and their employment stability.*** Additionally, we expect employer-funded transfers within corporations will be reduced, further hindering sales and leaving an already significant amount of inventory on the market. However, inkeeping with the previously described “K”-recovery, we are already seeing a strong “locale-focused” repositioning by those who can afford it. In other words, given low mortgage rates, those who can afford it, and whose employers allow remote working, are determined to move to homes and areas that

are desirable. Real estate has been a seller’s market for the duration of the summer, though expectations are that this trend will not continue indefinitely⁷⁴.

Commercial real estate is more of a mixed bag: as we have mentioned in previous reports, “...***we expect this index to falter, growing by no more than 0.2% this year and then dropping as investors look to repurpose assets*** to more stable purposes.” At this point, we would offer that as an optimistic view. While self-storage, take-out grocery/pharmacy, and professional services are stable in their footprints, most other retail, food service, and hospitality is still significantly impaired⁷⁵, and will likely not recover to pre-pandemic levels for several years, if ever⁷⁶.



Source: Author’s calculation

Other Commentary

- “As was expected, home buying and selling prospects drastically improved in September 2020 from pandemic lows. With unusually high buyer interest this late in the homebuying season, buyers are moving much faster than this time last year to beat out competition and lock in low mortgage rates. ... Homes are being sold at an increasingly fast pace when compared to [2019]. Housing prices have surged to new records due to very strong demand but low mortgage rates are helping buyers offset this increased cost. Mortgage rates for housing are anticipated to stay

⁷⁴ See <https://www.cnn.com/2020-housing-market-buyers-remorse/>

⁷⁵ See <https://www.cnn.com/2020/09/22/investing/commercial-real-estate-recession/index.html>

⁷⁶ See <https://www.cnn.com/2020/09/27/office-real-estate-back-to-normal-in-2025-cushman-wakefield.html>

at near 3% over the next 18 months which will make homes more affordable.” (see <https://www.noradarealestate.com/blog/housing-market-predictions/>; Oct. 6, 2020)

- “The median existing-home price for all housing types in August was \$310,600, up 11.4% from August 2019 (\$278,800), as prices rose in every region. ... August’s national price increase marks 102 straight months of year-over-year gains.” (Ibid.)
- “The myth that work from home is not productive has been busted,” [Levi Strauss & Co. CFO Harmit Singh] said. “I believe we will settle into a culture where working from anywhere will be the new norm, with work from home or office or a hybrid arrangement.” (<https://www.cnbc.com/2020/09/27/office-real-estate-back-to-normal-in-2025-cushman-wakefield.html>); Sept. 27, 2020)

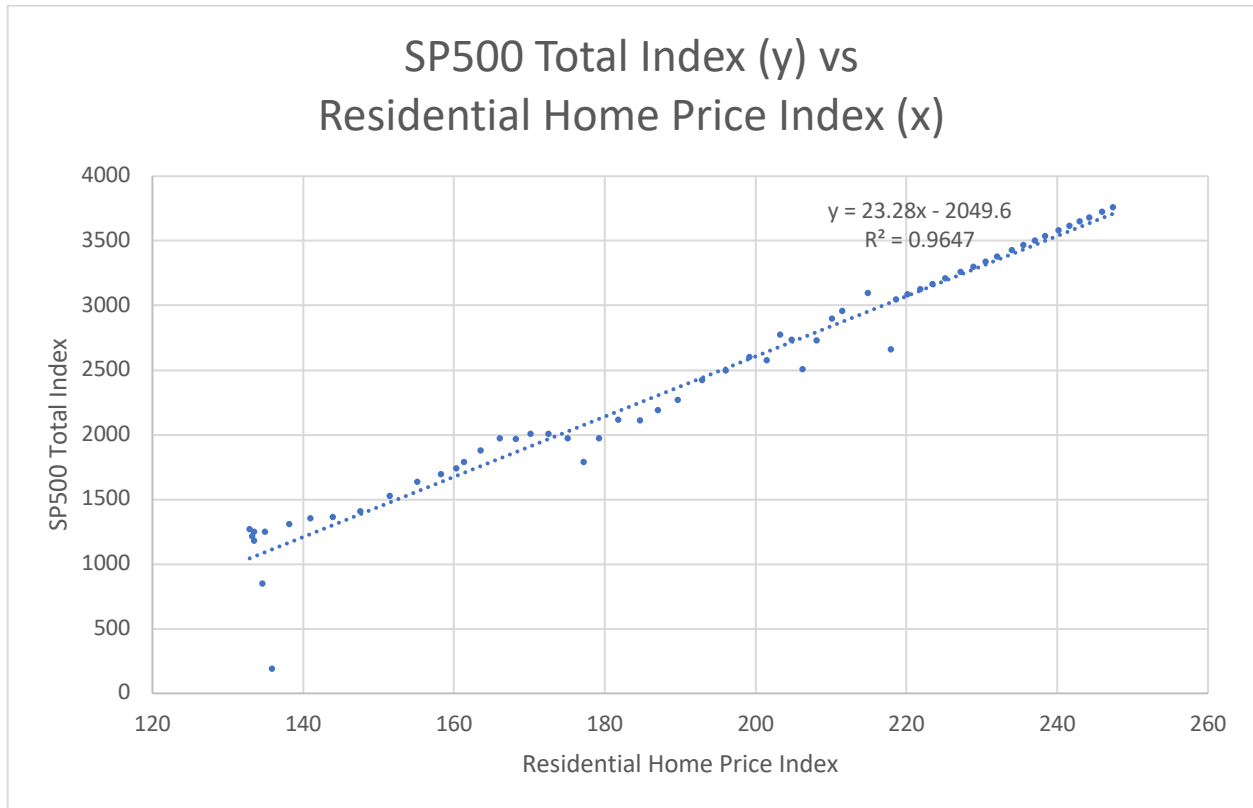
Dow Jones Total Stock Market Index (end-of-quarter) and S&P 500 (quarterly average)

Analysis

Given the business- and investor-friendly administration that is currently installed in the United States, we expected steady growth during 2020. This trend, however, has been hampered by the COVID-19 crisis: the Dow TSM Index plummeted 7000 points across 1Q2020, but rebounded by 5500 points in 2Q, and is (as of Oct 6, 2020) almost 1400 points above its YE2019 level. In contrast, however, the S&P 500 rose another 100 points across 1Q, retreated 440 points across 2Q, and is now about 100 points above its YE2019 level.

Our models are showing generally stability over both indexes, with neither significant growth nor erosion. However, the hinge-pin around what will actually occur with these indexes will likely be the outcome of the Presidential and Congressional elections in November. If Trump is elected and can restore investor confidence with his handling of the COVID crisis, we expect to see restored growth of the markets; on the other hand, if Biden is elected, as we have discussed, investors will likely be very concerned about money raised from taxation, and other means.

Beyond that, we can only repeat our previous analysis: given the lack of stability in the market today, we expect growth to be very slow once the economy re-emerges. We believe that, with the different regions that have different infection dates and degrees of infection, recovery will be staged geographically; there is a strong likelihood that aggressive relaxing of quarantine requirements will result in relapses across the country. Hence, the recovery will be “inconsistent and/or erratic”, and it will likely not be monotonically improving across the entire nation. The lack of a constantly improving perception will likely cause the markets to remain unstable until the end of the crisis, which will be indicated with the widespread release of a cure and/or inoculation, which is currently projected as being during the Summer of 2021. As such, ***we expect to see a continuation of the volatility that has been observed during 2020 for at least the next nine months (i.e., through 1H2021).*** We will only be able to estimate beyond this point after the Presidential election in November 2020.



Source: Author's calculation

Other Commentary

- “The S&P 500 suffered its fastest-ever 10% decline from an all-time high. The Dow Jones Industrial Average just had its worst week since the start of the 2008 global financial crisis. Shares of manufacturers, banks and utilities alike have dropped by double digits.” (per <https://www.wsj.com/articles/the-week-that-wiped-3-4-trillion-off-the-stock-market-11582891223>; Feb. 29, 2020)
- “Investors have grown increasingly pessimistic that efforts to stop the spread of the virus will prevent significant damage to the global economy. ... American businesses will generate no earnings growth in 2020 if the virus becomes widespread, Goldman Sachs Group’s equity analysts warned on Thursday.” (from <https://www.wsj.com/articles/global-stocks-extend-declines-as-coronavirus-concerns-mount-11582784087>; Feb. 27, 2020)

Regression Analyses

The following section document the linear regression coefficients found for each of the aforementioned variables, as a function of other variables (which are not significantly correlated with the control variable). With this report, we have also included the natural log and the square of all variables as experimental (dependent) variables; these variables are denoted by a “LN_” prefix and a “2” suffix below (respectively).

To compare the effectiveness of these regressions, we calculate the percentage error between the forecasted value (based on the given regression, using the values from the immediately preceding quarter) and the actual value for the period between 3Q2006 and 2Q2020, inclusive.

Table 15: Regression Aggregate Errors for 3Q2006 through 2Q2020

Variable	Min Abs. Error	Average Error	Max Abs. Error
Real GDP Growth	191.78%	**	***
Nominal GDP Growth	***	**	***
Real Disposable Income Growth	***	***	***
Nominal Disposable Income Growth	***	***	***
Inflation	0.00%	***	***
Unemployment Rate	554.53%	**	***
1-month Treasury Yield	303.02%	***	***
3-month Treasury Yield	0.00%	**	***
6-month Treasury Yield	373.98%	**	***
1-year Treasury Yield	936.03%	**	***
3-year Treasury Yield	0.39%	20.88%	490.81%
5-year Treasury Yield	1.28%	-1.29%	149.86%
7-year Treasury Yield	0.76%	14.90%	198.36%
10-year Treasury Yield	104.60%	218.74%	680.90%
20-year Treasury Yield	0.76%	-6.05%	75.95%
30-year Treasury Yield	0.05%	3.01%	44.07%
30-year Mortgage Rate	836.26%	***	***

MACROECONOMIC FORECASTS, 3Q2020 – FINAL VERSION

Moody's AAA Curve	1.97%	27.86%	99.43%
Moody's BAA Curve	0.26%	7.72%	46.92%
BBB Corporate Yield	0.08%	-0.93%	31.01%
Prime Rate	0.03%	-1.11%	34.67%
US Average Retail Gasoline Price	4.25%	70.12%	171.39%
Cost of Federal Funds	301.83%	**	***
Dow Jones Total Stock Market Index	1.88%	-2.30%	212.44%
S&P 500 Stock Price Index	0.00%	***	***
Commercial Real Estate Price Index	341.08%	867.61%	***
Residential Home Price Index	4.49%	50.51%	116.58%
Market Volatility Index	0.88%	9.13%	117.40%

** The indicated value has a percentage error less than -1000%.

*** The indicated value has a percentage error greater than 1000%.

Real & Nominal GDP Growth, Real & Nominal Disposable Income Growth, and CPI Inflation Rate

REGRESSION FOR REAL GDP GROWTH

<i>Dependent variable (+/- SE):</i>	
Real GDP growth	
Constant	-3.617 (+/- 1.216) p = 0.006***
30-year Treasury Yield	-12.179 (+/- 1.956) p = 0.00000***
LN_30-year Treasury Yield	39.009 (+/- 5.551) p = 0.00000***
Observations	40
R ²	0.622
Adjusted R ²	0.601
Residual Std. Error	1.487 (df = 37)
F Statistic	30.396*** (df = 2; 37)
<i>Note:</i>	*p<0.1; **p<0.05; ***p<0.01

REGRESSION FOR NOMINAL GDP GROWTH

	<i>Dependent variable (+/- SE):</i>
	Nominal GDP growth
Constant	-353.056 (+/- 22.872) p = 0.00000***
SP500 Stock Price Index	0.006 (+/- 0.001) p = 0.0003***
US Fed Reserve O-N Loan Rate	-35.984 (+/- 2.382) p = 0.00000***
Moody's AAA Curve	26.183 (+/- 2.360) p = 0.00001***
Moody's BAA Curve	-18.268 (+/- 1.350) p = 0.00000***
Real disposable income growth	0.148 (+/- 0.031) p = 0.002***
Unemployment Rate	-4.351 (+/- 0.682) p = 0.0003***
BBB corporate yield	7.837 (+/- 0.860) p = 0.00002***
30-year Mortgage Rate	-12.109 (+/- 1.219) p = 0.00001***
Prime Rate	16.335 (+/- 1.383)

MACROECONOMIC FORECASTS, 3Q2020 – FINAL VERSION

	$p = 0.00001^{***}$
Home Price Index	-1.661 (+/- 0.081)
	$p = 0.00000^{***}$
Commercial Real Estate Price Index	0.532 (+/- 0.028)
	$p = 0.00000^{***}$
30-year Treasury Yield	-529.767 (+/- 32.377)
	$p = 0.00000^{***}$
LN_30-year Treasury Yield	1,539.567 (+/- 88.147)
	$p = 0.00000^{***}$
20-year Treasury Yield	288.166 (+/- 26.769)
	$p = 0.00001^{***}$
LN_20-year Treasury Yield	-576.285 (+/- 60.819)
	$p = 0.00002^{***}$
10-year Treasury Yield	889.019 (+/- 51.847)
	$p = 0.00000^{***}$
LN_10-year Treasury Yield	-1,526.803 (+/- 83.772)
	$p = 0.00000^{***}$
LN_1-month Treasury Yield	8.538 (+/- 0.498)
	$p = 0.00000^{***}$
7-year Treasury Yield	-945.041 (+/- 62.028)
	$p = 0.00000^{***}$
LN_7-year Treasury Yield	1,082.132 (+/- 67.625)

	$p = 0.00000^{***}$
5-year Treasury Yield	501.198 (+/- 40.634)
	$p = 0.00001^{***}$
LN_5-year Treasury Yield	-281.534 (+/- 24.764)
	$p = 0.00001^{***}$
LN_6-month Treasury Yield	-12.247 (+/- 1.129)
	$p = 0.00001^{***}$
3-year Treasury Yield	73.389 (+/- 8.604)
	$p = 0.00003^{***}$
LN_3-year Treasury Yield	-51.827 (+/- 6.236)
	$p = 0.00004^{***}$
LN_1-year Treasury Yield	8.134 (+/- 0.985)
	$p = 0.00004^{***}$
3-year Treasury Yield ²	15.754 (+/- 2.181)
	$p = 0.0001^{***}$
6-month Treasury Yield ²	-5.483 (+/- 0.494)
	$p = 0.00001^{***}$
5-year Treasury Yield ²	-86.247 (+/- 7.438)
	$p = 0.00001^{***}$
7-year Treasury Yield ²	74.271 (+/- 7.283)
	$p = 0.00001^{***}$
10-year Treasury Yield ²	-53.927 (+/- 4.790)

p = 0.00001***

Observations	40
R ²	0.998
Adjusted R ²	0.991
Residual Std. Error	0.263 (df = 8)
F Statistic	142.950*** (df = 31; 8)

Note: *p<0.1; **p<0.05; ***p<0.01

REGRESSION FOR REAL DISPOSABLE INCOME GROWTH

	<i>Dependent variable (+/- SE):</i>
	Real disposable income growth
Constant	605.390 (+/- 51.508) p = 0.00000***
Real GDP growth	3.210 (+/- 0.708) p = 0.002***
Nominal GDP growth	-3.505 (+/- 0.584) p = 0.0002***
Unemployment Rate	7.581 (+/- 1.100) p = 0.00005***
CPI Inflation Rate	0.158 (+/- 0.017) p = 0.00001***
BBB corporate yield	-17.902 (+/- 2.048) p = 0.00001***
30-year Mortgage Rate	50.030 (+/- 4.456) p = 0.00000***
Prime Rate	-70.199 (+/- 9.390) p = 0.00003***
Home Price Index	-2.230 (+/- 0.180) p = 0.00000***
Commercial Real Estate Price Index	1.222 (+/- 0.096)

	$p = 0.00000^{***}$
Market Volatility Index	1.155 (+/- 0.207)
	$p = 0.0003^{***}$
LN_Market Volatility Index	-38.332 (+/- 5.691)
	$p = 0.0001^{***}$
US Avg Retail Gasoline Price (\$-gal; all grades, all formulations)	-22.511 (+/- 2.206)
	$p = 0.00001^{***}$
20-year Treasury Yield	-202.436 (+/- 19.987)
	$p = 0.00001^{***}$
10-year Treasury Yield	-423.428 (+/- 40.746)
	$p = 0.00001^{***}$
LN_10-year Treasury Yield	1,159.697 (+/- 91.145)
	$p = 0.00000^{***}$
1-month Treasury Yield	122.890 (+/- 15.831)
	$p = 0.00002^{***}$
7-year Treasury Yield	556.372 (+/- 46.847)
	$p = 0.00000^{***}$
LN_7-year Treasury Yield	-920.848 (+/- 64.233)
	$p = 0.00000^{***}$
LN_5-year Treasury Yield	-189.619 (+/- 19.301)
	$p = 0.00001^{***}$
6-month Treasury Yield	-302.839 (+/- 33.247)

	p = 0.00001***
LN_6-month Treasury Yield	19.048 (+/- 4.110)
	p = 0.001***
3-year Treasury Yield	-612.949 (+/- 49.191)
	p = 0.00000***
LN_3-year Treasury Yield	414.120 (+/- 31.048)
	p = 0.00000***
1-year Treasury Yield	575.161 (+/- 52.575)
	p = 0.00000***
LN_1-year Treasury Yield	-118.052 (+/- 10.909)
	p = 0.00000***
1-year Treasury Yield ²	-97.445 (+/- 9.495)
	p = 0.00001***
3-year Treasury Yield ²	85.390 (+/- 7.618)
	p = 0.00000***
3-month Treasury Yield ²	38.331 (+/- 5.624)
	p = 0.00005***
30-year Treasury Yield ²	19.710 (+/- 2.297)
	p = 0.00001***
<hr/>	
Observations	40
R ²	0.984
Adjusted R ²	0.936

Residual Std. Error	0.994 (df = 10)
F Statistic	20.786*** (df = 29; 10)
<hr/>	
<i>Note:</i>	*p<0.1; **p<0.05; ***p<0.01

REGRESSION FOR NOMINAL DISPOSABLE INCOME GROWTH

	<i>Dependent variable (+/- SE):</i>
	Nominal disposable income growth
Constant	389.536 (+/- 58.924) p = 0.00002***
US Fed Reserve O-N Loan Rate	50.355 (+/- 6.784) p = 0.00001***
Real GDP growth	-1.007 (+/- 0.296) p = 0.005***
CPI Inflation Rate	0.192 (+/- 0.030) p = 0.00002***
30-year Mortgage Rate	17.802 (+/- 4.717) p = 0.003***
Prime Rate	-113.326 (+/- 15.937) p = 0.00001***
Home Price Index	-1.257 (+/- 0.251) p = 0.0002***
Commercial Real Estate Price Index	0.704 (+/- 0.125) p = 0.0001***
US Avg Retail Gasoline Price (\$-gal; all grades, all formulations)	-9.642 (+/- 2.106) p = 0.0005***
LN_30-year Treasury Yield	291.172 (+/- 63.522)

	$p = 0.0005^{***}$
20-year Treasury Yield	131.134 (+/- 36.061)
	$p = 0.003^{***}$
LN_20-year Treasury Yield	-776.812 (+/- 107.150)
	$p = 0.00001^{***}$
10-year Treasury Yield	-317.992 (+/- 58.791)
	$p = 0.0001^{***}$
LN_10-year Treasury Yield	990.834 (+/- 141.241)
	$p = 0.00001^{***}$
1-month Treasury Yield	233.642 (+/- 31.343)
	$p = 0.00001^{***}$
LN_1-month Treasury Yield	-6.556 (+/- 1.717)
	$p = 0.002^{***}$
7-year Treasury Yield	283.436 (+/- 43.493)
	$p = 0.00002^{***}$
LN_7-year Treasury Yield	-633.257 (+/- 78.171)
	$p = 0.00001^{***}$
LN_5-year Treasury Yield	-93.208 (+/- 20.839)
	$p = 0.001^{***}$
6-month Treasury Yield	-108.515 (+/- 24.992)
	$p = 0.001^{***}$
3-year Treasury Yield	-240.247 (+/- 37.838)

	$p = 0.00002^{***}$
LN_3-year Treasury Yield	215.394 (+/- 26.356)
	$p = 0.00001^{***}$
1-year Treasury Yield	121.337 (+/- 26.076)
	$p = 0.0004^{***}$
LN_1-year Treasury Yield	-46.974 (+/- 6.017)
	$p = 0.00001^{***}$
3-year Treasury Yield ²	29.320 (+/- 6.146)
	$p = 0.0003^{***}$
6-month Treasury Yield ²	-42.042 (+/- 5.545)
	$p = 0.00001^{***}$
<hr/>	
Observations	40
R ²	0.948
Adjusted R ²	0.855
Residual Std. Error	1.565 (df = 14)
F Statistic	10.185 ^{***} (df = 25; 14)
<hr/>	
<i>Note:</i>	* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

REGRESSION FOR CPI INFLATION RATE

	<i>Dependent variable (+/- SE):</i>
	CPI Inflation Rate
Constant	3,454.136 (+/- 287.245) p = 0.00000***
SP500 Stock Price Index	0.045 (+/- 0.014) p = 0.009***
Moody's AAA Curve	209.009 (+/- 36.358) p = 0.0002***
Moody's BAA Curve	-257.837 (+/- 40.390) p = 0.0001***
Real GDP growth	-79.995 (+/- 8.693) p = 0.00001***
Nominal GDP growth	65.100 (+/- 7.951) p = 0.00001***
Real disposable income growth	12.727 (+/- 3.764) p = 0.007***
Nominal disposable income growth	-20.394 (+/- 3.652) p = 0.0002***
BBB corporate yield	209.222 (+/- 30.533) p = 0.00003***
Prime Rate	-1,081.882 (+/- 94.181)

	p = 0.00000***
Dow Total Stock Market Index	-0.021 (+/- 0.002)
	p = 0.00000***
LN_Market Volatility Index	-115.343 (+/- 11.406)
	p = 0.00000***
US Avg Retail Gasoline Price (\$-gal; all grades, all formulations)	-158.352 (+/- 23.452)
	p = 0.00004***
LN_20-year Treasury Yield	-2,845.347 (+/- 304.081)
	p = 0.00001***
10-year Treasury Yield	4,714.247 (+/- 485.492)
	p = 0.00000***
1-month Treasury Yield	1,204.681 (+/- 183.544)
	p = 0.00005***
LN_1-month Treasury Yield	-138.009 (+/- 14.480)
	p = 0.00001***
7-year Treasury Yield	-4,210.939 (+/- 411.456)
	p = 0.00000***
6-month Treasury Yield	2,691.165 (+/- 444.865)
	p = 0.0001***
3-year Treasury Yield	1,461.164 (+/- 161.346)
	p = 0.00001***
1-year Treasury Yield	-2,573.367 (+/- 334.697)

	p = 0.00001***
1-year Treasury Yield ²	1,057.203 (+/- 112.884)
	p = 0.00001***
3-year Treasury Yield ²	-407.783 (+/- 38.729)
	p = 0.00000***
6-month Treasury Yield ²	-1,462.060 (+/- 189.430)
	p = 0.00001***
5-year Treasury Yield ²	-166.062 (+/- 28.289)
	p = 0.0002***
7-year Treasury Yield ²	970.478 (+/- 104.541)
	p = 0.00001***
1-month Treasury Yield ²	389.398 (+/- 85.707)
	p = 0.001***
10-year Treasury Yield ²	-762.714 (+/- 88.749)
	p = 0.00001***
30-year Treasury Yield ²	57.816 (+/- 12.580)
	p = 0.001***
<hr/>	
Observations	40
R ²	0.994
Adjusted R ²	0.979
Residual Std. Error	8.252 (df = 11)
F Statistic	64.818*** (df = 28; 11)
<hr/>	

Note:

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Unemployment Rate

REGRESSION FOR UNEMPLOYMENT RATE

	<i>Dependent variable (+/- SE):</i>
	Unemployment Rate
Constant	12.373 (+/- 1.321) p = 0.00001***
US Fed Reserve O-N Loan Rate	3.383 (+/- 0.147) p = 0.000***
Moody's AAA Curve	1.299 (+/- 0.233) p = 0.0003***
Real GDP growth	-0.425 (+/- 0.026) p = 0.00000***
Nominal GDP growth	0.316 (+/- 0.022) p = 0.00000***
Real disposable income growth	0.175 (+/- 0.018) p = 0.00001***
Nominal disposable income growth	-0.160 (+/- 0.017) p = 0.00001***
BBB corporate yield	1.122 (+/- 0.087) p = 0.00000***
30-year Mortgage Rate	-0.683 (+/- 0.152) p = 0.002***

MACROECONOMIC FORECASTS, 3Q2020 – FINAL VERSION

Prime Rate	-3.512 (+/- 0.390)
	p = 0.00001***
Home Price Index	-0.034 (+/- 0.005)
	p = 0.0001***
Commercial Real Estate Price Index	-0.018 (+/- 0.002)
	p = 0.00003***
Market Volatility Index	0.015 (+/- 0.002)
	p = 0.00001***
30-year Treasury Yield	-48.784 (+/- 3.598)
	p = 0.00000***
LN_30-year Treasury Yield	111.782 (+/- 9.706)
	p = 0.00000***
20-year Treasury Yield	39.642 (+/- 3.341)
	p = 0.00000***
LN_20-year Treasury Yield	-67.104 (+/- 7.778)
	p = 0.00001***
10-year Treasury Yield	37.014 (+/- 1.713)
	p = 0.000***
LN_10-year Treasury Yield	-82.985 (+/- 4.380)
	p = 0.000***
1-month Treasury Yield	7.441 (+/- 0.845)
	p = 0.00001***

MACROECONOMIC FORECASTS, 3Q2020 – FINAL VERSION

7-year Treasury Yield	-51.436 (+/- 2.318)
	p = 0.000***
LN_7-year Treasury Yield	80.319 (+/- 3.852)
	p = 0.000***
3-month Treasury Yield	-3.820 (+/- 0.430)
	p = 0.00001***
5-year Treasury Yield	18.845 (+/- 1.104)
	p = 0.000***
LN_5-year Treasury Yield	-33.319 (+/- 1.829)
	p = 0.000***
6-month Treasury Yield	-4.795 (+/- 0.907)
	p = 0.0004***
LN_3-year Treasury Yield	8.852 (+/- 0.567)
	p = 0.00000***
1-year Treasury Yield	8.561 (+/- 1.101)
	p = 0.00002***
LN_1-year Treasury Yield	-3.043 (+/- 0.202)
	p = 0.00000***
1-year Treasury Yield ²	-2.044 (+/- 0.154)
	p = 0.00000***

Observations	40
R ²	1.000

MACROECONOMIC FORECASTS, 3Q2020 – FINAL VERSION

Adjusted R ²	1.000
Residual Std. Error	0.042 (df = 10)
F Statistic	3,808.430*** (df = 29; 10)
<hr/>	
<i>Note:</i>	*p<0.1; **p<0.05: ***p<0.01

Treasury Yields (1, 3, & 6-month; 1, 3, 5, 7, 10, 20, & 30-year series)

REGRESSION FOR 1-MONTH TREASURY YIELD

<i>Dependent variable (+/- SE):</i>	
1-month Treasury Yield	
Constant	-2.179 (+/- 0.396) p = 0.00001***
Prime Rate	0.384 (+/- 0.054) p = 0.00000***
30-year Treasury Yield	4.759 (+/- 1.298) p = 0.002***
LN_30-year Treasury Yield	-8.646 (+/- 2.089) p = 0.0004***
10-year Treasury Yield	-4.722 (+/- 1.303) p = 0.002***
LN_10-year Treasury Yield	6.537 (+/- 1.615) p = 0.0004***
7-year Treasury Yield	2.773 (+/- 0.830) p = 0.003***
LN_7-year Treasury Yield	-3.039 (+/- 0.840) p = 0.002***
3-month Treasury Yield	0.488 (+/- 0.043) p = 0.000***

MACROECONOMIC FORECASTS, 3Q2020 – FINAL VERSION

3-month Treasury Yield ²	0.063 (+/- 0.009)
	p = 0.00000***
7-year Treasury Yield ²	-0.287 (+/- 0.099)
	p = 0.008***
10-year Treasury Yield ²	0.400 (+/- 0.138)
	p = 0.008***
30-year Treasury Yield ²	-0.316 (+/- 0.103)
	p = 0.005***

Observations	40
R ²	1.000
Adjusted R ²	1.000
Residual Std. Error	0.017 (df = 27)
F Statistic	6,945.696*** (df = 12; 27)

Note: * p<0.1; ** p<0.05; *** p<0.01

REGRESSION FOR 3-MONTH TREASURY YIELD

	<i>Dependent variable (+/- SE):</i>
	3-month Treasury Yield
Constant	-0.797 (+/- 0.120) p = 0.00000***
Unemployment Rate	0.015 (+/- 0.005) p = 0.005***
30-year Treasury Yield	-2.550 (+/- 0.419) p = 0.00000***
LN_30-year Treasury Yield	7.509 (+/- 1.150) p = 0.00000***
20-year Treasury Yield	2.177 (+/- 0.382) p = 0.00001***
LN_20-year Treasury Yield	-5.823 (+/- 0.963) p = 0.00000***
1-month Treasury Yield	1.231 (+/- 0.036) p = 0.000***
1-month Treasury Yield ²	-0.097 (+/- 0.014) p = 0.00000***
Observations	40
R ²	0.999
Adjusted R ²	0.998

Residual Std. Error 0.032 (df = 32)

F Statistic 3,440.638*** (df = 7; 32)

Note: *p<0.1; **p<0.05; ***p<0.01

REGRESSION FOR 6-MONTH TREASURY YIELD

	<i>Dependent variable (+/- SE):</i>
	6-month Treasury Yield
Constant	6.605 (+/- 1.965) p = 0.003***
Moody's BAA Curve	0.503 (+/- 0.142) p = 0.002***
Unemployment Rate	0.962 (+/- 0.090) p = 0.000***
Home Price Index	0.093 (+/- 0.007) p = 0.000***
US Avg Retail Gasoline Price (\$-gal; all grades, all formulations)	0.348 (+/- 0.093) p = 0.001***
30-year Treasury Yield	-5.787 (+/- 0.726) p = 0.000***
LN_30-year Treasury Yield	13.695 (+/- 2.397) p = 0.00001***
10-year Treasury Yield	-36.917 (+/- 3.174) p = 0.000***
LN_10-year Treasury Yield	40.285 (+/- 3.559) p = 0.000***
10-year Treasury Yield ²	4.299 (+/- 0.369)

p = 0.000***

Observations	40
R ²	0.965
Adjusted R ²	0.955
Residual Std. Error	0.174 (df = 30)
F Statistic	92.413*** (df = 9; 30)

Note: *p<0.1; **p<0.05; ***p<0.01

REGRESSION FOR 1-YEAR TREASURY YIELD

	<i>Dependent variable (+/- SE):</i>
	1-year Treasury Yield
Constant	0.841 (+/- 3.348) p = 0.804
SP500 Stock Price Index	-0.001 (+/- 0.0004) p = 0.007***
BBB corporate yield	0.840 (+/- 0.192) p = 0.0002***
Home Price Index	0.063 (+/- 0.010) p = 0.00000***
US Avg Retail Gasoline Price (\$-gal; all grades, all formulations)	0.821 (+/- 0.187) p = 0.0002***
30-year Treasury Yield	-21.300 (+/- 5.135) p = 0.0003***
LN_30-year Treasury Yield	30.349 (+/- 6.746) p = 0.0001***
30-year Treasury Yield ²	1.749 (+/- 0.449) p = 0.0005***
Observations	40
R ²	0.883
Adjusted R ²	0.857

Residual Std. Error	0.310 (df = 32)
F Statistic	34.425 *** (df = 7; 32)
<hr/>	
<i>Note:</i>	*p<0.1; **p<0.05; ***p<0.01

REGRESSION FOR 3-YEAR TREASURY YIELD

<i>Dependent variable (+/- SE):</i>	
3-year Treasury Yield	
Constant	-6.925 (+/- 0.660) p = 0.000***
Nominal GDP growth	0.086 (+/- 0.016) p = 0.00001***
BBB corporate yield	0.800 (+/- 0.109) p = 0.000***
Home Price Index	0.026 (+/- 0.002) p = 0.000***
Observations	40
R ²	0.859
Adjusted R ²	0.847
Residual Std. Error	0.275 (df = 36)
F Statistic	72.875*** (df = 3; 36)
<i>Note:</i>	* p<0.1; ** p<0.05; *** p<0.01

REGRESSION FOR 5-YEAR TREASURY YIELD

<i>Dependent variable (+/- SE):</i>	
5-year Treasury Yield	
Constant	-5.317 (+/- 0.506) p = 0.000***
CPI Inflation Rate	-0.003 (+/- 0.001) p = 0.0003***
Home Price Index	0.025 (+/- 0.002) p = 0.000***
30-year Treasury Yield	0.861 (+/- 0.085) p = 0.000***
Observations	40
R ²	0.868
Adjusted R ²	0.857
Residual Std. Error	0.225 (df = 36)
F Statistic	78.873*** (df = 3; 36)
<i>Note:</i>	*p<0.1; **p<0.05; ***p<0.01

REGRESSION FOR 7-YEAR TREASURY YIELD

<i>Dependent variable (+/- SE):</i>	
7-year Treasury Yield	
Constant	-0.683 (+/- 0.459) p = 0.146
Unemployment Rate	-0.147 (+/- 0.024) p = 0.00000***
BBB corporate yield	0.854 (+/- 0.114) p = 0.000***
Observations	40
R ²	0.667
Adjusted R ²	0.649
Residual Std. Error	0.324 (df = 37)
F Statistic	37.101*** (df = 2; 37)
<i>Note:</i>	*p<0.1; **p<0.05; ***p<0.01

REGRESSION FOR 10-YEAR TREASURY YIELD

	<i>Dependent variable (+/- SE):</i>
	10-year Treasury Yield
Constant	0.044 (+/- 0.547) p = 0.937
SP500 Stock Price Index	-0.0004 (+/- 0.0001) p = 0.00002***
US Fed Reserve O-N Loan Rate	1.244 (+/- 0.151) p = 0.000***
Unemployment Rate	-0.219 (+/- 0.021) p = 0.000***
CPI Inflation Rate	0.003 (+/- 0.001) p = 0.00004***
LN_Market Volatility Index	0.490 (+/- 0.129) p = 0.001***
30-year Treasury Yield	2.690 (+/- 0.222) p = 0.000***
LN_30-year Treasury Yield	-5.401 (+/- 0.719) p = 0.00000***
1-month Treasury Yield	1.742 (+/- 0.360) p = 0.0001***
LN_1-month Treasury Yield	-0.174 (+/- 0.029)

MACROECONOMIC FORECASTS, 3Q2020 – FINAL VERSION

	$p = 0.00001^{***}$
6-month Treasury Yield	-1.937 (+/- 0.463)
	$p = 0.0003^{***}$
6-month Treasury Yield ²	0.321 (+/- 0.099)
	$p = 0.004^{***}$
1-month Treasury Yield ²	-0.564 (+/- 0.098)
	$p = 0.00001^{***}$
Market Volatility Index ²	-0.0002 (+/- 0.0001)
	$p = 0.003^{***}$
<hr/>	
Observations	40
R ²	0.993
Adjusted R ²	0.989
Residual Std. Error	0.058 (df = 26)
F Statistic	281.660 ^{***} (df = 13; 26)
<hr/>	
<i>Note:</i>	* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

REGRESSION FOR 20-YEAR TREASURY YIELD

	<i>Dependent variable (+/- SE):</i>
	20-year Treasury Yield
Constant	3.964 (+/- 0.291) p = 0.000***
SP500 Stock Price Index	-0.001 (+/- 0.0002) p = 0.0001***
Real disposable income growth	-0.172 (+/- 0.058) p = 0.006***
Nominal disposable income growth	0.161 (+/- 0.055) p = 0.007***
1-month Treasury Yield	7.004 (+/- 2.157) p = 0.003***
3-month Treasury Yield	-7.089 (+/- 1.978) p = 0.002***
3-month Treasury Yield ²	3.353 (+/- 0.781) p = 0.0002***
1-month Treasury Yield ²	-3.176 (+/- 0.789) p = 0.0004***
Observations	40
R ²	0.713
Adjusted R ²	0.651

Residual Std. Error	0.365 (df = 32)
F Statistic	11.375*** (df = 7; 32)
<hr/>	
<i>Note:</i>	*p<0.1; **p<0.05; ***p<0.01

REGRESSION FOR 30-YEAR TREASURY YIELD

	<i>Dependent variable (+/- SE):</i>
	30-year Treasury Yield
Constant	1.412 (+/- 0.331) p = 0.0003 ***
Moody's BAA Curve	0.361 (+/- 0.093) p = 0.001 ***
BBB corporate yield	-0.279 (+/- 0.070) p = 0.0005 ***
LN_10-year Treasury Yield	1.415 (+/- 0.118) p = 0.000 ***
1-month Treasury Yield	-0.924 (+/- 0.309) p = 0.006 ***
LN_1-month Treasury Yield	0.098 (+/- 0.030) p = 0.004 ***
5-year Treasury Yield	-1.137 (+/- 0.182) p = 0.00001 ***
6-month Treasury Yield	1.352 (+/- 0.437) p = 0.005 ***
LN_6-month Treasury Yield	-0.242 (+/- 0.076) p = 0.004 ***
6-month Treasury Yield ²	-0.478 (+/- 0.159)

MACROECONOMIC FORECASTS, 3Q2020 – FINAL VERSION

	p = 0.006***
5-year Treasury Yield ²	0.193 (+/- 0.059)
	p = 0.004***
1-month Treasury Yield ²	0.379 (+/- 0.128)
	p = 0.007***
10-year Treasury Yield ²	0.145 (+/- 0.013)
	p = 0.000***
<hr/>	
Observations	40
R ²	0.996
Adjusted R ²	0.995
Residual Std. Error	0.044 (df = 27)
F Statistic	639.052*** (df = 12; 27)
<hr/>	
<i>Note:</i>	*p<0.1; **p<0.05; ***p<0.01

30-year Mortgage Rate

REGRESSION FOR 30-YEAR MORTGAGE RATE

	<i>Dependent variable (+/- SE):</i>
	30-year Mortgage Rate
Constant	-6.181 (+/- 1.759) p = 0.002***
US Fed Reserve O-N Loan Rate	0.429 (+/- 0.087) p = 0.00003***
Unemployment Rate	-0.337 (+/- 0.084) p = 0.0004***
Home Price Index	-0.026 (+/- 0.008) p = 0.003***
30-year Treasury Yield	26.391 (+/- 5.801) p = 0.0001***
LN_30-year Treasury Yield	-41.563 (+/- 9.405) p = 0.0002***
30-year Treasury Yield ²	-1.920 (+/- 0.435) p = 0.0002***
Observations	40
R ²	0.924
Adjusted R ²	0.910

Moody's AAA & BAA Rates

REGRESSION FOR MOODY'S AAA CURVE

<i>Dependent variable (+/- SE):</i>	
Moody's AAA Curve	
Constant	1.233 (+/- 0.463) p = 0.012**
US Fed Reserve O-N Loan Rate	-0.181 (+/- 0.051) p = 0.002***
BBB corporate yield	1.069 (+/- 0.088) p = 0.000***
LN_Market Volatility Index	-0.517 (+/- 0.133) p = 0.0005***
Observations	40
R ²	0.814
Adjusted R ²	0.798
Residual Std. Error	0.244 (df = 36)
F Statistic	52.421*** (df = 3; 36)
<i>Note:</i>	*p<0.1; **p<0.05; ***p<0.01

REGRESSION FOR MOODY'S BAA CURVE

<i>Dependent variable (+/- SE):</i>	
Moody's BAA Curve	
Constant	0.570 (+/- 0.368)
	p = 0.132
US Fed Reserve O-N Loan Rate	-0.462 (+/- 0.076)
	p = 0.00001***
Unemployment Rate	0.071 (+/- 0.014)
	p = 0.00002***
BBB corporate yield	0.538 (+/- 0.053)
	p = 0.000***
30-year Treasury Yield	1.259 (+/- 0.229)
	p = 0.00001***
1-month Treasury Yield	-0.896 (+/- 0.135)
	p = 0.00000***
LN_1-year Treasury Yield	0.430 (+/- 0.052)
	p = 0.000***
1-month Treasury Yield ²	0.355 (+/- 0.046)
	p = 0.000***
30-year Treasury Yield ²	-0.139 (+/- 0.035)
	p = 0.0005***
Observations	40

MACROECONOMIC FORECASTS, 3Q2020 – FINAL VERSION

R ²	0.984
Adjusted R ²	0.980
Residual Std. Error	0.078 (df = 31)
F Statistic	237.007*** (df = 8; 31)

Note: *p<0.1; **p<0.05; ***p<0.01

BBB Corporate Yield

REGRESSION FOR BBB CORPORATE YIELD

	<i>Dependent variable (+/- SE):</i>
	BBB corporate yield
Constant	-0.459 (+/- 0.234) p = 0.060*
Moody's BAA Curve	1.021 (+/- 0.076) p = 0.000***
Real GDP growth	0.079 (+/- 0.025) p = 0.004***
Nominal GDP growth	-0.078 (+/- 0.023) p = 0.003***
US Avg Retail Gasoline Price (\$-gal; all grades, all formulations)	0.253 (+/- 0.048) p = 0.00001***
30-year Treasury Yield	-1.082 (+/- 0.156) p = 0.00000***
7-year Treasury Yield	1.948 (+/- 0.274) p = 0.00000***
6-month Treasury Yield	-1.511 (+/- 0.330) p = 0.0001***
3-year Treasury Yield	-2.183 (+/- 0.353) p = 0.00000***

1-year Treasury Yield	2.682 (+/- 0.473)
	p = 0.00001***
<hr/>	
Observations	40
R ²	0.972
Adjusted R ²	0.964
Residual Std. Error	0.089 (df = 30)
F Statistic	116.743*** (df = 9; 30)
<hr/>	
<i>Note:</i>	*p<0.1; **p<0.05; ***p<0.01

Prime Rate

REGRESSION FOR PRIME RATE

<i>Dependent variable (+/- SE):</i>	
Prime Rate	
Constant	3.281 (+/- 0.085) p = 0.000***
Moody's AAA Curve	0.175 (+/- 0.044) p = 0.0004***
Moody's BAA Curve	-0.127 (+/- 0.033) p = 0.0005***
1-month Treasury Yield	0.976 (+/- 0.017) p = 0.000***
7-year Treasury Yield ²	-0.027 (+/- 0.007) p = 0.001***
Observations	40
R ²	0.997
Adjusted R ²	0.997
Residual Std. Error	0.043 (df = 35)
F Statistic	2,896.580*** (df = 4; 35)
<i>Note:</i>	*p<0.1; **p<0.05; ***p<0.01

US Average Retail Gasoline Price

REGRESSION FOR US AVG RETAIL GASOLINE PRICE (-GAL; ALL GRADES, ALL FORMULATIONS)

<i>Dependent variable (+/- SE):</i>	
US Avg Retail Gasoline Price (\$-gal; all grades, all formulations)	
Constant	-1.940 (+/- 0.552) p = 0.002***
Real GDP growth	-0.150 (+/- 0.039) p = 0.001***
Nominal GDP growth	0.180 (+/- 0.031) p = 0.00001***
30-year Treasury Yield	1.265 (+/- 0.365) p = 0.002***
10-year Treasury Yield	-4.716 (+/- 0.813) p = 0.00001***
LN_10-year Treasury Yield	6.573 (+/- 1.264) p = 0.00002***
1-month Treasury Yield	2.041 (+/- 0.303) p = 0.00000***
LN_1-month Treasury Yield	-0.566 (+/- 0.135) p = 0.0003***
7-year Treasury Yield	4.613 (+/- 0.743) p = 0.00001***

MACROECONOMIC FORECASTS, 3Q2020 – FINAL VERSION

LN_7-year Treasury Yield	-6.591 (+/- 1.175)
	p = 0.00001***
LN_6-month Treasury Yield	1.318 (+/- 0.404)
	p = 0.004***
LN_1-year Treasury Yield	-1.577 (+/- 0.346)
	p = 0.0001***
6-month Treasury Yield ²	-0.509 (+/- 0.107)
	p = 0.0001***

Observations	40
R ²	0.956
Adjusted R ²	0.937
Residual Std. Error	0.140 (df = 27)
F Statistic	49.343*** (df = 12; 27)

Note: *p<0.1; ** p<0.05: *** p<0.01

Cost of Federal Funds (Primary Credit Rate)

REGRESSION FOR US FED RESERVE O-N LOAN RATE

	<i>Dependent variable (+/- SE):</i>
	US Fed Reserve O-N Loan Rate
Constant	0.223 (+/- 1.846) p = 0.905
SP500 Stock Price Index	0.001 (+/- 0.0002) p = 0.00002***
Moody's AAA Curve	-2.616 (+/- 0.325) p = 0.00000***
Moody's BAA Curve	0.830 (+/- 0.154) p = 0.00002***
Unemployment Rate	0.940 (+/- 0.142) p = 0.00000***
CPI Inflation Rate	-0.004 (+/- 0.001) p = 0.006***
Dow Total Stock Market Index	-0.0001 (+/- 0.00004) p = 0.002***
Home Price Index	0.084 (+/- 0.009) p = 0.000***
Market Volatility Index	-0.015 (+/- 0.005) p = 0.005***

MACROECONOMIC FORECASTS, 3Q2020 – FINAL VERSION

LN_30-year Treasury Yield	7.990 (+/- 2.009)
	p = 0.0005***
20-year Treasury Yield	-3.296 (+/- 0.879)
	p = 0.001***
10-year Treasury Yield	-20.329 (+/- 4.136)
	p = 0.00005***
LN_10-year Treasury Yield	27.094 (+/- 5.011)
	p = 0.00002***
10-year Treasury Yield ²	2.378 (+/- 0.475)
	p = 0.00004***
<hr/>	
Observations	40
R ²	0.977
Adjusted R ²	0.966
Residual Std. Error	0.142 (df = 26)
F Statistic	86.627*** (df = 13; 26)
<hr/>	
<i>Note:</i>	*p<0.1; **p<0.05; ***p<0.01

Dow Jones Total Stock Market Index (end-of-quarter) and S&P 500 (quarterly average)

REGRESSION FOR DOW TOTAL STOCK MARKET INDEX

	<i>Dependent variable (+/- SE):</i>
	Dow Total Stock Market Index
Constant	17,912.200 (+/- 3,549.777) p = 0.00002***
Market Volatility Index	-107.230 (+/- 33.403) p = 0.004***
US Avg Retail Gasoline Price (\$-gal; all grades, all formulations)	-4,450.124 (+/- 942.658) p = 0.00005***
LN_5-year Treasury Yield	-22,500.380 (+/- 3,549.738) p = 0.00000***
LN_3-year Treasury Yield	20,637.690 (+/- 3,529.014) p = 0.00001***
1-year Treasury Yield	31,517.000 (+/- 5,094.904) p = 0.00000***
LN_1-year Treasury Yield	-14,205.620 (+/- 1,774.411) p = 0.000***
1-year Treasury Yield ²	-6,051.797 (+/- 1,201.234) p = 0.00002***
Observations	40

MACROECONOMIC FORECASTS, 3Q2020 – FINAL VERSION

R ²	0.947
Adjusted R ²	0.935
Residual Std. Error	1,553.703 (df = 32)
F Statistic	80.881*** (df = 7; 32)

Note: *p<0.1; **p<0.05; ***p<0.01

REGRESSION FOR SP500 STOCK PRICE INDEX

	<i>Dependent variable (+/- SE):</i>
	SP500 Stock Price Index
Constant	6,117.844 (+/- 316.400) p = 0.000***
US Fed Reserve O-N Loan Rate	986.035 (+/- 110.585) p = 0.000***
Unemployment Rate	-435.172 (+/- 27.695) p = 0.000***
30-year Treasury Yield	14,433.180 (+/- 2,022.904) p = 0.00000***
LN_30-year Treasury Yield	-41,318.160 (+/- 4,936.639) p = 0.000***
20-year Treasury Yield	-10,244.700 (+/- 1,979.673) p = 0.00002***
LN_20-year Treasury Yield	26,649.070 (+/- 4,235.525) p = 0.00000***
LN_1-month Treasury Yield	-149.962 (+/- 31.368) p = 0.0001***
7-year Treasury Yield	1,357.167 (+/- 288.552) p = 0.0001***
LN_7-year Treasury Yield	-3,302.651 (+/- 449.938)

	p = 0.00000***
LN_1-year Treasury Yield	-247.075 (+/- 60.913)
	p = 0.0004***
1-month Treasury Yield ²	-139.153 (+/- 26.048)
	p = 0.00002***
<hr/>	
Observations	40
R ²	0.989
Adjusted R ²	0.985
Residual Std. Error	79.703 (df = 28)
F Statistic	229.863*** (df = 11; 28)
<hr/>	
<i>Note:</i>	*p<0.1; **p<0.05; ***p<0.01

House and Commercial Real Estate Price Indexes

REGRESSION FOR HOME PRICE INDEX

	<i>Dependent variable (+/- SE):</i>
	Home Price Index
Constant	51.810 (+/- 42.376) p = 0.232
Unemployment Rate	-6.327 (+/- 0.966) p = 0.00000***
US Avg Retail Gasoline Price (\$-gal; all grades, all formulations)	-10.389 (+/- 2.964) p = 0.002***
5-year Treasury Yield	443.538 (+/- 75.587) p = 0.00001***
LN_5-year Treasury Yield	-383.638 (+/- 42.042) p = 0.000***
3-year Treasury Yield	-325.879 (+/- 51.133) p = 0.00000***
LN_3-year Treasury Yield	200.432 (+/- 24.077) p = 0.000***
1-year Treasury Yield	130.378 (+/- 16.636) p = 0.00000***
LN_1-year Treasury Yield	-36.295 (+/- 5.774) p = 0.00000***

MACROECONOMIC FORECASTS, 3Q2020 – FINAL VERSION

1-year Treasury Yield ²	-26.898 (+/- 4.180)
	p = 0.00000***
3-year Treasury Yield ²	57.744 (+/- 12.378)
	p = 0.0001***
5-year Treasury Yield ²	-64.684 (+/- 15.593)
	p = 0.0003***
<hr/>	
Observations	40
R ²	0.986
Adjusted R ²	0.981
Residual Std. Error	3.852 (df = 28)
F Statistic	180.227*** (df = 11; 28)
<hr/>	
<i>Note:</i>	*p<0.1; **p<0.05; ***p<0.01

REGRESSION FOR COMMERCIAL REAL ESTATE PRICE INDEX

<i>Dependent variable (+/- SE):</i>	
Commercial Real Estate Price Index	
Constant	273.059 (+/- 120.040) p = 0.031 **
US Fed Reserve O-N Loan Rate	50.976 (+/- 5.754) p = 0.000***
Unemployment Rate	-20.252 (+/- 1.007) p = 0.000***
Prime Rate	-97.948 (+/- 30.054) p = 0.003***
30-year Treasury Yield	848.647 (+/- 89.015) p = 0.000***
LN_30-year Treasury Yield	-1,539.075 (+/- 122.240) p = 0.000***
1-month Treasury Yield	121.773 (+/- 35.967) p = 0.003***
LN_1-month Treasury Yield	-10.712 (+/- 2.045) p = 0.00002***
3-year Treasury Yield ²	-8.778 (+/- 1.701) p = 0.00002***
3-month Treasury Yield ²	-12.518 (+/- 4.026)

	p = 0.005 ***
30-year Treasury Yield ²	-55.938 (+/- 7.623)
	p = 0.00000 ***
<hr/>	
Observations	40
R ²	0.992
Adjusted R ²	0.990
Residual Std. Error	4.795 (df = 29)
F Statistic	373.703 *** (df = 10; 29)
<hr/>	
<i>Note:</i>	*p<0.1; **p<0.05; ***p<0.01

Market Volatility Index

REGRESSION FOR MARKET VOLATILITY INDEX

<i>Dependent variable (+/- SE):</i>	
Market Volatility Index	
Constant	31.607 (+/- 4.764) p = 0.00000***
Dow Total Stock Market Index	-0.0003 (+/- 0.0002) p = 0.133
Observations	40
R ²	0.058
Adjusted R ²	0.034
Residual Std. Error	8.137 (df = 38)
F Statistic	2.357 (df = 1; 38)
<i>Note:</i>	*p<0.1; **p<0.05; ***p<0.01

Appendix A: Data Sources

The following table lists the attributes provided by Capitalytics as part of its macro-economic forecast service. The sources for data that are defined by the document “2020 Supervisory Scenarios for Annual Stress Tests Required under the Dodd-Frank Act Stress Testing Rules and the Capital Plan Rule” (found at <https://www.federalreserve.gov/newsevents/pressreleases/files/bcreg20200206a1.pdf>) are listed. Please note that shaded attributes are not discussed within this report.

Table 16: Data Values and Referenced Sources

Attribute	Referenced Source ⁷⁷
Real GDP growth	Bureau of Economic Analysis (NIPA table 1.1.6, line 1)
Nominal GDP growth	Bureau of Economic Analysis (NIPA table 1.1.5, line 1)
Real disposable income growth	Bureau of Economic Analysis (NIPA table 2.1, line 27, and NIPA table 1.1.4, line 2)
Nominal disposable income growth	Bureau of Economic Analysis (NIPA table 2.1, line 27)
Unemployment rate	Bureau of Labor Statistics (series LNS14000000)
CPI inflation rate	Bureau of Labor Statistics (series CUSR0000SA0)
3-month Treasury yield	Quarterly average of 3-month Treasury bill secondary market rate on a discount basis, H.15 Release, Selected Interest Rates, Federal Reserve Board (series RIFSGFSM03_N.B)
5-year Treasury yield	Quarterly average of the yield on 5-year U.S. Treasury bonds, constructed for the FRB/U.S. model by Federal Reserve staff based on the Svensson smoothed term structure model; see Lars E. O. Svensson (1995), “Estimating Forward Interest Rates with the Extended Nelson-Siegel Method,” Quarterly Review, no. 3, Sveriges Riksbank, pp. 13–26
10-year Treasury yield	Quarterly average of the yield on 10-year U.S. Treasury bonds, constructed for the FRB/U.S. model by Federal

⁷⁷ Per <https://www.federalreserve.gov/newsevents/pressreleases/files/bcreg20190213a1.pdf>

	Reserve staff based on the Svensson smoothed term structure model; see Lars E. O. Svensson (1995), “Estimating Forward Interest Rates with the Extended Nelson-Siegel Method,” Quarterly Review, no. 3, Sveriges Riksbank, pp. 13–26
BBB corporate yield	Merrill Lynch 10-year BBB corporate bond yield, Z.1 Release (Financial Accounts of the United States), Federal Reserve Board (series FL073163013.Q). ⁷⁸
Mortgage rate	Quarterly average of weekly series for the interest rate of a conventional, conforming, 30-year fixed-rate mortgage, obtained from the Primary Mortgage Market Survey of the Federal Home Loan Mortgage Corporation.
Prime rate	Quarterly average of monthly series, H.15 Release, Selected Interest Rates, Federal Reserve Board (series RIFSPBLP_N.M).
Dow Jones Total Stock Market Index (end-of-qtr value)	Dow-Jones
House Price Index	Price Index for Owner-Occupied Real Estate, CoreLogic National, Z.1 Release (Financial Accounts of the United States), Federal Reserve Board (series FL075035243.Q).
Commercial Real Estate Price Index	Commercial Real Estate Price Index, Z.1 Release (Financial Accounts of the United States), Federal Reserve Board (series FL075035503.Q divided by 1000).
Market Volatility Index (VIX)	VIX converted to quarterly frequency using the maximum close-of-day value in any quarter, Chicago Board Options Exchange.
Euro Area Real GDP Growth	Percent change in real gross domestic product at an annualized rate, staff calculations based on Statistical Office of the European Communities via Haver, extended back using ECB Area Wide Model dataset (ECB Working Paper series no. 42).
Euro Area Inflation	Percent change in the quarterly average of the harmonized index of consumer prices 16 Federal Reserve Supervisory Scenarios at an annualized rate, staff calculations based on Statistical Office of the European Communities via Haver.

⁷⁸ The Merrill Lynch 10-year BBB corporate bond rate is being discontinued from future Z.1 releases as of April 30, 2019 due to licensing restrictions.

MACROECONOMIC FORECASTS, 3Q2020 – FINAL VERSION

Euro Area Bilateral Dollar Exchange Rate (USD/Euro)	End-of-quarter rates from the H.10 Release, Foreign Exchange Rates, Federal Reserve Board.
Developing Asia Real GDP Growth	Percent change in real gross domestic product at an annualized rate, staff calculations based on Bank of Korea via Haver; Chinese National Bureau of Statistics via CEIC; Indian Central Statistical Organization via CEIC; Census and Statistics Department of Hong Kong via CEIC; and Taiwan Directorate-General of Budget, Accounting, and Statistics via CEIC.
Developing Asia Inflation	Percent change in the quarterly average of the consumer price index, or local equivalent, at an annualized rate, staff calculations based on Chinese National Bureau of Statistics via CEIC; Indian Ministry of Statistics and Programme Implementation via Haver; Labour Bureau of India via CEIC; National Statistical Office of Korea via CEIC; Census and Statistic Department of Hong Kong via CEIC; and Taiwan Directorate General of Budget, Accounting, and Statistics via CEIC.
Developing Asia bilateral dollar exchange rate (F/USD, index)	End-of-quarter rates from the H.10 Release, Foreign Exchange Rates, Federal Reserve Board.
Japan Real GDP Growth	Percent change in gross domestic product at an annualized rate, Cabinet Office via Haver.
Japan Inflation	Percent change in the quarterly average of the consumer price index at an annualized rate, staff calculations based on Ministry of Internal Affairs and Communications via Haver.
Japan Bilateral Dollar Exchange Rate (Yen/USD)	End-of-quarter rates from the H.10 Release, Foreign Exchange Rates, Federal Reserve Board.
UK Real GDP Growth	Percent change in gross domestic product at an annualized rate, Office for National Statistics via Haver.
UK Inflation	Percent change in the quarterly average of the consumer price index at an annualized rate, staff calculations based on Office for National Statistics via Haver.
UK Bilateral Dollar Exchange Rate (USD/Pound)	End-of-quarter rates from the H.10 Release, Foreign Exchange Rates, Federal Reserve Board.

The above dataset from the Federal Reserve can be downloaded manually or automatically. Manual downloads are available at <https://www.federalreserve.gov/supervisionreg/ccar-2020.htm> (shown

below, as of Feb 2020) by clicking the link marked “Historical data (ZIP)”. Alternatively, downloading the file at <https://www.federalreserve.gov/supervisionreg/files/2020-historical-data.zip> using HTTP client software will also download the official dataset.

Decompressing the zip-file will provide two files in CVS format: one containing US domestic data elements on a quarterly basis, and the other containing international data elements on a quarterly basis⁷⁹.



Since the CCAR dataset is only released annually (through 4Q2019 as of this writing), and Capalitytics provides quarterly updates to its forecasts, the CCAR dataset is supplemented by the data sources shown below on a quarterly basis. All datasets discussed herein are supplemented with data through (including) 4Q2019.

Table 17: Supplementary Data Sources for Data Attributes

Attribute	Supplementary Data Source
Real GDP growth	Bureau of Economic Analysis (NIPA table 1.1.6, line 1)

⁷⁹ Again, due to the requirements of this client, international data elements are not being discussed in this document.

Nominal GDP growth	Bureau of Economic Analysis (NIPA table 1.1.5, line 1)
Real disposable income growth	Bureau of Economic Analysis (NIPA table 2.1, line 27, and NIPA table 1.1.4, line 2)
Nominal disposable income growth	Bureau of Economic Analysis (NIPA table 2.1, line 27)
Unemployment rate	Bureau of Labor Statistics (series LNS14000000)
CPI inflation rate	Bureau of Labor Statistics (series CUSR0000SA0)
3-month Treasury yield	Quarterly average of 3-month Treasury bill secondary market rate on a discount basis, H.15 Release
5-year Treasury yield	Federal Reserve Economic Research website (https://fred.stlouisfed.org/series/GS5), with “Quarterly” frequency and “Average” aggregation method
10-year Treasury yield	Federal Reserve Economic Research website (https://fred.stlouisfed.org/series/GS10), with “Quarterly” frequency and “Average” aggregation method
BBB corporate yield	Federal Reserve Economic Research website (https://fred.stlouisfed.org/series/BAMLCOA4CBBBEY), with “Quarterly” frequency and “Average” aggregation method
Mortgage rate	Federal Reserve Economic Research website (https://fred.stlouisfed.org/series/MORTGAGE30US), with “Quarterly” frequency and “Average” aggregation method
Prime rate	Federal Reserve Economic Research website (https://fred.stlouisfed.org/series/MPRIME), with “Quarterly” frequency and “Average” aggregation method
Dow Jones Total Stock Market Index (end-of-qtr value)	Dow-Jones as provided by the Wall Street Journal (https://quotes.wsj.com/index/DWCF/advanced-chart)
House Price Index	CoreLogic, index level (end-of-quarter)
Commercial Real Estate Price Index	From the Financial Accounts of the United States, Federal Reserve Board (Z.1 release); the series corresponds to the data for price indexes: Commercial Real Estate Price Index (series FL075035503.Q, divided by 1000). Series FL075035503.Q is also available at https://www.quandl.com/data/FED/FL075035503_Q-Interest-rates-and-price-indexes-commercial-real-estate-price-index-Quarterly-Levels-NSA

Market Volatility Index (VIX)	Federal Reserve Economic Research website (https://fred.stlouisfed.org/series/VIXCLS), with “Quarterly” frequency and “Average” aggregation method
Euro Area Real GDP Growth	Quarterly series for “European Union GDP Annual Growth Rate” per tradingeconomics.com
Euro Area Inflation	Quarterly average of monthly series for “European Union Inflation Rate” per tradingeconomics.com
Euro Area Bilateral Dollar Exchange Rate (USD/Euro)	End-of-quarter rates from the H.10 Release, Foreign Exchange Rates, Federal Reserve Board.
Developing Asia Real GDP Growth	The nominal GDP-weighted aggregate of the Real GDP growth for China, India, South Korea, Hong Kong Special Administrative Region, and Taiwan per OECD
Developing Asia Inflation	The nominal GDP-weighted aggregate of the inflation rate for China, India, South Korea, Hong Kong Special Administrative Region, and Taiwan per OECD
Developing Asia bilateral dollar exchange rate (F/USD, index)	End-of-quarter rates from the H.10 Release, Foreign Exchange Rates, Federal Reserve Board.
Japan Real GDP Growth	Quarterly average of monthly series for “Japan GDP Growth Rate” per tradingeconomics.com
Japan Inflation	Quarterly average of monthly series for “Japan Inflation Rate” per tradingeconomics.com
Japan Bilateral Dollar Exchange Rate (Yen/USD)	End-of-quarter rates from the H.10 Release, Foreign Exchange Rates, Federal Reserve Board.
UK Real GDP Growth	Quarterly average of monthly series for “United Kingdom GDP Growth Rate” per tradingeconomics.com
UK Inflation	Quarterly average of monthly series for “United Kingdom Inflation Rate” per tradingeconomics.com
UK Bilateral Dollar Exchange Rate (USD/Pound)	End-of-quarter rates from the H.10 Release, Foreign Exchange Rates, Federal Reserve Board.

While all data that is required for the Annual Stress Tests is available from <https://www.federalreserve.gov/supervisoryreg/files/2020-historical-data.zip>, Capitalytics provides 13 additional metrics per the information in the following table. These values are available from the point at which they are collected (which varies from metric to metric) through (and including) 4Q2019.

Table 17: Supplementary Data Attributes and Sources

Attribute	Capitalytics Source
1-month Treasury yield	https://fred.stlouisfed.org/series/dgs1mo
6-month Treasury yield	https://fred.stlouisfed.org/series/dgs6mo
1-year Treasury yield	https://fred.stlouisfed.org/series/dgs1
3-year Treasury yield	https://fred.stlouisfed.org/series/dgs3
7-year Treasury yield	https://fred.stlouisfed.org/series/dgs7
20-year Treasury yield	https://fred.stlouisfed.org/series/dgs20
30-year Treasury yield	https://fred.stlouisfed.org/series/dgs30
US Average Retail Gasoline Price (\$/gal; all grades, all formulations)	https://fred.stlouisfed.org/series/gasallm
S&P 500 Stock Price Index	https://fred.stlouisfed.org/series/S&P 500 Stock Price Index
Primary Credit	https://fred.stlouisfed.org/series/FEDFUNDS
Moody's AAA Rate	https://fred.stlouisfed.org/series/aaa
Moody's BAA Rate	https://fred.stlouisfed.org/series/baa
Dow Jones Total Industrial Average	https://fred.stlouisfed.org/series/djia

Appendix B: Methodologies

Capitalytics uses non-structured macroeconomic forecasting techniques in order to prepare its clients for what trends and relationships drive certain metrics, and what values those metrics may take on in the coming months.

Section I: General Forecasting Methodology

Generally, the most effective overall forecasting techniques have been found to be a hybridization of multiple other techniques. Capitalytics uses several forecasting schemes, and aggregates the results, as part of its analysis methodology. This section describes the process that is executed for generating these results.

For each metric, four distinct forecasts are produced.

1. The first forecast uses the full quarterly history of the metric as an input to an additive exponential smoothing representation. The process that is executed is that provided by R's⁸⁰ "forecast" package⁸¹; specifically, the "ets" function (see p.39 of <https://cran.r-project.org/web/packages/forecast/forecast.pdf>)⁸² is designed to automatically determine the best fitting representation out of the "Generic 'ETS' Methodology" (discussed later in this section), including optimal parameters thereto, given a sequence of values. In our work, we have restricted our study to only "additive" forms (i.e., we set "additive.only=TRUE" in our calls), and our optimization criteria is set to the mean of absolute residuals (i.e., "opt.crit=mae"). Therefore, calls to generate our estimates through this procedure look something like the following command, where "s" is an appropriately populated array, vector, time series, or similar object.

```
> m<-ets(s, model='ZZZ', opt.crit=c('mae'), additive.only=TRUE)
```

The results of this call are shown above each dataset, including the representation type returned (as described later this section), the initial values that are used by the software, the optimal smoothing parameters estimated, and the $n+1^{\text{st}}$ forecasted value given the first n values of the metric's sequence (the "fitted" values)⁸³, and the determined parameters. While fitting forecasts to previous values,

⁸⁰ As of this writing, v.3.6.2 of the "R" language is available at <https://cran.r-project.org/>.

⁸¹ As of this writing, v.8.11 of the forecast package is available at <https://CRAN.R-project.org/package=forecast>.

⁸² It should be noted that Microsoft's Excel software includes a FORECAST.ETS function which is documented as potentially producing comparable results; however, we have not been able to re-create its output independently, and, given the documentation, flexibility, and source availability of the R packages, Capitalytics has decided that it is a preferable option at this time.

⁸³ While this procedure does generate fitted values for intermediate samples within a sequence -- and allow for generating a forecasted set of samples to extend a sequence -- according to the identified parameter set, it does not directly provide for determining the optimal parameter set of a sub-sequence. Capitalytics is currently codifying the process herein so that we may prescribe a "most likely" long term representation for each forecast, and determine the likely effects of errors in the forecasts by estimating the "recent term" values of dy/dx_i (where y is the metric being estimated and x_i is each of the parameters within the representation) and then compensating for recent quantified errors. We can

- “forecast error” is defined as being actual values less forecasted values,
- “% error” is defined as forecast error divided by actual value, and
- “score” is defined as mean absolute forecast error over an appropriate range (generally the duration of the collected past values, less the first two to four years of collected values)⁸⁴.

2. The second forecast uses the differences between successive quarterly values in order to forecast the future quarterly differences. It should be noted that these sequences are (obviously) one data-point shorter than those in the preceding procedure. These values are forecasted using the same procedure as described in the first section, with forecasted values for the actual metric being built using the last known value for the metric and forecasts of incremental changes to the metric provided.

An edited example for loading the SP500 end-of quarter values, and the differences between successive quarterly values, is shown below.

```
> sp<-c(130.659129, 1250.520109, 998.4076848, 812.047, 799.5264066, 927.5045326,
1041.372826, ... )

> sp_ts<-ts(sp, freq=4, end=c(2017,4))

> sp_ts
      Qtr1      Qtr2      Qtr3      Qtr4
2008           130.6591 1250.5201  998.4077
2009 812.0470  799.5264  927.5045 1041.3728
...

> m<-ets(sp_ts,model='ZZZ',opt.crit=c('mae'),additive.only=TRUE)

> dsp_ts<-diff(sp_ts)

> dsp_ts
      Qtr1      Qtr2      Qtr3      Qtr4
2008           1119.860980 -252.112424
2009 -186.360685  -12.520593  127.978126  113.868293
...
```

also consider how “finite” a window to account for in building a set of parameters; these representations are theoretically using all history in building a forecast, but the values for alpha, beta, etc. implicitly give an indication of how much history of a metric is truly impacting a specific value.

⁸⁴ It bears noting that a lower value for the “score” indicates better accuracy of an algorithm.

```
> m<-ets(dsp_ts,model='ZZZ',opt.crit=c('mae'),additive.only=TRUE
```

3. The third forecast uses the sequence of numbers from the second forecast, but partitions the dataset based on the quarter in which they are incurred. Assuming that the differences between quarters are associated with the ending points of each quarter (i.e., the difference between third and fourth quarter values are associated with a date of December 31st), four sequences of numbers are now created, with annual forecasts now being produced for each sequence using the same procedures as previously outlined. The final sequence appropriately interleaves the forecasted data-points.
4. The fourth forecast builds three sequences of values based the history of the metric to an observed point:
 - the slope of the “best fitting” line (based on minimizing the total absolute error) using the immediately preceding 2 years of values⁸⁵;
 - the same slope using the immediately preceding 4 years of values; and,
 - the same slope using the immediately preceding 8 years of values.

While two years of data would provide for a relatively responsive change in aggregate values to be reflected given a change in the economic conditions, eight years of data (a not unreasonable estimate for an “economic cycle”) would allow for a much more slowly moving change in average window for a counterbalance.

Using these datasets independently, we are able to use our previous procedure to generate forecasts for each slope, and then average the results on a quarterly basis. Multiplying the average slope by the duration of the following quarter (in days) provides an estimate for the change in the metric’s value during that following quarter, just as in our second forecast.

Obviously, this technique requires at least eight years of data to pass before being able to produce any data. However, in order to err on the side of conservatism, we generally allow a sequence to “mature” for two to four years before believing that its initial transience has become less significant and its results are trustworthy. If a dataset does not have enough data to complete one of these analyses, the analysis is dropped. In other words, if the metric does not have +/-11 years of data available, the 8-year slopes cannot be reliably calculated, and the average slope is only based on the 2- & 4-year slopes⁸⁶.

5. In some cases, we may find variables with extremely tight cross-connections that can be justified as part of their nature (treasury bill yield rates, for example, with a magnitude or correlation greater than ~0.95). In these cases, we are able to additionally enhance our forecast by building a forecast that expresses one variable (the “dependent” variable, $y(t)$) in terms of another (the “independent” variable, $x(t)$) with a coefficient of determination (R^2), such that

⁸⁵ The value for this slope is calculated using Microsoft Excel’s SLOPE function, with the first argument being the appropriate number of preceding values for the metric, and the second argument being the same number of corresponding “end-of-quarter” dates.

⁸⁶ See the SP500 metric’s analysis.

$$y(t) = m(t) * x(t) + b(t) .$$

Notice that the “slope” and “intercept” terms in this expression are time varying expressions that are re-evaluated with each data-point, not simply constants.

By averaging the results of these distinct forecasts in order to provide an aggregate forecast, the error for which can be characterized and measured, Capitalytics aims to provide a robust dataset that can be used for future business decisions.

It was stated earlier that Capitalytics uses each metric’s complete history in order to generate a matching representation and forecast. It should be recognized that we also perform the same analyses for periods starting no more than 100, 80, 60, and 40 quarters prior to the forecasted period. However, we have found the results of all of these analyses are more reactionary and less coherent than that already presented within this report.

Section II: Exponentially Smoothed State Space Representations & Generic “ETS” Methodology

Exponential smoothing was proposed in the late 1950s (Brown 1959, Holt 1957 and Winters 1960 are key pioneering works) and has motivated some of the most successful forecasting methods. Forecasts produced using exponential smoothing methods are weighted averages of past observations, with the weights decaying exponentially as the observations get older. In other words, the more recent the observation the higher the associated weight. (See the following equation for one example of this type of equation which requires $0 \leq \alpha \leq 1$, and estimates future values of \hat{y} given a history of values denoted as y_t . The ϵ_{T+1} term denotes an error term, the *residual*, which determines the value of the forecasting function.) This framework generates reliable forecasts quickly and for a wide spectrum of time series.

$$\hat{y}_{T+1|T} = \alpha y_T + \alpha(1-\alpha)y_{T-1} + \alpha(1-\alpha)^2 y_{T-2} + \dots + \epsilon_{T+1}$$

In this study, the relevance of quarterly samples more than 3 years old is eliminated by setting the number of terms in this type of expression to no more than 13.

The challenge with these forecasting techniques is to estimate the value of α such that some criteria is optimized, e.g., minimizing the sum of squared errors (SSE), across all values of a set of historical values.

There are other forms of exponential smoothing methods that may account for any combination of forecasting *levels* (as in the Theta method), *trends* (for which a metric may, for instance, be growing or lessening according to a linear or higher order function), and *seasonality* (for which a metric may have engrained “cycles” on, e.g., a monthly, quarterly, or annual basis).

By considering variations in the combination of the trend and seasonal components, fifteen exponential smoothing methods are possible. Each method is labelled by a pair of letters (T,S) defining the type of ‘Trend’ and ‘Seasonal’ components. For example, (A,M) is the method with an additive trend and multiplicative seasonality; (M,N) is the method with multiplicative trend and no seasonality; and so on. Per Section 7.6 of Hyndman & Athanasopoulos, some of these methods are well known per the following table.

Table 18: Mathematical Methods Associated with Trend & Seasonal Components

Trend & Seasonal Components	Method
(N,N)	simple exponential smoothing
(A,N)	Holts linear method
(M,N)	Exponential trend method
(A _d ,N)	additive damped trend method
(M _d ,N)	multiplicative damped trend method
(A,A)	additive Holt-Winters method
(A,M)	multiplicative Holt-Winters method
(A _d ,M)	Holt-Winters damped method

Additionally, the following table (again from Section 7.6 of Hyndman & Athanasopoulos) gives the recursive formulae for applying all possible fifteen exponential smoothing methods. Each cell includes the forecast equation for generating *h*-step-ahead forecasts and the smoothing equations for applying the method. By recursively applying the appropriate expressions to generate consecutive forecasts, this framework can be an extremely powerful tool.

Section III: Regression Construction

Capalitytics also generates a regression to estimate future values of the variables that we track in terms of current-day values. By using R’s “lm” function, we estimate the next quarter’s values for each variable in terms of the preceding set of variables’ values. These regressions are built using the immediately preceding 57 sets of variables’ values.

Each output variable is considered in turn as the response variable, with all other variables as possibilities for the control (independent) variables *excluding* any variables that have an 80% correlation with the response variable. Successive linear regressions are built; if any of the control variables' p-values exceed 5%, or if the model's p-value exceeds 5% and the number of considered control variables is greater than one, the most offensive control variable is dropped, and the regression is re-run.

Trend	Seasonal		
	N	A	M
N	$\hat{y}_{t+h t} = \ell_t$ $\ell_t = \alpha y_t + (1 - \alpha)\ell_{t-1}$	$\hat{y}_{t+h t} = \ell_t + s_{t-m+h_m^+}$ $\ell_t = \alpha(y_t - s_{t-m}) + (1 - \alpha)\ell_{t-1}$ $s_t = \gamma(y_t - \ell_{t-1}) + (1 - \gamma)s_{t-m}$	$\hat{y}_{t+h t} = \ell_t s_{t-m+h_m^+}$ $\ell_t = \alpha(y_t/s_{t-m}) + (1 - \alpha)\ell_{t-1}$ $s_t = \gamma(y_t/\ell_{t-1}) + (1 - \gamma)s_{t-m}$
A	$\hat{y}_{t+h t} = \ell_t + hb_t$ $\ell_t = \alpha y_t + (1 - \alpha)(\ell_{t-1} + b_{t-1})$ $b_t = \beta^*(\ell_t - \ell_{t-1}) + (1 - \beta^*)b_{t-1}$	$\hat{y}_{t+h t} = \ell_t + hb_t + s_{t-m+h_m^+}$ $\ell_t = \alpha(y_t - s_{t-m}) + (1 - \alpha)(\ell_{t-1} + b_{t-1})$ $b_t = \beta^*(\ell_t - \ell_{t-1}) + (1 - \beta^*)b_{t-1}$ $s_t = \gamma(y_t - \ell_{t-1} - b_{t-1}) + (1 - \gamma)s_{t-m}$	$\hat{y}_{t+h t} = (\ell_t + hb_t)s_{t-m+h_m^+}$ $\ell_t = \alpha(y_t/s_{t-m}) + (1 - \alpha)(\ell_{t-1} + b_{t-1})$ $b_t = \beta^*(\ell_t - \ell_{t-1}) + (1 - \beta^*)b_{t-1}$ $s_t = \gamma(y_t/(\ell_{t-1} + b_{t-1})) + (1 - \gamma)s_{t-m}$
A_d	$\hat{y}_{t+h t} = \ell_t + \phi_h b_t$ $\ell_t = \alpha y_t + (1 - \alpha)(\ell_{t-1} + \phi b_{t-1})$ $b_t = \beta^*(\ell_t - \ell_{t-1}) + (1 - \beta^*)\phi b_{t-1}$	$\hat{y}_{t+h t} = \ell_t + \phi_h b_t + s_{t-m+h_m^+}$ $\ell_t = \alpha(y_t - s_{t-m}) + (1 - \alpha)(\ell_{t-1} + \phi b_{t-1})$ $b_t = \beta^*(\ell_t - \ell_{t-1}) + (1 - \beta^*)\phi b_{t-1}$ $s_t = \gamma(y_t - \ell_{t-1} - \phi b_{t-1}) + (1 - \gamma)s_{t-m}$	$\hat{y}_{t+h t} = (\ell_t + \phi_h b_t)s_{t-m+h_m^+}$ $\ell_t = \alpha(y_t/s_{t-m}) + (1 - \alpha)(\ell_{t-1} + \phi b_{t-1})$ $b_t = \beta^*(\ell_t - \ell_{t-1}) + (1 - \beta^*)\phi b_{t-1}$ $s_t = \gamma(y_t/(\ell_{t-1} + \phi b_{t-1})) + (1 - \gamma)s_{t-m}$
M	$\hat{y}_{t+h t} = \ell_t b_t^h$ $\ell_t = \alpha y_t + (1 - \alpha)\ell_{t-1} b_{t-1}$ $b_t = \beta^*(\ell_t/\ell_{t-1}) + (1 - \beta^*)b_{t-1}$	$\hat{y}_{t+h t} = \ell_t b_t^h + s_{t-m+h_m^+}$ $\ell_t = \alpha(y_t - s_{t-m}) + (1 - \alpha)\ell_{t-1} b_{t-1}$ $b_t = \beta^*(\ell_t/\ell_{t-1}) + (1 - \beta^*)b_{t-1}$ $s_t = \gamma(y_t - \ell_{t-1} b_{t-1}) + (1 - \gamma)s_{t-m}$	$\hat{y}_{t+h t} = \ell_t b_t^h s_{t-m+h_m^+}$ $\ell_t = \alpha(y_t/s_{t-m}) + (1 - \alpha)\ell_{t-1} b_{t-1}$ $b_t = \beta^*(\ell_t/\ell_{t-1}) + (1 - \beta^*)b_{t-1}$ $s_t = \gamma(y_t/(\ell_{t-1} b_{t-1})) + (1 - \gamma)s_{t-m}$
M_d	$\hat{y}_{t+h t} = \ell_t b_t^{\phi_h}$ $\ell_t = \alpha y_t + (1 - \alpha)\ell_{t-1} b_{t-1}^{\phi}$ $b_t = \beta^*(\ell_t/\ell_{t-1}) + (1 - \beta^*)b_{t-1}^{\phi}$	$\hat{y}_{t+h t} = \ell_t b_t^{\phi_h} + s_{t-m+h_m^+}$ $\ell_t = \alpha(y_t - s_{t-m}) + (1 - \alpha)\ell_{t-1} b_{t-1}^{\phi}$ $b_t = \beta^*(\ell_t/\ell_{t-1}) + (1 - \beta^*)b_{t-1}^{\phi}$ $s_t = \gamma(y_t - \ell_{t-1} b_{t-1}^{\phi}) + (1 - \gamma)s_{t-m}$	$\hat{y}_{t+h t} = \ell_t b_t^{\phi_h} s_{t-m+h_m^+}$ $\ell_t = \alpha(y_t/s_{t-m}) + (1 - \alpha)\ell_{t-1} b_{t-1}^{\phi}$ $b_t = \beta^*(\ell_t/\ell_{t-1}) + (1 - \beta^*)b_{t-1}^{\phi}$ $s_t = \gamma(y_t/(\ell_{t-1} b_{t-1}^{\phi})) + (1 - \gamma)s_{t-m}$

Appendix C: Variable Correlations

The following table shows the correlation factors between all of the listed variables for which the absolute value of the correlation is greater than 0.6, indicating a noteworthy degree of correlation. As is discussed in Appendix B of this report, correlations greater than 0.95 warrant further investigation as the relationship between variables may be useful for our research.

Table 19: Correlation Factors found as of 2Q2020

Variable 1	Variable 2	Correlation
S&P 500 Stock Price Index	Primary Credit	0.738808
S&P 500 Stock Price Index	Moody's AAA Rate	-0.640745
S&P 500 Stock Price Index	Moody's BAA Rate	-0.750838
S&P 500 Stock Price Index	Prime Rate	-0.655941
S&P 500 Stock Price Index	Dow Jones Total Stock Market Index	-0.941227
S&P 500 Stock Price Index	Home Price Index	-0.966567
S&P 500 Stock Price Index	Commercial Real Estate Price Index	-0.949553
S&P 500 Stock Price Index	30-year Treasury yield	-0.644099
S&P 500 Stock Price Index	1-month Treasury yield	0.730446
S&P 500 Stock Price Index	3-month Treasury yield	-0.657366
S&P 500 Stock Price Index	6-month Treasury yield	0.736503
S&P 500 Stock Price Index	3-year Treasury yield	0.670857
S&P 500 Stock Price Index	1-year Treasury yield	0.731774
Primary Credit	Moody's AAA Rate	0.798703
Primary Credit	Moody's BAA Rate	0.73391
Primary Credit	BBB Corporate Yield	-0.664906
Primary Credit	30-year Mortgage Rate	-0.778753
Primary Credit	Prime Rate	-0.824901
Primary Credit	Home Price Index	0.626339
Primary Credit	Commercial Real Estate Price Index	0.630608
Primary Credit	US Average Retail Gasoline Price	-0.623739

MACROECONOMIC FORECASTS, 3Q2020 – FINAL VERSION

Primary Credit	20-year Treasury yield	0.785366
Primary Credit	10-year Treasury yield	-0.777006
Primary Credit	1-month Treasury yield	0.992855
Primary Credit	7-year Treasury yield	0.890903
Primary Credit	3-month Treasury yield	-0.813286
Primary Credit	5-year Treasury yield	-0.814629
Primary Credit	6-month Treasury yield	0.994034
Primary Credit	3-year Treasury yield	0.954459
Primary Credit	1-year Treasury yield	0.987316
Moody's AAA Rate	Moody's BAA Rate	0.975506
Moody's AAA Rate	BBB Corporate Yield	-0.786494
Moody's AAA Rate	30-year Mortgage Rate	-0.891386
Moody's AAA Rate	Prime Rate	-0.738036
Moody's AAA Rate	Dow Jones Total Stock Market Index	0.868501
Moody's AAA Rate	Home Price Index	0.8495
Moody's AAA Rate	Commercial Real Estate Price Index	0.887655
Moody's AAA Rate	US Average Retail Gasoline Price	-0.750269
Moody's AAA Rate	30-year Treasury yield	0.953437
Moody's AAA Rate	20-year Treasury yield	0.982939
Moody's AAA Rate	10-year Treasury yield	-0.903555
Moody's AAA Rate	7-year Treasury yield	0.9658
Moody's AAA Rate	3-month Treasury yield	-0.765249
Moody's AAA Rate	5-year Treasury yield	-0.874634
Moody's AAA Rate	6-month Treasury yield	0.812377
Moody's AAA Rate	3-year Treasury yield	0.902452
Moody's AAA Rate	1-year Treasury yield	0.830454
Moody's BAA Rate	BBB Corporate Yield	-0.731391
Moody's BAA Rate	30-year Mortgage Rate	-0.835791
Moody's BAA Rate	Prime Rate	-0.66575
Moody's BAA Rate	Dow Jones Total Stock Market Index	0.856275

MACROECONOMIC FORECASTS, 3Q2020 – FINAL VERSION

Moody's BAA Rate	Home Price Index	0.830707
Moody's BAA Rate	Commercial Real Estate Price Index	0.875698
Moody's BAA Rate	US Average Retail Gasoline Price	-0.709077
Moody's BAA Rate	30-year Treasury yield	0.770726
Moody's BAA Rate	20-year Treasury yield	0.923875
Moody's BAA Rate	10-year Treasury yield	-0.855713
Moody's BAA Rate	7-year Treasury yield	0.9119
Moody's BAA Rate	3-month Treasury yield	-0.701047
Moody's BAA Rate	5-year Treasury yield	-0.821283
Moody's BAA Rate	6-month Treasury yield	0.745782
Moody's BAA Rate	3-year Treasury yield	0.839593
Moody's BAA Rate	1-year Treasury yield	0.764218
Real GDP Growth Rate	Nominal GDP Growth Rate	0.944986
Real Disposable Income Growth Rate	Nominal Disposable Income Growth Rate	0.908585
BBB Corporate Yield	30-year Mortgage Rate	0.933687
BBB Corporate Yield	Prime Rate	0.732098
BBB Corporate Yield	Dow Jones Total Stock Market Index	-0.801973
BBB Corporate Yield	Home Price Index	-0.775517
BBB Corporate Yield	Commercial Real Estate Price Index	-0.738863
BBB Corporate Yield	US Average Retail Gasoline Price	0.719695
BBB Corporate Yield	20-year Treasury yield	-0.829061
BBB Corporate Yield	10-year Treasury yield	0.915903
BBB Corporate Yield	7-year Treasury yield	-0.79696
BBB Corporate Yield	3-month Treasury yield	0.752685
BBB Corporate Yield	5-year Treasury yield	0.875403
BBB Corporate Yield	6-month Treasury yield	-0.689621
BBB Corporate Yield	3-year Treasury yield	-0.756821
BBB Corporate Yield	1-year Treasury yield	-0.70721
30-year Mortgage Rate	Prime Rate	0.850943
30-year Mortgage Rate	Dow Jones Total Stock Market Index	-0.792242

MACROECONOMIC FORECASTS, 3Q2020 – FINAL VERSION

30-year Mortgage Rate	Home Price Index	-0.79718
30-year Mortgage Rate	Commercial Real Estate Price Index	-0.795279
30-year Mortgage Rate	US Average Retail Gasoline Price	0.788117
30-year Mortgage Rate	30-year Treasury yield	-0.642891
30-year Mortgage Rate	20-year Treasury yield	-0.881886
30-year Mortgage Rate	10-year Treasury yield	0.993237
30-year Mortgage Rate	7-year Treasury yield	-0.885668
30-year Mortgage Rate	3-month Treasury yield	0.876803
30-year Mortgage Rate	5-year Treasury yield	0.980067
30-year Mortgage Rate	6-month Treasury yield	-0.790902
30-year Mortgage Rate	3-year Treasury yield	-0.851937
30-year Mortgage Rate	1-year Treasury yield	-0.805982
Prime Rate	US Average Retail Gasoline Price	0.679014
Prime Rate	20-year Treasury yield	-0.646024
Prime Rate	10-year Treasury yield	0.833013
Prime Rate	7-year Treasury yield	-0.792586
Prime Rate	3-month Treasury yield	0.991928
Prime Rate	5-year Treasury yield	0.905392
Prime Rate	6-month Treasury yield	-0.831848
Prime Rate	3-year Treasury yield	-0.833602
Prime Rate	1-year Treasury yield	-0.838964
Dow Jones Total Stock Market Index	Home Price Index	0.853949
Dow Jones Total Stock Market Index	Commercial Real Estate Price Index	0.9157
Dow Jones Total Stock Market Index	US Average Retail Gasoline Price	-0.642625
Dow Jones Total Stock Market Index	30-year Treasury yield	0.816906
Dow Jones Total Stock Market Index	20-year Treasury yield	0.867278
Dow Jones Total Stock Market Index	10-year Treasury yield	-0.806596
Dow Jones Total Stock Market Index	7-year Treasury yield	0.823908
Dow Jones Total Stock Market Index	5-year Treasury yield	-0.707108
Dow Jones Total Stock Market Index	6-month Treasury yield	0.612389

MACROECONOMIC FORECASTS, 3Q2020 – FINAL VERSION

Dow Jones Total Stock Market Index	3-year Treasury yield	0.724044
Dow Jones Total Stock Market Index	1-year Treasury yield	0.632044
Home Price Index	Commercial Real Estate Price Index	0.95547
Home Price Index	20-year Treasury yield	0.859743
Home Price Index	10-year Treasury yield	-0.813075
Home Price Index	7-year Treasury yield	0.824327
Home Price Index	5-year Treasury yield	-0.742904
Home Price Index	6-month Treasury yield	0.647458
Home Price Index	3-year Treasury yield	0.747062
Home Price Index	1-year Treasury yield	0.666714
Commercial Real Estate Price Index	US Average Retail Gasoline Price	-0.636465
Commercial Real Estate Price Index	30-year Treasury yield	0.734969
Commercial Real Estate Price Index	20-year Treasury yield	0.905976
Commercial Real Estate Price Index	10-year Treasury yield	-0.821242
Commercial Real Estate Price Index	7-year Treasury yield	0.846071
Commercial Real Estate Price Index	5-year Treasury yield	-0.74281
Commercial Real Estate Price Index	6-month Treasury yield	0.649243
Commercial Real Estate Price Index	3-year Treasury yield	0.759597
Commercial Real Estate Price Index	1-year Treasury yield	0.670153
US Average Retail Gasoline Price	20-year Treasury yield	-0.724965
US Average Retail Gasoline Price	10-year Treasury yield	0.757102
US Average Retail Gasoline Price	7-year Treasury yield	-0.764228
US Average Retail Gasoline Price	3-month Treasury yield	0.687034
US Average Retail Gasoline Price	5-year Treasury yield	0.741483
US Average Retail Gasoline Price	6-month Treasury yield	-0.647383
US Average Retail Gasoline Price	3-year Treasury yield	-0.73747
US Average Retail Gasoline Price	1-year Treasury yield	-0.670608
30-year Treasury yield	20-year Treasury yield	0.989744
30-year Treasury yield	10-year Treasury yield	-0.702278
30-year Treasury yield	7-year Treasury yield	0.852312

MACROECONOMIC FORECASTS, 3Q2020 – FINAL VERSION

30-year Treasury yield	3-year Treasury yield	0.60632
20-year Treasury yield	10-year Treasury yield	-0.884193
20-year Treasury yield	7-year Treasury yield	0.969939
20-year Treasury yield	3-month Treasury yield	-0.658247
20-year Treasury yield	5-year Treasury yield	-0.820188
20-year Treasury yield	6-month Treasury yield	0.805205
20-year Treasury yield	3-year Treasury yield	0.898822
20-year Treasury yield	1-year Treasury yield	0.829249
10-year Treasury yield	7-year Treasury yield	-0.891411
10-year Treasury yield	3-month Treasury yield	0.86283
10-year Treasury yield	5-year Treasury yield	0.981479
10-year Treasury yield	6-month Treasury yield	-0.787179
10-year Treasury yield	3-year Treasury yield	-0.851899
10-year Treasury yield	1-year Treasury yield	-0.802759
1-month Treasury yield	7-year Treasury yield	0.756837
1-month Treasury yield	6-month Treasury yield	0.995166
1-month Treasury yield	3-year Treasury yield	0.927448
1-month Treasury yield	1-year Treasury yield	0.988073
7-year Treasury yield	3-month Treasury yield	-0.800266
7-year Treasury yield	5-year Treasury yield	-0.878504
7-year Treasury yield	6-month Treasury yield	0.910941
7-year Treasury yield	3-year Treasury yield	0.977049
7-year Treasury yield	1-year Treasury yield	0.92717
3-month Treasury yield	5-year Treasury yield	0.932319
3-month Treasury yield	6-month Treasury yield	-0.818667
3-month Treasury yield	3-year Treasury yield	-0.828399
3-month Treasury yield	1-year Treasury yield	-0.826942
5-year Treasury yield	6-month Treasury yield	-0.820475
5-year Treasury yield	3-year Treasury yield	-0.86413
5-year Treasury yield	1-year Treasury yield	-0.833011

MACROECONOMIC FORECASTS, 3Q2020 – FINAL VERSION

6-month Treasury yield	3-year Treasury yield	0.972869
6-month Treasury yield	1-year Treasury yield	0.998026
3-year Treasury yield	1-year Treasury yield	0.983274

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