Macroeconomic Forecasts, 3Q2021

Domestic Metrics

Prepared by: Capitalytics, LLC

P. O. Box 381162

Birmingham, AL 35242

Table of Contents

Summary

The economic condition of the United States seems to be at a new crossroads every week. Although we might be predicting a breakout of growth or a surge in employment the first of the month, we are likely to change course by the 15th. At the start of our previous report we were discussing the impact of (Jamie Dimon from) Chase's insistence that **"everybody come back to the office![1]"** At this point, with the resurgence of the Delta variant, we might best describe the current state of the economy as **"Is anybody going to come back to the office?"**

Although we are seeing some states and metro areas making great gains, we are seeing other state and metro areas struggling with waves of COVID cases and conflicting policies on masks and vaccines. The economy is growing but we are experiencing a gap in employment and supply-chain issues (along with monetary and fiscal policies) that are contributing to inflationary pressures.

State of Affairs

The economy is still tied to the state of COVID, COVID infections, vaccine mandates and vaccination rates. the United States has approximately 54.68% of its population fully vaccinated, and 8.85% of its population has been at least partially vaccinated (63.55% of the population has been fully or partially vaccinated)[2]. This rate places the US right behind Germany and in front of Turkey and Mexico. Reticence towards the vaccine appears to stronger in 'Red' states relative to 'Blue' states – there is a 12% gap in vaccine rates for counties that voted for Trump relative to those that voted for Biden[3].

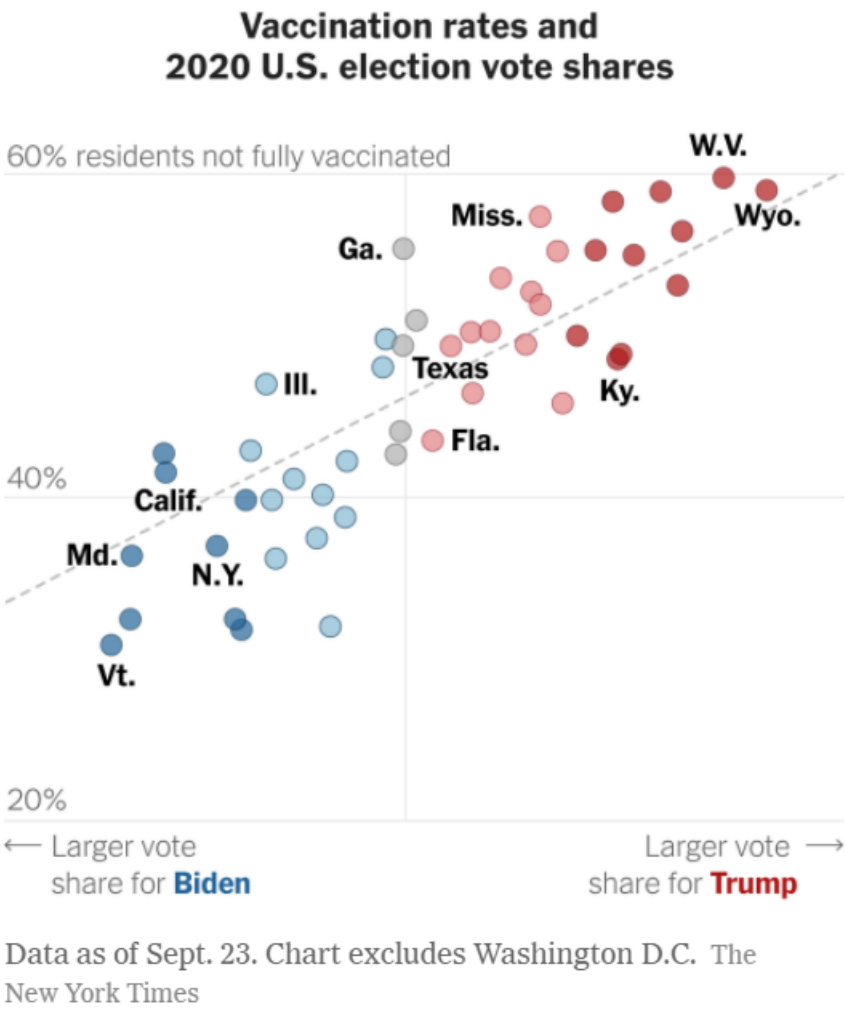
Table 1: Percentage of Population Partially and Fully Vaccinated

United States	
Share of people fully vaccinated against COVID-19	54.68%
Share of people only partly vaccinated against COVID-19	8.85%
Total	63.53%

Source: https://ourworldindata.org/covid-vaccinations

[1] https://www.marketwatch.com/story/jamie-dimon-insists-his-workers-return-to-the-office-thats-a-bit-rich-11624587736
[2] https://ourworldindata.org/covid-vaccinations
[3] https://www.kff.org/policy-watch/the-red-blue-divide-in-covid-19-vaccination-rates/

Figure 1: COVID Vaccination Rates & Vote Share (Trump vs Biden)

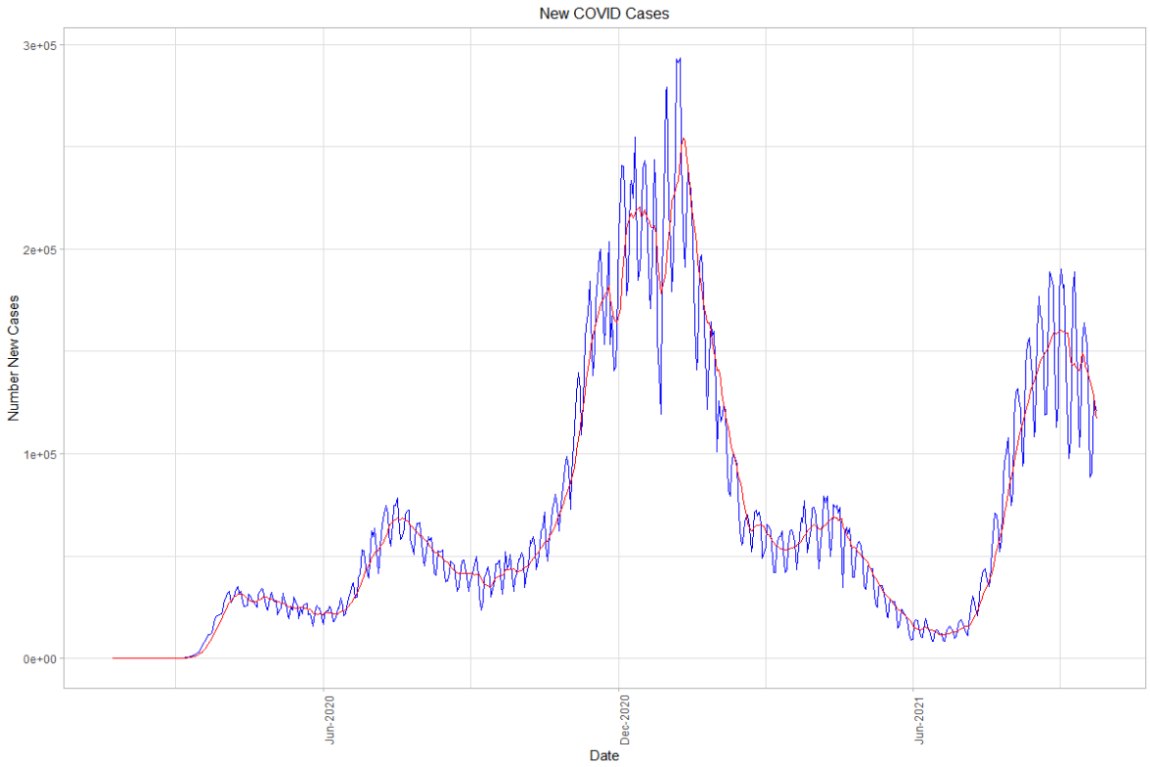


Source: New York Times[4]

Figure 1 shows the relationship between the percentage of the state population that is fully vaccinated relative to the state's vote share for Biden/Trump. The states with the highest population of unvaccinated residents are the states with the highest portion of votes for Trump, prompting some news sources to refer to the rate of COVID infections and deaths from COVID as "Red Covid.[5]"

[4] https://www.nytimes.com/2021/09/27/briefing/covid-red-states-vaccinations.html
[5] Ibid.

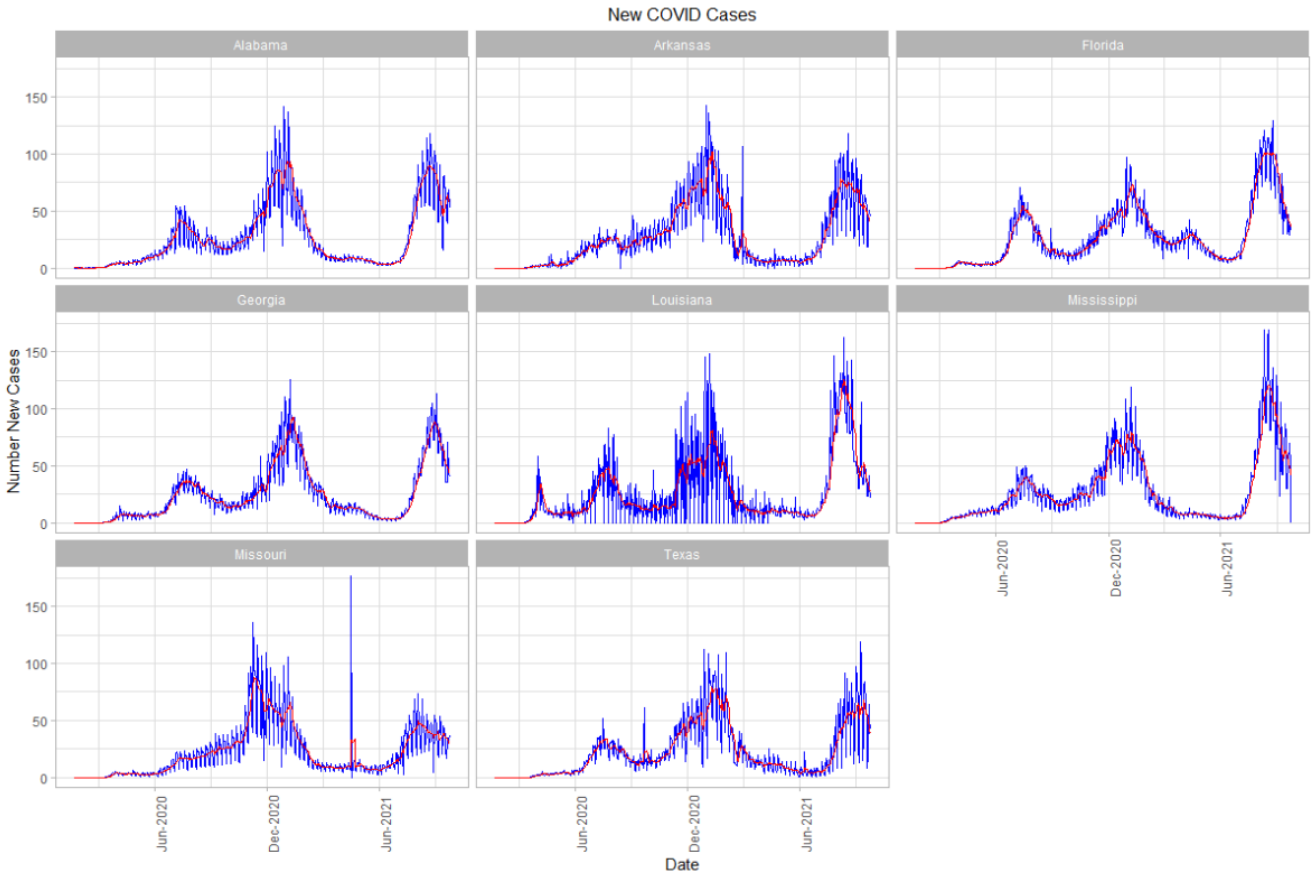
Figure 2 Number of New Cases (Blue) and Seven Day Moving Average (Red) for United States



Source: https://covid.cdc.gov/covid-data-tracker/#trends_dailycases

Figure 2 shows the number of new cases (blue) and the seven-day moving average of cases (red) for the US. The most recent wave has started to show a downward trend (with the seven-day moving average showing a decrease for the last 10 days).

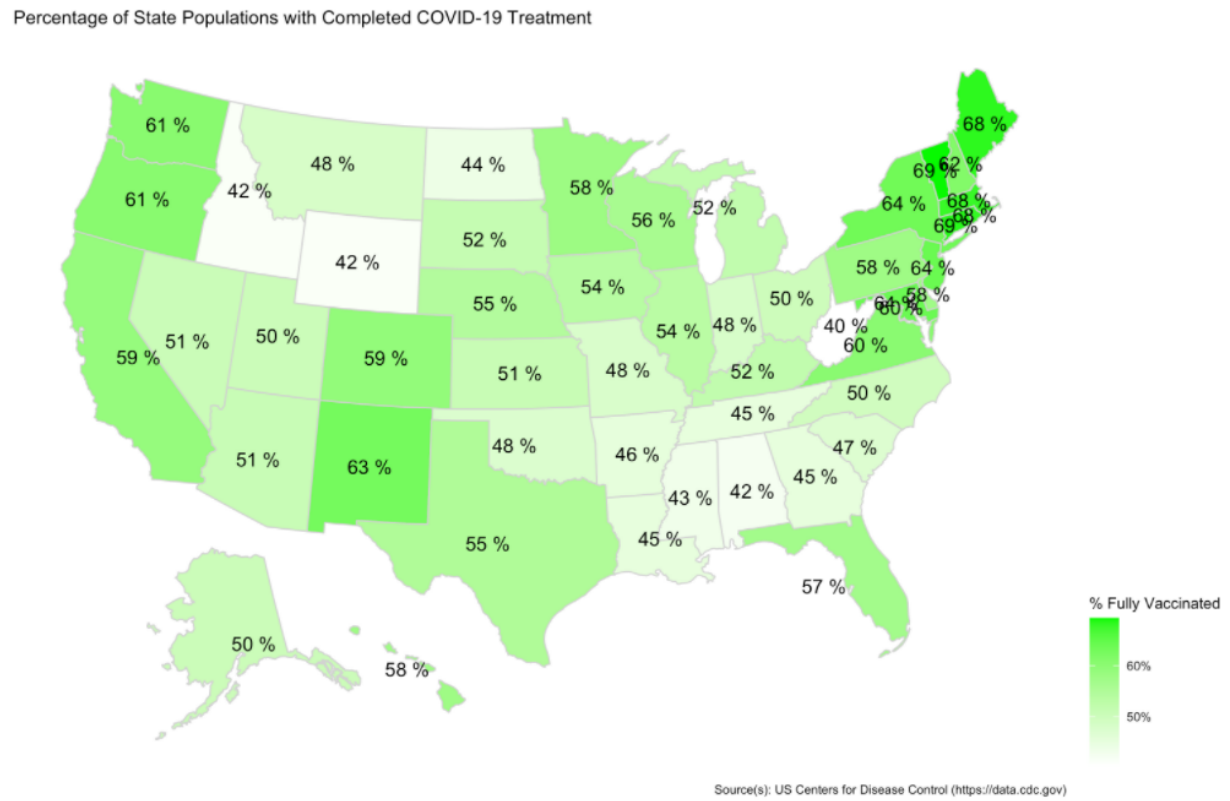
Figure 3: New COVID Cases Per 100K Residents (Blue) and Seven-Day Moving Average (Red) of COVID Cases Per 100k Residents by State



Source: https://covid.cdc.gov/covid-data-tracker/#trends_dailycases

Although the (raw) number of new cases is currently trending highest in Texas and Florida, the number of cases per 100,000 residents show similar trends in all of the states shown in Figure 3 (Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, Missouri, and Texas). Although the most recent surge in new cases in the US did not exceed the "third wave" experienced last winter, many of the southern states experienced a recent wave that eclipsed the wave experienced last winter. The good news, however, is that many of these states are now experiencing a decrease in new COVID cases.

Figure 4: Percentage of State Population Fully Vaccinated for COVID

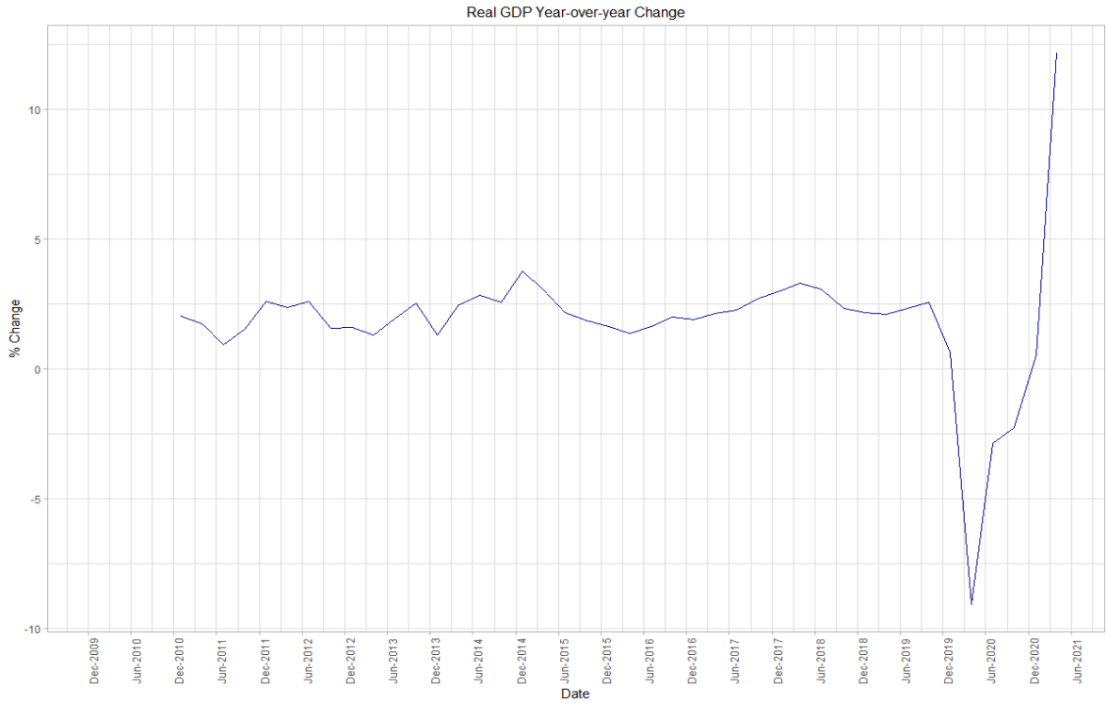


Alabama, Mississippi, Georgia, Louisiana, Arkansas, and Tennessee are ranking in the bottom 10 states for percentage of the state's population with completed treatment for COVID. The number of new cases (and seven-day average) is negatively correlated with the percentage of the population in the state with completed vaccinations against COVID. (See Figure 4.) Until these states (Alabama, Mississippi, Louisiana, Arkansas, and Tennessee) find ways to incentivize their residents to take the COVID vaccine, it is likely that they will continue to lead the country in new cases.

Current Economic Climate

The current state of the economy and the movement of the economy in the last two quarters might best be described as steady economic growth with an employment gap. Although there are some reports of stagflation[6], the data do not currently point to a confluence of stagnating real GDP and inflationary trends.

Figure 5: Percent Change in Real GDP Growth (2010-2021)

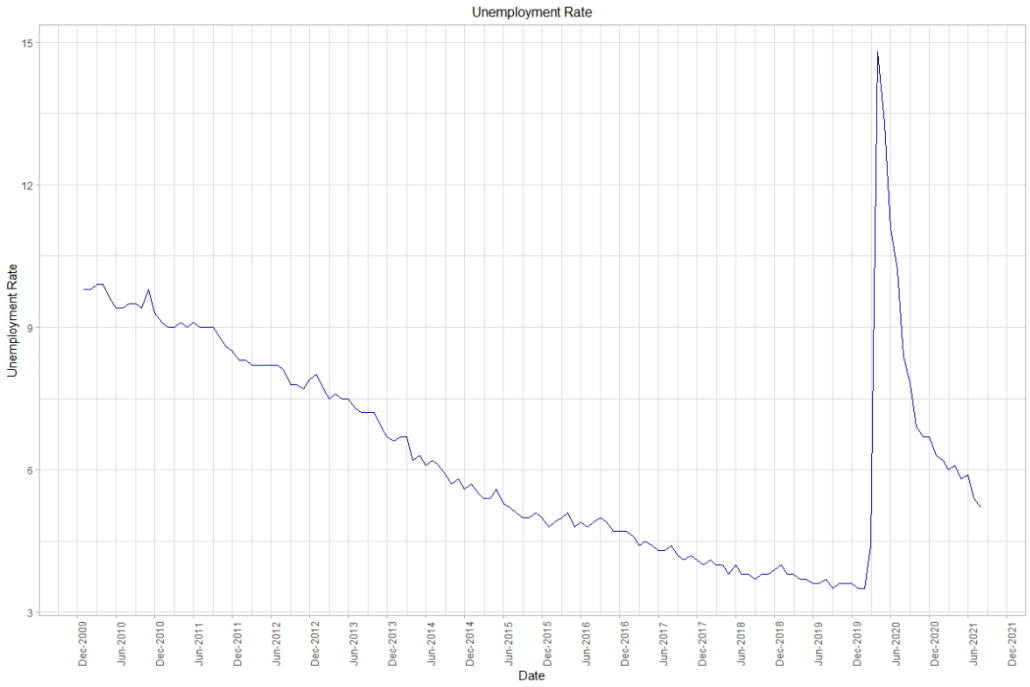


Source: Federal Reserve Economic Database (https://fred.stlouisfed.org)

Figure 5 shows the year-over-year change in real GDP from 2010 through 2Q 2021. The growth of the real GDP has been in double-digits the last several quarters (in part because the drop in real GDP was so severe in Q1 and Q2 of 2020). The steady growth in real output does not point to a stagnating economy. However, the employment gap does create a concern.

[6] https://www.cnbc.com/2021/09/10/investing-for-stagflation-bank-of-americas-hartnett-says-we-are-in-the-first-phase-.html

Figure 6: US Unemployment Rate

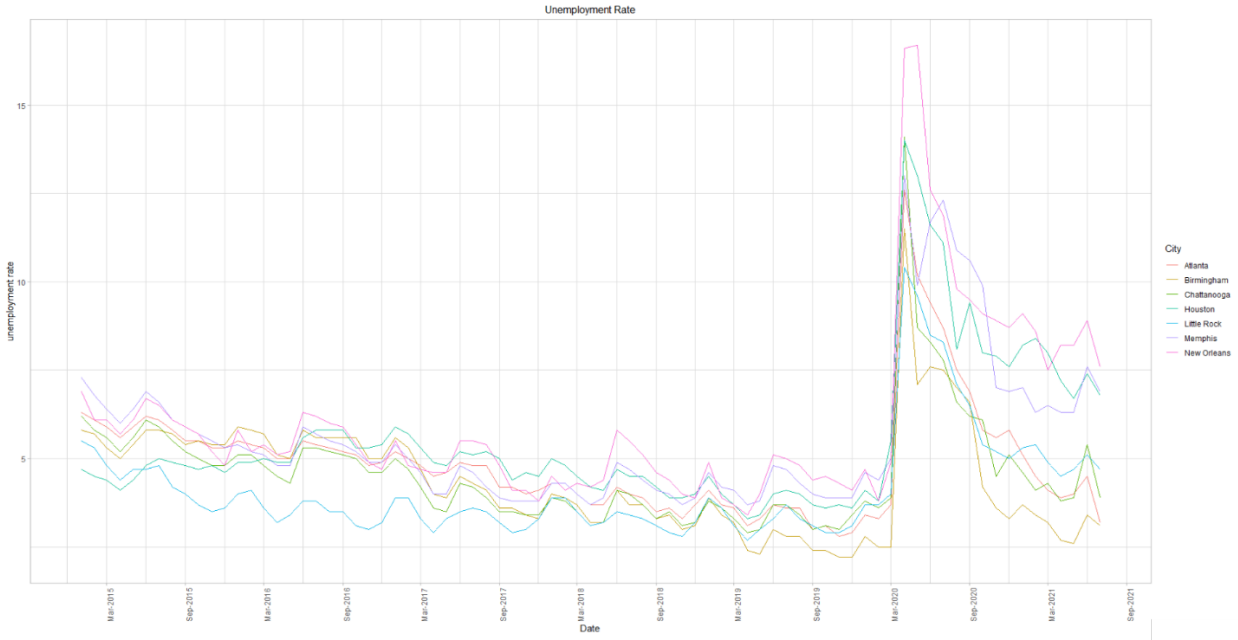


Source: Federal Reserve Economic Database (https://fred.stlouisfed.org)

The spike in the unemployment level in 1Q 2020 has fallen quite a bit in the last 12 months. The initial rate of employment gains pointed to a very quick recovery. However, the gains in employment (i.e., the drop in unemployment) since November 2020 have mirrored the rate of employment gains that the US experienced in early 2012 through 2013. Economists[7] have, retroactively, suggested that the US was experiencing a "growth recession"[8] coming out the 2008-09 Housing Crisis. Because the business cycle dating committee of the NBER does not have a strict definition of a "recession"[9], it is often convenient to identify a recession as two consecutive quarters experiencing a drop in real GDP (which is the definition of a recession for countries such as Germany[10].) The increase in real GDP combined with the stalled gains in the employment picture could be a signal that the US has entered into a growth recession. The fix for a growth recession, at least as pointed out by Nobel Laurate Paul Krugman[11], is an increase in aggregate demand (the sum of spending from the primary agents in the economy). However, one of the impacts of an increase in the aggregate demand is upward pressure in the price level; we will be discussing inflation shortly.

[7] https://www.rollingstone.com/politics/politics-news/paul-krugman-on-how-to-fix-the-economy-and-why-its-easier-than-you-think-191898/
[8] A "growth recession" is a scenario in which the GDP is growing but the underlying economic condition (unemployment, capacity utilization, labor force participation, etc.) is consistent with a recession.
[9] https://www.nber.org/business-cycle-dating-procedure-frequently-asked-questions
[10] https://www.bbc.com/news/business-52673727
[11] See Footnote 2

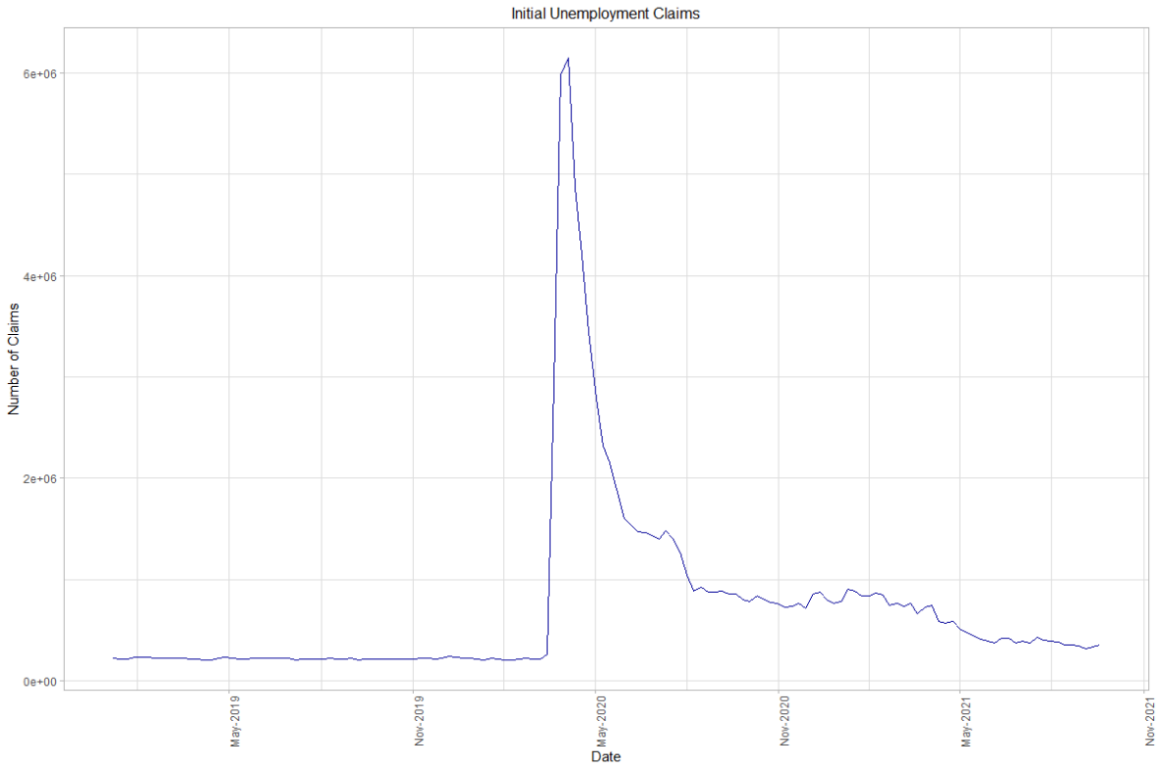
Figure 7: Unemployment Rate per MSA



Source: Federal Reserve Economic Database (https://fred.stlouisfed.org)

Figure 7 shows the unemployment rate by MSA. We saw huge spike universally in the unemployment rate at the start of the pandemic, but most notably in New Orleans (in this set of cities); New Orleans continues to show the highest level of unemployment relative to this group of metropolitan areas. Birmingham, on the other end, continues to show the lowest level of unemployment. This contrast is understandable given the significance of tourism to the New Orleans area, versus the predominance of financial services and other white collar service providers in Birmingham.

Figure 8: US Initial Unemployment Claims



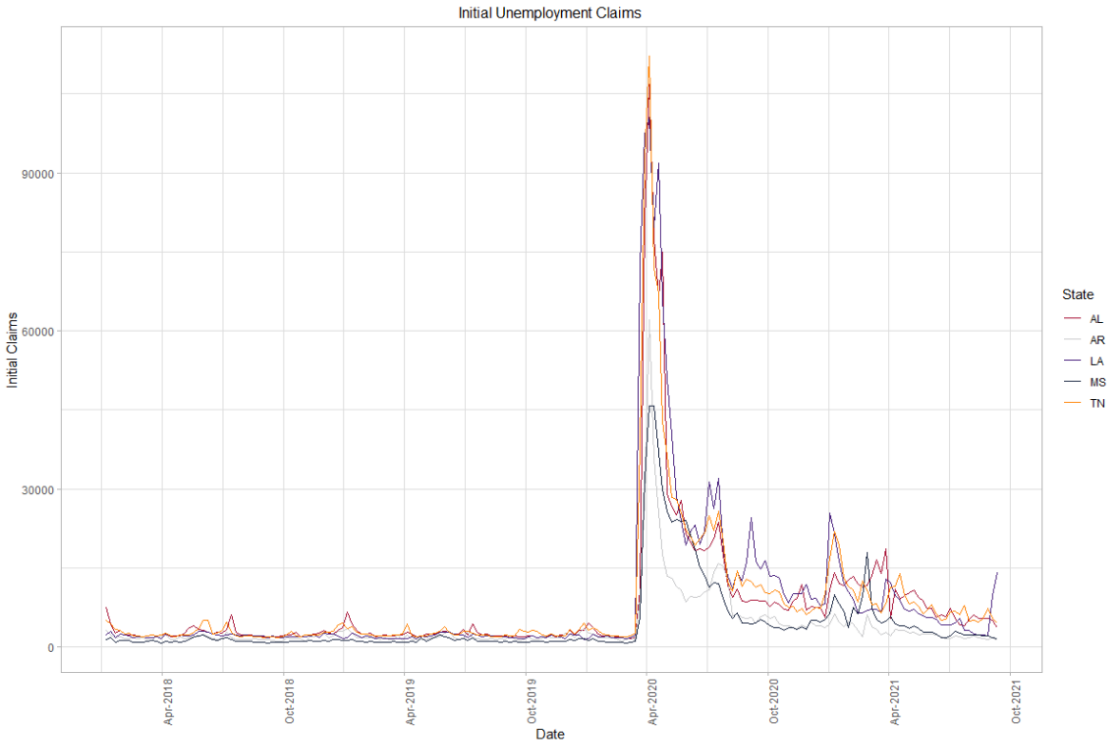
Source: Federal Reserve Economic Database (https://fred.stlouisfed.org)

At the start of the recession we saw a large spike in initial unemployment claims. The number of workers reporting initial unemployment claims has reached a near steady-state – bouncing between 200,000 and 300,000 claims per week[12]. The number of initial claims is still much higher than the US would see except for situations coinciding with natural disasters. Figure 9 and Figure 10 show the trend in initial unemployment claims for Alabama, Arkansas, Louisiana, Mississippi, Tennessee, and Texas. Louisiana has trended near the top of this list since the pandemic started in March 2020.

Figure 11 shows the employment-population ration. This metric captures the percentage of the employment-eligible population that is employed. The dramatic drop of this metric at the start of the pandemic signaled the start of the employment gap. Although the unemployment rate has shown gains, the employment-population ratio continues to show a large gap between the population that is eligible to work and the population that is employed. It is likely that a portion of the population is still unable to work because of, e.g., household production and child rearing issues.

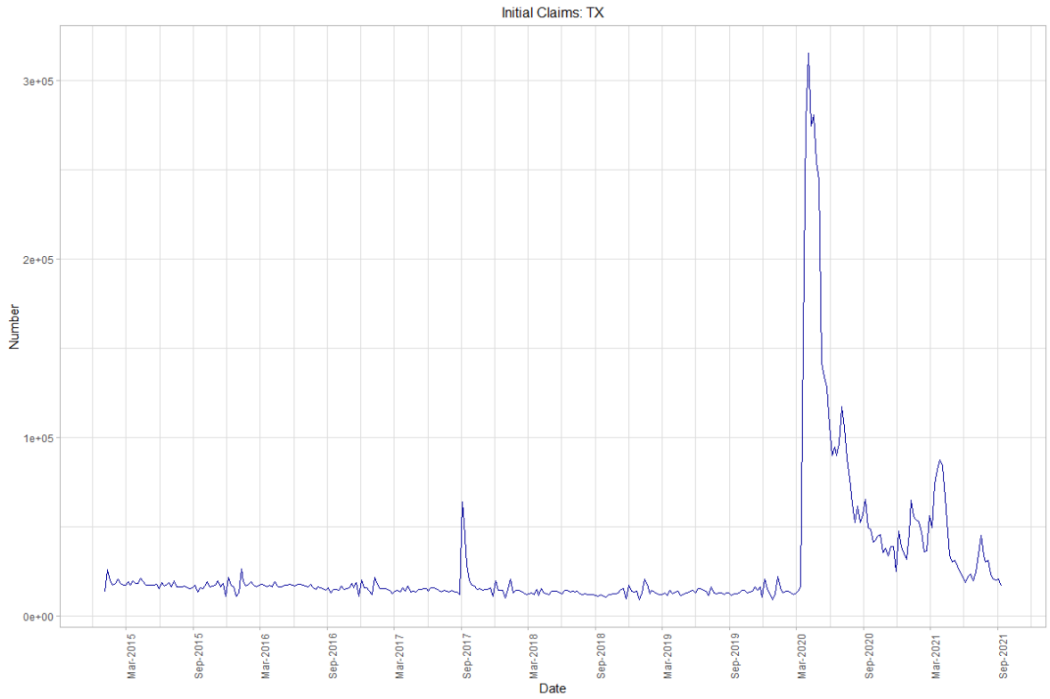
[12] https://www.cnbc.com/2021/09/02/us-weekly-jobless-claims.html

Figure 9: Initial Unemployment Claims by State



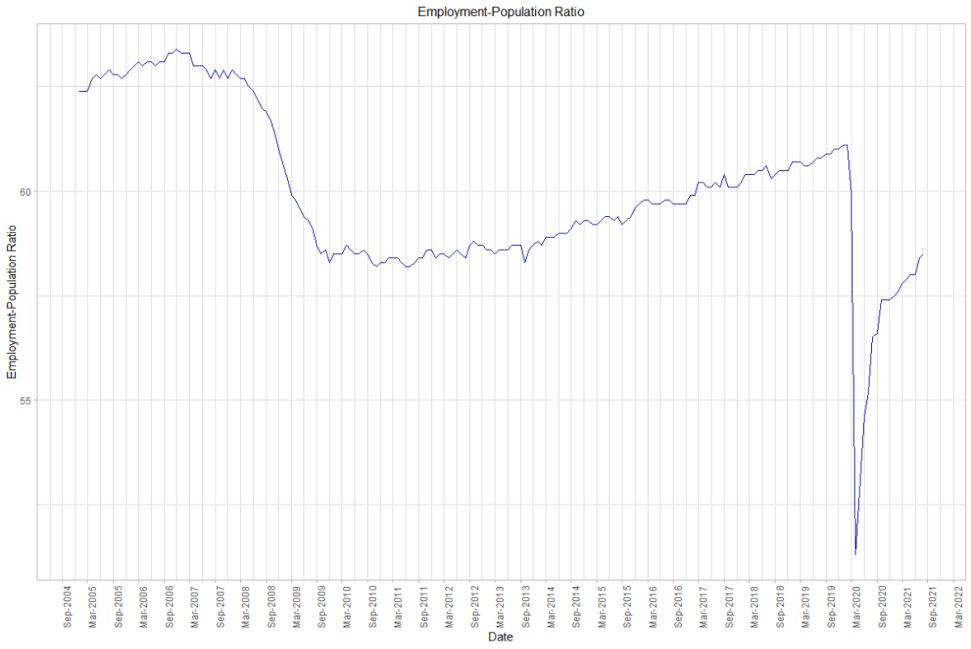
Source: Federal Reserve Economic Database (https://fred.stlouisfed.org)

Figure 10: Initial Unemployment Claims (Texas)



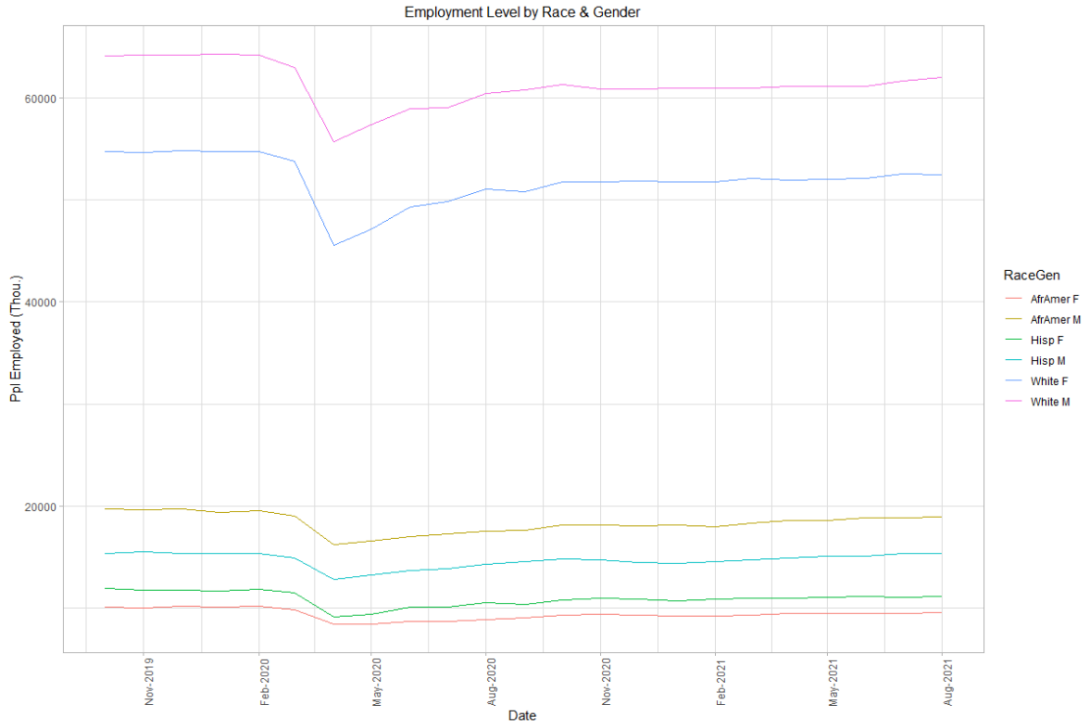
Source: Federal Reserve Economic Database (https://fred.stlouisfed.org)

Figure 11: Employment-Population Ratio



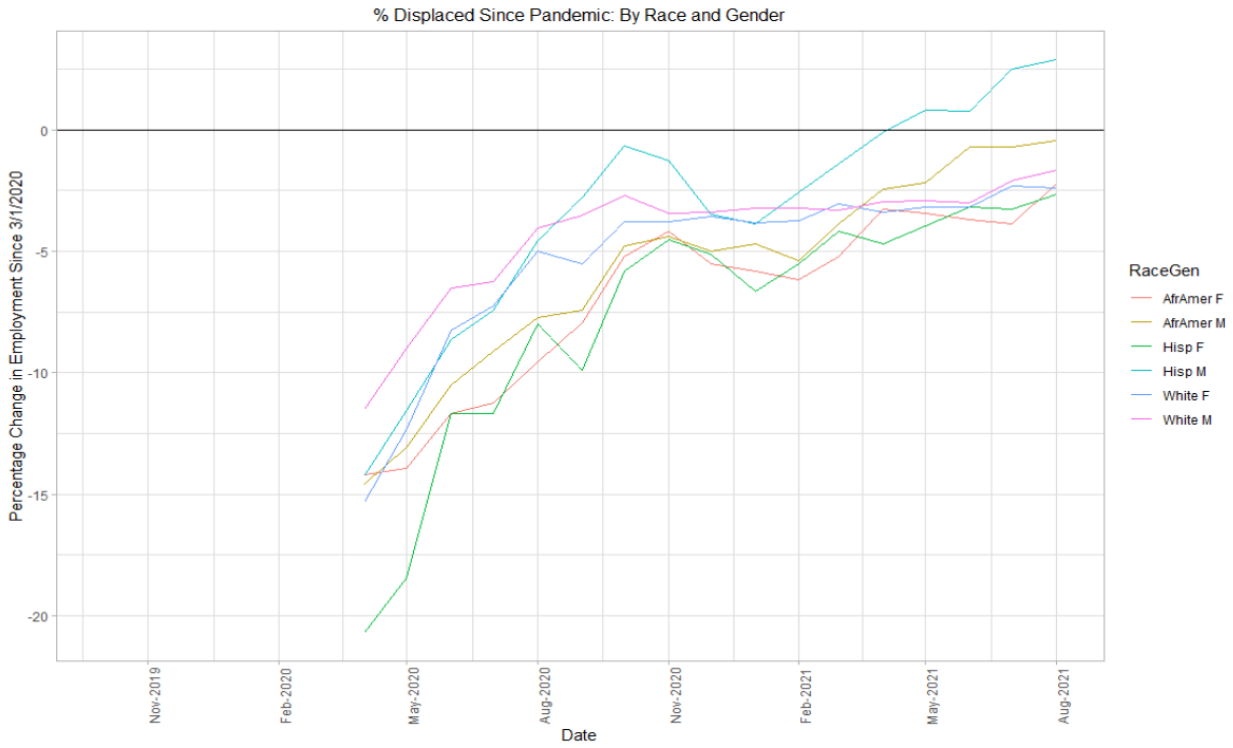
Source: Federal Reserve Economic Database (https://fred.stlouisfed.org)

Figure 12: Employment Level by Race and Gender



Source: Federal Reserve Economic Database (https://fred.stlouisfed.org)

Figure 13: Displaced Workers (%) Since Start of Pandemic (Mar. 2020) by Race and Gender



Source: Federal Reserve Economic Database (https://fred.stlouisfed.org)

As we have discussed regarding the 'K-shaped' recession, the employment picture (and re-employment picture) differs across races and genders. Figure 13 shows the percentage change of employment since the start of the pandemic by race and gender. Hispanic women, for example, experienced a 21% decrease in employment within the first month of the pandemic while white males experienced a 12% decrease in employment within the first month of the pandemic. Hispanic men, as a group, have fully recovered their employment since the pandemic; employment for Hispanic men is 2.5% greater in September 2021 than in March 2020. White, Hispanic, and African American females are still showing an employment gap of approximately 2.5%.

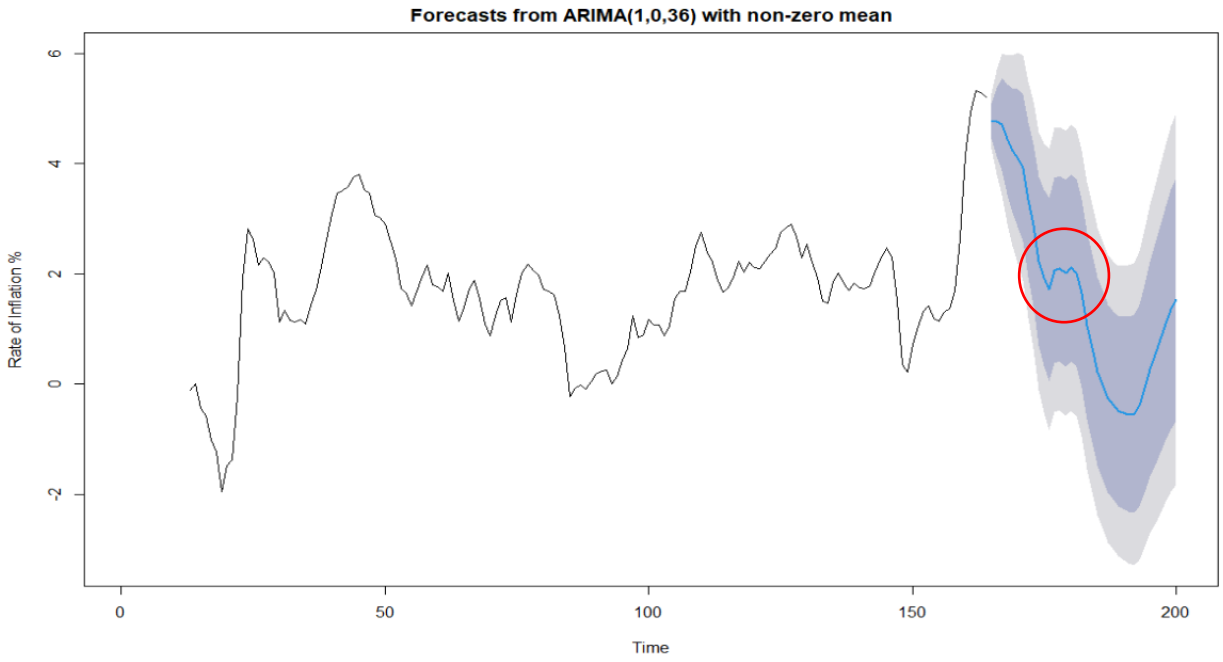
Inflation

As we have written in previous reports, inflation is, historically, a monetary phenomenon, driven by expansionary monetary policy and quantitative easing. However, relaxed monetary policy did not add to inflationary trends during the 2008 recession. The "great moderation[13]" (a period of low volatility around inflation) and a lack of a substantial increase in the aggregate demand after the 2008 recession created an extended period of near-zero federal funds rate and low inflation. That said, there is evidence that the expansionary monetary policy put in place in reaction to the COVID pandemic, large fiscal packages put in place to protect unemployed workers, a change in the demand for various

[13] https://www.federalreservehistory.org/essays/great-moderation

commodities (lumber, for example), and a substantial change in housing demand has caused upward pressure in the aggregate demand. The resulting impact has been an upward push in price levels.

Figure 14: Inflation and Inflation Expectations

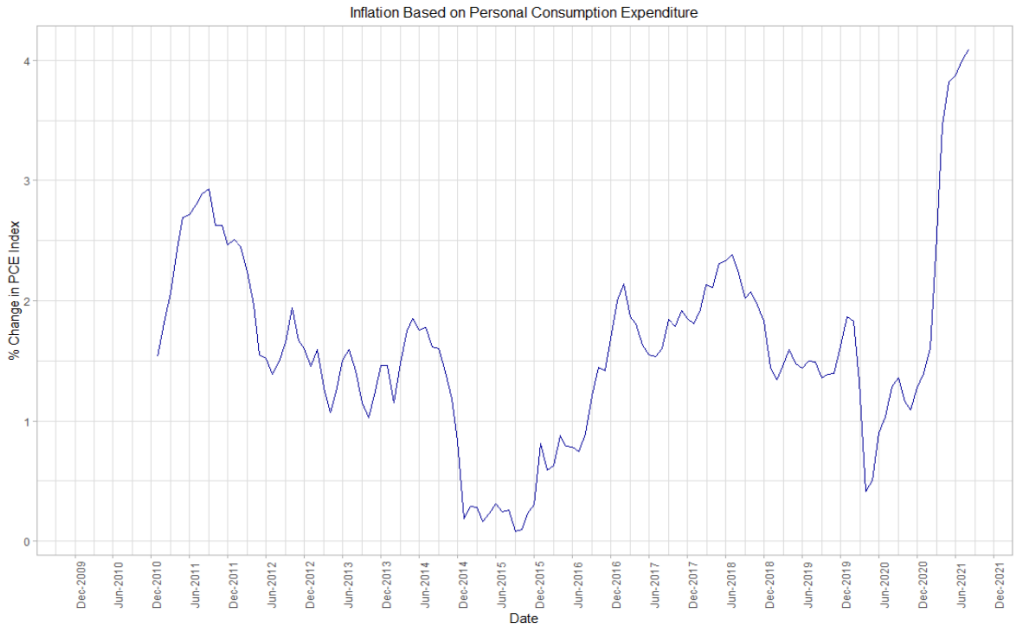


Sources: Authors' calculations

Figure 14 shows the trend of inflation using year-over-year changes in the CPI and our estimates (based on an ARIMA-centric model) that forecast inflation for the next 36 months. The forecast takes the past 3 years of inflationary trends to predict inflation going forward. We feel that this is the most appropriate model (a 36-month autoregressive model) based on Chairman Powell's remarks regarding the Fed's process of adopting a more longitudinal approach to inflationary pressures[14]. Our model is predicting a downward trend in the rate of inflation. (This should not be confused with deflationary trend, but rather a decrease in the rate that prices will be increasing.) We see inflation as settling between 1.75% and 3.5% within the next 12 to 20 months. The Fed's move towards contractionary policy has already started; the Fed' announced that it will taper its purchase of bonds and move towards a rate increase within the next twelve months[15]. The risks of inflation are currently outweighing any risks that a monetary contraction would slow down GDP growth. The Fed' is ***likely to make a 25 basis point increase during the first quarter of 2022*** and might ***increase the Federal Funds target rate by a total of 75 basis points during 2022***.

[14] https://www.cnbc.com/2020/08/27/powell-announces-new-fed-approach-to-inflation-that-could-keep-rates-lower-for-longer.html
[15] https://www.reuters.com/business/finance/fed-likely-open-bond-buying-taper-door-hedge-outlook-2021-09-22/

Figure 15: Inflation Based on Personal Consumption Expenditures



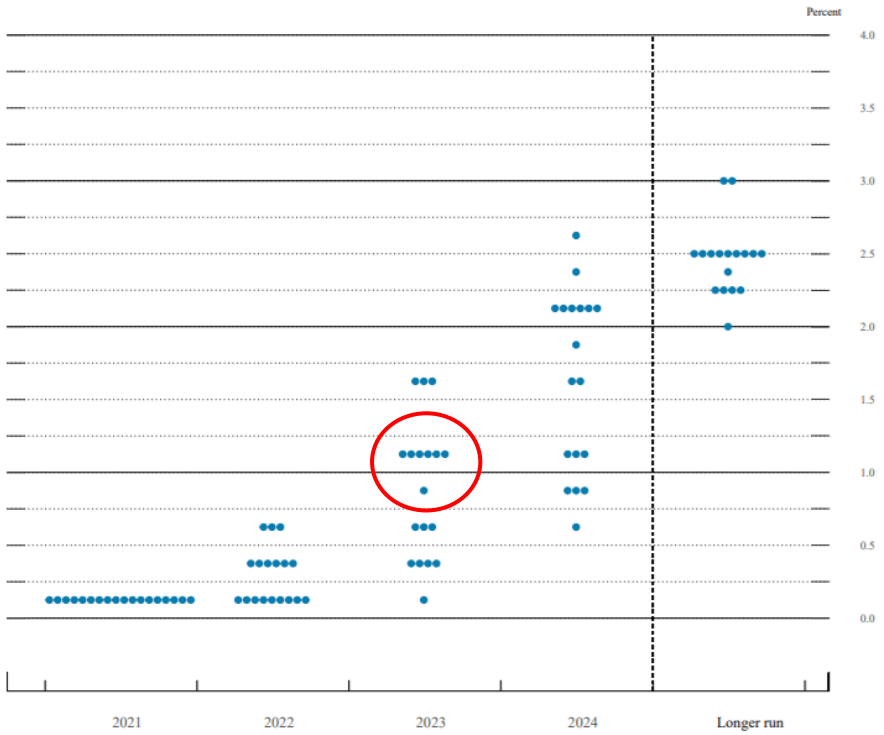
Source: Federal Reserve Economic Database (https://fred.stlouisfed.org)

Figure 15 shows an inflation measure based on the Personal Consumption Expenditure index. This index is capturing consumer expenditures over time. The Y/Y percentage change in PCE Index captures the inflation as it hits consumers wallets. This measure is also showing inflation at or near the 4% level (similar but not identical to the level of inflation captured by evaluating the percentage change in the CPI). This inflation measure may better capture how consumers are spending even with substitution between goods and services, and is trending towards an unprecedented rate[16].

The Federal Reserve Board of Governors releases the Governors' forward-looking trend of the appropriate Fed' Funds target rates (shown in Figure 16). Based on this information, the Governors appear to feel that, on average, the target rate should fall between 0.75 and 1.25 by the end of 2023.

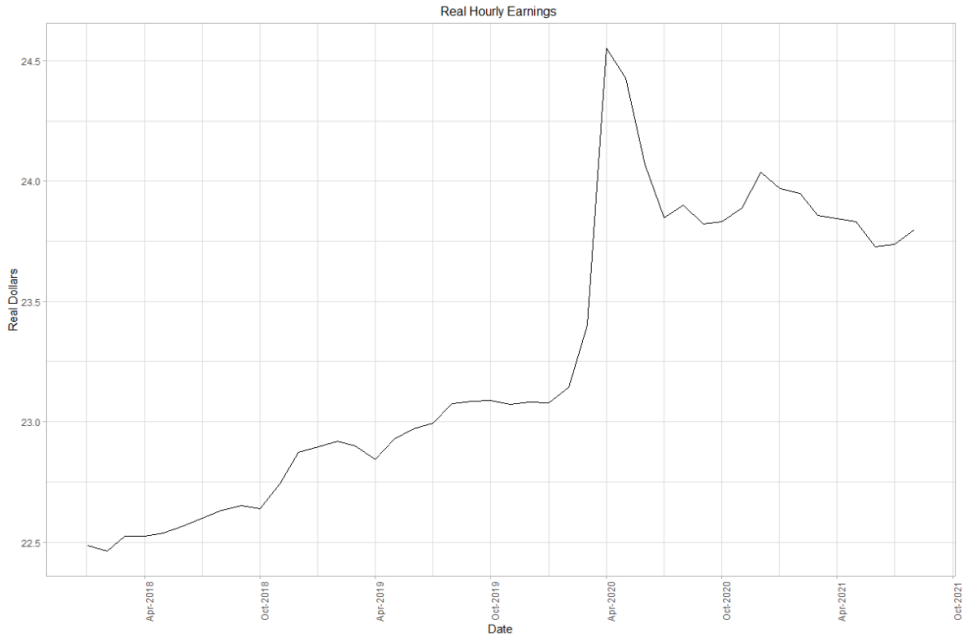
[16] https://www.cnn.com/2021/10/01/economy/inflation-incomes-august/index.html

Figure 16: FOMC "Dot Plot" from September 2021 Board of Governors' Meeting



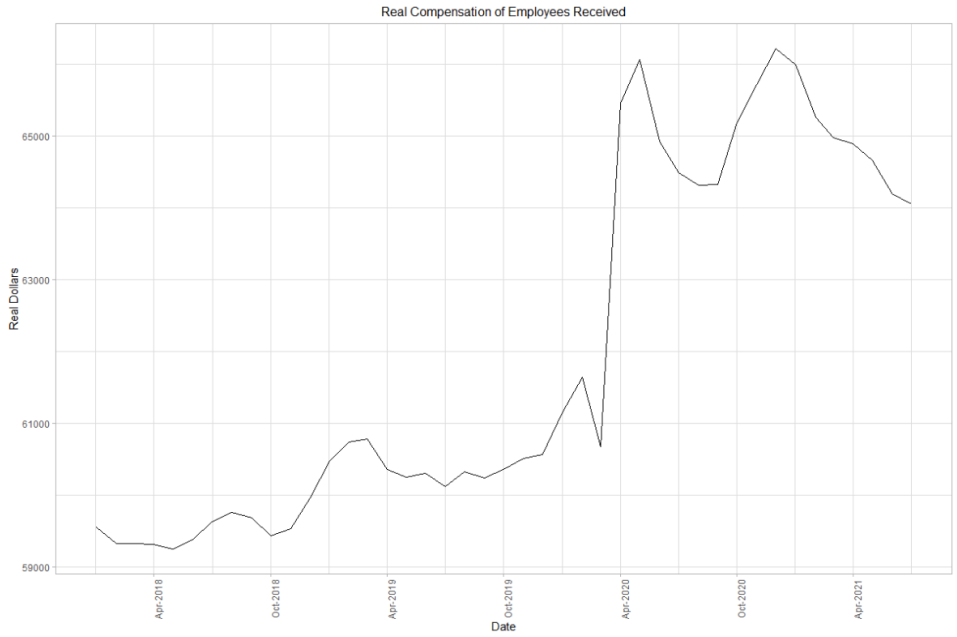
Source: https://www.federalreserve.gov/monetarypolicy/files/fomcprojtabl20210922.pdf

Figure 17: Real Average Hourly Wage



Source: Federal Reserve Economic Database (https://fred.stlouisfed.org)

Figure 18: Real Average Annual Compensation



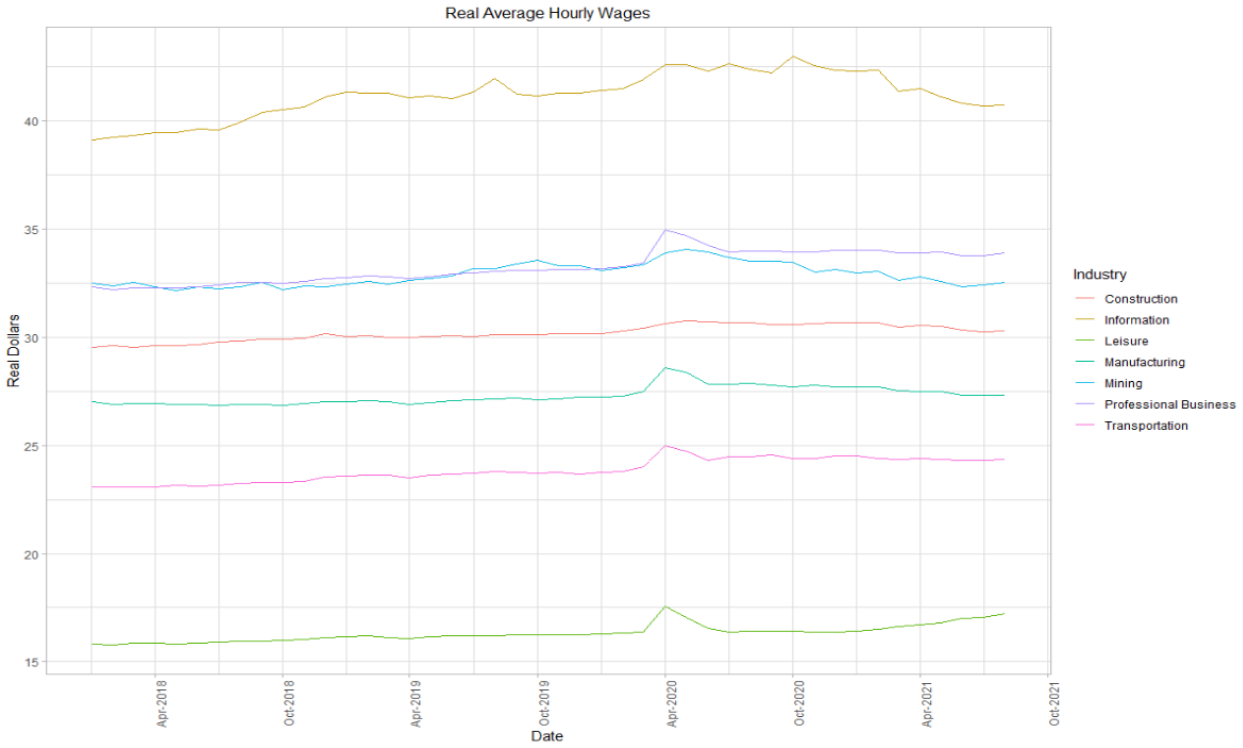
Source: Federal Reserve Economic Database (https://fred.stlouisfed.org)

Inflation creates havoc within an economic system. Inflation causes producers and consumers to re-evaluate their time horizon for making purchases. High inflation can create an urgency to make purchases (for both consumers and producers) because of fears that changes in income or revenue will not keep pace with the changes in prices of intermediate or final goods. The increase in urgency or frequency of purchases can create a system where a higher demand pulls up prices, which can then create additional purchasing frenzies. Although a spider-web of demand-pull inflation (that leads to additional demand-pull inflation) is not found in every market, we have seen examples in which the phenomena does occur, e.g., gold prices[17], and the current spike in housing prices.

Additionally, inflation can cause a decrease in buying power for consumers if income gains do not match the change in prices. Figure 17 and Figure 18 show the real compensation and real average hourly wages for employees within the US labor market. The real wage, which accounts for inflation, experienced large spikes at the start of the COVID recession. The decrease in labor demand and supply pushed up wages at a faster rate than the increase in commodity prices. Because of the "K"-shaped response to this recession (during which some groups of workers have seen very small negative impacts, or even gains, while other groups of workers have experienced significant negative impacts), these figures suggest that these real gains are likely concentrated in a core group of consumers or, in this case, employees.

[17] https://www.bls.gov/opub/btn/volume-2/gold-prices-during-and-after-the-great-recession.htm

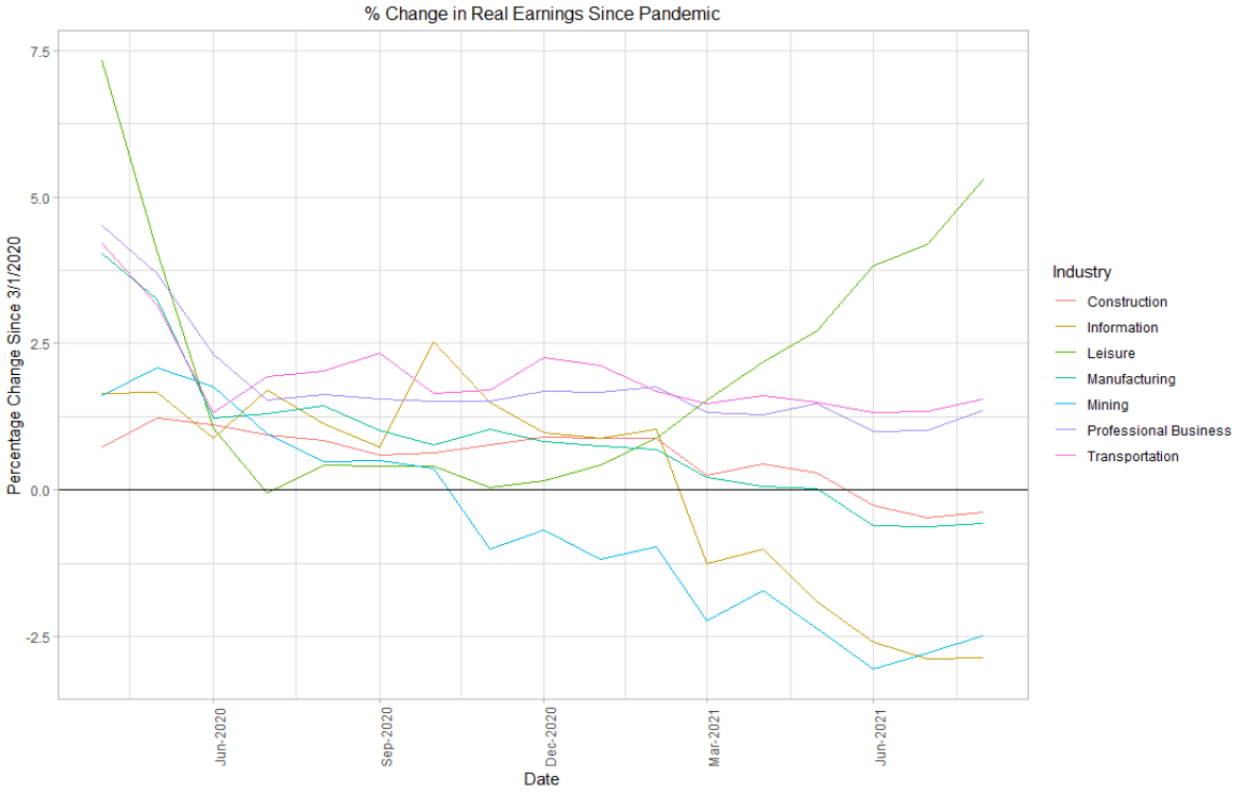
Figure 19: Real Average Hourly Wages by Industry



Source: Federal Reserve Economic Database (https://fred.stlouisfed.org)

When examining the trend in real wages by industry (Figure 19) we see that some industries have seen an uptick in real wages while others have seen more constant wages. The percentage change in real wages since March 2020 is shown in Figure 20. Because of the changes in labor supply and demand at the start of the pandemic, the real wages of every industry mapped here increased within 1 month of the start of the pandemic. As the pandemic and recession progressed, workers in manufacturing, construction, information systems, and mining saw their real wages decrease. Workers classified as professional business employees (i.e., "white-collar" workers) and transportation workers (e.g., truck drivers) saw their wages increase approximately 2.5% at the start of the pandemic and have remained at that level. Employees working in the leisure sector have seen their wages swing dramatically, from being up approximately 7% at the start of the pandemic, to falling even with the start of the recession, to increasing again. Inflation becomes a foe when it drives purchasing power lower; it appears that employees working in manufacturing, mining, transportation and construction have seen their real wages fall since March 2020.

Figure 20: Percentage Change in Real Wages (since Mar. 2020) by Industry



Source: Federal Reserve Economic Database (https://fred.stlouisfed.org)

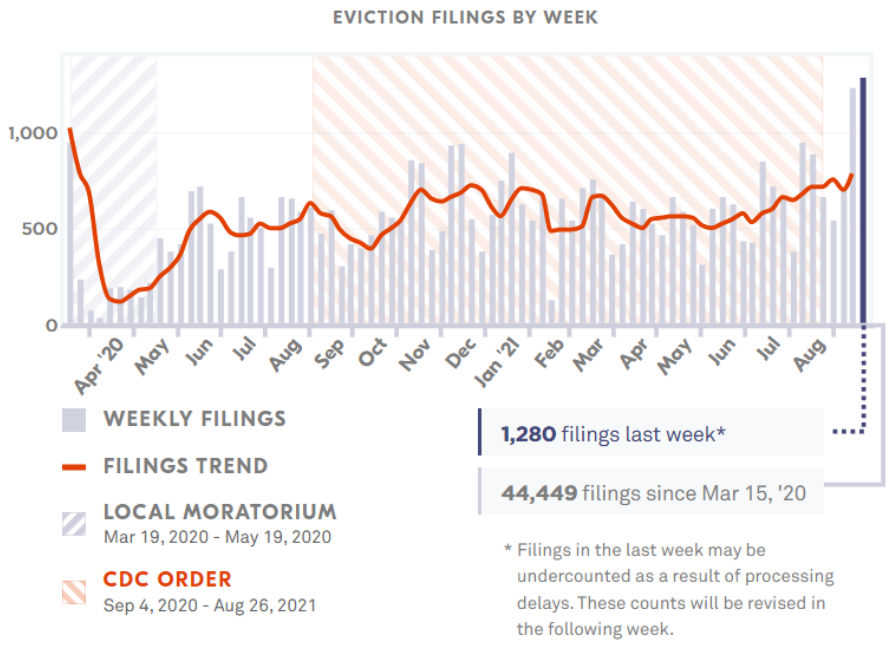
Housing

Evictions

The Federal Eviction Moratorium on evictions ended on August 26, 2021. Although the White House (in conjunction with the CDC) attempted to extend the moratorium though October, the Supreme Court ruled against this executive order[18]. Some states (California and Illinois, for example) had extended the moratorium through state-level mandates, but most of these extensions have also ended (e.g., the California moratorium ended on October 3, 2021[19]). Did lifting the moratorium increase risks for renters?

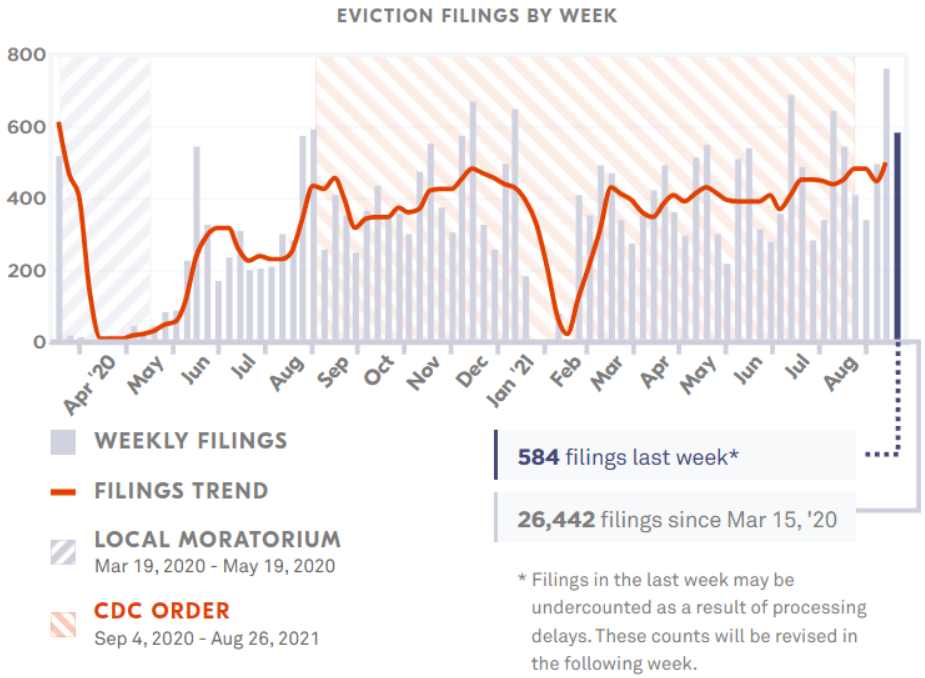
[18] https://www.jdsupra.com/legalnews/u-s-supreme-court-decision-ends-cdc-4834717/
[19] https://www.nolo.com/evictions-ban

Figure 21: Eviction Filings by Week: Houston, TX



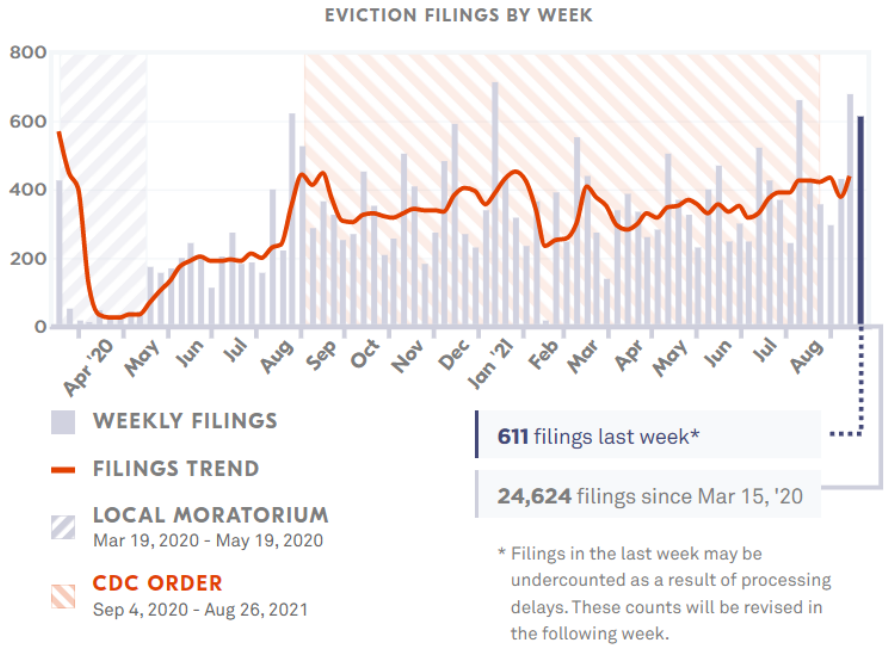
Source: https://evictionlab.org/eviction-tracking/

Figure 22: Eviction Filings by Week: Dallas, TX



Source: https://evictionlab.org/eviction-tracking/

Figure 23: Eviction Filings By Week: Fort Worth, TX



Source: https://evictionlab.org/eviction-tracking/

Figure 21, Figure 22, and Figure 23 show the weekly eviction filings by week for three MSAs in Texas. These figures show that the number of filings is trending upwards. The trend in filings by week has been increasing in all of these MSAs since June 2021, albeit only slightly. The eviction filings did increase after local moratoriums ended in mid-May 2020. Because evictions did not completely stop during the pandemic and the CDC eviction moratorium (see August, 2020 through August, 2021 period in the above figures), we are unlikely to see a spike in filings. However, the filings are trending upward. In the absence of local moratoriums, we are likely to see a steady increase in the number of eviction filings across the country, although we are not likely to see a huge spike. More tenants are likely to be susceptible to being evicted.

Will landlords in other MSAs or other states follow these same eviction filing trends or will tenants in other states be subject to the same risk? The PULSE Survey (US Census) has been asking participants about perceived risks of eviction (Figure 24) or inability to make regular household payments (Figure 25). The percentage of respondents in Texas who indicate they are “very” or “somewhat” likely to be evicted in the next 8 weeks is at 50%. This percentage is a little lower than what respondents in Louisiana are indicating but a little larger than the reported percentages in Alabama, Georgia, Mississippi, Arkansas, and Tennessee. We are likely to see small increases in the number of eviction filings across the South and Southeastern portion of the United States.

Figure 24 Percentage of Participants Who Estimate They are Likely to be Evicted

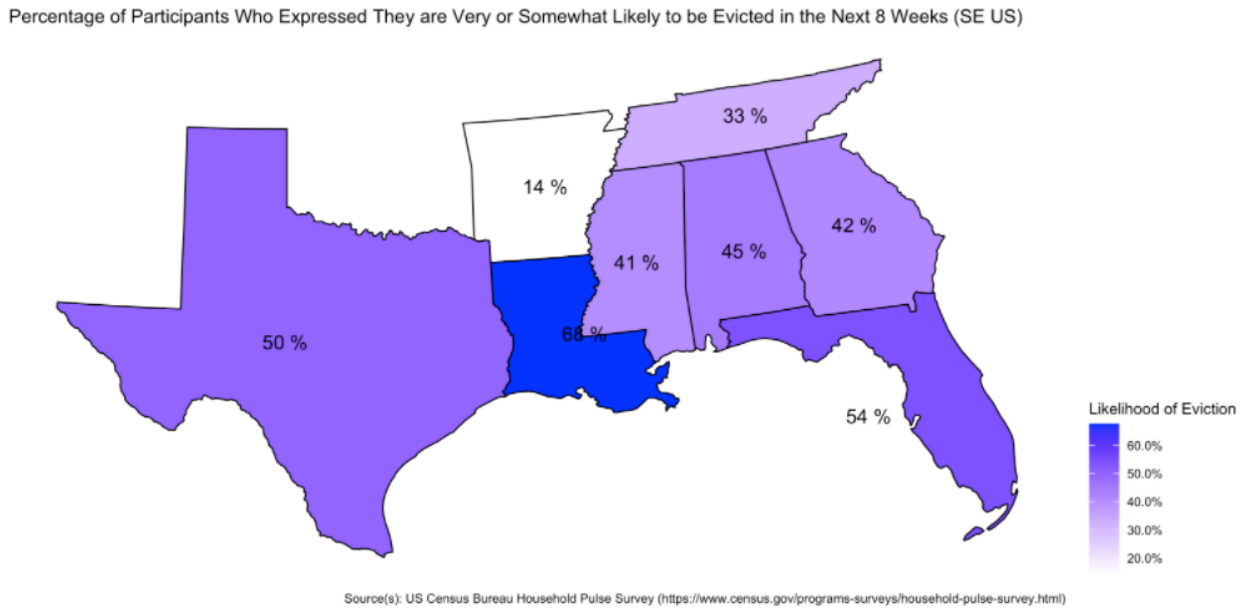
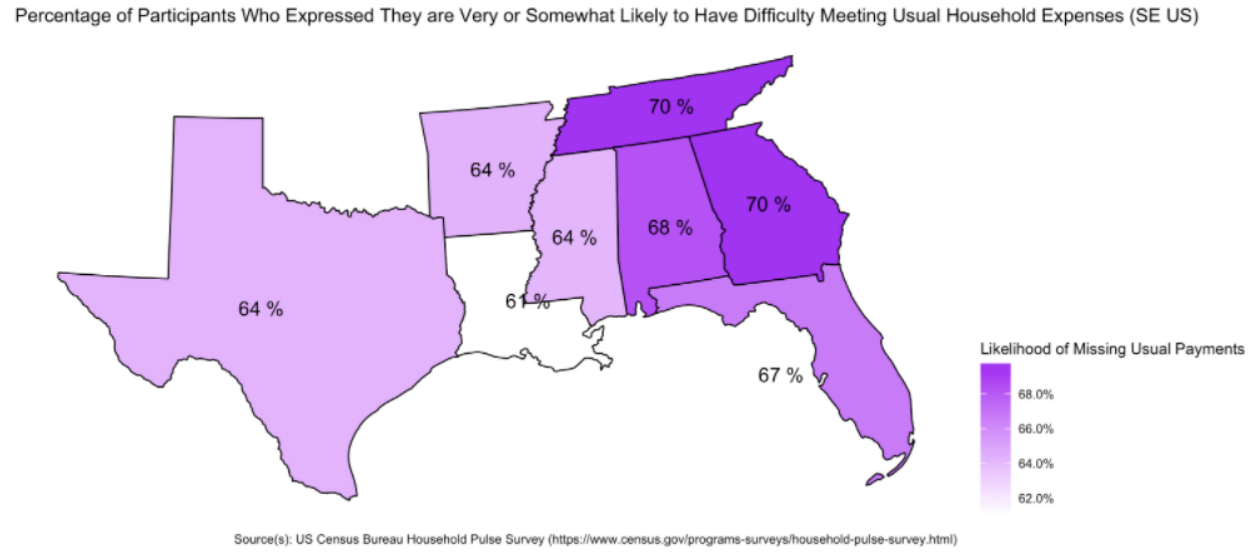


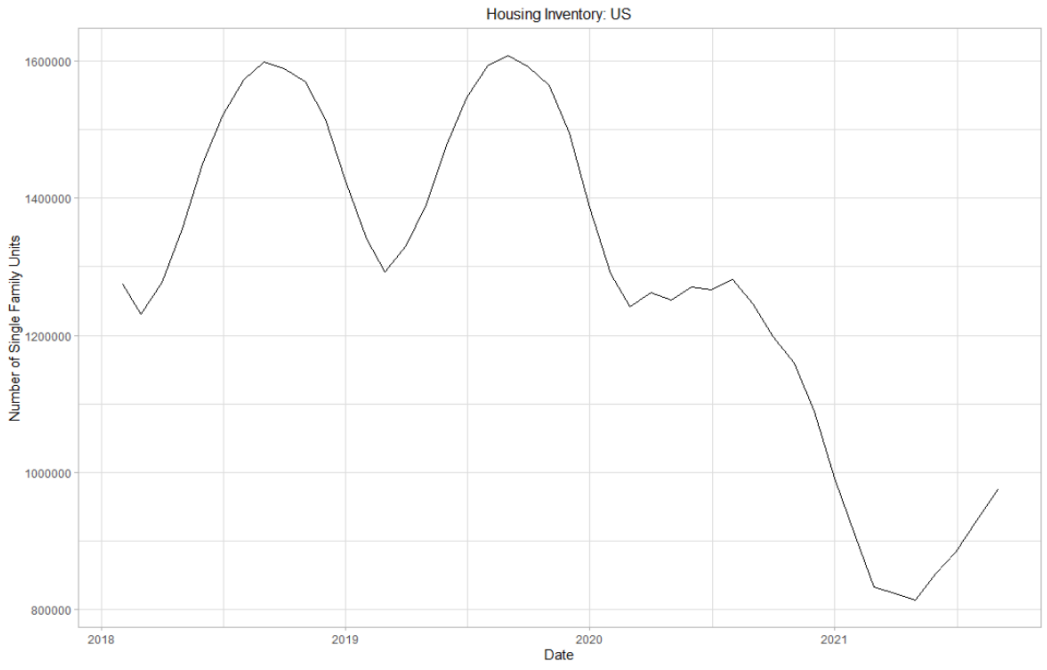
Figure 25 The Percentage of Household Indicating Difficulty Paying Household Expenses (PULSE Survey)



Inventory and Pricing

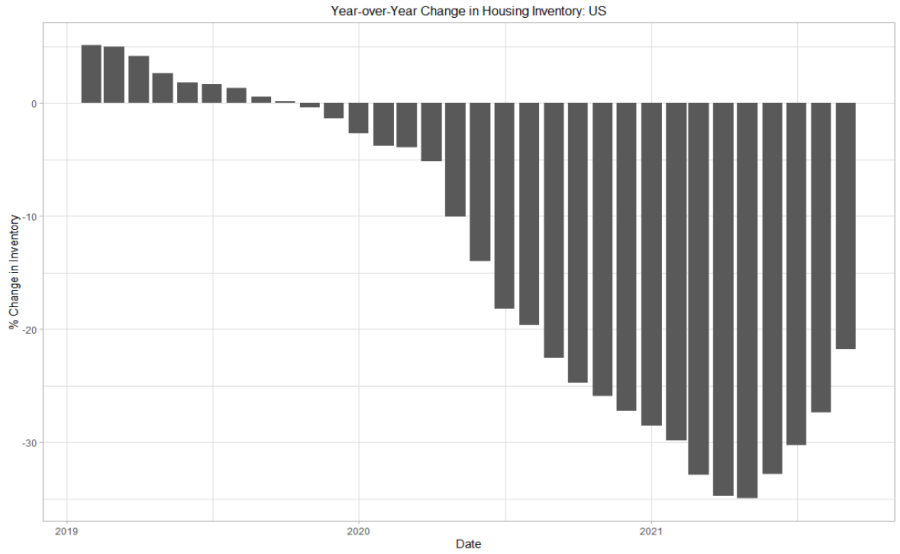
The housing inventory in the US is still down relative to where it was pre-pandemic, but it has been increasing. Figure 26 shows the number of single-family units in inventory in the US, and Figure 27 shows the year-over-year change in the number of units. The raw number of units fell during the first half of 2021 and has been rebounding slightly the last two months. The lack of inventory is contributing to the increase in prices for single family housing. We are not anticipating any relief in the prices for single family housing. The increase in the number of units in inventory is not going to satiate the needs of consumers. Additionally, the new starts for single family housing units (Figure 28) has decrease for 2021. This downward trend in new starts might be a function of the high cost of materials and the cost of construction labor. Although the real wages or construction workers has fallen during 2021, the nominal wages (out-of-pocket costs for developers/general contractors) has increased since the pandemic. The additional cost of construction combined with the uncertainty about pricing is likely causing some developers/contractors to pause construction until wages settle or expectations about housing prices solidify. Multi-unit housing starts has been increasing slightly. This should alleviate some of the upward pressure on housing prices, but it is not clear that consumers of single-family units are willing (or able) to substitute smaller apartments or condos in exchange for single-family units.

Figure 26: US Housing Inventory: Single Family Homes



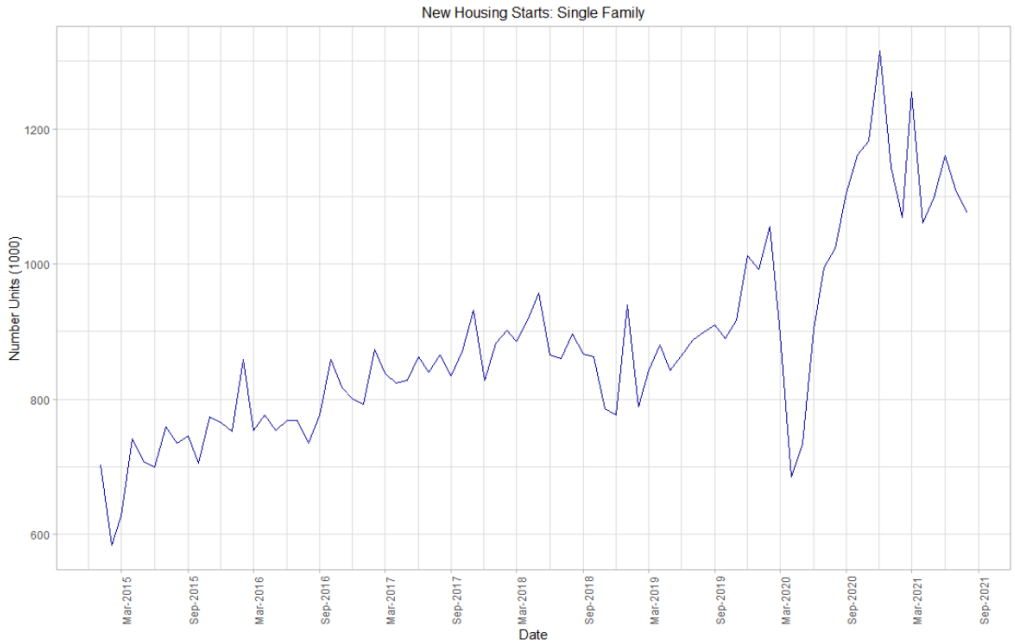
Source: Zillow.com

Figure 27: Year Over Year Change in Inventory Units: United States



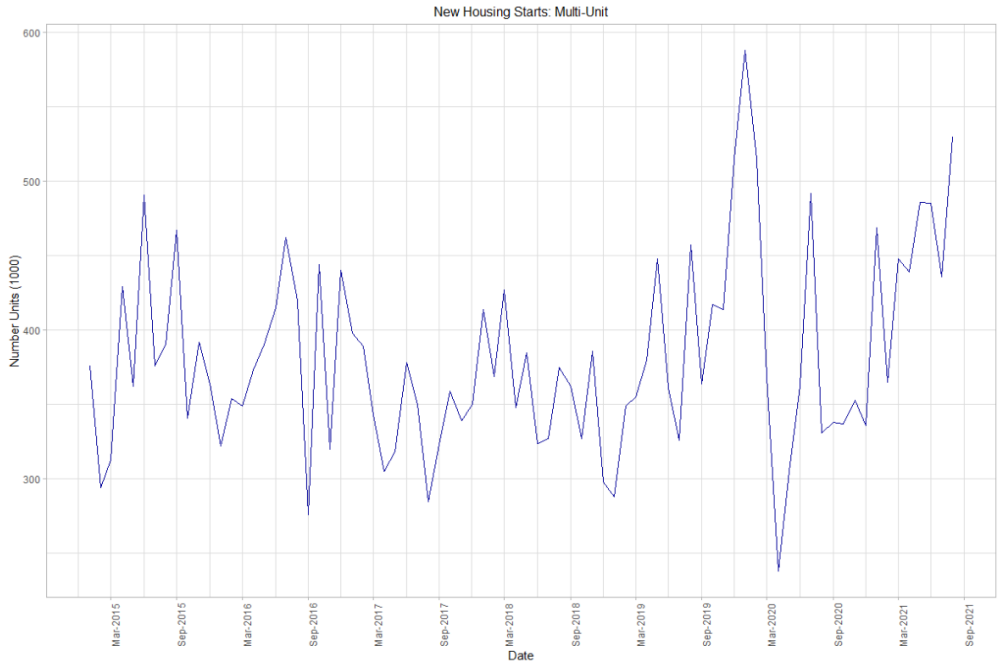
Source: Zillow.com

Figure 28: New US Single-Family Unit Starts



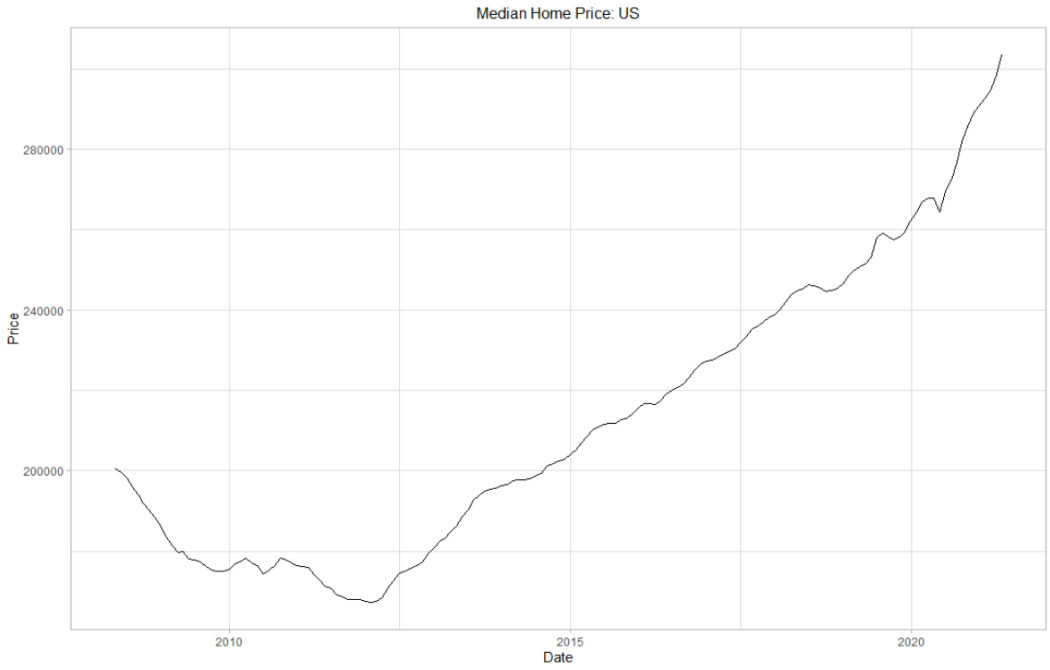
Source: Federal Reserve Economic Database (https://fred.stlouisfed.org)

Figure 29: New US Multi-Unit Home Starts



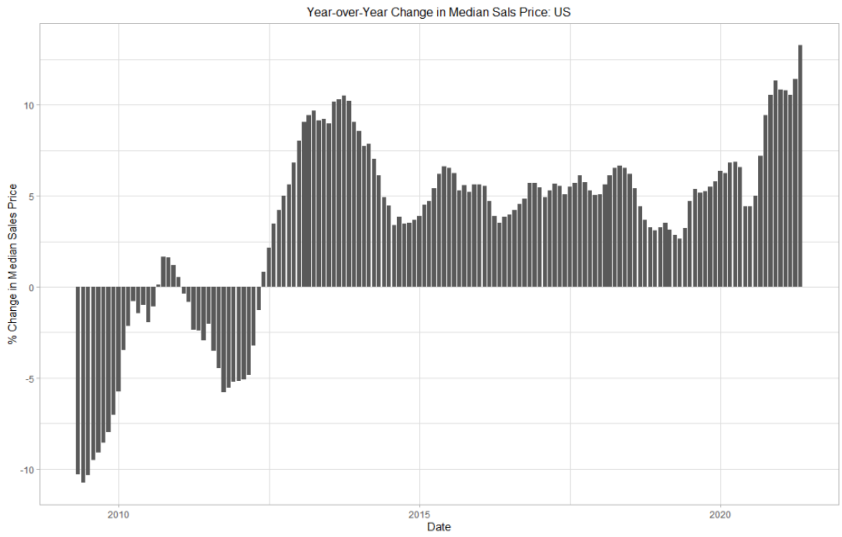
Source: Federal Reserve Economic Database (https://fred.stlouisfed.org)

Figure 30: Median Price for US Single Family Homes



Source: Zillow.com

Figure 31: Year-over-Year Change in Median Sales Price for US Single Family Units



Source: Zillow.com

The following tables, Table 2 through Table 6, present the delinquency rates of mortgages held by Freddie Mac for September 2021 in several southeastern states, broken down by MSA.

Table 2: Percentage of Freddie Mac Mortgages by Status (Current, 30 dpd and 30+ dpd) as of September 2021: Alabama & SMSAs

MSA	# Units	Total	Current	30-59 dpd	60-89 dpd	90-119 dpd	120+ dpd	% 30dpd	% >30 dpd	% >= 30 dpd
Anniston-Oxford, AL	1 unit	1138	1113	7	0	0	18	0.62%	1.58%	2.20%
	2 units	3	3	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	7	7	0	0	0	0	0.00%	0.00%	0.00%
Auburn-Opelika, AL	1 unit	4546	4494	17	10	0	25	0.37%	0.77%	1.14%
	2 units	27	27	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	1	1	0	0	0	0	0.00%	0.00%	0.00%
Birmingham-Hoover, AL	1 unit	29793	29360	139	26	14	254	0.47%	0.99%	1.45%
	2 units	23	23	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	14	14	0	0	0	0	0.00%	0.00%	0.00%
Columbus, GA-AL	1 unit	353	341	3	0	0	9	0.85%	2.55%	3.40%
	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	7266	7171	35	8	4	48	0.48%	0.83%	1.31%
	2 units	13	13	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	3	3	0	0	0	0	0.00%	0.00%	0.00%
Decatur, AL	1 unit	2133	2105	13	1	0	14	0.61%	0.70%	1.31%
	2 units	5	4	1	0	0	0	20.00%	0.00%	20.00%
	3+ units	8	8	0	0	0	0	0.00%	0.00%	0.00%
Dothan, AL	1 unit	2034	2011	10	0	1	12	0.49%	0.64%	1.13%
	2 units	1	1	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	2	2	0	0	0	0	0.00%	0.00%	0.00%
Florence-Muscle Shoals, AL	1 unit	2631	2577	21	0	5	28	0.80%	1.25%	2.05%
	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%
Gadsden, AL	1 unit	1212	1173	6	3	1	29	0.50%	2.72%	3.22%
	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%
Huntsville, AL	1 unit	13460	13295	53	17	3	92	0.39%	0.83%	1.23%
	2 units	17	17	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	40	40	0	0	0	0	0.00%	0.00%	0.00%
Mobile, AL	1 unit	5254	5150	30	7	1	66	0.57%	1.41%	1.98%
	2 units	12	12	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	5	4	0	1	0	0	0.00%	20.00%	20.00%
Montgomery, AL	1 unit	5873	5791	24	0	2	56	0.41%	0.99%	1.40%
	2 units	16	16	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	10	10	0	0	0	0	0.00%	0.00%	0.00%
Tuscaloosa, AL	1 unit	4885	4812	30	6	6	31	0.61%	0.88%	1.49%
	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	1 unit	10381	10167	76	21	8	109	0.73%	1.33%	2.06%

	2 units	41	40	0	0	0	1	0.00%	2.44%	2.44%
	3+ units	10	10	0	0	0	0	0.00%	0.00%	0.00%

Data: STACR Freddie Mac, as of 23 September 2021

Table 3: Percentage of Freddie Mac Mortgages by Status (Current, 30 dpd and 30+ dpd) as of September 2021: Florida & SMSAs

MSA	# Units	Total	Current	30-59 dpd	60-89 dpd	90-119 dpd	120+ dpd	% 30dpd	% >30 dpd	% >= 30 dpd
Cape Coral-Fort Myers, FL	1 unit	25276	24894	100	26	21	235	0.40%	1.12%	1.51%
	2 units	315	305	2	0	1	7	0.64%	2.54%	3.18%
	3+ units	38	36	1	0	0	1	2.63%	2.63%	5.26%
Crestview-Fort Walton Beach-Destin, FL	1 unit	6896	6804	34	9	2	47	0.49%	0.84%	1.33%
	2 units	13	13	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	18	18	0	0	0	0	0.00%	0.00%	0.00%
Deltona-Daytona Beach-Ormond Beach, FL	1 unit	17773	17498	80	31	13	151	0.45%	1.10%	1.55%
	2 units	138	133	0	0	0	5	0.00%	3.62%	3.62%
	3+ units	45	42	0	0	0	3	0.00%	6.67%	6.67%
Fort Lauderdale-Pompano Beach-Sunrise, FL	1 unit	48707	47127	290	108	72	1110	0.60%	2.65%	3.24%
	2 units	464	439	3	3	2	17	0.65%	4.74%	5.39%
	3+ units	250	241	1	0	0	8	0.40%	3.20%	3.60%
Gainesville, FL	1 unit	5780	5710	22	4	4	40	0.38%	0.83%	1.21%
	2 units	22	22	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	14	14	0	0	0	0	0.00%	0.00%	0.00%
Homosassa Springs, FL	1 unit	2922	2883	12	7	2	18	0.41%	0.92%	1.34%
	2 units	18	18	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	4	2	2	0	0	0	50.00%	0.00%	50.00%
Jacksonville, FL	1 unit	38646	38107	140	42	31	326	0.36%	1.03%	1.40%
	2 units	171	168	0	0	0	3	0.00%	1.75%	1.75%
	3+ units	102	102	0	0	0	0	0.00%	0.00%	0.00%
Lakeland-Winter Haven, FL	1 unit	14335	14104	56	21	17	137	0.39%	1.22%	1.61%
	2 units	91	88	1	0	0	2	1.10%	2.20%	3.30%
	3+ units	33	31	0	0	0	2	0.00%	6.06%	6.06%
Miami-Miami Beach-Kendall, FL	1 unit	40960	39505	286	79	60	1030	0.70%	2.85%	3.55%
	2 units	471	457	1	0	2	11	0.21%	2.76%	2.97%
	3+ units	127	124	0	0	0	3	0.00%	2.36%	2.36%
Naples-Marco Island, FL	1 unit	11972	11802	50	2	7	111	0.42%	1.00%	1.42%
	2 units	42	41	1	0	0	0	2.38%	0.00%	2.38%
	3+ units	16	16	0	0	0	0	0.00%	0.00%	0.00%
North Port-Bradenton-Sarasota, FL	1 unit	29962	29561	106	31	18	246	0.35%	0.99%	1.34%
	2 units	164	163	1	0	0	0	0.61%	0.00%	0.61%
	3+ units	27	27	0	0	0	0	0.00%	0.00%	0.00%
Ocala, FL	1 unit	7186	7065	33	11	8	69	0.46%	1.23%	1.68%
	2 units	23	23	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	15	12	2	0	0	1	13.33%	6.67%	20.00%

Orlando-Kissimmee-Sanford, FL	1 unit	70287	68751	341	98	63	1034	0.49%	1.70%	2.19%
	2 units	287	281	1	0	0	5	0.35%	1.74%	2.09%
	3+ units	84	82	0	0	0	2	0.00%	2.38%	2.38%
Palm Bay-Melbourne-Titusville, FL	1 unit	18224	17940	80	28	7	169	0.44%	1.12%	1.56%
	2 units	51	50	0	0	0	1	0.00%	1.96%	1.96%
	3+ units	25	23	0	0	0	2	0.00%	8.00%	8.00%
Palm Coast, FL	1 unit	182	179	0	2	0	1	0.00%	1.65%	1.65%
	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	4263	4192	29	6	4	32	0.68%	0.99%	1.67%
	2 units	36	36	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	14	14	0	0	0	0	0.00%	0.00%	0.00%
Pensacola-Ferry Pass-Brent, FL	1 unit	9076	8930	50	13	6	77	0.55%	1.06%	1.61%
	2 units	63	62	1	0	0	0	1.59%	0.00%	1.59%
	3+ units	37	37	0	0	0	0	0.00%	0.00%	0.00%
Port St. Lucie, FL	1 unit	14882	14606	78	32	12	154	0.52%	1.33%	1.86%
	2 units	55	51	0	0	0	4	0.00%	7.27%	7.27%
	3+ units	15	15	0	0	0	0	0.00%	0.00%	0.00%
Punta Gorda, FL	1 unit	6949	6850	23	14	4	58	0.33%	1.09%	1.43%
	2 units	26	25	1	0	0	0	3.85%	0.00%	3.85%
	3+ units	7	7	0	0	0	0	0.00%	0.00%	0.00%
Sebastian-Vero Beach, FL	1 unit	5416	5331	16	8	3	58	0.30%	1.27%	1.57%
	2 units	13	12	0	0	0	1	0.00%	7.69%	7.69%
	3+ units	6	6	0	0	0	0	0.00%	0.00%	0.00%
Sebring, FL	1 unit	1790	1758	10	2	2	18	0.56%	1.23%	1.79%
	2 units	14	14	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	4	4	0	0	0	0	0.00%	0.00%	0.00%
Tallahassee, FL	1 unit	8587	8469	36	11	5	66	0.42%	0.96%	1.37%
	2 units	49	49	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	31	31	0	0	0	0	0.00%	0.00%	0.00%
Tampa-St. Petersburg-Clearwater, FL	1 unit	87740	86123	397	106	80	1034	0.45%	1.39%	1.84%
	2 units	456	449	3	0	0	4	0.66%	0.88%	1.54%
	3+ units	250	243	2	0	1	4	0.80%	2.00%	2.80%
The Villages, FL	1 unit	2423	2406	5	1	0	11	0.21%	0.50%	0.70%
	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	43217	42146	198	71	63	739	0.46%	2.02%	2.48%
	2 units	222	215	1	0	0	6	0.45%	2.70%	3.15%
	3+ units	123	118	1	1	0	3	0.81%	3.25%	4.07%
Outside all MSAs	1 unit	8993	8819	48	15	14	97	0.53%	1.40%	1.94%

	2 units	332	319	3	1	0	9	0.90%	3.01%	3.92%
	3+ units	53	51	1	0	0	1	1.89%	1.89%	3.77%

Data: STACR Freddie Mac, as of 23 September 2021

Table 4: Percentage of Freddie Mac Mortgages by Status (Current, 30 dpd and 30+ dpd) as of September 2021: Louisiana & SMSAs

MSA	# Units	Total	Current	30-59 dpd	60-89 dpd	90-119 dpd	120+ dpd	% 30dpd	% >30 dpd	% >= 30 dpd
Alexandria, LA	1 unit	1545	1517	11	2	0	15	0.71%	1.10%	1.81%
	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%
Baton Rouge, LA	1 unit	19930	19501	149	36	13	231	0.75%	1.41%	2.15%
	2 units	50	48	1	0	0	1	2.00%	2.00%	4.00%
	3+ units	63	63	0	0	0	0	0.00%	0.00%	0.00%
Hammond, LA	1 unit	1948	1900	16	5	4	23	0.82%	1.64%	2.46%
	2 units	13	13	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	8	8	0	0	0	0	0.00%	0.00%	0.00%
Houma-Bayou Cane-Thibodaux, LA	1 unit	3287	3190	30	7	3	57	0.91%	2.04%	2.95%
	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	8297	8046	71	25	12	143	0.86%	2.17%	3.03%
	2 units	9	9	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	26	24	2	0	0	0	7.69%	0.00%	7.69%
Lake Charles, LA	1 unit	3358	3259	25	4	4	66	0.74%	2.20%	2.95%
	2 units	11	11	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	7	7	0	0	0	0	0.00%	0.00%	0.00%
Monroe, LA	1 unit	2374	2308	15	6	8	37	0.63%	2.15%	2.78%
	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	26192	25444	192	55	30	471	0.73%	2.12%	2.86%
	2 units	1358	1308	11	4	2	33	0.81%	2.87%	3.68%
	3+ units	347	334	1	0	0	12	0.29%	3.46%	3.75%
Shreveport-Bossier City, LA	1 unit	6406	6236	45	13	8	104	0.70%	1.95%	2.65%
	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	1 unit	5347	5181	47	10	10	99	0.88%	2.23%	3.11%
	2 units	460	439	2	1	0	18	0.44%	4.13%	4.57%
	3+ units	96	95	0	1	0	0	0.00%	1.04%	1.04%

Data: STACR Freddie Mac, as of 23 September 2021

Table 5: Percentage of Freddie Mac Mortgages by Status (Current, 30 dpd and 30+ dpd) as of September 2021: Mississippi & SMSAs

MSA	# Units	Total	Current	30-59 dpd	60-89 dpd	90-119 dpd	120+ dpd	% 30dpd	% >30 dpd	% >= 30 dpd
Gulfport-Biloxi, MS	1 unit	3830	3746	26	3	3	52	0.68%	1.51%	2.19%
	2 units	25	25	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	9	9	0	0	0	0	0.00%	0.00%	0.00%
Hattiesburg, MS	1 unit	2006	1963	14	7	2	20	0.70%	1.45%	2.14%
	2 units	3	3	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	1	1	0	0	0	0	0.00%	0.00%	0.00%
Jackson, MS	1 unit	7771	7603	41	13	11	103	0.53%	1.63%	2.16%
	2 units	8	8	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	3	3	0	0	0	0	0.00%	0.00%	0.00%
Memphis, TN-MS-AR	1 unit	4809	4735	18	10	6	40	0.37%	1.16%	1.54%
	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%
Pascagoula, MS	1 unit	78	72	1	0	1	4	1.28%	6.41%	7.69%
	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%
Outside all MSAs	1 unit	9363	9129	58	17	3	156	0.62%	1.88%	2.50%
	2 units	12	12	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	3	3	0	0	0	0	0.00%	0.00%	0.00%

Data: STACR Freddie Mac, as of 23 September 2021

Table 6: Percentage of Freddie Mac Mortgages by Status (Current, 30 dpd and 30 + dpd) as of September 2021: Texas & SMSAs

MSA	# Units	Total	Current	30-59 dpd	60-89 dpd	90-119 dpd	120+ dpd	% 30dpd	% >30 dpd	% >= 30 dpd
Abilene, TX	1 unit	3407	3349	23	6	2	27	0.68%	1.03%	1.70%
	2 units	15	15	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	2	2	0	0	0	0	0.00%	0.00%	0.00%
Amarillo, TX	1 unit	3866	3779	23	2	6	56	0.60%	1.66%	2.25%
	2 units	13	13	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	85515	84337	328	86	46	718	0.38%	0.99%	1.38%
	2 units	984	970	3	0	0	11	0.31%	1.12%	1.42%
	3+ units	206	202	3	0	0	1	1.46%	0.49%	1.94%
Beaumont-Port Arthur, TX	1 unit	4837	4709	38	10	7	73	0.79%	1.86%	2.65%
	2 units	2	2	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	7	7	0	0	0	0	0.00%	0.00%	0.00%
Brownsville-Harlingen, TX	1 unit	2310	2250	14	2	6	38	0.61%	1.99%	2.60%
	2 units	32	32	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	27	27	0	0	0	0	0.00%	0.00%	0.00%
College Station-Bryan, TX	1 unit	5983	5908	25	5	1	44	0.42%	0.84%	1.25%
	2 units	90	90	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	55	54	0	0	0	1	0.00%	1.82%	1.82%
Corpus Christi, TX	1 unit	6213	6071	42	12	8	80	0.68%	1.61%	2.29%
	2 units	13	13	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	14	14	0	0	0	0	0.00%	0.00%	0.00%
Dallas-Plano-Irving, TX	1 unit	163563	160719	730	170	120	1824	0.45%	1.29%	1.74%
	2 units	391	381	2	0	0	8	0.51%	2.05%	2.56%
	3+ units	103	99	2	0	0	2	1.94%	1.94%	3.88%
El Paso, TX	1 unit	5352	5195	37	10	11	99	0.69%	2.24%	2.93%
	2 units	59	58	0	0	0	1	0.00%	1.70%	1.70%
	3+ units	28	28	0	0	0	0	0.00%	0.00%	0.00%
Fort Worth-Arlington-Grapevine, TX	1 unit	68703	67491	354	86	64	708	0.52%	1.25%	1.76%
	2 units	351	348	0	0	0	3	0.00%	0.86%	0.86%
	3+ units	94	93	1	0	0	0	1.06%	0.00%	1.06%
Houston-Sugar Land-Baytown, TX	1 unit	165425	161344	990	266	205	2620	0.60%	1.87%	2.47%

	2 units	275	267	1	1	0	6	0.36%	2.55%	2.91%
	3+ units	239	232	2	0	0	5	0.84%	2.09%	2.93%
Killeen-Temple-Fort Hood, TX	1 unit	5421	5305	27	6	7	76	0.50%	1.64%	2.14%
	2 units	182	178	0	0	2	2	0.00%	2.20%	2.20%
	3+ units	167	166	1	0	0	0	0.60%	0.00%	0.60%
Laredo, TX	1 unit	1607	1563	9	7	3	25	0.56%	2.18%	2.74%
	2 units	3	1	2	0	0	0	66.67%	0.00%	66.67%
	3+ units	8	8	0	0	0	0	0.00%	0.00%	0.00%
Longview, TX	1 unit	2322	2278	9	5	4	26	0.39%	1.51%	1.90%
	2 units	9	9	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	2	1	0	0	0	1	0.00%	50.00%	50.00%
Lubbock, TX	1 unit	7167	7055	31	8	4	69	0.43%	1.13%	1.56%
	2 units	87	87	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	13	13	0	0	0	0	0.00%	0.00%	0.00%
McAllen-Edinburg-Mission, TX	1 unit	3669	3522	32	12	7	96	0.87%	3.13%	4.01%
	2 units	17	16	0	0	0	1	0.00%	5.88%	5.88%
	3+ units	157	154	0	0	0	3	0.00%	1.91%	1.91%
Midland, TX	1 unit	5385	5219	31	15	7	113	0.58%	2.51%	3.08%
	2 units	15	15	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	2	2	0	0	0	0	0.00%	0.00%	0.00%
Odessa, TX	1 unit	2013	1932	19	9	3	50	0.94%	3.08%	4.02%
	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	2175	2122	10	8	5	30	0.46%	1.98%	2.44%
	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	47075	46170	244	66	47	548	0.52%	1.40%	1.92%
	2 units	329	320	4	0	0	5	1.22%	1.52%	2.74%
	3+ units	194	189	0	0	0	5	0.00%	2.58%	2.58%
Sherman-Denison, TX	1 unit	3822	3758	24	3	5	32	0.63%	1.05%	1.68%
	2 units	28	28	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	1	1	0	0	0	0	0.00%	0.00%	0.00%
Texarkana, TX-Texarkana, AR	1 unit	1085	1063	6	2	2	12	0.55%	1.48%	2.03%
	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	3978	3897	30	4	4	43	0.75%	1.28%	2.04%

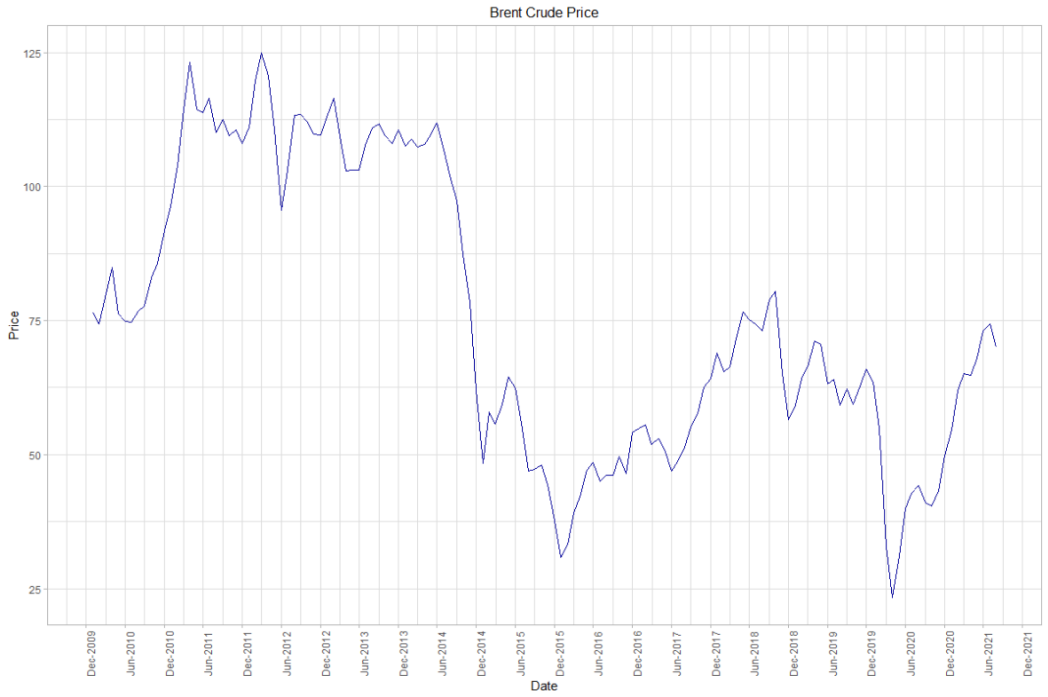
	2 units	7	7	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	1	1	0	0	0	0	0.00%	0.00%	0.00%
Victoria, TX	1 unit	983	953	6	5	3	16	0.61%	2.44%	3.05%
	2 units	3	3	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	0	0	0	0	0	0	0.00%	0.00%	0.00%
Waco, TX	1 unit	4322	4237	39	6	3	37	0.90%	1.06%	1.97%
	2 units	42	42	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	2	2	0	0	0	0	0.00%	0.00%	0.00%
Wichita Falls, TX	1 unit	1240	1205	9	4	0	22	0.73%	2.10%	2.82%
	2 units	6	6	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	1 unit	31063	30342	240	54	32	395	0.77%	1.55%	2.32%
	2 units	462	457	0	0	0	5	0.00%	1.08%	1.08%
	3+ units	62	62	0	0	0	0	0.00%	0.00%	0.00%

Data: STACR Freddie Mac, as of 23 September 2021

Energy Prices: Oil and Natural Gas

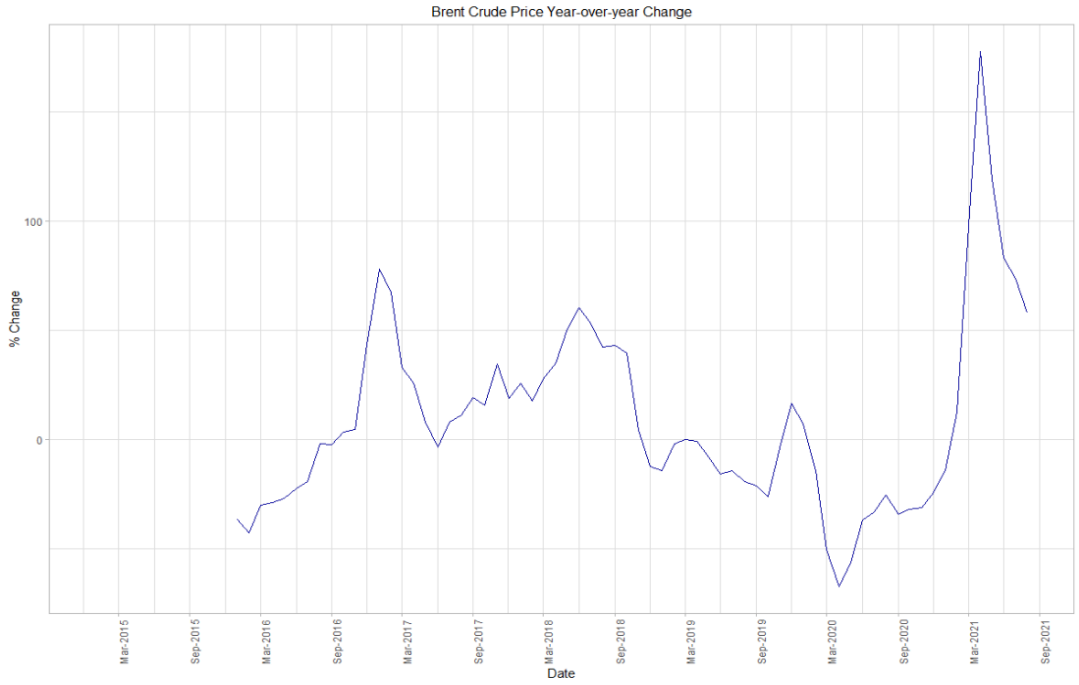
The price of Brent Crude has been steadily increasing in price since the hard crash in March 2020. The drop in prices corresponded to the significant drop in consumer and industry demand. Consumers decreased their consumption of fuel as their driving miles fell during the pandemic (Figure 34). Airlines reduce their demand for fuel as customer miles also decreased significantly (Figure 35). The increase in vehicle miles and flight miles traveled has pushed the demand for Brent crude up, coinciding with an increase in energy prices. Brent crude prices are also significantly correlated to the over-all changes in the price level (see the correlation illustrated in Figure 36). Because the demand for fuel has continued to increase, there is little reason to forecast anything but a continued increase in the price of fuel. The only respite for households is that a share of companies are still working from home or instituting a hybrid model where at least some time is spent working from home each week. As employers require workers to return to the office, we will likely see an escalation of demand and a continued increase in fuel prices.

Figure 32: Brent Crude Prices



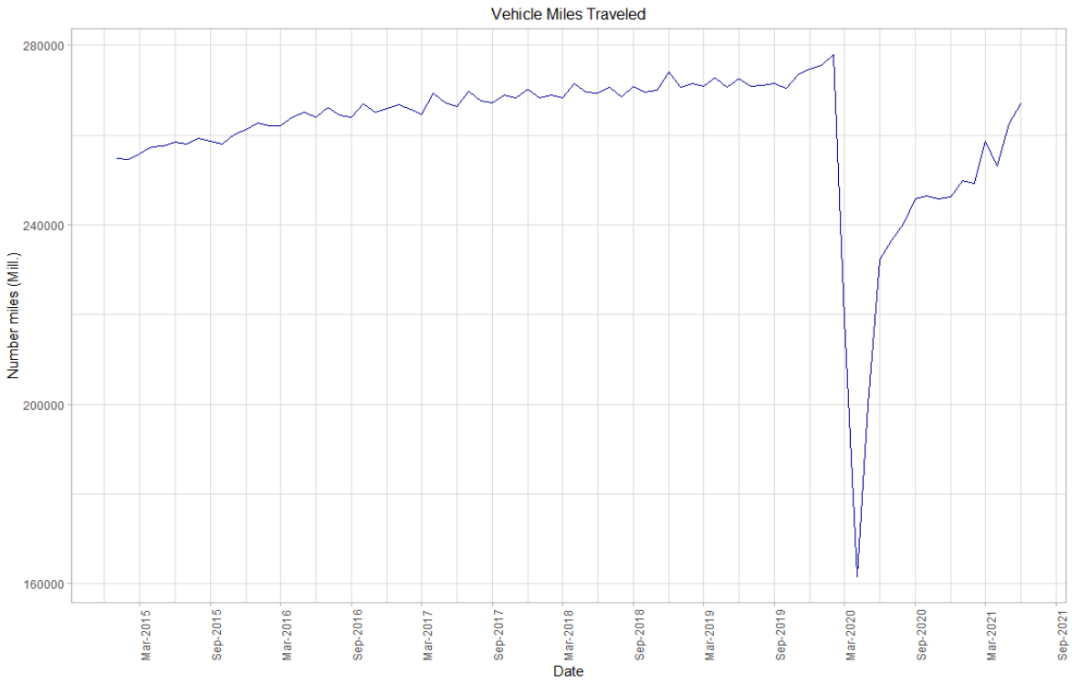
Source: Federal Reserve Economic Database (https://fred.stlouisfed.org)

Figure 33: Year Over Year Changes in Brent Crude Prices



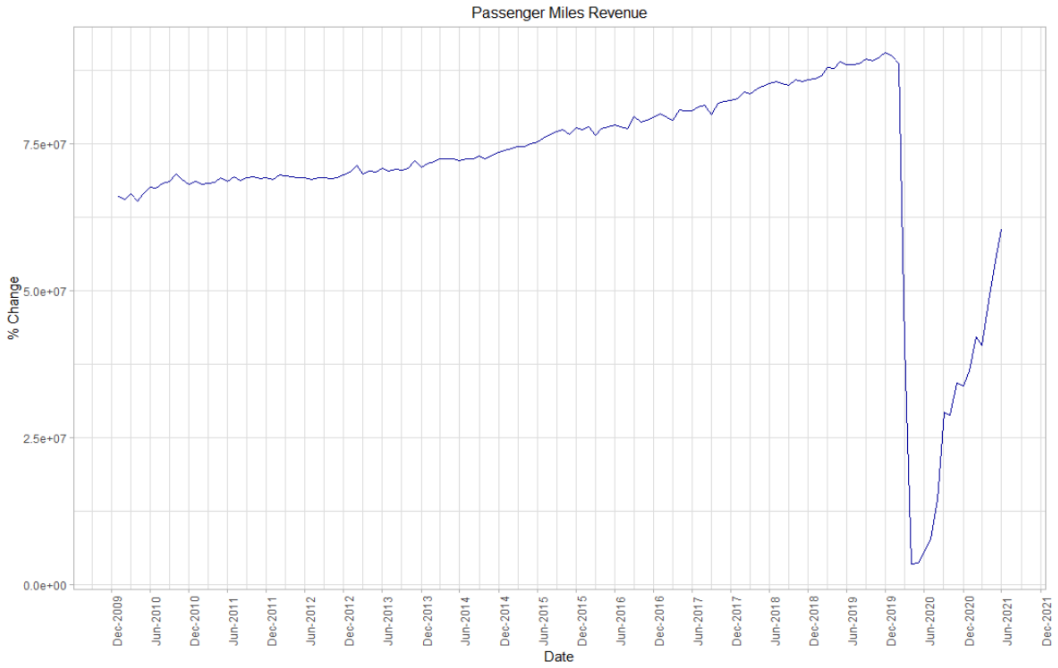
Source: Federal Reserve Economic Database (https://fred.stlouisfed.org)

Figure 34: Vehicle Miles Traveled



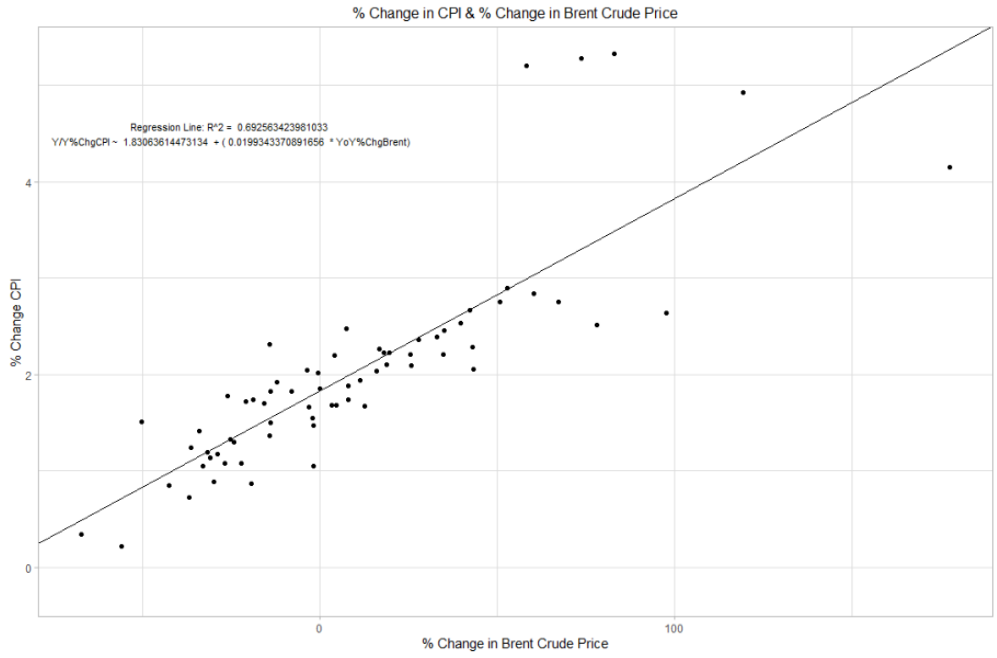
Source: Federal Reserve Economic Database (https://fred.stlouisfed.org)

Figure 35: Airline Passenger Miles of Revenue



Source: Federal Reserve Economic Database (https://fred.stlouisfed.org)

Figure 36: Change in CPI versus Change in Brent Crude Prices



Source: Federal Reserve Economic Database (https://fred.stlouisfed.org)

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 (2019-2021), with several different strains (most recently, "Delta" and "Gamma")

   While questions during the handling of the COVID-19 emergency have shone a light on the globe's ability to address a new pathogen under pressure, any answer is still a function of the contagiousness of the pathogen. The newly identified "Delta" and "Mu" strains are seen as particularly virulent and threatening at least the (approximately) 1/3 of the unvaccinated US population.[20] Depending on how quickly a new pathogen spreads, along with its incubation period and symptoms, could mean the difference between survival and massive devastation.

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 networks[21]. It is expected that the same types of propaganda that was made noteworthy in 2016 will continue to be seen in future elections at all levels of government, and as part of other key events.

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."[22] 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)[23]. 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

[20] See https://www.cbsnews.com/news/covid-19-delta-variant-dense-outbreaks-gottlieb/
[21] See https://www.nytimes.com/2020/09/01/technology/facebook-russia-disinformation-election.html
[22] See https://us.norton.com/internetsecurity-malware-ransomware-5-dos-and-donts.html
[23] See https://security.berkeley.edu/faq/ransomware/ and https://securityintelligence.com/articles/6-ransomware-trends-2020/

will then infect a system and demand a fee for the decryption key. As our society becomes more dependent on automated systems, disruptions to those systems will have an increasing impact on us. Recently, $4.3M in ransom was demanded of the Colonial Pipeline Company[24], $11M was demanded of a JBS USA Holdings (an international meat supplier)[25], and over $21B was demanded of hospitals like St. Joseph's/Candler Hospital in Savannah, GA in 2020[26].

4. Societal Unrest, including Domestic Social Changes and Terrorism: During 2020, we saw many social protests turn violent on both ends of the political spectrum. Without warning, these movements have caused rapid and unexpected upheavals in social climates, and upended assumptions on which financial decisions were made. As these questions have been explored socially and officially, the discussions have led to questions of how deep the disdain in the country remains on both sides of the political fence, and what societal and legislative impacts these investigations may carry.[27]

5. Unanticipated Changes in Leadership: President Biden is currently 78 years old, and it is entirely possible that a transition of leadership from him to (assumedly) Vice President Harris may be necessary before the next inauguration in 2024. It is not clear at this time what differences in policy may come to light between Mr. Biden and Ms. Harris if such a transition were to occur, or how effective Ms. Harris may be at leading domestically or internationally. It has been reported that Ms. Harris is a strong advocate of diversity[28] and wage protection[29], but we are most concerned about how she will be perceived on the international stage in negotiations with, e.g., Saudi Arabia (particularly if she inherits Mr. Biden's baggage)[30], and countries in the Far East (given cultural differences).

6. Supply Chain Disruptions: The recent (March 2021) blockage of the Suez Canal by the tanker Ever Given over a five-day period highlighted the fragility of certain key bottlenecks in distribution of many goods, including paper products, oil, and food. The Suez itself accounts for 10-15% of all goods[31]. While the issue has been resolved, the Suez, along with the Panama Canal, the Strait of Hormuz, and the Malacca Strait, are the four most noteworthy trade chokepoints. If closed, the Panama Canal would impact 5% of global trade (and 60% of US imports and exports); closing the Strait of Hormuz would affect 25% of seaborne oil and a third

[24] See https://www.nytimes.com/2021/05/13/us/politics/biden-colonial-pipeline-ransomware.html
[25] See https://www.wsj.com/articles/jbs-paid-11-million-to-resolve-ransomware-attack-11623280781
[26] See https://www.savannahnow.com/story/news/2021/06/17/cyberattack-hits-computer-systems-st-josephs-candler-hospital-savannah-ga/7734444002/ and https://www.savannahnow.com/story/news/2021/06/25/cyberattack-savannah-hospital-system-part-growing-trend/5336312001/
[27] See https://www.npr.org/2020/11/05/931829801/election-dispute-increases-risk-of-political-violence-analysts-warn , https://www.independent.co.uk/news/world/americas/us-election-2020/election-results-2020-riots-trump-biden-b1700559.html , and https://www.brookings.edu/blog/fixgov/2020/10/27/why-the-risk-of-election-violence-is-high/
[28] See, e.g., https://www.huffpost.com/entry/kamala-harris-vice-president-nominee-dnc_n_5f36f56bc5b69fa9e2fb7862
[29] See, e.g., https://www.shrm.org/resourcesandtools/hr-topics/benefits/pages/where-kamala-harris-stands-on-workers-pay-and-benefits.aspx
[30] See https://www.middleeasteye.net/news/kamala-harris-joe-biden-vice-president-saudi-israel
[31] See https://www.businessinsider.com/toilet-paper-coffee-products-delayed-suez-canal-blockage-impact-2021-3

of global liquified natural gas; and the Malacca Strait carries 40% of all global trade (including 16M barrels of oil per day).[32]

7. The US is currently within striking distance of exceeding its specified debt ceiling during the second half of October.[33] If the US Treasury is unable to borrow additional money, the country will not be able to fulfill all of its obligations (as approved during the previous and current administration by the President and Congress). Further, there is a current political dispute within Congress in which Republican senators are vowing that they would oppose any bill that would keep the U.S. from defaulting on its debt in order to take advantage of the leverage that they would gain in the otherwise Democratically controlled Congress. In the event that the US does default on its obligations, the country would likely have its credit rating affected, and its currency would likely would likely be de-valued in international exchanges, thereby undermining the US' position as a monetary standard.

8. With the increasing visibility of distributed cryptocurrencies, several countries are currently investigating the possibility and benefits of such an offering based on their own hard currencies. While China received notable press after initially launching their own digital currency[34], they recently withdrew some of their offering. In contrast, several Caribbean countries have launched successful cryptocurrencies, including the Bahamas, Grenada, and St. Kitt's & Nevis[35]. Ecuador and Senegal canceled their projects[36].

   Mr. Powell and Ms. Yellen have stated that the US is currently investigating the opportunity to issue a cryptocurrency that is backed by the US Dollar; however, for the US to undertake issuing its own cryptocurrency, there are significant risks. First, cybercurrencies are inherently distributed and not centrally controlled; the security of an online cryptocurrency would have to be absolute, for if it were to be breached, the availability of truly "perfect counterfeit currency" would be the "brass ring" for criminals and states that would like to undermine the US economy. The US currently has over $2T of currency in circulation (and over $120T of wealth), and being able to potentially dilute that through cyber-based initiatives (versus traditional counterfeiting efforts) is potentially the most significant concerns. Aside from the security of the currency, public acceptance of a digital currency that may be subject to government control (as evidenced by China's brief use[37]) would also hamper its usefulness. Finally, assuming that there would exist a transition period during which the cybercurrency would coexist with paper currencies, it would be virtually impossible to ensure that the two currencies would retain identical values in the world markets[38]; the risks of a virtual currency taking on negative value compared to its

[32] See https://www.dw.com/en/suez-canal-blockage-4-of-the-biggest-trade-chokepoints/a-57020755
[33] https://thehill.com/policy/finance/573772-us-could-default-on-debt-as-soon-as-oct-15-analysis
[34] See https://www.wsj.com/articles/china-creates-its-own-digital-currency-a-first-for-major-economy-11617634118
[35] https://www.atlanticcouncil.org/cbdctracker/
[36] Ibid.
[37] https://www.wsj.com/articles/china-creates-its-own-digital-currency-a-first-for-major-economy-11617634118
[38] See https://www.wsj.com/articles/digital-currencies-pave-way-for-deeply-negative-interest-rates-11631091581

paper counterpart cannot be understated, since that phenomena would lead to hoarding of the paper dollar (that would likely retain its “original” value, in comparison), thereby undermining the project.

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."

Capitalytics provides the results of a rigorous analysis of every variable that is included in our quarterly macroeconomic study. These variables include the following[39]:

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

[39] 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.

26. House Price Index
27. Commercial Real Estate Price Index
28. Market Volatility Index (VIX)

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 172 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**[40]
6-month Treasury yield		3-year Treasury yield*
Prime rate	**… depends on …**	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*

[40] 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 "*".

10-year Treasury yield		5-year Treasury yield
20-year Treasury yield		7-year Treasury yield*
30-year Mortgage rate		5-year Treasury yield*
30-year Treasury yield		20-year Treasury yield*
S&P 500 Stock Price Index		Commercial Real Estate Price index
US Residential Home Price Index		Commercial Real Estate Price index
Primary Credit rate		3-year Treasury yield*
Moody's AAA Rate		30-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 are adopting a monetary policy of not adjusting interest rates until the nation's economy has recovered (meaning that employment has returned to "acceptable" levels, while inflation is kept in check), 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 2Q2023, before gradual realistic adjustments. We re-emphasize that the previous statements are only policy, and not law, meaning that, ***it is possible (and we even view it as likely) for interest rates to rise during 1H2022 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

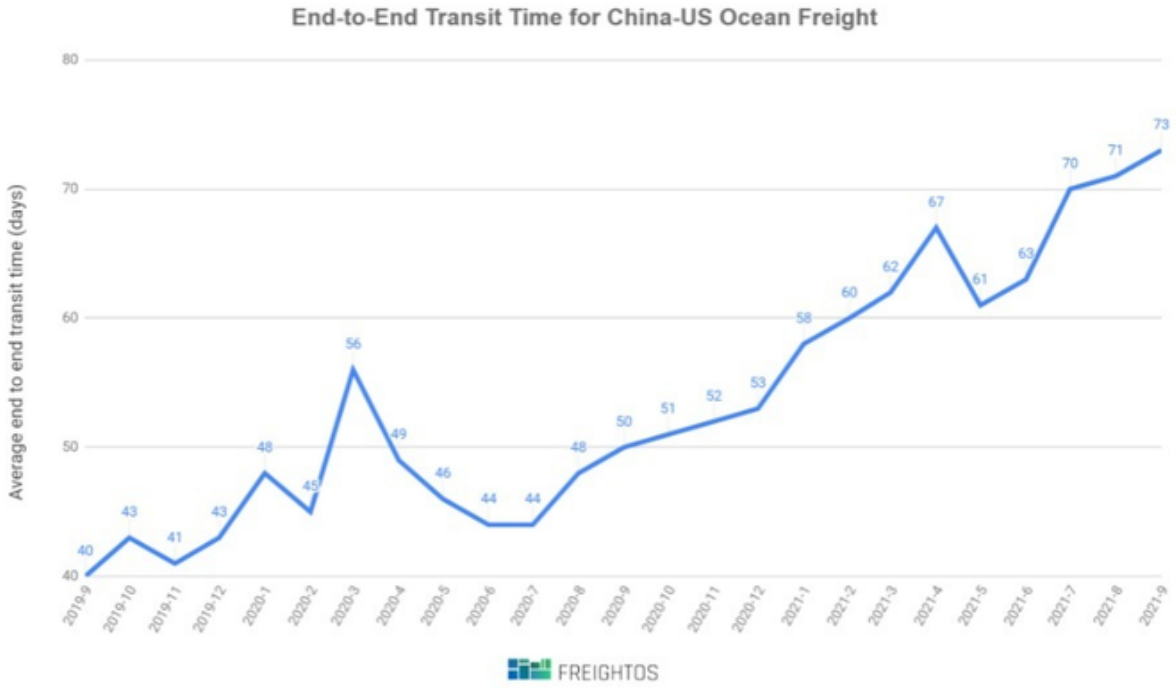
Analysis

Ordinarily, GDP is driven by several factors:

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

The United States is still experiencing localized or regional "pockets" of COVID infections, resulting in a "jerking" availability of goods and services based on their origination and traversal points. Products appear to be becoming available to the majority of the country, but international supply chains are still experiencing weaknesses either at the origination ports, or while ships are enqueued to be unloaded at various east- and west- coast ports. See Figure 37[41] for a recent chart of the delays that have grown for freight shipped from China to the US as a function of the shipment's *offload date* (meaning that, e.g., shipments that were offloaded during May of 2021 left their origination port 61 days prior). Delays at ports have been generally characterized as labor issues with warehouse companies, ground transportation, and dockworkers[42].

Figure 37: Trans-Pacific shipping time (as a function of offload date)



Real GDP increased at an annual rate of 6.6 percent during 2Q2021[43]. As business has attempted to return to US communities, demand is continuing to be stifled by the availability of workers and goods, with service venues being unable to open due to unavailable workers, and products not being available at the point of sale (i.e., in storefronts and similar fora). In the net, the market sees spikes in pricing; these price spikes, though not truly "systemic", are being characterized as "inflation" and will be discussed later in this paper.

[41] https://www.indiegogo.com/projects/chessup-level-up-your-chess-game
[42] https://www.wsj.com/articles/cargo-delays-are-getting-worse-but-california-ports-still-rest-on-weekends-11632648602
[43] https://www.bea.gov/data/gdp/gross-domestic-product

In 2Q2021, Q/Q spending increased (to $15.68T) by 4.47%[44]. ***We expect for this trend to continue as the country continues to present an appearance of stability in returning markets, services, and employment opportunities.*** Hence, while there is demand for personal consumption and retail trade, we expect it to grow slowly in the aggregate as the rest of the world's supply chains are restored. Again, ***until the global labor force is restored***, ***there will be a drag on consumer spending and the US GDP***, and increases in prices and services will continue to be felt (with a lack of adequate competition).

While the US has recovered from the COVID pandemic more rapidly than other countries, the US' demand for foreign products dropped very slightly in Q2, but is still approximately level with Q1 – meaning that US demand for foreign products is still much stronger than foreign demand for US goods[45]. While we are hopeful that the rest of the world will also recover from the COVID crisis, we are still expecting a very slow recovery globally, and for ***the US' net trade deficit to continue to generally trend upwards through all of 2022[46].***

Further, we expect ***government spending will continue to increase*** through 2022. President Biden has already lobbied and passed a one-time $1.9T stimulus plan that resulted in substantial aid being distributed to portions of the population. As of the time of this writing (September 2021), the White House and senior Congressional leaders have made progress in negotiations regarding the latest versions of President Biden's "American Jobs Plan" (originally a $2.3T bill that has evolved into the $1T "Infrastructure Investment and Jobs Act") and "American Families Plan" (originally $1.8T, and now coined the $3.5T "Reconciliation Bill", i.e., an amendment to the national budget)[47]. The IIJA will leverage about 50% of its spending from reallocations out of other programs, and will provide monies for use on infrastructure repair during FY2022-26. The "Reconciliation Bill" will provide for additional spending over the next 10 years[48]. It is difficult to predict which pieces of these spending bills might be passed by Congress, when they might be passed, and in what form.

We are concerned about the possible route to recovery taken by the US. Given that the US market is showing a strong desire to return to a pre-COVID "lifestyle" (both producers and consumers), we are seeing that labor force participation is a noteworthy stumbling block to market restoration. While we will discuss issues with the domestic workforce in the next section, suffice it to say for now that employers are still experiencing strong forces against their staffing efforts.

To wit, employers are not only ensuring the safety of the enterprise for their employees, but are also substantially increasing wages in order to overcome employees' care issues and/or competitive offers, resulting in price increases that are eventually borne at the register, fueling inflationary concerns. So, while there is demand for products and services, the current rebound is stumbling somewhat in its ability to produce. We expect this trend to continue for several years while employers and employees work to re-join each other at an optimal point, meaning that a certain amount of "churn" in the

[44] https://fred.stlouisfed.org/series/PCE

[45] https://fred.stlouisfed.org/series/BOPGSTB and https://www.census.gov/foreign-trade/Press-Release/current_press_release/ft900.pdf

[46] https://www.bea.gov/news/2021/us-international-trade-goods-and-services-january-2021

[47] See https://www.brookings.edu/blog/the-avenue/2021/08/05/the-senate-infrastructure-bill-puts-america-closer-to-another-new-deal/ , https://www.cnn.com/2021/07/28/politics/infrastructure-bill-explained/index.html , and https://www.cfr.org/backgrounder/state-us-infrastructure

[48] https://www.cnn.com/2021/08/09/politics/read-senate-resolution-fiscal-year-2022/index.html

marketplace is expected until employers find employees that meet their (changing) expectations. Inflation (and the reports thereof) will be the force that will erode the employers' expectations of workers, and ability to hire.

Returning to our discussion of supply chain issues, while we do appreciate that there are transient issues in the domestic and global markets' ability to deliver goods and services – resulting in higher prices for end-consumers, ***we do still believe that competitive pressures will eventually return and force consumers' (real) prices down***. As South America, the Pac-Asia area, and portions of Europe are still working to control their own health issues, competitive pressures from these areas are substantially lessened, allowing US businesses to increase prices.

While we don't doubt that non-US businesses also feel pressures to increase prices from their own workers and suppliers, in cases that these forces are not equally felt around the globe, there will eventually have to be a reckoning (or several "reckonings" spread across markets as regions regain control of their health). For domestic goods that are experiencing a reprieve at the moment, there will come a time when prices will need to be re-adjusted in the global marketplace. As that competition returns (and turnover in workers occurs), workers' wages will undoubtedly be re-assessed for businesses to survive.

While the Biden administration has promised to donate 1 billion doses of COVID-19 vaccine[49] to other countries, the world economy still has a long way to go in order to return to stability. With an estimated global population approaching eight billion people, we are revising our previous expectations to say that ***the global economy will remain in a state of flux for at least another 24 to 36 months (i.e., until possibly mid-2024)***. Therefore, supply chain issues that are currently plaguing at least some of the US' markets will likely continue into 2023, with the points at which different foreign companies – companies that may have dominated an industry prior to the pandemic – each eventually try to re-assert themselves at some point in the next few years, resulting in a strong competitive scene that will eventually benefit buyers.

Finally, consumer spending (or the desire thereof) has been strong during 2021. As prices have increased, members of the FOMC have accepted that price pressures have emerged more quickly than originally expected[50]. Recognizing that the FOMC intends to manage inflation to a "long term" target of approximately 2%, ***we expect that price changes will be significant & erratic through 2023***, whether those changes are coined as "inflation" or not. ***We expect that inflation will be reported as increasing by over 5% annualized through 1H2022,*** and the ***real GDP growth rates will most likely be between 0.5% and 1.5% (Q/Q).*** (Note that these inflation expectations are heightening since our last report, and our GDP expectations are dropping.) We take this position regarding GDP due to the fact that we expect international competitive pressure and demand for products to be slowly restored, and for domestic issues (i.e., hiring) to continue to become more significant issues over the next six months.

[49] Per https://apnews.com/article/united-nations-general-assembly-joe-biden-pandemics-business-united-nations-e7c09c1f896d83c0ed80513082787bd3

[50] See https://www.wsj.com/articles/transitory-inflation-can-be-a-lasting-affair-11632139391

Other Commentary

- "The GDPNow model estimate for real GDP growth (seasonally adjusted annual rate) in the third quarter of 2021 is 1.3 percent on October 5, down from 2.3 percent on October 1. After recent releases from the US Bureau of Economic Analysis, the US Census Bureau, and the Institute for Supply Management, the nowcasts of third-quarter real personal consumption expenditures growth and third-quarter real gross private domestic investment growth decreased from 1.4 percent and 12.9 percent, respectively, to 1.1 percent and 10.5 percent, respectively, while the nowcast of the contribution of the change in real net exports to third-quarter real GDP growth decreased from -1.27 percentage points to -1.57 percentage points." (per https://www.atlantafed.org/cqer/research/gdpnow; Oct. 6, 2021)
- " … [H]eadlines don't contradict claims by the Federal Reserve and other central banks that prices are accelerating because of one-time effects, and thus raising interest rates to counter the trend would be a mistake. … The issue, as Barclays analyst Michael Pond puts it, is that 'the market seems to have a very different meaning of << transitory >> than the Fed and professional forecasters.' " (see https://www.wsj.com/articles/transitory-inflation-can-be-a-lasting-affair-11632139391; Sept. 20, 2021)
- "The 12-month inflation rate is 5.3%, and should stay that high through the end of the year. ... Expect inflation in 2022 to ease to 3% as shortages fade, but that will be still be higher than the 2% yearly average from 2016 to 2019, prior to the pandemic. … This higher inflation is going to create a quandary for the Federal Reserve, since one of the Fed's goals is to fight inflation. Fed Chair Jerome Powell has indicated a commitment to keeping short-term interest rates near zero in order to push down the unemployment rate, and his analysts tell him that the higher inflation is temporary. So, it is likely that the Fed will stand pat, but if strong consumer demand means that businesses now have pricing power, then this could create a self-fulfilling prophecy of rising prices, leaving the Fed to play catch-up." (see https://www.kiplinger.com/economic-forecasts/inflation; Sept 15, 2021)
- "GDP will likely grow by 6.0% or more this year … because of fiscal stimulus passed by Congress. The stimulus checks boosted personal disposable income by 10% at a yearly rate in the first half of the year, which led to an 11.6% gain in consumer spending. The quarterly savings rate dropped to 11% in the second quarter, from 21% in the first, but is still far above the normal level of 7.5%, indicating that more spending could be on tap later in the year." (see https://www.kiplinger.com/economic-forecasts/gdp; Sept 3, 2021)
- "[Arindrajit Dube, an economics professor at University of Massachusetts Amherst] — along with researchers from Harvard University, Columbia University, and University of Toronto — released a new paper looking at 19 states who withdrew benefits early. They found that ending benefits had a small impact on employment in those states: 'For every 8 workers who lost their benefits, 1 worker found a new job.' … The researchers found that consumer spending in those states dropped by $2 billion — 'for every $1 of reduced benefits, spending fell by 52 cents.'." (see https://www.businessinsider.com/cutting-off-unemployment-hurts-states-did-not-help-employment-research-2021-9; Sept 1, 2021)

Employment

Analysis

It is unfortunate that we are still sounding like the proverbial "broken record", but employment in the US continues to be an extremely slow area of recovery. While there were 133.3M people employed in April 2020, as of this writing, there are only 153.2M people employed (as of early September 2021), meaning that approximately 20M people have returned to work during the preceding sixteen months. (See Figure 38.) However, the majority of that recovery was in early and mid 2020, and the country is now only seeing an average of 300,000 people rejoining the workforce per month over the past year. Previously, we speculated that there were a few key reasons that were keeping people from returning to work:

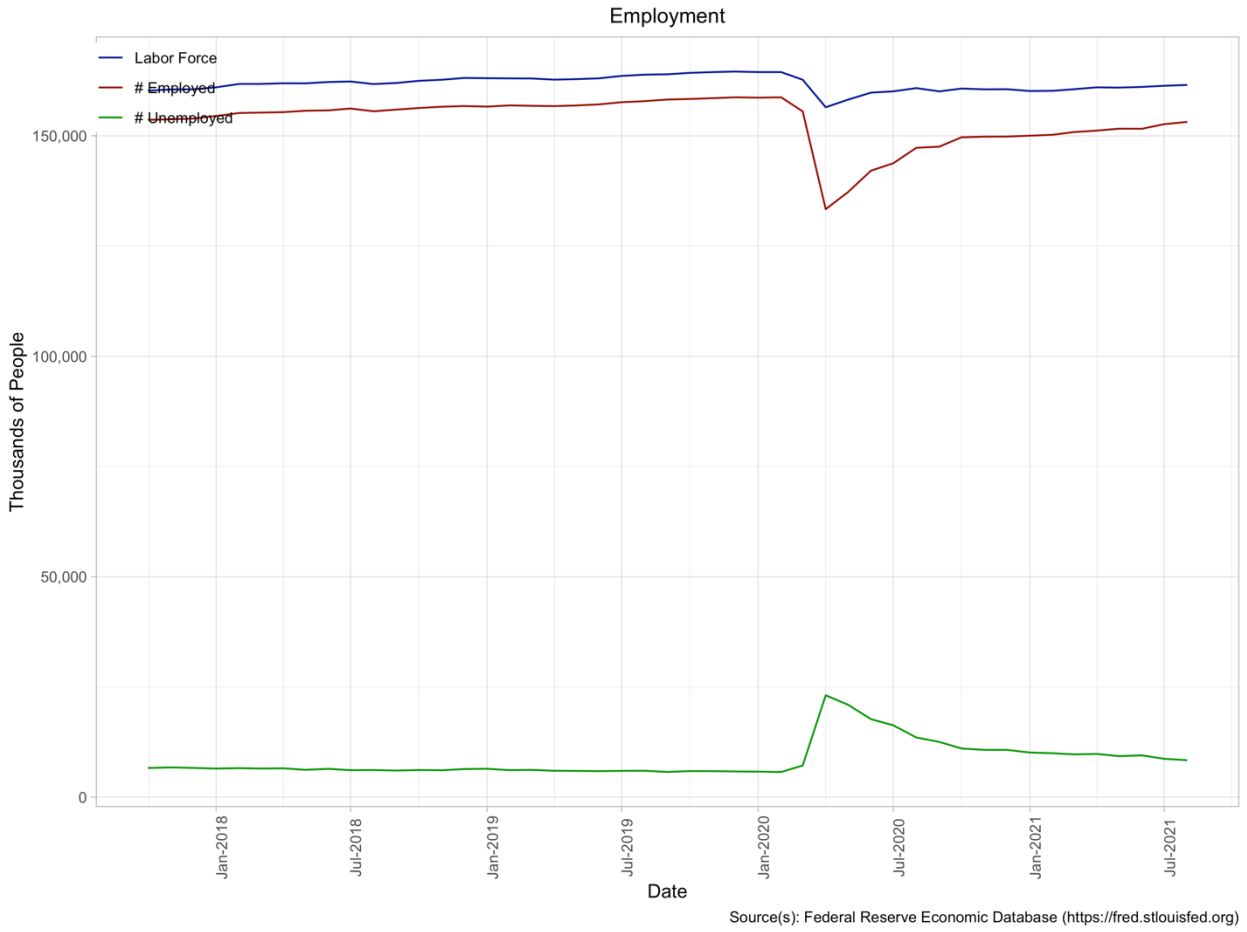
(1) A need to care for children, the elderly, and ill;
(2) A diminished sense of urgency to work based on savings, increased unemployment benefits, and decreased obligations (which supported a "wait and see" attitude to finding a new job with maximum income and benefits); and,
(3) A fear of contracting the COVID virus.

In support of the first bullet above, we saw a marked increase in the workforce after the end of the traditional school year this past spring/summer: while a total of approximately 2M people started work during the period from October 2020 to June 2021[51], the economy saw about 1M people rejoining the workforce during each of June and July 2021.

Second, 25 states withdrew their extended unemployment benefits during June and July 2021[52]; these benefits provided $300 per week federal supplement ("Pandemic Unemployment Compensation"), benefits for "gig workers" not usually eligible for unemployment insurance ("Pandemic Unemployment Assistance"), and assistance for the long-term unemployed who have already surpassed the standard number of weeks allocated for state benefits ("Pandemic Emergency Unemployment Compensation")[53]. Further, the last federal ban on evictions was overturned by the Supreme Court on August 26, 2021. Without these additional benefits and the obligation of rent for many workers, and with the highly publicized increases in the starting wages for many positions, it was speculated that many tenants were able to wait before returning to the workforce. The true effect of these benefits expiring will be seen in our next report.

[51] https://fred.stlouisfed.org/series/CE16OV
[52] Per https://time.com/nextadvisor/in-the-news/25-states-ending-unemployment-benefits-early/
[53] Many of the benefits from the American Rescue Plan Act of 2021 were slated to expire in September 2021.

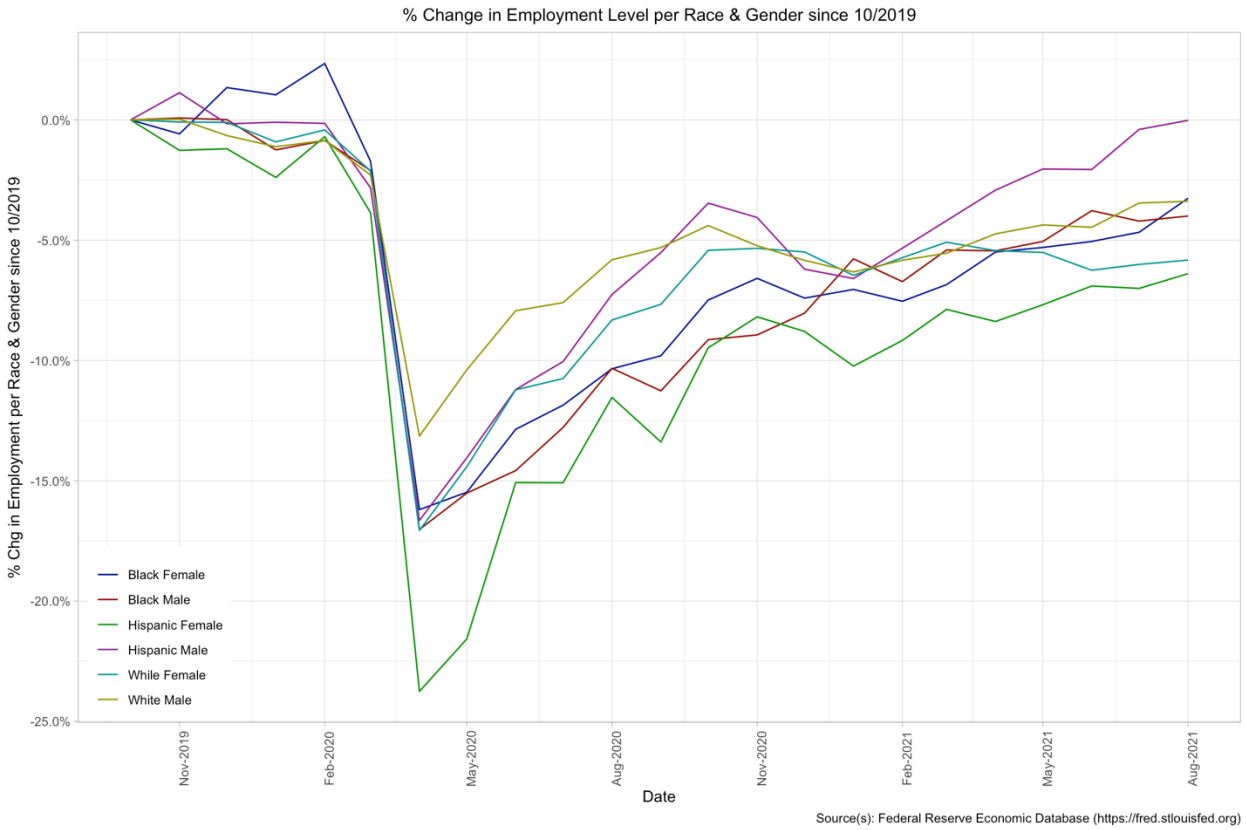
Figure 38: US Employment & Unemployment Levels



However, we suspect that employees will return to the workforce during the fall of 2021 (in anticipation of winter holidays). While many workers have reconsidered their opportunities, and even relocated themselves to other locales, based on their experience, the reasserted drive for income (and even the call of year-end holiday spending) will bring significant numbers back to the economy during the latter portion of the third quarter and during the fourth quarter of 2021. While the need for compensation may drive workers back to the workforce, we reiterate our previous point that we expect a significant amount of "churn" in the marketplace over the next several years.

As we mentioned previously, we return to look at which segments of the population are already returning to work. Looking at Figure 39, we see that Hispanic men have already returned to the workforce as they were pre-pandemic. Caucasian men, African-American men, and African-American women have all returned to the workforce within approximately 4% of pre-pandemic levels. Caucasian women have returned to within approximately 6% of pre-pandemic levels, closely followed by Hispanic women. This phenomena meshes with our previous assumptions regarding religion, family values, and culture in their respective communities.

Figure 39: Percent change in employment (since Oct. 2019) based on race and gender



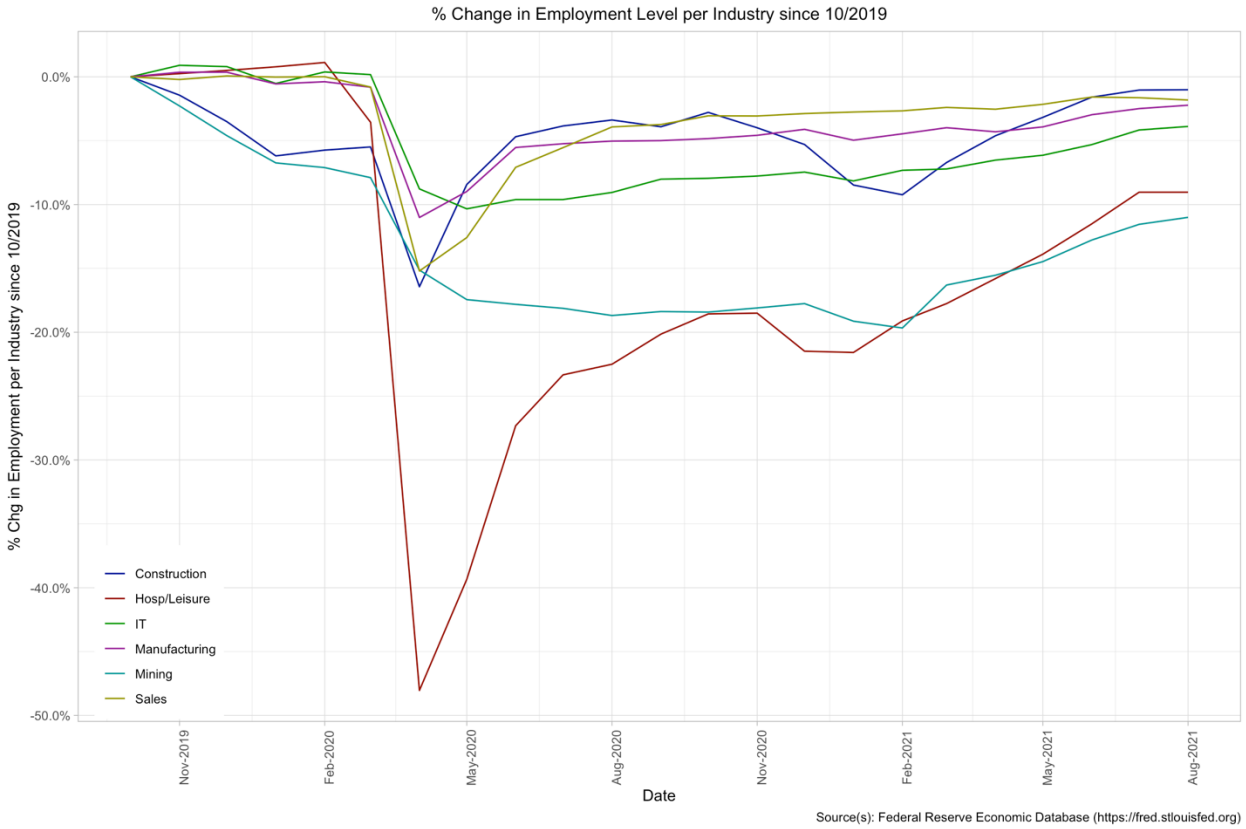
Turning to Figure 40, we see the how close several industries have returned to pre-pandemic levels in terms of their employment. Construction, albeit cyclical, appears to be closest to its pre-pandemic levels (within about 1-2% of its pre-pandemic levels); this case is likely attributable to its being male dominated (consider the impact of the male "bravado" and cultural need to earn an income for family), generally independent working, and outdoor setting (enhancing the business' appeal during the COVID period with part of the virus' strength stemming from air circulation indoors). Additionally, the recent opportunities in real estate have likely fueled the push to return to work.

Though not as volatile as construction, retail sales and manufacturing positions have also been restored to levels close to those prior to the pandemic. Given the circulation of minimally skilled yet trainable workers that were willing to work between the restaurant/hospitality industry and these areas, these points are also not unexpected. IT positions are slightly further off from pre-pandemic levels (about 4% lower); this point is somewhat surprising given the likely option that many employers have given their workers to work remotely.

Less surprisingly, the service & hospitality and mining sectors have seen the slowest recoveries from the pandemic. Geographies such as Miami, Las Vegas, and Hawaii that are extremely dependent on tourism and service were devastated during 2020 and 2021, and finding the compensation packages to lure workers back to work has been extremely slow (particularly given the press regarding the desperate

need of these venues, highlighting the leverage of returning workers). Similarly, the working conditions of the mining industry, as well as the lessened demands of their products, has hampered their recovery.

Figure 40: Percent change in employment (since Oct. 2019) based on industry



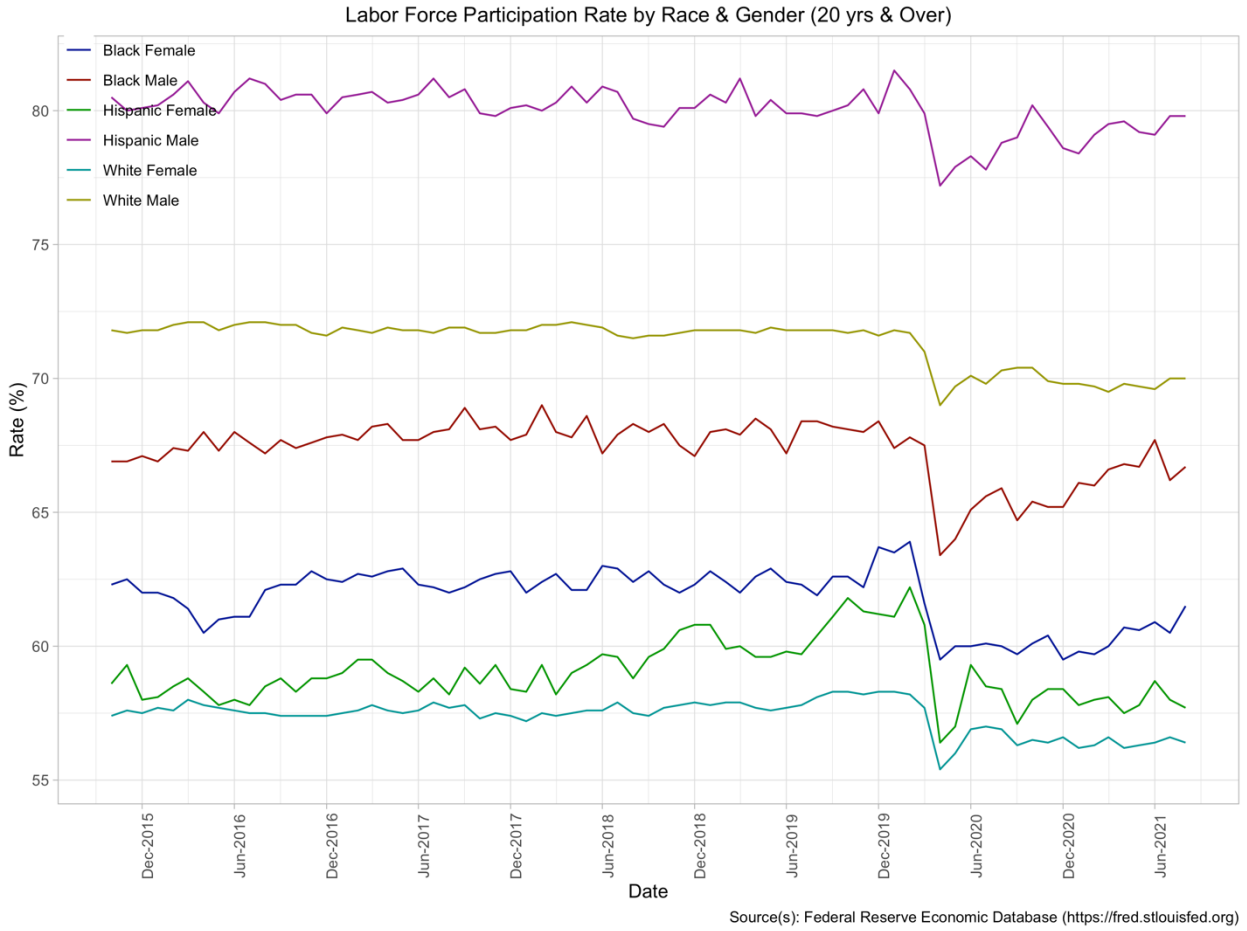
Finally, ***we now expect that employment will recover during 1H2022 provided that COVID infections within the US continue to recede***. Employers in some sectors will need to continue offering a premium (in wages) in order to recruit workers, and we are still concerned about how those premium wages will co-exist with other compensation packages in the long term (i.e., post-COVID): the only two (extreme) outcomes that are apparent are (a) wage adjustments, which will likely not be accepted well by employees; and (b) absorption of premium wages in product prices & inflation (which will similar displease customers). The actual final outcome will surely involve a combination of these two possibilities.

Secondly, we are concerned about the press that has recently emerged which highlights the numbers of people that are unemployed and the employment positions that are being presented to the workforce. While we previously highlighted that the US workforce was growing extremely slowly, we would also point out (as of this writing) that the workforce is within 6M persons of its highest level despite current claims of there being over 10M job openings at the moment[54].

[54] See https://www.cnbc.com/2021/08/09/job-openings-surge-above-10-million-for-first-time-ever-labor-department-says.html and https://www.washingtonpost.com/business/2021/09/04/ten-million-job-openings-labor-shortage/

Let's consider the two key points of the "Great Resignation" (as the current period is being attributed): first, workers appear to have re-evaluated how they are spending roughly 25% of their lives and have determined that they didn't enjoy what they were doing. As a result, many have retired, relocated, and repositioned themselves in different locales and business sectors. (Please forgive the alliteration.) That situation left a large number of positions open within one set of "legacy" businesses. However, many of these individuals have survived the pandemic by finding creative solutions and opportunities that were previously unrecognized or unable to fill, i.e., in an entirely new set of businesses. As these new endeavors take advantage of new opportunities, they also find themselves with job openings that the new business owners feel would be prudent and profitable to fill.

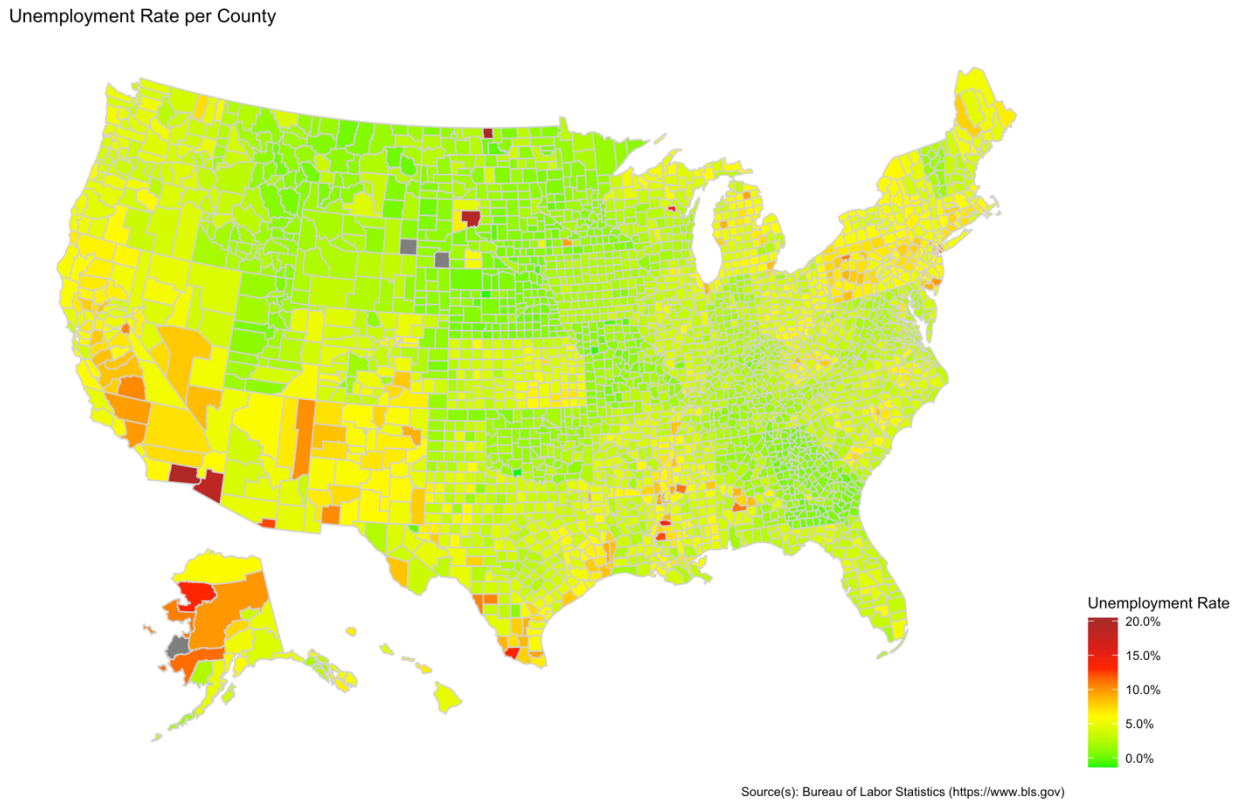
Figure 41: Labor Force Participation Rate based on race and gender



Long term, we expect that the failure rate of businesses over the next few years will gradually rise as the competition between "new" and "legacy" businesses takes place. Again, it will be a very long-term process for the churn of employees introduced during the COVID pandemic to settle, resulting in workers being reabsorbed into "winning" companies. Adding to the time for the "frothiness" to settle is the fact that skilled employees have moved themselves to new homes, and, depending on the industry under consideration, one's ability to retire, and local employment opportunities (see Figure 42), and the

number of years required for surviving enterprises to solidly reassemble could easily stretch into the next decade.

Figure 42: Unemployment Rate per County, as of September 2021



Other Commentary

- "Resignations are the highest on record — up 13 percent over pre-pandemic levels. There are 4.9 million more people who aren't working or looking for work than there were before the pandemic. There's a surge in retirements with 3.6 million people retiring during the pandemic, or more than 2 million more than expected. And there's been a boost in entrepreneurship that has caused the biggest jump in years in new business applications." (per https://www.washingtonpost.com/business/2021/09/04/ten-million-job-openings-labor-shortage/, Sept 4, 2021)
- "A smallish jobs report for August (with 235,000 net new jobs) showed that the Delta infection surge slowed hiring from July's blowout 1.05 million gain. The biggest impact was in food service, as restaurants cut staff after the hiring binge they went on during the previous six months. Teachers and other school staff additions came to a sudden end in August, as most of

the hiring for the fall was done in June and July. Retail, home health care and nursing homes also showed job losses." (per https://www.kiplinger.com/economic-forecasts/jobs, Sept 3, 2021)

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

Analysis

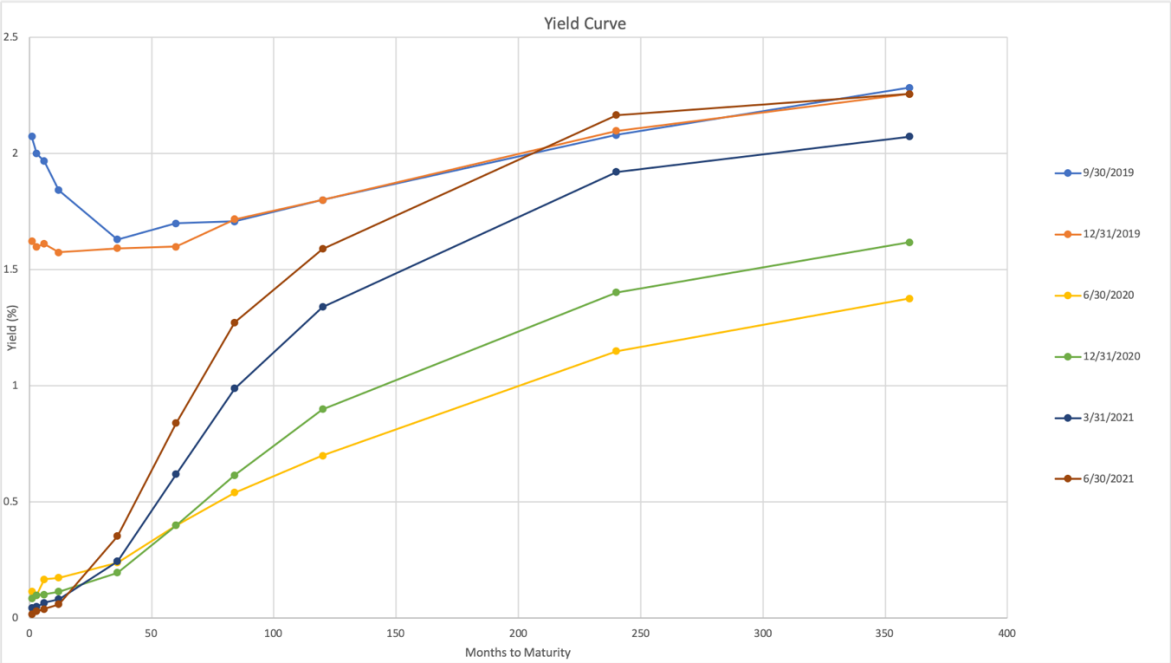
Looking at Figure 43, we see how the yield curve for T-bill's has evolved over the past two years. Starting in late 2019, we see how investors starting to become concerned about the prospects for the economy as we move into the final year of the Trump administration. In early 2020, after the COVID pandemic's reach was realized and the FOMC slashed overnight lending rates, the yield curve flattened to reflect the almost negligible returns in the short-term, with long-term returns hampered due to uncertainty. Now we are seeing a steeper curve that is offering short-term rates at virtually zero and twenty- to thirty-year rates approaching pre-pandemic levels (illustrating that traders realize that people do still need goods and services, and there will be a "tomorrow"). Unfortunately, none of these yields are strong enough to stave off the effects of inflation that are being witnessed now, so factoring in the loss in value as a result of inflation makes even the high end of the yield curve a questionable investment.

We have previously discussed that we believe ***inflation could potentially rise by as much as 5% during 2021 before the FOMC takes action***. However, given that Chairman Powell has now taken an extremely strong stance against any action prior to 2022, we are even more concerned about price spikes and/or inflation. We do still interpret the steep slope of the yield curve as the expression by investors that (a) the strength of the overall economy is improving with the distribution of the COVID-19 vaccines, and (b) they expect that the economy will experience inflation due to (1) global supply chain issues (both in raw materials & transportation), (2) domestic labor issues, and (3) President Biden's stimulus plans. We still believe that yields will continue to rapidly increase in order to remain competitive and continue to "price in" the current beliefs that are circulating regarding price hikes and inflation.

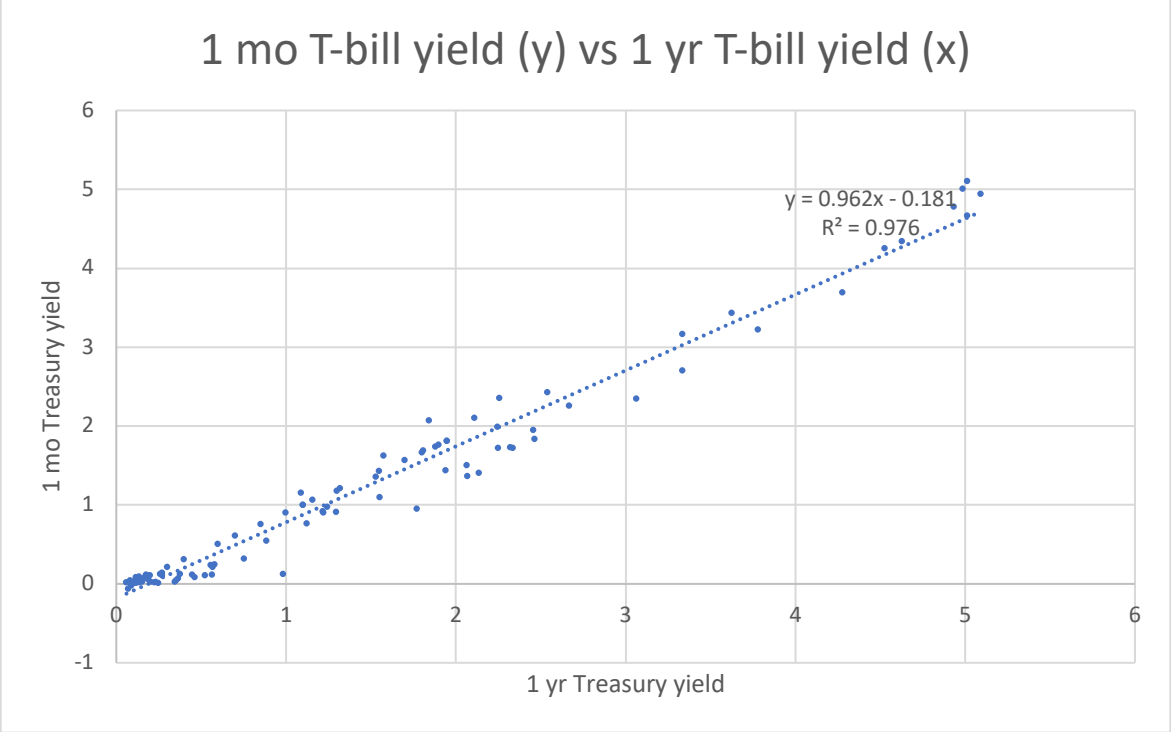
Other Commentary

- "Federal Reserve Chairman Jerome Powell, in prepared remarks delivered to the Senate on Tuesday, warned that higher inflation may last longer than anticipated … he said that economic growth has 'continued to strengthen' but has been met with upward price pressures caused by supply chain bottlenecks and other factors." (see https://www.cnbc.com/2021/09/28/us-bonds-10-year-treasury-yield-spikes-amid-inflation-fears.html; Sept 28, 2021)

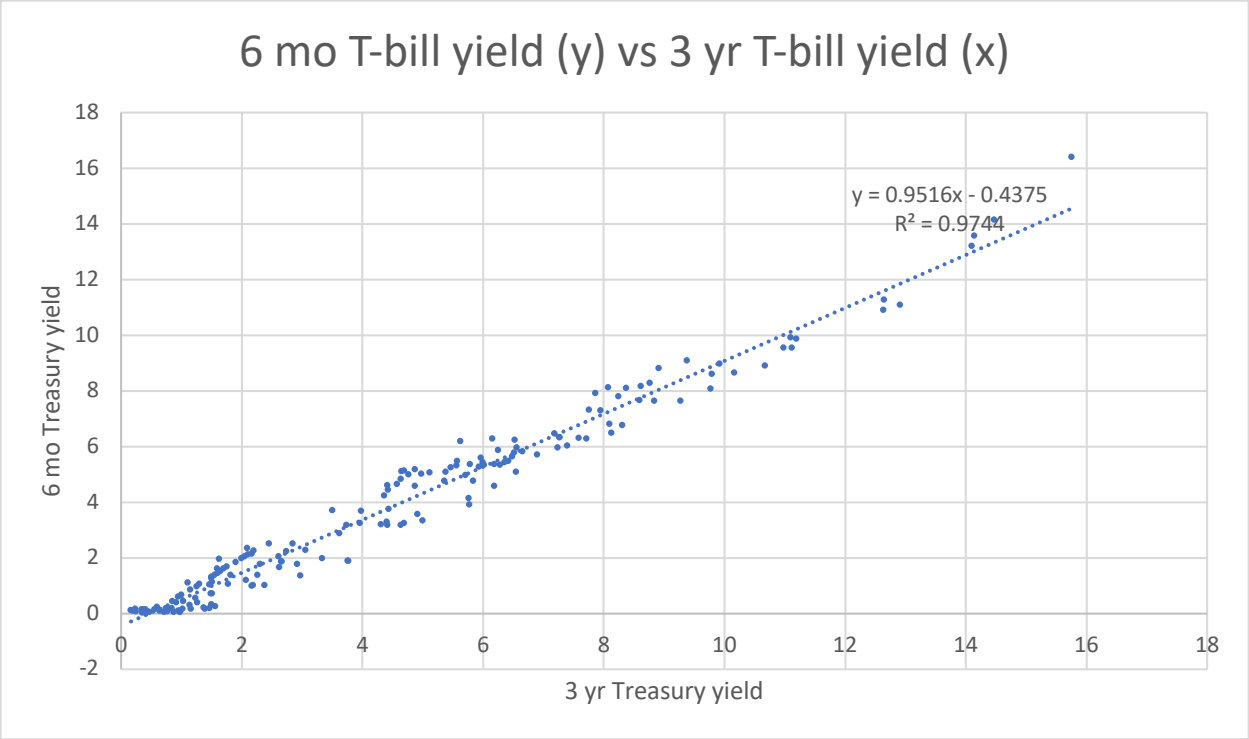
Figure 43: Treasury Yield Curves based on maturity duration



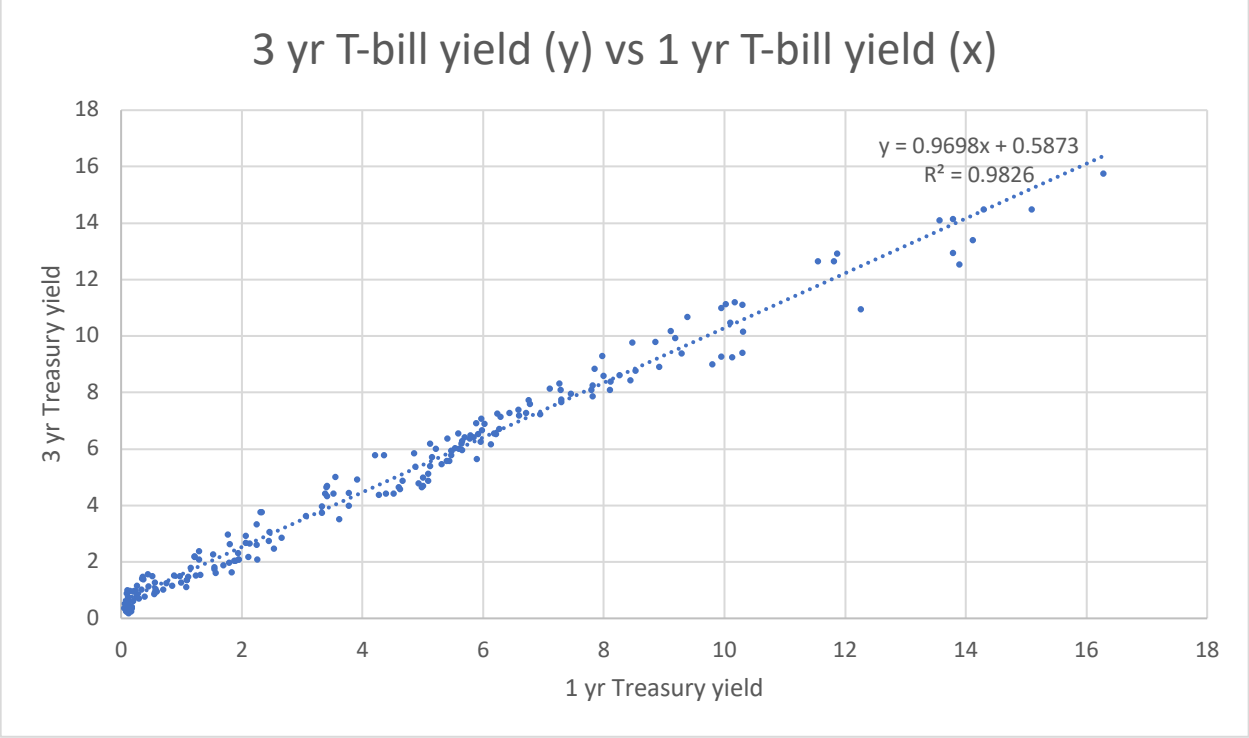
Source: US Treasury



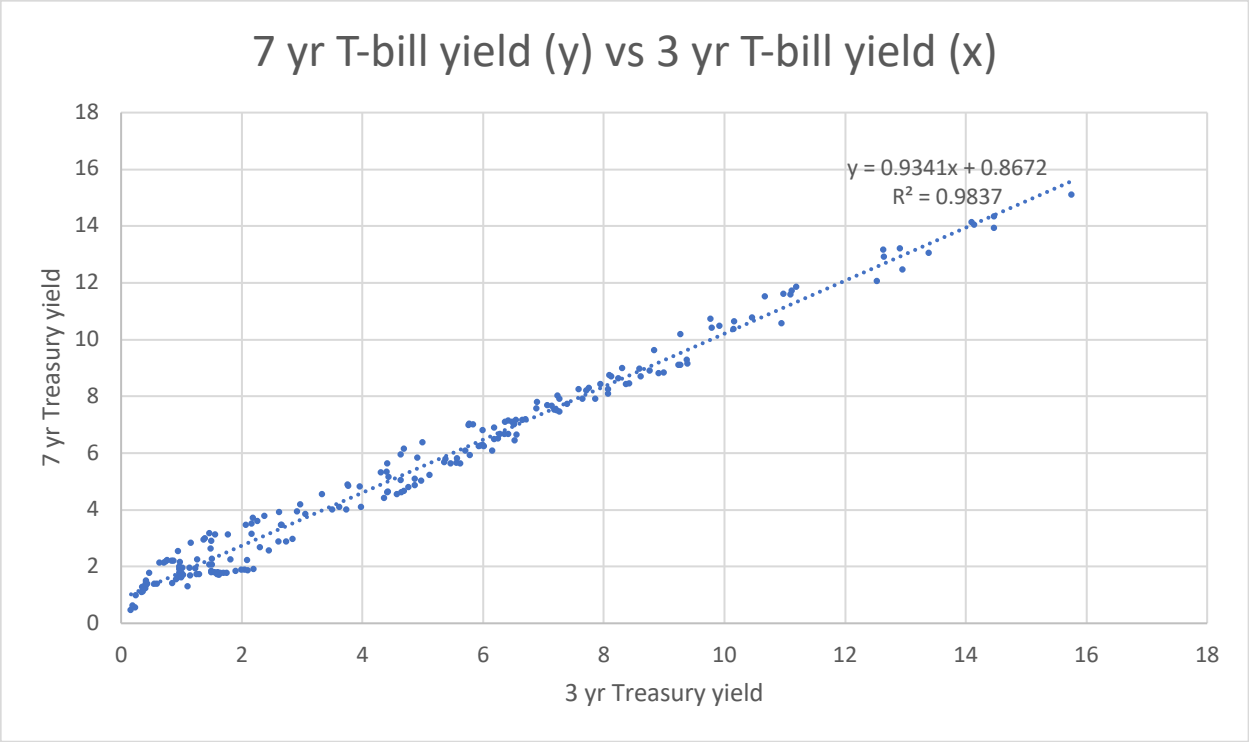
Source: Authors' calculation



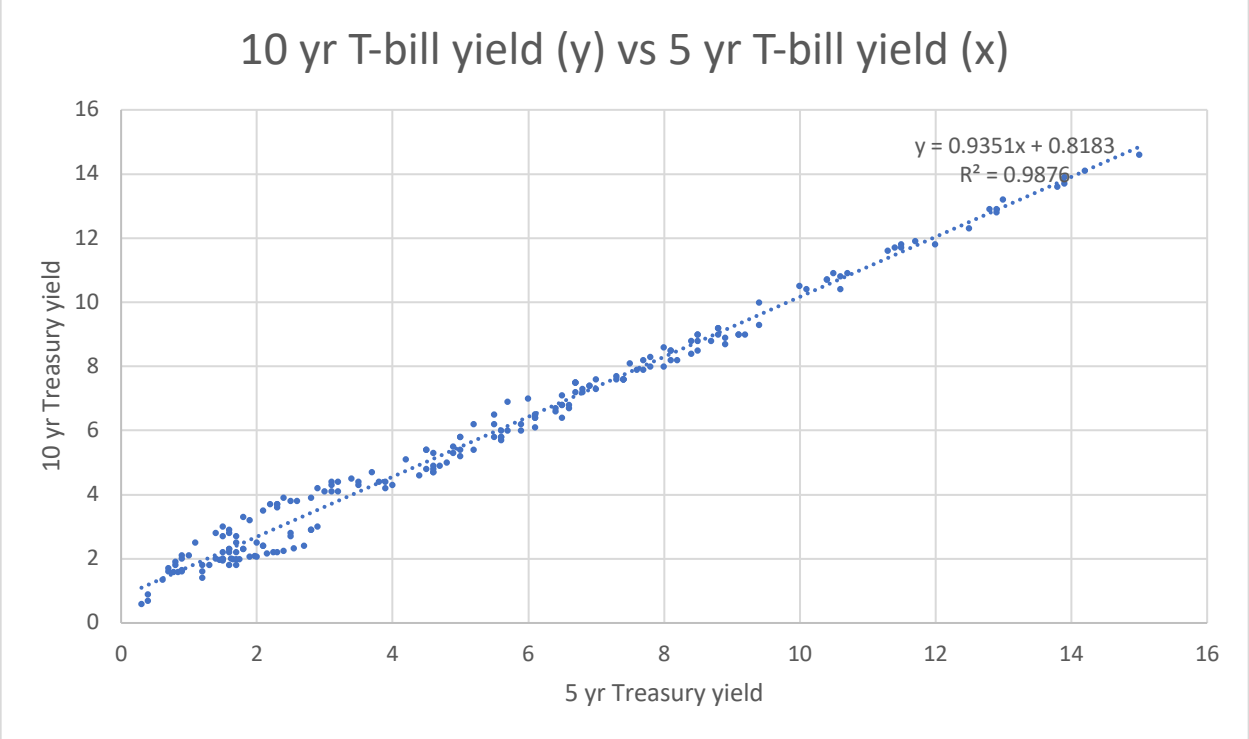
Source: Authors' calculation



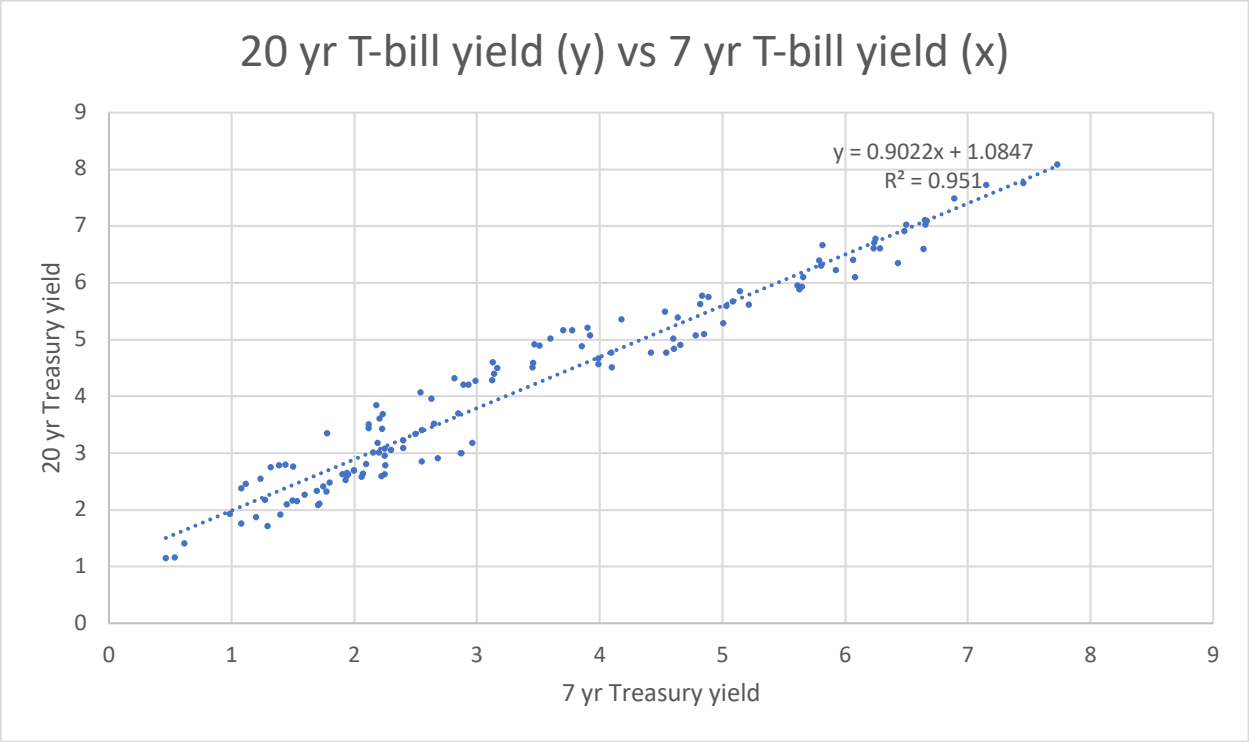
Source: Authors' calculation



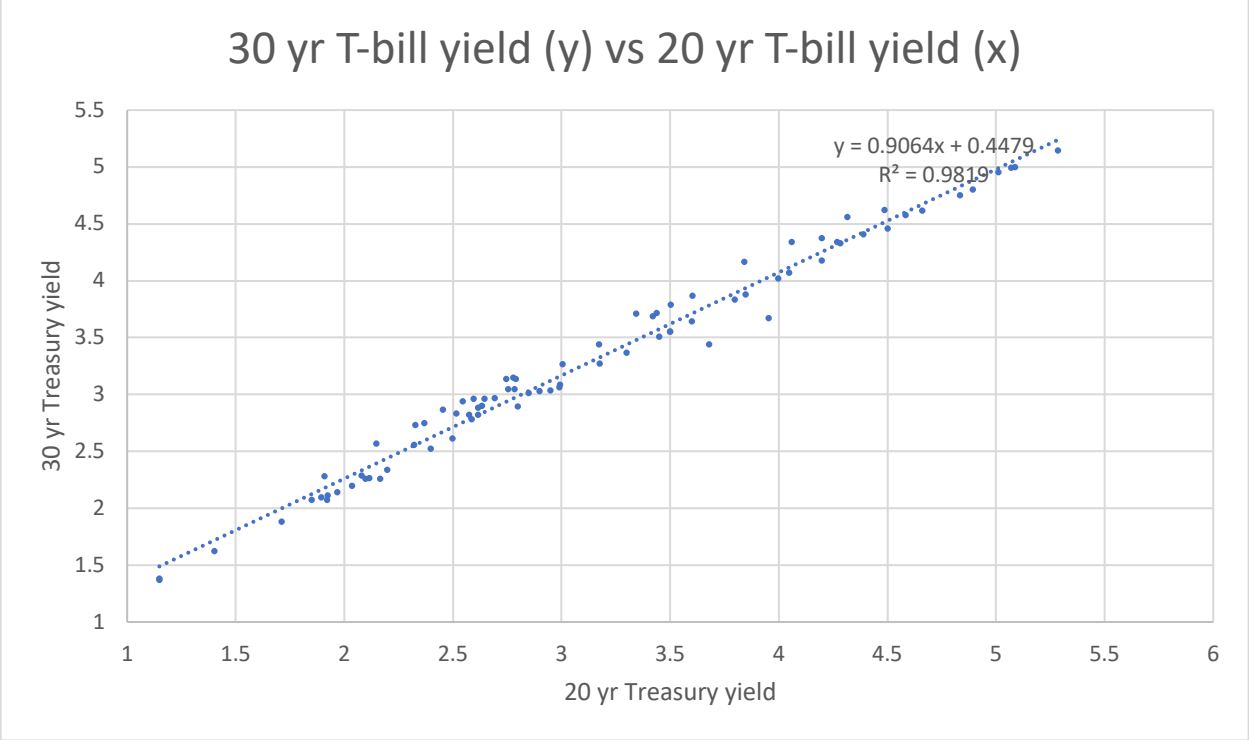
Source: Authors' calculation



Source: Authors' calculation



Source: Authors' calculation



Source: Authors' calculation

30-year Mortgage Rate

Analysis

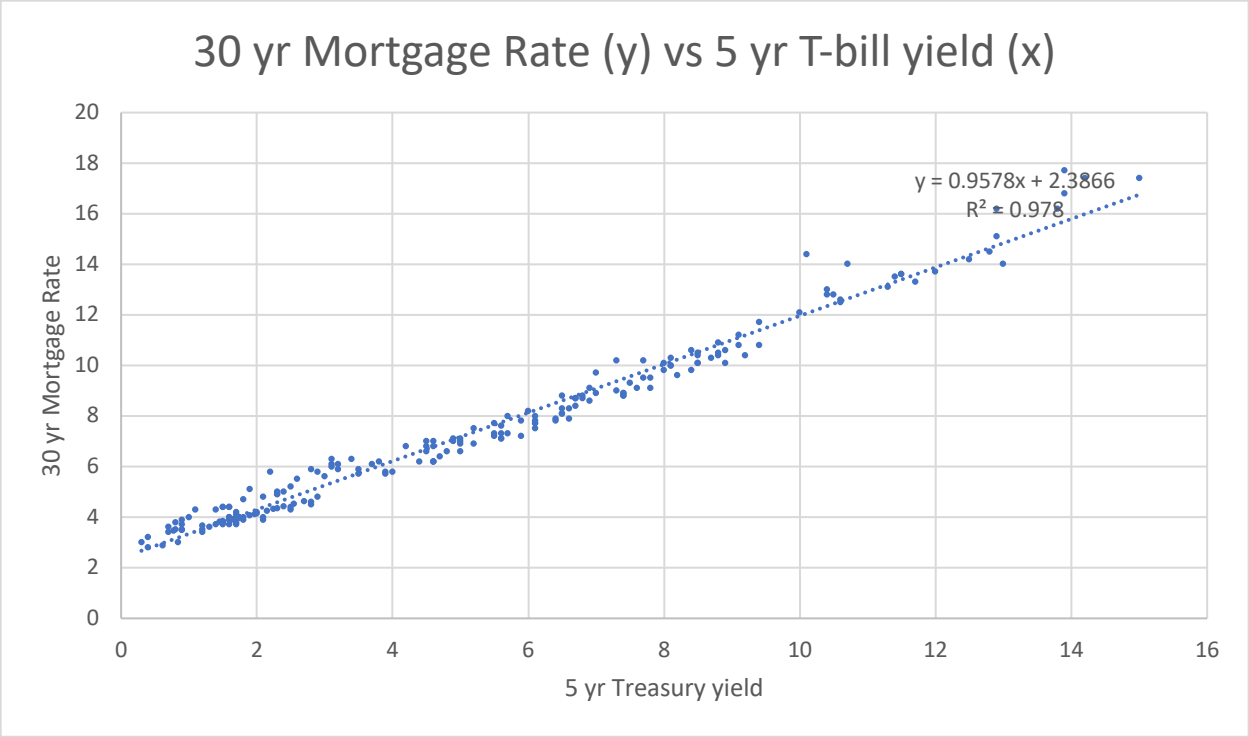
At the risk of being repetitive, mortgage rates have remained extremely low, and they are expected to remain low, but will be tempered by two factors: first, banks are managing their risks by being extremely cautious in their vetting processes, and only granting new mortgages (and refinancing) to extremely well-vetted and well-qualified applicants. The Fed' is keeping overnight lending rates low, which is strongly influencing mortgage rates via 10-year bond yields. Secondly, given the nature of the markets, and the fact that many mortgages find their way into "Collateralized Mortgage Obligations" (CMOs) and other trading instruments, futures on these instruments are finding themselves as investments that are in demand, which, in turn, pressure mortgage rates up from their otherwise extremely low positions. As such, while the housing market is starting to feel some more "rational exuberance" (which is discussed elsewhere in this report), mortgage rates are seeing some increases in the marketplace; rates have vacillated around 3% recently.

Looking forward, though, as the country starts to truly manage the COVID pandemic, we expect for the frothiness of the retail market to settle. Additionally, we expect rates to start to nudge upwards as the Treasury slows down its investment in mortgage-backed bonds (part of its "quantitative easing" campaign) during 1Q2022. ***We expect 30-year fixed rate mortgage rates to remain between 2.8% to 3.75% through 2022***. (Averaged 30-year fixed rates peaked in early April at 3.18%, retreated below 3% and have returned to cross above 3% at the time of this writing, late September 2021.[55])

Other Commentary

- "The Federal Reserve warned on Wednesday that it's close to being ready to taper the bond-buying program that's been in place throughout the COVID-19 pandemic to boost the nation's economy. In a speech following the central bank's meeting, Fed Chairman Jerome Powell indicated that the bank could 'easily move' to scale back those purchases when it meets again in November." (see https://www.marketwatch.com/story/the-era-of-sub-3-mortgage-rates-may-be-behind-us-the-feds-policy-shift-could-have-major-repercussions-for-home-buyers-11632345480; Sept.26, 2021)
- "[George Ratiu, manager of economic research at Realtor.com] projects that mortgage rates will approach 3.5% by early 2022 and could be approaching 4% by the end of next year." (see https://www.marketwatch.com/story/the-era-of-sub-3-mortgage-rates-may-be-behind-us-the-feds-policy-shift-could-have-major-repercussions-for-home-buyers-11632345480; Sept.26, 2021)

[55] https://fred.stlouisfed.org/series/MORTGAGE30US



Source: Authors' calculation

Moody's AAA & BAA Rates; and the BofA BBB Corporate Yield

Analysis

Moody's AAA bond rates tend to track in conjunction with mid-duration T-bill yields. 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 Moody's indices both show a noteworthy inverse correlation with the BBB Corporate Yield and the 30-year Mortgage Rate.

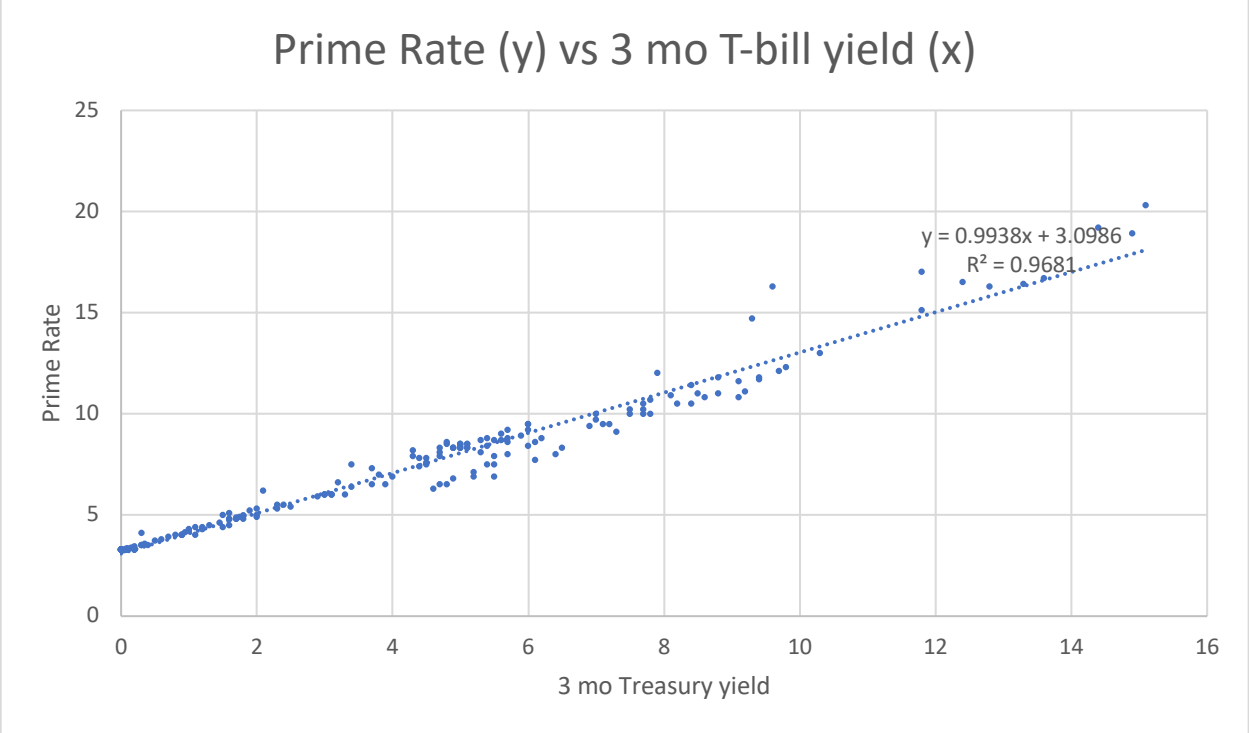
Capitalytics' quantitative models see AAA rates gradually rising over the next several years (through 2024) from 2.77% in 2021Q1 to 3% by the end of 2023. We do not believe that this is a likely outcome, instead believing that BAA yields will continue to track with AAA yields, with approximately 0.5% additional return to counter the risk associated with the BAA instruments. We anticipate that AAA yields will actually drop from about 3% to 2.7% between 3Q2021 and 4Q2023, with (again) BAA yields at 0.5% higher. BBB yields will be about 50 bp lower than AAA yields.

Prime Rate

Analysis

The Prime Rate has historically been very tightly coupled to very short-term Treasury Bills (specifically, very short-term yields). Capitalytics' models anticipate that trend continuing, and the Prime Rate remaining very close its current level of 3.25% for the foreseeable future (through 2022, and into 2023). However, given the Fed's stance regarding rates, ***we feel that it is likely that the Prime Rate will remain at or below 3.75% through 2022 due to its dependence on other rates & yields***, moving in concert with overnight lending rates and short-term T-bill yields.

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



Source: Authors' calculation

US Average Retail Gasoline Price

Analysis

Retail gasoline prices hit seven-year highs this summer due to the price of West Texas Intermediate (WTI) crude oil prices; WTI is selling at almost $75 per barrel as of this writing and Brent crude oil is at $80 per barrel[56], with many confident that both will go higher[57]. On the heels of this news, OPEC+ production is expected to be trimmed in the coming months despite US market demand[58].

In addition, oil refineries in the Gulf of Mexico have been relatively slow to return to service due to COVID infections amongst inspectors post-Ida. (Ida was the Category 4 hurricane that crossed through the Gulf of Mexico and Louisiana on August 29, 2021.) The short-term impact was a shutdown of 15% of the US' oil production[59], but this was mitigated to about a 4% reduction in output from expectations within three weeks[60].

The national average for gasoline has topped $3.16/gallon as of August 2021. While most outlets are following the EIA's forecasts that gasoline will fall to $2.91/gallon by YE2021[61], we are still concerned about two things:

1. As has happened several times in recent years, the 2021 hurricane season[62] may have a significant impact on the availability domestic oil (from the Gulf of Mexico) and imported oil. This season was expected to be an "above average" season, just as 2020 was expected to be; however, it should be noted that in 2020 the US had a record number of named storms, and 12 "direct strikes" by hurricanes. The 2021 season has had 19 named storms since May 22, 2021, and runs until November 30, 2021.
2. Over the past year, the impact of COVID on the number & availability of tanker drivers has impacted the local availability of gasoline at the pumps despite its "regional" availability[63].

We expect that gas prices in 2021 will be (nationally) at $3.40/gallon by Thanksgiving Day if there is any significant interruption in petroleum distribution.

We are more concerned about natural gas supplies, though, as they are inherently coupled with oil production, and there are economic forces in play in the US and Europe that are signaling that the harsh upcoming winter that is expected will drive natural gas prices to record territory[64].

---

[56] See https://oilprice.com/oil-price-charts/

[57] https://www.reuters.com/business/energy/goldman-expects-oil-prices-hit-90-by-year-end-supply-tightens-2021-09-27/

[58] https://www.reuters.com/business/energy/opec-raises-2022-oil-demand-growth-forecast-2021-09-01/ and https://oilprice.com/Energy/Crude-Oil/OPEC-Sees-Global-Oil-Demand-Growing-Until-2035.html

[59] https://www.cnbc.com/2021/08/30/oil-gasoline-prices-head-higher-as-ida-kicks-hurricane-season-into-a-higher-gear.html

[60] https://www.statista.com/statistics/1264677/hurricane-ida-impact-oil-and-gas-industry/

[61] See, e.g., https://www.ogj.com/general-interest/economics-markets/article/14209970/eia-oil-market-outlook-largely-unchanged-demand-forecasts-reduced

[62] https://www.noaa.gov/news-release/noaa-predicts-another-active-atlantic-hurricane-season

[63] See https://www.cnn.com/2021/06/28/business/gas-station-outages/index.html

[64] https://www.cnbc.com/2021/09/09/natural-gas-prices-are-rising-and-could-be-the-most-expensive-in-13-years-this-winter.html

Other Commentary

- "Natural gas is the leading fuel source for the US power grid, supplying 40% of utility-scale electricity generation, according to the EIA. … The situation has been exacerbated by unplanned production outages in Norway and Russia as well as by Hurricane Ida, which knocked offline the vast majority of the Gulf of Mexico's oil and gas production." (https://www.cnn.com/2021/09/28/business/natural-gas-inflation/index.html; Sept 29, 2021)
- "Oil prices remain rangebound, with benchmark West Texas Intermediate recently trading near $68 per barrel. We look for WTI to remain in the $65 to $70 range as summer comes to a close, and then trend lower this autumn, unless there is a major supply outage somewhere in the world." (per https://www.kiplinger.com/economic-forecasts/energy; Sept 16, 2021)
- "Gas stockpiles in underground storage are lower than normal for this time of year, and demand has been strong in parts of the country that depend heavily on gas-fired power plants for electricity during heat waves. Low supply and strong demand have pushed the benchmark gas futures contract to $4.60 per million British thermal units, near the highest level in years. Whether those higher prices will last depends heavily on autumn weather." (per https://www.kiplinger.com/economic-forecasts/energy; Sept 16, 2021)
- "We forecast that retail gasoline prices will average $3.14/gal in September before falling to $2.91/gal, on average, in 4Q21. The expected drop in retail gasoline prices reflects our forecast that gasoline margins will decline from currently elevated levels, both as a result of rising refinery runs as operations return in the first half of September following Hurricane Ida and because of typical seasonality." (https://www.eia.gov/outlooks/steo/; Sept 8, 2021)

Federal Funds (Primary Credit) Rate

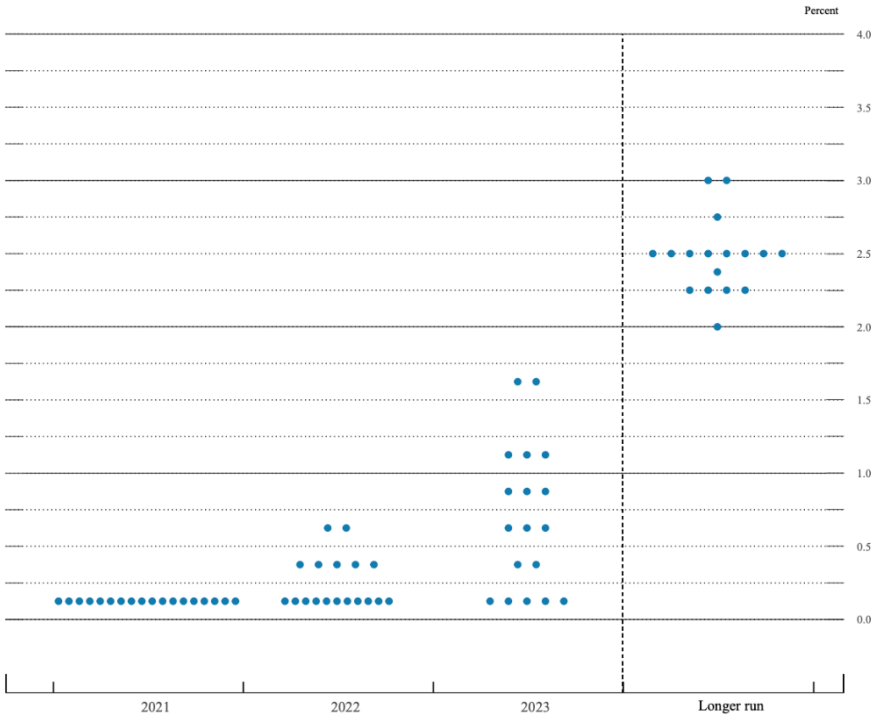
Analysis

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 was expecting to maintain the Federal Funds rate at "essentially zero" (0 bp to 25 bp) through 2022, but has recently given concrete signs that it intends to roll back some of its quantitative easing efforts during 1H2022[65], one step in withdrawing their support of the economy. At the FOMC meeting in September 2021 (see Figure 44 and Figure 45), the Board of Governors voted to hold rates through 2021[66], but are now slightly more confident of at least one rate hike in 2022, and two or three more 25 bp increases in 2023. ***We feel that it is very likely that the FOMC will raise rates by 25 bps before April 2022.*** Depending on how 2022 starts to play out with respect to domestic employment and international supply chains, ***we even feel that it is very likely for a second increase (and as many as two <u>more</u> 25 bps increases, for a total of three) to occur by YE2022***. Given the recent departures from the Federal Reserve system, and the Democratic hold in Congress, however, we would not be surprised that new members of the FOMC may be more hesitant than their predecessors to raise rates.

The accompanying chart shows the relationship that has existed historically between the Federal Funds rate and the 3-year T-bill yield.

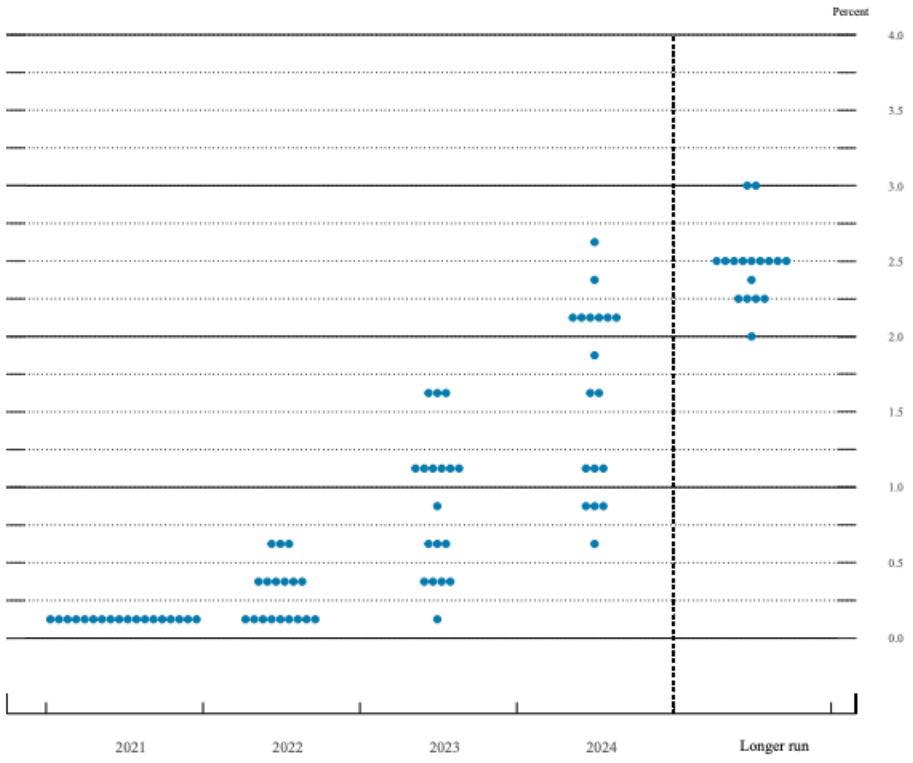
Figure 44: FOMC "Dot Plot" from June 2021 Board of Governors' Meeting

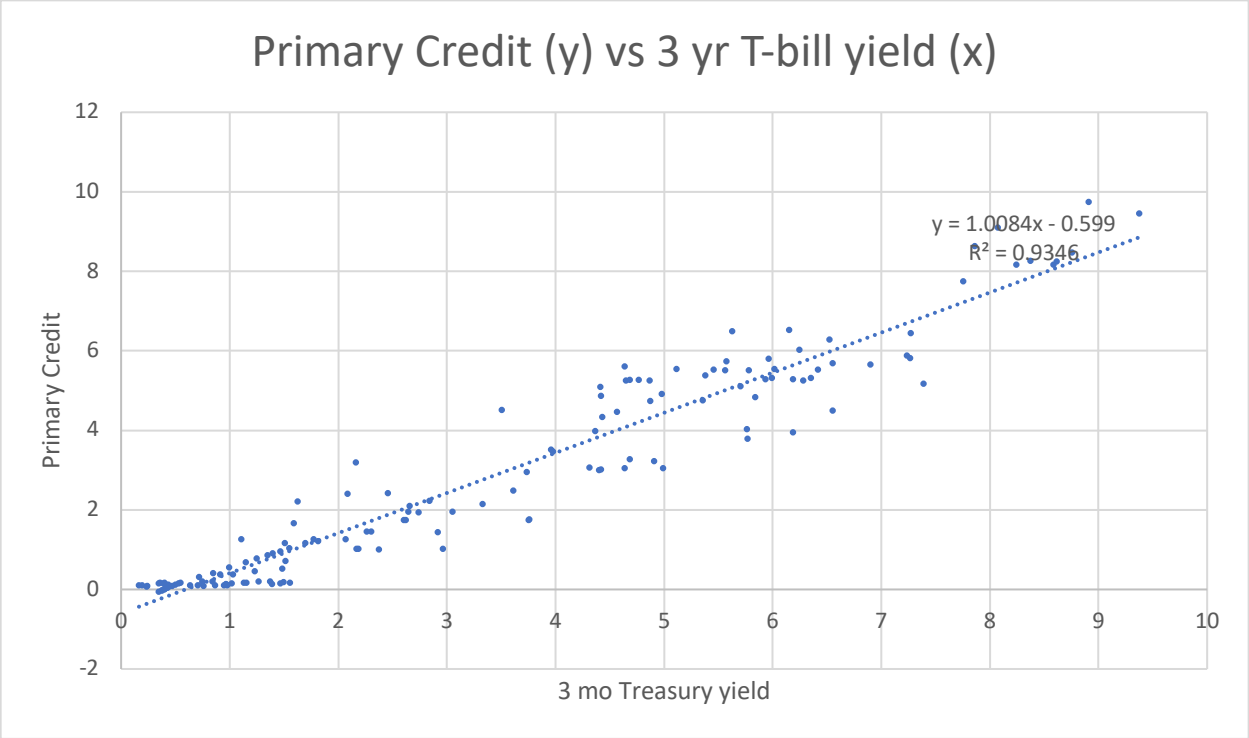


[65] https://www.cnbc.com/2021/09/22/watch-jerome-powell-speak-after-fed-wraps-up-september-meeting-live-blog.html

[66] See https://www.federalreserve.gov/monetarypolicy/files/fomcprojtabl20210922.pdf

Figure 45: FOMC "Dot Plot" from September 2021 Board of Governors' Meeting





Source: Authors' calculation

Other Commentary

- "In the FOMC statement, Powell noted that tapering 'may soon be warranted.' Some took that to suggest that tapering could begin later in the fall, after the debt ceiling fracas is hopefully resolved." (see https://www.forbes.com/advisor/investing/fomc-meeting-federal-reserve/; Sept 22, 2021)
- "Lawrence Gillum, fixed income strategist for LPL Financial, said that the medium and long-term policy path for the Fed remains unclear … 'We continue to think the Fed will announce plans to taper in November with the actual reduction in bond purchases taking place in December,' Gillum said in a note. 'Of note though, through the Dot Plot, signaling on future path of short-term interest rates continues to show the wide divergence of opinions on the committee. As such, the future make-up of the committee and whether Powell is reappointed or not will likely have a notable impact on the future of monetary policy.' " (see https://www.cnbc.com/2021/09/22/watch-jerome-powell-speak-after-fed-wraps-up-september-meeting-live-blog.html; Sept 22, 2021)

House and Commercial Real Estate Price Indexes

Analysis

The residential real estate market has been skyrocketing for a multitude of reasons over the past 24 months; record low interest rates, questions about job satisfaction, and allowing for the option to be much more self-sufficient within one's home (or transitioning from a rented property to an owned property) has fueled demand for upwardly accessible single-family-homes; in many markets, inventory has been all but exhausted.

Furthermore, new home construction is slowing nationwide. While builders pass on increased material costs to buyers (see Figure 46), the coordinated availability of skilled tradesmen (that have also been impacted by the COVID pandemic) has slowed development. Slowed production of finished homes result in increased competition for that product, and increased prices; once prices exceed a buyer's appetite, they will exit from discussions, i.e., they are "priced out" of their market[67]. The result of this phenomena is that first-time home buyers will eventually exit the market altogether, which is just what is being seen in many markets, and results in selling price dips and fewer homes sold[68].

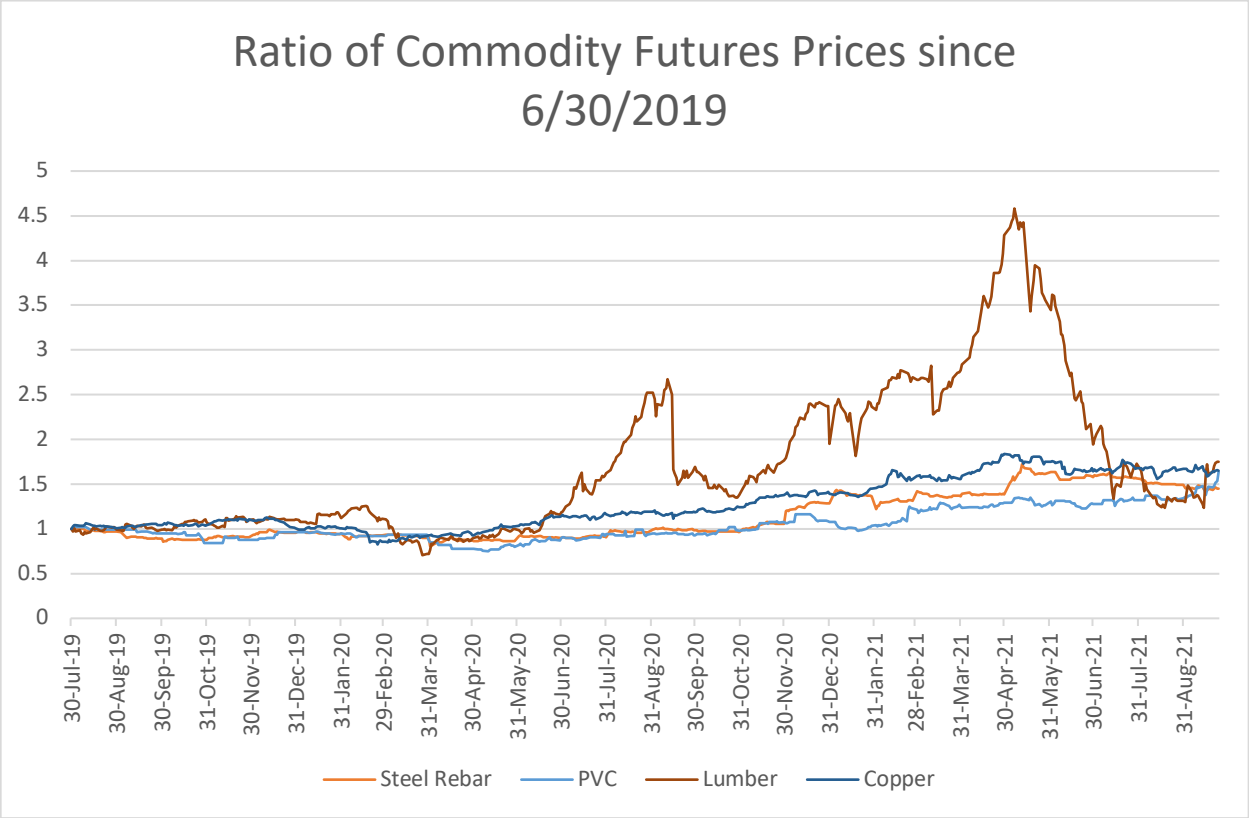
We expect for this trend of very slowly cooling markets to gradually continue (cooling) until 2Q2022, after which time it will reheat for first-time home buyers. Secondary homes will likely also return to the market as values soften in vacation or "retreat" locales that weren't designed to support full-time day-to-day living. Also, as buyers re-adapt to an appropriate level of social lifestyle, a significant number will

[67] See https://www.realtor.com/news/trends/the-new-housing-crisis-are-first-time-buyers-being-priced-out-of-homeownership/ and https://www.cnbc.com/2021/07/20/builders-pull-back-as-more-homebuyers-are-priced-out-of-the-market.html

[68] https://www.businessinsider.com/housing-market-softening-home-prices-unaffordable-realtors-association-report-2021-9

put their recently acquired "dream home" back on the market in order to match the lifestyle that they can afford. It also would not be surprising for the emergence of a new trend with landlords (that want to exit that industry) presenting "rent-to-own" financing options to eligible tenants where possible.

Figure 46: Ratio of Commodity Futures Prices to Prices from mid-2019



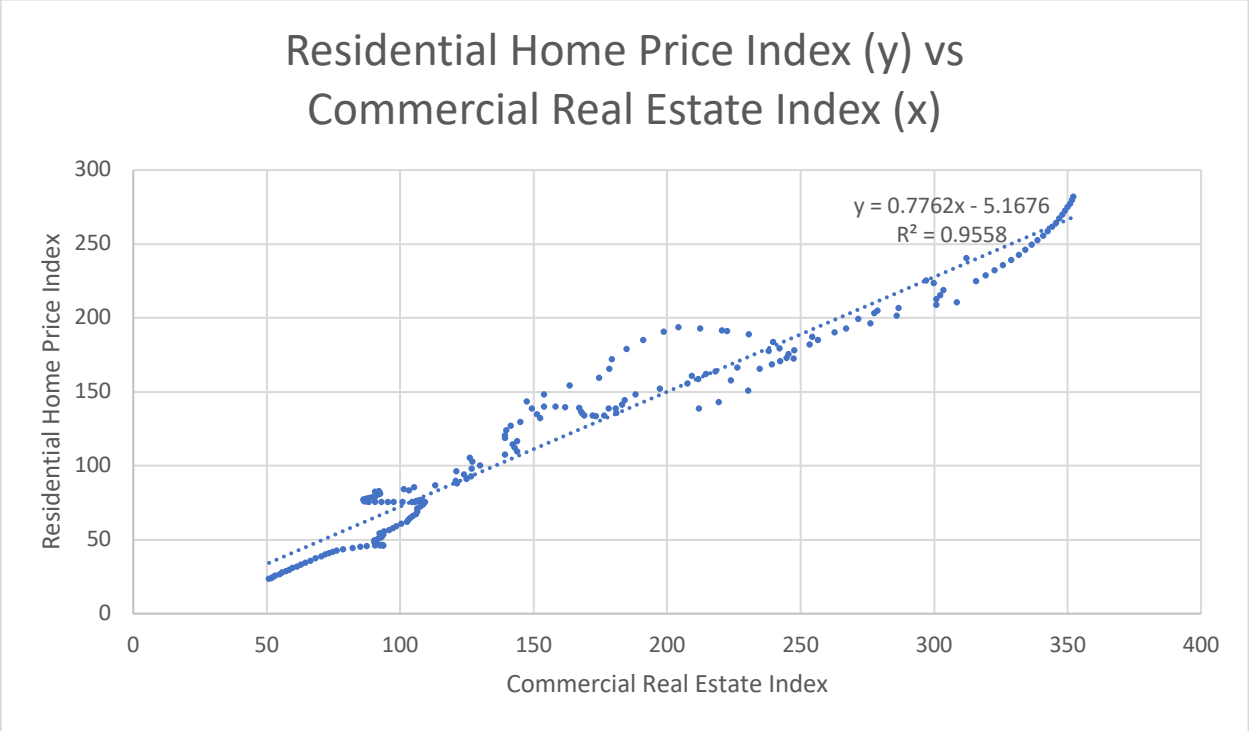
Sources: https://www.investing.com/commodities/pvc-com-futures-historical-data, https://www.investing.com/commodities/lumber-historical-data, https://www.investing.com/commodities/steel-rebar-historical-data, & https://www.investing.com/commodities/copper-historical-data

At this point, ***we expect commercial real estate investors to be quickly committing to a strategy for their assets, with most likely directions being to upgrade, repurpose, or sell assets*** as we re-emerge from the COVID pandemic. Investors have been watching the climate for the past 18 months in order to determine the direction that tenants will take in the future, and use that information to guide how they will continue to survive. At this stage, most that have not exited the industry via divestiture have already determined if their best strategic course is to continue to compete for tenants[69], or adapt their investments to new markets and clients. In terms of "adaptation of assets", as residential home prices increase along with mortgage borrowing rates, we would not be surprised to find commercial real estate

[69] https://www.nbcnews.com/business/economy/jobs-market-will-return-pre-pandemic-level-2022-according-latest-n1256360

investors investigate converting traditional office buildings into novel residential and/or warehouse/distribution offerings[70].

The accompanying chart shows the correlation between the residential and commercial real estate indexes.



Source: Authors' calculation

Other Commentary

- "High office vacancy rates are plaguing cities nationwide, according to Avison Young, a commercial real estate firm. In the second quarter of this year, the commercial vacancy rate across San Francisco reached 15.4 percent, more than the 12 percent figure last year and more than double what it was just two years ago. … Phoenix's office market vacancy is 'elevated' at 16.2 percent, while Miami is at an 'eight-year high' of 16.9 percent and Los Angeles has reached 'all-time highs' of 17.8 percent. Meanwhile, New York City is at a 'post-2000 high' of 19.2 percent vacancy, and Houston is at a 'record high' 22.9 percent of such workspaces that are going unused." (https://www.nbcnews.com/business/real-estate/why-empty-offices-aren-t-being-turned-housing-despite-lengthy-n1274810; July 25, 2021)

[70] See, e.g., https://ggwash.org/view/78585/not-every-obsolete-office-building-is-cut-out-to-become-apartments-2 , https://www.forbes.com/sites/joshuastein/2021/06/29/can-we-convert-underutilized-commercial-buildings-into-badly-needed-affordable-housing/ , and https://blog.northspyre.com/blog/pandemic-adaptive-reuse

- "Just as some properties have fallen vacant, fervent demand has blossomed in other asset classes. Together, these trends have created a new era in adaptive reuse in commercial real estate development. Now, developers are seeing more potential than ever before to repurpose old buildings into new and better uses." (https://blog.northspyre.com/blog/pandemic-adaptive-reuse; Aug. 30, 2021)

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

Analysis

The Dow Jones U.S. Total Market Index (DWCF) is a market-capitalization-weighted index that represents the top 95% of the U.S. stock market based on market capitalization.

Table 7: Approximate Quarterly Milestones for the Dow-Jones Total Market Index

Period	Index Range[71]	Trading Days	Avg points/day
"4Q2020" (10/1/2020-1/20/2021)	34567.89 → 40551.83	77	77.7
"1Q2021" (1/21/2021-3/31/2021)	40551.83 → 41602.65	49	21.4
2Q2021 (4/1/2021-6/30/2021)	41602.65 → 44904.32	63	52.4
"3Q2021" (7/1/2021-9/29/2021)	44904.32 → 45194.36	64	17.5

Per Table 7, prior to President Biden taking office, the index grew an average of 77.7 points per day. Recall that during this period, the US had generally been "locked down" for over 6 months at this point (except for "essential services"), but life had been able to continue for many: the Federal Reserve made borrowing money very easy, and provided many supplements to lower income individuals; and trading was at record levels. In the portion of 1Q2021 after President Biden assumed office, the index grew only an average of 21.4 points per business day. The markets were very concerned about the costs of President Biden's "Build Back Better" plan, and what policies he and a Democratically dominated Congress would work put in place. There was also a growing concern about how much more money could be squeezed from technology stocks that had flourished during the previous year. During 2Q2021, the index grew by an average of 52.4 points per day, reflecting the growing comfort with the new administration and its different tone; however, now attention was shifting back to the Federal Reserve, its bond yields, its quantitative easing program (that will come to an end eventually), and supply chain issues that emerged as the US distributed its vaccines while the rest of the world was struggling. (Foreshadowing a bit, the index has only grown an average of 17.5 points per day during 3Q2021 thus far; that makes for all but no gains over the past three months, an increase of about 15% YTD, and an increase of almost 31% Y/Y.)

[71] Index values found at https://www.marketwatch.com/investing/index/dwcf

We note in Table 8 that the Standard & Poor's 500 Index ("SP500") is an index of 500 very large, publicly traded companies in the U.S. This index's measures are very similar to that of the DWCF, though on a different scale.

Table 8: Approximate Quarterly Milestones for the Standard and Poor's 500 ("SP500") Index

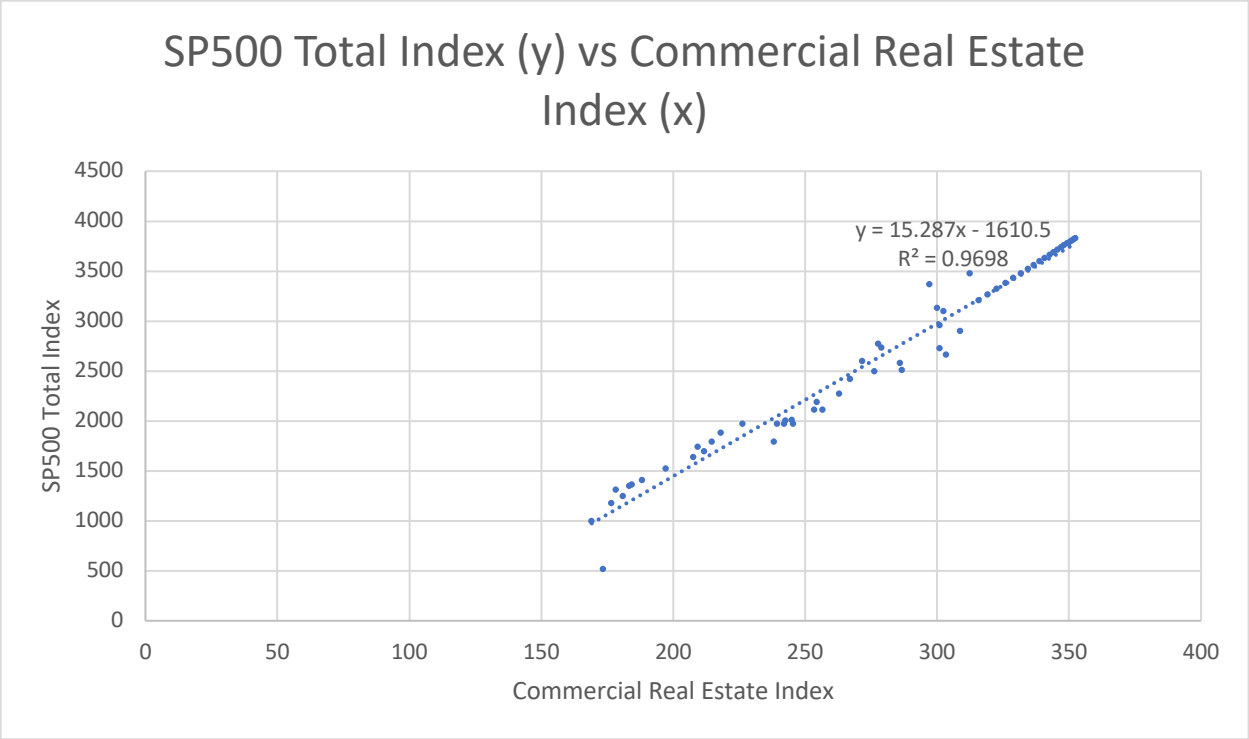
Period	Index Range[72]	Trading Days	Avg points/day
"4Q2020" (10/1/2020-1/20/2021)	3380.80 → 3851.85	77	6.12
"1Q2021" (1/21/2021-3/31/2021)	3851.85→ 3972.89	49	2.47
2Q2021 (4/1/2021-6/30/2021)	3972.89 → 4297.50	63	5.15
"3Q2021" (7/1/2021-9/29/2021)	4297.50 → 4359.46	64	0.97

We expect that major issues of the next two quarters (that will have a bearing on the DWCF and SP500 indexes) to revolve around the Fed' and its tactics to extricate itself from the financial support role. This means that ***the Fed' will need to give the market confidence that landlords will be able to recover from the recently removed eviction moratorium, tenants will have a place to live (and hopefully employment with which to support themselves), and the entire QE strategy will need to be slowed down dramatically***. President Biden's new plans for rebuilding infrastructure (equipment and human infrastructure, if adopted) will need to be paid for through reasonable means, and global supply chains will need to be restored to a "more" reliable level.

Along with the DWCF and the SP500, ***we believe that the VIX will stay relatively low and the markets will remain stable if US leadership remains consistent in its message, and virus cases (and economic channels) can be controlled through well-communicated protocols***. An eroding satisfaction with the Biden administration on various fronts, and a perception of long-term inflation will fuel the VIX and hamper the other indexes. Further, the outcome of Congressional stand-off over raising the debt ceiling, and any significant changes within the Federal Reserve system (including the FOMC, not excluding Chairman Powell himself being replaced) could cause the VIX to increase, similarly hampering the DWCF and SP500.

The following chart shows the connection between the SP500 index and the commercial real estate index previous discussed.

[72] Index values found at https://www.marketwatch.com/investing/index/spx



Source: Authors' calculations

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 3Q2011 and 2Q2021, inclusive.

Table 15: Regression Aggregate Errors for 3Q2011 through 2Q2021

Variable	Min Abs. Error	Average Error	Max Abs. Error
Real GDP Growth	333.42%	**	***
Nominal GDP Growth	343.40%	**	***
Real Disposable Income Growth	415.35%	***	***
Nominal Disposable Income Growth	286.56%	***	***
Inflation	0.00%	***	***
Unemployment Rate	6.21%	-595.61%	***
1-month Treasury Yield	1.57%	23.39%	849.27%
3-month Treasury Yield	0.00%	**	***
6-month Treasury Yield	4.41%	177.49%	***
1-year Treasury Yield	0.19%	325.44%	***
3-year Treasury Yield	***	***	***
5-year Treasury Yield	0.70%	5.92%	290.57%
7-year Treasury Yield	0.07%	7.20%	252.30%
10-year Treasury Yield	0.41%	2.37%	103.25%
20-year Treasury Yield	1.28%	5.15%	107.45%
30-year Treasury Yield	0.01%	-0.13%	57.34%
30-year Mortgage Rate	0.06%	0.35%	12.72%
Moody's AAA Curve	0.27%	-16.40%	50.45%
Moody's BAA Curve	1.15%	-12.86%	36.75%
BBB Corporate Yield	0.42%	23.46%	71.91%
Prime Rate	0.01%	-0.74%	31.38%
US Average Retail Gasoline Price	0.81%	-6.80%	86.96%
Cost of Federal Funds	9.39%	793.95%	***
Dow Jones Total Stock Market Index	405.20%	***	***
S&P 500 Stock Price Index	69.75%	657.45%	***
Commercial Real Estate Price Index	28.58%	200.69%	399.85%
Residential Home Price Index	1.03%	27.31%	60.45%
Market Volatility Index	***	***	***

** 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

	Dependent variable (+/- SE):
	Real GDP growth
Constant	20.251 (+/- 11.335)
	p = 0.086*
US Fed Reserve O-N Loan Rate	19.113 (+/- 2.048)
	p = 0.000***
Unemployment Rate	-8.544 (+/- 0.415)
	p = 0.000***
BBB corporate yield	6.387 (+/- 1.525)
	p = 0.0003***
Home Price Index	-0.179 (+/- 0.029)
	p = 0.00001***
US Avg Retail Gasoline Price ($-gal; all grades, all formulations)	4.497 (+/- 1.068)
	p = 0.0003***
10-year Treasury Yield	147.618 (+/- 12.617)
	p = 0.000***
LN_10-year Treasury Yield	-333.226 (+/- 20.349)
	p = 0.000***
7-year Treasury Yield	-238.519 (+/- 24.674)
	p = 0.000***
LN_7-year Treasury Yield	440.224 (+/- 33.320)
	p = 0.000***
5-year Treasury Yield	129.257 (+/- 14.376)

	p = 0.000***
LN_5-year Treasury Yield	-198.365 (+/- 14.582)
	p = 0.000***
LN_6-month Treasury Yield	-6.296 (+/- 0.668)
	p = 0.000***
1-year Treasury Yield^2	-6.273 (+/- 0.760)
	p = 0.000***
Observations	40
R^2	0.973
Adjusted R^2	0.959
Residual Std. Error	1.533 (df = 26)
F Statistic	70.903*** (df = 13; 26)
Note:	*p<0.1; **p<0.5; ***p<0.01

REGRESSION FOR NOMINAL GDP GROWTH

	Dependent variable (+/- SE):
	Nominal GDP growth
Constant	-209.307 (+/- 28.819)
	p = 0.00001***
Real disposable income growth	9.127 (+/- 1.203)
	p = 0.00001***
Nominal disposable income growth	-8.742 (+/- 1.142)
	p = 0.00001***
Unemployment Rate	-8.356 (+/- 0.637)
	p = 0.000***
CPI Inflation Rate	7.847 (+/- 0.883)
	p = 0.00000***
BBB corporate yield	8.070 (+/- 1.256)
	p = 0.00002***
Prime Rate	79.847 (+/- 9.085)
	p = 0.00000***
Home Price Index	-0.267 (+/- 0.030)
	p = 0.00000***
US Avg Retail Gasoline Price ($-gal; all grades, all formulations)	5.609 (+/- 0.988)
	p = 0.00005***
10-year Treasury Yield	209.371 (+/- 15.135)
	p = 0.000***
LN_10-year Treasury Yield	-431.119 (+/- 23.869)
	p = 0.000***
1-month Treasury Yield	-251.218 (+/- 23.125)

	p = 0.00000***
LN_1-month Treasury Yield	9.484 (+/- 1.261)
	p = 0.00001***
7-year Treasury Yield	-418.691 (+/- 31.166)
	p = 0.000***
LN_7-year Treasury Yield	729.989 (+/- 44.317)
	p = 0.000***
3-month Treasury Yield	75.596 (+/- 10.969)
	p = 0.00001***
5-year Treasury Yield	241.040 (+/- 17.699)
	p = 0.000***
LN_5-year Treasury Yield	-397.147 (+/- 28.074)
	p = 0.000***
6-month Treasury Yield	82.912 (+/- 13.938)
	p = 0.00003***
LN_6-month Treasury Yield	-19.596 (+/- 2.555)
	p = 0.00001***
LN_3-year Treasury Yield	38.746 (+/- 7.940)
	p = 0.0003***
1-year Treasury Yield^2	-16.831 (+/- 1.813)
	p = 0.00000***
1-month Treasury Yield^2	21.004 (+/- 2.374)
	p = 0.00000***
20-year Treasury Yield^2	17.381 (+/- 3.199)
	p = 0.0001***
30-year Treasury Yield^2	-15.777 (+/- 2.506)

	p = 0.00002***
Observations	40
R^2	0.994
Adjusted R^2	0.985
Residual Std. Error	1.004 (df = 15)
F Statistic	110.534*** (df = 24; 15)
Note:	*p<0.1; **p<0.5; ***p<0.01

REGRESSION FOR REAL DISPOSABLE INCOME GROWTH

	Dependent variable (+/- SE):
	Real disposable income growth
Constant	425.580 (+/- 112.683)
	p = 0.002***
Moody's BAA Curve	-27.472 (+/- 6.130)
	p = 0.0004***
Real GDP growth	-4.440 (+/- 0.867)
	p = 0.0001***
Nominal GDP growth	2.630 (+/- 0.775)
	p = 0.004***
BBB corporate yield	20.845 (+/- 5.527)
	p = 0.002***
Prime Rate	-64.507 (+/- 13.253)
	p = 0.0002***
Dow Total Stock Market Index	-0.005 (+/- 0.001)
	p = 0.00001***
Home Price Index	1.120 (+/- 0.205)
	p = 0.00005***
20-year Treasury Yield	-1,312.890 (+/- 267.645)
	p = 0.0002***
LN_20-year Treasury Yield	1,375.199 (+/- 322.907)
	p = 0.001***
10-year Treasury Yield	876.724 (+/- 147.382)
	p = 0.00002***
LN_10-year Treasury Yield	-530.761 (+/- 128.088)

	p = 0.001***
LN_1-month Treasury Yield	-11.935 (+/- 2.109)
	p = 0.00003***
LN_5-year Treasury Yield	-114.535 (+/- 22.190)
	p = 0.0001***
6-month Treasury Yield	384.887 (+/- 52.572)
	p = 0.00001***
3-year Treasury Yield	55.151 (+/- 14.833)
	p = 0.002***
1-year Treasury Yield	-312.069 (+/- 43.203)
	p = 0.00001***
1-year Treasury Yield^2	104.047 (+/- 14.951)
	p = 0.00001***
6-month Treasury Yield^2	-182.585 (+/- 26.609)
	p = 0.00001***
1-month Treasury Yield^2	68.139 (+/- 11.414)
	p = 0.00002***
10-year Treasury Yield^2	-109.481 (+/- 19.357)
	p = 0.00003***
20-year Treasury Yield^2	127.418 (+/- 26.098)
	p = 0.0002***
Market Volatility Index^2	-0.006 (+/- 0.001)
	p = 0.00003***
Observations	40
R^2	0.970
Adjusted R^2	0.930

Residual Std. Error	2.360 (df = 17)
F Statistic	24.723*** (df = 22; 17)

Note: *p<0.1; **p<0.5; ***p<0.01

REGRESSION FOR NOMINAL DISPOSABLE INCOME GROWTH

	Dependent variable (+/- SE):
	Nominal disposable income growth
Constant	237.223 (+/- 111.345)
	p = 0.048**
US Fed Reserve O-N Loan Rate	28.046 (+/- 9.723)
	p = 0.010***
Real GDP growth	-4.488 (+/- 1.143)
	p = 0.001***
Nominal GDP growth	3.287 (+/- 1.058)
	p = 0.007***
BBB corporate yield	12.348 (+/- 3.650)
	p = 0.004***
Prime Rate	-119.612 (+/- 28.700)
	p = 0.001***
Dow Total Stock Market Index	-0.006 (+/- 0.001)
	p = 0.0002***
Home Price Index	1.433 (+/- 0.313)
	p = 0.0003***
Market Volatility Index	-0.556 (+/- 0.156)
	p = 0.003***
20-year Treasury Yield	-289.501 (+/- 62.770)
	p = 0.0003***
LN_10-year Treasury Yield	245.503 (+/- 60.940)
	p = 0.001***
1-month Treasury Yield	208.317 (+/- 48.912)

	p = 0.0005***
LN_1-month Treasury Yield	-11.468 (+/- 2.831)
	p = 0.001***
7-year Treasury Yield	241.207 (+/- 66.202)
	p = 0.002***
5-year Treasury Yield	131.757 (+/- 45.010)
	p = 0.009***
LN_5-year Treasury Yield	-243.139 (+/- 60.088)
	p = 0.001***
6-month Treasury Yield	172.313 (+/- 54.437)
	p = 0.006***
1-year Treasury Yield	-247.274 (+/- 50.856)
	p = 0.0002***
1-year Treasury Yield^2	65.100 (+/- 14.438)
	p = 0.0003***
6-month Treasury Yield^2	-85.357 (+/- 15.678)
	p = 0.00004***
7-year Treasury Yield^2	-57.561 (+/- 16.490)
	p = 0.003***
20-year Treasury Yield^2	31.227 (+/- 7.792)
	p = 0.001***
Observations	40
R^2	0.921
Adjusted R^2	0.829
Residual Std. Error	3.513 (df = 18)
F Statistic	10.021*** (df = 21; 18)

Note:	*p<0.1; **p<0.5; ***p<0.01

REGRESSION FOR CPI INFLATION RATE

	Dependent variable (+/- SE):
	CPI Inflation Rate
Constant	17.725 (+/- 3.916)
	p = 0.0004***
Real GDP growth	0.090 (+/- 0.015)
	p = 0.00002***
Real disposable income growth	-1.181 (+/- 0.039)
	p = 0.000***
Nominal disposable income growth	1.125 (+/- 0.037)
	p = 0.000***
Unemployment Rate	0.821 (+/- 0.117)
	p = 0.00001***
BBB corporate yield	-0.790 (+/- 0.163)
	p = 0.0002***
Prime Rate	-8.541 (+/- 1.259)
	p = 0.00001***
Home Price Index	0.038 (+/- 0.006)
	p = 0.00002***
30-year Treasury Yield	8.273 (+/- 1.943)
	p = 0.001***
20-year Treasury Yield	-8.812 (+/- 2.283)
	p = 0.002***
10-year Treasury Yield	-17.143 (+/- 2.483)
	p = 0.00001***
LN_10-year Treasury Yield	39.217 (+/- 4.710)

	p = 0.00000***
1-month Treasury Yield	24.647 (+/- 3.026)
	p = 0.00000***
LN_1-month Treasury Yield	-0.484 (+/- 0.124)
	p = 0.002***
7-year Treasury Yield	36.683 (+/- 4.338)
	p = 0.00000***
LN_7-year Treasury Yield	-65.549 (+/- 7.168)
	p = 0.00000***
3-month Treasury Yield	-8.835 (+/- 1.350)
	p = 0.00001***
5-year Treasury Yield	-21.182 (+/- 2.625)
	p = 0.00000***
LN_5-year Treasury Yield	34.397 (+/- 3.822)
	p = 0.00000***
6-month Treasury Yield	-6.372 (+/- 1.898)
	p = 0.005***
LN_3-year Treasury Yield	-3.594 (+/- 0.925)
	p = 0.002***
LN_1-year Treasury Yield	2.135 (+/- 0.290)
	p = 0.00001***
1-year Treasury Yield^2	1.102 (+/- 0.261)
	p = 0.001***
1-month Treasury Yield^2	-1.627 (+/- 0.341)
	p = 0.0003***
Observations	40

R^2	0.996
Adjusted R^2	0.990
Residual Std. Error	0.155 (df = 16)
F Statistic	177.593*** (df = 23; 16)
Note:	*p<0.1; **p<0.5; ***p<0.01

Unemployment Rate

REGRESSION FOR UNEMPLOYMENT RATE

	Dependent variable (+/- SE):
	Unemployment Rate
Constant	-17.998 (+/- 4.215)
	p = 0.001***
Moody's AAA Curve	3.818 (+/- 0.757)
	p = 0.0001***
Real GDP growth	-0.090 (+/- 0.011)
	p = 0.00000***
Real disposable income growth	0.948 (+/- 0.152)
	p = 0.00001***
Nominal disposable income growth	-0.888 (+/- 0.147)
	p = 0.00002***
CPI Inflation Rate	0.788 (+/- 0.128)
	p = 0.00002***
Prime Rate	8.957 (+/- 1.486)
	p = 0.00002***
Home Price Index	-0.064 (+/- 0.005)
	p = 0.000***
30-year Treasury Yield	-16.833 (+/- 2.905)
	p = 0.00003***
20-year Treasury Yield	15.725 (+/- 2.803)
	p = 0.00004***
10-year Treasury Yield	12.757 (+/- 2.337)

	p = 0.00005***
LN_10-year Treasury Yield	-34.660 (+/- 3.420)
	p = 0.000***
1-month Treasury Yield	-22.128 (+/- 3.072)
	p = 0.00001***
LN_1-month Treasury Yield	1.208 (+/- 0.219)
	p = 0.00004***
7-year Treasury Yield	-29.532 (+/- 4.131)
	p = 0.00001***
LN_7-year Treasury Yield	55.401 (+/- 6.208)
	p = 0.00000***
5-year Treasury Yield	16.159 (+/- 2.271)
	p = 0.00001***
LN_5-year Treasury Yield	-29.851 (+/- 3.588)
	p = 0.00000***
LN_3-year Treasury Yield	3.217 (+/- 1.068)
	p = 0.008***
1-year Treasury Yield	16.834 (+/- 1.766)
	p = 0.00000***
LN_1-year Treasury Yield	-4.582 (+/- 0.560)
	p = 0.00000***
1-year Treasury Yield^2	-3.852 (+/- 0.422)
	p = 0.00000***
3-month Treasury Yield^2	4.080 (+/- 0.548)
	p = 0.00000***
Observations	40

R^2	0.997
Adjusted R^2	0.994
Residual Std. Error	0.156 (df = 17)
F Statistic	302.075*** (df = 22; 17)
Note:	*p<0.1; **p<0.5; ***p<0.01

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

REGRESSION FOR 1-MONTH TREASURY YIELD

	Dependent variable (+/- SE):
	1-month Treasury Yield
Constant	-1.576 (+/- 0.125)
	p = 0.000***
Real disposable income growth	0.032 (+/- 0.009)
	p = 0.001***
Nominal disposable income growth	-0.031 (+/- 0.009)
	p = 0.001***
CPI Inflation Rate	0.024 (+/- 0.007)
	p = 0.002***
Prime Rate	0.484 (+/- 0.038)
	p = 0.000***
3-month Treasury Yield	0.452 (+/- 0.037)
	p = 0.000***
3-month Treasury Yield^2	0.045 (+/- 0.007)
	p = 0.00000***
Observations	40
R^2	1.000
Adjusted R^2	0.999
Residual Std. Error	0.019 (df = 33)
F Statistic	11,565.030*** (df = 6; 33)
Note:	*p<0.1; **p<0.5; ***p<0.01

REGRESSION FOR 3-MONTH TREASURY YIELD

	Dependent variable (+/- SE):
	3-month Treasury Yield
Constant	-0.389 (+/- 0.113)
	p = 0.002***
30-year Treasury Yield	-1.771 (+/- 0.532)
	p = 0.003***
LN_30-year Treasury Yield	4.843 (+/- 1.376)
	p = 0.002***
20-year Treasury Yield	1.575 (+/- 0.478)
	p = 0.003***
LN_20-year Treasury Yield	-3.885 (+/- 1.124)
	p = 0.002***
1-month Treasury Yield	1.127 (+/- 0.036)
	p = 0.000***
1-month Treasury Yield^2	-0.066 (+/- 0.016)
	p = 0.0002***
Observations	40
R^2	0.998
Adjusted R^2	0.997
Residual Std. Error	0.040 (df = 33)
F Statistic	2,575.255*** (df = 6; 33)
Note:	*p<0.1; **p<0.5; ***p<0.01

REGRESSION FOR 6-MONTH TREASURY YIELD

	Dependent variable (+/- SE):
	6-month Treasury Yield
Constant	-6.091 (+/- 1.159)
	p = 0.00001***
Commercial Real Estate Price Index	0.017 (+/- 0.003)
	p = 0.00000***
30-year Treasury Yield	0.876 (+/- 0.212)
	p = 0.0002***
Observations	40
R^2	0.521
Adjusted R^2	0.495
Residual Std. Error	0.585 (df = 37)
F Statistic	20.114*** (df = 2; 37)
Note:	*p<0.1; **p<0.5; ***p<0.01

REGRESSION FOR 1-YEAR TREASURY YIELD

	Dependent variable (+/- SE):
	1-year Treasury Yield
Constant	-7.586 (+/- 1.157)
	p = 0.00000***
SP500 Stock Price Index	-0.001 (+/- 0.0004)
	p = 0.007***
Commercial Real Estate Price Index	0.035 (+/- 0.006)
	p = 0.00001***
30-year Treasury Yield	0.856 (+/- 0.196)
	p = 0.0001***
Observations	40
R^2	0.617
Adjusted R^2	0.585
Residual Std. Error	0.535 (df = 36)
F Statistic	19.357*** (df = 3; 36)
Note:	*p<0.1; **p<0.5; ***p<0.01

REGRESSION FOR 3-YEAR TREASURY YIELD

	Dependent variable (+/- SE):
	3-year Treasury Yield
Constant	-28.686 (+/- 5.187)
	p = 0.00001***
Real GDP growth	-0.029 (+/- 0.007)
	p = 0.0003***
Unemployment Rate	-0.420 (+/- 0.035)
	p = 0.000***
30-year Treasury Yield	41.996 (+/- 6.695)
	p = 0.00000***
LN_30-year Treasury Yield	-53.474 (+/- 8.237)
	p = 0.00000***
30-year Treasury Yield^2	-3.866 (+/- 0.651)
	p = 0.00001***
Observations	40
R^2	0.845
Adjusted R^2	0.822
Residual Std. Error	0.317 (df = 34)
F Statistic	37.138*** (df = 5; 34)
Note:	*p<0.1; **p<0.5; ***p<0.01

REGRESSION FOR 5-YEAR TREASURY YIELD

	Dependent variable (+/- SE):
	5-year Treasury Yield
Constant	0.817 (+/- 0.289)
	p = 0.008***
Real disposable income growth	0.018 (+/- 0.005)
	p = 0.001***
Unemployment Rate	-0.167 (+/- 0.028)
	p = 0.00000***
30-year Treasury Yield	0.495 (+/- 0.068)
	p = 0.000***
1-month Treasury Yield	0.348 (+/- 0.068)
	p = 0.00002***
Observations	40
R^2	0.882
Adjusted R^2	0.869
Residual Std. Error	0.242 (df = 35)
F Statistic	65.505*** (df = 4; 35)
Note:	*p<0.1; **p<0.5; ***p<0.01

REGRESSION FOR 7-YEAR TREASURY YIELD

	Dependent variable (+/- SE):
	7-year Treasury Yield
Constant	3.477 (+/- 0.376)
	p = 0.000***
SP500 Stock Price Index	-0.0004 (+/- 0.0001)
	p = 0.0005***
Unemployment Rate	-0.167 (+/- 0.041)
	p = 0.0003***
1-month Treasury Yield	0.312 (+/- 0.109)
	p = 0.007***
Observations	40
R^2	0.620
Adjusted R^2	0.588
Residual Std. Error	0.393 (df = 36)
F Statistic	19.561*** (df = 3; 36)
Note:	*p<0.1; **p<0.5; ***p<0.01

REGRESSION FOR 10-YEAR TREASURY YIELD

	Dependent variable (+/- SE):
	10-year Treasury Yield
Constant	-0.339 (+/- 0.160)
	p = 0.043**
Nominal GDP growth	0.009 (+/- 0.003)
	p = 0.010***
Real disposable income growth	0.013 (+/- 0.003)
	p = 0.0004***
Unemployment Rate	-0.051 (+/- 0.015)
	p = 0.003***
US Avg Retail Gasoline Price ($-gal; all grades, all formulations)	-0.218 (+/- 0.049)
	p = 0.0002***
30-year Treasury Yield	0.981 (+/- 0.041)
	p = 0.000***
1-month Treasury Yield	0.807 (+/- 0.191)
	p = 0.0002***
LN_1-month Treasury Yield	-0.136 (+/- 0.033)
	p = 0.0003***
1-month Treasury Yield^2	-0.179 (+/- 0.060)
	p = 0.006***
Observations	40
R^2	0.979
Adjusted R^2	0.974
Residual Std. Error	0.096 (df = 31)

F Statistic	181.858*** (df = 8; 31)
Note:	*p<0.1; **p<0.5; ***p<0.01

REGRESSION FOR 20-YEAR TREASURY YIELD

	Dependent variable (+/- SE):
	20-year Treasury Yield
Constant	2.055 (+/- 0.509)
	p = 0.0003***
SP500 Stock Price Index	-0.0003 (+/- 0.0001)
	p = 0.001***
US Fed Reserve O-N Loan Rate	0.536 (+/- 0.137)
	p = 0.0005***
Unemployment Rate	-0.114 (+/- 0.033)
	p = 0.002***
US Avg Retail Gasoline Price ($-gal; all grades, all formulations)	0.420 (+/- 0.118)
	p = 0.002***
LN_1-month Treasury Yield	-0.197 (+/- 0.062)
	p = 0.003***
Observations	40
R^2	0.751
Adjusted R^2	0.714
Residual Std. Error	0.304 (df = 34)
F Statistic	20.472*** (df = 5; 34)
Note:	*p<0.1; **p<0.5; ***p<0.01

REGRESSION FOR 30-YEAR TREASURY YIELD

	Dependent variable (+/- SE):
	30-year Treasury Yield
Constant	-0.653 (+/- 0.290)
	p = 0.033**
Real GDP growth	-0.009 (+/- 0.001)
	p = 0.00001***
Real disposable income growth	-0.007 (+/- 0.001)
	p = 0.00001***
Dow Total Stock Market Index	-0.00004 (+/- 0.00001)
	p = 0.000***
Home Price Index	0.008 (+/- 0.002)
	p = 0.00001***
Market Volatility Index	-0.011 (+/- 0.002)
	p = 0.00003***
LN_Market Volatility Index	0.194 (+/- 0.065)
	p = 0.006***
US Avg Retail Gasoline Price ($-gal; all grades, all formulations)	0.085 (+/- 0.019)
	p = 0.0001***
10-year Treasury Yield	1.304 (+/- 0.036)
	p = 0.000***
LN_5-year Treasury Yield	-0.429 (+/- 0.038)
	p = 0.000***
5-year Treasury Yield^2	-0.079 (+/- 0.007)
	p = 0.000***

Observations	40
R^2	0.997
Adjusted R^2	0.996
Residual Std. Error	0.037 (df = 29)
F Statistic	955.477^{***} (df = 10; 29)

Note: *p<0.1; **p<0.5; ***p<0.01

30-year Mortgage Rate

REGRESSION FOR 30-YEAR MORTGATE RATE

	Dependent variable (+/- SE):
	30-year Mortgate Rate
Constant	1.818 (+/- 0.209)
	p = 0.000***
30-year Treasury Yield	0.668 (+/- 0.072)
	p = 0.000***
1-month Treasury Yield	0.211 (+/- 0.053)
	p = 0.0004***
Observations	40
R^2	0.731
Adjusted R^2	0.717
Residual Std. Error	0.261 (df = 37)
F Statistic	50.322*** (df = 2; 37)
Note:	*p<0.1; **p<0.5; ***p<0.01

Moody's AAA & BAA Rates

REGRESSION FOR MOODY'S AAA CURVE

	Dependent variable (+/- SE):
	Moody's AAA Curve
Constant	6.022 (+/- 0.305)
	p = 0.000***
SP500 Stock Price Index	-0.001 (+/- 0.0001)
	p = 0.000***
Unemployment Rate	-0.130 (+/- 0.029)
	p = 0.0001***
Observations	40
R^2	0.660
Adjusted R^2	0.641
Residual Std. Error	0.344 (df = 37)
F Statistic	35.877*** (df = 2; 37)
Note:	*p<0.1; **p<0.5; ***p<0.01

REGRESSION FOR MOODY'S BAA CURVE

	Dependent variable (+/- SE):
	Moody's BAA Curve
Constant	6.049 (+/- 0.165)
	p = 0.000***
SP500 Stock Price Index	-0.001 (+/- 0.0001)
	p = 0.000***
1-month Treasury Yield	-2.397 (+/- 0.674)
	p = 0.002***
6-month Treasury Yield	1.684 (+/- 0.486)
	p = 0.002***
1-month Treasury Yield^2	0.409 (+/- 0.121)
	p = 0.002***
Observations	40
R^2	0.798
Adjusted R^2	0.774
Residual Std. Error	0.279 (df = 35)
F Statistic	34.464*** (df = 4; 35)
Note:	*p<0.1; **p<0.5; ***p<0.01

BBB Corporate Yield

REGRESSION FOR BBB CORPORATE YIELD

	Dependent variable (+/- SE):
	BBB corporate yield
Constant	-0.410 (+/- 0.596)
	p = 0.496
SP500 Stock Price Index	-0.001 (+/- 0.0002)
	p = 0.00000***
Commercial Real Estate Price Index	0.019 (+/- 0.003)
	p = 0.00001***
30-year Treasury Yield	0.892 (+/- 0.103)
	p = 0.000***
Market Volatility Index^2	0.0001 (+/- 0.00004)
	p = 0.002***
Observations	40
R^2	0.854
Adjusted R^2	0.837
Residual Std. Error	0.265 (df = 35)
F Statistic	51.097*** (df = 4; 35)
Note:	*p<0.1; **p<0.5; ***p<0.01

Prime Rate

REGRESSION FOR PRIME RATE

	Dependent variable (+/- SE):
	Prime Rate
Constant	2.467 (+/- 0.178)
	p = 0.000***
Commercial Real Estate Price Index	0.001 (+/- 0.0004)
	p = 0.005***
30-year Treasury Yield	0.795 (+/- 0.152)
	p = 0.00001***
20-year Treasury Yield	-0.781 (+/- 0.146)
	p = 0.00001***
1-month Treasury Yield	1.364 (+/- 0.083)
	p = 0.000***
LN_1-month Treasury Yield	-0.077 (+/- 0.016)
	p = 0.00002***
1-month Treasury Yield^2	-0.117 (+/- 0.024)
	p = 0.00004***
Observations	40
R^2	0.998
Adjusted R^2	0.998
Residual Std. Error	0.036 (df = 33)
F Statistic	2,723.900*** (df = 6; 33)
Note:	*p<0.1; **p<0.5; ***p<0.01

US Average Retail Gasoline Price

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

	Dependent variable (+/- SE):
	US Avg Retail Gasoline Price ($-gal; all grades, all formulations)
Constant	2.537 (+/- 0.416)
	p = 0.00000***
Home Price Index	-0.017 (+/- 0.001)
	p = 0.000***
1-year Treasury Yield	3.820 (+/- 0.632)
	p = 0.00000***
LN_1-year Treasury Yield	-1.500 (+/- 0.189)
	p = 0.000***
1-year Treasury Yield^2	-0.727 (+/- 0.159)
	p = 0.0001***
Observations	40
R^2	0.858
Adjusted R^2	0.842
Residual Std. Error	0.225 (df = 35)
F Statistic	52.822*** (df = 4; 35)
Note:	*p<0.1; **p<0.5; ***p<0.01

Cost of Federal Funds (Primary Credit Rate)

REGRESSION FOR US FED RESERVE O-N LOAN RATE

	Dependent variable (+/- SE):
	US Fed Reserve O-N Loan Rate
Constant	-0.149 (+/- 1.936)
	p = 0.940
SP500 Stock Price Index	-0.003 (+/- 0.001)
	p = 0.00001***
Unemployment Rate	-0.196 (+/- 0.041)
	p = 0.00003***
Home Price Index	0.065 (+/- 0.014)
	p = 0.00004***
30-year Treasury Yield	-6.965 (+/- 1.495)
	p = 0.00005***
20-year Treasury Yield	6.822 (+/- 1.362)
	p = 0.00002***
Observations	40
R^2	0.759
Adjusted R^2	0.724
Residual Std. Error	0.408 (df = 34)
F Statistic	21.446*** (df = 5; 34)
Note:	*p<0.1; **p<0.5; ***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

	Dependent variable (+/- SE):
	Dow Total Stock Market Index
Constant	-160,135.200 (+/- 46,992.620)
	p = 0.003***
Real GDP growth	-331.244 (+/- 45.388)
	p = 0.00000***
Unemployment Rate	-4,434.027 (+/- 494.981)
	p = 0.000***
30-year Mortgate Rate	-4,720.037 (+/- 1,104.711)
	p = 0.0003***
30-year Treasury Yield	353,389.600 (+/- 68,567.790)
	p = 0.00003***
LN_30-year Treasury Yield	-534,561.700 (+/- 90,233.640)
	p = 0.00001***
5-year Treasury Yield	-41,675.590 (+/- 10,039.320)
	p = 0.0004***
LN_5-year Treasury Yield	74,958.100 (+/- 12,232.530)
	p = 0.00001***
3-year Treasury Yield	31,379.800 (+/- 9,283.198)
	p = 0.003***
LN_3-year Treasury Yield	-43,804.230 (+/- 6,984.590)
	p = 0.00001***
1-year Treasury Yield	20,018.620 (+/- 4,688.854)

	p = 0.0003***
LN_1-year Treasury Yield	-7,396.488 (+/- 1,651.494)
	p = 0.0002***
6-month Treasury Yield^2	-4,688.188 (+/- 853.134)
	p = 0.00002***
30-year Treasury Yield^2	-29,194.620 (+/- 6,274.244)
	p = 0.0001***
Market Volatility Index^2	-2.408 (+/- 0.237)
	p = 0.000***
Observations	40
R^2	0.983
Adjusted R^2	0.973
Residual Std. Error	1,274.516 (df = 25)
F Statistic	100.357*** (df = 14; 25)
Note:	*p<0.1; **p<0.5; ***p<0.01

REGRESSION FOR SP500 STOCK PRICE INDEX

	Dependent variable (+/- SE):
	SP500 Stock Price Index
Constant	4,192.914 (+/- 700.464)
	p = 0.00001***
Moody's AAA Curve	1,409.413 (+/- 176.916)
	p = 0.00000***
Nominal GDP growth	-13.700 (+/- 2.832)
	p = 0.0001***
Unemployment Rate	-185.135 (+/- 30.806)
	p = 0.00001***
BBB corporate yield	-398.819 (+/- 84.917)
	p = 0.0001***
30-year Mortgate Rate	-369.925 (+/- 78.601)
	p = 0.0001***
LN_30-year Treasury Yield	-13,434.300 (+/- 1,167.124)
	p = 0.000***
LN_20-year Treasury Yield	10,784.240 (+/- 1,349.923)
	p = 0.00000***
LN_10-year Treasury Yield	-1,701.839 (+/- 559.032)
	p = 0.006***
1-month Treasury Yield	-2,337.479 (+/- 339.856)
	p = 0.00000***
LN_1-month Treasury Yield	140.681 (+/- 45.621)
	p = 0.005***
1-year Treasury Yield	4,010.167 (+/- 632.099)

	p = 0.00001***
LN_1-year Treasury Yield	-946.191 (+/- 167.660)
	p = 0.00001***
1-year Treasury Yield^2	-783.734 (+/- 148.023)
	p = 0.00002***
3-month Treasury Yield^2	636.440 (+/- 135.492)
	p = 0.0001***
Observations	40
R^2	0.991
Adjusted R^2	0.986
Residual Std. Error	83.950 (df = 25)
F Statistic	198.471*** (df = 14; 25)
Note:	*p<0.1; **p<0.5; ***p<0.01

House and Commercial Real Estate Price Indexes

REGRESSION FOR HOME PRICE INDEX

	Dependent variable (+/- SE):
	Home Price Index
Constant	196.119 (+/- 23.578)
	p = 0.000***
Unemployment Rate	-4.359 (+/- 1.309)
	p = 0.003***
US Avg Retail Gasoline Price ($-gal; all grades, all formulations)	-28.557 (+/- 4.930)
	p = 0.00001***
LN_30-year Treasury Yield	-52.533 (+/- 10.453)
	p = 0.00002***
1-year Treasury Yield	162.620 (+/- 26.400)
	p = 0.00000***
LN_1-year Treasury Yield	-65.124 (+/- 8.078)
	p = 0.000***
1-year Treasury Yield^2	-29.628 (+/- 6.701)
	p = 0.0002***
Observations	40
R^2	0.924
Adjusted R^2	0.910
Residual Std. Error	9.245 (df = 33)
F Statistic	66.579*** (df = 6; 33)
Note:	*p<0.1; **p<0.5; ***p<0.01

REGRESSION FOR COMMERCIAL REAL ESTATE PRICE INDEX

	Dependent variable (+/- SE):
	Commercial Real Estate Price Index
Constant	339.885 (+/- 28.695)
	p = 0.000***
Real GDP growth	-1.219 (+/- 0.203)
	p = 0.00001***
Unemployment Rate	-13.701 (+/- 1.605)
	p = 0.000***
LN_Market Volatility Index	-15.385 (+/- 4.258)
	p = 0.002***
US Avg Retail Gasoline Price ($-gal; all grades, all formulations)	-22.813 (+/- 4.810)
	p = 0.0001***
30-year Treasury Yield	137.796 (+/- 22.815)
	p = 0.00001***
LN_30-year Treasury Yield	-452.310 (+/- 60.988)
	p = 0.00000***
LN_1-month Treasury Yield	-32.761 (+/- 7.674)
	p = 0.0003***
LN_6-month Treasury Yield	69.391 (+/- 19.867)
	p = 0.002***
1-year Treasury Yield	191.092 (+/- 26.484)
	p = 0.00000***
LN_1-year Treasury Yield	-107.037 (+/- 16.782)
	p = 0.00000***
1-year Treasury Yield^2	-35.058 (+/- 6.542)

	p = 0.00002***
Observations	40
R^2	0.977
Adjusted R^2	0.969
Residual Std. Error	7.986 (df = 28)
F Statistic	110.330*** (df = 11; 28)
Note:	*p<0.1; **p<0.5; ***p<0.01

Market Volatility Index

REGRESSION FOR MARKET VOLATILITY INDEX

	Dependent variable (+/- SE):
	Market Volatility Index
Constant	297.762 (+/- 44.222)
	p = 0.00000***
Dow Total Stock Market Index	-0.004 (+/- 0.001)
	p = 0.00000***
Home Price Index	0.670 (+/- 0.177)
	p = 0.001***
30-year Treasury Yield	702.086 (+/- 126.565)
	p = 0.00001***
LN_30-year Treasury Yield	-2,019.264 (+/- 308.432)
	p = 0.00000***
20-year Treasury Yield	-582.705 (+/- 110.789)
	p = 0.00002***
LN_20-year Treasury Yield	1,298.349 (+/- 227.451)
	p = 0.00001***
LN_10-year Treasury Yield	177.480 (+/- 29.676)
	p = 0.00001***
3-year Treasury Yield	-66.926 (+/- 10.682)
	p = 0.00000***
3-year Treasury Yield^2	19.499 (+/- 3.116)
	p = 0.00000***
Observations	40

R^2	0.882
Adjusted R^2	0.846
Residual Std. Error	5.315 (df = 30)
F Statistic	24.844^{***} (df = 9; 30)
Note:	*p<0.1; **p<0.5; ***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 "2021 Stress Test Scenarios" (found at https://www.federalreserve.gov/newsevents/pressreleases/files/bcreg20210212a1.pdf) are listed. Please note that shaded attributes are not discussed within this report.

Table 16: Data Values and Referenced Sources

Attribute	Referenced Source[73]
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 Reserve staff based on the Svensson smoothed term structure model; see Lars E. O. Svensson (1995),

[73] Per https://www.federalreserve.gov/newsevents/pressreleases/files/bcreg20190213a1.pdf

	"Estimating Forward Interest Rates with the Extended Nelson-Siegel Method," Quarterly Review, no. 3, Sveriges Riksbank, pp. 13–26
BBB corporate yield	Ice Data Indices, LLC, ICE BofA BBB US Corporate Index Effective Yield [BAMLC0A4CBBBEY], retrieved from FRED, Federal Reserve Bank of St. Louis; https://fred.stlouisfed.org/series/BAMLC0A4CBBBEY[74]
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 divided by 1000)[75].
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)[76].
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).

[74] Capitalytics does not have license to use the data referenced in https://www.federalreserve.gov/newsevents/pressreleases/files/bcreg20210212a1.pdf, specifically "Quarterly average of ICE BofAML U.S. Corporate 7-10 Year Yield-to-Maturity Index, ICE Data Indices, LLC, used with permission. (C4A4 series.)", but we use the referenced series as a proxy.

75 Capitalytics accesses this series from the data provided at https://www.quandl.com/data/FED/FL075035243_Q-Interest-rates-and-price-indexes-owner-occupied-real-estate-CoreLogic-national-SA-Quarterly-Levels-NSA

[76] Capitalytics accesses this series from the data provided by https://www.quandl.com/data/FED/FL075035503_Q-Interest-rates-and-price-indexes-commercial-real-estate-price-index-Quarterly-Levels-NSA

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.
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/files/2021-table_1a_historic_domestic.csv and https://www.federalreserve.gov/supervisionreg/files/2021-table_1b_historic_international.csv (shown below, as of Feb 2021) by clicking the links marked "2021 Historical Domestic (CSV)" and "2021 Historical International (CSV)". Alternatively, downloading the files at https://www.federalreserve.gov/supervisionreg/files/2021-table_1a_historic_domestic.csv and https://www.federalreserve.gov/supervisionreg/files/2021-table_1b_historic_international.csv using HTTP client software will also download the official datasets[77].

Since the CCAR dataset is only released annually (through 4Q2020 as of this writing), and Capitalytics 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) 4Q2020.

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

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)
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/BAMLC0A4CBBBEY), 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	https://data.nasdaq.com/data/FED/FL075035243_Q-interest-rates-and-price-indexes-owneroccupied-real-estate-corelogic-national-sa-quarterly-levels-nsa

Commercial Real Estate Price Index	https://data.nasdaq.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 at https://www.federalreserve.gov/supervisionreg/files/2021-table_1a_historic_domestic.csv and

https://www.federalreserve.gov/supervisionreg/files/2021-table_1b_historic_international.csv, 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) 4Q2020.

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's[78] "forecast" package[79]; specifically, the "ets" function (see p.39 of https://cran.r-project.org/web/packages/forecast/forecast.pdf)[80] 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*st forecasted value given the first *n* values of the metric's sequence (the "fitted" values)[81], and the determined parameters. While fitting forecasts to previous values,

[78] As of this writing, v.4.1.0 of the "R" language is available at https://cran.r-project.org/.

[79] As of this writing, v.8.14 of the forecast package is available at https://CRAN.R-project.org/package=forecast.

[80] 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.

[81] 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

- "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)[82].

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
…

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

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 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.

[82] It bears noting that a lower value for the "score" indicates better accuracy of an algorithm.

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 values[83];
    - 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 slopes[84].

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

[83] 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.
[84] 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.

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

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

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

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, (absolute) correlations greater than 0.95 warrant further investigation as the relationship between variables may be useful for our research.

Table 9: Correlation Factors found as of 2Q2021

Variable 1	Variable 2	Correlation
S&P 500 Stock Price Index	Moody's AAA Rate	-0.690122
S&P 500 Stock Price Index	Moody's BAA Rate	-0.792143
S&P 500 Stock Price Index	Dow Jones Total Stock Market Index	-0.905584
S&P 500 Stock Price Index	**National Home Price Index**	**-0.955142**
S&P 500 Stock Price Index	**Commercial Real Estate Price Index**	**-0.962598**
S&P 500 Stock Price Index	US Average Retail Gasoline Price	-0.613239
S&P 500 Stock Price Index	30-year Treasury Yield	-0.651275
Primary Credit	Moody's AAA Rate	0.805693
Primary Credit	Moody's BAA Rate	0.745357
Primary Credit	BBB Corporate Yield	-0.821959
Primary Credit	30-year Fixed Mortgage Rate	-0.828837
Primary Credit	Prime Rate	-0.822424
Primary Credit	Dow Jones Total Stock Market Index	0.660432
Primary Credit	National Home Price Index	0.697781
Primary Credit	Commercial Real Estate Price Index	0.654343
Primary Credit	US Average Retail Gasoline Price	-0.627611
Primary Credit	20-year Treasury Yield	0.793276
Primary Credit	10-year Treasury Yield	-0.810394
Primary Credit	**1-month Treasury Yield**	**0.993080**
Primary Credit	7-year Treasury Yield	0.894231
Primary Credit	3-month Treasury Yield	-0.807392
Primary Credit	5-year Treasury Yield	-0.827576
Primary Credit	**6-month Treasury Yield**	**0.994281**
Primary Credit	**3-year Treasury Yield**	**0.955849**
Primary Credit	**1-year Treasury Yield**	**0.987804**
Moody's AAA Rate	**Moody's BAA Rate**	**0.977978**
Moody's AAA Rate	BBB Corporate Yield	-0.863773
Moody's AAA Rate	30-year Fixed Mortgage Rate	-0.933550
Moody's AAA Rate	Prime Rate	-0.798715
Moody's AAA Rate	Dow Jones Total Stock Market Index	0.853933
Moody's AAA Rate	National Home Price Index	0.857421
Moody's AAA Rate	Commercial Real Estate Price Index	0.869940
Moody's AAA Rate	US Average Retail Gasoline Price	-0.717104
Moody's AAA Rate	**30-year Treasury Yield**	**0.961986**
Moody's AAA Rate	**20-year Treasury Yield**	**0.984109**
Moody's AAA Rate	10-year Treasury Yield	-0.934952
Moody's AAA Rate	**7-year Treasury Yield**	**0.967844**
Moody's AAA Rate	3-month Treasury Yield	-0.818103
Moody's AAA Rate	5-year Treasury Yield	-0.913187
Moody's AAA Rate	6-month Treasury Yield	0.818987
Moody's AAA Rate	3-year Treasury Yield	0.907211
Moody's AAA Rate	1-year Treasury Yield	0.836966

Moody's BAA Rate	BBB Corporate Yield	-0.813490
Moody's BAA Rate	30-year Fixed Mortgage Rate	-0.902775
Moody's BAA Rate	Prime Rate	-0.790093
Moody's BAA Rate	Dow Jones Total Stock Market Index	0.825395
Moody's BAA Rate	National Home Price Index	0.836452
Moody's BAA Rate	Commercial Real Estate Price Index	0.845571
Moody's BAA Rate	US Average Retail Gasoline Price	-0.669398
Moody's BAA Rate	30-year Treasury Yield	0.812192
Moody's BAA Rate	20-year Treasury Yield	0.930869
Moody's BAA Rate	10-year Treasury Yield	-0.912123
Moody's BAA Rate	7-year Treasury Yield	0.918422
Moody's BAA Rate	3-month Treasury Yield	-0.813129
Moody's BAA Rate	5-year Treasury Yield	-0.896913
Moody's BAA Rate	6-month Treasury Yield	0.757084
Moody's BAA Rate	3-year Treasury Yield	0.849326
Moody's BAA Rate	1-year Treasury Yield	0.775541
Real GDP Growth Rate	**Nominal GDP Growth Rate**	**0.983967**
Real Disposable Income Growth Rate	**Nominal Disposable Income Growth Rate**	**0.962423**
BBB Corporate Yield	30-year Fixed Mortgage Rate	0.939260
BBB Corporate Yield	Prime Rate	0.743288
BBB Corporate Yield	Dow Jones Total Stock Market Index	-0.815994
BBB Corporate Yield	National Home Price Index	-0.803238
BBB Corporate Yield	Commercial Real Estate Price Index	-0.768584
BBB Corporate Yield	US Average Retail Gasoline Price	0.764033
BBB Corporate Yield	30-year Treasury Yield	-0.612038
BBB Corporate Yield	20-year Treasury Yield	-0.822272
BBB Corporate Yield	10-year Treasury Yield	0.922652
BBB Corporate Yield	7-year Treasury Yield	-0.882511
BBB Corporate Yield	3-month Treasury Yield	0.762364
BBB Corporate Yield	5-year Treasury Yield	0.883961
BBB Corporate Yield	6-month Treasury Yield	-0.829904
BBB Corporate Yield	3-year Treasury Yield	-0.866079
BBB Corporate Yield	1-year Treasury Yield	-0.839017
30-year Fixed Mortgage Rate	Prime Rate	0.855985
30-year Fixed Mortgage Rate	Dow Jones Total Stock Market Index	-0.793774
30-year Fixed Mortgage Rate	National Home Price Index	-0.816592
30-year Fixed Mortgage Rate	Commercial Real Estate Price Index	-0.815862
30-year Fixed Mortgage Rate	US Average Retail Gasoline Price	0.782584
30-year Fixed Mortgage Rate	30-year Treasury Yield	-0.733447
30-year Fixed Mortgage Rate	20-year Treasury Yield	-0.896439
30-year Fixed Mortgage Rate	**10-year Treasury Yield**	**0.993390**
30-year Fixed Mortgage Rate	7-year Treasury Yield	-0.922458
30-year Fixed Mortgage Rate	3-month Treasury Yield	0.880276
30-year Fixed Mortgage Rate	**5-year Treasury Yield**	**0.981101**
30-year Fixed Mortgage Rate	6-month Treasury Yield	-0.835103
30-year Fixed Mortgage Rate	3-year Treasury Yield	-0.892870
30-year Fixed Mortgage Rate	1-year Treasury Yield	-0.849024
Prime Rate	US Average Retail Gasoline Price	0.604719
Prime Rate	20-year Treasury Yield	-0.687378
Prime Rate	10-year Treasury Yield	0.838813
Prime Rate	7-year Treasury Yield	-0.812198
Prime Rate	**3-month Treasury Yield**	**0.992277**
Prime Rate	5-year Treasury Yield	0.908517
Prime Rate	6-month Treasury Yield	-0.817038
Prime Rate	3-year Treasury Yield	-0.831533
Prime Rate	1-year Treasury Yield	-0.824470

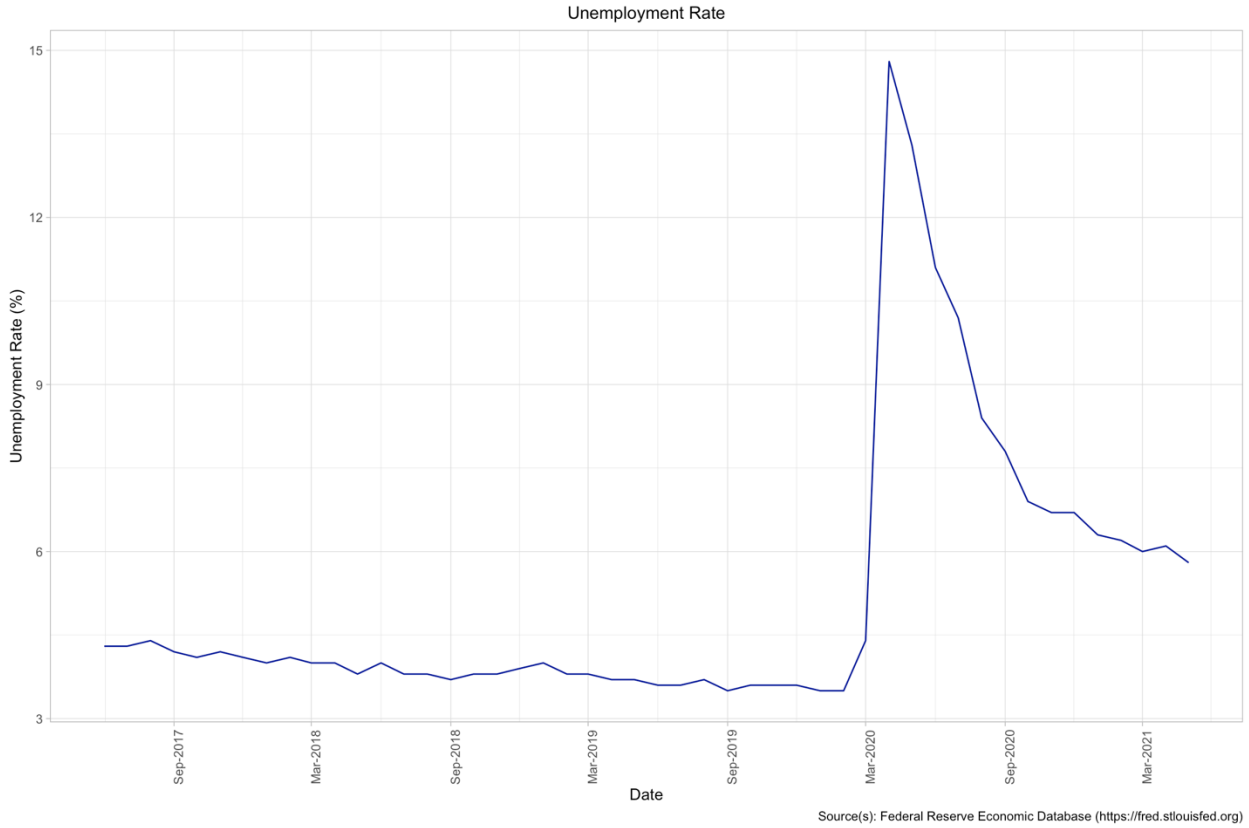
Dow Jones Total Stock Market Index	National Home Price Index	0.868871
Dow Jones Total Stock Market Index	Commercial Real Estate Price Index	0.906647
Dow Jones Total Stock Market Index	US Average Retail Gasoline Price	-0.677552
Dow Jones Total Stock Market Index	30-year Treasury Yield	0.795078
Dow Jones Total Stock Market Index	20-year Treasury Yield	0.847584
Dow Jones Total Stock Market Index	10-year Treasury Yield	-0.802037
Dow Jones Total Stock Market Index	7-year Treasury Yield	0.835925
Dow Jones Total Stock Market Index	5-year Treasury Yield	-0.713835
Dow Jones Total Stock Market Index	6-month Treasury Yield	0.678565
Dow Jones Total Stock Market Index	3-year Treasury Yield	0.763507
Dow Jones Total Stock Market Index	1-year Treasury Yield	0.693407
National Home Price Index	**Commercial Real Estate Price Index**	**0.962741**
National Home Price Index	30-year Treasury Yield	0.604271
National Home Price Index	20-year Treasury Yield	0.861325
National Home Price Index	10-year Treasury Yield	-0.828633
National Home Price Index	7-year Treasury Yield	0.856138
National Home Price Index	5-year Treasury Yield	-0.762927
National Home Price Index	6-month Treasury Yield	0.718892
National Home Price Index	3-year Treasury Yield	0.798370
National Home Price Index	1-year Treasury Yield	0.734865
Commercial Real Estate Price Index	US Average Retail Gasoline Price	-0.621757
Commercial Real Estate Price Index	30-year Treasury Yield	0.665952
Commercial Real Estate Price Index	20-year Treasury Yield	0.916034
Commercial Real Estate Price Index	10-year Treasury Yield	-0.837849
Commercial Real Estate Price Index	7-year Treasury Yield	0.851695
Commercial Real Estate Price Index	5-year Treasury Yield	-0.765303
Commercial Real Estate Price Index	6-month Treasury Yield	0.676917
Commercial Real Estate Price Index	3-year Treasury Yield	0.775912
Commercial Real Estate Price Index	1-year Treasury Yield	0.696614
US Average Retail Gasoline Price	20-year Treasury Yield	-0.707281
US Average Retail Gasoline Price	10-year Treasury Yield	0.753918
US Average Retail Gasoline Price	7-year Treasury Yield	-0.745890
US Average Retail Gasoline Price	3-month Treasury Yield	0.605306
US Average Retail Gasoline Price	5-year Treasury Yield	0.699336
US Average Retail Gasoline Price	6-month Treasury Yield	-0.649554
US Average Retail Gasoline Price	3-year Treasury Yield	-0.729555
US Average Retail Gasoline Price	1-year Treasury Yield	-0.671022
30-year Treasury Yield	**20-year Treasury Yield**	**0.990482**
30-year Treasury Yield	10-year Treasury Yield	-0.748993
30-year Treasury Yield	7-year Treasury Yield	0.875046
30-year Treasury Yield	5-year Treasury Yield	-0.602467
30-year Treasury Yield	3-year Treasury Yield	0.643211
20-year Treasury Yield	10-year Treasury Yield	-0.900953
20-year Treasury Yield	**7-year Treasury Yield**	**0.972498**
20-year Treasury Yield	3-month Treasury Yield	-0.701489
20-year Treasury Yield	5-year Treasury Yield	-0.840593
20-year Treasury Yield	6-month Treasury Yield	0.812129
20-year Treasury Yield	3-year Treasury Yield	0.904282
20-year Treasury Yield	1-year Treasury Yield	0.835685
10-year Treasury Yield	7-year Treasury Yield	-0.916058
10-year Treasury Yield	3-month Treasury Yield	0.866893
10-year Treasury Yield	**5-year Treasury Yield**	**0.982342**
10-year Treasury Yield	6-month Treasury Yield	-0.815925
10-year Treasury Yield	3-year Treasury Yield	-0.877956
10-year Treasury Yield	1-year Treasury Yield	-0.830363
1-month Treasury Yield	7-year Treasury Yield	0.758339

1-month Treasury Yield	**6-month Treasury Yield**	**0.995251**
1-month Treasury Yield	3-year Treasury Yield	0.925894
1-month Treasury Yield	**1-year Treasury Yield**	**0.988049**
7-year Treasury Yield	3-month Treasury Yield	-0.816302
7-year Treasury Yield	5-year Treasury Yield	-0.896591
7-year Treasury Yield	6-month Treasury Yield	0.913402
7-year Treasury Yield	**3-year Treasury Yield**	**0.977900**
7-year Treasury Yield	1-year Treasury Yield	0.929338
3-month Treasury Yield	5-year Treasury Yield	0.934035
3-month Treasury Yield	6-month Treasury Yield	-0.800856
3-month Treasury Yield	3-year Treasury Yield	-0.823484
3-month Treasury Yield	1-year Treasury Yield	-0.809502
5-year Treasury Yield	6-month Treasury Yield	-0.826434
5-year Treasury Yield	3-year Treasury Yield	-0.873998
5-year Treasury Yield	1-year Treasury Yield	-0.838475
6-month Treasury Yield	**3-year Treasury Yield**	**0.973494**
6-month Treasury Yield	**1-year Treasury Yield**	**0.998081**
3-year Treasury Yield	**1-year Treasury Yield**	**0.983677**

Appendix D: Follow-up on Previous Charts

In our previous reports, we have focused on the US' unemployment rate, and its "K-recovery". As some of these metrics have changed, and readers may be interested in their evolution despite the fact that we have not provided any significant additional conclusions (from our previous reports), we are including updated charts here.

Figure 47: US National Unemployment Rate



As seen in Figure 47, the national unemployment rate continues at a level close to that from YE2013. Although it is still declining, it appears that the number of people employed is actually relatively consistent. This point is discussed later in this report.

Prior to the pandemic, the weekly number of people filing initial unemployment claims hovered around 250,000; currently, the number of initial unemployment claimants is vacillating between 600,000 and 750,000 – a notable reduction from previous reports. (See Figure 48.)

Figure 48: Initial Unemployment Claims

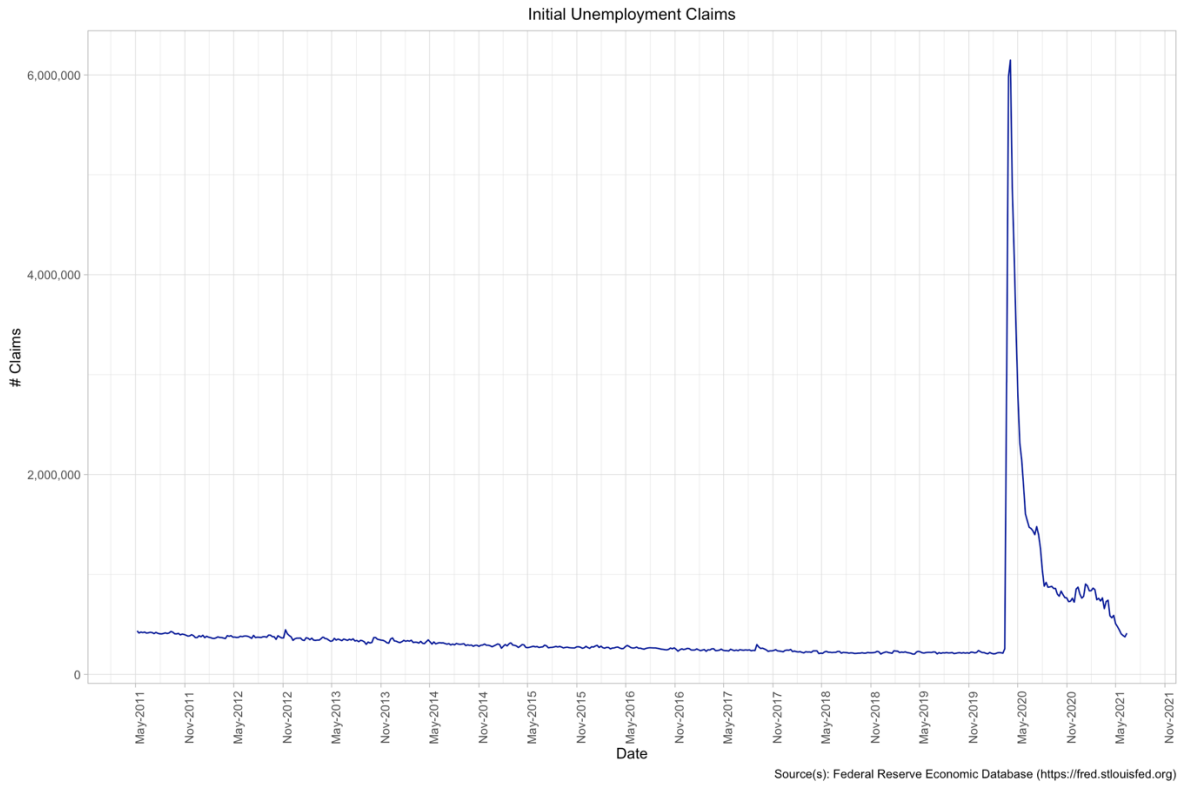
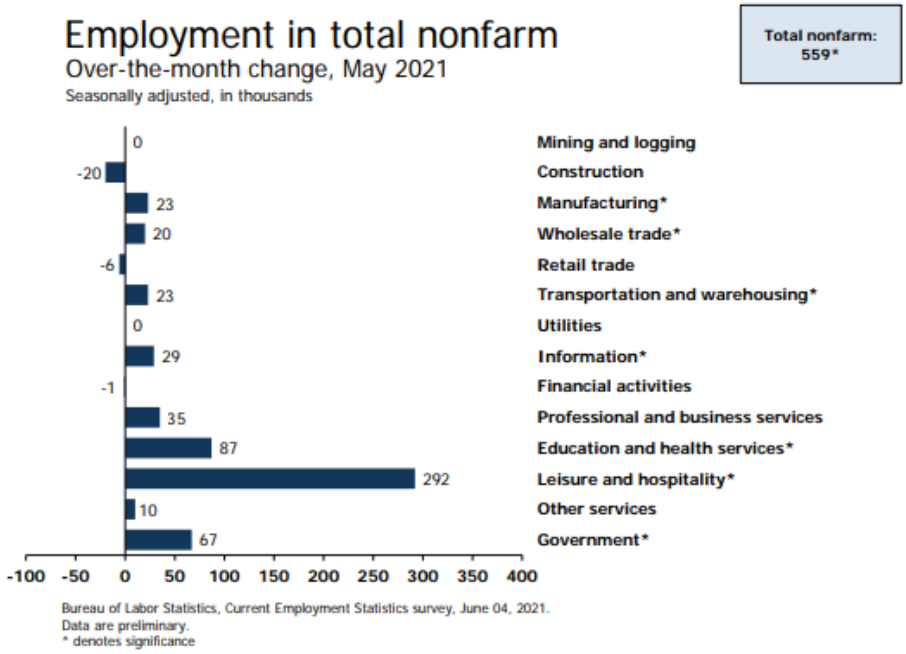
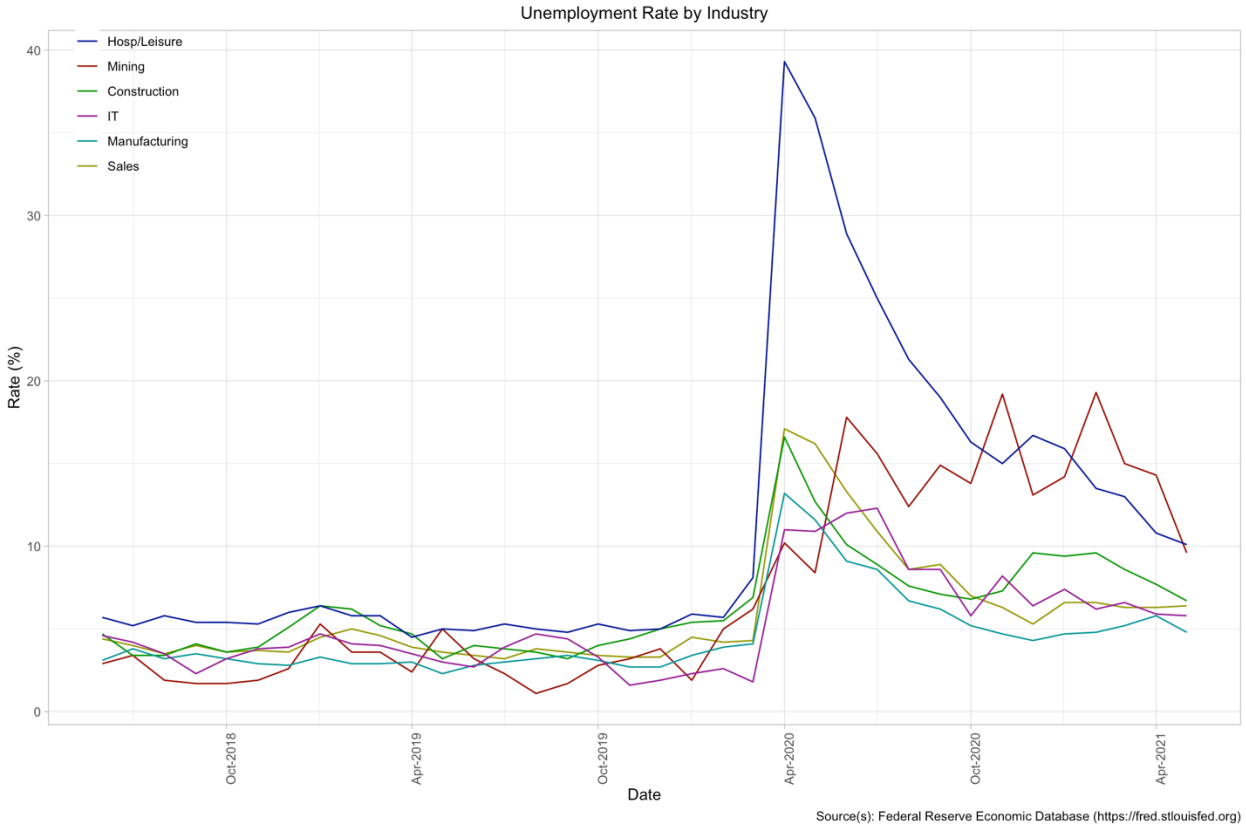


Figure 49: Job Gains and Losses by Sector betw. April & May 2021



Source: https://www.bls.gov/web/empsit/ceshighlights.pdf

Figure 50: Unemployment Rate by Industry



Obviously, not all sectors have recovered equally over the past several months. Leisure & hospitality has finally seen some noteworthy gains as Florida, Nevada, and California have "fully opened". Mining experienced substantial unemployment during the winter and spring of 2021 due to changes in investments and the presidential administration's policies. "White collar" segments saw approximately 100,000 new employees between January and February. (See Figure 49 & Figure 50.)

Figure 51 shows that there are still approximately 3 million people identifying as unemployed.

Figure 51: Continued Unemployment Claims

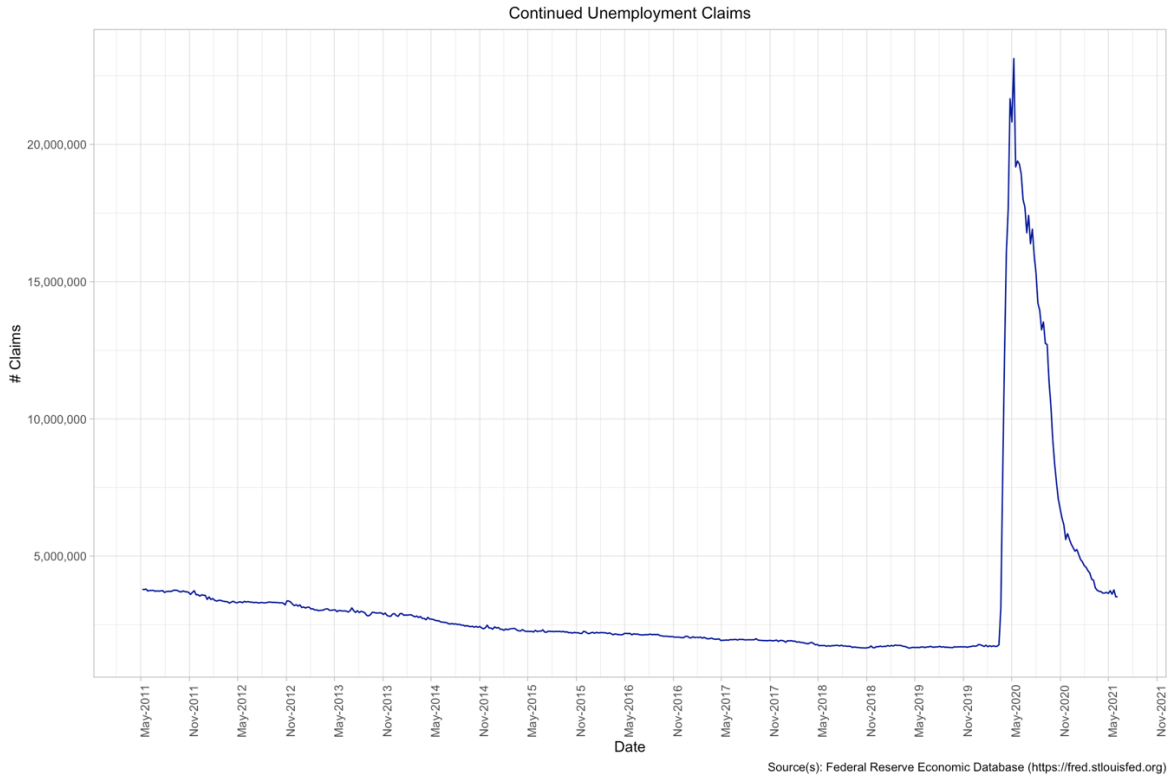
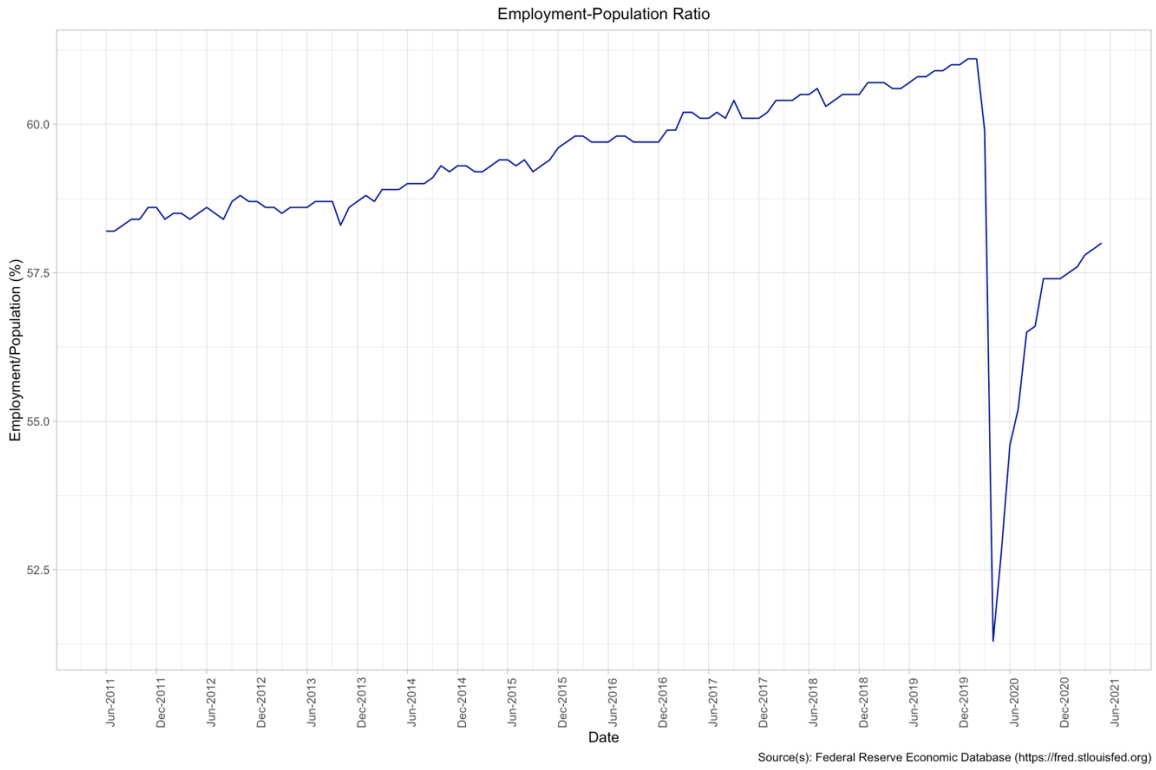


Figure 52: Employment-Population Ratio



Another indication of the weakened economy is the trend in the employment to population ratio. (See Figure 52.) Prior to the lock-down the employment-population ratio was over 60%. The pandemic pushed the ratio to below 52%. The ratio has been increasing steadily during the last 9 months, though its rate of improvement has slowed considerably of late.

Per Figure 53 and Figure 54, the capacity utilization and the industrial production index both show similar trends. The decrease in capacity utilization and industrial production indicate the manufacturers modified their output in response to soft consumer demand. The upward trend in both these indicators in the last 12 months suggests a positive response by manufacturers to continued spending demand.

We've described the current recovery as being "K-shaped", with different portions of the economy being impacted in different ways. One of trends we've seen is the differentiation of the unemployment rate by race. (See Figure 55.) The unemployment rate for Blacks and Hispanics reached over 15% back in April 2020 and have not recovered at the same pace as unemployment for Whites. When examining these rates by race and gender (see Figure 56), we see that under-represented minorities and women have had the slowest recovery with respect to the unemployment rate. We also see that women and women of color are entering back into the labor force at lower rates then men of color and white men.

Figure 53: Capacity Utilization

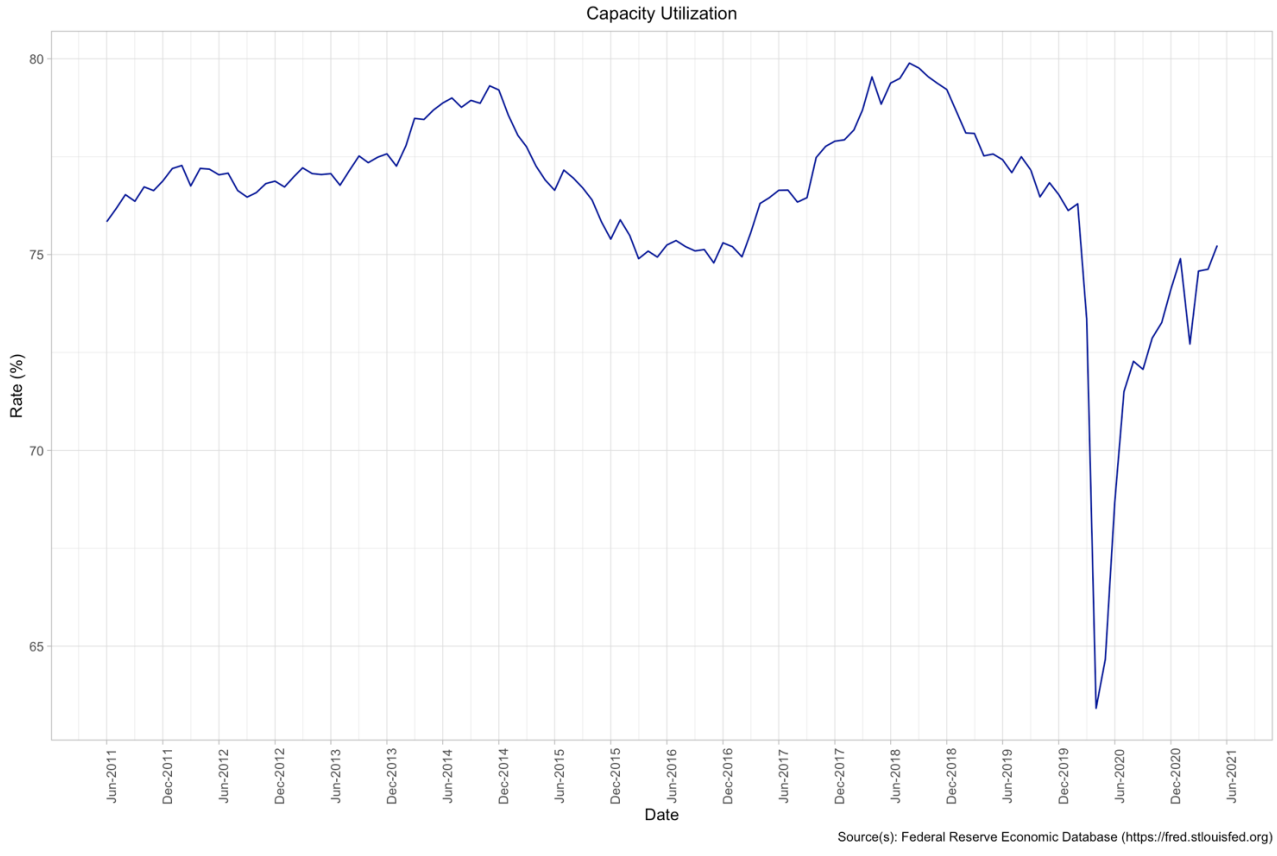


Figure 54: Industrial Production

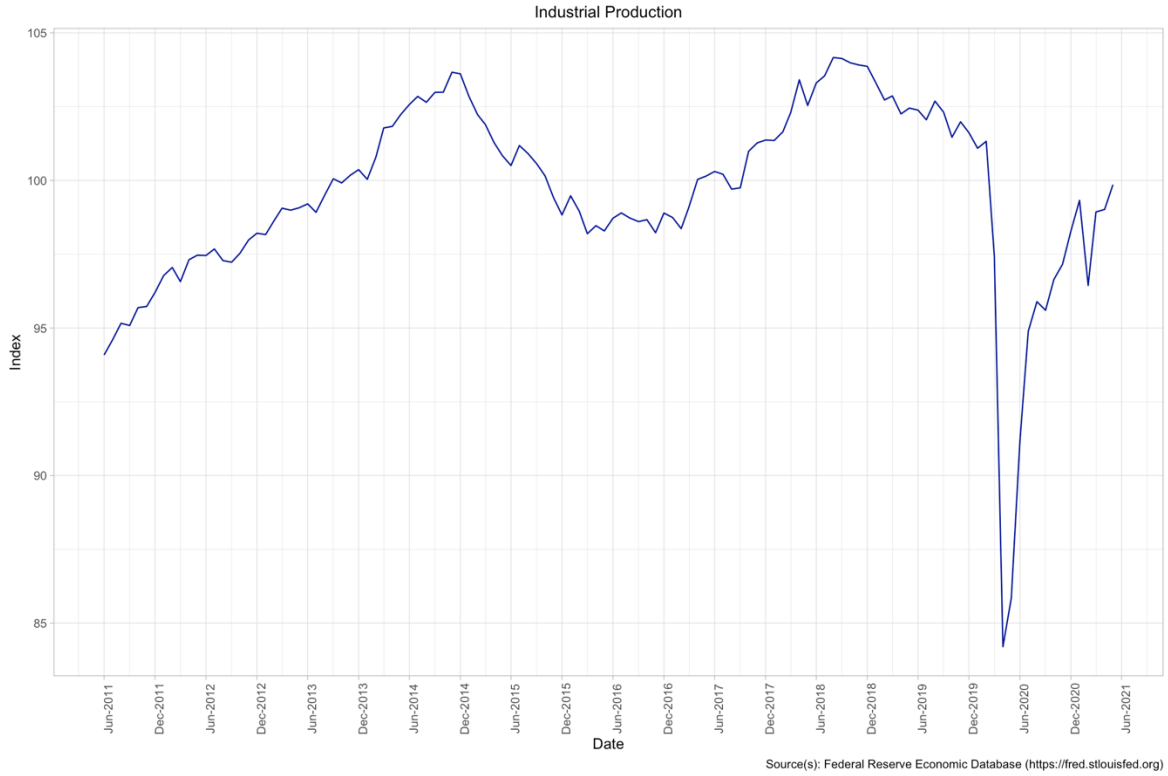


Figure 55: Unemployment Rate by Race

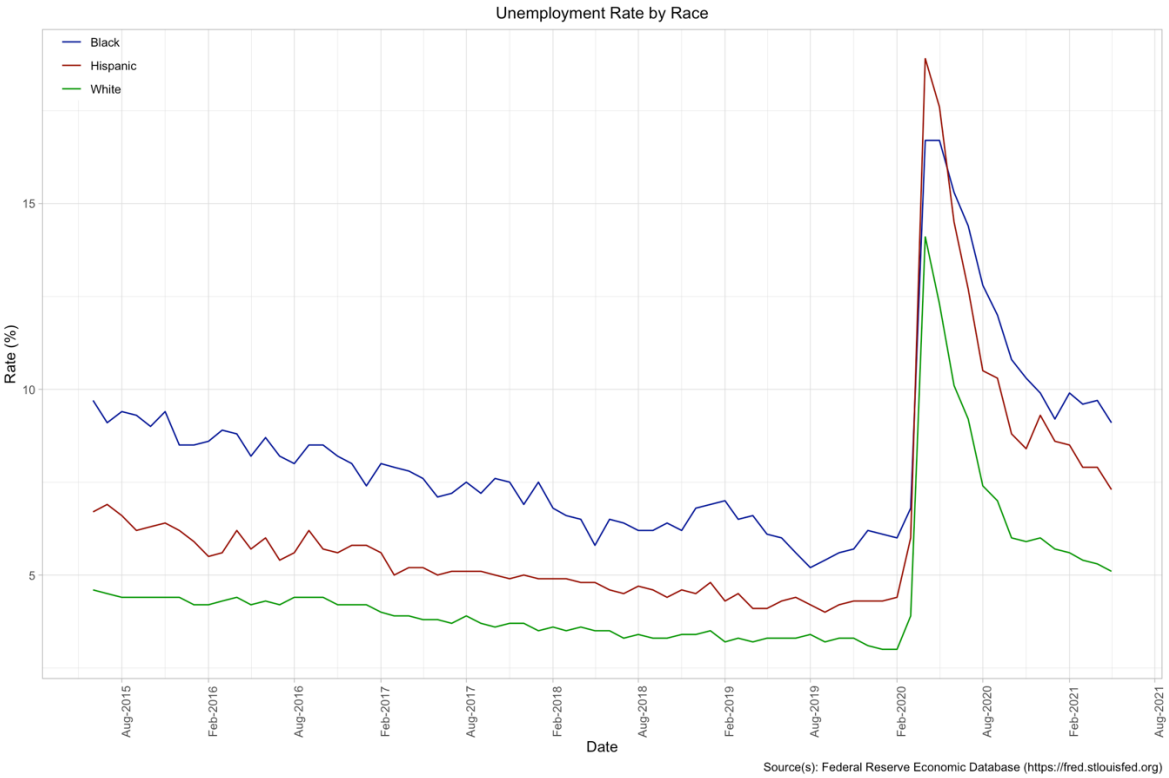


Figure 56: Unemployment Rate Race and Gender

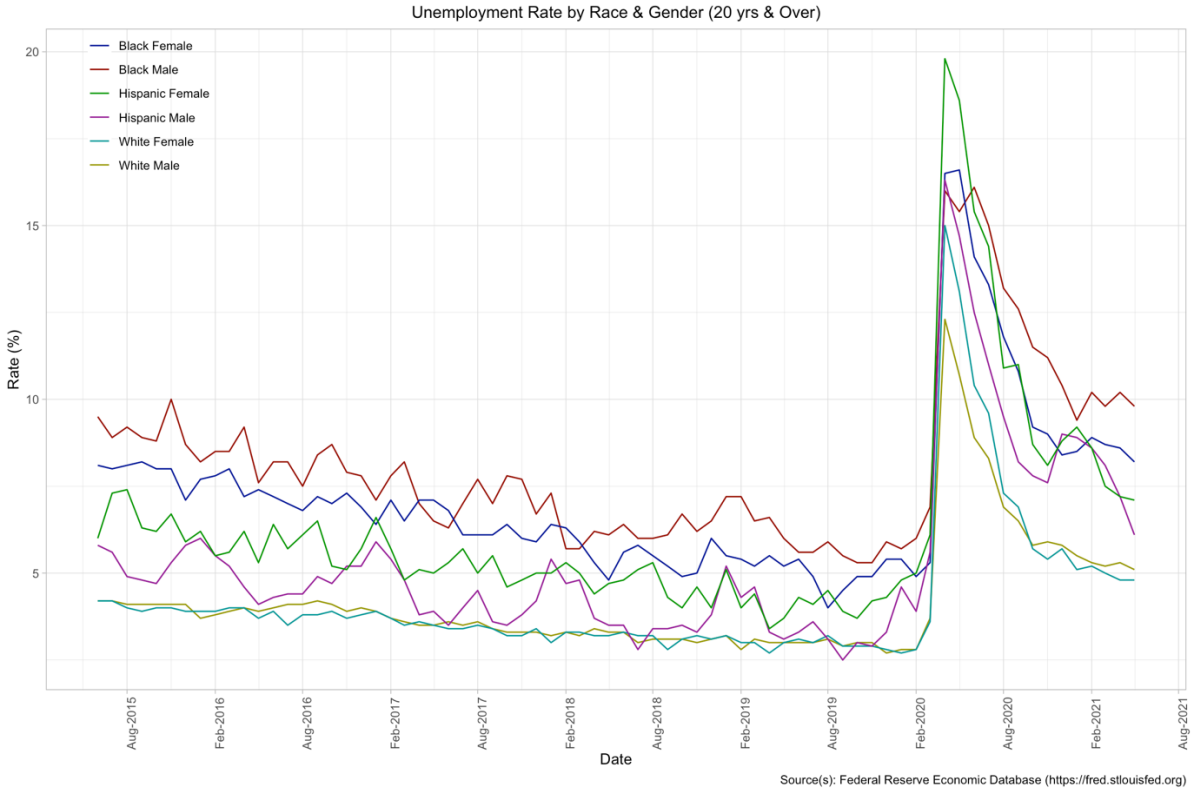


Figure 57: Labor Force Participation Rate by Gender

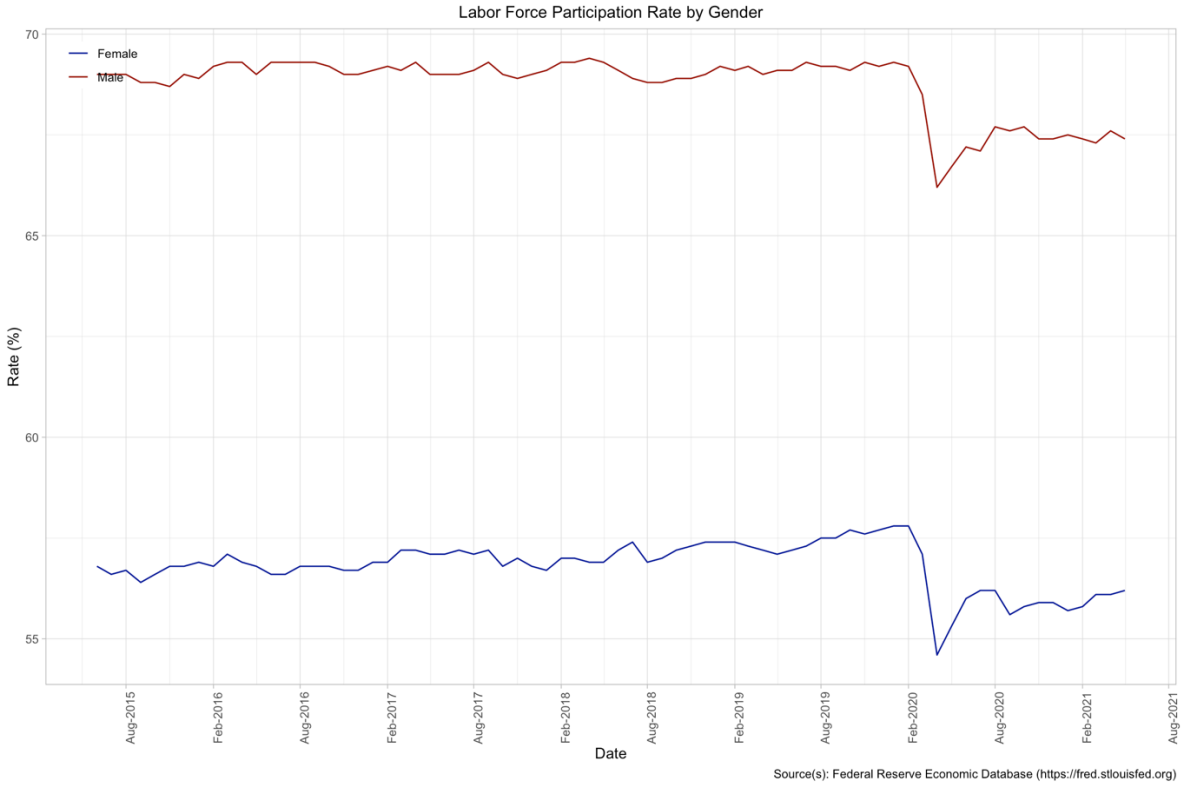
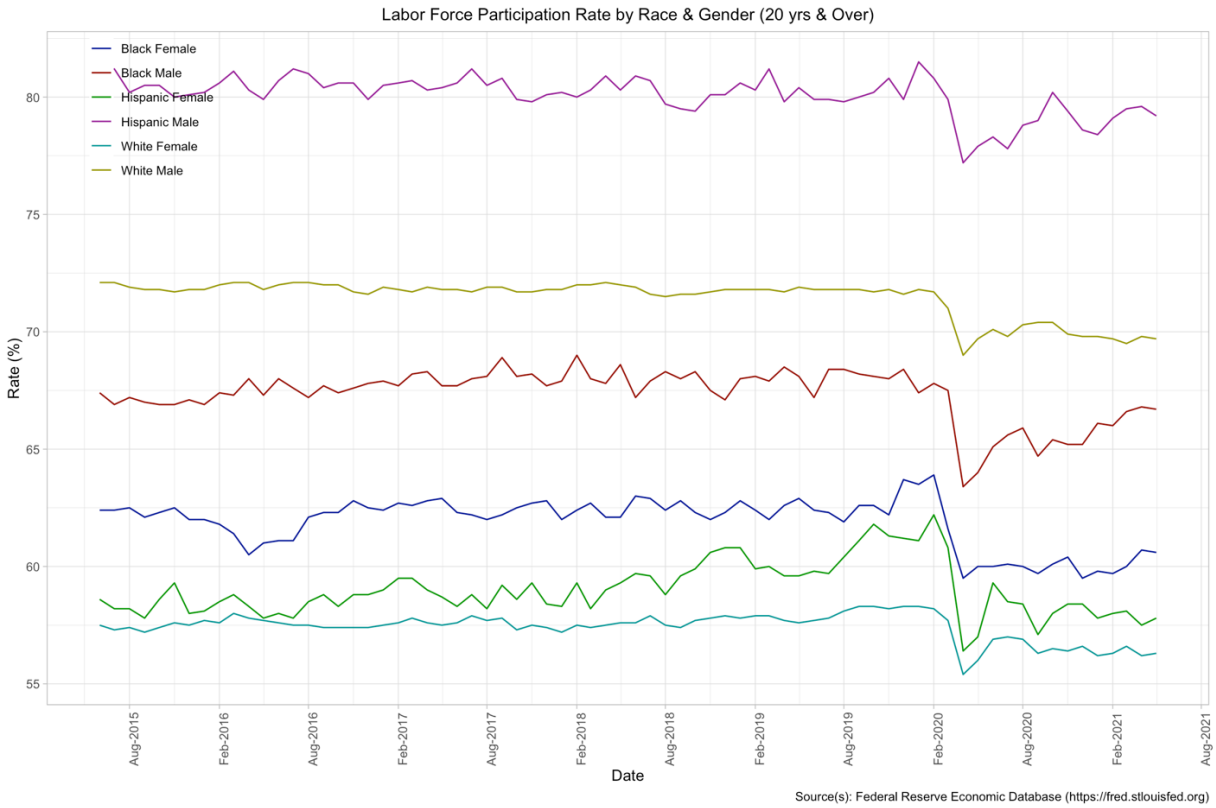


Figure 58: Labor Force Participation Rate by Race and Gender



When examining the unemployment trends by MSA (per Figure 59), we see that nearly all the major cities we've analyzed are seeing declining unemployment rates. New Orleans, LA, saw the highest spike in unemployment and is seeing a small up-tick in unemployment rates between October and November. This increase in unemployment rate and spike in initial unemployment claims (see Figure 60) correspond to an increase in COVID-19 cases in New Orleans. Figure 60, Figure 61, Figure 62, and Figure 63 show the initial and continued unemployment claims for several southeastern states.

Figure 59: Unemployment Rate by MSA

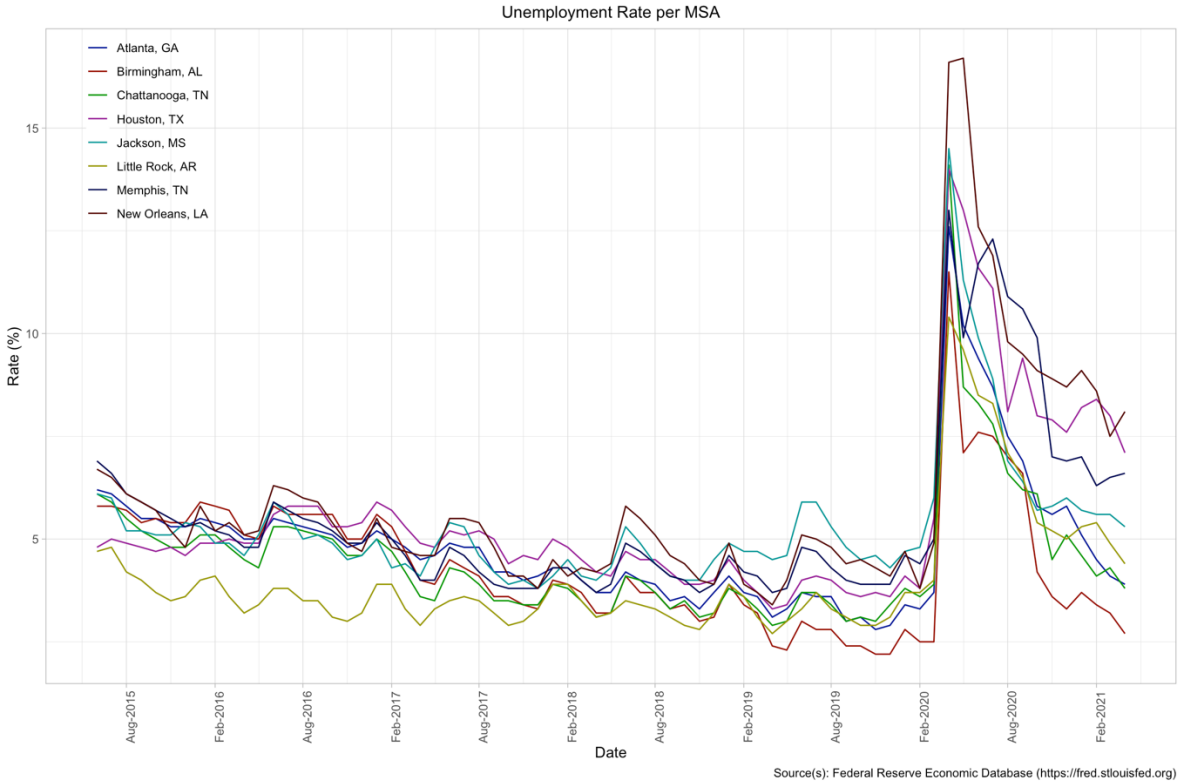


Figure 60: Initial Unemployment Claims: AL, AR, LA, MS, TN

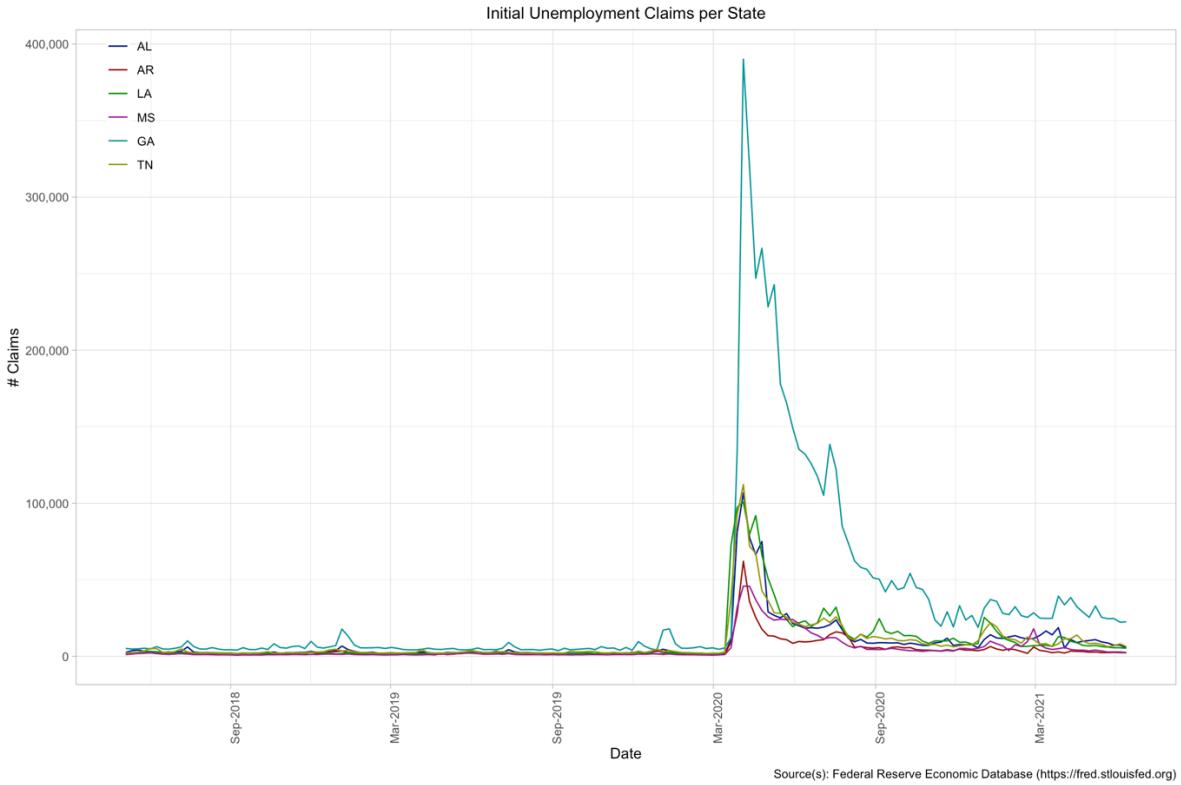


Figure 61: Initial Unemployment Claims TX

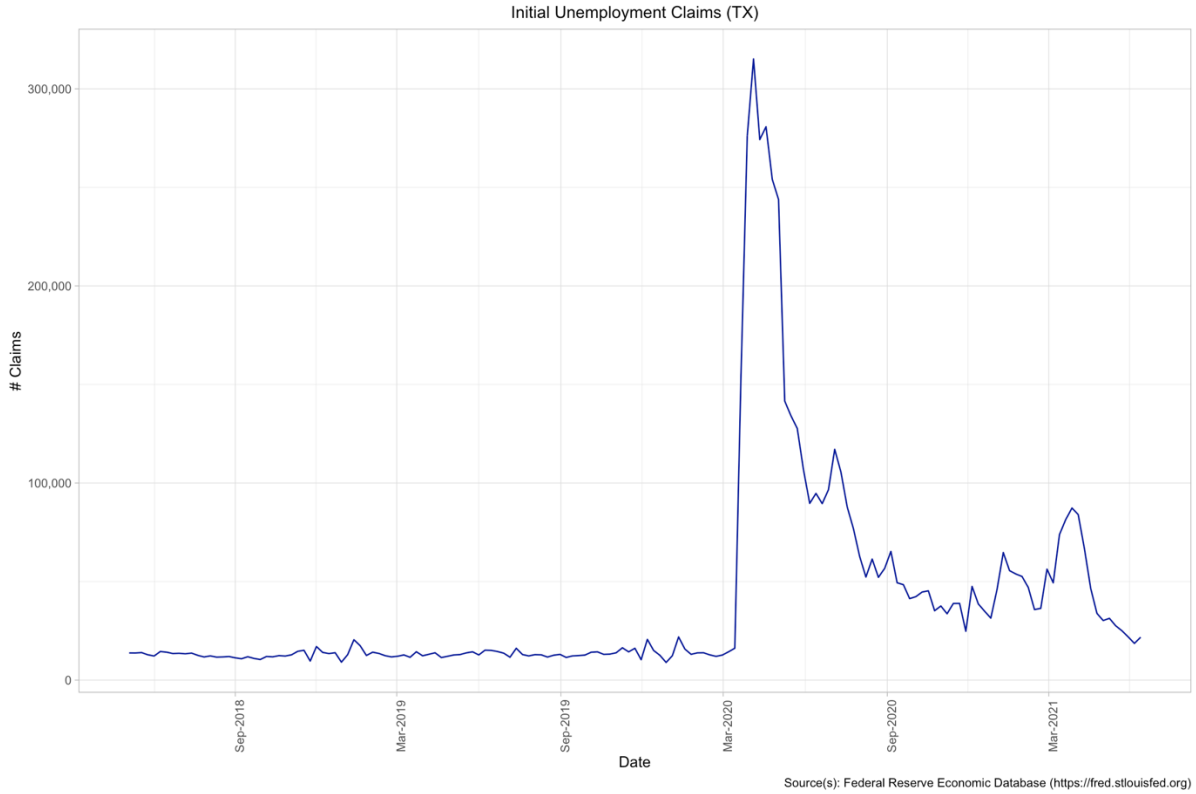


Figure 62: Continued Unemployment Claims: AL, AR, LA, MS, TN

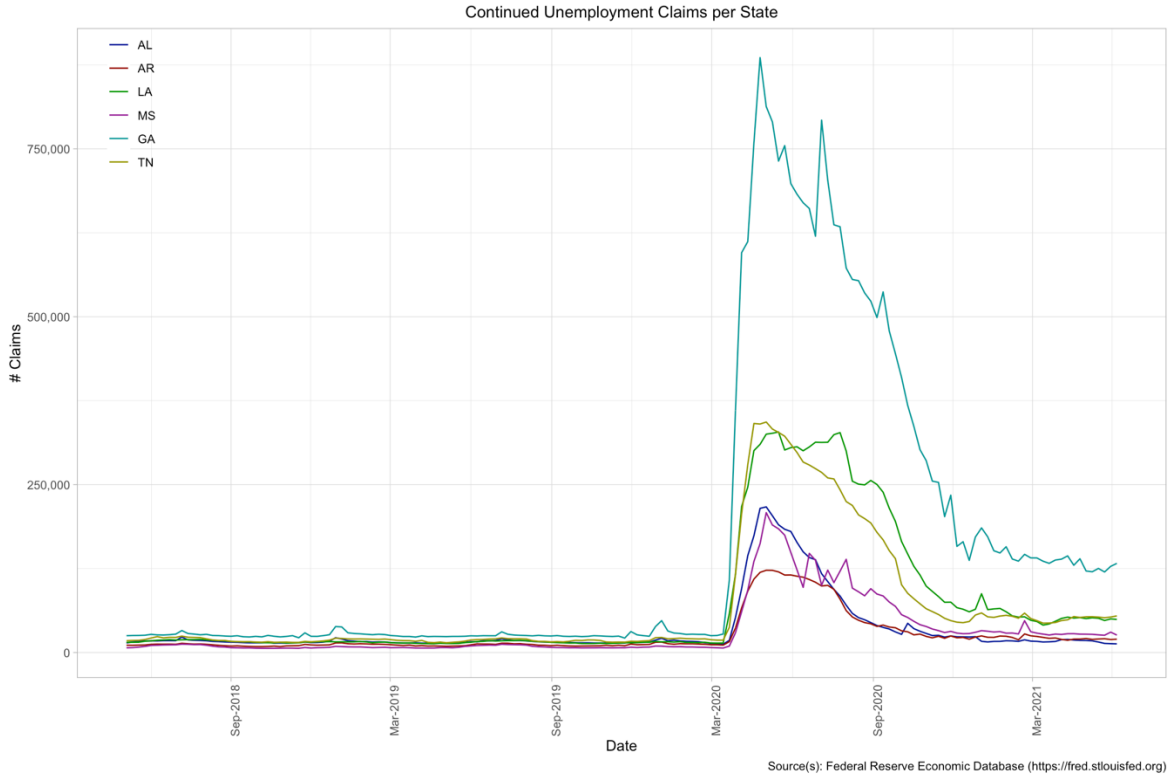


Figure 63: Continued Unemployment: TX

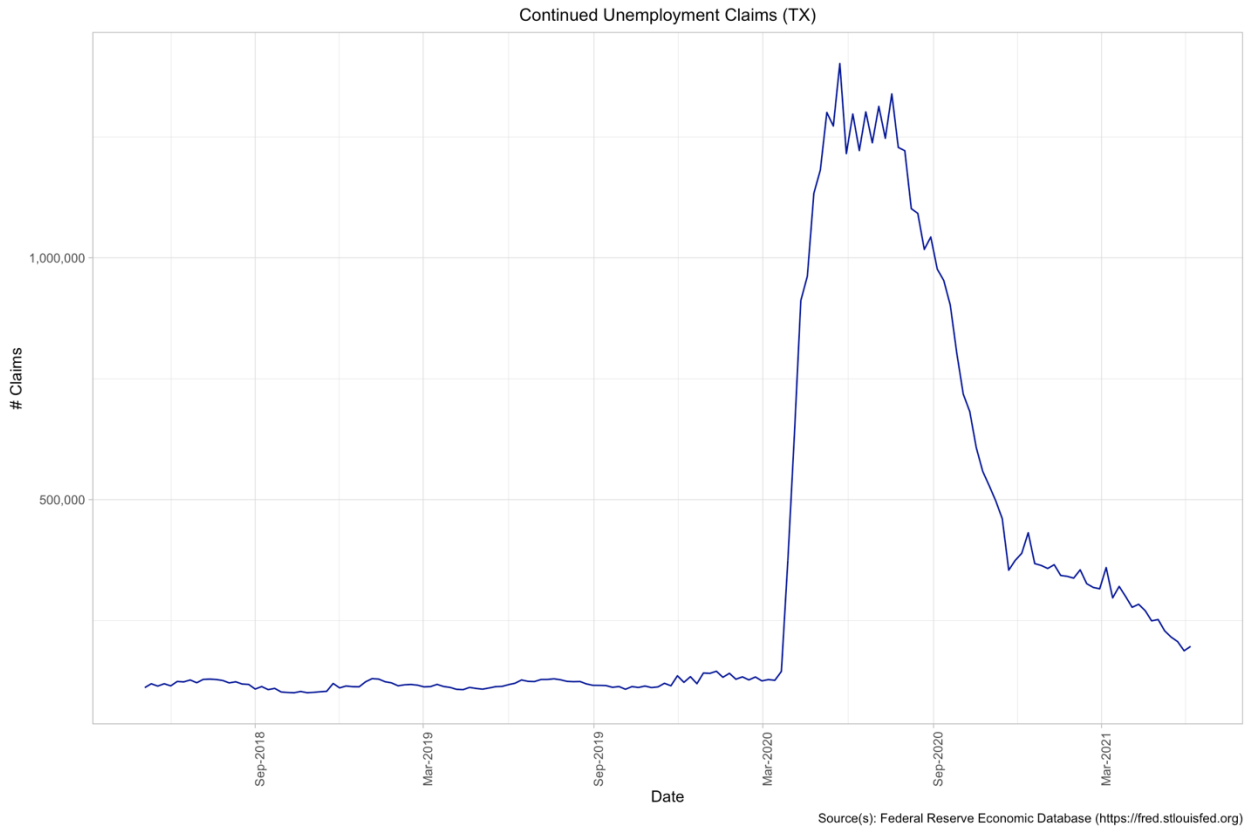
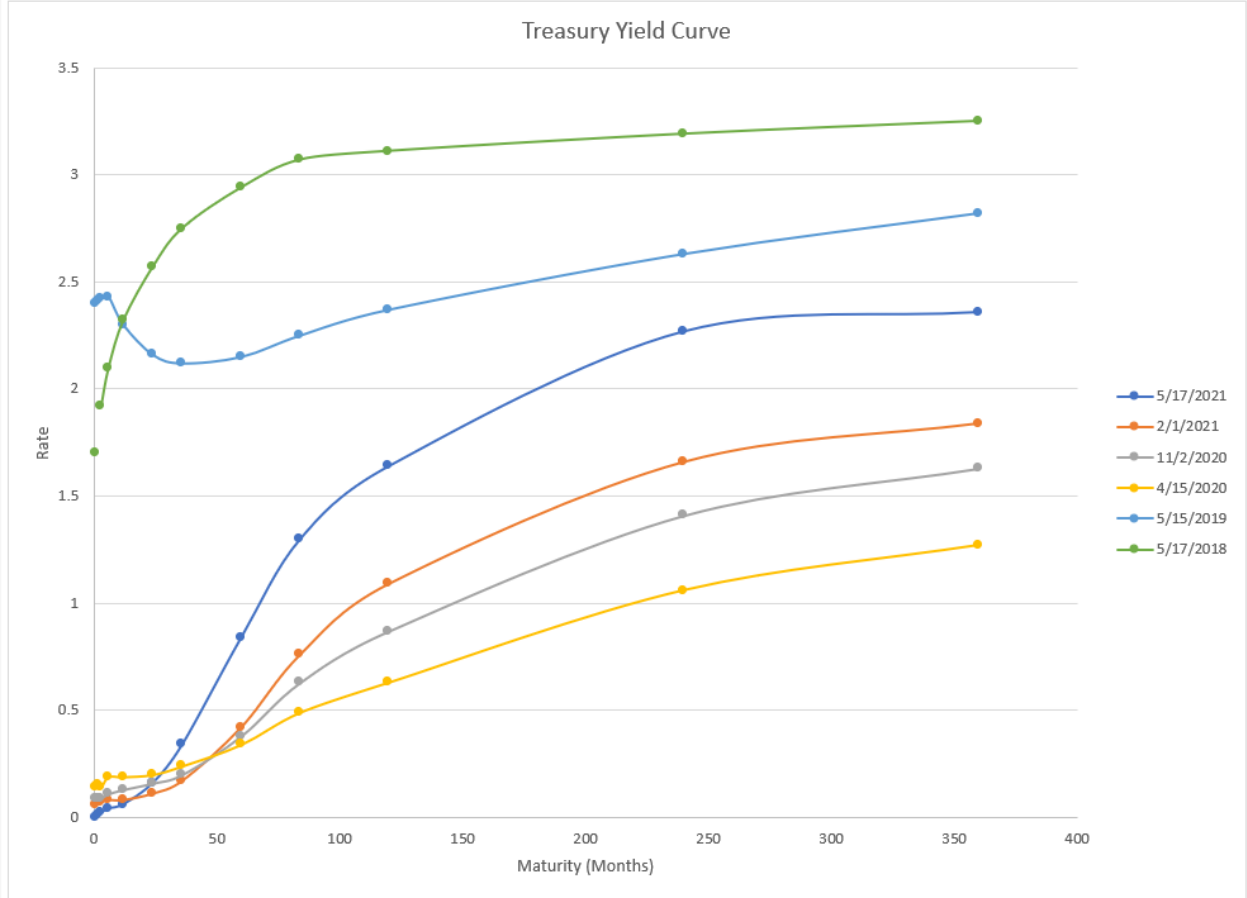


Figure 64: Historical Yield Curves



Source: US Treasury

References

Fiorucci, Jose A., Tiago R. Pellegrini, Francisco Louzada, Fotios Petropoulos, Anne B. Koehler, "Models for optimising the theta method and their relationship to state space models", In International Journal of Forecasting, Volume 32, Issue 4, 2016, Pages 1151-1161, ISSN 0169-2070, https://doi.org/10.1016/j.ijforecast.2016.02.005.

(http://www.sciencedirect.com/science/article/pii/S0169207016300243)

De Livera, Alysha M. "Automatic forecasting with a modified exponential smoothing state space framework." Monash Econometrics and Business Statistics Working Papers 10, no. 10 (2010).

De Livera, Alysha M., Rob J Hyndman, Ralph D Snyder, "Forecasting time series with complex seasonal patterns using exponential smoothing", Journal of the American Statistical Association, Volume 106, Number 496, pp 1513-1527, (2011)

Hyndman, R.J. and Athanasopoulos, G, Forecasting: principles and practice. OTexts: Melbourne, Australia. http://otexts.org/fpp/. Accessed on December 23, 2017 (2013)

Hyndman, Rob J., Baki Billah, "Unmasking the Theta method", In International Journal of Forecasting, Volume 19, Issue 2, 2003, Pages 287-290, ISSN 0169-2070, https://doi.org/10.1016/S0169-2070(01)00143-1. (http://www.sciencedirect.com/science/article/pii/S0169207001001431)

Jiang, Bin, George Athanasopoulos, Rob J Hyndman, Anastasios Panagiotelis, Farshid Vahid, "Macroeconomic forecasting for Australia using a large number of predictors", Unpublished working paper, http://business.monash.edu/econometrics-and-business-statistics/research/publications/ebs/wp02-17.pdf. Accessed on December 27, 2017 (2017)

