Macroeconomic Forecasts, 1Q2021

Domestic Metrics

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Summary

The economic condition of the United States has changed significantly in the last 12 months. On March 1, 2020 the US had roughly 100 confirmed cases of COVID-19 – by April 1, 2020 there were more than 200,000 confirmed cases, and there are now (as of March 29, 2021) approximately 31 million confirmed cases, with over 190,000 deaths[1]. As we exit from this crisis, many are touting the national economy as being in a much better place: in late 2019, we were on the brink of a likely recession, and, in retrospect, COVID may have simply been the straw (or bale of hay) to break the proverbial camel's back. Now, Jamie Dimon, JPMorgan Chase's CEO, is arguing that the US economy "will likely boom"[2] through 2022 due to the "euphoria around the end of the pandemic" despite likely long-term inflation, a measured growth in interest rates, and a rapid return to pre-pandemic levels.

Many areas are still grappling with tactical issues like unemployment, and will be doing so for some time. We also expect those issues to be compounded depending on how the Fed' and the White House continues to address these problems.

State of Affairs

Much of the economic forecast is based on the likelihood that the country can emerge from behind the shadow of COVID-19. One year ago, the pandemic ripped through our economy and caused a disruption that was unlike any other economic recession the US (or the world) has experienced. Unlike the 2008 recession, which was caused by a massive failure in the housing sector in the US, the COVID recession was brought on by a combination of shelter-in-place mandates and consumer fear of being infected by the virus. The Government mandates were, arguably, under-coordinated, with some states "opening" back up (Georgia and Florida) in late Spring and early Summer, 2020, while other states remained (and still remain, to some degree) under more substantial "lock downs" (California and New York) through the Fall and Winter.

First and most significantly, while we previously estimated that a vaccine for the COVID-19 illness would be widely available in 2H2021, we are pleased with the reports of distribution to date: as of the end of 1Q, the United States has approximately 16% of its population fully vaccinated, and almost 30% of its population has been at least partially vaccinated[3]. Reticence towards the vaccine appears to be lessening (with 61% of the population now intending or being vaccinated, and 13% refusing to be vaccinated), but is still an issue[4]. As of April 1, 2021, the five states with the lowest rate of completed vaccinations are Utah (10.9% of the state population), Georgia (12%), Alabama (12.9%), Texas (13%),

[1] "Teneo Risk - Coronavirus Daily Update" for March 29, 2021
[2] nytimes.com/live/2021/04/07/business/stock-market-today
[3] https://ourworldindata.org/covid-vaccinations
[4] https://www.kff.org/coronavirus-covid-19/poll-finding/kff-covid-19-vaccine-monitor-march-2021/

and Tennessee (13.4%). Vaccines are now being reported as more than 90% effective after a six-month period[5], and the efficacy of these vaccines on teens is being evaluated as comparable to that of adults[6].

Although the vaccine roll-out in the US is more robust than predicted – President Biden's goal of 100 million vaccines in his first 100 days was accomplished in 58 days and was replaced by a new goal of 200 million vaccines in his first 100 days – the US might be entering into a "fourth" wave of infections[7].

Figure 1 shows the number of new COVID-19 cases by day, a 7-day moving average (red), and a 14-day moving average (green) of new cases. When the 7-day average falls below the 14-day average, we are experiencing a drop in cases. When, however, the 7-day moving average trends above the 14-day moving average, the US is experiencing an up-tick in the number of cases. Unfortunately, the 7-day moving average has started to climb higher than the 14-day moving average, signaling, perhaps, that the US is starting another wave of infections.

Figure 2 shows the number of new cases per 1 million persons in the US along with the 7-day moving average of new cases per 1 million persons. The upward trend in the 7-day moving average of new cases per million persons is troubling. Figure 3 shows the 7-day moving average of new cases per million persons in France, Sweden, Austria, Italy, the US and the UK. France, Sweden, Austria and Italy saw an increase in the 7-day moving average of new cases per million starting approximately 45 days ago. Only Italy, at this point, has engaged in mitigation policies and seems to be reversing this trend the last two weeks. The UK, however, has continued to show a decrease in the 7-day moving average of new cases per million persons. The US, it appears, is following the trend of France, Sweden, Austria and Italy. The lack of coordination between US states and the rush to eliminate mask-mandates across many US states may be contributing to this trend. It's also very likely that shelter-in-place-fatigue and the nicer weather in the US is resulting in fewer precautions taken by persons in the economy.

The fourth wave in the US not guaranteed. However, an increase in the number of COVID variants[8], particularly variants that are highly transmittible and/or variants that lead to higher hospitalization rates or death rates (per million), could throw the US economy out of balance and move the US economy away from what appears to be a steady recovery. The economies of Germany[9], France[10], and Italy[11] have transitioned back into lock-down modes, putting their economic recoveries in jeopardy. In fact, many countries across Europe – Belgium to Sweden – have put a series of lockdowns and controls in place to minimize the spread of new, more infectious COVID variants. Although our models are leaning towards a continuation of the US economic recovery, any of the following changes could derail the economic recovery: A) an increase in super-spreader events, such as Spring-break in Miami[12], B) an elimination of

[5] https://www.wsj.com/articles/pfizer-biontech-covid-19-vaccine-protects-for-six-months-companies-say-11617273901

[6] https://www.wsj.com/articles/pfizer-covid-19-vaccine-100-effective-in-study-of-12-to-15-year-olds-company-says-11617187500

[7] See https://www.theatlantic.com/health/archive/2021/03/fourth-surge-variant-vaccine/618463/

[8] https://www.npr.org/sections/coronavirus-live-updates/2021/03/28/982086058/u-s-is-in-a-race-between-vaccines-and-variants-says-public-health-expert

[9] https://abcnews.go.com/Health/wireStory/germany-set-extend-lockdown-measures-76600707

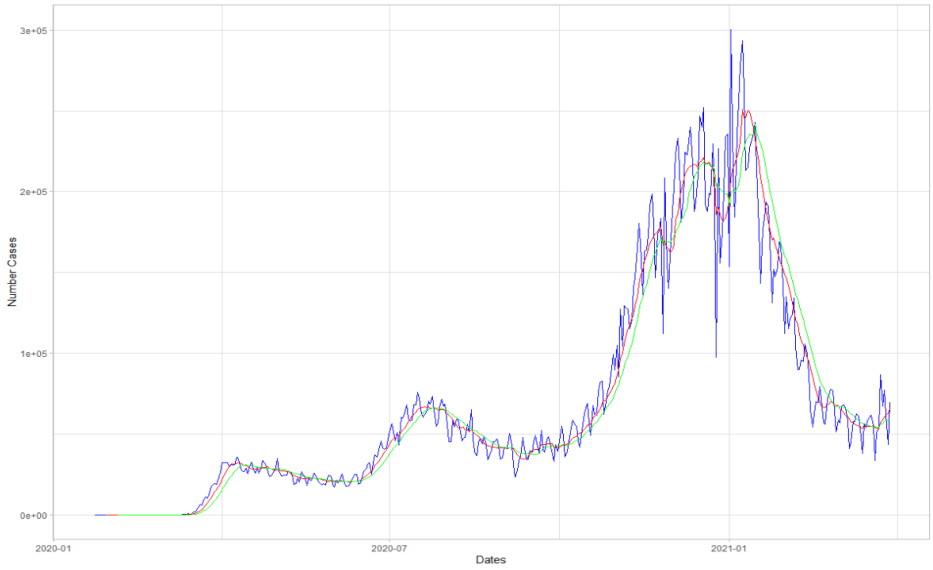
[10] https://www.npr.org/2021/03/31/983157525/france-imposes-3rd-national-lockdown-as-covid-19-again-surges

[11] https://www.cnn.com/2021/03/13/europe/italy-coronavirus-national-lockdown-intl/index.html

[12] https://www.forbes.com/sites/robertglatter/2021/03/20/miami-beach-declares-state-of-emergency-due-to-spring-break-crowds-announces-8-pm-curfew/?sh=538750522a53

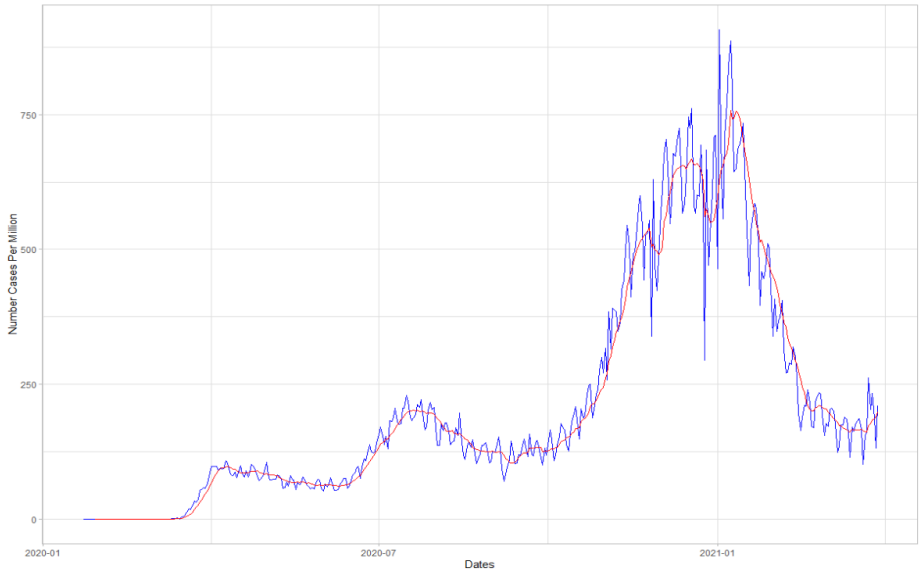
mask-mandates[13] across different states, and/or C) an increase in the frequency-of-appearance for highly-transmittable COVID variants[14].

Figure 1: Number of new COVID-19 cases in US (blue), 7-day (red) and 14-day (green) moving average



Source: https://ourworldindata.org/

Figure 2: New COVID Cases per million population in US (blue), and 7-day moving average (red)

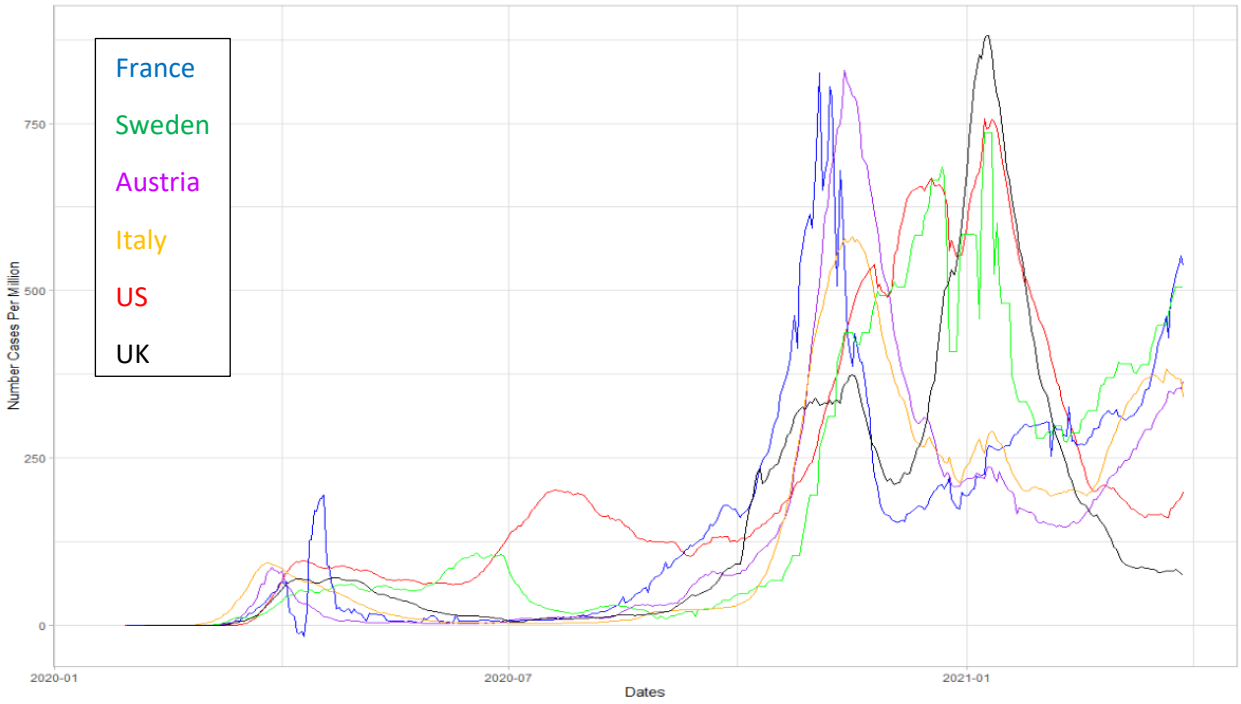


Source: https://ourworldindata.org/

[13] https://www.khou.com/article/news/health/coronavirus/texas-joins-us-states-without-mask-mandates/269-76a067f5-4703-4f1f-a080-e55c31cee5d9

[14] https://www.nytimes.com/live/2021/02/14/world/covid-19-coronavirus

Figure 3: New COVID cases per day (7-day moving average) by country



Source: https://ourworldindata.org/

Inflation

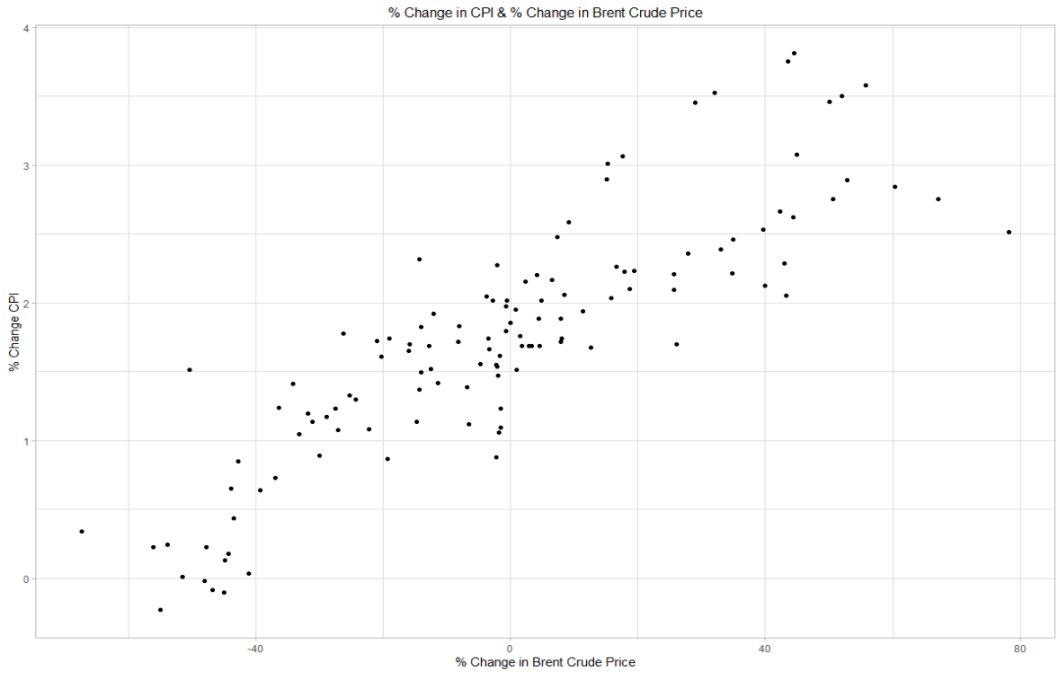
Inflation is, historically, a monetary phenomenon, driven by expansionary monetary policy and quantitative easing. The connection between "easy" money and inflation has been relaxed since the 2008 recession when the Federal Reserve engaged in extensive quantitative easing without pushing the economy into an inflationary situation. The US economy has experienced inflationary trends during periods of rapid increases in the prices of underlying commodities; oil price shocks in the mid 1970's and late 70's lead to significant inflationary trends[15]. However, changes to Federal Reserve monetary policy throughout the 1990's contributed to a lack of inflationary impacts of oil price shocks in the mid 1990's[16]. That said, there is a concern that the easy monetary policy of the current Fed and an increase in prices of lumber, housing, or fuel could lead to inflationary pressures over the next 12 – 18 months.

There are strong correlations between commodity prices and inflation – the CPI is constructed from a basket of goods and services which reflect products that are consumed by residents from major MSAs. Figure 4 shows the relationship between the % change in CPI (inflation) and the % change in Brent Crude prices (2010-2020).

[15] https://www.stlouisfed.org/publications/regional-economist/january-2001/rising-oil-prices-and-economic-turmoil-must-they-always-go-hand-in-hand

[16] ibid

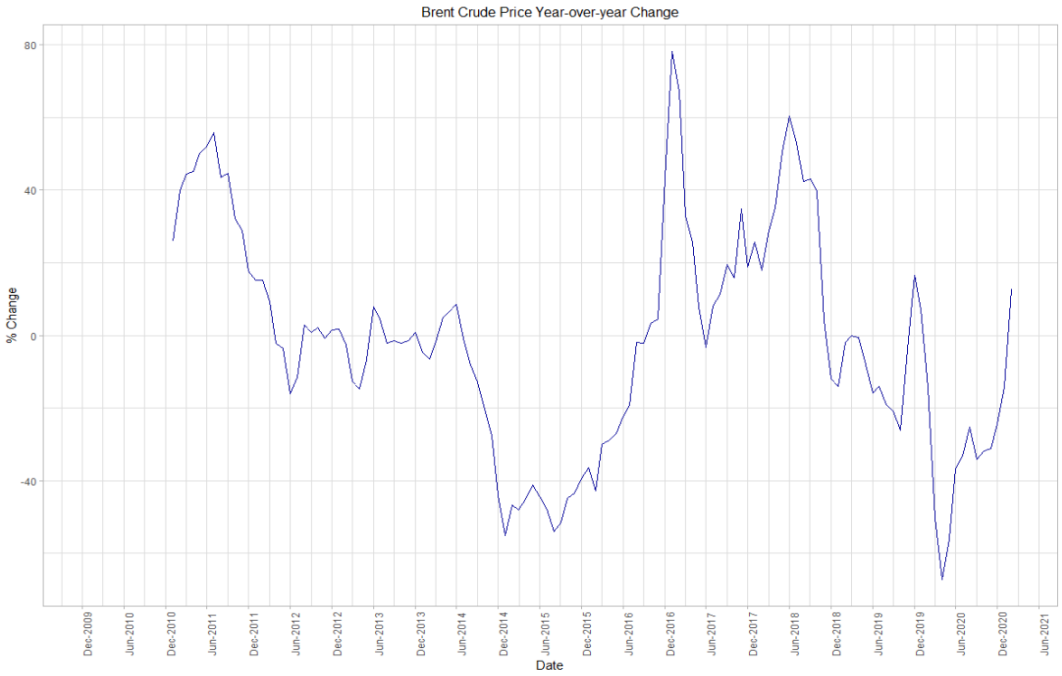
Figure 4: Relating Inflation to the % Change in Oil Prices



Source: FRED St. Louis

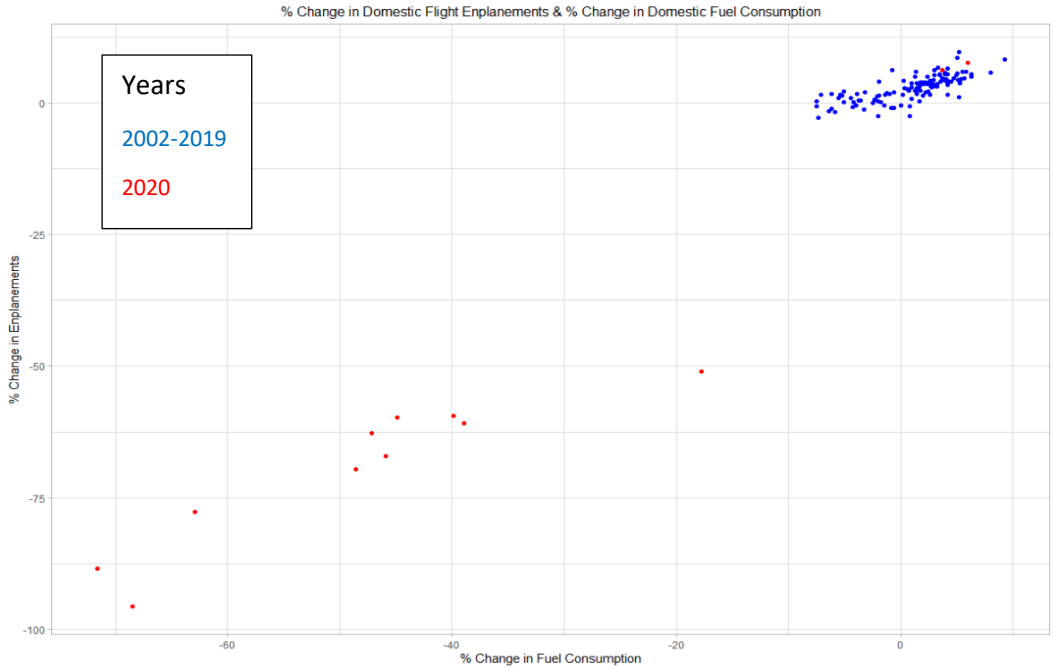
There are newly formed fears of a near-term escalation in oil prices being driven by an increase in the demand for travel. Figure 5 shows the year-over-year change in Brent Crude prices; here we see a sharp increase in this metric for Brent crude over the last 7 months. If we examine demand for crude as a function of travel, for example, we see a strong correlation between domestic airline travel (domestic enplanement) and airline fuel consumption (see Figure 6). An increase in vaccine rates will likely pull up the demand for domestic business and recreational travelers (car and airline travel), which will create an increased demand for fuel and push up fuel prices. The recent passage of the Biden Stimulus will put much needed money in the pockets of consumers, some of whom will increase their demand for travel. The additive effects of more vaccines and stimulus checks will likely lead to increased airline travel, increased car travel and increased fuel prices. All of this suggests a short-run spike in the overall price level. ***We suggest that this is a short-run spike because of latent demand – consumers are likely to make a series of purchases as soon as they have been "cleared" – and the Fed's shift in policy to control inflation through contractionary policy while looking at a much longer time horizon.***

Figure 5: Y/Y Change in Brent Crude Oil Prices



Source: FRED St. Louis

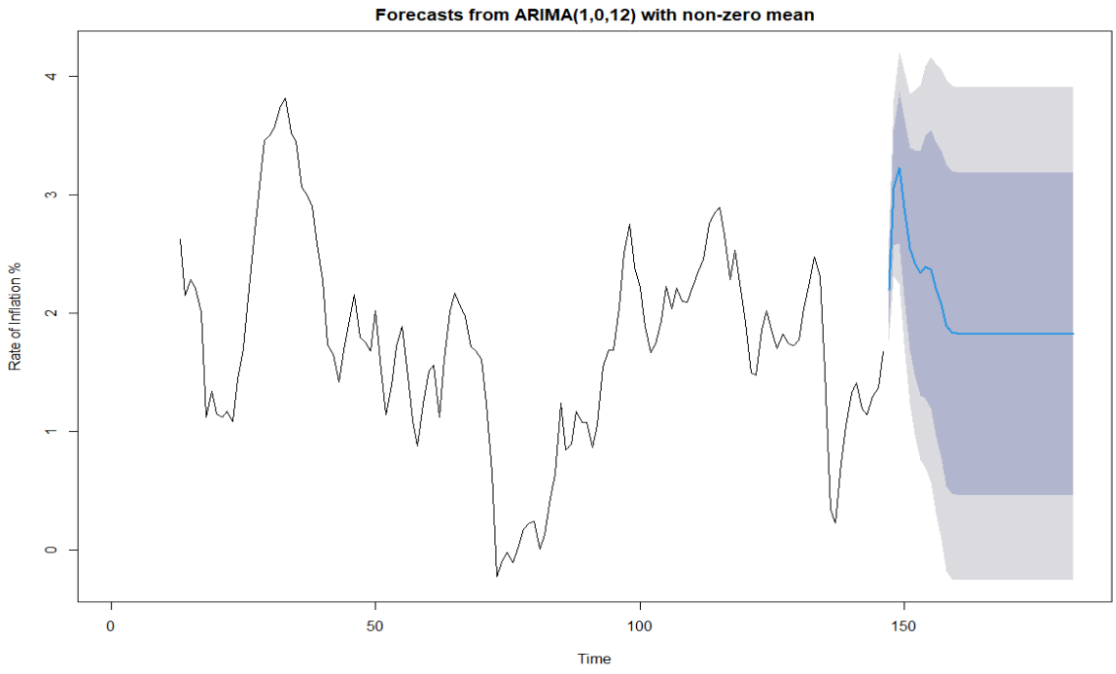
Figure 6: Relationship between % Change in Domestic Enplanements & % Change in Domestic Fuel Consumption



Source(s): https://www.transtats.bts.gov/databases.asp?Z1qr_VQ=E&Z1qr_Qr5p=N8vn6v10&f7owrp6_VQF=D; https://www.tsa.gov/coronavirus/passenger-throughput; and https://www.transtats.bts.gov/TRAFFIC/

Now consider Figure 7, Figure 8, and Figure 9; each of these figures show inflation calculated by year-over-year change in the consumer price index[17] (CPI: All Cities). The time sequence in these graphs shows the number of months since the start of the series (1/1/2010). For example, the inflation rate at time period 50 (~1.30%), is the rate of inflation experienced in March, 2014. Each figure shows the actual rate of inflation (black line) along with a 36-period forecast rate of inflation (blue line). The blue-line forecast is shadowed by 80% and 95% confidence intervals. The forecasts are built using 12, 24 or 36-period moving averages. Given that the Federal Reserve Board of Governors released a report claiming that the Fed' would be adhering to the Taylor Rule 2% inflation target using a "longer time horizon"[18], we feel that the 24 and 36-period moving-average forecasts are more likely to reflect their reluctance to engage in contractionary monetary policy even if inflation rates jump above 2%. As such, ***we are likely to see short-term inflation rates jump up to 2.5-3% before the Fed' responds with a 25 – 50 basis point increase in the Federal Funds target rate***.

Figure 7: Inflation Forecasts (ARIMA Model with 12-period Moving Average)



[17] https://fred.stlouisfed.org/series/CPIAUCSL

[18] https://www.federalreserve.gov/faqs/economy_14400.htm

Figure 8: Inflation Forecasts (ARIMA Model with 24-period Moving Average)

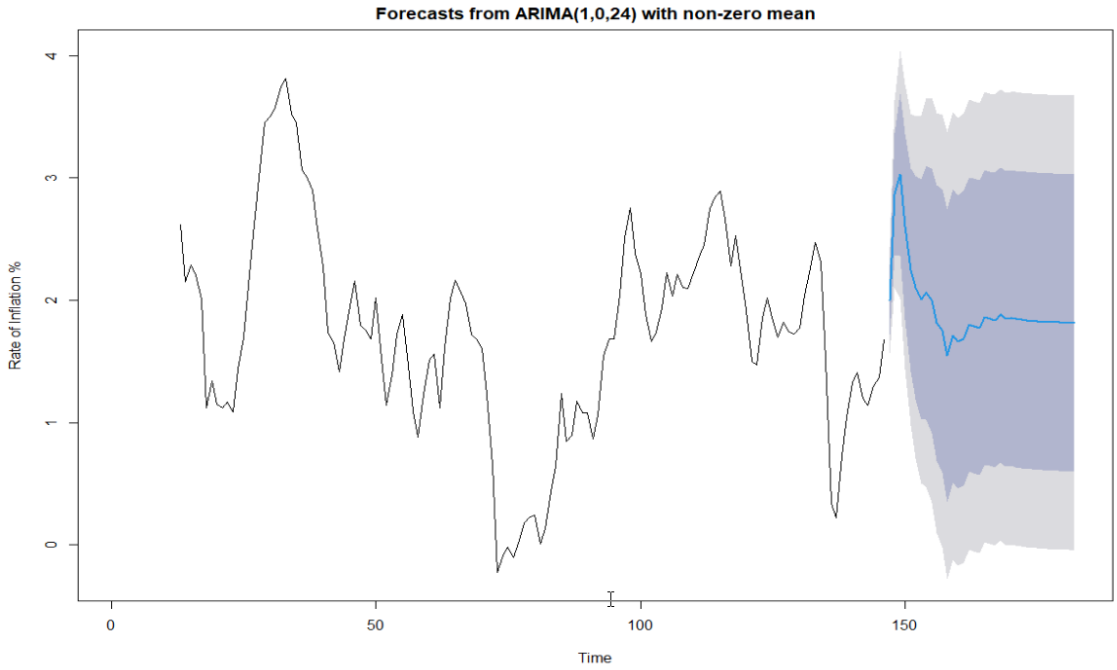
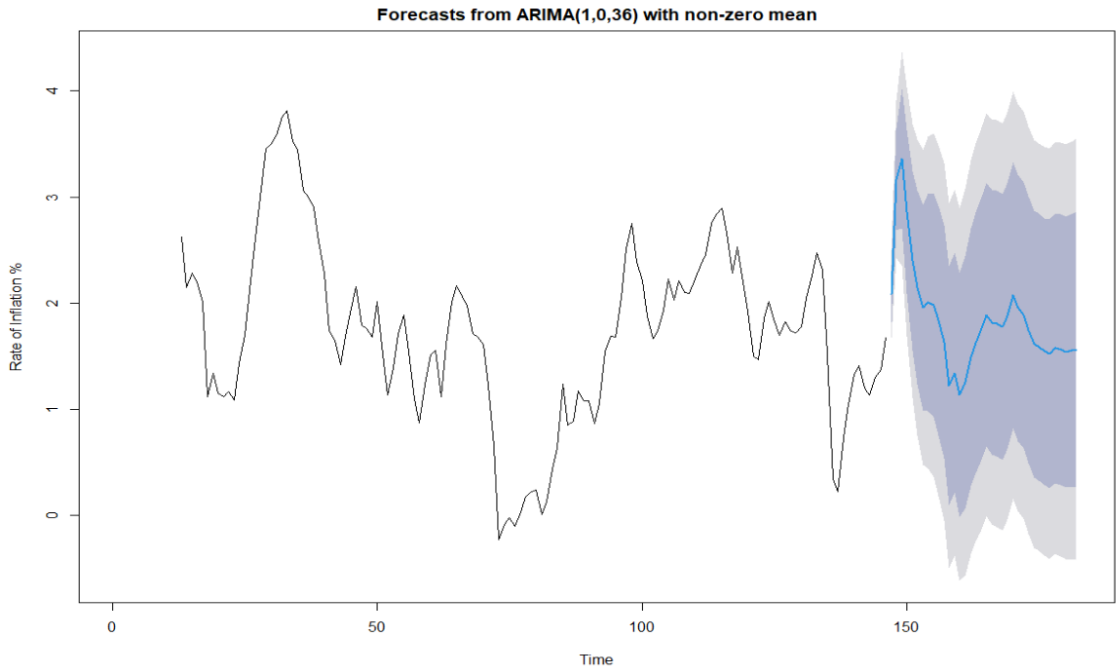


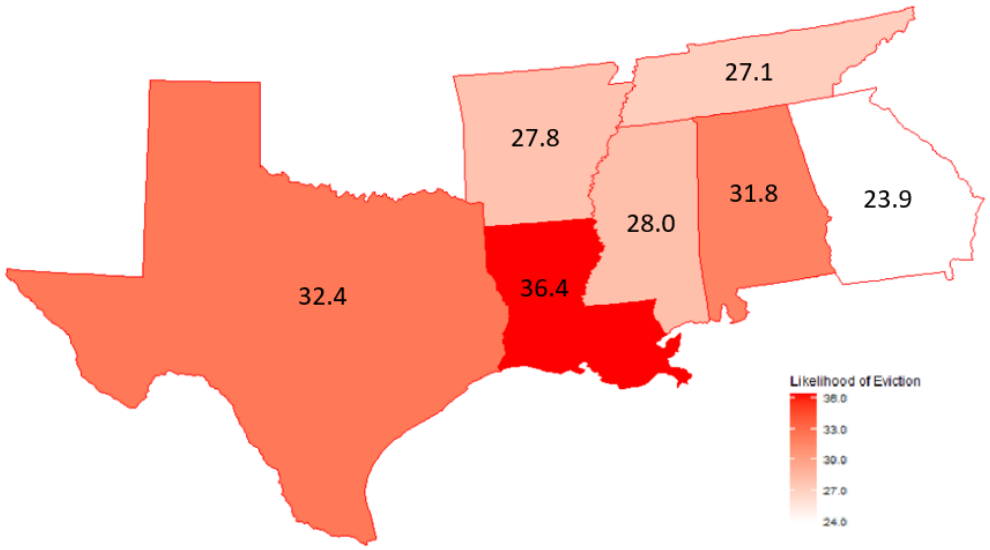
Figure 9: Inflation Forecasts (ARIMA Model with 36-period Moving Average)



Housing & Evictions

The information from the PULSE survey (Census) reveals that the economy is still in very precarious position with respect to mortgage and evictions. Households in the Southeastern US (Alabama, Arkansas, Mississippi, Georgia, Texas, Tennessee and Louisiana) still have shown a high predicted likelihood of eviction or foreclosure; nearly one-in-three households are expressing either a very high or somewhat high likelihood of being evicted within the next two months. The percentage of households expressing a very high likelihood or somewhat high likelihood of losing income is **lower** than the percentage of households fearful of being evicted – but still shows that one-in-six families is fearful of losing income. Nearly 40% of households in the states shown above express very high or somewhat high difficulty in making regular payments to monthly bills and expenses, e.g., credit cards, utilities, car loans or other revolving debt payments.

Figure 10 Percentage of Participants Who Expressed They are Very or Somewhat Likely to be Evicted in the Next 8 Weeks (Week Ending March 15, 2021)

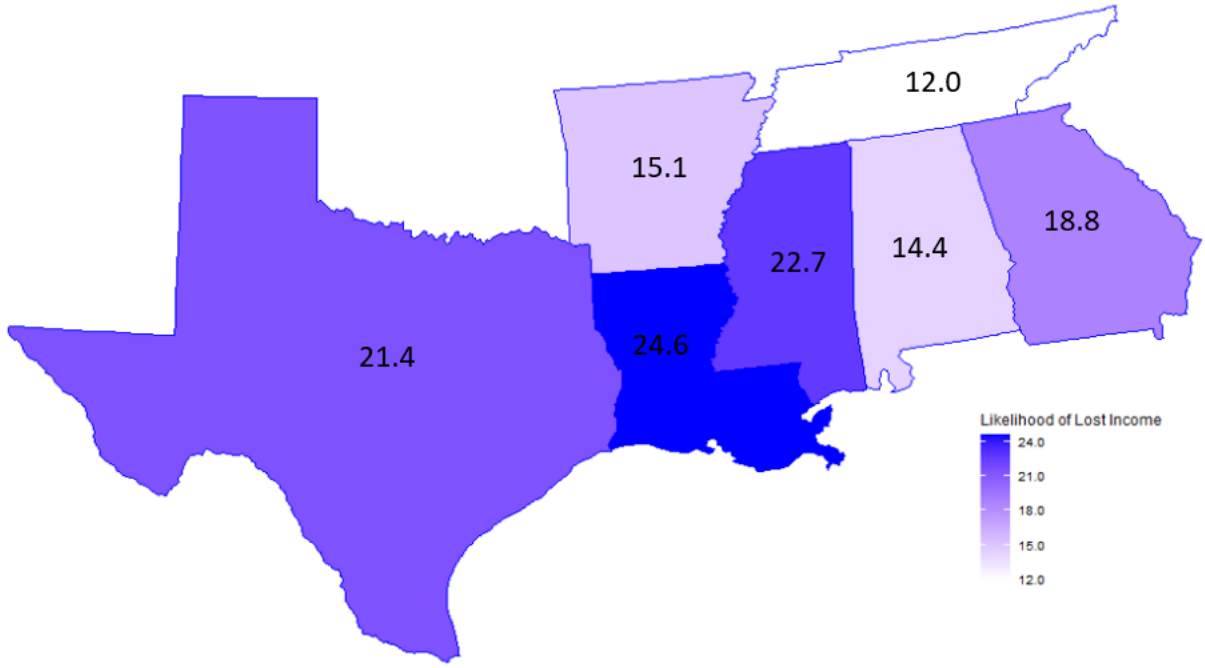


Source: Census Pulse Survey

On March 11, 2021, President Biden signed the "American Recovery Plan Act", the $1.9T stimulus package, into law[19]. This package provided direct payments of up to $1,400 per person, additional $1,400 stimulus for each child under 18 claimed on their most recent taxes, and extended a $300 per week unemployment insurance supplement. The way that families are spending their stimulus checks also points to possible issues within the housing market.

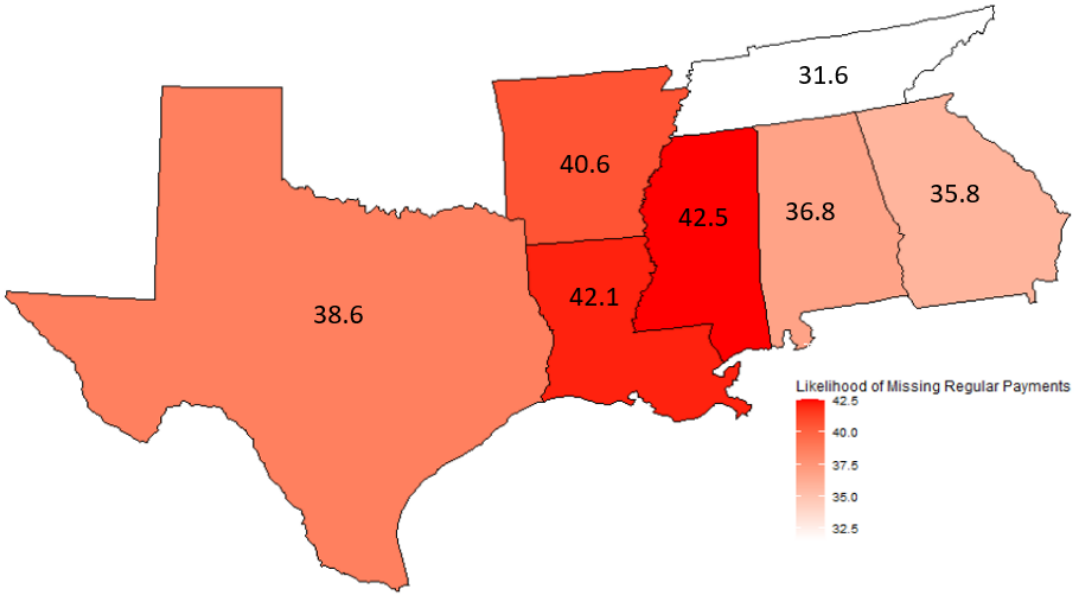
[19] https://www.washingtonpost.com/us-policy/2021/03/11/biden-sign-stimulus-covid-relief-congress-checks/

Figure 11 Percentage of Participants Who Expressed They are Very or Somewhat Likely to Experience a Loss of Income the Next 4 Weeks (Week Ending March 15, 2021)



Source: Census Pulse Survey

Figure 12 Percentage of Participants Who Expressed They are Very or Somewhat Likely to Miss A Regular Payment (Debt) the Last 7 Days (Week Ending March 15, 2021)



Source: Census Pulse Survey

Table 1: Percentage of Households Spending Received Stimulus Checks for Different Uses

Stimulus payment uses	**% of Households Spending Money By Category**
Food (groceries, eating out, take out)	32.6%
Clothing (clothing, accessories, shoes)	44.6%
Household supplies or personal care products	36.0%
Household items (TV, electronics, furniture, appliances)	54.8%
Recreational goods (sports and fitness equipment, bicycles, toys, games)	62.4%
Rent	22.3%
Mortgage (scheduled or monthly)	25.2%
Utilities and telecommunications (natural gas, electricity, cable, internet, cellphone)	25.2%
Vehicle payments (scheduled or monthly)	22.5%
Paying down credit card, student loans, or other debts	16.9%
Charitable donations or giving to family members	42.7%
Savings or investments	13.3%
Other	43.3%

Source: https://www.census.gov/data/tables/2021/demo/hhp/hhp26.html

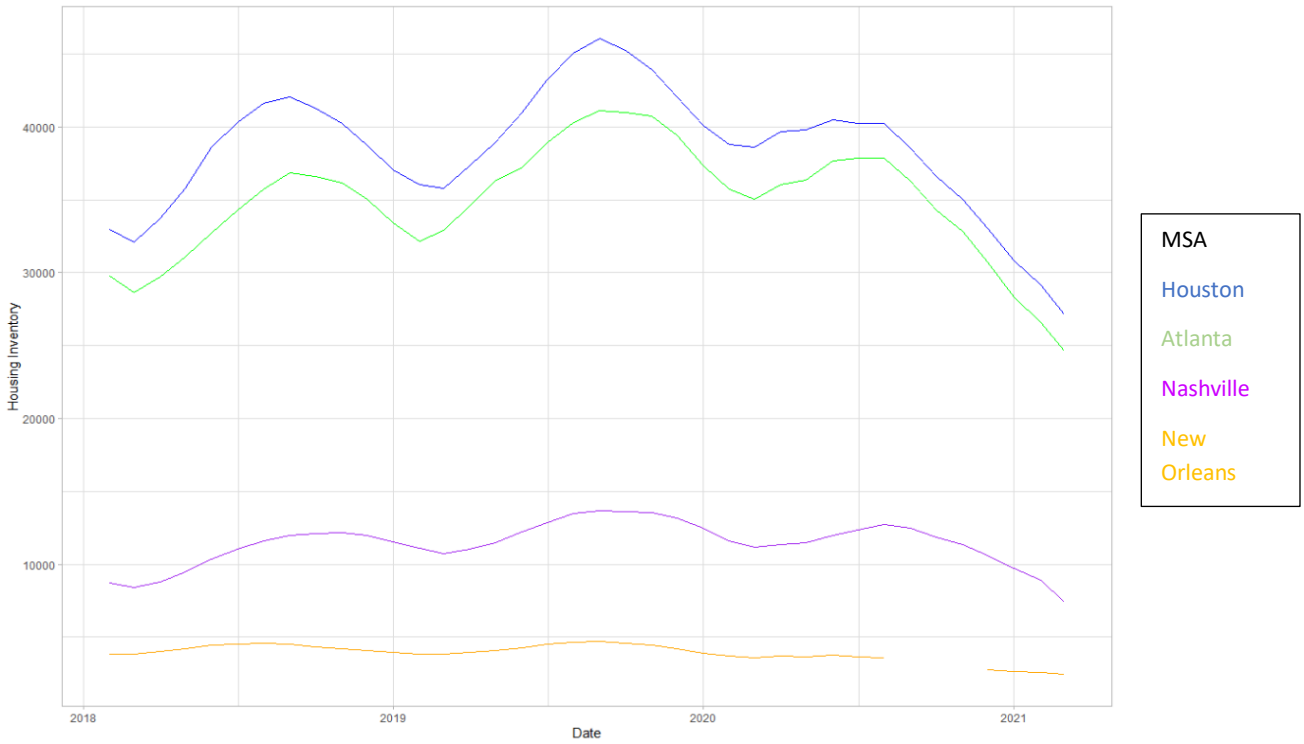
The Census Pulse survey[20] queried households regarding how they were spending their "American Recovery Plan Act" stimulus checks. Table 1 shows the percentage of households identifying categories of spending. Households were allowed to identify as many categories as appropriately captured how they spent their stimulus -- the average household identified 3 categories. Over 22% of households spent stimulus checks on rent and more than 25% of households spent money on mortgages – over 45% of households spent some of the stimulus money on their house/apartment/condo/living arrangements.

Added to this stress, the inventory of homes on the market has decreased substantially during the last year. Although the market experiences fluctuations that correspond to the school year (a decrease in inventories at the start of August and then an increase in inventories at the start of March), the changes in inventories for 2020 were even more dramatic. Figure 13 shows the year-over-year changes in inventory in the United States.

The US experienced a dramatic decrease in inventory throughout 2020 relative to 2019. The huge decrease in housing inventory contributed to a dramatic spike in median home prices. There are usually increases in home prices that are consistent with an increase in demand June through August. However, the median sales price for 2020 showed an above-normal increase in prices that started in March and continued through the entire year (March through December). The market has experienced a small decrease in median sales price in February 2021. However, it is anticipated that the market will not experience a prolonged drop in sales prices much before July, 2021. With an increase in vaccinations and an anticipated increase in inventory, we are forecasting that the market will experience a significant down-ward adjustment in prices in early to mid-fall. The downturn in the average prices might leave some homeowners with a case of “buyer’s remorse” – particularly home owners that purchased their homes in the Summer and Fall of 2020. We saw a rapid increase in home prices between 2006 and 2008 followed by a dramatic decrease (bubble); we hope that the downward adjustment in prices is more subtle than the 2008 bubble but we cannot completely dismiss the possibility that home prices will return to pre-COVID levels.

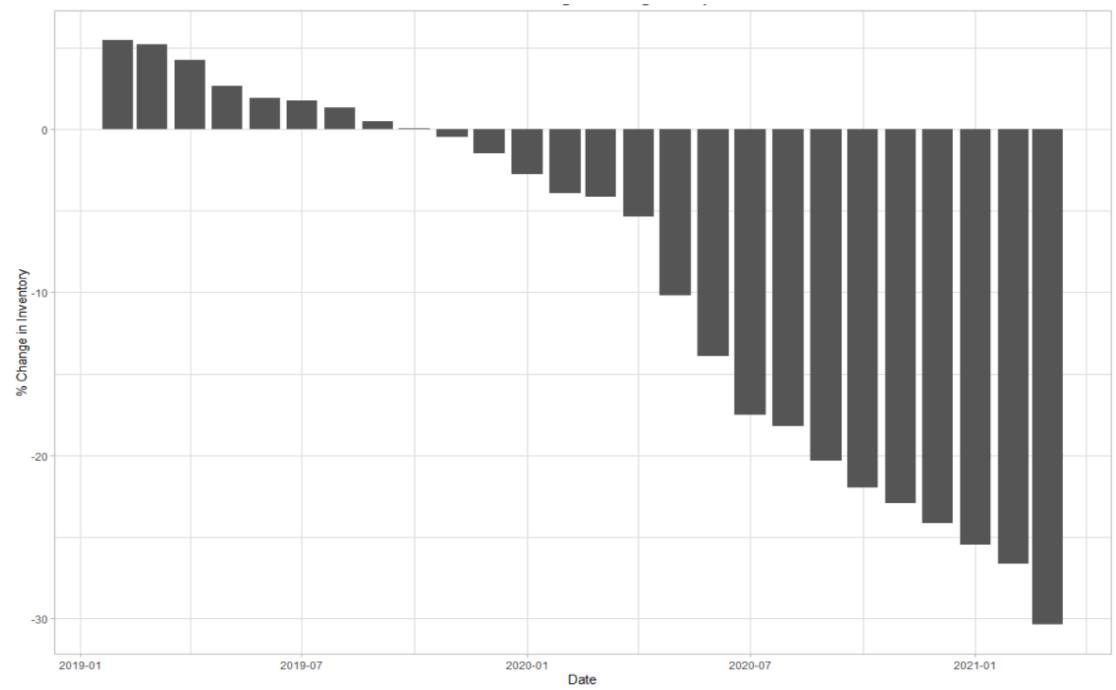
[20] https://www.census.gov/data/tables/2021/demo/hhp/hhp26.html

Figure 13: Housing Inventory per MSA



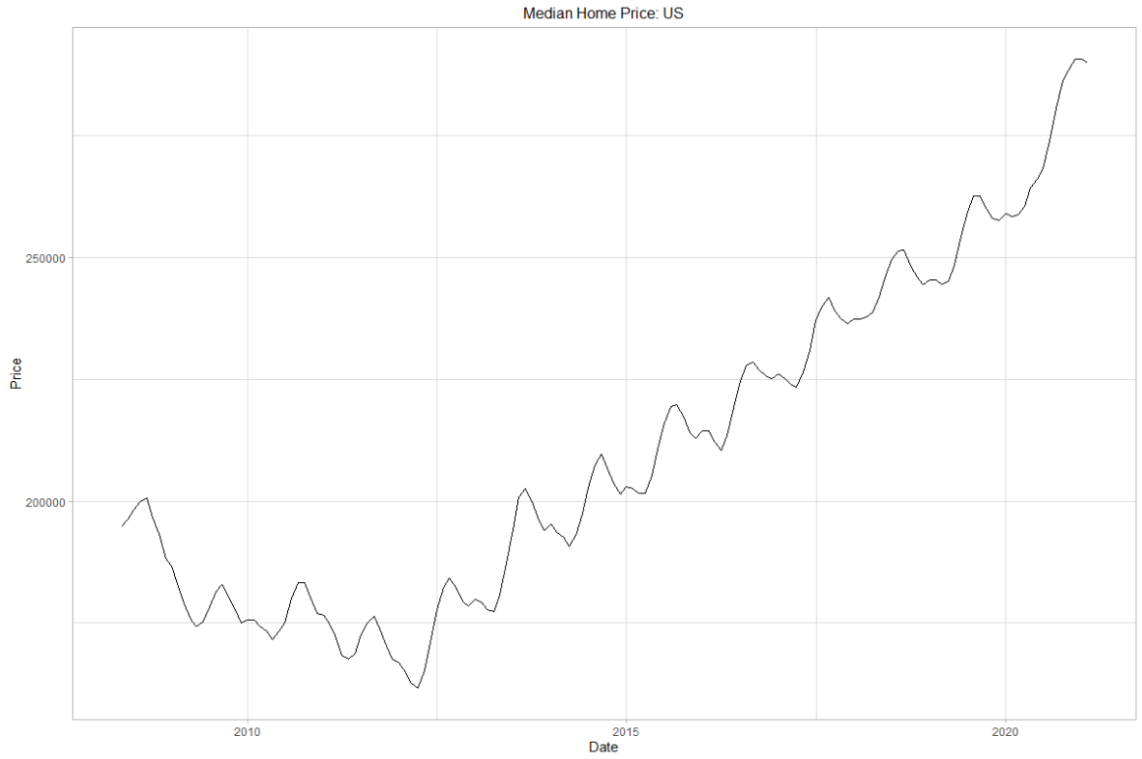
Source: Zillow

Figure 14: Y/Y % Change in US Housing Inventory



Source: Zillow

Figure 15: Median US Home Price



Source: Zillow

The combination of the high frequency of households that are fearful of being evicted (Figure 10), the high frequency of households that are experiencing difficulty making regular payments (Figure 12), new potential cases of "buyer's remorse", and the high percentage of households spending stimulus checks on their physical living arrangements suggests ***the US might be headed for a mortgage delinquency crisis***. The following tables, Table 2 through Table 6, present the delinquency rates of mortgages held by Freddie Mac for March 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 March 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	1075	1033	16	2	3	21	1.49%	2.42%	3.91%
	2 units	2	2	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	5	5	0	0	0	0	0.00%	0.00%	0.00%
Auburn-Opelika, AL	1 unit	4235	4160	19	11	0	45	0.45%	1.32%	1.77%
	2 units	25	23	2	0	0	0	8.00%	0.00%	8.00%
	3+ units	1	1	0	0	0	0	0.00%	0.00%	0.00%
Birmingham-Hoover, AL	1 unit	27736	27122	193	45	38	338	0.70%	1.52%	2.21%
	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	326	311	2	3	0	10	0.61%	3.99%	4.60%
	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	6846	6687	50	12	8	89	0.73%	1.59%	2.32%
	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%
Decatur, AL	1 unit	1990	1953	16	3	3	15	0.80%	1.06%	1.86%
	2 units	4	4	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	8	8	0	0	0	0	0.00%	0.00%	0.00%
Dothan, AL	1 unit	1914	1878	18	4	3	11	0.94%	0.94%	1.88%
	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	2478	2416	27	3	2	30	1.09%	1.41%	2.50%
	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	1139	1092	8	0	1	38	0.70%	3.42%	4.13%
	2 units	1	1	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	0	0	0	0	0	0	0.00%	0.00%	0.00%

Huntsville, AL	1 unit	12567	12363	76	13	15	100	0.61%	1.02%	1.62%
	2 units	16	16	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	37	37	0	0	0	0	0.00%	0.00%	0.00%
Mobile, AL	1 unit	4977	4832	39	13	10	83	0.78%	2.13%	2.91%
	2 units	11	11	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	5	5	0	0	0	0	0.00%	0.00%	0.00%
Montgomery, AL	1 unit	5518	5383	45	12	6	72	0.82%	1.63%	2.45%
	2 units	15	15	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	9	9	0	0	0	0	0.00%	0.00%	0.00%
Tuscaloosa, AL	1 unit	4593	4502	31	7	5	48	0.68%	1.31%	1.98%
	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	9751	9484	95	23	13	136	0.97%	1.76%	2.74%
	2 units	41	39	0	0	0	2	0.00%	4.88%	4.88%
	3+ units	9	9	0	0	0	0	0.00%	0.00%	0.00%

Data: STACR Freddie Mac

Table 3: Percentage of Freddie Mac Mortgages by Status (Current, 30 dpd and 30+ dpd) as of March 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	23721	23110	169	42	41	359	0.71%	1.86%	2.58%
	2 units	302	282	7	0	0	13	2.32%	4.31%	6.62%
	3+ units	35	33	1	0	0	1	2.86%	2.86%	5.71%
Crestview-Fort Walton Beach-Destin, FL	1 unit	6429	6277	46	11	5	90	0.72%	1.65%	2.36%
	2 units	13	13	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	17	17	0	0	0	0	0.00%	0.00%	0.00%
Deltona-Daytona Beach-Ormond Beach, FL	1 unit	16608	16237	113	28	21	209	0.68%	1.55%	2.23%
	2 units	129	120	0	0	0	9	0.00%	6.98%	6.98%
	3+ units	43	40	0	0	0	3	0.00%	6.98%	6.98%
Fort Lauderdale-Pompano Beach-Sunrise, FL	1 unit	45923	43434	463	159	114	1753	1.01%	4.41%	5.42%
	2 units	449	406	9	2	4	28	2.00%	7.57%	9.58%
	3+ units	240	219	1	5	1	14	0.42%	8.33%	8.75%
Gainesville, FL	1 unit	5427	5330	28	7	5	57	0.52%	1.27%	1.79%
	2 units	20	20	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	13	11	0	0	0	2	0.00%	15.39%	15.39%
Homosassa Springs, FL	1 unit	2752	2716	8	5	4	19	0.29%	1.02%	1.31%
	2 units	18	18	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	3	1	2	0	0	0	66.67%	0.00%	66.67%
Jacksonville, FL	1 unit	36083	35224	260	74	35	490	0.72%	1.66%	2.38%
	2 units	163	156	1	0	0	6	0.61%	3.68%	4.29%
	3+ units	99	96	0	0	1	2	0.00%	3.03%	3.03%
Lakeland-Winter Haven, FL	1 unit	13451	13082	95	34	19	221	0.71%	2.04%	2.74%

	2 units	87	84	0	0	0	3	0.00%	3.45%	3.45%
	3+ units	30	28	0	0	0	2	0.00%	6.67%	6.67%
Miami-Miami Beach-Kendall, FL	1 unit	38538	36188	403	126	124	1697	1.05%	5.05%	6.10%
	2 units	446	425	2	0	1	18	0.45%	4.26%	4.71%
	3+ units	122	115	0	0	0	7	0.00%	5.74%	5.74%
Naples-Marco Island, FL	1 unit	11239	10964	69	21	13	172	0.61%	1.83%	2.45%
	2 units	36	34	2	0	0	0	5.56%	0.00%	5.56%
	3+ units	15	15	0	0	0	0	0.00%	0.00%	0.00%
North Port-Bradenton-Sarasota, FL	1 unit	27939	27278	168	47	30	416	0.60%	1.77%	2.37%
	2 units	160	156	0	0	0	4	0.00%	2.50%	2.50%
	3+ units	24	23	0	0	0	1	0.00%	4.17%	4.17%
Ocala, FL	1 unit	6774	6619	56	13	7	79	0.83%	1.46%	2.29%
	2 units	18	18	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	15	12	0	0	0	3	0.00%	20.00%	20.00%
Orlando-Kissimmee-Sanford, FL	1 unit	65494	63087	486	185	164	1572	0.74%	2.93%	3.68%
	2 units	275	268	2	0	0	5	0.73%	1.82%	2.55%
	3+ units	84	79	1	0	0	4	1.19%	4.76%	5.95%
Palm Bay-Melbourne-Titusville, FL	1 unit	17067	16664	115	33	27	228	0.67%	1.69%	2.36%
	2 units	49	48	0	0	0	1	0.00%	2.04%	2.04%
	3+ units	24	22	0	0	0	2	0.00%	8.33%	8.33%
Palm Coast, FL	1 unit	182	179	1	1	0	1	0.55%	1.10%	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	4086	3981	40	12	5	48	0.98%	1.59%	2.57%
	2 units	34	34	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	12	12	0	0	0	0	0.00%	0.00%	0.00%
Pensacola-Ferry Pass-Brent, FL	1 unit	8579	8360	73	10	12	124	0.85%	1.70%	2.55%
	2 units	61	61	0	0	0	0	0.00%	0.00%	0.00%

	3+ units	37	34	0	0	0	3	0.00%	8.11%	8.11%
Port St. Lucie, FL	1 unit	13901	13491	105	38	34	233	0.76%	2.19%	2.95%
	2 units	51	49	1	0	0	1	1.96%	1.96%	3.92%
	3+ units	13	10	2	0	0	1	15.39%	7.69%	23.08%
Punta Gorda, FL	1 unit	6516	6367	40	10	11	88	0.61%	1.67%	2.29%
	2 units	24	23	1	0	0	0	4.17%	0.00%	4.17%
	3+ units	6	6	0	0	0	0	0.00%	0.00%	0.00%
Sebastian-Vero Beach, FL	1 unit	5115	5009	25	5	7	69	0.49%	1.58%	2.07%
	2 units	13	12	0	0	0	1	0.00%	7.69%	7.69%
	3+ units	5	5	0	0	0	0	0.00%	0.00%	0.00%
Sebring, FL	1 unit	1683	1638	17	2	2	24	1.01%	1.66%	2.67%
	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	8167	8012	46	15	3	91	0.56%	1.34%	1.90%
	2 units	45	45	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	82326	80021	589	164	111	1441	0.72%	2.08%	2.80%
	2 units	435	425	4	0	0	6	0.92%	1.38%	2.30%
	3+ units	237	223	1	0	3	10	0.42%	5.49%	5.91%
The Villages, FL	1 unit	2263	2229	11	0	0	23	0.49%	1.02%	1.50%
	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	40630	39047	302	123	113	1045	0.74%	3.15%	3.90%
	2 units	213	199	1	0	0	13	0.47%	6.10%	6.57%
	3+ units	118	108	2	0	0	8	1.70%	6.78%	8.48%
Outside all MSAs	1 unit	8537	8303	57	32	19	126	0.67%	2.07%	2.74%
	2 units	329	311	1	2	0	15	0.30%	5.17%	5.47%

	3+ units	52	50	1	0	0	1	1.92%	1.92%	3.85%

Data: STACR Freddie Mac

Table 4: Percentage of Freddie Mac Mortgages by Status (Current, 30 dpd and 30+ dpd) as of March 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	1448	1412	9	6	4	17	0.62%	1.87%	2.49%
	2 units	0	0	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	0	0	0	0	0	0	0.00%	0.00%	0.00%
Baton Rouge, LA	1 unit	18536	17972	168	56	36	304	0.91%	2.14%	3.04%
	2 units	50	48	1	0	0	1	2.00%	2.00%	4.00%
	3+ units	61	56	0	0	0	5	0.00%	8.20%	8.20%
Hammond, LA	1 unit	1814	1752	18	7	5	32	0.99%	2.43%	3.42%
	2 units	10	10	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	3090	2971	31	9	19	60	1.00%	2.85%	3.85%
	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	7774	7474	63	30	19	188	0.81%	3.05%	3.86%
	2 units	9	9	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	26	25	1	0	0	0	3.85%	0.00%	3.85%
Lake Charles, LA	1 unit	3287	3119	28	11	16	113	0.85%	4.26%	5.11%
	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	2217	2143	20	7	4	43	0.90%	2.44%	3.34%
	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	24412	23412	236	90	61	613	0.97%	3.13%	4.10%
	2 units	1265	1208	7	2	4	44	0.55%	3.95%	4.51%
	3+ units	332	307	2	0	2	21	0.60%	6.93%	7.53%

Shreveport-Bossier City, LA	1 unit	6058	5819	76	19	9	135	1.26%	2.69%	3.95%
	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	5107	4857	86	16	10	138	1.68%	3.21%	4.90%
	2 units	460	429	2	1	0	28	0.44%	6.30%	6.74%
	3+ units	96	95	0	0	0	1	0.00%	1.04%	1.04%

Data: STACR Freddie Mac

Table 5: Percentage of Freddie Mac Mortgages by Status (Current, 30 dpd and 30+ dpd) as of March 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	3598	3489	30	11	5	63	0.83%	2.20%	3.03%
	2 units	23	23	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	1899	1843	23	2	2	29	1.21%	1.74%	2.95%
	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	7284	7055	61	19	15	134	0.84%	2.31%	3.14%
	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	4461	4347	30	22	13	49	0.67%	1.88%	2.56%
	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	8859	8538	81	29	21	190	0.91%	2.71%	3.62%
	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

Table 6: Percentage of Freddie Mac Mortgages by Status (Current, 30 dpd and 30 + dpd) as of March 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	3223	3142	29	8	4	40	0.90%	1.61%	2.51%
	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	3644	3537	23	11	6	67	0.63%	2.31%	2.94%
	2 units	10	10	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	2	2	0	0	0	0	0.00%	0.00%	0.00%
Austin-Round Rock-San Marcos, TX	1 unit	80001	78147	473	134	100	1147	0.59%	1.73%	2.32%
	2 units	940	921	4	0	0	15	0.43%	1.60%	2.02%
	3+ units	196	191	0	0	0	5	0.00%	2.55%	2.55%
Beaumont-Port Arthur, TX	1 unit	4614	4456	47	13	12	86	1.02%	2.41%	3.42%
	2 units	1	1	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	2170	2070	23	9	9	59	1.06%	3.55%	4.61%
	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	5686	5562	29	7	8	80	0.51%	1.67%	2.18%
	2 units	84	83	0	0	0	1	0.00%	1.19%	1.19%
	3+ units	52	48	0	0	0	4	0.00%	7.69%	7.69%
Corpus Christi, TX	1 unit	5912	5705	51	25	21	110	0.86%	2.64%	3.50%
	2 units	11	11	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	14	13	1	0	0	0	7.14%	0.00%	7.14%
El Paso, TX	1 unit	5035	4796	59	19	18	143	1.17%	3.58%	4.75%
	2 units	57	56	0	0	0	1	0.00%	1.75%	1.75%
	3+ units	27	27	0	0	0	0	0.00%	0.00%	0.00%

Houston-Sugar Land-Baytown, TX	1 unit	155656	149673	1340	435	407	3801	0.86%	2.98%	3.84%
	2 units	259	254	0	0	0	5	0.00%	1.93%	1.93%
	3+ units	216	209	2	0	0	5	0.93%	2.32%	3.24%
Killeen-Temple-Fort Hood, TX	1 unit	5155	5006	36	18	17	78	0.70%	2.19%	2.89%
	2 units	178	178	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	161	160	0	0	0	1	0.00%	0.62%	0.62%
Laredo, TX	1 unit	1527	1449	21	12	1	44	1.38%	3.73%	5.11%
	2 units	3	2	1	0	0	0	33.33%	0.00%	33.33%
	3+ units	7	6	1	0	0	0	14.29%	0.00%	14.29%
Longview, TX	1 unit	2203	2132	18	6	4	43	0.82%	2.41%	3.22%
	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	6774	6599	59	13	10	93	0.87%	1.71%	2.58%
	2 units	79	79	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	11	11	0	0	0	0	0.00%	0.00%	0.00%
McAllen-Edinburg-Mission, TX	1 unit	3504	3298	46	18	16	126	1.31%	4.57%	5.88%
	2 units	17	11	0	0	0	6	0.00%	35.29%	35.29%
	3+ units	144	139	1	1	0	3	0.69%	2.78%	3.47%
Midland, TX	1 unit	5071	4829	48	15	22	157	0.95%	3.83%	4.77%
	2 units	14	14	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	1907	1789	28	12	11	67	1.47%	4.72%	6.19%
	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	2075	1999	24	9	3	40	1.16%	2.51%	3.66%
	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	44335	42965	371	126	88	785	0.84%	2.25%	3.09%
	2 units	303	295	3	0	0	5	0.99%	1.65%	2.64%
	3+ units	175	170	0	0	0	5	0.00%	2.86%	2.86%
Sherman-Denison, TX	1 unit	3633	3537	35	10	10	41	0.96%	1.68%	2.64%
	2 units	28	28	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	0	0	0	0	0	0	0.00%	0.00%	0.00%
Texarkana, TX-Texarkana, AR	1 unit	1021	994	9	3	3	12	0.88%	1.76%	2.64%
	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	3779	3666	33	11	8	61	0.87%	2.12%	2.99%
	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	931	890	10	6	4	21	1.07%	3.33%	4.40%
	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	4088	3981	45	9	5	48	1.10%	1.52%	2.62%
	2 units	38	38	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	1168	1133	7	4	0	24	0.60%	2.40%	3.00%
	2 units	5	5	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	2	2	0	0	0	0	0.00%	0.00%	0.00%
Outside all MSAs	1 unit	29519	28504	304	89	59	563	1.03%	2.41%	3.44%
	2 units	457	449	2	0	0	6	0.44%	1.31%	1.75%
	3+ units	59	59	0	0	0	0	0.00%	0.00%	0.00%

Data: STACR Freddie Mac

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)

   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. 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. For instance, the efficacy of COVID vaccines have allegedly been a recent target of propaganda from several sources in recent months, causing concerns about the US' ability to develop a "herd immunity" and restore its economy.[22] As another example, fictitious (but realistic) videos have been purported as showing up on social media in an error to sway a unionization vote of Amazon workers; while many may be sensitive enough to how technology can be abused, there are concerns that the confidence of people may lead to a mistrust of legitimate information sources.[23]

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

[21] See https://www.nytimes.com/2020/09/01/technology/facebook-russia-disinformation-election.html

[22] See https://fas.org/wp-content/uploads/2020/07/COVID-19-Disinformation-Report-for-July-20.pdf, https://www.healthline.com/health-news/covid-19-vaccine-myths-are-spreading-thanks-to-russian-propaganda-what-to-know, https://www.usnews.com/news/world-report/articles/2021-03-12/russia-accuses-us-of-propaganda-campaign-to-undermine-its-coronavirus-vaccine

[23] https://www.technologyreview.com/2021/03/31/1021487/deepfake-amazon-workers-are-sowing-confusion-on-twitter-thats-not-the-problem/

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."[24] 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)[25]. And, just to add an interesting twist, ransomware is now even offered as a *service* in which a criminal may sell a *license* to a (software) ransomware variant to another criminal, who will then infect a system and demand a fee for the decryption key. As our society becomes more dependent on automated systems, disruptions to those systems will have an increasing impact on us.

4. Societal Unrest, including Domestic Social Changes and Terrorism: The events of 9/11 resoundingly affected market activity for years following the attacks on the US. 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.[26]

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 (assumably) Vice President Harris may be necessary before the next election 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[27] and wage protection[28], 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)[29], 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[30], and the blockage caused over 300 tankers to become backlogged, and

[24] See https://us.norton.com/internetsecurity-malware-ransomware-5-dos-and-donts.html

[25] See https://security.berkeley.edu/faq/ransomware/ and https://securityintelligence.com/articles/6-ransomware-trends-2020/

[26] 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/

[27] See, e.g., https://www.huffpost.com/entry/kamala-harris-vice-president-nominee-dnc_n_5f36f56bc5b69fa9e2fb7862

[28] See, e.g., https://www.shrm.org/resourcesandtools/hr-topics/benefits/pages/where-kamala-harris-stands-on-workers-pay-and-benefits.aspx

[29] See https://www.middleeasteye.net/news/kamala-harris-joe-biden-vice-president-saudi-israel

[30] See https://www.businessinsider.com/toilet-paper-coffee-products-delayed-suez-canal-blockage-impact-2021-3

contemplate an expensive two week redirection around the Cape of Good Hope.[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 of global liquified natural gas; and the Malacca Strait carries 40% of all global trade (including 16M barrels of oil per day).[32]

[31] See https://www.wsj.com/articles/egypt-aims-to-refloat-cargo-ship-grounded-in-suez-canal-11616837175

[32] See https://www.dw.com/en/suez-canal-blockage-4-of-the-biggest-trade-chokepoints/a-57020755

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[33]:

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

[33] 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 171 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**[34]
6-month Treasury yield		3-year Treasury yield*
Prime rate		3-month Treasury yield
1-month Treasury yield	**… depends on …**	1-year Treasury yield
3-year Treasury yield		1-year Treasury yield
7-year Treasury yield		3-year Treasury yield*
10-year Treasury yield		5-year Treasury yield

[34] 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 "*".

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		Dow-Jones Total Index
US Residential Home Price Index		Commercial Real Estate Price index
Primary Credit rate		6-month 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 4Q2023, 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 prior to 2024 based on market conditions and the opinions of the members of the FOMC*.**

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

Analysis

As 2021 has rolled in with a roar, the impatience of the country to return to pre-pandemic times has fueled a jump in the (real Q/Q) US GDP by 33.4% during 3Q and another approximately 4.3% (annualized) during 4Q; these values correspond to nominal annualized growth rates of 38.3% and 6.3%, respectively[35]. These values are obviously not "normal", but are caused by the globally withheld demand for products and services. As people and municipalities have become more comfortable with re-opening venues and interacting, the ability for business to transpire has led to more transactions. While we are hopeful that society will be able to resume its course globally, we are still concerned about the possible risks that could exist. These risks are discussed elsewhere in this paper, but it should suffice to mentioned that they exist on both the conservative and optimistic sides of the scale: on the one hand, taking an excessively cautious approach to resuming activities would prevent the continued

[35] https://www.bea.gov/news/2021/gross-domestic-product-third-estimate-gdp-industry-and-corporate-profits-4th-quarter-and

spread of the COVID virus and its mutations, but this case would also result in lost opportunities and perpetuating the ongoing economic malaise in which the globe is entrenched.

Ordinarily, GDP is driven by several factors:

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

The current COVID emergency is expected to continue significantly hampering domestic output in the near term, starting with international travel, imports & exports, and related industries, which affect the pricing of products & services that can be offered for sale; specifically, we have already also seen dozens of producers bankrupted by the current pandemic[36]. We have previously discussed unemployment filings[37], and recent personal consumption[38], savings[39], and retail sales figures[40].

We expect ***government spending will continue to increase*** through much of 2021. 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 (April 2021), the White House and senior Democratic leaders in Congress have announced that they are starting to build a $3T plan to overhaul significant portions of American infrastructure, including roads, bridges, rail lines, electrical vehicle charging stations, cellular service, and subsidized education (for improving worker competitiveness and employability), among other items. Based on President Biden's campaign positions, it is expected that these actions will be funded by additional taxes on the wealthier segments of the population, but this has yet to be finalized. Republicans in Congress, however, point to the emerging economy as evidence that an additional stimulus plan is not necessary.

While consumer spending experienced a "bump" in January 2021, personal consumption has been dropping slightly (Q/Q) with minor exceptions since the beginning of 2020. ***We expect for this trend to continue as the country continues to evaluate the stability of returning markets, services, and employment opportunities.*** The country has experienced several rounds of social upheaval over the past 12-24 months, including the COVID pandemic, drastic employment changes, societal transformations (including domestic chaos at the Capital building), and so on; until the appearance of order is restored (in terms of governmental, financial, and personal security), we expect a malaise to continue with regard to spending (versus conserving resources). This conclusion is in-line with previously published comments regarding spending of government-issued stimulus to date[41].

[36] See https://www.businessinsider.com/retailers-filed-bankruptcy-liquidation-closing-stores-2020-2

[37] See https://www.nytimes.com/2020/12/10/business/economy/unemployment-claims.html

[38] See https://www.brookings.edu/blog/future-development/2020/12/14/the-decline-and-recovery-of-consumer-spending-in-the-us/

[39] See https://www.kansascityfed.org/publications/research/eb/articles/2020/why-are-americans-saving-so-much-income

[40] See https://www.kiplinger.com/economic-forecasts/retail-sales

[41] See, e.g., https://fortune.com/2021/03/12/stimulus-check-3-spending-food-utilities-stocks-bitcoin-3rd-round-stimulus-checks-payments-us-census/

There is an exception to this position that is equally important to consider. Given the "pent up" desire by American's to escape from their current self-imposed exile (at home), and the fact that many "Baby Boomers" and older "Generation X" constituents (who are likely part of the more affluent members of society, and who will most likely have families with children) have completed vaccination regimens, we could expect a burst of domestic travel to occur during 2021 and 2022, impacting the services' sectors[42,43]. We hope that this "unbridled enthusiasm" will not cause another national wave of infections to occur among unvaccinated individuals, but acknowledge this possibility.

Finally, as the US has recovered from the COVID pandemic more rapidly than other countries over the past few months, the US' demand for foreign products has increased quickly, and much more quickly than foreign demand for US goods. As such, the US' trade deficit rapidly widened during Q1. While we are hopeful that the rest of the world will also recover from the COVID crisis, multiple mutations that appear to have originated in Europe, Africa, and South America are expected to slow the recovery for those areas of the globe, meaning that, we expect ***the US' net trade deficit to remain heightened, and very gradually return to 2019 levels, over the course of 2021 & 2022 (and possibly further)[44].*** As one might expect, during this period of recovery, spending has been seen to lean heavily towards goods (as opposed to services).

We are concerned about the possible effects of expected route to recovery taken by the US. Given that the US markets (both production and demand) is showing strong signs of desire to return to 2019 levels, we expect that ***employment and spending will rapidly rebound during 2021 & 2022 provided that the US does not stumble with another infection wave that demands closing supply channels[45]***. If this outcome comes to fruition, then we could see multiple quarters during 2021 with strong single digit (even multi-digit) GDP growth rate percentages. However, without international demand to absorb our production, the US will end up stagnating until those markets are able to catch up, leading to a "whipsaw" in unemployment rates. When taken in combination with increased taxation for FY2021 (or FY2022, depending on the levels of support available) to support President Biden's expected infrastructure push, there is a real possibility of dramatically increased inflation[46].

However, inflation is not expected to be systemically created and persistent; in other words, a basket of goods or services may increase in price within a currency or market simply due to (admittedly, relatively long-term) transient changes in the global market's ability to provide such goods or services. So, whether price changes are attributable to inflation or not, prices may rise and subsequently fall through the period that the globe wrestles with a long-term strategy for coronavirus variants. This conclusion also takes into account the FOMC's recently adopted policy of managing inflation (via overnight bank

[42] See https://www.cnbc.com/2021/03/30/heres-what-post-pandemic-travel-might-look-like.html

[43] https://www.wsj.com/articles/cdc-says-travel-is-low-risk-for-fully-vaccinated-people-11617376809

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

[45] Needless to say, if the US experiences another wave of infections due to a COVID mutation, then the economic position of the world will likely revert to that of mid-2020. Furthermore, this reversion will likely occur much faster than the three months during which the original COVID virus spread since the new strains that have been identified are seemingly much more transmissive. See, e.g., https://www.npr.org/sections/health-shots/2021/02/10/965940914/covid-19-vaccines-could-add-fuel-to-evolution-of-more-coronavirus-mutations, https://science.sciencemag.org/content/371/6534/1116.1, and https://www.statnews.com/2021/02/05/what-scientists-know-variants-covid-19-vaccines/.

[46] https://www.politico.com/news/2021/04/02/biden-spending-collide-economy-478915

loan rate adjustments) to a "long term" target of approximately 2%. Attributing these price changes to inflation, and accounting for the aforementioned change in the FOMC's strategy, we expect that ***inflation will be relatively low, rising at a rate of no more than 2.5% (annualized Q/Q rate) for the next 18 months,*** and the ***real and nominal GDP growth rates will most likely be between 2.0% and 9.0% (Q/Q) for the rest of 2020 (possibly spiking to 12.0% during 2Q2020)***.

Other Commentary

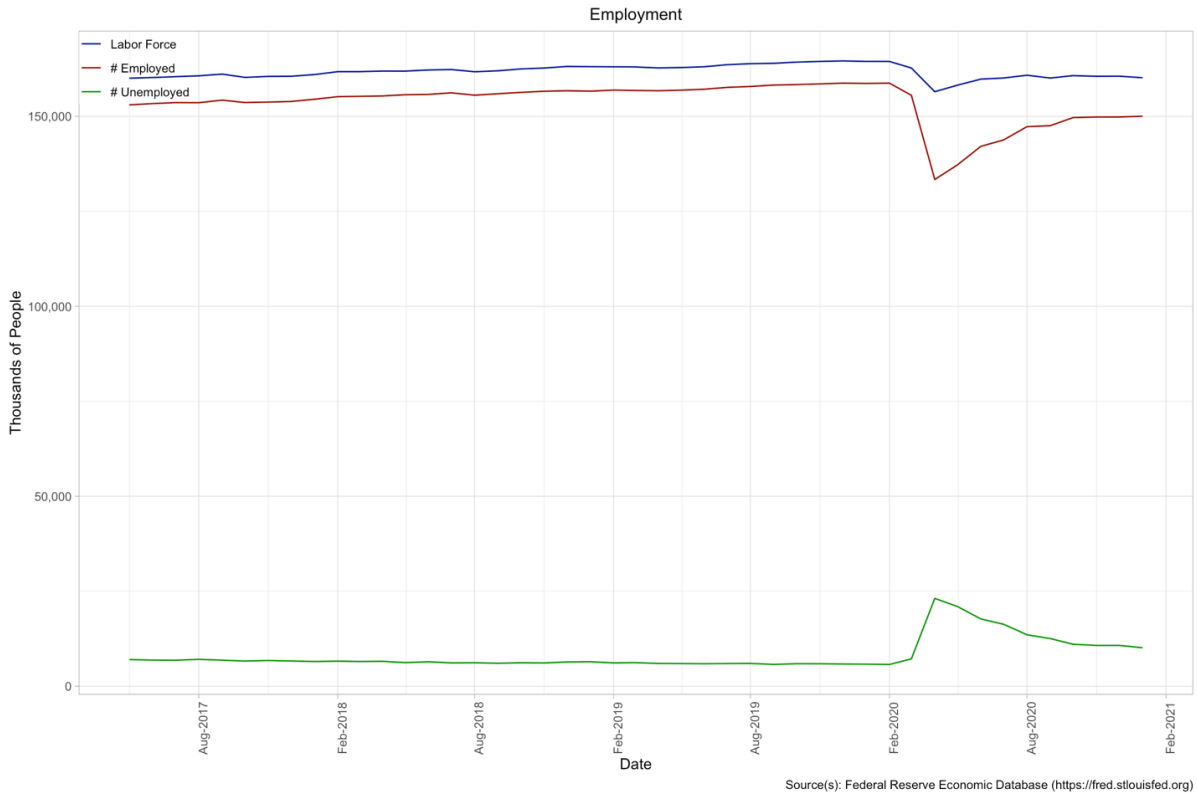
- "Although empirically none of the three theories of inflation have been infallible, all three are currently pointing in the same direction—toward more inflation pressure in 2021 than the U.S. has experienced in recent years. Furthermore, all three are fueled by large increases in their featured variables: money supply growth, fiscal deficits and projected economic growth." (see https://www.stlouisfed.org/publications/regional-economist/first-quarter-2021/is-inflation-horizon-us-economy by James Bullard; March 31, 2021)
- "'We are always on the lookout for runaway inflation, but right now we are just not seeing it,' Raphael Bostic, head of the Atlanta Fed, was quoted as saying by Marketwatch. He added that there's no reason to remove easy-money policies any time soon." (see https://www.tradestation.com/insights/2021/03/29/vix-collapse-good-news/; March 29, 2021)
- "Despite the Federal Reserve's latest commitment to low short-term interest rates and easy-money policies into 2023, long-term rates rose again on continued inflation fears. … Despite the Federal Reserve's latest commitment to low short-term interest rates and easy-money policies into 2023, long-term rates rose again on continued inflation fears." (see https://www.kiplinger.com/economic-forecasts/interest-rates; March 18, 2021)
- "The Conference Board forecasts that US Real GDP growth will rise to 3.0 percent (annualized rate) in Q1 21 and 5.5 percent (year-over-year) in 2021. Following a lull in the economic recovery in November and December, growth has improved. … While the economy has already partially rebounded from the deep contraction in the first half of 2020, a variety of factors will determine the way forward. Key variables include: a) the spread of the virus itself, b) the deployment and effectiveness of COVID-19 vaccines, c) the size and timing of fiscal support, and d) the status of labor markets and household consumption; and (e) the pace at which mobility and travel restrictions are lifted." (see https://www.conference-board.org/research/us-forecast; March 10, 2021)
- "The Federal Reserve Bank of Atlanta's GDPNow model on Wednesday predicted the economy will grow at a 9.5% seasonally adjusted annual rate in the first quarter …" (per https://www.wsj.com/articles/us-economy-january-retail-sales-coronavirus-recovery-11613503145, Feb. 17, 2021)

Employment

Analysis

Since the economy's peak in February 2020, employment in the US has gone from 158.7M (persons employed) to 133.3M (in April 2020) to 150.8M (in March 2021). We note that the number of people employed has risen from 149.7M in October 2020 to 150.8M in March 2021[47]. (See Figure 16.) We bring this point up since the unemployment rate (the ratio of the number of unemployed people to the sum of unemployed and employed people) generally garners a substantial amount of the focus. In fact, the unemployment rate (Figure 17) has decreased from 6.87% in October 2020 to 6.05% in March 2021. While 1,179,000 people have been added to the jobs roles, and 1,339,000 fewer people are considered "unemployed", approximately 0.1% of the labor force is unaccounted for. The point of this is to simply note that, while the unemployment rate may be reported as showing improvement, the number of people who are actually employed is rapidly stabilizing, and is currently where the labor force was in early 2016 (about 7.9M people fewer than were in the labor force in February 2020), despite the unemployment rate being where it was in August 2014.

Figure 16: US Employment & Unemployment Levels



[47] See https://fred.stlouisfed.org/series/CE16OV

In our last report, we stated that we were extremely concerned about the ability of "brick-and-morter" retailer to be able to generate sales needed to avoid taking steps to downsize or exit the market. Coresight Research has stated that they expect businesses to be shuttered at a higher rate in 2021 than 2020[48]. Restaurants were devastated during 2Q2020 as customers and restauranteurs had to "figure out" how to reach each other given the operating procedures required during the pandemic; while things improved during the summer and fall, sales decreased notably during 4Q2020[49].

As we have mentioned previously, the recovery is moving at different paces for different people; specifically, communities of color are continuing to bear the brunt of high unemployment and economic insecurity, even as the overall numbers fall. (See Figure 28.) From https://projects.fivethirtyeight.com/us-economy-coronavirus/, "Low-wage workers — who are disproportionately likely to be Black and Hispanic — have been hardest hit by the pandemic because they generally work in sectors, like retail and hospitality, where their work can't be done from home. Those workplaces pose significant public health risks in a pandemic, and have been subjected to full or partial shutdowns as infections ebb and flow. … As a result, we're much closer to economic normalcy in sectors like construction and professional and business services than we are in sectors like leisure and hospitality."

Only now, in 1Q2021, are retails sales, and, hence, employment finding some signs of relief. While the situation is still grim[50], retail spending in January were reported as increasing by over 5% over December, as some new significant numbers of job postings have been issued[51]. Since President Biden's "American Recovery Plan Act" provides for about $230B in small business aid ($28B specifically earmarked for restaurants)[52], it is hopeful that the monies can be made available, distributed, and help prevent the collapse of retail businesses.

Our concern is going to be the availability of workers between the time of this writing and the summer. We specifically noted in previous reports that a disproportionate number of women, and ethnic women, exited the workforce in order to provide childcare and home-schooling given the demands of our pandemic-affected culture. If businesses are truly on a "tightrope" today (April 1, 2021), their ability to last for the next 60 days may likely determine their longevity altogether simply due to the availability of workers. We expect that a significant jump in seasonal, part-time, and full-time labor will occur near Memorial Day, and that the need for personal income may be the force that helps to slow the previously mentioned "fourth wave". Given the drop in the overall labor force of 8M workers that was seen between February and April of 2020, and the fact that there is still a deficit of about 3.9M workers since February of 2020[53], it would be entirely plausible to see a return of more than 1M workers to the labor force during the summer of 2021.

[48] https://www.cnbc.com/2021/01/28/10000-stores-set-to-close-in-2021-covid-keeps-pummeling-retailers.html
[49] https://fredblog.stlouisfed.org/2021/02/gauging-the-recovery-in-retail-sales-at-bars-and-restaurants/
[50] https://www.newyorkfed.org/newsevents/news/regional_outreach/2021/20210203
[51] https://www.wsj.com/articles/us-economy-january-retail-sales-coronavirus-recovery-11613503145
[52] https://www.sba.gov/article/2021/mar/11/american-rescue-plan-act-elevates-small-business-support-response-covid-19-pandemic and https://www.cnn.com/2021/03/10/success/rescue-plan-small-businesses-feseries/index.html
[53] https://fred.stlouisfed.org/series/CLF16OV

Other Commentary

- "U.S. employers added a seasonally adjusted 916,000 jobs in March, the best gain since August, the Labor Department said Friday, and the unemployment rate, determined by a separate survey, fell to 6.0%, a pandemic low. Still, as of March, there are 8.4 million fewer jobs than in February 2020 before the pandemic hit." (per https://www.wsj.com/articles/march-jobs-report-unemployment-rate-2021-11617314225, April 2, 2021)
- "ManpowerGroup conducts an Employment Outlook Survey each quarter to get a sense of the hiring plans of employers in America's 100 most populated metropolitan areas. The report reveals a net employment outlook of 17% for the first quarter of 2021, when seasonally adjusted to remove the influences of recurring events like holidays and school schedules. Though this represents a 3% increase from the fourth quarter of 2020, it's a 2% decrease from the first. … Even more depressing: Just 13% of employers surveyed say they expect pre-pandemic hiring to return before July 2021 …" (per https://www.forbes.com/sites/kristinstoller/2020/12/21/heres-where-the-jobs-will-be-in-2021/?sh=6b84bfcd1541, Dec. 21, 2020)

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

Analysis

The Federal Reserve and the FOMC have announced that they will no longer simply manage the economy towards a short-term goal of 2% inflation and 3% unemployment, but will now try to take a "longer term" view towards these objectives. This new goal means that inflation, unemployment, and other metrics will be consciously allowed to deviate from their targets in the "short term" in order to potentially allow other objectives to be achieved, and the current strategy of purchasing equities and "quantitative easing" is expected to be continued for the foreseeable future[54]. The issue that has manifested recently is the concern by investors regarding tradeoff between equities (and their rising futures) and bonds; the current perception of market instability and rising equities has led to increased interest in bonds. In this period of "money being cheap" (due to the FOMC maintaining a floor on the Federal Funds rate), any return from bonds is preferable to buying equities at handsome premiums and running the risk of losing one's (proverbial) shirt[55].

We have previously discussed that we believe ***inflation could potentially rise by as much as 3.0% (Q/Q annualized) during 2021 before the FOMC potentially takes action***. We are assuming that ***the Federal Funds Rate will stay below 0.5% until that point,*** and will only grow slowly afterwards. We do interpret

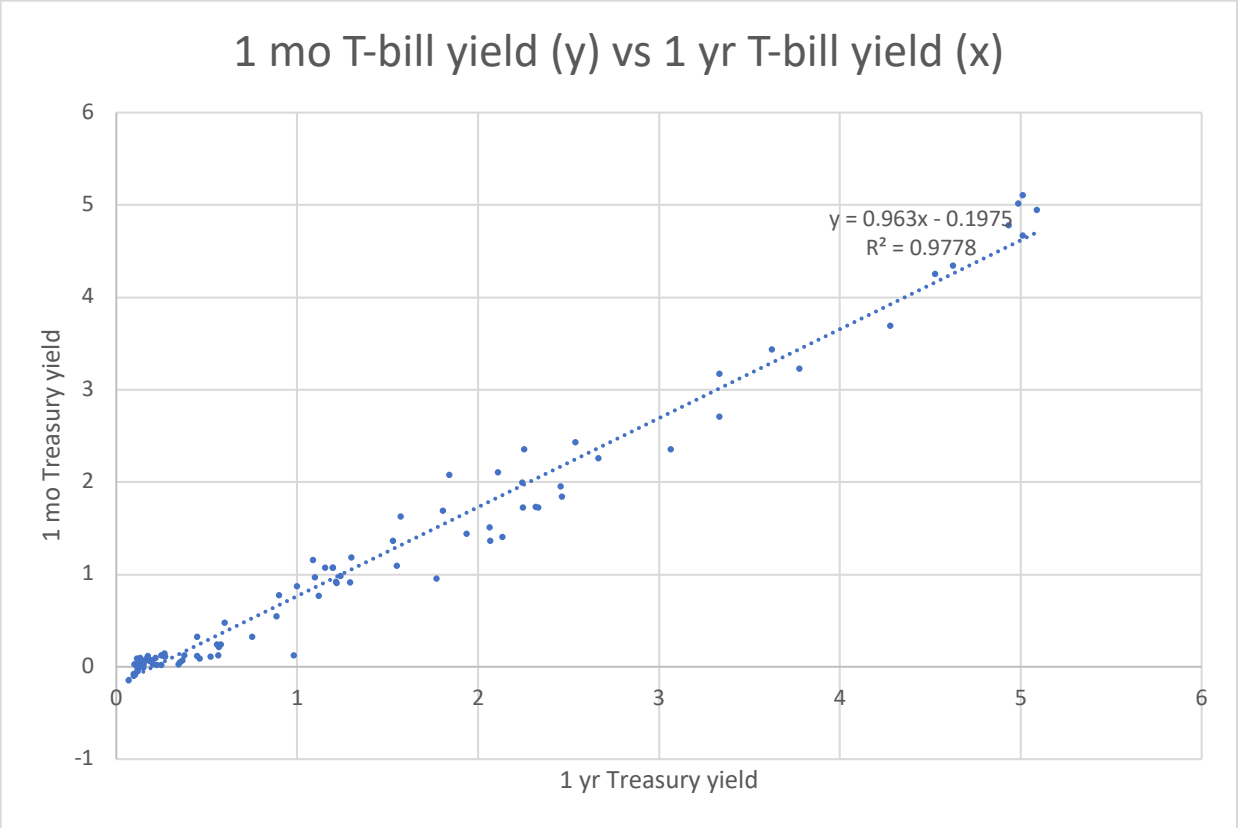
[54] See https://www.politico.com/news/2020/06/15/fed-to-start-buying-debt-from-corporations-in-expansion-of-rescue-effort-320772
[55] https://www.marketwatch.com/story/heres-how-far-the-nasdaq-could-fall-if-bond-yields-reach-2-11615548461

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 President Biden's proposed stimulus plans will generate inflation. Historically, uncontrolled inflation is managed by the central bank increasing bond rates, but Chairman Powell's change in strategy to manage to the "longer term" view makes one wonder how responsive the FOMC will be, and how quickly President Biden will try to press his new $2T+ stimulus bill into law.

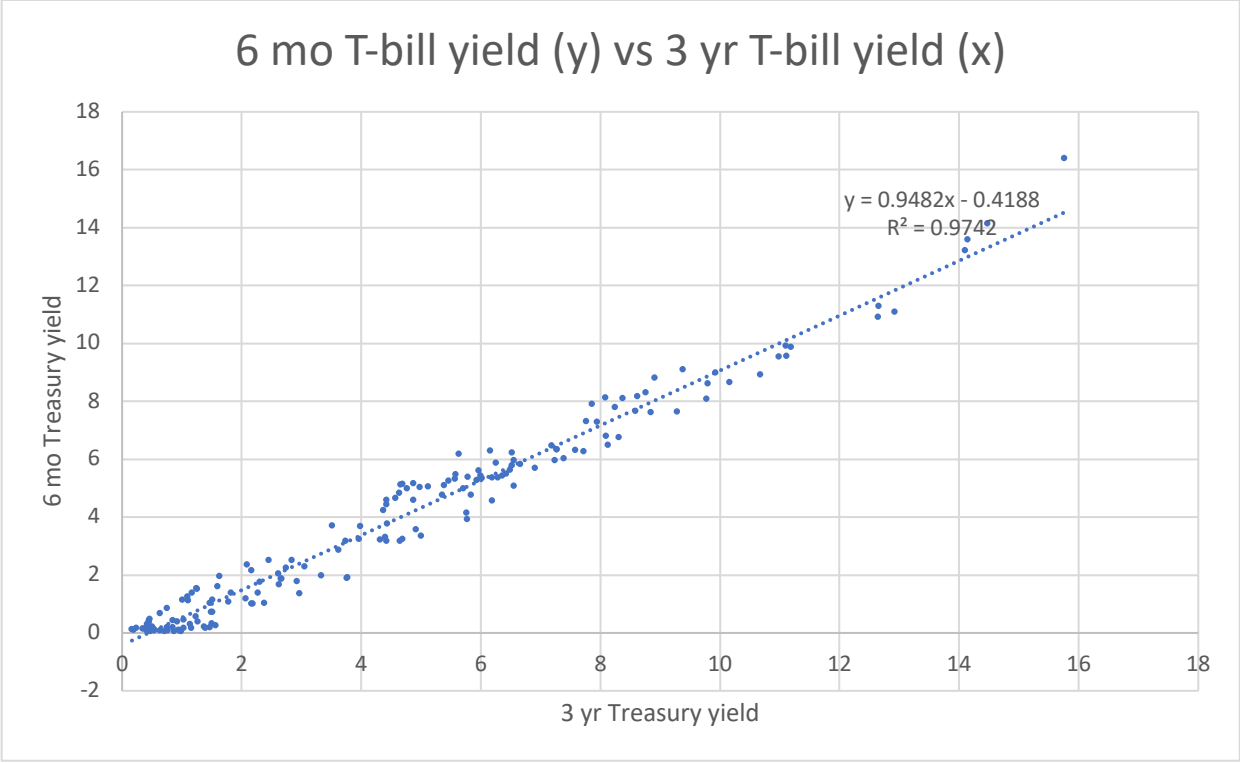
The five-year Treasury yield bottomed out at 0.19% in August 2020, and is now (April 2, 2020) trading at 0.9%. The ten-year Treasury yield was at 0.52%, but is now trading at 1.69% (where it was during January of 2020). We expect that, during this "optimistic" period with President Biden leading the recovery, yields will continue to rise -- rapidly in the near term. Inflation concerns will continue to fuel rate increases until those concerns are managed or justified. Chairman Powell's "flexible" approach to managing inflation will allow for a more volatile inflation curve, and means that interest rate changes may need to be more dramatic when they are called for, resulting in the market taking more time to adjust to changes.

Other Commentary

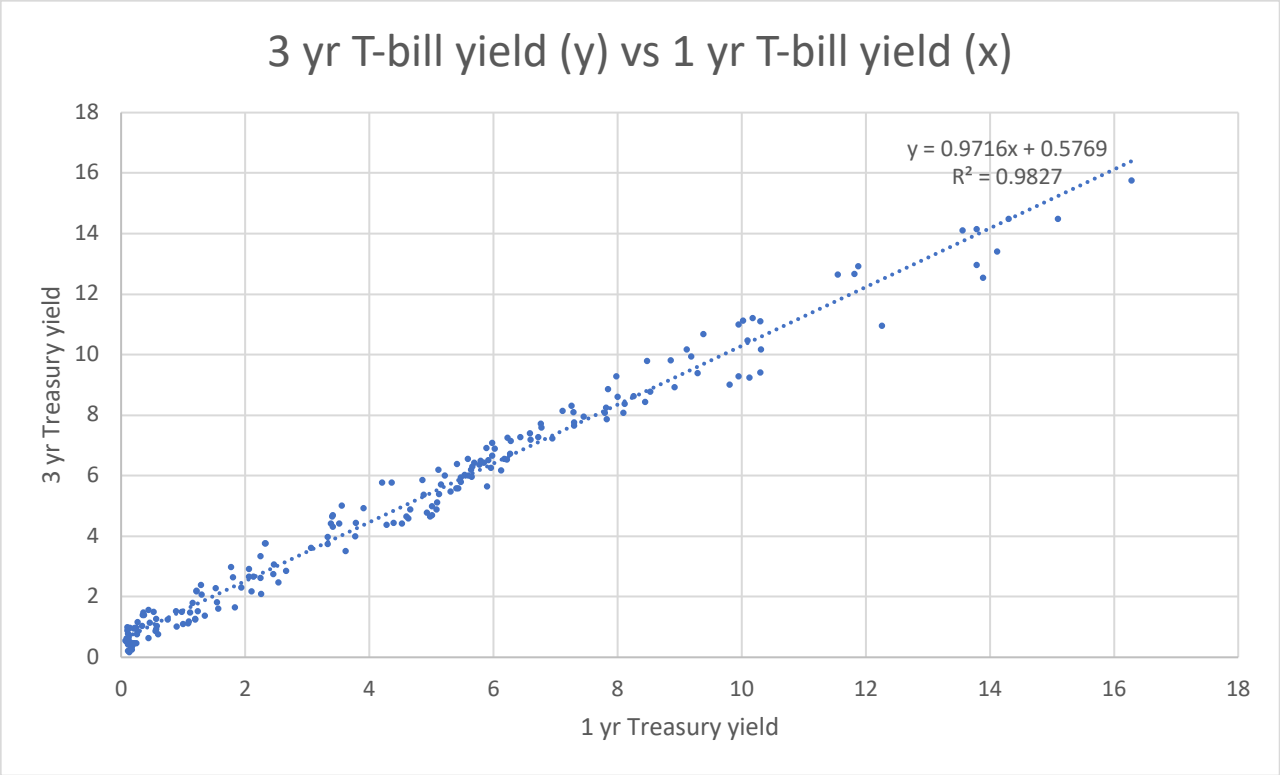
- "The U.S. Treasury yield curve has steepened to levels not seen since 2016, signaling that investors expect economic expansion and higher inflation in the coming years as coronavirus vaccines are distributed and incoming President Joe Biden and a Democrat-controlled Congress are expected to pass another substantial stimulus package." (see https://www.spglobal.com/marketintelligence/en/news-insights/latest-news-headlines/treasury-yield-curve-steepens-to-4-year-high-as-investors-bet-on-growth-rebound-62067561; Jan. 13, 2021)



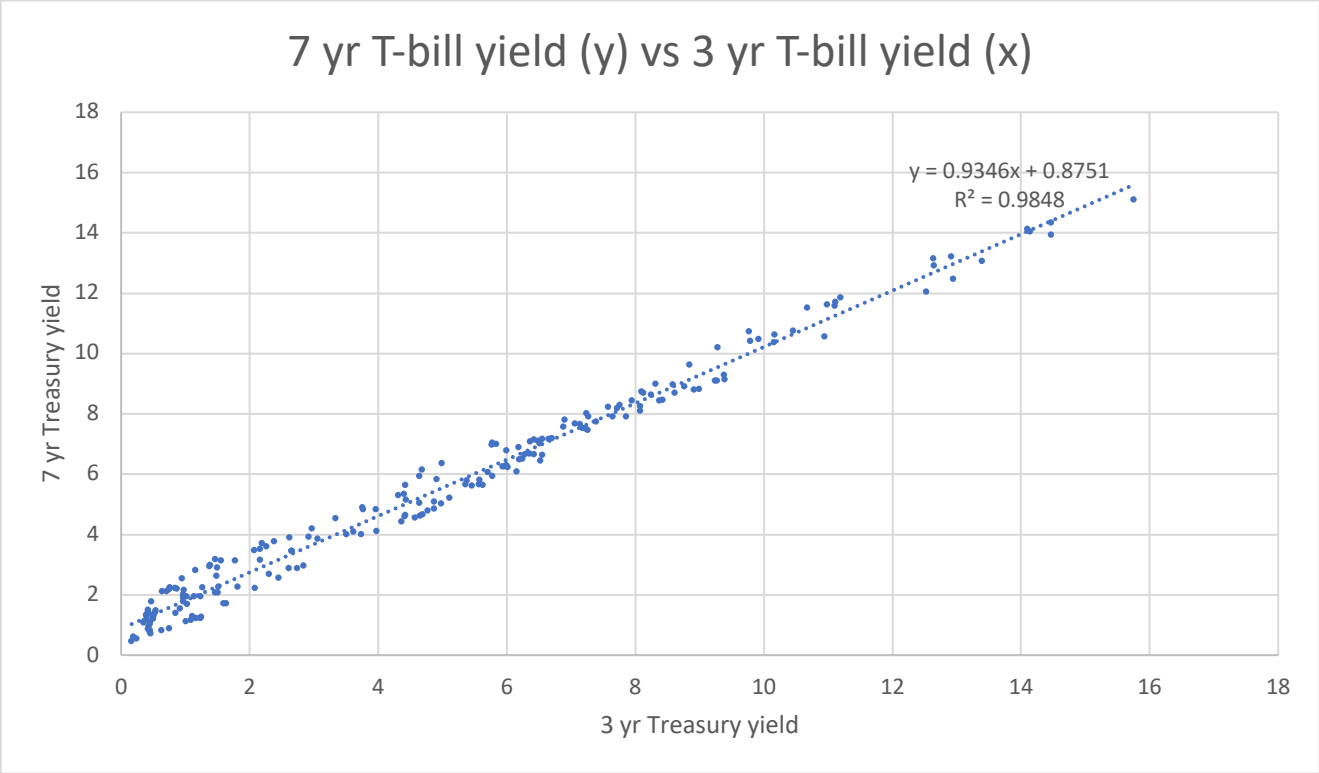
Source: Author's calculation



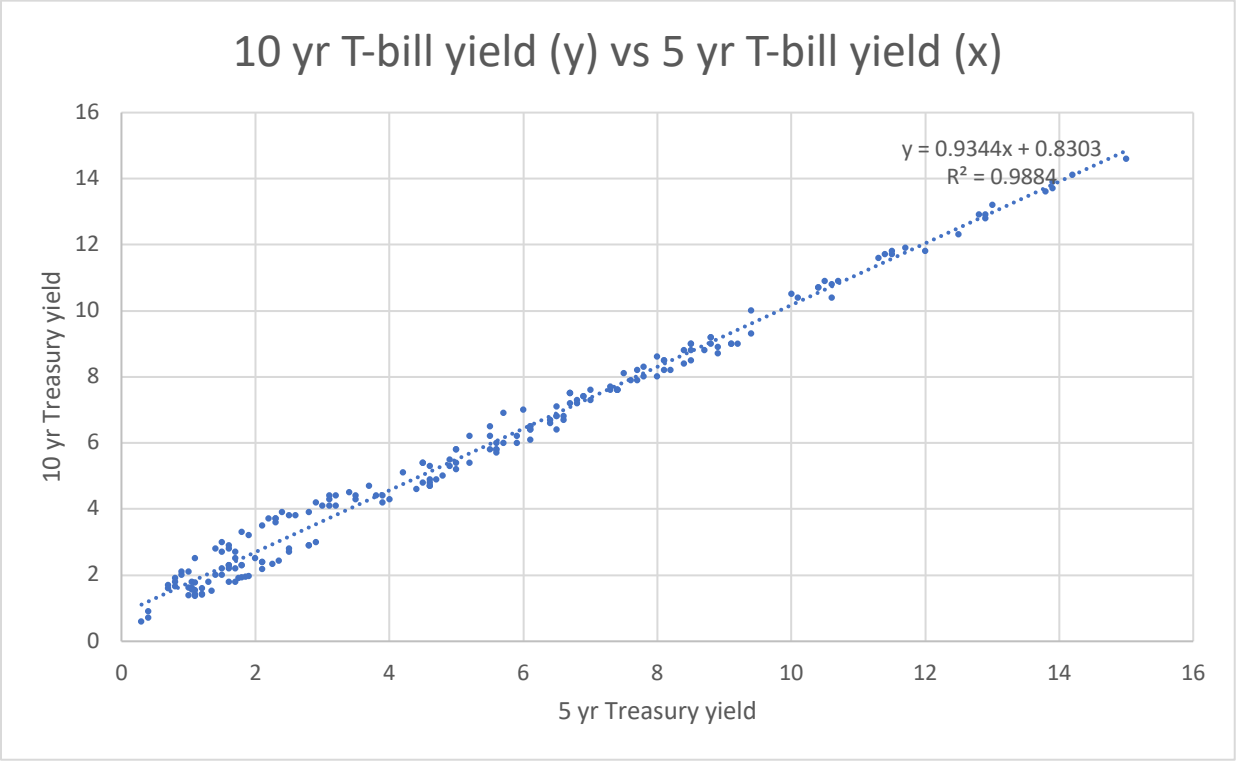
Source: Author's calculation



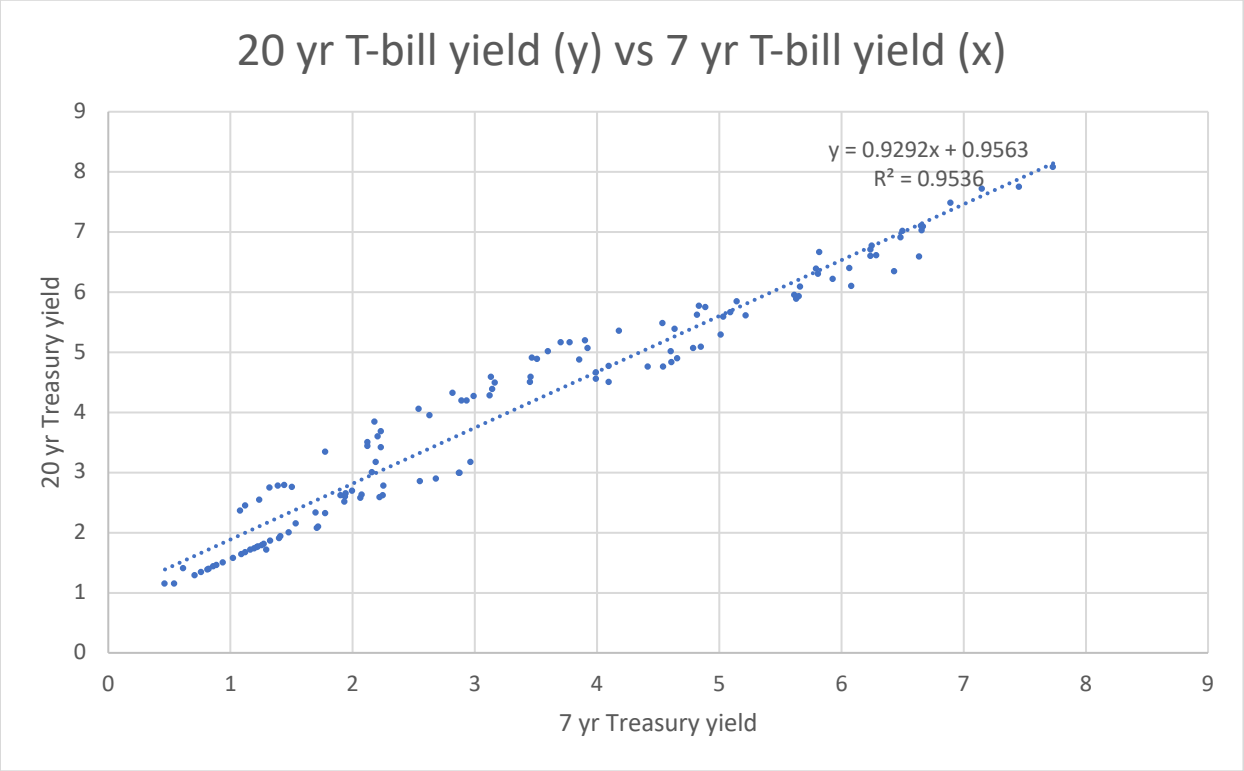
Source: Author's calculation



Source: Author's calculation



Source: Author's calculation



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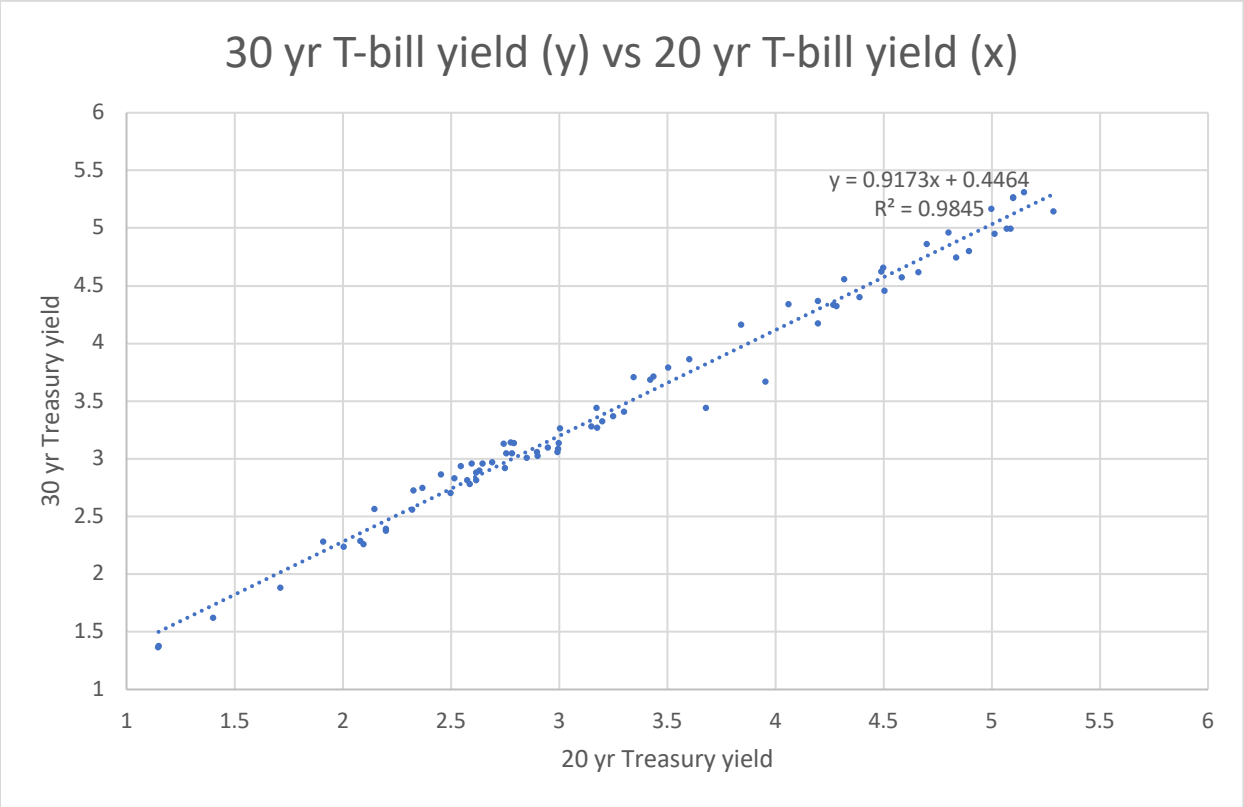


Source: Author's calculation

30-year Mortgage Rate

Analysis

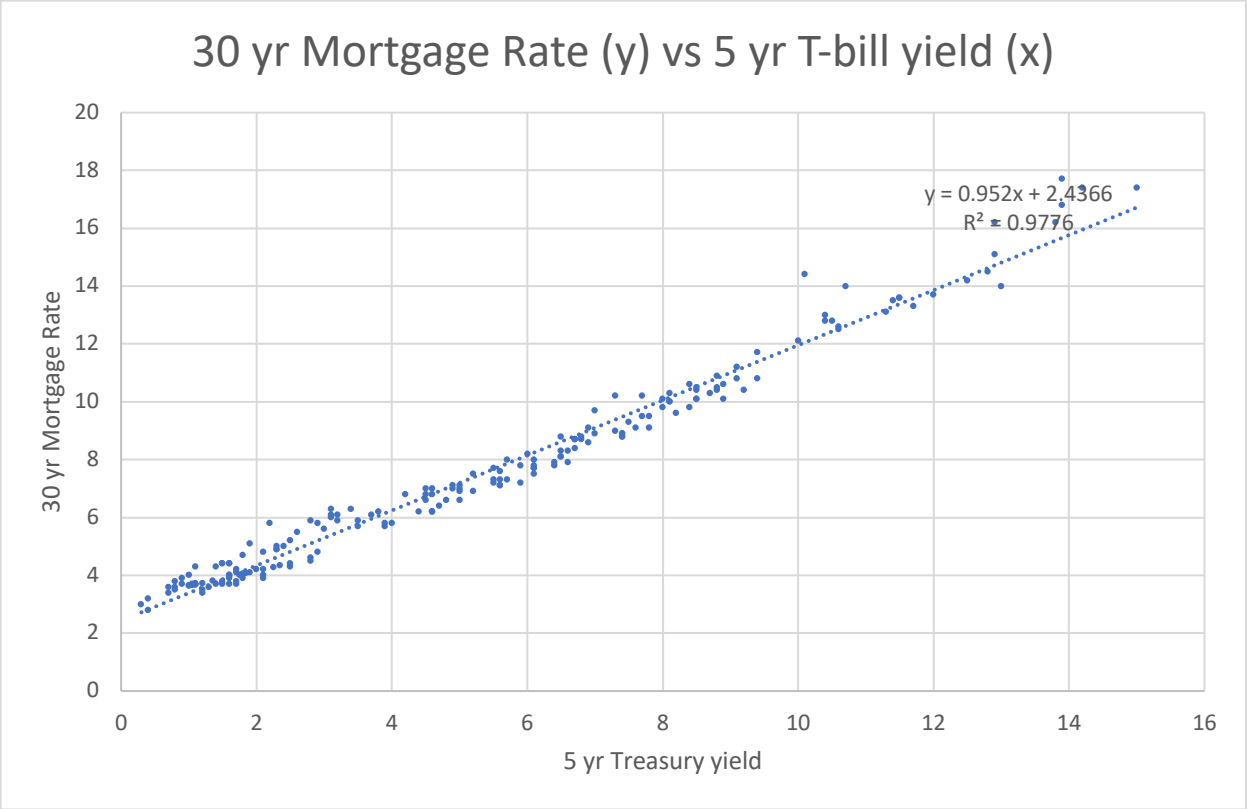
Mortgage rates have remained extremely low through the end of 2020 and beginning of 2021, and they are expected to remain inordinately low, but will be tempered by two factors: first, banks are managing their risks by being extremely cautious in their vetting processes, and only granting new mortgages (and refinancing) to extremely well-vetted and well-qualified applicants. 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 dictated by overnight borrowing rates). As such, while the housing market is still seeing significant "irrational exuberance" (which is discussed elsewhere in this report), mortgage rates are seeing some notable increases in the marketplace.

Looking forward, though, as unemployment stabilizes at the higher levels that we have quoted earlier, we expect for the frothiness of the retail market to settle and ***expect 30-year fixed rate mortgages to remain between 2.8% to 3.75% during 2021 and 2022***. (Averaged 30-year fixed rates were at 2.65% in early January 2021, but are now at 3.18%.[56]) We had expected rates to recover more slowly than they have, and believe that their recovery is due to their correlation with increasing bond rates (discussed previously).

Other Commentary

- "According to Freddie Mac, In spite of low mortgage rates, there is evidence of a pullback by those looking to enter the housing market. … Purchase demand has diminished compared with late May and early June 2020, when mortgage rates were at the same level. … This confirms that the marginal buyer is feeling the affordability squeeze resulting from rising mortgage rates and house prices.." (see https://finance.yahoo.com/news/u-mortgage-rates-7-row-003835961.html; April 3, 2021)
- "Mortgage rates tend to move in the same direction as the yield on the 10-year Treasury, which has been rising. Treasury yields rise when investors feel confident enough in the economy to forgo safe-haven assets such as bonds for riskier ones including stocks." (see https://www.wsj.com/articles/30-year-mortgage-rate-tops-3-for-first-time-since-july-11614870208; as of March 4, 2021)

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



Source: Author's calculation

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

Analysis

Moody's AAA bond rates tend to track in conjunction with mid-duration T-bill 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 BBB Corporate Yield is generally tied to Moody's indices (particularly the Moody's BAA bond yield), CPI, and the 30-year Mortgage Rate, even though these bonds are generally 10 years in duration. Capitalytics' analysis showed that the VIX was usually tightly coupled to the BBB corporate yield.

Capitalytics' quantitative models see ***AAA rates gradually rising over the next several years (through 2024) from 3.15% in 2021Q1 to 4.3% by the end of 2023***. These rates are a function of the regression that is presented later in this report, and that regression indicates a relationship with the BBB yield (below), 3-month Treasury yields, and the Prime Rate. Unfortunately, the correlation between AAA bond rates and BAA bond rates was not detected as part of the latest values, and the BAA quantitative model show rates dropping from 3.3% to 2.9% over the next five years. We believe that this is not a likely outcome, and that BAA yields will continue to track with AAA yields, with approximately 0.5%

additional return. The BofA BBB corporate yield will also track with AAA yields, with about 0.5% lower yield.

As the populus has become more comfortable with "the new normal", the VIX has gone as high of 80 (with the start of the pandemic) to its current value of about 20.0, and we expect it to stay there depending on the future evolution of the COVID treatment. Weaknesses in the vaccines (or the emergence of a new biological threat) is one possibility that could cause a dramatic reversal in the VIX and other indices.

Other Commentary

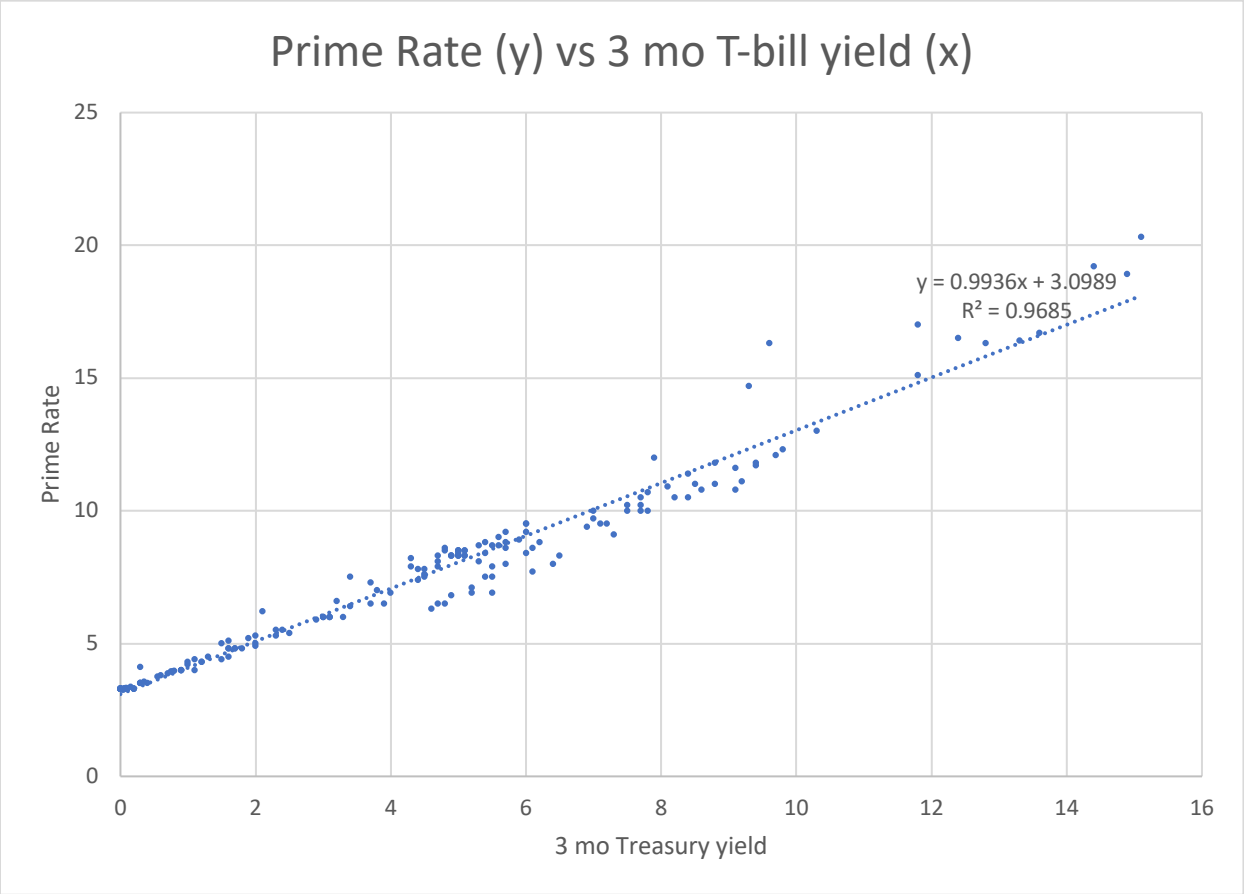
- "Now, with yields subdued and tech stocks surging, the VIX is sinking. … This means bulls might want to hold on a little longer before bailing on their positions. Outside of inflation, the market's major short-term worries are being defused left and right. Sure, the whole financial system has been poisoned by a glut of liquidity and stimulus, but those are long-term problems." (per https://www.unseenopp.com/is-the-vix-signaling-a-buying-frenzy/; April 1, 2021)
- "The extreme demand for portfolio hedges suggests that all is not well for the U.S. stock bull run, which is already on shaky ground between rising Treasury yields and extended lockdowns. It shows how volatility markets are still on edge one year after the S&P 500 hit rock bottom, according to speculators who bet on price swings." (per https://www.bloomberg.com/news/articles/2021-03-25/fear-is-everywhere-in-volatility-market-even-as-the-vix-retreats; March 25, 2021)

Prime Rate

Analysis

The Prime Rate has historically been very tightly coupled to very short-term Treasury Bills (specifically, 3-month 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 possible that the Prime Rate will remain at approximately 3.25% into 2023 due to its dependence on other rates/yields***.

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



Source: Author's calculation

US Average Retail Gasoline Price

Analysis

As the US seems to emerge from its COVID-induced slumber with baited anticipation of road trips, fuel demand is already starting to increase and challenge supplies, causing increased fuel prices at the pump. Additionally, President Biden signed an executive order to revoke the permit that was granted to TC Energy Corporation for the Keystone XL Pipeline (Phase 4) on January 20, 2021. The result of this revocation is that the Phase 4 pipeline that runs from the same area as the origin of the Phase 1 Keystone pipeline in Alberta, Canada to Steele City, NE would not be able to be completed; this pipeline would have carried Canadian oil from the Keystone Hardisty Terminal in Canada (joined with US oil in Montana) through a larger pipeline to a refinery and distribution hub in the central US[57]. As a result, less domestic oil will be able to be harvested daily, and the US will likely turn to OPEC & South American suppliers for oil for additional supplies.

[57] See https://www.nrdc.org/stories/what-keystone-pipeline

However, this switch in policy in Washington is only less than a year after the US was caught in the crossfire by a price war between Russia & Saudi Arabia that resulted in over 100,000 workers being put out of work and some domestic refineries being bankrupted. While industry players are used to the business' cyclical nature, West Texas crude oil is now around $60/barrel, 10% off of its 1-month peak, and 50% above its price 6 months ago.[58]

OPEC has agreed to increase its production by 350,000 barrels/day in May, to execute another comparable increase in June, and then to increase production by another 450,000 barrels/day in July; Saudi Arabia has also agreed to increase its production, which had been restrained earlier in 2021[59]. With gasoline up by over 12% (30 cents/gallon) during February due to weather, and expected increases in consumption due to workers returning to their offices and summer travel, many states are already over $3/gallon with a national average of ***$4/gallon by YE2021 seeming possible based on the projected 2021 hurricane season***[60,61]. This coming season (2021) is 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. If there is a significant interruption in petroleum distribution as we have seen in recent years due to storms (and noting that an "above-normal season for tropical activity in the Atlantic" is anticipated), we expect that gas prices in 2021 will be much higher than in 2020 (due to restored demand post-COVID)[62].

Other Commentary

- "We look for the national average to hit $3 or more sometime this spring, a level the United States hasn't seen since 2014 (though in a number of states, the local average has already breached $3, with California highest in the nation at $3.90). Now that more people are traveling and commuting again, the increasing fuel demand should push prices a bit higher in coming weeks." (https://www.kiplinger.com/economic-forecasts/energy; March 29, 2021)
- "The latest price jumps are a direct result of February's winter storm that took 26 U.S. refineries offline and pushed refinery utilization from an average of about 83% down to an atypical low of 68%, according to the Energy Information Administration (EIA). In its latest data, EIA also reported demand at 7.2 million b/d. Both utilization and demand rates have not been reported this low since last May." (see https://gasprices.aaa.com/march-gas-prices-in-like-a-lion-but-out-like-a-lamb/; March 1, 2021)
- "EIA expects the rising price of crude oil, which started in the fourth quarter of 2020, will contribute to more U.S. crude oil production later this year. EIA forecasts monthly domestic crude oil production will reach 11.3 million b/d by the end of 2021 and 11.9 million b/d by the

[58] See https://oilprice.com/oil-price-charts/45
[59] https://www.wsj.com/articles/opec-agree-to-gradually-boost-oil-output-over-next-three-months-11617293942
[60] See https://gasprices.aaa.com/march-gas-prices-in-like-a-lion-but-out-like-a-lamb and https://www.nytimes.com/2021/03/11/business/energy-environment/oil-prices-opec-shale.html
[61] https://www.accuweather.com/en/hurricane/accuweathers-2021-atlantic-hurricane-season-forecast/924431
[62] See https://www.foxbusiness.com/economy/hurricane-season-an-unusual-one-for-gas-prices-heres-why

> end of 2022. These values are increases from the most recent monthly average of 11.1 million b/d in November 2020 (based on data in EIA's Petroleum Supply Monthly) but still lower than the previous peak of 12.9 million b/d in November 2019." (per https://www.eia.gov/todayinenergy/detail.php?id=46776; Feb. 17, 2021)

Federal Funds (Primary Credit) Rate

Analysis

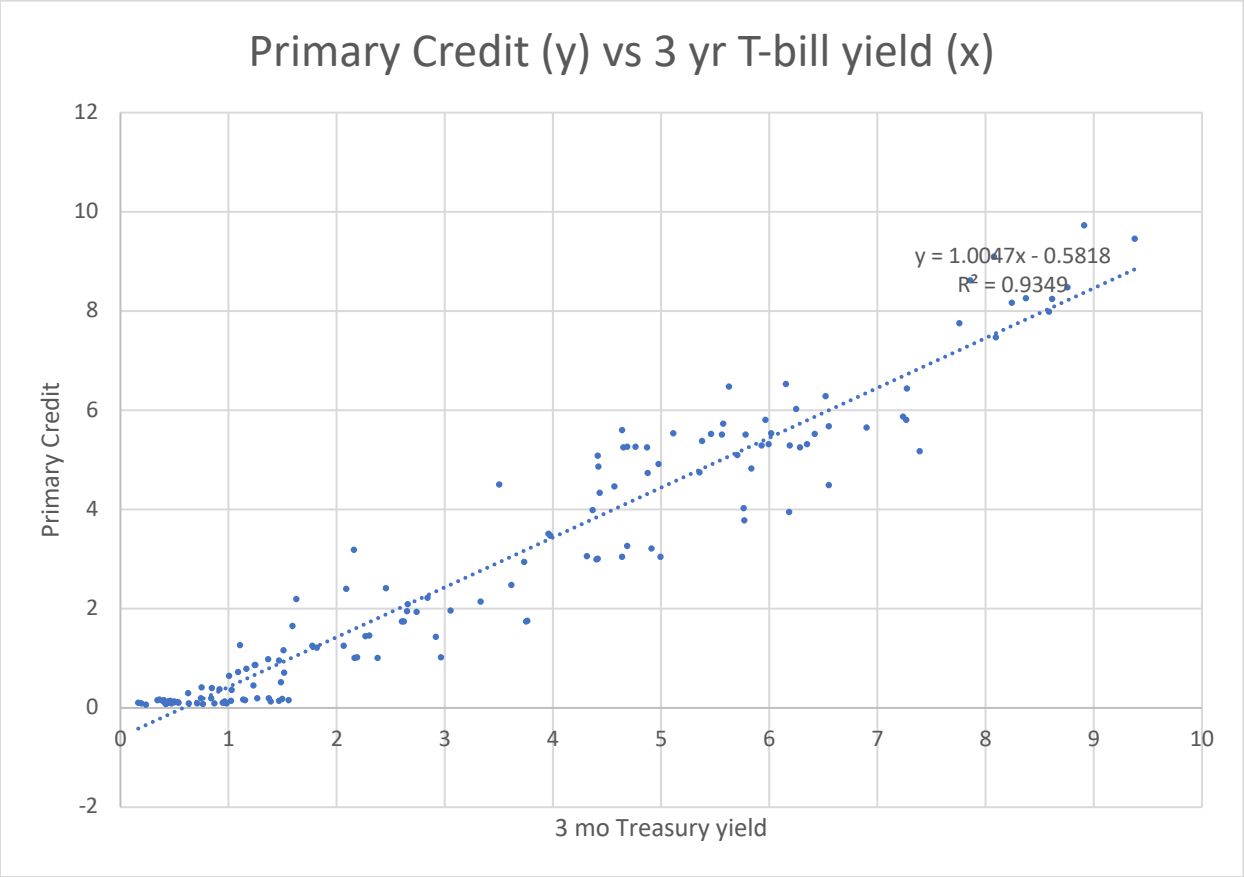
When a depository institution has a shortfall and need for liquidity, it may borrow funds on a short-term basis from the Federal Reserve. The "discount rate" is the interest rate charged to commercial banks and other depository institutions on loans they receive from their regional Federal Reserve Bank's "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 is currently expecting to maintain the Federal Funds rate at "essentially zero" (0 bp to 25 bp)[63] through 2021, and potentially through 2023***. We reiterate that this position is a matter of policy, and not of law; regardless, based on Fed' Chairman Jerome Powell's consistent doggedness in his message, we feel that it is likely that the FOMC will hold to this position. To wit, citing Chairman Powell's belief that the Federal Reserve's objectives are not only to manage inflation, but also to help influence unemployment, he stated:

> "Fully realizing the benefits of a strong labor market will take continued support from both near-term policy and longer-run investments so that all those seeking jobs have the skills and opportunities that will enable them to contribute to, and share in, the benefits of prosperity."[64]

[63] See https://www.federalreserve.gov/newsevents/pressreleases/monetary20200916a1.htm

[64] See https://www.cnbc.com/2021/02/10/fed-chair-powell-citing-bleak-jobs-picture-says-policy-will-need-to-stay-patiently-accommodative.html



Source: Author's calculation

Other Commentary

- "Federal Reserve Chairman Jerome Powell [says] there is no plan to raise interest rates until labor-market conditions are consistent with maximum employment and inflation is sustainably at 2%" (see https://www.wsj.com/articles/feds-powell-to-take-questions-on-job-market-interest-rates-bond-yields-11614872817; March 4, 2021)

House and Commercial Real Estate Price Indexes

Analysis

Not to be repetitive, but ***mortgage originators are already <u>extremely</u> <u>selective</u> of new mortgagees and their repayment ability***. Further, as businesses continue to "re-open" to a more "typical" business culture, we expect employer-funded transfers within corporations to be minimized, leaving new home acquisitions at the risk of owners. In other words, given low mortgage rates, those who can afford it (and whose employers allow it) will drive the real estate moves to homes and areas that are desirable.

Given that point, real estate has continued to be a seller's market for far longer than anyone expected as homebuyers (on the upper end of the "K-recovery") have scraped together liquidity from deferred student loan payments; discretionary expenditures; lack of gasoline, restaurant, and dry cleaning expenses; and anywhere else they can to fuel bidding wars for new homes[65].

Why is there so much demand for homes? The bottom line is interest rates. The availability of low-cost money makes it possible for aging millennials and Generation Z to make the grasp that even 18 or 24 months ago might have not been viewed as possible given their debt-load. Many of these younger Americans decided that this may have been their only chance to get into property ownership, or to upgrade their property, or relocate to a more appealing locale. As such, if it was in the realm of possibility, then ***homeowners are continuing (whether it is a good or bad decision) to roll the dice on selling their current home and finding something new***[66]. As we have mentioned previously, the continuation of this trend through 2021 and 2022 concerns us.

Commercial real estate is more of a mixed bag: as we have mentioned in previous reports, ***we expect this index to falter as tenants re-evaluate their needs, and as investors look to repurpose assets*** to more stable purposes." While self-storage, take-out grocery/pharmacy, and professional services are stable in their footprints, most other retail, food service, and hospitality is still significantly impaired[67], and will likely not recover to pre-pandemic levels for several years, if ever[68].

The more worrisome problem is what will happen once banks acknowledge the distressed properties that are on their books, and those properties are then exposed to regulators. After a year of souring, new and attractive uses for defaulted commercial property will be the key for lenders who will become saddled with these assets a la TARP; ***we are expecting successful lenders to partner early with developers who excel in alternative residential (and other innovative) opportunities***[69].

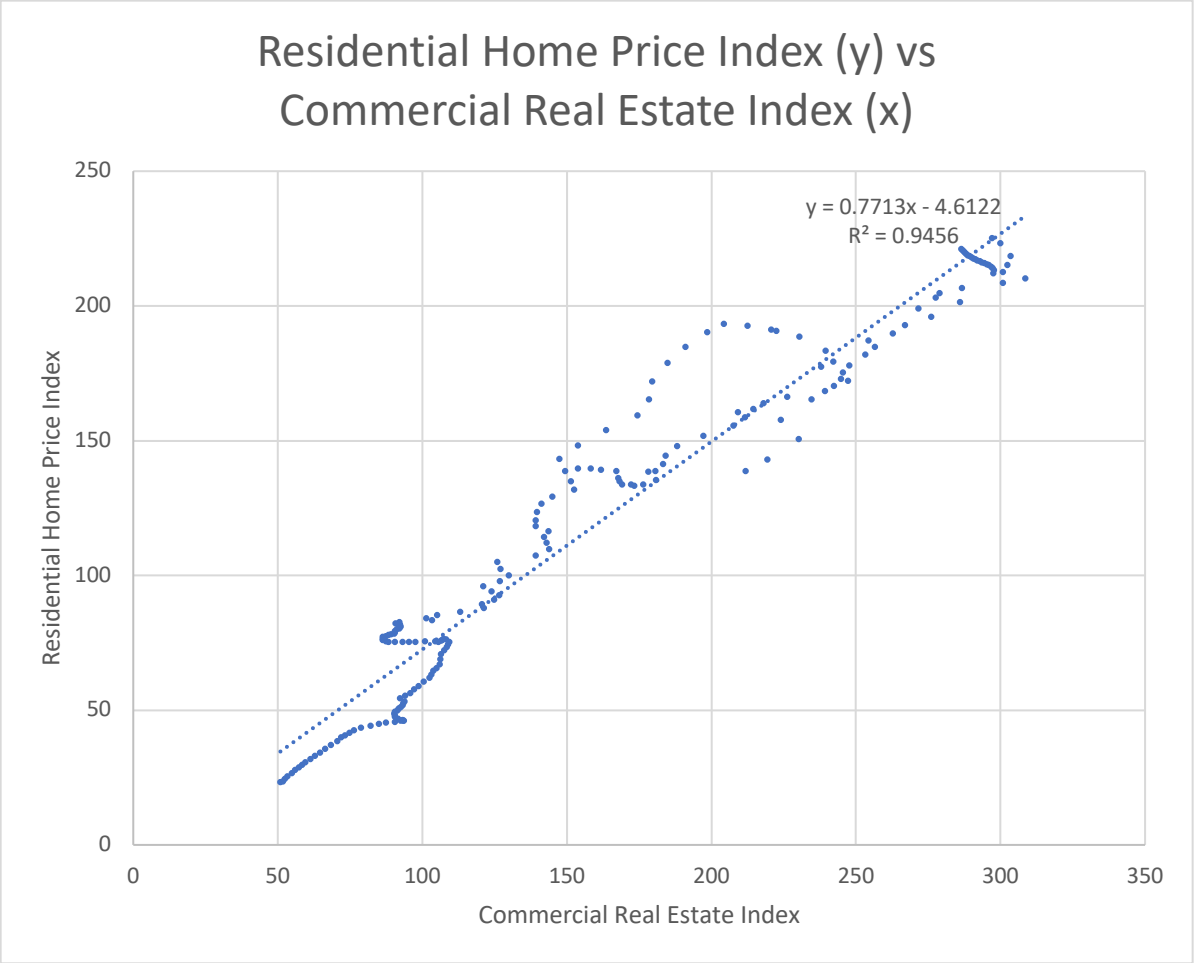
[65] See https://www.wsj.com/articles/the-housing-market-is-crazier-than-its-been-since-2006-11617422403

[66] See https://www.wsj.com/articles/housing-demand-tight-supply-propel-u-s-home-prices-11617159025

[67] See https://www.cnn.com/2020/09/22/investing/commercial-real-estate-recession/index.html

[68] See https://www.cnbc.com/2020/09/27/office-real-estate-back-to-normal-in-2025-cushman-wakefield.html

[69] See, e.g., https://www.forbes.com/sites/forbesrealestatecouncil/2021/02/08/10-commercial-real-estate-predictions-for-2021, https://www.cpexecutive.com/post/will-2021-bring-cre-certainty/, and https://finance.yahoo.com/news/what-to-expect-from-commercial-real-estate-in-2021-210629855.html



Source: Author's calculation

Other Commentary

- "A number of forces have merged to fuel the red hot housing market, including mortgage rates dropping below 3% in July for the first time ever. Millions of millennials are aging into their prime-homebuying years in their 30s. New-home construction has lagged behind demand and homeowners are holding on to their houses longer." (https://www.wsj.com/articles/u-s-home-price-growth-accelerated-in-january-11617109259; March 30, 2021)
- "In 2020, Millennials and other cohorts started to move from major cities to the suburbs and from gateway markets to secondary and tertiary markets in states with lower taxes and a better quality of life. … Nearly 16 million people have left the larger cities of the country, with 14.2 million filing permanent change-of-address forms," noted Barry LePatner, a veteran real estate and construction attorney …" (https://www.cpexecutive.com/post/will-2021-bring-cre-certainty/; Feb. 5, 2021)
- "Most office spaces stood empty in 2020. Investors expect workers to slowly re-enter offices after the pandemic subsides. But companies have adjusted to work-from-home policies, and

> office demand could be permanently cut by 15% because of the shift to remote work, according to CBRE." (see https://finance.yahoo.com/news/what-to-expect-from-commercial-real-estate-in-2021-210629855.html; Dec. 7, 2020)

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

Analysis

The US has experienced unprecedentedly strong growth in its equity markets during the "K-recovery" from the COVID-19 pandemic. Since the end of 2020Q1 (the approximate time that most states' "lockdowns" began), the Dow Jones Total Stock Market Index has averaged gaining over 60 points per trading day. (The S&P 500 showed comparable gains for all of the following discussion, with point gains being between 1/10x and 1/12x those of the Dow Jones index.)

While, yes, the driver for the equity markets has been the COVID-19 pandemic, its effects are not as simple as one might think. First, the economic lockdowns have provided an unnatural injection to small groups of companies: technology and technology-powered companies, "essential" businesses, ("bulletproof" or "best guess"?) large-cap conglomerates, and medical industries – after which others were left as so much carrion on the landscape. Second, the Fed's "quantitative easing" has allowed for phenomenal amounts of capital[70] to be injected into solid brands that might have otherwise fallen: we have previously mentioned the likes of Ford and Kraft which were termed to be "fallen angels", going from "blue chip" to "borderline" in a matter of days in early 2020[71]. Third, the COVID pandemic highlighted that the markets are intrinsically based on a shared perception of the future; as long as there was a feeling that the pandemic was a transient event, and that certain (near-mechanical) actions simply had to work their way to fruition, then investors were extremely happy to leverage the circumstances in order to drive up returns in equities that were worthwhile.

Now that the logistics around a (hopefully) working vaccine have been resolved, though, questions of pessimism surrounding President Biden's courses of action, virus mutations, and China's "digital yuan"[72] are starting to settle in to the collective psyche. The growth of the Treasury bond market is an indicator of the discontentment with the value of "tech stocks" now that life appears to be returning to 2019 conditions[73]; as we have previously mentioned, though, these bond yields also drive loan rates and will have other secondary effects on the market.

As such, we believe that the VIX will stay low and the markets will remain stable provided that US leadership remains consistent in its message; virus cases (and economic channels) can be controlled through well communicated protocols; and employment & inflation remains well-managed. Investors

[70] https://www.wsj.com/articles/how-the-2020-qe-boom-might-trip-up-central-bankers-11609237796

[71] https://www.spglobal.com/marketintelligence/en/news-insights/latest-news-headlines/global-fallen-angel-debt-on-track-to-reach-record-high-in-2020-8211-s-p-60173177

[72] https://www.wsj.com/articles/china-creates-its-own-digital-currency-a-first-for-major-economy-11617634118

[73] https://www.forbes.com/advisor/investing/stock-market-year-in-review-2020/

will remain in the market, and will seek profitable opportunities, even though the luster of FAANG stocks may have found some tarnish through overuse during the past 12 months. Per our previous analyses, we expect home improvement brands, energy, real estate, and banking equities to emerge from 2021 and 2022 with new opportunities. ***We expect growth in equities and indices will slow, particularly if Congress, the IRS, and/or the FTC takes the anti-trust actions that have been threatened against some of investors' preferred players for the past several months; this trend will be balanced against gains that will be viewed positively as the Fed' slowly gets out of the "quantitative easing" business***.

Other Commentary

- "Economists at the Official Monetary and Financial Institutions Forum put it succinctly, saying that he only scenario to be genuinely fearful of is stagflation, where growth is poor but inflation is high." (https://www.wsj.com/articles/how-the-2020-qe-boom-might-trip-up-central-bankers-11609237796; Dec. 29, 2020)

Regression Analyses

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

To compare the effectiveness of these regressions, we calculate the percentage error between the forecasted value (based on the given regression, using the values from the immediately preceding quarter) and the actual value for the period between 1Q2011 and 4Q2020, inclusive.

Table 15: Regression Aggregate Errors for 1Q2011 through 4Q2020

Variable	Min Abs. Error	Average Error	Max Abs. Error
Real GDP Growth	36.75%	**	***
Nominal GDP Growth	55.89%	-355.90%	***
Real Disposable Income Growth	79.66%	-127.41%	***
Nominal Disposable Income Growth	0.62%	-3.46%	323.92%
Inflation	0.00%	4.31%	647.19%
Unemployment Rate	94.38%	***	***
1-month Treasury Yield	539.58%	***	***
3-month Treasury Yield	0.00%	-576.88%	***
6-month Treasury Yield	509.57%	**	***
1-year Treasury Yield	132.47%	**	***
3-year Treasury Yield	157.87%	-467.87%	***
5-year Treasury Yield	1.56%	1.32%	350.87%
7-year Treasury Yield	0.17%	-49.10%	184.02%
10-year Treasury Yield	0.01%	2.12%	96.46%
20-year Treasury Yield	0.33%	11.11%	77.75%
30-year Treasury Yield	7.42%	-27.21%	45.40%
30-year Mortgage Rate	0.01%	0.41%	12.46%
Moody's AAA Curve	0.40%	4.01%	39.58%
Moody's BAA Curve	3.89%	-17.15%	30.56%
BBB Corporate Yield	0.21%	2.08%	69.63%
Prime Rate	48.75%	317.02%	503.93%
US Average Retail Gasoline Price	3.29%	30.40%	96.97%
Cost of Federal Funds	36.88%	***	***
Dow Jones Total Stock Market Index	0.74%	-4.41%	145.66%
S&P 500 Stock Price Index	405.18%	***	***
Commercial Real Estate Price Index	131.32%	589.74%	***
Residential Home Price Index	63.19%	408.90%	734.91%
Market Volatility Index	241.13%	***	***

** 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	63.521 (+/- 21.867)
	p = 0.009***
SP500 Stock Price Index	-0.033 (+/- 0.005)
	p = 0.00001***
US Fed Reserve O-N Loan Rate	-198.705 (+/- 23.361)
	p = 0.00000***
Home Price Index	0.860 (+/- 0.135)
	p = 0.00001***
Market Volatility Index	-0.417 (+/- 0.058)
	p = 0.00000***
US Avg Retail Gasoline Price ($-gal; all grades, all formulations)	19.030 (+/- 2.677)
	p = 0.00000***
LN_20-year Treasury Yield	-40.051 (+/- 11.072)
	p = 0.002***
LN_10-year Treasury Yield	-65.483 (+/- 9.128)
	p = 0.00000***
1-month Treasury Yield	170.092 (+/- 27.376)
	p = 0.00001***
5-year Treasury Yield	-44.734 (+/- 5.654)
	p = 0.00000***
LN_5-year Treasury Yield	101.994 (+/- 10.529)

	p = 0.000***
6-month Treasury Yield	314.620 (+/- 53.633)
	p = 0.00001***
LN_6-month Treasury Yield	-62.015 (+/- 7.663)
	p = 0.00000***
LN_3-year Treasury Yield	-23.687 (+/- 4.531)
	p = 0.00005***
1-year Treasury Yield	-342.266 (+/- 62.270)
	p = 0.00003***
LN_1-year Treasury Yield	116.189 (+/- 16.213)
	p = 0.00000***
1-year Treasury Yield^2	44.807 (+/- 11.133)
	p = 0.001***
6-month Treasury Yield^2	-67.777 (+/- 10.837)
	p = 0.00001***
3-month Treasury Yield^2	27.535 (+/- 2.883)
	p = 0.000***
20-year Treasury Yield^2	3.471 (+/- 0.472)
	p = 0.00000***
Observations	40
R^2	0.955
Adjusted R^2	0.912
Residual Std. Error	2.243 (df = 20)
F Statistic	22.345*** (df = 19; 20)
Note:	*p<0.1; **p<0.05; ***p<0.01

REGRESSION FOR NOMINAL GDP GROWTH

	Dependent variable (+/- SE):
	Nominal GDP growth
Constant	20.962 (+/- 4.441)
	p = 0.00005***
Moody's AAA Curve	17.024 (+/- 2.547)
	p = 0.00000***
Moody's BAA Curve	-15.338 (+/- 2.254)
	p = 0.00000***
Real disposable income growth	-3.030 (+/- 0.411)
	p = 0.00000***
Nominal disposable income growth	2.313 (+/- 0.429)
	p = 0.00001***
LN_10-year Treasury Yield	-11.468 (+/- 1.846)
	p = 0.00000***
Market Volatility Index[2]	-0.002 (+/- 0.0004)
	p = 0.0002***
Observations	40
R^2	0.904
Adjusted R^2	0.886
Residual Std. Error	2.807 (df = 33)
F Statistic	51.522*** (df = 6; 33)
Note:	*p<0.1; **p<0.05; ***p<0.01

REGRESSION FOR REAL DISPOSABLE INCOME GROWTH

	Dependent variable (+/- SE):
	Real disposable income growth
Constant	13.798 (+/- 6.164)
	p = 0.032**
Moody's AAA Curve	16.839 (+/- 3.433)
	p = 0.00003***
Moody's BAA Curve	-14.029 (+/- 3.007)
	p = 0.00005***
Real GDP growth	-0.975 (+/- 0.087)
	p = 0.000***
LN_10-year Treasury Yield	-8.308 (+/- 2.399)
	p = 0.002***
Observations	40
R^2	0.812
Adjusted R^2	0.791
Residual Std. Error	4.095 (df = 35)
F Statistic	37.815*** (df = 4; 35)
Note:	*p<0.1; **p<0.05; ***p<0.01

REGRESSION FOR NOMINAL DISPOSABLE INCOME GROWTH

	Dependent variable (+/- SE):
	Nominal disposable income growth
Constant	15.094 (+/- 7.079)
	p = 0.040**
Moody's AAA Curve	9.833 (+/- 3.360)
	p = 0.006***
Moody's BAA Curve	-9.665 (+/- 3.344)
	p = 0.007***
Real GDP growth	-0.892 (+/- 0.101)
	p = 0.000***
Observations	40
R^2	0.706
Adjusted R^2	0.681
Residual Std. Error	4.779 (df = 36)
F Statistic	28.797*** (df = 3; 36)
Note:	*p<0.1; **p<0.05; ***p<0.01

REGRESSION FOR CPI INFLATION RATE

	Dependent variable (+/- SE):
	CPI Inflation Rate
Constant	-0.159 (+/- 0.736)
	p = 0.831
Real disposable income growth	-1.291 (+/- 0.048)
	p = 0.000***
Nominal disposable income growth	1.266 (+/- 0.051)
	p = 0.000***
Dow Total Stock Market Index	0.0001 (+/- 0.00002)
	p = 0.00001***
US Avg Retail Gasoline Price ($-gal; all grades, all formulations)	0.764 (+/- 0.261)
	p = 0.007***
1-year Treasury Yield	-5.857 (+/- 1.456)
	p = 0.0004***
LN_1-year Treasury Yield	1.996 (+/- 0.529)
	p = 0.001***
1-year Treasury Yield^2	1.220 (+/- 0.321)
	p = 0.001***
Observations	40
R^2	0.969
Adjusted R^2	0.962
Residual Std. Error	0.326 (df = 32)
F Statistic	143.445*** (df = 7; 32)
Note:	*p<0.1; **p<0.05; ***p<0.01

Unemployment Rate

REGRESSION FOR UNEMPLOYMENT RATE

	Dependent variable (+/- SE):
	Unemployment Rate
Constant	4.057 (+/- 0.122)
	p = 0.001***
US Fed Reserve O-N Loan Rate	19.829 (+/- 0.112)
	p = 0.00004***
Moody's AAA Curve	-1.197 (+/- 0.005)
	p = 0.00002***
Real GDP growth	0.339 (+/- 0.001)
	p = 0.00002***
Nominal GDP growth	-0.298 (+/- 0.001)
	p = 0.00002***
Nominal disposable income growth	0.021 (+/- 0.0002)
	p = 0.0001***
BBB corporate yield	0.767 (+/- 0.005)
	p = 0.00005***
30-year Mortgage Rate	-1.103 (+/- 0.014)
	p = 0.0002***
Dow Total Stock Market Index	-0.0002 (+/- 0.00000)
	p = 0.00004***
Home Price Index	-0.155 (+/- 0.001)
	p = 0.00002***
Commercial Real Estate Price Index	0.054 (+/- 0.0003)

	p = 0.00003***
Market Volatility Index	0.051 (+/- 0.001)
	p = 0.001***
LN_Market Volatility Index	-1.763 (+/- 0.020)
	p = 0.0002***
US Avg Retail Gasoline Price ($-gal; all grades, all formulations)	-2.370 (+/- 0.008)
	p = 0.00002***
30-year Treasury Yield	19.585 (+/- 0.150)
	p = 0.0001***
LN_30-year Treasury Yield	-44.223 (+/- 0.336)
	p = 0.0001***
LN_20-year Treasury Yield	6.084 (+/- 0.165)
	p = 0.001***
LN_10-year Treasury Yield	10.753 (+/- 0.031)
	p = 0.00001***
1-month Treasury Yield	-20.597 (+/- 0.155)
	p = 0.0001***
7-year Treasury Yield	8.108 (+/- 0.067)
	p = 0.0001***
LN_7-year Treasury Yield	-10.155 (+/- 0.092)
	p = 0.0001***
3-month Treasury Yield	-8.039 (+/- 0.024)
	p = 0.00001***
5-year Treasury Yield	16.193 (+/- 0.053)
	p = 0.00002***
LN_5-year Treasury Yield	-22.620 (+/- 0.038)

	p = 0.00001***
6-month Treasury Yield	-23.173 (+/- 0.132)
	p = 0.00004***
LN_6-month Treasury Yield	6.128 (+/- 0.029)
	p = 0.00003***
3-year Treasury Yield	-27.017 (+/- 0.113)
	p = 0.00002***
LN_3-year Treasury Yield	14.849 (+/- 0.059)
	p = 0.00002***
1-year Treasury Yield	58.559 (+/- 0.192)
	p = 0.00002***
LN_1-year Treasury Yield	-17.103 (+/- 0.060)
	p = 0.00002***
1-year Treasury Yield^2	-16.554 (+/- 0.049)
	p = 0.00001***
3-year Treasury Yield^2	6.195 (+/- 0.026)
	p = 0.00002***
6-month Treasury Yield^2	6.815 (+/- 0.038)
	p = 0.00004***
5-year Treasury Yield^2	-1.900 (+/- 0.011)
	p = 0.00004***
3-month Treasury Yield^2	2.962 (+/- 0.018)
	p = 0.00004***
1-month Treasury Yield^2	1.700 (+/- 0.031)
	p = 0.0004***
20-year Treasury Yield^2	-1.569 (+/- 0.015)

	p = 0.0001***
Market Volatility Index[2]	0.0004 (+/- 0.00001)
	p = 0.002***
Observations	40
R^2	1.000
Adjusted R^2	1.000
Residual Std. Error	0.002 (df = 2)
F Statistic	1,309,205.000*** (df = 37; 2)
Note:	*p<0.1; **p<0.05; ***p<0.01

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

REGRESSION FOR 1-MONTH TREASURY YIELD

	Dependent variable (+/- SE):
	1-month Treasury Yield
Constant	5.050 (+/- 0.879)
	p = 0.00001***
SP500 Stock Price Index	-0.0004 (+/- 0.0001)
	p = 0.001***
Moody's AAA Curve	-0.255 (+/- 0.065)
	p = 0.001***
Moody's BAA Curve	0.404 (+/- 0.062)
	p = 0.00001***
Prime Rate	0.501 (+/- 0.064)
	p = 0.00000***
Dow Total Stock Market Index	0.00005 (+/- 0.00001)
	p = 0.00002***
Commercial Real Estate Price Index	0.007 (+/- 0.002)
	p = 0.0002***
US Avg Retail Gasoline Price ($-gal; all grades, all formulations)	0.220 (+/- 0.039)
	p = 0.00001***
LN_30-year Treasury Yield	-11.040 (+/- 1.257)
	p = 0.000***
20-year Treasury Yield	-4.582 (+/- 1.036)
	p = 0.0002***
LN_20-year Treasury Yield	14.439 (+/- 2.327)

	p = 0.00001***
7-year Treasury Yield	-4.878 (+/- 0.628)
	p = 0.00000***
LN_7-year Treasury Yield	3.879 (+/- 0.480)
	p = 0.00000***
3-month Treasury Yield^2	0.139 (+/- 0.032)
	p = 0.0003***
7-year Treasury Yield^2	0.645 (+/- 0.094)
	p = 0.00000***
30-year Treasury Yield^2	0.486 (+/- 0.089)
	p = 0.00002***
Market Volatility Index^2	0.0001 (+/- 0.00001)
	p = 0.002***
Observations	40
R^2	0.998
Adjusted R^2	0.997
Residual Std. Error	0.045 (df = 23)
F Statistic	735.307*** (df = 16; 23)
Note:	*p<0.1; **p<0.05; ***p<0.01

REGRESSION FOR 3-MONTH TREASURY YIELD

	Dependent variable (+/- SE):
	3-month Treasury Yield
Constant	-6.720 (+/- 1.294)
	p = 0.00002***
Unemployment Rate	-0.100 (+/- 0.011)
	p = 0.000***
Dow Total Stock Market Index	-0.00004 (+/- 0.00001)
	p = 0.00001***
Market Volatility Index	0.014 (+/- 0.005)
	p = 0.007***
30-year Treasury Yield	4.663 (+/- 0.889)
	p = 0.00002***
20-year Treasury Yield	4.962 (+/- 0.597)
	p = 0.000***
LN_20-year Treasury Yield	-11.907 (+/- 1.499)
	p = 0.000***
1-month Treasury Yield	1.859 (+/- 0.111)
	p = 0.000***
1-month Treasury Yield^2	-0.375 (+/- 0.041)
	p = 0.000***
30-year Treasury Yield^2	-0.838 (+/- 0.120)
	p = 0.00000***
Market Volatility Index^2	-0.0002 (+/- 0.0001)
	p = 0.0002***

Observations	40
R^2	0.991
Adjusted R^2	0.987
Residual Std. Error	0.089 (df = 29)
F Statistic	303.638^{***} (df = 10; 29)
Note:	*p<0.1; **p<0.05; ***p<0.01

REGRESSION FOR 6-MONTH TREASURY YIELD

	Dependent variable (+/- SE):
	6-month Treasury Yield
Constant	-7.312 (+/- 0.991)
	p = 0.00000***
Real disposable income growth	-0.169 (+/- 0.056)
	p = 0.006***
Nominal disposable income growth	0.169 (+/- 0.059)
	p = 0.008***
Dow Total Stock Market Index	0.0001 (+/- 0.00001)
	p = 0.000***
LN_Market Volatility Index	0.769 (+/- 0.187)
	p = 0.0003***
30-year Treasury Yield	-2.733 (+/- 0.520)
	p = 0.00001***
LN_30-year Treasury Yield	9.573 (+/- 1.440)
	p = 0.00000***
Observations	40
R^2	0.807
Adjusted R^2	0.772
Residual Std. Error	0.391 (df = 33)
F Statistic	23.025*** (df = 6; 33)
Note:	*p<0.1; **p<0.05; ***p<0.01

REGRESSION FOR 1-YEAR TREASURY YIELD

	Dependent variable (+/- SE):
	1-year Treasury Yield
Constant	-7.785 (+/- 0.931)
	p = 0.000***
Home Price Index	0.034 (+/- 0.003)
	p = 0.000***
LN_30-year Treasury Yield	2.393 (+/- 0.389)
	p = 0.00000***
Observations	40
R^2	0.736
Adjusted R^2	0.722
Residual Std. Error	0.434 (df = 37)
F Statistic	51.544*** (df = 2; 37)
Note:	*p<0.1; **p<0.05; ***p<0.01

REGRESSION FOR 3-YEAR TREASURY YIELD

	Dependent variable (+/- SE):
	3-year Treasury Yield
Constant	-4.416 (+/- 0.477)
	p = 0.000***
SP500 Stock Price Index	0.001 (+/- 0.0001)
	p = 0.000***
LN_30-year Treasury Yield	2.573 (+/- 0.276)
	p = 0.000***
Observations	40
R^2	0.809
Adjusted R^2	0.799
Residual Std. Error	0.322 (df = 37)
F Statistic	78.338*** (df = 2; 37)
Note:	*p<0.1; **p<0.05; ***p<0.01

REGRESSION FOR 5-YEAR TREASURY YIELD

	Dependent variable (+/- SE):
	5-year Treasury Yield
Constant	0.620 (+/- 0.315)
	p = 0.058*
Unemployment Rate	-0.169 (+/- 0.027)
	p = 0.00000***
30-year Treasury Yield	0.556 (+/- 0.079)
	p = 0.00000***
1-month Treasury Yield	1.144 (+/- 0.269)
	p = 0.0002***
1-month Treasury Yield^2	-0.406 (+/- 0.121)
	p = 0.002***
Observations	40
R^2	0.797
Adjusted R^2	0.773
Residual Std. Error	0.311 (df = 35)
F Statistic	34.270*** (df = 4; 35)
Note:	*p<0.1; **p<0.05; ***p<0.01

REGRESSION FOR 7-YEAR TREASURY YIELD

	Dependent variable (+/- SE):
	7-year Treasury Yield
Constant	2.557 (+/- 0.328)
	p = 0.000***
SP500 Stock Price Index	-0.001 (+/- 0.0002)
	p = 0.010***
1-month Treasury Yield	0.619 (+/- 0.141)
	p = 0.0001***
Observations	40
R^2	0.344
Adjusted R^2	0.309
Residual Std. Error	0.492 (df = 37)
F Statistic	9.717*** (df = 2; 37)
Note:	*p<0.1; **p<0.05; ***p<0.01

REGRESSION FOR 10-YEAR TREASURY YIELD

	Dependent variable (+/- SE):
	10-year Treasury Yield
Constant	1.531 (+/- 0.207)
	p = 0.000***
Unemployment Rate	-0.111 (+/- 0.026)
	p = 0.0002***
1-month Treasury Yield	0.753 (+/- 0.252)
	p = 0.006***
1-month Treasury Yield^2	-0.314 (+/- 0.111)
	p = 0.008***
30-year Treasury Yield^2	0.141 (+/- 0.012)
	p = 0.000***
Market Volatility Index^2	-0.0001 (+/- 0.00004)
	p = 0.010***
Observations	40
R^2	0.832
Adjusted R^2	0.807
Residual Std. Error	0.279 (df = 34)
F Statistic	33.702*** (df = 5; 34)
Note:	*p<0.1; **p<0.05; ***p<0.01

REGRESSION FOR 20-YEAR TREASURY YIELD

	Dependent variable (+/- SE):
	20-year Treasury Yield
Constant	2.751 (+/- 0.379)
	p = 0.000***
SP500 Stock Price Index	-0.001 (+/- 0.0002)
	p = 0.00000***
Prime Rate	0.543 (+/- 0.128)
	p = 0.0002***
Observations	40
R^2	0.547
Adjusted R^2	0.522
Residual Std. Error	0.453 (df = 37)
F Statistic	22.337*** (df = 2; 37)
Note:	*p<0.1; **p<0.05; ***p<0.01

REGRESSION FOR 30-YEAR TREASURY YIELD

	Dependent variable (+/- SE):
	30-year Treasury Yield
Constant	-1.731 (+/- 0.327)
	p = 0.00001***
Moody's BAA Curve	0.405 (+/- 0.068)
	p = 0.00001***
US Avg Retail Gasoline Price ($-gal; all grades, all formulations)	0.344 (+/- 0.059)
	p = 0.00001***
10-year Treasury Yield	1.271 (+/- 0.180)
	p = 0.00000***
LN_10-year Treasury Yield	-0.934 (+/- 0.281)
	p = 0.003***
LN_3-year Treasury Yield	0.305 (+/- 0.065)
	p = 0.00005***
5-year Treasury Yield^2	-0.130 (+/- 0.030)
	p = 0.0002***
Observations	40
R^2	0.954
Adjusted R^2	0.946
Residual Std. Error	0.153 (df = 33)
F Statistic	114.405*** (df = 6; 33)
Note:	*p<0.1; **p<0.05; ***p<0.01

30-year Mortgage Rate

REGRESSION FOR 30-YEAR MORTGAGE RATE

	Dependent variable (+/- SE):
	30-year Mortgage Rate
Constant	2.067 (+/- 0.200)
	$p = 0.000^{***}$
30-year Treasury Yield	0.591 (+/- 0.063)
	$p = 0.000^{***}$
1-month Treasury Yield	0.192 (+/- 0.053)
	$p = 0.001^{***}$
Observations	40
R^2	0.712
Adjusted R^2	0.696
Residual Std. Error	0.254 (df = 37)
F Statistic	45.684^{***} (df = 2; 37)
Note:	*p<0.1; **p<0.05; ***p<0.01

Moody's AAA & BAA Rates

REGRESSION FOR MOODY'S AAA CURVE

	Dependent variable (+/- SE):
	Moody's AAA Curve
Constant	-3.609 (+/- 2.151)
	p = 0.103
SP500 Stock Price Index	-0.0005 (+/- 0.0001)
	p = 0.004***
BBB corporate yield	0.424 (+/- 0.118)
	p = 0.002***
Prime Rate	2.060 (+/- 0.612)
	p = 0.002***
3-month Treasury Yield	-1.817 (+/- 0.578)
	p = 0.004***
Observations	40
R^2	0.716
Adjusted R^2	0.684
Residual Std. Error	0.306 (df = 35)
F Statistic	22.081*** (df = 4; 35)
Note:	*p<0.1; **p<0.05; ***p<0.01

REGRESSION FOR MOODY'S BAA CURVE

	Dependent variable (+/- SE):
	Moody's BAA Curve
Constant	4.678 (+/- 0.459)
	p = 0.000***
SP500 Stock Price Index	-0.0004 (+/- 0.0001)
	p = 0.0004***
LN_30-year Treasury Yield	0.986 (+/- 0.266)
	p = 0.001***
Observations	40
R^2	0.694
Adjusted R^2	0.678
Residual Std. Error	0.310 (df = 37)
F Statistic	42.024*** (df = 2; 37)
Note:	*p<0.1; **p<0.05; ***p<0.01

BBB Corporate Yield

REGRESSION FOR BBB CORPORATE YIELD

	Dependent variable (+/- SE):
	BBB corporate yield
Constant	5.508 (+/- 1.006)
	p = 0.00001***
LN_1-month Treasury Yield	-0.346 (+/- 0.084)
	p = 0.0003***
3-year Treasury Yield	-5.179 (+/- 1.065)
	p = 0.00003***
LN_3-year Treasury Yield	2.096 (+/- 0.483)
	p = 0.0002***
1-year Treasury Yield	2.442 (+/- 0.569)
	p = 0.0002***
3-year Treasury Yield^2	0.992 (+/- 0.215)
	p = 0.0001***
6-month Treasury Yield^2	-0.572 (+/- 0.120)
	p = 0.00004***
30-year Treasury Yield^2	0.099 (+/- 0.014)
	p = 0.00000***
Observations	40
R^2	0.868
Adjusted R^2	0.840
Residual Std. Error	0.235 (df = 32)
F Statistic	30.155*** (df = 7; 32)

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

Prime Rate

REGRESSION FOR PRIME RATE

	Dependent variable (+/- SE):
	Prime Rate
Constant	2.190 (+/- 1.123)
	p = 0.062*
Unemployment Rate	-0.110 (+/- 0.009)
	p = 0.000***
Dow Total Stock Market Index	-0.00005 (+/- 0.00001)
	p = 0.00000***
Market Volatility Index	0.076 (+/- 0.021)
	p = 0.001***
LN_Market Volatility Index	-1.202 (+/- 0.356)
	p = 0.003***
30-year Treasury Yield	8.016 (+/- 1.072)
	p = 0.00000***
LN_30-year Treasury Yield	-11.270 (+/- 1.447)
	p = 0.00000***
1-month Treasury Yield	0.727 (+/- 0.046)
	p = 0.000***
LN_1-month Treasury Yield	0.099 (+/- 0.017)
	p = 0.00001***
20-year Treasury Yield^2	0.212 (+/- 0.046)
	p = 0.0001***
30-year Treasury Yield^2	-0.877 (+/- 0.107)

	p = 0.000***
Market Volatility Index^2	-0.001 (+/- 0.0001)
	p = 0.0003***
Observations	40
R^2	0.994
Adjusted R^2	0.992
Residual Std. Error	0.068 (df = 28)
F Statistic	419.442*** (df = 11; 28)
Note:	*p<0.1; **p<0.05; ***p<0.01

US Average Retail Gasoline Price

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

	Dependent variable (+/- SE):
	US Avg Retail Gasoline Price ($-gal; all grades, all formulations)
Constant	-0.205 (+/- 0.504)
	p = 0.687
SP500 Stock Price Index	0.001 (+/- 0.0002)
	p = 0.0002***
US Fed Reserve O-N Loan Rate	5.555 (+/- 0.861)
	p = 0.00000***
Unemployment Rate	-0.110 (+/- 0.030)
	p = 0.002***
Dow Total Stock Market Index	-0.0001 (+/- 0.00002)
	p = 0.00000***
LN_20-year Treasury Yield	1.501 (+/- 0.308)
	p = 0.00004***
1-month Treasury Yield	-4.464 (+/- 0.792)
	p = 0.00001***
5-year Treasury Yield	1.547 (+/- 0.259)
	p = 0.00001***
LN_5-year Treasury Yield	-2.377 (+/- 0.412)
	p = 0.00001***
LN_6-month Treasury Yield	0.557 (+/- 0.151)
	p = 0.001***
LN_1-year Treasury Yield	-1.601 (+/- 0.194)

	p = 0.000***
Observations	40
R^2	0.945
Adjusted R^2	0.927
Residual Std. Error	0.154 (df = 29)
F Statistic	50.216*** (df = 10; 29)
Note:	*p<0.1; **p<0.05; ***p<0.01

Cost of Federal Funds (Primary Credit Rate)

REGRESSION FOR US FED RESERVE O-N LOAN RATE

	Dependent variable (+/- SE):
	US Fed Reserve O-N Loan Rate
Constant	8.913 (+/- 2.590)
	p = 0.002***
Real GDP growth	0.096 (+/- 0.011)
	p = 0.000***
Unemployment Rate	0.839 (+/- 0.101)
	p = 0.000***
Home Price Index	0.079 (+/- 0.008)
	p = 0.000***
30-year Treasury Yield	-15.295 (+/- 3.114)
	p = 0.00004***
LN_30-year Treasury Yield	22.530 (+/- 4.081)
	p = 0.00001***
20-year Treasury Yield	2.931 (+/- 0.620)
	p = 0.0001***
10-year Treasury Yield	-25.629 (+/- 2.696)
	p = 0.000***
LN_10-year Treasury Yield	27.290 (+/- 2.891)
	p = 0.000***
10-year Treasury Yield^2	2.811 (+/- 0.314)
	p = 0.000***
30-year Treasury Yield^2	0.833 (+/- 0.264)

	p = 0.004***
Observations	40
R^2	0.953
Adjusted R^2	0.937
Residual Std. Error	0.195 (df = 29)
F Statistic	58.558*** (df = 10; 29)
Note:	*p<0.1; **p<0.05; ***p<0.01

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

REGRESSION FOR DOW TOTAL STOCK MARKET INDEX

	Dependent variable (+/- SE):
	Dow Total Stock Market Index
Constant	-18,633.810 (+/- 11,840.960)
	p = 0.127
Unemployment Rate	-2,036.165 (+/- 267.162)
	p = 0.00000***
Prime Rate	-17,351.100 (+/- 3,656.394)
	p = 0.0001***
5-year Treasury Yield	73,896.250 (+/- 9,295.019)
	p = 0.000***
LN_5-year Treasury Yield	-50,538.170 (+/- 5,539.226)
	p = 0.000***
3-year Treasury Yield	39,397.330 (+/- 10,662.940)
	p = 0.001***
LN_3-year Treasury Yield	-18,274.480 (+/- 5,537.234)
	p = 0.003***
1-year Treasury Yield	25,351.880 (+/- 4,317.081)
	p = 0.00001***
LN_1-year Treasury Yield	-5,028.707 (+/- 1,237.906)
	p = 0.0004***
3-year Treasury Yield^2	-8,717.236 (+/- 1,961.774)
	p = 0.0002***
5-year Treasury Yield^2	-11,695.620 (+/- 1,836.782)

	p = 0.00000***
Observations	40
R^2	0.949
Adjusted R^2	0.931
Residual Std. Error	1,735.137 (df = 29)
F Statistic	53.793*** (df = 10; 29)
Note:	*p<0.1; **p<0.05; ***p<0.01

REGRESSION FOR SP500 STOCK PRICE INDEX

	Dependent variable (+/- SE):
	SP500 Stock Price Index
Constant	13,362.940 (+/- 731.555)
	p = 0.000***
Moody's BAA Curve	-314.412 (+/- 17.733)
	p = 0.000***
Nominal GDP growth	-21.857 (+/- 1.085)
	p = 0.000***
Unemployment Rate	-102.252 (+/- 7.217)
	p = 0.000***
BBB corporate yield	398.426 (+/- 33.953)
	p = 0.00000***
30-year Mortgage Rate	-556.712 (+/- 68.304)
	p = 0.00001***
Prime Rate	1,253.962 (+/- 113.187)
	p = 0.00000***
Market Volatility Index	15.991 (+/- 2.648)
	p = 0.0001***
LN_Market Volatility Index	-447.965 (+/- 77.786)
	p = 0.0001***
US Avg Retail Gasoline Price ($-gal; all grades, all formulations)	-129.289 (+/- 30.638)
	p = 0.002***
30-year Treasury Yield	12,353.850 (+/- 1,204.680)
	p = 0.00000***
LN_30-year Treasury Yield	-35,968.390 (+/- 2,871.539)

	p = 0.00000***
20-year Treasury Yield	-12,562.940 (+/- 1,342.253)
	p = 0.00000***
LN_20-year Treasury Yield	30,464.660 (+/- 2,736.914)
	p = 0.00000***
LN_7-year Treasury Yield	-3,393.281 (+/- 421.354)
	p = 0.00001***
3-month Treasury Yield	-1,112.564 (+/- 117.230)
	p = 0.00000***
6-month Treasury Yield	-4,850.945 (+/- 636.131)
	p = 0.00001***
LN_6-month Treasury Yield	542.270 (+/- 74.091)
	p = 0.00001***
3-year Treasury Yield	-11,813.230 (+/- 675.774)
	p = 0.000***
LN_3-year Treasury Yield	5,477.668 (+/- 387.170)
	p = 0.000***
1-year Treasury Yield	10,055.330 (+/- 871.947)
	p = 0.00000***
LN_1-year Treasury Yield	-1,820.854 (+/- 171.628)
	p = 0.00000***
1-year Treasury Yield^2	-3,779.466 (+/- 278.373)
	p = 0.000***
3-year Treasury Yield^2	1,882.697 (+/- 127.357)
	p = 0.000***
6-month Treasury Yield^2	1,881.925 (+/- 177.970)

	p = 0.00000***
5-year Treasury Yield[2]	-33.054 (+/- 9.930)
	p = 0.007***
3-month Treasury Yield[2]	1,031.870 (+/- 69.555)
	p = 0.000***
7-year Treasury Yield[2]	956.413 (+/- 77.351)
	p = 0.00000***
Observations	40
R^2	1.000
Adjusted R^2	0.999
Residual Std. Error	19.358 (df = 12)
F Statistic	1,419.608*** (df = 27; 12)
Note:	*p<0.1; **p<0.05; ***p<0.01

House and Commercial Real Estate Price Indexes

REGRESSION FOR HOME PRICE INDEX

	Dependent variable (+/- SE):
	Home Price Index
Constant	-173.897 (+/- 73.308)
	p = 0.025**
Unemployment Rate	-4.887 (+/- 1.193)
	p = 0.0004***
CPI Inflation Rate	-2.065 (+/- 0.556)
	p = 0.001***
30-year Treasury Yield	417.740 (+/- 109.472)
	p = 0.001***
LN_30-year Treasury Yield	-644.847 (+/- 150.347)
	p = 0.0002***
3-month Treasury Yield	-33.023 (+/- 7.690)
	p = 0.0002***
5-year Treasury Yield	134.197 (+/- 33.950)
	p = 0.0005***
LN_5-year Treasury Yield	-82.471 (+/- 27.230)
	p = 0.006***
1-year Treasury Yield	69.132 (+/- 8.967)
	p = 0.00000***
1-year Treasury Yield^2	-8.750 (+/- 1.840)
	p = 0.0001***
5-year Treasury Yield^2	-22.137 (+/- 5.205)

	p = 0.0003***
30-year Treasury Yield^2	-33.885 (+/- 9.589)
	p = 0.002***
Observations	40
R^2	0.985
Adjusted R^2	0.980
Residual Std. Error	4.060 (df = 28)
F Statistic	172.162*** (df = 11; 28)
Note:	*p<0.1; **p<0.05; ***p<0.01

REGRESSION FOR COMMERCIAL REAL ESTATE PRICE INDEX

	Dependent variable (+/- SE):
	Commercial Real Estate Price Index
Constant	-329.955 (+/- 117.127)
	p = 0.009***
Real GDP growth	-6.300 (+/- 2.276)
	p = 0.010***
Nominal GDP growth	6.673 (+/- 2.188)
	p = 0.005***
CPI Inflation Rate	-7.190 (+/- 1.438)
	p = 0.00003***
30-year Treasury Yield	798.852 (+/- 144.475)
	p = 0.00001***
LN_30-year Treasury Yield	-1,247.995 (+/- 185.470)
	p = 0.00000***
3-month Treasury Yield	-55.310 (+/- 12.300)
	p = 0.0002***
5-year Treasury Yield	113.977 (+/- 10.065)
	p = 0.000***
1-year Treasury Yield	117.606 (+/- 15.456)
	p = 0.00000***
1-year Treasury Yield^2	-12.618 (+/- 3.082)
	p = 0.0004***
5-year Treasury Yield^2	-28.565 (+/- 2.974)
	p = 0.000***
30-year Treasury Yield^2	-66.362 (+/- 13.005)

	p = 0.00003***
Observations	40
R^2	0.984
Adjusted R^2	0.978
Residual Std. Error	6.679 (df = 28)
F Statistic	157.987*** (df = 11; 28)
Note:	*p<0.1; **p<0.05; ***p<0.01

Market Volatility Index

REGRESSION FOR MARKET VOLATILITY INDEX

	Dependent variable (+/- SE):
	Market Volatility Index
Constant	130.260 (+/- 43.665)
	p = 0.006***
Dow Total Stock Market Index	-0.005 (+/- 0.001)
	p = 0.0001***
Home Price Index	0.629 (+/- 0.229)
	p = 0.010***
LN_30-year Treasury Yield	-360.139 (+/- 85.812)
	p = 0.0002***
LN_20-year Treasury Yield	282.782 (+/- 71.132)
	p = 0.0004***
Observations	40
R^2	0.515
Adjusted R^2	0.460
Residual Std. Error	9.858 (df = 35)
F Statistic	9.300*** (df = 4; 35)
Note:	*p<0.1; **p<0.05; ***p<0.01

Appendix A: Data Sources

The following table lists the attributes provided by Capitalytics as part of its macro-economic forecast service. The sources for data that are defined by the document "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[74]
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),

[74] 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[75]
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)[76].
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)[77].
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).

[75] 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.

76 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

[77] 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[78].

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.

[78] 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://www.quandl.com/data/FED/FL075035243_Q-Interest-rates-and-price-indexes-owner-occupied-real-estate-CoreLogic-national-SA-Quarterly-Levels-NSA

Commercial Real Estate Price Index	https://www.quandl.com/data/FED/FL075035503_Q-Interest-rates-and-price-indexes-commercial-real-estate-price-index-Quarterly-Levels-NSA
Market Volatility Index (VIX)	Federal Reserve Economic Research website (https://fred.stlouisfed.org/series/VIXCLS), with "Quarterly" frequency and "Average" aggregation method
Euro Area Real GDP Growth	Quarterly series for "European Union GDP Annual Growth Rate" per tradingeconomics.com
Euro Area Inflation	Quarterly average of monthly series for "European Union Inflation Rate" per tradingeconomics.com
Euro Area Bilateral Dollar Exchange Rate (USD/Euro)	End-of-quarter rates from the H.10 Release, Foreign Exchange Rates, Federal Reserve Board.
Developing Asia Real GDP Growth	The nominal GDP-weighted aggregate of the Real GDP growth for China, India, South Korea, Hong Kong Special Administrative Region, and Taiwan per OECD
Developing Asia Inflation	The nominal GDP-weighted aggregate of the inflation rate for China, India, South Korea, Hong Kong Special Administrative Region, and Taiwan per OECD
Developing Asia bilateral dollar exchange rate (F/USD, index)	End-of-quarter rates from the H.10 Release, Foreign Exchange Rates, Federal Reserve Board.
Japan Real GDP Growth	Quarterly average of monthly series for "Japan GDP Growth Rate" per tradingeconomics.com
Japan Inflation	Quarterly average of monthly series for "Japan Inflation Rate" per tradingeconomics.com
Japan Bilateral Dollar Exchange Rate (Yen/USD)	End-of-quarter rates from the H.10 Release, Foreign Exchange Rates, Federal Reserve Board.
UK Real GDP Growth	Quarterly average of monthly series for "United Kingdom GDP Growth Rate" per tradingeconomics.com
UK Inflation	Quarterly average of monthly series for "United Kingdom Inflation Rate" per tradingeconomics.com
UK Bilateral Dollar Exchange Rate (USD/Pound)	End-of-quarter rates from the H.10 Release, Foreign Exchange Rates, Federal Reserve Board.

While all data that is required for the Annual Stress Tests is available from 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[79] "forecast" package[80]; specifically, the "ets" function (see p.39 of https://cran.r-project.org/web/packages/forecast/forecast.pdf)[81] 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)[82], and the determined parameters. While fitting forecasts to previous values,

[79] As of this writing, v.3.6.2 of the "R" language is available at https://cran.r-project.org/.

[80] As of this writing, v.8.11 of the forecast package is available at https://CRAN.R-project.org/package=forecast.

[81] 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.

[82] 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)[83].

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.

[83] 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[84];
    - 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[85].

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

[84] 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.
[85] 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, correlations greater than 0.95 warrant further investigation as the relationship between variables may be useful for our research.

Table 19: Correlation Factors found as of 4Q2020

Variable 1	**Variable 2**	**Correlation**
BBB Corporate Yield	Commercial Real Estate Price Index	-0.75299
BBB Corporate Yield	Dow Jones Total Stock Market Index	-0.812935
BBB Corporate Yield	3-month Treasury Yield	0.75748
BBB Corporate Yield	6-month Treasury Yield	-0.779752
BBB Corporate Yield	Home Price Index	-0.789697
BBB Corporate Yield	Prime Rate	0.737656
BBB Corporate Yield	US Average Retail Gasoline Price	0.749588
BBB Corporate Yield	10-year Treasury Yield	0.920581
BBB Corporate Yield	1-year Treasury Yield	-0.790306
BBB Corporate Yield	20-year Treasury Yield	-0.834084
BBB Corporate Yield	30-year Mortgage Rate	0.936703
BBB Corporate Yield	3-year Treasury Yield	-0.822416
BBB Corporate Yield	5-year Treasury Yield	0.880704
BBB Corporate Yield	7-year Treasury Yield	-0.845478
Commercial Real Estate Price Index	6-month Treasury Yield	0.65362
Commercial Real Estate Price Index	US Average Retail Gasoline Price	-0.622905
Commercial Real Estate Price Index	10-year Treasury Yield	-0.832525
Commercial Real Estate Price Index	1-year Treasury Yield	0.67501
Commercial Real Estate Price Index	20-year Treasury Yield	0.916177
Commercial Real Estate Price Index	30-year Treasury Yield	0.673556
Commercial Real Estate Price Index	3-year Treasury Yield	0.762235
Commercial Real Estate Price Index	5-year Treasury Yield	-0.757015
Commercial Real Estate Price Index	7-year Treasury Yield	0.845215
Primary Credit	BBB Corporate Yield	-0.765442
Primary Credit	Commercial Real Estate Price Index	0.63254
Primary Credit	Dow Jones Total Stock Market Index	0.62311
Primary Credit	**1-month Treasury Yield**	**0.992958**
Primary Credit	3-month Treasury Yield	-0.827128
Primary Credit	**6-month Treasury Yield**	**0.994164**
Primary Credit	Moody's AAA Rate	0.801393
Primary Credit	Moody's BAA Rate	0.739479
Primary Credit	Home Price Index	0.659251
Primary Credit	Prime Rate	-0.840409
Primary Credit	US Average Retail Gasoline Price	-0.618128
Primary Credit	10-year Treasury Yield	-0.804327
Primary Credit	**1-year Treasury Yield**	**0.987574**
Primary Credit	20-year Treasury Yield	0.788322

Primary Credit	30-year Mortgage Rate	-0.814897
Primary Credit	**3-year Treasury Yield**	**0.955079**
Primary Credit	5-year Treasury Yield	-0.833133
Primary Credit	7-year Treasury Yield	0.891995
Dow Jones Total Stock Market Index	Commercial Real Estate Price Index	0.909989
Dow Jones Total Stock Market Index	6-month Treasury Yield	0.644149
Dow Jones Total Stock Market Index	Home Price Index	0.859493
Dow Jones Total Stock Market Index	US Average Retail Gasoline Price	-0.656917
Dow Jones Total Stock Market Index	10-year Treasury Yield	-0.814101
Dow Jones Total Stock Market Index	1-year Treasury Yield	0.661501
Dow Jones Total Stock Market Index	20-year Treasury Yield	0.862727
Dow Jones Total Stock Market Index	30-year Treasury Yield	0.795214
Dow Jones Total Stock Market Index	3-year Treasury Yield	0.742064
Dow Jones Total Stock Market Index	5-year Treasury Yield	-0.717492
Dow Jones Total Stock Market Index	7-year Treasury Yield	0.82788
1-month Treasury Yield	**6-month Treasury Yield**	**0.995205**
1-month Treasury Yield	**1-year Treasury Yield**	**0.988038**
1-month Treasury Yield	3-year Treasury Yield	0.925863
1-month Treasury Yield	7-year Treasury Yield	0.754212
3-month Treasury Yield	6-month Treasury Yield	-0.826078
3-month Treasury Yield	1-year Treasury Yield	-0.834205
3-month Treasury Yield	3-year Treasury Yield	-0.838608
3-month Treasury Yield	5-year Treasury Yield	0.932821
6-month Treasury Yield	**1-year Treasury Yield**	**0.998052**
6-month Treasury Yield	**3-year Treasury Yield**	**0.973057**
Moody's AAA Rate	BBB Corporate Yield	-0.825218
Moody's AAA Rate	Commercial Real Estate Price Index	0.874361
Moody's AAA Rate	Dow Jones Total Stock Market Index	0.858014
Moody's AAA Rate	3-month Treasury Yield	-0.80156
Moody's AAA Rate	6-month Treasury Yield	0.814741
Moody's AAA Rate	**Moody's BAA Rate**	**0.977116**
Moody's AAA Rate	Home Price Index	0.851098
Moody's AAA Rate	Prime Rate	-0.778118
Moody's AAA Rate	US Average Retail Gasoline Price	-0.722537
Moody's AAA Rate	10-year Treasury Yield	-0.919798
Moody's AAA Rate	1-year Treasury Yield	0.832849
Moody's AAA Rate	**20-year Treasury Yield**	**0.983955**
Moody's AAA Rate	30-year Mortgage Rate	-0.914207
Moody's AAA Rate	**30-year Treasury Yield**	**0.960347**
Moody's AAA Rate	3-year Treasury Yield	0.904467
Moody's AAA Rate	5-year Treasury Yield	-0.897818
Moody's AAA Rate	**7-year Treasury Yield**	**0.967076**
Moody's BAA Rate	BBB Corporate Yield	-0.767734
Moody's BAA Rate	Commercial Real Estate Price Index	0.8575
Moody's BAA Rate	Dow Jones Total Stock Market Index	0.836598
Moody's BAA Rate	3-month Treasury Yield	-0.77045
Moody's BAA Rate	6-month Treasury Yield	0.751128
Moody's BAA Rate	Home Price Index	0.830371
Moody's BAA Rate	Prime Rate	-0.742646
Moody's BAA Rate	US Average Retail Gasoline Price	-0.682409

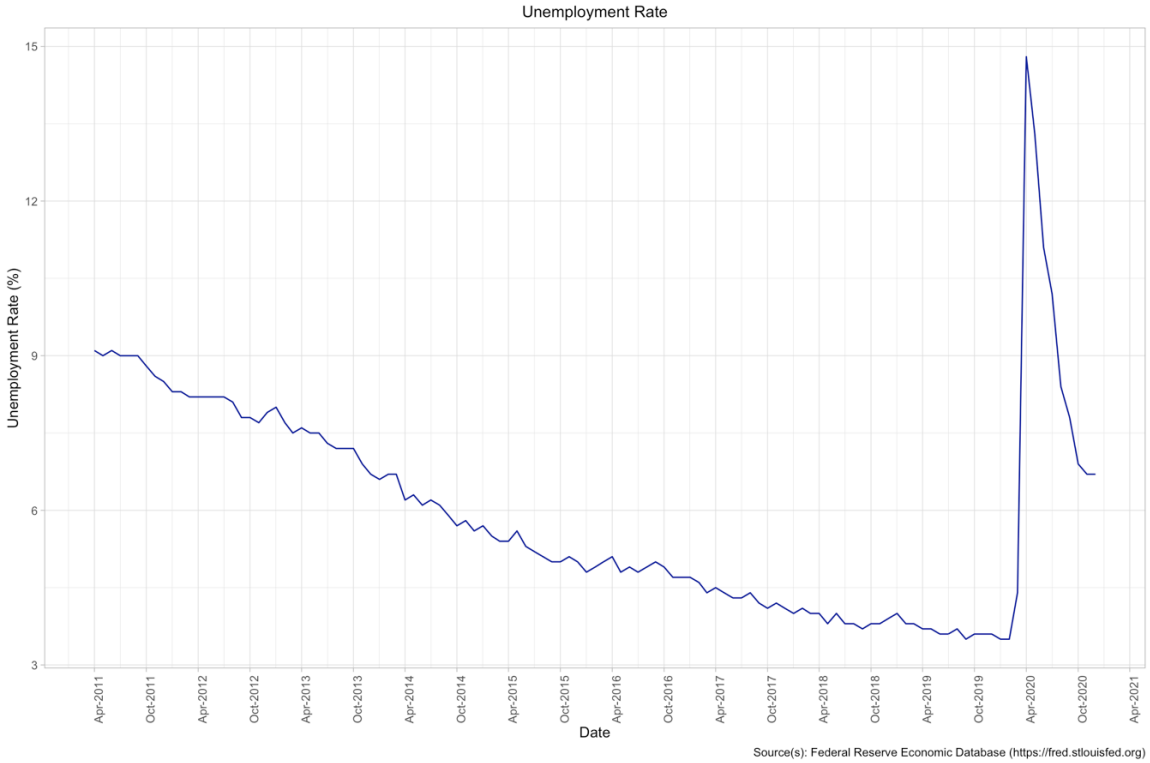
Moody's BAA Rate	10-year Treasury Yield	-0.881671
Moody's BAA Rate	1-year Treasury Yield	0.769639
Moody's BAA Rate	20-year Treasury Yield	0.929255
Moody's BAA Rate	30-year Mortgage Rate	-0.866415
Moody's BAA Rate	30-year Treasury Yield	0.79982
Moody's BAA Rate	3-year Treasury Yield	0.844758
Moody's BAA Rate	5-year Treasury Yield	-0.860598
Moody's BAA Rate	7-year Treasury Yield	0.916268
Home Price Index	**Commercial Real Estate Price Index**	**0.960118**
Home Price Index	6-month Treasury Yield	0.680917
Home Price Index	10-year Treasury Yield	-0.824696
Home Price Index	1-year Treasury Yield	0.698734
Home Price Index	20-year Treasury Yield	0.863384
Home Price Index	3-year Treasury Yield	0.771336
Home Price Index	5-year Treasury Yield	-0.756018
Home Price Index	7-year Treasury Yield	0.839242
Prime Rate	**3-month Treasury Yield**	**0.99211**
Prime Rate	6-month Treasury Yield	-0.84136
Prime Rate	US Average Retail Gasoline Price	0.662854
Prime Rate	10-year Treasury Yield	0.835101
Prime Rate	1-year Treasury Yield	-0.848416
Prime Rate	20-year Treasury Yield	-0.656475
Prime Rate	3-year Treasury Yield	-0.845412
Prime Rate	5-year Treasury Yield	0.906622
Prime Rate	7-year Treasury Yield	-0.811152
Real Disposable Income Growth	**Nominal Disposable Income Growth**	**0.963253**
Real GDP Growth	**Nominal GDP Growth**	**0.984098**
US Average Retail Gasoline Price	3-month Treasury Yield	0.66504
US Average Retail Gasoline Price	6-month Treasury Yield	-0.641356
US Average Retail Gasoline Price	10-year Treasury Yield	0.76106
US Average Retail Gasoline Price	1-year Treasury Yield	-0.663667
US Average Retail Gasoline Price	20-year Treasury Yield	-0.700369
US Average Retail Gasoline Price	3-year Treasury Yield	-0.725844
US Average Retail Gasoline Price	5-year Treasury Yield	0.734153
US Average Retail Gasoline Price	7-year Treasury Yield	-0.744426
S&P 500 Stock Price Index	BBB Corporate Yield	0.636994
S&P 500 Stock Price Index	Commercial Real Estate Price Index	-0.936071
S&P 500 Stock Price Index	Dow Jones Total Stock Market Index	-0.950039
S&P 500 Stock Price Index	Moody's AAA Rate	-0.728647
S&P 500 Stock Price Index	Moody's BAA Rate	-0.801683
S&P 500 Stock Price Index	**Home Price Index**	**-0.959784**
S&P 500 Stock Price Index	US Average Retail Gasoline Price	-0.679625
S&P 500 Stock Price Index	20-year Treasury Yield	-0.650261
S&P 500 Stock Price Index	30-year Treasury Yield	-0.732217
10-year Treasury Yield	3-month Treasury Yield	0.86397
10-year Treasury Yield	6-month Treasury Yield	-0.810362
10-year Treasury Yield	1-year Treasury Yield	-0.825059
10-year Treasury Yield	3-year Treasury Yield	-0.872011
10-year Treasury Yield	**5-year Treasury Yield**	**0.981773**
10-year Treasury Yield	7-year Treasury Yield	-0.908576

20-year Treasury Yield	3-month Treasury Yield	-0.67248
20-year Treasury Yield	6-month Treasury Yield	0.807447
20-year Treasury Yield	10-year Treasury Yield	-0.896611
20-year Treasury Yield	1-year Treasury Yield	0.831316
20-year Treasury Yield	3-year Treasury Yield	0.901145
20-year Treasury Yield	5-year Treasury Yield	-0.830983
20-year Treasury Yield	**7-year Treasury Yield**	**0.971489**
30-year Mortgage Rate	Commercial Real Estate Price Index	-0.806834
30-year Mortgage Rate	Dow Jones Total Stock Market Index	-0.798072
30-year Mortgage Rate	3-month Treasury Yield	0.878321
30-year Mortgage Rate	6-month Treasury Yield	-0.822339
30-year Mortgage Rate	Home Price Index	-0.808629
30-year Mortgage Rate	Prime Rate	0.853254
30-year Mortgage Rate	US Average Retail Gasoline Price	0.794875
30-year Mortgage Rate	**10-year Treasury Yield**	**0.993361**
30-year Mortgage Rate	1-year Treasury Yield	-0.836171
30-year Mortgage Rate	20-year Treasury Yield	-0.889392
30-year Mortgage Rate	30-year Treasury Yield	-0.696169
30-year Mortgage Rate	3-year Treasury Yield	-0.878963
30-year Mortgage Rate	**5-year Treasury Yield**	**0.980818**
30-year Mortgage Rate	7-year Treasury Yield	-0.908956
30-year Treasury Yield	10-year Treasury Yield	-0.742086
30-year Treasury Yield	**20-year Treasury Yield**	**0.990561**
30-year Treasury Yield	3-year Treasury Yield	0.627969
30-year Treasury Yield	7-year Treasury Yield	0.868897
3-year Treasury Yield	**1-year Treasury Yield**	**0.983381**
5-year Treasury Yield	6-month Treasury Yield	-0.833749
5-year Treasury Yield	1-year Treasury Yield	-0.845879
5-year Treasury Yield	3-year Treasury Yield	-0.877991
7-year Treasury Yield	3-month Treasury Yield	-0.817996
7-year Treasury Yield	6-month Treasury Yield	0.911497
7-year Treasury Yield	1-year Treasury Yield	0.927655
7-year Treasury Yield	**3-year Treasury Yield**	**0.977247**
7-year Treasury Yield	5-year Treasury Yield	-0.894817

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 17: US National Unemployment Rate



As seen in Figure 17, 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 18.)

Figure 18: Initial Unemployment Claims

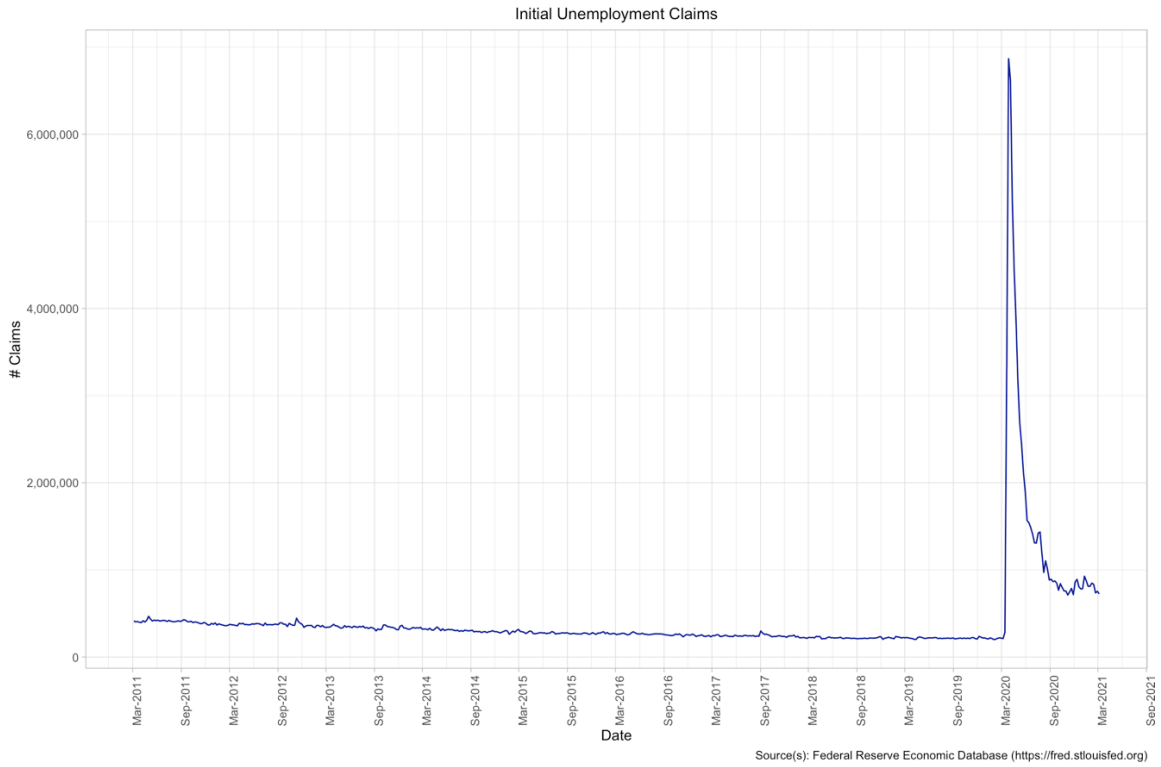
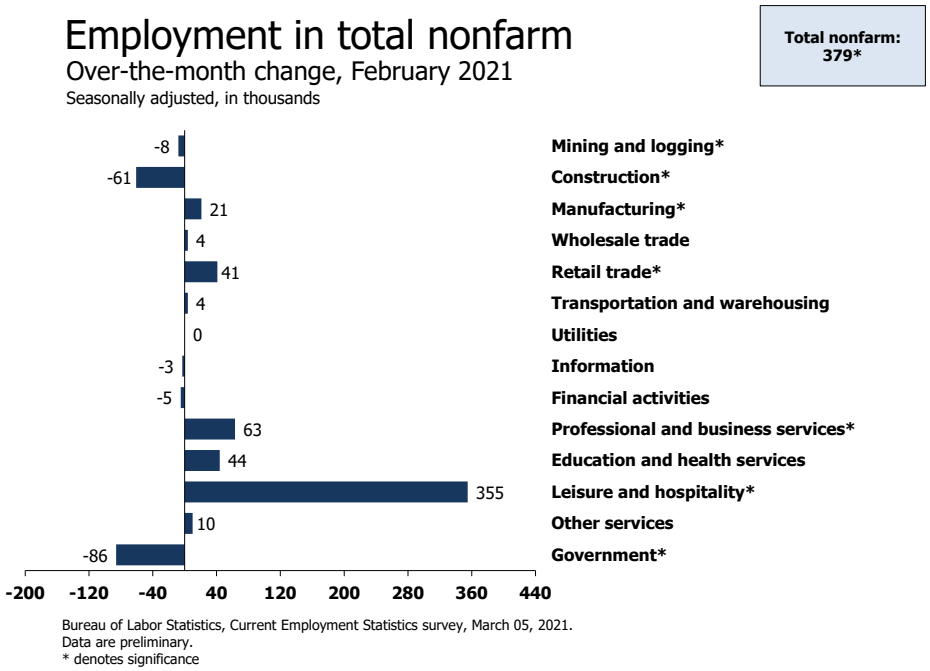
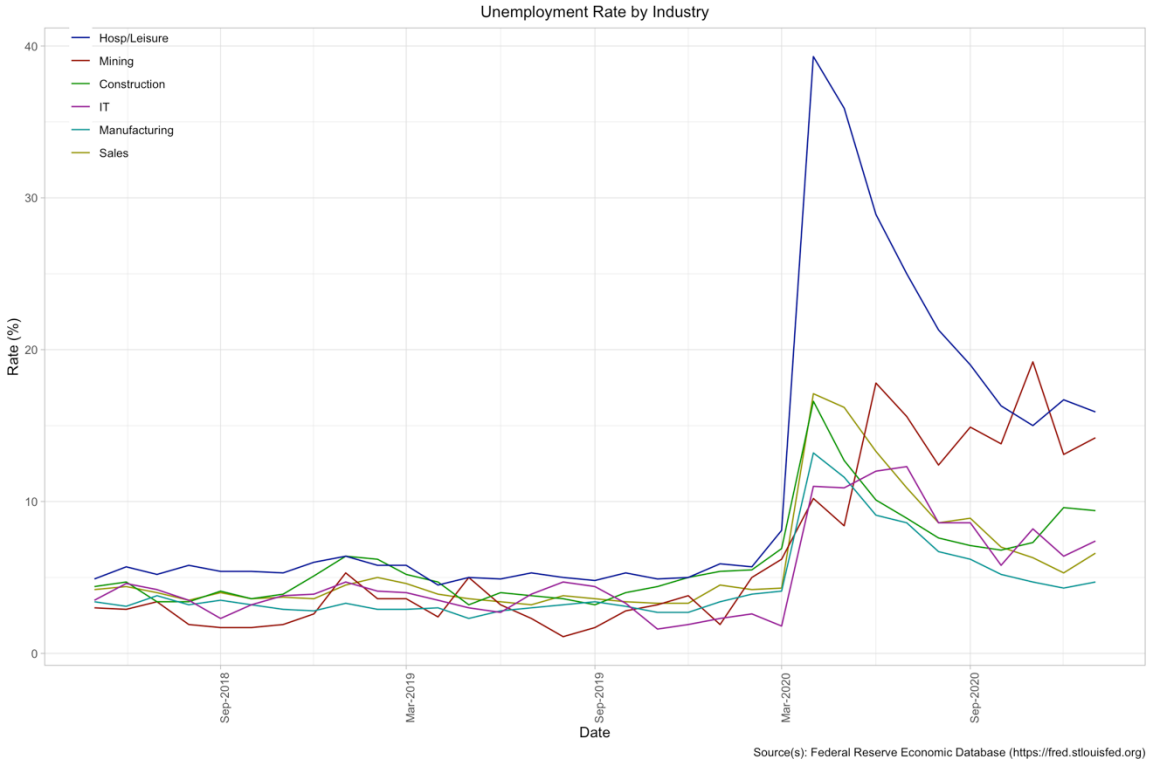


Figure 19: Job Gains and Losses by Sector betw. January & February 2021



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

Figure 20: Unemployment Rate by Industry



Obviously, not all sectors have recovered equally over the past several months. Retail trade and leisure & hospitality have finally seen some gains during the first quarter of 2021. Construction lost a notable number of workers as a function of the poor weather that was experienced by the country in February. the government lost workers as other sectors gained significant employees. “White collar” segments saw approximately 100,000 new employees between January and February. (See Figure 19 & Figure 20.)

Figure 21 shows that there are still approximately 4 million people identifying as unemployed. We feel that the volatility (and accounting) of this number is obfuscating the true scale of the problem. Per https://www.forbes.com/sites/pedrodacosta/2021/02/12/feds-powell-says-real-jobless-rate-is-10-with-big-policy-implications/, “Federal Reserve Chairman Jerome Powell has offered a sobering assessment of the U.S. economic prospects as the Covid pandemic rages: the actual unemployment rate when accounting for crisis-related exits from the labor force is closer to 10%.”

Figure 21: Continued Unemployment Claims

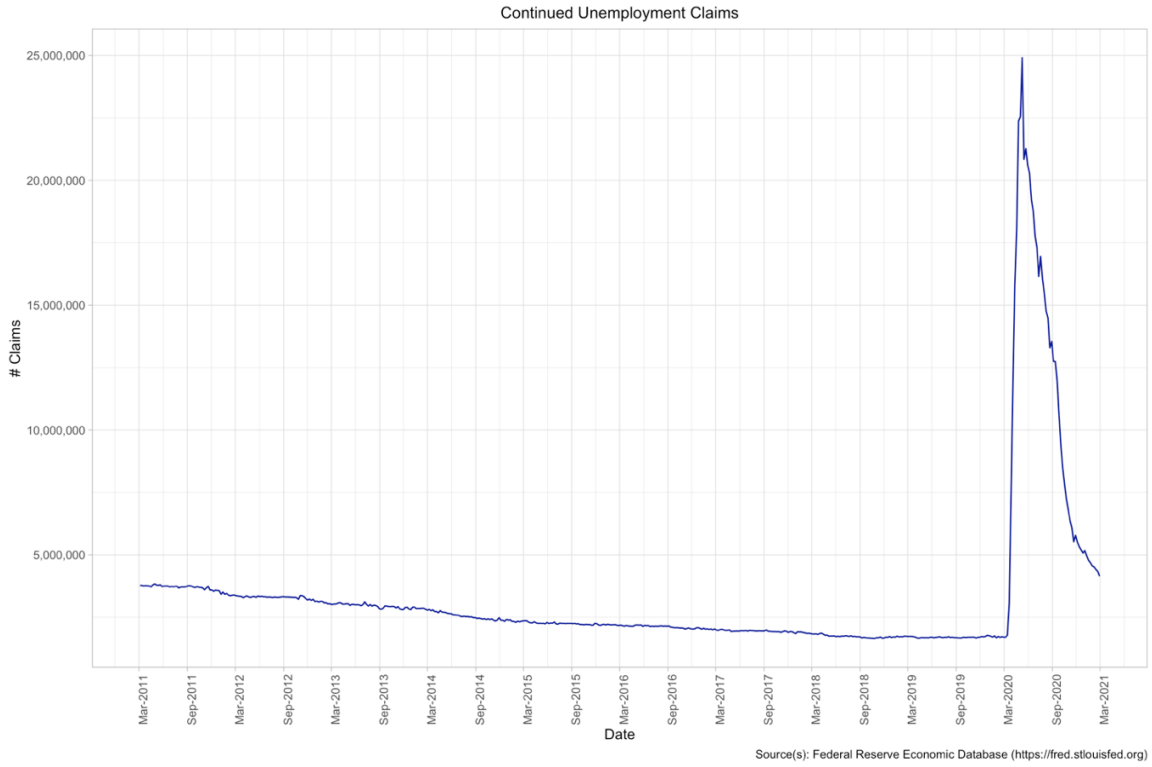
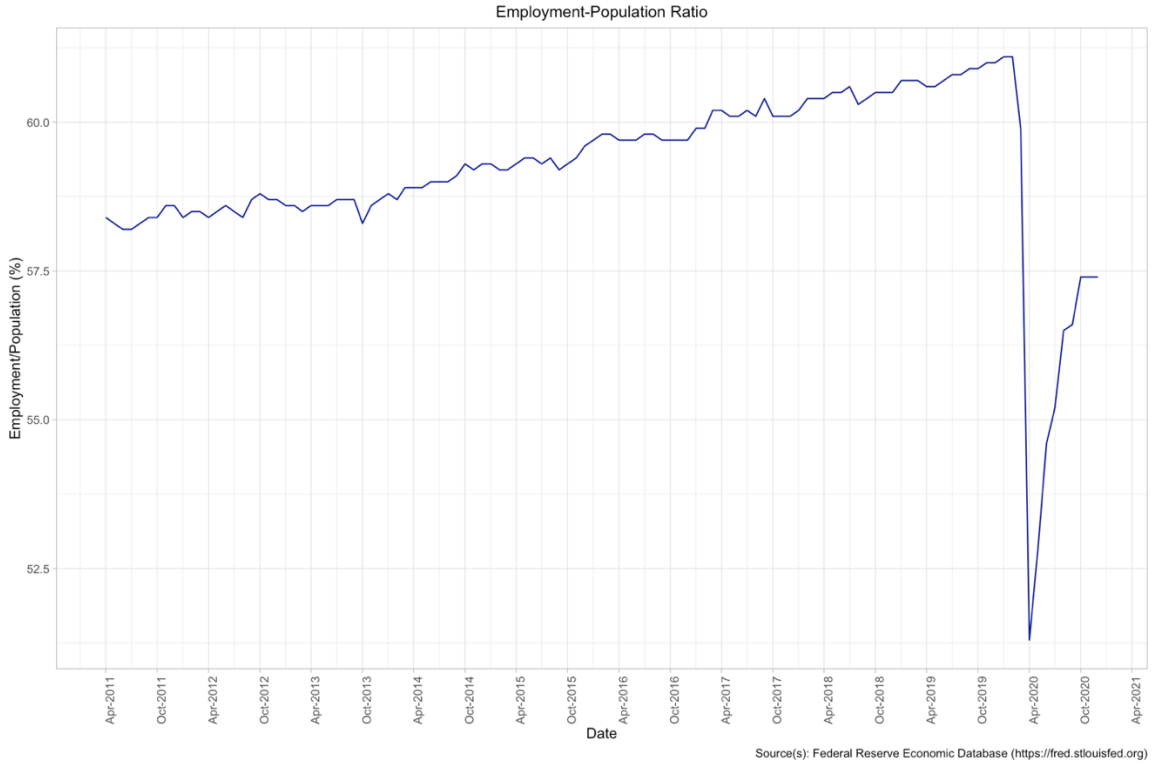


Figure 22: Employment-Population Ratio



Another indication of the weakened economy is the trend in the employment to population ratio. (See Figure 22.) 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 6 months.

Per Figure 23 and Figure 24, 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 25.) The unemployment rate for Blacks and Hispanics reached over 15% back in April and have not recovered at the same pace as unemployment for Whites. When examining these rates by race and gender (see Figure 26), 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 23: Capacity Utilization

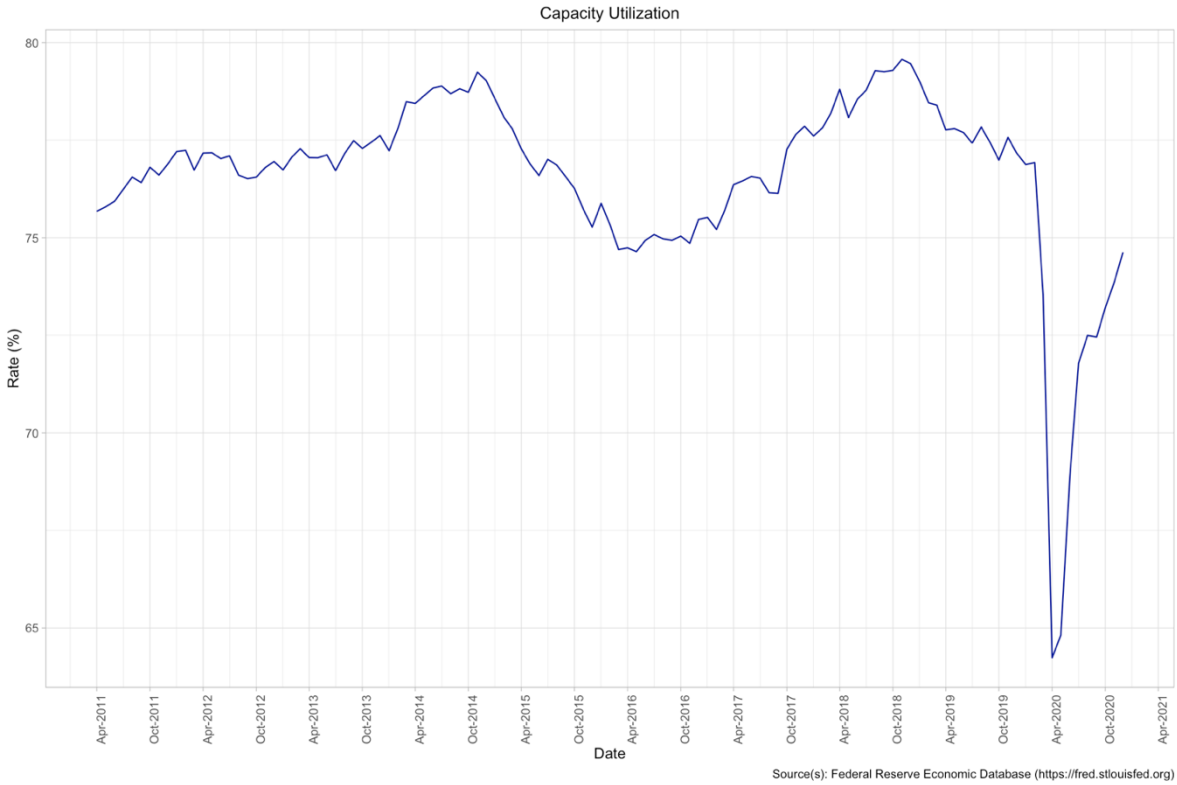


Figure 24: Industrial Production

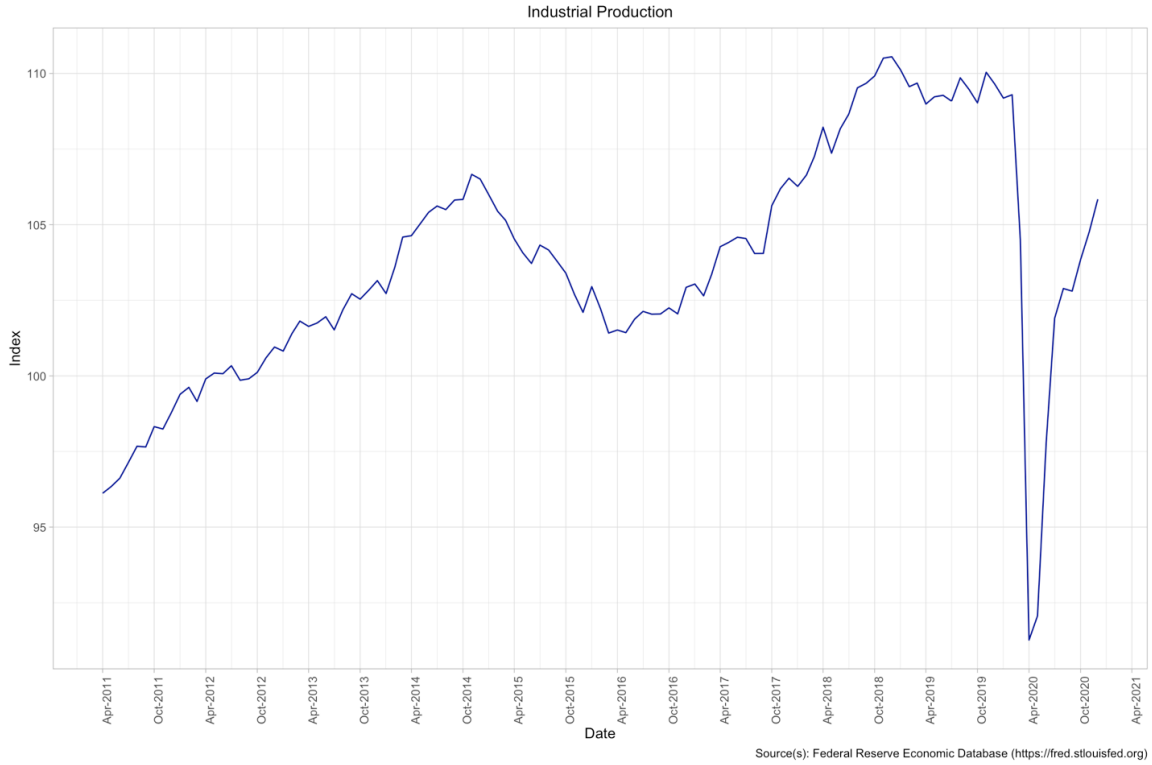


Figure 25: Unemployment Rate by Race

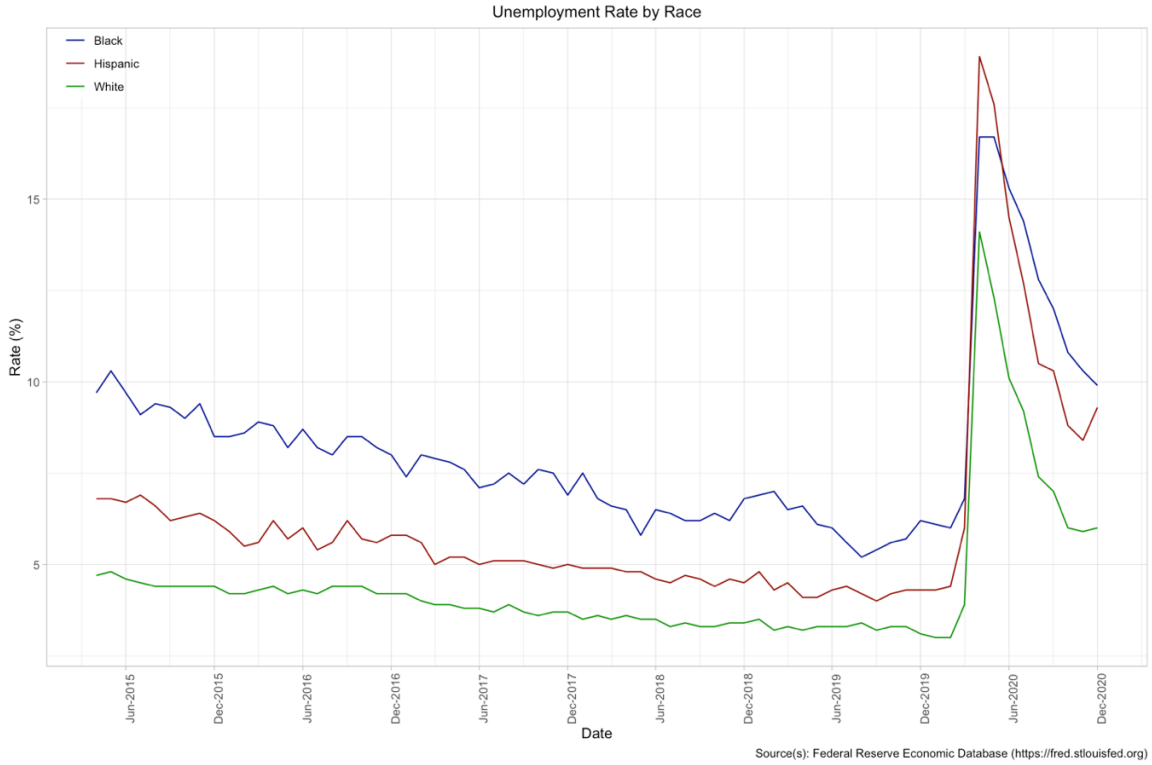


Figure 26: Unemployment Rate Race and Gender

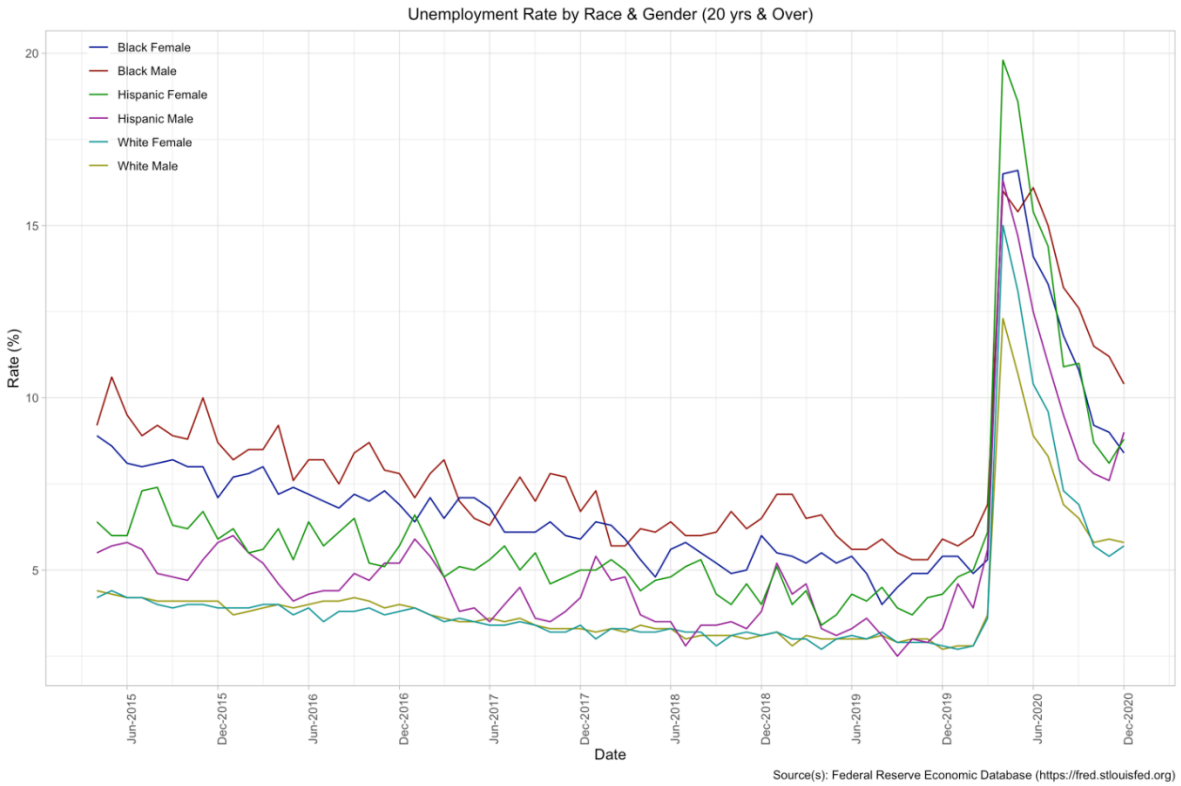


Figure 27: Labor Force Participation Rate by Gender

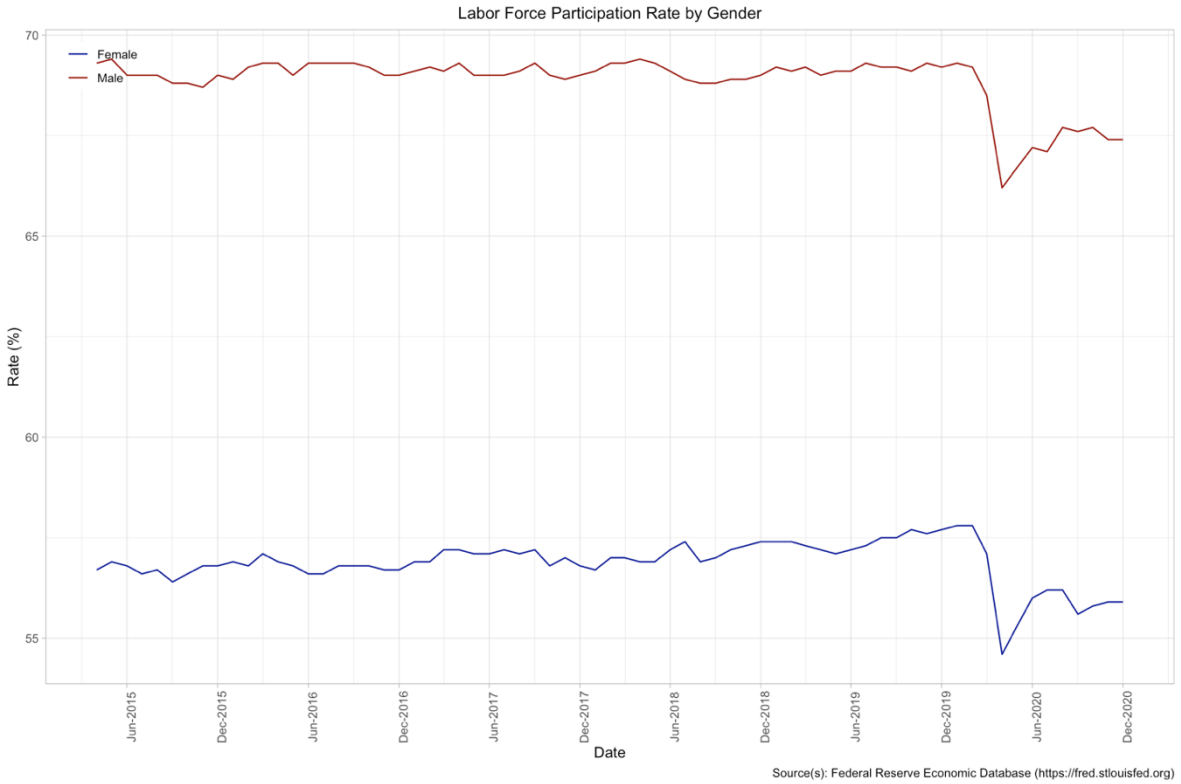
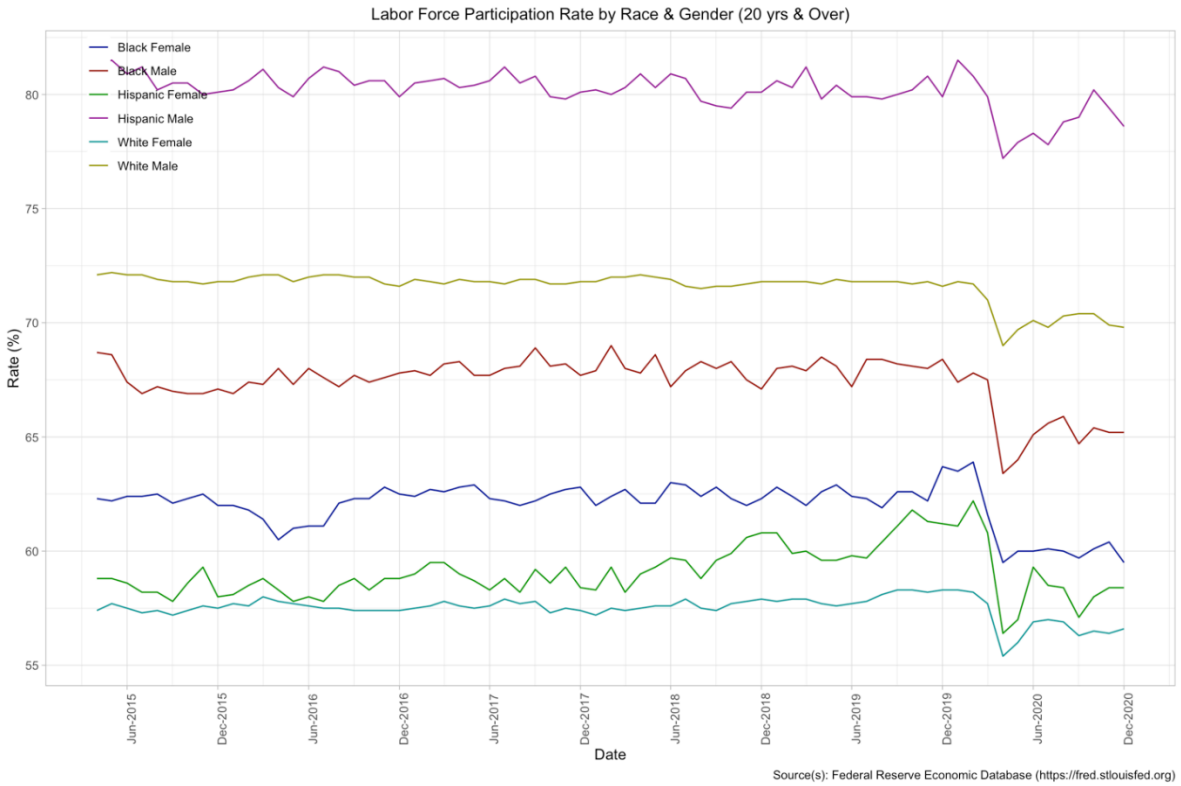


Figure 28: Labor Force Participation Rate by Race and Gender



When examining the unemployment trends by MSA (per Figure 29), 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 30) correspond to an increase in COVID-19 cases in New Orleans. Figure 30, Figure 31, Figure 32, and Figure 33 show the initial and continued unemployment claims for several southeastern states.

Figure 29: Unemployment Rate by MSA

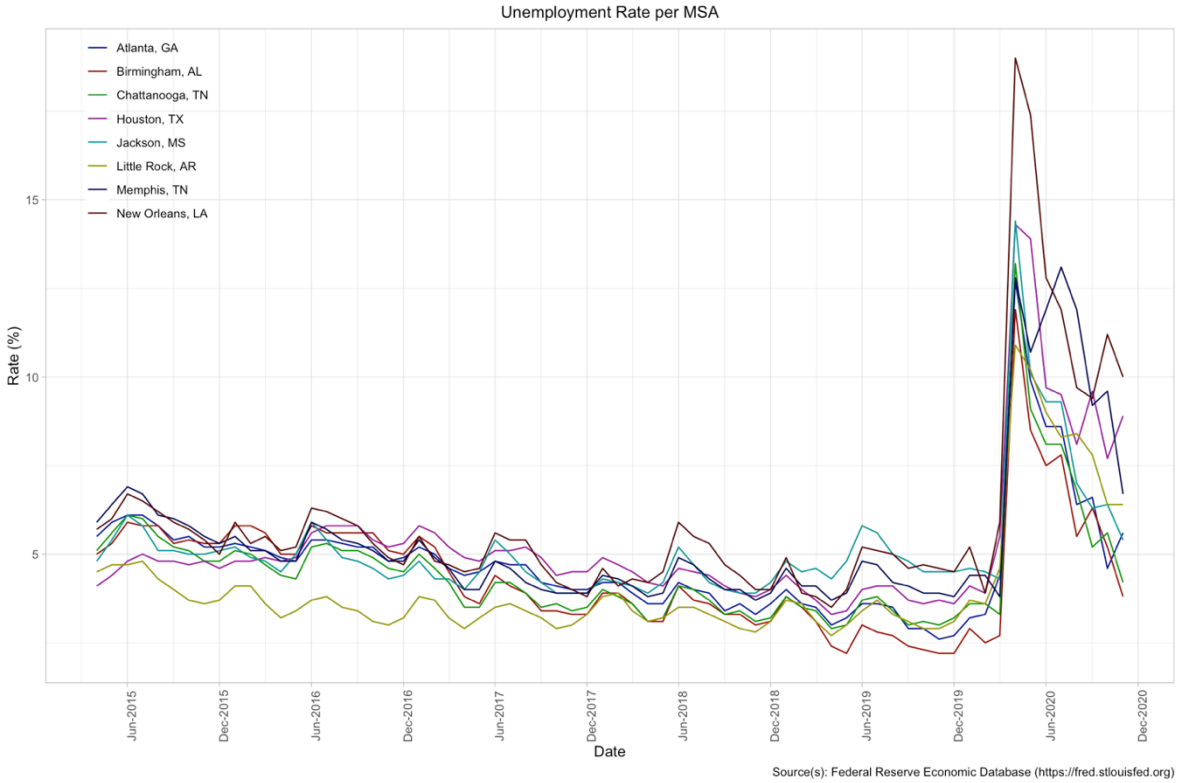


Figure 30: Initial Unemployment Claims: AL, AR, LA, MS, TN

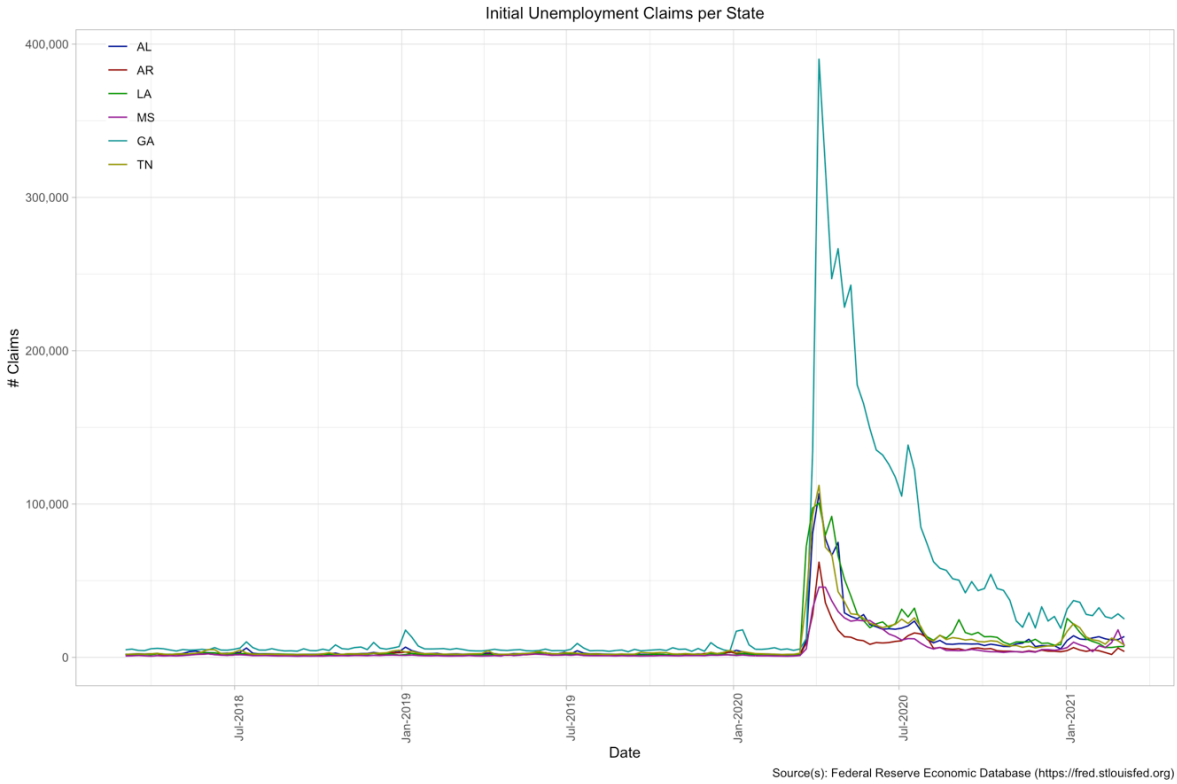


Figure 31: Initial Unemployment Claims TX

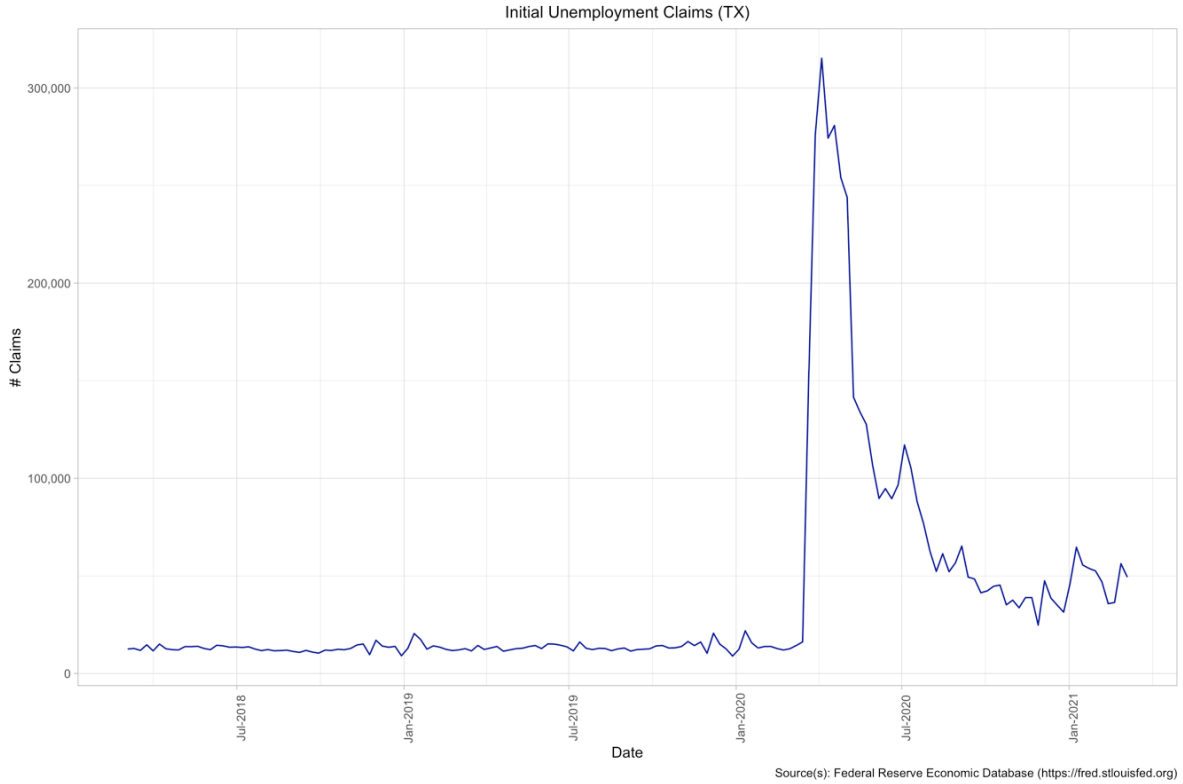


Figure 32: Continued Unemployment Claims: AL, AR, LA, MS, TN

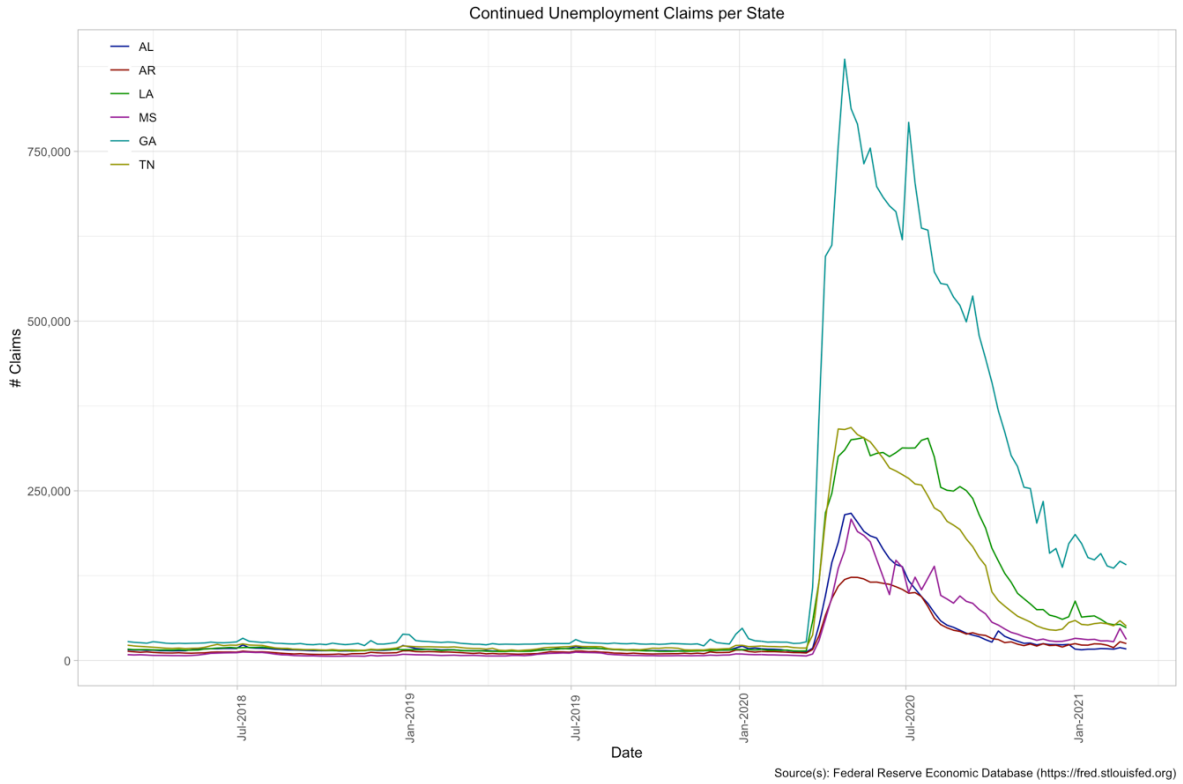
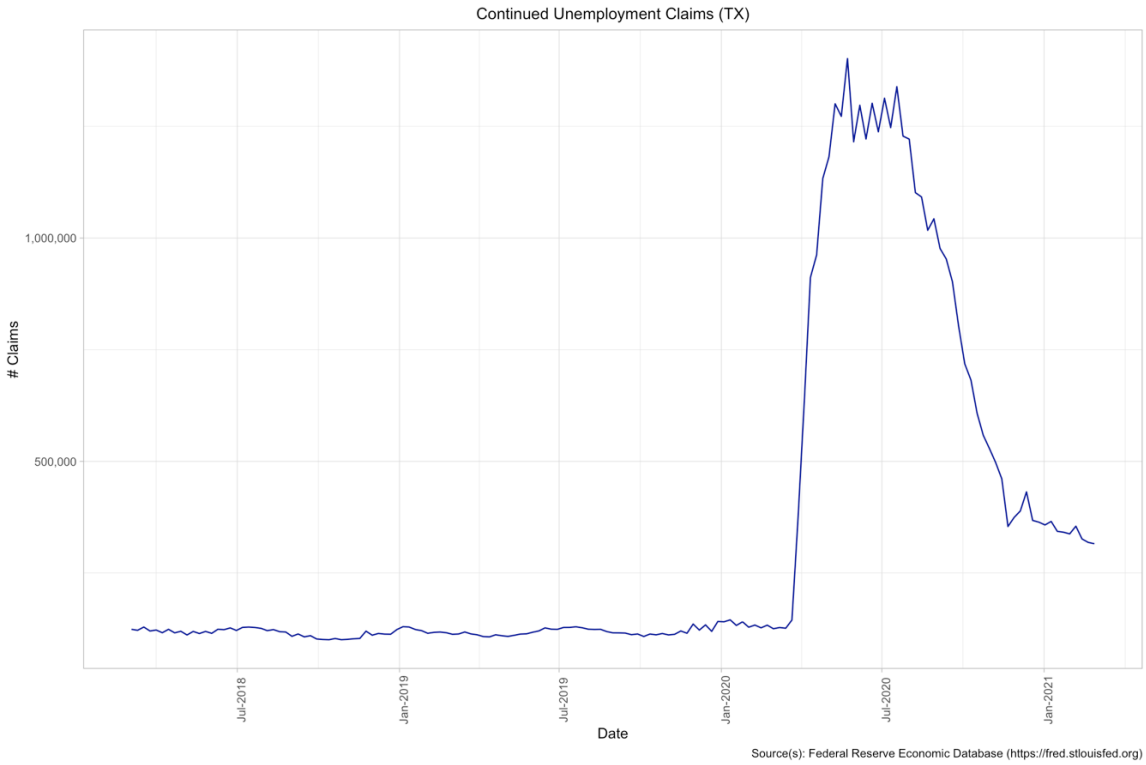


Figure 33: Continued Unemployment: TX



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