Macroeconomic Forecasts, 2Q2023
Domestic Metrics

Prepared by: Capitalytics, LLC
P. O. Box 381162
Birmingham, AL 35242

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Summary

Looking at 1Q and 2Q of 2023, the United States is continuing to ride out the economic circumstances that rippled out from the COVID pandemic:

- With several million potential workers having permanently exited the workforce, the labor force participation rate is still below its pre-pandemic levels, and unemployment rate is close to a record low levels (3.7%, as of this writing, and fluctuating by a few tenths of percentage points each month). In spite of the questions about the validity of record job postings, employees to continue to willingly play a game of musical chairs, oblivious to the possibility of the music ever stopping.
- The Federal Reserve and FOMC have been increasing interest rates in order to attempt to slow an economy that is barreling along due to an excess of capital in the hands of consumers, but has yet to see significant flinching by industry. In the mean time, the CPI appears to be slowing its "rocket flight" for the moment.
- Technology originally enabled the option of employees moving into their dream home – in any city in the world, or on the road between cities – but now companies are feeling comfortable pressing workers back to the office as commercial lease prices plummet due to mis-match in demand, and residential home prices faltering from near peak prices for the same reason.
- International politics took center stage 15 months ago when Vladimir Putin and Russia invaded Ukraine, and lit the fuse on food and energy inflation. Some food product prices have leveled out, and demand for domestic petroleum products have lessened, but the question of how much longer the conflict will last, and what will happen when it ceases, is starting to creep into mind.

While we feel that there is "a light at the end of the (proverbial) tunnel" for the economy that is visible, it still is not clear how or when we will get there, nor what exact challenges will be encountered on the way. Inflation is currently hovering at 4% (twice the preference of the FOMC), and likely not to move far for the next few quarters. Unemployment is likely lower than the Fed' would prefer. While wages have risen over the past several quarters, increases in compensation have not kept up with inflation, resulting in the erosion of buying power. Additionally, the banking sector has taken its share of lumps over the past six months, and will likely see more in the next 24 months depending on how the changes in demand for commercial real estate shake out.

The next twelve months will see GDP continue to strengthen to 2-3% annualized growth, the FOMC will chip away at inflation with less frequent rate increases (we expect 75 to 100 bps total), and unemployment rates will slightly increase to approach 4.25% by mid-year 2024. All of these options are with the expectation of gradual progress to various end goals, and no drastic actions by, say, Russia to end its war with Ukraine, or other significant events.

State of Affairs

For the last three and one-half years, we've started each report with an examination of the number of new COVID-19 cases. Here we are showing the number of hospitalizations for COVID-19. Although COVID isn't the front-page (or second page) story, it is important to, at the very least, keep one eye on this trend. (See Figure 1.) We believe that the country is now operating in a "steady-state" situation[1] where the number of new cases and hospitalizations will be relatively stable for the foreseeable future (in the absence of a new variant or outbreak of a COVID related illness.

Figure 1: Weekly Number of Hospitalizations for COVID-19
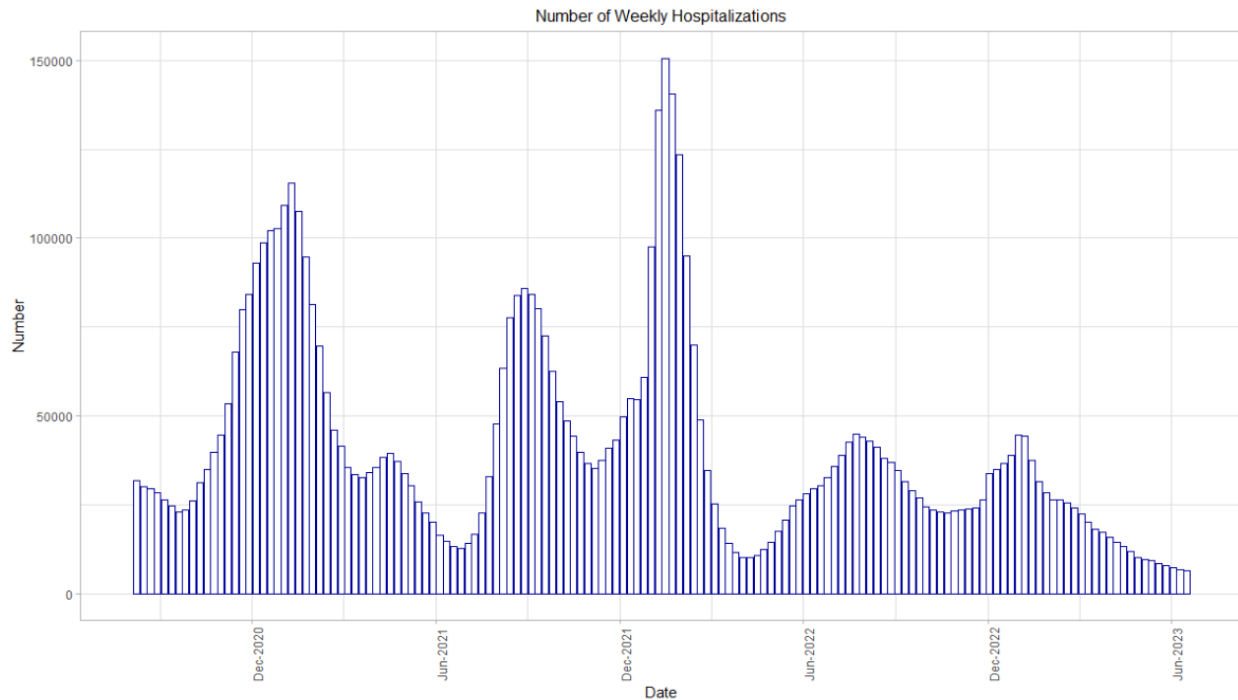
Source: Centers for Disease Control & Prevention (https://www.cdc.org): https://covid.cdc.gov/covid-data-tracker)

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[1] https://www.kff.org/coronavirus-covid-19/issue-brief/what-happens-when-covid-19-emergency-declarations-end-implications-for-coverage-costs-and-access/

Inflation

The primary concerns of the economy (dating back to 1Q2022) are related to inflation and the policy responses to inflation. We believe that consumers are acutely aware of the prices changes in three areas: energy[2], food[3], and housing[4]. We have entered a period of dis-inflation (where price increases are becoming smaller). We begin by discussing overall inflation in the US. (See Figure 2.) The rate of inflation has fallen to approximately 4.3% annually – well within ear-shot of the 3% Taylor-Rule target. The Fed' is likely to slow down interest rate increases in the second half of the year.

Figure 2: National Overall Rate of Inflation, 2008-Present
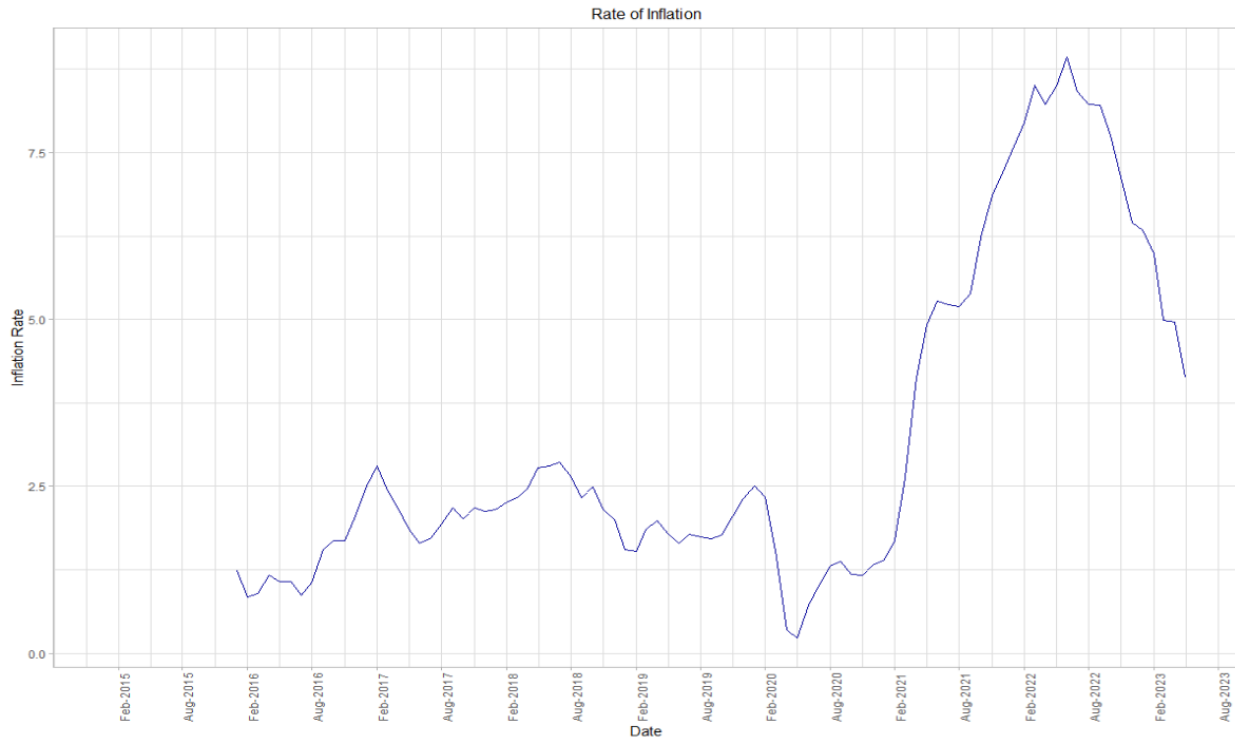
Inflation: Fuel

Because fuel and food are two of the biggest components in consumer's budgets, it is critical to understand the inflationary aspects of these areas. Table 1 and

Figure 3 highlight the issues that have troubled consumers and now seem to be closer to pre-pandemic levels. Fuel prices as of July 1, 2023, are nearly 20% lower than the prices from July 1, 2022. This corresponds with the over-all lower inflationary trend (see preceding graph of inflation).

Table 1: Average Gas Prices (per Gallon) in US, as of July 1, 2023

	Regular	Mid-Grade	Premium	Diesel	E85
Current Avg.	$3.543	$3.973	$4.300	$3.864	$2.935
Yesterday Avg.	$3.549	$3.979	$4.305	$3.871	$2.950
Week Ago Avg.	$3.584	$4.012	$4.340	$3.898	$2.963
Month Ago Avg.	$3.579	$3.997	$4.332	$3.946	$2.956
Year Ago Avg.	$4.857	$5.278	$5.577	$5.772	$4.107

Source: https://gasprices.aaa.com

Figure 3: US National Energy Price Inflation, 2009-Present
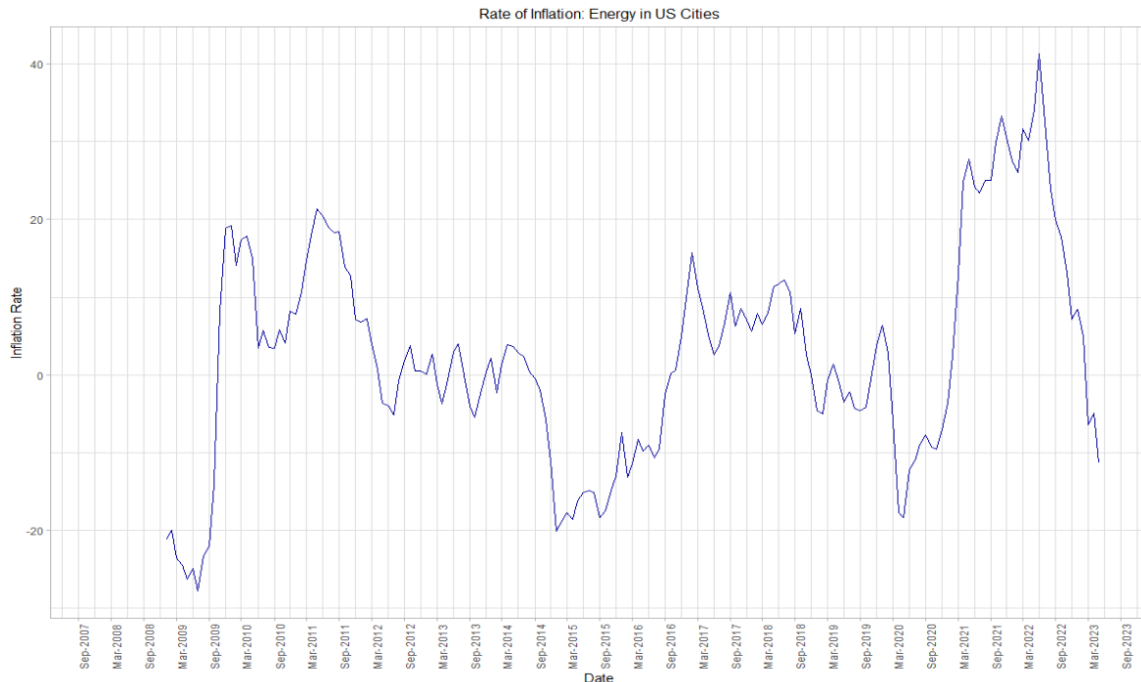
Source: Author's calculation

The price of energy in US cities has also fallen considerably. We are seeing year-over-year drops in energy prices in the range of 10% (that is, prices have fallen more than 10% between July 1,

2022 and July 1, 2023). This sharp decrease has contributed to the dramatic decrease in prices level shown in the CPI.

Inflation: Food

We are seeing two different trends for food. First, the cost for food at home (grocery store food prices) have started pushing downward the last three months. However, the price of food away from home (restaurant meals), is still quite high and only slightly moving towards lower prices.

Figure 4: US National Food Price Inflation (at Home), 2000-Present

Source: Federal Reserve Economic Database (https://fred.stlouisfed.org/
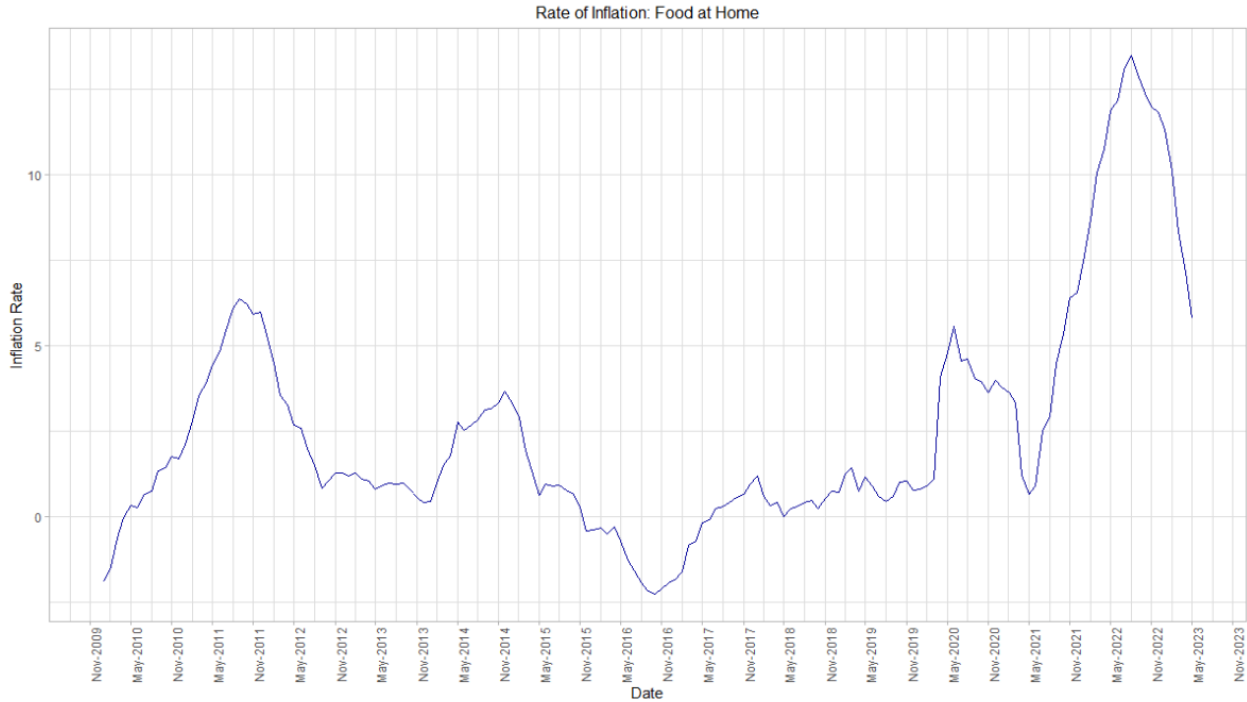
Figure 5: US National Prepared Food Price Inflation (Away from Home), 2008-Present
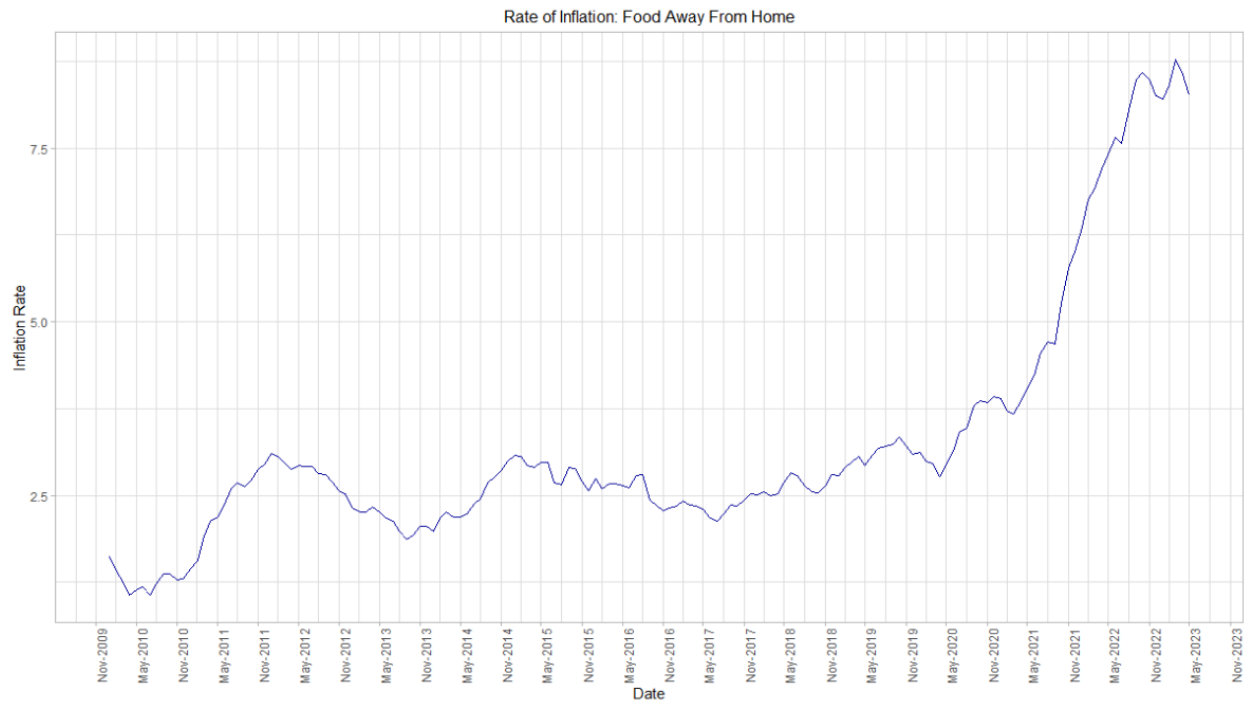
Inflation: Housing

Since early in the pandemic, the US has seen an upward spike in the price of single-family housing units. However, we have seen a reversal of this trend since last spring. The upward pressure in prices for singl-family residents was likely driven by a decrease in the supply of housing inventory (see Figure 6) and an increase in the demand (driven by mandates to 'work at home' during COVID). We saw an increase in inventories last spring and a small decrease in demand, which pushed home prices down. Housing inventory has, until COVID, shown seasonal changes, with decreases in late Fall and Early Winter, followed by upticks in inventory during the spring. The seasonal movements ceased for much of the early part of COVID and started showing back up in Fall 2021 and Spring 2022. We saw the seasonal decrease in inventory during the Fall and Winter (2022 and 2023) and have started seeing an uptick this Spring.

Figure 6: US National Residential Housing Inventory, February 2018-November 2022
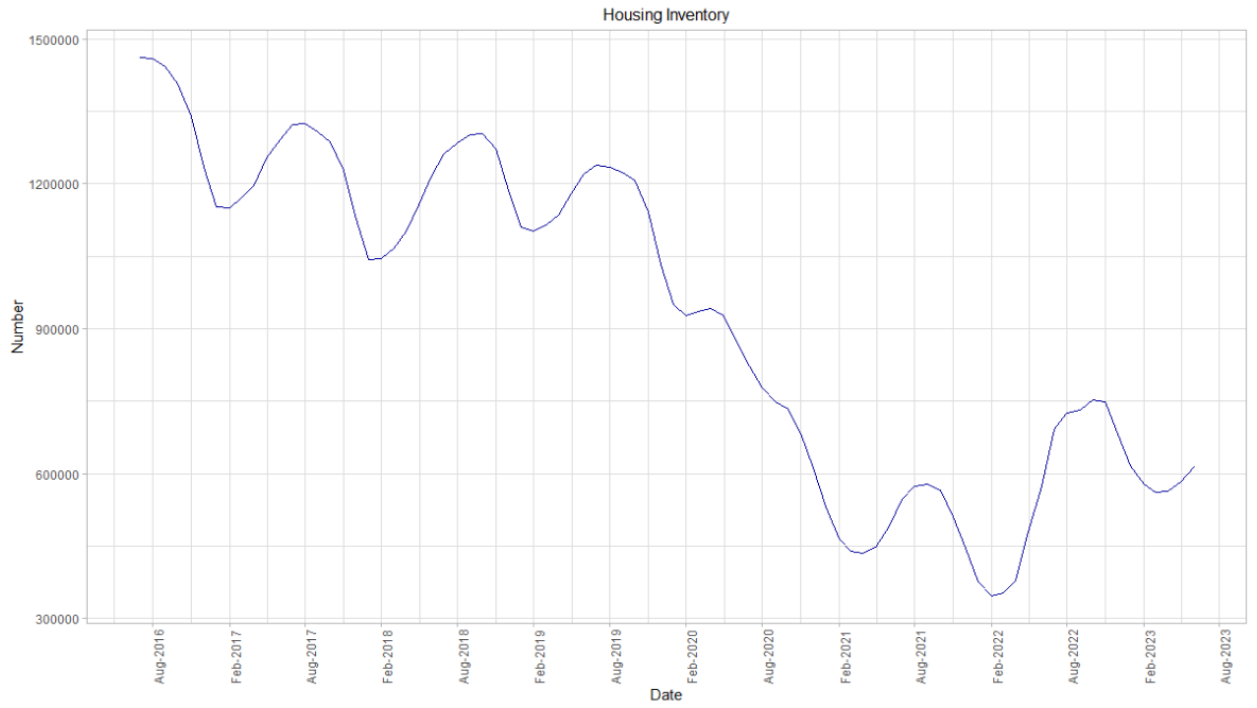
Source: FRED St. Louis

Figure 7: US National Home Price Inflation Case-Shiller, 2009-Present

Source: Federal Reserve Economic Database (https://fred.stlouisfed.org/)
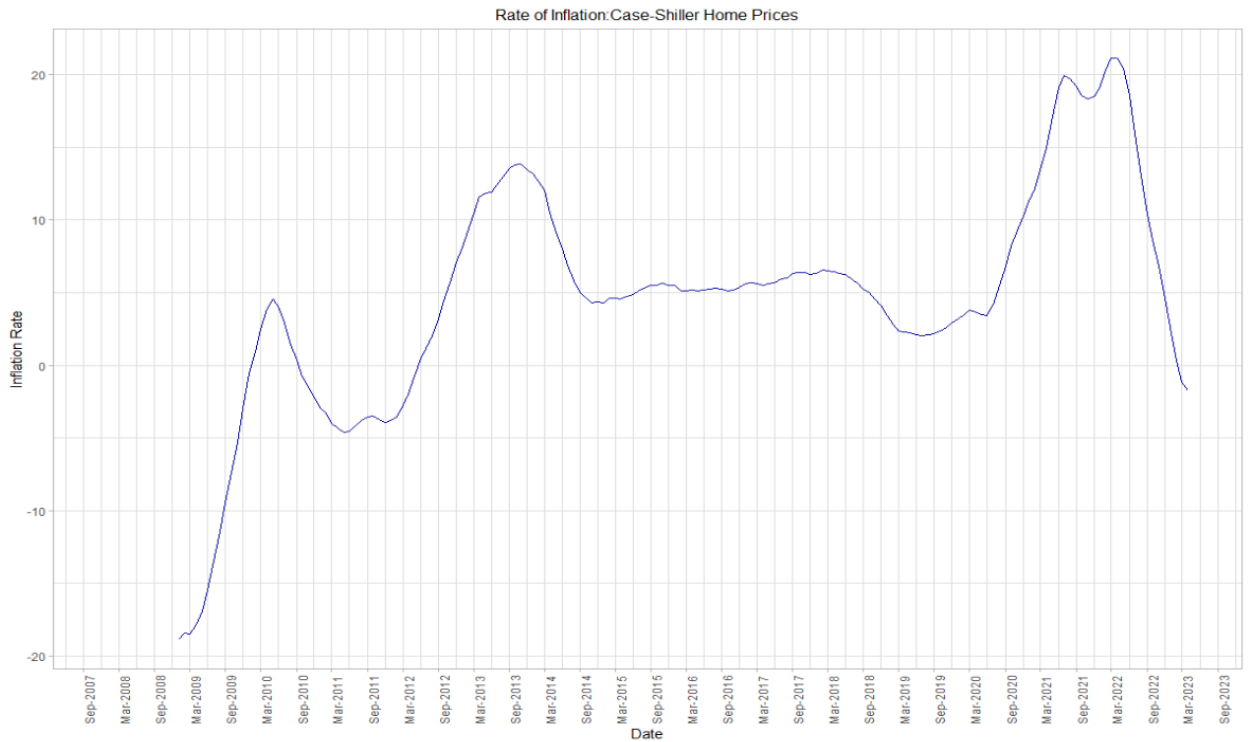
The Case-Shiller home price index (Figure 7) and the median sales price of houses (Figure 8) both show a decrease in the price of housing. Per Figure 10, new housing permits are also down substantially since early-2022. The price of housing is falling and the market is shifting, although just slightly, from a seller's market to a buyer's market. The rental cost of housing, however, has continued to increase. We are not confident that rental prices will fall or settle anytime soon. The relatively high mortgage rates (Figure 11) are pushing away potential "buyers", creating a larger rental pool and increasing rental home demand. The increased demand for rental homes and the inability (or, perhaps, weariness) of new-home-buyers will continue to put upward pressure on rental prices. (See Figure 12 and Figure 13.)

Figure 8: Median Sales Price
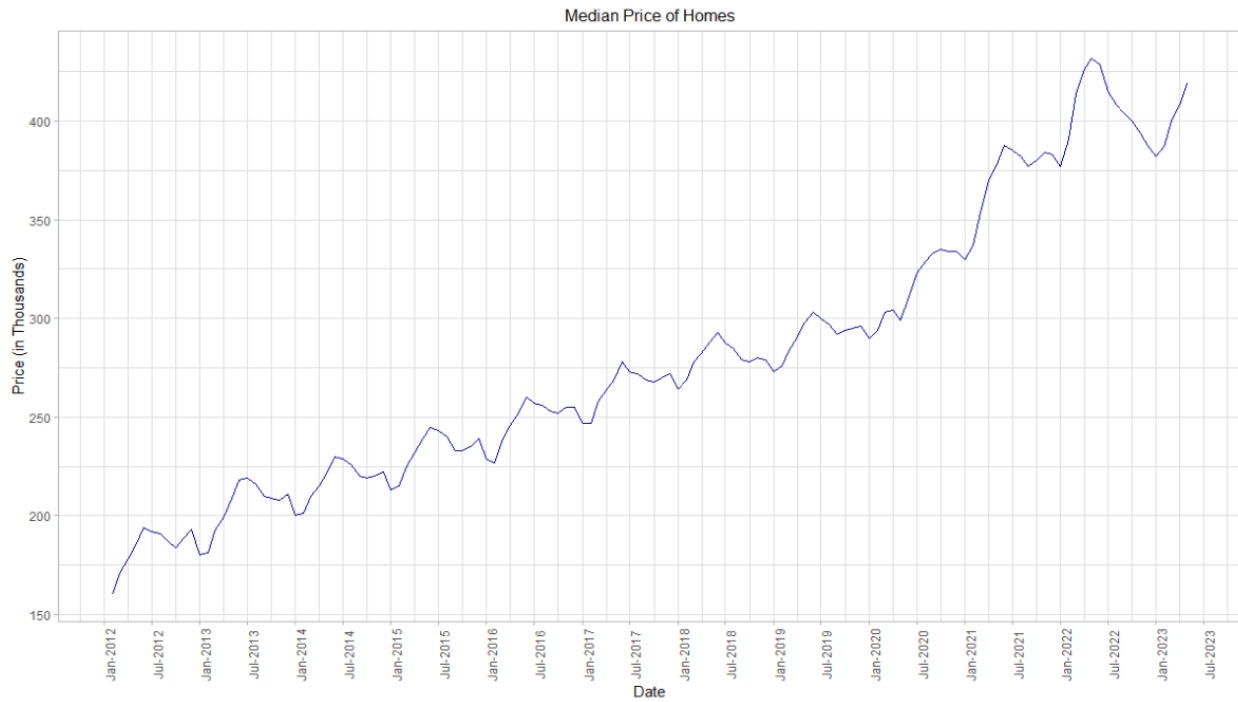
Figure 9: US National Home Price Inflation (Redfin), Feb 2018-Nov 2022

Source: Redfin (https://www.redfin.com/news/data-center/)
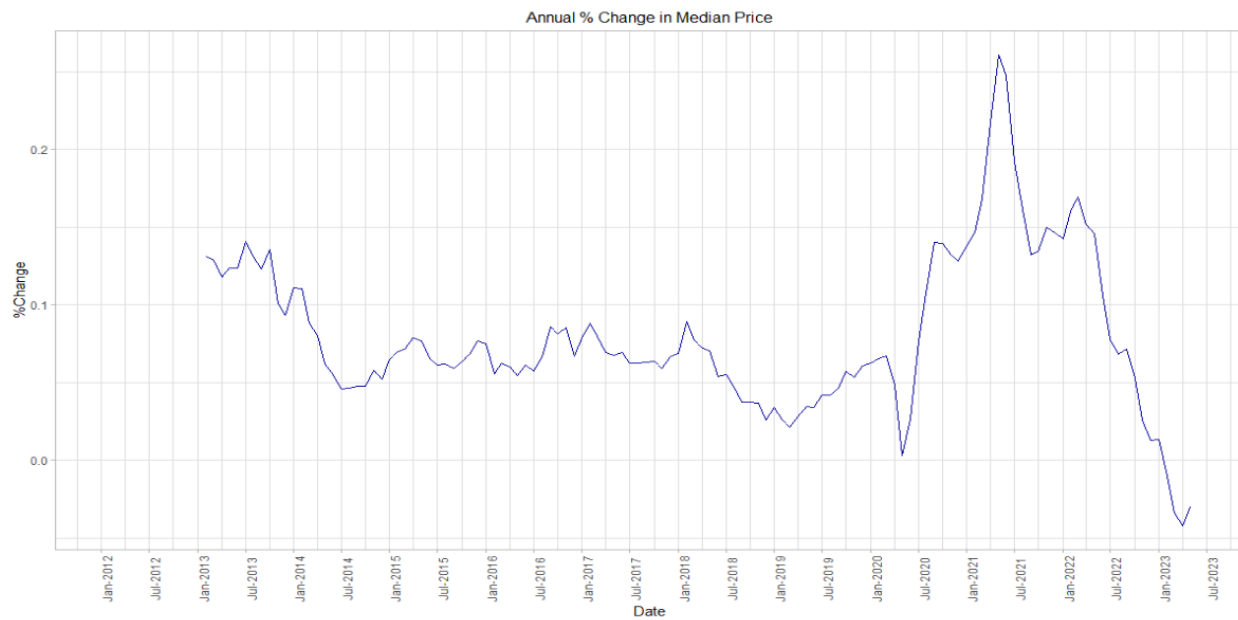
Figure 10: US National New Home Construction Permits, January 2015-Present

New Housing Permits

Source: Federal Reserve Economic Database (https://fred.stlouisfed.org/)
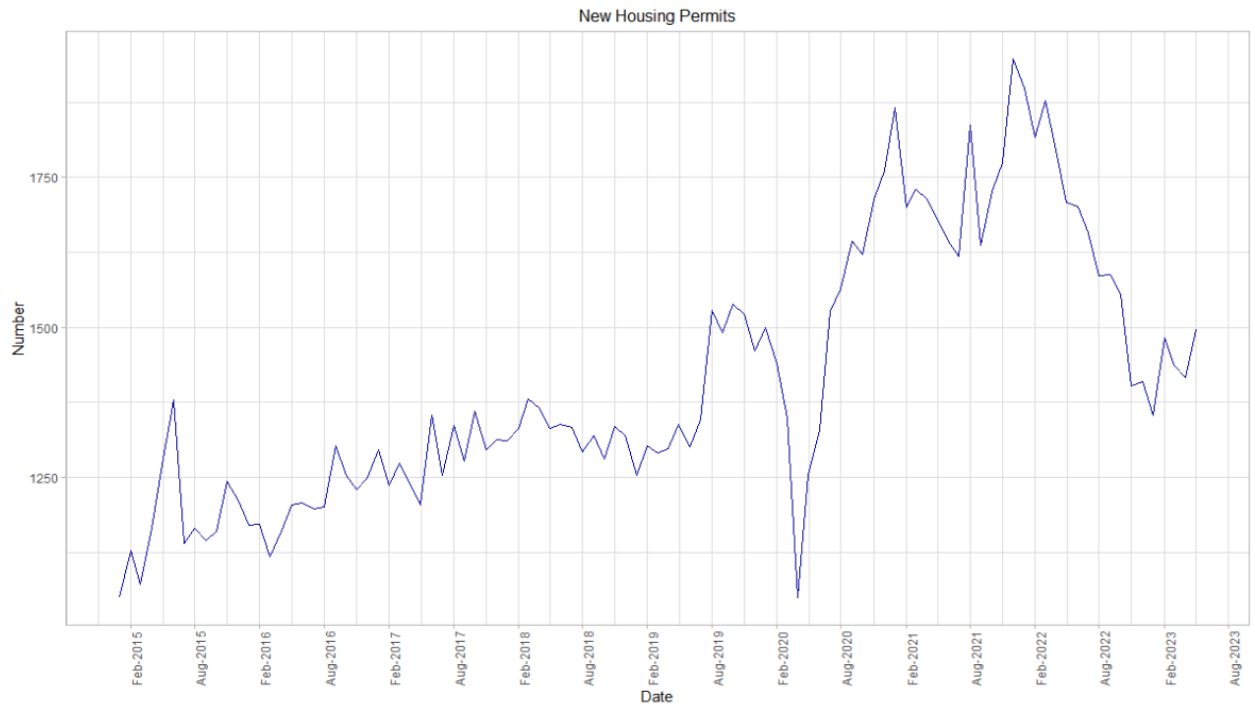
Figure 11: 30-year Fixed Mortgage Rate

30 Year Fixed Rate

Source: Federal Reserve Economic Database (https://fred.stlouisfed.org/)
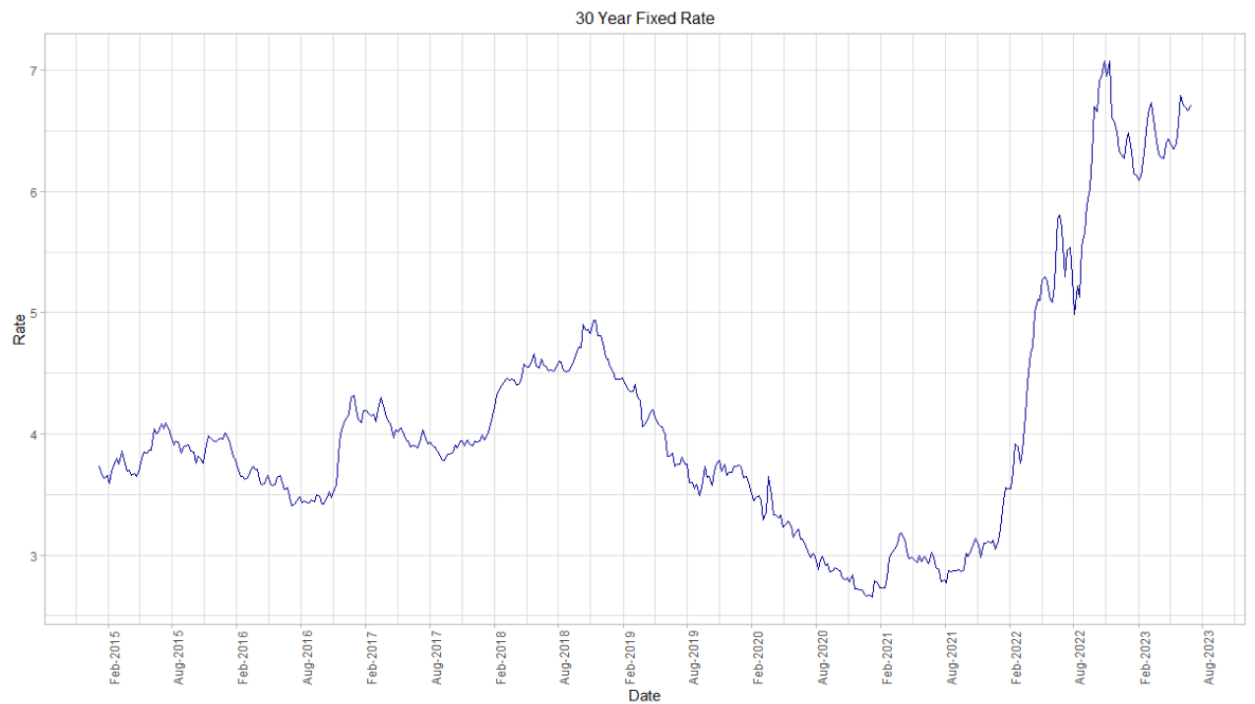
Figure 12: US National Residential Median Price per Square Foot, July 2016-Present

Median Price Per Square Foot Residential Housing

Source: Federal Reserve Economic Database (https://fred.stlouisfed.org/)
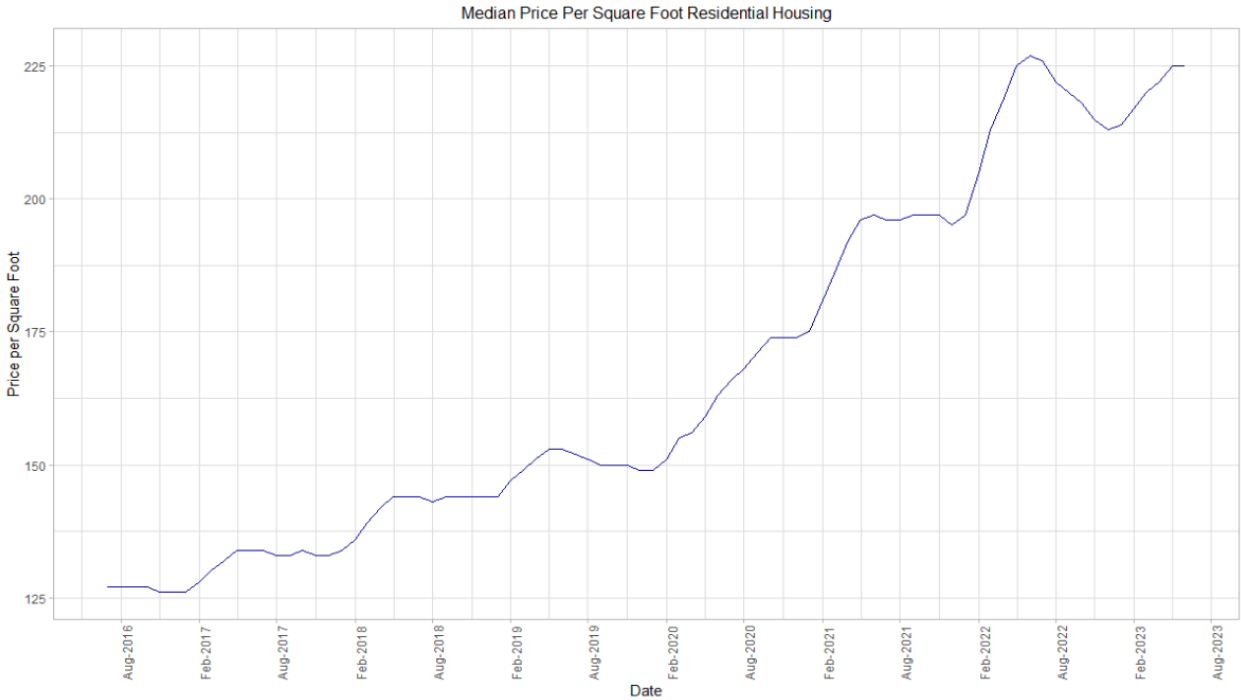
Figure 13: US National Residential Rental Prices, 2008-Present

Rate of Inflation: Residential Rental Prices

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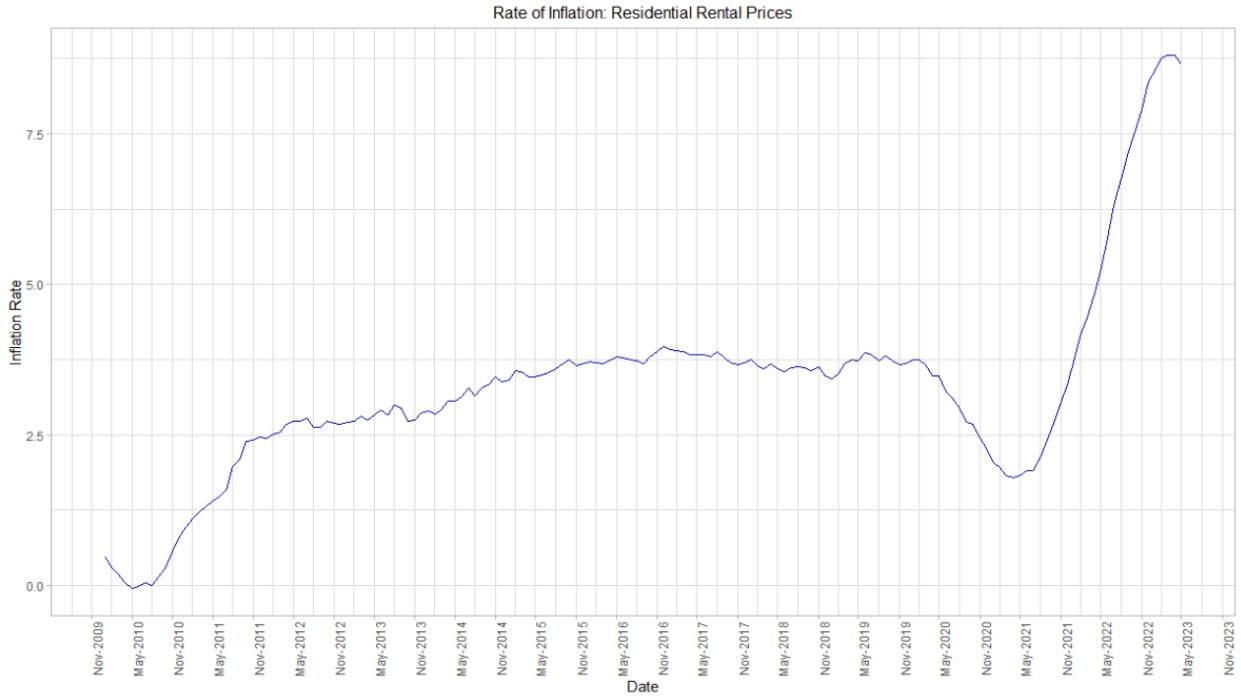
Inflation: Summary

Consumers are extremely aware of the inflationary trends of the US. The inflationary expectations (as shown in Figure 14 and Figure 15, from the University of Michigan) suggest that consumers have anticipated that inflation will start to fall by small amounts. This is probably less reflective of an awareness of how Federal Reserve Bank policies work and more a reflection that consumers have heard that an increase in interest rates "should" control inflationary trends. The Fed's policy has been broadly covered, by media sources on the left and right sides of the aisle (i.e., CNN[5], Fox[6], and Newsmax[7]); consumers have been alerted to these policies and range of outcomes stemming from these policies (e.g., a recession[8]). Perhaps because of these revelations (or because consumers are having difficulties with their budgets), consumer confidence in the economy has continued to decline. However, there is a recent sliver of hope: we are seeing inflationary pressures easing and are starting to see a rebound in consumer confidence.

Figure 14: US Consumer Inflation Expectations

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

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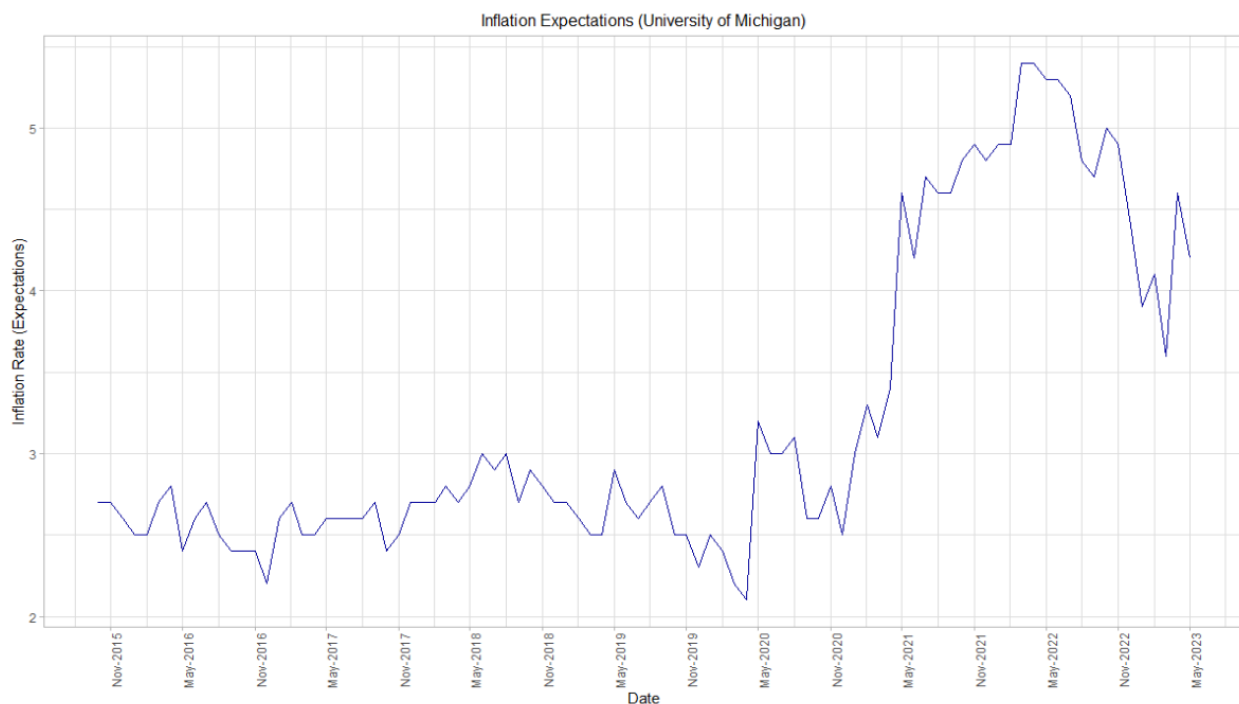
[5] https://www.cnn.com/2022/06/15/economy/fed-rate-hike-decision-june/index.html
[6] https://www.foxbusiness.com/economy/fed-could-break-economy-aggressive-rate-hike-campaign-analyst-says
[7] https://www.newsmax.com/finance/streettalk/federal-reserve-75-basis-point-rate-hike-inflation-jerome-powell-recession/2022/06/15/id/1074589/
[8] Supra 16, 17, and 18

Figure 15: US National Consumer Confidence
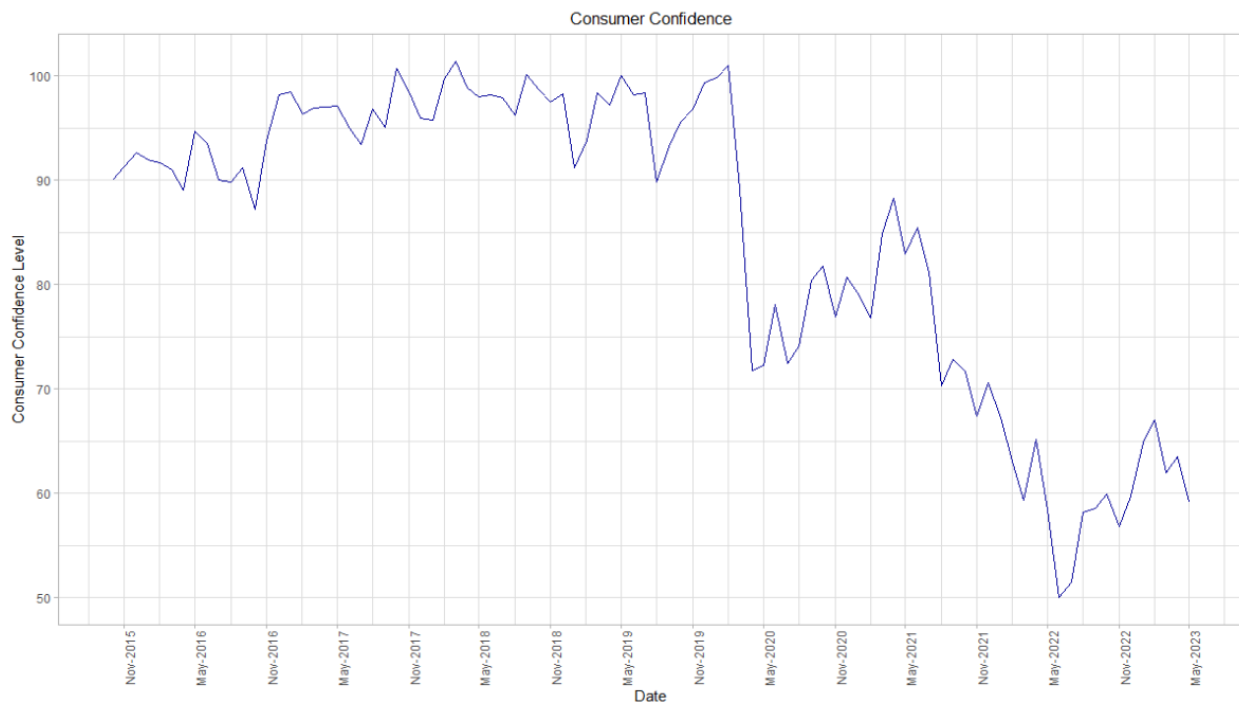
Our models (both the 24-month and 36-month horizon) for forecasting inflation have proven to be quite accurate regarding the trend of inflation (See Figure 16 and Figure 17); inflation will continue to fall during the next 6 months and consumer confidence will continue to rise. Our model predicted that inflation in the US will move toward 5-6% this Summer and perhaps land at 4.25 – 5.25% by the end of 2023. (ref. Figure 18). We are seeing inflation move towards the Fed's 3% goal by the end of 1st quarter 2024.

Figure 16: 24-month ARIMA Model for US Inflation: Prediction from 3Q2022 (Left Panel) and Current Prediction (Right Panel)

Figure 17: 36-month ARIMA Model for US Inflation: Prediction from 3Q2022 (Left Panel) and Current Prediction (Right Panel)
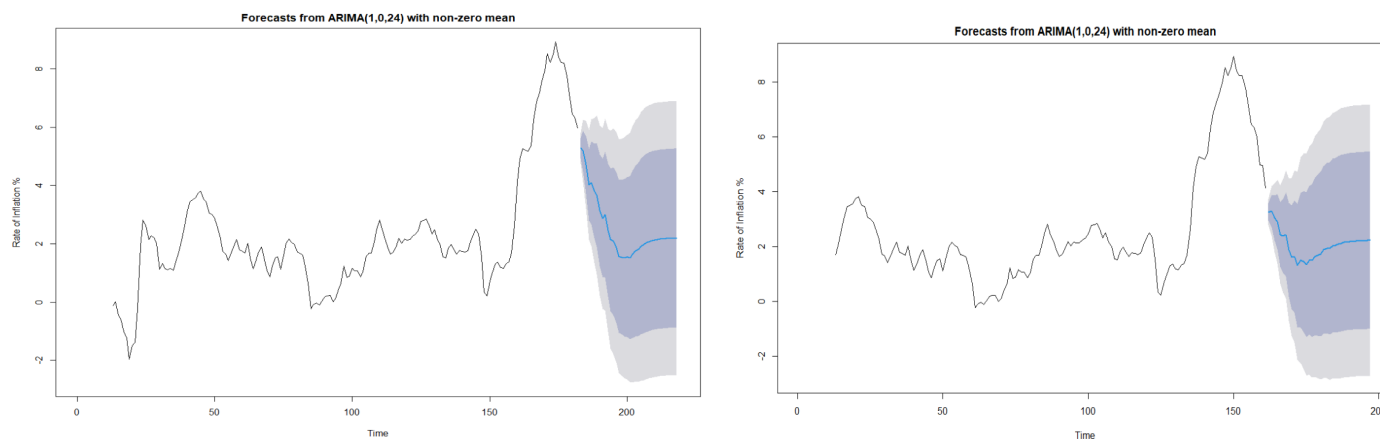
Source: Authors' calculations based on CPI
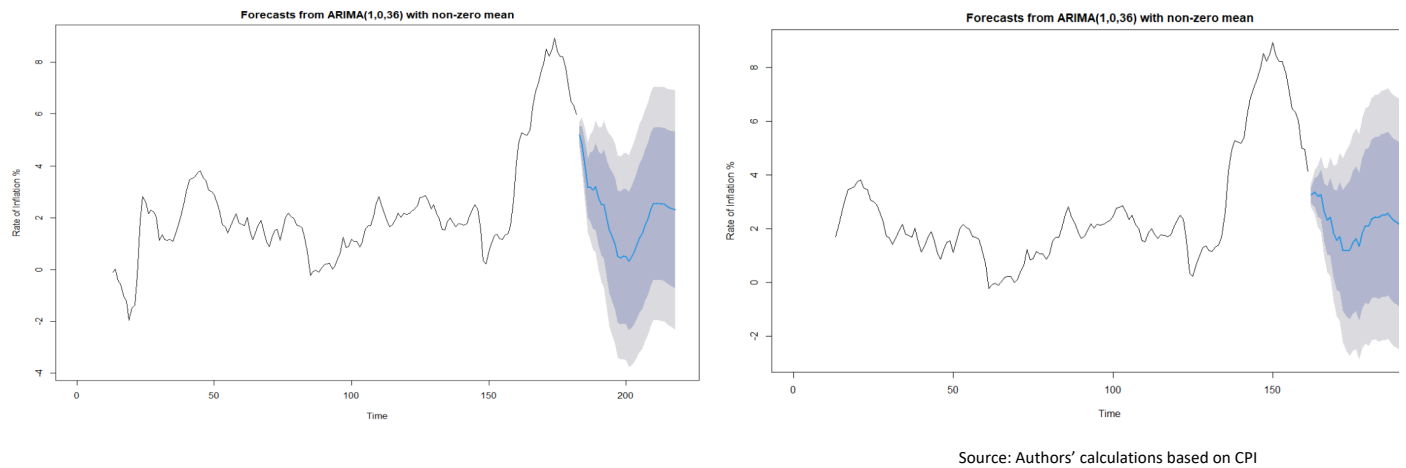
Figure 18: Effective Federal Funds Rate, 2010-Present

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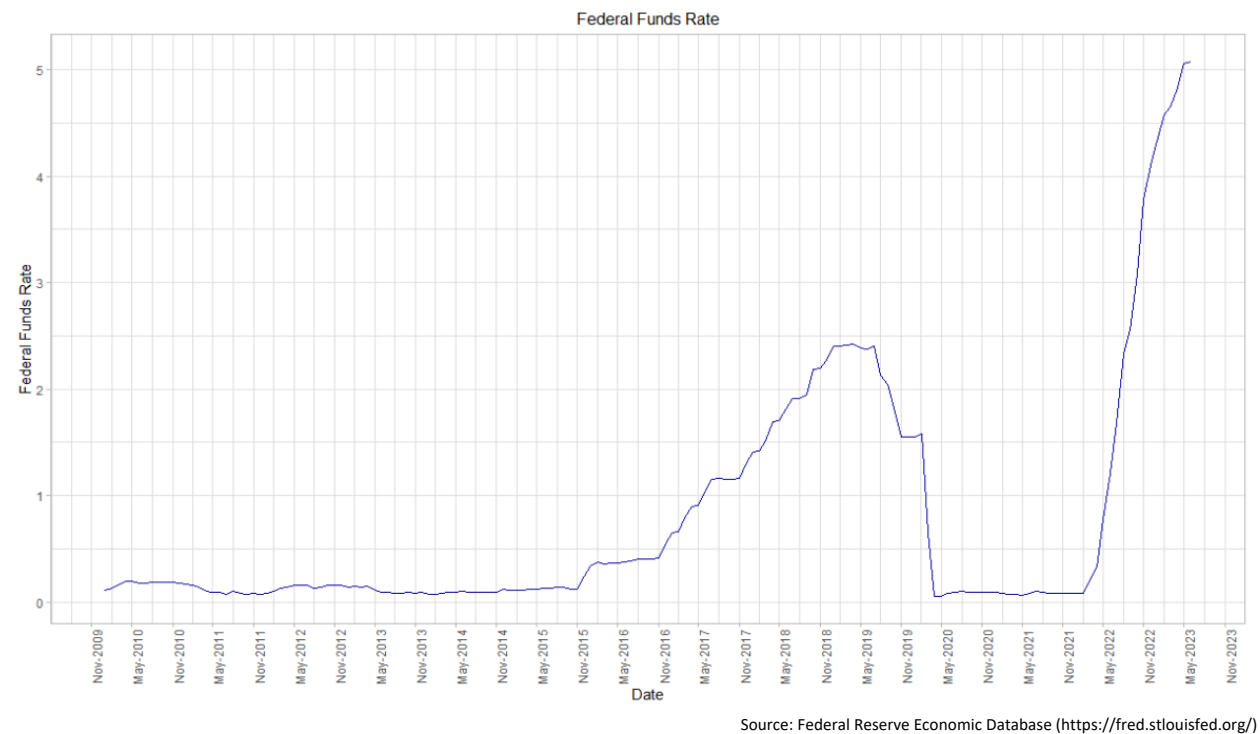
Macroeconomic Indicators: Other

The Real GDP of the United States is still growing, although we did experience two periods of negative quarter-over-quarter growth for the real GDP during 1Q2022 and 2Q2022 (see Figure 19 and Figure 20). Although the definition of a recession isn't technically tied to this metric, it is important to note that the US real GDP did "freeze" at the beginning of last year. Although we've suggested that the economy has

been operating in a growth recession, we are less certain that this is still the case. The current GDP growth is slightly under 2.5 percent annually.

Figure 19: Y/Y Change in Real GDP

Source: Federal Reserve Economic Database (https://fred.stlouisfed.org/)
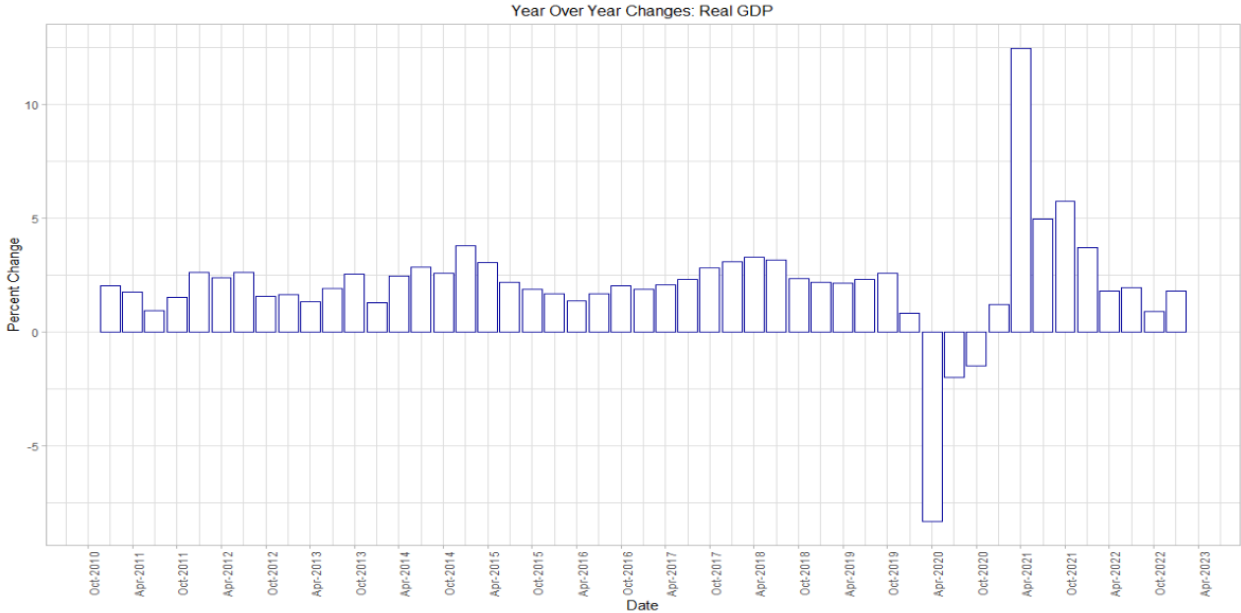
Figure 20: Q/Q % Change in Real GDP

Source: Federal Reserve Economic Database (https://fred.stlouisfed.org)
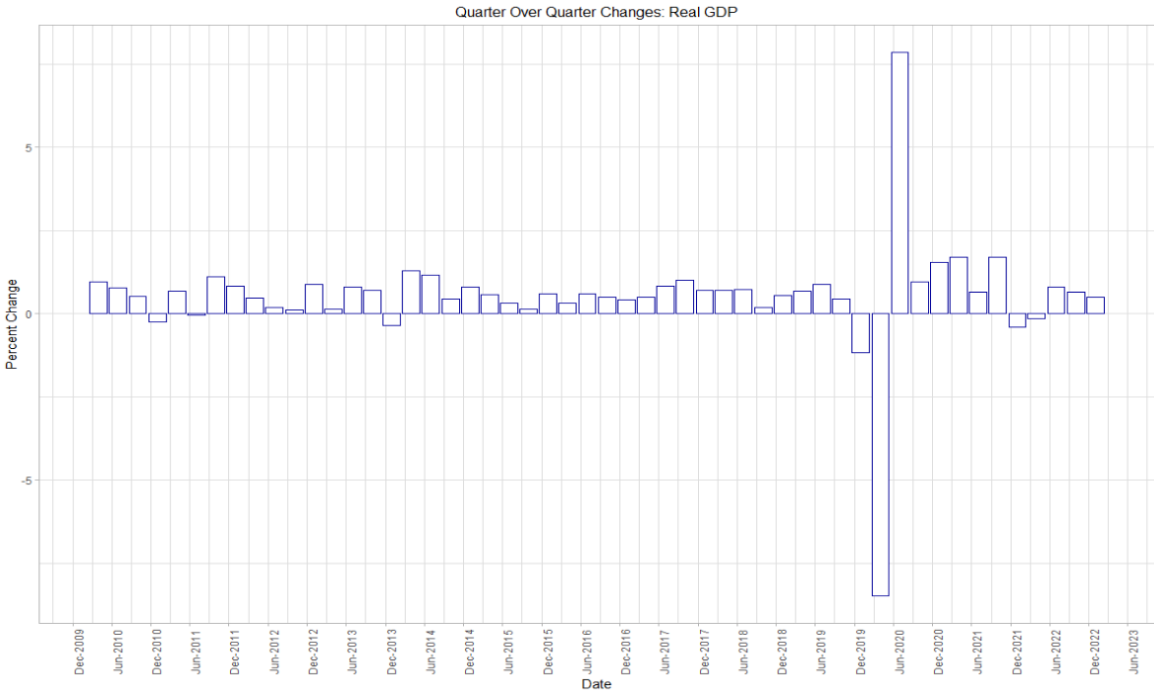
Figure 21 and Figure 22 identify capacity utilization and industrial production have reached and surpassed pre-pandemic levels. We will need to keep a closer eye on these trends; historically, downward trends in these indicators are consistent with economic recessions.

Figure 21: Capacity Utilization

Source: Federal Reserve Economic Database (https://fred.stlouisfed.org)
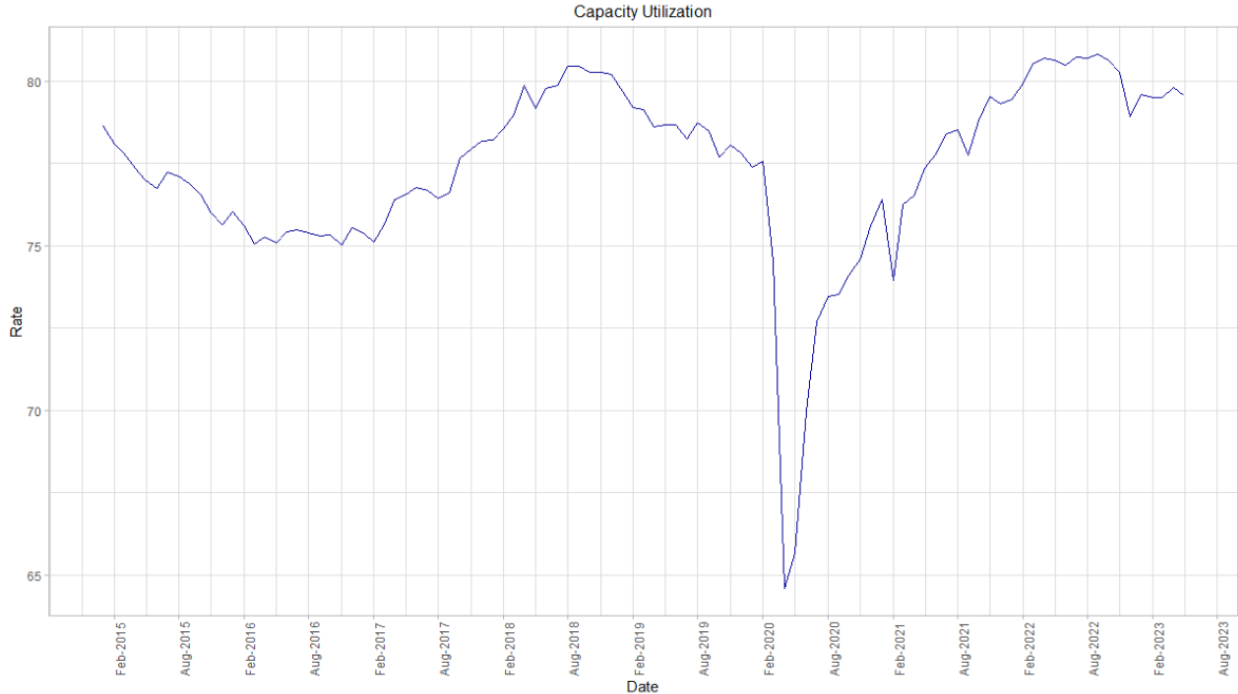
Figure 22: Industrial Production Index
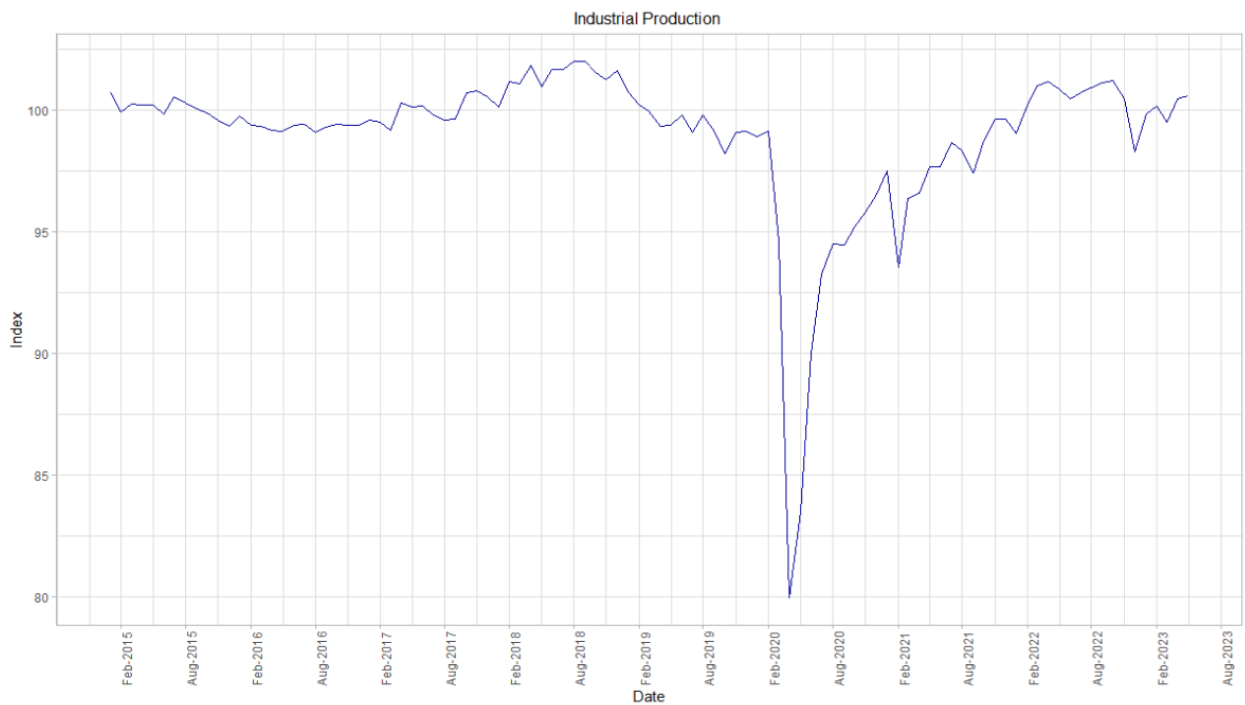
Inflations & Real Wages

Figure 23 and Figure 24 show national overall average real wages, and national average real wages by industry. The real wages for the US have shown a continued downward trend. Although nominal wages are increasing slightly, the buying power of those wages have decreased significantly as the result of the near double-digit inflation. The construction sector and the manufacturing sector are showing slight upward trends in real wages. There is some concern that the US might be heading caught in an inflation-wage spiral – where overall inflation has upward pressure on wages, which, in turn, puts upward pressure on prices, which leads to more wage inflation. There is little evidence that the entire economy is caught in a wage-inflation web. Rather, there seems to be some wage inflation in a select number of industries. Most sectors are starting to experience an upward trend in real wages, although real wages are still down from the levels experienced during the first 6 months of the COVID pandemic.

Figure 23: Real Hourly Wages (Nationwide)

Source: Federal Reserve Economic Database (https://fred.stlouisfed.org)
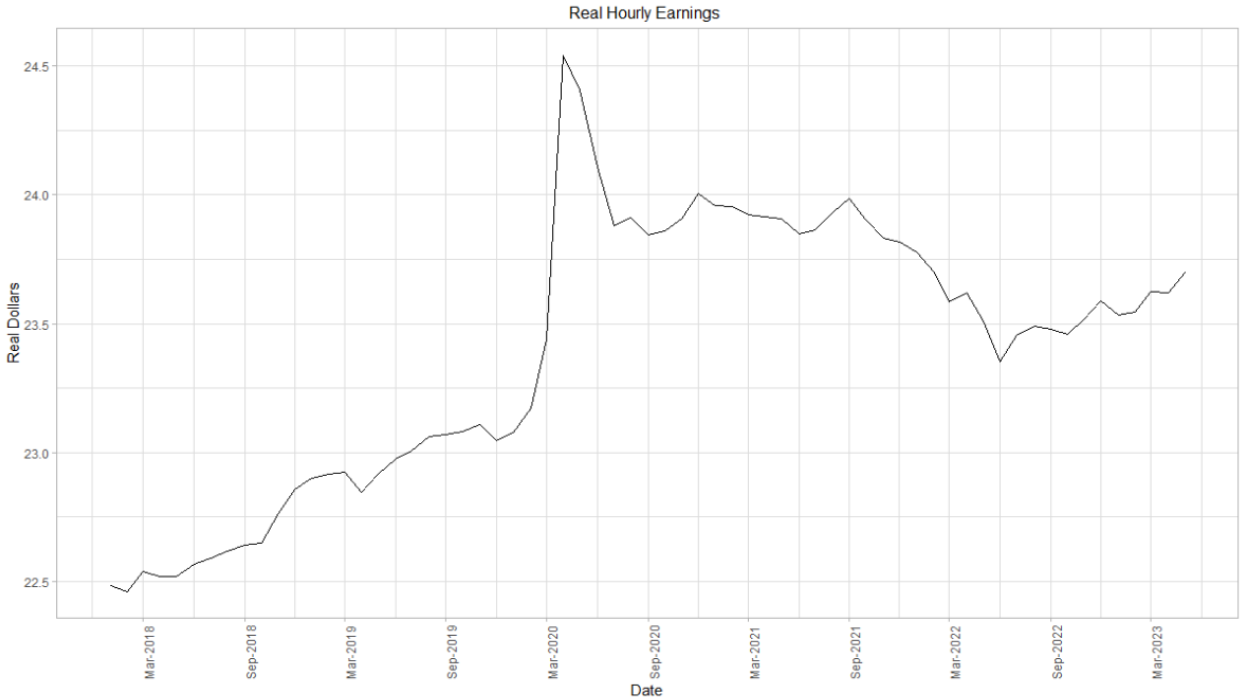
Figure 24: Real Hourly Wages for Select Industries (Nationwide)

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

MACROECONOMIC FORECASTS, 2Q2023 – DRAFT VERSION
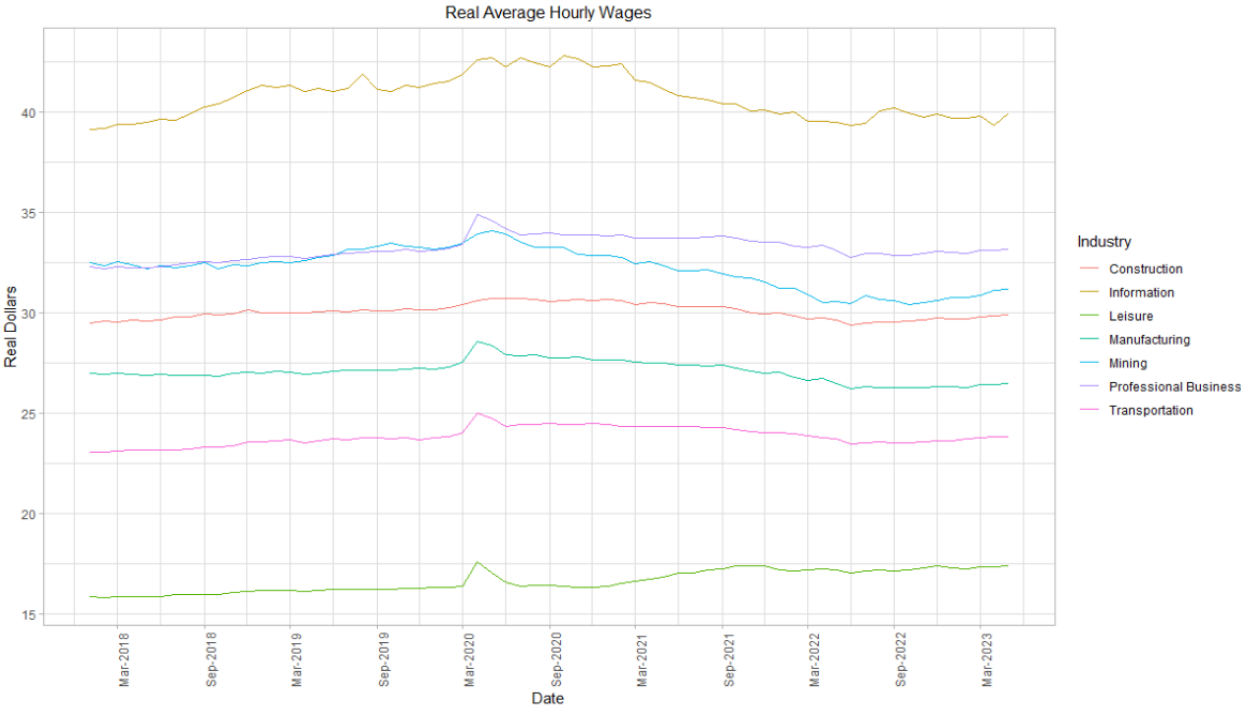
Unemployment and Labor Force Participation

Although the current unemployment rate (3.6%) is nearly as low as the month before the start of the pandemic (3.5%, March 2020, per Figure 25), the employment situation is still unstable and is a continued cause for concern. The labor force participation rate (Figure 26) has not reached pre-pandemic levels. The labor force participation rate is ticking up a little bit, but not at the magnitude needed to fulfill the plethora of job vacancies. The differences in the labor force participation rate across genders and races shows that only black men and Hispanic men have surpassed their participation rates prior to the pandemic.

The labor market participants have continued to be stubborn; we are seeing some movements in the labor force participation, but the gains are marginal.

Figure 25: US National Unemployment Rate

Source: Federal Reserve Economic Database (https://fred.stlouisfed.org)
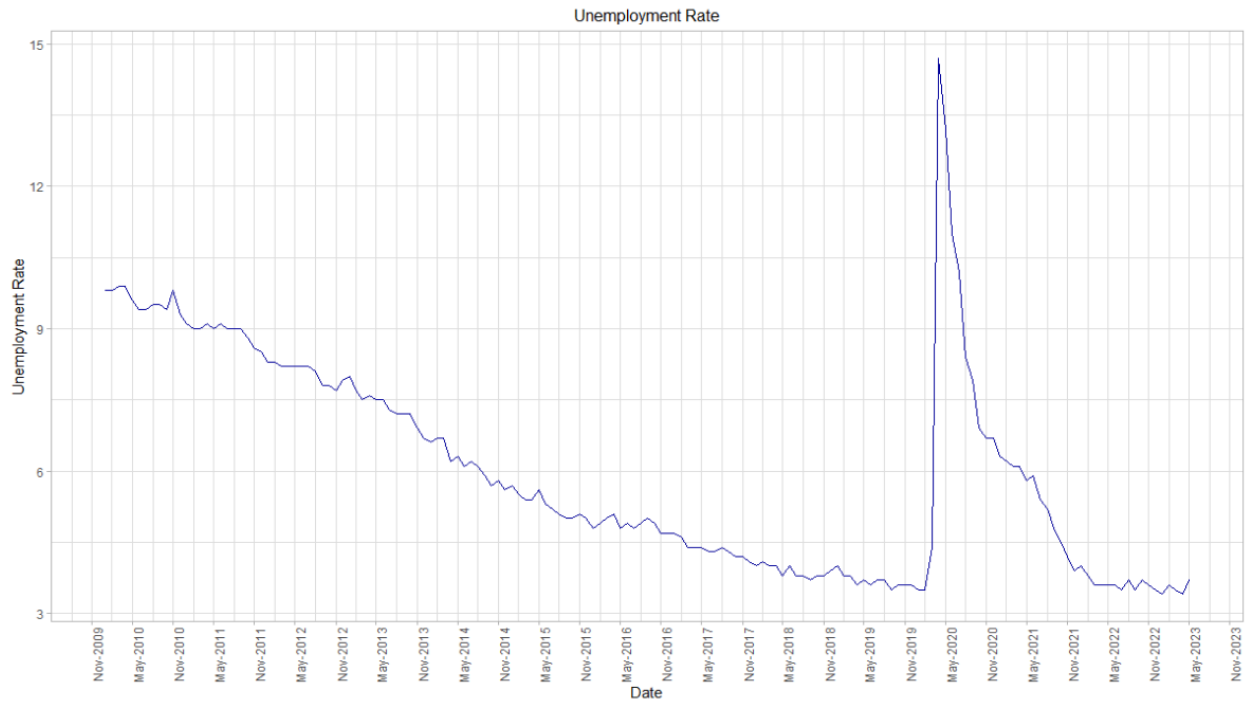
Figure 26: US National Labor Force Participation Rate

Labor Force Participation Rate

Source: Federal Reserve Economic Database (https://fred.stlouisfed.org)
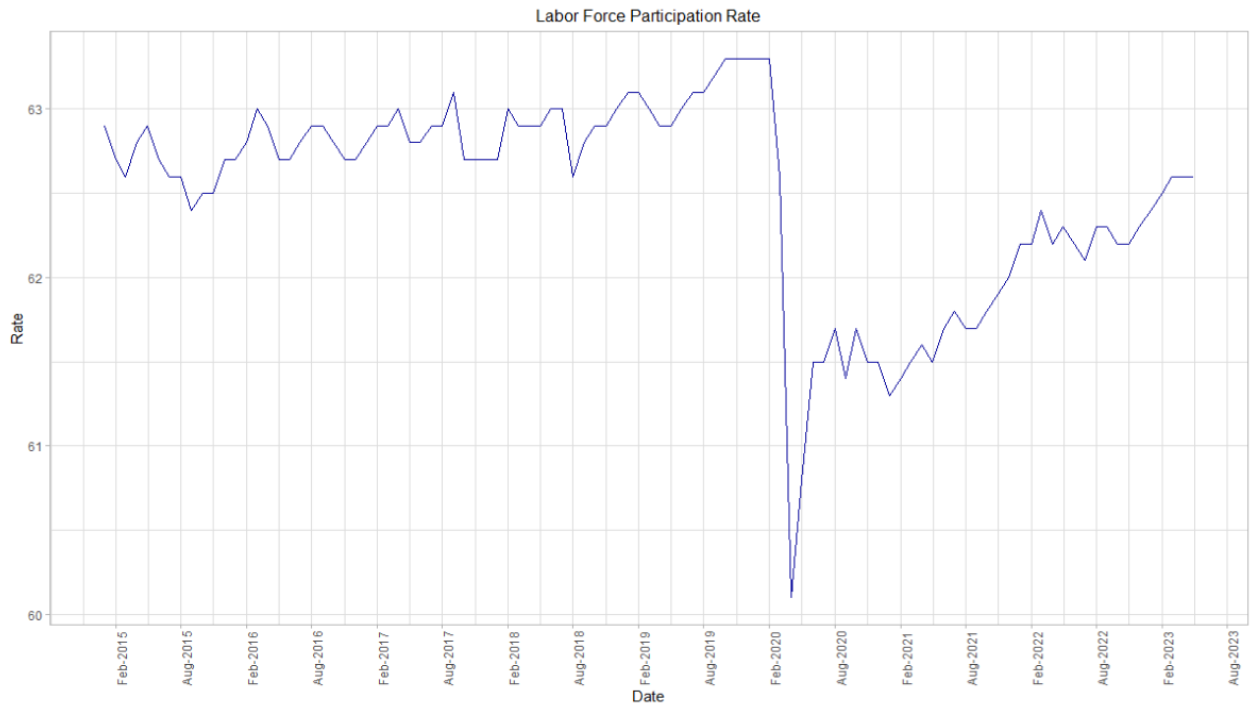
Figure 27: US Employment to Population Ratio (%)

Employment-Population Ratio

Source: Federal Reserve Economic Database (https://fred.stlouisfed.org)
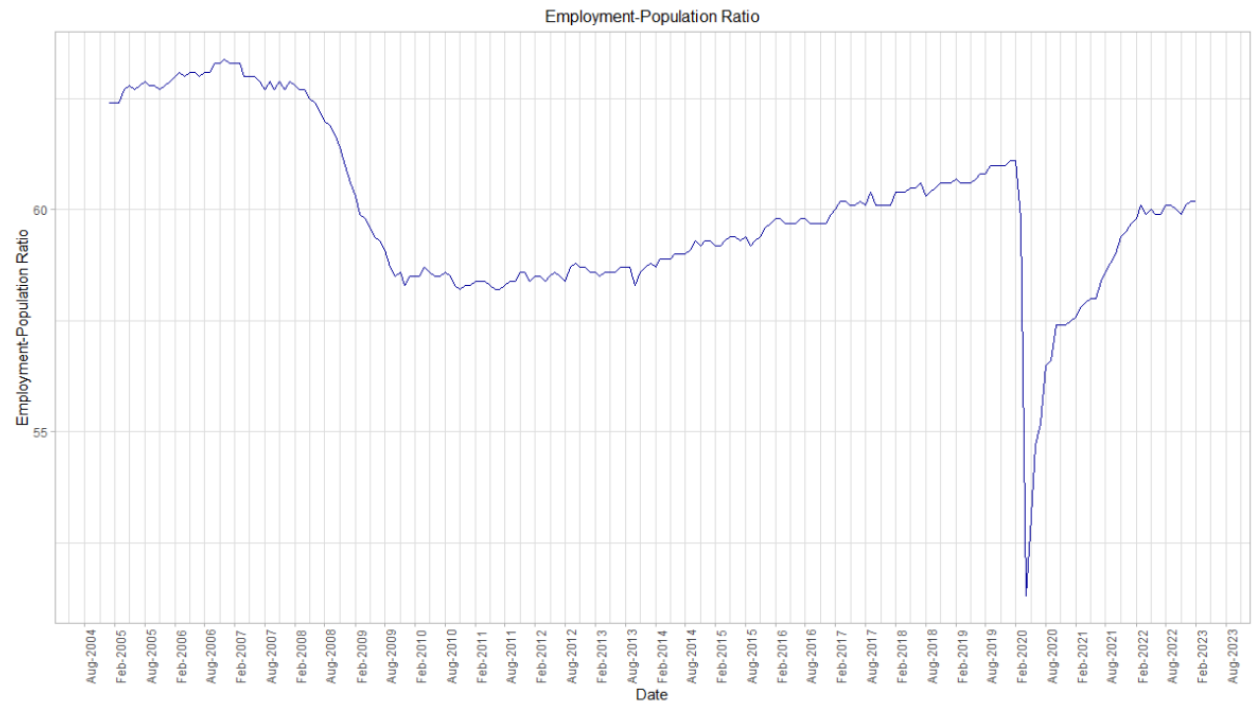
Figure 28: Employment Level (Nationwide)

Source: Federal Reserve Economic Database (https://fred.stlouisfed.org)
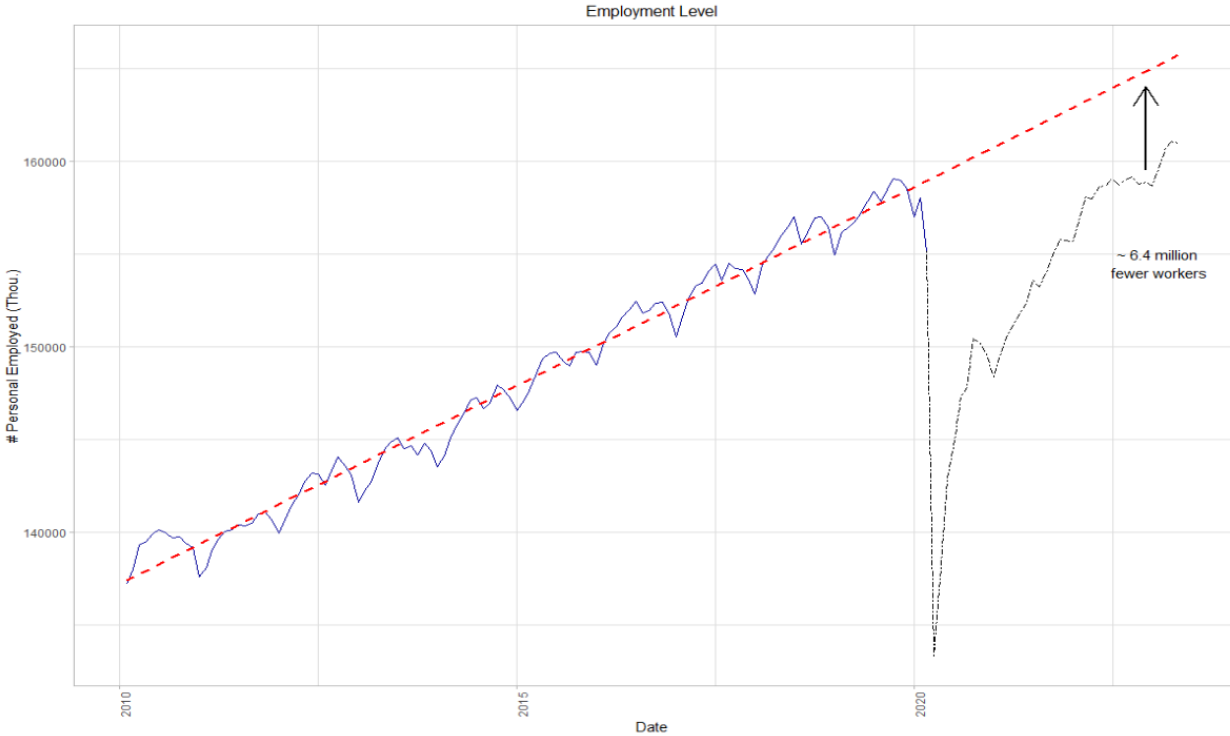
Disruptive ("Black Swan") Events

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

1. Biological Events: The world has seen a number of new "Influenza-Like Illnesses" (ILI), with the latest now directly affecting virtually every country on the global in a crippling fashion.

   A. SARS (2002 & 2004)
   B. "Swine flu" (H1N1, 2009)
   C. "Avian flu" (H5N1 in 1997; H7N9 in 2013; H5N6 in 2014; H5N8 in 2016)
   D. COVID-19 (2019-2022), with several different strains (most recently, "Omicron")
   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[9]. It is expected that the same types of propaganda that was made noteworthy in 2016 will continue to be seen in future elections at all levels of government, and as part of other key events.

3. Disruptive Malware and Ransomware: Malware has been an issue for computers for decades, dating back to the initial hypothesized versions of "worms" in US universities of the 1960s and 1970s (as "thought exercises"). More recently, however, sophisticated attacks on businesses has (literally) become a business for some entities, foreign and domestic. "Ransomware" is the latest version of malware that "… [locks and encrypts] a victim's computer or device data, then demand a ransom to restore access."[10] 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)[11]. 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.

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[9] See https://www.nytimes.com/2020/09/01/technology/facebook-russia-disinformation-election.html
[10] See https://us.norton.com/internetsecurity-malware-ransomware-5-dos-and-donts.html
[11] See https://security.berkeley.edu/faq/ransomware/ and https://securityintelligence.com/articles/6-ransomware-trends-2020/

4. Societal Unrest, including Domestic Social Changes and Terrorism: During 2020, we saw many social protests turn violent on both ends of the political spectrum. Without warning, these movements have caused rapid and unexpected upheavals in social climates, and upended assumptions on which financial decisions were made. As these questions have been explored socially and officially, the discussions have led to questions of how deep the disdain in the country remains on both sides of the political fence, and what societal and legislative impacts these investigations may carry.[12]

5. Unanticipated Changes in Leadership: President Biden is currently 80 years old (the oldest seated President of the United States). While he is now expected to run for President again in 2024[13], his age is a recurring topic of conversation. 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[14] and wage protection[15], but we are most concerned about how she will be perceived on the international stage in negotiations with, e.g., Saudi Arabia, and countries in the Far East.

6. Supply Chain Disruptions: The blockage of the Suez Canal by the tanker Ever Given in March 2021 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[16]. Notice that the Suez, 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 globally).[17]

7. Cryptocurrencies: With the increasing visibility of distributed cryptocurrencies, several countries are currently investigating the benefits of implementing their own cryptocurrencies based on their own hard currencies. Over the past few years, several Caribbean countries have launched successful cryptocurrencies, including the Bahamas, Grenada, and St. Kitt's & Nevis[18]. Ecuador, Senegal, and China have canceled or withdrawn their currencies[19].

8. Global unrest: As we have now seen, Russia's invasion of the Ukraine has led to a dramatic impact on the energy and grain sectors globally. Though the west has not agreed to purchase Russian oil with a price cap, Russia is now refusing to sell its resources for anything other than a market price. The resulting rising energy prices can only drain the level of wealth of (primarily) Europe, and raise prices globally.

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[12] 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/

[13] https://www.cnn.com/2023/02/16/politics/joe-biden-age-question/index.html

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

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

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

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

[18] https://www.atlanticcouncil.org/cbdctracker/

[19] Ibid.

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[20]:

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

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

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

Correlations

Part of Capitalytics' analysis of macro-economic variables entails computing the correlation between variables, to establish the existence and level of interdependence of variables. In Appendix C of this document, we document the 166 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[21]
1-month, 3-year, and 5-year Treasury yield		1-year Treasury yield
3-month, 6-month and 7-year Treasury yield	**… depends on …**	3-year Treasury yield*
20-year and 30-year Treasury yield, and Moody's AAA yield		7-year Treasury yield*
30-year Mortgage rate		3-year Treasury yield*
Prime Rate		1-year Treasury yield

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

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[21] 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 "*".

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

Analysis

Looking at growth in gross domestic product (GDP), real GDP increased by 2.6% in 4Q2022, and 1.3% in 1Q2023 (from $20.18T -- in 2012 US$ -- to $20.25T). Per the BEA, the increase during 1Q2023 was due to increases in consumer spending, exports, government spending.[22] Nominal GDP rose from $26.1T to $26.5T.[23]

Nominal personal consumption increased by about 1.2% (i.e., $620B, from $52.6T to $53.25T) during 4Q2022, and then increased by 2.0% (i.e., $1.05T, from $53.25T to $54.3T) during 1Q2023. [24]   These increases were offset, though, by Q/Q inflation rates of 1.03% across 4Q2022 and 0.94% across 1Q2023,[25] resulting in quarterly increases in real personal consumption expenses of approximately 0.26% and 0.93%[26], respectively. While inflation is slowly declining, particularly in energy and food, end consumers are continuing to cautiously spend money, appearing to consciously weigh off (1) the belief that personal income is relatively stable in light of employment figures against (2) the genuine possibility of an interruption in income (more possible today than in recent years).[27]

Personal consumption spending of durable goods went from $6.54T in 4Q2022 to $6.78T in 1Q2023 (a difference of $237.5B), accounting for roughly 38% of the increase in personal consumption expenditures. Over the past few years, spending on durable goods was increasing dramatically Q/Q, but its growth has flattened since post-COVID inflation rates spiked[28]. Quarterly retail trade increased by 4.3% during 4Q2022, followed by a 1.8% *decrease* during 1Q2023; this change was expected with the muted holiday spending (4Q figures are usually up by 6-7% over 3Q, but inflation during 2022 hampered sales), and 1Q retail performance was in-line with pre-COVID trends (apx 2.0% decline Q/Q)[29]. Spending on services went from $35.3T to $36T during the same periods, with a change of $736.5B. Total spending has been dominated by services in recent history, and both have been on an approximate straight line (growth) path since the period from late-2019 through mid-2020, with spending on services increasing about $600B/quarter[30]. ***While durable goods spending will likely continue to fluctuate inversely with tariffs and interest rates, we have no reason to believe that services' revenue will decline substantially without significant contraction in employment.***

The quarterly trade balance went from a deficit of $213.5B to a deficit of $201B, a quarterly change of -5.9%.[31] The trade deficit peaked in 1Q2022 at $276B, but has gradually eroded since then as the rest of the globe has recovered from the COVID-19 pandemic.

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[22] https://www.bea.gov/news/2023/gross-domestic-product-second-estimate-corporate-profits-preliminary-estimate-first
[23] https://fred.stlouisfed.org/series/GDP
[24] https://fred.stlouisfed.org/series/PCE
[25] https://fred.stlouisfed.org/series/CPIAUCSL
[26] https://fred.stlouisfed.org/series/PCEC96
[27] See https://www.marketwatch.com/story/the-economy-was-supposed-to-cave-in-by-now-it-hasnt-and-gdp-is-set-to-rise-again-a3b7553
[28] https://fred.stlouisfed.org/series/PCEDG
[29] https://fred.stlouisfed.org/series/MARTSMPCSM44000USN
[30] https://fred.stlouisfed.org/series/PCES
[31] https://fred.stlouisfed.org/series/BOPGSTB

Federal government spending increased by about $200B (from $6.23T to $6.44T, +3.4% Q/Q) between 4Q2022 and 1Q2023.[32] State and local government spending has decreased slightly by about $15B (-0.4% Q/Q) across the same two periods, though spending has increased by about 9% during 2022.[33]

Inflation is still the biggest issue in the economy. While the FOMC is determined to control inflation, they are also facing significant political pressure to exercise that control while not endangering the current state of high employment[34]. While US inflation rates are no longer the 9% that were seen a year ago, we are still seeing +/- 5% annualized inflation rates. The rate of inflation that occurred over the 12 months ending with 1Q2023 was approximately 5.77%, where the annualized rates for the inflation during 1Q2023 is 3.81% (0.94% Q/Q). See Figure 29 for US quarterly inflation rates.

Figure 29: Q/Q Inflation Rate for all items, all urban consumers (1Q2021 – 1Q2023)
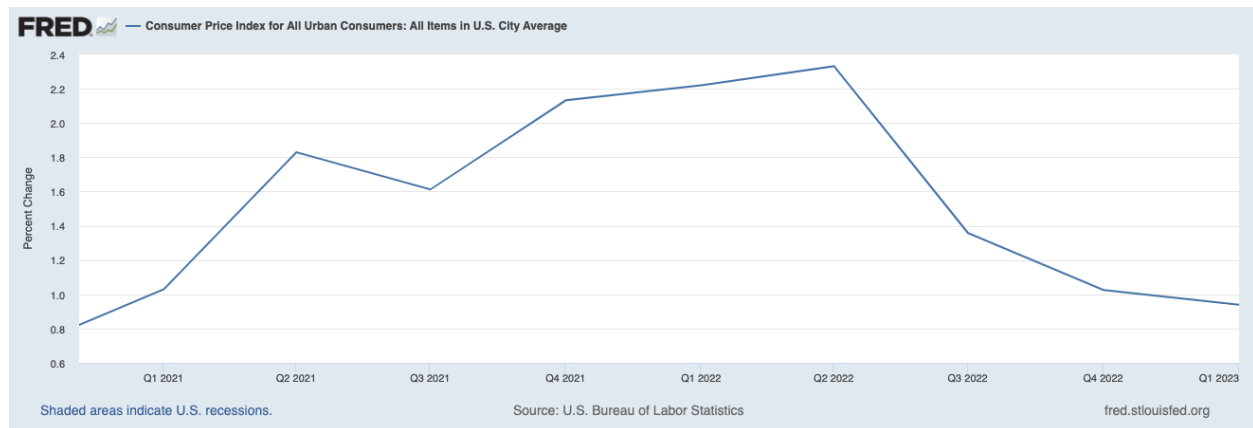
We continue to believe that inflation will be a significant issue through 2023. The fragility of the ongoing recovery is a key point of concern; we believe that it would be extremely easy to derail the recovery by the wrong key event occurring: unexpected wage pressures; continued/additional geopolitical conflict; additional bank failures (domestically or globally); or any of several of the events mentioned in our "Black Swan Events" section. At this point, we continue to believe that **the global economy will remain in a state of flux through 2024**. **We expect that annualized US inflation will average at least 5% through 2023, with a potential to drop to as low as 4% in a best case outcome in 2024,** and **real GDP growth rates during 2023 and 2024 will most likely come in at no more than 0.75% (Q/Q).**

Other Commentary

- "What was supposed to have brought a recession about by now is the rapid increase in interest rates since spring 2022. Higher borrowing costs usually depress the economy by making it more expensive for consumers and businesses to spend and invest. … Consumers, for their part, have largely shrugged off higher interest rates. They are still spending lots of money, especially on services such as dining out, travel and recreation. They are even buying more new cars, a clear

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[32] https://fred.stlouisfed.org/series/FGEXPND
[33] See https://fred.stlouisfed.org/series/SLEXPND
[34] https://www.cnn.com/2023/06/26/economy/fed-mandate-pence-employment/index.html

sign of optimism." (https://www.marketwatch.com/story/the-economy-was-supposed-to-cave-in-by-now-it-hasnt-and-gdp-is-set-to-rise-again-a3b7553; June 26, 2023)

- "Equity investors are hoping that central banks can return inflation to their 2% targets without inducing a recession. But history suggests that bringing inflation down will be painful. In Britain mortgage rates are surging, causing pain to aspiring and existing homeowners alike. Rarely has America's economy escaped unscathed as the Fed has raised rates. By one reckoning, the unemployment rate would have to rise to 6.5% for inflation to come down to the Fed's target, the equivalent of another 5m people being out of work." (https://www.economist.com/leaders/2023/06/22/investors-must-prepare-for-sustained-higher-inflation; June 22, 2023)

- "The World Bank sees better global economic growth than previously estimated in 2023, thanks to resilient U.S. consumer spending and China's faster-than-expected reopening in the early part of the year. ... The bank now projects the world's economy will grow 2.1% this year, up from the 1.7% pace it forecast in January. The new estimate still marks a slowdown from last year's 3.1% expansion." (https://www.wsj.com/articles/world-bank-brightens-view-of-global-growth-this-year-downgrades-2024-58ce3726; June 6, 2023)

Employment

Analysis

The FOMC has been steadily raising rates in an effort to slow the US economy, to be evidenced by expected increases in unemployment rates. While some parts of California, Alaska, and a few other states are showing increased unemployment since March, the country's resilience appears on display in full force. We see county-level unemployment rates in Figure 30 which have shown recovery since earlier in the year in Ohio, Minnesota, Washington, and parts of the Deep South. Further, the number of open positions seems to be continuing to decline extremely slowly since peaking in early 2022[35]. Despite unemployment rates rising by 0.3% to 3.7% during May 2023, we are still seeing extremely low unemployment nationally (see Figure 31), although the employment-to-population ratio appears to have risen slightly over the past 12 months (Figure 32).

Figure 30: US Unemployment Rate per County (March 2023 and June 2023, respectively)

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[35] https://data.bls.gov/timeseries/JTS000000000000000JOL
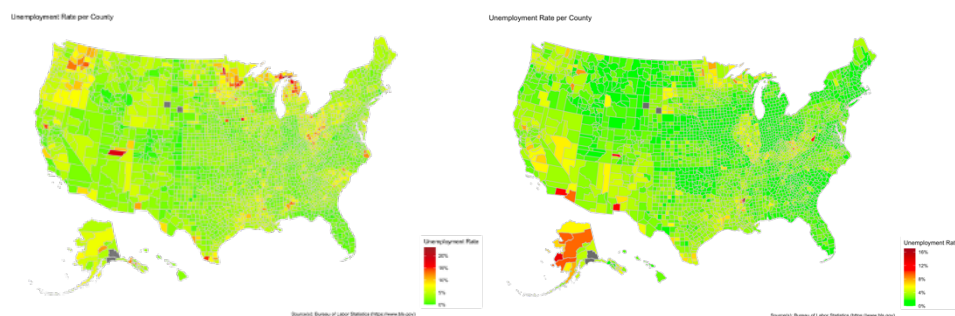
Figure 31: US Unemployment Rate

Source(s): Federal Reserve Economic Database (https://fred.stlouisfed.org)
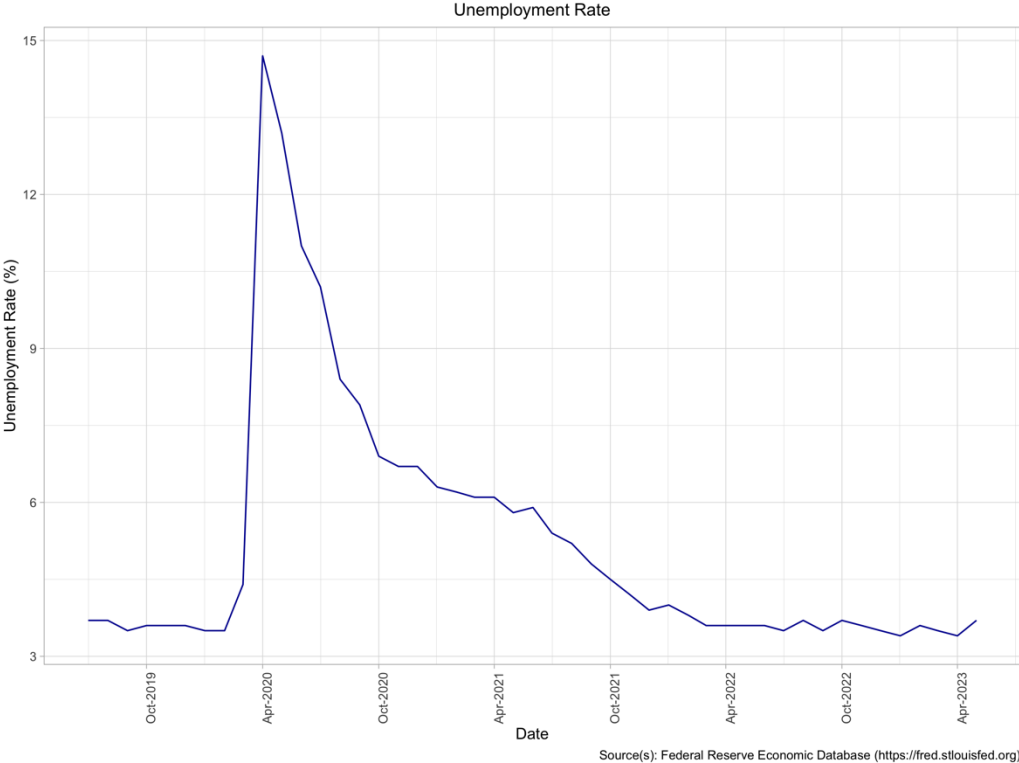
Figure 32: US Employment to Population Ratio (%)

Source(s): Federal Reserve Economic Database (https://fred.stlouisfed.org)
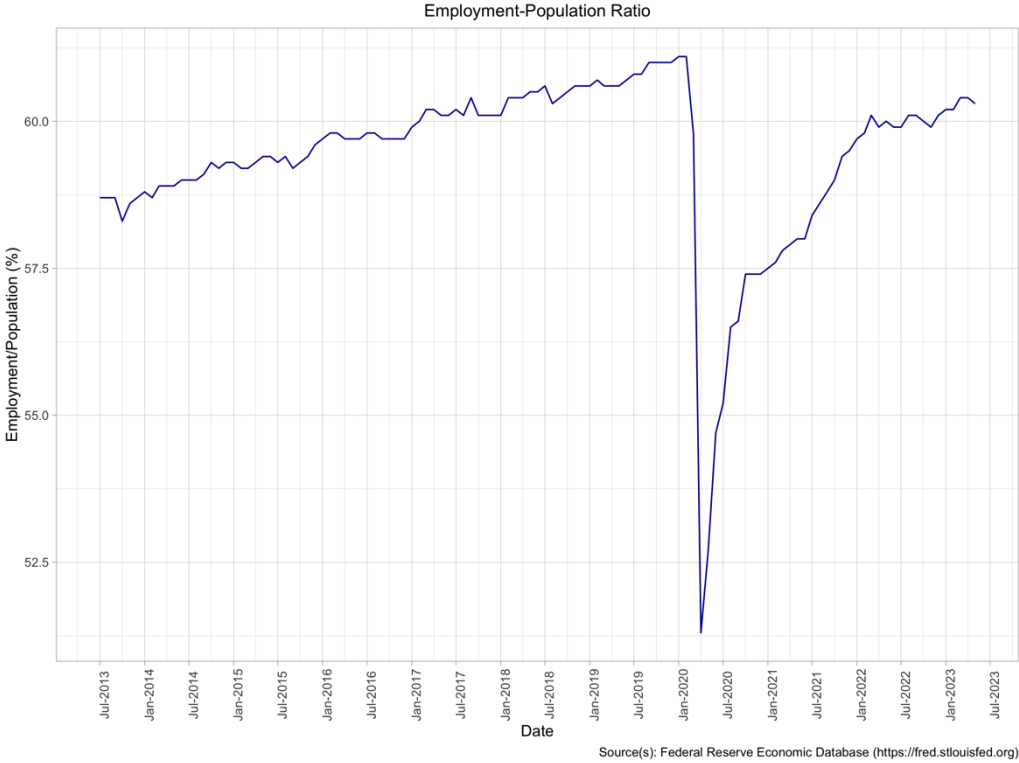
The more interesting point in the most recent jobs report is that the unemployment rate increased by 0.3% during May of 2023. This change is due to an increase in the number of unemployed of 440,000 to 6.1M persons, but the labor force size increased by only 130,000 to 166.8M persons[36], indicating the possibility that the FOMC's approach for addressing unemployment may be working. It should be noted that employers have announced layoffs of over 125,000 during 2H2022, 136,000 during 1Q2023, and 50,000 during 2Q2023[37], despite the economy adding 217,000 jobs in March 2023, 294,000 jobs in April 2023, and 339,000 in May 2023[38].

Jobless claims, both initial and continuing have been fairly level for approximately 12 months, reflecting the stability of the employment situation in the US despite Chairman Powell's attempts to move unemployment levels via lending rates. (See Figure 33 and Figure 34.)

Figure 33: US National Initial Unemployment Claims

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[36] See https://www.bls.gov/news.release/empsit.t01.htm and https://www.bls.gov/news.release/empsit.nr0.htm

[37] https://www.forbes.com/sites/brianbushard/2023/06/27/2023-layoff-tracker-new-relic-cuts-150-jobs-while-ford-slashes-1000-report-says/

[38] https://www.bls.gov/news.release/pdf/empsit.pdf
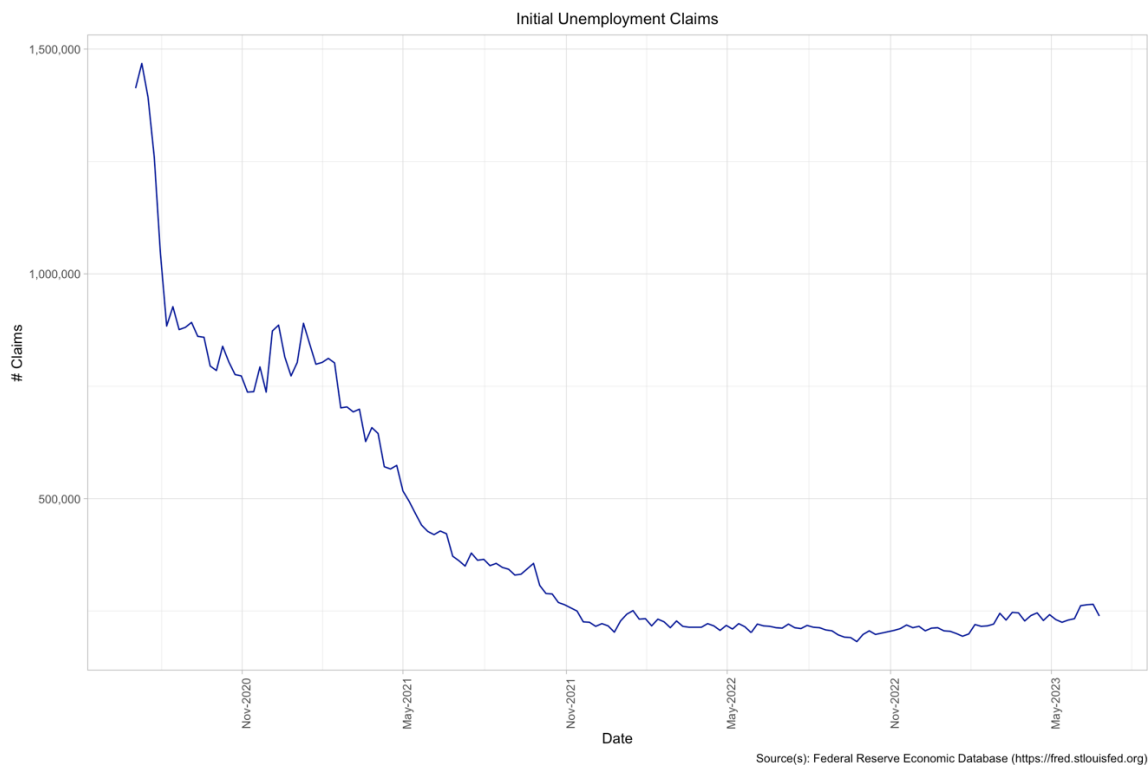
Figure 34: US National Continued Unemployment Claims
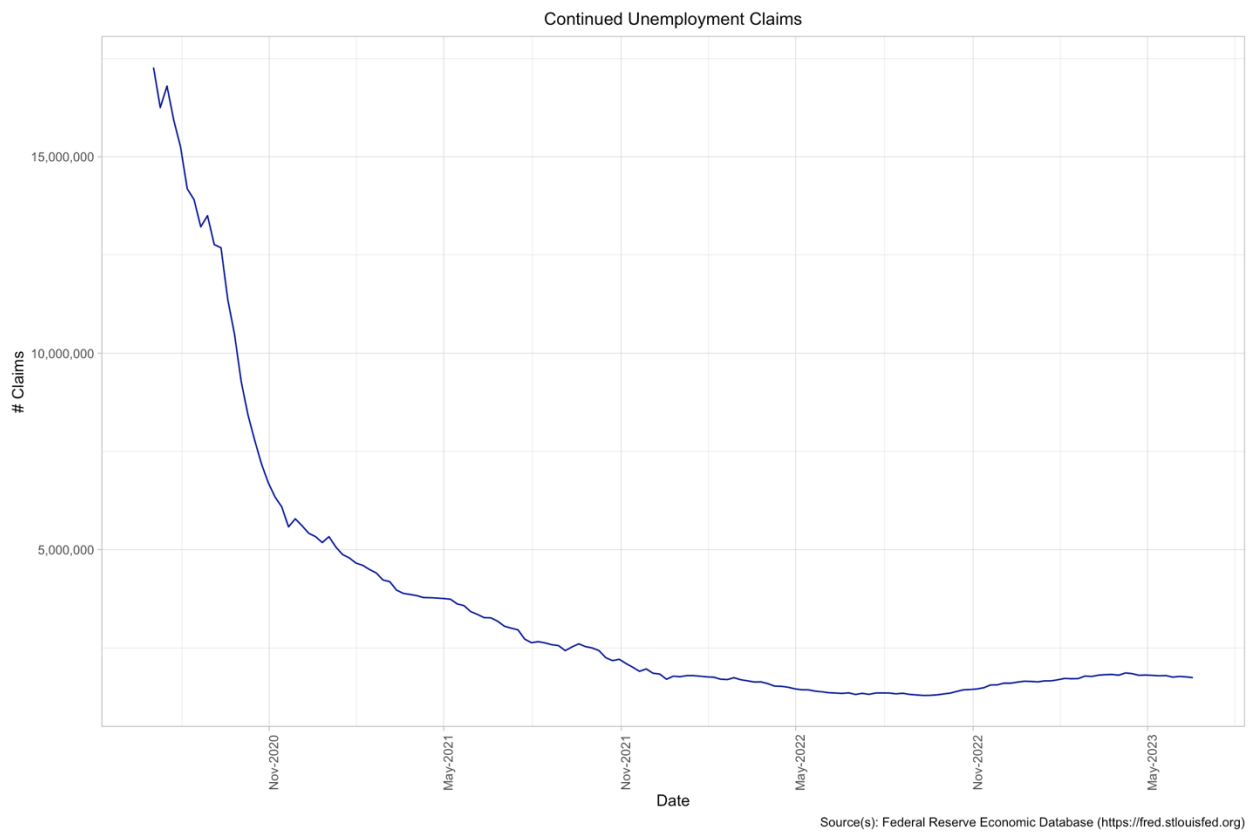
Per Figure 35, we see that unemployment in Southeastern cities is notably (as a representation of trends in the entire nation) lower after peaking in January and February of 2023. With the low unemployment rate, we see nominal wages increasing in most industries (see Figure 36), although it is challenging to find those that are keeping up with inflation (Figure 37). Many industries have been stable over the past several months (per Figure 38), with the exception being the growth seen in the hospitality and travel space; this note speaks to the "pent up" demand for travel that has perpetuated over the past 12 months, and is expected to continue for higher-end customers[39]. However, when per-industry unemployment is viewed as a function of education (Figure 39), we see dropping unemployment for less educated workers, and rising unemployment for better educated workers, pointing to "upskilling" trends that have been reported in the press[40].

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[39] See, e.g., https://www.bloomberg.com/news/articles/2023-06-16/soaring-travel-stocks-risk-stalling-as-pent-up-demand-wanes and https://www.marketwatch.com/story/delta-air-lines-raises-guidance-for-2023-and-reiterates-2024-targets-ahead-of-investor-day-23b4ca0a
[40] See, e.g., https://finance.yahoo.com/news/workera-ai-announces-pioneering-skills-120000431.html

Figure 35: Unemployment Rate per US SE MSA
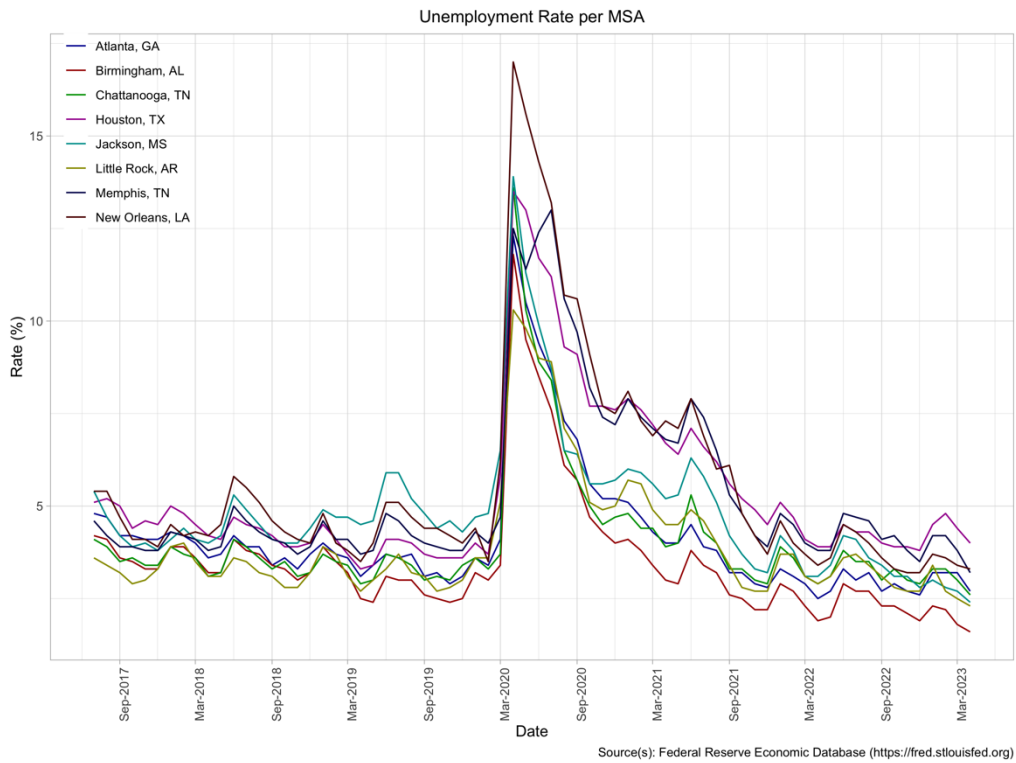
Figure 36: Hourly Wages per Industry
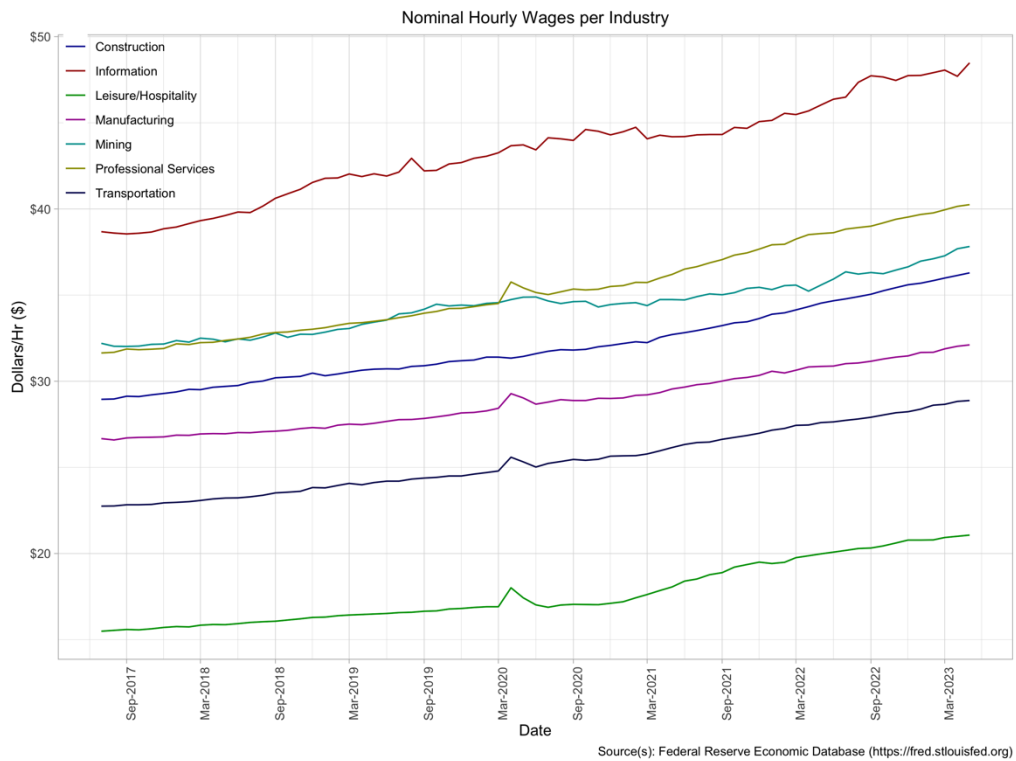
Figure 37: Real Hourly Wages per Industry
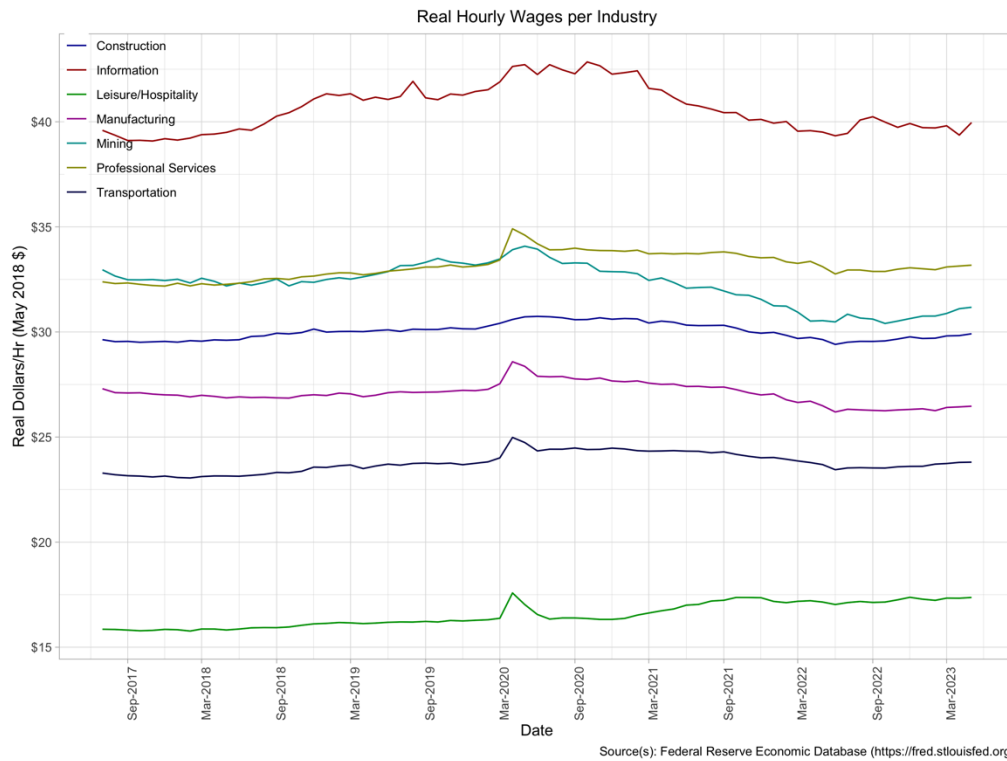
Figure 38: US Employment Level by Industry
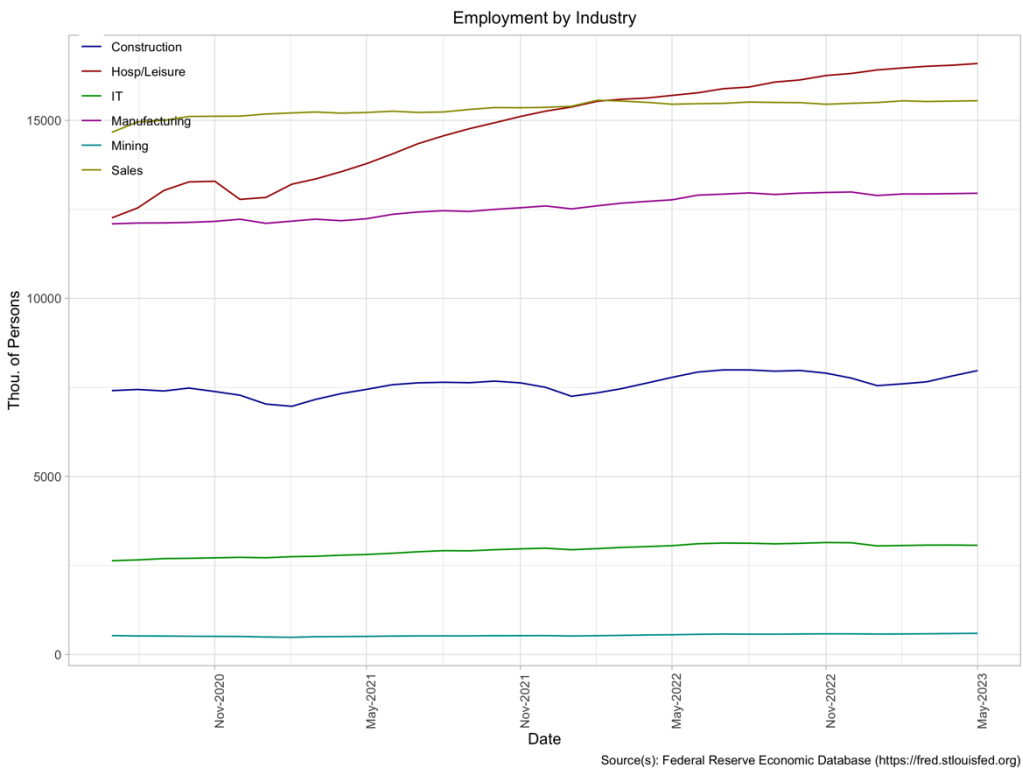
Figure 39: US Unemployment Rate by Education
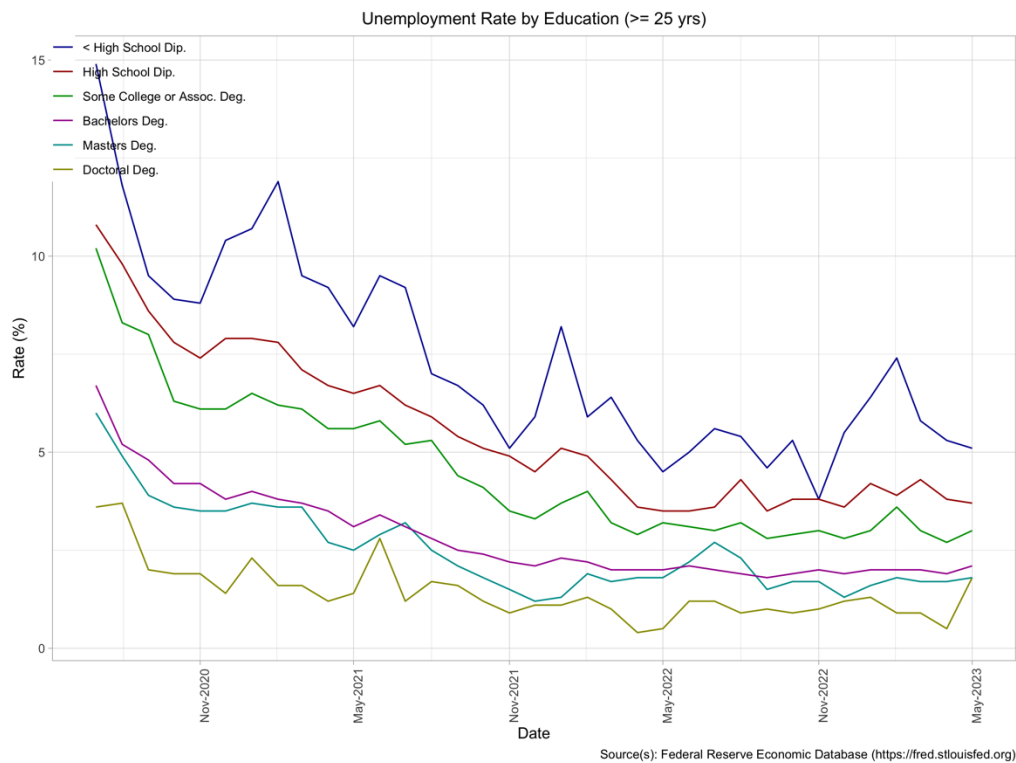
Other Commentary

- "Layoffs retreated last week and economic growth was stronger than initially reported in the first quarter, the government reported Thursday. … 'If you look at the data over the last quarter, what you see is stronger than expected growth, tighter than expected labor markets and higher than expected inflation,' Federal Reserve Chair Jerome Powell said Wednesday at a conference in Portugal." (https://www.wsj.com/articles/u-s-economy-shows-surprising-vigor-in-first-half-of-2023-1a8a32eb; June 29, 2023)
- "Outside of motor vehicles, manufacturers are laying off more workers than they are hiring, indicating that production of goods is expected to decline in the future because of declining order backlogs." (https://www.kiplinger.com/economic-forecasts/jobs; June 2, 2023)

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.

Inter-bank loan rates will also track with the primary credit rate for overnight lending.   The rate for inter-bank loans is generally driven by the target federal funds rate; the target federal funds rate is the target interest rate set by the Federal Open Market Committee (FOMC), and is intended as a guide for the rate at which commercial banks borrow and lend their excess reserves to each other on an overnight basis. The FOMC sets the target federal funds rate periodically based on key economic indicators that may show signs of inflation, recession, or other issues that can affect sustainable economic growth. The actual interest rate that a lending bank will charge is determined through negotiations between the two banks. The weighted average of interest rates across all transactions of this type is known as the effective federal funds rate.

The FOMC has raised the target federal funds rate ten times since their March 2022 meeting (see Figure 40 and Figure 41), most recently adding 25 bp to raise the rate to between 5.00% and 5.25% after their May 2023 meeting. The market's expectations are that rates will rise slightly (i.e., between an additional 25 and 50 bps) from current day levels before YE 2023, which is roughly in-line with the FOMC's expectations (though the FOMC is slightly more optimistic). Additionally, the FOMC believes that rates will drop to between 4.5% and 4.75% as inflation comes under control.

Consumer expectations are for overall inflation to remain heightened between 4% and 4.5% for the next year (see Figure 42), and we do not disagree.

Figure 40: FOMC "Dot Plot" from March 2023 Board of Governors' Meeting

Source: https://www.federalreserve.gov/monetarypolicy/files/fomcprojtabl20230322.pdf
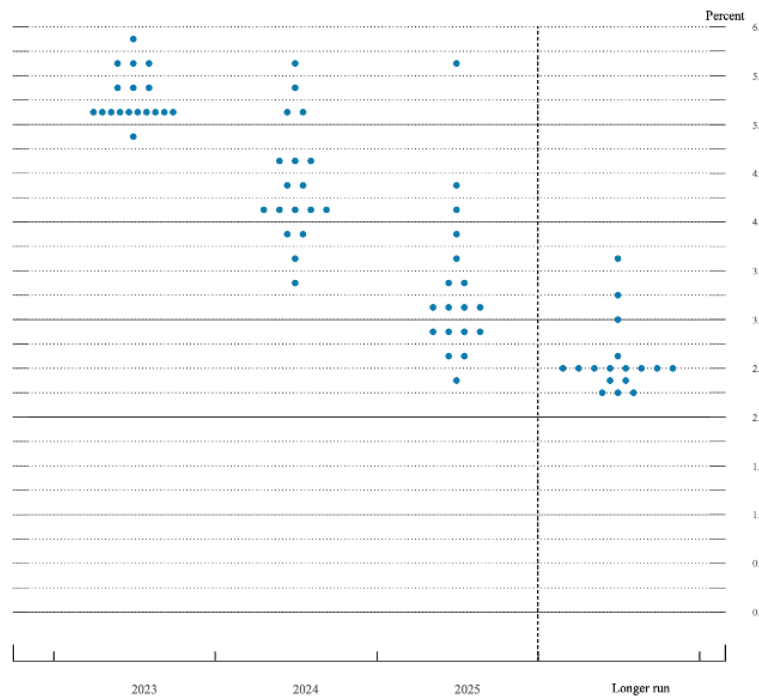
Figure 41: FOMC "Dot Plot" from June 2023 Board of Governors' Meeting

Source: https://www.federalreserve.gov/monetarypolicy/files/fomcprojtabl20230614.pdf
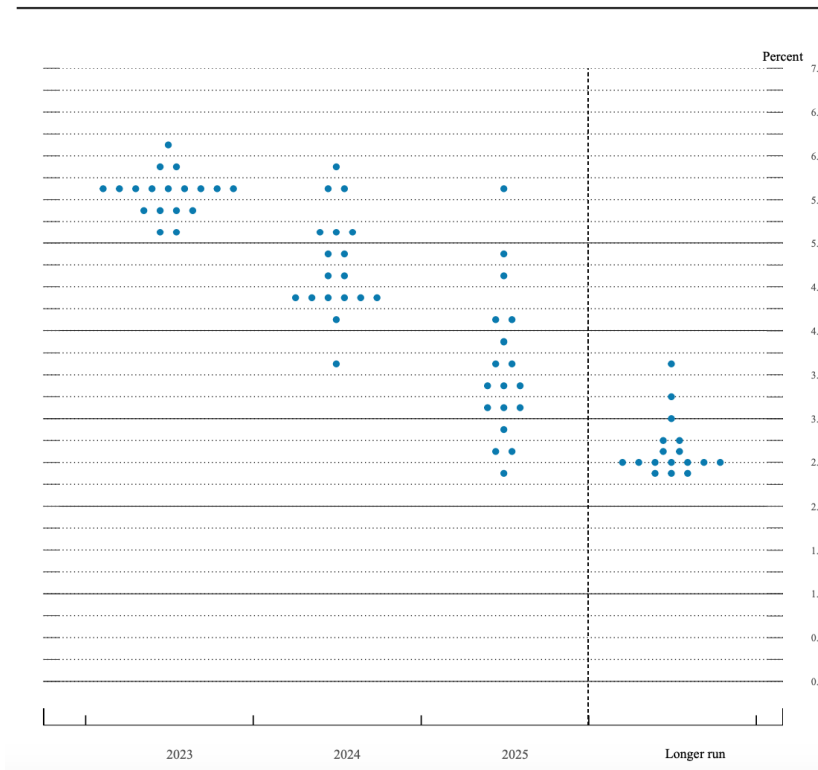
Figure 42: US Consumer Inflation Expectations

Source(s): Federal Reserve Economic Database (https://fred.stlouisfed.org)
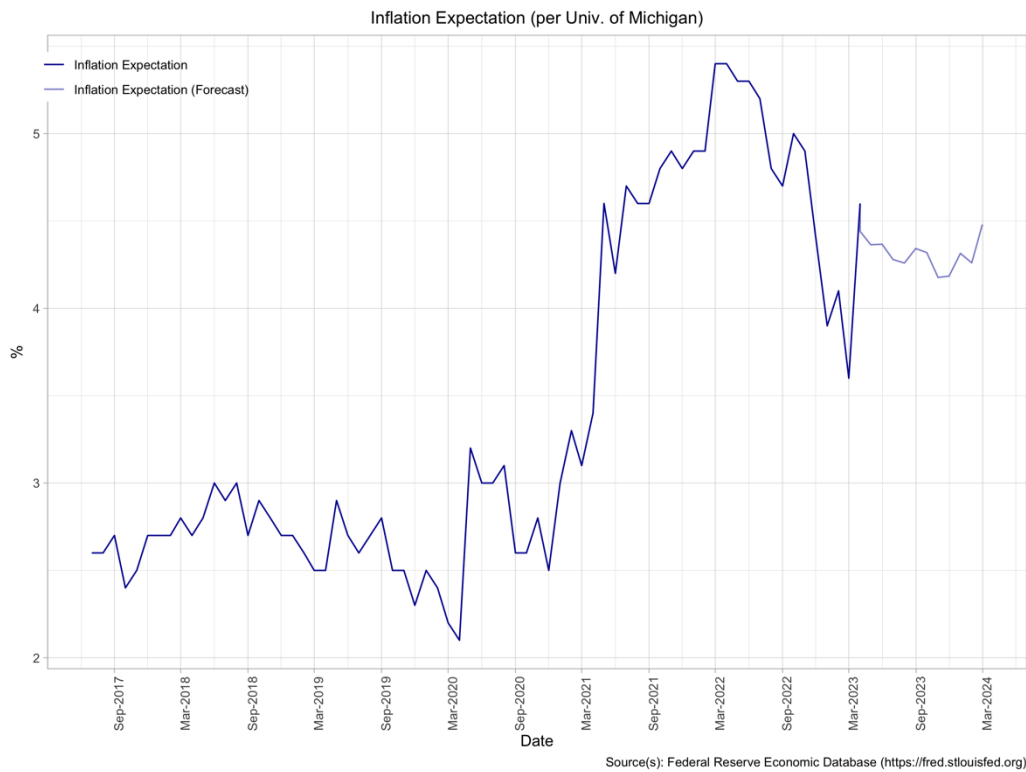
Figure 43: Primary Credit, as a function of 3-year Treasury yield
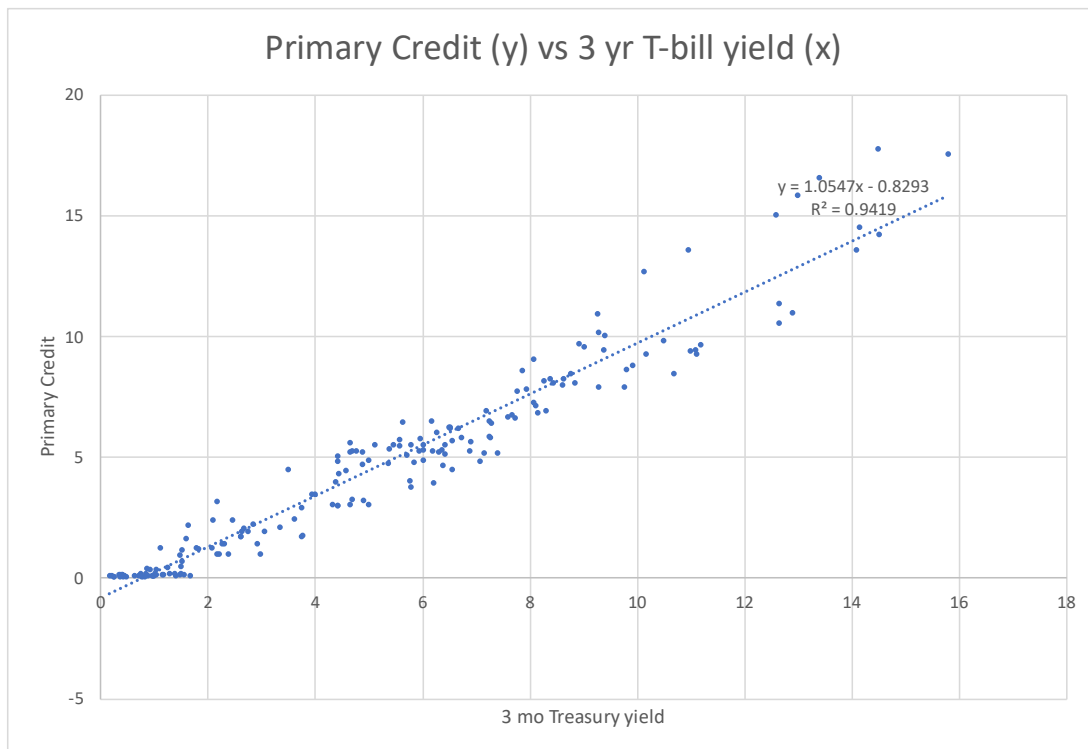
Source: Authors' calculation

Other Commentary

- "Central bankers vow that they are determined to meet their targets. They could, by raising rates, destroy enough demand to bring inflation down. Were they to keep their word, a recession would seem likelier than a painless disinflation. But the costs of inducing a recession, together with the longer term pressures on inflation, suggest another scenario: that central banks seek to evade their nightmarish trade-off, by raising rates less than is needed to hit their targets and instead living with higher inflation of, say, 3% or 4%." (https://www.economist.com/leaders/2023/06/22/investors-must-prepare-for-sustained-higher-inflation; June 22, 2023)

- "The Federal Reserve did NOT raise rates at its policy meeting for the first time in seventeen months. … [R]ate projections by other members of the policy-making committee and the Board suggested that participants thought an average of two more quarter-point hikes may be necessary before the end of the year. The main reason given was that price inflation in the non-housing services sector of the economy (known as 'core services') is stubbornly high, and to bring it down might require additional slowing of the economy and easing in the labor market." (https://www.kiplinger.com/economic-forecasts/interest-rates; June 16, 2023)

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

Analysis

The US Treasury yield curve is still exhibiting the pronounced inversion that has been seen for the past year (see Figure 44), with yields notably spiking as of this writing for 1-year maturities. Given this inversion, we interpret the markets as feeling that a short-term recession is likely in the near future. **We do not expect the yield curve shown in Figure 44 to change substantially for the next six- to nine-months.** Yields will continue to increase in lock-step with overnight lending rates through YE2023, with increasing jitter (as a function of investor qualms).

We still anticipate that there is only a minimal risk of additional bank failures occurring, since the root causes of the known failures have been broadly publicized as a combination of poor management and sudden, unexpected illiquidity. **Assuming that the markets continue as they have for the past several months, we are next concerned about a mild recession that the nation might already be experiencing, along with the emergence of notable commercial real-estate driven risks**. The recessionary forces that are currently at work will continue to drive short-term Treasury yields up (above mid-term yields), and mid-to long-term yields to moderate levels.

Figure 45 through Figure 53 illustrate the most significant correlations between Treasury yield rates.

Other Commentary

- "U.S. bond markets are already pricing beyond expected Federal Reserve interest rate hikes in coming months, with strategists polled by Reuters forecasting short-dated yields to fall sharply and most saying they will not revisit the year's highs. … 'That is essentially the markets getting ahead of the anticipated tightening,' said Bas Van Geffen, strategist at Rabobank. 'It is going to be very difficult for the Fed to convince markets they will keep rates higher ... and that there won't be a quick pivot,' he said." (https://www.reuters.com/markets/rates-bonds/bond-market-divergence-fed-entrenched-us-yield-forecasts-2023-06-21/; June 21, 2023)
- "Investors, however, have to first expect more tightening, and markets didn't appear to take the Fed's message seriously. The 2-year Treasury yield remained largely unchanged throughout the day at 4.7 percent, despite Powell signaling that more rate hikes are likely. … 'The risks of overdoing it and underdoing it are getting closer to being in balance,' Powell said. 'I still think, and my colleagues agree, that the risks of inflation are to the upside still.' " (https://www.bankrate.com/banking/federal-reserve/fomc-meeting-recap-june-2023/#next-move; June 14, 2023)
- "'Higher for longer' rates remains as a theme, as the Fed battles to control inflation. Higher interest rates are likely to cause additional volatility. The underlying growth outlook remains healthy thanks to strong consumer balance sheets and solid levels of businesses investment. This combination should keep corporate defaults low. Treasury yields are likely to fall slightly this year, and we expect the 10-year Treasury yield to end 2023 around 3.25%." (https://www.nuveen.com/en-us/insights/investment-outlook/fixed-income-weekly-commentary; June 26, 2023)

Figure 44: Treasury Yield Curves based on maturity duration
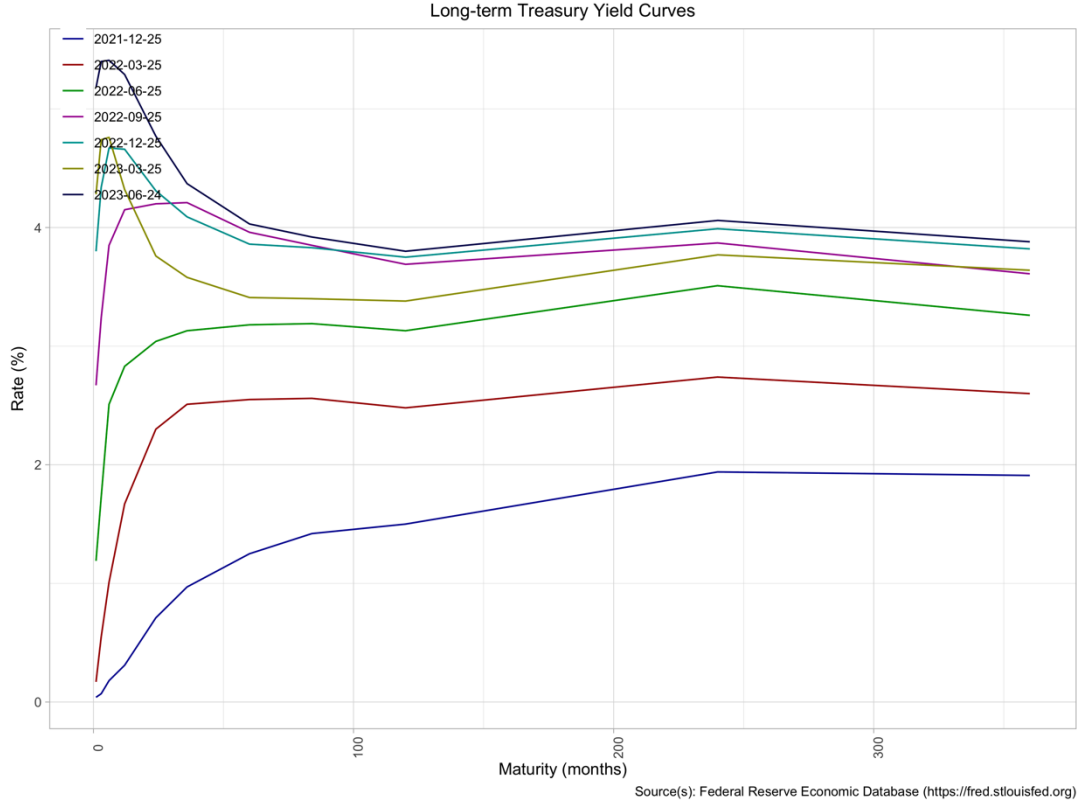
Figure 45: 1-month Treasury yield rates, as a function of 1-year Treasury yield rates
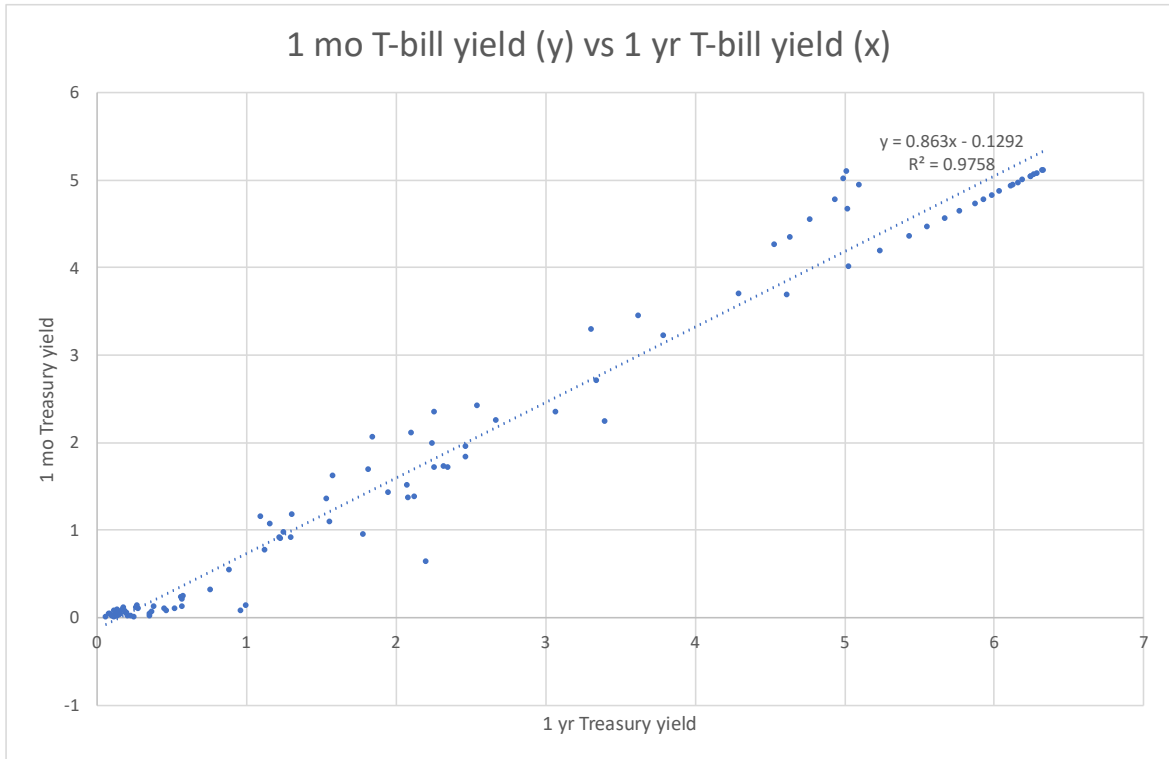
Figure 46: 3-month Treasury yields, as a function of 3-year Treasury yields
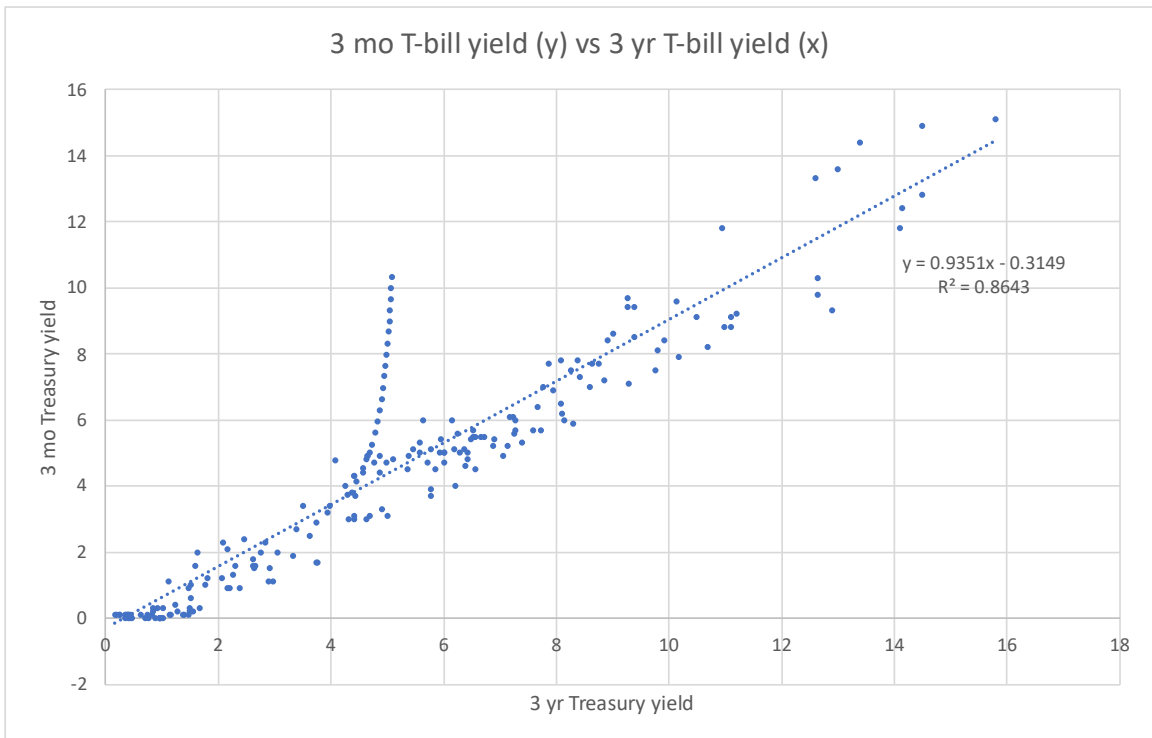
Figure 47: 6-month Treasury yields, as a function of 3-year Treasury yields
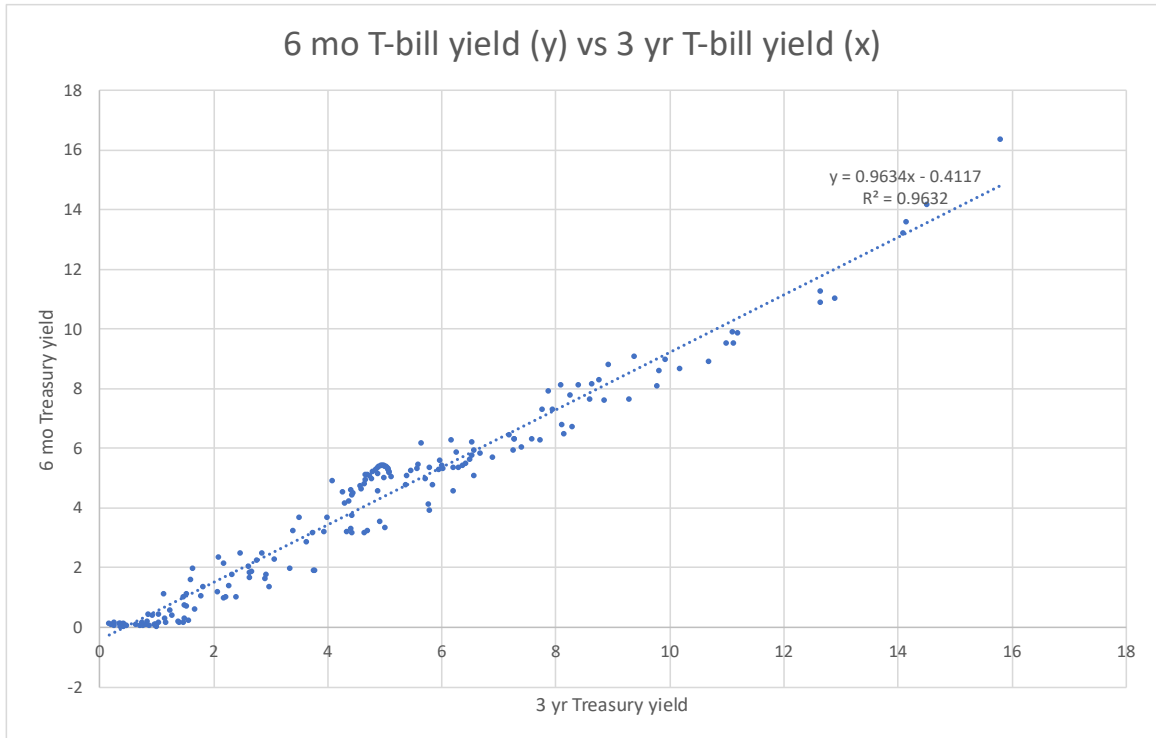
Source: Authors' calculation

Figure 48: 3-year Treasury yields, as a function of 1-year Treasury yields
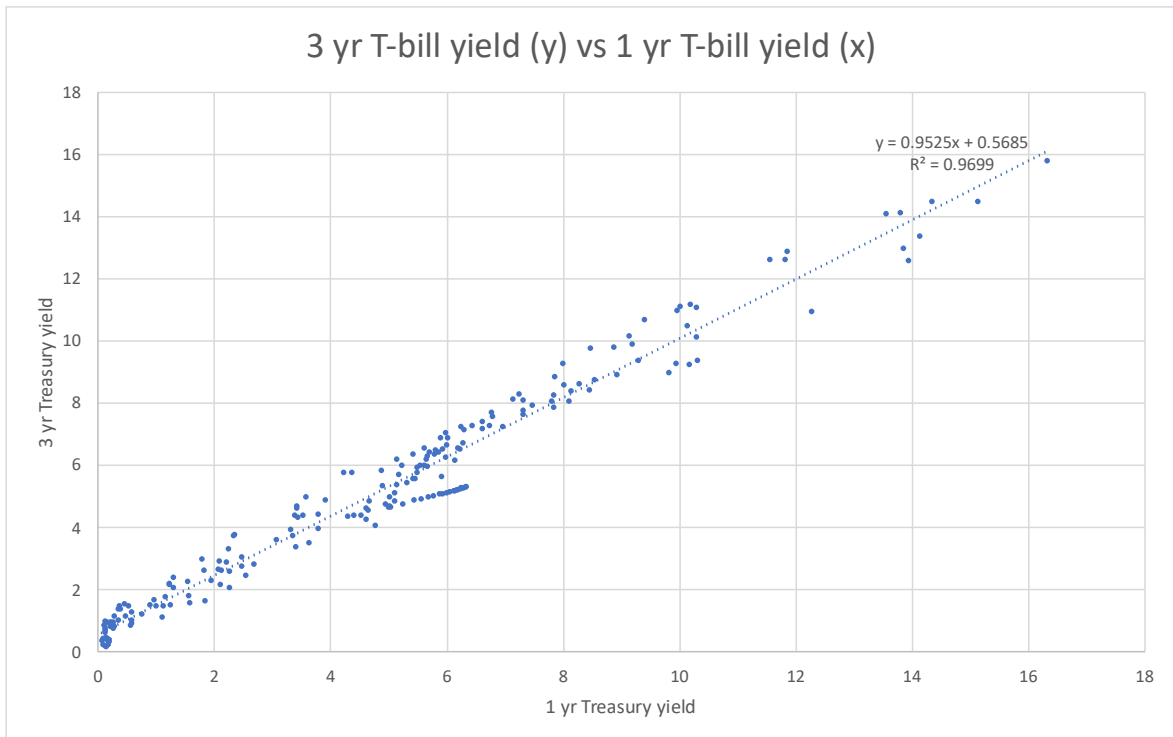
Source: Authors' calculation

Figure 49: 5-year Treasury yields, as a function of 1-year Treasury yields

5 yr T-bill yield (y) vs 1 yr T-bill yield (x)

y = 0.89x + 1.1134
R² = 0.9177
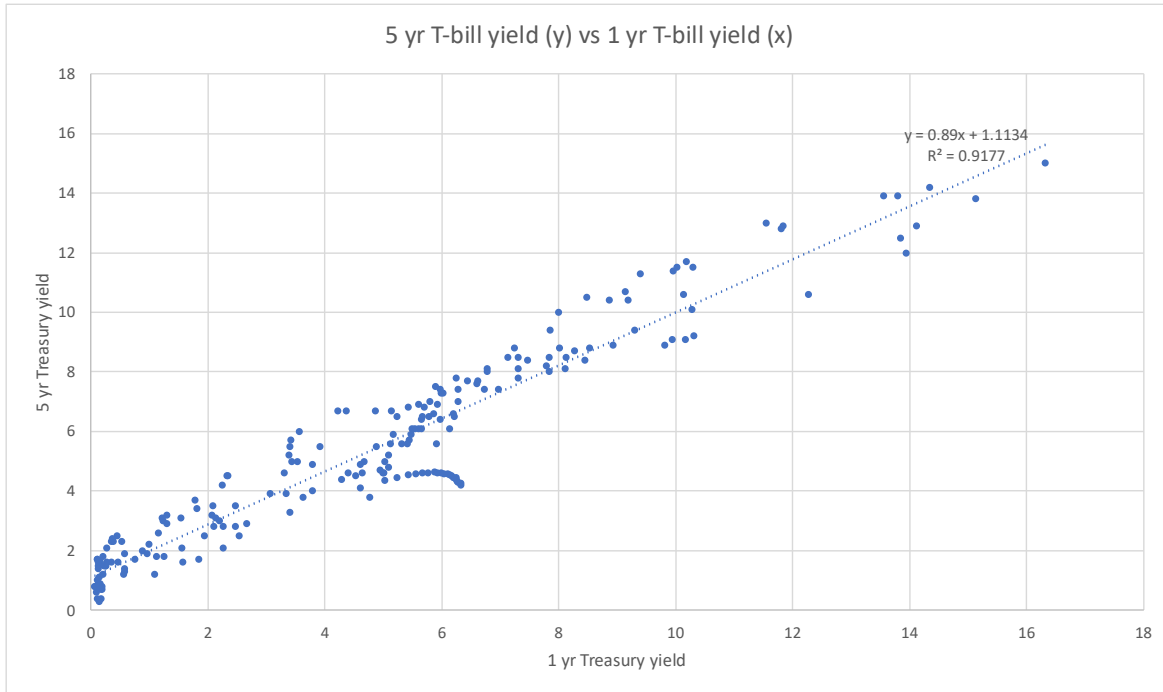
Source: Authors' calculation

Figure 50: 7-year Treasury yields, as a function of 3-year Treasury yields

7 yr T-bill yield (y) vs 3 yr T-bill yield (x)

y = 0.927x + 0.8079
R² = 0.97
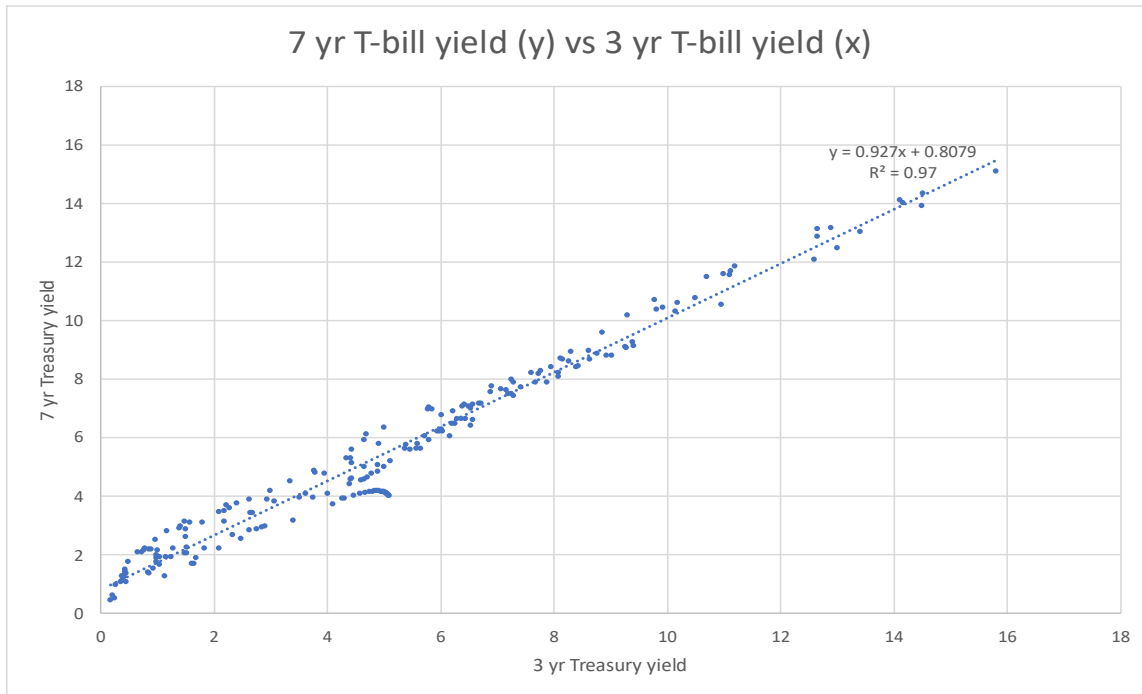
Source: Authors' calculation

Figure 51: 20-year Treasury yields, as a function of 7-year Treasury yields
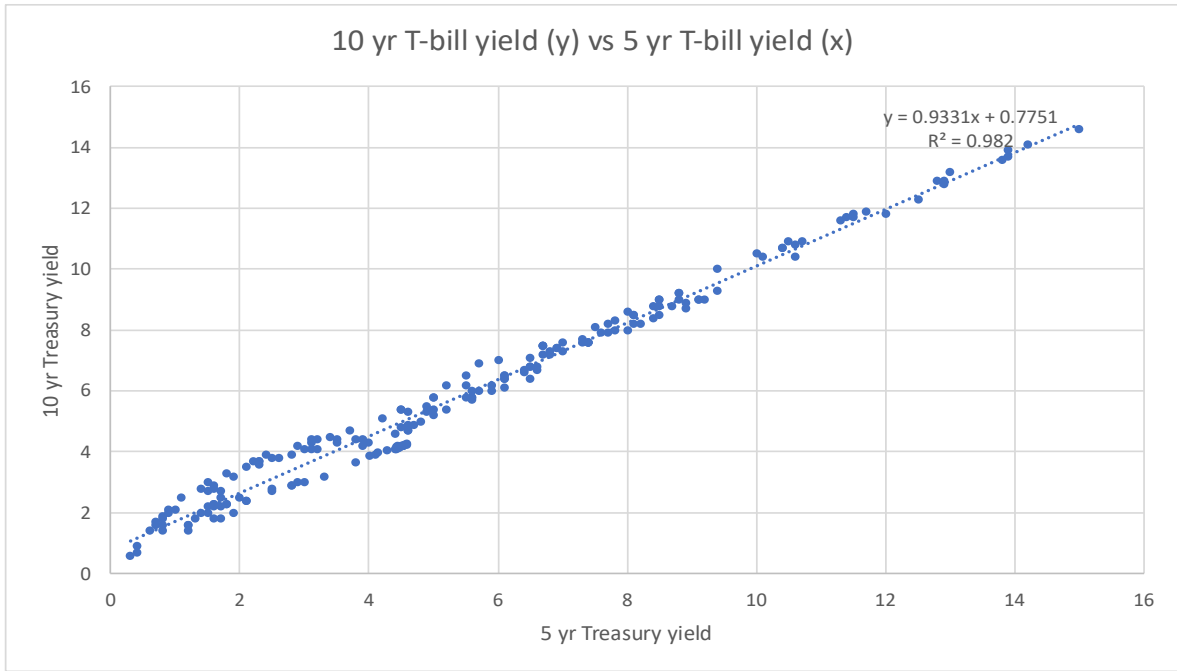
Source: Authors' calculation

Figure 52: 20-year Treasury yields, as a function of 7-year Treasury yields
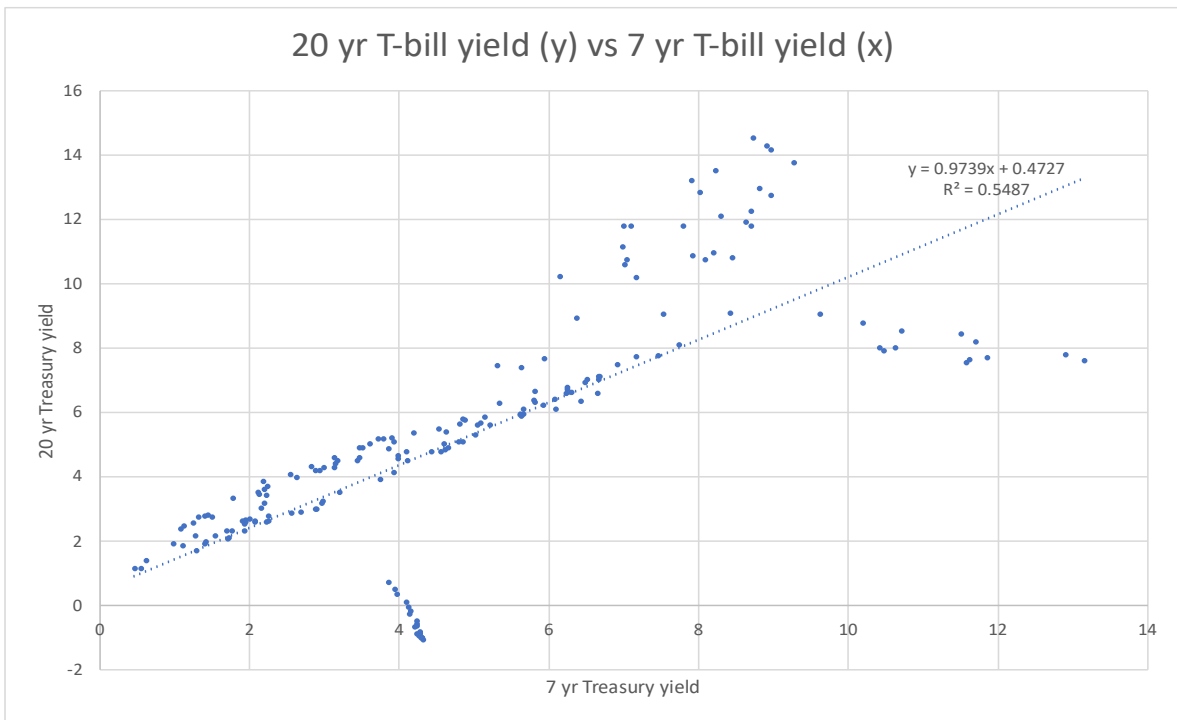
Source: Authors' calculation

Figure 53: 30-year Treasury yields, as a function of 7-year Treasury yields
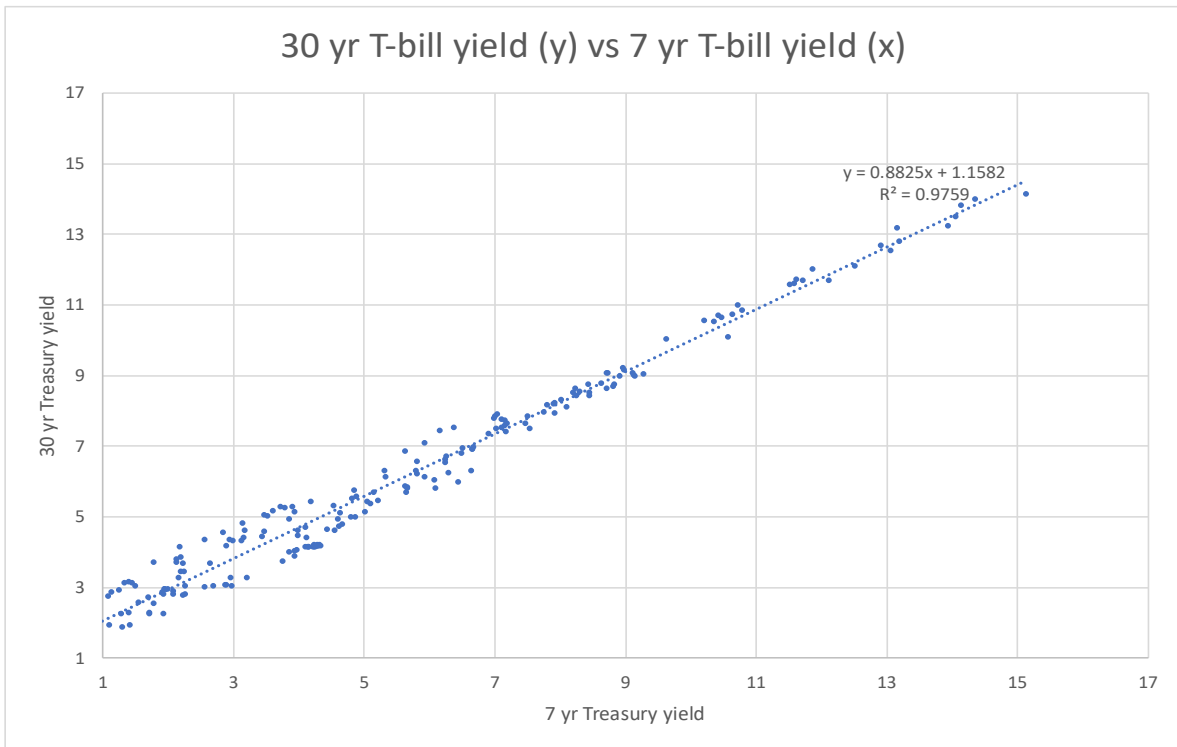
Source: Authors' calculation

30-year Mortgage Rate

Analysis

Mortgage rates have been traditionally tightly correlated with mid-duration Treasury yields given the typical sources of funding and duration of held mortgages. Day-to-day, interest rates are driven by traditional economic supply-and-demand forces. Interest rate increases are slowing, with the FOMC telegraphing that they expect a 25 to 50 bps increase in overnight lending rates; taking that point into account, we expect that ***mortgage rates will be solidly above 7% during the summer peak selling season***, potentially retreating slightly in the late fall. At that point, the question of whether the FOMC has control of inflation and unemployment will drive their actions, as well as the ripples through the economy to mortgage rates.

Figure 54: US 30-year (fixed rate) mortgage rate
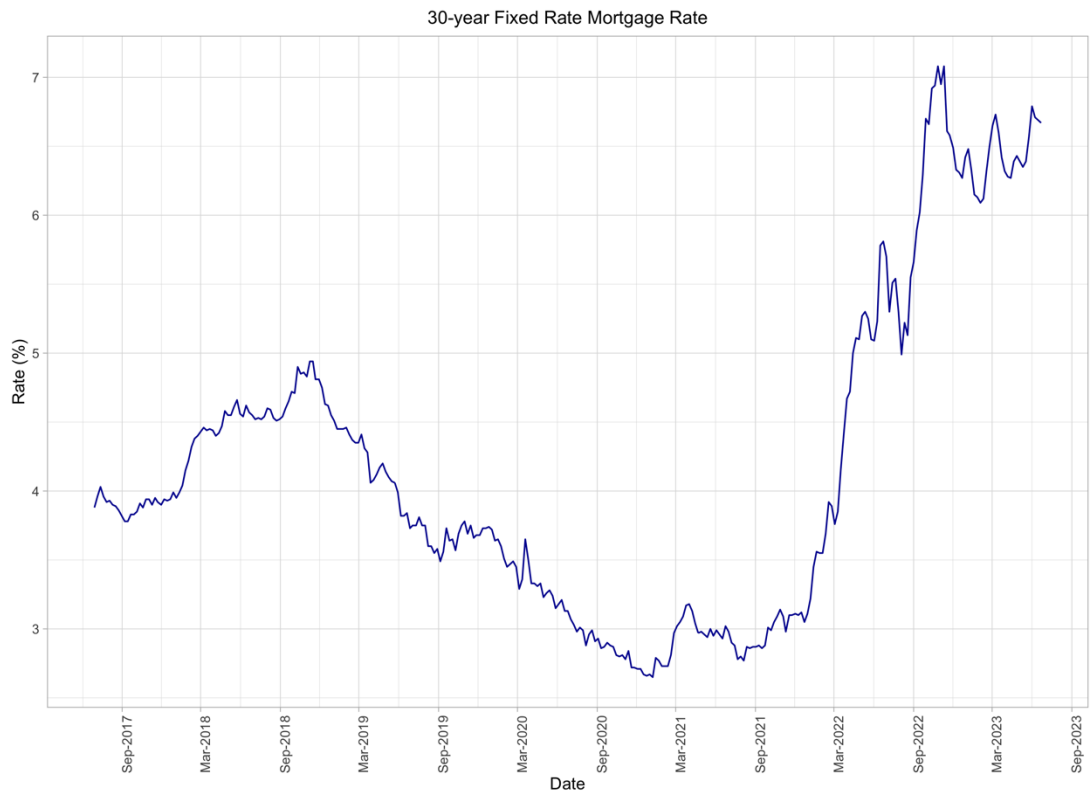
Other Commentary

- "… [A] separate survey from Mortgage News Daily showed the rate crossed over 7% [on June 29, 2023]. It has remained above that mark since then, rising to 7.08% on [July 4, 2023]." (https://www.cnbc.com/2023/07/06/mortgage-demand-drops-as-interest-rates-rise.html; July 6, 2023)

- "House prices rose in April by the fastest monthly pace in close to a year. The S&P CoreLogic Case-Shiller National Home Price Index actually fell 0.2% in April from a year ago, after a 0.7% increase in the previous month. But on a month-to-month basis, home prices are rising again. … After seasonal adjustment, prices have increased for three consecutive months, capped by April's 0.5% monthly gain. Still, on an annual basis, house prices probably have a bit further to fall, particularly as households' purchasing power has yet to feel the full impact of tighter credit conditions. (https://www.kiplinger.com/economic-forecasts/housing; June 30, 2023)

- "Applications to refinance a home loan rose 6% for the week but were 41% lower than the same week one year ago. While rates pulled back, they are still more than a full percentage point higher than they were a year ago and more than twice what they were in the first two years of the Covid pandemic, when there was a refinance boom. Most borrowers today have lower rates than what is currently available and therefore do not want to lose those rates even for a cash-out refinance." (https://www.cnbc.com/2023/06/14/mortgage-demand-surges-higher-as-interest-rates-fall-.html; June 14, 2023)

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

Analysis

AAA bond rates tend to track with mid-duration Treasury yields, with rates for bonds with lower grades tending to be higher (in conjunction with their risk ratings).   On a quarterly basis, Moody's Seasoned AAA Corporate Bond yield was 4.52% in 1Q2023 and 4.60% in 2Q2023; Moody's BAA yields were 5.60% and 5.68%, respectively. The quarterly averages for the 1-year and 7-year Treasury yields were 4.76% and 3.74% (respectively) in 1Q2023, and 4.95% and 3.65% in 2Q2023. We present these numbers, and comparable numbers for the more familiar 10-year/2-year yield spread, in Table 2[41].

Table 2: Comparison between Moody's Bond Yields and Treasury Yields

Instrument	1Q2023	2Q2023	Δ
Moody's AAA Bonds	4.52%	4.60%	+0.08%
Moody's BAA Bonds	5.60%	5.68%	+0.08%
BAA-AAA Yield Spread	+1.08%	+1.08%	
1-year Treasury Yield	4.76%	4.95%	+0.16%
7-year Treasury Yield	3.74%	3.65%	-0.09%
2-year Treasury Yield	4.34%	4.26%	-0.08%
10-year Treasury Yield	3.65%	3.60%	-0.05%
10 yr-2 yr Yield Spread	-0.69%	-0.66%	

First, as overnight lending interest rates have increased by 25 bps over the past quarter, 1-year Treasury yields have increased by 29 bps, but AAA bonds and BAA bonds have only increased by 8 bps (respectively). Admittedly, 2-year Treasury yields have decreased by 8 bps in yield Q/Q. The change in 1-year bonds' yields makes us continue to believe that the market is saying that a recession is likely "any day now", without seeing any firm indicators; instead, the market is pricing the expectation of a noticeable decline occurring based on experience. However, the recent economic turmoil has been anything but similar to those of days past.

As a result, while the AAA and BAA bonds have not increased as quickly as short-term Treasuries, they have had their hits priced in, while bonds that are sold are committed to the (risk free) rates that approach 5%. While it was more noteworthy in one of our previous reports, ***the AAA yield is currently 25 bp less than that of the 1-year Treasury yield (see Figure 55).*** The only thing that we can foresee buoying bond yields are actually default rates, which are reported as being on the rise due primarily to rising financing rates causing an increased number of defaults in the recent months.[42]

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[41] See https://fred.stlouisfed.org/series/DGS10, https://fred.stlouisfed.org/series/DGS7, https://fred.stlouisfed.org/series/DGS2, https://fred.stlouisfed.org/series/DGS1, https://fred.stlouisfed.org/series/aaa, and https://fred.stlouisfed.org/series/baa

[42] https://www.bloomberg.com/news/articles/2023-06-15/moody-s-sees-global-high-yield-default-rate-hitting-5-in-2024#xj4y7vzkg

Figure 55: Moody's Seasoned AAA Corporate Bond Yield versus 1-Year Treasury Yield
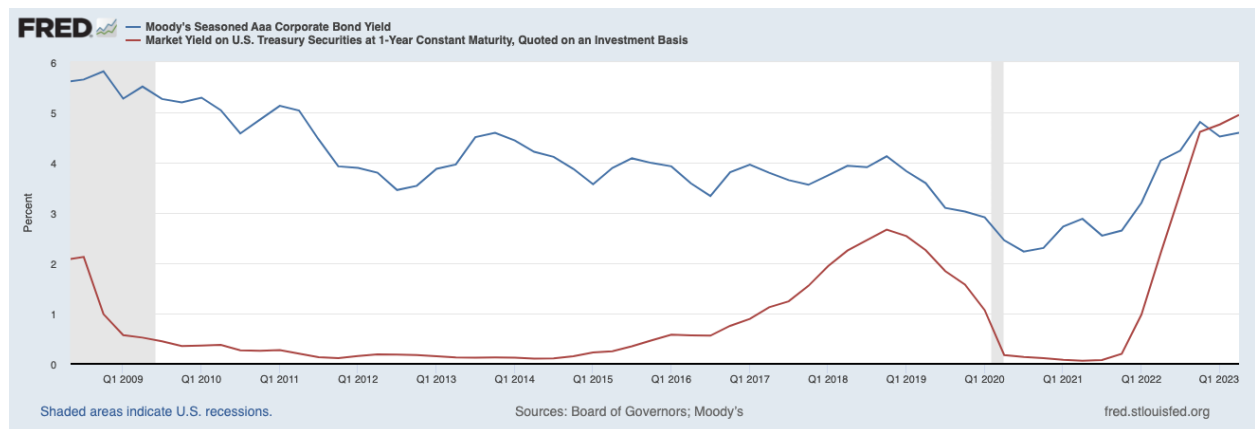
See Figure 56 for how Moody's AAA yields have historically tracked with the 7-year Treasury yield.

Figure 56: Moody's AAA-grade investment yields, as a function of 7-year Treasury yields
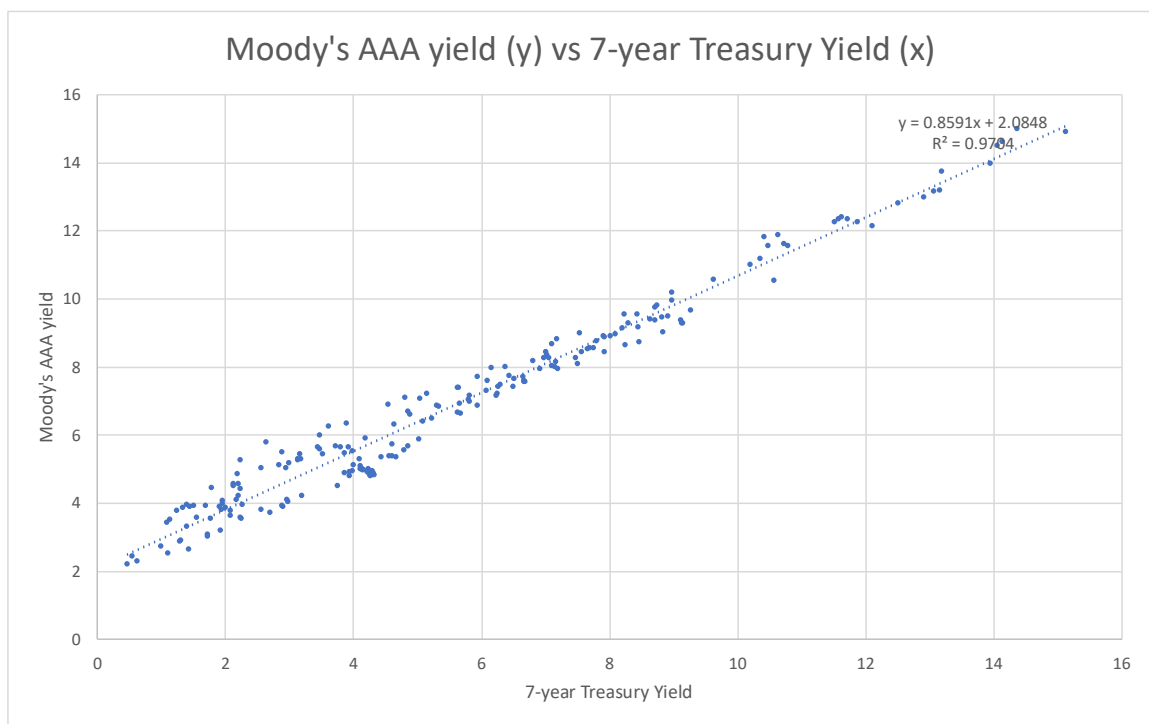
Source: Authors' calculation

Other Commentary

- "Many speculative companies loaded their balance sheet with debt with floating borrowing costs, when the Fed slashed rates close to zero at the peak of the Covid crisis. However, this has left borrowers facing much higher interest payments as the Fed embarked on rate increase that lifted target range to 5-5.25% in just 14-months. … Majority of default is expected to arise from companies working on distressed-debt exchange, a way to lessen financial burdens and avoid

      filing for chapter 11 bankruptcy protection. These firms are perceived as being at risk of a conventional default as most of time the restructuring process does not go in the right direction." (https://www.linkedin.com/pulse/aftermath-fed-policy-rising-default-us-corporate-debt-bharambe-cfa-1c/; June 19, 2023)

- "The debt ceiling deal helped corporate high-yield bond rates to ease. AAA bonds are now yielding 4.7% and BBB bonds, 5.9%, while CCC-rated bond yields are at 14.0%. With better prospects for economic growth, the yields on higher-rated bonds typically edge up, while lower-rated bond rates decline because of a lower risk of bankruptcies." (https://www.kiplinger.com/economic-forecasts/interest-rates; June 16, 2023)
- "We have raised our 2023 HY bond default rate forecast to 4.5%-5.0% in 2023 … We expect the cumulative 2023-2024 HY bond default rate to total 8.75% at the forecast mid-points, well below the 22% during 2007-2009." (https://www.fitchratings.com/research/corporate-finance/lifting-us-corporate-default-rate-forecasts-in-2023-2024-30-05-2023; May 30, 2023)

Prime Rate

Analysis

The Prime Rate is a benchmark rate that many banks use for setting consumer credit rates for creditworthy customers. It is generally based on the federal funds rate, and a spread (typically 3%) is dictated by banks as a matter of policy to specify lending rates for mortgages, small business loans, and personal loans[43]. The quarterly average of the Prime Rate is currently (as of this writing) 8.16%, and the daily value is currently 8.25%[44].

We do not expect the relationship between the federal funds rate and the Prime Rate to change in the near future. We do believe that it is possible that the FOMC could raise the federal funds rate as much as 50 bp before YE2023, causing the Prime Rate to increase to a level between 8.5% and 8.75%. ***We believe that it is possible that the Prime Rate could rise by as much as 50 bp from its current level by YE2023, with another increase of 50bp during 1H2024 also possible.***

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[43] https://www.investopedia.com/terms/p/primerate.asp
[44] https://fred.stlouisfed.org/series/DPRIME

Figure 57: Prime Rate as a function of 1-year Treasury yields
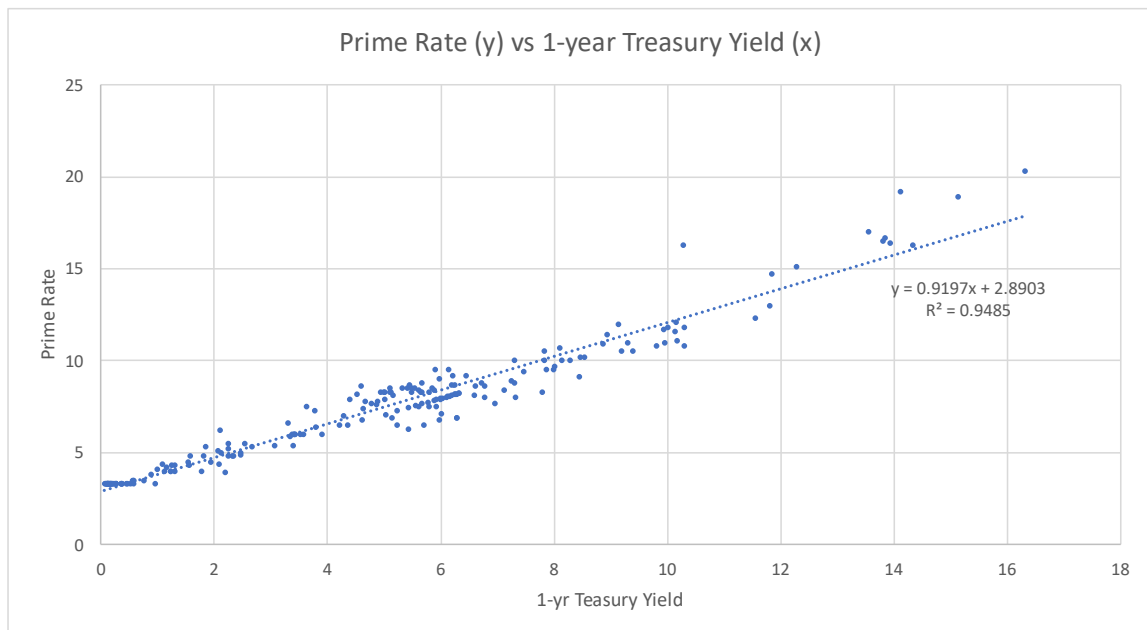
Source: Authors' calculation

US Average Retail Gasoline Price

Analysis

The US average retail gasoline price for regular unleaded gasoline is $3.51/gallon[45] at the time of this writing, about 16% less than it was one year ago. (See Figure 58 and Figure 59.) Further, retail gasoline is up about 6.1% in the past month, with prices the lowest in the Southeast US, and highest in the West[46].

EIA forecasts that oil prices will fall in 2023 and 2024, believing that Brent crude oil prices (currently $85/barrel, as of this writing[47]) will hit $83/barrel in 2023 and $78/barrel in 2024. Goldman-Sachs, on the other hand, estimates that prices will rise to $95/barrel by YE2023, a dramatic difference[48]. However, there are three factors that the EIA identifies as potentially impacting that forecast:
- Russia's oil production and ability to export petroleum products (now exporting directly to India and China by sea, counter to sanctions by the US & EU nations[49]),
- Several countries' ability to increase oil production, and
- China's loosening of COVID-related restrictions[50].

Again, given these factors and the energy inflation rate expected for the near term, ***we expect mean retail prices to remain between $3.40/gallon and $3.90/gallon through the Summer of 2023***.

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[45] https://gasprices.aaa.com/

[46] https://gasprices.aaa.com/like-the-temperatures-gas-prices-start-to-rise/

[47] https://oilprice.com/

[48] https://www.cnbc.com/2023/04/03/oil-opec-just-made-the-feds-job-more-complicated-heres-what-they-did.html

[49] https://www.cnn.com/2023/04/02/business/opec-production-cuts/index.html

[50] https://www.eia.gov/outlooks/steo/report/BTL/2023/01-brentprice/article.php

To that point, Fox Business reports "A group of OPEC+ countries led by Saudi Arabia, Iraq, and the United Arab Emirates announced a surprise oil production cut on Sunday that will reduce the energy bloc's output by 1.15 million barrels per day from May through the end of this year. The latest cuts are in addition to the 2 million barrels per day output cuts OPEC+ announced in October."[51] The result of this has pundits speculating about a 5% immediate increase (during week of April 2, 2023)[52] and a long-term 15%-20% increase in retail gasoline prices.[53]

Other Commentary

- "But this year, sea surface temperatures in the Atlantic, the Gulf of Mexico and the Caribbean Sea are well above normal. And warm water serves as fuel, potentially allowing any hurricanes that do form to develop faster and stronger. So, figure on a normal number of storms, but watch out for bad ones. Conditions may be especially ripe for powerful hurricanes to form. And remember, it takes only one severe hurricane hitting the wrong spot to make for a bad season." (https://www.kiplinger.com/investing/economy/watch-out-for-bad-hurricanes-kiplinger-economic-forecasts; June 18, 2023)
- "OPEC appears concerned about oil demand taking a hit in the United States and other Western nations later this year, as higher interest rates weigh on economic growth and a possible banking crisis makes financial markets jittery. But for now, demand appears to be solid, so the reduced output is likely to push oil prices higher. We look for WTI to trade between $75 and $85 per barrel this spring, and possibly spike even higher if any further disruptions to supply hit the market." (https://www.kiplinger.com/economic-forecasts/energy; April 3, 2023)

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[51] https://www.foxbusiness.com/markets/yellen-opec-production-cut-regrettable-not-positive-global-growth
[52] https://www.bbc.com/news/business-61188579 and https://www.cnn.com/2023/04/02/business/opec-production-cuts/index.html
[53] https://www.foxbusiness.com/economy/gas-prices-4-gallon-after-opec-production-cut

Figure 58: Crude Oil vs Retail Gasoline Prices
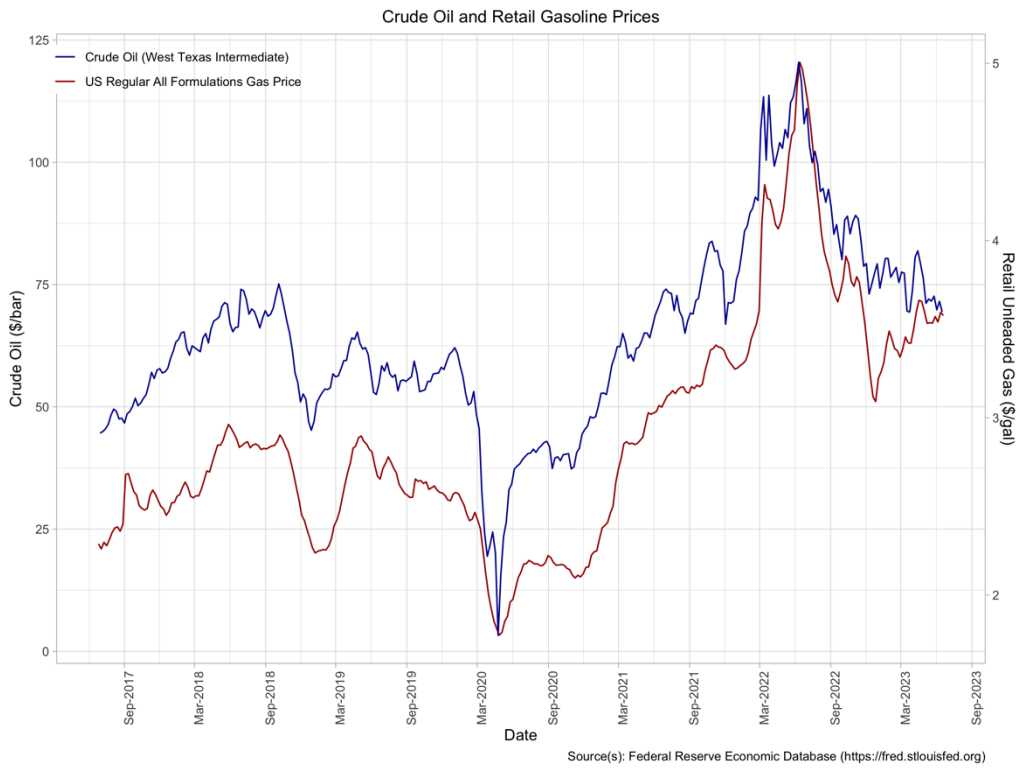
Figure 59: Global crude oil prices
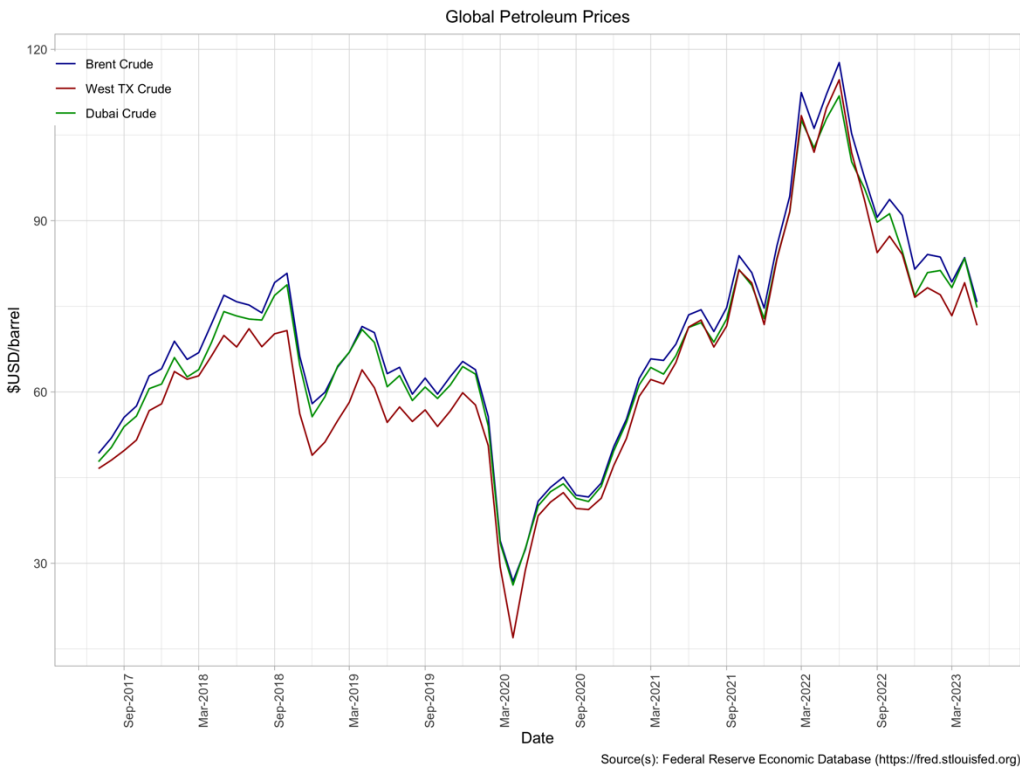
House and Commercial Real Estate Price Indexes

Analysis

As we mentioned previously, housing prices appear to have crested in many markets[54], but buying is still an uphill process due to higher mortgage rates and low inventory[55]. Higher housing prices (both purchase prices and rental rates) will likely remain elevated (for the most part[56]) for the near term due to higher market prices & expected mortgage rates[57] (for owners) and underlying prices for landlords (for renters). Given that the FOMC will likely raise the Federal funds rates by 25 to 50 bps during 2023, we do not expect to see either inventories or sales to move significantly from their current levels.

Commercial Real Estate, on the other hand, is becoming a more significant issue. Many large-scale, national tenants are working with employees[58] to determine their real estate needs, and trends are generally downward to smaller footprints[59]. Institutional investors appear to be making serious decisions to default on commercial space that cannot be profitably restored, and are strategically concentrating future investments, resulting in an increased amount of distressed property existing and likely to eventually shift to lenders' balance sheets; according to MSCI Real Assets, $64B of commercial real estate was classified as "distressed" at the end of 1Q2023, split between retail (i.e., shopping malls), office (due to weak demand, i.e., work-from-home), and multi-family, with another $155B of CRE "at risk of distress".[60] Assuming that the trend continues, the result will be devaluation of the properties and their peers, as well as losses for the underlying owners and/or lenders. In the case of the latter, the banking sector could be substantially impacted on a regional basis (as we have discussed in previous reports). Some are reporting that they anticipate property values not returning for ten to 15 years.[61]

Other Commentary

- "Major institutional investors, including Brookfield Corp. and Blackstone Inc., have already defaulted on some office buildings, choosing to stop loan payments rather than spend more on money-losing properties. … Office usage is only about half what it was before the pandemic, according to badge-swipe data from Kastle Systems. Available space for lease in cities such as San Francisco and Atlanta has climbed to 30%, the brokerage Savills reported." (https://www.bloomberg.com/news/articles/2023-06-22/office-owners-get-dire-warning-rebound-unlikely-before-2040; June 22, 2023)
- "Currently, 17% of all office space in the US is vacant. … Meanwhile, over $1.5 trillion of commercial real estate debt is coming due by 2025. … Most of this debt is held by regional banks

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[54] See https://www.wsj.com/articles/u-s-home-prices-posted-first-annual-decline-since-2012-in-april-a5d0bbdc, https://www.redfin.com/news/housing-market-update-home-price-declines-shrinking/, and https://www.wsj.com/articles/higher-interest-rates-hit-home-prices-again-e6f57f55

[55] https://www.cnbc.com/video/2023/03/23/housing-market-was-already-dropping-into-recession-says-moodys-economist-mark-zandi.html and https://www.realtor.com/news/trends/as-home-prices-fall-a-whole-new-problem-has-just-reared-its-head/

[56] https://www.cnn.com/2023/06/26/economy/us-rents-may/index.html

[57] See https://www.marketwatch.com/story/new-york-fed-housing-survey-americans-expect-mortgage-rates-to-rise-above-8-a-year-from-now-55712690 and https://www.economist.com/finance-and-economics/2023/04/02/the-rich-worlds-housing-crunch-is-far-from-over

[58] https://www.cbsnews.com/news/return-to-office-incentives-perks-benefits/

[59] See, e.g., https://www.sfgate.com/bayarea/article/google-offloading-office-space-in-bay-area-18126629.php and https://www.thestreet.com/real-estate/which-cities-have-the-most-empty-offices

[60] https://news.theregistryps.com/report-troubled-commercial-real-estate-assets-across-us-reach-64b-in-q123/ and https://www.wsj.com/articles/office-owners-dump-lesser-buildings-for-whatever-they-can-get-4f3d2948

[61] https://fortune.com/2023/06/26/commercial-real-estate-office-downturn-outlook-goldman-sachs-morgan-stanley-ubs-pwc-bofa/ and https://www.bloomberg.com/news/articles/2023-06-22/office-owners-get-dire-warning-rebound-unlikely-before-2040

> and vacant properties are struggling to pay the debt."
> (https://twitter.com/KobeissiLetter/status/1666089781951107076; June 6, 2023)

- "Office investment in the Americas fell by 71% year-over-year in Q1 to US$11 billion, largely due to uncertainty about future occupier demand and tight credit conditions. While investors still appear interested in high-quality office assets, less-desirable Class B and C assets will suffer over the medium-term." (https://www.cbre.com/insights/briefs/global-real-estate-investment-continues-to-fall-in-q1; May 12, 2023)

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

Analysis

The Dow Jones U.S. Total Market Index (DWCF) is a market-capitalization-weighted index that represents the top 95% of the U.S. stock market based on market capitalization. Per Table 3, stocks have improved markedly during 2Q2023.

Table 3: Approximate Quarterly Milestones for the Dow-Jones Total Market Index

Period	Index Range[62]	Trading Days	Avg points/day
3Q2022 (7/1/2022-9/30/2022)	37976.52 → 36097.99	64	-29.4
4Q2022 (10/1/2022-12/31/2022)	36097.99 → 38520.60	61	39.7
1Q2023 (1/1/2023-3/31/2023)	38520.60 → 41136.55	62	42.2
2Q2023 (4/1/2023-6/30/2023)	41136.55 → 44411.47	61	53.7

We note in Table 4 that the Standard & Poor's 500 Index ("SP500") is an index of 500 very large, publicly traded companies in the U.S.

Table 4: Approximate Quarterly Milestones for the Standard and Poor's 500 ("SP500") Index

Period	Index Range[63]	Trading Days	Avg points/day
3Q2022 (7/1/2022-9/30/2022)	3785.38 → 3585.62	64	-3.12
4Q2022 (10/1/2022-12/31/2022)	3585.62 → 3839.50	61	4.16
1Q2023 (1/1/2023-3/31/2023)	3839.50 → 4109.31	62	4.35
2Q2023 (4/1/2023-6/30/2023)	4109.31 → 4450.38	61	5.59

However, the notable point of this section is that of the VIX: it's quarterly average has gone from 25.0 in 4Q2022, to 20.7 in 1Q2023, to 16.44 in 2Q2023 and falling[64]. The crux of these numbers is the perception of *decreasing* forward-looking market volatility. Generally speaking, with decreasing volatility, we should see increasing levels of the DWCF and the SP500. The intuitive interpretation of these numbers, despite the issues with inflation, yield rates, housing, and so on, is that everything is "business as usual"; the VIX' figures have not been this low since 2019.

Markets are extremely tense at the moment, watching for any sign of runaway inflation, housing implosion, or other monsters in the shadows. However, as long as the FAANG stocks (and their

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[62] Index values found at https://www.marketwatch.com/investing/index/dwcf
[63] Index values found at https://www.marketwatch.com/investing/index/spx
[64] See https://fred.stlouisfed.org/series/VIXCLS

compatriots) continue their consistent march up the markets (regardless of any headcount reductions), many analysts believe that markets will continue their drumbeat. The FOMC's regular "telegraphing" of expected adjustments to the market have played a key part in maintaining the expectations of traders. As long as there aren't any surprises in the windshield, many seem to feel that everything is ok.

The counterpoint to this philosophy is that a significant portion of the returns generated for the market have been exactly the FAANG stocks mentioned previously, and there are some who believe that this is a sign of a weak market that is relying on a concentrated segment of stocks: Alphabet, Meta, Amazon, Tesla, AMD, Nvidia, etc.; without this group, the returns (of, in their case, the SP500) have been slim, and investors should be planning on portfolios without these market drivers[65].

We are similarly concerned about the concentrated returns in the SP500 and other indexes, and believe that care should be used in constructing a portfolio dependent on the returns of these underlying instruments. Most of these companies have an "Achilles' heel" that could easily lead to a shake-up in their valuation: Tesla requires mining materials for batteries; Amazon or Alphabet could be forced to break-up based on any of several anti-trust investigations; and Meta's Mark Zuckerberg could dramatically lose his "cage match" to Elon Musk. Jokes notwithstanding, the fragility of these industries, including the fact that all are in one of two GICS categories, should never be forgotten by investors, and could lead to a dramatic change in overall earnings.

Other Commentary

- "'It wouldn't take much of a shock to send the market into a tailspin,' says Jason Mountford, trend analyst at Q.ai, an artificial-intelligence-powered investment platform. 'Right now, I'm watching very closely for anything that could provide this shock, such as additional weakness in the banking sector or even macroeconomic or political events globally.' " (https://money.usnews.com/investing/stock-market-news/will-the-stock-market-crash-again-risk-factors-to-watch; June 29, 2023)
- "Earnings growth should be another positive tailwind for equity markets next year. Earnings drive stock prices. And in today's market, with its newfound emphasis on fundamentals, earnings really matter. Short of a recession — a very real possibility — consensus estimates are for about 5% earnings growth for S&P 500 companies in 2023. That's certainly less than what it was in years past, but still respectable." (https://www.kiplinger.com/investing/what-the-markets-could-look-like-in-2023; March 14, 2023)

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[65] See https://money.usnews.com/investing/stock-market-news/will-the-stock-market-crash-again-risk-factors-to-watch

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 1Q2013 and 4Q2022, inclusive.

Table 15: Regression Aggregate Errors for 1Q2013 through 4Q2022

Variable	Min Abs. Error	Average Error	Max Abs. Error
Real GDP Growth	***	***	***
Nominal GDP Growth	***	***	***
Real Disposable Income Growth	44.43%	-94.74%	***
Nominal Disposable Income Growth	0.64%	4.79%	389.23%
Inflation	0.00%	**	***
Unemployment Rate	80.24%	718.15%	***
1-month Treasury Yield	749.97%	**	***
3-month Treasury Yield	10.52%	**	***
6-month Treasury Yield	899.46%	***	***
1-year Treasury Yield	1.82%	-42.97%	859.76%
3-year Treasury Yield	2.52%	71.85%	763.49%
5-year Treasury Yield	4.98%	-84.28%	587.90%
7-year Treasury Yield	1.57%	0.62%	235.36%
10-year Treasury Yield	0.57%	22.17%	204.19%
20-year Treasury Yield	0.34%	-0.20%	84.88%
30-year Treasury Yield	0.40%	-21.91%	74.93%
30-year Mortgage Rate	0.02%	7.83%	62.34%
Moody's AAA Curve	0.65%	-12.67%	54.09%
Moody's BAA Curve	2.74%	-32.40%	100.22%
BBB Corporate Yield	0.21%	-0.34%	33.71%
Prime Rate	64.36%	-848.20%	***
US Average Retail Gasoline Price	314.50%	720.58%	***
Cost of Federal Funds	10.26%	45.55%	***
Dow Jones Total Stock Market Index	0.33%	-5.00%	44.64%
S&P 500 Stock Price Index	115.41%	***	***
Commercial Real Estate Price Index	0.22%	-2.65%	45.67%
Residential Home Price Index	0.21%	-56.21%	110.67%
Market Volatility Index	***	***	***

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

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

REGRESSION FOR REAL GDP GROWTH

	Dependent variable (+/- SE):
	Real GDP growth
Constant	614.581 (+/- 73.345)
	$p = 0.00001^{***}$
SP500 Stock Price Index	-0.116 (+/- 0.012)
	$p = 0.00000^{***}$
US Fed Reserve O-N Loan Rate	89.748 (+/- 20.642)
	$p = 0.002^{***}$
Moody's AAA Curve	74.855 (+/- 14.028)
	$p = 0.0003^{***}$
Moody's BAA Curve	-51.521 (+/- 8.883)
	$p = 0.0002^{***}$
Real disposable income growth	0.143 (+/- 0.040)
	$p = 0.005^{***}$
CPI Inflation Rate	7.213 (+/- 0.599)
	$p = 0.00000^{***}$
BBB corporate yield	29.545 (+/- 4.956)
	$p = 0.0001^{***}$
Dow Total Stock Market Index	0.004 (+/- 0.001)
	$p = 0.0002^{***}$
Market Volatility Index	-0.200 (+/- 0.061)
	$p = 0.008^{***}$
US Avg Retail Gasoline Price ($-gal; all grades, all formulations)	-24.454 (+/- 2.809)
	$p = 0.00001^{***}$
30-year Treasury Yield	973.548 (+/- 133.636)
	$p = 0.00002^{***}$
LN_30-year Treasury Yield	-3,165.339 (+/- 347.638)
	$p = 0.00001^{***}$
20-year Treasury Yield	-705.997 (+/- 98.822)
	$p = 0.00002^{***}$
LN_20-year Treasury Yield	2,026.064 (+/- 219.748)
	$p = 0.00001^{***}$
10-year Treasury Yield	-185.792 (+/- 17.716)
	$p = 0.00000^{***}$
LN_10-year Treasury Yield	292.036 (+/- 29.102)
	$p = 0.00000^{***}$

1-month Treasury Yield	-183.939 (+/- 24.128)
	$p = 0.00002^{***}$
LN_1-month Treasury Yield	-13.038 (+/- 3.350)
	$p = 0.003^{***}$
7-year Treasury Yield	-110.502 (+/- 24.697)
	$p = 0.001^{***}$
LN_7-year Treasury Yield	194.351 (+/- 38.259)
	$p = 0.0004^{***}$
5-year Treasury Yield	49.895 (+/- 12.361)
	$p = 0.002^{***}$
LN_5-year Treasury Yield	-89.250 (+/- 15.932)
	$p = 0.0002^{***}$
6-month Treasury Yield	188.525 (+/- 20.324)
	$p = 0.00001^{***}$
LN_6-month Treasury Yield	36.738 (+/- 8.162)
	$p = 0.001^{***}$
LN_1-year Treasury Yield	-78.539 (+/- 9.190)
	$p = 0.00001^{***}$
3-year Treasury Yield_2	10.888 (+/- 3.032)
	$p = 0.005^{***}$
6-month Treasury Yield_2	-18.030 (+/- 3.680)
	$p = 0.0005^{***}$
3-month Treasury Yield_2	10.713 (+/- 2.228)
	$p = 0.001^{***}$
Observations	40
R^2	0.982
Adjusted R^2	0.936
Residual Std. Error	1.953 (df = 11)
F Statistic	21.266^{***} (df = 28; 11)

Note: $^{*}p<0.1; ^{**}p<0.05; ^{***}p<0.01$

REGRESSION FOR NOMINAL GDP GROWTH

	Dependent variable (+/- SE):
	Nominal GDP growth
Constant	1,054.586 (+/- 80.349)
	p = 0.00000***
SP500 Stock Price Index	-0.128 (+/- 0.010)
	p = 0.00000***
Moody's AAA Curve	212.097 (+/- 20.264)
	p = 0.00001***
Moody's BAA Curve	-115.007 (+/- 11.149)
	p = 0.00001***
Real disposable income growth	13.264 (+/- 2.078)
	p = 0.0002***
Nominal disposable income growth	-12.063 (+/- 1.927)
	p = 0.0002***
Unemployment Rate	-25.927 (+/- 2.031)
	p = 0.00000***
CPI Inflation Rate	17.590 (+/- 1.784)
	p = 0.00001***
BBB corporate yield	49.173 (+/- 4.264)
	p = 0.00001***
Prime Rate	-55.741 (+/- 8.062)
	p = 0.0001***
Dow Total Stock Market Index	0.010 (+/- 0.001)
	p = 0.00001***
Home Price Index	-1.646 (+/- 0.177)
	p = 0.00001***
Market Volatility Index	-0.750 (+/- 0.067)
	p = 0.00001***
US Avg Retail Gasoline Price ($-gal; all grades, all formulations)	-56.352 (+/- 5.119)
	p = 0.00001***
30-year Treasury Yield	587.471 (+/- 58.675)
	p = 0.00001***
LN_30-year Treasury Yield	-2,581.297 (+/- 183.429)
	p = 0.00000***
20-year Treasury Yield	-262.920 (+/- 40.445)
	p = 0.0002***
LN_20-year Treasury Yield	1,603.764 (+/- 121.630)

	$p = 0.00000^{***}$
10-year Treasury Yield	-45.097 (+/- 7.378)
	$p = 0.0002^{***}$
1-month Treasury Yield	-219.285 (+/- 19.357)
	$p = 0.00001^{***}$
LN_1-month Treasury Yield	-20.686 (+/- 2.088)
	$p = 0.00001^{***}$
7-year Treasury Yield	-373.690 (+/- 46.601)
	$p = 0.00003^{***}$
3-month Treasury Yield	118.394 (+/- 9.781)
	$p = 0.00000^{***}$
6-month Treasury Yield	272.553 (+/- 27.748)
	$p = 0.00001^{***}$
LN_6-month Treasury Yield	26.525 (+/- 4.963)
	$p = 0.0005^{***}$
LN_3-year Treasury Yield	107.976 (+/- 14.138)
	$p = 0.00004^{***}$
1-year Treasury Yield	92.805 (+/- 14.398)
	$p = 0.0002^{***}$
LN_1-year Treasury Yield	-122.443 (+/- 9.831)
	$p = 0.00000^{***}$
1-year Treasury Yield_2	-18.320 (+/- 2.690)
	$p = 0.0001^{***}$
7-year Treasury Yield_2	32.259 (+/- 5.499)
	$p = 0.0003^{***}$
10-year Treasury Yield_2	-11.484 (+/- 1.509)
	$p = 0.00004^{***}$
Observations	40
R^2	0.997
Adjusted R^2	0.985
Residual Std. Error	1.057 (df = 9)
F Statistic	88.116^{***} (df = 30; 9)

Note: $^{*}p<0.1; ^{**}p<0.05; ^{***}p<0.01$

REGRESSION FOR REAL DISPOSABLE INCOME GROWTH

	Dependent variable (+/- SE):
	Real disposable income growth
Constant	16.743 (+/- 12.997)
	p = 0.207
CPI Inflation Rate	-4.317 (+/- 1.003)
	p = 0.0002***
US Avg Retail Gasoline Price ($-gal; all grades, all formulations)	20.647 (+/- 7.045)
	p = 0.007***
LN_20-year Treasury Yield	-177.970 (+/- 63.285)
	p = 0.009***
LN_7-year Treasury Yield	203.531 (+/- 71.304)
	p = 0.008***
LN_3-year Treasury Yield	-97.192 (+/- 32.070)
	p = 0.005***
LN_1-year Treasury Yield	21.801 (+/- 7.166)
	p = 0.005***
Observations	40
R^2	0.407
Adjusted R^2	0.299
Residual Std. Error	10.587 (df = 33)
F Statistic	3.774*** (df = 6; 33)

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

REGRESSION FOR NOMINAL DISPOSABLE INCOME GROWTH

	Dependent variable (+/- SE):
	Nominal disposable income growth
Constant	8.543 (+/- 2.583)
	$p = 0.003^{***}$
CPI Inflation Rate	-1.324 (+/- 0.665)
	$p = 0.054^{*}$
Observations	40
R^2	0.094
Adjusted R^2	0.071
Residual Std. Error	11.905 (df = 38)
F Statistic	3.963^{*} (df = 1; 38)
Note:	$^{*}p<0.1; ^{**}p<0.05; ^{***}p<0.01$

REGRESSION FOR CPI INFLATION RATE

	Dependent variable (+/- SE):
	CPI Inflation Rate
Constant	-19.873 (+/- 3.056)
	$p = 0.00001^{***}$
SP500 Stock Price Index	0.005 (+/- 0.001)
	$p = 0.00001^{***}$
Moody's AAA Curve	-5.419 (+/- 1.083)
	$p = 0.0002^{***}$
Moody's BAA Curve	3.783 (+/- 0.468)
	$p = 0.00000^{***}$
Real disposable income growth	-1.172 (+/- 0.056)
	$p = 0.000^{***}$
Nominal disposable income growth	1.094 (+/- 0.054)
	$p = 0.000^{***}$
Unemployment Rate	0.849 (+/- 0.080)
	$p = 0.000^{***}$
Dow Total Stock Market Index	-0.0002 (+/- 0.00004)
	$p = 0.00002^{***}$
Market Volatility Index	0.072 (+/- 0.013)
	$p = 0.0001^{***}$
LN_Market Volatility Index	-1.971 (+/- 0.442)
	$p = 0.0004^{***}$
US Avg Retail Gasoline Price ($-gal; all grades, all formulations)	1.332 (+/- 0.209)
	$p = 0.00001^{***}$
30-year Treasury Yield	-36.475 (+/- 4.866)
	$p = 0.00001^{***}$
LN_30-year Treasury Yield	108.312 (+/- 12.591)
	$p = 0.00000^{***}$
20-year Treasury Yield	23.699 (+/- 4.663)
	$p = 0.0002^{***}$
LN_20-year Treasury Yield	-72.801 (+/- 10.872)
	$p = 0.00001^{***}$
10-year Treasury Yield	1.032 (+/- 0.217)
	$p = 0.0003^{***}$
1-month Treasury Yield	7.011 (+/- 0.868)
	$p = 0.00000^{***}$
LN_1-month Treasury Yield	0.508 (+/- 0.153)

	$p = 0.005^{***}$
7-year Treasury Yield	9.102 (+/- 1.071)
	$p = 0.00000^{***}$
6-month Treasury Yield	-10.792 (+/- 1.189)
	$p = 0.00000^{***}$
LN_3-year Treasury Yield	-2.923 (+/- 0.635)
	$p = 0.00000^{***}$
LN_1-year Treasury Yield	2.165 (+/- 0.274)
	$p = 0.0003^{***}$
1-year Treasury Yield_2	0.828 (+/- 0.157)
	$p = 0.00000^{***}$
3-year Treasury Yield_2	-1.361 (+/- 0.179)
	$p = 0.0001^{***}$
Observations	40
R^2	0.998
Adjusted R^2	0.995
Residual Std. Error	0.195 (df = 16)
F Statistic	366.418^{***} (df = 23; 16)
Note:	$^{*}p<0.1; ^{**}p<0.05; ^{***}p<0.01$

Unemployment Rate

REGRESSION FOR UNEMPLOYMENT RATE

	Dependent variable (+/- SE):
	Unemployment Rate
Constant	13.035 (+/- 0.700)
	p = 0.00001***
SP500 Stock Price Index	-0.002 (+/- 0.0002)
	p = 0.00005***
US Fed Reserve O-N Loan Rate	2.200 (+/- 0.254)
	p = 0.0004***
Moody's AAA Curve	5.075 (+/- 0.199)
	p = 0.00001***
Moody's BAA Curve	-3.469 (+/- 0.111)
	p = 0.00000***
Real GDP growth	0.072 (+/- 0.011)
	p = 0.002***
Nominal GDP growth	-0.089 (+/- 0.011)
	p = 0.0005***
Real disposable income growth	0.666 (+/- 0.028)
	p = 0.00001***
Nominal disposable income growth	-0.616 (+/- 0.026)
	p = 0.00001***
CPI Inflation Rate	0.572 (+/- 0.016)
	p = 0.00000***
BBB corporate yield	0.814 (+/- 0.061)
	p = 0.00005***
30-year Mortgate Rate	0.914 (+/- 0.069)
	p = 0.00005***
Prime Rate	-4.236 (+/- 0.171)
	p = 0.00001***
Dow Total Stock Market Index	0.0003 (+/- 0.00001)
	p = 0.00000***
Home Price Index	-0.035 (+/- 0.002)
	p = 0.00003***
Market Volatility Index	-0.023 (+/- 0.001)
	p = 0.00000***
US Avg Retail Gasoline Price ($-gal; all grades, all formulations)	-1.834 (+/- 0.052)
	p = 0.00000***

30-year Treasury Yield	12.992 (+/- 0.479)
	$p = 0.00001^{***}$
LN_30-year Treasury Yield	-37.730 (+/- 1.147)
	$p = 0.00000^{***}$
20-year Treasury Yield	10.063 (+/- 0.671)
	$p = 0.00003^{***}$
LN_10-year Treasury Yield	-6.371 (+/- 0.136)
	$p = 0.00000^{***}$
1-month Treasury Yield	-9.875 (+/- 0.322)
	$p = 0.00000^{***}$
LN_1-month Treasury Yield	-0.522 (+/- 0.022)
	$p = 0.00001^{***}$
7-year Treasury Yield	-9.058 (+/- 0.343)
	$p = 0.00001^{***}$
3-month Treasury Yield	4.184 (+/- 0.098)
	$p = 0.00000^{***}$
5-year Treasury Yield	-1.279 (+/- 0.205)
	$p = 0.002^{***}$
LN_5-year Treasury Yield	3.965 (+/- 0.188)
	$p = 0.00001^{***}$
6-month Treasury Yield	12.504 (+/- 0.406)
	$p = 0.00000^{***}$
LN_6-month Treasury Yield	-1.166 (+/- 0.091)
	$p = 0.0001^{***}$
3-year Treasury Yield	4.672 (+/- 0.289)
	$p = 0.00002^{***}$
LN_1-year Treasury Yield	-1.644 (+/- 0.090)
	$p = 0.00001^{***}$
1-year Treasury Yield_2	-0.454 (+/- 0.052)
	$p = 0.0004^{***}$
5-year Treasury Yield_2	-0.193 (+/- 0.032)
	$p = 0.002^{***}$
3-month Treasury Yield_2	-0.224 (+/- 0.027)
	$p = 0.0005^{***}$
20-year Treasury Yield_2	-1.003 (+/- 0.087)
	$p = 0.0001^{***}$
Observations	40
R^2	1.000
Adjusted R^2	1.000

Residual Std. Error	0.017 (df = 5)
F Statistic	13,955.490*** (df = 34; 5)

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	-28.900 (+/- 7.194)
	$p = 0.0005^{***}$
Moody's AAA Curve	-6.016 (+/- 0.880)
	$p = 0.00000^{***}$
Moody's BAA Curve	2.128 (+/- 0.364)
	$p = 0.00001^{***}$
Unemployment Rate	-0.571 (+/- 0.096)
	$p = 0.00001^{***}$
CPI Inflation Rate	-0.119 (+/- 0.028)
	$p = 0.0003^{***}$
BBB corporate yield	-1.264 (+/- 0.280)
	$p = 0.0002^{***}$
30-year Mortgate Rate	1.289 (+/- 0.274)
	$p = 0.0001^{***}$
LN_30-year Treasury Yield	12.981 (+/- 2.926)
	$p = 0.0002^{***}$
20-year Treasury Yield	70.701 (+/- 14.346)
	$p = 0.00005^{***}$
LN_20-year Treasury Yield	-96.688 (+/- 17.791)
	$p = 0.00002^{***}$
7-year Treasury Yield	-20.187 (+/- 4.443)
	$p = 0.0002^{***}$
LN_7-year Treasury Yield	19.055 (+/- 3.807)
	$p = 0.00004^{***}$
7-year Treasury Yield_2	2.486 (+/- 0.556)
	$p = 0.0002^{***}$
20-year Treasury Yield_2	-6.309 (+/- 1.386)
	$p = 0.0002^{***}$
Observations	40
R^2	0.960
Adjusted R^2	0.940
Residual Std. Error	0.274 (df = 26)
F Statistic	48.153^{***} (df = 13; 26)

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

REGRESSION FOR 3-MONTH TREASURY YIELD

	Dependent variable (+/- SE):
	3-month Treasury Yield
Constant	-24.394 (+/- 4.767)
	p = 0.00002***
Real GDP growth	0.174 (+/- 0.049)
	p = 0.002***
Nominal GDP growth	-0.172 (+/- 0.044)
	p = 0.0005***
Unemployment Rate	-0.219 (+/- 0.076)
	p = 0.008***
Commercial Real Estate Price Index	0.024 (+/- 0.005)
	p = 0.00004***
30-year Treasury Yield	-8.725 (+/- 2.699)
	p = 0.003***
LN_30-year Treasury Yield	27.047 (+/- 6.227)
	p = 0.0002***
20-year Treasury Yield	27.962 (+/- 4.477)
	p = 0.00000***
LN_20-year Treasury Yield	-44.897 (+/- 6.734)
	p = 0.00000***
20-year Treasury Yield_2	-1.909 (+/- 0.464)
	p = 0.0003***
Observations	40
R^2	0.957
Adjusted R^2	0.944
Residual Std. Error	0.319 (df = 30)
F Statistic	74.102*** (df = 9; 30)
Note:	*p<0.1; **p<0.05; ***p<0.01

REGRESSION FOR 6-MONTH TREASURY YIELD

	Dependent variable (+/- SE):
	6-month Treasury Yield
Constant	-24.757 (+/- 6.278)
	p = 0.0005***
Real GDP growth	0.285 (+/- 0.056)
	p = 0.00002***
Nominal GDP growth	-0.284 (+/- 0.048)
	p = 0.00001***
Unemployment Rate	-0.318 (+/- 0.100)
	p = 0.004***
Commercial Real Estate Price Index	0.024 (+/- 0.004)
	p = 0.00000***
30-year Treasury Yield	26.943 (+/- 8.501)
	p = 0.004***
LN_30-year Treasury Yield	-35.411 (+/- 11.154)
	p = 0.004***
30-year Treasury Yield_2	-2.249 (+/- 0.796)
	p = 0.009***
Observations	40
R^2	0.907
Adjusted R^2	0.886
Residual Std. Error	0.420 (df = 32)
F Statistic	44.494*** (df = 7; 32)
Note:	*p<0.1; **p<0.05; ***p<0.01

REGRESSION FOR 1-YEAR TREASURY YIELD

	Dependent variable (+/- SE):
	1-year Treasury Yield
Constant	-8.573 (+/- 1.320)
	p = 0.00000***
Moody's BAA Curve	1.012 (+/- 0.150)
	p = 0.00000***
Real GDP growth	0.224 (+/- 0.059)
	p = 0.001***
Nominal GDP growth	-0.210 (+/- 0.053)
	p = 0.0004***
Unemployment Rate	-0.176 (+/- 0.057)
	p = 0.004***
Commercial Real Estate Price Index	0.023 (+/- 0.003)
	p = 0.000***
Observations	40
R^2	0.834
Adjusted R^2	0.810
Residual Std. Error	0.540 (df = 34)
F Statistic	34.227*** (df = 5; 34)
Note:	*p<0.1; **p<0.05; ***p<0.01

REGRESSION FOR 3-YEAR TREASURY YIELD

	Dependent variable (+/- SE):
	3-year Treasury Yield
Constant	-1.175 (+/- 0.671)
	p = 0.089[*]
SP500 Stock Price Index	-0.002 (+/- 0.0003)
	p = 0.00000[***]
Unemployment Rate	-0.278 (+/- 0.047)
	p = 0.00000[***]
Home Price Index	0.048 (+/- 0.006)
	p = 0.000[***]
Observations	40
R^2	0.781
Adjusted R^2	0.763
Residual Std. Error	0.505 (df = 36)
F Statistic	42.818[***] (df = 3; 36)
Note:	*p<0.1; **p<0.05; ***p<0.01

REGRESSION FOR 5-YEAR TREASURY YIELD

	Dependent variable (+/- SE):
	5-year Treasury Yield
Constant	-0.939 (+/- 0.652)
	p = 0.159
SP500 Stock Price Index	-0.002 (+/- 0.0003)
	p = 0.00002***
Unemployment Rate	-0.220 (+/- 0.044)
	p = 0.00002***
Home Price Index	0.033 (+/- 0.006)
	p = 0.00001***
US Avg Retail Gasoline Price ($-gal; all grades, all formulations)	0.461 (+/- 0.137)
	p = 0.002***
Observations	40
R^2	0.761
Adjusted R^2	0.734
Residual Std. Error	0.471 (df = 35)
F Statistic	27.921*** (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	5.633 (+/- 0.539)
	p = 0.000***
Unemployment Rate	-0.171 (+/- 0.036)
	p = 0.00004***
Home Price Index	0.034 (+/- 0.006)
	p = 0.00000***
Commercial Real Estate Price Index	-0.037 (+/- 0.005)
	p = 0.00000***
1-month Treasury Yield	0.420 (+/- 0.063)
	p = 0.00000***
Observations	40
R^2	0.827
Adjusted R^2	0.807
Residual Std. Error	0.342 (df = 35)
F Statistic	41.738*** (df = 4; 35)
Note:	*p<0.1; **p<0.05; ***p<0.01

REGRESSION FOR 10-YEAR TREASURY YIELD

	Dependent variable (+/- SE):
	10-year Treasury Yield
Constant	-0.430 (+/- 0.578)
	p = 0.462
SP500 Stock Price Index	-0.003 (+/- 0.001)
	p = 0.0001***
Unemployment Rate	-0.168 (+/- 0.038)
	p = 0.0001***
Dow Total Stock Market Index	0.0001 (+/- 0.00005)
	p = 0.008***
Home Price Index	0.027 (+/- 0.006)
	p = 0.00003***
US Avg Retail Gasoline Price ($-gal; all grades, all formulations)	0.709 (+/- 0.117)
	p = 0.00000***
Observations	40
R^2	0.765
Adjusted R^2	0.731
Residual Std. Error	0.391 (df = 34)
F Statistic	22.186*** (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	4.409 (+/- 0.453)
	p = 0.000***
Real GDP growth	-0.019 (+/- 0.007)
	p = 0.010***
Real disposable income growth	-0.161 (+/- 0.037)
	p = 0.0002***
Nominal disposable income growth	0.155 (+/- 0.036)
	p = 0.0002***
Home Price Index	-0.017 (+/- 0.002)
	p = 0.000***
US Avg Retail Gasoline Price ($-gal; all grades, all formulations)	0.389 (+/- 0.089)
	p = 0.0002***
3-month Treasury Yield_2	0.120 (+/- 0.010)
	p = 0.000***
Observations	40
R^2	0.898
Adjusted R^2	0.879
Residual Std. Error	0.238 (df = 33)
F Statistic	48.330*** (df = 6; 33)

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

REGRESSION FOR 30-YEAR TREASURY YIELD

	Dependent variable (+/- SE):
	30-year Treasury Yield
Constant	2.175 (+/- 0.279)
	$p = 0.000^{***}$
SP500 Stock Price Index	-0.001 (+/- 0.0001)
	$p = 0.000^{***}$
Real GDP growth	-0.019 (+/- 0.005)
	$p = 0.001^{***}$
Unemployment Rate	-0.105 (+/- 0.030)
	$p = 0.002^{***}$
CPI Inflation Rate	0.115 (+/- 0.022)
	$p = 0.00001^{***}$
Prime Rate	0.692 (+/- 0.054)
	$p = 0.000^{***}$
LN_6-month Treasury Yield	-0.369 (+/- 0.049)
	$p = 0.000^{***}$
Observations	40
R^2	0.900
Adjusted R^2	0.882
Residual Std. Error	0.221 (df = 33)
F Statistic	49.663^{***} (df = 6; 33)

Note: $^{*}p<0.1; ^{**}p<0.05; ^{***}p<0.01$

30-year Mortgage Rate

REGRESSION FOR 30-YEAR MORTGATE RATE

	Dependent variable (+/- SE):
	30-year Mortgate Rate
Constant	-0.314 (+/- 0.506)
	$p = 0.539$
SP500 Stock Price Index	-0.002 (+/- 0.0002)
	$p = 0.000^{***}$
Unemployment Rate	-0.121 (+/- 0.034)
	$p = 0.002^{***}$
Home Price Index	0.043 (+/- 0.005)
	$p = 0.000^{***}$
US Avg Retail Gasoline Price ($-gal; all grades, all formulations)	0.627 (+/- 0.107)
	$p = 0.00001^{***}$
Observations	40
R^2	0.860
Adjusted R^2	0.844
Residual Std. Error	0.366 (df = 35)
F Statistic	53.935^{***} (df = 4; 35)

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	2.818 (+/- 0.249)
	p = 0.000***
SP500 Stock Price Index	-0.001 (+/- 0.0001)
	p = 0.000***
Real GDP growth	-0.022 (+/- 0.005)
	p = 0.0003***
Real disposable income growth	-0.174 (+/- 0.025)
	p = 0.00000***
Nominal disposable income growth	0.166 (+/- 0.024)
	p = 0.00000***
Prime Rate	0.648 (+/- 0.048)
	p = 0.000***
LN_1-month Treasury Yield	-0.199 (+/- 0.031)
	p = 0.00000***
Observations	40
R^2	0.913
Adjusted R^2	0.897
Residual Std. Error	0.212 (df = 33)
F Statistic	57.631*** (df = 6; 33)
Note:	*p<0.1; **p<0.05; ***p<0.01

REGRESSION FOR MOODY'S BAA CURVE

	Dependent variable (+/- SE):
	Moody's BAA Curve
Constant	-2.047 (+/- 2.429)
	p = 0.407
SP500 Stock Price Index	-0.001 (+/- 0.0001)
	p = 0.00000***
US Fed Reserve O-N Loan Rate	-0.973 (+/- 0.191)
	p = 0.00003***
Real disposable income growth	0.214 (+/- 0.075)
	p = 0.009***
Nominal disposable income growth	-0.202 (+/- 0.071)
	p = 0.009***
Unemployment Rate	-0.113 (+/- 0.037)
	p = 0.006***
CPI Inflation Rate	0.174 (+/- 0.063)
	p = 0.010***
Prime Rate	1.760 (+/- 0.614)
	p = 0.009***
Market Volatility Index	-0.040 (+/- 0.012)
	p = 0.003***
LN_Market Volatility Index	1.292 (+/- 0.391)
	p = 0.003***
US Avg Retail Gasoline Price ($-gal; all grades, all formulations)	0.368 (+/- 0.109)
	p = 0.003***
3-month Treasury Yield	-1.811 (+/- 0.616)
	p = 0.007***
LN_6-month Treasury Yield	0.368 (+/- 0.118)
	p = 0.005***
1-year Treasury Yield_2	0.230 (+/- 0.041)
	p = 0.00001***
Observations	40
R^2	0.931
Adjusted R^2	0.897
Residual Std. Error	0.225 (df = 26)
F Statistic	27.188*** (df = 13; 26)
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	6.835 (+/- 0.543)
	$p = 0.000^{***}$
US Fed Reserve O-N Loan Rate	-3.819 (+/- 0.759)
	$p = 0.00002^{***}$
Unemployment Rate	-0.112 (+/- 0.032)
	$p = 0.002^{***}$
Commercial Real Estate Price Index	-0.011 (+/- 0.001)
	$p = 0.000^{***}$
US Avg Retail Gasoline Price ($-gal; all grades, all formulations)	0.454 (+/- 0.069)
	$p = 0.00000^{***}$
1-month Treasury Yield	3.061 (+/- 0.708)
	$p = 0.0002^{***}$
LN_1-month Treasury Yield	-0.202 (+/- 0.065)
	$p = 0.005^{***}$
LN_1-year Treasury Yield	0.780 (+/- 0.082)
	$p = 0.000^{***}$
3-month Treasury Yield_2	0.133 (+/- 0.016)
	$p = 0.000^{***}$
Observations	40
R^2	0.960
Adjusted R^2	0.950
Residual Std. Error	0.200 (df = 31)
F Statistic	93.887^{***} (df = 8; 31)

Note: $^*p<0.1; ^{**}p<0.05; ^{***}p<0.01$

Prime Rate

REGRESSION FOR PRIME RATE

	Dependent variable (+/- SE):
	Prime Rate
Constant	-18.149 (+/- 3.908)
	p = 0.0001***
Moody's AAA Curve	-1.492 (+/- 0.407)
	p = 0.001***
Real GDP growth	0.182 (+/- 0.042)
	p = 0.0002***
Nominal GDP growth	-0.185 (+/- 0.036)
	p = 0.00002***
Unemployment Rate	-0.212 (+/- 0.064)
	p = 0.003***
Commercial Real Estate Price Index	0.021 (+/- 0.004)
	p = 0.00002***
30-year Treasury Yield	-9.667 (+/- 2.322)
	p = 0.0003***
LN_30-year Treasury Yield	34.513 (+/- 5.969)
	p = 0.00001***
20-year Treasury Yield	28.372 (+/- 3.948)
	p = 0.00000***
LN_20-year Treasury Yield	-48.937 (+/- 6.363)
	p = 0.00000***
20-year Treasury Yield_2	-1.774 (+/- 0.383)
	p = 0.0001***
Observations	40
R^2	0.967
Adjusted R^2	0.956
Residual Std. Error	0.262 (df = 29)
F Statistic	84.877*** (df = 10; 29)
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	7.730 (+/- 1.472)
	p = 0.0003***
SP500 Stock Price Index	-0.002 (+/- 0.0003)
	p = 0.00001***
US Fed Reserve O-N Loan Rate	2.187 (+/- 0.592)
	p = 0.004***
Moody's AAA Curve	1.930 (+/- 0.368)
	p = 0.0003***
Moody's BAA Curve	-1.527 (+/- 0.202)
	p = 0.00001***
Nominal GDP growth	-0.012 (+/- 0.003)
	p = 0.001***
Real disposable income growth	0.187 (+/- 0.049)
	p = 0.003***
Nominal disposable income growth	-0.170 (+/- 0.046)
	p = 0.004***
Unemployment Rate	-0.358 (+/- 0.038)
	p = 0.00000***
CPI Inflation Rate	0.213 (+/- 0.030)
	p = 0.00002***
BBB corporate yield	0.761 (+/- 0.110)
	p = 0.00002***
Prime Rate	-1.337 (+/- 0.300)
	p = 0.001***
Dow Total Stock Market Index	0.0002 (+/- 0.00002)
	p = 0.00000***
Market Volatility Index	-0.010 (+/- 0.002)
	p = 0.00005***
30-year Treasury Yield	6.525 (+/- 0.490)
	p = 0.00000***
LN_30-year Treasury Yield	-21.456 (+/- 1.588)
	p = 0.000***
LN_20-year Treasury Yield	7.666 (+/- 1.367)
	p = 0.0002***

LN_10-year Treasury Yield	-2.902 (+/- 0.229)
	p = 0.00000***
1-month Treasury Yield	-4.425 (+/- 0.524)
	p = 0.00001***
LN_1-month Treasury Yield	-0.312 (+/- 0.046)
	p = 0.00003***
7-year Treasury Yield	-4.035 (+/- 0.369)
	p = 0.00000***
3-month Treasury Yield	1.229 (+/- 0.292)
	p = 0.002***
5-year Treasury Yield	-0.829 (+/- 0.219)
	p = 0.003***
LN_5-year Treasury Yield	2.068 (+/- 0.222)
	p = 0.00000***
6-month Treasury Yield	4.535 (+/- 0.462)
	p = 0.00000***
3-year Treasury Yield	2.839 (+/- 0.278)
	p = 0.00000***
LN_1-year Treasury Yield	-1.421 (+/- 0.083)
	p = 0.000***
1-year Treasury Yield_2	-0.396 (+/- 0.028)
	p = 0.000***
Observations	40
R^2	0.998
Adjusted R^2	0.993
Residual Std. Error	0.052 (df = 12)
F Statistic	205.318*** (df = 27; 12)

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

US Federal Reserve Overnight Lending Rate

REGRESSION FOR US FED RESERVE O-N LOAN RATE

	Dependent variable (+/- SE):
	US Fed Reserve O-N Loan Rate
Constant	-7.485 (+/- 0.703)
	$p = 0.000$***
Real GDP growth	0.410 (+/- 0.054)
	$p = 0.000$***
Nominal GDP growth	-0.381 (+/- 0.049)
	$p = 0.000$***
Commercial Real Estate Price Index	0.024 (+/- 0.002)
	$p = 0.000$***
20-year Treasury Yield	0.976 (+/- 0.118)
	$p = 0.000$***
Observations	40
R^2	0.815
Adjusted R^2	0.794
Residual Std. Error	0.495 (df = 35)
F Statistic	38.599*** (df = 4; 35)

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	45,841.160 (+/- 3,677.878)
	$p = 0.000^{***}$
US Fed Reserve O-N Loan Rate	-29,202.440 (+/- 8,125.661)
	$p = 0.002^{***}$
Real GDP growth	-2,608.963 (+/- 251.855)
	$p = 0.000^{***}$
Nominal GDP growth	2,373.680 (+/- 234.987)
	$p = 0.000^{***}$
Unemployment Rate	-1,245.971 (+/- 369.743)
	$p = 0.003^{***}$
1-month Treasury Yield	41,257.490 (+/- 7,781.535)
	$p = 0.00001^{***}$
3-month Treasury Yield	11,758.490 (+/- 2,182.698)
	$p = 0.00001^{***}$
1-year Treasury Yield	-27,797.740 (+/- 3,547.557)
	$p = 0.000^{***}$
3-year Treasury Yield_2	2,365.235 (+/- 503.159)
	$p = 0.0001^{***}$
20-year Treasury Yield_2	-1,804.436 (+/- 168.743)
	$p = 0.000^{***}$
Observations	40
R^2	0.952
Adjusted R^2	0.938
Residual Std. Error	2,201.242 (df = 30)
F Statistic	66.014^{***} (df = 9; 30)
Note:	*$p<0.1$; **$p<0.05$; ***$p<0.01$

REGRESSION FOR SP500 STOCK PRICE INDEX

	Dependent variable (+/- SE):
	SP500 Stock Price Index
Constant	9,156.384 (+/- 281.268)
	p = 0.000***
US Fed Reserve O-N Loan Rate	483.170 (+/- 92.440)
	p = 0.0003***
Real GDP growth	-6.782 (+/- 0.522)
	p = 0.00000***
Real disposable income growth	-126.875 (+/- 5.850)
	p = 0.000***
Nominal disposable income growth	119.916 (+/- 5.493)
	p = 0.000***
Unemployment Rate	183.337 (+/- 23.060)
	p = 0.00001***
BBB corporate yield	357.305 (+/- 26.908)
	p = 0.00000***
Prime Rate	1,039.379 (+/- 73.260)
	p = 0.000***
LN_30-year Treasury Yield	-22,425.190 (+/- 660.204)
	p = 0.000***
20-year Treasury Yield	-9,026.174 (+/- 450.320)
	p = 0.000***
LN_20-year Treasury Yield	26,790.830 (+/- 921.247)
	p = 0.000***
LN_10-year Treasury Yield	3,086.918 (+/- 249.253)
	p = 0.00000***
LN_1-month Treasury Yield	-51.624 (+/- 12.960)
	p = 0.002***
7-year Treasury Yield	1,636.195 (+/- 82.845)
	p = 0.000***
3-month Treasury Yield	-659.008 (+/- 114.562)
	p = 0.0001***
LN_5-year Treasury Yield	-1,491.116 (+/- 101.128)
	p = 0.000***
6-month Treasury Yield	-1,926.185 (+/- 193.237)
	p = 0.00000***
LN_6-month Treasury Yield	910.163 (+/- 54.747)

	$p = 0.000^{***}$
3-year Treasury Yield	-2,013.588 (+/- 139.150)
	$p = 0.000^{***}$
LN_3-year Treasury Yield	829.942 (+/- 73.676)
	$p = 0.00000^{***}$
1-year Treasury Yield	2,048.669 (+/- 212.351)
	$p = 0.00000^{***}$
LN_1-year Treasury Yield	-1,122.432 (+/- 68.276)
	$p = 0.000^{***}$
3-year Treasury Yield_2	69.255 (+/- 21.774)
	$p = 0.008^{***}$
5-year Treasury Yield_2	196.623 (+/- 14.589)
	$p = 0.000^{***}$
3-month Treasury Yield_2	154.906 (+/- 22.358)
	$p = 0.00002^{***}$
1-month Treasury Yield_2	-111.544 (+/- 17.500)
	$p = 0.00004^{***}$
10-year Treasury Yield_2	-417.394 (+/- 27.509)
	$p = 0.000^{***}$
30-year Treasury Yield_2	845.118 (+/- 48.002)
	$p = 0.000^{***}$
Observations	40
R^2	1.000
Adjusted R^2	1.000
Residual Std. Error	11.110 (df = 12)
F Statistic	8,990.149*** (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	332.342 (+/- 14.574)
	p = 0.000***
US Fed Reserve O-N Loan Rate	-74.496 (+/- 20.029)
	p = 0.001***
Real GDP growth	-7.582 (+/- 0.936)
	p = 0.000***
Nominal GDP growth	6.635 (+/- 0.883)
	p = 0.00000***
Unemployment Rate	-16.285 (+/- 1.945)
	p = 0.000***
10-year Treasury Yield	52.825 (+/- 14.010)
	p = 0.001***
LN_10-year Treasury Yield	-132.003 (+/- 25.003)
	p = 0.00002***
7-year Treasury Yield	-35.832 (+/- 5.632)
	p = 0.00000***
3-month Treasury Yield	95.155 (+/- 13.227)
	p = 0.00000***
6-month Treasury Yield	164.525 (+/- 34.434)
	p = 0.0001***
1-year Treasury Yield	-216.247 (+/- 33.554)
	p = 0.00000***
3-year Treasury Yield_2	15.482 (+/- 3.327)
	p = 0.0001***
3-month Treasury Yield_2	-10.092 (+/- 2.259)
	p = 0.0002***
1-month Treasury Yield_2	10.132 (+/- 2.185)
	p = 0.0001***
Observations	40
R^2	0.986
Adjusted R^2	0.979
Residual Std. Error	6.414 (df = 26)
F Statistic	142.881*** (df = 13; 26)

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	193.380 (+/- 42.240)
	$p = 0.0002^{***}$
US Fed Reserve O-N Loan Rate	-169.329 (+/- 41.632)
	$p = 0.0005^{***}$
Real GDP growth	-9.753 (+/- 1.091)
	$p = 0.000^{***}$
Nominal GDP growth	8.139 (+/- 1.031)
	$p = 0.00000^{***}$
Unemployment Rate	-22.302 (+/- 2.285)
	$p = 0.000^{***}$
1-month Treasury Yield	149.971 (+/- 35.233)
	$p = 0.0003^{***}$
LN_1-month Treasury Yield	-11.667 (+/- 3.371)
	$p = 0.002^{***}$
LN_7-year Treasury Yield	-66.776 (+/- 9.957)
	$p = 0.00000^{***}$
3-month Treasury Yield	77.328 (+/- 12.384)
	$p = 0.00001^{***}$
5-year Treasury Yield	220.425 (+/- 50.203)
	$p = 0.0002^{***}$
LN_5-year Treasury Yield	-167.811 (+/- 35.147)
	$p = 0.0001^{***}$
1-year Treasury Yield_2	-46.348 (+/- 9.189)
	$p = 0.00004^{***}$
6-month Treasury Yield_2	62.531 (+/- 12.128)
	$p = 0.00003^{***}$
5-year Treasury Yield_2	-37.706 (+/- 8.622)
	$p = 0.0002^{***}$
1-month Treasury Yield_2	-25.971 (+/- 5.738)
	$p = 0.0002^{***}$
Observations	40
R^2	0.977
Adjusted R^2	0.964
Residual Std. Error	8.730 (df = 25)
F Statistic	75.665^{***} (df = 14; 25)

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	1,422.020 (+/- 72.807)
	p = 0.000***
SP500 Stock Price Index	-0.168 (+/- 0.012)
	p = 0.00000***
Moody's AAA Curve	287.684 (+/- 18.365)
	p = 0.00000***
Moody's BAA Curve	-154.472 (+/- 8.928)
	p = 0.00000***
Real GDP growth	-1.296 (+/- 0.125)
	p = 0.00001***
Real disposable income growth	19.687 (+/- 1.739)
	p = 0.00001***
Nominal disposable income growth	-17.972 (+/- 1.637)
	p = 0.00001***
Unemployment Rate	-35.396 (+/- 1.494)
	p = 0.000***
CPI Inflation Rate	24.143 (+/- 1.277)
	p = 0.00000***
BBB corporate yield	65.773 (+/- 3.376)
	p = 0.000***
Prime Rate	-74.582 (+/- 8.980)
	p = 0.00002***
Dow Total Stock Market Index	0.013 (+/- 0.001)
	p = 0.000***
Home Price Index	-2.272 (+/- 0.195)
	p = 0.00001***
US Avg Retail Gasoline Price ($-gal; all grades, all formulations)	-77.180 (+/- 3.536)
	p = 0.000***
30-year Treasury Yield	776.602 (+/- 69.726)
	p = 0.00001***
LN_30-year Treasury Yield	-3,396.879 (+/- 229.480)
	p = 0.00000***
20-year Treasury Yield	-339.509 (+/- 59.106)
	p = 0.0003***

LN_20-year Treasury Yield	2,100.510 (+/- 172.784)
	$p = 0.00000^{***}$
10-year Treasury Yield	-63.221 (+/- 7.769)
	$p = 0.00002^{***}$
1-month Treasury Yield	-292.556 (+/- 17.904)
	$p = 0.00000^{***}$
LN_1-month Treasury Yield	-28.341 (+/- 1.892)
	$p = 0.00000^{***}$
7-year Treasury Yield	-528.632 (+/- 33.114)
	$p = 0.00000^{***}$
3-month Treasury Yield	158.775 (+/- 10.418)
	$p = 0.00000^{***}$
6-month Treasury Yield	370.796 (+/- 28.728)
	$p = 0.00000^{***}$
LN_6-month Treasury Yield	36.181 (+/- 7.564)
	$p = 0.001^{***}$
LN_3-year Treasury Yield	153.260 (+/- 10.115)
	$p = 0.00000^{***}$
1-year Treasury Yield	120.126 (+/- 13.816)
	$p = 0.00002^{***}$
LN_1-year Treasury Yield	-165.959 (+/- 9.359)
	$p = 0.00000^{***}$
1-year Treasury Yield_2	-25.754 (+/- 2.336)
	$p = 0.00001^{***}$
7-year Treasury Yield_2	47.624 (+/- 5.166)
	$p = 0.00001^{***}$
10-year Treasury Yield_2	-14.339 (+/- 2.250)
	$p = 0.0002^{***}$
Observations	40
R^2	0.997
Adjusted R^2	0.987
Residual Std. Error	1.469 (df = 9)
F Statistic	100.316^{***} (df = 30; 9)

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 "2022 Stress Test Scenarios" (found at https://www.federalreserve.gov/newsevents/pressreleases/files/bcreg20220210a1.pdf) are listed. Please note that shaded attributes are not discussed within this report.

Table 16: Data Values and Referenced Sources

Attribute	Referenced Source[66]
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), "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[67]

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

[67] 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.

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)[68].
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)[69].
Market Volatility Index (VIX)	VIX converted to quarterly frequency using the maximum close-of-day value in any quarter, Chicago Board Options Exchange.
Euro Area Real GDP Growth	Percent change in real gross domestic product at an annualized rate, staff calculations based on Statistical Office of the European Communities via Haver, extended back using ECB Area Wide Model dataset (ECB Working Paper series no. 42).
Euro Area Inflation	Percent change in the quarterly average of the harmonized index of consumer prices 16 Federal Reserve Supervisory Scenarios at an annualized rate, staff calculations based on Statistical Office of the European Communities via Haver.
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

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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.

68 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

[69] 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

	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/2023-Table_1A_Historic_Domestic.csv and https://www.federalreserve.gov/supervisionreg/files/2023-Table_1B_Historic_International.csv (shown below, as of March 2023) by clicking the links marked "2023 Historical Domestic (CSV)" and "2023 Historical International (CSV)"[70].

Since the CCAR dataset is only released annually (through 1Q2023 as of this writing), and Capitalytics provides quarterly updates to its forecasts, the CCAR dataset is supplemented by the data sources

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

shown below on a quarterly basis. All datasets discussed herein are supplemented with data through (including) 1Q2023.

Table 17: Supplementary Data Sources for Data Attributes

Attribute	Supplementary Data Source
Real GDP growth	Bureau of Economic Analysis (NIPA table 1.1.6, line 1)
Nominal GDP growth	Bureau of Economic Analysis (NIPA table 1.1.5, line 1)
Real disposable income growth	Bureau of Economic Analysis (NIPA table 2.1, line 27, and NIPA table 1.1.4, line 2)
Nominal disposable income growth	Bureau of Economic Analysis (NIPA table 2.1, line 27)
Unemployment rate	Bureau of Labor Statistics (series LNS14000000)
CPI inflation rate	Bureau of Labor Statistics (series CUSR0000SA0)
3-month Treasury yield	Quarterly average of 3-month Treasury bill secondary market rate on a discount basis, H.15 Release
5-year Treasury yield	Federal Reserve Economic Research website (https://fred.stlouisfed.org/series/GS5), with "Quarterly" frequency and "Average" aggregation method
10-year Treasury yield	Federal Reserve Economic Research website (https://fred.stlouisfed.org/series/GS10), with "Quarterly" frequency and "Average" aggregation method
BBB corporate yield	Federal Reserve Economic Research website (https://fred.stlouisfed.org/series/BAMLC0A4CBBBEY), with "Quarterly" frequency and "Average" aggregation method
Mortgage rate	Federal Reserve Economic Research website (https://fred.stlouisfed.org/series/MORTGAGE30US), with "Quarterly" frequency and "Average" aggregation method
Prime rate	Federal Reserve Economic Research website (https://fred.stlouisfed.org/series/MPRIME), with "Quarterly" frequency and "Average" aggregation method
Dow Jones Total Stock Market Index (end-of-qtr value)	Dow-Jones as provided by the Wall Street Journal (https://quotes.wsj.com/index/DWCF/advanced-chart)
House Price Index	https://data.nasdaq.com/data/FED/FL075035243_Q-interest-rates-and-price-indexes-owneroccupied-real-estate-corelogic-national-sa-quarterly-levels-nsa
Commercial Real Estate Price Index	https://data.nasdaq.com/data/FED/FL075035503_Q-interest-rates-and-price-indexes-commercial-real-estate-price-index-quarterly-levels-nsa
Market Volatility Index (VIX)	Federal Reserve Economic Research website (https://fred.stlouisfed.org/series/VIXCLS), with "Quarterly" frequency and "Average" aggregation method

Euro Area Real GDP Growth	Quarterly series for "European Union GDP Annual Growth Rate" per tradingeconomics.com
Euro Area Inflation	Quarterly average of monthly series for "European Union Inflation Rate" per tradingeconomics.com
Euro Area Bilateral Dollar Exchange Rate (USD/Euro)	End-of-quarter rates from the H.10 Release, Foreign Exchange Rates, Federal Reserve Board.
Developing Asia Real GDP Growth	The nominal GDP-weighted aggregate of the Real GDP growth for China, India, South Korea, Hong Kong Special Administrative Region, and Taiwan per OECD
Developing Asia Inflation	The nominal GDP-weighted aggregate of the inflation rate for China, India, South Korea, Hong Kong Special Administrative Region, and Taiwan per OECD
Developing Asia bilateral dollar exchange rate (F/USD, index)	End-of-quarter rates from the H.10 Release, Foreign Exchange Rates, Federal Reserve Board.
Japan Real GDP Growth	Quarterly average of monthly series for "Japan GDP Growth Rate" per tradingeconomics.com
Japan Inflation	Quarterly average of monthly series for "Japan Inflation Rate" per tradingeconomics.com
Japan Bilateral Dollar Exchange Rate (Yen/USD)	End-of-quarter rates from the H.10 Release, Foreign Exchange Rates, Federal Reserve Board.
UK Real GDP Growth	Quarterly average of monthly series for "United Kingdom GDP Growth Rate" per tradingeconomics.com
UK Inflation	Quarterly average of monthly series for "United Kingdom Inflation Rate" per tradingeconomics.com
UK Bilateral Dollar Exchange Rate (USD/Pound)	End-of-quarter rates from the H.10 Release, Foreign Exchange Rates, Federal Reserve Board.

While all data that is required for the Annual Stress Tests is available from at https://www.federalreserve.gov/supervisionreg/files/2022-table_1a_historic_domestic.csv and https://www.federalreserve.gov/supervisionreg/files/2022-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) 1Q2022.

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/sp500
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[71] "forecast" package[72]; specifically, the "ets" function (see p.39 of https://cran.r-project.org/web/packages/forecast/forecast.pdf)[73] 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)[74], and the determined parameters. While fitting forecasts to previous values,
   - "forecast error" is defined as being actual values less forecasted values,
   - "% error" is defined as forecast error divided by actual value, and

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[71] As of this writing, v.4.1.2 of the "R" language is available at https://cran.r-project.org/.

[72] As of this writing, v.8.16 of the forecast package is available at https://CRAN.R-project.org/package=forecast.

[73] 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.

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

- "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)[75].

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
```

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[76];
- 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

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

[76] 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.

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[77].

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

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

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≤α≤1, and estimates future values of ŷ 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.

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

---

[77] See the SP500 metric's analysis.

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

Appendix C: Variable Correlations

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

Table 5: Correlation Factors found as of 2Q2023

Variable 1	Variable 2	Correlation
S&P 500 Stock Price Index	Annualized US Inflation Rate (all items, all urban areas)	0.706489
S&P 500 Stock Price Index	**Dow Jones Total Stock Market Index**	**0.97404**
S&P 500 Stock Price Index	US Nat'l Residential Home Price Index	0.949899
S&P 500 Stock Price Index	**US Nat'l Commercial Real Estate Index**	**0.968114**
Cost of Federal Funds	Moody's AAA Yield	0.802225
Cost of Federal Funds	Moody's BAA Yield	0.745959
Cost of Federal Funds	BofA	0.764534
Cost of Federal Funds	30-year Fixed Mortgage Rate	0.874181
Cost of Federal Funds	**US Prime Rate**	**0.996548**
Cost of Federal Funds	30-year Treasury Yield	0.787826
Cost of Federal Funds	20-year Treasury Yield	0.790385
Cost of Federal Funds	10-year Treasury Yield	0.853667
Cost of Federal Funds	**1-month Treasury Yield**	**0.993274**
Cost of Federal Funds	7-year Treasury Yield	0.893553
Cost of Federal Funds	**3-month Treasury Yield**	**0.995705**
Cost of Federal Funds	5-year Treasury Yield	0.920408
Cost of Federal Funds	**6-month Treasury Yield**	**0.992417**
Cost of Federal Funds	**3-year Treasury Yield**	**0.954222**
Cost of Federal Funds	**1-year Treasury Yield**	**0.98546**
Moody's AAA Yield	**Moody's BAA Yield**	**0.979322**
Moody's AAA Yield	BofA BBB Corporate Debt Yield	0.949372
Moody's AAA Yield	**30-year Fixed Mortgage Rate**	**0.977136**
Moody's AAA Yield	US Prime Rate	0.784584
Moody's AAA Yield	Dow Jones Total Stock Market Index	-0.809665
Moody's AAA Yield	US Nat'l Residential Home Price Index	-0.827356
Moody's AAA Yield	US Nat'l Commercial Real Estate Index	-0.85607
Moody's AAA Yield	Average Retail Gasoline Price (all grades)	-0.720462
Moody's AAA Yield	**30-year Treasury Yield**	**0.985275**
Moody's AAA Yield	**20-year Treasury Yield**	**0.983879**
Moody's AAA Yield	**10-year Treasury Yield**	**0.984829**
Moody's AAA Yield	**7-year Treasury Yield**	**0.964998**
Moody's AAA Yield	3-month Treasury Yield	0.802864
Moody's AAA Yield	5-year Treasury Yield	0.943523
Moody's AAA Yield	6-month Treasury Yield	0.806083
Moody's AAA Yield	3-year Treasury Yield	0.897632
Moody's AAA Yield	1-year Treasury Yield	0.823366
Moody's BAA Yield	**BofA BBB Corporate Debt Yield**	**0.985036**
Moody's BAA Yield	**30-year Fixed Mortgage Rate**	**0.950714**
Moody's BAA Yield	US Prime Rate	0.727509
Moody's BAA Yield	Dow Jones Total Stock Market Index	-0.826598
Moody's BAA Yield	US Nat'l Residential Home Price Index	-0.812157
Moody's BAA Yield	US Nat'l Commercial Real Estate Index	-0.831157
Moody's BAA Yield	Average Retail Gasoline Price (all grades)	-0.682218
Moody's BAA Yield	30-year Treasury Yield	0.949062
Moody's BAA Yield	20-year Treasury Yield	0.933489
Moody's BAA Yield	10-year Treasury Yield	0.94849
Moody's BAA Yield	7-year Treasury Yield	0.917675
Moody's BAA Yield	3-month Treasury Yield	0.744318
Moody's BAA Yield	5-year Treasury Yield	0.893435

Moody's BAA Yield	6-month Treasury Yield	0.748975
Moody's BAA Yield	3-year Treasury Yield	0.842596
Moody's BAA Yield	1-year Treasury Yield	0.766394
Real GDP Growth Rate	**Nominal GDP Growth Rate**	**0.962067**
Real Disposable Income Growth Rate	**Nominal Disposable Income Growth Rate**	**0.972978**
BofA BBB Corporate Debt Yield	30-year Fixed Mortgage Rate	0.940834
BofA BBB Corporate Debt Yield	US Prime Rate	0.747316
BofA BBB Corporate Debt Yield	Dow Jones Total Stock Market Index	-0.760755
BofA BBB Corporate Debt Yield	US Nat'l Residential Home Price Index	-0.738584
BofA BBB Corporate Debt Yield	US Nat'l Commercial Real Estate Index	-0.745527
BofA BBB Corporate Debt Yield	Average Retail Gasoline Price (all grades)	-0.620582
BofA BBB Corporate Debt Yield	30-year Treasury Yield	0.906735
BofA BBB Corporate Debt Yield	20-year Treasury Yield	0.88635
BofA BBB Corporate Debt Yield	10-year Treasury Yield	0.925794
BofA BBB Corporate Debt Yield	7-year Treasury Yield	0.902347
BofA BBB Corporate Debt Yield	3-month Treasury Yield	0.763521
BofA BBB Corporate Debt Yield	5-year Treasury Yield	0.886705
BofA BBB Corporate Debt Yield	6-month Treasury Yield	0.770236
BofA BBB Corporate Debt Yield	3-year Treasury Yield	0.847309
BofA BBB Corporate Debt Yield	1-year Treasury Yield	0.785351
30-year Fixed Mortgage Rate	US Prime Rate	0.858132
30-year Fixed Mortgage Rate	Dow Jones Total Stock Market Index	-0.716529
30-year Fixed Mortgage Rate	US Nat'l Residential Home Price Index	-0.719965
30-year Fixed Mortgage Rate	US Nat'l Commercial Real Estate Index	-0.757379
30-year Fixed Mortgage Rate	Average Retail Gasoline Price (all grades)	-0.679995
30-year Fixed Mortgage Rate	**30-year Treasury Yield**	**0.967784**
30-year Fixed Mortgage Rate	**20-year Treasury Yield**	**0.973323**
30-year Fixed Mortgage Rate	**10-year Treasury Yield**	**0.989736**
30-year Fixed Mortgage Rate	1-month Treasury Yield	0.694482
30-year Fixed Mortgage Rate	**7-year Treasury Yield**	**0.987354**
30-year Fixed Mortgage Rate	3-month Treasury Yield	0.88093
30-year Fixed Mortgage Rate	**5-year Treasury Yield**	**0.980508**
30-year Fixed Mortgage Rate	6-month Treasury Yield	0.886747
30-year Fixed Mortgage Rate	**3-year Treasury Yield**	**0.9547**
30-year Fixed Mortgage Rate	1-year Treasury Yield	0.902102
US Prime Rate	30-year Treasury Yield	0.766166
US Prime Rate	20-year Treasury Yield	0.781802
US Prime Rate	10-year Treasury Yield	0.836574
US Prime Rate	**1-month Treasury Yield**	**0.991646**
US Prime Rate	7-year Treasury Yield	0.878264
US Prime Rate	**3-month Treasury Yield**	**0.992042**
US Prime Rate	5-year Treasury Yield	0.907075
US Prime Rate	**6-month Treasury Yield**	**0.989103**
US Prime Rate	3-year Treasury Yield	0.944864
US Prime Rate	**1-year Treasury Yield**	**0.981475**
Dow Jones Total Stock Market Index	US Nat'l Residential Home Price Index	0.908553
Dow Jones Total Stock Market Index	US Nat'l Commercial Real Estate Index	0.925464
Dow Jones Total Stock Market Index	30-year Treasury Yield	-0.806825
Dow Jones Total Stock Market Index	20-year Treasury Yield	-0.750141
Dow Jones Total Stock Market Index	10-year Treasury Yield	-0.749917
Dow Jones Total Stock Market Index	7-year Treasury Yield	-0.692816
Dow Jones Total Stock Market Index	5-year Treasury Yield	-0.647788
US Nat'l Residential Home Price Index	**US Nat'l Commercial Real Estate Index**	**0.973627**
US Nat'l Residential Home Price Index	Average Retail Gasoline Price (all grades)	0.694466
US Nat'l Residential Home Price Index	30-year Treasury Yield	-0.818567
US Nat'l Residential Home Price Index	20-year Treasury Yield	-0.749401
US Nat'l Residential Home Price Index	10-year Treasury Yield	-0.764859
US Nat'l Residential Home Price Index	7-year Treasury Yield	-0.720085
US Nat'l Residential Home Price Index	5-year Treasury Yield	-0.677411
US Nat'l Residential Home Price Index	3-year Treasury Yield	-0.610666
US Nat'l Commercial Real Estate Index	Average Retail Gasoline Price (all grades)	0.71632
US Nat'l Commercial Real Estate Index	30-year Treasury Yield	-0.859668
US Nat'l Commercial Real Estate Index	20-year Treasury Yield	-0.823923

US Nat'l Commercial Real Estate Index	10-year Treasury Yield	-0.803959
US Nat'l Commercial Real Estate Index	7-year Treasury Yield	-0.758795
US Nat'l Commercial Real Estate Index	5-year Treasury Yield	-0.714551
US Nat'l Commercial Real Estate Index	3-year Treasury Yield	-0.646028
Average Retail Gasoline Price (all grades)	30-year Treasury Yield	-0.706573
Average Retail Gasoline Price (all grades)	20-year Treasury Yield	-0.699408
Average Retail Gasoline Price (all grades)	10-year Treasury Yield	-0.71399
Average Retail Gasoline Price (all grades)	7-year Treasury Yield	-0.712792
Average Retail Gasoline Price (all grades)	5-year Treasury Yield	-0.703418
Average Retail Gasoline Price (all grades)	3-year Treasury Yield	-0.668923
Average Retail Gasoline Price (all grades)	1-year Treasury Yield	-0.602581
30-year Treasury Yield	**20-year Treasury Yield**	**0.995625**
30-year Treasury Yield	**10-year Treasury Yield**	**0.98688**
30-year Treasury Yield	**7-year Treasury Yield**	**0.967387**
30-year Treasury Yield	3-month Treasury Yield	0.793026
30-year Treasury Yield	5-year Treasury Yield	0.942745
30-year Treasury Yield	6-month Treasury Yield	0.796032
30-year Treasury Yield	3-year Treasury Yield	0.894135
30-year Treasury Yield	1-year Treasury Yield	0.815223
20-year Treasury Yield	**10-year Treasury Yield**	**0.992682**
20-year Treasury Yield	**7-year Treasury Yield**	**0.971532**
20-year Treasury Yield	3-month Treasury Yield	0.793228
20-year Treasury Yield	5-year Treasury Yield	0.944545
20-year Treasury Yield	6-month Treasury Yield	0.800873
20-year Treasury Yield	3-year Treasury Yield	0.896746
20-year Treasury Yield	1-year Treasury Yield	0.823716
10-year Treasury Yield	1-month Treasury Yield	0.646537
10-year Treasury Yield	**7-year Treasury Yield**	**0.993372**
10-year Treasury Yield	3-month Treasury Yield	0.860337
10-year Treasury Yield	**5-year Treasury Yield**	**0.980414**
10-year Treasury Yield	6-month Treasury Yield	0.865166
10-year Treasury Yield	3-year Treasury Yield	0.947047
10-year Treasury Yield	1-year Treasury Yield	0.882753
1-month Treasury Yield	7-year Treasury Yield	0.761548
1-month Treasury Yield	**3-month Treasury Yield**	**0.997626**
1-month Treasury Yield	5-year Treasury Yield	0.839586
1-month Treasury Yield	**6-month Treasury Yield**	**0.99135**
1-month Treasury Yield	3-year Treasury Yield	0.921687
1-month Treasury Yield	**1-year Treasury Yield**	**0.981558**
7-year Treasury Yield	3-month Treasury Yield	0.902736
7-year Treasury Yield	**5-year Treasury Yield**	**0.99595**
7-year Treasury Yield	6-month Treasury Yield	0.907955
7-year Treasury Yield	**3-year Treasury Yield**	**0.975748**
7-year Treasury Yield	1-year Treasury Yield	0.92401
3-month Treasury Yield	5-year Treasury Yield	0.930725
3-month Treasury Yield	**6-month Treasury Yield**	**0.998589**
3-month Treasury Yield	**3-year Treasury Yield**	**0.965742**
3-month Treasury Yield	**1-year Treasury Yield**	**0.994204**
5-year Treasury Yield	6-month Treasury Yield	0.936386
5-year Treasury Yield	**3-year Treasury Yield**	**0.990648**
5-year Treasury Yield	**1-year Treasury Yield**	**0.950783**
6-month Treasury Yield	**3-year Treasury Yield**	**0.971664**
6-month Treasury Yield	**1-year Treasury Yield**	**0.997911**
3-year Treasury Yield	**1-year Treasury Yield**	**0.982444**

Appendix D: Mortgage Delinquencies

The following tables, Table 6 through Table 10, present the delinquency rates of mortgages held by Freddie Mac for May 2022 in several southeastern states, broken down by MSA. As we have provided this information for many previous reports, but the information does not appear pertinent to the main portion of the paper, we have included it here for continuity and general interest.

Table 6: Percentage of Freddie Mac Mortgages by Status (Current, 30 dpd and 30+ dpd) as of March 2023: 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	1407	1389	12	0	0	6	0.85%	0.43%	1.28%
	2 units	3	3	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	7	7	0	0	0	0	0.00%	0.00%	0.00%
Auburn-Opelika, AL	1 unit	5424	5375	19	12	1	17	0.35%	0.55%	0.90%
	2 units	36	36	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	1	1	0	0	0	0	0.00%	0.00%	0.00%
Birmingham-Hoover, AL	1 unit	35772	35319	233	48	18	154	0.65%	0.62%	1.27%
	2 units	30	30	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	18	18	0	0	0	0	0.00%	0.00%	0.00%
Columbus, GA-AL	1 unit	419	410	7	0	1	1	1.67%	0.48%	2.15%
	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	9536	9441	49	17	2	27	0.51%	0.48%	1.00%
	2 units	18	18	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	4	4	0	0	0	0	0.00%	0.00%	0.00%
Decatur, AL	1 unit	2593	2556	24	3	1	9	0.93%	0.50%	1.43%
	2 units	6	6	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	12	12	0	0	0	0	0.00%	0.00%	0.00%
Dothan, AL	1 unit	2440	2410	12	2	2	14	0.49%	0.74%	1.23%
	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	3116	3063	28	2	0	23	0.90%	0.80%	1.70%
	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%
Gadsden, AL	1 unit	1470	1438	15	2	1	14	1.02%	1.16%	2.18%
	2 units	2	2	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	1	1	0	0	0	0	0.00%	0.00%	0.00%
Huntsville, AL	1 unit	16558	16412	74	22	7	43	0.45%	0.44%	0.88%
	2 units	25	25	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	58	58	0	0	0	0	0.00%	0.00%	0.00%
Mobile, AL	1 unit	6713	6618	44	4	3	44	0.66%	0.76%	1.42%
	2 units	16	16	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	6	6	0	0	0	0	0.00%	0.00%	0.00%
Montgomery, AL	1 unit	7125	7027	45	6	6	41	0.63%	0.74%	1.38%

	2 units	25	25	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	11	11	0	0	0	0	0.00%	0.00%	0.00%
Tuscaloosa, AL	1 unit	5928	5841	56	4	4	23	0.95%	0.52%	1.47%
	2 units	4	4	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	12622	12396	107	23	10	86	0.85%	0.94%	1.79%
	2 units	45	45	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	11	9	2	0	0	0	18.18%	0.00%	18.18%

Source: STACR Freddie Mac, as of 23 Mar 2023

Table 7: Percentage of Freddie Mac Mortgages by Status (Current, 30 dpd and 30+ dpd) as of March 2023: 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	31879	31316	184	65	67	247	0.58%	1.19%	1.77%
	2 units	437	420	7	2	0	8	1.60%	2.29%	3.89%
	3+ units	48	45	1	0	0	2	2.08%	4.17%	6.25%
Crestview-Fort Walton Beach-Destin, FL	1 unit	8654	8552	64	12	3	23	0.74%	0.44%	1.18%
	2 units	20	20	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	19	19	0	0	0	0	0.00%	0.00%	0.00%
Deltona-Daytona Beach-Ormond Beach, FL	1 unit	22518	22200	157	37	22	102	0.70%	0.72%	1.41%
	2 units	203	203	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	56	55	0	0	0	1	0.00%	1.79%	1.79%
Gainesville, FL	1 unit	7057	6985	38	8	4	22	0.54%	0.48%	1.02%
	2 units	28	27	1	0	0	0	3.57%	0.00%	3.57%
	3+ units	16	16	0	0	0	0	0.00%	0.00%	0.00%
Homosassa Springs, FL	1 unit	3795	3745	29	5	1	15	0.76%	0.55%	1.32%
	2 units	33	33	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	4	4	0	0	0	0	0.00%	0.00%	0.00%
Jacksonville, FL	1 unit	48577	48076	275	53	21	152	0.57%	0.47%	1.03%
	2 units	211	209	1	0	0	1	0.47%	0.47%	0.95%
	3+ units	129	129	0	0	0	0	0.00%	0.00%	0.00%
Lakeland-Winter Haven, FL	1 unit	18542	18273	136	34	16	83	0.73%	0.72%	1.45%
	2 units	119	118	1	0	0	0	0.84%	0.00%	0.84%
	3+ units	53	53	0	0	0	0	0.00%	0.00%	0.00%
Miami-Fort Lauderdale-Pompano Beach, FL	1 unit	160247	157709	1177	262	171	928	0.73%	0.85%	1.58%
	2 units	1395	1369	16	1	2	7	1.15%	0.72%	1.86%
	3+ units	617	611	4	0	0	2	0.65%	0.32%	0.97%
Naples-Marco Island, FL	1 unit	14932	14768	74	9	11	70	0.50%	0.60%	1.10%
	2 units	54	54	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	18	17	0	0	0	1	0.00%	5.56%	5.56%
North Port-Sarasota-Bradenton, FL	1 unit	37348	36901	200	61	33	153	0.54%	0.66%	1.20%
	2 units	208	208	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	33	32	1	0	0	0	3.03%	0.00%	3.03%
Ocala, FL	1 unit	9191	9071	69	8	12	31	0.75%	0.56%	1.31%

	2 units	28	28	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	24	24	0	0	0	0	0.00%	0.00%	0.00%
Orlando-Kissimmee-Sanford, FL	1 unit	87051	85857	527	156	91	420	0.61%	0.77%	1.37%
	2 units	362	359	1	0	0	2	0.28%	0.55%	0.83%
	3+ units	99	97	1	0	1	0	1.01%	1.01%	2.02%
Palm Bay-Melbourne-Titusville, FL	1 unit	22340	22055	145	32	18	90	0.65%	0.63%	1.28%
	2 units	68	67	1	0	0	0	1.47%	0.00%	1.47%
	3+ units	30	28	1	0	0	1	3.33%	3.33%	6.67%
Panama City, FL	1 unit	5179	5100	44	13	5	17	0.85%	0.68%	1.53%
	2 units	49	49	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	16	16	0	0	0	0	0.00%	0.00%	0.00%
Pensacola-Ferry Pass-Brent, FL	1 unit	11580	11423	75	13	15	54	0.65%	0.71%	1.36%
	2 units	84	82	2	0	0	0	2.38%	0.00%	2.38%
	3+ units	46	46	0	0	0	0	0.00%	0.00%	0.00%
Port St. Lucie, FL	1 unit	18865	18611	133	35	11	75	0.71%	0.64%	1.35%
	2 units	75	74	0	0	0	1	0.00%	1.33%	1.33%
	3+ units	17	17	0	0	0	0	0.00%	0.00%	0.00%
Punta Gorda, FL	1 unit	8724	8570	42	22	12	78	0.48%	1.28%	1.77%
	2 units	37	35	2	0	0	0	5.41%	0.00%	5.41%
	3+ units	7	7	0	0	0	0	0.00%	0.00%	0.00%
Sebastian-Vero Beach, FL	1 unit	6532	6462	28	5	3	34	0.43%	0.64%	1.07%
	2 units	16	15	0	0	0	1	0.00%	6.25%	6.25%
	3+ units	10	10	0	0	0	0	0.00%	0.00%	0.00%
Sebring-Avon Park, FL	1 unit	2212	2184	19	3	1	5	0.86%	0.41%	1.27%
	2 units	23	23	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	6	6	0	0	0	0	0.00%	0.00%	0.00%
Tallahassee, FL	1 unit	10032	9912	73	13	4	30	0.73%	0.47%	1.20%
	2 units	59	59	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	40	40	0	0	0	0	0.00%	0.00%	0.00%
Tampa-St. Petersburg-Clearwater, FL	1 unit	108113	106820	643	125	83	442	0.60%	0.60%	1.20%
	2 units	588	585	2	0	0	1	0.34%	0.17%	0.51%
	3+ units	301	299	1	0	1	0	0.33%	0.33%	0.66%
The Villages, FL	1 unit	3102	3087	8	1	0	6	0.26%	0.23%	0.48%
	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	10539	10372	71	18	17	61	0.67%	0.91%	1.59%
	2 units	352	346	3	0	0	3	0.85%	0.85%	1.71%
	3+ units	60	59	1	0	0	0	1.67%	0.00%	1.67%

Source: STACR Freddie Mac, as of 23 Mar 2023

Table 8: Percentage of Freddie Mac Mortgages by Status (Current, 30 dpd and 30+ dpd) as of March 2023: 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	1839	1808	18	3	0	10	0.98%	0.71%	1.69%
	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%
Baton Rouge, LA	1 unit	23697	23312	171	42	27	145	0.72%	0.90%	1.63%
	2 units	62	60	1	0	0	1	1.61%	1.61%	3.23%
	3+ units	68	68	0	0	0	0	0.00%	0.00%	0.00%
Hammond, LA	1 unit	2410	2370	18	7	2	13	0.75%	0.91%	1.66%
	2 units	13	13	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	10	10	0	0	0	0	0.00%	0.00%	0.00%
Houma-Thibodaux, LA	1 unit	3674	3600	30	7	6	31	0.82%	1.20%	2.01%
	2 units	5	4	0	0	0	1	0.00%	20.00%	20.00%
	3+ units	5	5	0	0	0	0	0.00%	0.00%	0.00%
Lafayette, LA	1 unit	9829	9614	79	21	9	106	0.80%	1.38%	2.19%
	2 units	12	12	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	33	31	2	0	0	0	6.06%	0.00%	6.06%
Lake Charles, LA	1 unit	3955	3878	27	14	8	28	0.68%	1.26%	1.95%
	2 units	15	15	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	2876	2812	23	10	1	30	0.80%	1.43%	2.23%
	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, LA	1 unit	31237	30655	252	65	34	231	0.81%	1.06%	1.86%
	2 units	1677	1660	9	3	0	5	0.54%	0.48%	1.01%
	3+ units	407	396	1	0	1	9	0.25%	2.46%	2.70%
Shreveport-Bossier City, LA	1 unit	7607	7450	76	16	6	59	1.00%	1.07%	2.06%
	2 units	5	5	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	9	9	0	0	0	0	0.00%	0.00%	0.00%
Outside all MSAs	1 unit	6184	6019	73	21	3	68	1.18%	1.49%	2.67%
	2 units	470	461	1	0	0	8	0.21%	1.70%	1.92%
	3+ units	96	96	0	0	0	0	0.00%	0.00%	0.00%

Source: STACR Freddie Mac, as of 23 Mar 2023

Table 9: Percentage of Freddie Mac Mortgages by Status (Current, 30 dpd and 30+ dpd) as of March 2023: 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	4940	4874	36	4	4	22	0.73%	0.61%	1.34%
	2 units	37	36	1	0	0	0	2.70%	0.00%	2.70%
	3+ units	14	14	0	0	0	0	0.00%	0.00%	0.00%
Hattiesburg, MS	1 unit	2389	2353	18	3	1	14	0.75%	0.75%	1.51%
	2 units	4	4	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	2	2	0	0	0	0	0.00%	0.00%	0.00%
Jackson, MS	1 unit	9265	9113	68	11	5	68	0.73%	0.91%	1.64%
	2 units	12	12	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	4	4	0	0	0	0	0.00%	0.00%	0.00%
Memphis, TN-MS-AR	1 unit	6005	5933	36	9	5	22	0.60%	0.60%	1.20%
	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%
Outside all MSAs	1 unit	11310	11098	82	20	9	101	0.73%	1.15%	1.87%
	2 units	16	16	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	3	3	0	0	0	0	0.00%	0.00%	0.00%

Source: STACR Freddie Mac, as of 23 Mar 2023

Table 10: Percentage of Freddie Mac Mortgages by Status (Current, 30 dpd and 30 + dpd) as of March 2023: 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	3883	3819	36	6	3	19	0.93%	0.72%	1.65%
	2 units	20	20	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	4546	4475	24	10	10	27	0.53%	1.03%	1.56%
	2 units	15	15	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	5	5	0	0	0	0	0.00%	0.00%	0.00%
Austin-Round Rock-Georgetown, TX	1 unit	99910	99057	425	93	50	285	0.43%	0.43%	0.85%
	2 units	1139	1131	7	0	0	1	0.62%	0.09%	0.70%
	3+ units	237	233	0	1	0	3	0.00%	1.69%	1.69%
Beaumont-Port Arthur, TX	1 unit	5659	5543	45	20	12	39	0.80%	1.26%	2.05%
	2 units	4	4	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	9	9	0	0	0	0	0.00%	0.00%	0.00%
Brownsville-Harlingen, TX	1 unit	2827	2769	30	6	4	18	1.06%	0.99%	2.05%
	2 units	36	36	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	33	33	0	0	0	0	0.00%	0.00%	0.00%
College Station-Bryan, TX	1 unit	6957	6903	31	5	1	17	0.45%	0.33%	0.78%
	2 units	106	106	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	68	68	0	0	0	0	0.00%	0.00%	0.00%
Corpus Christi, TX	1 unit	7241	7124	52	13	7	45	0.72%	0.90%	1.62%
	2 units	17	16	1	0	0	0	5.88%	0.00%	5.88%
	3+ units	18	18	0	0	0	0	0.00%	0.00%	0.00%
Dallas-Fort Worth-Arlington, TX	1 unit	271369	268490	1414	318	189	958	0.52%	0.54%	1.06%
	2 units	879	874	2	1	0	2	0.23%	0.34%	0.57%
	3+ units	238	237	1	0	0	0	0.42%	0.00%	0.42%
El Paso, TX	1 unit	6627	6504	62	13	7	41	0.94%	0.92%	1.86%
	2 units	74	73	0	0	1	0	0.00%	1.35%	1.35%
	3+ units	32	32	0	0	0	0	0.00%	0.00%	0.00%
Houston-The Woodlands-Sugar Land, TX	1 unit	195538	192702	1285	326	177	1048	0.66%	0.79%	1.45%
	2 units	349	346	1	0	0	2	0.29%	0.57%	0.86%
	3+ units	294	287	4	0	0	3	1.36%	1.02%	2.38%
Killeen-Temple, TX	1 unit	6766	6674	44	12	5	31	0.65%	0.71%	1.36%

	2 units	225	225	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	189	187	0	0	0	2	0.00%	1.06%	1.06%
Laredo, TX	1 unit	1885	1845	27	6	0	7	1.43%	0.69%	2.12%
	2 units	4	2	2	0	0	0	50.00%	0.00%	50.00%
	3+ units	11	11	0	0	0	0	0.00%	0.00%	0.00%
Longview, TX	1 unit	2903	2849	25	4	1	24	0.86%	1.00%	1.86%
	2 units	17	17	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	2	2	0	0	0	0	0.00%	0.00%	0.00%
Lubbock, TX	1 unit	8417	8312	63	12	6	24	0.75%	0.50%	1.25%
	2 units	124	124	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	19	19	0	0	0	0	0.00%	0.00%	0.00%
McAllen-Edinburg-Mission, TX	1 unit	4454	4342	47	15	9	41	1.06%	1.46%	2.52%
	2 units	17	17	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	208	207	0	0	0	1	0.00%	0.48%	0.48%
Midland, TX	1 unit	6158	6055	42	15	3	43	0.68%	0.99%	1.67%
	2 units	15	15	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	2	2	0	0	0	0	0.00%	0.00%	0.00%
Odessa, TX	1 unit	2326	2263	32	4	1	26	1.38%	1.33%	2.71%
	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%
San Angelo, TX	1 unit	2575	2529	24	6	3	13	0.93%	0.85%	1.79%
	2 units	7	7	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	56805	56065	392	91	36	221	0.69%	0.61%	1.30%
	2 units	418	412	6	0	0	0	1.44%	0.00%	1.44%
	3+ units	222	222	0	0	0	0	0.00%	0.00%	0.00%
Sherman-Denison, TX	1 unit	4519	4454	38	7	5	15	0.84%	0.60%	1.44%
	2 units	40	40	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	1	1	0	0	0	0	0.00%	0.00%	0.00%
Texarkana, TX-AR	1 unit	1236	1212	7	0	2	15	0.57%	1.38%	1.94%
	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	4758	4697	37	1	1	22	0.78%	0.50%	1.28%
	2 units	13	13	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	1182	1159	11	3	2	7	0.93%	1.02%	1.95%

	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%
Waco, TX	1 unit	5144	5065	50	10	2	17	0.97%	0.56%	1.54%
	2 units	53	53	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	1577	1553	8	1	2	13	0.51%	1.02%	1.52%
	2 units	7	7	0	0	0	0	0.00%	0.00%	0.00%
	3+ units	3	3	0	0	0	0	0.00%	0.00%	0.00%
Outside all MSAs	1 unit	36528	35882	311	80	30	225	0.85%	0.92%	1.77%
	2 units	480	477	1	0	0	2	0.21%	0.42%	0.63%
	3+ units	64	64	0	0	0	0	0.00%	0.00%	0.00%

Data: STACR Freddie Mac, as of 23 Mar 2023

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