

Macroeconomic Forecasts, 3Q2019

Prepared for BancorpSouth
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DRAFT

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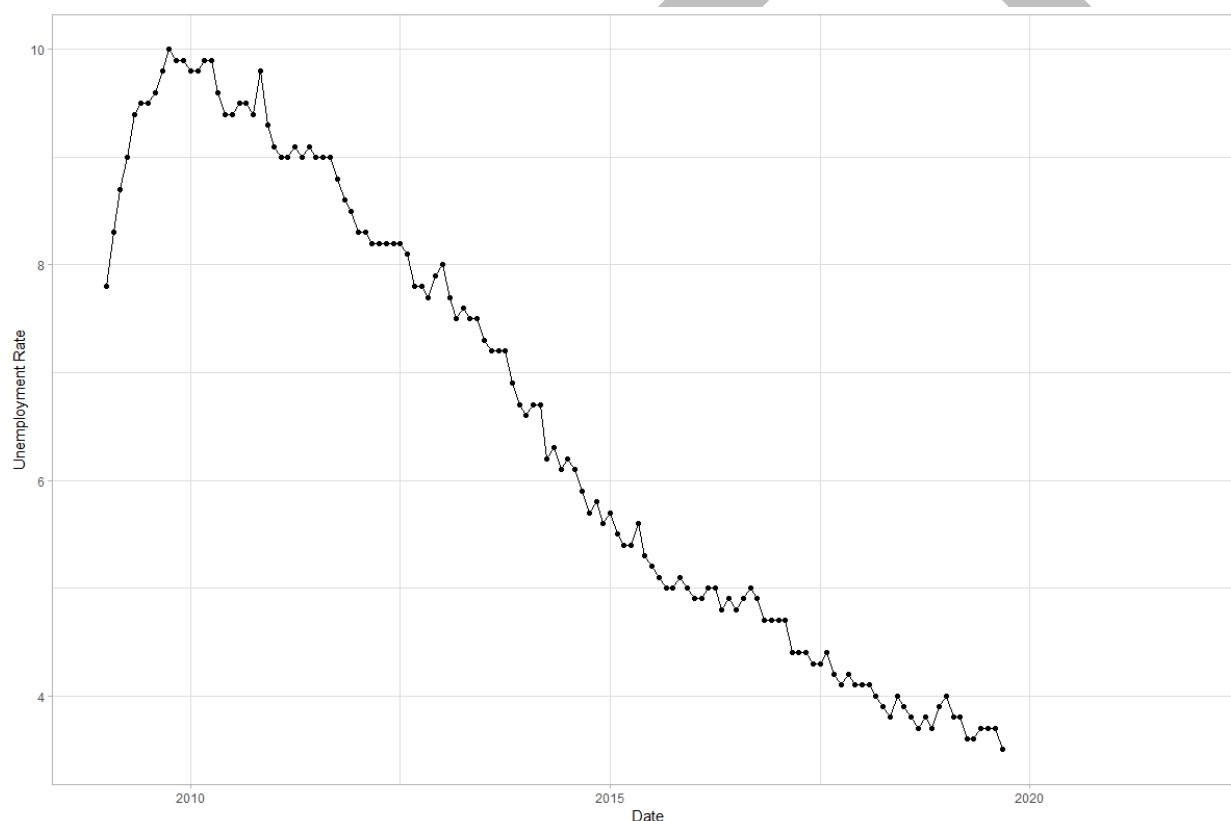
Macroeconomic Overview

The current economic climate is quite strong. However, there are several troubling indicators that support a view that the US economy has a number of soft-spots and is likely headed towards an economic recession in the next 12 – 18 months.

The Strengths of the US Economy

The unemployment rate in the US has been on a steady decline since the first quarter of 2010. Although there are occasional small upticks, the overall trend has not deviated in the last nine years. The current unemployment rate (October 2019¹) is 3.5%.

Figure 1: Unemployment Rate 2009 – 2019

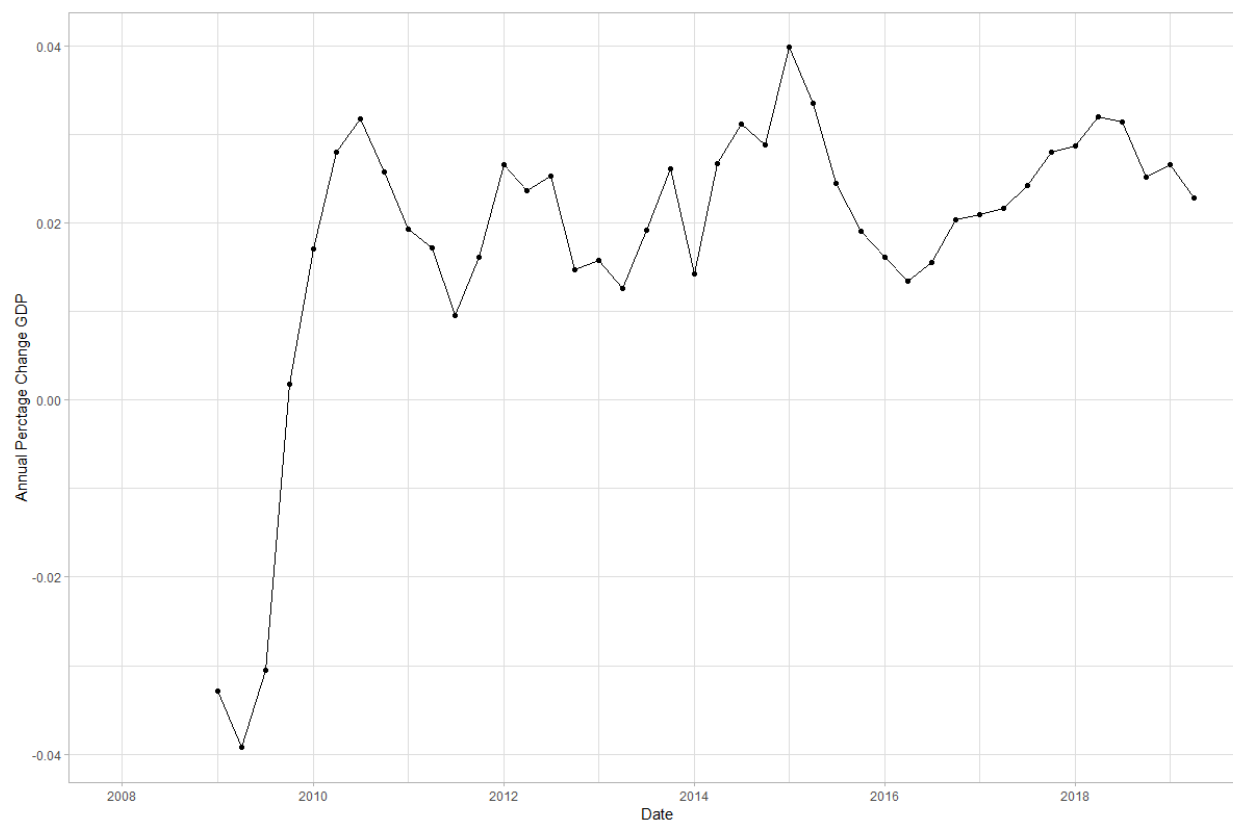


source: BLS.gov, <https://fred.stlouisfed.org/>

The year-over-year change in real GDP has shown some variability since the last recession – with annual growth fluctuating between 1% and 3% in the last 12 quarters. The projected annual growth rate of real GDP is in the range of 1.5% - 2.5% for the next two quarters. Real GDP growth is strong but does show a trend, as of late, that suggest the US economy is weakening.

¹ <https://www.bls.gov/news.release/empsit.nr0.htm>

Figure 2: Year-over-Year Change in Real GDP (2009 - 2019)



Source: BLS.gov, <https://fred.stlouisfed.org/series/GDPC1>

Another very positive aspect of the current US economy is the lack of inflationary pressures. The year-over-year change in the CPI continues to fluctuate around 2%. The Federal Reserve Bank generally follows the Taylor Rule², which establishes a core-inflation target at or near 2%. That is to say that the US economy is operating at an inflation rate that is consistent with the Fed's target rate.

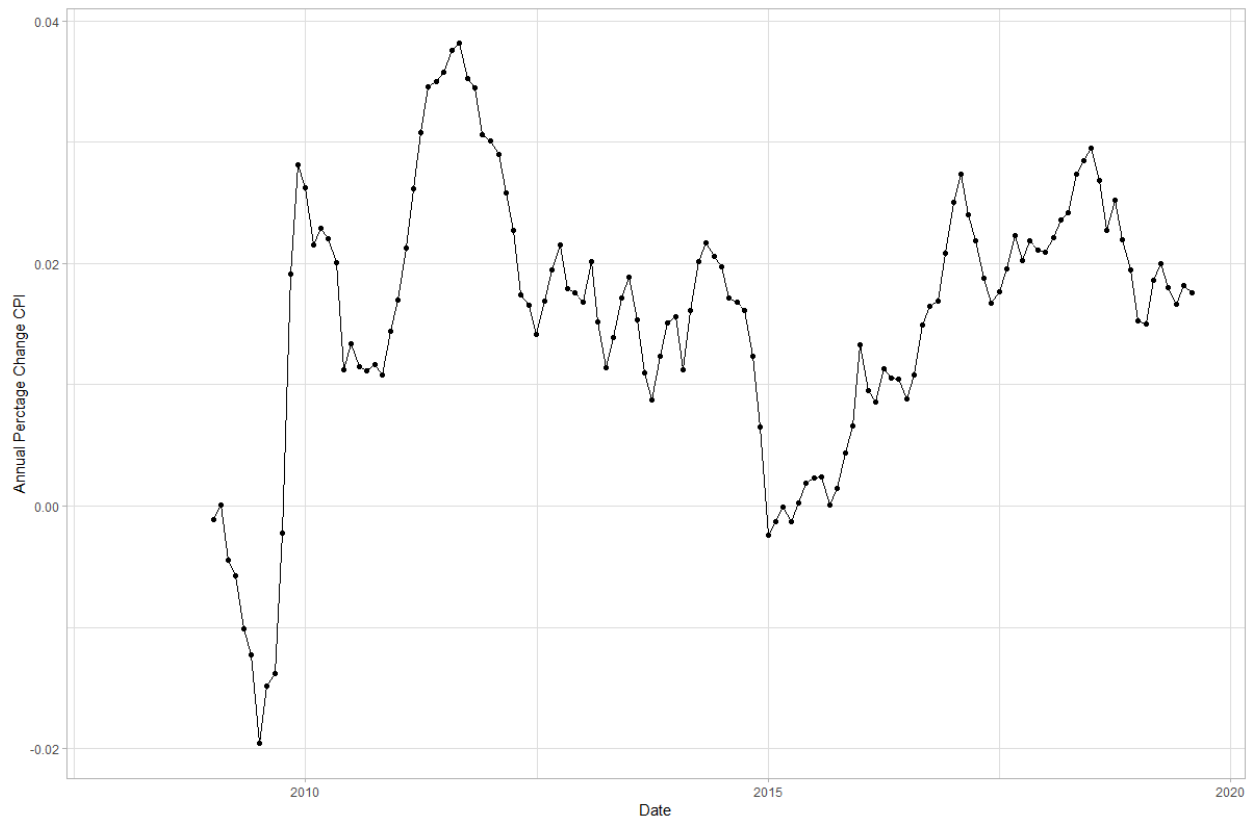
The US is experiencing quarterly growth in productivity³ between 1.5% and 3.5%, and is adding between 50,000 and 300,000 non-farm employment⁴ per quarter in the last twelve months. With an increase in non-farm employment, a decrease in unemployment, stable prices and increases in productivity, it is clear that the current economic condition is strong.

² <https://www.federalreserve.gov/monetarypolicy/policy-rules-and-how-policymakers-use-them.htm>

³ <https://data.bls.gov/timeseries/PRS85006092>

⁴ https://data.bls.gov/timeseries/CES0000000001?output_view=net_1mth

Figure 3: Year-Over-Year Change in CPI (2009-2019)



Source: <https://fred.stlouisfed.org/series/CPIAUCSL>

Weak Spots of the Current US Economy

Although the current US economic condition presents with a number of strong indicators, there is some pessimism about the strength of the economy in the near term.

The Federal Reserve Board Open Market Committee (FOMC) continues to vacillate between increasing the federal funds rate, decreasing the federal funds rate and keeping this rate constant. Historically, when the economy is growing, the FOMC, has increased rates in 25 basis point intervals. Between 2005 and 2007, for example, the Fed continued to increase the Federal Funds rate while the unemployment rate was falling. Once the unemployment rate stalled (at 4.7%) and started increasing (to 5.0%), the Fed engaged in expansionary monetary policy and started dropping rates. At the September 2019 FOMC meeting, the Fed dropped rates by 25 basis points even though the unemployment rate is continuing to fall. This suggests that the Fed is concerned about the growth of the economy in the short run.

Table 1: Federal Funds Rate (and Changes) 2005 - 2007

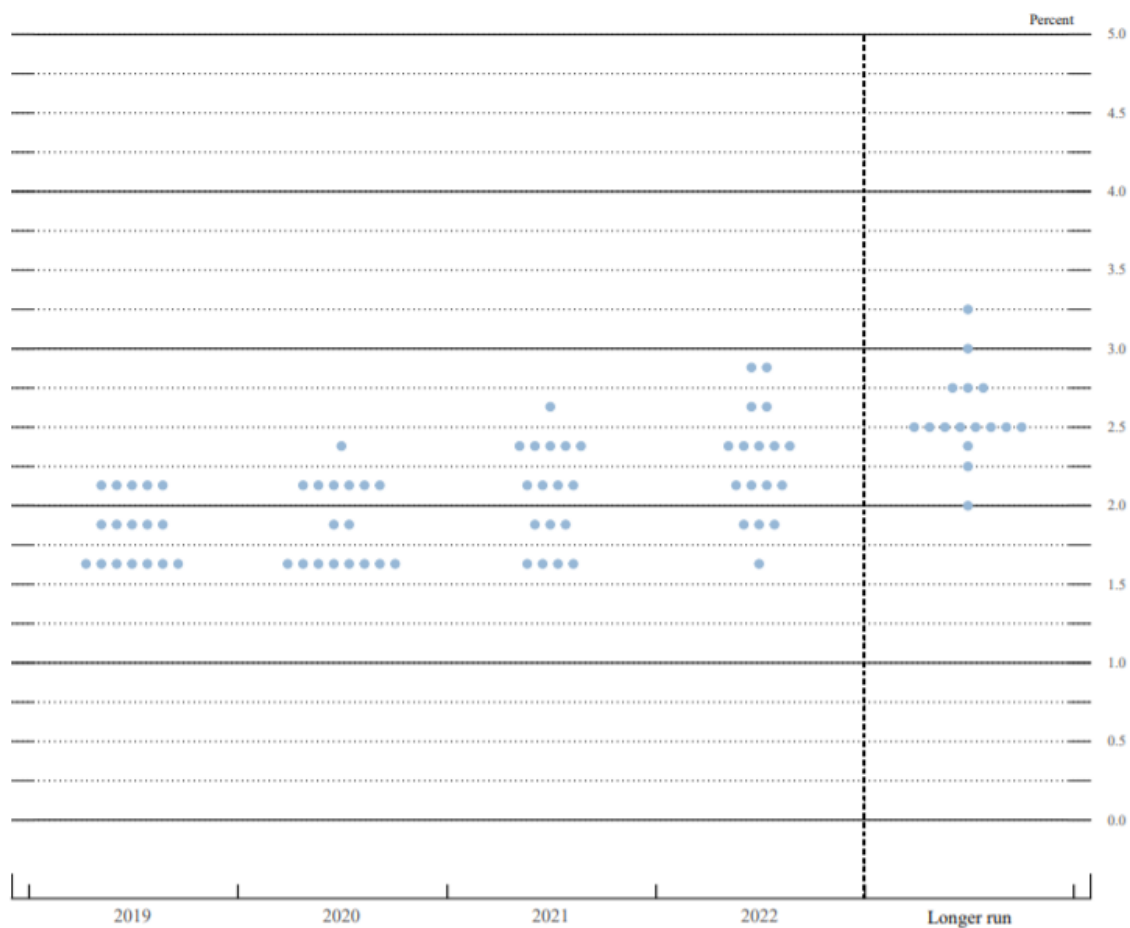
Date	Increase (bp)	Decrease (bp)	Fed Funds Rate (%)	Unemployment Rate (%)
2/2/2005	25	...	2.50	5.40
3/22/2005	25	...	2.75	5.20
5/3/2005	25	...	3.00	5.10
6/30/2005	25	...	3.25	5.00
8/9/2005	25	...	3.50	4.90
9/20/2005	25	...	3.75	5.00
11/1/2005	25	...	4.00	5.00
12/13/2005	25	...	4.25	4.90
1/31/2006	25	...	4.50	4.70
3/28/2006	25	...	4.75	4.70
5/10/2006	25	...	5.00	4.60
6/29/2006	25	...	5.25	4.60
9/18/2007	...	50	4.75	4.70
10/31/2007	...	25	4.50	4.70
12/11/2007	...	25	4.25	5.00

Source: <https://www.federalreserve.gov/monetarypolicy/openmarket.htm>, BLS.gov

The Fed's internal poll of where the federal funds rate should be (the dot-plot) also shows short-run pessimism about the strength of the US economy. The dot-plot (shown in Figure 4), shows the "ideal" federal funds rate as identified by each member of the FOMC. A federal funds rate at 1.75% - 2.00% with 5 dots indicates that 5 members of the FOMC have identified 1.75% - 2.00% as the ideal federal funds rate range. A rate (or range of rates) with more dots indicates more members suggesting the corresponding rate as the ideal level given economic conditions or forecasted economic condition. The current median dot is located at a federal funds rate between 1.75% - 2.00%. The median dot for 2020, however, shows a decrease in the ideal federal funds rate to 1.50%- 1.75%. This suggests that more FOMC members are inclined to push for a drop in the federal funds target by an additional 25 to 50 basis points.

The Fed is not the only group that is skeptical about the long-run stability of the US economy. Investors (institutional and casual investors) drive the market for US securities. The US Treasury yield curve shows the yield of US Treasuries of different maturities. When the economy is strong, investors are willing to trade interest for maturity date – preferring higher interest for longer maturity dates. When the economy is trending towards an economic recession, investors push the market to trade interest for short-term liquidity, driving up the short-term rates relative to longer maturity rates. When short term rates fall above longer maturity rates, the yield curve inverts. This inverted yield curve is evident during early 2007 (as shown in Figure 5). As we know, the inverted yield curve was forecasting the great recession, which hit the US approximately 10 months after the yield curve started inverting.

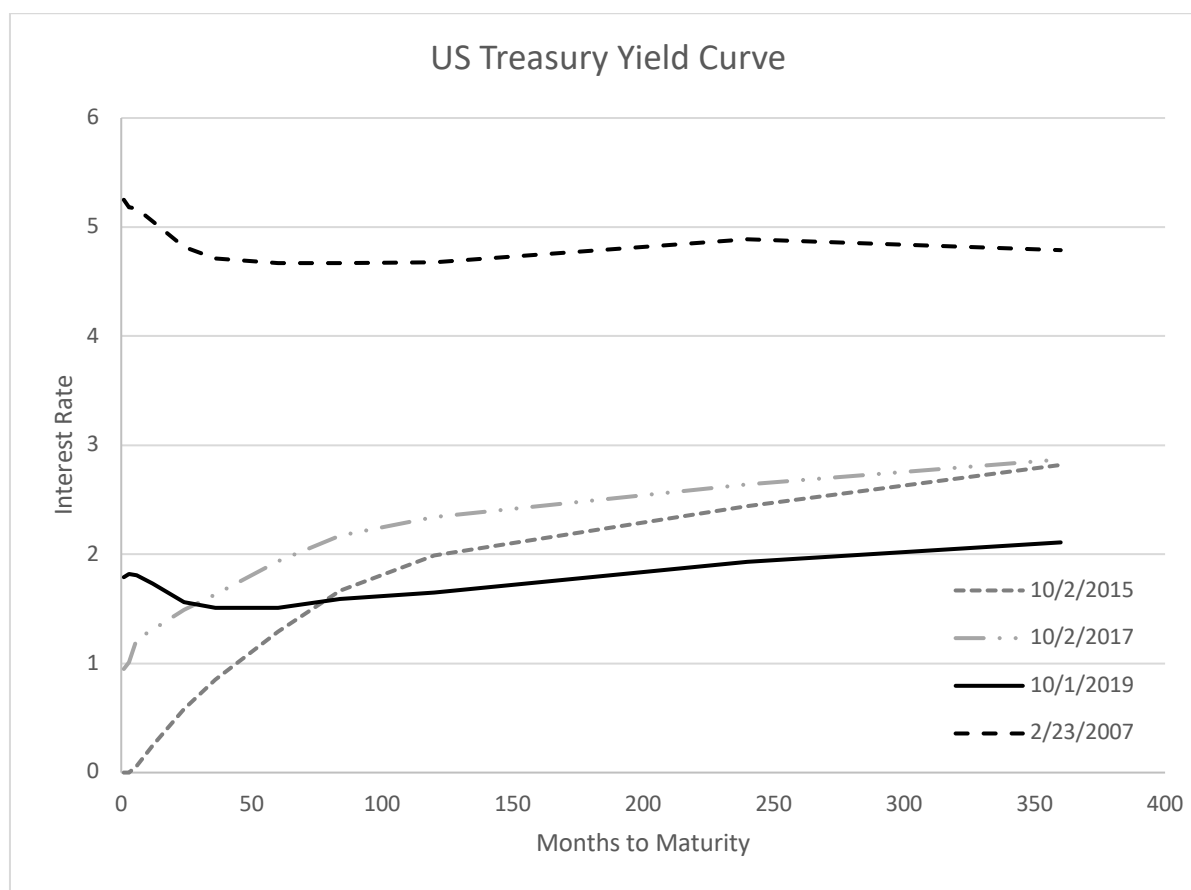
Figure 4: FOMC Member's Ideal/Target Federal Funds Rate



Source: <https://www.federalreserve.gov/monetarypolicy/files/fomcprojtabl20190918.pdf>

The current yield curve (October 2019) look much more like the inverted yield curve of 2007 rather than the positive yield curve for 2015 and 2017.

Figure 5: US Treasury Yield Curve: Comparison Between 2007, 2015, 2017 and 2019



Source: <https://www.treasury.gov/resource-center/data-chart-center/interest-rates/Pages/TextView.aspx?data=yield>

Two metrics that measure output and production are Industrial Production Index, which measure the value of produced output, and total capacity utilization, which measure the actual output of firms relative to what they can produce (see Figures 6 & 7). The downward trend in both of these metrics over the last 10 months indicates that value of output is falling, and firms are using a smaller percentage of their capital. In general, firms are exhibiting more productive capacity. The accompanying trend of an increase in inventory to sales ratio, starting in May 2018, suggests that output is sitting longer in inventory (per Figure 8). This change is likely due to an over-production of goods influenced by optimism associated with the Tax Cut and Jobs Act. The Tax Cut and Jobs Act was signed into law at the tail-end of 2017 (taking effect in early 2018⁵), and changed how companies and consumers were taxed. Some companies used these tax benefits to re-tool and invest⁶, which may have had a positive impact on production. Companies also may have been overly optimistic regarding how the tax cut would impact wages or purchasing power by consumers. Consumer disposable income did grow between then end of 2017 to the beginning of 2018⁷, however this growth tapered off quickly (and consumer spending actually took a bit of a downturn at the start of 2018). A combination of company optimism and lack of consumer spending created an increase in inventory relative to sales.

⁵ <https://fortune.com/2017/12/20/gop-tax-bill-cuts-start/>

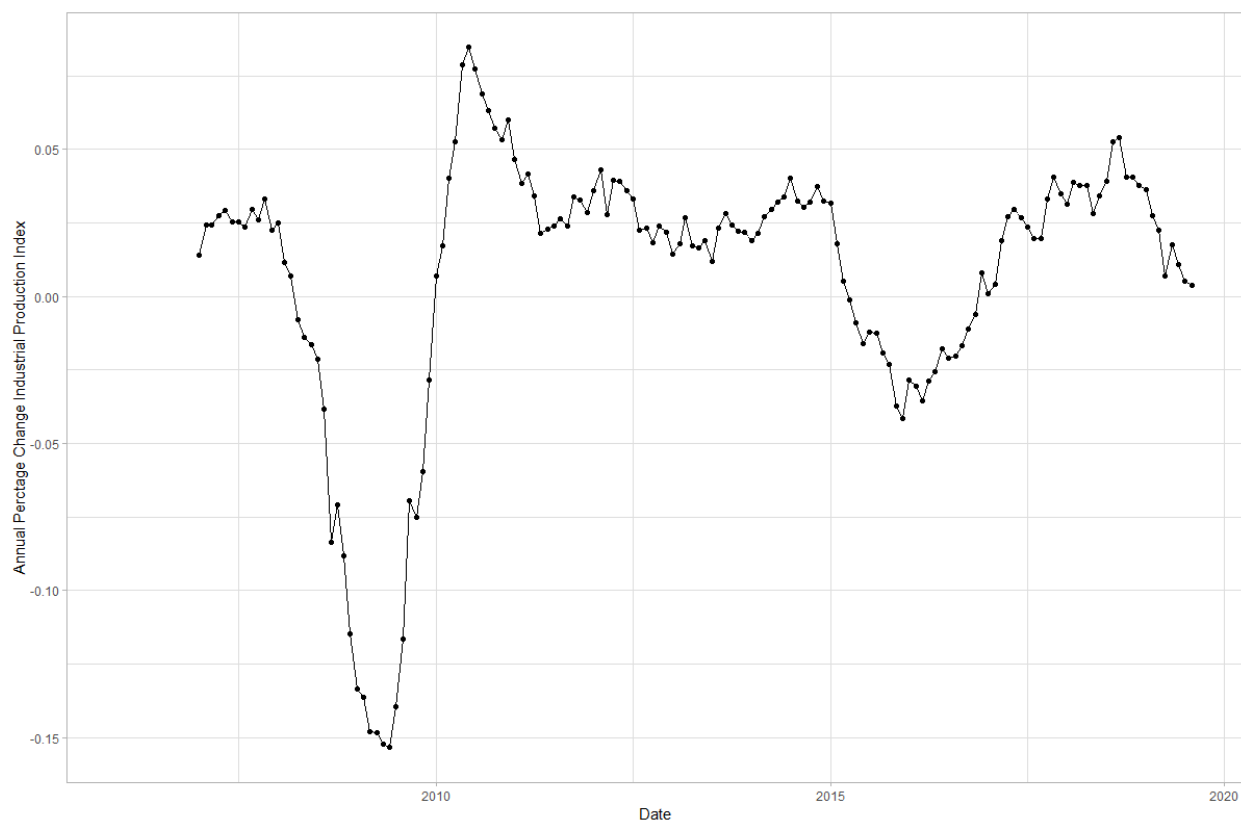
⁶ <https://www.cnbc.com/2018/06/20/now-we-know-how-major-corporations-are-spending-tax-cuts.html>

⁷ <https://www.wsj.com/articles/are-the-tax-cuts-working-what-to-watch-in-12-charts-1529323200>

MACROECONOMIC FORECASTS, 3Q2019 (DRAFT VERSION)

A decrease in capacity utilization, a decrease in industrial production and an increase in inventories relative to sales suggests an overall slowing of production and a softening of consumer demand. The reaction of firms to lower demand is to reduce output and use a smaller percentage of their productive resources.

Figure 6: Year-Over-Year Change in Industrial Production Index (2007 - 2019)



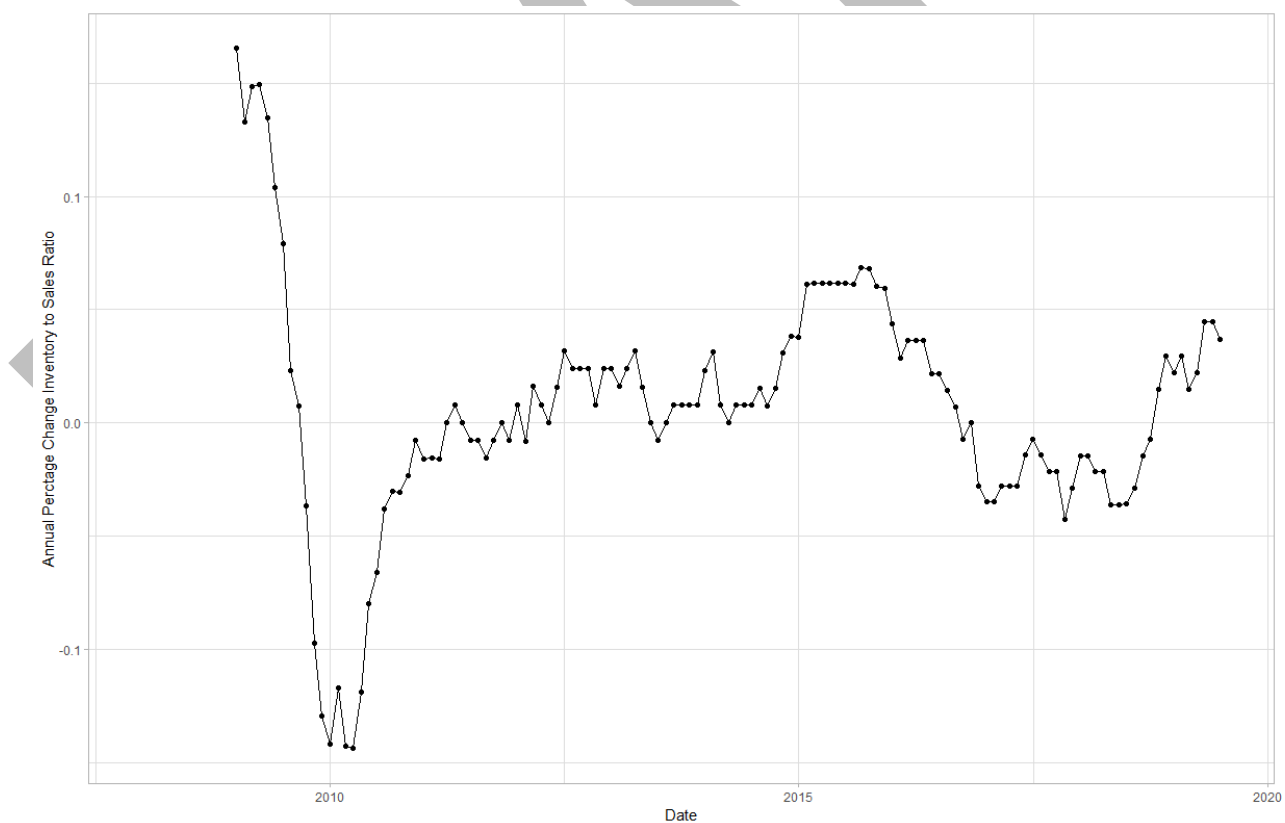
Source: <https://fred.stlouisfed.org/series/INDPRO>

Figure 7: Total Capacity Utilization: All Industries (2009 - 2019)



Source: <https://fred.stlouisfed.org/series/TCU>

Figure 8: Inventory to Sales Ratio (2008-2019)



Short and Long-Run Expectations

Every economic recession occurs as a result of an economic shock. The following table identifies a chronology of the last six recessions, their peak and trough months and the corresponding economic shocks. The recessions of 1975 and 1980 were motivated by energy policies and oil prices. The recession in 1991 was caused by consumer pessimism surrounding the Iraq war and massive failures within the savings and loan industry. The 2001 recession was caused by a burst of the dot.com bubble and the loss in consumer confidence caused by failures by Enron, WorldCom and the 9-11 terrorist strikes to the US. The Great Recession in 2008 was caused by a collapse of the housing market and the sub-prime loan market. The last four recessions were the result of decreases of consumer spending.

The movement of several economic indicators suggest that we are headed towards another consumer driven economic recession.

Table 2: Recession Chronology and Corresponding Shocks

Peak Month	Trough Month	Economic Shock
November 1973	March 1975	Oil Embargo
January 1980	July 1980	Fall of the Shah of Iran/Energy Crisis/Volker Interest Rates
July 1981	November 1982	Volker Interest Rate Hike
July 1990	March 1991	Iraq War/ Savings and Loan Crisis
March 2001	November 2001	Dot.com Bubble/ Enron & WorldCom/ 9-11 Terrorist Strike
December 2007	June 2009	Housing Crisis
May 2020 - Jan 2021	?	Tariff Crisis/ Farming Failures / White House Crisis

Source: NBER.org

The on-going trade war between the US and China has driven soybean and other agricultural exports between the US and China to significantly low levels: during the 2018-19 season, China purchased 14.3 million tonnes of soy, the lowest purchase amount by China in more than 10 years⁸. As a result, soy stockpiles have increased by more 1.8 billion bushels and are pushing domestic soy prices down⁹. Although soy future prices¹⁰ have started to increase with renewed trade talks, the damage has already taken hold. The value of agricultural exports have been trending considerably lower (see Figure 9) and year-over-year changes have hit negative levels in the last 12 months (see Figure 10). Lower exports and lower domestic prices (and corresponding lower domestic revenue) have driven down farm profits. The net-cash income of

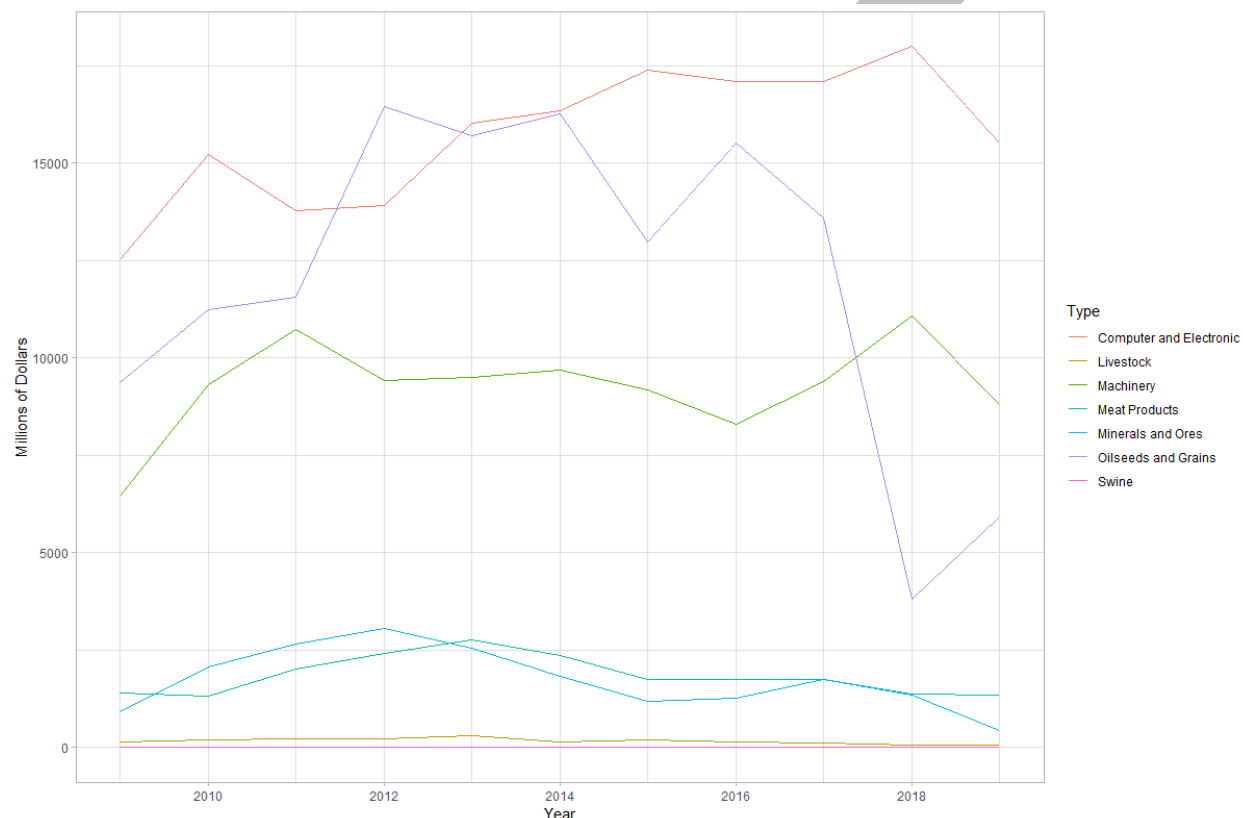
⁸ <https://www.reuters.com/article/us-usa-trade-china-agriculture/us-soybean-exports-to-china-rise-but-big-purchases-remain-elusive-idUSKCN1UO1ZL>

⁹ *ibid*

¹⁰ <https://www.wsj.com/articles/soybean-futures-bounce-back-after-china-restarts-purchases-11570127899>

soy farmers has decreased from \$130,000 per farm in 2016 to \$65,100 in 2018¹¹. It is not surprising to see farm loan delinquency rates increase to the highest levels since 2012 (see Figure 11).

Figure 9: Value of Exports (in Millions) by Type of Goods (2009-2019)¹²



Source: <http://usatrade.census.gov>

Soy farmers are not the only groups negatively impacted by the trade-war¹³. Exports of computers and electronics, livestock, machinery, minerals and ores as well as other oilseeds and grains are all down in either 2018 or 2019. (See Figure 9.) Exporters of meat products (including swine) experienced small upticks in 2018 but saw a softening of the market so far in 2019. The outbreak of the swine flu in China¹⁴ has had a small positive impact on the exports for swine from the US.

Although the tariffs (and retaliatory tariffs) are impacting farmers directly, they will start impacting consumers more directly in the next few months. Price increases as a result of these

¹¹ <https://data.ers.usda.gov/reports.aspx?ID=17840>

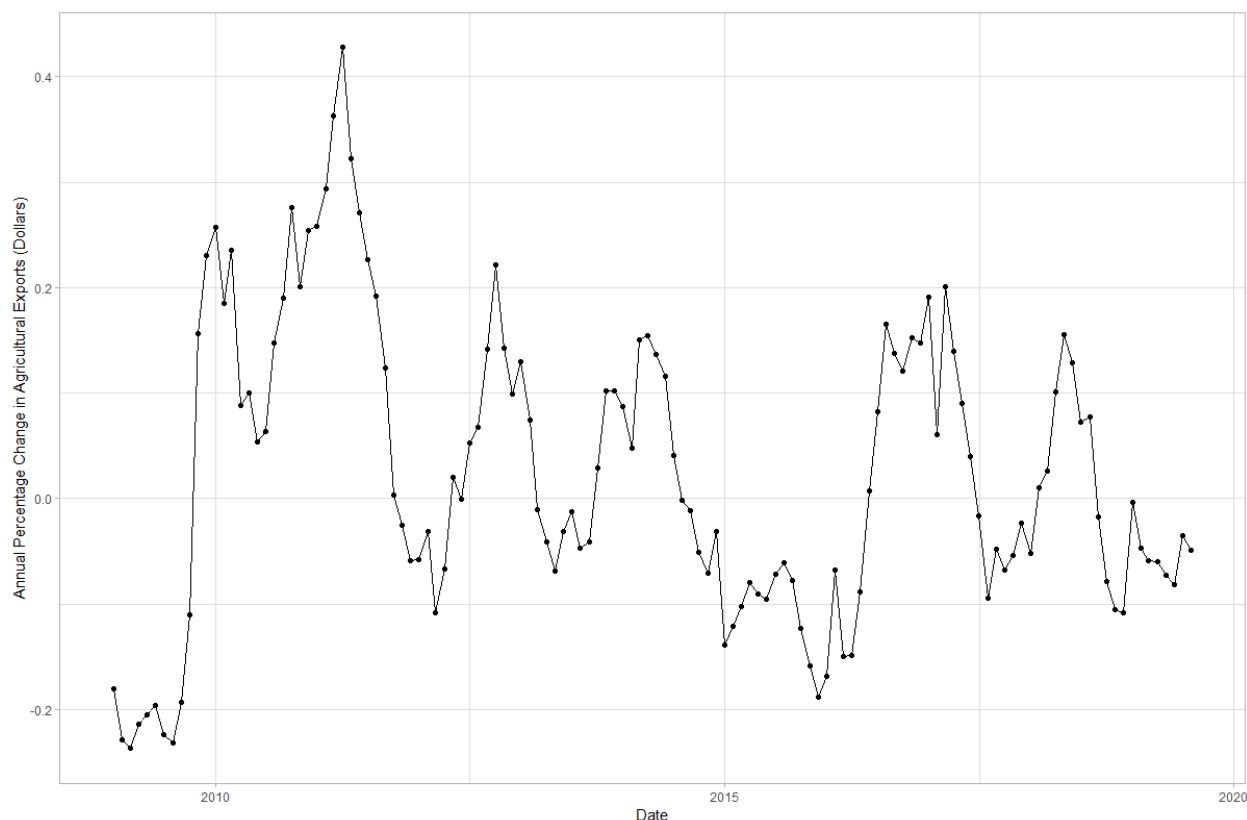
¹² Data for exports was available through August 2019; the values for 2019 are based on released numbers through August and then forecast values through the rest of 2019.

¹³ Recent reports of a new deal have become available - <https://www.cnbc.com/2019/10/14/phase-one-us-china-trade-deal-not-enough-to-boost-trumps-2020-odds.html>, however, Secretary Mnuchin has indicated that new tariffs are still scheduled to go into effect until the deal is signed - <https://www.cnbc.com/2019/10/14/mnuchin-says-he-expects-tariffs-to-go-up-in-december-if-there-is-no-china-deal-in-place.html>

¹⁴ <https://www.cnn.com/2019/09/04/business/china-pork-swine-fever-pigs/index.html>

tariffs could cost consumers between \$300 and \$900 per year¹⁵. This is likely to translate into a drop in consumer confidence and could easily spin into a mild consumer-driven recession.

Figure 10: Year-Over-Year Change in Value of Agricultural Exports (2009-2019)



Source: <https://www.ers.usda.gov/data-products/foreign-agricultural-trade-of-the-united-states-fatus/us-agricultural-trade-data-update>

Given the current trends in macroeconomic indicators, it is likely the economy will experience a recession in the next 12-18 months. The depth of the recession is likely to be something similar to the 2001 recession (6-9 months) with peak unemployment between 5.5% and 6.5%. The graph above shows the trends in the unemployment rates given the severity of the economic shock and the depth of the economic recession. Given the attention that the Federal Reserve Bank is placing on the current economic climate, it is possible (although slightly less likely) that the economy would bounce into a small recession with unemployment rates topping off around 5%. The Fed would have to make significant changes (50-75 basis point) reductions to the federal funds rate target within the next two meetings to stave a more significant recession. Given the pressure that the current administration is putting on the Federal Reserve Bank¹⁶, it is not an unreasonable course of action for the Fed to engage in significant expansionary policy. If the timing is right, aggressive Fed moves might act as a safety net for a falling economy.

¹⁵ <https://www.nytimes.com/interactive/2019/business/economy/trade-war-costs.html>

¹⁶ <https://www.bloomberg.com/news/articles/2019-08-22/key-trump-quotes-on-powell-as-fed-remains-in-the-firing-line>

Figure 11: Bank Loans for Agricultural Production: Delinquency Rates (2008 - 2019)

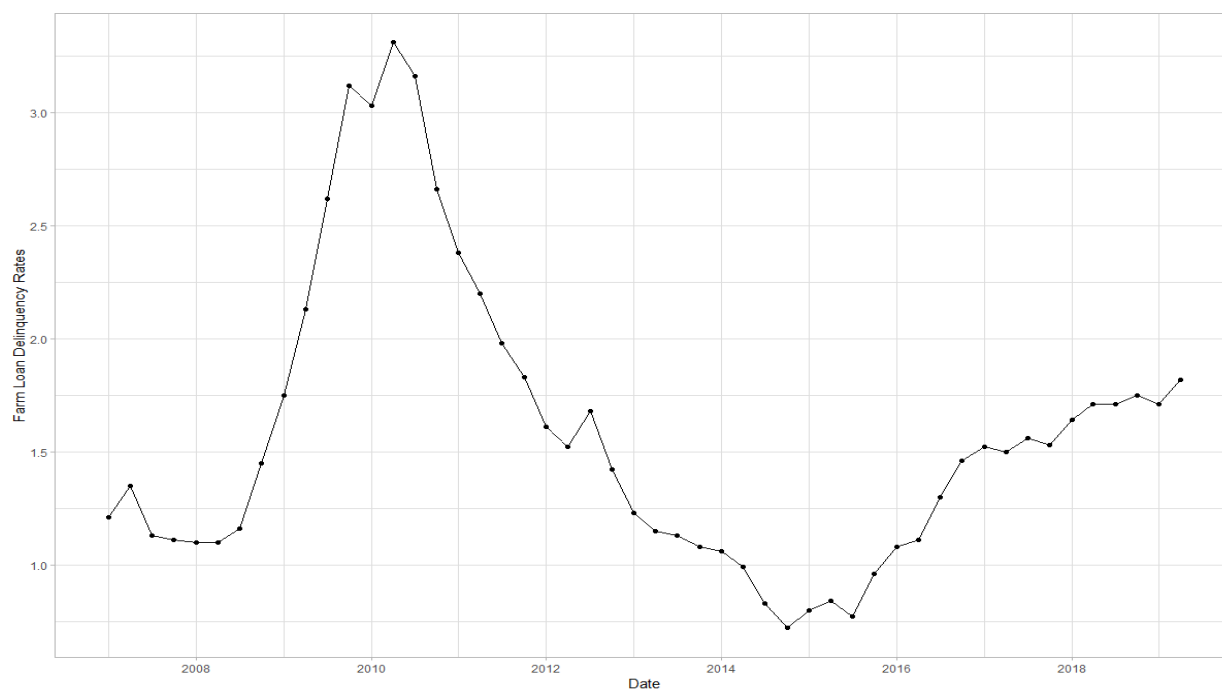
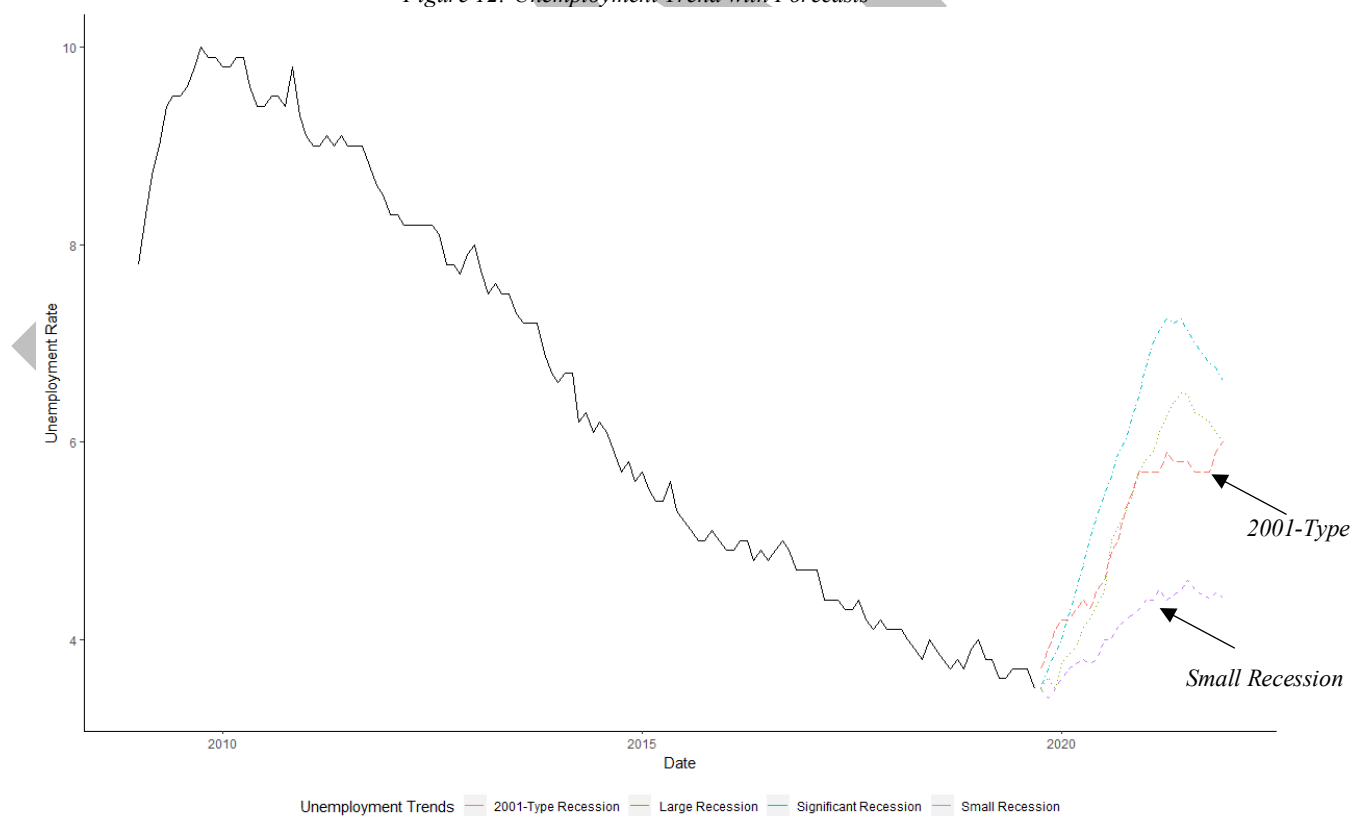


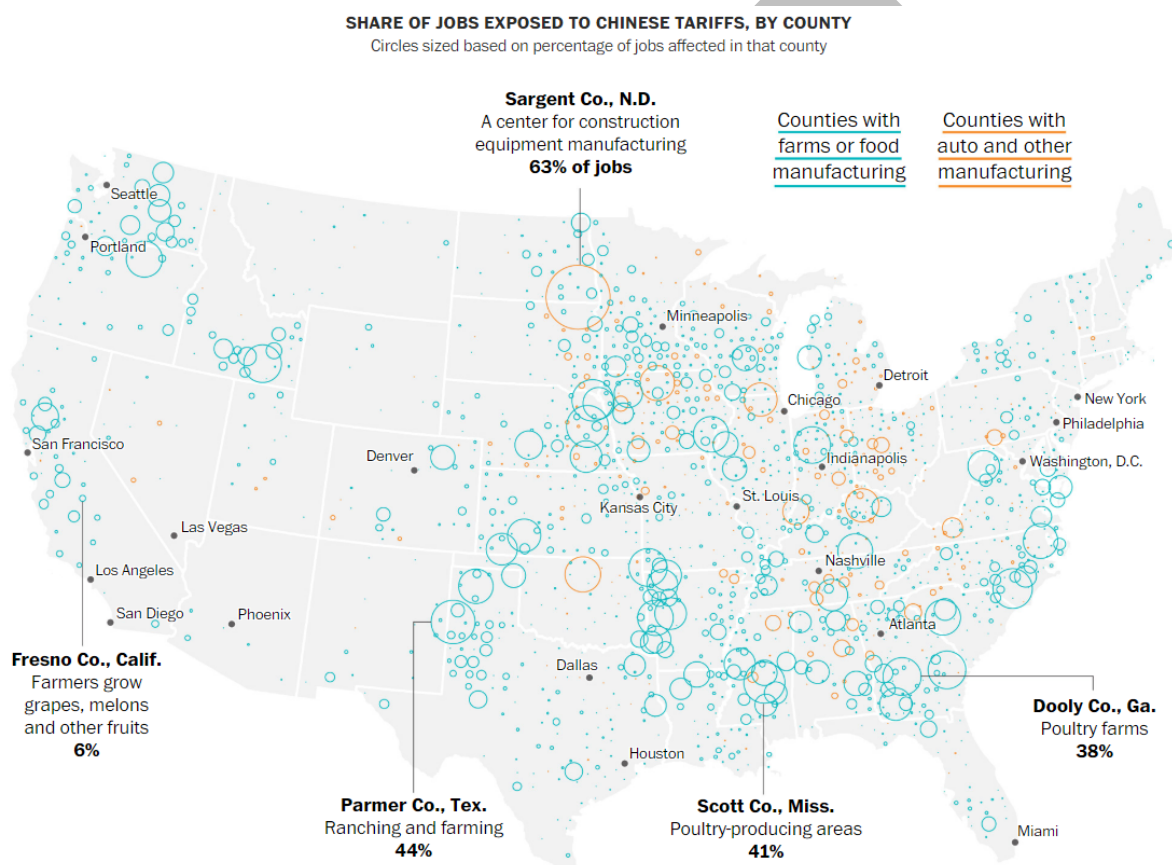
Figure 12: Unemployment Trend with Forecasts



Impact on 2020 Election

The impact of the escalation in tariffs has not been felt evenly across the US. China has targeted very specific goods in their retaliatory tariffs. We can see that states in the Midwest—Illinois, Wisconsin, Minnesota, and Ohio -- have experienced a much harder hit than western plains states such as Colorado, Utah and Wyoming.

Figure 13: State Exposure to Trade War: Food and Manufacturing Sectors



Source: <https://www.washingtonpost.com/graphics/2018/business/china-tariff-jobs/>

The drop in exports in the Midwest could cause an uptick in unemployment rates in these states. This could be very damaging to the re-election chances for President Trump; changes in unemployment (for the negative) can be a mobilizing event¹⁷ -- creating an urgency for voters to voice their opinions at the polls. Additionally, higher unemployment rates and lower GDP growth have been associated with voters turning against the incumbent party in presidential and midterm elections¹⁸. A change in the economy trajectory from growth to economic recession could turn voters away from Trump in Wisconsin and Ohio. Given that Trump narrowly won these states, even small changes in voter sentiment could flip these states back to the democratic

¹⁷ See, for example, https://scholar.princeton.edu/sites/default/files/mincantalupo/files/incantalupo_turnout_0.pdf

¹⁸ <https://www.theatlantic.com/business/archive/2010/11/the-most-important-economic-indicator-in-midterm-elections/65505/>

candidate, which is intended to convey how easily the US' economic policy may change with the next Presidential election cycle. Changes could require 6 to 12 months to implement (after the inauguration of a Democratic victor), but a chill could fall over the economy essentially as soon as election results are announced.

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 following¹⁹:

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. Primary Credit Rate

¹⁹ 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.

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)

Our procedure is as follows:

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

Correlations

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

In Appendix C of this document, we document the 104 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.

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

²⁰ 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 "*",

7-year Treasury yield		3-year Treasury yield*
30-year Mortgage rate		10-year Treasury yield
Moody's AAA Rate		20-year Treasury yield
30-year Treasury yield		20-year Treasury yield
Primary Credit rate		6-month Treasury yield*

Analysis of Variables

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

Analysis

The slowing of US GDP growth continued through 2Q2019 to 0.5%, and Caplalytics quantitative analysis expects it to very slowly rebound, first to 1.5% by mid-2020 and then to 2.0% by the end of 2021. This drop from 3% in 2018 is a result of several factors, including the trade war that the White House is currently waging with China. Nominal GDP growth is projected to barely reach 3.0% by 2021 before again retreating. And, while millennials are accused of bumping the overall savings rate to 8%, overall disposable income growth is projected to barely reach 2.0% by mid-2020, and peak at 2.86% in just over 4 years, resulting in the nominal disposable income growth going from its current value of 1.2% to 2.2% by the end of 2019, peaking at 4.0% by mid-2022, and then waffling between 3.5% and 4.0% until mid-2024.

While the Fed' attempts to drive inflation to a target of 2% by adjusting interest rates on Treasury bonds, rates for Q1 & Q2 were both around 0.2%, resulting in a significant dampening of forecasted values to a level under 0.6% for the foreseeable future (without adjustment of other factors, which is extremely likely if not definitively necessary).

Unemployment has also been at record low levels, leading experts to continue to question the modern day definitions and target that the Fed' uses for its controls of the economy. Having been below 4% since mid-2018, currently holding around 3.6%, and expected to possibly drop below 3% in 2021, leads us to believe that a change in the reporting metrics for employment is a likely possibility within the next few years.

Other Commentary

- Kiplinger reports that it believes overall inflation rate will rise to 2.3% during 2019, with the core rate rising to 2.6% (see <https://www.kiplinger.com/article/business/T019-C000-S010-inflation-rate-forecast.html>; Sept 13, 2019)
- Per the WSJ, "Private-sector economists surveyed in recent days expect U.S. gross domestic product to expand an inflation-adjusted 2.2% this year on average, measured from the fourth quarter a year earlier. Forecasters expect economic growth will slow to 1.7% in 2020 and will be 1.9% in 2021." (see <https://www.wsj.com/articles/economists-dont-see-path-to-3-growth-in-2019-11568296800>; Sept 12, 2019)

- ITR Economics anticipates a GDP growth rate of 2.7% by 2020. (see <https://www.bizjournals.com/kansascity/news/2019/01/11/economist-expect-gdp-to-dramatically-slow-in-2019.html>; Jan 11, 2019)

Unemployment Rate

Analysis

Unemployment shows no sign of breaking from its historic sub-4% low levels in the foreseeable future (currently 3.6%), staying below 4% through mid-2021 and dropping below 3% thereafter (depending on national elections and other comparable factors). While the economy is trending towards more contractor-assigned tasks, particularly in urban areas where there is an increasing demand for delivery services and other independent task-oriented & transactional positions, the wages and requirements for that type of lifestyle will become increasingly stringent as time continues. A significant portion of the unemployed population has been out of work so long that they will never be able to recover to earn their previous income.

Other Commentary

- Monthly job growth has showed from 223,000 in September 2018 to 150,000 in September 2019. Kiplinger reports "... the smaller gains signal that the economy is slowing down to a more moderate growth rate. The tax cuts' stimulus to growth couldn't last, and the trade war with China is keeping exporters and commodities-oriented industries from expanding." (see <https://www.kiplinger.com/article/business/T019-C000-S010-unemployment-rate-forecast.html>; Oct 4, 2019)
- "The unemployment rate will average 3.6% in 2019. It will increase slightly to 3.7% in 2020 and 3.8% in 2021. That's lower than the Fed's 6.7% target. But former Federal Reserve Chair Janet Yellen noted a lot of workers are part-time and would prefer full-time work. Also, most job growth is in low-paying retail and food service industries." per The Balance (see <https://www.thebalance.com/us-economic-outlook-3305669>; Aug 27, 2019)
- The unemployment rate—at 3.7% in October—sits near a 50-year low. When unemployment gets so low, it has tended to be a sign that economic resources are running tight. In the 1960s, low unemployment was followed by a decade-long run toward double-digit inflation. In the 1990s, low unemployment came with an epoch of asset bubbles that ended badly. (see <https://www.wsj.com/articles/the-economic-forecast-for-2019-less-growth-and-more-uncertainty-1543892700>; Jan 7, 2019)

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

Analysis

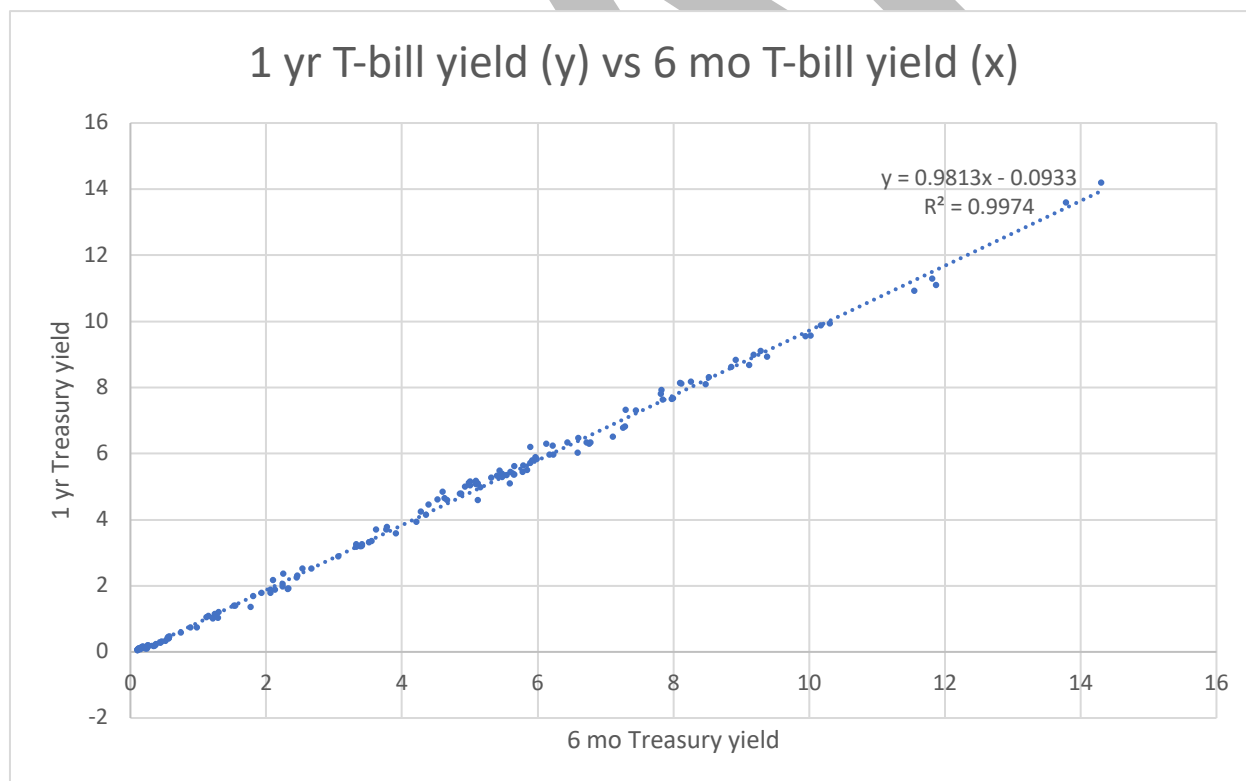
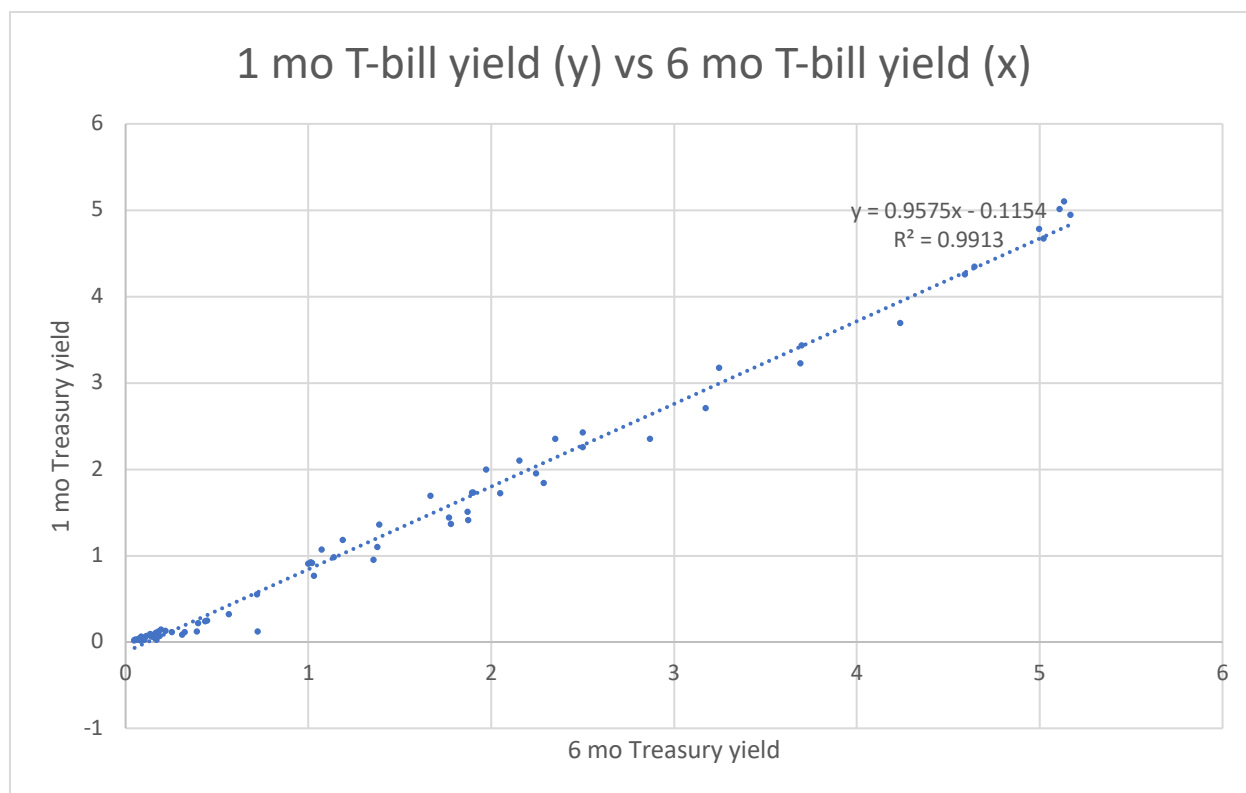
For the past several months, the US' yield rates have toyed with long-term rates dropping below short-term rates, i.e., a "yield curve inversion". Now, in October 2019, the yield curve has

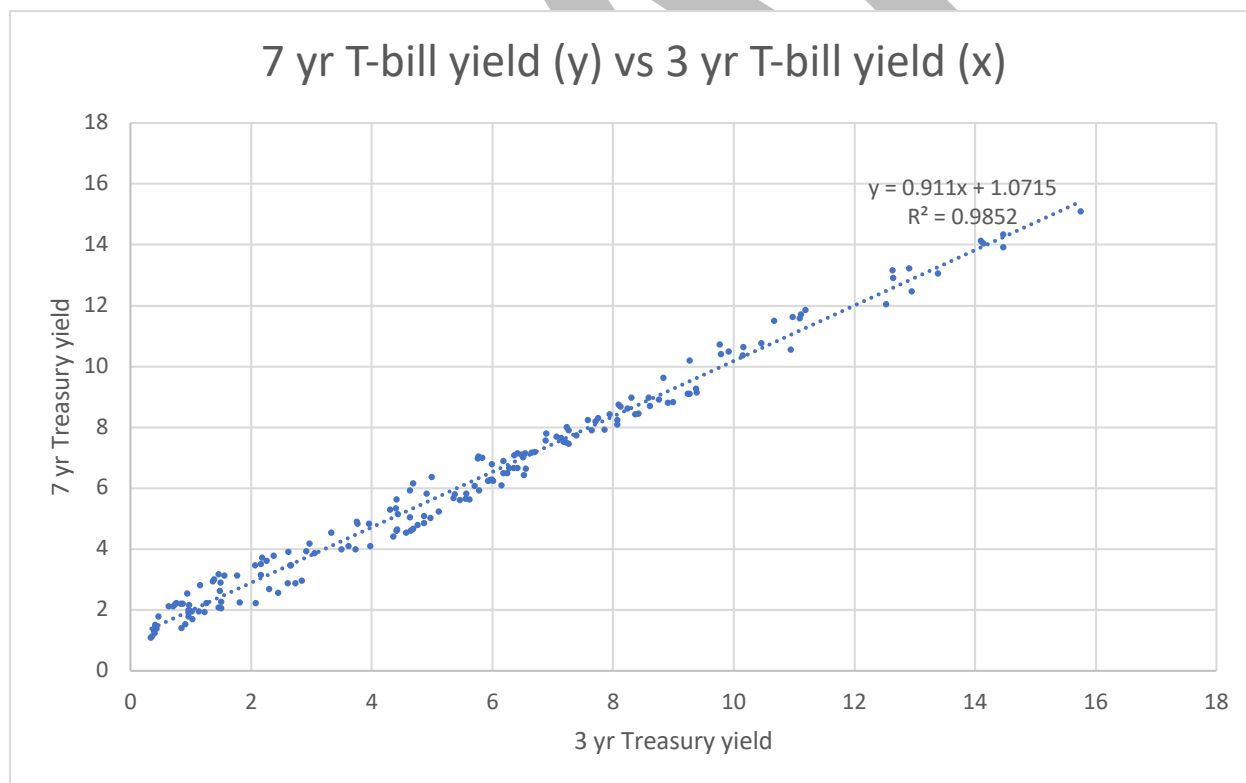
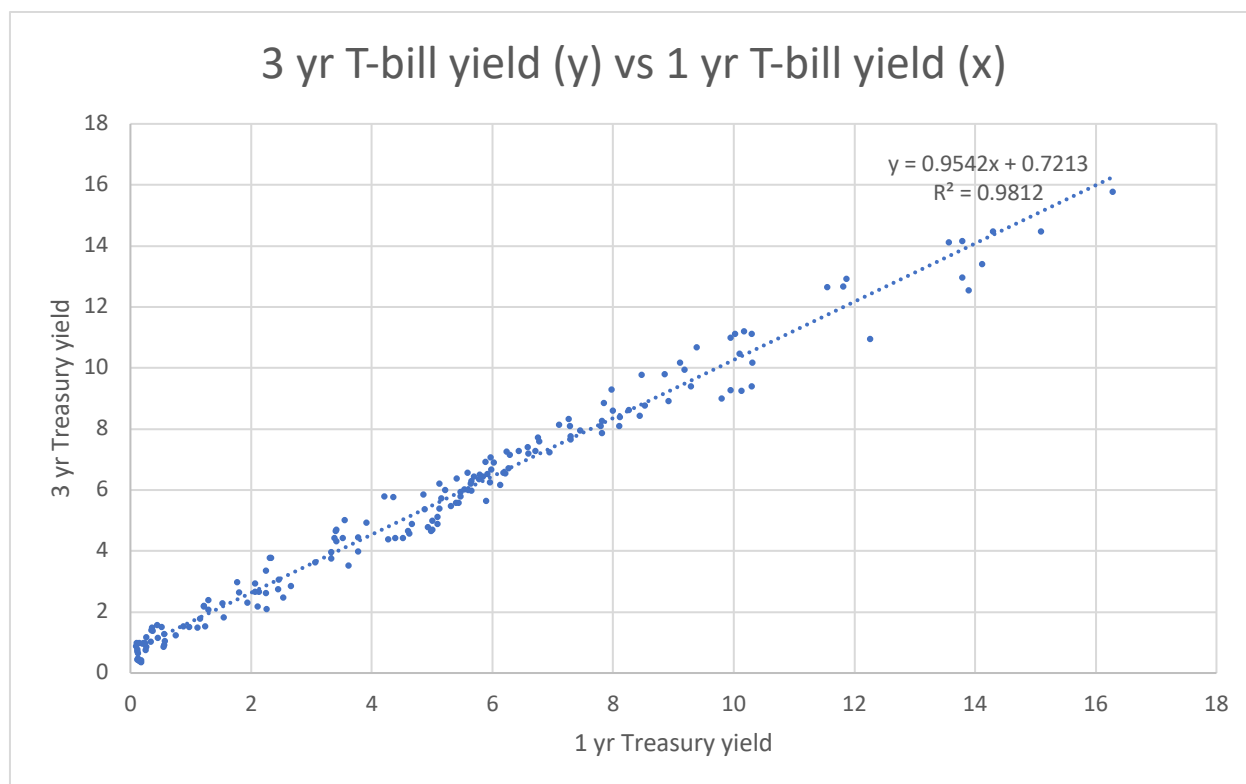
“inverted” as it did in 2007 (and at other times in recent history). The question now is whether this inversion is a precursor now for a recession as it has been in other cases.

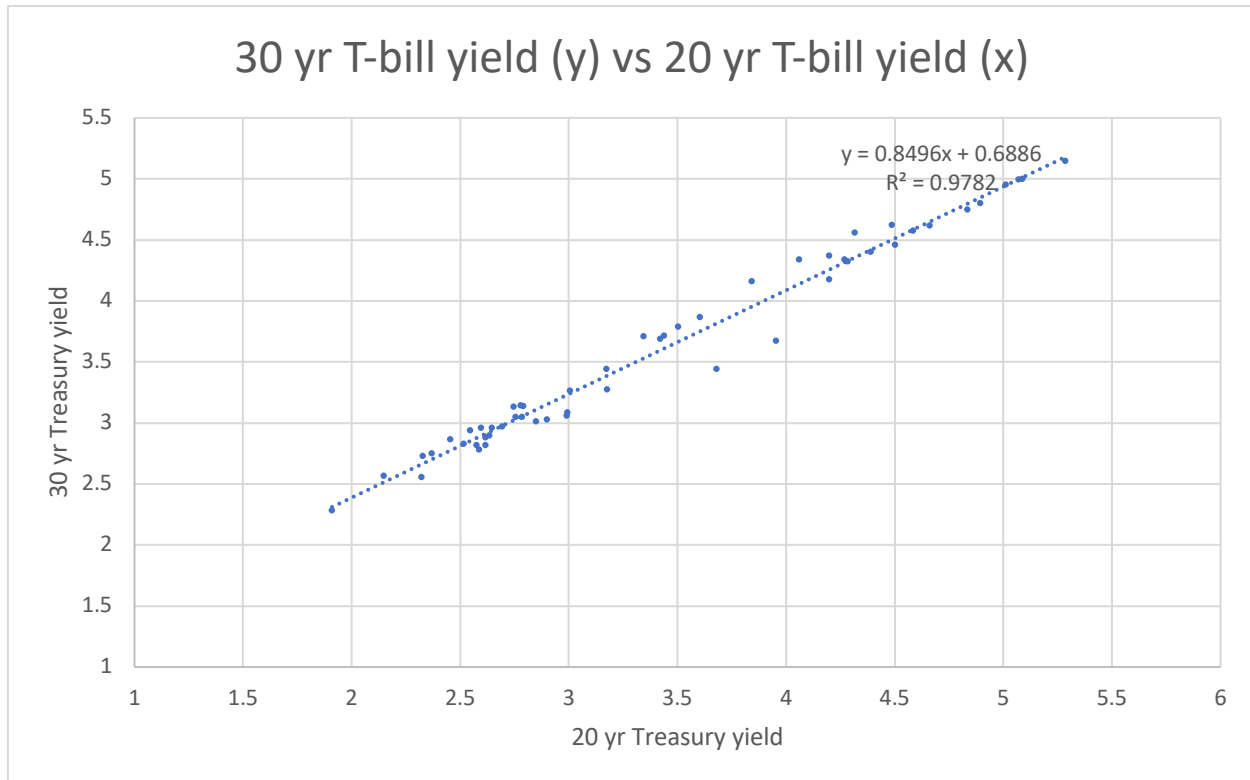
Capitalytics’ analysis shows that the 3-month Treasury yield to steadily climb by a few basis points per quarter to a level of less than 2.5% by the end of 2020. We compute that 5-year Treasury yield rates to rise to 2.2% by mid-2020, at which point we project the 10-year Treasury yield rates to rise to 2.4%. We also project rates to stabilize in 2021 & 2022. Because of these forecasts, we do think that recession is a realistic possibility.

Other Commentary

- Kiplinger asserts that an additional rate cut will occur late in 2019, and will then re-evaluate the state of the economy with particular emphasis on the US’ trade war with China; this position makes it likely that 10-year rates will remain below 2% until these issues are resolved. (<https://www.kiplinger.com/article/business/T019-C000-S010-interest-rate-forecast.html>; Sept 19, 2019)
- “[Robert Shiller] chalks it up to analysts “data-mining” to find any indicator that holds up. While the yield curve has preceded each of the seven recessions since the 1950s, with only one false positive, it’s a fairly small data set to be really conclusive.” (<https://www.cnbc.com/2019/08/22/robert-shiller-says-recession-fears-may-make-it-a-reality.html>; Aug 22, 2019)
- “Fears of an economic slowdown ... [resurfaced] ... when the release of the Federal Reserve’s July meeting minutes reiterated officials’ belief that its July rate cut was just a “mid-cycle adjustment.” (see <https://www.cnbc.com/2019/08/21/us-bonds-fed-meeting-minutes-in-focus-ahead-of-g7-summit.html>; Aug 21, 2019)







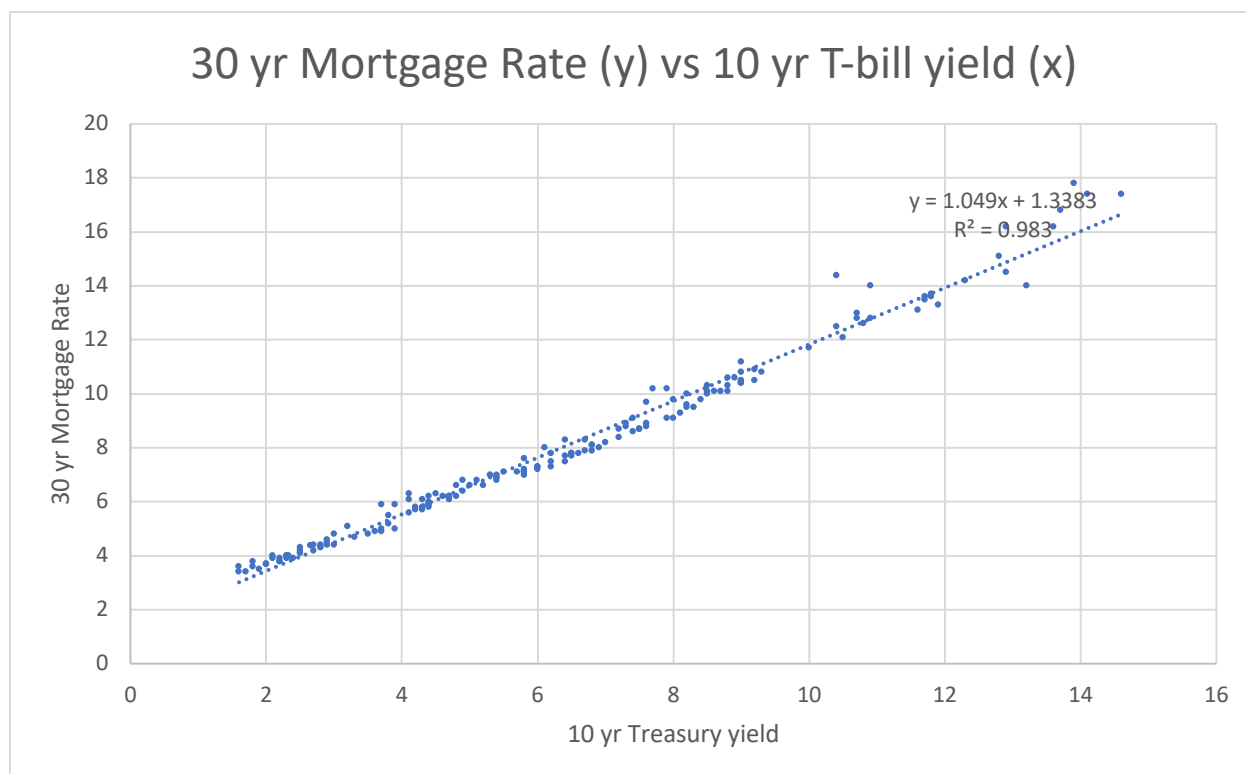
30-year Mortgage Rate

Analysis

Over the past year, an anticipated economic slowdown and reduction in the housing market has been continuously rumored as being “right around the corner”. At this point, our models reflect a drop in rates from their current 4.0% rate to 3.5% in the next six months, and stabilizing at that level for the foreseeable future.

However, we are concerned about the current White House administration’s continued attempts to influence interest rates (which are closely tied to the mortgage rate), and the expectation that this influence will continue for the next 12-18 months.

The following chart serves to illustrate the strong connection between mortgage rates and the 10-year T-bill.



Other Commentary

- Kiplinger asserts that an additional rate cut will occur late in 2019, and will then re-evaluate the state of the economy with particular emphasis on the US' trade war with China; this position makes it likely that mortgage rates will stay around 3.5% until these issues are resolved. (<https://www.kiplinger.com/article/business/T019-C000-S010-interest-rate-forecast.html>; Sept 19, 2019)
- “The average rate on a 30-year mortgage, after peaking at 4.87% in November, fell more than one percentage point to 3.75% in June. ... The S&P CoreLogic Case-Shiller National Home Price Index rose 3.4% in May from a year ago, down from 3.5% growth in the previous month. Home-price growth has declined on a year-to-year basis for 14 consecutive months. Double-digit price gains have vanished across the nation, after being the norm in many coastal cities just a couple of years ago.” (see <https://www.kiplinger.com/article/business/T019-C000-S003-housing-market-forecast-housing-starts-home-sales.html>; Aug 1, 2019)

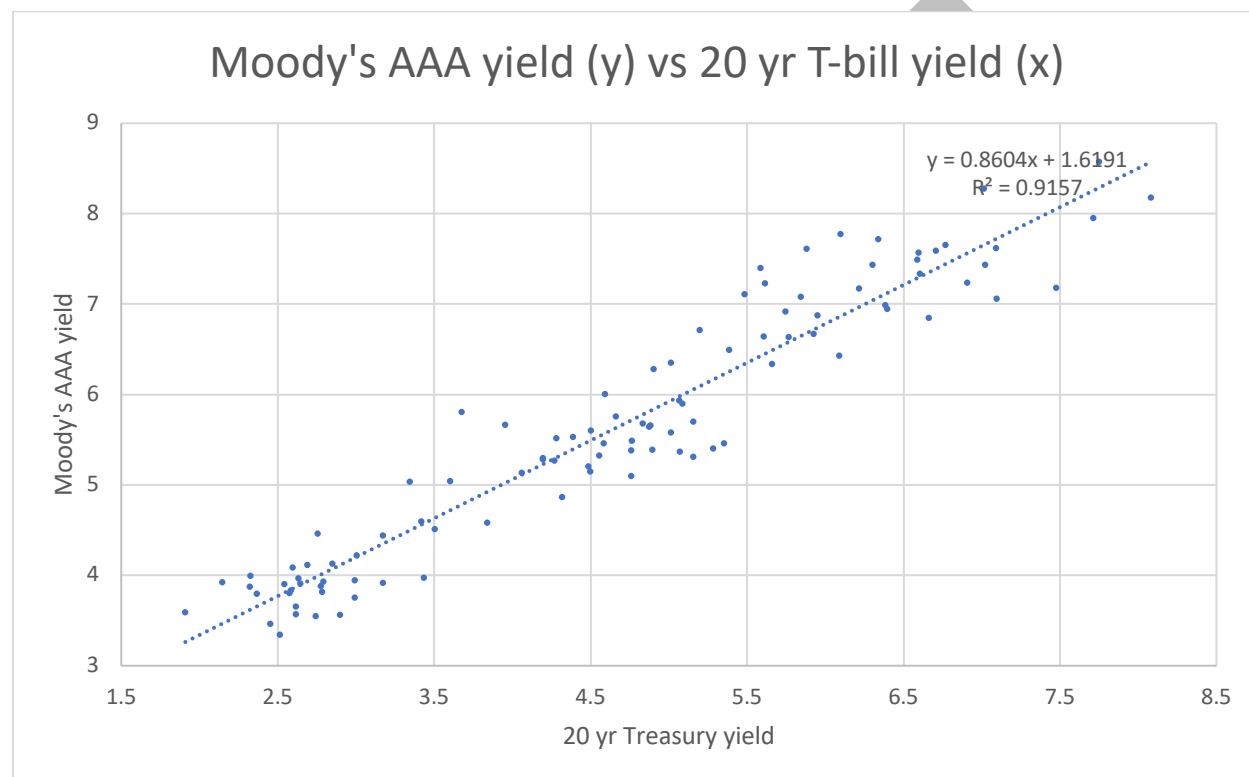
Moody's AAA & BAA Rates

Analysis

Moody's AAA bond rates tend to track in conjunction with mid-duration T-bill yields (i.e., 10- and 20-year maturities). Moody's BAA rates tend to be higher, and more volatile, than AAA rates.

Capitalytics' quantitative models sees AAA rates being relatively stable over the next several years (through 2022) at between 3.4% and 3.6% yields; given the projected climate, and the connection between these bonds and the 10- and 20-year Treasury yields, these values are not surprising. BAA rates will fluctuate between 4.85% and 4.95% for the foreseeable future,

The following chart illustrates the strong historical relationship between Moody's AAA rate and the 20-year T-bill yield.



BBB Corporate Yield

Analysis

The BBB Corporate Yield is generally tied to Moody's indices (particularly the Moody's BAA bond yield), and the 30-year Mortgage Rate, even though these bonds are generally 10 years in duration. Over the past few years, the volume of bonds that are rated generally in the BBB range has grown dramatically, to take up a significant portion of the investment grade market. This aggregation implies that this slab of the market is all within one to three grades of "junk bond" status, and could be easily downgraded if the ability of the market to absorb defaults is hampered in a down cycle.

Given the recent turn in returns, Capitalytics sees returns on BBB investments stabilizing to between 3.75% and 3.9% through 2024.

Other Commentary

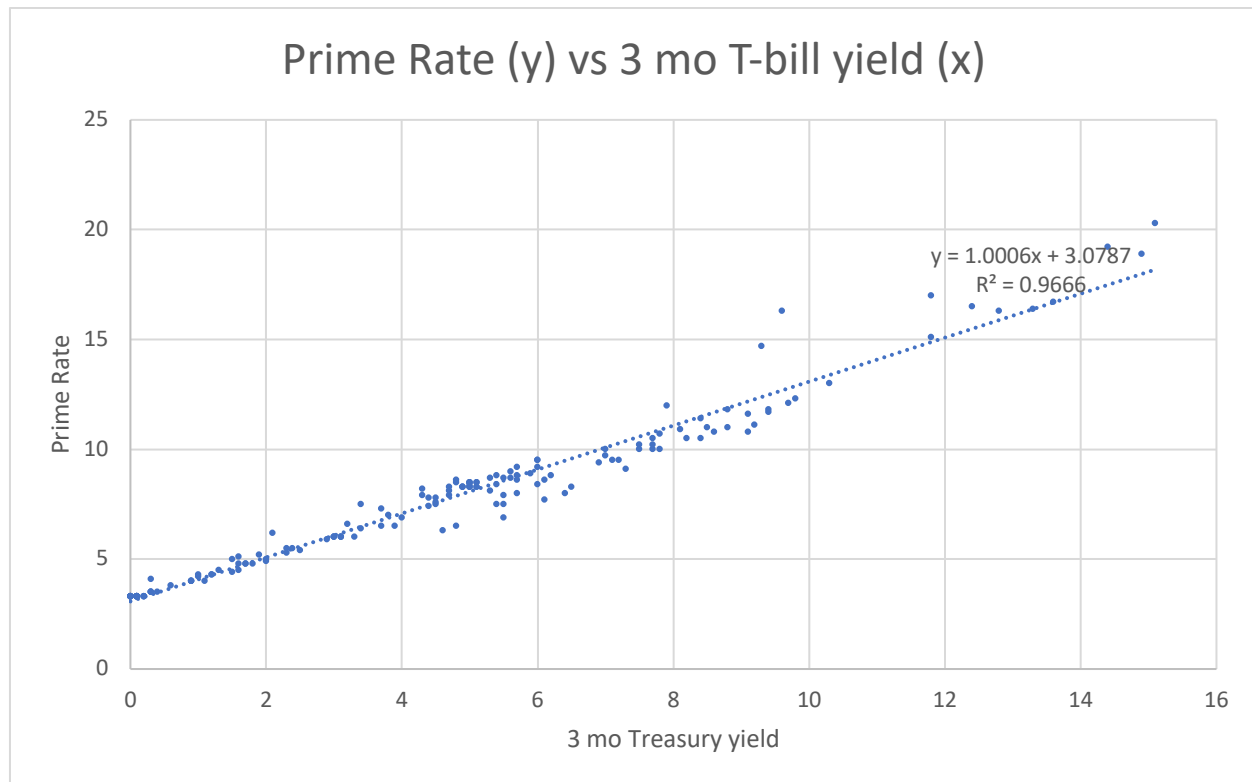
- “According to Morgan Stanley, as Baa (equivalent to BBB) credit spreads widen, the added funding cost impedes both economic growth and employment conditions, acting like an increase in the overall Fed Funds (FF) rate. Moreover, they conclude a 100-basis point increase in Baa spreads is equivalent to a 62-basis point rise in the FF rate. And, because of this relationship, as credit spreads widen the unemployment rate tends to rise as well.” (see <https://www.bizjournals.com/portland/news/2019/07/12/breaking-down-the-u-s-debt-bubble-in-five-points.html>; Jul 12, 2019)
- “While the growth in the BBB segment of the market is beyond question, the risk profiles for most of the large cap BBB credits are completely different than typical highly levered cyclical companies. Most of the incremental debt growth in the BBB market now resides on the balance sheets of companies that are less sensitive to the business cycle and are better able to protect their ratings. These tend to be concentrated in defensive sectors that will benefit from stable cash flows during periods of economic weakness. ... Much of this growth [in BBB bonds] can be attributed to large debt-funded acquisitions by companies such as Verizon, CVS and Anheuser-Busch InBev. This transaction-related downgrade may prove transitory. In fact, AT&T and Verizon, two of the largest BBB credits in the market, have both announced debt reduction as a top priority over the next several years with the ultimate goal of reestablishing an A credit rating.” (per <https://www.nb.com/en/global/fiio/fixed-income-investment-outlook-2q2019>)
- “BBB-rated bonds have a much larger weighting in the investment-grade bond market than prior to the crisis, which is a bearish sign.” (see <https://seekingalpha.com/article/4224172-outlook-investment-grade-corporate-bonds>; Nov 23, 2018)

Prime Rate

Analysis

The Prime Rate is historically very tightly coupled to very short-term Treasury Bills (specifically, 3-month yields). Capalitytics models show the Prime Rate stabilizing to within 0.1% of 4.6% by the end of 2020.

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



Other Commentary

- “The bank prime lending rate will decline to 4.75% after the October cut. ... The decline in rates is likely to boost the housing market — by making mortgages easier to afford — and perhaps consumer lending, but it will not boost business borrowing much because of all the economic uncertainty.” (see <https://www.kiplinger.com/article/business/T019-C000-S010-energy-price-forecast.html>; Sept 19, 2019)

US Average Retail Gasoline Price

Analysis

Gasoline prices are expected to remain relatively stable over the next several years, with typically expected fluctuations occurring during the summer and winter months. For the foreseeable future, gasoline is expected to stay at between \$2.90/year and \$3.00/year, beginning in mid-2020.

Other Commentary

- Kiplinger reports “... it appears that the Saudis are well on their way to restoring output, so global oil markets needn’t prepare for serious supply shortfalls just yet. After jumping from \$55 per barrel to more than \$60 in the days following the attacks, benchmark West

Texas Intermediate crude oil has slipped to about \$58.50. ... Drivers in the United States saw gasoline prices rise by about a dime because of the increase in oil prices. The national average price of regular unleaded is now \$2.67 per gallon, up from \$2.57 a week ago. But even after that quick rise, the national average remains 18 cents cheaper than a year ago. And, barring some fresh disruption in oil supply, prices at the pump will probably start to decline again soon.” (see

<https://www.kiplinger.com/article/business/T019-C000-S010-energy-price-forecast.html>; Sept 23, 2019)

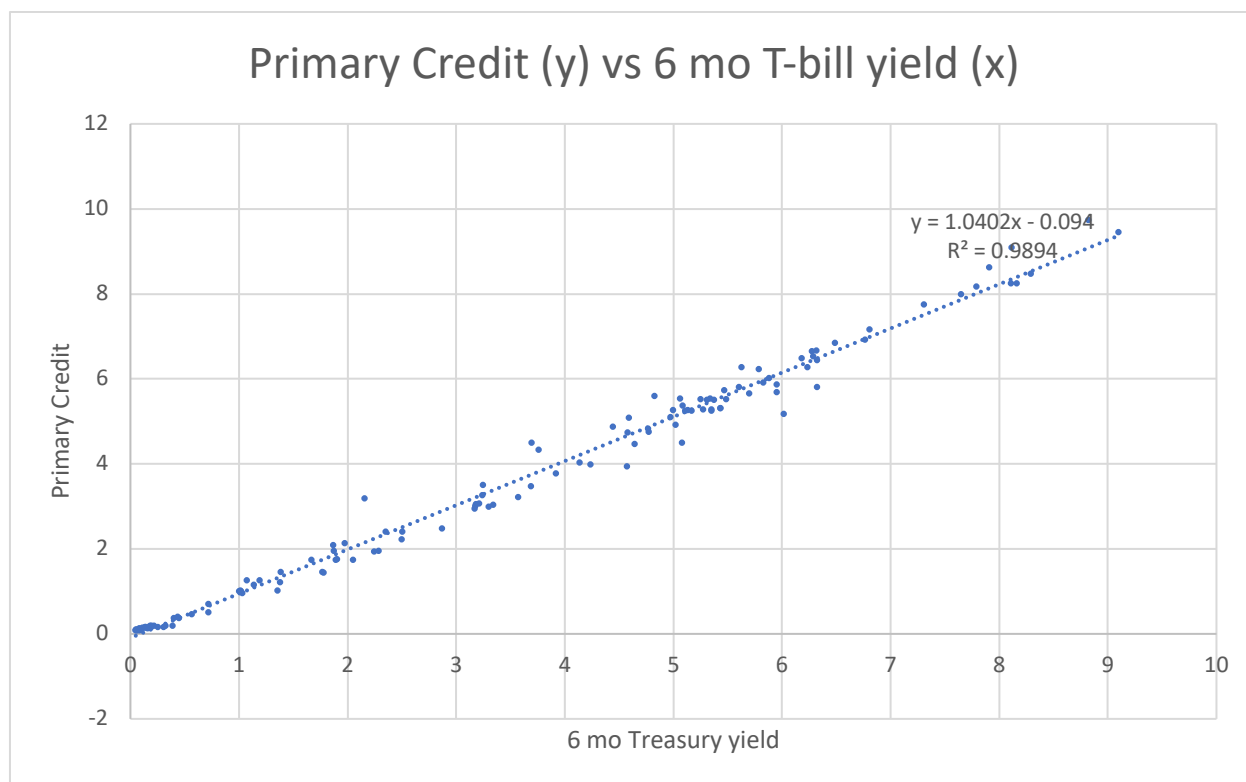
- Per The Balance, “[The U.S. Energy Information Administration] predicts [Brent global] crude oil prices will average \$64/barrel in the second half of 2019 ... West Texas Crude will average around \$6.60/barrel less. ... Since oil contracts are priced in dollars, a strong dollar depresses oil prices. Oil companies are laying off workers. Some may default on their debt. High yield bond funds haven't done well as a result. ... The oil market is still responding to the impact of U.S. shale oil production. That reduced oil prices by 25% in 2014 and 2015. ... That raised profit margins. It also gave consumers more disposable income to spend. The slight slowdown is because both companies and families are saving instead of spending.” (see <https://www.thebalance.com/us-economic-outlook-3305669>; Aug 27, 2019)
- Also, “Oil prices used to have a predictable seasonal swing. They spiked in the spring, as oil traders anticipated high demand for summer vacation driving. Once demand peaked, prices dropped in the fall and winter. ... Oil prices have been volatile thanks to unexpected swings in the factors affecting oil prices.” (see <https://www.thebalance.com/oil-price-forecast-3306219>; Aug 26, 2019)

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.

The Primary Credit rate is currently at 2.4%, and Capitalytics is projecting it to fall below 2.0% by Q3, and approach 1.4% (+/- 0.1%) by mid-2020. The accompanying chart serves to illustrate the relationship between the Primary Credit rate and the 6-month T-bill yield.



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

Analysis

Given the business- and investor-friendly administration that is currently installed in the United States, we expect decreasing growth occurring in 2019 and 2020 in concert with the next round of legislative elections.

Based on our current research (and no significant changes to the legislative composition in the federal government), Capalitytics sees the Dow-Jones index' growth slowing below what we've previously published, so that the Dow will stabilize at around 31,000 within the next 18-24 months, and remain at that point. We also anticipate growth of the S&P500 to slow to approximately 40 points/quarter starting in the very near-term.

Other Commentary

- “The DOW reached record levels this summer and if Trump were to give China a big, big break in a new bilateral trade deal, the DOW would move upward. It could reach 30,000 by next May if China gets its way. Yet President Trump is tough on dealing, and won't be giving China freebies. He trashes them frequently on Twitter and his disdain for them is obvious. And the Democrats wouldn't give China major freebies either if they won the 2020 election. Dems or Trump, there's no going back to the past — a key fact for the DJIA.” (from <https://gordcollins.com/stock-market/dow-jones-forecast/>; Sept 2, 2019)

House and Commercial Real Estate Price Indexes

Analysis

New home-construction and home sales (both new- and existing-home sales) have dropped dramatically since the end of 2018. These trends will be reflected in the Home Real Estate Price Index as it may grow by as much as 1% per quarter nationally over the next several quarters, while still being driven by the aforementioned trends.

The Commercial Real Estate Price index is currently projected to grow at between 0.4% and 1% per quarter. As has been previously discussed, residential and commercial trends ideally parallel each other, and that has been the case for the past 24-36 months. The Commercial Real Estate Price index is expected to slowly grow approximately 1%-2% per quarter over the next 60 months.

Other Commentary

- Per the National Association of Realtors, "... numerous experts have lowered their housing market predictions for the next 5 years for home prices and appreciation rates. According to Zillow's Home Price Expectations Survey (which surveyed a panel of over 100 real estate and economic experts), experts forecast that home prices will rise only 2.8% in 2020 nationally." (see <https://www.mashvisor.com/blog/us-housing-market-predictions-2020/>; Sept 7, 2019)
- The S&P CoreLogic Case-Shiller National Home Price Index rose 3.4% in May from a year ago, down from 3.5% growth in the previous month. Home-price growth has declined on a year-to-year basis for 14 consecutive months. Double-digit price gains have vanished across the nation, after being the norm in many coastal cities just a couple of years ago. (see <https://www.kiplinger.com/article/business/T019-C000-S003-housing-market-forecast-housing-starts-home-sales.html>; Aug 1, 2019)

Market Volatility Index

Analysis

Capitalytics is calling for the Market Volatility Index to fluctuate between 15 and 18 over the next five years. We again caveat the statement as we did last quarter, saying that we find "stability" to be fairly unlikely for next few years, and would caution our clients in relying on this information. It should be noted that a value of 40.7 was recorded in Q3 of 2015 (immediately prior to the last US Presidential election), and a value of 37.32 was recorded in Q1 of 2018.

Other Commentary

- “As the market has gotten more volatile, there’s been a pickup in the VIX – the CBOE Volatility Index –which reflects action on options of S&P 500 component stocks maturing in about a month. ... VIX close of 18.47 means that a month from now, the options market is predicting the S&P will be either 5.3% higher or 5.3% lower [sic, the latter being more likely] ... Such a downward move will bring the S&P more in line with the broader indexes which are already showing the market in a bearish stance.” (from <https://www.forbes.com/sites/brendancoffey/2019/08/18/the-vix-projects-the-sp-going-bearish/#19ea44c769df>; Aug 18, 2019)

DRAFT

Regression Analyses

Real & Nominal GDP Growth

Real GDP Growth

Residuals:

Min	1Q	Median	3Q	Max
-3.2628	-0.8797	0.0492	0.9911	2.8643

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	2.3742404	1.2288284	1.932	0.0608 .
comm_re_index	-0.0006618	0.0054943	-0.120	0.9048

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 1.547 on 38 degrees of freedom

Multiple R-squared: 0.0003817, Adjusted R-squared: -0.02592

F-statistic: 0.01451 on 1 and 38 DF, p-value: 0.9048

Nominal GDP Growth

Residuals:

Min	1Q	Median	3Q	Max
-3.3979	-1.4576	0.2285	1.5243	3.8739

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	3.3500	1.1710	2.861	0.00683 **
y7tbill	0.2582	0.5301	0.487	0.62893

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 1.95 on 38 degrees of freedom

Multiple R-squared: 0.006207, Adjusted R-squared: -0.01995

F-statistic: 0.2373 on 1 and 38 DF, p-value: 0.6289

Real & Nominal Disposable Income Growth

Real Disposable Income Growth

Residuals:

Min	1Q	Median	3Q	Max
-14.5545	-1.1119	-0.1326	1.5468	10.9656

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	-0.139	4.086	-0.034	0.97304
moodys_aaa	6.056	2.101	2.883	0.00652 **
moodys_baa	-4.382	1.420	-3.086	0.00383 **

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 3.594 on 37 degrees of freedom

Multiple R-squared: 0.2062, Adjusted R-squared: 0.1633

F-statistic: 4.805 on 2 and 37 DF, p-value: 0.01396

Nominal Disposable Income Growth

Residuals:

Min	1Q	Median	3Q	Max
-17.2396	-0.9786	0.0702	1.5049	10.5431

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	1.1095	4.6668	0.238	0.813
moodys_aaa	0.6451	1.0954	0.589	0.559

Residual standard error: 4.124 on 38 degrees of freedom

Multiple R-squared: 0.009045, Adjusted R-squared: -0.01703

F-statistic: 0.3468 on 1 and 38 DF, p-value: 0.5594

CPI Inflation Rate

Residuals:

Min	1Q	Median	3Q	Max
-0.9849	-0.2388	0.0315	0.2714	0.7018

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	-0.11564	0.12441	-0.929	0.359
real_disposable_income_growth	-1.26744	0.06219	-20.379	<2e-16 ***
nominal_disposable_income_growth	1.22989	0.05991	20.529	<2e-16 ***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.4238 on 37 degrees of freedom

Multiple R-squared: 0.9203, Adjusted R-squared: 0.916

F-statistic: 213.5 on 2 and 37 DF, p-value: < 2.2e-16

Unemployment Rate

Residuals:

Min	1Q	Median	3Q	Max
-0.273040	-0.058865	0.002302	0.047315	0.231584

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)	
(Intercept)	2.476e+01	1.634e+00	15.155	4.16e-14	***
moodys_aaa	3.426e-01	1.029e-01	3.328	0.002712	**
bbb	-2.046e-01	7.628e-02	-2.683	0.012763	*
y30mort	-8.029e-01	2.758e-01	-2.911	0.007472	**
prime_rate	-1.279e+00	4.059e-01	-3.150	0.004199	**
dow_jones_total	-2.232e-04	2.502e-05	-8.921	3.05e-09	***
national_home_price_index	-4.963e-02	5.325e-03	-9.320	1.30e-09	***
vix	-2.191e-02	3.502e-03	-6.257	1.52e-06	***
y30tbill	-1.876e+00	6.375e-01	-2.943	0.006926	**
y20tbill	1.690e+00	8.092e-01	2.089	0.047059	*
y7tbill	1.645e+00	7.113e-01	2.312	0.029310	*
m3tbill	2.393e+00	7.354e-01	3.254	0.003255	**
m6tbill	-3.536e+00	1.334e+00	-2.651	0.013721	*
y3tbill	-1.659e+00	5.783e-01	-2.869	0.008254	**
y1tbill	3.824e+00	8.993e-01	4.252	0.000259	***

 Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.1197 on 25 degrees of freedom

Multiple R-squared: 0.998, Adjusted R-squared: 0.9968

F-statistic: 872.2 on 14 and 25 DF, p-value: < 2.2e-16

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

1-month Treasury Yield

Residuals:

Min	1Q	Median	3Q	Max
-0.091589	-0.030665	-0.001071	0.020850	0.140850

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)	
(Intercept)	0.17819	0.07004	2.544	0.01552	*
moodys_aaa	0.07720	0.03352	2.303	0.02733	*
moodys_baa	-0.16348	0.02931	-5.578	2.78e-06	***
bbb	0.07796	0.01925	4.050	0.00027	***
m3tbill	1.05341	0.01428	73.786	< 2e-16	***

 Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.0571 on 35 degrees of freedom

Multiple R-squared: 0.9945, Adjusted R-squared: 0.9938

F-statistic: 1572 on 4 and 35 DF, p-value: < 2.2e-16

MACROECONOMIC FORECASTS, 3Q2019 (DRAFT VERSION)

3-month Treasury Yield

Residuals:

Min	1Q	Median	3Q	Max
-0.124399	-0.036232	-0.002539	0.033767	0.115330

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)	
(Intercept)	1.083e+00	2.428e-01	4.461	9.44e-05	***
sp500	-2.741e-04	6.806e-05	-4.027	0.000325	***
moodys_aaa	2.309e-01	7.125e-02	3.241	0.002783	**
moodys_baa	-2.494e-01	4.863e-02	-5.129	1.37e-05	***
inflation_rate	1.751e-02	8.128e-03	2.155	0.038812	*
vix	-3.616e-03	1.454e-03	-2.487	0.018303	*
y30tbill	-1.247e-01	4.679e-02	-2.666	0.011944	*
y1tbill	1.075e+00	3.247e-02	33.111	< 2e-16	***

 Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.06442 on 32 degrees of freedom
 Multiple R-squared: 0.9937, Adjusted R-squared: 0.9924
 F-statistic: 725.8 on 7 and 32 DF, p-value: < 2.2e-16

6-month Treasury Yield

Residuals:

Min	1Q	Median	3Q	Max
-0.18504	-0.04260	-0.01055	0.04546	0.15959

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)	
(Intercept)	-1.545349	0.899581	-1.718	0.09580	.
moodys_baa	-0.122594	0.037124	-3.302	0.00242	**
unemployment_rate	0.113124	0.055031	2.056	0.04832	*
inflation_rate	0.027003	0.010643	2.537	0.01642	*
bbb	0.086766	0.034134	2.542	0.01624	*
comm_re_index	0.005872	0.002671	2.198	0.03552	*
y10tbill	-0.247820	0.112547	-2.202	0.03524	*
m3tbill	0.898904	0.047298	19.005	< 2e-16	***
y5tbill	0.310980	0.128700	2.416	0.02176	*

 Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.08796 on 31 degrees of freedom
 Multiple R-squared: 0.9898, Adjusted R-squared: 0.9872
 F-statistic: 376 on 8 and 31 DF, p-value: < 2.2e-16

MACROECONOMIC FORECASTS, 3Q2019 (DRAFT VERSION)

1-year Treasury Yield

Residuals:

Min	1Q	Median	3Q	Max
-0.265109	-0.049069	0.002194	0.072959	0.165171

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)	
(Intercept)	-2.5025594	1.1590487	-2.159	0.038692	*
sp500	0.0004810	0.0001144	4.205	0.000206	***
unemployment_rate	0.2036447	0.0630874	3.228	0.002943	**
inflation_rate	0.0258320	0.0113588	2.274	0.030029	*
bbb	0.2190979	0.0433354	5.056	1.83e-05	***
y30mort	-0.6194861	0.1271155	-4.873	3.09e-05	***
comm_re_index	0.0070223	0.0030033	2.338	0.026003	*
m3tbill	0.8564067	0.0468498	18.280	< 2e-16	***
y5tbill	0.3677347	0.0999372	3.680	0.000882	***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1					

Residual standard error: 0.0961 on 31 degrees of freedom
Multiple R-squared: 0.9882, Adjusted R-squared: 0.9851
F-statistic: 323.9 on 8 and 31 DF, p-value: < 2.2e-16

3-year Treasury Yield

Residuals:

Min	1Q	Median	3Q	Max
-0.37252	-0.08446	0.01598	0.08119	0.32779

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)	
(Intercept)	-1.534e+01	1.212e+00	-12.653	3.29e-14	***
unemployment_rate	7.165e-01	8.704e-02	8.231	1.67e-09	***
bbb	3.798e-01	5.461e-02	6.955	5.98e-08	***
dow_jones_total	1.903e-04	3.120e-05	6.101	7.17e-07	***
national_home_price_index	4.196e-02	6.137e-03	6.837	8.40e-08	***
vix	1.039e-02	3.875e-03	2.681	0.0114	*
y30tbill	-2.206e-01	1.008e-01	-2.187	0.0359	*

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1					

Residual standard error: 0.1662 on 33 degrees of freedom
Multiple R-squared: 0.9502, Adjusted R-squared: 0.9412
F-statistic: 105 on 6 and 33 DF, p-value: < 2.2e-16

MACROECONOMIC FORECASTS, 3Q2019 (DRAFT VERSION)

5-year Treasury Yield

Residuals:

	Min	1Q	Median	3Q	Max
	-0.46773	-0.13240	-0.00927	0.16892	0.41432

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)	
(Intercept)	-1.195e+01	2.500e+00	-4.779	3.77e-05	***
sp500	-5.235e-04	2.377e-04	-2.203	0.034929	*
cost_of_funds	-1.879e+00	4.397e-01	-4.274	0.000161	***
unemployment_rate	5.451e-01	1.456e-01	3.744	0.000716	***
dow_jones_total	1.314e-04	4.028e-05	3.262	0.002630	**
national_home_price_index	4.478e-02	1.111e-02	4.029	0.000323	***
y30tbill	3.035e-01	1.198e-01	2.534	0.016373	*
y1tbill	1.568e+00	3.951e-01	3.970	0.000381	***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.224 on 32 degrees of freedom

Multiple R-squared: 0.8862, Adjusted R-squared: 0.8613

F-statistic: 35.58 on 7 and 32 DF, p-value: 2.391e-13

7-year Treasury Yield

Residuals:

	Min	1Q	Median	3Q	Max
	-0.5756	-0.1811	0.0146	0.2318	0.5571

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)	
(Intercept)	-2.6106581	1.2618132	-2.069	0.04646	*
sp500	0.0010826	0.0003522	3.074	0.00422	**
unemployment_rate	0.2815757	0.0898156	3.135	0.00360	**
bbb	0.5463663	0.0966990	5.650	2.71e-06	***
vix	-0.0202380	0.0070859	-2.856	0.00736	**
retail_gasoline	-0.3882401	0.1320001	-2.941	0.00594	**
mltbill	0.3361438	0.1274629	2.637	0.01265	*

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.3345 on 33 degrees of freedom

Multiple R-squared: 0.7148, Adjusted R-squared: 0.663

F-statistic: 13.79 on 6 and 33 DF, p-value: 8.841e-08

MACROECONOMIC FORECASTS, 3Q2019 (DRAFT VERSION)

10-year Treasury Yield

Residuals:

Min	1Q	Median	3Q	Max
-0.52293	-0.13935	0.01027	0.14367	0.61398

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	-1.364e+01	2.903e+00	-4.698	4.48e-05 ***
cost_of_funds	-1.636e+00	5.084e-01	-3.218	0.002889 **
unemployment_rate	7.306e-01	1.691e-01	4.321	0.000134 ***
dow_jones_total	8.130e-05	3.955e-05	2.055	0.047835 *
national_home_price_index	5.055e-02	1.292e-02	3.913	0.000430 ***
y30tbill	4.747e-01	1.398e-01	3.396	0.001797 **
y1tbill	1.140e+00	4.584e-01	2.487	0.018128 *

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.2614 on 33 degrees of freedom
Multiple R-squared: 0.8431, Adjusted R-squared: 0.8145
F-statistic: 29.55 on 6 and 33 DF, p-value: 6.306e-12

20-year Treasury Yield

Residuals:

Min	1Q	Median	3Q	Max
-0.90100	-0.12482	0.08146	0.23834	0.73032

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	3.427713	0.715615	4.790	3.66e-05 ***
cost_of_funds	-4.866259	1.896542	-2.566	0.015179 *
real_disposable_income_growth	-0.125603	0.061653	-2.037	0.049966 *
nominal_disposable_income_growth	0.134463	0.058573	2.296	0.028396 *
unemployment_rate	0.320043	0.052300	6.119	7.69e-07 ***
vix	-0.021615	0.008135	-2.657	0.012196 *
retail_gasoline	-0.640769	0.150930	-4.245	0.000175 ***
mltbill	5.021442	1.777268	2.825	0.008068 **

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.3716 on 32 degrees of freedom
Multiple R-squared: 0.7405, Adjusted R-squared: 0.6838
F-statistic: 13.05 on 7 and 32 DF, p-value: 8.354e-08

MACROECONOMIC FORECASTS, 3Q2019 (DRAFT VERSION)

30-year Treasury Yield

Residuals:

Min	1Q	Median	3Q	Max
-0.4922	-0.1518	0.0244	0.1334	0.5507

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	-4.278476	2.028573	-2.109	0.04216 *
unemployment_rate	0.498885	0.132044	3.778	0.00059 ***
comm_re_index	0.015358	0.005868	2.617	0.01301 *
vix	-0.014768	0.004562	-3.237	0.00264 **
y10tbill	0.489512	0.079996	6.119	5.38e-07 ***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.2317 on 35 degrees of freedom

Multiple R-squared: 0.872, Adjusted R-squared: 0.8573

F-statistic: 59.59 on 4 and 35 DF, p-value: 3.889e-15

30-year Mortgage Rate

Residuals:

Min	1Q	Median	3Q	Max
-0.41552	-0.07906	-0.00618	0.09638	0.55464

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	-5.729e+00	2.030e+00	-2.823	0.008123 **
sp500	-3.950e-04	1.904e-04	-2.075	0.046142 *
cost_of_funds	-1.318e+00	3.539e-01	-3.724	0.000756 ***
unemployment_rate	4.980e-01	1.307e-01	3.811	0.000594 ***
dow_jones_total	1.096e-04	3.201e-05	3.425	0.001703 **
comm_re_index	1.600e-02	5.542e-03	2.886	0.006926 **
y30tbill	4.650e-01	8.889e-02	5.231	1.01e-05 ***
y1tbill	1.144e+00	3.132e-01	3.654	0.000914 ***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.1788 on 32 degrees of freedom

Multiple R-squared: 0.8765, Adjusted R-squared: 0.8495

F-statistic: 32.45 on 7 and 32 DF, p-value: 8.558e-13

Moody's AAA & BAA Rates

Moody's AAA

Residuals:

	Min	1Q	Median	3Q	Max
	-0.62138	-0.12185	0.03874	0.17643	0.41641

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)	
(Intercept)	1.50924	0.25203	5.988	8.0e-07	***
unemployment_rate	0.09382	0.03512	2.672	0.01138	*
bbb	0.44040	0.06627	6.645	1.1e-07	***
mltbill	2.70564	0.98453	2.748	0.00941	**
m3tbill	-2.50914	0.96941	-2.588	0.01395	*

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.2724 on 35 degrees of freedom

Multiple R-squared: 0.8025, Adjusted R-squared: 0.7799

F-statistic: 35.55 on 4 and 35 DF, p-value: 7.089e-12

Moody's BAA

Residuals:

	Min	1Q	Median	3Q	Max
	-0.300476	-0.075584	-0.000371	0.076195	0.219364

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)	
(Intercept)	6.4759543	0.6066107	10.676	1.47e-11	***
sp500	-0.0012030	0.0001777	-6.769	1.98e-07	***
cost_of_funds	-1.8203587	0.6966437	-2.613	0.014076	*
unemployment_rate	-0.2193788	0.0474366	-4.625	7.19e-05	***
bbb	0.2491079	0.0708355	3.517	0.001459	**
retail_gasoline	-0.2792561	0.0699248	-3.994	0.000407	***
y30tbill	0.7281490	0.1187318	6.133	1.11e-06	***
mltbill	3.8647930	0.6962075	5.551	5.49e-06	***
m3tbill	-2.6634957	0.6209536	-4.289	0.000181	***
y5tbill	-0.3718677	0.1310362	-2.838	0.008205	**
yltbill	0.9298789	0.4192875	2.218	0.034563	*

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.1273 on 29 degrees of freedom

Multiple R-squared: 0.9789, Adjusted R-squared: 0.9716

F-statistic: 134.2 on 10 and 29 DF, p-value: < 2.2e-16

BBB Corporate Yield

Residuals:

	Min	1Q	Median	3Q	Max
	-1.48427	-0.19817	0.02325	0.19823	0.81597

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)	
(Intercept)	-8.93259	4.34506	-2.056	0.047320	*
cost_of_funds	-2.87704	0.72184	-3.986	0.000325	***
unemployment_rate	0.89614	0.24527	3.654	0.000839	***
comm_re_index	0.03376	0.01285	2.627	0.012692	*
yltbill	2.28462	0.66051	3.459	0.001444	**

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.4205 on 35 degrees of freedom

Multiple R-squared: 0.7163, Adjusted R-squared: 0.6839

F-statistic: 22.1 on 4 and 35 DF, p-value: 3.596e-09

Prime Rate

Residuals:

	Min	1Q	Median	3Q	Max
	-0.126208	-0.036931	0.003454	0.045432	0.134166

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)	
(Intercept)	3.40577	0.06241	54.575	< 2e-16	***
cost_of_funds	0.61178	0.10113	6.049	5.97e-07	***
moodys_baa	-0.04726	0.01156	-4.088	0.000233	***
yltbill	0.35735	0.08528	4.190	0.000172	***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.05686 on 36 degrees of freedom

Multiple R-squared: 0.9934, Adjusted R-squared: 0.9929

F-statistic: 1811 on 3 and 36 DF, p-value: < 2.2e-16

US Average Retail Gasoline Price**Residuals:**

	Min	1Q	Median	3Q	Max
	-0.38950	-0.08194	-0.00930	0.11510	0.33648

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)	
(Intercept)	25.386262	3.100339	8.188	4.99e-09	***
moodys_aaa	-0.275747	0.118645	-2.324	0.02733	*
unemployment_rate	-0.929436	0.152259	-6.104	1.20e-06	***
bbb	-0.449208	0.095507	-4.703	5.78e-05	***
national_home_price_index	-0.057956	0.010647	-5.444	7.40e-06	***
comm_re_index	-0.019829	0.006252	-3.172	0.00357	**
y30tbill	-4.829339	0.887779	-5.440	7.48e-06	***
y20tbill	5.904191	0.923681	6.392	5.47e-07	***
mltbill	-2.755452	0.868839	-3.171	0.00357	**
m6tbill	4.211332	0.924379	4.556	8.70e-05	***
y3tbill	-2.028108	0.286660	-7.075	8.78e-08	***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.182 on 29 degrees of freedom
 Multiple R-squared: 0.9138, Adjusted R-squared: 0.8841
 F-statistic: 30.74 on 10 and 29 DF, p-value: 9.063e-13

Primary Credit Rate & Cost of Funds**Primary Credit Rate****Residuals:**

	Min	1Q	Median	3Q	Max
	-0.115392	-0.034589	-0.007339	0.024805	0.135636

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)	
(Intercept)	-0.1384806	0.1917129	-0.722	0.475029	
sp500	-0.0003720	0.0001381	-2.694	0.010876	*
moodys_baa	-0.1783121	0.0535823	-3.328	0.002112	**
y30mort	0.1756086	0.0532918	3.295	0.002306	**
comm_re_index	0.0050949	0.0012660	4.024	0.000302	***
m3tbill	0.9413265	0.0273737	34.388	< 2e-16	***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.06128 on 34 degrees of freedom
 Multiple R-squared: 0.9935, Adjusted R-squared: 0.9925
 F-statistic: 1032 on 5 and 34 DF, p-value: < 2.2e-16

MACROECONOMIC FORECASTS, 3Q2019 (DRAFT VERSION)

Cost of Funds

Residuals:

	Min	1Q	Median	3Q	Max
	-0.09266	-0.05197	-0.01074	0.03784	0.16042

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	0.53685	0.07211	7.444	1.03e-08 ***
moodys_baa	-0.06974	0.01863	-3.744	0.000650 ***
y20tbill	-0.25801	0.06362	-4.056	0.000266 ***
y10tbill	0.29106	0.06780	4.293	0.000133 ***
m3tbill	0.94077	0.02291	41.059	< 2e-16 ***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.06376 on 35 degrees of freedom

Multiple R-squared: 0.9927, Adjusted R-squared: 0.9919

F-statistic: 1191 on 4 and 35 DF, p-value: < 2.2e-16

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

Dow Jones Total Stock Market Index

Residuals:

	Min	1Q	Median	3Q	Max
	-1804.96	-579.53	10.51	565.08	2033.85

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	43197.5	2763.4	15.632	< 2e-16 ***
unemployment_rate	-2414.7	167.8	-14.390	5.04e-16 ***
y30mort	-3810.4	1276.5	-2.985	0.00522 **
m3tbill	7768.8	975.4	7.965	2.80e-09 ***
y5tbill	13531.3	2385.3	5.673	2.29e-06 ***
y3tbill	-15473.2	2407.3	-6.428	2.41e-07 ***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 862.8 on 34 degrees of freedom

Multiple R-squared: 0.9816, Adjusted R-squared: 0.9789

F-statistic: 362.9 on 5 and 34 DF, p-value: < 2.2e-16

MACROECONOMIC FORECASTS, 3Q2019 (DRAFT VERSION)

S&P 500

Residuals:

	Min	1Q	Median	3Q	Max
	-158.259	-54.217	7.509	47.753	198.660

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)	
(Intercept)	2725.879	316.632	8.609	1.76e-09	***
moodys_aaa	-258.836	68.623	-3.772	0.000741	***
real_disposable_income_growth	41.215	16.646	2.476	0.019373	*
nominal_disposable_income_growth	-42.307	16.080	-2.631	0.013491	*
vix	-7.907	2.086	-3.791	0.000704	***
retail_gasoline	140.426	42.055	3.339	0.002320	**
y30tbill	1058.957	330.681	3.202	0.003299	**
y20tbill	-2596.210	327.250	-7.933	9.49e-09	***
y7tbill	2923.395	284.567	10.273	3.57e-11	***
y3tbill	-2173.120	335.536	-6.477	4.35e-07	***
y1tbill	1179.532	160.691	7.340	4.37e-08	***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 94.29 on 29 degrees of freedom
Multiple R-squared: 0.9794, Adjusted R-squared: 0.9723
F-statistic: 138 on 10 and 29 DF, p-value: < 2.2e-16

House and Commercial Real Estate Price Indexes

National Home Price Index

Residuals:

	Min	1Q	Median	3Q	Max
	-7.4341	-1.3982	-0.1531	1.6875	5.6339

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)	
(Intercept)	216.5500	3.4303	63.129	< 2e-16	***
cost_of_funds	32.3924	13.1233	2.468	0.018762	*
unemployment_rate	-10.4363	0.3970	-26.285	< 2e-16	***
y10tbill	4.2832	0.9318	4.597	5.69e-05	***
m1tbill	-52.0589	12.6761	-4.107	0.000238	***
m3tbill	27.7479	9.9885	2.778	0.008839	**

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 2.793 on 34 degrees of freedom
Multiple R-squared: 0.9896, Adjusted R-squared: 0.988
F-statistic: 644.2 on 5 and 34 DF, p-value: < 2.2e-16

MACROECONOMIC FORECASTS, 3Q2019 (DRAFT VERSION)

Commercial Real Estate Price Index

Residuals:

Min	1Q	Median	3Q	Max
-8.4194	-3.0150	-0.5278	3.7316	12.7359

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)	
(Intercept)	321.4377	9.3910	34.228	< 2e-16	***
cost_of_funds	78.0142	21.4959	3.629	0.000924	***
unemployment_rate	-18.7161	0.7019	-26.666	< 2e-16	***
bbb	-5.5581	1.5598	-3.563	0.001110	**
y30mort	9.8980	3.2250	3.069	0.004198	**
mltbill	-67.5707	20.5405	-3.290	0.002340	**

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 4.843 on 34 degrees of freedom
Multiple R-squared: 0.9905, Adjusted R-squared: 0.9891
F-statistic: 711.6 on 5 and 34 DF, p-value: < 2.2e-16

Market Volatility Index

Residuals:

Min	1Q	Median	3Q	Max
-9.5395	-4.9744	-0.3183	2.5252	19.7499

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)	
(Intercept)	8.112	4.679	1.734	0.091762	.
y7tbill	72.955	16.343	4.464	8e-05	***
m3tbill	-27.045	7.647	-3.537	0.001165	**
y5tbill	-136.074	32.871	-4.140	0.000208	***
y3tbill	90.087	23.117	3.897	0.000420	***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 6.921 on 35 degrees of freedom
Multiple R-squared: 0.4624, Adjusted R-squared: 0.4009
F-statistic: 7.525 on 4 and 35 DF, p-value: 0.0001747

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 “2019 Supervisory Scenarios for Annual Stress Tests Required under the Dodd-Frank Act Stress Testing Rules and the Capital Plan Rule” (found at <https://www.federalreserve.gov/newsevents/pressreleases/files/bcreg20190213a1.pdf>) are listed. Please note that shaded attributes are not discussed within this report.

Attribute	Referenced Source ²¹
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

²¹ Per <https://www.federalreserve.gov/newsevents/pressreleases/files/bcreg20190213a1.pdf>

MACROECONOMIC FORECASTS, 3Q2019 (DRAFT VERSION)

BBB corporate yield	Merrill Lynch 10-year BBB corporate bond yield, Z.1 Release (Financial Accounts of the United States), Federal Reserve Board (series FL073163013.Q). ²²
Mortgage rate	Quarterly average of weekly series for the interest rate of a conventional, conforming, 30-year fixed-rate mortgage, obtained from the Primary Mortgage Market Survey of the Federal Home Loan Mortgage Corporation.
Prime rate	Quarterly average of monthly series, H.15 Release, Selected Interest Rates, Federal Reserve Board (series RIFSPBLP_N.M).
Dow Jones Total Stock Market Index (end-of-qtr value)	Dow-Jones
House Price Index	Price Index for Owner-Occupied Real Estate, CoreLogic National, Z.1 Release (Financial Accounts of the United States), Federal Reserve Board (series FL075035243.Q).
Commercial Real Estate Price Index	Commercial Real Estate Price Index, Z.1 Release (Financial Accounts of the United States), Federal Reserve Board (series FL075035503.Q divided by 1000).
Market Volatility Index (VIX)	VIX converted to quarterly frequency using the maximum close-of-day value in any quarter, Chicago Board Options Exchange.
Euro Area Real GDP Growth	Percent change in real gross domestic product at an annualized rate, staff calculations based on Statistical Office of the European Communities via Haver, extended back using ECB Area Wide Model dataset (ECB Working Paper series no. 42).
Euro Area Inflation	Percent change in the quarterly average of the harmonized index of consumer prices 16 Federal Reserve Supervisory Scenarios at an annualized rate, staff calculations based on Statistical Office of the European Communities via Haver.
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.

²² The Merrill Lynch 10-year BBB corporate bond rate is being discontinued from future Z.1 releases as of April 30, 2019 due to licensing restrictions.

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

The above dataset from the Federal Reserve can be downloaded manually or automatically. Manual downloads are available at <https://www.federalreserve.gov/supervisionreg/ccar-2019.htm> (shown below, as of June 2019) by clicking the link marked “Historical data (ZIP)”. Alternatively, downloading the file at <https://www.federalreserve.gov/supervisionreg/files/2019-historical-data.zip> using HTTP client software will also download the official dataset.

Decompressing the zip-file will provide two files in CVS format: one containing US domestic data elements on a quarterly basis, and the other containing international data elements on a quarterly basis²³.

²³ Again, due to the requirements of this client, international data elements are not being discussed in this document.

Since the CCAR dataset is only released annually (through 4Q2018 as of this writing), and Capalitytics provides quarterly updates to its forecasts, the CCAR dataset is supplemented by the data sources shown below on a quarterly basis. All datasets discussed herein are supplemented with data through (including) 2Q2019.

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	CoreLogic, index level (end-of-quarter)
Commercial Real Estate Price Index	From the Financial Accounts of the United States, Federal Reserve Board (Z.1 release); the series corresponds to the data for price indexes: Commercial Real Estate Price Index (series FL075035503.Q, divided by 1000). Series FL075035503.Q is also available at https://www.quandl.com/data/FED/FL075035503_Q-Interest-rates-and-price-indexes-commercial-real-estate-price-index-Quarterly-Levels-NSA
Market Volatility Index (VIX)	Federal Reserve Economic Research website (https://fred.stlouisfed.org/series/VIXCLS), with “Quarterly” frequency and “Average” aggregation method
Euro Area Real GDP Growth	Quarterly series for “European Union GDP Annual Growth Rate” per tradingeconomics.com
Euro Area Inflation	Quarterly average of monthly series for “European Union Inflation Rate” per tradingeconomics.com
Euro Area Bilateral Dollar Exchange Rate (USD/Euro)	End-of-quarter rates from the H.10 Release, Foreign Exchange Rates, Federal Reserve Board.
Developing Asia Real GDP Growth	The nominal GDP-weighted aggregate of the Real GDP growth for China, India, South Korea, Hong Kong Special Administrative Region, and Taiwan per OECD
Developing Asia Inflation	The nominal GDP-weighted aggregate of the inflation rate for China, India, South Korea, Hong Kong Special Administrative Region, and Taiwan per OECD
Developing Asia bilateral dollar exchange rate (F/USD, index)	End-of-quarter rates from the H.10 Release, Foreign Exchange Rates, Federal Reserve Board.
Japan Real GDP Growth	Quarterly average of monthly series for “Japan GDP Growth Rate” per tradingeconomics.com
Japan Inflation	Quarterly average of monthly series for “Japan Inflation Rate” per tradingeconomics.com
Japan Bilateral Dollar Exchange Rate (Yen/USD)	End-of-quarter rates from the H.10 Release, Foreign Exchange Rates, Federal Reserve Board.
UK Real GDP Growth	Quarterly average of monthly series for “United Kingdom GDP Growth Rate” per tradingeconomics.com

UK Inflation	Quarterly average of monthly series for “United Kingdom Inflation Rate” per tradingeconomics.com
UK Bilateral Dollar Exchange Rate (USD/Pound)	End-of-quarter rates from the H.10 Release, Foreign Exchange Rates, Federal Reserve Board.

While all data that is required for the Annual Stress Tests is available from <https://www.federalreserve.gov/supervisoryreg/files/2019-historical-data.zip>, Capitalytics provides 13 additional metrics per the information in the following table. These values are available from the point at which they are collected (which varies from metric to metric) through (and including) 2Q2019.

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

Appendix B: Methodologies

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

Section I: General Forecasting Methodology

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

For each metric, four distinct forecasts are produced.

1. The first forecast uses the full quarterly history of the metric as an input to an additive exponential smoothing representation. The process that is executed is that provided by R's²⁴ “forecast” package²⁵; specifically, the “ets” function (see p.39 of <https://cran.r-project.org/web/packages/forecast/forecast.pdf>)²⁶ is designed to automatically determine the best fitting representation out of the “Generic ‘ETS’ Methodology” (discussed later in this section), including optimal parameters thereto, given a sequence of values. In our work, we have restricted our study to only “additive” forms (i.e., we set “additive.only=TRUE” in our calls), and our optimization criteria is set to the mean of absolute residuals (i.e., “opt.crit=mae”). Therefore, calls to generate our estimates through this procedure look something like the following command, where “s” is an appropriately populated array, vector, time series, or similar object.

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

The results of this call are shown above each dataset, including the representation type returned (as described later this section), the initial values that are used by the software, the optimal smoothing parameters estimated, and the $n+1^{\text{st}}$ forecasted value given the first n values of the metric's sequence (the “fitted” values)²⁷, and the determined parameters. While fitting forecasts to previous values,

²⁴ As of this writing, v.3.6.1 of the “R” language is available at <https://cran.r-project.org/>.

²⁵ As of this writing, v.8.8 of the forecast package is available at <https://CRAN.R-project.org/package=forecast>.

²⁶ 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.

²⁷ 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

- “forecast error” is defined as being actual values less forecasted values,
- “% error” is defined as forecast error divided by actual value, and
- “score” is defined as mean absolute forecast error over an appropriate range (generally the duration of the collected past values, less the first two to four years of collected values)²⁸.

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 -186.360685 -12.520593 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:

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.

²⁸ It bears noting that a lower value for the “score” indicates better accuracy of an algorithm.

- the slope of the “best fitting” line (based on minimizing the total absolute error) using the immediately preceding 2 years of values²⁹;
- the same slope using the immediately preceding 4 years of values; and,
- the same slope using the immediately preceding 8 years of values.

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

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

Obviously, this technique requires at least eight years of data to pass before being able to produce any data. However, in order to err on the side of conservatism, we generally allow a sequence to “mature” for two to four years before believing that its initial transience has become less significant and its results are trustworthy. If a dataset does not have enough data to complete one of these analyses, the analysis is dropped. In other words, if the metric does not have +/-11 years of data available, the 8-year slopes cannot be reliably calculated, and the average slope is only based on the 2- & 4-year slopes³⁰.

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

²⁹ 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.

³⁰ See the SP500 metric’s analysis.

analyses for periods starting no more than 100, 80, 60, and 40 quarters prior to the forecasted period. However, we have found the results of all of these analyses are more reactionary and less coherent than that already presented within this report.

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

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

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

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

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

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

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

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

Capitolytics 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 40 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			
	N	Seasonal A	M
N	$\hat{y}_{t+h t} = \ell_t$	$\hat{y}_{t+h t} = \ell_t + s_{t-m+h_m^+}$	$\hat{y}_{t+h t} = \ell_t s_{t-m+h_m^+}$
	$\ell_t = \alpha y_t + (1 - \alpha)\ell_{t-1}$	$\ell_t = \alpha(y_t - s_{t-m}) + (1 - \alpha)\ell_{t-1}$ $s_t = \gamma(y_t - \ell_{t-1}) + (1 - \gamma)s_{t-m}$	$\ell_t = \alpha(y_t/s_{t-m}) + (1 - \alpha)\ell_{t-1}$ $s_t = \gamma(y_t/\ell_{t-1}) + (1 - \gamma)s_{t-m}$
A	$\hat{y}_{t+h t} = \ell_t + hb_t$	$\hat{y}_{t+h t} = \ell_t + hb_t + s_{t-m+h_m^+}$	$\hat{y}_{t+h t} = (\ell_t + hb_t)s_{t-m+h_m^+}$
	$\ell_t = \alpha y_t + (1 - \alpha)(\ell_{t-1} + b_{t-1})$ $b_t = \beta^*(\ell_t - \ell_{t-1}) + (1 - \beta^*)b_{t-1}$	$\ell_t = \alpha(y_t - s_{t-m}) + (1 - \alpha)(\ell_{t-1} + b_{t-1})$ $b_t = \beta^*(\ell_t - \ell_{t-1}) + (1 - \beta^*)b_{t-1}$ $s_t = \gamma(y_t - \ell_{t-1} - b_{t-1}) + (1 - \gamma)s_{t-m}$	$\ell_t = \alpha(y_t/s_{t-m}) + (1 - \alpha)(\ell_{t-1} + b_{t-1})$ $b_t = \beta^*(\ell_t - \ell_{t-1}) + (1 - \beta^*)b_{t-1}$ $s_t = \gamma(y_t/(\ell_{t-1} + b_{t-1})) + (1 - \gamma)s_{t-m}$
A _d	$\hat{y}_{t+h t} = \ell_t + \phi_h b_t$	$\hat{y}_{t+h t} = \ell_t + \phi_h b_t + s_{t-m+h_m^+}$	$\hat{y}_{t+h t} = (\ell_t + \phi_h b_t)s_{t-m+h_m^+}$
	$\ell_t = \alpha y_t + (1 - \alpha)(\ell_{t-1} + \phi b_{t-1})$ $b_t = \beta^*(\ell_t - \ell_{t-1}) + (1 - \beta^*)\phi b_{t-1}$	$\ell_t = \alpha(y_t - s_{t-m}) + (1 - \alpha)(\ell_{t-1} + \phi b_{t-1})$ $b_t = \beta^*(\ell_t - \ell_{t-1}) + (1 - \beta^*)\phi b_{t-1}$ $s_t = \gamma(y_t - \ell_{t-1} - \phi b_{t-1}) + (1 - \gamma)s_{t-m}$	$\ell_t = \alpha(y_t/s_{t-m}) + (1 - \alpha)(\ell_{t-1} + \phi b_{t-1})$ $b_t = \beta^*(\ell_t - \ell_{t-1}) + (1 - \beta^*)\phi b_{t-1}$ $s_t = \gamma(y_t/(\ell_{t-1} + \phi b_{t-1})) + (1 - \gamma)s_{t-m}$
M	$\hat{y}_{t+h t} = \ell_t b_t^h$	$\hat{y}_{t+h t} = \ell_t b_t^h + s_{t-m+h_m^+}$	$\hat{y}_{t+h t} = \ell_t b_t^h s_{t-m+h_m^+}$
	$\ell_t = \alpha y_t + (1 - \alpha)\ell_{t-1}b_{t-1}$ $b_t = \beta^*(\ell_t/\ell_{t-1}) + (1 - \beta^*)b_{t-1}$	$\ell_t = \alpha(y_t - s_{t-m}) + (1 - \alpha)\ell_{t-1}b_{t-1}$ $b_t = \beta^*(\ell_t/\ell_{t-1}) + (1 - \beta^*)b_{t-1}$ $s_t = \gamma(y_t - \ell_{t-1}b_{t-1}) + (1 - \gamma)s_{t-m}$	$\ell_t = \alpha(y_t/s_{t-m}) + (1 - \alpha)\ell_{t-1}b_{t-1}$ $b_t = \beta^*(\ell_t/\ell_{t-1}) + (1 - \beta^*)b_{t-1}$ $s_t = \gamma(y_t/(\ell_{t-1}b_{t-1})) + (1 - \gamma)s_{t-m}$
M _d	$\hat{y}_{t+h t} = \ell_t b_t^{\phi_h}$	$\hat{y}_{t+h t} = \ell_t b_t^{\phi_h} + s_{t-m+h_m^+}$	$\hat{y}_{t+h t} = \ell_t b_t^{\phi_h} s_{t-m+h_m^+}$
	$\ell_t = \alpha y_t + (1 - \alpha)\ell_{t-1}b_{t-1}^{\phi}$ $b_t = \beta^*(\ell_t/\ell_{t-1}) + (1 - \beta^*)b_{t-1}^{\phi}$	$\ell_t = \alpha(y_t - s_{t-m}) + (1 - \alpha)\ell_{t-1}b_{t-1}^{\phi}$ $b_t = \beta^*(\ell_t/\ell_{t-1}) + (1 - \beta^*)b_{t-1}^{\phi}$ $s_t = \gamma(y_t - \ell_{t-1}b_{t-1}^{\phi}) + (1 - \gamma)s_{t-m}$	$\ell_t = \alpha(y_t/s_{t-m}) + (1 - \alpha)\ell_{t-1}b_{t-1}^{\phi}$ $b_t = \beta^*(\ell_t/\ell_{t-1}) + (1 - \beta^*)b_{t-1}^{\phi}$ $s_t = \gamma(y_t/(\ell_{t-1}b_{t-1}^{\phi})) + (1 - \gamma)s_{t-m}$

Appendix C: Variable Correlations

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

Variable 1	Variable 2	Correlation
S&P 500 Stock Price Index	Cost of Funds	0.737168
S&P 500 Stock Price Index	Unemployment Rate	0.951765
S&P 500 Stock Price Index	BBB Corporate Yield	0.70358
S&P 500 Stock Price Index	Prime Rate	-0.751538
S&P 500 Stock Price Index	Dow Jones Total Stock Market Index	-0.943084
S&P 500 Stock Price Index	House Price Index	-0.927656
S&P 500 Stock Price Index	Commercial Real Estate Price Index	-0.950307
S&P 500 Stock Price Index	30-year Treasury yield	-0.657606
S&P 500 Stock Price Index	1-month Treasury yield	0.718515
S&P 500 Stock Price Index	3-month Treasury yield	-0.724057
S&P 500 Stock Price Index	6-month Treasury yield	0.728232
S&P 500 Stock Price Index	1-year Treasury yield	0.720723
Primary Credit	Mortgage Rate	-0.69741
Primary Credit	Prime Rate	-0.724931
Primary Credit	House Price Index	0.611851
Primary Credit	Commercial Real Estate Price Index	0.674828
Primary Credit	US Average Retail Gasoline Price	-0.628575
Primary Credit	20-year Treasury yield	0.79886
Primary Credit	10-year Treasury yield	-0.721457
Primary Credit	1-month Treasury yield	0.992903
Primary Credit	7-year Treasury yield	0.896113
Primary Credit	3-month Treasury yield	-0.730154
Primary Credit	5-year Treasury yield	-0.755525
Primary Credit	6-month Treasury yield	0.993992
Primary Credit	3-year Treasury yield	0.955794
Primary Credit	1-year Treasury yield	0.987376
Unemployment Rate	30-year Treasury yield	-0.602055
BBB Corporate Yield	US Average Retail Gasoline Price	0.670796
BBB Corporate Yield	30-year Treasury yield	-0.652325
BBB Corporate Yield	20-year Treasury yield	-0.801479
BBB Corporate Yield	7-year Treasury yield	-0.725794
BBB Corporate Yield	3-year Treasury yield	-0.643297
Mortgage Rate	US Average Retail Gasoline Price	0.787332
Mortgage Rate	20-year Treasury yield	-0.886414
Mortgage Rate	7-year Treasury yield	-0.846802
Mortgage Rate	6-month Treasury yield	-0.714008
Mortgage Rate	3-year Treasury yield	-0.793565
Mortgage Rate	1-year Treasury yield	-0.731961
Prime Rate	US Average Retail Gasoline Price	0.692341
Prime Rate	20-year Treasury yield	-0.728785
Prime Rate	7-year Treasury yield	-0.743624
Prime Rate	6-month Treasury yield	-0.745749
Prime Rate	3-year Treasury yield	-0.76855
Prime Rate	1-year Treasury yield	-0.75471

MACROECONOMIC FORECASTS, 3Q2019 (DRAFT VERSION)

Dow Jones Total Stock Market Index	US Average Retail Gasoline Price	-0.609435
Dow Jones Total Stock Market Index	30-year Treasury yield	0.893084
Dow Jones Total Stock Market Index	20-year Treasury yield	0.828685
Dow Jones Total Stock Market Index	7-year Treasury yield	0.823954
Dow Jones Total Stock Market Index	6-month Treasury yield	0.611316
Dow Jones Total Stock Market Index	3-year Treasury yield	0.72185
Dow Jones Total Stock Market Index	1-year Treasury yield	0.630497
House Price Index	30-year Treasury yield	0.650143
House Price Index	20-year Treasury yield	0.842819
House Price Index	7-year Treasury yield	0.803109
House Price Index	6-month Treasury yield	0.623845
House Price Index	3-year Treasury yield	0.721836
House Price Index	1-year Treasury yield	0.64033
Commercial Real Estate Price Index	US Average Retail Gasoline Price	-0.677783
Commercial Real Estate Price Index	30-year Treasury yield	0.715922
Commercial Real Estate Price Index	20-year Treasury yield	0.884151
Commercial Real Estate Price Index	7-year Treasury yield	0.864427
Commercial Real Estate Price Index	6-month Treasury yield	0.685986
Commercial Real Estate Price Index	3-year Treasury yield	0.783931
Commercial Real Estate Price Index	1-year Treasury yield	0.701188
US Average Retail Gasoline Price	20-year Treasury yield	-0.756573
US Average Retail Gasoline Price	10-year Treasury yield	0.770354
US Average Retail Gasoline Price	7-year Treasury yield	-0.78374
US Average Retail Gasoline Price	3-month Treasury yield	0.702595
US Average Retail Gasoline Price	5-year Treasury yield	0.75937
US Average Retail Gasoline Price	6-month Treasury yield	-0.651812
US Average Retail Gasoline Price	3-year Treasury yield	-0.746017
US Average Retail Gasoline Price	1-year Treasury yield	-0.675375
30-year Treasury yield	20-year Treasury yield	0.989045
30-year Treasury yield	7-year Treasury yield	0.842654
30-year Treasury yield	3-year Treasury yield	0.627642
20-year Treasury yield	10-year Treasury yield	-0.885116
20-year Treasury yield	7-year Treasury yield	0.969392
20-year Treasury yield	3-month Treasury yield	-0.726459
20-year Treasury yield	5-year Treasury yield	-0.830924
20-year Treasury yield	6-month Treasury yield	0.817722
20-year Treasury yield	3-year Treasury yield	0.903405
20-year Treasury yield	1-year Treasury yield	0.839657
10-year Treasury yield	7-year Treasury yield	-0.861219
10-year Treasury yield	6-month Treasury yield	-0.735608
10-year Treasury yield	3-year Treasury yield	-0.81031
10-year Treasury yield	1-year Treasury yield	-0.75192
1-month Treasury yield	7-year Treasury yield	0.793126
1-month Treasury yield	6-month Treasury yield	0.995637
1-month Treasury yield	3-year Treasury yield	0.937796
1-month Treasury yield	1-year Treasury yield	0.989624
7-year Treasury yield	3-month Treasury yield	-0.755105
7-year Treasury yield	5-year Treasury yield	-0.842955
7-year Treasury yield	6-month Treasury yield	0.915658
7-year Treasury yield	3-year Treasury yield	0.978236
7-year Treasury yield	1-year Treasury yield	0.930683
3-month Treasury yield	6-month Treasury yield	-0.747115
3-month Treasury yield	3-year Treasury yield	-0.772039

MACROECONOMIC FORECASTS, 3Q2019 (DRAFT VERSION)

3-month Treasury yield	1-year Treasury yield	-0.755795
5-year Treasury yield	6-month Treasury yield	-0.768242
5-year Treasury yield	3-year Treasury yield	-0.82072
5-year Treasury yield	1-year Treasury yield	-0.781325
6-month Treasury yield	3-year Treasury yield	0.974027
6-month Treasury yield	1-year Treasury yield	0.998089
3-year Treasury yield	1-year Treasury yield	0.983905

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