WHITE PAPER

Interest Rates, Inflation, and Economic Growth

MORRISON STREET RESEARCH

NOVEMBER 2021

Table of Contents

(with approximate times to read each section)

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OVERVIEW - (Approx. 5 Minutes to Read)

Interest Rates, Inflation, and Economic Growth

Introduction

This white paper has been produced at the request of investors who want to further understand inflation and interest rates, and their relationships to growth in the economy. The objective of this paper is to provide a framework for evaluating how these factors can be incorporated to derive forecast values at various stages of economic development and at different points in a business cycle. We will also examine the influence the Federal Reserve and Congress exert via officials' policy responses to economic cycles. As always, please let us know if you have any questions or feedback.

Backdrop

In response to the economic downturn caused by Covid-19, Congress has thus far allocated $5.65 trillion of fiscal stimulus relief, and during the same period, the Fed's balance sheet has expanded from $4.2 trillion to $8.5 trillion. That's almost $10 trillion in combined fiscal and monetary stimulus over just 18 months. The headline unemployment rate is now 4.8% and inflation is increasing by the month. True unemployment is obviously much higher, but employers are having difficulty filling mission-critical jobs. Supply-chain problems are disrupting trade and pushing costs. Meanwhile, Congress continues to debate two bills that would provide $1.2 trillion for infrastructure (non-traditionally defined), and another $1.75 trillion for a broad spending package. Asset prices have been fueled by low interest rates, with many indices having doubled in value since their lows in March 2020. The official Fed Funds Rate sits at 0.25% with an effective rate near zero, and the 10-year Treasury currently hovers around 1.6%. There is little precedent for this type of potential spending in an otherwise overheated economy.

Interest Rate Outlook

On November 3, 2021, the Fed announced it will begin tapering by $15 billion per month, meaning the central bank's current monthly purchases of $80 billion of U.S. Treasuries and $40 billion of mortgage-backed securities would run-off by July 2022. At least in the short-run, it's expected that interest rates will gradually climb as the Fed attempts to extricate itself from emergency policy measures, hoping to leave itself room to apply its range of monetary tools to fight a future recession.

We expect the Fed Funds Rate to be raised quickly in 2022, having the primary effect of increasing short-term rates and flattening the yield curve. Due to high amounts of debt in the economy, if longer term rates rise appreciably, they would hit a rate of natural resistance (see: Framework and Analysis), with the 10-year UST capped at 3% to 4% before pushing economy back into recession, forcing the Fed to steer the 10-year UST quickly back below 2%. The next recession should in fact be caused by the effects of these interest rate increases and/or near-term inflation. These pending inflation and interest rate increases are due specifically to the stop-and-start economic effects of Covid-19, and the subsequent overabundance of fiscal and monetary solutions offered up by Congress and the Federal Reserve.

Over the longer-term, interest rates are determined by broader market forces that factor in alternative yield opportunities and naturally account for the amount of public and private leverage embedded in the economy. The market should intuitively evaluate the ability of any borrower (including the U.S. Government) to manage its debt obligations, and to do so in comparison to other potential borrowers. However, in highly leveraged economies with the ongoing ability to raise capital, yields counterintuitively seem to have an inverse relationship to the amount of debt. As discussed later in this white paper, we observe that **for the past four decades, growing debt loads for mature, developed countries have coincided with decreasing interest rates.** It's as though these economies and central banks set interest rates at the amount borrowers can afford. Severe financial reckonings have been limited to resource-rich, yet poorly-managed states (Venezuela, Argentina), or to developed countries with aging economies, overly generous pension liabilities, and undisciplined budget processes--places such as Greece and Italy. Yet rapidly rising rates as the consequence of profligate borrowing and spending haven't yet found their way to the largest, most robust democratic/capitalist economies. As such, we would expect that following an initial phase of rising interest rates next year, the next U.S. recession will be caused in part by the economy's inability to handle such rising interest rates. A future recession will be followed by another round of aggressive fiscal and monetary policy responses. **Viewed through a longer lens, the most likely outcome of another overleveraged credit cycle in the U.S. will simply be lower rates during another sluggish period of low inflation.**

Inflation Outlook

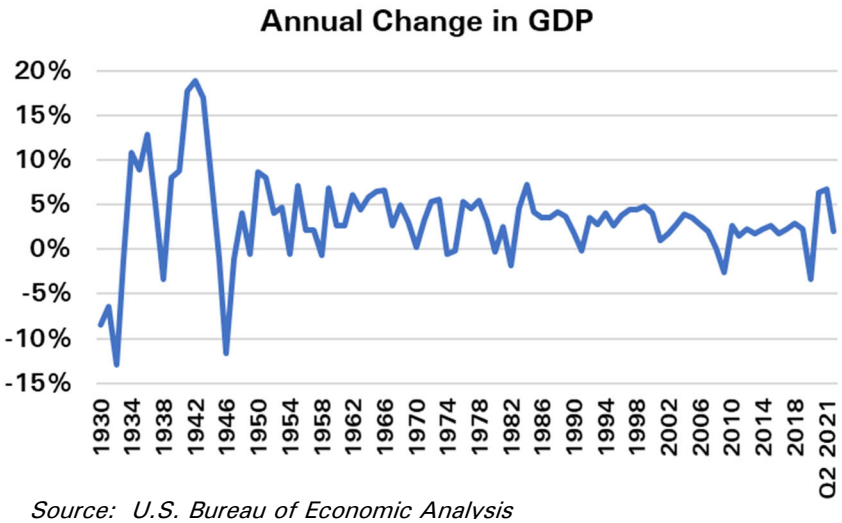
Recent increases in inflation have many asking whether the economy is due for a repeat of the high inflation period of the 1970's/early 1980's. Of course, while there are similarities and parallels between the two periods, today's economy also has its own distinct features and causes of inflation that will create a different experience. Recall that in the 1970's, a combination of poor monetary policy decisions and the scarcity of certain commodities and price spikes caused a runaway upward spiral of costs. Under the leadership of Paul Volcker, the Fed was ultimately forced to target the money supply and raise interest rates until the economy went into recession to kill the inflationary cycle. In the aftermath of the 1970's, the economy was heavily de-regulated and the tax system restructured, leading to an extended period of low inflation and low interest rates.

Today's U.S. inflation has as its cause the sudden Covid-related stop to economies worldwide, followed by an abrupt defibrillation by Congress and the Federal Reserve. The extreme swings in economic activity altered the normal rhythm of demand and disrupted supply chains, causing the transitory portion of price increases. Decisions by Congress and the Fed to use the crisis to pursue additional policy objectives are now providing an excess of cure being prescribed to a largely healed economy, and longer-term inflation is possible in more durable areas such as housing and wages.

Growth Outlook

Over the last 18 months, the Federal Reserve and Congress have supplied the U.S. economy with nearly $10 trillion in combined monetary and fiscal stimulus—an amount nearly equal to an astounding 40% of GDP! Ignoring the massive initial drop in Q2 2020 GDP and sharp bounce in Q3 2020, the added fuel from dual fiscal and monetary support has served to grow the economy by rates of 6.3% in Q1 and 6.7% in Q2 2021; however, the GDP growth rate has already fallen to 2.0% for Q3 2021. It's almost as though the fuel has already been burned.

GDP growth has averaged 2.3% since 1995 and 1.7% since 2010. It's possible to conclude that absent extraordinary policy interventions, 2% is a normalized rate of growth for the U.S. economy given current population trends and policy configurations. Especially when considering that $10 trillion of combined firepower from Congress and the Federal Reserve should only push the annual 2021 growth rate to at-best 5% to 6%.



Source: U.S. Bureau of Economic Analysis

Looking back in time, below are the annual averages through 2020 for interest rates, inflation, and economic growth since two measurement dates used later in this presentation: i) 1995, the first full year after the Federal Open Market Committee (FOMC) began increased transparency initiatives and unofficially commenced setting targets for inflation; ii) 2010, the recovery year from the last significant recession.

	CPI Inflation	10 Year UST	GDP Growth
Annual Avg. (2010-2021)	2.3%	2.4%	2.0%
Annual Avg. (1995-2021)	2.4%	3.8%	2.3%

Sources: U.S. Bureau of Economic Analysis, U.S. Bureau of Labor Statistics, Federal Reserve Economic Data (FRED)

We observe that although the 10-year average UST rate was much higher prior to 2010, the U.S. economy then was saddled with a much lower debt burden. It's reasonable to assume that the post-2010 experience is more indicative of current market conditions.

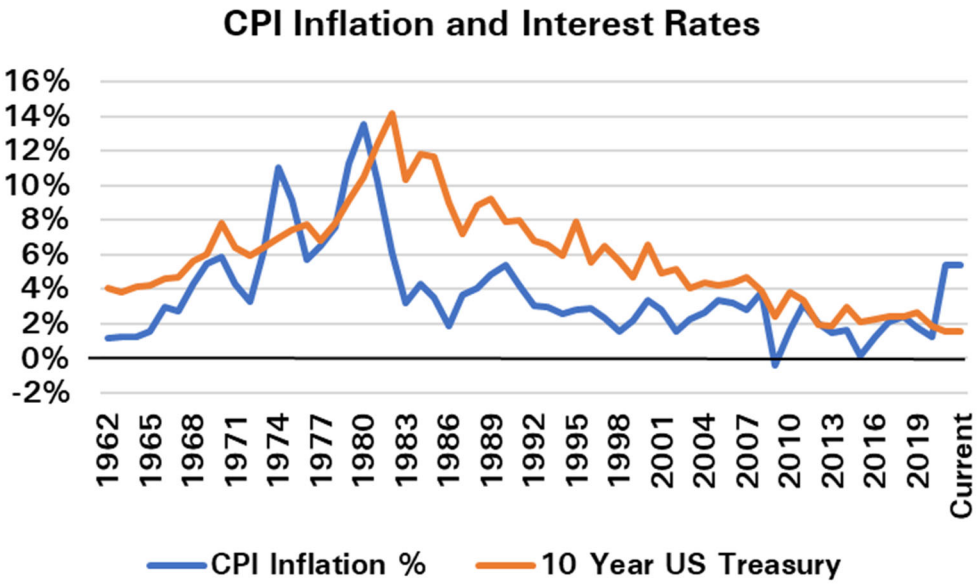
As we move deeper into the analysis of each of these measurements of the U.S. economy, we'll leave you with a few questions to ponder:

- **Is the recent uptick in inflation and the pending increase in interest rates a reversal of prior lower for longer trends? A simple expression of this question would be: must all things that come down go back up?**

- **Or is it reasonable at this stage of U.S. economic maturity to assume that normalized rates should follow a rule of 2-2-2? In other words, based on the data, could one conclude that after a brief bout of inflation in 2021-2022, the most likely longer-term scenario continues to be something like 2% inflation, 2% GDP growth, and 2% 10-year Treasuries?**

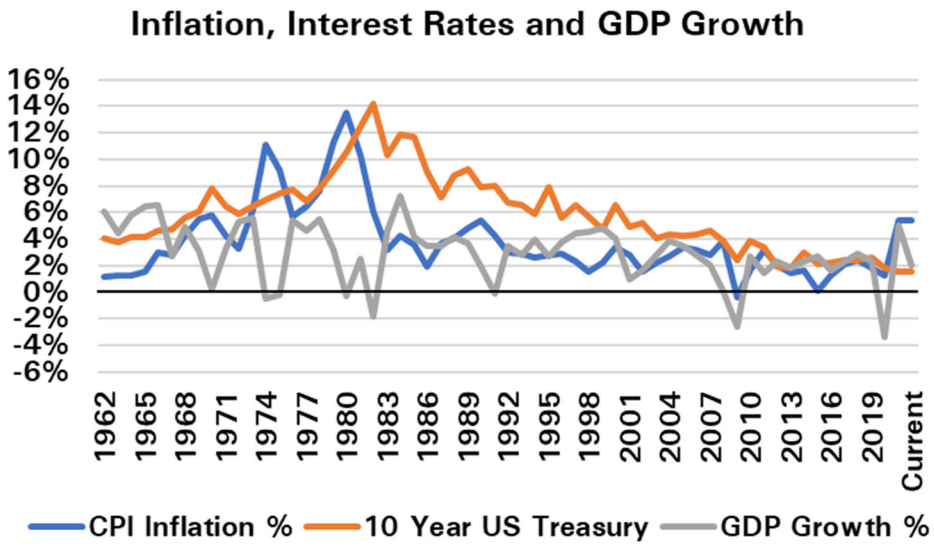
Relationships Among Inflation, Interest Rates and Growth

When we place inflation and interest rates on the same graph, they tend to look correlated with small timing differences. Therefore, it's not as simple as saying low interest rates lead to high inflation and high interest rates lead to low inflation. If anything, until quite recently, the trend had simply been absolute percentages trending lower for longer for both interest rates and inflation.



Sources: U.S. Bureau of Economic Analysis, Federal Reserve Economic Data (FRED)

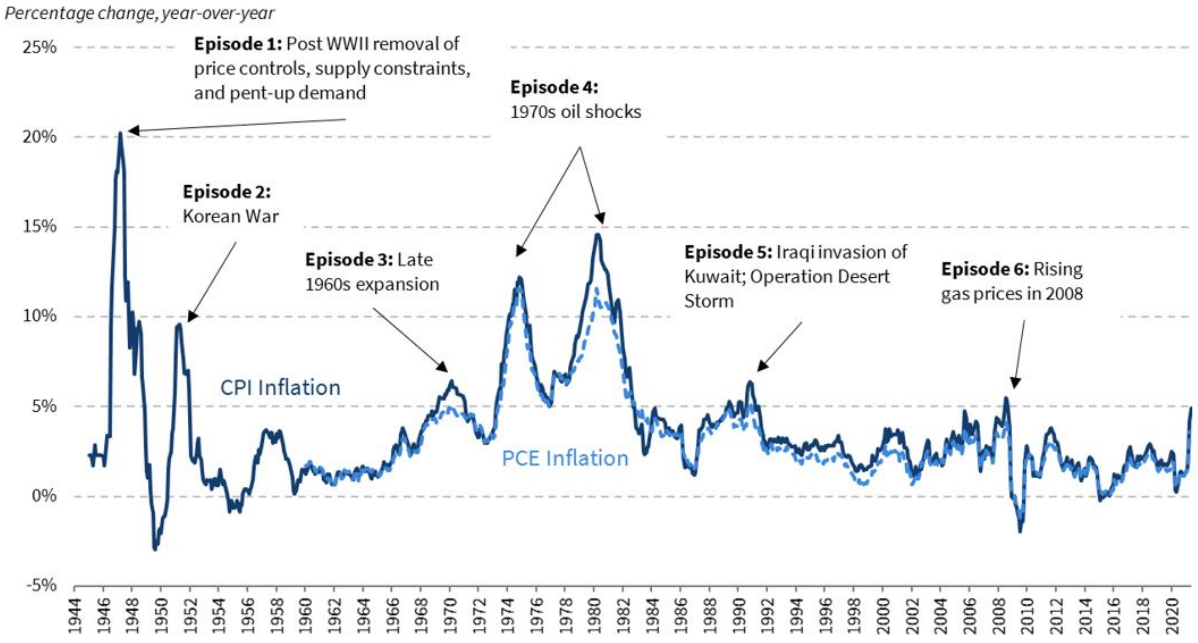
Interestingly, this nearly four-decade period of declining interest rates and reduced inflation has not led to straight-line and sustained increases in GDP growth. One reason is that it's more difficult for large, mature countries to continue to grow at the same rate they did during earlier phases of urbanization, industrialization and rapid economic development. Even with low interest rates and low inflation, the GDP growth potential of mature, developed countries also tends to slow when debt has been added beyond the level supportable in an environment of declining birth rates, reduced immigration and aging populations.



Sources: U.S. Bureau of Labor Statistics, Federal Reserve Economic Data (FRED)

To consider inflation on its own, let's examine the length of prior U.S. periods when annual inflation has exceeded 5% in the post-WWII era. As you can see, **in most cases inflationary cycles have lasted 1-2 years.** The long experience of the 1970s was the exception.

Six Episodes of Post-WWII Inflation



Source: Federal Reserve Economic Data (FRED, Haver Analytics, CEA Calculations.

The Covid '19-'21 Era

Now let's analyze the extreme halt and reboot of the post-Covid economy. The chart below demonstrates the sudden stop in the form of massively declining Q2 2020 GDP, followed by a large recovery in Q3 2020 GDP. Inflation followed the same pattern involving one quarter of negative change (short-lived deflation) and a quick return to positive territory, though far from recovering all lost ground. The slamming of the brakes of the economy was seen from the alarming increase in the unemployment rate from 3.5% in February 2020 to 14.8% two months later, and now a year later various forms of stimulus have worked together to bring the unemployment back down to 4.8% on the latest monthly measurement. Meanwhile, we can see the early efforts of the Federal Reserve to rescue the economy with the Q2 2020 decrease in the average 10-year Treasury Rate.

	Average Quarterly Unemployment Rate	Quarterly Change in GDP	10 Yr UST Quarterly Average	Average Quarterly Headline PCE Inflation (annualized)
Q1 2020	7.6%	-5.1%	1.4%	1.3%
Q2 2020	11.5%	-31.2%	0.7%	-1.6%
Q3 2020	7.7%	33.8%	0.7%	3.6%
Q4 2020	6.6%	4.5%	0.9%	1.5%
Q1 2021	6.1%	6.3%	1.3%	3.8%
Q2 2021	5.7%	6.7%	1.6%	6.3%
Q3 2021	5.1%	2.0%	1.4%	5.0%

	Not Good	Concerning	Meh	Good	Great
Key					

Sources: U.S. Bureau of Labor Statistics, Federal Reserve Economic Data (FRED)

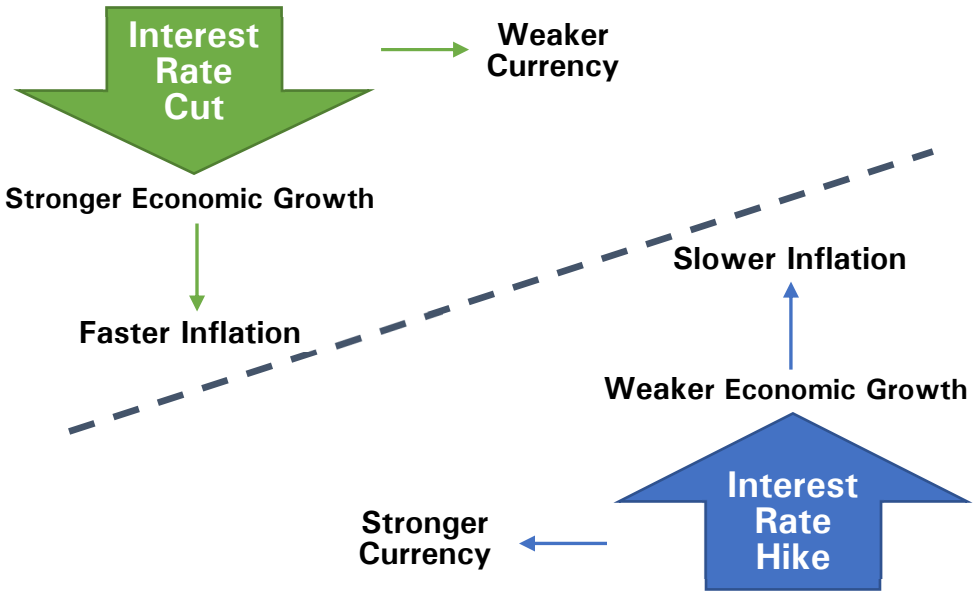
In 2020, the economy was like a freeway that had been closed for months, with all the cars waiting to get back on the road. In 2021 the cars were set loose again and every on- and off-ramp become choked with traffic. Only in this case (to mix similes), the traffic is occurring mostly at the ports, with empty containers sitting on docks while loaded cargo ships pile up offshore to wait their turn. The disruptions to logistics and the supply chain are causing scarcity and price increases. Left alone for product to work its way through the system, we might see some settling and return to normal volume and price activity. Yet on top of these traffic jams, we also have the influence of elevated demand for goods. Some of the demand was caused by purchases put on hold during the pandemic, and the resumption of orders made the problems worse. If inflation persists for too many months, consumers and businesses may accelerate purchases in the fear of shortage and ever-higher prices. The other factor causing prices to escalate is the sheer amount of excess capital seeking to purchase and invest.

There are certain goods and services that are more likely to be transitory, where a temporary squeeze in supply might lead to rising prices, followed by stable-to-slackening demand that leads to a moderation or even a drop in prices. Things that aren't so easily substituted, such as housing and wages (employees), are expected to be a bit stickier in price and less prone to offsetting deflation.

FED TOOLS & IMPACTS - (Approx. 3 Minutes to Read)

Federal Reserve Actions and Outcomes

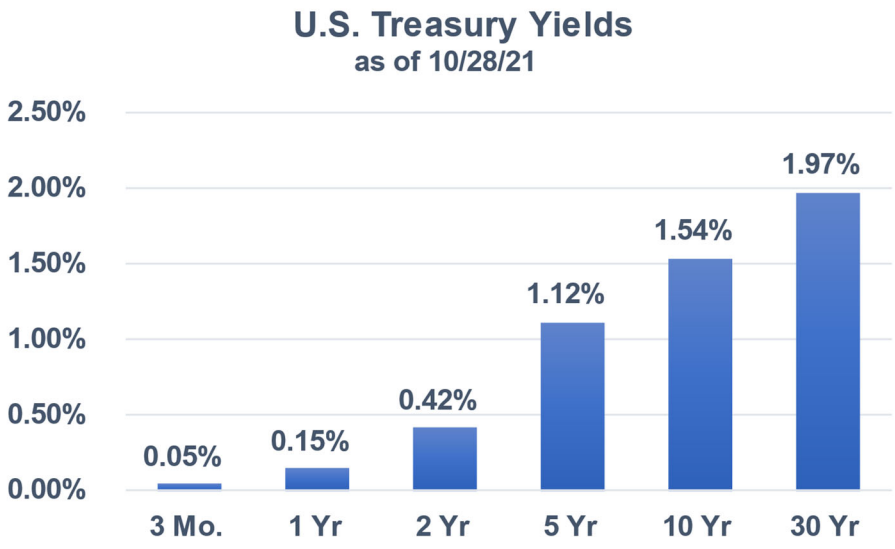
One of the tools the Federal Reserve can use to influence inflation and unemployment involves changing the Fed Funds Rate to speed up or slow down the economy. Generally speaking, the Fed could cut rates to stimulate the economy and increase rates to slow down an economy that's overheating.



Source: S&P Dow Jones Indices LLC, Morrison Street Research.

The yield curve continues to reflect historically low rates. These conditions are somewhat limiting for central bankers, since they have little room in the future to drop rates to reinvigorate economies. Hence their desire now to taper and tighten in advance of the next recession (while hoping they don't cause one). With these market conditions, it's very difficult to tighten monetary policy significantly without triggering a market sell-off, which then requires the Fed to act again to stimulate the economy. It's a vicious cycle in highly leveraged systems. As of this writing, yield curves are flattening worldwide, with short rates rising in anticipation of central banks tightening, while longer rates remain somewhat stable, reflecting concerns about future growth.

The Federal Open Market Committee statement of November 3, 2021 marked an important shift in policy, with the Committee announcing its intention to begin tapering by reducing its monthly asset purchases. The existing monthly Fed purchases of $80 billion of Treasuries and $40 billion of mortgage-backed securities are scheduled to decrease by $10 million per month of Treasuries and by $5 billion per month of MBS. The Committee left itself the discretion to later speed or slow this pace. Finally, the FOMC



Source: U.S. Department of the Treasury

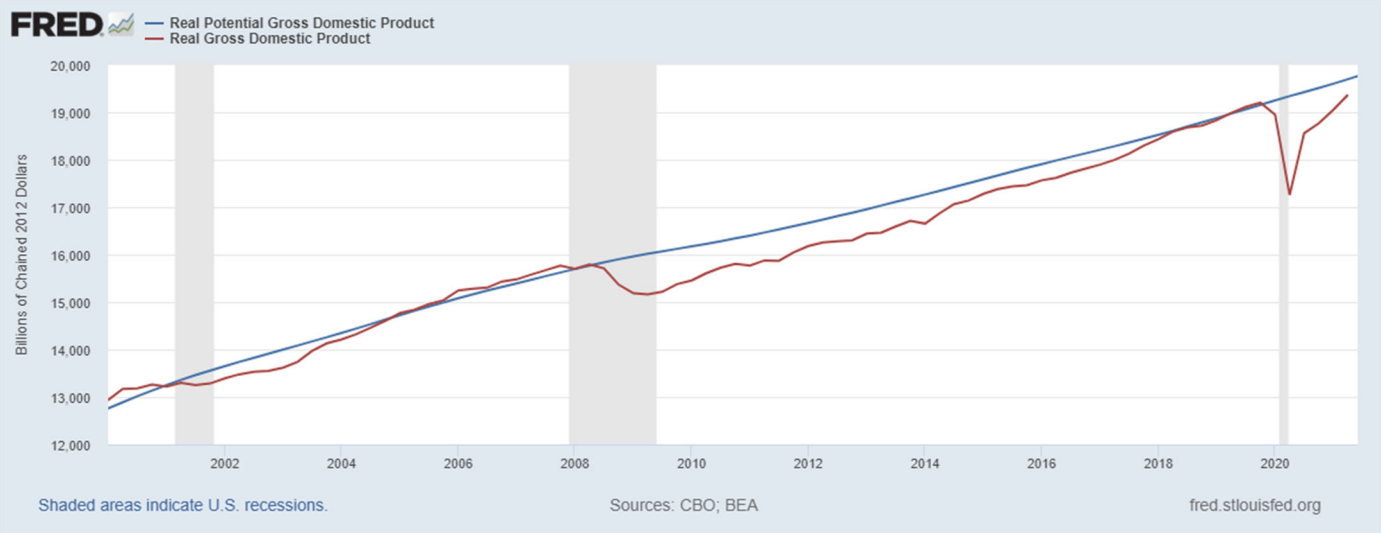
says for now it will leave in place the current Fed Funds Rate target at 0% to .25%. The Fed judges the asset purchase reductions to be an appropriate level of tightening to address rising inflation while the economy is still growing and moving toward an acceptable level of employment. The market currently expects two .25% rate increases in 2022.

Even when the Federal Reserve has conviction in its policy targets, interest rate shifts don't occur in a vacuum, and achieving the desired cause and effect is challenging, to say the least. The Fed's job of supporting the conditions necessary for economic growth while keeping unemployment low and inflation in check depends on many external factors including (among many others): consumer expectations, levels of public and private debt, government spending, currency strength/weakness, demographic shifts, tax changes, regulation, political stability, production demand/supply, trade, and the health and competitiveness of other countries.

Inflation and Monetary Policy

Relative inflation or deflation are heavily influenced by the monetary and fiscal policies of central banks and executive/legislative bodies. Quite simply, inflation occurs when demand exceeds supply. This dynamic can be monitored by the output gap, a comparison of potential GDP to real GDP. If the economy grows faster than the growth in production capacity, prices rise. In contractionary periods where supply exceeds demand, prices fall. Recessions lead to actual GDP falling short of potential GDP. While the U.S. economy still demonstrates a slightly negative output gap, real GDP had until recently been growing rapidly and added to supply chain problems, has been enough to prompt above-standard cost increases.

Output Gap



Source: Federal Reserve Economic Data (FRED)

Types of Inflation

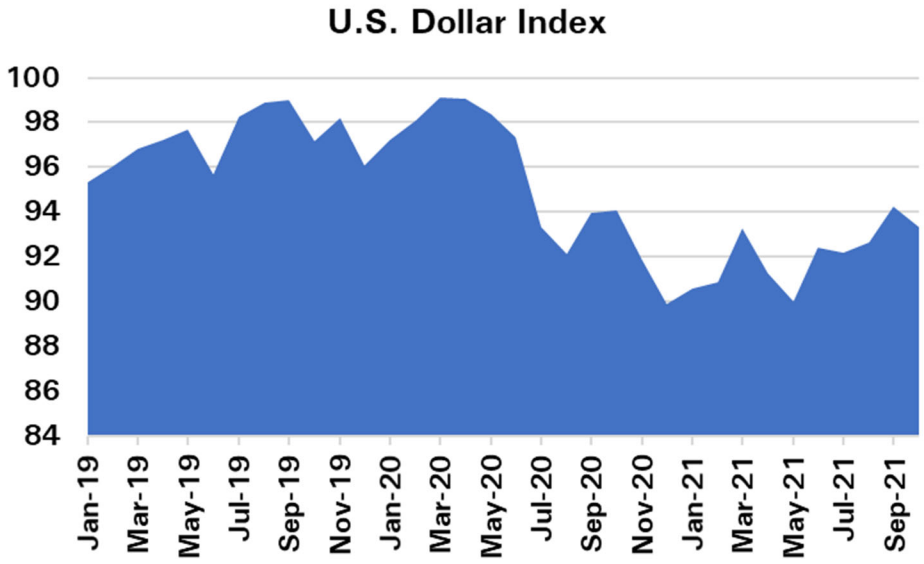
Inflation can result from cost-push or demand-pull catalysts, or from built-in inflation that propels the economy further into an inflationary or deflationary direction. Demand-pull inflation often results from increases in fiscal or monetary stimulus and occurs when the demand for goods and services exceeds the production capacity of an economy. By contract, cost-push inflation results from input prices increasing the total cost of goods production and delivery of services. Cost-push inflation often follows loose fiscal or monetary policy, as excess liquidity can find its way into segments of the commodities or other component markets in a way that push up the cost of production.

Inflation expectations alone can become a driver and exacerbating force behind relative built-in inflation/deflation cycles. For example, suppose that higher prices cause workers to demand higher wages, which increases the cost of production. The result is an upward cycle of internal inflationary conditions. Deflation would occur when consumers and businesses expect prices to fall, so they defer purchasing decisions. The contraction in demand causes prices to fall, wages to drop and production costs to decrease.

In isolation, among the conditions that can lead to inflation, the easiest to identify are economic sudden stops and starts following wars/pandemics, rapid expansions to the money supply, or large increases in fiscal stimulus. The last two years have featured all these prominent forces, making it difficult to tease out and attribute relative contributions to the underlying cause(s) of recent inflation, and to determine whether the Fed is more likely to risk running the economy too hot or too cold.

Currency Factors

Inflation can have significant negative effects on the value of a country's currency exchange rate, since it erodes the purchasing power and makes holding that currency relatively less attractive. While it is possible for low inflation to help increase the value of a currency, economists generally believe the exchange rate penalty for high inflation is much greater than the reward for low inflation. It's almost impossible to isolate inflation's specific impact on the value of a currency. Numerous additional factors can influence an exchange rate, such as trade balances, economic growth, expectations for growth and changes in monetary and fiscal policy. Suffice it to say, unusually high levels of inflation are not good in terms of sustaining monetary value. The U.S. Dollar has weakened somewhat in the wake of Fed balance sheet expansion and Congressional stimulus in response to the economic challenges posed by Covid-19.



Source: Intercontinental Exchange, Inc.

Observations - (Approx. 2 Minutes to Read)

The pandemic was the proximate cause of the downturn: Federal Reserve and Congressional policy responses could have reacted proportionally to the size and characteristics of the problem. Instead, both institutions have gone beyond the basic call of duty to pursue additional objectives.

Monetary Response

The Fed Reserve's policies have been more accommodative and expansionary than needed merely to prevent a deeper recession, and beyond even that needed for basic recovery from the pandemic. Presumably the Fed recognizes that pumping the system full of liquidity exacerbates the wealth gap by increasing the prices of financial assets; meanwhile, younger and disadvantaged populations without investment capital are unemployed/underemployed and scraping to get by. Perhaps the Fed is extending the run of accommodate policy to reach for full employment and offset the negative consequences of its policies on middle- and lower-class Americans. From here, it's important to follow how and when the Fed chooses to taper its loose monetary programs, and what outcomes derive from those decisions. The market shrugged off the first tapering announcement, and inflation continues to rise, which means the Fed may need to get more aggressive in reducing asset purchases and/or increasing the target rate.

Fiscal Response

Meanwhile, the Executive and Legislative branches saw an opening to address larger priorities, also spending well beyond amounts needed to prevent recession and extend recovery. Rather, the current budget proposals are designed to remake significant portions of the economy by redesigning/rebalancing for improved fairness. In Congress' initial efforts in 2020, money was distributed to educational institutions, state and local governments, providing payments to individuals, forgivable loans to businesses, foreclosure moratoriums, and enhancing employment insurance—interventions all designed to triage an immediate crisis. More recent initiatives focus on childcare, home care, tax credits, climate change, education and workforce training, supplementing the ACA, and addressing equity—all important initiatives, to be sure—designed to improve the safety net and prepare the economy for the future. Yet let's acknowledge the newer rounds of Congressional stimulus extend beyond repairing economic damage directly caused by Covid-19, and generally fails to account for the potential inflationary impact.

The main factors that can cause inflation are all running at the same time. We have the transitory demand-pull conditions caused by rebooting a stalled economy, similar to post-war conditions. We have cost-push supply-chain disruptions caused by work absences and factory shutdowns, followed by sudden cargo traffic and logistical kinks in the system. We have an aggressive Fed trying to reduce unemployment and still trying to maintain its goal of >2% inflation after years of failing to achieve its benchmark. We have an ambitious Executive Branch seeking to make its mark in a first term, and a Congress hoping to get reelected by delivering pet projects for activist constituencies.

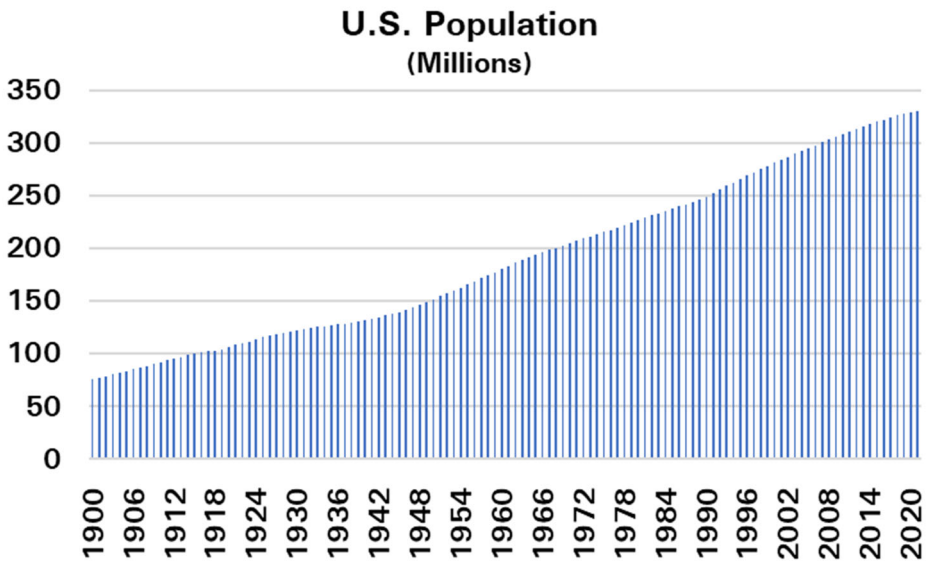
More than enough ink has been spilled by others debating the definition of "transitory". It should suffice to say that over longer periods of time, prices have generally risen in the U.S., and that brief deflationary periods were ultimately overtaken by longer inflationary cycles. Therefore, the time period for which something is defined as transitory inflation may differ. Even for perceived "temporary" inflation, if not followed by an offsetting deflationary period, the underlying cost base increases during the transitory period, and overall costs come out the other side higher than they would have otherwise. In other words, short-term periods of price growth tend to metastasize into more permanent elevated prices.

Framework and Analysis - (Approx. 8 Minutes to Read)

There are many economic theories surrounding how and why economies experience various stages of development and growth. Without getting stuck in a quagmire of political or policy debates, let's borrow from W.W. Rostow's oft-cited framework for stages of economic development to frame a discussion around where the United States fits in historical context. According to Rostow, economies go through five stages:

1) **Traditional Society:** Think of this as agrarian and labor intensive. Low reliance on technology.
2) **Pre-Conditions to Take-Off:** A move from subsistence to commercialization. New external demand for raw materials.
3) **Take-Off Phase:** Short period of rapid growth around key industries. Urbanization and industrialization occur.
4) **Drive to Maturity:** Long period with advancements in technology, diversification of industries and economy. Investments in infrastructure
5) **Age of Mass Consumption:** Shift from dominance of manufacturing to consumer goods and services.
6) **TBD:** Depends on the path the country takes. If growth can't keep pace with debt, deleveraging needs to occur, either slowly or through financial crash.

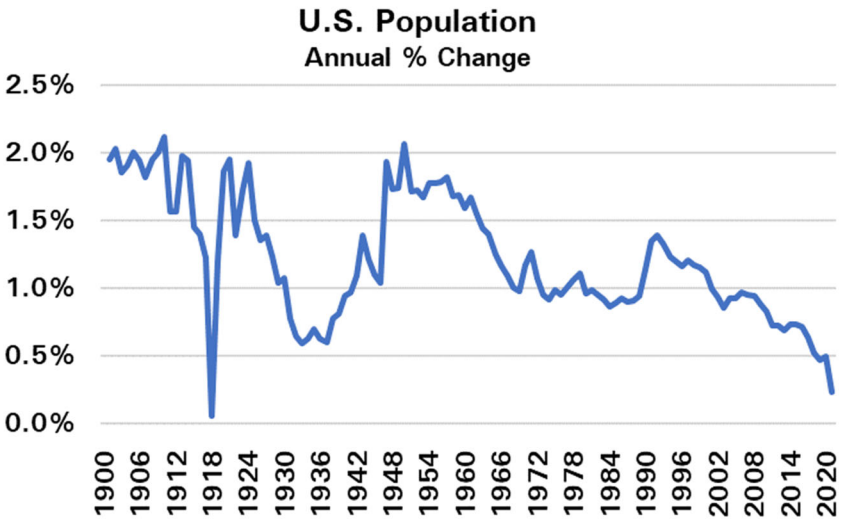
As countries move through these phases, there is a key demographic shift that occurs. In early stages, fertility and mortality rates are high. With advancements in technology and increased proximity to medical services, life expectancy increases and the population expands rapidly. Eventually, in the mature phase of an economy, the fertility rate declines and population growth slows. The economic impact is that in these late stages there are fewer workers per retiree to pay for all the obligations that piled up in the growth and stabilization periods. At advanced later stages of an economy, immigration is needed to offset declining population growth. Without immigration, see: Japan.



Source: U.S. Census Bureau

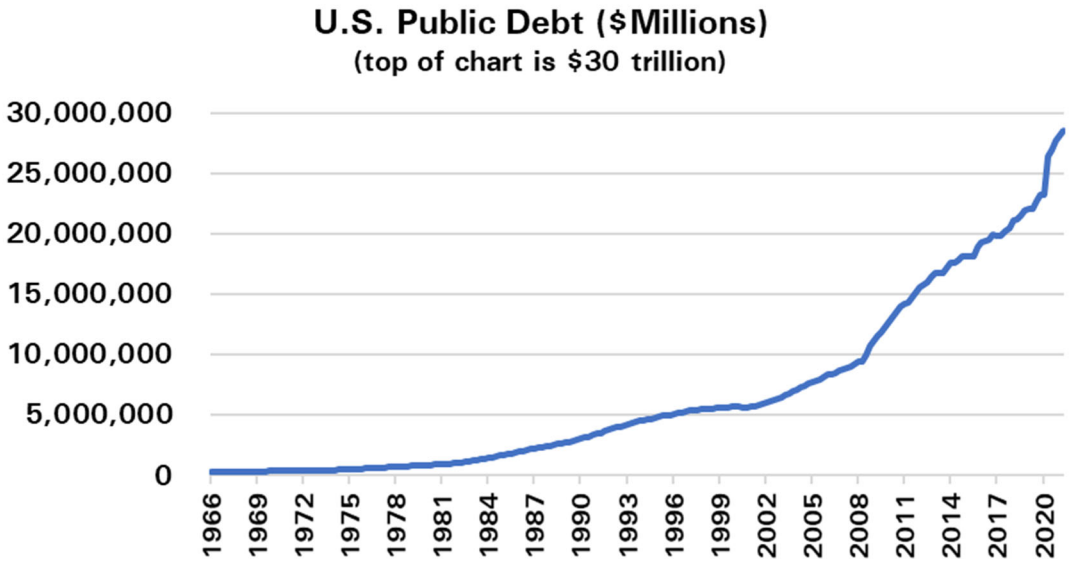
Given all this, it's interesting to note **the U.S. population grew at a record low .35% over the past year, and it's possible (though not likely) the population could actually shrink this year for the first time in history.**

Note that reductions in the population growth percentage occurred during the global pandemics of both 1918 and 2020. However, the more recent trend is not merely pandemic-related, since U.S. population growth has been below 1% annually since the year 2000.



Source: U.S. Census Bureau

As nations go through these economic development phases, debt capital is added from a low starting point to finance periods of rapid growth. Initially this leverage is productive, meaning it fuels creation and expansion of industries that produce jobs and upward social and economic mobility. Over time, as economies reach full potential, politicians begin using the expansion of debt to reward voters and spend beyond the natural growth rate of the economy. Another way to say this: as the absolute level of debt increases, it shifts from productive leverage used to finance growth to primarily non-productive debt used to pay for entitlements and fixed government obligations. As spending and debt increase relative to the size of the economy, these obligations serve to restrict growth potential.

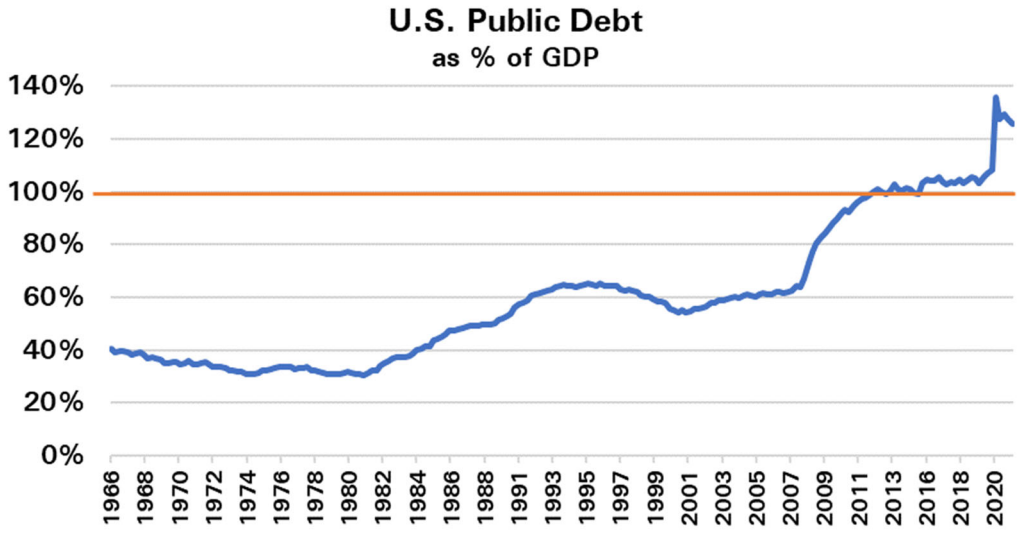


Source: Federal Reserve Economic Data (FRED)

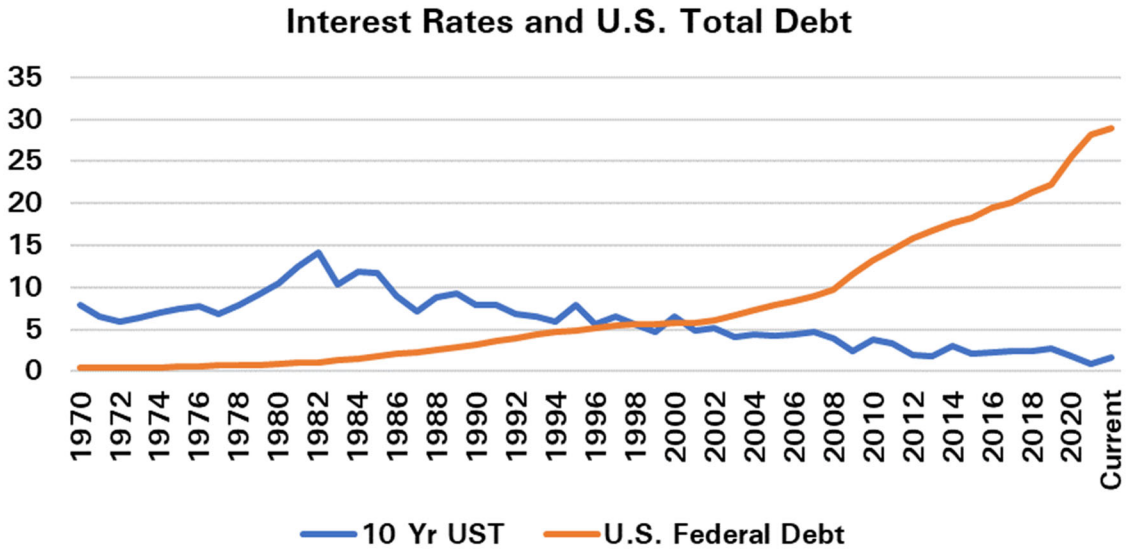
One of the conundrums for governments and central bankers of later-stage developed countries is that each time they step in to mitigate or prevent recession, fiscal policy interventions tend to increase the debt burden of the country. The higher the debt-to-GDP ratio, the more difficult it becomes for all but the fastest growing economies to weather higher interest rates. The higher the debt levels in the system, the higher the interest payments. When interest rates and debt service payments get too high, growth slows, recessions follow, and central banks intervene to keep rates lower for longer.

Over the past four decades, the cumulative effect has been increasing total leverage while reducing interest rates. Each time there's a new crisis, the central bank must react from a starting point of already low rates. Federal, state and local governments respond to economic downturns by adding spending on top of already high debt burdens.

This cycle plays out in almost all advanced economies unable to maintain high enough rates of fertility or in-migration to offset the growth drag caused by excess debt. Eventually, the need to deleverage to regain growth potential can only result in one of two paths: a quick and painful credit crash, or a slow-motion re-sizing of the debt-to-GDP equation. In the latter scenario, very low inflation or even deflationary conditions can persist for extended periods.



Source: Federal Reserve Economic Data (FRED), Bureau of Economic Analysis



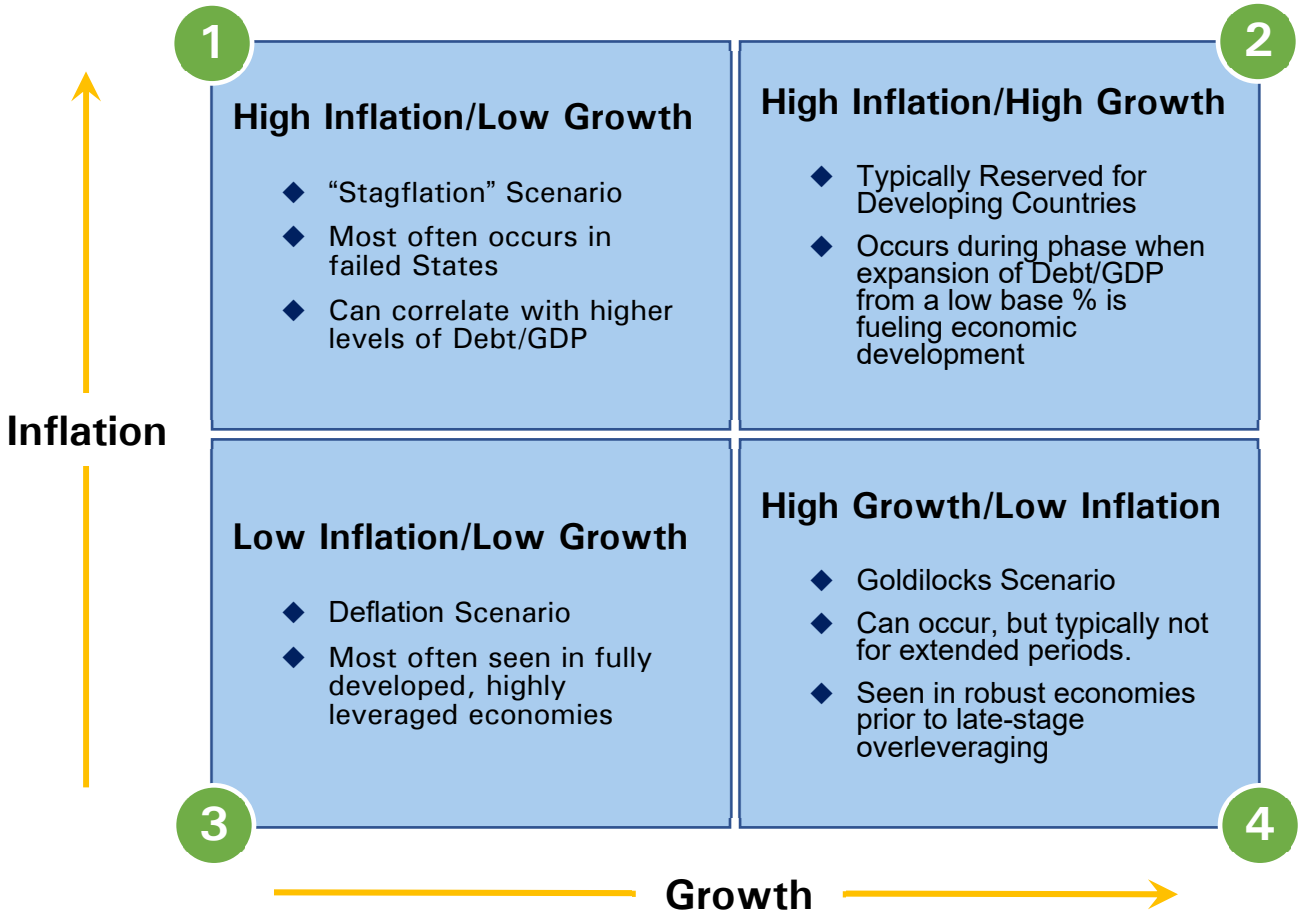
Note: Left axis numbers represent both interest rates in percent terms and dollars of debt in trillions (i.e.: interest rates are currently 1.6% and Federal debt is $28.9 trillion.

Source: Federal Reserve Economic Data (FRED)

One bright spot for the U.S. we should mention here is that since 2009 households have deleveraged balance sheets from 100% of GDP to 78% today. This improvement in the household financial picture has helped offset somewhat the growth in federal debt over this period. It's interesting to consider that for borrowers who locked in fixed-rate loans with some term, interest rate increases won't immediately result in higher debt payments. This may mean the Fed has to raise rates more than it might like or anticipate in order to cool the economy or pop financial bubbles.

Whether one subscribes to the implications of Rostow's theory, it's safe to say the U.S. occupies phase five (Age of Consumption) or beyond (sluggish growth) in the sequences of economic development.

We designed the following matrix to think through the potential combinations of inflation and growth, and to assess where the U.S. should be more likely to reside at its stage of economic development.



Source: Morrison Street Research

As an advanced, developed economy, it seems unlikely that the U.S. would spend extensive time in the high growth boxes labeled 2 or 4. As assessed later in this analysis, we believe the U.S. is about to experience a short stagflationary period (#1), the proximate causes being Covid-19 shutdowns and post-Covid fiscal and monetary stimulus. This limited stagflationary phase required to clear supply-chain bottlenecks, and absorb massive amounts of new debt and spending, should be followed by an extended deleveraging phase, characterized by low inflation and low growth (#3).

Impact of Debt on the Economy

The following analysis shows measurements of debt, GDP and interest rates comparing 1980 and 2021. The idea here was to establish a rough proxy for the Federal debt burden using the 10-year UST against total federal debt. In 1980, when the debt-to-GDP ratio was only 31.8% but interest rates were averaging 11.4%, the effective federal debt service burden was 3.6% of GDP. Even though in 2021 total federal debt exceeds annual GDP, the 10-year UST yield is so low that the equivalent debt service burden is only 1.4%. However, because of the increase in total debt since 1980, the economy is no longer able to tolerate the same elevated levels of interest rates without tipping into recession. Recall that when Paul Volcker went full throttle in order to cause a recession, interest rates actually increased until averaging nearly 14% in 1981, and 13% in 1982, and then began a declining trendline that has broadly persisted until today.

We have also included a parallel analysis of household debt. Interestingly, the 1980 and 2021 household debt burdens are the same at 7.4% of GDP (derived from historic household debt, averages of debt service as a % of disposable income and GDP). The total result is that due to very low interest rates, today's combined Federal and Household debt service burden of 8.8% of GDP remains lower than the 11.0% of GDP debt service burden of 1980.

	1980	1980 Public Debt Burden	1980 Household/ Non-Profit Debt	1980 Total U.S. Debt Burden
GDP	$2.86 trillion			
10 Year UST	11.4%			
Fed Funds Rate	17.5%			
Federal Debt		$894.7 billion	$1.37 trillion	$2.27 trillion
Debt/GDP Ratio		31.3%	48.1%	79.4%
Debt Service as % of GDP		3.6%	7.4%	11.0%

	2021	2021 Public Debt Burden	2021 Household/ Non-Profit Debt Burden	Total 2021 Debt Burden
GDP	$22.68 trillion			
10 Year UST	1.6%			
Fed Funds Rate	0.0% to 0.25%			
Federal Debt		$28.53 trillion	$17.33 trillion	$45.9 trillion
Debt/GDP Ratio		125.8%	76.4%	202.2%
Debt Service as % of GDP		1.4%	7.4%	8.8%

Unfortunately, due to a now combined public and private debt/GDP ratio of 202%, we discovered that the 10-year Treasury would need only to rise to 2.45% to match the combined 11.0% debt burden of 1980.

What If Analysis	2022+?	2021 Public Debt Burden	2021 Household/Non-Profit Debt Burden	Total 2021 Debt Burden
10 Year UST	2.45%			
Debt Service as % of GDP		3.1%	8.0%	11.0%

The 11.4% 10-year UST rate of 1980 would brutalize today's economy. Federal debt service as a percentage of GDP would increase to 14.3%, and the household burden to 14.8%, for an astonishing total of 29.1%.

What If Analysis	2022+?	2021 Public Debt Burden	2021 Household/Non-Profit Debt Burden	Total 2021 Debt Burden
10 Year UST	11.40%			
Debt Service as % of GDP		14.3%	14.8%	29.1%

We also ran a milder downside case to compare this dichotomy of higher rates/lower debt in 1980 to lower rates/higher debt in 2021. As you can see, even just a 4% 10-year UST results in a combined 14.2% debt service-to-GDP burden.

What If Analysis	2022+?	2021 Public Debt Burden	2021 Household/Non-Profit Debt Burden	Total 2021 Debt Burden
10 Year UST	4.00%			
Debt Service as % of GDP		5.0%	9.1%	14.2%

Source: Morrison Street Research, Bureau of Labor Statistics, Federal Reserve Economic Data (FRED), Bureau of Economic Analysis

Looking back, the higher interest rates of the early 1980's were certainly painful when coupled with high inflation, but the economy continued to function and that allowed Volcker to raise rates until the fever broke. This time around, with so much debt in the system, the economy would crack long before the Fed Chair could break inflation during a growth cycle, and rates would need to be dropped sooner, leading either to hyperinflation (more likely in a developing economy) or deflation (much more likely in the U.S.). This view is also informed by the (prior to Covid) long-running deflationary trends of globalization and offshoring of production and labor.

Sudden bouts of inflation can be caused when an economy reboots, such as after a large war. Covid in this context was the economic equivalent of a short-lived war. Central banks and legislative bodies around the world have taken extreme measures to carry the world economy through the initial shock from Covid. Despite these best efforts, we know that in due time, another global slowdown will arrive.

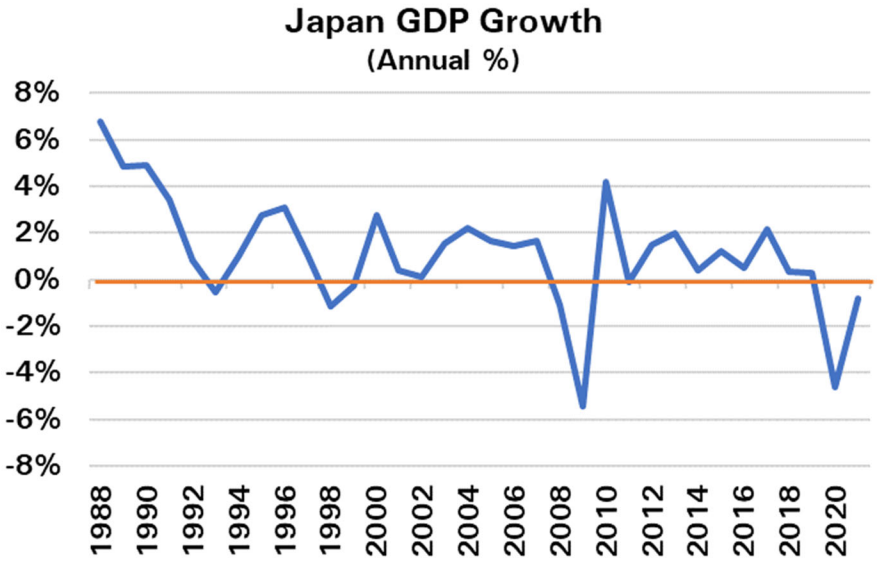
Thinking ahead to the potential causes and effects for the next U.S. recession, **a fair guess for what might catalyze the next down cycle would be monetary policy: either the Fed raises interest rates and induces a recession to combat inflation, or the Fed doesn't act, and inflation rises too much, thereby causing a recession.** In either scenario, the Fed will almost certainly reach for the same tool in the kit—lowering interest rates to create lower employment and growth in GDP. The question isn't whether the economy is experiencing inflation, it's for how long. And the answer to that question helps determine whether what lies ahead is a brief bout of high growth and high inflation, or a longer bout of high inflation combined with low growth—the latter putting the stagnant, or "stag" in stagflation.

At this point, all things considered, it seems likely that inflation will continue to run hot until the supply-chain bottlenecks clear, demand cools, the Fed tapers, asset prices settle, and the tight labor market gains some slack. There are several ways that could happen: 1) the passage of time; 2) the Fed significantly tightens monetary policy, or the market does so on its own in anticipation; 3) Congress backs off some of its spending plans, or; 4) the economy can't take all this pressure and collapses back into recession.

By so dramatically overshooting the scale of the Covid problem with the solutions offered, the Fed is now faced with some difficult tradeoffs. **Our forecast is for short-term stagflation (through 2022 and perhaps into 2023), followed by an extended deflationary cycle of low interest rates and low inflation while the economy addresses an overhang of debt obligations incurred subsequent to the earlier growth phase of economic development.**

The Japan Comparison

When considering the path of overleveraged, aging countries, Japan is the first to come to mind. Japan's growth challenges have been greater than most and are compounded by several factors. Japan's accumulated debt not only financed the traditional growth and development phase, the nation's public and private sectors also paid for an overly generous pension system, and its banks financed one of the greatest financial asset bubbles in history. A historic lack of immigration and low birth rate make it more difficult to meet the demands of its public and private pension and benefit systems. Japan has paid for all of this in the form of depressed growth and the country has been on the tipping point of deflation for decades. Deflationary periods also made the debt burden worse. As a result, Japan's public debt-to-GDP ratio was 232% in 2019 and post-Covid it exceeds 250%. The only good news is that Japan's household debt-to-GDP ratio is tame, in the range of 65% to 68%.

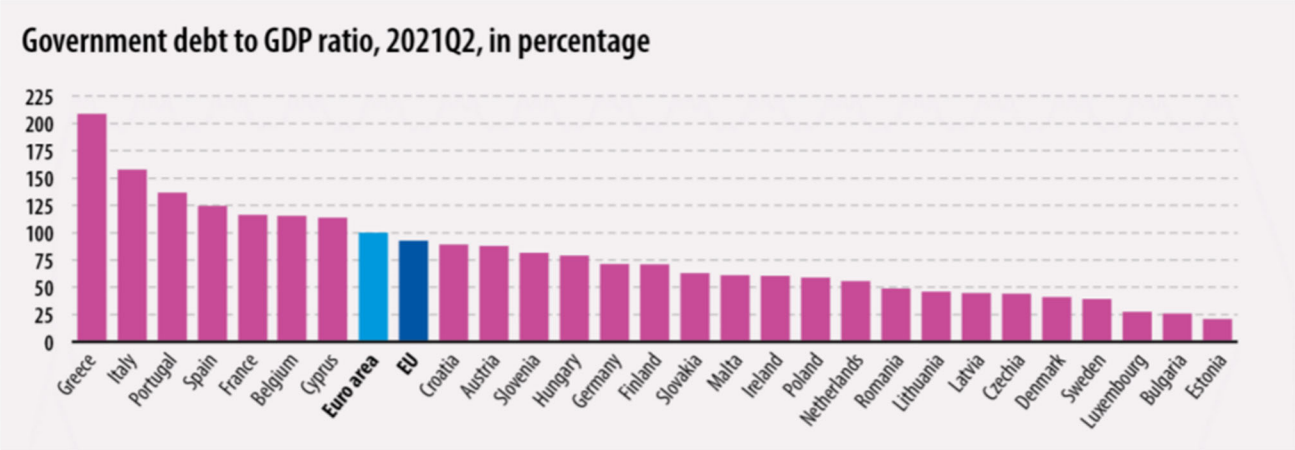


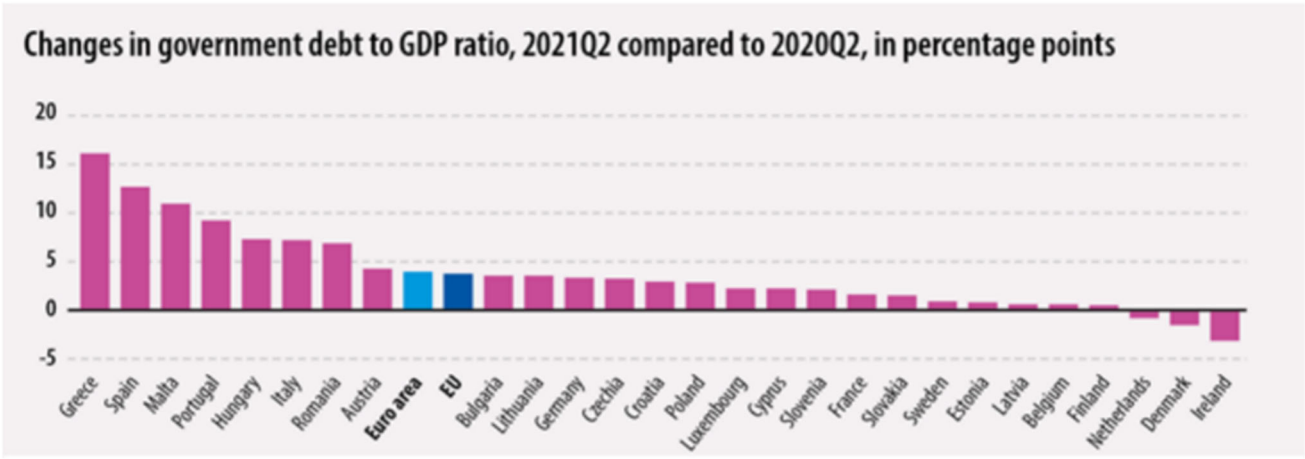
**Japan's GDP growth since 1988 has averaged 1.3% per year, and since 1995 has averaged just .93%.*

Source: Macrotrends.net, World Bank

The Europe Comparison

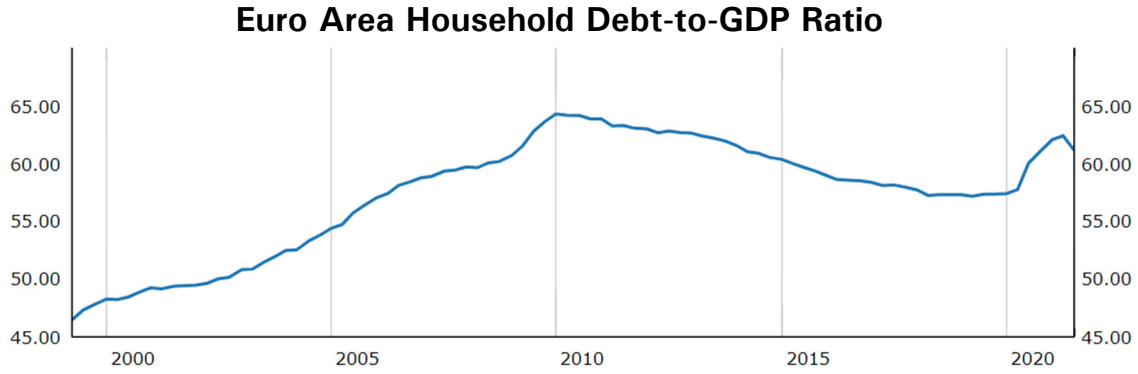
In 2019, Eurostat indicates the 19 countries using the Euro had a debt-to-GDP ratio of 83.9%. Similar to the U.S., European countries spent significantly to prevent a deeper recession and to recover from Covid-related economic shutdowns. The Euro area crested over 100% debt-to-GDP during Q1 of 2021, before falling slightly in Q2 2021 and now sits somewhere around 98.3%. Europe has spent the past few decades trying simultaneously to strengthen their social welfare states while also attempting to make their economies more efficient and competitive on the world stage. Despite some recent reforms in Europe, the U.S. remains a more dynamic (less restricted) production and labor market, which should in theory provide more medium-term growth potential. Nevertheless, in practice the two areas are no longer so different. Recent real outcomes from fiscal, regulatory, and monetary policies may now be more predictive of actual growth than historical reference points.





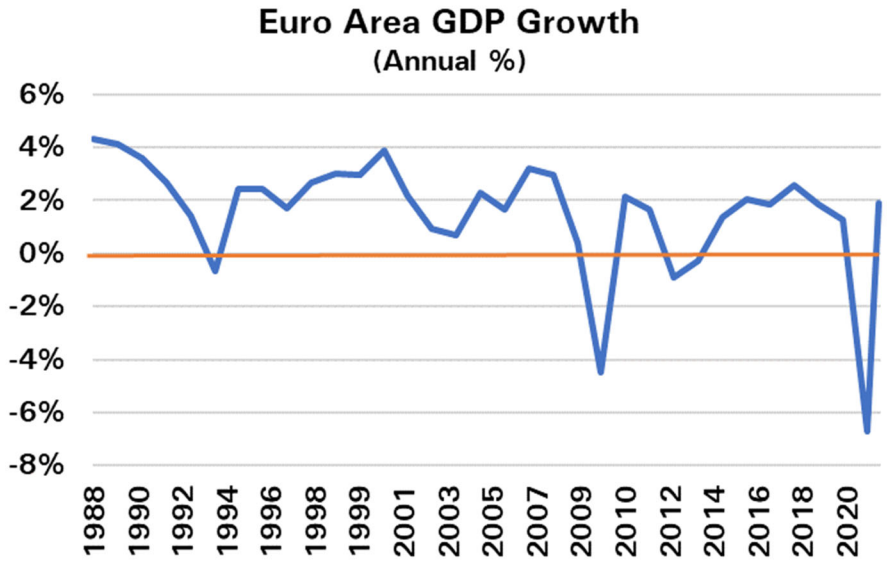
Source: Eurostat

The Euro Area's average household debt ratio has increased quite a bit since the late 1990's, but at around 60% to 65% is still much lower than the U.S. ratio of 78% household debt-to-GDP.



Source: Eurostat

The Euro Area has averaged 1.9% GDP growth since 1988 and 1.8% since 1995.



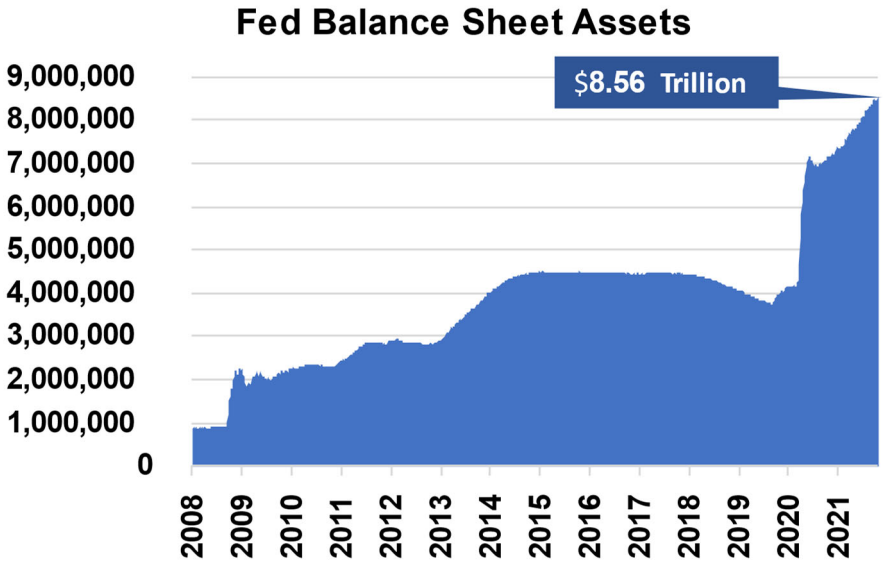
Source: Macrotrends.net

Recent/Current Data - (Approx. 7 Minutes to Read)

The Modern Role of the Federal Reserve and Congress

The past few financial recessions, starting with the dotcom burst in 2000 and continuing through the 2009 Global Financial Crisis, unleashed a discernable change in the behavior of politicians and central bankers in response to any financial disruption or potential recession. To be blunt, they've become allergic to economic cycles, unwilling to allow contractions to occur if at all possible. At the first sign of trouble, these political and financial leaders bring to bear the full force of their institutions to head-off potential crises.

When it became clear that Covid-19 would be extremely problematic for the worldwide economy, the Federal Reserve leaped into action. **The Fed's balance grew from $4.2 trillion at the beginning of March 2020 to $5.8 trillion a month later, to $7 trillion in mid-May. The balance sheet now sits at its peak of $8.5 trillion.**



Source: Federal Reserve Economic Data (FRED)

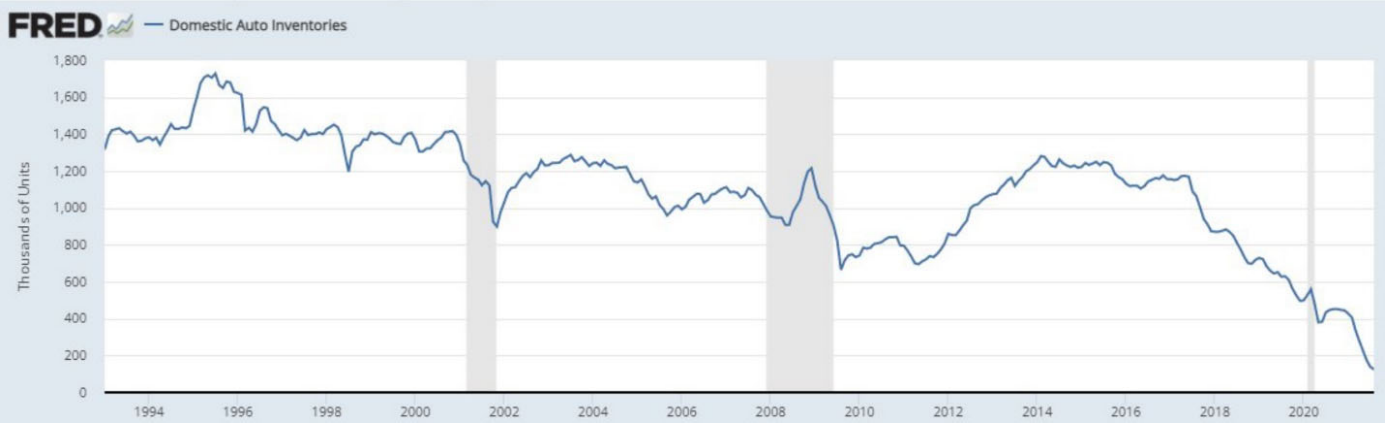
Going a step further, even once the crisis at hand abates, these officials now follow a politician's mantra, passed down over the years through the likes of Winston Churchill and Rahm Emanuel: -"Never let a good crisis go to waste."

Through fiscal and monetary support, the unemployment rate has dropped to near pre-Covid levels. Although the recovery of jobs has also been robust, the number of employed persons has stayed stubbornly low relative to the demand for labor. There may now be a conflict emerging between increasing inflation and the desire of the Fed and Congress to fill open jobs and return to full employment.

Nevertheless, after spending $5.65 trillion across multiple rounds of fiscal stimulus, Congress is busy trying to pass a $1.2 trillion infrastructure plan and another $1.75 trillion (down from $3.5 trillion) spending package which have the potential to fuel the fires of inflation. **The initial >$5 trillion rounds of spending represented an astonishing 26.8% of 2020 GDP, and the proposed infrastructure and spending plans would represent another 13.0% of GDP. If those latter bills pass, the total Congressional action since early 2020 would equate to a hard-to-believe 39.8% of GDP.**

Financial writers and economists have spent much of 2021 reporting on various categories of goods and services experiencing price or wage spikes. We observe that if any pattern has emerged, it's simply a rotation of categories of items experiencing inflation, some more "transitory" than others. **It is critical to understand that unless even a temporary inflation spike is followed a moment of offsetting deflation, the absolute price and/or wage levels have moved permanently higher upward.**

As a current stark example of one product area experiencing a pronounced supply/demand squeeze, take a look at domestic auto inventories, which were already on a downtrend, due to severe weather, obsolescence and other factors, but have plummeted in the wake of Covid. To remedy the cost inflation of automobile sales and car rentals, more supply needs to become available to meet traditional levels of demand.



Source: Federal Reserve Economic Data (FRED)

Policy Shifts During Low Inflation Era

Prior to the sudden above-standard inflation being experienced in the aftermath of Covid, the fact that unemployment over the past few decades has consistently run at historically low levels without stoking above-target inflation has eroded previous understanding and confidence in the Phillips Curve. Once again, one reason for this is that increasing globalization of production, trade and labor have proven to be fundamentally deflationary for the U.S. In any case, this breakdown in the unemployment/inflation model has led many Fed governors and observers to wonder if other financial market indicators might be more instructive for determining Fed action/inaction (see: Supplement/Extra Credit section for more information).

In recent decades, the U.S. has experienced relatively low inflation, averaging an increase of just 1.84% per year since 1992. Therefore, during this period the Federal Reserve has enjoyed the luxury of pursuing other policy objectives without fear, in particular continuing to chase full employment. However, so many years of low inflation during which the Fed was unable to move the needle on its expanded policy goals, eventually brought about the opposite worry (potential deflation), and the Fed instituted a formal 2.0% inflation target in January 2012. Many have noted the Fed was informally operating at a similar target since 1995.

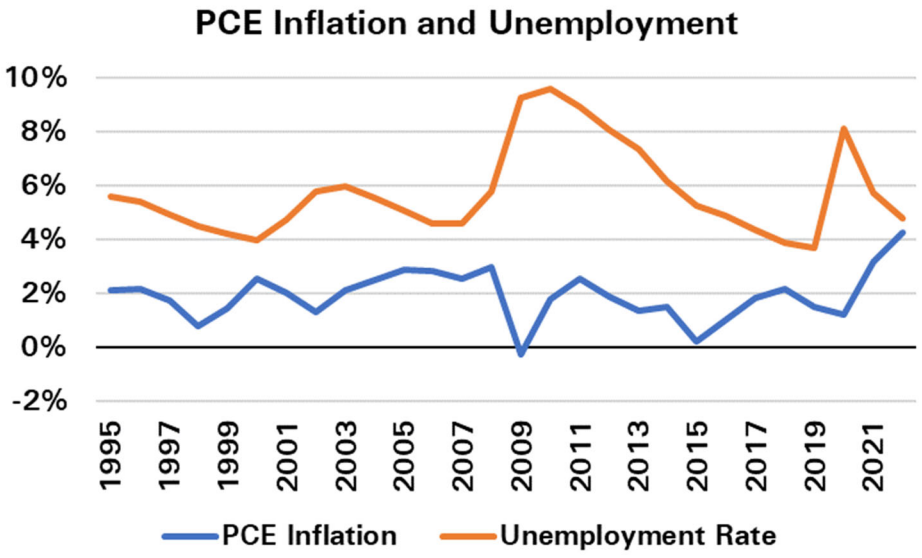
Key FOMC Process Changes

Prior to 1994, the Fed was mostly non-communicative and lacked transparency as to any formal or informal policy goals or changes to policy. Market participants were previously forced to divine the Fed's intentions by watching for unusual movements in securities markets. Beginning in 1994, following significant policy conclusions reached at an FOMC meeting, the Fed for the first time began signaling in extremely vague language what had occurred at those meetings. As each year has passed, the FOMC has gradually, step-by-step provided more detailed and specific information regarding actual decisions. The language has firmed up over the years, containing tighter ranges and more guidelines for market-watchers to follow.

In addition to the important FOMC changes of 1994-1995, another key shift occurred in 2012, when the FOMC began referencing a specific target Fed Funds Rate and what conditions would cause central bankers to adjust the rate up or down. This provided a whole new level of transparency for the market to study. Today FOMC minutes are much longer and more detailed, they provide evidence of dissenting votes, and establish forward-looking guidance targets for measurements such as the Fed Funds Rate, inflation and unemployment.

Fed Policy Analysis

How has actual experience compared to the Fed's targets? As a backdrop, keep in mind the FOMC judges 2% inflation to be the long-run target consistent with its statutory mandate. FOMC members on average believe a 4.1% rate is the proper long-run target for unemployment.



Source: U.S. Bureau of Labor Statistics, Federal Reserve Economic Data (FRED)

Here we will evaluate the two periods, starting first with the informal targeting phase beginning in 1995, and a shorter window beginning with the formal policy phase starting in 2012. Annual inflation averaged 1.84% since 1995 and 1.58% since 2012. Meanwhile the unemployment rate has averaged 5.78% since 1995 and 5.75% since 2012. These outcomes seem reasonable in the contexts of the Fed's view of potential employment, although perhaps a bit higher than they would like. However, it's important to recognize this nominal unemployment rate sounds

better than it is without considering the context of an aging population, characterized by fewer workers per retiree and declining labor force participation.

More recently, after years of being unable to bump annual inflation above 2%, a worrisome trend in the monthly inflation statistics may catch enough attention of the FOMC to spur greater tightening action and near-term changes to policy.

Year 2020	Trailing 12-month Inflation Rate
January	1.4%
February	1.6%
March	2.5%
April	3.6%
May	4.0%
June	4.0%
July	4.2%
August	4.3%

Source: U.S. Bureau of Labor Statistics, Federal Reserve Economic Data (FRED)

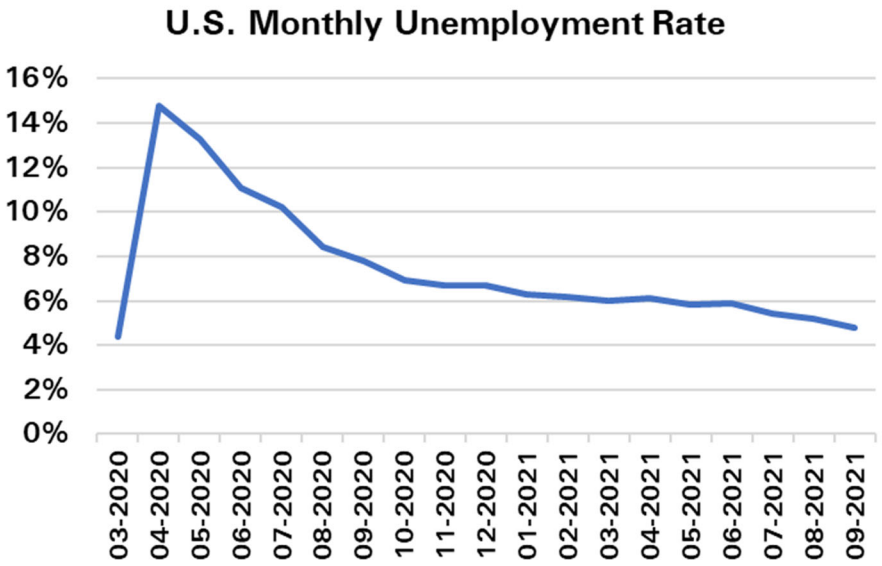
Here are the monthly 2021 increases for the Consumer Price Index (tends to show greater increases):

Year 2020	Annualized CPI Increase
January	1.4%
February	1.7%
March	2.6%
April	4.2%
May	5.0%
June	5.4%
July	5.4%
August	5.3%
September	5.4%

Source: U.S. Bureau of Labor Statistics, Federal Reserve Economic Data (FRED)

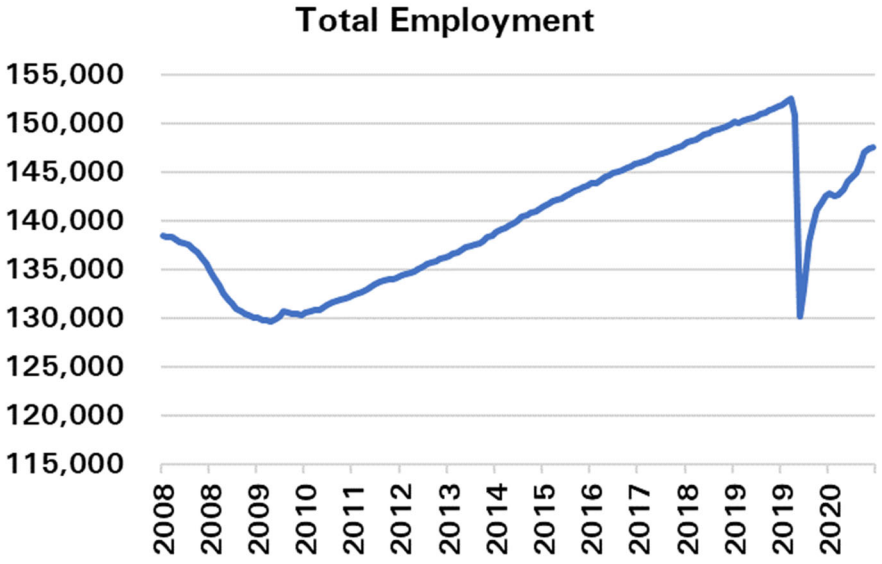
Employment Picture

Following the onset of Covid, the unemployment rate shot up from 4.4% in April 2020 to 14.8% a month later. Thanks to the aggressive interventions of the Congress and the Fed, the nominal rate has quickly recovered.



Source: Federal Reserve Economic Data (FRED)

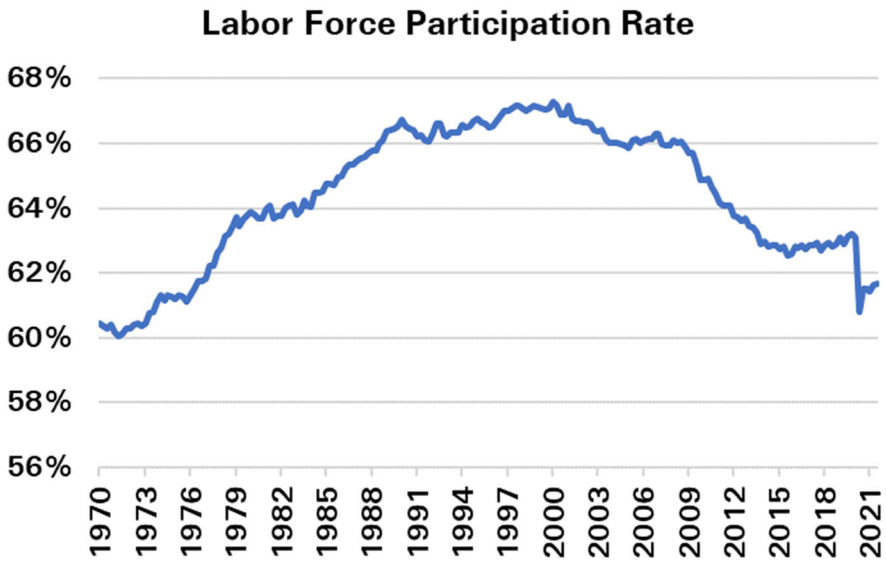
Of course, while the official current statistic of 4.8% unemployment sounds terrific, it does obscure some continuing structural issues. Post-Covid fiscal and monetary stimulus was needed to prevent a deep recession, but in some cases may now be hindering reemployment. Many workers stopped out and structural barriers to return to work emerged such as vaccine hesitancy, and lack of access to childcare and caregivers. Anecdotal and objective data shows that employers are finding difficulty filling key jobs, and not all of the pre-Covid labor force has returned to work.



Source: U.S. Bureau of Labor Statistics, Federal Reserve Economic Data (FRED)

A solution to potential wage inflation would be to increase the labor force participation rate, which declined and has failed to recover since the 2009 Global Financial Crisis. One policy response not yet on the table that could make a difference would be providing strong incentives/subsidies and removal

of any access barriers hindering return to work. Of course, those ideas carry their own moral hazards and would run the risk of furthering inflation in areas other than wages.

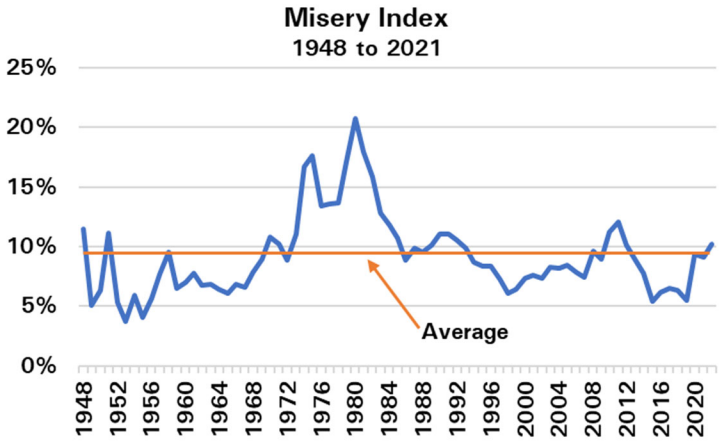


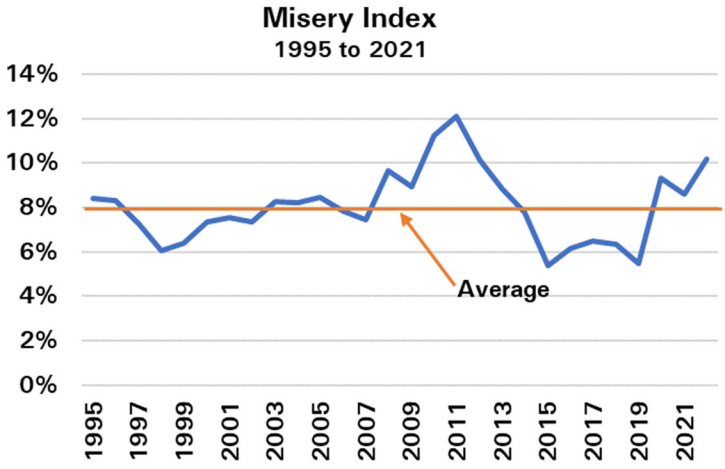
Source: U.S. Bureau of Labor Statistics, Federal Reserve Economic Data (FRED)

Misery Index

Even though the formal unemployment rate remains low, when combined with sudden inflation, the misery index (sum of unemployment and CPI inflation) rises, and is now slightly above the long-run historic average of 9.2% and the post-1995 average of 8.0%.

Note: *Due to the different years captured, these two charts are not on the same scale for X or Y axis.*

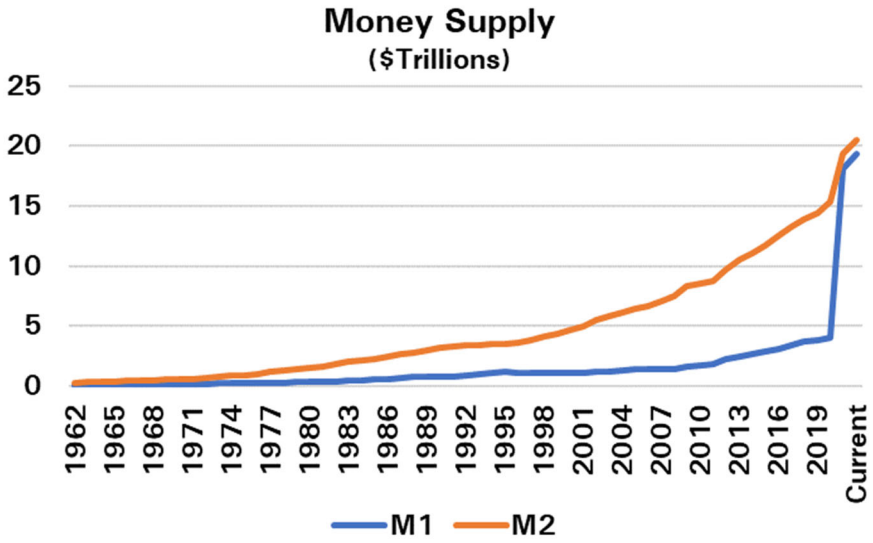




Source: U.S. Bureau of Labor Statistics, Federal Reserve Economic Data (FRED)

Monetary Policy

Milton Friedman: **"Inflation is always and everywhere a monetary phenomenon in the sense that it is and can be produced only by a more rapid increase in the quantity of money than in output"**

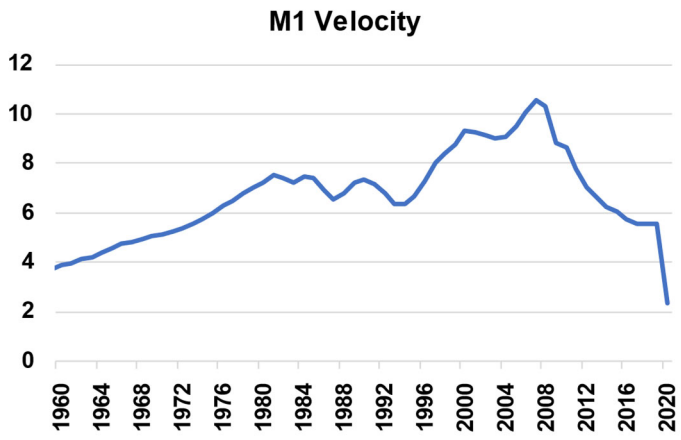


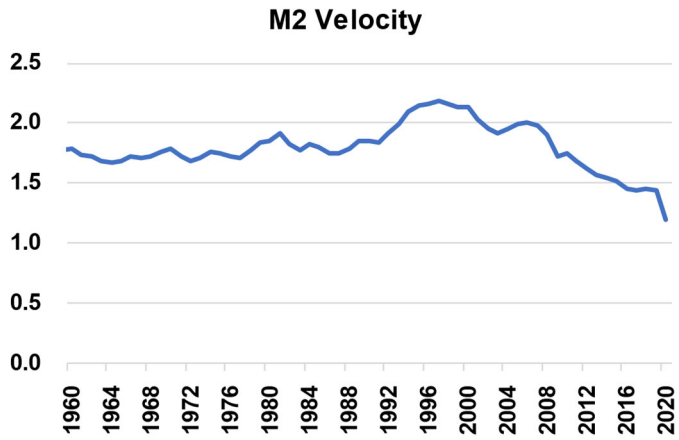
Source: Federal Reserve Economic Data (FRED)

While Mr. Friedman believed the money supply was the most significant factor in determining relative inflation, it has company as one of several potential catalysts. Like any supply/demand equation, the demand for money dictates whether an economy experiences a shortage or surplus of capital relative to demand. Thus, the velocity of money matters as well.

Velocity, expressed as a ratio of GDP to money stock, is essentially a measurement of how fast/how frequently dollars are being used in the economy. M1 represents the most liquid forms of coins and paper currency, demand deposits (checking accounts) and traveler's checks. M2 includes all those items listed in M1, but adds savings and money market accounts and CDs. Some would argue that troublesome longer-term inflation won't arise until you have both an expansion in the money supply and an increase in the velocity of money. On this front, we don't yet have cause to worry about the velocity portion of the equation. Perhaps much of recent inflation for now remains a transitory effect of rebooting the economy, and not an overall increase in activated money supply.

Note: The Y axes are on different scales for these two measurements



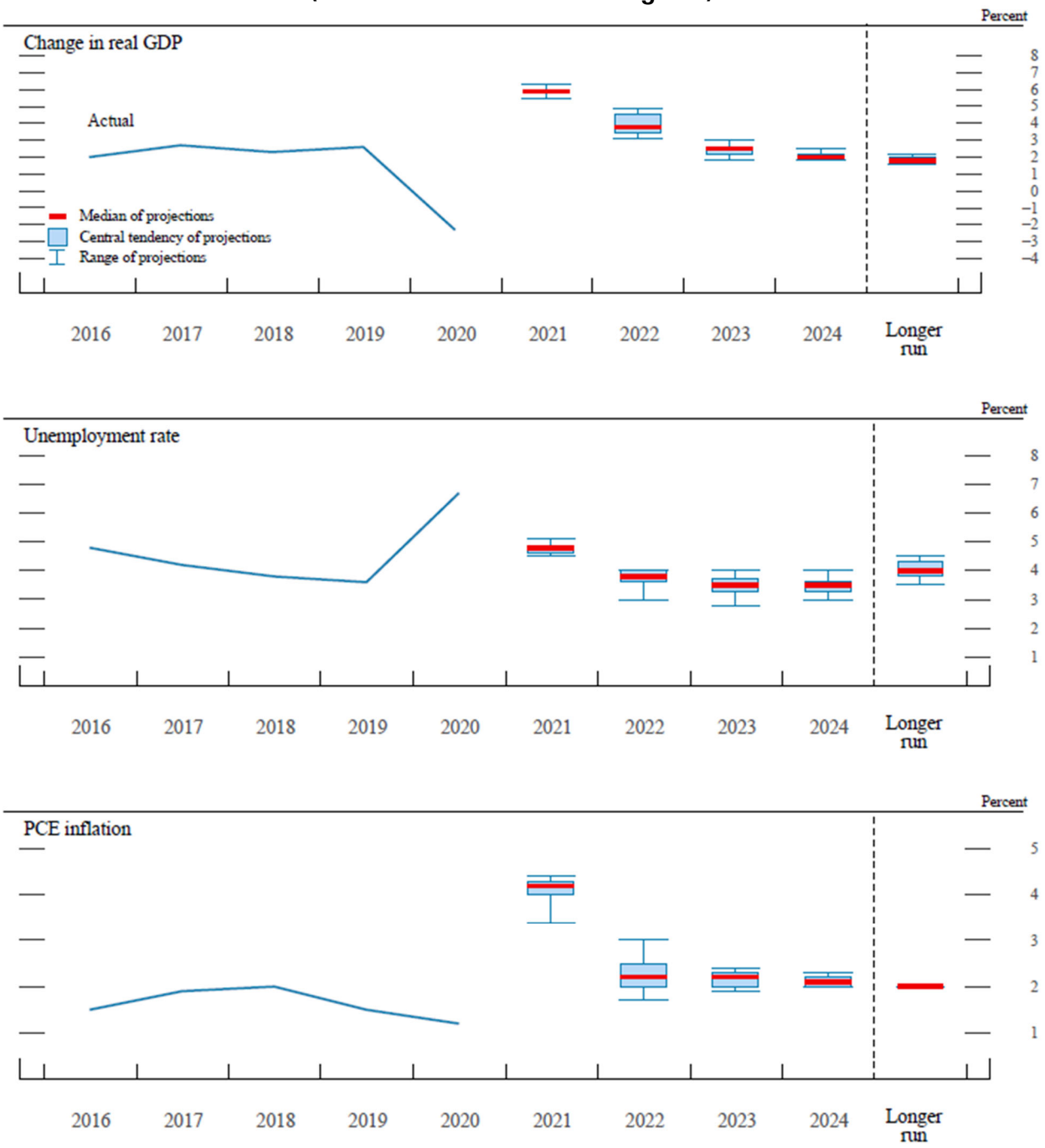


Source: Federal Reserve Economic Data (FRED)

FOMC Policy

One way to understand and anticipate potential Federal Reserve actions is to review individual and aggregated data provided through the Fed's published summaries of economic forecasts. For example, here are the results from the 9/22/21 Federal Open Market Committee report. Surveys are returned by Federal Reserve Board Members and Federal Reserve Bank Presidents.

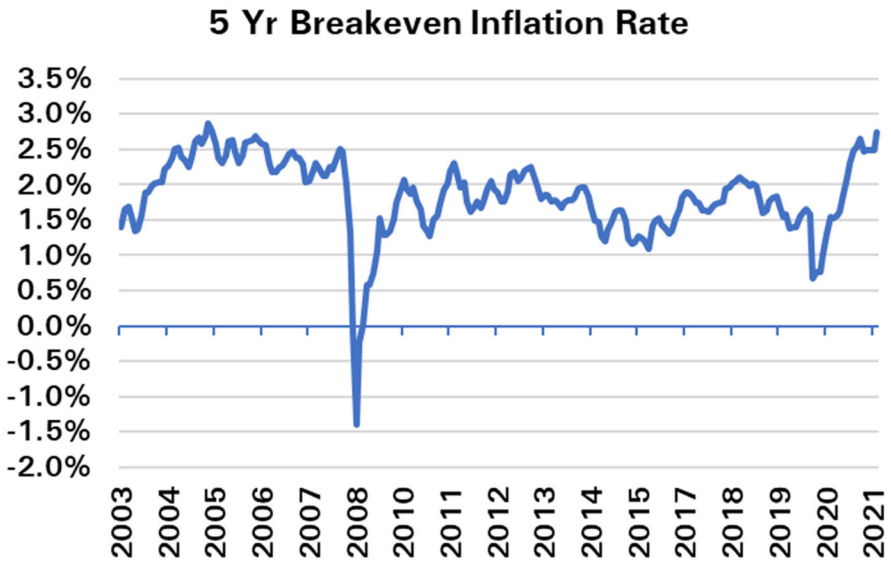
Medians, Central Tendencies, and Ranges of Economic Projections
(2021-24 and over the long run)



Source: Federal Open Market Committee, Summary of Projections, September 22, 2021

Let's quickly compare FOMC survey data to the market-based expectations for inflation over the next 5 years, as represented by the Breakeven Inflation Rate. It appears the market has inflation

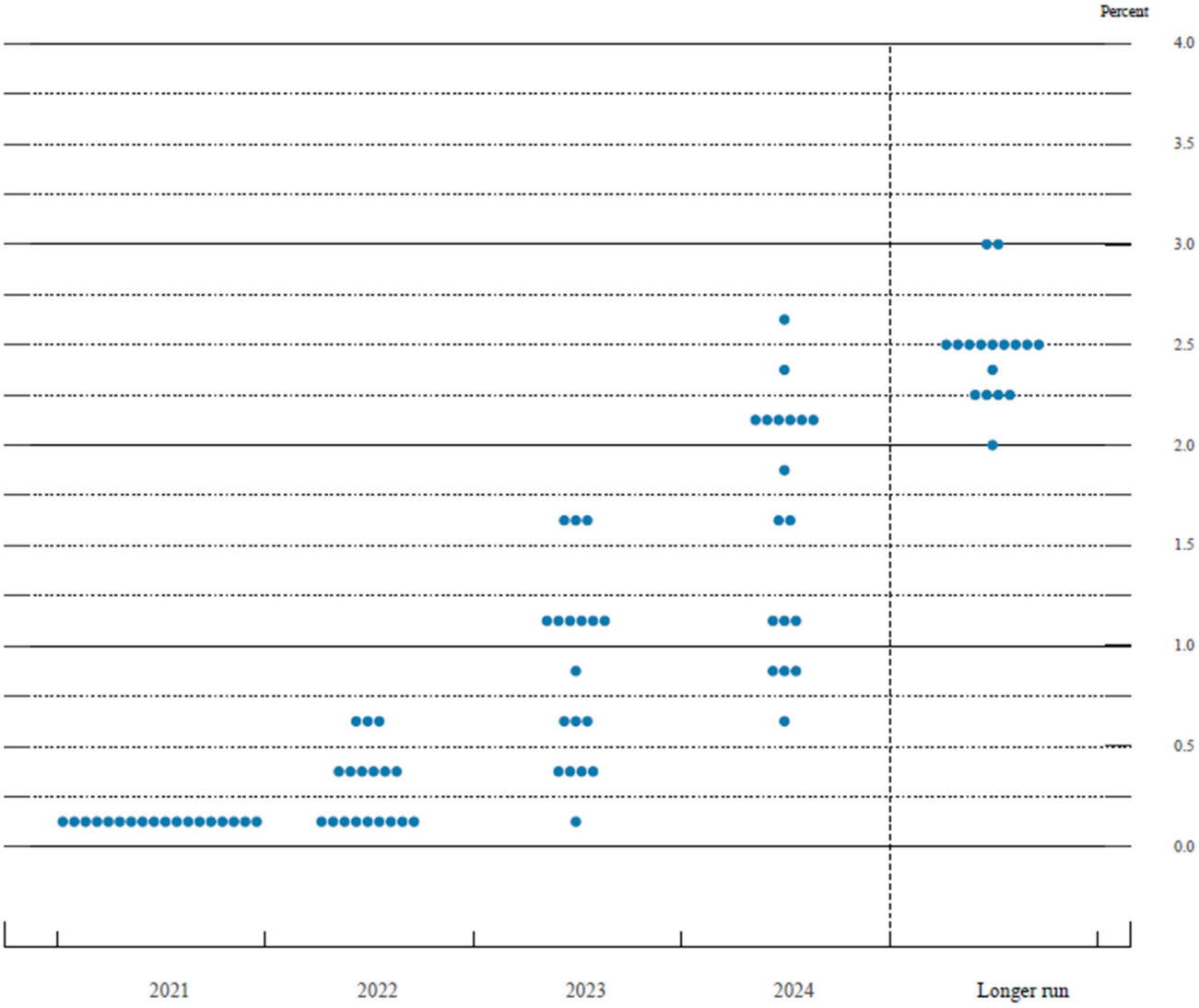
expectations that track the logic of FOMC forecasts in predicting transitory higher cost increases, followed by moderating inflation in subsequent years. Looking at the Fed PCE chart above and the 5-year break-even inflation rate below, in essence the **FOMC consensus is that following 2021 inflation will settle back into its target range of 2% to 3%, and the market-based expectations index currently shows an average inflation rate of 2.75 for the next five years. Both measurements will continue to rise and extend their predicted inflationary period if cost pressures don't soon show signs of future relief.**



Source: Federal Reserve Economic Data (FRED)

Perhaps the most famous FOMC indicator of all is what's known as the "Dot Plot", an aggregated survey of FOMC participants' prescriptions for monetary policy in the form of a target level for the Fed Funds Rate.

FOMC Participants' Assessments of Appropriate Monetary Policy
Midpoint of target range or target level for the federal funds rate



Source: FOMC Summary of Projections, September 22, 2021

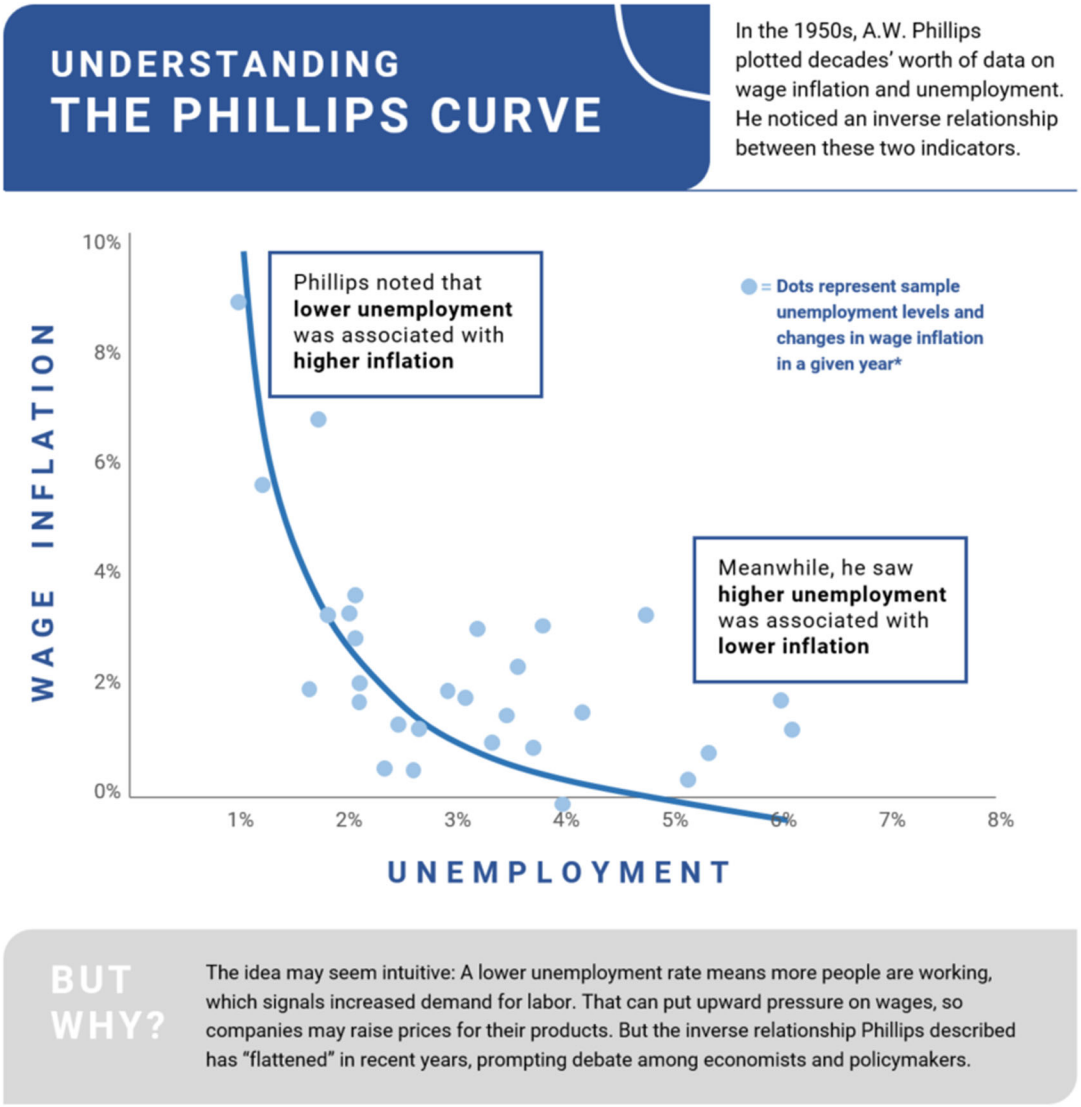
From the most recent Dot Plot we can conclude that the FOMC believes/hopes they will be able to tighten and taper from a current negligible Fed Funds Rate to more than 2% over the longer run. Note that in 2022 the dots show only three dots above 0.5%.

Supplement/Extra Credit - (Approx. 12 Minutes to Read)

The Historic Role of the Federal Reserve

In all the years before the Federal Reserve was conscripted by the political winds and began adding to its policy portfolio, the institution operated under a dual mandate, to achieve maximum sustainable employment (a low unemployment rate) and price stability (low inflation). To aid in executing on its previously understood mission, among the gauges the Fed actively monitored was the Phillips Curve, which was thought to reliably model an inverse relationship between unemployment and inflation—that is, until actual U.S. economic experience beginning in the late 1970's broke the model.

Theoretical Phillips Curve



*This illustration is intended for conceptual purposes only. It's partly modeled on the Figure 1 scatterplot on Page 285 of Phillips' 1958 paper, which contained 1861-1913 data. Each dot represents a year. The vertical axis shows the average rate of change of money wage rates; the horizontal axis shows average unemployment.

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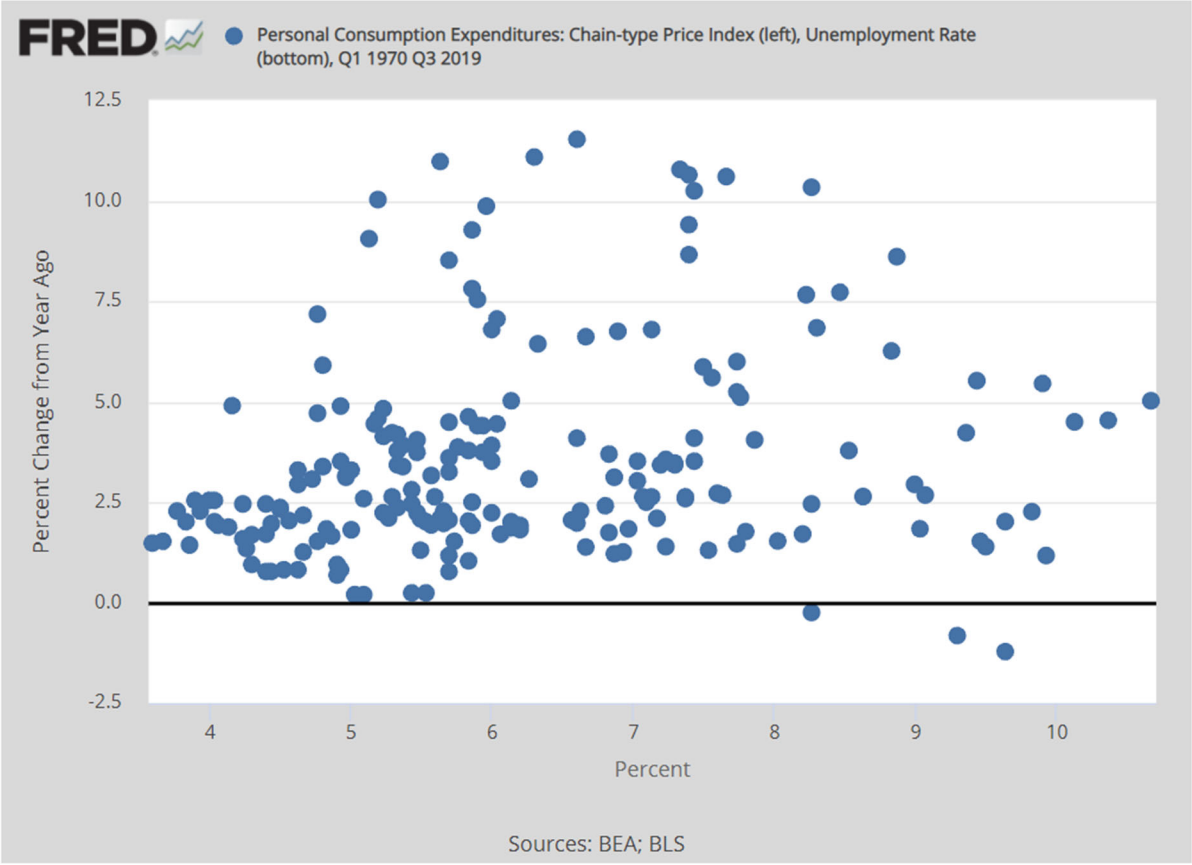
The actual Phillips Curve beginning in 1970 does not resemble a curve. The relationship between inflation and unemployment appeared to have fractured and the resulting pattern has disaggregated. There is another way of drawing this in which you could instead say the Phillips Curve has "flattened". Picture, for example, on the chart above, if low unemployment doesn't push inflation up, then the curve becomes flatter. The chart below, putting the dots where they occur, is where it begins to look more like abstract art.

Actual Phillips "Curve"



Note: The popular press focuses on the Consumer Price Index. The Fed anchors its inflation targets to the Personal Consumption Expenditures Index. The following are but a few of the key distinctions between the two indices:

The CPI tends to run a higher average rate than the PCE Index. Both indices have "headline" versions and "core" measures which exclude more volatile food and energy prices. The CPI is produced by the Bureau of Labor Statistics while the PCE comes from the Bureau of Economic Analysis. The BLS data derives from consumer surveys while the BEA data uses business surveys. The CPI is focused on urban consumer prices, and the PCE considers broader areas.

There are many competing theories for why since the 1980s the Phillips Curve has not behaved as history would have indicated. These hypotheses include: i) the possibility that low inflation expectations themselves have caused lower inflation; ii) structural changes in the labor market may be keeping a damper on wages; iii) monetary actions of the Fed have prevented large swings in inflation; iv) technological and productivity advances have reduced cost pressures; v) increased global trade has altered the way inflation is produced. None of these explanations has proved satisfactory, so perhaps academics will feel more comfortable now that—at least for the moment—inflation is coinciding with low unemployment.

Policy Updates

To get inside the mind of the central bank's policy transition over time and up to today, it's instructive to read a few sentences from several key FOMC/Fed policy statements, starting with the FOMC's January 25, 2012 press release:

> *"The inflation rate over the longer run is primarily determined by monetary policy…The Committee judges that inflation at the rate of 2 percent, as measured by the annual change in the price index for personal consumption expenditures, is most consistent over the longer run with the Federal Reserve's statutory mandate.*
>
> *The maximum level of employment is largely determined by nonmonetary factors…These factors may change over time and may not be directly measurable. Consequently, it would not be appropriate to specify a fixed goal for employment…*
>
> *In setting monetary policy, the Committee seeks to mitigate deviations of inflation from its longer-run goal and deviations of employment from the Committee's assessments of its maximum level. These objectives are generally complementary. However, under circumstances in which the Committee judges that the objectives are not complementary, it follows a balanced approach in promoting them…"*

The Statement on Longer-Run Goals and Policy Strategy was amended in January 2016 with some of the following language (excerpts):

> *"The Federal Open Market Committee (FOMC) is firmly committed to fulfilling its statutory mandate from the Congress of promoting maximum employment, stable prices, and moderate long-term interest rates."* **(Editor's Note: That's three things. Dual mandate?).**
>
> *"The Committee reaffirms its judgment that inflation at the rate of 2 percent, as measured by the annual change in the price index for personal consumption expenditures, is most consistent over the longer run with the Federal Reserve's statutory mandate. The Committee would be concerned if inflation were running persistently above or below this objective.* **(Editor's Note: In other words, 2% is a target, not a floor or a ceiling).**

And here we have the Fed's latest policy update, dated January 26, 2021.

> *"The Committee judges that the level of the federal funds rate consistent with maximum employment and price stability over the longer run has declined relative to its historical average. Therefore, the federal funds rate is likely to be constrained by its effective lower bound more frequently than in the past. Owing in part to the proximity of interest rates to the effective lower bound, the Committee judges that downward risks to employment and inflation have increased.*
>
> *"The maximum level of employment is a broad-based and inclusive goal that is not directly measurable…The Committee intends to review these principles and to make adjustments as appropriate at its annual organizational meeting each January, and to undertake roughly every 5 years…""*

Editor's Note: Statements like these make it very clear the Fed entered 2021 thinking that it still hadn't encountered average inflation above 2% and was willing to pursue an accommodative monetary policy in order to achieve other objectives such as reducing the unemployment rate for marginalized groups. In other words, the Fed believed it could keep the pedal down for a while without stoking inflation significantly above 2%. Recent data leave the Fed and observers watching carefully to see if inflation risks may be more substantial than at first thought. If Congress walks back its spending plans, perhaps the Fed would continue to move slowly. However, if the added fiscal stimulus hits the economy, inflation would undoubtedly increase and the Fed may be forced to shift its focus from inclusive employment to slowing inflation. This would result in increasing interest rates to stem the tide of inflation, similar to the actions taking by Paul Volcker from 1979 to 1981. The question would become whether Congressional stimulus could get job growth and wage gains going enough to offset the negative effects of rising interest rates and inflation. Again, there is little precedent in aging, developed economies for running so hot such a large and old engine.

As Fed Vice Chair Richard Clarida noted in a speech on October 12, 2021, fiscal policy has already resulted in $2 trillion of accumulated excess savings as a result of unspent transfer payments. These dollars will hit the economy at some future point regardless of new rounds of stimulus. Clarida also spoke to the Fed's recent views of inflation, employment and their influence on tapering policy.

"Since February 2020, core PCE (personal consumption expenditures) price inflation is running at a 2.9 percent annual pace that is well above what I would consider to be a moderate overshoot of our 2 percent longer-run goal for inflation. I myself believe that the "substantial further progress" standard has more than been met with regard to our price-stability mandate and has all but been met with regard to our employment mandate…As we reaffirmed in September, we continue to expect that it will be appropriate to maintain the current 0 to 1/4 percent target range for the federal funds rate until labor market conditions have reached levels consistent with the Committee's assessment of maximum employment and inflation has risen to 2 percent and is on track to moderately exceed 2 percent for some time. At least half of the 18 FOMC participants in their Summary of Economic Projections (SEP) submissions projected that these necessary threshold conditions for liftoff will be met by December 2022, and all participants but 1 project that these conditions will be met by December 2023."

As mentioned earlier, the FOMC met November 2-3, 2021 and began its tapering process. Here are the key comments in the latest press release:

"The Committee decided to keep the target range for the federal funds rate at 0 to 1/4 percent and expects it will be appropriate to maintain this target range until labor market conditions have reached levels consistent with the Committee's assessments of maximum employment and inflation has risen to 2 percent and is on track to moderately exceed 2 percent for some time…the Committee decided to begin reducing the monthly pace of its net asset purchases by $10 billion for Treasury securities and $5 billion for agency mortgage-backed securities…"

Taylor Rule

To evaluate Fed policy over the past few decades, it's important to understand the Taylor Rule, created in 1992 by Stanford economist John Taylor (full disclosure: Taylor was an economics professor of the editor of this white paper). Taylor believes that the inflationary debacle of the 1970s was the result of poorly coordinated policy. His observation and prescription are relatively simple: the Fed should raise rates when inflation is high and/or employment levels are high, while the Fed should lower

rates when inflation is low and the labor market is weak. To determine how and when the Fed should change the Fed Funds Rate, he outlined a simple formula designed to cause policy adjustments when a gap emerges between the Fed's targeted inflation rate and the economy's actual inflation and/or a gap between expected GDP growth and actual GDP results.

There are many different versions, but we would summarize the bones of the equation like this:

Target Fed Funds Rate = Neutral (short-term) Interest Rate + 0.5 * (Expected/Actual GDP – Long-Term GDP Growth) + 0.5 * (Expected/Actual Inflation – Target Inflation)

Some shorthand the original rule even further to say that Taylor thought the Fed Funds Rate should be 1.5x the rate of inflation. Again, the basic idea here is that if actual inflation or growth deviate too far from Fed expectations and targets, policy should adjust accordingly. Our own view is that the greatest limitation is that the Taylor Rule doesn't necessarily help the Fed or other policy makers navigate the most challenging condition of all—stagflation.

Nonetheless, the Taylor Rule is a key tool used as a reference and policy framework, and it can be predictive of eventual Fed behavior. Right now, the Taylor Rule would indicate that the Fed Funds Rate is far too low to account for the current rate of inflation, and most forecasts based on the rule would prescribe that the Fed Funds Rate should be increased from the current target range of 0.0% to 0.25% to a range of 3% to 5%. The Morrison Street Research calculation of the Taylor Rule shows that given relevant inflation and GDP measurements, the Fed Funds Rate should currently sit around 3.5%.

Taylor himself wrote an editorial on August 12th of this year suggesting that his use of the formula indicates that when using the trailing four quarters of actual inflation, the current Fed Funds Rate should be 5% in order to avoid unacceptable levels of inflation. He also noted that even if inflation falls to 2% and the output gap is zero, the Fed Funds Rate should be 3%. His opinion is that the Fed has recently deviated wildly from monetary policy rules in order to pursue other objectives, and they will have no choice but to eventually recognize the consequences of an unduly low Funds Rate and revert to a naturally higher policy rate.

However, there are limitations to the rule. First, it relies on real-time quality data, otherwise the Fed may act too soon or too late, and too aggressively or too cautiously. Some have observed that because Fed policy has closely tracked Taylor's formula for the past few decades, perhaps the rule itself should be blamed for an extended period of low interest rates. There are now many different variations of the rule offered by economists, some that say the original 2% neutral rate assumption is antiquated, and a more appropriate input might be a risk-free rate less inflation. However, this concept would have resulted in a negative Fed Funds Rate following the 2009 Financial Crisis.

Keynesian (Demand-Side) Theory

As a reaction to the Great Depression, British economist John Maynard Keynes diverged from classical economics to postulate a more active role for government in managing the economy, in particular that in times of high unemployment, central banks could increase the money to create economic growth and Congress could add fiscal stimulus, all to increase growth and employment without causing inflation. What Keynes described as classical economics had traditionally taken more of a hands-off approach, assuming that distress and profit opportunities would attract private capital and be the cure that would clean up bad debts, and reinvigorate the economy. Classical theory maintained that increased unemployment would also lead to lower wages and prompt employers to rehire. A simple explanation of this theory might be to say that Keynes felt as though allowing the business cycle to

become so prolonged and pronounced was unnecessary, that government intervention could mitigate recessions and prevent depressions. Keynes and his successors took it further to argue that as a replacement to private investment, government spending and additions to the monetary supply come with a multiplier effect. Keynes' demand-side theory (government intervention to stimulate demand) was challenged by the U.S. battle with inflation in the 1970's. Under Keynesian theory, the medicine that Congress and the Fed could apply (more fiscal and monetary stimulus) would only serve to make the problem worse.

Monetarist Theory (Supply-Side)

Economist Milton Friedman came along to help make more sense of the monetary puzzle. There are those who think Keynes and Friedman contradict each other, and those who think that Friedman's ideas were complementary to Keynesian economics. In essence, both agreed that business cycles left to their own devices could be extreme, and that there is a role for government to play in managing through economic downturns. However, where Keynes viewed government's role as one merely of stimulating demand, Friedman believed the central bank needed to be careful in managing the supply of money. Monetarist theory argues that above all else, the supply of money is the single greatest determinant of growth and inflation. The theory hinges on this simple formula: $MV = PQ$, where M is the money supply, V is the velocity, P is the price of goods and services and Q is the quantity of goods and services.

Milton Friedman also proposed a few rule ideas that are interesting to think about in today's environment. These concepts were driven by the notion that the economy and the markets would be more stable and produce low inflation combined with solid growth if a known set of rules are followed. The primary Friedman Rule would seek to set the nominal interest rate at zero, with the goal of insuring holders of cash don't lose money on a real basis due to inflation alone. Since Treasury yields imply inflation expectations plus the real (after inflation) rate, this rule would require the Fed to target a deflationary real interest rate on government securities. Another of Friedman's proposed policies, the "K-Percent Rule", would require that the growth in the money supply be limited to the rate of GDP growth. Clearly the Fed has thrown this idea out the window, as the money supply has wildly outgrown the rate of GDP growth during this cycle, increasing some 119% since the beginning of 2020.

Modern Monetary Theory

Modern Monetary Theory ("MMT") is a newer DIY economic theory that originated on trading floors, found its way into internet chat rooms, and has now reached a national audience in a few recent political campaigns in the U.S., most notably those of Bernie Sanders and Alexandria Ocasio-Cortez. The theory was first proposed by a trader and self-trained economist named Warren Mosler. Mosler profited from investments in Italian bonds in the early 1990's thinking that government would find a way around the default. Today the public flag of MMT is most often flown by Professor Stephanie Kelton at Stony Brook University, a key policy advisor of Senator Sanders. The relevance here is that many of the Congressional spending plans submitted over the past few years have some grounding in this largely untested theory.

The crux of MMT is that since the U.S. is no longer on the gold standard and the U.S. government controls the currency and money supply, there is no limit to what it can print and spend. The theory essentially argues that a government doesn't function like a household or business, and therefore doesn't need to match its revenues and expenses. If a government decides to spend more than it receives in revenue, the concept prescribes that it simply expand the money supply to fill the gap. The most memorable part of the theory is that if inflation begins to run too hot, the government could

increase taxes, causing taxpayers to source currency to pay their tax, and then the government could shred or burn or otherwise destroys the currency. Voila, the money supply is reduced.

MMT, as a new upstart concept, is known as a post-Keynesian theory, and owes some of its origins to predecessor schools of thought such as "functional finance" and "chartalism". Functional finance was an offshoot inspired by Keynes and argues for government control of business cycles through deficit spending to achieve what is essentially now the Fed's dual mandate concept of low inflation and low unemployment. Chartalism postulates the monetary value does not derive from the traditional understanding of being anchored to something tangible like a metal, nor does it owe its value to being the medium of exchange between consumers and businesses. Rather, chartalism says the form and value of a currency is simply whatever the government decides it to be. As an extreme example to illustrate the concept, the government could decide that pink unicorn stickers are the form of currency, they are each worth one unicorn unit, and if the government needs money, it doesn't even need to tax or borrow to get it, it just prints more money. In the old days, that would have meant making more pink unicorn stickers. Today it means merely adding entries to its computer ledgers indicating more pink unicorn stickers exist.

It would be an understatement to say that most classical, Keynesian, and monetarist economists view Modern Monetary Theory with skepticism, even some of those with highly interventionist tendencies. This is in part because MMT has to make some very convoluted and untested arguments regarding how in practice the government would prevent and/or stop runaway inflation. MMT is an extreme extension of the Keynesian theory, which had provided a helpful framework for understanding the Great Depression, but not at all for solving the 1970s. Therefore, until MMT can demonstrate more robustly either in theory or in practice how it proposes to solve inflation caused by fiscal and monetary interventions, this theory will remain outside the bounds of traditional scholarship.

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