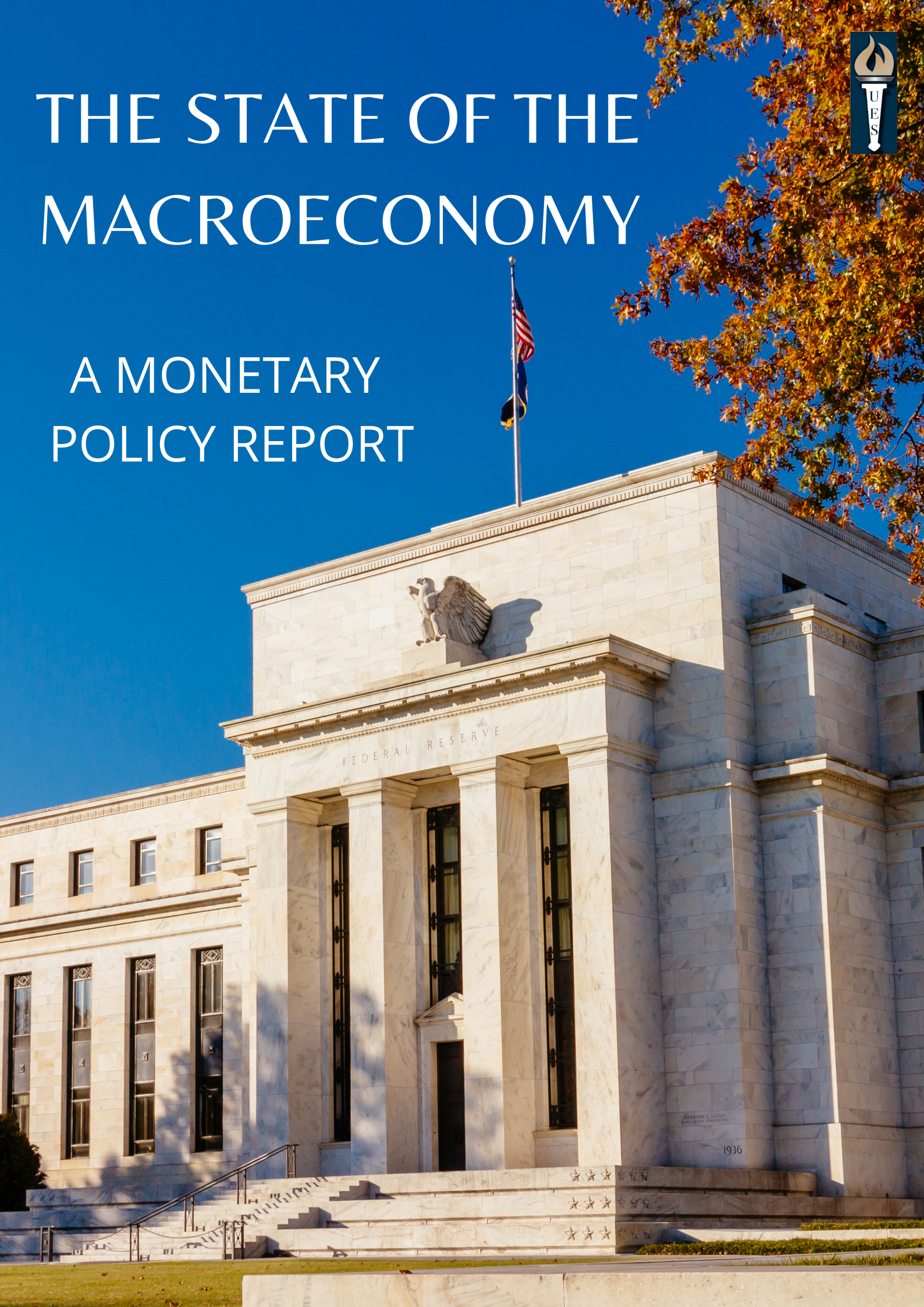
THE STATE OF THE MACROECONOMY

A MONETARY POLICY REPORT



The State of the Macroeconomy: A Monetary Policy Report

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Dear Reader,

We are pleased to share with you the first volume of The State of the Macroeconomy: A Monetary Policy Report. This extensive analysis is the culmination of my 6-person analyst team's deep dive into the world of the Federal Reserve.

I wanted to create this research opportunity for these passionate analysts as we select competitors for our 2022 Federal Reserve College Challenge Team. These six economics scholars eagerly took to the test and surpassed all expectations; immersing themselves in all things Fed and choosing focus areas based on their specific interests. Each of these focus areas required deep specialization and new forms of quantitative analysis, yet still culminated in an all-encompassing dissection of the Fed's macroeconomy. I have become increasingly impressed with the stimulating discussions in our weekly meetings over the course of this research. Especially watching the lightbulb moments happen - when they realize how their topics are intertwined, and how a possible solution can be pieced together - that is what I hoped to see when I started this project.

While this paper focuses on a current analysis of macroeconomic conditions and establishing the short-run future of the macroeconomy, we specifically tailored research to be of reactions to monetary policy and potential solutions similar to that of a Federal Reserve Report. It has provided excellent preparation prior to the 2022 National College Federal Reserve Challenge where our analyst team will be representing The George Washington University and hoping to defend our finalist recognition and 1st place win in the Richmond Federal Reserve region.

Please enjoy all of the hard work and fantastic analysis in the Quarter II, Fiscal Year 2022 edition of The State of the Macroeconomy: A Monetary Policy Report by Federal Reserve Research Analysts at the Undergraduate Economics Society!

Sophia Chin
Federal Reserve Program Chair

INTRODUCTION

As the global macroeconomy recovers from the pandemic, people return to their pre-pandemic life, and the War in Ukraine continues, inflation in the US has reached its highest point in decades. The US unemployment rate has almost returned to pre-pandemic levels, and GDP growth continues to remain positive but is slowing down since its pace in the fourth quarter of 2021. The US wage is at a record-high, and the jobs market is booming in a tight labor market. The housing market is also heating. As the Federal Reserve (Fed) deals with the current state of the US economy, there are concerns over triggering another recession.

In accordance with the Fed's dual mandate to achieve maximum employment and price stability of 2%, our analyst team recommends the Fed increase the federal funds rate (FFR) by 50 basis points during the May Federal Open Market Committee (FOMC) meeting and by 25 basis points for every following meeting until the end of the year to combat inflation. Increasing the FFR demonstrates a strong commitment to stabilizing the price level, and our recommendation takes into consideration how other parts of the economy may react to avoid triggering a recession. The Fed should also reduce its Treasury securities, agency debt, and mortgage-backed securities to counter a heating housing market. The continued quantitative tightening of the balance sheet should proceed with caution, as this policy has never been pursued alongside an increasing FFR. As the Fed moves towards these policies, we strongly emphasize that the Fed continually employs forward guidance in all sectors of the economy to influence market expectations and reactions to avoid triggering a recession from these policies.

This report will provide a detailed analysis of the current situation in the US economy with GDP, inflation, unemployment, the FFR, real estate and the housing market, and quantitative easing/tightening and the assets market. Each section will define key terms, offer

forecasts for future macroeconomic conditions, and make more specific policy recommendations for each sector.

GROSS DOMESTIC PRODUCT

Gross domestic product (GDP) is a measure of all newly produced final goods and services in a country during some period of time and serves as an indicator of the health of an economy. GDP generally reflects past conditions, but it impacts current markets if reported GDP numbers are different than expectations.

Current News

At the onset of the COVID-19 pandemic in 2020 in the United States, GDP dropped by almost $2 billion from the previous year. With people staying at home, consumption spending dropped, specifically the personal consumption expenditure fell by 3.9% in 2020, and there was little economic activity.[1] The economy entered a recession and has been recovering ever since, with the help of government stimulus programs, unemployment insurance, and the development of vaccines for COVID that increase consumer expectations.

Currently, there is positive growth in the United States's GDP, especially in the fourth quarter of 2021 (Figure 1.1).[2] Growth is slowing down after a nearly two year climb though, as a result of inflation, inventory swings, and the trade deficit. Supply chains have been a consistent issue throughout the pandemic, limiting the capacity to consume. Inflation hit a record 7.4% in March, and consumer spending has dropped as a result of higher prices.[3] However, reports from

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[1] Akrur Barura, "A spring in consumers' steps: Americans prepare to get back to their spending ways," *Deloitte*, June 28, 2021, https://www2.deloitte.com/us/en/insights/economy/us-consumer-spending-after-covid.html

[2] U.S. Bureau of Economic Analysis, Gross Domestic Product [GDP], retrieved from FRED, *Federal Reserve Bank of St. Louis*; https://fred.stlouisfed.org/series/GDP, April 22, 2022

[3] WSJ Staff, "Economy Week Ahead: Economic Growth, Inflation in Focus," *The Wall Street Journal*, April 24, 2022, https://www.wsj.com/articles/economy-week-ahead-economic-growth-inflation-in-focus-11650826801.

the members of the Federal Open Market Committee (FOMC) from the Federal Reserve still project a 2.8% GDP growth this year and 1.8% growth in the longer run.[4]

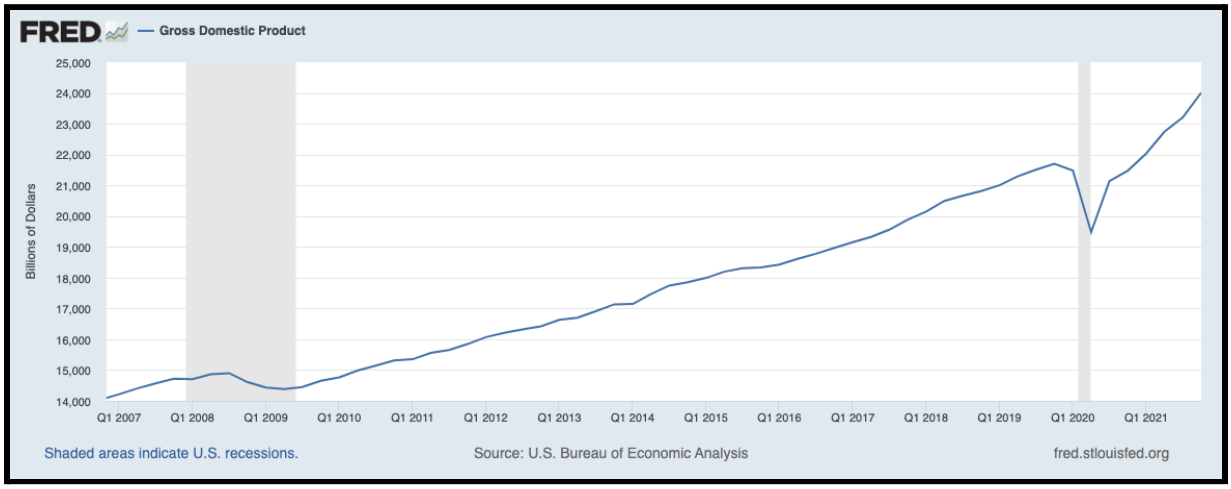

Figure 1.1: GDP from Q1 of 2007 to Q1 of 2022 measured in billions of dollars

Components of GDP

There are two important types of GDP measured, nominal GDP and real GDP. Nominal GDP is the product of current prices and current quantities, whereas real GDP is the product of base year prices and current quantities, accounting for inflation. There are three different ways to measure GDP: the production approach, the income approach, and the expenditure approach.[5] The production approach is the sum of the value-added to the economy from each step of production. The income approach is the measure of the incomes created by production. Finally, the expenditure approach is the sum of the value of the purchases made by consumers such as individuals, businesses, and the government. The formula for the expenditure approach is GDP = Consumption + Investment + Government Spending + Net Exports. While not all economic

[4] Federal Open Market Committee, "Summary of Economic Projections," *FOMC Meetings*, (March 16, 2022):1-17, https://www.federalreserve.gov/monetarypolicy/files/fomcprojtabl20220316.pdf
[5] Tim Callen, "Gross Domestic Product: An Economy's All," *International Monetary Fund*, February 24, 2020, https://www.imf.org/external/pubs/ft/fandd/basics/gdp.htm

activities are included in this GDP equation, such as transfer payments and transactions of used goods, changes in GDP help us understand the economic growth in a nation.[6]

Durable and Non-Durable Goods

Durable goods are defined as goods that are expensive and expected to last three or more years.[7] When considering the consumption part of the GDP equation, it is helpful to understand consumer preferences and common baskets of goods. There are consumer durable goods like furniture and appliances, and business durable goods such as machinery and equipment. Nondurable goods are less expensive and are expected to last less than three years.[8] When durable goods orders increase, it is an indicator that consumers and businesses believe the economy will improve in the future. On the other hand, a drop in durable goods orders can indicate an oncoming recession as consumers lose faith in the future of the economy.

Orders for durable goods dropped off at the beginning of the COVID-19 pandemic, but as demand for services and expenditures outside of the home decreased because of worldwide quarantines and lockdowns, households specifically began to purchase more durable goods like furniture and appliances and other aspects of home improvement.[9] This trend is the opposite of the 2007-2009 recession during which durable goods expenditures fell by 12%.[10] The recent shift contributed to positive GDP growth because of the increase in sales of high priced items, yet decreased demand for services still had a negative impact on GDP, as seen in Figure 1.2 which indicates the approximately two trillion dollar drop in demand for services at the onset of the

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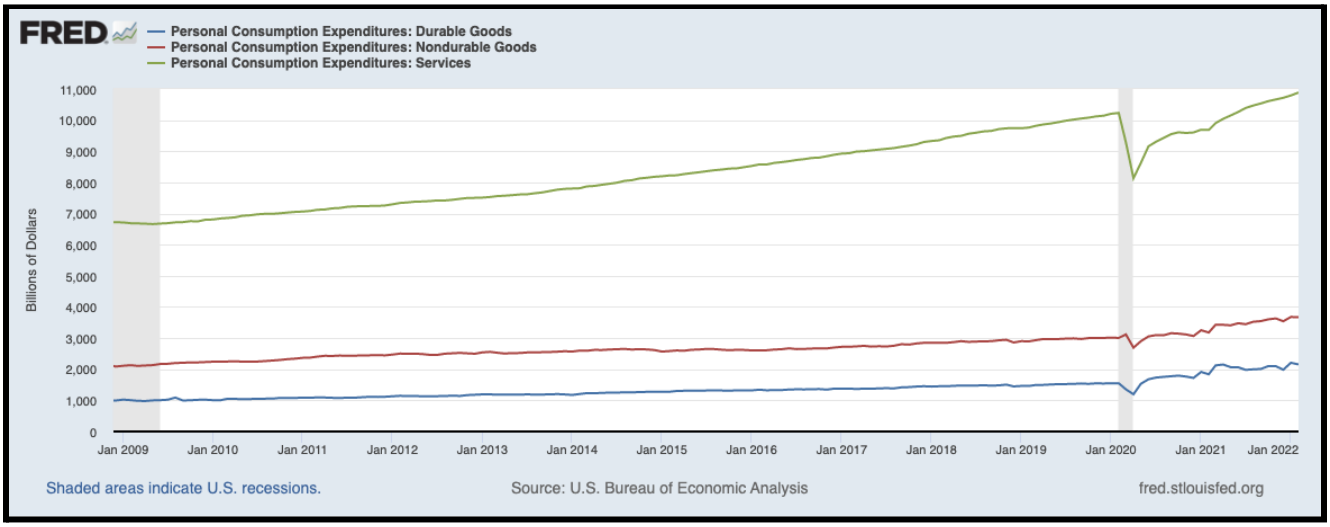
[6] Ibid.
[7] Kimberly Amadeo, "Durable Goods and How They Differ From Nondurable Goods," *The Balance*, January 28, 2022, https://www.thebalance.com/durable-goods-orders-report-3305739
[8] Kimberly Amadeo, "Durable Goods and How They Differ From Nondurable Goods," *The Balance*, January 28, 2022, https://www.thebalance.com/durable-goods-orders-report-3305739
[9] Ibid.
[10] Federal Reserve Bank of St. Louis, "Dips in Durables and Nondurables," *The FRED Blog*, August 16, 2018, https://fredblog.stlouisfed.org/2018/08/dips-in-durables-and-nondurables/

pandemic.[11] Now that the economy is opening back up, demand for durable goods is slowing, while demand for services is growing.

Figure 1.2: Personal consumption expenditures for durable goods, nondurable goods, and services 2009-2022



Orders for durable goods decreased by 2.2% in February of 2022, but new orders are up 14.2% year over year.[12] It will be an important trend to look out for if durable good orders continue to drop because it could indicate the economy is entering a recession, especially if inflationary pressures diminish demand as well. Figure 1.3 shows the personal consumption expenditures of durable goods since 2017, indicating the sharp decline in expenditures at the beginning of the pandemic, and the recent uptake in expenditures on durable goods.[13]

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[11] U.S. Bureau of Economic Analysis, Personal Consumption Expenditures: Durable Goods [PCEDG], retrieved from FRED, *Federal Reserve Bank of St. Louis*; https://fred.stlouisfed.org/series/PCEDG, April 22, 2022.
[12] Kimberly Amadeo, "Durable Goods and How They Differ From Nondurable Goods," *The Balance*, January 28, 2022, https://www.thebalance.com/durable-goods-orders-report-3305739
[13] U.S. Bureau of Economic Analysis, Personal Consumption Expenditures: Durable Goods [PCEDG], retrieved from FRED, *Federal Reserve Bank of St. Louis*; https://fred.stlouisfed.org/series/PCEDG, April 22, 2022.

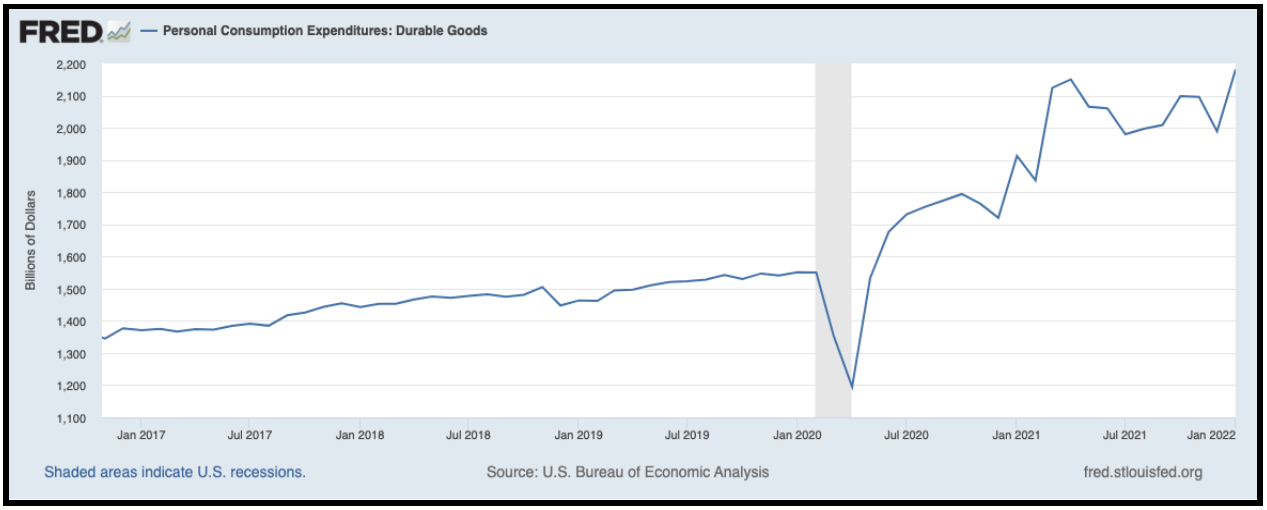

Figure 1.3: Personal consumption expenditures for durable goods from Q4 2016 - Q1 2022

Retail Sales

Retail sales have transformed over the last decade. As online retail options have become widely available the need for storefronts has diminished. From 2008 to 2009 during the recession, retail sales dropped by 3.6% and shops closed down.[14] Following the recession, consumer behavior has changed with a permanent decline in retail sales, forcing businesses to lower prices.[15]

Retail sales have been volatile over the past two years in a similar way to other areas of consumption. As the pandemic kept people at home, stores shut down and retail sales on any platform other than online became temporarily obsolete. In 2022, retail sales increased by 4.9% in January but increased at only 0.3% in February.[16] These numbers are not adjusted for inflation, so it is important to note the relationship between rising inflation and rising retail sales in terms of how much inflation has led to higher prices which translates to greater spending.

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[14] Lauren Hirsch and Lauren Thomas, "10 years after the financial crisis, Americans are still looking for a deal," *CNBC*, Sep. 18, 2018, https://www.cnbc.com/2018/09/18/ten-years-after-the-financial-crisis-were-still-looking-for-a-deal.html#:~:text=From%202007%20to%202008%2C%20sales,the%20pain%20of%20plummeting%20sales.

[15] Ibid.

[16] David Harrison, "U.S. Retail Sales Grew 0.3% in February," *The Wall Street Journal*, March 16, 2022, https://www.wsj.com/articles/us-economy-february-2022-retail-sales-11647375833

A large part of higher retail sales numbers is spending on gasoline and automobiles. Inflation and the ongoing war in Ukraine and economic sanctions against Russia have led to high prices in the United States, such as a 20% increase in food prices from last year, which takes larger portions of Americans' incomes.[17] For example, without gasoline and auto sales, retail sales were down 0.4% in February.[18]

Soon to be another impact on retail sales are interest rate hikes planned by the Federal Reserve throughout the year. As interest rates go up, consumers are forced to allocate more income towards paying interest rates as opposed to consumption such as in retail. However, Federal Reserve officials believe that the stimulus payments made by the government throughout the pandemic will help provide a layer of support to consumers in the face of high prices and higher interest rates.[19] Figure 1.4 shows current trends in retail sales, not accounting for inflation, while they have been on the rise, retail sales are beginning to increase at a decreasing rate.[20]

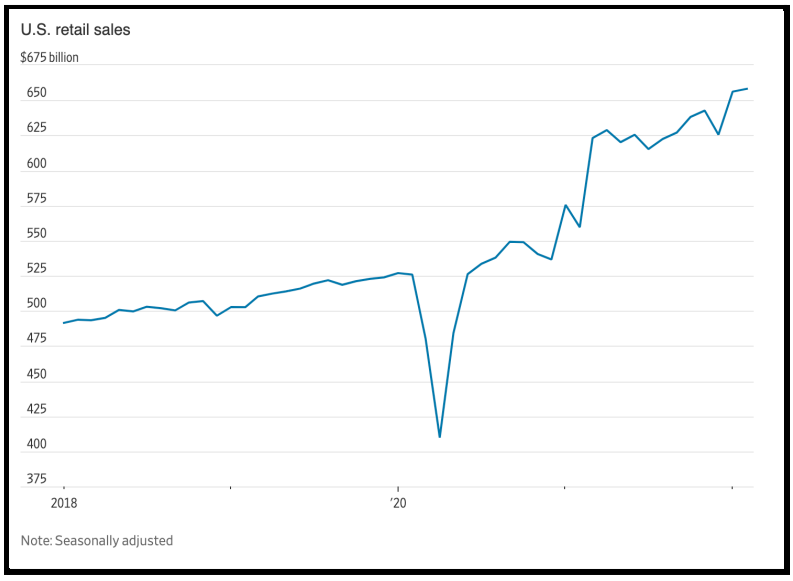

Figure 1.4: U.S. retail sales from 2018 to 2022 in billions of dollars, not adjusted for inflation.

[17] Alfons Weersink and Michael von Massow, "How the war in Ukraine will affect food prices," The Conversation, March 14, 2022, https://theconversation.com/how-the-war-in-ukraine-will-affect-food-prices-
[18] David Harrison, "U.S. Retail Sales Grew 0.3% in February,"
[19] Nick Timiraos, "Fed Raises Interest Rates for First Time Since 2018," *The Wall Street Journal*, March 17, 2022, https://www.wsj.com/articles/fed-raises-interest-rates-for-first-time-since-2018-
[20] David Harrison, "U.S. Retail Sales Grew 0.3% in February,"

If retail sales continue to rise, it will contribute positively to GDP growth as consumers feel comfortable purchasing in the economy and are still hopeful for the future. Moreover, inventories will fall, as demonstrated in Figure 1.5, with increased demand and production will increase.[21] Higher inventory numbers contribute positively to GDP temporarily but indicate that there is not enough demand to meet supply in the economy, and unsold goods go into inventories. Figure 1.5 below shows the inventories to sales ratio, before the pandemic, inventories remained at a higher but stable level in relation to sales, after the start of the pandemic, production slowed and inventories were liquidated.[22] Inventories remain low at this time but are expected to rise if higher interest rates prevent people from spending, sending unsold goods to inventories.

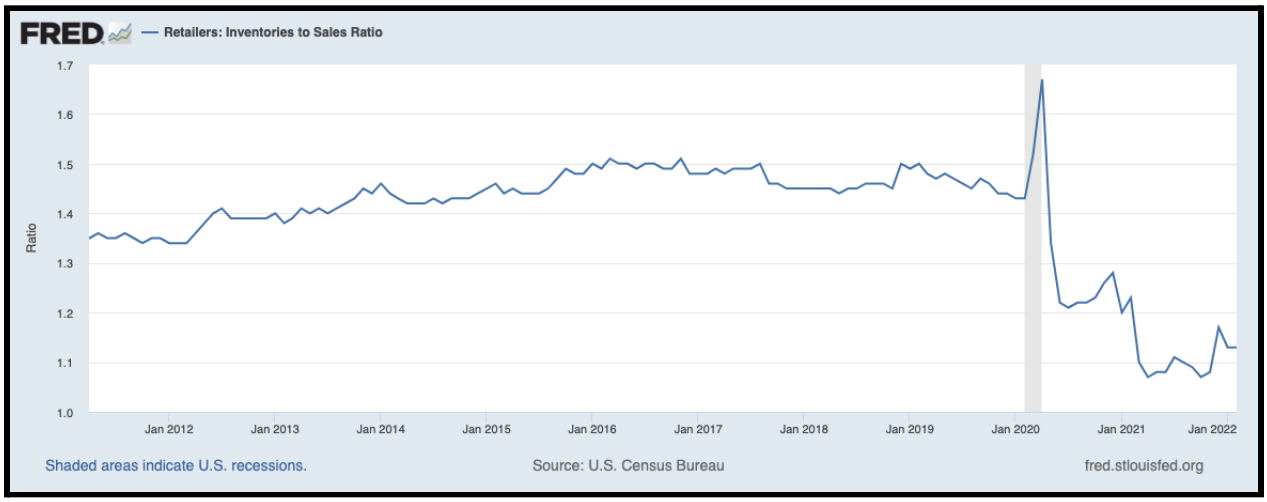

Figure 1.5: Inventories to sales ratio from January 2011 to January of 2022

Investment Spending Over the Pandemic

At the start of the pandemic, production slowed as demand for goods decreased, but when demand rose again, inventories were liquidated while manufacturers tried to restart production.[23]

[21] U.S. Census Bureau, Retailers: Inventories to Sales Ratio [RETAILIRSA], retrieved from FRED, *Federal Reserve Bank of St. Louis*; https://fred.stlouisfed.org/series/RETAILIRSA, April 23, 2022.
[22] U.S. Census Bureau, Retailers: Inventories to Sales Ratio
[23] Lucia Mutikani, "U.S. goods trade deficit narrows in February; still near record highs," *Reuters*, March 28, 2022, https://www.reuters.com/world/us/us-goods-trade-deficit-narrows-retail-inventory-accumulation-slows-2022-03-28/

Currently, domestic private businesses are increasing investment, as seen in Figure 1.6, which has the potential to increase the capacity to produce in the future.[24]

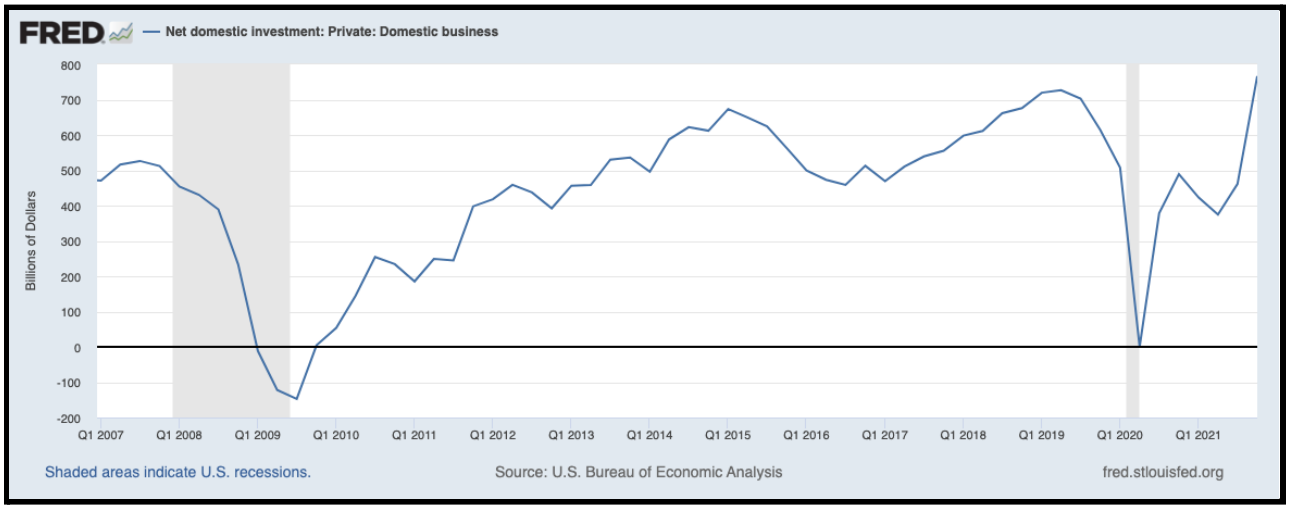

Figure 1.6: Net domestic investment from Q1 of 2007 to Q1 of 2022 measured in billions of dollars

Inventory investment is the change in private inventories as represented by the difference between production and sales during some period of time. Inventories contribute to GDP, so large inventories positively impact GDP growth. In the first few months of 2022, inventories grew, specifically retail inventories which grew 1.9% in January and 1.1% in February.[25]

Change in private inventories is an important economic indicator because, during recessions, inventory investment is negative because firms lower production and liquidate their inventories, but when the economy is doing well, inventory investment is positive as firms increase production and their inventories. For example, from the fall of 2008 to the fall of 2009 during the financial crisis, the stock of business inventory in the US fell by $100 billion.[26] As indicated by Figure 1.6, investment increased by 249.342 billion dollars in 2022.[27] This increase

[24] U.S. Bureau of Economic Analysis, Net domestic investment: Private: Domestic business [W790RC1Q027SBEA], retrieved from FRED, *Federal Reserve Bank of St. Louis*; https://fred.stlouisfed.org/series/W790RC1Q027SBEA, April 25, 2022.
[25] Lucia Mutikani, "U.S. goods trade deficit narrows in February; still near record highs,"
[26] George Alessandria, et. all., "The Great Trade Collapse of 2008-09: An Inventory Adjustment?," *International Monetary Fund*, January 2010, https://www.imf.org/external/np/res/seminars/2010/paris/pdf/alessandria.pdf
[27] U.S. Bureau of Economic Analysis, Change in Private Inventories [CBI], retrieved from FRED, Federal Reserve Bank of St. Louis; https://fred.stlouisfed.org/series/CBI, April 23, 2022.

is the highest in recent decades and has the opportunity to positively contribute to GDP. However, if the trade deficit continues to rise, and retail sales fall, and the demand for durable goods falls, the increase in inventories may have a neutral effect on GDP as we move back to equilibrium in the long run.

Government Spending

Recent news around government spending has been connected to unemployment benefits and stimulus checks aimed at boosting the economy during the pandemic. The government's budget deficit grew during the pandemic as a result of the $5 trillion of stimulus money.[28] The money was distributed to individuals, businesses, hospitals, local governments, and many other corners of the economy, with the goal of maintaining economic activity. It succeeded specifically in aiding poorer families and smaller businesses that relied on the extra cash flow to stay afloat.[29]

In the near future is the implementation of the $1.2 trillion Bipartisan Infrastructure Bill.[30] The core of the bill is the improvement of infrastructure and capital, which will inherently lead to the opportunity to increase productivity, which based on the Solow Growth Model where productivity equals capital per worker (Figure 1.7), will increase economic growth in the long run.

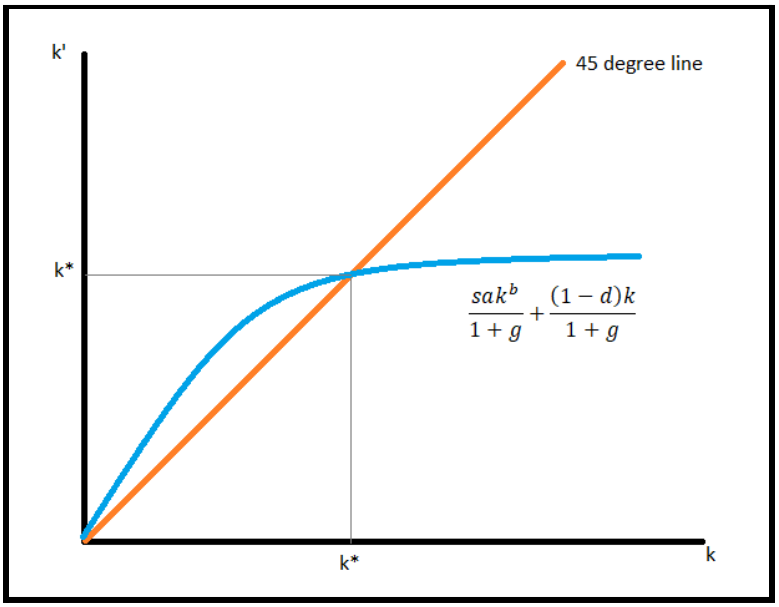

Figure 1.7: The Solow Growth Model

[28] Alicia Parlapiano, et. al., " Where $5 Trillion in Pandemic Stimulus Money Went," *The New York Times*, March 11, 2022, https://www.nytimes.com/interactive/2022/03/11/us/how-covid-stimulus-money-was-spent.html
[29] Ibid.
[30] Jonathan Ponciano, "Everything In The $1.2 Trillion Infrastructure Bill: New Roads, Electric School Buses More," *Forbes*, Nov. 15, 2021, https://www.forbes.com/sites/jonathanponciano/2021/11/15/everything-in-the-12-trillion-infrastructure-bill-biden-just-signed-new-roads-electric-school-buses-and-more/?sh=251bce58161f

Meanwhile, increased government spending positively adds to GDP. The debt to GDP ratio helps put this in perspective, with debt to GDP equal to total debt of a country divided by the GDP.[31] The higher this ratio, the harder it will be for the country in question to pay off its debt. With the Bipartisan Infrastructure Bill, the hope was that the additional added debt would be balanced out by the growth to GDP.

Net Exports

While other aspects of the GDP equation have experienced positive growth as the nation emerges from the pandemic, net exports have decreased, meaning that imports are greater than exports and the trade deficit is growing. The trade deficit dropped by only 0.1% from January to February, from $89.23 billion to $89.19 billion, and economists fear that the trade deficit will continue to detract from GDP in the first quarter of 2022 as it has for the past six quarters in a row.[32] Visualized by Figure 1.8, the green bars show the percentage points by which the trade balance adds or detracts from GDP, while the orange line is the projected trade balance of goods in billions of dollars.[33] The higher rate of imports as compared to exports is connected to supply chain issues with domestic exporters and the higher demand for imported goods among domestic consumers. Inventory and investment spending may be able to offset the negative impact of the trade deficit on GDP.[34] Following these projections, if net exports continuously contribute negatively by upwards of six percentage points, inventory investment would need to offset that negative contribution with at least a positive gain of six percentage points. In the fourth quarter of 2021, inventory investment contributed 5.32 percentage points to GDP growth, but that may not continue in the future.[35]

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[31] Will Kenton, "Debt-to-GDP Ratio," *Investopedia*, March 28, 2022, https://www.investopedia.com/terms/d/debtgdpratio.asp
[32] Josh Zumbrun, "U.S. Trade Deficit Narrowed Slightly in February," The Wall Street Journal, April 5, 2022, https://www.wsj.com/articles/u-s-trade-deficit-narrowed-slightly-in-february-11649162803
[33] Lucia Mutikani, "U.S. goods trade deficit narrows in February; still near record highs,"
[34] Ibid.
[35] Ibid.

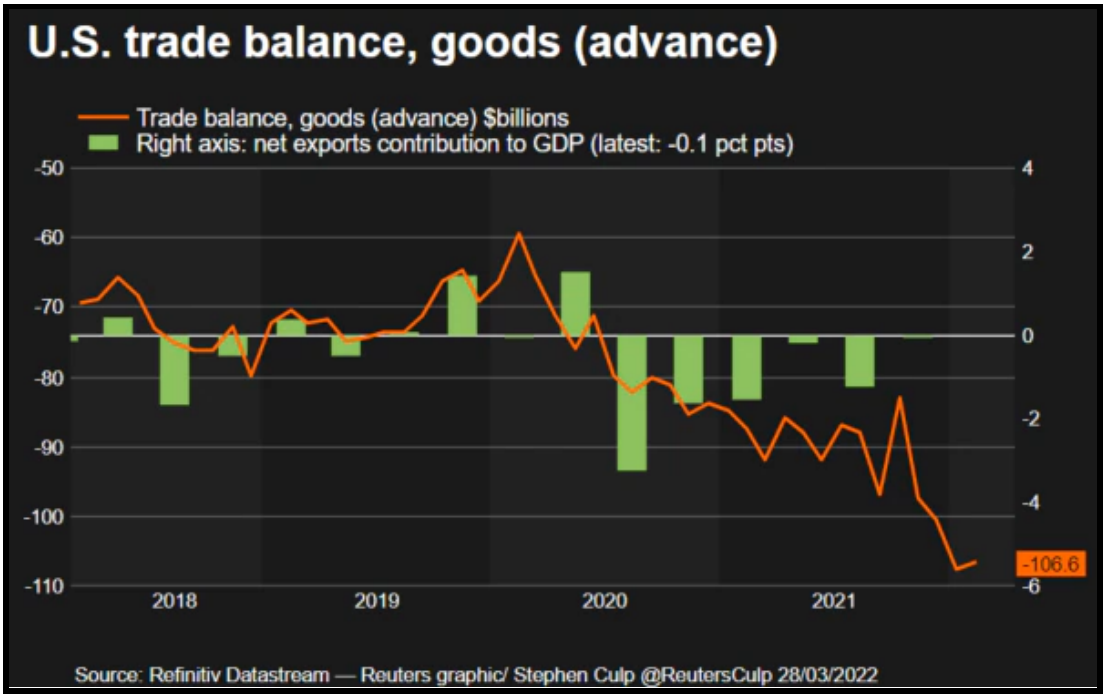

Figure 1.8: U.S. trade balance for goods and net exports contribution to GDP from Q4 2017 - 2022

Limitations of the Federal Reserve

The Federal Reserve, equipped with monetary policy tools to curb inflation and slow economic growth, has few tools to greatly stimulate economic growth. They can establish the federal funds rate and influence banks to charge higher interest rates, but there is no method to have banks lower their interest rates past the desired rate.

The Federal Reserve is currently attempting a "soft landing" in which they raise interest rates to curb inflation without sending the economy into a recession, that is, still maintain a level of GDP growth.[36] As supply issues persist and worsen, the task of attempting a soft landing becomes more difficult. The potential for the Federal Reserve to obtain a soft landing depends on mitigating inflation as it results from high demand mismatched with a lack of supply.[37] Meanwhile, the labor force is regrowing to pre-pandemic levels, loosening the tight labor market

[36] Greg Ip, "The Odds Don't Favor the Fed's Soft Landing," *The Wall Street Journal*, March 23, 2022, https://www.wsj.com/articles/the-odds-dont-favor-the-feds-soft-landing-11648045029
[37] Ibid.

as the demand for labor drops but job openings will remain at lower wages.[38] Under the dual mandate of monetary policy, a soft landing brings down inflation without having a drastically negative effect on unemployment. A "soft landing" is most favorable to maintain GDP growth but may require less aggression in combating inflation.

Forecast for the Remainder of 2022

Due to the current economic conditions, we forecast that gross domestic product will grow at a rate lower than the 5.7% growth last year, possibly by two or more percentage points. While consumption spending was up at the beginning of the year, analysis points to higher inflation and economic effects of the War in Ukraine, especially in regard to gas prices, which will decrease consumer spending. Also, supply chains are still constrained, especially with new lockdowns in China, backing up shipments around the world. These negative, dynamic factors are important to monitor throughout the year.

Our analyst team predicts there will continue to be a decrease in retail sales, similarly connected to high inflation, as well as a decrease in orders for durable goods. This is an important economic indicator to look out for because it may indicate a lack of faith from consumers and investors towards the future health of the economy. Analysis predicts that change in private inventories will remain a positive contributor to GDP, especially in the fourth quarter, but we argue it will not be enough to offset losses in other areas of the GDP equation. As the Federal Reserve increases interest rates throughout the year, there will be less of an incentive to spend and more of an incentive to save, further detracting from GDP. It will also be more expensive for businesses to invest. In regards to net exports, higher interest rates will make imports from abroad cheaper in the United States, while United States exports will be more expensive, this will further grow the trade deficit and detract from GDP.

[38] Ibid.

Monetary Policy Recommendations for the Federal Reserve

The current plans from the Federal Reserve for the rest of the year are to incrementally raise interest rates. However, as mentioned above, higher interest rates have the potential to cause real GDP to fall because higher interest rates remove a level of disposable income that could have been used for other parts of the GDP expenditure equation, such as consumption. The FOMC announced in their March meeting that they plan to increase the federal funds rate by 25 to 50 basis points.[39] This will decrease consumption and investment and slow down economic growth, as higher interest rates make it more expensive to borrow money, which encourages saving rather than consumption. The goal is to keep unemployment below 4% as it is now while curbing inflation to bring it closer to the target rate of 2%.[40] However, the Fed estimates a neutral federal funds rate of 2.4% that does not stimulate growth or shutter demand, and history demonstrates that nearly every time the federal funds rate has gotten near or gone above that rate, it has been followed by a recession.[41]

The Federal Reserve must curb inflation without severely damaging economic growth. We recommend that the Federal Reserve increases the Federal Funds rate incrementally and gradually throughout the year in order to keep the rate below 2%. We recommend increasing the federal funds rate by one round of 50 basis points and then following that with three 25 basis point increases at the following FOMC meetings to reach an approximately 1.25% federal funds rate increase by the end of 2022. After gauging the results on inflation, then the Federal Reserve could move forward with interest rate hikes as needed, especially considering the state of the pandemic and the war in Ukraine. At this level, the rate could have neither an expansionary or

[39] Federal Open Market Committee, "Summary of Economic Projections," *FOMC Meetings*, (March 16, 2022):1-17, https://www.federalreserve.gov/monetarypolicy/files/fomcprojtabl20220316.pdf
[40] Greg Ip, "The Odds Don't Favor the Fed's Soft Landing,"
[41] Ibid.

contractionary effect, but rather maintain the current level of economic growth. Unemployment will likely increase as spending and production decrease, but that is a risk of targeting inflation.

Finally, the Federal Reserve should engage in the unconventional policy of forward guidance which allows for clear communication of the Federal Reserve's plans for the federal funds rate and the expected impact on the economy.[42] For example, in the March FOMC meeting of this year, the Federal Reserve communicated the change in the federal funds rate target range by 25 basis points.[43] This affects consumption and investment as a part of GDP because consumers will want to spend their income before the rate increases.

INFLATION

Inflation in the US is at its highest point since 1981. There are four indexes that measure inflation: the Consumer Price Index (CPI), the Producer Price Index (PPI), the Personal Consumption Expenditure (PCE) price index, and the core PCE. CPI is calculated using the following formula:

$$CPI = \frac{cost\ of\ \ basket\ in\ a\ year}{cost\ of\ basket\ in\ base\ year}\ x\ 100$$

Current Situation

PCE differs from CPI because it measures how many goods and services are bought by all US households and nonprofits, whereas CPI uses household surveys to measure a basket of goods and services that are typically bought by urban households. This difference in measurement also makes PCE a more accurate measurement of the cost of living. PCE is the Federal Reserve's preferred index because it responds more quickly to changes in consumer preferences, includes a more extensive list of expenditures, and allows revisions in historical data

[42] Akhilesh Ghanti, "Forward Guidance," *Investopedia*, March 28, 2022, https://www.investopedia.com/terms/f/forward-guidance.asp
[43] Federal Open Market Committee, "Summary of Economic Projections," *FOMC Meetings*, (March 16, 2022):1-17, https://www.federalreserve.gov/monetarypolicy/files/fomcprojtabl20220316.pdf

to reflect new data.[44] However, the Fed uses core PCE, which excludes food and energy prices which have a tendency towards volatility, to compare to the target inflation rate of 2% and base its decision to lower or increase the interest rate.[45] If the inflation rate is above 2%, the Fed should increase interest rates, and if inflation is below 2%, the Fed should decrease interest rates.

In March of this year, CPI increased by 8.5% compared to one year ago, which is the highest it has been since 1981, or by 6.4%, if food and energy prices are excluded (Figure 2.1).[46]

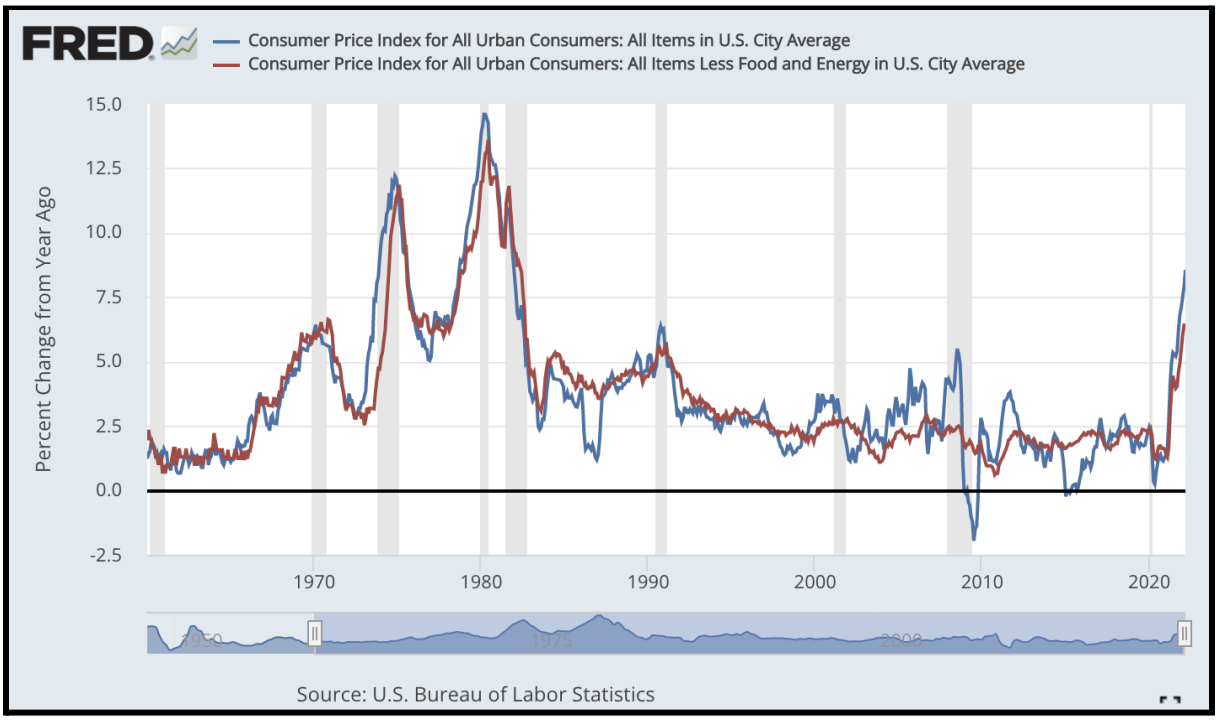

Figure 2.1: CPI increased by 8.5% in March in comparison to one year ago

[44] Kimberly Amadeo. "PCE Inflation, How It's Calculated, and Why the Fed Prefers It." The Balance, February 24, 2022. https://www.thebalance.com/pce-inflation-how-it-s-calculated-why-the-fed-prefers-it-4004939.
[45] Ibid.
[46] Federal Reserve of St. Louis. "Consumer Price Index for All Urban Consumers: All Items in US City Average," n.d. https://fred.stlouisfed.org/graph/?g=ANNk.

Also in March, PPI for total final demand increased by 11.2% compared to one year ago or 7.0%, excluding food, energy, and trade (Figure 2.2).[47] In February of this year, PCE increased by 6.4% compared to one year ago, and core PCE increased by 5.4%.[48]

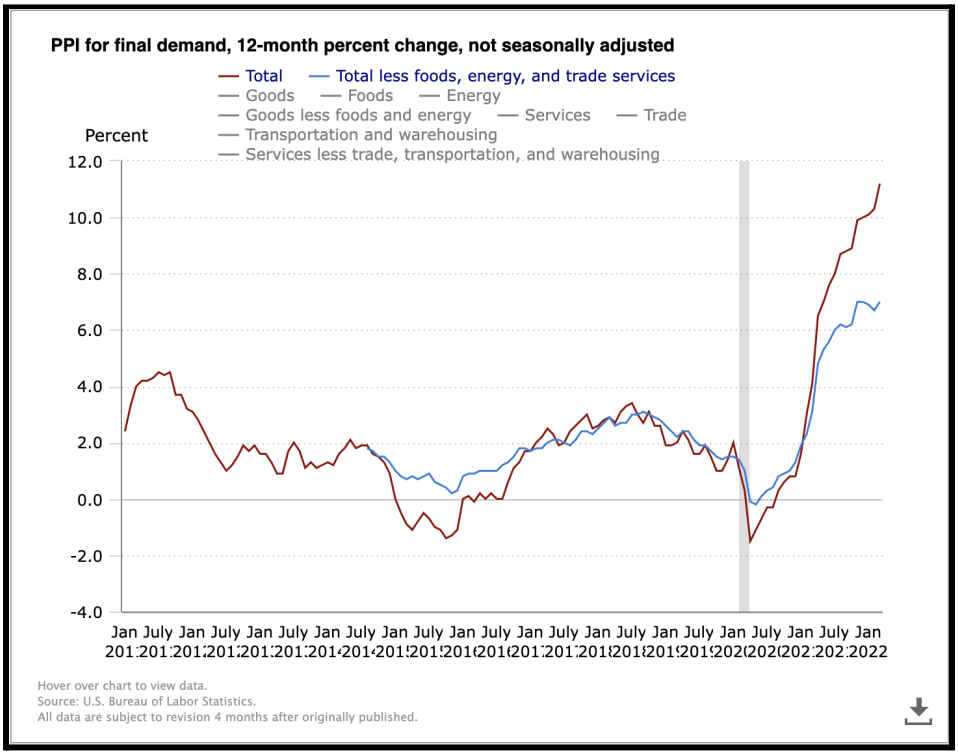

Figure 2.2: PPI for total final demand increased by 11.2% in March in comparison to one year ago

Inflationary Pressures

A current, impactful inflationary pressure is global supply chain disruptions caused by the pandemic. Shorter-term supply shortages have relatively eased like the toilet paper supply but shortages in food, beverages, and electronics still remain.[49] In addition, supply chain bottlenecks continue to persist from higher demand from an economic recovery, an increase in demand for

[47] US Bureau of Labor Statistics. "Producer Price Indexes for Final Demand, 12-Month Percent Change, Not Seasonally Adjusted," n.d. https://www.bls.gov/charts/producer-price-index/final-demand-12-month-percent-change.htm.

[48] Bureau of Economic Analysis. "Personal Consumption Expenditures Price Index | U.S. Bureau of Economic Analysis (BEA)," March 31, 2022. https://www.bea.gov/data/personal-consumption-expenditures-price-index.; Bureau of Economic Analysis. "Personal Consumption Expenditures Price Index, Excluding Food and Energy | U.S. Bureau of Economic Analysis (BEA)," n.d. https://www.bea.gov/data/personal-consumption-expenditures-price-index-excluding-food-and-energy.

[49] Rachel Layne. "Why Are Prices So High Right Now—and Will They Ever Return to Normal?" Harvard Business School, February 10, 2022. http://hbswk.hbs.edu/item/why-are-prices-so-high-right-now-inflation.

durable goods like cars and furniture, and hoarding and panic buying.[50] For example, the prices for used cars and trucks increased 40.5% in January, which contributed to 1.1% of the overall inflation in January.[51] However, the semiconductor shortage is also partly responsible for this increase in prices, as semiconductors are inputs for vehicle construction.[52] Furthermore, the Federal Reserve Bank of St. Louis found that exposure to global supply chain disruptions caused a significant difference in PPI inflation rates: if foreign bottleneck exposures followed 2019 paths, the PPI inflation in the manufacturing sector would have been 20% lower in November 2021.[53] The pandemic increased the demand for durable goods, but production for these goods are usually outsourced and therefore rely on the global value chain. One key finding was that US industries that were more exposed to foreign supply chain disruptions experienced statistically significant higher PPI inflation. Meaning, for the supply-side of inflation to mitigate, the global supply chain needs to restore to equilibrium. Despite these supply-chain disruptions, US imports continued to outpace exports, resulting in a record-low in the trade deficit in Q4 of 2021.[54]

The second inflationary pressure is a result of changes in consumer demand. Two trends are evident from the past two years. First, there has been a shift in demand towards goods and away from services during the pandemic, especially durable goods. The IMF further suggests that this shift may be a permanent one because the pandemic has reshaped the number of people working from home.[55] In September 2021, 45% of full-time employees were working remotely

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[50] Ruchir Agarwal and Miles Kimball. "Will Inflation Remain High?" International Monetary Fund, April 7, 2022. https://www.imf.org/en/Publications/fandd/issues/2022/03/Future-of-inflation-partI-Agarwal-kimball.

[51] Gwynn Guilford. "Will Inflation Fall? Any Pullback Depends on These Sectors." Wall Street Journal, March 7, 2022. https://www.wsj.com/articles/will-inflation-fall-any-pullback-depends-on-these-sectors-11646649003.

[52] Ibid.

[53] Ana Maria Santacreu and Jesse LaBelle. "Global Supply Chain Disruptions and Inflation During the COVID-19 Pandemic." Federal Reserve Bank of St. Louis, February 7, 2022. https://files.stlouisfed.org/files/htdocs/publications/review/2022/02/07/global-supply-chain-disruptions-and-inflation-during-the-covid-19-pandemic.pdf.

[54] U.S. Bureau of Economic Analysis. "Net Exports of Goods and Services." FRED, Federal Reserve Bank of St. Louis, March 30, 2022. https://fred.stlouisfed.org/series/NETEXP.

[55] Ruchir Agarwal and Miles Kimball. "Will Inflation Remain High?"

according to Gallup.[56] The other trend in changes in consumer demand is an increase in aggregate demand from economic recovery and expansionary fiscal policy. When aggregate demand outweighs aggregate supply, prices increase. In an economy where supply shortages are already transpiring, an increase in consumer demand would put even greater pressure on prices to increase. To put this into perspective, US retail sales increased 17.6% in February from last year.[57] However, the EPI predicts that this increase in demand will likely decrease this year. One reason is that durable goods are not bought every year.[58] This suggests that the second trend, an increase in aggregate demand from economic recovery and expansionary fiscal policy, is more temporary than a shift towards goods and should ease pressures on inflation soon.

As alluded to, the third cause of high inflation rates is expansionary fiscal policy during the pandemic, which has two effects on inflation. First, it contributes to increases in aggregate demand, which drives inflation as discussed above. John Cochrane, a senior fellow at the Hoover Institution, points out that expansionary fiscal policy is also a driver of inflation alongside monetary policy because of its effects on government debt and investor behavior. He explains that as the government debt grows, inflation results from investors losing trust in the government to repay that debt and selling their bonds.[59] Moreover, if inflation is largely stemming from fiscal policy, inflationary pressures will rise as the Fed increases interest rates because federal debt will be at a higher interest rate. Since March 2020, the Treasury has issued $5 trillion in new debt, which the Fed has bought in exchange for $5 trillion in new reserves.[60] Overall, the federal debt

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[56]Lydia Saad and Ben Wigert. "Remote Work Persisting and Trending Permanent." Gallup, October 13, 2021. https://news.gallup.com/poll/355907/remote-work-persisting-trending-permanent.aspx.

[57]Scott Summer. "What Caused the High Inflation?" Econlib, March 29, 2022. https://www.econlib.org/what-caused-the-high-inflation/.

[58] Josh Bivens. "Inflation and the Policy Response in 2022." Economic Policy Institute (blog), February 7, 2022. https://www.epi.org/blog/inflation-and-the-policy-response-in-2022/.

[59]Varadarajan, Tunku. "How Government Spending Fuels Inflation." Wall Street Journal, February 18, 2022. https://www.wsj.com/articles/government-spending-fuels-inflation-covid-relief-pandemic-debt-federal-reserve-stimulus-powell-biden-stagflation-11645202057.

[60] Ibid.

has increased by 30% over the course of the pandemic.[61] To contextualize this number, the US hit its debt ceiling in October, and President Biden had to increase the ceiling in December to avoid a default.[62] The Federal Reserve of San Francisco found that Biden's $1.9 trillion American Rescue Plan had some effects on inflation but suggested those effects would only be temporary.[63] Even though the American Rescue Plan is likely to only have temporary effects on inflation, a 30% increase in the federal debt did not help to assuage investors' concerns about US debt.

Fourth, a tight labor market is putting pressure on wages to increase, which in turn is putting pressure on prices to increase. Inflation and unemployment are always in a tradeoff according to the Philipps curve. With high inflation and low unemployment, there are less workers in the economy, so there is pressure for wages to increase to attract workers to jobs. In this current period of high inflation in the US, it makes sense that the unemployment rate was 3.8% in February and annual wage growth is at its highest in years (Figure 2.3).[64]

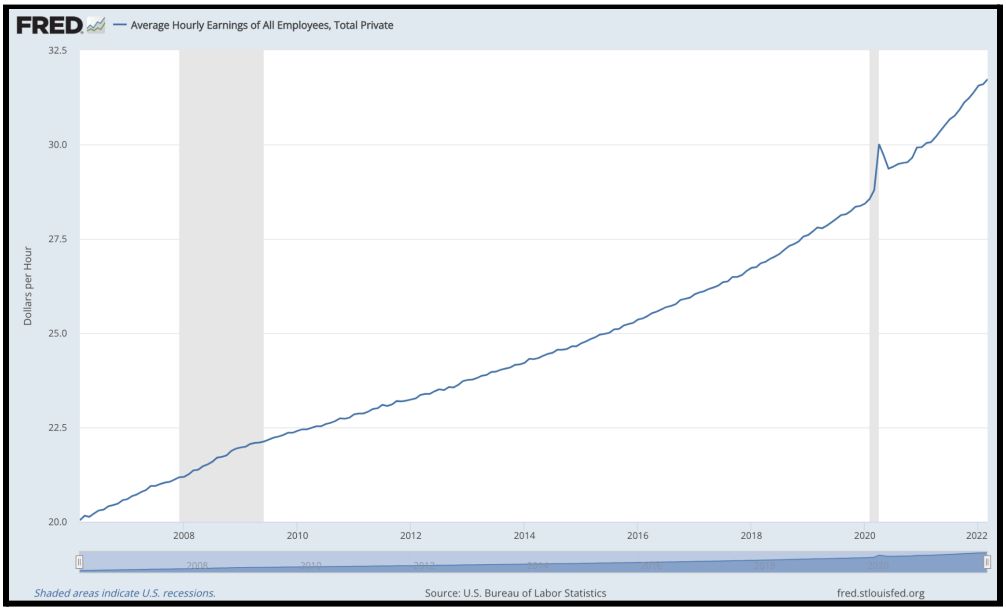

Figure 2.3: US wages are at a record-high

[61] Ibid.
[62] Pramuk, Jacob. "Biden Signs Debt Ceiling Increase, Preventing First-Ever U.S. Default." CNBC, December 16, 2021. https://www.cnbc.com/2021/12/16/biden-signs-debt-ceiling-increase-preventing-first-ever-us-default.html.
[63] Greg Heilman. "Are Stimulus Checks Causing Inflation in the United States?" AS, January 18, 2022. https://en.as.com/en/2022/01/19/latest_news/1642555340_994917.html.
[64] Nick Timiraos. "Fed Raises Interest Rates for First Time Since 2018."

It is also important to note that labor participation is 0.9% lower than before the pandemic (Figure 2.4), which is also contributing to a tighter labor market.[65]

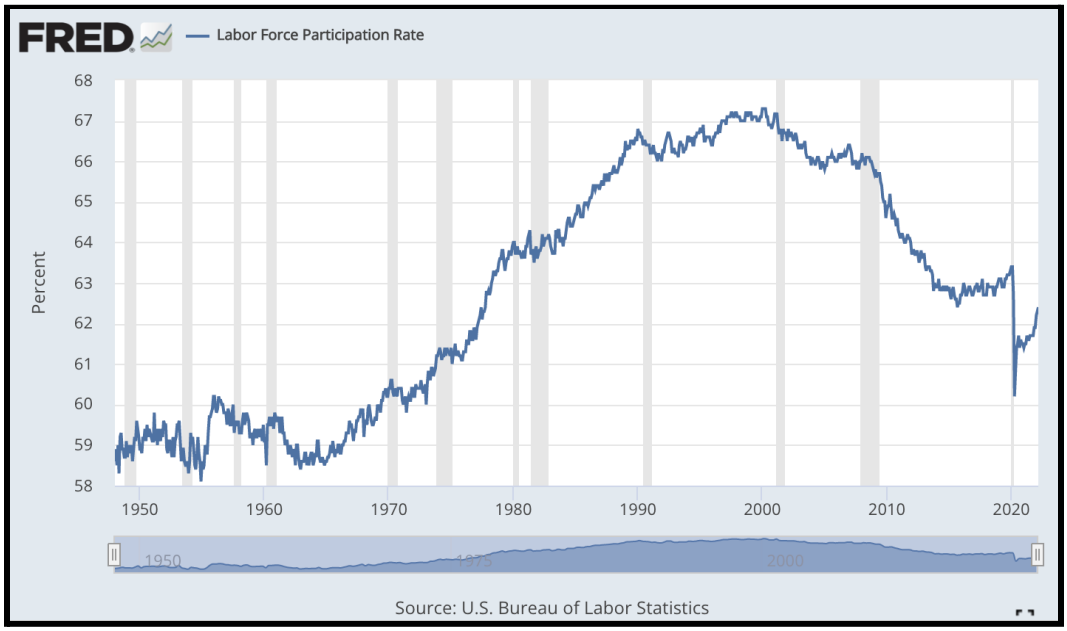

Figure 2.4: Labor force participation rates in the US are below pre-pandemic levels

The housing market makes up one-third of the CPI and contributes greatly to high inflation rates. As there is an increased demand for housing, including from young adults moving out who previously moved in with their families, an expiration of rent freezes that were in place during the pandemic, and wealthier renters, rent prices have increased.[66] In January, the Owners' Equivalent Rent increased by 4.1% compared to last year and housing itself contributed to 1.46% of the overall inflation rate in January.[67]

Finally, the War in Ukraine and sanctions on Russia have caused a recent surge in energy and food prices because Russia and Ukraine are major exporters of those commodities. The CPI

[65]U.S. Bureau of Labor Statistics. "Labor Force Participation Rate." FRED, Federal Reserve Bank of St. Louis, April 2022. https://fred.stlouisfed.org/series/CIVPART.

[66] Bhattarai, Abha. "Four Reasons Your Rent Is Going Up." Washington Post, February 10, 2022. https://www.washingtonpost.com/business/2022/02/10/rent-rising-inflation-housing/.

[67] Gwynn Guilford. "Will Inflation Fall? Any Pullback Depends on These Sectors."

for energy increased by 32.0% in March compared to last year, oil by 70.1% and gas by 48.0%.[68] As the war continues, upwards pressures on energy and food prices will persist, negatively impacting inflation.

Inflationary Expectations

Inflationary expectations are an important indicator of economic activity for businesses and consumers. For example, if prices are expected to rise, businesses will want to raise their prices as well.

One way to measure these expectations is through surveys. In January, Gallup surveyed Americans' expectations for the economy in the next 6 months, and 79% of respondents said inflation would go up, which is the highest prediction Gallup has ever measured (Figure 2.5).[69]

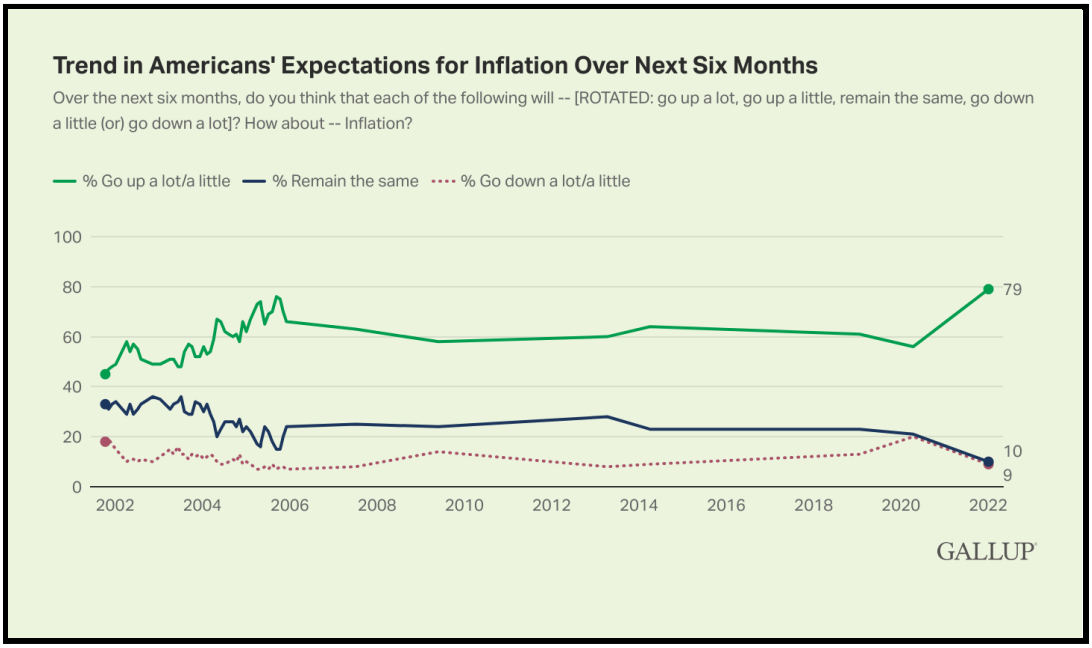

Figure 2.5: Americans' expectations for inflation to go up in the next 6 months are at a record-high

[68]US Bureau of Labor Statistics. "Consumer Price Index Summary ." Accessed April 24, 2022. https://www.bls.gov/news.release/cpi.nr0.htm.
[69]Jeffrey Jones. "Americans Expect Inflation to Persist Over Next Six Months." Gallup, January 26, 2022. https://news.gallup.com/poll/389129/americans-expect-inflation-persist-next-six-months.aspx.

Two other common measures of inflationary expectations are the 5-year forward inflation expectation rate and the 10-year breakeven inflation rate. The most recent number is what market participants expect the inflation rate to be in a given number of years. The 5-year forward inflation expectation rate (Figure 2.6) is calculated by comparing Treasury Inflation Protection Securities (TIPSS) with nominal Treasury yields. The 5-year forward inflation expectation rate as of April 22th is 3.37%.[70] The 10-year forward breakeven inflation rate (Figure 2.7) is calculated by comparing the 10-year TIPS with the 10-year nominal Treasury yields. The 10-year breakeven inflation rate as of April 22th is 2.98%.[71] It is important to note that both longer-term expectations rates are above the target inflation rate of 2%, signaling that the inflation rate may not go down to pre-pandemic levels.

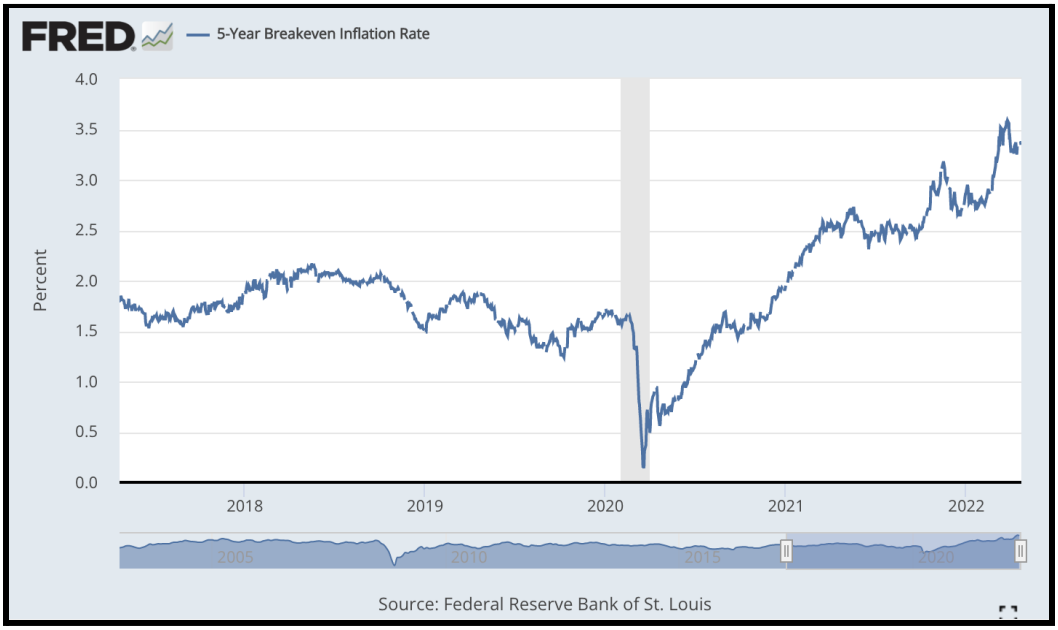

Figure 2.6: 5-year breakeven inflation rate is above 3%

[70]Federal Reserve Bank of St. Louis. "5-Year Breakeven Inflation Rate," April 22, 2022. https://fred.stlouisfed.org/series/T5YIE.
[71] Federal Reserve Bank of St. Louis. "10-Year Breakeven Inflation Rate," April 22, 2022. https://fred.stlouisfed.org/series/T10YIE.

Figure 2.7: 10-year breakeven inflation rate is slightly under 3%

Forecasts

There is a large debate currently surrounding the transitory (temporary) nature of inflation. In November 2021, Raphael Bostic, the president of the Atlanta Federal Reserve, labeled inflation as "pandemic-induced price swings" and therefore "episodic."[72] In March, the FOMC restated that it expects inflation will return to 2%.[73] Furthermore, Fed Chairman Jerome Powell said in a speech on March 21 that he expects "inflation coming down and unemployment holding steady" with the Fed's policy response.[74] While evidence suggests that inflation is temporary, evidence also suggests that inflation will likely not return to the target 2% rate, let alone pre-pandemic levels of 1.8%, for some years.

First, the IMF found that of all countries that brought their inflation under control (below 4% in 3 years) in the 1990s, very few experienced persistent inflation (above 4% inflation for

[72]Julia Glum. "What Is 'Transitory' Inflation, and When Will Prices Come Down?" Money, October 14, 2021. https://money.com/what-is-transitory-inflation/.
[73]Board of Governors of the Federal Reserve System. "Federal Reserve Issues FOMC Statement," March 16, 2022. https://www.federalreserve.gov/newsevents/pressreleases/monetary20220316a.htm.
[74] Powell, Jerome. "Restoring Price Stability." Board of Governors of the Federal Reserve System, March 21, 2022. https://www.federalreserve.gov/newsevents/speech/powell20220321a.htm.

more than 3 years).[75] This suggests that it is highly unlikely that the US will experience persistent inflation: inflation will go down (inflation is transitory). Furthermore, the bonds market is already anticipating inflation to return to pre-pandemic levels and the 10-year forward breakeven inflation rate shows inflation below 3%.[76] Additionally, the inflation was transitory after all six episodes of post-WWII inflation, even with four of the periods of inflation at higher rates that today's (Figure 2.8).[77]

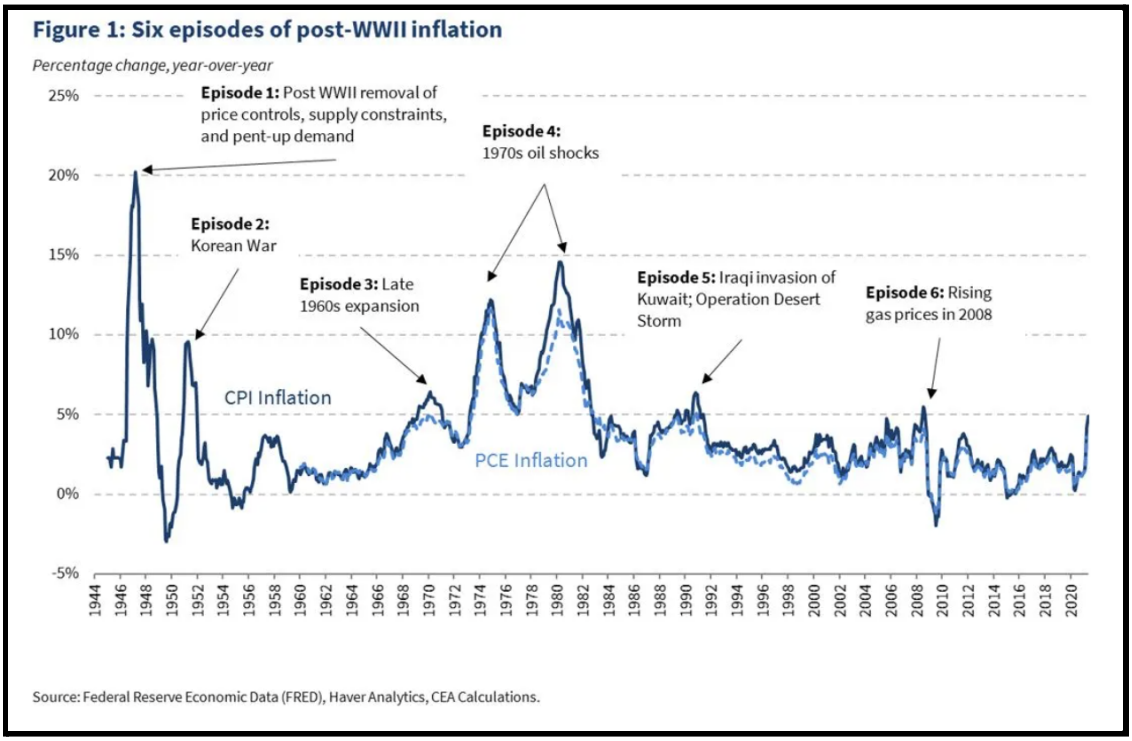

Figure 2.8: Six episodes of post-WWII inflation

While it is likely that inflation will be temporary, the 5 and 10 year inflationary expectations are both above 2%, which suggests that inflation will not return to 2% or pre-pandemic levels like the bonds market is predicting for some years (Figure 2.8 also supports

[75] Ruchir Agarwal and Miles Kimball. "Will Inflation Remain High?" International Monetary Fund, April 7, 2022. https://www.imf.org/en/Publications/fandd/issues/2022/03/Future-of-inflation-partI-Agarwal-kimball.
[76] Paul Krugman. "How High Inflation Will Come Down." The New York Times, March 24, 2022. https://www.nytimes.com/2022/03/24/opinion/inflation-united-states-economy.html.
[77] Cecilia Rouse, Jeffery Zhang, and Ernie Tedeschi. "Historical Parallels to Today's Inflationary Episode." White House, July 6, 2021. https://www.whitehouse.gov/cea/written-materials/2021/07/06/historical-parallels-to-todays-inflationary-episode/.

this prediction). All the periods of inflationary episodes took at least two years to return to 2%, suggesting that the current inflation will remain high for some time but eventually return to the target rate. Out of the six inflationary pressures listed above, there are two that could explain this slower return to the target rate. First, if there is a permanent shift toward goods and away from services as the IMF predicts, it will take longer for supply chains to adjust to this change in consumer preferences. Furthermore, some economists believe that the inflationary pressure caused by the housing market will hinder the inflation from reaching pre-pandemic levels of 1.8%.[78]

Policy Recommendations

The Fed must continue with its current course of action of increasing interest rates through a "soft landing" to avoid a recession. Additionally, it should use its power of forward guidance to influence inflationary expectations.

The Fed is currently increasing the federal funds rate, which influences interest rates, by a quarter-percent point to a range between 25 to 50 basis points.[79] In addition, the Fed also has six more federal funds rate increases scheduled for 2022.[80] The Fed should increase the interest rate by 50 basis points during the May meeting and then by 25 basis points at each following meeting for the rest of the year. This recommendation takes into account the effects of increasing the federal funds rate on the rest of the macroeconomy. Increasing the interest rate encourages people to save and slows demand to catch up with supply, which puts less pressure on prices to increase. It is important to note that increasing the inflation rate can only influence the demand-pull inflationary pressures, not the supply-side ones.

[78] Gwynn Guilford. "Will Inflation Fall? Any Pullback Depends on These Sectors."
[79] Timiraos, Nick. "Fed Raises Interest Rates for First Time Since 2018."
[80] Ibid.

Forward guidance is a new, unconventional monetary tool that involves communicating economic outlook and policy plans to help the public understand the current situation and influence policymakers to commit to "lower-for-longer" rate policies.[81] The Fed used explicit guidance starting in 2011, and it convinced markets that rates would remain low.[82] After Fed Chairman Jerome Powell announced a 50 basis point increase in the interest rate was possible in May, the Dow decreased by 981 points, further exemplifying the power of forward guidance.[83] The current surge in inflation seems to be transitory, but the federal funds rate needs to increase to combat inflation. The Fed should continue to use forward guidance to emphasize the transitory nature of inflation to the public and markets.

UNEMPLOYMENT

Since the Federal Reserve Act of 1977, the Federal Reserve's dual mandate has been to maintain the economy at stable prices and maximum employment.[84] Maximum employment refers to the level of employment the economy can handle without bringing inflationary pressures. Although the Fed cannot influence the unemployment rate directly, its ability to set targets for the Federal Funds Rate and to use forward guidance have implications for unemployment levels in the country. The target for the Federal Funds Rate (FFR) can influence unemployment because when interest rates become raised, businesses slow down investment, which leads to less positions available and loosens the labor market. Additionally, forward guidance, a tool used by the Fed involving educating the public on current economic conditions

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[81] Ben Bernanke. "The New Tools of Monetary Policy." Brookings (blog), January 5, 2020. https://www.brookings.edu/blog/ben-bernanke/2020/01/04/the-new-tools-of-monetary-policy/.
[82] Ibid.
[83] Tim Smart. "Economy, Markets in Crosshairs This Week as Fed's New Anti-Inflation Stance Gathers Steam." US News, April 25, 2022. https://www.usnews.com/news/economy/articles/2022-04-25/economy-markets-in-crosshairs-this-week-as-feds-new-anti-inflation-stance-gathers-steam.
[84] Matthew Johnston, "Breaking Down the Federal Reserve's Dual Mandate", *Investopedia*, March 23, 2022.

and providing projections of monetary policy, impacts unemployment because it allows the average worker to gain a sense of where the economy is headed and what the state of the labor market will look like in the following months.[85] Looking at different aspects of unemployment will help determine how close the country is to maximum employment and the policies the Fed should use to move the economy in that direction.

Unemployment in the US: Overview

The most common metric used to measure unemployment is the U-3 unemployment rate, also known as the headline rate. Economists calculate this number by finding the ratio of people who have actively searched for work in the past four weeks to the total number of people in the labor force. It is important to note that the headline unemployment rate does not describe the total proportion of people in the country who do not hold a job. Many citizens have not looked for work recently and are therefore not a part of the labor force under the headline rate.

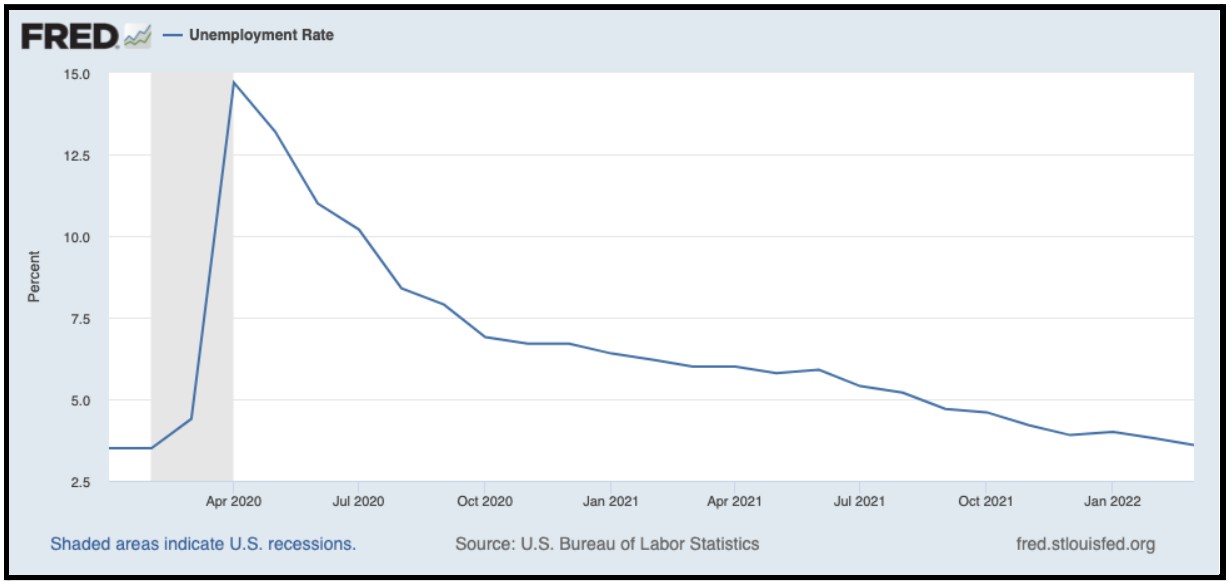

Figure 3.1: Headline unemployment rate, January 2020-March 2022

[85] Akhilesh Ganti, "What Is Forward Guidance?", *Investopedia*, March 28, 2022.

$$\text{U-3 Rate} = \frac{Number\ of\ people\ without\ a\ job\ who\ have\ searched\ for\ one\ in\ the\ past\ four\ weeks}{Number\ of\ people\ in\ labor\ force} X\ 100$$

$$\text{March 2022 Unemployment Rate: } \frac{5{,}592\ actively\ searching\ for\ work}{164{,}409\ people\ in\ civilian\ labor\ force} X\ 100 = 3.6\%$$

Note: These numbers are not the total for the nation's labor force. Instead, it is the most recent data from the Current Population Survey sponsored by the U.S. Bureau of Labor Statistics (BLS) and the U.S. Census Bureau which questions roughly 60,000 households to help determine the status of labor.[86]

The country is currently at levels of unemployment roughly equal to those on the eve of the pandemic. Additionally, the Federal Open Market Committee (FOMC) predicted at the March 2022 meeting that this will remain so and the U-3 rate will hover around 3.5% for the next couple of years before stabilizing near 4%.[87]

The U-3 rate, however, only shows the general unemployment rate in the nation and does not provide information on how employment differs among various demographic groups in the country. Analyzing unemployment through the perspective of different races and genders allows greater insight into the situation faced by workers depending on their background. As of March 2022, unemployment rates by demographic appear as the following:

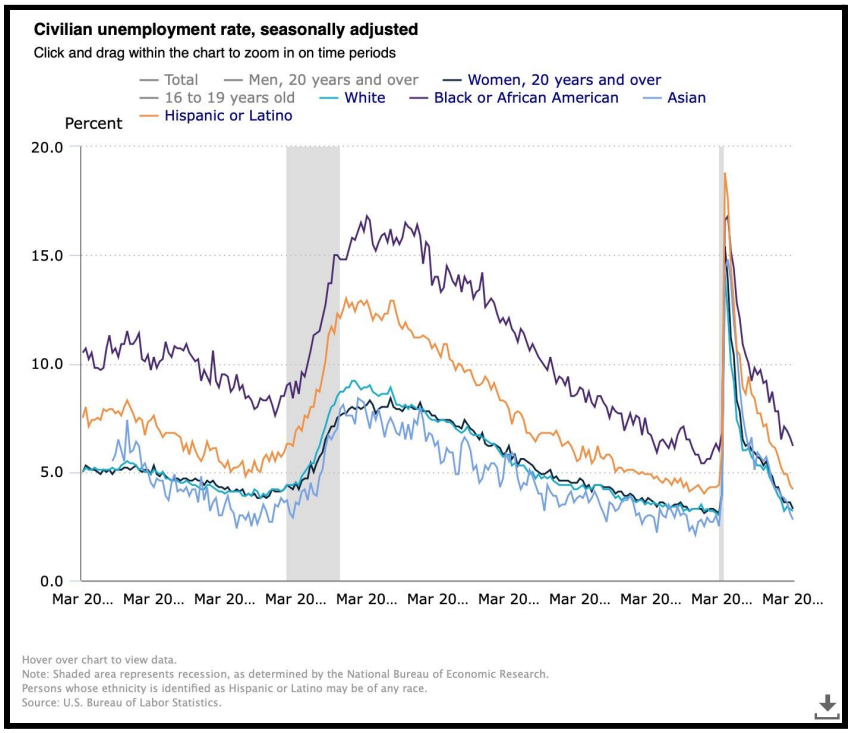

Figure 3.2: United States headline unemployment rate by demographic, March 2002-2022

[86] U.S. Bureau of Labor Statistics, "Employment Situation Summary Table", April 1, 2022.
[87] Federal Open Market Committee, "Summary of Economic Projections", *The Federal Reserve*, March 16, 2022.

Unemployment levels for almost all demographic groups have returned to their pre-pandemic levels, but disparities between groups have returned as well. As of March 2022, in the United States, Blacks are the most unemployed while Asians are the least. Additionally, it appears that Blacks have had the worst recovery in their unemployment rate and appear to be the only group sitting at elevated levels compared to February 2020.

Within the U-3 rate, unemployment can be categorized into three different groups based on its cause and how long it lasts. These groups are known as structural, frictional, and cyclical unemployment. Structural unemployment refers to people being out of work due to technological changes in the economy that render their skills obsolete and is unrelated to recessions in the market–instead it is related to the "structure" of the economy. Cyclical unemployment is joblessness resulting from recessions in the economy, such as the 2008 Great Recession and the recent COVID-19-related collapse.

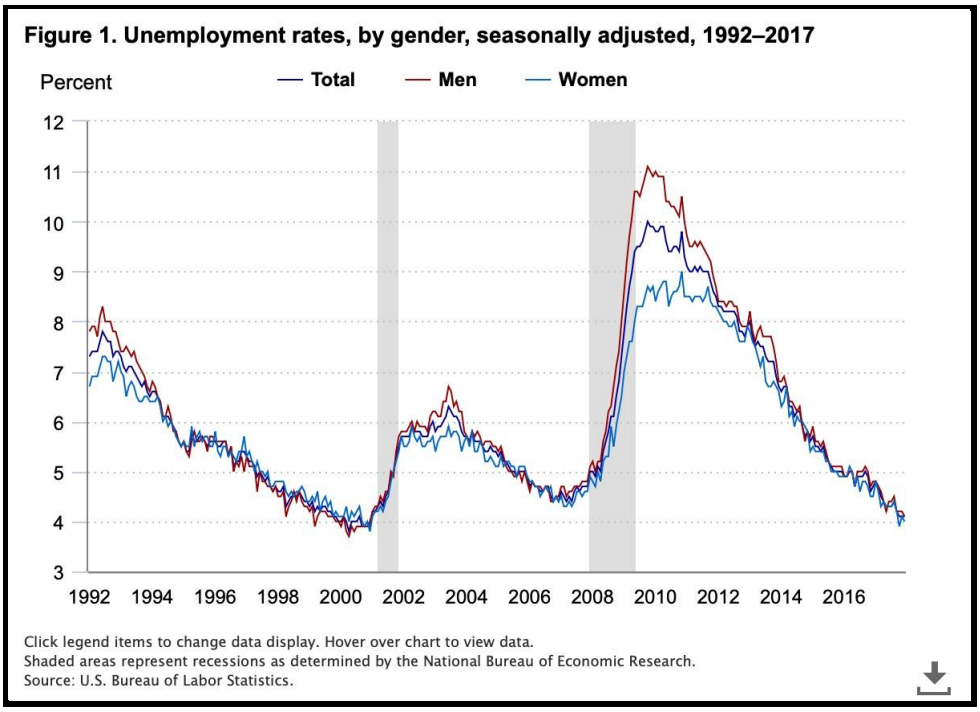

Figure 3.3: U.S. headline unemployment rate by gender, 1992-2007. Recessions are highlighted in gray.

It is short-term unemployment that resolves itself with the rebound of the economy. Lastly, frictional unemployment is the rate of unemployment that occurs as some part of the population will always be changing careers or employers, and explains why unemployment will never fall to 0% even if the economy is considered to be at maximum employment.[88] The combination of structural and frictional unemployment is known as the natural rate of unemployment.

Current unemployment currently results from a combination of cyclical, structural, and frictional factors. Structural unemployment accounts for roughly 20% of current joblessness, found by measuring the number of long-term unemployed (those without a job that have been actively seeking one for 27 weeks or more) which amounts to 1.4 million people.[89]

$$\text{Long-term unemployment rate} = \frac{Number\ of\ long-term\ unemployed}{Total\ in\ civilian\ labor\ force} X\ 100$$

$$\text{March 2022 long-term unemployment: } \frac{1{,}528\ people\ unemployed\ long-term}{164{,}409\ in\ civilian\ labor\ force} X\ 100 = .93\%$$

Note: These numbers come from the March 2022 Current Population Survey.[90]

Although this does not necessarily mean technological changes have prevented all of these people from obtaining employment, it does indicate that a significant part of the population cannot find work due to a labor force mismatch.

Additionally, despite the unemployment rate having essentially returned to pre-pandemic levels, COVID-19 continues to impact the labor market in a negative way. March 2022 saw about 2.5 million people unable to work or facing reduced hours due to their employer either closing or losing business as a result of the pandemic.[91] The economy has rebounded from the pandemic when it comes to growth, but cyclical unemployment is still responsible for a large

[88] Adam Hayes, "What Is Unemployment?", *Investopedia*, January 30, 2022.
[89] U.S. Bureau of Labor Statistics, "Job Openings and Labor Turnover Summary", March 29, 2022.
[90] U.S. Bureau of Labor Statistics, "Employment Situation Summary Table", April 1, 2022.
[91] Ibid.

part of the country's unemployment. Frictional unemployment accounts for the rest of the joblessness and of course will continue contributing to U-3 levels as there will always be a part of the population in the process of switching careers and/or employers. The dimensions of unemployment described in the section above relate to the U-3 or "headline" unemployment rate but they do not fully illustrate the state of the US labor market and, in reality, it is not as healthy as the 3.6% rate may lead one to believe.

Unemployment: What the Headlines Leave Out

The U-3 rate is the most commonly cited figure when it comes to the labor market, although using it alone is insufficient to determine the health of the economy. Rather, the labor force participation rate (LFPR) provides insight into civilian population activity in the labor market and helps the Fed determine where the economy stands in terms of full employment.

Figure 3.4: U.S. labor force participation rate, January 1948-March 2022.

The LFPR is found by comparing the civilian noninstitutional population (the number of citizens 16 or older who are not a part of the active military and are not institutionalized in places such as

prisons, mental facilities, etc.) with the number of people in the labor force (those either employed or are unemployed and have actively looked for work in the past four weeks).[92]

$$\text{Labor force participation rate} = \frac{Size\ of\ labor\ force}{Civilian\ noninstitutional\ population} X\ 100$$

$$\text{March 2022 LFPR: } \frac{164{,}409\ people\ in\ labor\ force}{263{,}444\ people\ in\ civilian\ noninstitutional\ population} X\ 100\ =\ 62.4\%$$

Note: The numbers used in the equation above come from the same survey previously used to determine the U-3 unemployment rate.[93]

While the unemployment rate has essentially returned to pre-pandemic levels, the LFPR has yet to have the same recovery and sits below the pre-pandemic participation rate of 63.4%. This lack of labor force participation combined with historic resignation rates have resulted in a massive scramble for employers to find workers, also categorized as a tight labor market.[94] This has negative effects on the economy which the Fed can help curb by raising targets for the FFR and effectively utilizing forward guidance in its monetary policy.

The current tightness of the labor market is exemplified by the 11.3 million job openings as of March 2022 which is almost double the number of unemployed.[95] These conditions have been favorable for workers, since desperation to fill positions has allowed employees to bargain for increased pay and benefits. In fact, average hourly earnings have increased by 5.6% in the past year compared to target annual increases of 3.5-4%.[96]

[92] Adam Hayes, "Labor Force Participation Rate", *Investopedia*, January 8, 2022.
[93] U.S. Bureau of Labor Statistics, "Employment Situation Summary Table", April 1, 2022.
[94] Harry J. Holzer, "Tight labor markets and wage growth in the current economy", *Brookings*, April 13, 2022.
[95] U.S. Bureau of Labor Statistics, "Job Openings and Labor Turnover Summary", March 29, 2022.
[96] Economic Policy Institute, "Nominal Wage Tracker", January 8, 2022.

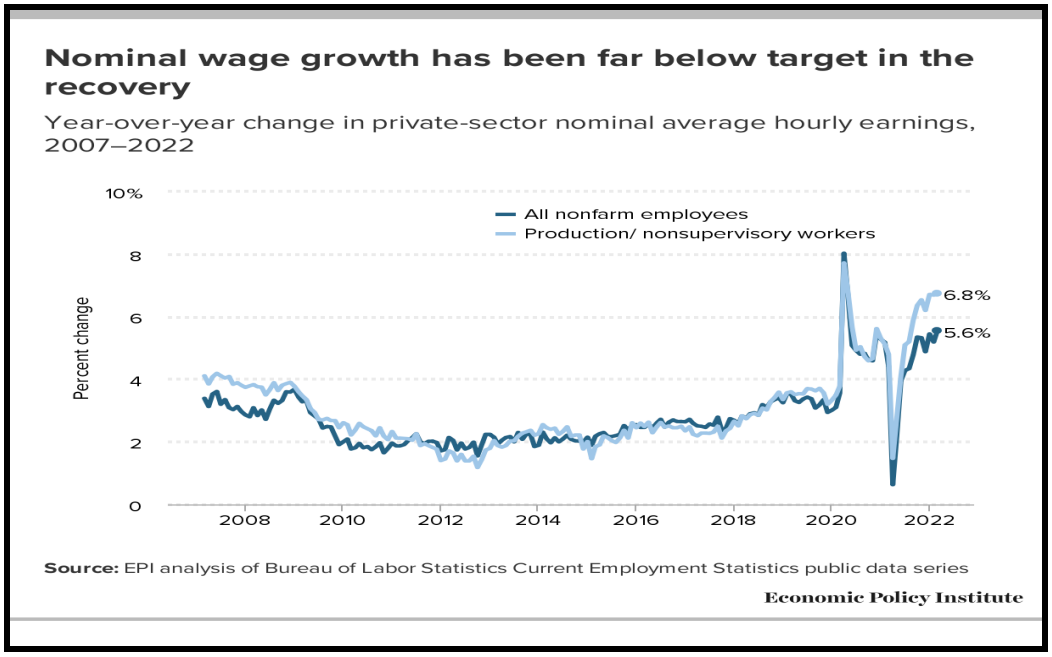

Figure 3.5: Annual U.S. wage growth by hourly earnings, 2007-2002

Although this graph highlights that inflation is outpacing wage gains, these conditions are still favorable to the average worker but demonstrate that the economy is not at optimal employment levels. Higher labor costs resulting from increased wages for workers is reflected in the prices of goods and services which is helping to partially drive the historic inflation the country currently faces.[97] Because the current level of employment is not stymying inflationary pressures, it is clear that the economy cannot be considered fully employed, and that the Fed needs to enact monetary policies to steer the economy towards that goal. One such move includes continued increases in the target for the FFR combined with adequate forward guidance to slow the growth of the economy and reduce the number of positions available. However, it is also important to investigate the reasons why the participation rate has not recovered to fully understand the state of the labor market.

[97] Jeanna Smialek and Ben Casselman, "Rising Wages Could Complicate America's Inflation Cool-Down", *The New York Times*, March 31, 2022.

An ongoing phenomenon the 3.6% U-3 unemployment rate will not show is what economists have labeled as the "Great Resignation." This term has been coined to help describe the record number of people quitting their jobs in the United States which began in 2021. February 2022 saw 4.4 million people quit their current positions, slightly down from a record high 4.5 million people in November 2021, yet still far greater than pre-pandemic levels.

Figure 3.6: Monthly U.S. resignations, January 2001-March 2022

The fact that the number of people leaving their positions remains above normal, while unemployment rates continue to decline, indicates that many people are not just quitting their jobs to find new ones, but instead many are leaving the labor force altogether. These numbers help to clarify the nature of the Great Resignation, though, it does not help to explain what is driving it. To help identify the forces behind the Great Resignation, the Pew Research Center conducted a survey asking those who left a position in 2021 why they decided to do so. This study revealed the main forces behind resignations to be inadequate working conditions.[98]

[98] Kim Parker and Juliana Menasce, "Majority of workers who quit in 2021 cite low pay, no opportunities for advancement, feeling disrespected", *Pew Research Center*, March 9, 2022.

Additionally, while schooling in the age of COVID-19 has generally returned to in-person instruction, students are often required to quarantine after exposure and/or testing positive for the virus. This has made it very difficult for some to maintain a steady job due to the frequent need to stay home with children and has caused many to leave the labor force completely because of childcare needs.

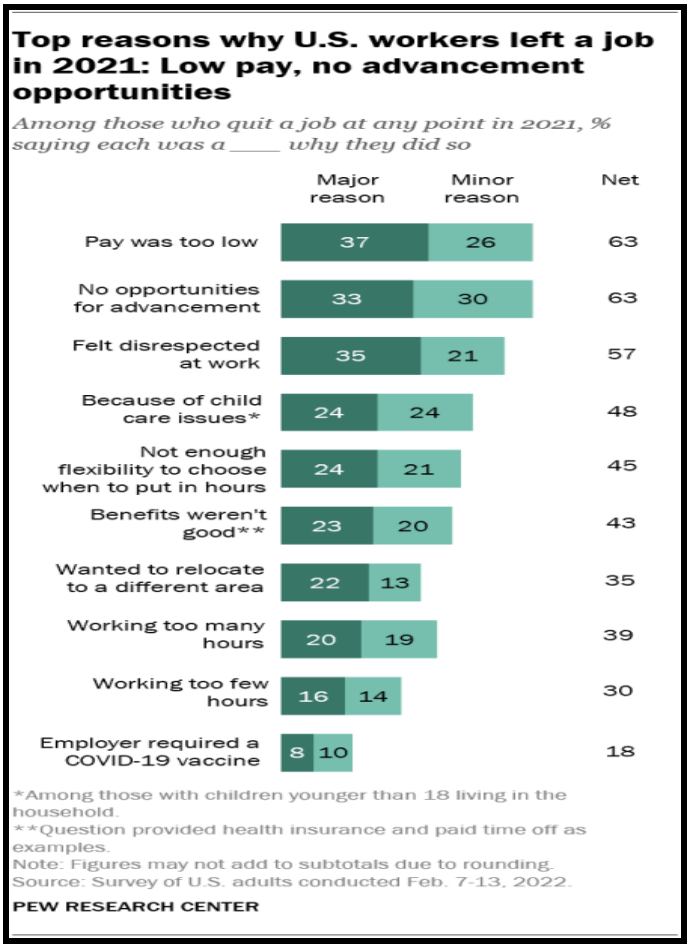

Figure 3.7: Pew Research Center findings on the top reasons for resignations in 2021

Another factor to consider when it comes to the Great Resignation is that many older Americans have decided to retire from the labor force earlier than usual because of COVID-19, due to the greater health risks for older adults.[99] Although it is out of the Fed's ability, in order to help combat the Great Resignation, employers in the US need to offer employees better benefits, pay, and flexibility if they hope to bring back some of the people disillusioned with the traditional workforce. In addition to a lacking LFPR, the labor market is also suffering from a condition best described as structural underemployment.

[99] Theresa Sintetos, "The Great Resignation is Accelerating: Here's What You Should Do", *BoardEffect*, April 5, 2022.

While economists commonly cite unemployment to describe the health of the labor market, underemployment offers great insight as well. Those classified as underemployed include overqualified workers in low-paying positions as well as part-time workers who would like full-time employment. The current economy suffers from an oversaturation of the latter. A recent survey conducted by SaverLife, a nonprofit savings program, in collaboration with the Brookings Institute, revealed that of the 1,514 people sampled (mainly people of color, women, and those earning less than $50,000 annually), 19% reported working part-time or less hours than preferred.[100]

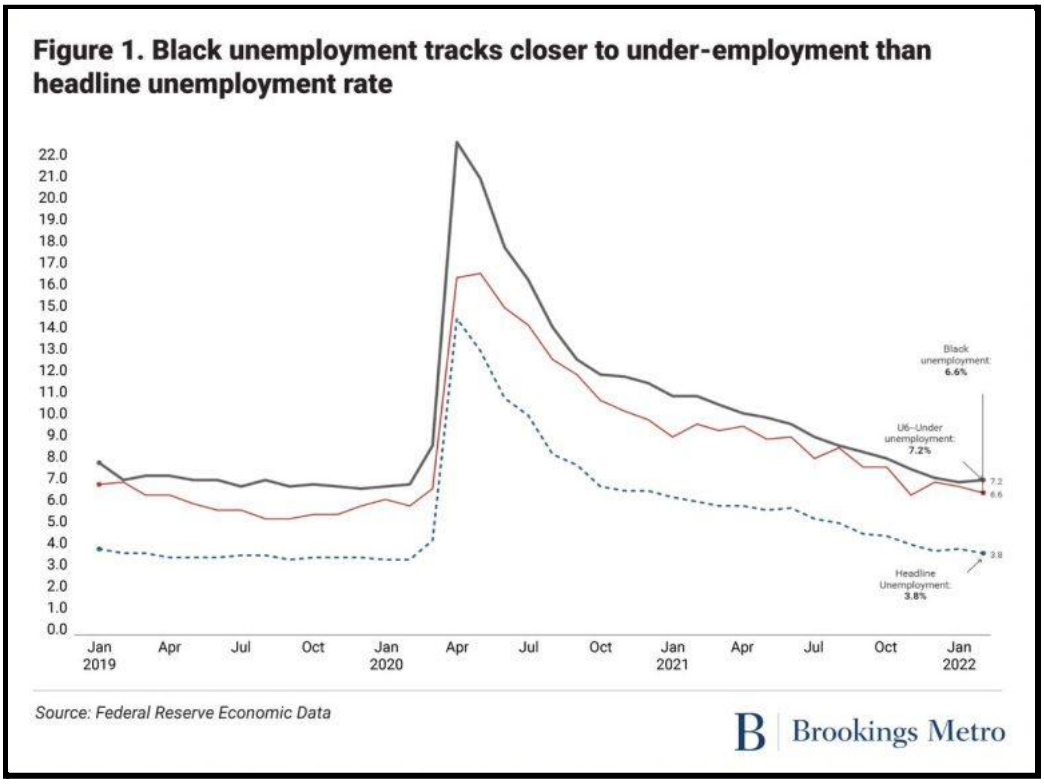

Figure 3.8: Comparison of black Americans unemployment with headline unemployment and underemployment

Although this survey only represents a subgroup of the population, it offers insight into the status of the labor market for the most vulnerable parts of the population. Having a large

[100] Makada Henry-Nickie, Regina Seo, and Anthony Barr, "Even with positive job reports, systemic problems are hurting vulnerable job seekers", *Brookings*, March 21, 2022.

portion of low-wage workers is unsatisfactory for the labor market because it could lead to more worker resignations to pursue positions with greater hours and benefits. This would cause a spike in unemployment, slow down economic growth, and may accelerate inflation if producers have less capacity to produce goods and services while demand stays high. Once again, although it is out of the Fed's control, American employers need to expand employee benefits and ensure more hours to those willing if they wish to stave off future resignations similar to current patterns.

Forecasts

While the level of employment in the country currently does not meet the Fed's goal, the rest of the year may see a trend in that direction. The U.S. added 431,000 jobs in March 2022, the smallest gain in six months, but the country may be able to close the 1.6 million worker gap to pre-pandemic levels if other labor trends continue.[101] This would see a decrease in wage gains and help to stymy inflationary pressures stemming from the tight labor market. On the other hand, although some have been led to believe that unemployment benefits to assist with pandemic related wage loss have been keeping people out of the labor force, little evidence exists to support this claim.[102] For the U.S. labor market, this means that as additional states end pandemic-related benefits throughout the rest of the year, it will not be a sufficient way of getting citizens back into the workforce.

Other factors to consider when it comes to recovering the labor force participation rate include the ongoing Great Resignation as well as the war in Ukraine. Economists believe that resignations are beginning to plateau and that the Great Resignation may be on its way out, but only time will tell when the tightness of the labor market will stop ushering in inflation due to wage growth.[103] Supply chain issues resulting from the war in Ukraine are helping to keep global

[101] David Payne, "Jobs: Strong Gains As Pandemic Eases Further", *Kiplinger*, April 1, 2022.
[102] Greg Iacurchi, "Evidence still missing that the end of extra unemployment pushed people back to work", *CNBC*, September 24, 2021.
[103] Greg Iacurchi, "The Great Resignation is still in full swing. Here's what to know", *CNBC*, March 31, 2022.

inflation at its highest levels in 40 years.[104]If this trend continues, employers may begin to remove positions to cover increased costs, potentially raising unemployment but reducing inflation caused by wage growth.

Monetary Policy Recommendations

The greatest employment challenge the Fed should attempt to solve currently is the low labor force participation rate. To help return this to pre-pandemic levels, the Fed must continue to increase the target FFR. After the next meeting, the Fed should increase the FFR by 50 basis points (BP) and continue with similar increases for the rest of the year if they do not observe adverse effects. If the 50 BP raise does more harm than good, then, after the next meeting, the Fed should continue hiking interest rates by 25 BP for the rest of the year. This will not only result in less bargaining of employee contracts and slow increases in annual earnings to effectively lower inflation, but will also help bring people back into the labor force. Once people who have left the labor force gain awareness of decreases in potential opportunities for employment, they are more likely to begin searching for work again since they know they may not be able to find any in the future when their economic status may change. However, raising the target for the FFR will only improve the participation rate if it is effectively combined with forward guidance from the Fed.

If discouraged workers do not know that the Fed plans to increase interest rates, they will be unaware of changes in the labor market and may rejoin the labor force when work is difficult to find, which would increase unemployment rates. Or they may never rejoin the workforce at all, if they learn that jobs are difficult to find at the time when they are considering searching for work again. Additionally, if the Fed increases their FFR target rate below 50 BP after the next meeting, inflation caused by wage increases will continue raising prices. On the other hand, if the

[104] Jim O'Donnell, "Ukraine war, sanctions will extend supply chain disruptions", *TechTarget*, March 18, 2022.

Fed raises the target rate above this while failing to observe adverse effects, the economy may slow too quickly which will result in high numbers of layoffs and increased unemployment rates, once again taking the Fed off track of its goal of maximum employment.

The economy does not sit at the Fed's goal of maximum employment as of March 2022. Although many of the factors driving unseen ills in the labor market lie out of the Fed's reach, by increasing the target FFR by 50 BP after the next meeting and determining whether they should continue with 25 or 50 BP hikes for the rest of the year, the Fed will be able to move the economy in that direction. Combining this with educating the public on these moves through forward guidance will help restore the labor force participation rate, cool down inflation caused by wage increases, and set the economy up to reach the Fed's dual mandate.

FEDERAL FUNDS RATE AND INTEREST RATES

With inflation reaching four-decade highs, recent yield curve inversions, and an increasingly tight labor market, there has been increasing pressure for the Federal Reserve (Fed) to adopt more aggressive monetary policies in an attempt to prevent the economy from overheating.

Current Situation

Issues within the federal funds market have been exacerbated by current events such as the war in Ukraine, which has raised the price of oil significantly and, by extension, increases production costs and supply-chain issues across the board. In tandem, these factors threaten to overheat the economy in the short term while increasing the risk of recession in the long term by slowing future economic growth. The Fed is therefore limited in how it can respond to this myriad of crises given the monetary policy implements at hand, but their goal should be to

aggressively tighten the monetary supply by raising the Federal Funds Rate (FFR), engaging in quantitative tightening, and steadily increasing interest rates over the next several meetings of the Federal Open Market Committee (FOMC) in order to achieve a soft landing.

Federal Funds Rate

Monetary policy is oftentimes referred to as a blunt instrument because the Federal Reserve does not have direct control over the markets - they merely have tools that can set target rates, and increase/decrease bank reserves to indirectly adjust the monetary supply. The Fed can set the target Federal Funds Rate - the rate for overnight transactions between bank reserves - which can hugely influence the short-term interest rates on everything from mortgage loans to credit cards. When the FFR is low, it incentivizes overnight lending, and thus increases the money supply. Throughout the Covid-19 pandemic, the FFR range was set between 0%-0.25%, which is the lowest rate at which it can be set, in order to encourage economic expansion. The rates were also set to near-zero levels following the 2008 Great Recession. Although it was effective in stimulating the economy, it has the double-edged effect of increasing inflationary pressures as well should rates stay low for too long. Because of this, in March 2022, the Fed announced a raise in interest rates to the 0.25%-.50%[105] range in order to quell rising inflation, as seen in Figure 4.1.

[105] Federal Open Market Committee. "Summary of Economic Projections". Presented at FOMC Meeting, March 16th, 2022. https://www.federalreserve.gov/monetarypolicy/files/fomcprojtabl20220316.pdf

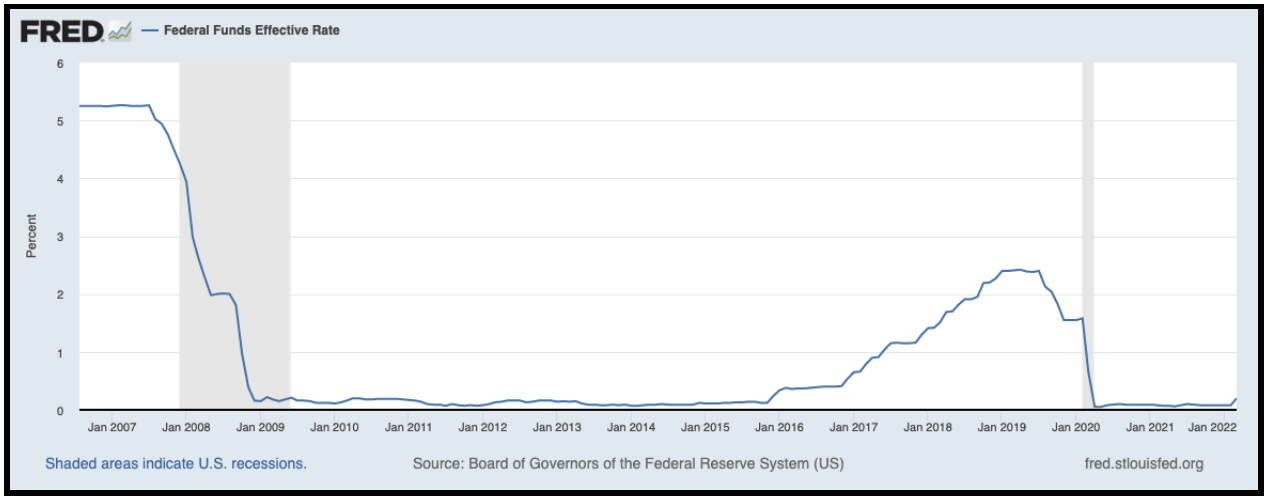

Figure 4.1: Effective FFR 2007 - 2022. Note pandemic rates at 0.07 - 0.10% until Q2 2022, where it rose to 0.20%.

The current consensus among financial institutions is that the FFR will continue to be raised by several 25-50 basis point (bp) hikes throughout 2022, with Deutsche Bank predicting a peak of 3.5% in 2023 and other institutions predicting between 2%-2.8% by the end of 2022. Support has coalesced amongst the Fed branches for a more aggressive push towards a neutral rate - the rate that neither aids nor constrains growth - which sits at approximately 2.4%. The current target is to reach this by the end of 2022. This would involve the utilization of 50 bp hikes to achieve a more swift realization of the target levels, though it would be pertinent to taper this off to 25 bp for the last few meetings in order to quell expansionary and contractionary effects[106]. At the end of 2022, the FFR is projected by the Fed to sit at 1.9% - a whole percentage point higher than estimated in the December FOMC meeting - and at 2.8% by 2023, though it should be noted that due to the market instability caused by Ukraine and other supply-chain issues, these projections are subject to change.

Recent comments by Chairman of the Fed Jerome Powell present a more hawkish view than what has been traditionally adopted by the central bank, promoting 50 bp hikes in order to

[106] Smith, Colby. "Jay Powell Says Fed Prepared to Move More Aggressively to Tighten Policy." Financial Times, March 21, 2022. https://www.ft.com/content/baabbe1f-d823-4727-a090-0d1b89438048

front-load its main policy rate to reach a neutral rate of inflation more rapidly[107]. In their March meeting, 7/8 FOMC governors voted in favor of 25 bp hikes over more drastic 50 bp increases, but clearly more drastic measures are required in order to establish price stability.

Interest on Reserve Balances / Other Monetary Approaches

The Fed possesses several tools in order to manipulate the actual FFR into its target range: Interest on Reserve Balances (IORB); the Overnight Reverse Repo Rate (ON RRP), the Discount Window, Open Market Operations (OMO), and Quantitative Easing/Tightening (QE/QT). In tandem with each other, these tools manipulate the federal funds rate into its target range by providing ceilings and floors, and by increasing or decreasing the money supply.

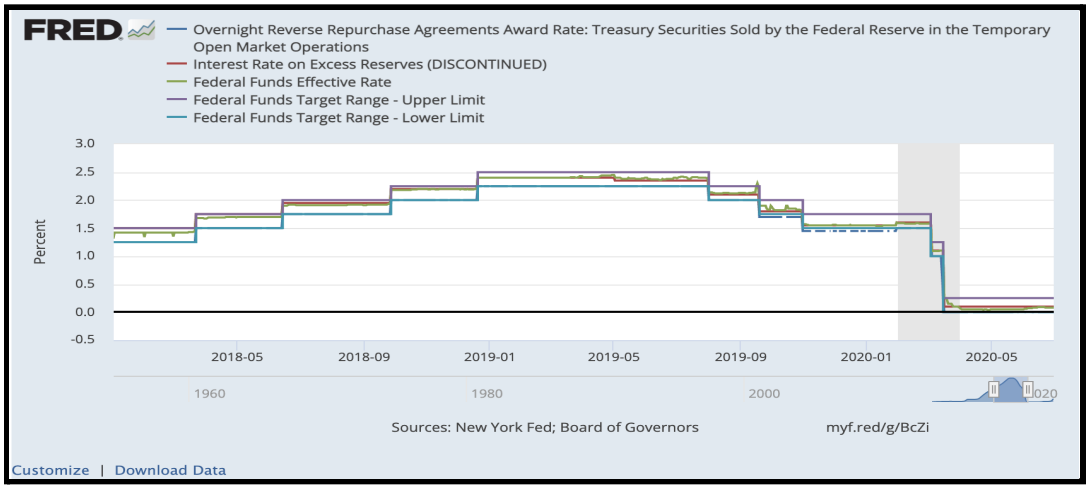

Figure 4.2: NOTE: IOER was discontinued and replaced with the IORB, but the correlation shown in the graph between the IOER and related rates applies directly to the IORB

Interest on Reserve Balances (IORB)

Of these, the IORB rate is their chief implement for guiding the FFR. The IORB represents the interest rate which banks earn from reserves deposited at the Fed - that is to say, banks earn interest on reserve balances held at the Fed. It serves as a reservation rate for banks

[107] Smith, Colby. "Jay Powell Says Fed Prepared to Move More Aggressively to Tighten Policy." Financial Times, March 21, 2022. https://www.ft.com/content/baabbe1f-d823-4727-a090-0d1b89438048

(the lowest rate banks are willing to accept for lending out funds), and since banks can arbitrage the difference between the IORB and other short-term rates, it serves as the primary tool for guiding the FFR. It does not, however, set a hard floor for the FFR; the ON RRP (see below) does that.

Understanding the IORB depends on two main concepts: arbitrage, and the reservation rate. The reservation rate, as previously explained, represents the lowest rate banks will accept to lend out funds. Since the IORB is a reservation rate, if it is greater than market interest rates, then it is conducive for banks to deposit funds in a reserve account. Otherwise, they can either lend excess funds out in the Federal Funds market and earn the FFR, or invest in treasury bills and earn the treasury rate.

Arbitrage, on the other hand, is the simultaneous buying and selling of a good in separate markets in order to profit from a discrepancy in prices. For example, let's suppose a bank borrows from the Fed at 2% and deposits at 2.5% for a profit. Other banks will be inspired to follow suit, and soon the borrowing rate will rise to 2.5%, reaching equilibrium. Essentially, arbitrage ensures fair prices, equalizing the IORB, FFR, and treasury bill rate over time.

The IORB rate remained at a steady .15% throughout the pandemic, tracking the effective FFR at a slightly higher rate (.15% vs ~.7%, respectively). Historically, the effective FFR has been higher than the IOER (see note below) since mid-2019, but as of March 2020, the IORB rate has been higher and raises proportionally whenever the Fed decides to raise the target FFR. On March 16th, the IORB rate was raised to .40 percent in order to ensure the effective FFR reached its target, which mirrors how the discount rate was set to .50 percent. If the IORB is higher than the effective FFR, which it currently is, it serves as a risk-free investment option for banks, as they can deposit at the IORB rate and earn a profit.

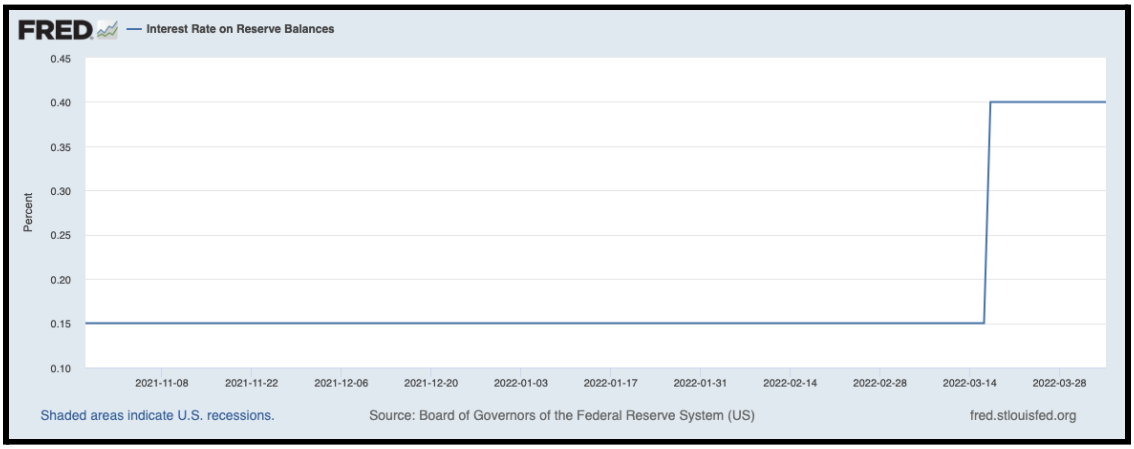

Figure 4.3: The IORB rate was increased from .15 - .40 on March 16th, 2022 increased the Fed's target FFR

The Overnight Reverse Repo Rate (ON RRP)

The Overnight Reverse Repo Rate (ON RRP) serves as a floor to the FFR by acting as an alternative investment for when rates fall below the IORB rate. In a reverse repo transaction, the Fed sells securities to a counterparty subject to an agreement, binding them to sell the securities at a later date. This temporarily reduces the supply of reserve balances within the economy. The difference between the buying and selling price, largely due to the time gap, results in interest being paid by the Fed for the transaction. When the Fed increases interest rates, it raises the IORB and ON RRP rates as well. Banks should not invest below these rates in private markets.

Since the ON RRP serves as a supplemental tool to the IORB in adjusting the FFR, it's directly correlated to the movements of either rate. That is to say, if the target FFR is raised, both the IORB rate and the ON RRP rate are raised, and vice versa if the target FFR is lowered.

Figure 4.4: Since Q1 2021, Treasury securities sold by the Fed increased from a billion dollars to $1.5T in Q2 2022

Discount Window

The discount window is a monetary policy instrument that allows non-Fed Fund (commercial) banks to borrow from the Fed in order to mitigate liquidity risks. Discount lending is not an active tool of monetary policy; instead, it is placed at a level far above the target Federal Funds rate in order to facilitate banks borrowing and lending from each other, and thus banks only resort to the discount window during short-term liquidity issues. The discount rate - the price the Fed charges to banks for short-term, collateralized loans to provide emergency credit to other banks in times of financial crisis, also considered the lender of last resorts. In 2008, the discount rate was cut down to only .25% above the FFR to aid in bailing banks out of insolvency, and the discount rate itself was reduced from 6.25% to .5% in order to promote borrowing.

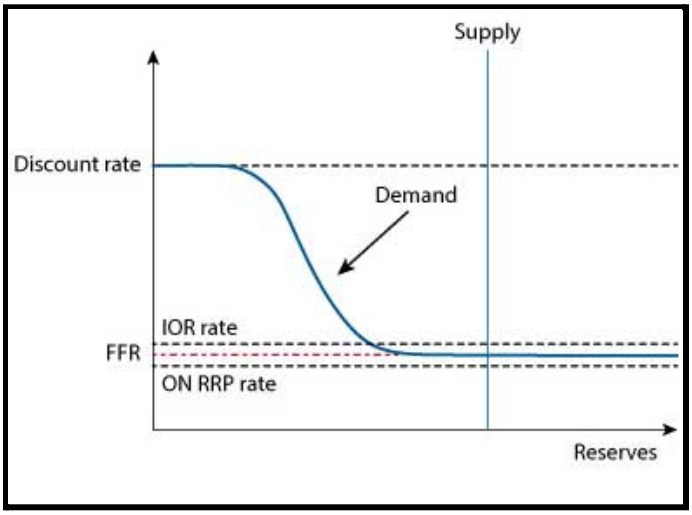

Figure 4.5: St. Louis Fed illustration of the discount window serving as a ceiling for the FFR

Banks often avoid touching the discount window, such as in November 2019 when the economy seemed primed for a contraction, yet banks were unwilling to borrow at the discount rate.

Throughout the pandemic, the discount rate hovered around .25% - about 10 bp above the FFR. With several quarter-bp hikes seeming likely in the near future, the discount rate should be expected to rise accordingly, though kept far above the FFR in order to de-incentivize banks from borrowing from the Fed wantonly. Following the Fed's announcement on March 16th, 2022, the discount rate was raised from .25 percent to .5 percent in accordance with the raise to the target FFR, indicating a higher ceiling and therefore future raises to the rates. Because it serves as a ceiling to the FFR, when the interest rate increases from .25 percent to .5 percent, the discount rate is set to .5 percent, with the effective FFR remaining far lower than the ceiling. It is safe to assume, therefore, that the discount rate will be approximately 2.5%-2.85% by the end of 2022, in accordance with the FFR, in order to manage recessionary risks.

Figure 4.6: Pre-pandemic and pandemic discount window rates, with the rate in Feb 2020 being ~2.25% and the pandemic rate being .25%, only being raised to .5% as a result of the FFR increase announced on March 16th, 2022

Open market operations

Open market operations are the buying and selling of Treasury securities by the Fed in order to maintain ample reserves. The Fed purchases securities in order to increase the supply of money and sells them to remove money from the system, raising short-term interest rates. ON RRPs are a form of open market operation, and as of April 2022, the amount of treasury securities being sold by the Fed has reached record highs, approaching $2 trillion currently, which is reflective of their contractionary policy.

There are two main types of OMOs: temporary and permanent. Permanent open market operations (POMO) refers to the Fed constantly using the open market to buy/sell securities to directly affect the money supply. This is contrasted by temporary open market operations, which generally involve repo and reverse repo agreements, which address more transitory issues such as short-term interest rates and reserve requirements. The Fed is currently engaging in temporary OMOs in order to reduce their balance sheet of nearly $9 trillion, by letting their currently owned securities mature and thereby reducing the money supply.

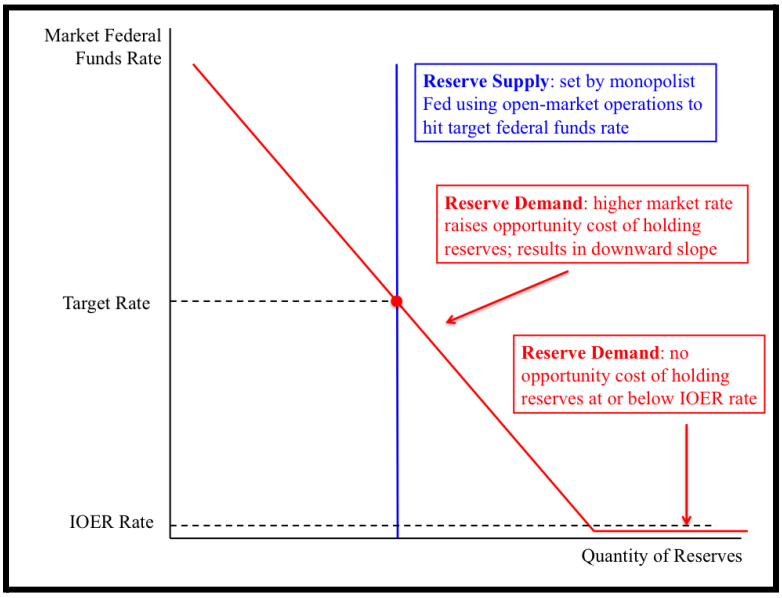

Figure 4.7: Pre-IORB illustration of the Fed using OMO to manipulate target FFR

Quantitative easing (QE) and quantitative tightening (QT)

Quantitative easing (QE) and quantitative tightening (QT) represent unconventional, modern monetary policy tools. QE is the process by which the Fed buys long-term securities en masse from the market to pump up money supply rapidly. This is an expansionary policy, only

utilized when interest rates are approaching zero and traditional OMOs are rendered ineffective. First used in the US following the 2008 Recession, QT refers to the opposite - the contractionary policy where the Fed reduces its balance sheet in order to decrease the liquidity in the economy.

Just as quantitative easing was first utilized after the 2008 Recession, quantitative tightening is a brand new monetary policy tool, introduced in 2018 to lower inflation following a decade of near-zero interest rates. However, it was quickly ended in 2019 after economic conditions worsened, re-incentivizing market liquidity. Because of its novelty, some financial analysts worry that QT will have a cascading effect on the economy[108], drastically lowering asset prices (just as QE inflates them) and increasing recessionary pressures. The effect QT will have on the economy is projected to have the equivalent of a 125 bp hike of the FFR[109], which in conjunction with the FFR hikes, could drastically slow economic growth if handled imprecisely.

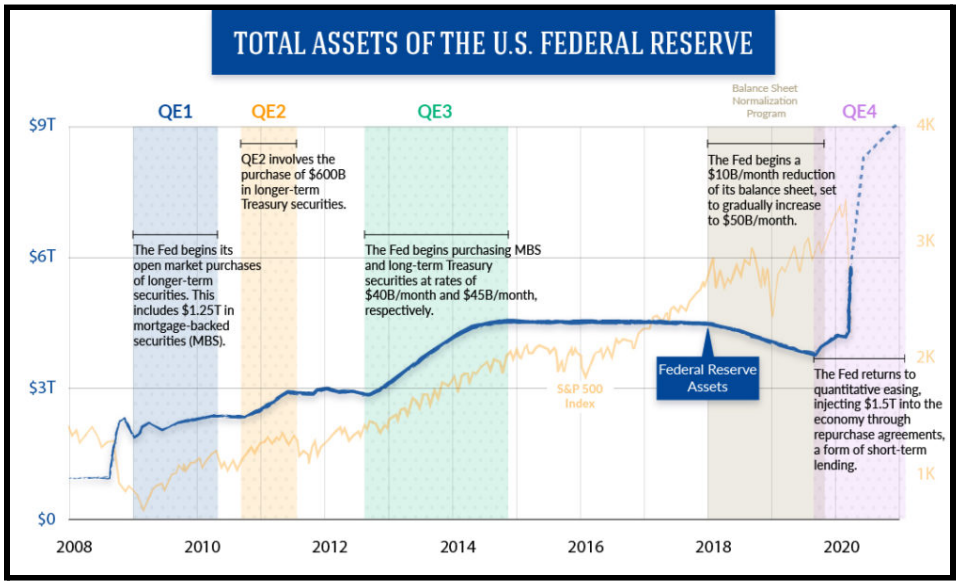

Figure 4.8: Fed balance sheet increased massively under QE policies following 2008, and again during the Covid pandemic, in an attempt to stimulate the economy by injecting trillions into the money supply

[108] Lahart, Justin. "Quantitative Tightening Could Set Off a Lengthy Tantrum" *Wall Street Journal*, April 6th, 2022. https://www.wsj.com/articles/quantitative-tightening-could-set-off-a-lengthy-tantrum-11649277856

[109] The Economist "Quantitative tightening is no substitute for higher interest rates." *The Economist*, Jan 29th, 2022. https://www.economist.com/finance-and-economics/2022/01/29/quantitative-tightening-is-no-substitute-for-higher-interest-rates

Forecast

In the March FOMC meeting, Fed Chair Jerome Powell noted the median FFR is projected to reach 1.9% by the end of 2022, and hit 2.8% over the following two years[110]. This is an entire percentage point higher than last December's projections and largely caused by the economic instability caused by the conflict in Ukraine - which continues to evolve and cause market fluctuations. Because the labor market remains tight, and GDP growth is projected to remain high (2.8% growth projected for 2022), the economy is analyzed to be stable enough to withstand tighter monetary policy. Inflation is also projected to remain high throughout 2022, not expected to come down until the second half of the year, and decrease rapidly in 2023. The discount rate, will reflect this range and will likely sit around 2.5% by the end of the fiscal year.

Monetary Policy Recommendations

The current dialogue concerning 25 bp hikes to the FFR is insufficient; a more hawkish position of one or two 50 bp increases should be utilized to bring inflation rates down. The FFR should be increased to a neutral rate of 2.3-2.5% at least by the end of 2022, rather than the 1.9% projected by the Fed in March. The discount window should be kept low in respect to the FFR in order to lower the risk of insolvency in case of recession, so a discount rate of 2.5-2.8% should be the target for the end of 2022. The Fed's current plan to reduce their balance sheet of $9T by monthly $90 billion increments through OMO will also be instrumental in reining in inflation, as it will have the equivalent effect of a 1.25% hike in the FFR by the end of the tightening process.

The main risk of adopting a more aggressive approach to curbing inflation is that of disrupting the delicate state of the US economy. Between the conflict in Ukraine increasing production costs, China going into lockdown, and massive inflation, there's a great deal of

[110] Powell, Jerome. "Chair Powell's Press Conference". Transcript of speech delivered at March 16th, 2022 *FOMC Meeting*. https://www.federalreserve.gov/mediacenter/files/FOMCpresconf20220316.pdf

uncertainty concerning the economy. Should the FFR hikes be too aggressive, such as adopting multiple 50 bp or even 75 bp hikes, it could slow the economy to a halt. That in conjunction with the unprecedented reduction of the Fed's balance sheet, which will have an effect equivalent to an interest rate hike, can have hugely negative impacts on the economy. Conversely, the risk of runaway inflation should the interest rate increases prove insufficient would also prove catastrophic. In order to navigate a soft landing, the Fed must take swift action to curb rising inflation, but they must also be wary of raising interest rates too high.

REAL ESTATE MARKET

Rising mortgage rates from its historic low combined with rising housing prices have triggered fears of a housing bubble. Meanwhile, the Federal Reserve has responded with contractionary monetary policy, raising interest rates and scaling back purchases of mortgage-backed securities (MBS).

Current Situation

The housing market started heating up during the pandemic, when mortgage rates bottomed out at 2.65%, the lowest it has ever been, in January 2021.[111] Since then, mortgage rates have rapidly risen to 5%.[112] While higher mortgage rates should cool down the housing market, there has been no sign of that yet. A confluence of unending supply chain disruptions, record-low inventory, and resurgent demand for durable goods continue to push house prices to new highs. The median home sale price was up 17% from 2021.[113] Because of this, consumers

[111] Kathy Orton, Rachel Siegel, "Mortgage rates hit 5 percent, ushering in new economic uncertainty," *The Washington Post*, April 14, 2022, https://www.washingtonpost.com/business/2022/04/14/mortgage-rates-5-percent/.
[112] Matt Grossman, "Mortgage Rates Hit 5% for First Time Since 2011," *Wall Street Journal*, April 14, 2022, https://www.wsj.com/articles/mortgage-rates-hit-5-for-first-time-since-2011-11649943332.
[113] Kenneth Applewhaite, "Redfin Reports Demand Slips, Pushing More Sellers to Drop Asking Prices," *Business Wire*, April 21, 2022, https://www.businesswire.com/news/home/20220421005989/en/Redfin-Reports-Demand-Slips-Pushing-More-Sellers-to-Drop-Asking-Prices#:~:text=The%20median%20home%20sale%20price,week%20period%20ending%20April%2010.

are increasingly pessimistic about home-buying conditions. Meanwhile, global economic uncertainty from the invasion of Ukraine and resulting sanctions may further worsen housing prices in the long run. The result: while rising mortgage rates should theoretically reduce demand and therefore prices in the housing market, the data so far show the two metrics rising in unison. Supply and demand factors are both pushing housing prices up, which won't subside until mortgage rates rise high enough to push a significant portion of buyers out of the market or housing inventories catch up with demand. At the current rate, neither supply nor demand factors appear to be subsiding, so the trends of higher mortgage rates and housing prices are likely to hold for the foreseeable future.

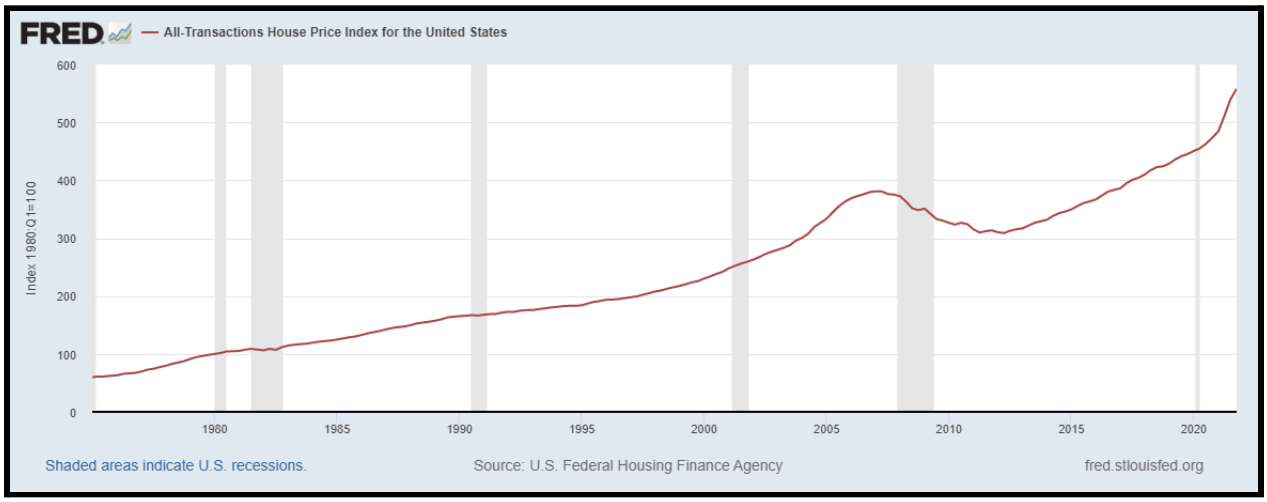

Figure 5.1: Housing Prices in the US Market, 2000-2022

Housing Bubble on the Horizon?

A housing bubble happens when real estate demand outpaces supply, causing prices to skyrocket. Like in 2007-2008, expectations of future growth become disconnected from economic reality. There are a few important indicators of a housing bubble: rising serious mortgage delinquency rates, increasing mortgage household debt as a share of income, speculatively high price of mortgage-backed securities (corresponding to low interest rates), and

fast-rising home prices. Additionally, the Federal Reserve raising interest rates to combat rising inflation can spell trouble by causing a market correction, as it did during 2008. On March 29th, the Federal Reserve Bank of Dallas published research that they believe points to a brewing housing bubble.

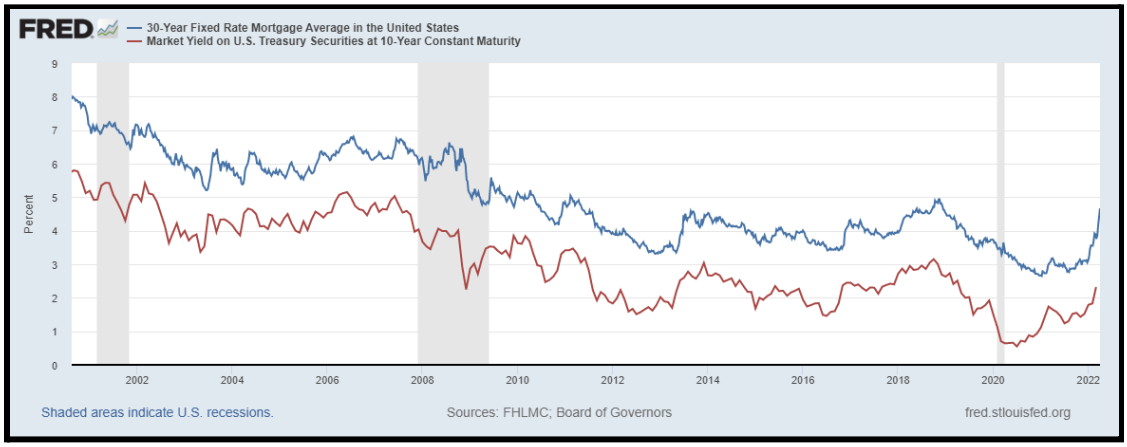

Figure 5.2: Mortgage Rates, 2000-2022

According to the Dallas Fed, housing prices "appear increasingly out of step with fundamentals".[114] Mortgage rates rose to their highest point since 2018 from its historic low of 2.65% in January 2021, hitting 4.67% for a fixed 30-year loan on March 31st, 2022.[115] Furthermore, The national median listing home price jumped 27% over two years, equaling a record $405,000.[116] The Dallas Fed also evaluated exuberance, which they define as price increases at an exponential rate that cannot be justified by economic fundamentals, also known as "expectations-driven explosive appreciation".[117] The current exuberance measure is 115%, which signals the probability that the market is undergoing abnormal explosive behavior is above the 95% threshold.[118] That strongly indicates the housing market is entering a bubble. Lastly, the

[114] Max Gottlich, "U.S. home prices 'out of step' with market fundamentals: Dallas Fed," *Seeking Alpha*, April 2, 2022, https://seekingalpha.com/news/3819665-us-home-prices-out-of-step-with-market-fundamentals-dallas-fed.
[115] Matt Grossman, "Mortgage Rates Hit 5% for First Time Since 2011," *Wall Street Journal*, April 14, 2022, https://www.wsj.com/articles/mortgage-rates-hit-5-for-first-time-since-2011-11649943332.
[116] Aimee Picchi, "Federal Reserve issues warning about "brewing U.S. housing bubble"," *CBS News*, April 5, 2022, https://www.cbsnews.com/news/housing-bubble-2022-federal-reserve-warning/.
[117] Jarod Coulter, Valerie Grossman, Enrique Martínez-García, Peter C.B. Phillips, Shuping Shi, "Real-Time Market Monitoring Finds Signs of Brewing U.S. Housing Bubble," *Federal Reserve Bank of Dallas*, March 29, 2022, https://www.dallasfed.org/research/economics/2022/0329.
[118] Ibid.

Dallas Fed pointed to the ratio of home prices to disposable income, which is a measure of affordability. They found that home affordability is at one of the worst levels ever.[119]

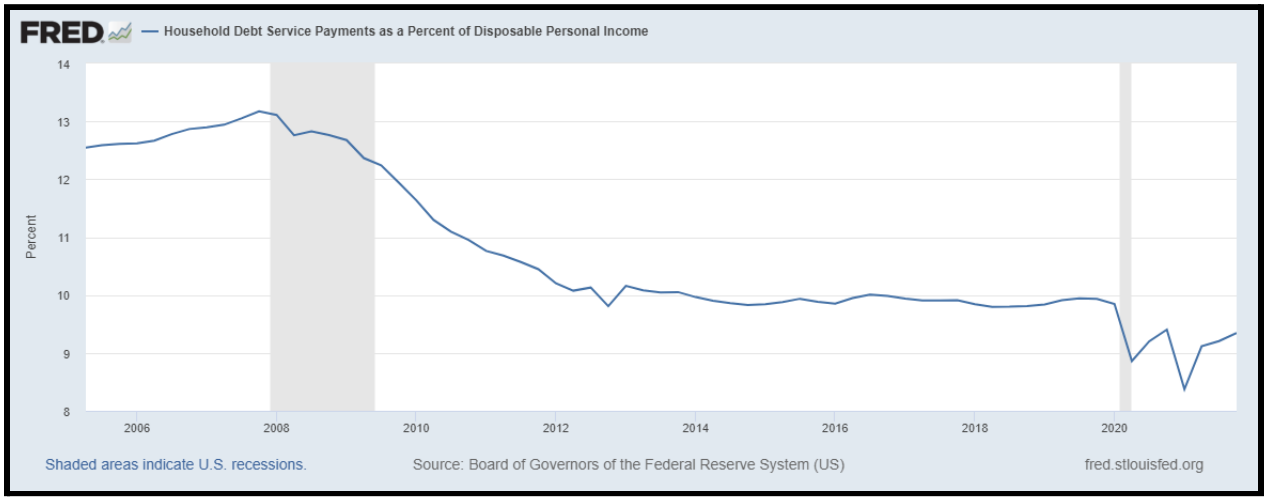

Figure 5.3: Household Debt Burden 2021 vs 2008

However, in other aspects, the current situation is unlike the 2008 crisis. From the perspective of mortgage delinquency rates, the rate for Fannie-Mae and Freddie-Mac-backed mortgages rose above 12% in 2007.[120] While delinquency rates rose during the pandemic as a result of lockdowns and lost income, they only hit a high of 2.85% in the fourth quarter of 2020 before slumping back down to 2.33% by the end of 2021 - nowhere near 2008 levels.[121] Moratoriums on evictions and foreclosures during the pandemic helped prevent the possibility of a housing crisis. Similarly, household debt service payments as a percent of disposable income show they reached as high as 13% during the 2008 recession, but were only at 10% during the COVID-induced 2020 recession.

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[119] Ronda Lee, "Housing affordability 'is the worst it's ever been,' analysts say," *Yahoo News*, March 15, 2022, https://news.yahoo.com/housing-affordability-is-the-worst-201008334.html.
[120] Denny Ceizyk, "Historical Mortgage Rates: Averages and Trends from the 1970s to 2019," *Value Penguin*, February 25 2022, https://www.valuepenguin.com/mortgages/historical-mortgage-rates.
[121] Lisa Dettling, Lauren Lambie-Hanson, "Why is the Default Rate So Low? How Economic Conditions and Public Policies Have Shaped Mortgage and Auto Delinquencies During the COVID-19 Pandemic," *Board of Governors of the Federal Reserve System*, March 4, 2021, https://www.federalreserve.gov/econres/notes/feds-notes/why-is-the-default-rate-so-low-20210304.htm.

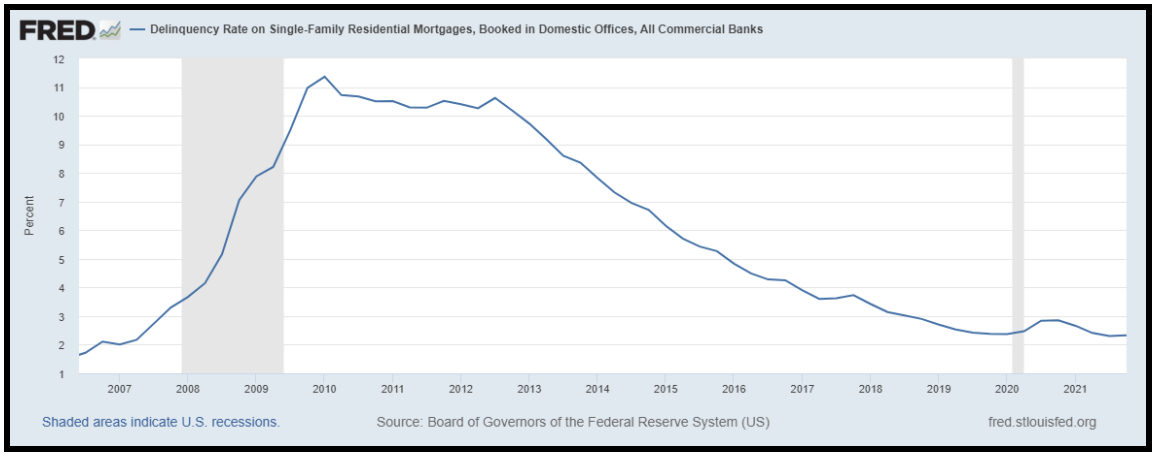

Figure 5.4: Mortgage Delinquency Rates 2021 vs 2008

As for the cost of mortgage-backed securities, they do not seem out of step from the normal average. In fact, the price of MBS has dropped significantly in recent years, making runaway speculation like in 2008 highly unlikely.[122]

While the housing market is clearly overvalued, a 2008-level crash is unlikely. The warning signs of a severe crash - debt ratios and delinquency rates - should not warrant concern. Even a downward correction of prices is unlikely because supply and demand factors are still pushing housing prices up. As a result of higher mortgage rates, more buyers should be priced out of the market, causing the pace of home price growth to fall. Nevertheless, until supply rises to meet demand, exuberant housing prices are unlikely to subside.

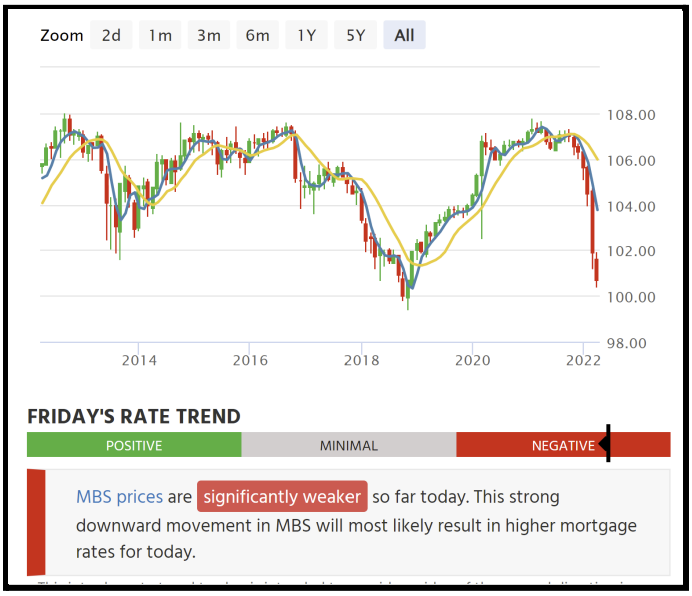

Figure 5.5: Price Of Mortgage-Backed Securities 2012-2022 (via Mortgage News Daily - https://www.mortgagenewsdaily.com/mbs)

[122] Diana Olick, "Mortgage rates plunge just as home prices set another record," *CNBC News*, March 1, 2022, https://www.cnbc.com/2022/03/01/mortgage-rates-plunge-just-as-home-prices-set-another-record.html.

Housing Prices

Housing is uniquely price and demand inelastic because new inventory is so low, making the housing market incredibly susceptible to distorted prices. While supply in part determined by new construction costs, including lumber and labor, demand depends on mortgage rate.

A confluence of factors arose out of the pandemic, dramatically pushing up housing prices. On the supply side, there is critically low inventory, which is the result of a fall in new construction, an interest rate trap, and a rise in institutional buyers. First, during the pandemic, housing construction fell sharply.[123] Hit by rising costs from supply chain and labor issues, many projects were put on hold. Now that the economic recovery has driven even higher demand for housing, there is not enough supply to match even normal expected demand. A National Association of Realtors report estimates that there is a 5.5 million housing unit shortage.[124]

Second is the potential for an interest rate trap; now that mortgage rates are at 5% and climbing, some sellers are likely to take their home off the market. Some homeowners may be looking to trade up by selling their current home and buying a new, more expensive one. However, because these sellers are also simultaneously buyers, they are hit just as hard by higher borrowing costs. Thus, higher interest rates also have the potential to push sellers out of the market. 86% of homeowners have a mortgage rate of 4.625% or lower and therefore are unlikely to sell.[125] That limits the pool of likely sellers to 14% of homeowners with mortgages, further reducing supply. Because existing homeowners are 40% of sales, this has enormous consequences. As interest rates go up, potential sellers may be pushed out of the market just as it pushes out potential buyers.

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[123] Ibid.
[124] Nicole Friedman, "U.S. Housing Market Needs 5.5 Million More Units, Says New Report," *Wall Street Journal*, June 16, 2021, https://www.wsj.com/articles/u-s-housing-market-needs-5-5-million-more-units-says-new-report-11623835800.
[125] Ronda Lee, "Mortgage rate trap is making the housing market worse," *Yahoo News*, April 8, 2022, https://news.yahoo.com/mortgage-rate-trap-housing-market-203108693.html.

Lastly, beckoned by profits, investors are buying up homes and moving them from the buyer market to the rental market. Institutional buyers and investors bought significantly more houses in 2021 than before, further reducing supply. The result of this supply-destructive trio: housing inventory for existing homes is down 15.5% from a year ago.[126]

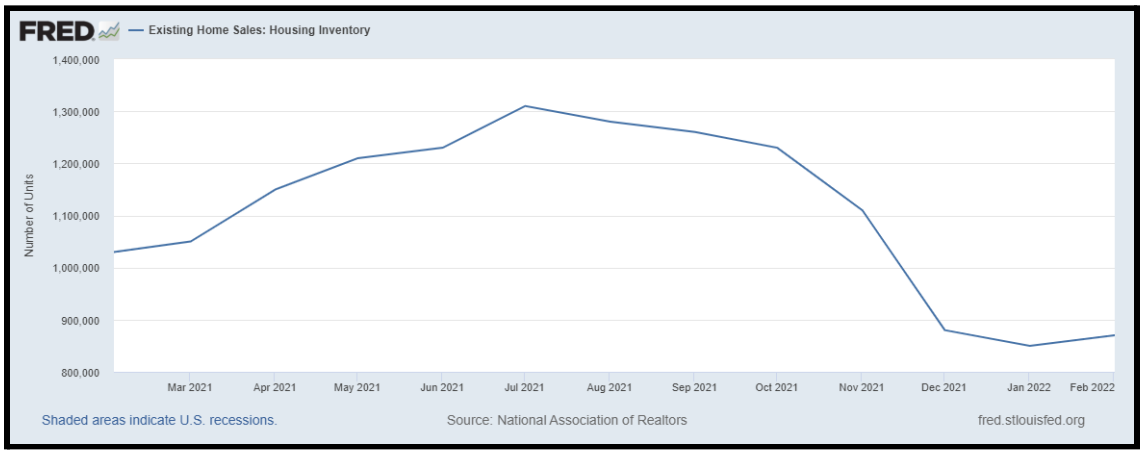

Figure 5.6: Housing Inventory Levels March 2021 - February 2022

On the demand side, four factors have pushed home prices sky-high. First, the millennial generation is reaching the home-buying age, accounting for 43% of all home-buyers in 2022.[127] Second, the pandemic has caused demand to shift towards durable goods. During the pandemic, durable goods spending contracted severely but then rose sharply. Lockdowns and social distancing caused consumers to buy more durable goods and less services. Moreover, households with incomes stabilized with pandemic stimulus are looking to buy durable goods all at once, driving up prices.[128] Third, cheap borrowing costs at the zenith of the pandemic lockdowns massively expanded the number of potential buyers. Finally, the continued trend of online or

[126] Brenda Richardson, "Existing Home Sales Fall As Affordability Concerns Rise," *Forbes*, March 18, 2022, https://www.forbes.com/sites/brendarichardson/2022/03/18/existing-home-sales-fall-as-affordability-concerns-rise/?sh=1af0fd7c5490.
[127] National Association of Realtors, "UNAR Report Shows Share of Millennial Home Buyers Continues to Rise," *National Association of Realtors*, March 23, 2022, https://www.nar.realtor/newsroom/nar-report-shows-share-of-millennial-home-buyers-continues-to-rise#:~:text=Millennials%20now%20make%20up%2043,suburban%20areas%20and%20small%20towns.
[128] Kristen Tauber, "Why Has Durable Goods Spending Been So Strong during the COVID-19 Pandemic?," *Federal Reserve Bank of Cleveland*, July 7, 2021, https://www.clevelandfed.org/en/newsroom-and-events/publications/economic-commentary/2021-economic-commentaries/ec-202116-durable-goods-spending-during-covid19-pandemic.aspx.

hybrid work environments has allowed families the flexibility to relocate further away from city centers, expanding the number of potential buyers interested in single-family suburban homes. These factors pushed the median price of home sales to $357,300 in the first quarter of 2022.

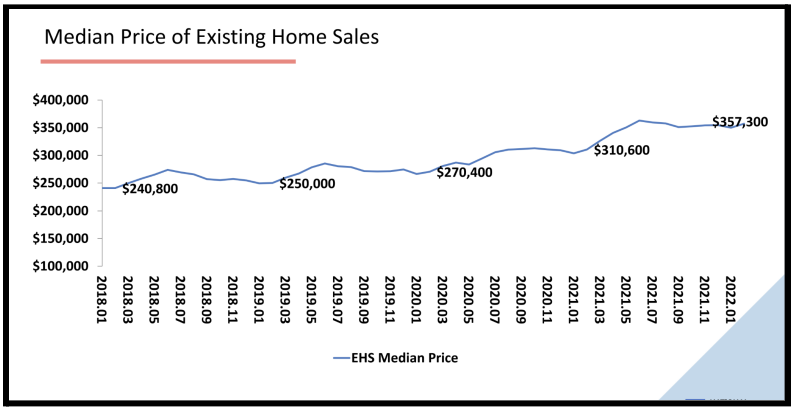

Figure 5.7: Median Price of Existing Home Sales 2018-2022

The rental market and the home-buyer market are strongly related. When buying homes is very expensive, potential buyers get pushed to the rental market, causing rent inflation. Moreover, higher rent inflation pushes people into the buying market, causing a positive feedback loop of higher prices as people are willing to pay more for less. As mortgage rates go up, expect rent to rise as well until the inventory of rentals goes up.

Over the past year, rent prices have skyrocketed 17.1% nationally.[129] Additionally, in Q1 of 2022, they have gone up 1.8%, twice as fast as before the pandemic in 2018.[130]

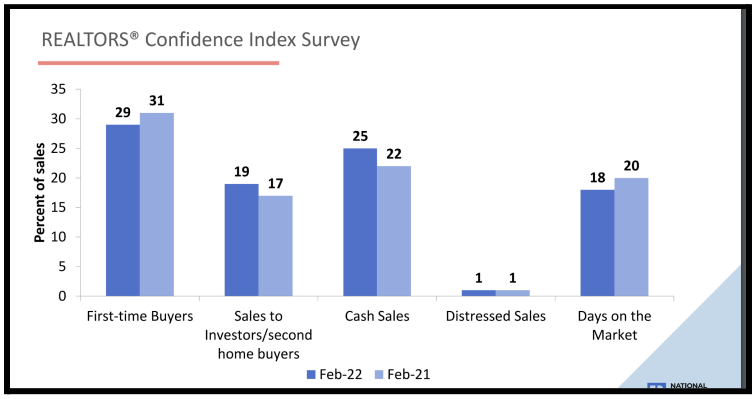

Figure 5.8: First Time Buyers Make Up Largest Portion of Sales 2021-2022

[129] Yaël Bizouati-Kennedy, "Rent Jumped 17% in a Year, Reaches New High — Here's Where You'll Pay the Most," *Go Banking Rates*, March 24, 2022, https://www.gobankingrates.com/money/economy/rent-jumped-17-percent-yoy-new-high/#:~:text=In%20February%2C%20national%20rents%20grew,according%20to%20a%20new%20report.

[130] Ibid.

Suburban vs Urban Housing

The post-pandemic economy has pushed more buyers to the suburbs, resulting in tighter inventory and higher price growth. Home-buyers are showing a preference for lower-density areas: on Realtor.com, data from February and March indicates 62% of views were for properties in the suburbs.[131] Moreover, demand for suburban housing was up 42.1% compared to three years ago, and supply is down 14.4%.[132] That last number is compared to an 8% drop in urban housing from three years ago. Still, home-buyer demand is up for both urban and suburban housing by more than 40%.

Supply Chain Issues

High prices for lumber and labor along with delays in material sourcing continue to hamper construction. 91% of homebuilding companies are struggling with supply chain problems.[133] According to data from the US Housing and Urban Development agency, overall new housing construction has decreased by 4.1% as a result.[134]

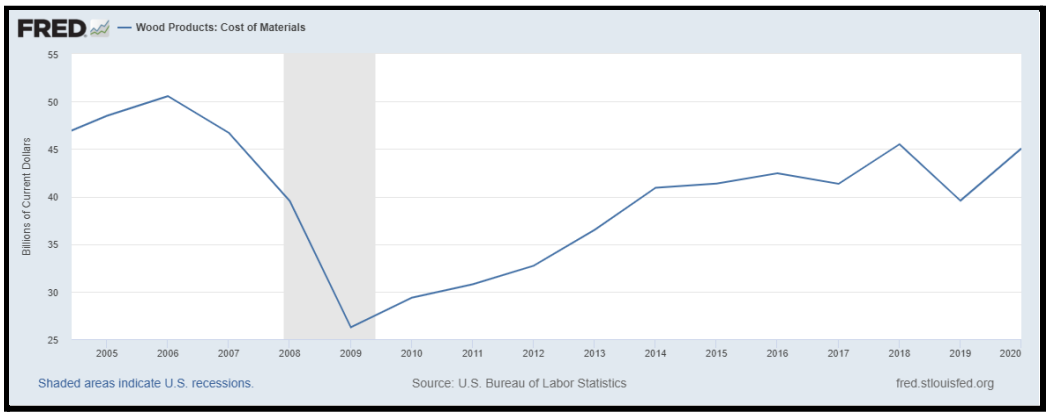

Figure 5.9: Cost of Lumber 2004-2020

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[131] Jiayi Xu, Sabrina Speianu, Danielle Hale, "Urban vs Suburban Growth Report: Homebuyers face more intense competition in the booming suburbs," *Realtor.com*, November 23, 2021, https://www.realtor.com/research/urbanicity-2021/.
[132] Ibid.
[133] Clare Trapasso, "Why Supply Chain Bottlenecks Are Keeping Home Prices Sky High," *Realtor.com*, October 27, 2021, https://www.realtor.com/news/trends/why-supply-chain-bottlenecks-are-keeping-home-prices-sky-high/.
[134] "Supply Chain Issues Continue to Slow Housing," *National Association of Home Builders*, February 17, 2022, https://www.nahb.org/blog/2022/02/supply-chain-issues-continue-to-slow-housing/#:~:text=With%20builders%20continuing%20to%20report,and%20the%20U.S.%20Census%20Bureau.

Data shows lumber cost has risen greatly from the pandemic-lows in 2019. In March, lumber prices were up 135% from 2020. Huge volatility in the lumber market also remains a concern. Strong swings in the cost of lumber makes deciding on new construction more difficult.

Figure 5.10: Price Volatility of Lumber January 2021 - January 2022

Data from the National Association of Home Builders (NAHB) shows the cost of building materials is up 20.3% compared to last year.[135] The PPI for lumber increased faster than other construction materials, indicating severe price inflation. Additionally, concern about the cost and availability of labor is rising rapidly.

PPI Changes for Common Building Materials, January 2022

Material	PPI Change in January 2022 from December 2021
Softwood Lumber	25.4%
Ready-Mix Concrete	1.4%
Gypsum Products	3.4%
Steel Mill Products	-1.9%
Paint	9.0%

Source: National Association of Home Builders; Novogradac

NOVOGRADAC®

Figure 5.11: PPI Changes for Building Materials 2021-2022

[135] "Lumber and Paint Lead Building Materials Price Increases in January," *National Association of Home Builders*, February 18, 2022, https://www.nahb.org/blog/2022/02/lumber-and-paint-lead-building-materials-price-increases-in-january/#:~:text=Building%20materials%20prices%20increased%2020.3,1.3%25%20increase%20in%20December%202021.

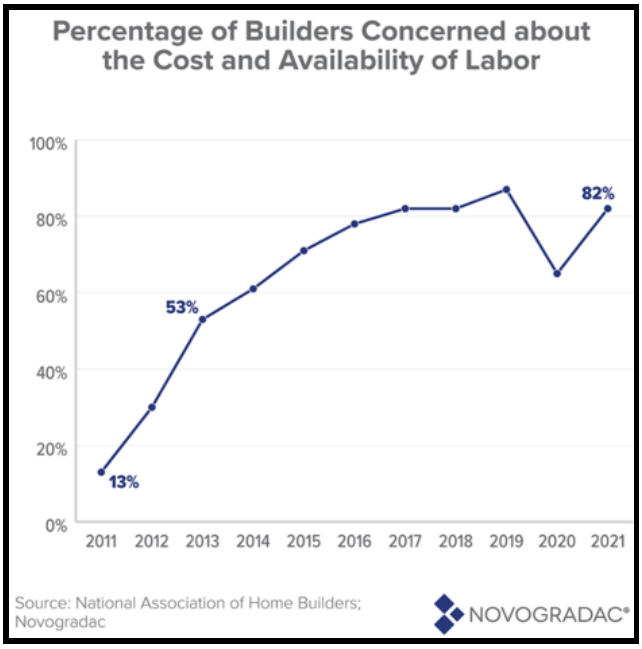

Figure 5.12: Builders' Concern about Labor 2011-2021

Despite chronic production bottlenecks, explosive appreciation has raised profit upside, generating great interest in new construction. New building permits increased 0.7% in January, a sign that supply will meet demand in the long run.[136] While there is new construction underway, it remains dwarfed by the inventory shortage, which may continue to be stretched out as a result of long construction cycle times. There are 785,000 single family homes under construction currently, a 26.8% year over year gain, and 758,000 multifamily units under construction currently, a 14% gain.[137] However, there is a 5.5 million unit shortage in housing, so the market is unlikely to see a significant reduction in home prices anytime soon.[138]

Interest Rates and the Housing Market

Fixed-rate mortgages are tied to the 10-year Treasury rate. Considered a risk-free asset, 10-year Treasury bonds are the floor for long-term investment profits. Mortgage loans are a riskier investment, and therefore require higher interest rates. During the COVID-induced recession, the Fed bought up Treasury bonds, lowering yields and increasing the money supply.

[136] "U.S. housing starts fall in January amid freezing weather; permits surge," *Reuters*, February 17, 2022, https://www.reuters.com/business/us-housing-starts-fall-january-amid-freezing-weather-permits-surge-2022-02-17/#:~:text=Permits%20for%20future%20homebuilding%20in,units%2C%20the%20highest%20since%202006.
[137] Elizabeth Thompson, "Supply Chain Issues Continue to Slow Housing," *National Association of Home Builders*, February 17, 2022, https://www.nahb.org/news-and-economics/press-releases/2022/02/supply-chain-issues-continue-to-slow-housing.
[138] Nicole Friedman, "U.S. Housing Market Needs 5.5 Million More Units, Says New Report," *Wall Street Journal*, June 16, 2021, https://www.wsj.com/articles/u-s-housing-market-needs-5-5-million-more-units-says-new-report-11623835800.

Now that the Fed shifted to allowing its holdings of Treasury bonds to mature, the yield on 10-year Treasury bonds has risen and so have mortgage rates. Increasing the federal funds rate (FFR) has had similar effects, making borrowing costs for banks more expensive, which then pass the cost onto mortgage applicants. However, it may take between 3-6 months to see large scale effects from FFR and 10-year Treasury yield changes on consumer and seller behavior.

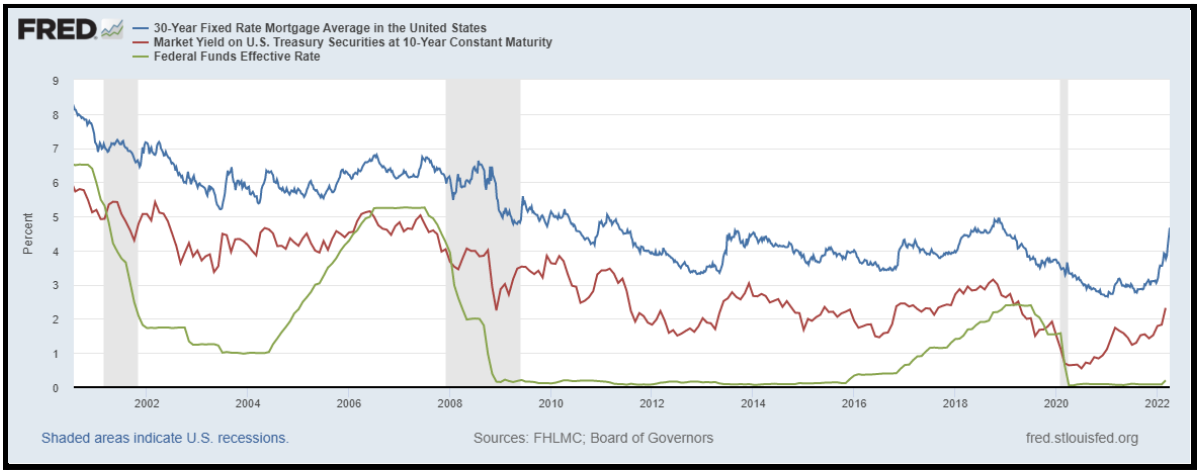

Figure 5.13: 30-Year Fixed Mortgage Rate Tracks 10-Year Treasury Bond Yield 2000-2022

Mortgage-Backed Securities

Mortgage-backed securities are home mortgages bundled in large quantities which are then sold as stocks. However, they are only as sound as the mortgages that back them up. MBS are issued by the banks that collect the mortgage payments from homeowners and must receive one of the top two ratings by a credit rating agency. The two types of MBS are pass-through MBS and collateralized mortgage obligation (CMO). With pass-through MBS, principal and interest payments on the mortgage are passed onto investors and are treated as a trust. CMOs bundle multiple pools of securities known as tranches. More risky tranches come with a higher interest rate.

During the pandemic, the Federal expanded the quantity of MBS on its balance sheet to an unprecedented level. This helped stabilize the housing market, providing liquidity when investor confidence is low. Now that inflation has picked up, it is considering shrinking its assets by about $35 billion a month, letting them mature naturally and not reinvesting into new MBS.[139] The minutes from the Federal Reserve's March FOMC meeting signaled support for quantitative tightening in the housing market. It is unclear whether investors are prepared for the fast turnaround in quantitative easing or the possibility of eventual removal of all MBS from the Federal Reserve's balance sheet. The reaction of investors in the market is uncertain, which signals possible volatility in the future when the Fed does begin to shrink its balance sheet.

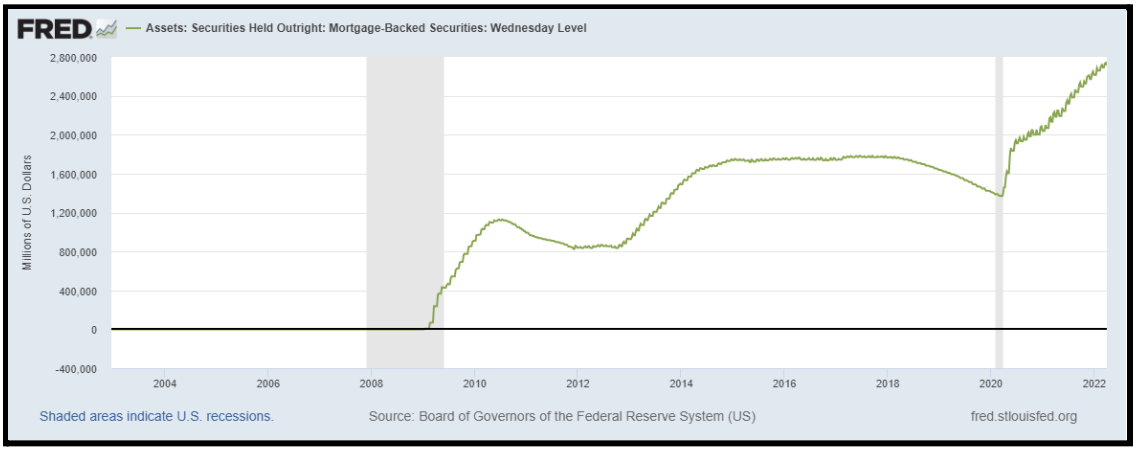

Figure 5.14: Fed Holdings of Mortgage-Backed Securities 2002-2022

Forecast

While a housing crash is unlikely, the housing market will continue to be significantly overvalued for the next few years. Demand will continue to far outpace supply because of construction delays and a vast shortage of units. Any decline of interested buyers is likely 3 months or more away. Buyers may believe now is the last chance to get into the market before

[139] Joseph Brusuelas, "FOMC minutes: Fed prepares to shift its policy normalization into a higher gear," *Real Economy Blog*, April 6, 2022, https://realeconomy.rsmus.com/fomc-minutes-fed-prepares-to-shift-its-policy-normalization-into-a-higher-gear/.

they are completely priced out by high borrowing costs.[140] Additionally, supply chain problems have no end in sight. Expect housing prices to stay high because of low inventory, though the growth in housing prices will slow and total home sales are likely to decline. Home prices are likely to keep rising, even as rates go higher. Rising mortgage rates have a long way to go before it starts affecting buyer and seller behavior. The current inertia of price growth will cause home values to increase 10-15% over the next year.

There are a few emerging trends that may indicate explosive appreciation has just started to subside. The number of new listings in March jumped 8% from a year ago, indicating a potential resurgence on the horizon for housing inventory.[141] Moreover, some sellers have just started reducing prices. 12% of homes for sale had a price drop, an increase of 9% since last year. This is a clear sign that the housing market may be starting to cool off. Lastly, new mortgage applications have declined by 8.48%, signaling that higher borrowing costs are pushing more potential buyers out of the market, reducing competition and forcing prices down.[142] However, these are long-term indicators which will take 6 months or longer to filter throughout the national housing market. Even as demand starts to subside sometime late this year, supply constraints will continue to keep housing prices high. Housing prices will not fall for the foreseeable future even as the rate of housing price increases slows.

Lastly, the invasion of Ukraine has destabilized the world economy and increased uncertainty about future economic prospects. In the short term, it caused sudden and temporarily lower yields on 10-year treasury bonds, causing mortgages to fall from 3.89% to 3.76% before

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[140] Emily Badger, Quoctrung Bui, "Can Home Prices and Interest Rates Soar at the Same Time?," *New York Times The Upshot*, April 2, 2022, https://www.nytimes.com/2022/03/31/upshot/home-prices-mortgage-rates.html.
[141] Diana Olick, "Rising mortgage rates are causing more home sellers to lower their asking prices," *CNBC News*, April 7, 2022, https://www.cnbc.com/2022/04/07/rising-mortgage-rates-cause-more-home-sellers-to-lower-asking-prices.html.
[142] Lisa Rizzolo, "Mortgage applications drop to lowest level in over 2 years," *CNBC News*, February 23, 2022, https://www.cnbc.com/2022/02/23/mortgage-applications-drop-to-lowest-level-in-over-2-years.html.

rebounding.[143] Furthermore, because gas prices and wheat prices have risen dramatically, consumers are likely to fear further inflation. Home-buying is a good hedge against inflation, making it less likely that current homeowners will sell their houses. That will reduce inventory and increase prices, adding another factor to a market already out of step with economic fundamentals. Further price inflation may spillover to construction costs, raising the price of labor and lumber.

Monetary Policy Recommendations

The Federal Reserve should steadily increase interest rates, but not too fast to cause a severe market correction. That could destabilize the housing market and cause a panic when it is already fragile and significantly overvalued. An increase of the target federal funds rate by 25 basis points each meeting for the rest of the year would strike an appropriate balance. To achieve a soft landing for the housing market, the Fed must raise interest rates to alleviate skyrocketing price inflation in the housing market. However, hikes greater than 25 basis points could cause a housing bubble to pop. 50 basis point hikes could make it even harder for home-buyers to afford houses, pushing a wave of potential buyers out of the market. Home prices could crash as the Fed sends a strong contractionary signal to investors. Taking into consideration other macroeconomic factors including inflation and GDP, a 50 basis point hike may still be the safest path between a recession and high inflation.

Lastly, the Fed should allow its mortgage-backed securities to mature at a steady rate and not reinvest. The Fed should increase the rate of tapering up to $20 billion a month in three months. The Fed should announce it will allow $20 billion of MBS to mature each month. The minutes of the Fed's March meeting suggests it intends to target the sale of roughly $15 billion in

[143] Matt Ott, "Long-term US mortgage rates fall this week to 3.76%," *ABC News*, March 3, 2022, https://abcnews.go.com/Business/wireStory/long-term-us-mortgage-rates-fall-week-376-83227623.

MBS each month, in addition to the above. However, combining additional quantitative tightening with rising interest rates could have unpredictable and severe unforeseen consequences in the housing market, causing the housing bubble to pop. Pushing off the sale of MBS to a later date, and adjusting based on new data, could help engineer a soft landing.

FEDERAL RESERVE BALANCE SHEET

In response to growing inflationary pressures, the Federal Reserve released plans to reduce its balance sheet by $95 billion per month, or just under $1 trillion per year, at the March Federal Open Market Committee meeting.[144] This comes at a high point for Fed holdings, totalling $9 trillion, that remain from quantitative easing (large-scale asset purchases) during the COVID-19 pandemic and the 2008 Financial Crisis.

Current Situation

The purchase of long-term assets in such downturns stimulates the economy by increasing the money supply and driving down interest rates; however, persistent intrusion by the Fed causes price levels to rise. Some worry that the swift federal funds rate hikes and balance sheet cuts will trigger a recession, forcing the Fed to choose between the two components of the dual mandate: price stability and maximum employment. A pragmatic monetary policy given the current conditions would look like a 50 basis point hike at the May FOMC meeting, followed by 25-basis-point hikes at subsequent meetings up until the end of the year. Monthly asset reductions should remain significantly below their monthly caps.

[144] "Minutes of the Federal Open Market Committee, March 15-16." Federal Reserve Board, April 6, 2022. https://www.federalreserve.gov/monetarypolicy/files/fomcminutes20220316.pdf.

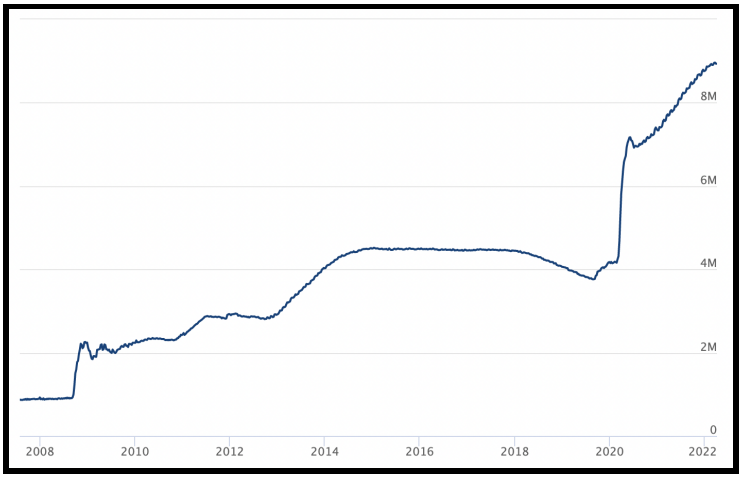


Figure 6.1: Historical Trend of Total Assets on Fed's Balance Sheet[145]

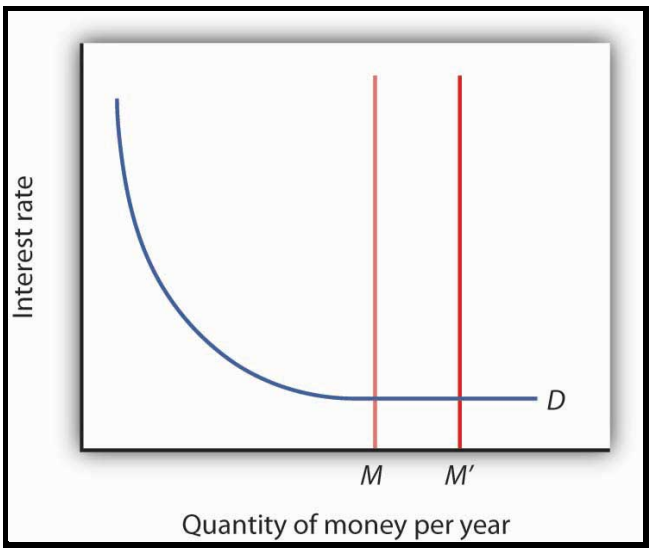
When Central Banks Utilize QE

Quantitative easing is an unconventional monetary policy tool that the Fed utilizes when adjustments to the federal funds rate prove ineffective or are no longer feasible. This generally occurs with low, zero, or negative interest rates. The Taylor Rule states that central banks will raise nominal interest rates when actual inflation or output outpaces their targets (2% and 2.2% respectively) and will lower nominal interest rates when inflation or output fall short of their targets. Once interest rates reach their effective lower bound of around 0% in the United States, the central bank must resort to other measures.[146]

Taylor Rule: $r = p + 0.5y + 0.5(p - 2) + 2$

r = nominal fed funds rate, p = inflation rate, y = real and projected GDP percent deviation

[145] "Recent Balance Sheet Trends." Federal Reserve Board. Accessed April 24, 2022. https://www.federalreserve.gov/monetarypolicy/bst_recenttrends.htm.
[146] Williamson, Stephen D. "Quantitative Easing: How Well Does This Tool Work?" Federal Reserve Bank of St. Louis, December 9, 2021. https://www.stlouisfed.org/publications/regional-economist/third-quarter-2017/quantitative-easing-how-well-does-this-tool-work.



This can also be described as the liquidity trap: the point where cash is preferred to all other financial assets because of zero or negative return. Quantitative easing can be used as a last resort under these circumstances to prevent economic slowdown or deflation.

Figure 6.2: Liquidity Trap in Loanable Funds Market[147]

Asset Types

The Fed purchases fixed-income securities outright that pay back principal as well as interest upon maturity. As of April 21, 2022, U.S. Treasury securities make up the bulk of its holdings at $5.75 trillion. T-bills range from four, eight, 13, 26, and 52 weeks. Treasury bonds have longer maturities of up to 30 years. The average length of maturities on the balance sheet generally increases during quantitative easing in order to increase the attractiveness of shorter-term securities. Both primary and secondary markets exist for Treasuries, where they can be purchased for the first time or exchanged. Interest rate risk describes the opportunity cost for fixed interest on T-bills if interest rates continue to rise after purchase. Other than facing interest rate risk, Treasuries have virtually no risk due to their backing with the full faith and credit of the United States government. Mortgage-backed securities account for $2.74 trillion of the balance sheet and pay a monthly coupon. They are derived from real-estate loans through a process known as securitization and can be sold to federal government agencies with full government

[147] "Liquidity Trap." Lumen Learning. Accessed April 24, 2022. https://courses.lumenlearning.com/suny-macroeconomics/chapter/liquidity-trap/.

backing, government-sponsored enterprises with partial government backing, or securities firms backed privately. Finally, agency debt is the smallest category at $2.35 billion.[148]

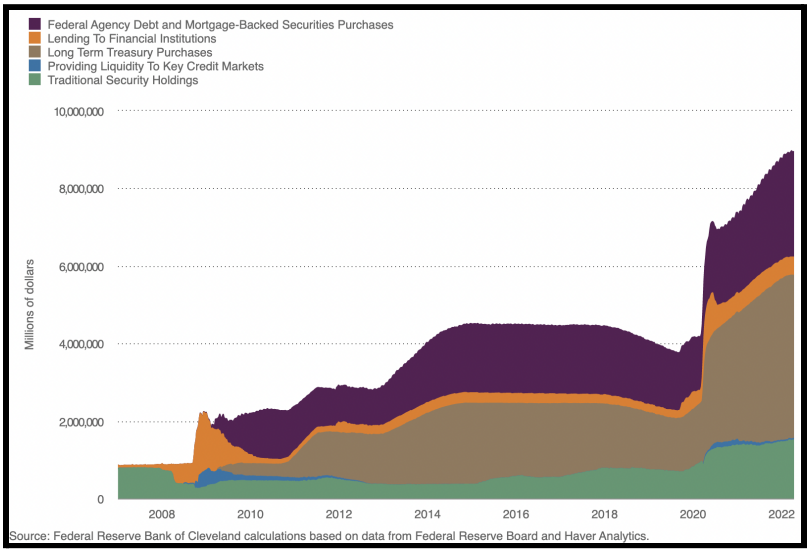


Figure 6.3: Fed's Balance Sheet Asset Breakdown[149]

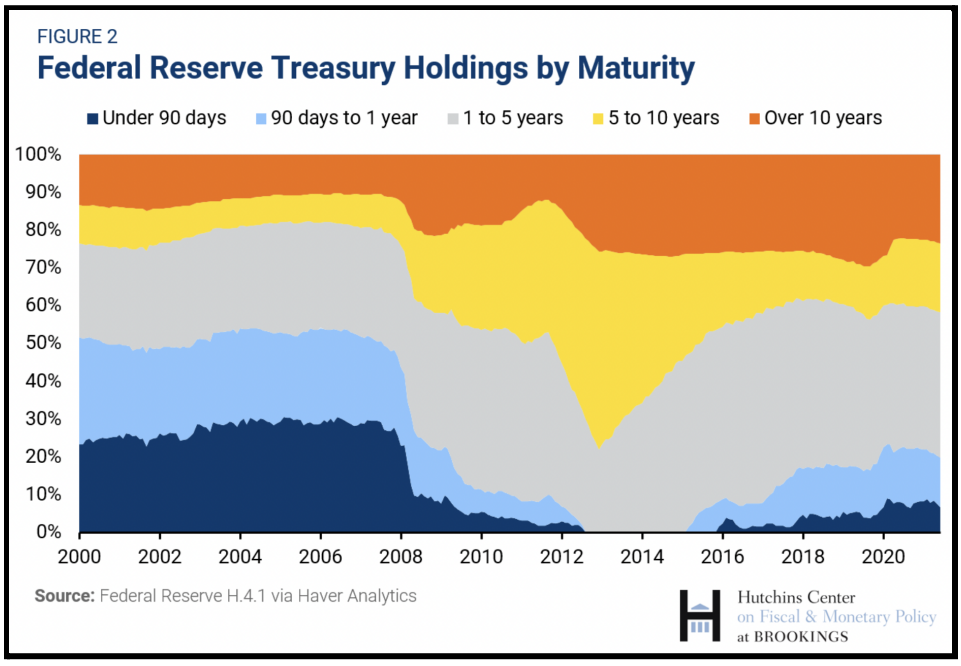


Figure 6.4: Longer-Term Maturity Share Increases During QE[150]

[148] "Factors Affecting Reserve Balances." Federal Reserve Board, April 21, 2022. https://www.federalreserve.gov/releases/h41/current/.
[149] "Credit Easing." Federal Reserve Bank of Cleveland, January 8, 2021. https://www.clevelandfed.org/our-research/indicators-and-data/credit-easing.aspx.
[150] Milstein, Eric, David Wessel. "What Does the Federal Reserve Mean When It Talks About Tapering?" Brookings, January 27, 2022. https://www.brookings.edu/blog/up-front/2021/07/15/what-does-the-federal-reserve-mean-when-it-talks-about-tapering/.

QE Impact on Money Supply

In order to better understand the desired outcome of quantitative easing, it is useful to look at its impact on the money supply. An increase in the money supply decreases interest rates and prompts firms and consumers to borrow and subsequently spend. As the Fed purchases longer-term securities, capital flows into the hands of lending institutions, increasing their liquidity. The hope is that they lend those funds out again, although this does not always go according to plan; immediately prior to the COVID-19-induced financial crisis, excess reserves hit a peak of $2.7 trillion. The Fed responded by reducing the interest rate on excess reserves from a high point of 1.6% to 0.1%.

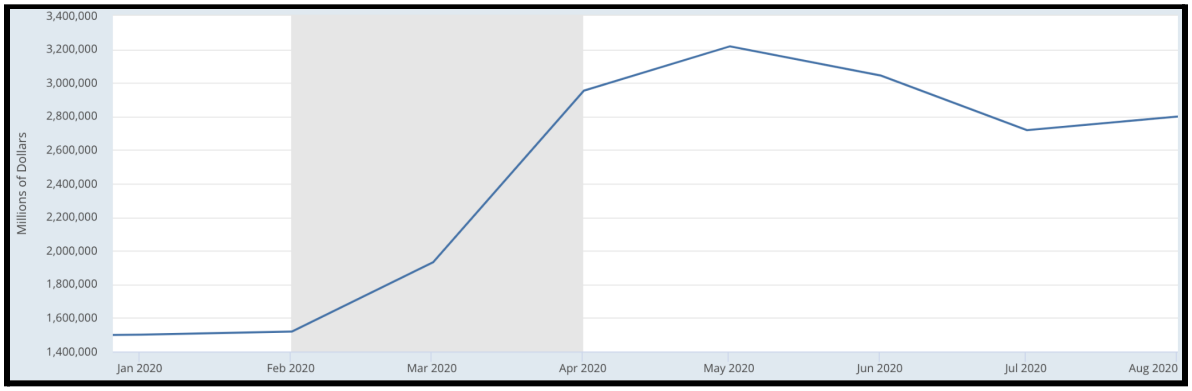


Figure 6.5: Excess Reserves During COVID-19 Pandemic[151]

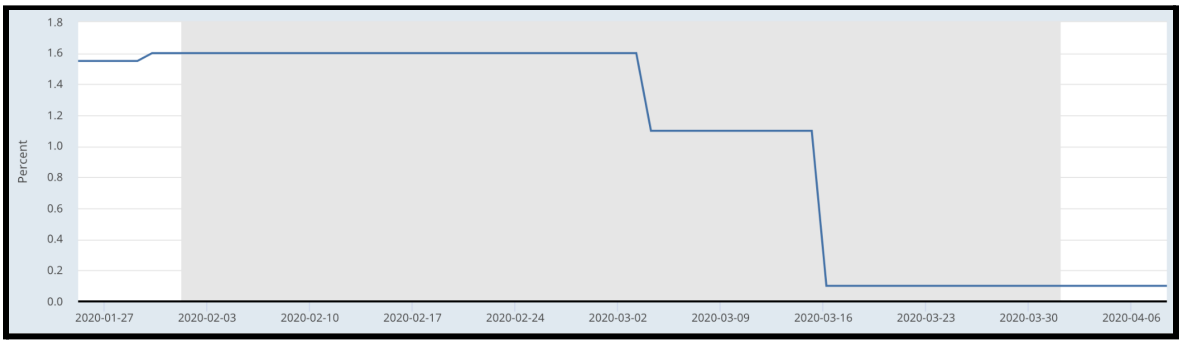


Figure 6.6: Interest Rate on Excess Reserves During COVID-19 Pandemic[152]

[151] "Excess Reserves of Depository Institutions." Federal Reserve Bank of St. Louis, September 10, 2020. https://fred.stlouisfed.org/series/EXCSRESNS.
[152] "Interest Rate on Excess Reserves." Federal Reserve Bank of St. Louis, July 27, 2021. https://fred.stlouisfed.org/series/IOER.

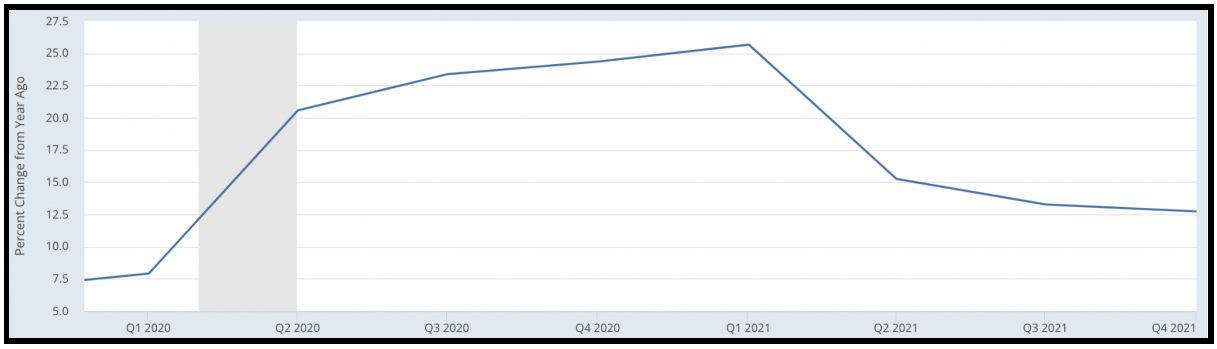


Figure 6.7: M2 (Money Supply) Growth Rate During COVID-19 Pandemic[153]

Liquidity Preferences Theory

Liquidity preferences theory explains the interest rate differential between short-term and long-term investments. John Maynard Keynes criticized the classical model with the supply of savings and demand for investment. Savings should be a function of GDP, which is itself a function of investment and therefore interest rates, rather than the other way around. Instead, he proposed three determinants of the demand for liquidity: the transactions motive to meet daily needs, the precautionary motive for unforeseen circumstances, and the speculative motive to wait for interest rates to rise. Bonds offer the only alternative to cash in the model, and the opportunity cost of holding cash rises as interest rates rise. This results in a downward-sloping demand for money and a vertical (fixed) money supply. If the actual interest rate surpasses the equilibrium interest rate, market participants invest in bonds, evidenced by the excess supply of money. Therefore, by considering short-term bonds as almost equivalent to money due to their high liquidity, long-term bonds require compensation through higher interest rates. The level of risk also grows in the long-term with more likelihood of default, changes to the interest rate, and unexpected inflation.

[153] "M2." Federal Reserve Bank of St. Louis, March 22, 2022. https://fred.stlouisfed.org/graph/?graph_id=248494.

Inflation reached a 40-year high of 8.5% this March 2022 due to supply-chain disruptions from the ongoing Russian invasion of Ukraine and stringent COVID-19 lockdowns in China. Uncertainty and volatility have led to greater preferences for liquidity. With stock prices down, investors can now earn modest returns with lower risk profiles as the Fed moves ahead with interest rate increases. The 35% rise in prime money-market holdings between February 2022 and March 2022 illustrates the seismic shift toward more liquid assets. Based on Bank of America's prediction that interest rates will rise to 3% early in 2023, cash-like assets would far exceed the dividend yield of the S&P 500, currently at 1.4%. Bank of America also found that cash holdings reached levels similar to April 2020 during the COVID-19-induced market sell off.[154] The Fed's looming quantitative tightening program will also make liquid assets more desirable as overall liquidity in the economy decreases.

Yield Curves

One conventional theory supporting the efficacy of quantitative easing, called the portfolio balance or segmented markets theory, assumes that assets with different maturities are imperfect substitutes. A higher supply of short-term assets in relation to a lower supply of long-term assets raises short-term interest rates and lowers long-term interest rates, and vice versa. The convergence of short and long-term yields, also known as a flat yield curve, encourages more lending in the short term because of uncompensated risk in the long term. Quantitative easing accomplishes this by driving up demand to increase the price of long-term securities and decrease the interest rate. Inverted yield curves occur when short-term interest rates exceed long-term interest rates. This reflects interest rate hikes by the Fed in the short term as part of contractionary monetary policy that generally precedes a recession. Investors see

[154] Rabouin, Dion. "Wall Street Finds New Value in Cash as Global Fears Weigh on Markets." The Wall Street Journal, April 25, 2022. https://www.wsj.com/articles/maybe-there-is-an-alternative-wall-street-finds-new-value-in-cash-11650834514.

greater risk associated with inflation in the short-term rather than the long-term, decreasing demand and increasing interest rates for short-term Treasuries and increasing demand and decreasing interest rates for long-term Treasuries. Borrowing also becomes more expensive in the short term and can potentially slow economic activity.

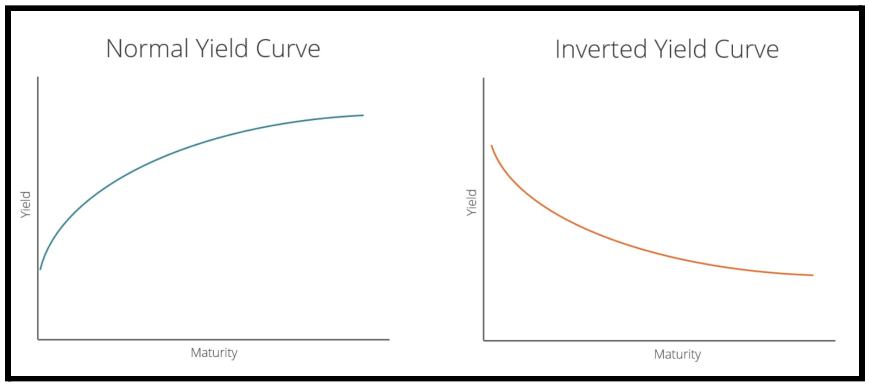


Figure 6.8: Normal vs. Inverted Yield Curve[155]

The 10 year to 3 month yield spread tends to have a stronger correlation to an imminent recession. While it is promising that 10 year yields are outpacing 3 month yields, the more worrying phenomenon is the near inversion of the 10 year to 2 year spread. It reached 0.18% on April 25th, 2022, moving dangerously close to 0.[156] This reflects expectations that the Fed will raise interest rates gradually and could trigger a recession within the next few years.

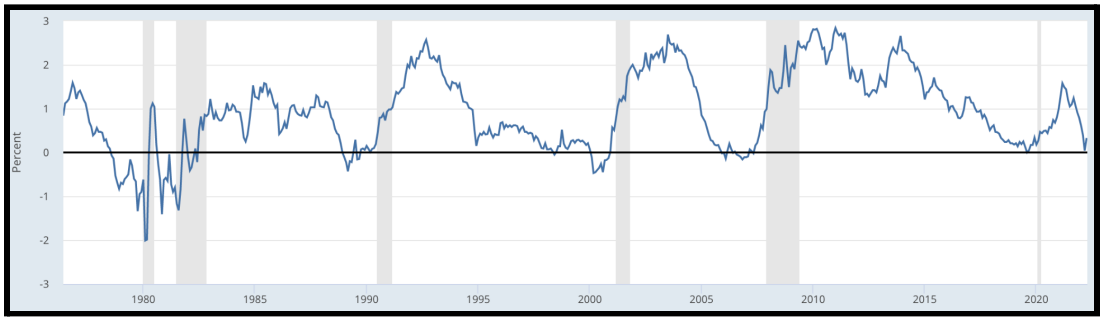


Figure 6.9: 10-2 Year Treasury Yield Spread Goes Negative Before Recessions[157]

[155] "Inverted Yield Curve." Corporate Finance Institute, February 27, 2020. https://corporatefinanceinstitute.com/resources/knowledge/finance/inverted-yield-curve/.
[156] "10-Year Treasury Constant Maturity Minus 2-Year Treasury Constant Maturity." Federal Reserve Bank of St. Louis, April 22, 2022. https://fred.stlouisfed.org/series/T10Y2Y.
[157] "10-Year Treasury Constant Maturity Minus 2-Year Treasury Constant Maturity." Federal Reserve Bank of St. Louis, April 22, 2022. https://fred.stlouisfed.org/series/T10Y2Y.

Figure 6.10: 10 Year to 2 Year Spread Reflects Longer-Term Recession Fears

Real Interest Rate

While yield curves display nominal interest rates, real interest rates provide a more accurate figure for return on investment because they are adjusted for inflation. Longer-term debt instruments generally maintain a higher real interest rate despite nominal yield curve inversions. The Fisher equation does this by subtracting the inflation rate from the nominal interest rate. Real interest rates are finally beginning to go positive for this next economic cycle, largely driven by nominal increases rather than inflation. This is also partly due to the Fed's tapering that decreases demand and therefore prices. The neutral rate of interest is the real interest rate where the economy is operating at its full level. There is neither an expansionary or contractionary stance taken by the central bank. Estimates put the neutral rate at around 2.5% under today's conditions, far off from the current federal funds rate of 0.33%. In effect, the prevailing interest rate is stimulating the economy in spite of unprecedented inflation concerns.

Fisher equation: $(1 + i) = (1 + r)(1 + \pi)$

i = nominal interest rate, r = real interest rate, π = inflation rate

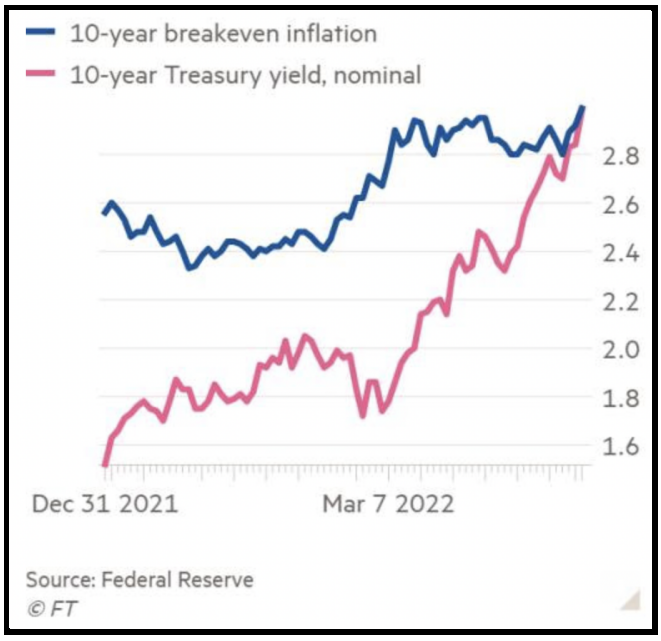


Figure 6.11: Nominal Rate Increases Rather Than Inflation Driving Real Interest Rates Up[158]

Potential Drawbacks of QE

Under the quantitative theory of money, the money supply multiplied by the circulation velocity of money is equal to the price level multiplied by total output ($MV = PY$). An increase in the money supply can lead to higher output, but it can also contribute to a higher price level due to the time it takes GDP to adjust. Currency in circulation during the COVID-19 Pandemic grew by 11.6% from the previous year to $2.07 trillion in response to a $3 trillion quantitative easing program

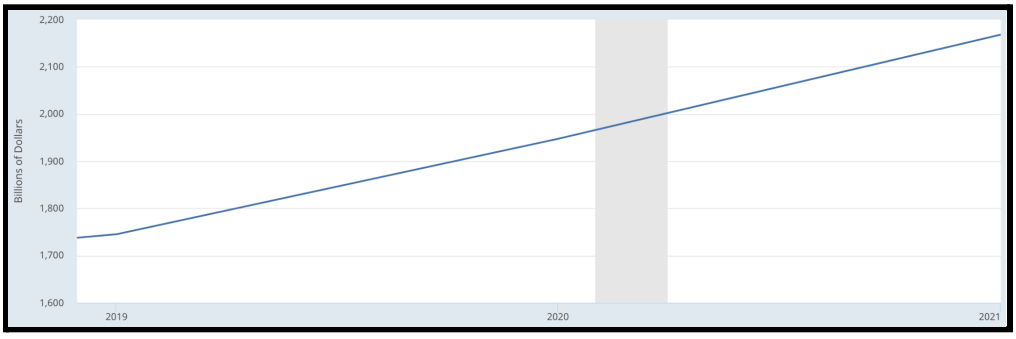


Figure 6.12: Total Volume of Currency in Circulation in Billions of Dollars

[158] Armstrong, Robert. "Real Rates and Recession." Financial Times, April 20, 2022. https://www.ft.com/content/39129e25-9eec-4042-a282-8f219847d661.

The relative devaluation of domestic currency hurts consumers and non-exporting firms with more expensive import prices. Even worse, the refusal of banks to loan out their greater level of reserves brought about by quantitative easing can result in stagflation (inflation paired with low growth). Some economists also argue that the transformation of a long-term asset (currency) into a short-term asset (Treasuries) poses greater risks as there is less safe collateral.[159]

Figure 6.13: Nominal Broad U.S. Dollar Index (Import Purchasing Power) Falls Following QE[160]

Past Usage of QE

The Fed first instituted quantitative easing in response to the 2008 Financial Crisis by purchasing agency debt, agency MBS, and longer-term Treasuries between 2008 and 2010. A second round of Treasury purchases went into effect between 2010 and 2011, and a third round between 2012 and 2014 involved agency MBS and Treasuries. Some tactics to extend intervention include selling shorter-term Treasuries to purchase longer-term Treasuries and reinvesting principal payments from agency debt and agency MBS into Treasuries or more agency MBS. Balance sheet normalization began in 2017.[161] Tapering describes decreasing the rate of reinvestment, while roloff allows securities to mature without being reinvested. These are both more common than outright sales. Quantitative easing resumed during the COVID-19

[159] Williamson, Stephen D. "Quantitative Easing: How Well Does This Tool Work?" Federal Reserve Bank of St. Louis, December 9, 2021. https://www.stlouisfed.org/publications/regional-economist/third-quarter-2017/quantitative-easing-how-well-does-this-tool-work.
[160] "Nominal Broad U.S. Dollar Index." Federal Reserve Bank of St. Louis, April 18, 2022. https://fred.stlouisfed.org/series/DTWEXBGS.
[161] "Large-Scale Asset Purchases." Federal Reserve Bank of New York. Accessed April 24, 2022. https://www.newyorkfed.org/markets/programs-archive/large-scale-asset-purchases.

pandemic. In March 2020, the Fed announced open-ended purchases of securities, and in June 2020, set the rate to at least $80 billion in Treasuries and $40 billion in MBS per month. Tapering began in November 2021 by $10 billion in Treasuries and $5 billion in MBS per month. This doubled in December 2021 to $20 billion in Treasuries and $10 billion MBS per month.[162]

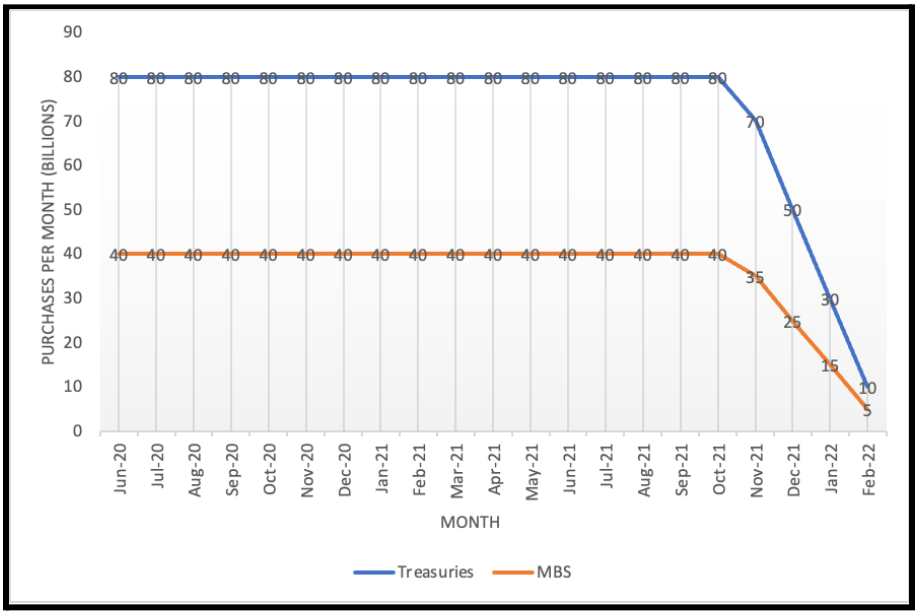


Figure 6.14: Monthly Asset Purchase Rate Target During COVID-19

Recent Announcements

The Federal Open Market Committee finally began to reverse course in March 2022 with the announcement that it planned to reduce the balance sheet by caps of $60 billion in Treasuries and $35 billion in MBS per month beginning as early as May 2022. This is intended to remove the monetary stimulus that has contributed to record levels of inflation. Once longer-term Treasuries mature at a rate below the monthly cap, the Fed will also begin reductions in holdings of shorter-term Treasuries. Another possibility involves outright sales of MBS with the goal of holding only Treasuries in the future. These reductions will occur at a far quicker pace than those

[162] Milstein, Eric, and David Wessel. "What Did the Fed Do in Response to the COVID-19 Crisis?" Brookings, December 17, 2021. https://www.brookings.edu/research/fed-response-to-covid19/#:~:text=Quantitative%20easing%20(QE)%3A%20The,employed%20during%20the%20Great%20Recession.

initiated in 2017 that took a year to reach a less ambitious monthly reduction of $50 billion. The Fed would ideally have acted sooner and must now rush to catch up by transitioning from balance sheet expansions to reductions in the matter of eight weeks. Instead of simply inflation, the economy now faces more persistent cyclical inflation worsened by the quantitative easing program. Fed officials justify the quick turnaround with the economy's overall resilience and strong fundamentals like the tight labor market.

Forecast

A survey of economists conducted by the Wall Street Journal predicted a 28% recession within the next year. Another recession may not be imminent, but the odds of a soft landing continue to decline as Fed officials become increasingly hawkish. Chairman Powell and other Fed Officials cite three previous successes in 1965, 1984, and 1994 despite the current situation having a far higher inflation rate, lower initial interest rates, and the objective of disinflation rather than stabilizing inflation at its present rate. A working paper by the National Bureau of Economic Research found that eight other instances of wage inflation above 5% and unemployment below 4% triggered a recession in two years.[163]

The Fed plans a far more rapid implementation than what has been seen in the past. Quantitative tightening presents a further complication to checking inflation without triggering a recession that was not present in the past. It is reliably unpredictable, with interest rates decreasing under the 2018 program against what conventional theories predicted. The Fed's planned use of both conventional and unconventional monetary policy tools may be justified given the severity of the situation, but with greater potency comes greater risk. In fact, Johns Hopkins economists John Greenwood and Steve Hanke argue that reducing the money supply

[163] Domash, Alex, and Lawrence H. Summers. "A Labor Market View on the Risks of a U.S. Hard Landing." National Bureau of Economic Research, April 2022. https://www.nber.org/system/files/working_papers/w29910/w29910.pdf.

growth rate from 11% to 6% may be necessary to achieve a soft landing.[164] Goldman Sachs economist David Mericle alternatively claims that declines in wage growth are key to addressing inflation. GDP growth would fall by between 1 to 1.5%. Unfortunately, wages are sticky and unlikely to fall in the short run. The model shown below assumes that inflation will eventually fall to 2% and that 1 to 1.5 million workers will return to the workforce.

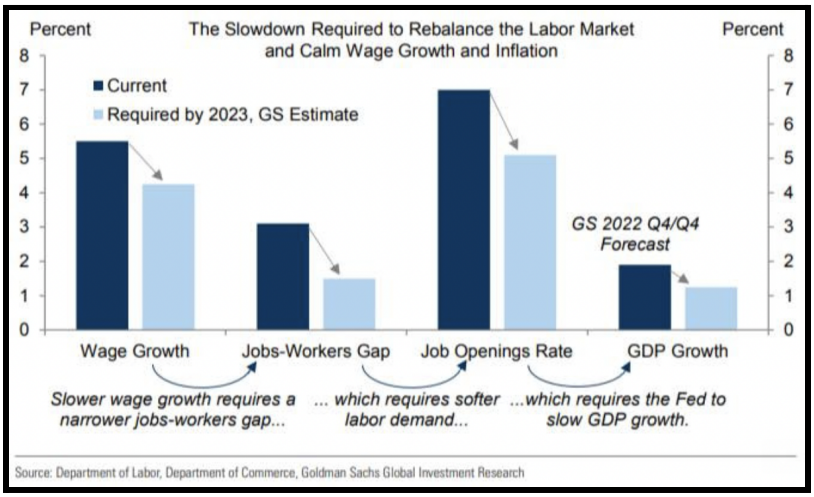


Figure 6.15: Decline in Wage and GDP Growth Necessary to Achieve Soft Landing

There is a lack of preparation for potential crises that could result. In a repetition of 2019, the possibility of bank reserves falling below their required levels remains a concern. This led to a spike in overnight rates that spread to overall short-term borrowing, necessitating an injection of liquidity.[165] Persistent stigma surrounding the Standing Repo Facility threatens the efficacy of such a response.[166] Its intended effect is to stabilize the federal funds rate against friction by offering overnight repos. The public interprets this as a sign of trouble at the participating institution.

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[164] Greenwood, John, and Steve H. Hanke. "The Altimeter for Powell's Soft Landing." The Wall Street Journal, April 10, 2022. https://www.wsj.com/articles/powell-soft-landing-economy-jerome-inflation-labor-market-spending-fed-rate-hikes-price-increase-rise-federal-reserve-11649613267.

[165] Timiraos, Nick, and Daniel Kruger. "Fed Intervenes to Curb Soaring Short-Term Borrowing Costs." The Wall Street Journal, September 17, 2019. https://www.wsj.com/articles/fed-to-conduct-first-overnight-repo-transactions-in-several-years-11568729757?mod=article_inline.

[166] Derby, Michael S. "Former Fed Staffer: Standing Repo Facility Suffering From Stigma." The Wall Street Journal, February 23, 2022. https://www.wsj.com/articles/former-fed-staffer-standing-repo-facility-suffering-from-stigma-11645612201.

Monetary Policy Recommendations

It is still possible to achieve a soft landing with a proper response by the Fed. Given the unknown equivalency of balance sheet reductions to federal funds rate increases, the Fed should take a dovish approach when using both at the same time to avoid triggering a recession. Forward guidance can be used to indicate future changes to the federal funds rate and the balance sheet, thereby reducing the likelihood of market shocks. An initial increase of 50 basis points at the May meeting is advisable to signal a strong commitment to stabilizing the price level and meeting future targets. The remaining meetings up until the end of the year should follow with 25 basis point increases to allow for time to assess the repercussions as well as developments in exogenous economic conditions. This would leave the federal funds rate at around 1.6%. These increases must be coordinated with reductions in the balance sheet, which are considered more "permanent" and could have the same impact as multiple federal funds rate hikes. Fed Governor Lael Brainard cites the current literature's attempts to equate a balance sheet reduction figure to a 125 basis point increase in the federal funds rate.[167] The proposed federal funds rate hikes will leave it short of the neutral interest rate of 2.5%, allowing room for a relatively ambitious quantitative tightening program. Roloff is generally preferred to outright sales, and the long-term goal of eliminating MBS should not be actively implemented until the long-term economic outlook becomes clearer. Monthly asset reductions should remain substantially below the monthly caps in order to avoid economic slowdown or a liquidity crisis.

[167] "Transcript: Fed's Lael Brainard at the WSJ Jobs Summit." The Wall Street Journal, April 12, 2022. https://www.wsj.com/articles/transcript-feds-lael-brainard-at-the-wsj-jobs-summit-11649794835?tpl=cb.

CONCLUSION

Indicators of economic activity and employment project continued growth despite the effects of the Ukraine war, the coronavirus pandemic, and rising inflation. Unemployment has essentially returned to pre-pandemic levels. While GDP growth is set to be lower than last year, it will likely remain above 2%.

To achieve the Federal Reserve's goal of maximum employment and price stability, we recommend raising the target range for the federal funds rate by 50 basis points at the May FOMC meeting. With inflation reaching above 5%, raising the federal funds rate faster than usual is necessary to rein in inflation and inflationary expectations. Depending on how the economy adjusts to higher rates, the Fed should aim to raise the FFR by 25 basis points each meeting after for the rest of the year. To achieve a soft landing, the Fed will have to strike a careful balance between hitting the neutral rate of 2.4% quickly and keeping rates slow and steady. Raising the FFR by 50 basis points will signal a strong commitment to fighting inflation, but further 50 basis point raises could trigger a recession. Given the scope of the economy, the conflict in Ukraine, and continued supply chain disruptions, a single 50 basis point increase is best positioned to stabilize the economy without tipping over the boat. With this recommendation, the Fed should reach its target FFR of 1.9% by the end of the year and 2.4% by 2023.

Additionally, the Fed should begin reducing its holdings of Treasury securities and agency debt and agency mortgage-backed securities. Keeping in mind the risk of a hard landing, the Fed should roll off its holdings of Treasury security holdings by $40 billion per month and of MBS by $20 billion per month. This is notably less than what the Fed has suggested in its March FOMC minutes of $60 billion and $35 billion per month, respectively. A lighter touch on

quantitative tightening is necessary because a simultaneous increase in FFR and rapid balance sheet reductions is unprecedented. QT has the potential to be far more potent than anticipated. Moreover, markets are familiar with FFR adjustments, but QT is relatively new and may not be priced into expectations. Higher roll off rates could spark market volatility and risk a recession. Tightening the balance sheet cautiously and slowly will be key to a successful soft landing.

Looking towards the October FOMC meeting, we expect inflation to start responding to higher interest rates. Inflation should begin to slow down compared to its year-over-year rate. More rate hikes by 25 basis points are seen as highly likely. Jobs numbers are not expected to be impacted in October, but if the Fed starts to see an uptick in unemployment, the Fed should shift back to 25 basis point rate hikes and slow down quantitative tightening. Given the inherently unpredictable effects of the Ukraine war and potential pandemic-induced economic shocks, the Fed should closely monitor the situation. If further supply-related shocks hit the economy, the Fed must be prepared to react quickly with revised guidance and adjustments to the FFR and balance sheet as needed. The economy is headed for a tumultuous year. But with the Fed's steady hand at the wheel, there is still great potential for a safe landing.

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