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A comprehensive monetary analysis of the U.S. during COVID-19

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Abstract. As a response to the economic crisis caused by the COVID-19 pandemic, the Federal Reserve implemented one of the most expansionary monetary policies in its history, renewing asset purchases under quantitative easing and supporting the economy using a wide range of other tools. In this paper, the authors provide an overview of the changes in the balance sheet of the Federal Reserve from February 26th, 2020 to April 7th, 2021 as well as an overview of the main actions taken by the Federal Reserve over the same period. The authors then analyze the impact of the activity of the Federal Reserve on the economy from the monetary perspective. In particular, the authors examine the expansion of the balance sheet of U.S. commercial banks, analyze credit counterparts of broad money, and conduct the golden growth rate analysis for broad money supply growth. The authors conclude the paper by analyzing changes in inflation expectations and Treasury yields.

Keywords. Money supply; Credit; Money multipliers; Monetary policy.

JEL. E50; E51; E52.

1. Introduction

On February 19th, 2020, the S&P 500 hit an all-time high of 3,393.52 (Parker, 2020). The following day marked the beginning of the fastest 30% sell-off in the S&P 500 ever, with the sell-off spreading to the vast majority of global capital markets as the realities of a global pandemic kicked in (Li, 2020). On March 23rd, 2020, in response to the economic slowdown and stress in the financial system, the Federal Reserve announced its commitment to using “its full range of tools to support households, businesses, and the U.S. economy overall.” (Bord of Governors of the Federal Reserve System, 2020). Fast forward to 2021 and this commitment turned into an unprecedented expansion of the balance sheet of the Federal Reserve, a significant increase in the money supply, and a sharp expansion of the balance sheet of U.S. commercial banks.

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2. Federal Reserve's balance sheet analysis

2.1. Assets

From February 26th, 2020 to April 7th, 2021, the Federal Reserve's total assets expanded by \$3.55 trillion or 85.4%. As a result of extensive asset purchases under quantitative easing, the balance sheet expansion was primarily driven by increases in holdings of U.S.

	Absolute change since February 26 th , 2020 (in trillions)	Percentage change since February 26 th , 2020	YoY % change	Percentage Composition as of April 7 th , 2021	Outstanding as of April 7 th , 2021 (in trillions)	Outstanding as of February 26 th , 2020 (in trillions)
Total Assets	\$3.55	85.4%	26.7%	100.0%	\$7.71	\$4.16
Treasuries	\$2.48	100.4%	36.4%	64.3%	\$4.96	\$2.47
MBS	\$0.81	59.3%	49.7%	28.3%	\$2.18	\$1.37

Treasury securities by \$2.48 trillion or 100.4% and mortgage-backed securities (MBS) by \$0.81 trillion or 59.3%. As of April 7th, 2021, the Federal Reserve's balance sheet totaled \$7.71 trillion in assets, by far the largest amount in history ([Board of Governors of the Federal Reserve System, n.d.](#)).

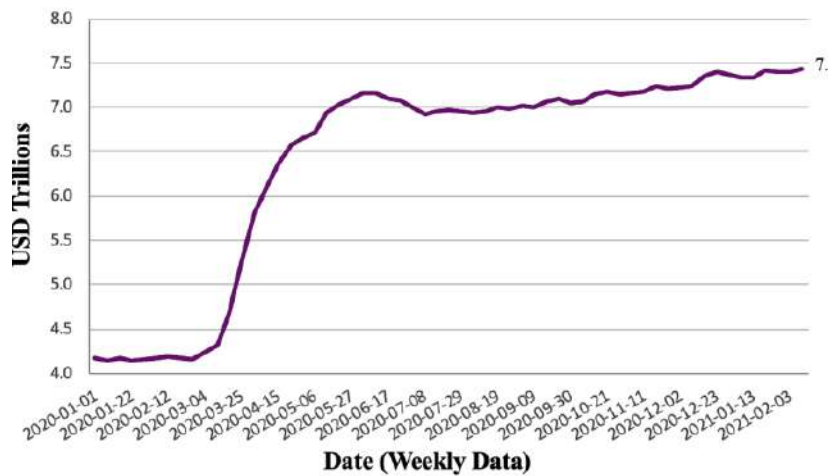


Figure 1. Federal Reserve total assest

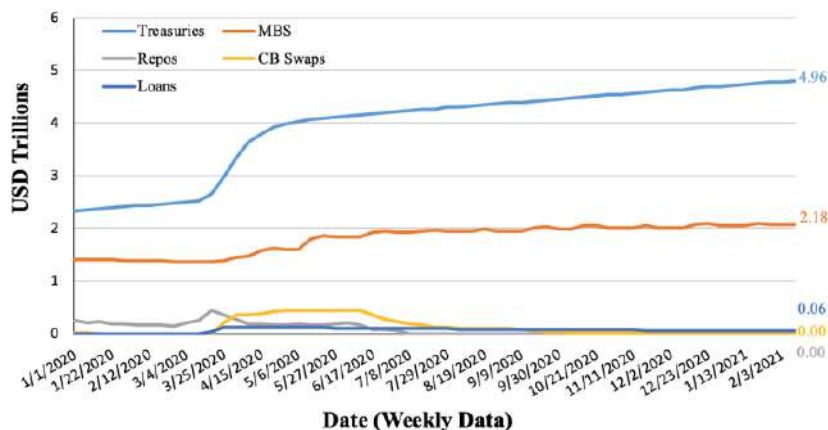


Figure 2. Key assets purchased by the federal reserve

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A substantial share of the increase in the Federal Reserve's balance sheet occurred over the course of three weeks in March 2020. Specifically, during the weeks ending March 18th, March 25th, and April 1st, 2020, total assets of the Federal Reserve expanded by 8.3%, 12.6%, and 10.6%, respectively. The increase was driven by significant purchases of U.S. Treasury securities and mortgage-backed securities as well as expansion of existing and introduction of new swap line arrangements and credit facilities. Such a massive expansion of the Federal Reserve's balance sheet in a short period of time is unprecedented in U.S. history and speaks to the scale of the Federal Reserve's efforts to combat the pandemic-induced economic fallout. Following three weeks of vast balance sheet expansion, the Federal Reserve continued to grow its balance sheet but at a slower pace. The driving force behind the continued expansion was weekly purchases of U.S. Treasury securities and mortgage-backed securities, albeit in smaller quantities ([Board of Governors of the Federal Reserve System, n.d.](#)).

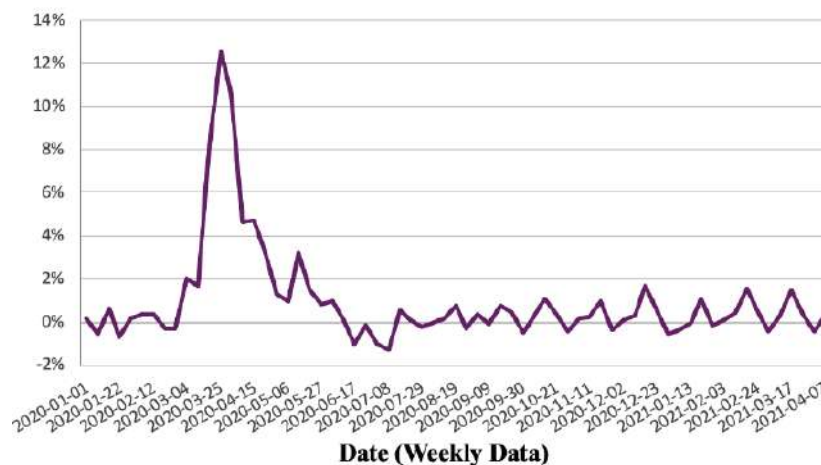


Figure 3. Week-over-week percentage changes in federal reserve total assets

2.1.1. U.S. Dollar liquidity swap line arrangements

Since global commodity invoicing is largely billed in U.S. dollars, the Federal Reserve had to step in early in the pandemic-induced recession to provide dollar liquidity to grease the wheels of international trade and prevent a liquidity crisis ([Greenwood, & Hanke, 2020](#)). U.S. dollar liquidity swaps became one of the main tools employed by the Federal Reserve to achieve this objective.

On March 15th, 2020, the central banks with standing U.S. dollar liquidity swap line arrangements announced “a coordinated action to enhance the provision of liquidity” by lowering the pricing on the standing U.S. dollar liquidity swap line arrangements and beginning to offer U.S. dollars weekly in each jurisdiction with an 84-day maturity, in addition to the 1-week maturity operations offered at the time ([Board of Governors of the Federal Reserve System, n.d.](#)). On March 19th, 2020, the Federal Reserve announced the establishment of temporary U.S. dollar liquidity swap line arrangements with the Reserve Bank of Australia, the Banco Central do Brasil, the Danmarks Nationalbank (Denmark), the Bank of Korea, the Banco de

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Mexico, the Norges Bank (Norway), the Reserve Bank of New Zealand, the Monetary Authority of Singapore, and the Sveriges Riksbank (Sweden). (Board of Governors of the Federal Reserve System, n.d.).

Multiple central banks drew on their U.S. dollar liquidity swap lines over the course of spring of 2020 to prevent liquidity strains in local economies. By mid-May, the outstanding balance of central bank U.S. dollar liquidity swap lines totaled more than \$450 billion. The Bank of Japan and the European Central Bank drew the most on their swap lines, with their outstanding balances picking at more than \$220 billion and at about \$150 billion, respectively (Federal Reserve Bank of New York, n.d.).

However, as the strain in the global U.S. dollar funding markets lessened, the central banks that initially drew on the U.S. dollar liquidity swap lines gradually allowed their outstanding balances to decline to near-zero levels observed prior to the pandemic. As of April 7th, 2021, only a handful of central banks had outstanding balances on their U.S. dollar liquidity swap lines: the European Central Bank (\$420 million), Banco de Mexico (\$400 million), and the Swiss National Bank (\$5 million) (Federal Reserve Bank of New York, n.d.).

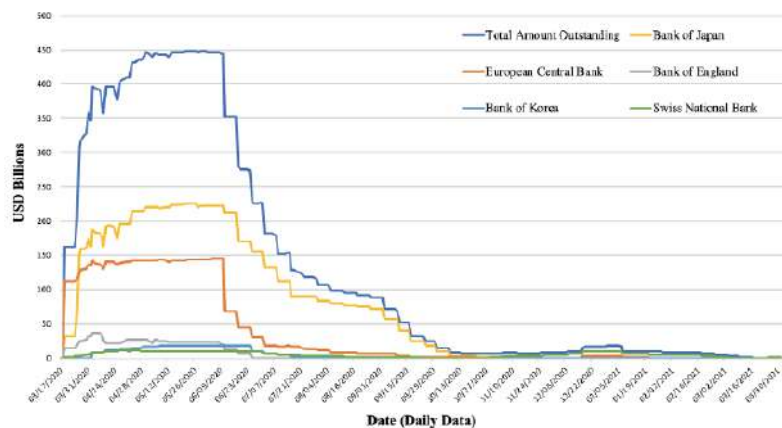


Figure 4. Federal reserve US Dollar swap lines by counterparty

2.1.2. Loans and credit facilities

The Federal Reserve also expanded the existing and introduced new loan programs and credit facilities, most notably the Paycheck Protection Program (PPP). As of April 7th, 2021, the Paycheck Protection Program Liquidity Facility balance totaled \$62.1 billion. Among other notable liquidity facilities are Commercial Paper Funding Facility II LLC, Corporate Credit Facilities LLC, MS Facilities LLC (Main Street Lending Program), Municipal Liquidity Facility LLC, and TALF II LLC that account for \$8.6 billion, \$25.9 billion, \$31.0 billion, \$11.4 billion and \$5.3 billion of the total assets, respectively (Board of Governors of the Federal Reserve System, n.d.).

Looking at liquidity available through the discount window, it is evident that while during the period of liquidity strains on the financial systems in the spring of 2020 depository institutions actively used the discount window, they have since repaid the majority of the respective loans (Board of Governors of the Federal Reserve System, n.d.).

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2.2. Liabilities

From February 26th, 2020 to April 7th, 2021, the monetary base expanded by \$2.61 trillion or 75.1%, with the expansion primarily driven by an increase in currency in circulation by \$0.35 trillion or 19.5% and an increase in reserve balances with the Federal Reserve by \$2.26 trillion or 134.8%.

	Absolute change since February 26 th , 2020 (in trillions)	Percentage change since February 26 th , 2020	YoY % change	Percentage Composition as of April 7 th , 2021	Outstanding as of April 7 th , 2021 (in trillions)	Outstanding as of February 26 th , 2020 (in trillions)
Monetary Base	\$2.61	75.1%	30.8%	78.6%	\$6.09	\$3.48
Liabilities Other than Monetary Base	\$0.94	129.0%	12.9%	21.4%	\$1.66	\$0.73

Liabilities other than monetary base expanded by \$0.94 trillion or 129.0% over the same period. The expansion was driven primarily by an increase in U.S. Treasury General Account by \$0.57 trillion or 146.4%. As a result of a relatively larger expansion of liabilities other than monetary base, its percentage composition increased from 17.3% as of February 26th, 2020 to 21.3% as of April 7th, 2021, driven by the change in the percentage composition of U.S. Treasury General Account, which increased from 9.21% to 12.3% over the same period.

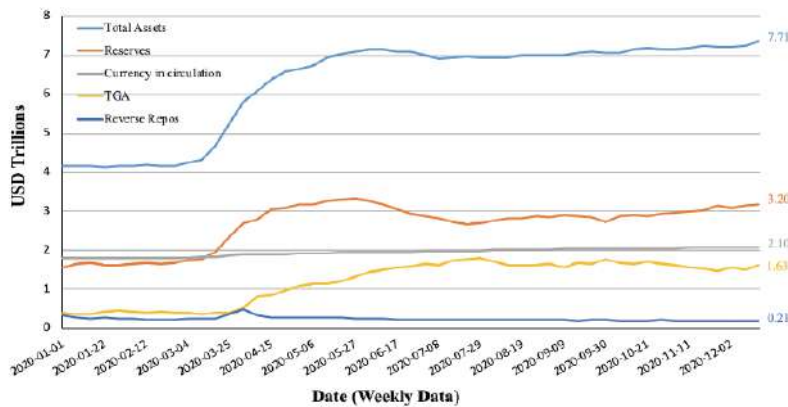


Figure 5. Total assets and key liabilities of the federal reserve

3. Overview of main actions taken by the federal reserve

On March 3rd, 2020, the Federal Open Market Committee lowered the target range for the federal funds rate by ½ percentage point to 1-1¼ percent (Board of Governors of the Federal Reserve System, 2020, March 03).

On March 15th, 2020, the Federal Open Market Committee lowered the target range for the federal funds rate by 1 percentage point to 0-¼ percent. The Committee also announced that over the coming months, it will “increase its holdings of Treasury securities by at least \$500 billion and its holding of agency mortgage-backed securities by at least \$200 billion. The Committee will also reinvest all principal payments from the Federal

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Reserve's holdings of agency debt and agency mortgage-backed securities in agency mortgage-backed securities.” (Board of Governors of the Federal Reserve System, 2020, March 15). It was also announced that “the Open Market Desk has recently expanded its overnight and term repurchase agreement operations.” (Board of Governors of the Federal Reserve System, 2020, March 15).

On March 15th, 2020, the Federal Reserve Board of Governors lowered the primary credit rate by 150 basis points to 0.25%, effective March 16th, 2020. The Board also reduced reserve requirement ratios to 0% effective March 26th, 2020. (Board of Governors of the Federal Reserve System, 2020, March 15).

On March 15th, 2020, the Bank of Canada, the Bank of England, the Bank of Japan, the European Central Bank, the Federal Reserve, and the Swiss National Bank announced “a coordinated action to enhance the provision of liquidity via the standing U.S. dollar liquidity swap line arrangements,” by lowering the pricing on the standing U.S. dollar liquidity swap arrangements by 25 basis points and beginning to offer U.S. dollars weekly in each jurisdiction with an 84-day maturity, in addition to the 1-week maturity operations offered at the time (Board of Governors of the Federal Reserve System, 2020, March 15).

On March 17th, 2020, the Federal Reserve Board announced that it will establish a Commercial Paper Funding Facility (CPFF) to support the flow of credit to households and businesses. “The CPFF will provide a liquidity backstop to U.S. issuers of commercial paper through a special purpose vehicle (SPV) that will purchase unsecured and asset-backed commercial paper rated A1/P1 (as of March 17, 2020) directly from eligible companies.” (Board of Governors of the Federal Reserve System, 2020, March 17).

On March 17th, 2020, the Federal Reserve Board announced that it will establish a Primary Dealer Credit Facility (PDCF). “The PDCF will offer overnight and term funding with maturities up to 90 days and will be available on March 20, 2020.” (Board of Governors of the Federal Reserve System, 2020, March 17).

On March 18th, 2020, the Federal Reserve Board announced that it will establish a Money Market Mutual Fund Liquidity Facility (MMLF). “Through the establishment of a Money Market Mutual Fund Liquidity Facility, or MMLF, the Federal Reserve Bank of Boston will make loans available to eligible financial institutions secured by high-quality assets purchased by the financial institution from money market mutual funds.” (Board of Governors of the Federal Reserve System, 2020, March 18).

On March 19th, 2020, the Federal Reserve announced the establishment of temporary U.S. dollar liquidity arrangements (swap lines) with the Reserve Bank of Australia, the Banco Central do Brasil, the Danmarks Nationalbank (Denmark), the Bank of Korea, the Banco de Mexico, the Norges Bank (Norway), the Reserve Bank of New Zealand, the Monetary Authority of Singapore, and the Sveriges Riksbank (Sweden). (Board of Governors of the Federal Reserve System, 2020, March 19).

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On March 20th, 2020, the Bank of Canada, the Bank of England, the Bank of Japan, the European Central Bank, the Federal Reserve, and the Swiss National Bank improved the swap lines' effectiveness in providing U.S. dollar funding by agreeing to increase the frequency of 7-day maturity operations from weekly to daily. ([Board of Governors of the Federal Reserve System, 2020, March 20](#)).

On March 20th, 2020, the Federal Reserve announced an expansion of collateral options for the MMLF by allowing the Federal Reserve Bank of Boston to “make loans available to eligible financial institutions secured by certain high-quality assets purchased from single state and other tax-exempt municipal money market mutual funds” through the MMLF. ([Board of Governors of the Federal Reserve System, 2020, March 20](#)).

On March 23rd, 2020, the Federal Open Market Committee announced that it will “include purchases of agency commercial mortgage-backed securities in its agency mortgage-backed security purchases.” ([Board of Governors of the Federal Reserve System, 2020, March 23](#)).

On March 23rd, 2020, the Federal Reserve announced its commitment to “use its full range of tools to support households, businesses, and the U.S. economy overall.” ([Board of Governors of the Federal Reserve System, 2020, March 23](#)). The Federal Reserve took the following actions:

- Established new programs that, taken together, will provide up to \$300 billion in new financing
 - Established two facilities to support credit to large employers: the Primary Market Corporate Credit Facility (PMCCF) for new bond and loan issuance and the Secondary Market Corporate Credit Facility (SMCCF) to provide liquidity for outstanding corporate bonds
 - “The PMCCF is open to investment grade companies and will provide bridge financing of four years.” ([Board of Governors of the Federal Reserve System, 2020, March 23](#)).
 - “The SMCCF will purchase in the secondary market corporate bonds issued by investment grade U.S. companies and U.S.-listed exchange-traded funds whose investment objective is to provide broad exposure to the market for U.S. investment grade corporate bonds.” ([Board of Governors of the Federal Reserve System, 2020, March 23](#)).
- Established the Term Asset-Backed Securities Loan Facility (TALF) to support the flow of credit to consumers and businesses
 - “The TALF will enable the issuance of asset-backed securities (ABS) backed by student loans, auto loans, credit card loans, loans guaranteed by the Small Business Administration (SBA), and certain other assets.” ([Board of Governors of the Federal Reserve System, 2020, March 23](#)).
 - “Under the TALF, the Federal Reserve will lend on a non-recourse basis to holders of certain AAA-rated ABS backed by newly and recently originated consumer and small

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business loans.” (Board of Governors of the Federal Reserve System, 2020, March 23).

- Expanded the MMLF to include a wider range of securities, including municipal variable rate demand notes (VRDNs) and bank certificates of deposit
 - Expanded the CPFF to include high-quality, tax-exempt commercial paper as eligible securities and reduced the pricing of the facility (Board of Governors of the Federal Reserve System, 2020, March 23).

On March 31st, 2020, the Federal Reserve announced the establishment of a temporary repurchase agreement facility for foreign and international monetary authorities (FIMA Repo Facility). (Board of Governors of the Federal Reserve System, 2020, March 31).

On April 1st, 2020, the Federal Reserve announced a temporary change to its supplementary leverage ratio rule. Effective until March 31st, 2021, the change would “exclude U.S. Treasury securities and deposits at Federal Reserve Banks from the calculation of the rule for holding companies.” (Board of Governors of the Federal Reserve System, 2020, April 01).

On April 9th, 2020, the Federal Reserve announced the following additional actions to “provide up to \$2.3 trillion in loans to support the economy” (Board of Governors of the Federal Reserve System, 2020, April 09):

- Extension of credit to eligible financial institutions that originate PPP loans through the Paycheck Protection Program Liquidity Facility (PPPLF)
 - Purchases of up to \$600 billion in loans through the Main Street Lending Program
 - “The Main Street Lending Program will enhance support for small and mid-sized businesses that were in good financial standing before the crisis by offering 4-year loans to companies employing up to 10,000 workers or with revenues of less than \$2.5 billion.” (Board of Governors of the Federal Reserve System, 2020, April 09).
- Expansion of the size and scope of the Primary and Secondary Market Corporate Credit Facilities (PMCCF and SMCCF) as well as the Term Asset-Backed Securities Loan Facility (TALF)
 - These three programs will now support up to \$850 billion in credit backed by \$85 billion in credit protection provided by the Treasury.
- Establishment of a Municipal Liquidity Facility that will offer up to \$500 billion in lending to states and municipalities
 - “The facility will purchase up to \$500 billion of short term notes directly from U.S. states (including the District of Columbia), U.S. counties with a population of at least two million residents, and U.S. cities with a population of at least one million residents.” (Board of Governors of the Federal Reserve System, 2020, April 09).

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On April 16th, 2020, the Federal Reserve announced that the “Paycheck Protection Program Liquidity Facility is fully operational and available to provide liquidity to eligible financial institutions.” ([Board of Governors of the Federal Reserve System, 2020, April 16](#)).

On April 23rd, 2020, the Federal Reserve Board announced temporary actions aimed at increasing the availability of intraday credit extended by Federal Reserve Banks on both a collateralized and uncollateralized basis. In particular, the Board suspended uncollateralized intraday credit limits (net debit caps), waived overdraft fees for institutions that are eligible for the primary credit program, and permitted a streamlined procedure for secondary credit institutions to request collateralized intraday credit (max caps). ([Board of Governors of the Federal Reserve System, 2020, April 23](#)).

On April 24th, 2020, the Federal Reserve Board announced an interim final rule to amend Regulation D (Reserve Requirements of Depository Institutions) to delete the six-per-month limit on convenient transfers from the "savings deposit" definition. ([Board of Governors of the Federal Reserve System, 2020, April 24](#)).

On April 27th, 2020, the Federal Reserve Board announced an expansion of the scope and duration of the Municipal Liquidity Facility (MLF). “The facility, as revised, will purchase up to \$500 billion of short-term notes issued by U.S. states (including the District of Columbia), U.S. counties with a population of at least 500,000 residents, and U.S. cities with a population of at least 250,000 residents.” ([Board of Governors of the Federal Reserve System, 2020, April 27](#)).

On April 29th, 2020, the Federal Open Market Committee maintained the target range for the federal funds rate at 0-¼ percent. ([Board of Governors of the Federal Reserve System, 2020, April 29](#)).

On April 30th, 2020, the Federal Reserve Board expanded loan options available to businesses and increased the maximum size of businesses that are eligible for support under the Main Street Lending Program. ([Board of Governors of the Federal Reserve System, 2020, April 30](#)).

On April 30th, 2020, the Federal Reserve expanded access to its Paycheck Protection Program Liquidity Facility (PPPLF) to all PPP lenders approved by the SBA and expanded the collateral that can be pledged to include purchased PPP loans. ([Board of Governors of the Federal Reserve System, 2020, April 30](#)).

On June 3rd, 2020, the Federal Reserve Board announced an expansion in the number and type of entities eligible to directly use its Municipal Liquidity Facility (MLF) by including at least two cities or counties in all U.S. states and two issuers in each governor’s jurisdiction with revenue derived from operating government activities in eligibility to directly use the facility. ([Board of Governors of the Federal Reserve System, 2020, June 03](#)).

On June 8th, 2020, the Federal Reserve Board expanded its Main Street Lending Program to allow more small and medium-sized businesses to be able to receive support. “The Board lowered the minimum loan amount, raised the maximum loan limit, adjusted the principal repayment schedule

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to begin after two years, and extended the term to five years, providing borrowers with greater flexibility in repaying the loans." (Board of Governors of the Federal Reserve System, 2020, June 08).

On June 10th, 2020, the Federal Open Market Committee maintained the target range for the federal funds rate at 0-¼ percent. (Board of Governors of the Federal Reserve System, 2020, June 10).

On June 15th, 2020, the Federal Reserve Board announced that the Secondary Market Corporate Credit Facility will begin buying a broad and diversified portfolio of corporate bonds in addition to the facility's ongoing purchases of exchange-traded funds. (Board of Governors of the Federal Reserve System, 2020, June 15).

On June 25th, 2020, the Federal Reserve Board announced that it is "requiring large banks to preserve capital by suspending share repurchases, capping dividend payments, and allowing dividends according to a formula based on recent income" for the third quarter of 2020. It also required banks to re-evaluate their longer-term capital plans. (Board of Governors of the Federal Reserve System, 2020, June 25).

On July 17th, 2020, the Federal Reserve Board modified the Main Street Lending Program by approving "two new loan options to provide support to a broad set of nonprofit organizations that were in sound financial condition prior to the pandemic." (Board of Governors of the Federal Reserve System, 2020, July 17).

On July 28th, 2020, the Federal Reserve Board announced an extension through December 31st, 2020 of its lending facilities that were scheduled to expire on or around September 30th, 2020. (Board of Governors of the Federal Reserve System, 2020, July 28).

On July 29th, 2020, the Federal Open Market Committee maintained the target range for the federal funds rate at 0-¼ percent. (Board of Governors of the Federal Reserve System, 2020, July 29).

On July 29th, 2020, the Federal Reserve announced an "extensions of its temporary U.S. dollar liquidity swap lines and the temporary repurchase agreement facility for foreign and international monetary authorities (FIMA repo facility) through March 31, 2021." (Board of Governors of the Federal Reserve System, 2020, July 29).

On August 27th, 2020, the Federal Open Market Committee (FOMC) announced the approval of updates to its Statement on Longer-Run Goals and Monetary Policy Strategy. The main changes to the framework document include:

- "The FOMC emphasized that maximum employment is a broad-based and inclusive goal and reports that its policy decision will be informed by its 'assessments of the shortfalls of employment from its maximum level.'" (Board of Governors of the Federal Reserve System, 2020, August 27).

- "The FOMC adjusted its strategy for achieving its longer-run inflation goal of 2 percent by noting that it 'seeks to achieve inflation that averages 2 percent over time.'" (Board of Governors of the Federal Reserve System, 2020, August 27).

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On September 16th, 2020, the Federal Open Market Committee maintained the target range for the federal funds rate at 0-¼ percent and stated that it expects that “it will be appropriate to maintain this target range until labor market conditions have reached levels consistent with the Committee's assessments of maximum employment and inflation has risen to 2 percent and is on track to moderately exceed 2 percent for some time.” ([Board of Governors of the Federal Reserve System, 2020, September 16](#)).

On September 30th, 2020, the Federal Reserve extended for an additional quarter “several measures to ensure that large banks maintain a high level of capital resilience.” In particular, the Federal Reserve announced that for the fourth quarter of 2020, “large banks — those with more than \$100 billion in total assets — will be prohibited from making share repurchases [and] dividend payments will be capped and tied to a formula based on recent income.” ([Board of Governors of the Federal Reserve System, 2020, September 30](#)).

On October 1st, 2020, the Federal Reserve Board on Thursday extended to March 31st, 2021 temporary actions aimed at increasing the availability of intraday credit extended by Federal Reserve Banks on both a collateralized and uncollateralized basis, which were announced on April 23rd, 2020. ([Board of Governors of the Federal Reserve System, 2020, October 01](#)).

On October 30th, 2020, the Federal Reserve adjusted the terms of the Main Street Lending Program by reducing the minimum loan size for three Main Street facilities available to for-profit and non-profit borrowers from \$250,000 to \$100,000 and adjusted the fees to “encourage the provision of these smaller loans.” ([Board of Governors of the Federal Reserve System, 2020, October 30](#)).

On November 5th, 2020, the Federal Open Market Committee maintained the target range for the federal funds rate at 0-¼ percent. ([Board of Governors of the Federal Reserve System, 2020, November 05](#)).

On November 30th, 2020, the Federal Reserve announced an extension through March 31st, 2021, for several of its lending facilities that were generally scheduled to expire on or around December 31st, 2020. ([Board of Governors of the Federal Reserve System, 2020, November 30](#)).

On December 16th, 2020, the Federal Open Market Committee maintained the target range for the federal funds rate at 0-¼ percent. ([Board of Governors of the Federal Reserve System, 2020, December 16](#)).

On December 16th, 2020, the Federal Reserve announced the extension of its temporary U.S. dollar liquidity swap lines and the temporary repurchase agreement facility for foreign and international monetary authorities (FIMA repo facility) through September 30th, 2021. ([Board of Governors of the Federal Reserve System, 2020, December 16](#)).

On December 29th, 2020, the Federal Reserve extended the termination date of the Main Street Lending Program facilities to January 8th, 2021. ([Board of Governors of the Federal Reserve System, 2020, December 29](#)).

On January 27th, 2021, the Federal Open Market Committee maintained the target range for the federal funds rate at 0-¼ percent. ([Board of Governors of the Federal Reserve System, 2021, January 27](#)).

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On March 8th, 2021, the Federal Reserve Board announced that it will extend the Paycheck Protection Program Liquidity Facility (PPPLF) by three months to June 30th, 2021. It also stated that “the other currently active 13(3) facilities—the Commercial Paper Funding Facility, the Money Market Mutual Fund Liquidity Facility, and the Primary Dealer Credit Facility—have not had significant usage since last summer and will expire as scheduled on March 31.” (Board of Governors of the Federal Reserve System, 2021, March 08).

On March 17th, 2021, the Federal Open Market Committee maintained the target range for the federal funds rate at 0-¼ percent. The Committee also stated that it “would be prepared to adjust the stance of monetary policy as appropriate if risks emerge that could impede the attainment of the Committee's goals.” (Board of Governors of the Federal Reserve System, 2021, March 17).

On March 19th, 2021, the Federal Reserve Board announced that the temporary change to its supplementary leverage ratio (SLR) for bank holding companies will expire as scheduled on March 31st, 2021. (Board of Governors of the Federal Reserve System, 2021, March 19).

On March 25th, 2021, the Federal Reserve Board announced that “the temporary and additional restrictions on bank holding company dividends and share repurchases currently in place will end for most firms after June 30, after completion of the current round of stress tests.” (Board of Governors of the Federal Reserve System, 2021, March 25).

3. M2 and Counterparts

3.1. M2 Analysis

From February 24th, 2020 to April 5th, 2021, not seasonally adjusted M2 monetary aggregate increased by \$5.01 trillion or 32.6% from \$15.35 trillion to \$20.36 trillion. (Board of Governors of the Federal Reserve System, n.d.).

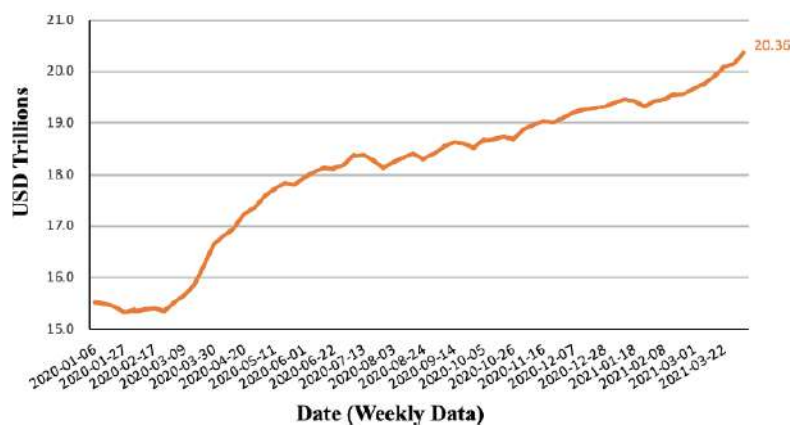


Figure 6. M2 money stock

On a week-over-week percentage change basis, the most prominent growth in not seasonally adjusted M2 occurred over the period from mid-March to late April 2020, with week-over-week percentage growth peaking

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at 2.6% over the week ending March 30th, 2020. (Board of Governors of the Federal Reserve System, n.d.).

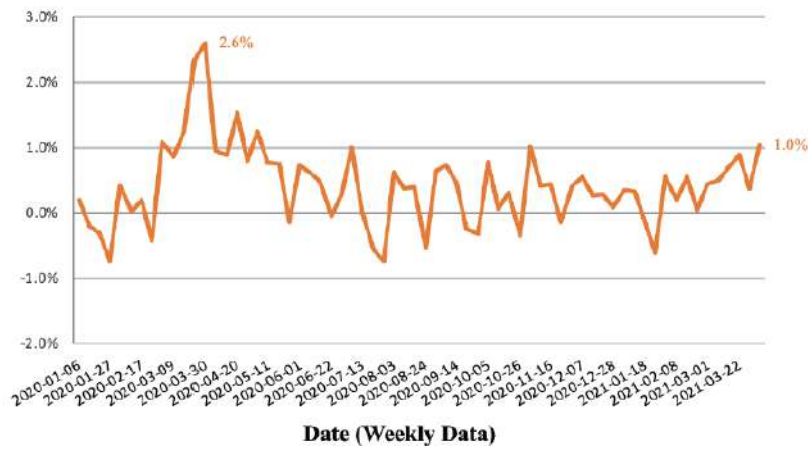


Figure 7. Week-over-week percentage changes in M2 money stock

On a week-over-week absolute change basis, the most prominent growth happened over the same period from mid-March to late April 2020. However, it is also important to note that on an absolute change basis, the growth of not seasonally adjusted M2 accelerated again toward the end of the analysis period after a period of relatively slow growth from early June 2020 to late January 2021. This acceleration is not observed on a week-over-week percentage change basis due to the effect of the larger basis. (Board of Governors of the Federal Reserve System, n.d.).

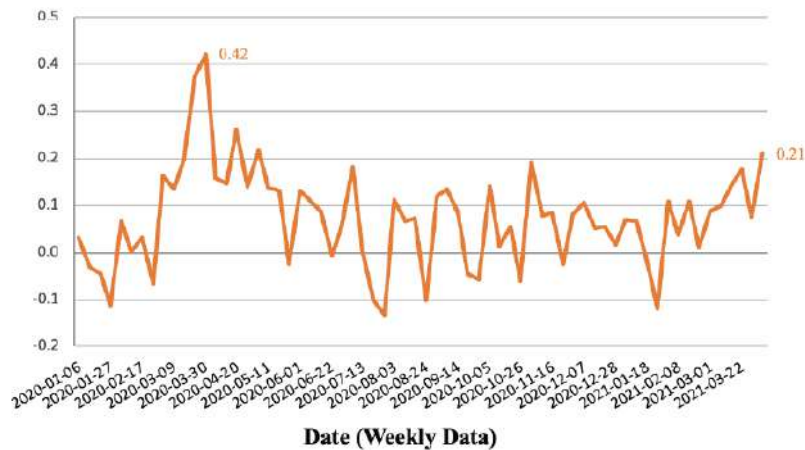


Figure 8. Week-over-week absolute changes in M2 money stock

On a component-by-component basis, the growth of not seasonally adjusted M2 was primarily driven by growth in demand deposits and other liquid deposits. In particular, from February 24th, 2020 to April 5th, 2021, demand deposits increased by \$2.28 trillion or 146.3% from \$1.56 trillion to \$3.84 trillion while other liquid deposits grew by \$2.74 trillion or 26.0% from \$10.54 trillion to \$13.27 trillion. Currency and retail money funds also contributed to the growth in M2 though on a smaller scale as the balances grew by \$0.33 trillion or 18.9% from \$1.72 trillion to \$2.04 trillion and by \$0.05

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trillion or 4.9% from \$1.01 trillion to \$1.06 trillion, respectively. On the other hand, small-denomination time deposits declined by \$0.38 trillion or 72.1% from \$0.53 trillion to \$0.15 trillion.

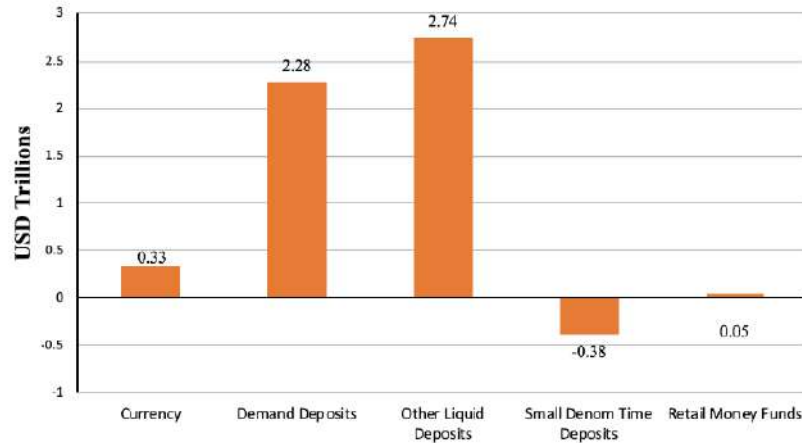


Figure 9. Changes M2 components since february 24, 2020

3.2. Credit counterparts

While looking at broad money in itself is crucial in gauging the state of the economy, examining credit counterparts of broad money (CCBM) helps establish the sources of changes in broad money. Since broad money includes both state and bank money, analyzing credit counterparts requires one to look at the consolidated balance sheet of depository corporations (DCs), which include the central bank and U.S. commercial banks. Using the balance sheet accounting principle, the sources of broad money — otherwise known as assets or counterparts — may be isolated to produce the following identity:

$$\text{Broad Money Liabilities} = \text{Domestic Credit} + \text{Net Foreign Assets} - \text{Other Items Net, where Domestic Credit} = \text{Credit to the Private Sector} + \text{Credit to the Public Sector}.$$

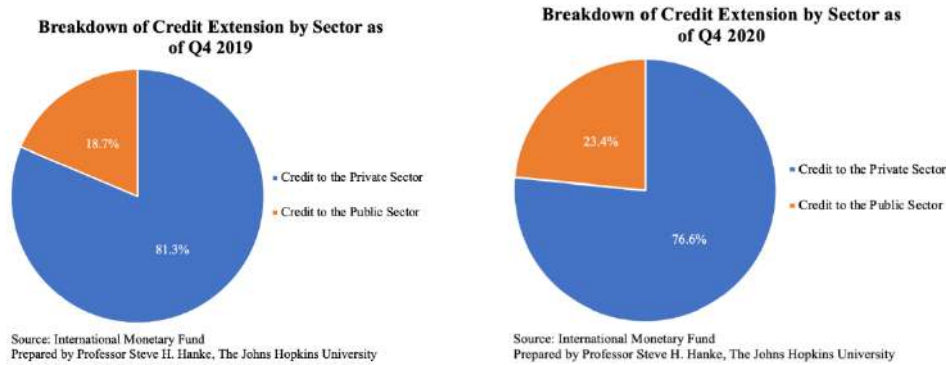
Therefore, the authors used credit counterparts analysis from Q4 2019 to Q4 2020 to identify whether changes in broad money liabilities of the central bank and commercial banks are primarily due to credit being extended to the private sector, public sector (a form of debt monetization), or due to changes in net foreign assets and other items net. The data is presented on a quarterly basis with the analysis period ending with Q4 2020 rather than with Q1 2021 due to a quarterly lag in the release of the data.

From Q4 2019 to Q4 2020, credit to the private sector and credit to the public sector grew by \$1.50 trillion and \$1.85 trillion, respectively. While on the absolute basis the fact that credit to the public sector increased by a significantly larger amount is already evident, the difference in the year-over-year growth rate is even more prominent. In particular, the year-over-year growth rate of credit to the private sector picked at 10.4% as of Q2 2020 during the period and declined slightly thereafter to 8.3% as of Q4 2020. In

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contrast, the year-over-year growth of credit to the public sector picked at 50.3% as of Q2 2020 during the period and declined slightly thereafter to 44.5% as of Q4 2020. As the result of materially faster growth in credit to the public sector, its percentage share of total credit extended by the DCs increased from 18.7% as of Q4 2019 to 23.4% as of Q4 2020. [Retrieved from].



Looking at other credit counterparts, net foreign assets increased by \$0.01 trillion while other items net fell by \$0.05 trillion from Q4 2019 to Q4 2020 and, therefore, contributed relatively little to changes in broad money during the analysis period.

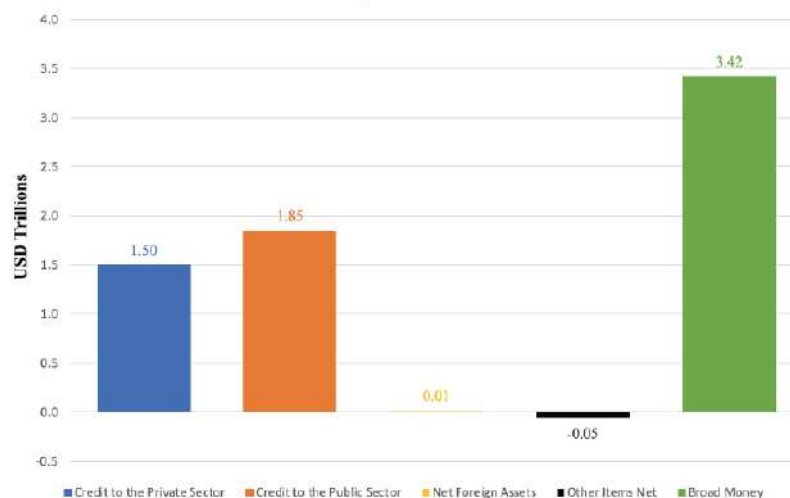


Figure 10. Changes in major credit counterparts and board money from Q4 2019 to Q4 2020

Therefore, the credit counterparts framework allows us to conclude that the primary source of an increase in broad money from Q4 2019 to Q4 2020 was the extension of credit to the public sector by the DCs. It should be noted that this trend is an expected effect of the asset purchases under quantitative easing as evident by past rounds of quantitative easing.

However, while the significant acceleration of growth in credit to the public sector was a cornerstone of past rounds of quantitative easing, the simultaneous though slower acceleration of growth in credit to the private sector is an important deviation from past episodes. While during the global financial crisis, recapitalization and a handful of other factors resulted in

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DCs being reluctant to extend credit to the private sector, the liquidity backstop provided by the Federal Reserve as well as government guarantees on loans and healthier balance sheets made DCs more willing to extend credit to the private sector throughout the analysis period. As a result, in contrast to the decline in the year-over-year growth rate of broad money and even a brief period of negative growth during the period following the global financial crisis, the year-over-year growth rate of broad money accelerated in Q1 2020 and remained above 15% for the rest of the year, with broad money growing by \$3.42 trillion from Q4 2019 to Q4 2020. [Retrieved from].

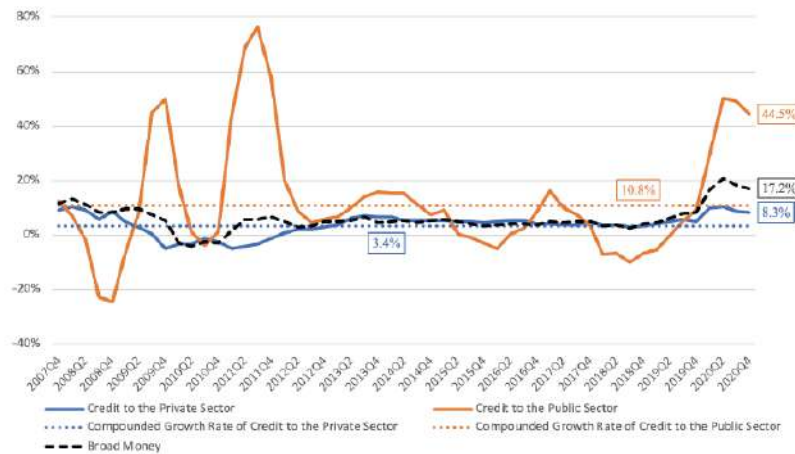


Figure 11. Growth rates of major credit counterparts (Q4 2007 - Q4 2020)

3.3. M2 counterparts on the balance sheet of U.S. commercial banks

The main counterparts to M2 on the balance sheet of U.S. commercial banks are securities held, loans and leases, and cash assets. From February 24th, 2020 to April 5th, 2021, the trends in the 13-week annualized growth rates of M2 and its main counterparts can be characterized via separation into four time periods.

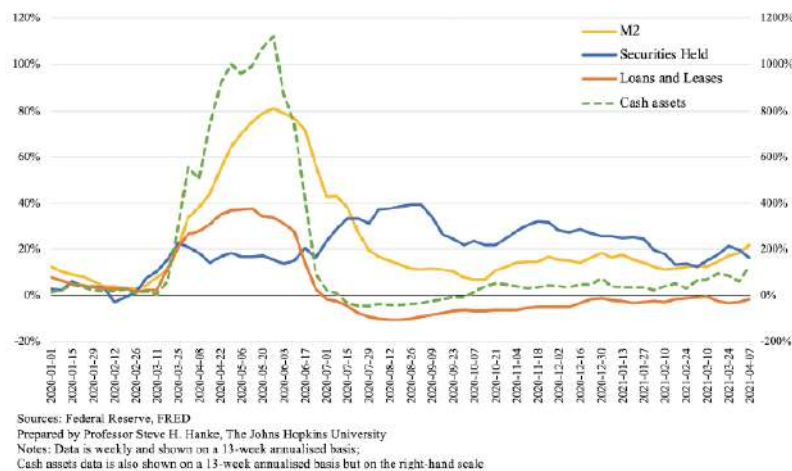


Figure 11. US M2 and counterparts on the balance sheet of commercial banks growth rates

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The first period began in early March 2020 and ended in late June 2020. Over the period, the 13-week annualized growth rate of M2 rose sharply from sub-5% levels to above 70% for seven consecutive weeks, peaking at 81.2% over the 13-week period ending May 25th, 2020. The expansion of M2 over the period was driven by all three main counterparts but primarily by the acceleration in the growth of loans and leases and cash assets. Over the period, the 13-week annualized growth rate of loans and leases increased from sub-5% levels to above 30% for eight consecutive weeks, peaking at 37.7% over the 13-week period ending May 13th, 2020. Meanwhile, the growth rate of cash assets rose from already elevated levels of around 20% to above 900% for six consecutive weeks, peaking at 1120% over the 13-week period ending May 27th, 2020.

The second period started in late-June 2020 and ended in mid-October 2020. It can be characterized by negative 13-week annualized growth rates in both loans and leases and cash assets but acceleration of growth in securities held. 13-week annualized growth rates of loans and leases and cash assets bottomed at negative 10.6% and negative 47.4%, respectively. Meanwhile, the growth in securities picked up from 15-20% in the period from April to June 2020 to above 30% in July and August before falling back to about 20% by mid-October. The 13-week annualized growth rate in securities held peaked at 39.4% over the 13-week period ending August 26th, 2020. However, the acceleration of growth in securities held was not enough to support the significantly elevated growth rate of M2, which steadily declined over the period and bottomed at 6.6% over the 13-week period ending October 5th, 2020.

The third period began in mid-October 2020 and ended in mid-February 2021. It can be characterized by yet another acceleration in growth of securities held and renewed growth in cash assets that were partially offset by the continued decline in loans and leases. Over the period, the 13-week annualized growth rate of securities held rose back above 25%, peaking at 32.1% over the 13-week period ending November 18th, 2020. At the same time, there was a revival of growth in cash assets, with the 13-week annualized growth rate rising above 30% for most of the period and picking at 72.2% over the 13-week period ending December 30th, 2020. Loans and leases, however, continued to decline though the rate of the decline on a 13-week annualized basis slowed from 6-7% at the start of the period to 1-3% toward the end of the period. As a result of growth in securities held and cash assets, the growth in M2 accelerated again to above 10% and reached a local peak of 18.2% over the 13-week period ending December 28th, 2020 before slowing down to 11-13% toward the end of the period.

The fourth period started in mid-February 2021 and was ongoing as of April 7th, 2021. Over the period, the rate of growth of securities held slowed down to levels below 20% and reached 16.4% over the 13-week period ending April 7th, 2021. Meanwhile, the rate of growth in cash assets continued to accelerate, rising to 121.5% over the 13-week period ending April 7th, 2021. Loans and leases remained flat at around \$10.35 trillion, though the 13-week annualized rate of decline fluctuate between 0% and 4%

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due to the basis effect. Stabilization in the balance of loans and leases and continued acceleration in the growth of cash assets resulted in acceleration of growth in M2, which reached 21.7% over the 13-week period ending April 7th, 2021. ([Board of Governors of the Federal Reserve System, n.d.](#)).

3.4. Notes

Not seasonally adjusted M2 and its components were used for analysis and calculations since the Federal Reserve discontinued the reporting of seasonally adjusted M2 and its components on February 1st, 2021, which falls within the analysis period.

The Federal Reserve started to recognize savings deposits as a type of transaction account with the release dated February 23rd, 2021. This recognition reflects the Board's action on April 24th, 2020 to remove the regulatory distinction between transaction accounts and savings deposits by deleting the six-per-month transfer limit on savings deposits in Regulation D. ([Board of Governors of the Federal Reserve System, 2020, April 24](#)). As a result of this change, savings deposits and other checkable deposits were combined into other liquid deposits retroactively back to May 2020. ([Board of Governors of the Federal Reserve System, n.d.](#)). In this paper, the authors combined savings deposits and other checkable deposits values reported by the Federal Reserve for the period from February 24th, 2020 to April 27th, 2020 and reported the combined values as other liquid deposits in order to achieve consistency.

The data from Assets and Liabilities of Commercial Banks in the United States – H.8 is released as of Wednesday on a weekly basis. The data from Money Stock Measures – H.6 is released as of Monday on a weekly basis. Therefore, the dates in charts and analysis align on a weekly basis but not a daily basis, with M2 and its components data lacking assets and liabilities of U.S. commercial banks data by two days.

4. Golden growth rate analysis

The golden growth rate of money supply is calculated based on the equality $MV = Py$, where “M” is money supply, “V” is the velocity of money, “P” is the price level, and “y” is real GDP. Velocity of money in this equation is defined by the ratio of nominal GDP to broad money (M4). The rate that can be obtain from the QTM (the “golden growth rate” for M4) is the growth rate of the money supply required to meet a target inflation rate. In that case, the growth rate of broad money should equal the inflation rate plus the percentage change in real GDP minus the percentage change in the velocity of money or $\Delta M = \Delta P + \Delta y - \Delta V$.

The authors computed the golden growth rate for the broad money supply (M4) for the 10-year period from Q1 2011 to Q1 2021, using the following equation:

$$\text{Golden Growth Rate} = \text{Inflation Target} + \text{Compounded Annual Real GDP Growth} - \text{Compounded Annual Percent Change in Velocity}$$

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The following values were used in the calculation of the golden growth rate for M4:

- The Federal Reserve's 2.0% inflation target
- The compounded annual real GDP growth rate from Q1 2011 to Q1 2021 of 2.0% (U.S. Bureau of Economic Analysis, n.d.).
- The compounded annual percent change in velocity from Q1 2011 to Q1 2021 of -2.5% (U.S. Bureau of Economic Analysis, n.d.).

Using the values above and the QTM equation, the golden growth rate for broad money supply (M4) in the United States was estimated at 6.5%.

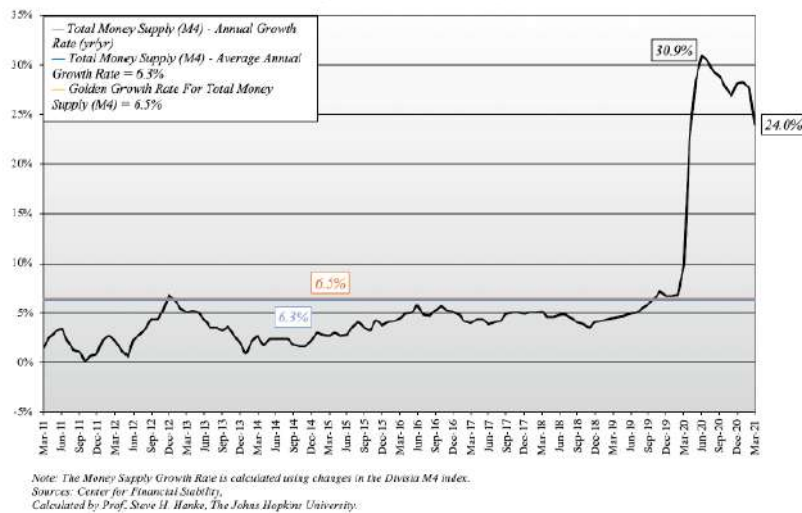
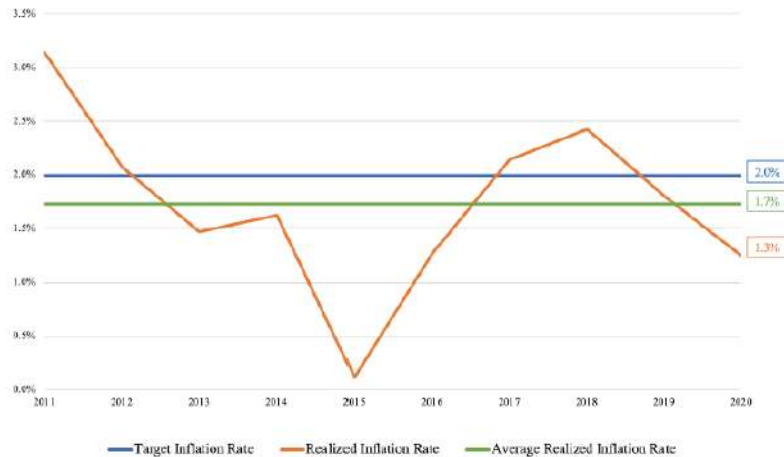


Figure 12. US money supply (M4) (Q1 2011 – Q1 2021)

Comparing the golden growth model target of 6.5% to the compounded annual broad money supply (M4) growth rate from Q1 2011 to Q1 2021 of 6.3%, it can be seen that, on average, the Federal Reserve undershot the golden growth rate for broad money by 0.2%. [Retrieved from]. It should also be noted that if the golden growth rate and compounded annual broad money supply (M4) growth rate are calculated for the 9-year period from Q1 2011 to Q1 2020 to exclude the exceptionally high growth of money supply from Q1 2020 to Q1 2021, 5.0% and 4.8% are obtained for the golden growth rate and compounded M4 growth rate, respectively. Similar to the 10-year period from Q1 2011 to Q1 2021, the Federal Reserve only slightly undershoots the golden growth rate over the 9-year period from Q1 2011 to Q1 2020.

The fact that the Federal Reserve slightly undershoots the golden growth rate over the period resulted in an average realized inflation rate falling short of the 2.0% inflation target, albeit by a relatively small percentage [Retrieved from]. It can also be observed that the changes in the realized inflation rate closely followed changes in the rate of growth of broad money supply (M4) as predicted by the QTM once the time lag is taken into account.

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Sources: The Economist Intelligence Unit
Prepared by Professor Steve H. Hanke, The Johns Hopkins University.

Figure 13. US target inflation rates vs. realized inflation rate

However, the acceleration of growth in broad money (M4) toward the end of Q1 2020 caused year-over-year growth rates to rise well above the golden growth rate. In particular, the year-over-year growth rate of M4 rose above 20.0% in April 2020 and remained above that level for the remainder of the analysis period, picking at 30.9% as of June 2020. The year-over-year growth rate remained close to 30.0% over the summer and started to decline in the following months, falling to 24.0% as of March 2021. Nevertheless, the growth rate of M4 remained well above the golden growth rate toward the end of the analysis period. Considering the predictive power of changes in the broad money supply growth rates in explaining realized inflation and the time lag between changes in one versus the other, it is highly likely that the U.S. will experience at least a temporary inflation shock over the course of 2021 and 2022.

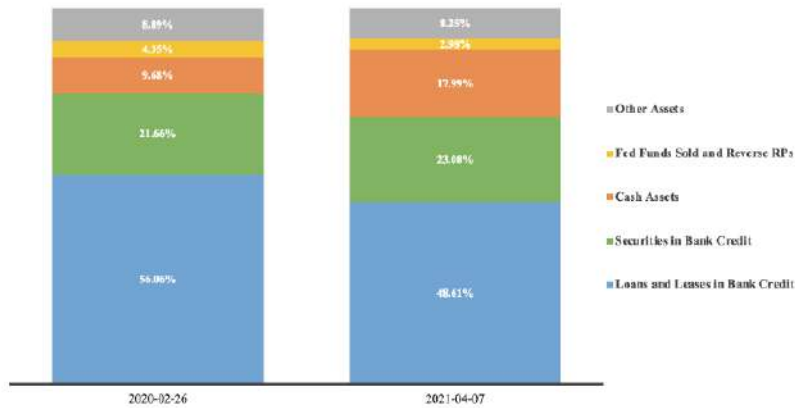
5. U.S. commercial banks' balance sheet analysis

	Absolute change since February 26 th , 2020 (in trillions)	Percentage change since February 26 th , 2020	Outstanding as of April 7 th , 2021 (in trillions)
Total assets	\$3.31	18.42%	\$21.29
Bank credit	\$1.33	9.55%	\$15.26
Securities in bank credit	\$1.03	26.55%	\$4.91
Loans and leases in bank credit	\$0.30	2.98%	\$10.35
Allowance for loan and lease losses	\$0.08	71.78%	\$0.19
Cash assets	\$2.06	116.05%	\$3.83
Total fed funds sold and reverse RPs	\$(0.15)	-19.26%	\$0.64
Other assets, including loans to commercial banks	\$0.16	9.82%	\$1.76
Total liabilities	\$3.40	21.33%	\$19.36
Deposits	\$3.56	26.67%	\$16.93
Borrowings	\$(0.20)	-10.11%	\$1.76
Net due to related foreign offices	\$(0.06)	-49.42%	-\$0.18
Other liabilities	\$0.10	12.63%	\$0.85
Residual (assets less liabilities)	\$(0.09)	-4.51%	\$1.93

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5.1. Assets

From February 26th, 2020 to April 7th, 2021, total assets of U.S. commercial banks expanded by \$3.31 trillion or 18.4% from \$17.98 to \$21.29 trillion. (Board of Governors of the Federal Reserve System, n.d.).



Sources: Federal Reserve, FRED
Prepared by Professor Steve H. Hanke, The Johns Hopkins University

Figure 14. Composition of commercial banks assets

Loans and leases increased by \$0.30 trillion or 3.0% from \$10.05 to 10.35 trillion over the same period. However, since relative to other assets, loans and leases expanded at a slower pace, their percentage share of total assets fell from 55.9% to 48.6% over the period. Looking at loans and leases on a component-by-component basis, real estate loans remained flat at around \$4.64 trillion. Commercial and industrial loans increased from by \$0.25 trillion or 10.4% from \$2.35 trillion to \$2.60 trillion. Meanwhile, consumer loans decreased by \$0.08 trillion or 5.0% from \$1.60 trillion to \$1.52 trillion. Lastly, other loans and leases increased by \$0.11 trillion or 7.7% from \$1.47 trillion to \$1.59 trillion. (Board of Governors of the Federal Reserve System, n.d.).



Sources: Federal Reserve, FRED
Prepared by Professor Steve H. Hanke, The Johns Hopkins University

Figure 15. US commercial banks asset holdings

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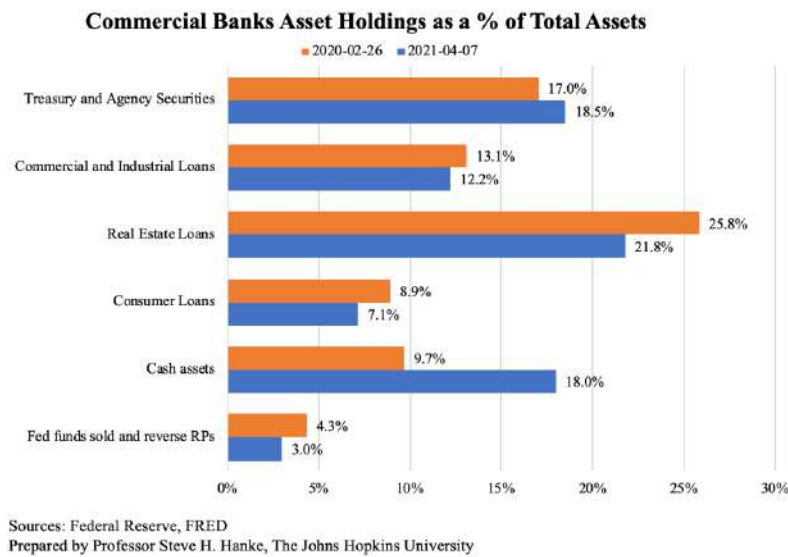


Figure 15. Commercial banks asset holdings as a % of total assets

Turning to other assets, Treasury and agency securities expanded by \$0.88 trillion or 28.9% from \$3.06 trillion to \$3.94 trillion, and their percentage share of total assets increased from 17.0% to 18.5%. Cash assets increased by \$2.09 trillion or 120.0% from \$1.77 trillion to \$3.83 trillion. As a result of the drastic increase in cash assets, their percentage share of total assets increased from 9.9% to 18.0%. Finally, fed funds and reserve repos (RPs) decreased by \$0.15 trillion or 18.7% from \$0.79 to \$0.64 trillion, and the percentage share of total assets fell from 4.4% to 3.0%.

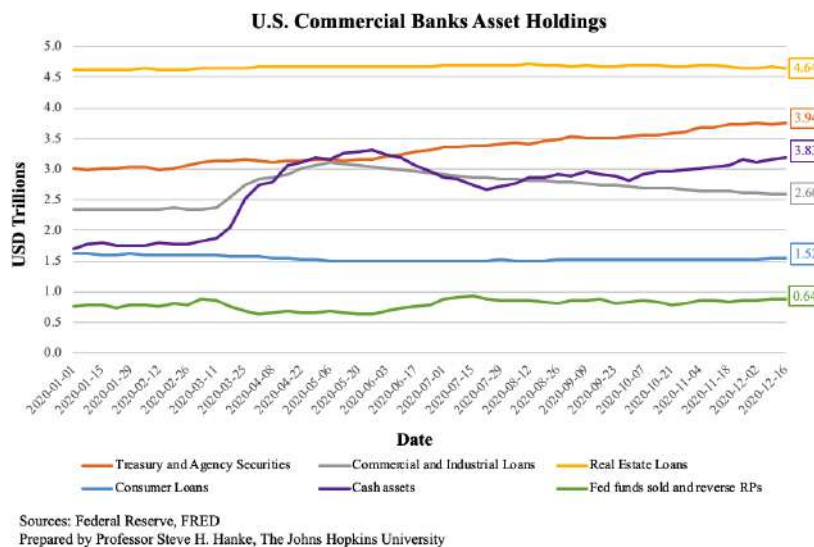


Figure 16. US commercial banks asset holdings

5.2. Liabilities

From February 26th, 2020 to April 7th, 2021, total liabilities increased by \$3.40 trillion or 21.3% from \$15.95 trillion to \$19.36 trillion. Deposits increased by \$3.5 trillion or 26.7% from \$13.36 to \$16.93 trillion, driving the

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growth in total liabilities. As a result, their percentage share of total liabilities increased from 83.8% to 87.4% over the same period.

Between February 2020 and April 2020, deposits and cash assets grew together, making cash assets the primary counterpart to deposits growth. However, in May 2020, this relationship largely broke down as changes in net due to foreign offices became the primary counterpart to deposits. The best explanation for observed changes in net due to foreign offices in late spring and early summer of 2020 is the fact that foreign repayments on loans received from the U.S. required the use of deposit claims on U.S. banks. Following the period of foreign repayments, no single balance sheet item can be credited as a main counterpart to deposits growth. However, it is important to note that a portion of the slowdown in growth in cash assets relative to growth in deposits can be attributed to a shift toward purchases of Treasury and agency securities.

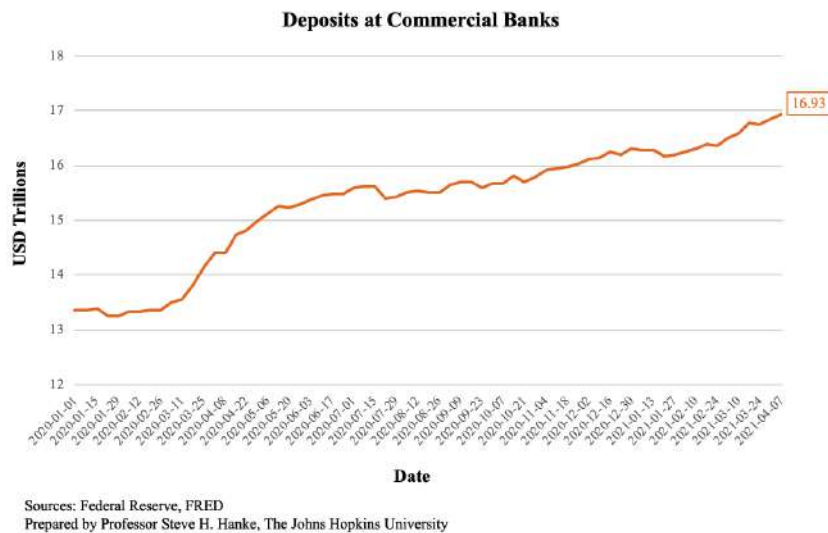


Figure 17. Deposits at commercial banks

Looking at other liabilities line items, borrowings decreased by \$0.20 trillion or 10.1% from \$1.96 trillion to \$1.76 trillion. Net due to related foreign offices decreased by \$0.06 trillion or 49.4% from \$(0.12) trillion to \$(0.18) trillion. Meanwhile, other liabilities increased by \$0.10 trillion or 12.6% from \$0.75 trillion to \$0.85 trillion. ([Board of Governors of the Federal Reserve System, n.d.](#)).

5.3. Notes

While the expansion of U.S. commercial banks' balance sheet from February 26th, 2020 to April 7th, 2021 was slower than that of Federal Reserve's balance sheet on a percentage basis, the two are closely aligned, as would be expected, on an absolute basis at \$3.31 trillion and \$3.55 trillion, respectively. ([Board of Governors of the Federal Reserve System, n.d.](#)).

U.S. commercial banks allocated a surge in deposits primarily to cash assets and Treasury and agency securities while extending few additional loans, which can be viewed as a consequence of both deleveraging on a risk-

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adjusted basis and weak loan demand. (Board of Governors of the Federal Reserve System, n.d.).

6. Inflation expectations and treasury yields

6.1. Inflation expectations

The authors used 5-year, 5-year forward inflation expectation rate and 10-year breakeven inflation rate as proxies for inflation expectations. Both rates hit a bottom over the analysis period on March 19th, 2020 as part of the broad sell-off in capital markets. In particular, the 5-year, 5-year forward inflation expectation rate fell to 0.86%, down by 0.24% for the day and 0.72% since February 26th, 2020. [Retrieved from]. Similarly, 10-year breakeven inflation rate reached a bottom at 0.50%, down by 0.13% for the day and 1.04% since February 26th, 2020. [Retrieved from].

Both rates recovered to the levels observed at the beginning of 2020 by late August 2020 and consolidated around these levels until December 2020 when both rates broke out on the upside. As of April 7th, 2021, the 5-year, 5-year forward inflation expectation rate and the 10-year breakeven inflation rate reached 2.15% and 2.34%, respectively, only slightly below peak levels over the analysis period of 2.20% and 2.37% as of March 31st, 2021, respectively.



Figure 18. US inflation expectations

6.2. Nominal treasury yields and spreads

The primary part of the selloff in U.S. Treasuries occurred from late February 2020 to early March 2020, preceding the broad market selloff in mid-March. Specifically, U.S. 2-year, 5-year, 10-year, and 30-year Treasury yields fell by 1.04%, 0.95%, 1.02%, and 1.02%, respectively, between February 20th, 2020 and March 9th, 2020. [Retrieved from].

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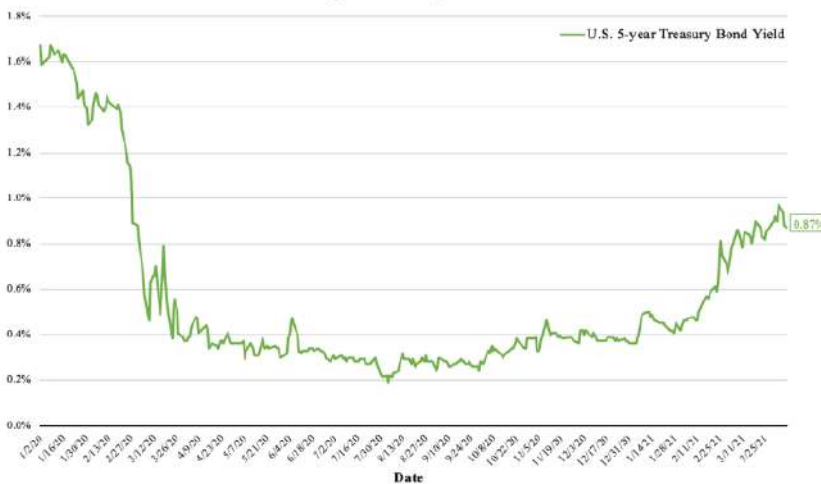
U.S. 2-year Treasury Bond Yield



Sources: U.S. Department of the Treasury
Prepared by Professor Steve H. Hanke, The Johns Hopkins University

Figure 19. US 2-years treasury bond yield

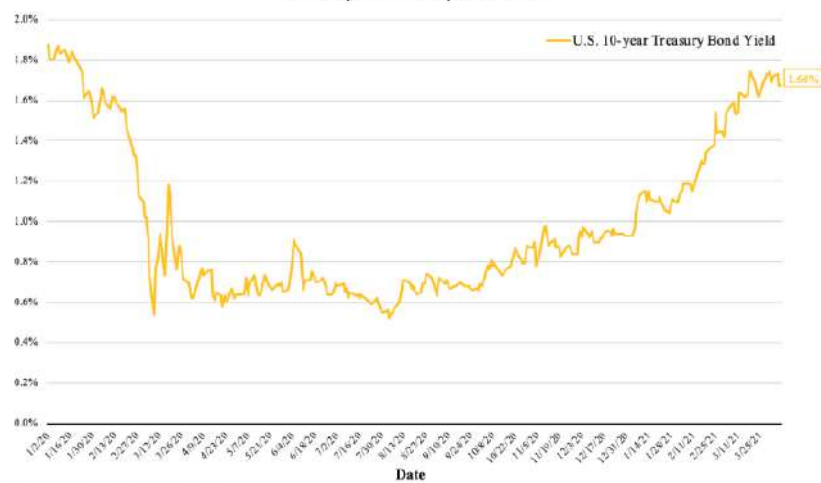
U.S. 5-year Treasury Bond Yield



Sources: U.S. Department of the Treasury
Prepared by Professor Steve H. Hanke, The Johns Hopkins University

Figure 20. US 5- years treasury bond yield

U.S. 10-year Treasury Bond Yield



Sources: U.S. Department of the Treasury
Prepared by Professor Steve H. Hanke, The Johns Hopkins University

Figure 21. US 10- years treasury bond yield

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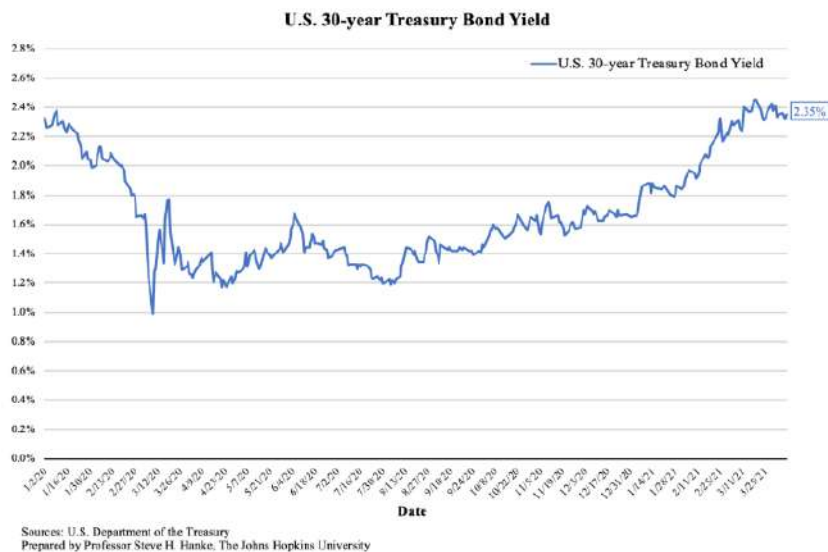


Figure 22. US 30-years treasury bond yield

The 2-year Treasury yield gradually declined following the main selloff period until it fell to levels slightly below 0.20% and consolidated at these levels for the remainder of the analysis period. As of April 7th, 2021, the 2-year Treasury yield stood at 0.16%. Similarly, the 5-year Treasury yield gradually declined following the main selloff period, bottoming at 0.19% as of August 4th, 2020. However, the 5-year Treasury yield has since rebounded in contrast to the 2-year Treasury yield. As of April 7th, 2021, the 5-year Treasury yield stood at 0.87%, up by 0.68% from the lows and only slightly below the recent high of 0.97% reached on April 2nd, 2021. Nevertheless, the 5-year Treasury yield was still only about halfway through the recovery to the pre-pandemic levels as of early April 2021. [Retrieved from].

In contrast to the 2-year and 5-year Treasury yields, the 10-year and 30-year Treasury yields consolidated right after the main selloff period until early 2021 when they broke on the upside similar to the moves in the 5-year Treasury yield. As of April 7th, 2021, the 10-year and 30-year Treasury yields stood at 1.68% and 2.35%, respectively, up by 1.16% and 1.36% from the lows and only slightly off recent highs observed in late March 2021. In contrast to the 2-year and 5-year Treasury yields, the 10-year and 30-year Treasury yields recovered fully to the pre-pandemic levels by early March 2021. [Retrieved from].

Turning to spreads, both the 10 year - 2 year Treasury yield spread and the 30 year - 10 year Treasury yield spread were in an upward trend for the majority of the analysis period. From February 26th, 2020 to April 7th, 2021, the 10 year - 2 year Treasury yield spread and the 30 year - 10 year Treasury yield spread increased by 1.35% and 0.81%, respectively, to 1.52% and 1.48% as of April 7th, 2021, respectively. It is important to note that the gap between the 10 year - 2 year Treasury yield spread and the 30 year - 10 year Treasury yield spread that persisted for the majority of the analysis period closed following the moves in yields in early 2021, with the 10 year - 2 year Treasury

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yield spread climbing above the 30 year - 10 year Treasury yield spread for the first time over the analysis period on March 19th, 2021. The closure of the gap can be primarily attributed to the difference in the moves of the 2-year and 5-year Treasury yields as discussed above. [Retrieved from].

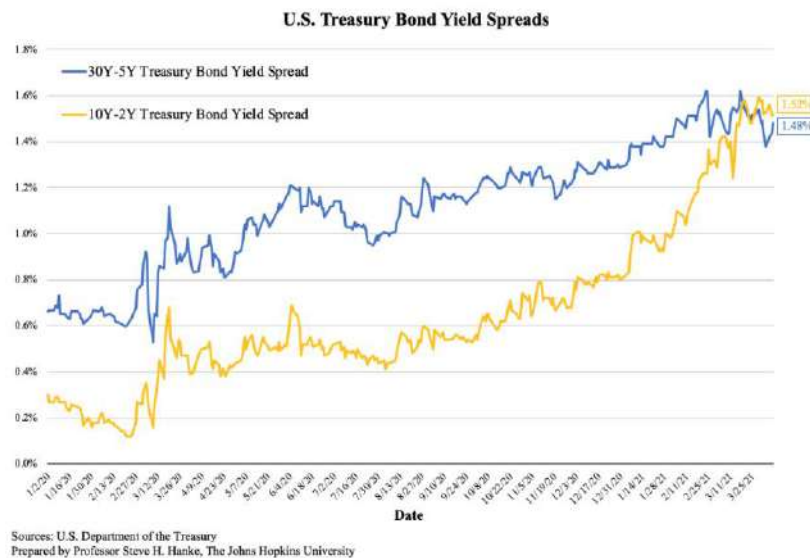


Figure 23. US treasury bond yield spreads

6.3. Real treasury yields

As discussed above, the nominal 10-year Treasury yield consolidated after the main selloff period until it broke on the upside in early 2021. Disaggregating the nominal 10-year Treasury yield into the real yield and inflation components, it can be seen that the consolidation period can be broken down into three time periods.¹ From mid-March 2020 to early August 2020, the decline in the real yield was offset by the recovery in the 10-year breakeven inflation rate. The trends in components changed in early to mid-August 2020 as both the real yield and the 10-year breakeven inflation rate consolidated, leaving the consolidation in the nominal 10-year Treasury yield intact. As discussed above, the 10-year breakeven inflation rate broke on the upside in December 2020. However, the simultaneous decline in the real yield allowed the period of consolidation in the nominal 10-year Treasury yield to continue until early 2021. Finally, the nominal 10-year Treasury yield broke on the upside in early 2021 as both the real yield and the 10-year breakeven inflation rate rose. It is important to note that the move in the nominal 10-year Treasury yield in early 2021 can be attributed to the rise in the 10-year breakeven inflation rate and the rise in the real yield in relatively similar proportions. In particular, the 10-year breakeven inflation rate increased by 0.33% from January 4th, 2021 to April 7th, 2021 while the real yield rose by 0.42% over the same period.²

¹ The authors used the yield on 10-year TIPS as a proxy for the real yield

² Federal Reserve Bank of St. Louis. (n.d.). 10-Year Breakeven Inflation Rate. [Retrieved from]; Federal Reserve Bank of St. Louis. (n.d.). 10-Year Treasury Inflation-Indexed Security, Constant Maturity. [Retrieved from].

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Figure 24. US 10-years TIPS yield

7. Conclusion

The Federal Reserve's response to the economic slowdown caused by the pandemic was swift and ample. Not only did the Federal Reserve revamp asset purchases under quantitative easing in an accelerated manner, but it also provided much-needed U.S. dollar liquidity early in the pandemic through swap arrangements and other tools. The Federal Reserve also supported smooth market functioning and availability of credit through the establishment of multiple credit facilities. Meanwhile, U.S. commercial banks used the surge in deposits to build up sizable additional cash and securities positions and were notably more lenient in extending credit to the private sector as compared to their behavior during the global financial crisis. Combined, the actions of the Federal Reserve and U.S. commercial banks led to a significant acceleration of growth in M2 and M4 monetary aggregates to historically high levels, with the extension of credit to the public sector being the primary source of growth in the money supply.

While the easing of strains on the global financial system since the early stages of the pandemic resulted in reversion of balances of most credit facilities and swap arrangements back to pre-pandemic levels, the continued asset purchases under quantitative easing as well as other liquidity enhancing measures resulted in the slowdown in the broad money supply growth to levels that are still notably above the golden growth rate. As a result, it is sensible to predict at least a temporary inflation scare, the degree and the duration of which will largely depend on the policies of the Federal Reserve. It is also evident that the markets reacted to the actions of the Federal Reserve and accelerated growth in the money supply by raising inflation expectations and consequently nominal yields. Noteworthy, the gap between the 10 year - 2 year Treasury yield spread and the 30 year - 10 year Treasury yield spread that persisted for the majority of the analysis period closed following the moves in yields in early 2021, with the majority of this development being attributable to little changes in the short end of

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the yield curve as a result of the Federal Reserve's stance on the target range but relatively material changes in the belly of the yield curve as a result of growing inflation expectations.

The analysis confirms the importance of the Federal Reserve's actions and highlights how the response of the central bank in this particular episode affected the balance sheets of the economy, the growth of the money supply, and other crucial economic variables. The analysis also demonstrates the need for continued monitoring of the Federal Reserve's balance sheet to gauge the future path and health of the economy.

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