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A photograph of the Federal Reserve Building in Washington, D.C. The image shows the grand neoclassical facade with a portico of tall white columns. In the foreground, a bronze statue of Alexander Hamilton stands on a stone pedestal. An American flag flies on a tall pole in the background against a blue sky with scattered white clouds. The ground is paved with large, light-colored tiles.

FEDERAL RESERVE MONETARY POLICY IN THE 21ST CENTURY

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SUMMARY

The primary role of the Federal Reserve at its inception was to ensure an elastic currency, rediscount commercial paper and supervise banking in the U.S. If a bank run occurred, the Federal Reserve could exchange a member bank's commercial paper for the currency being demanded. Subsequently, the Federal Reserve's role was expanded to conduct policy to achieve maximum employment, stable prices, and moderate long-term interest rates.

Historically, to stimulate the economy, the Federal Reserve would inject monetary wealth into the economy by buying securities. To cool an overheated economy, the Federal Reserve would withdraw monetary wealth from the economy by selling securities.

In the 21st Century, the tools of monetary policy changed fundamentally with the onset of the Great Recession and the Covid-Pandemic, both of which led to significant asset expansions of the Federal Reserve to the tune of \$3.5 trillion and \$4.5 trillion, respectively.

To prevent these unprecedented open-market purchases of securities from reaching the economy, the Federal Reserve began paying member banks interest on bank reserve balances and borrowing reserves from non-bank financial institutions at an overnight borrowing rate. These asset expansions resulted in almost record prices in financial markets so that the purchased assets had low yields. As market interest rates rose, the payments required to prevent banks and non-bank financial institutions from expanding the money supply and producing inflation exceeded Federal Reserve income. As a result, the Federal Reserve is losing \$50 billion a month!

The Federal Reserve is now trying to unwind the massive expansion and in the last year has reduced its securities holding by almost \$900 billion. But we are still several years away from the Federal Reserve returning to its asset holdings to its former share of GDP.

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Cover Photograph

Highsmith, Carol M, photographer. *Alexander Hamilton statue in front of the Treasury Building in Washington, D.C.* United States Washington D.C, None. [Between 1980 and 2006] Photograph. <https://www.loc.gov/item/2011631526/>.

FEDERAL RESERVE MONETARY POLICY IN THE 21ST CENTURY

INTRODUCTION

The primary role of the Federal Reserve at its inception was to ensure an elastic currency, rediscount commercial paper and supervise banking in the United States. The first two roles go together as when a member bank experienced a deluge of depositors demanding currency, a bank run, the newly established Federal Reserve could exchange that bank's commercial paper for the currency being demanded. Subsequently, the Federal Reserve's role was expanded to conduct policy to achieve maximum employment, stable prices, and moderate long-term interest rates.

The major tool of Federal Reserve monetary policy in non-crises has historically been open-market operations in securities markets. To stimulate the economy, the Federal Reserve injects monetary wealth into the economy by buying securities. To cool an overheated economy, the Federal Reserve withdraws monetary wealth from the economy by selling securities and, in effect, destroys the newly acquired money. In monetary crisis situations, the Federal Reserve has directly entered financial markets that were in distress by supplying what is, in effect, freshly printed money.¹

The tools of monetary policy changed fundamentally with the onset of the Great Recession and the tremendous Federal Reserve expansion that began in September 2008. In the 6 years of the monetary wealth injection, Federal Reserve open-market operations amounted to 25% of GDP in 2007. To prevent these unprecedented open-market purchases of securities from reaching the economy, in October 2008, the Federal Reserve began paying member banks to hold reserves through the introduction of paying interest on bank reserve balances. This fundamental change allowed the Federal Reserve to offset the inflationary effects of an unprecedented rate of Federal Reserve open-market asset purchases by incentivizing banks to hold a large share of the monetary expansion as reserves.

Then came the Covid-19 Pandemic Federal Reserve expansion. In just 2 years, the Federal Reserve added \$4.8 trillion in securities, more than double their year-end 2019 holdings and 21.2% of 2019 GDP. As with the Great Recession expansion, paying interest on reserves resulted in bank reserves absorbing half of the increase. But that still left a tremendous increase in Federal Reserve-injected monetary wealth in the economy. The Federal Reserve then expanded its use of its reverse repo facility, in which the Federal Reserve borrows reserves from non-bank financial institutions, reverse repos, to control its inflationary asset expansion. The combination of reverse repos and additions to bank reserves reduced the initial \$2 trillion increase in Federal Reserve injected monetary wealth to \$500 billion, or just over 2% of 2019 GDP.

Before this new ability of the Federal Reserve to almost micro-manage the inflationary effect of its open-market operations, both the Great Recession asset expansion, a 380% increase in Federal Reserve assets, and the Covid-19 Pandemic expansion, a 219% expansion in Federal Reserve assets, would have led to similar expansions in the money supply and hyper-inflation.

¹ For a review of the first century of Federal Reserve monetary policy see Thomas R. Saving, *A Century of Federal Reserve Monetary Policy: Issues and Implications for the Future*, World Scientific Press, 2019.

But by using the interest on reserves tool and the temporary asset sales tool, the actual expansion in Federal Reserve net assets over the six-year period increased by only 55%. However, even this much lower total expansion was 7% annually.

THE BASICS OF MONETARY POLICY FOR ENSURING AN ELASTIC CURRENCY

At its inception in 1913, the primary issue in the public's eye was recurring monetary crises that virtually shut down financial markets. As a result, maintaining an "elastic" currency was a principal role for the Federal Reserve.² The Act that established the Federal Reserve also included the means to achieve currency elasticity: "rediscounting commercial paper." Subsequently, the Act was amended to include what we now view as monetary policy. That said, however, monetary crises still happen, just not as regularly as they did before the establishment of the Federal Reserve. Solving a monetary crisis is simple, as the solution to a liquidity crisis is to flood the market with liquidity, something the Federal Reserve can do easily.

A pure liquidity crisis occurs when the public fears that their ability to get to their assets will be limited by an event that is out of their control. Their response is to withdraw cash from their financial accounts. The result of a massive demand by the public to convert financial accounts to cash is that the financial institutions that are subject to these mass withdrawals cannot meet the public's demand. There have been two recent such crises that, while totally unrelated, both resulted in a run on the assets of financial institutions. In both cases, the public, afraid that financial markets would at least temporarily shut down, withdrew cash from their accounts.

The first episode, known as Y2K, was related to the historic fact that as we neared the year 2000, the computer systems that financial markets relied on were programmed when memory capacity was scarce. As a result, the year in these programs was represented by only two digits. The concern was that when 99 turned to 00, the computers would crash and result in at least a temporary shutdown of the public's ability to get cash. In fact, this concern even extended to automobiles as the increased computerization of auto electronics made many think that as the date was automatically updated, the double zero automobile engines would shut down.

The second episode was less than two years later with the September 11, 2001 terrorist attack on the World Trade Center. Much of the New York financial system relied on firms located in the World Trade Center. That, coupled with the fear that this attack might be part of a much larger terrorist plan, resulted in a demand-for-cash tidal wave.

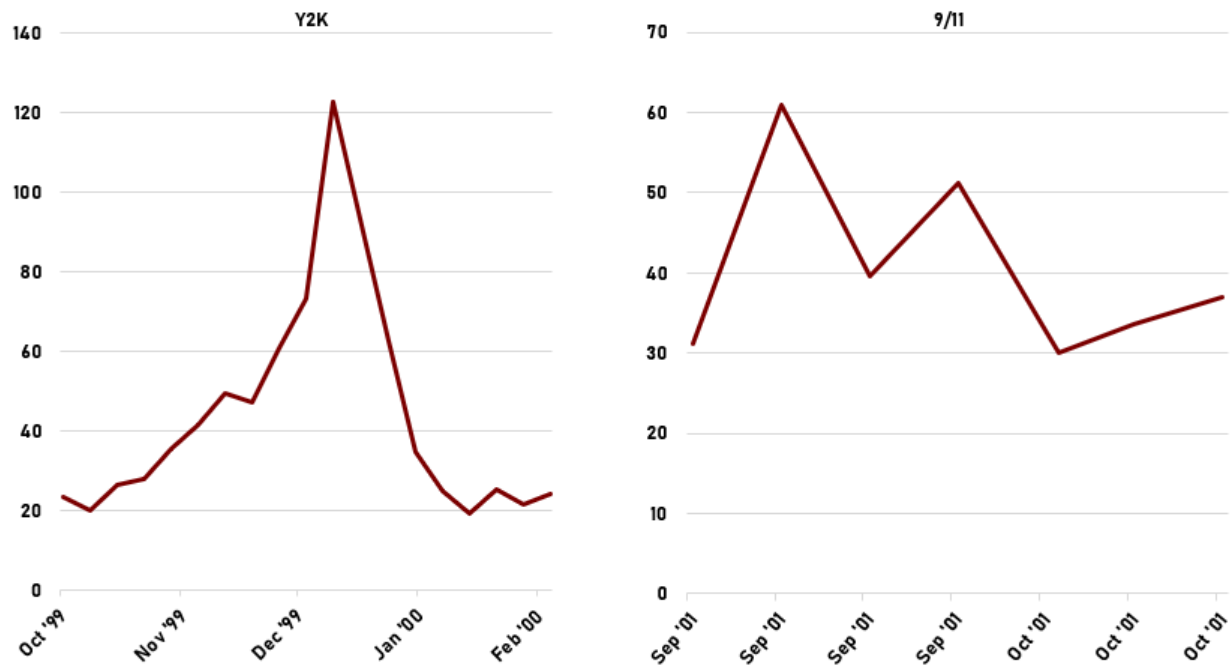
What tools does the Federal Reserve have to respond to such a cash crisis? The Federal Reserve has the ultimate tool, a cash printing press. The issue is how to get the cash where it is needed.

² The Act establishing the Federal Reserve is entitled "An Act To provide for the establishment of Federal reserve banks, to furnish an elastic currency, to afford means of rediscounting commercial paper, to establish a more effective supervision of banking in the United States, and for other purposes."

One way is to discount the non-cash assets of the troubled financial institutions, supplying them with cash and holding title to their financial assets.³

Figure 1 shows the Federal Reserve response to each of these crises in terms of the banking system repurchase agreements in which the Federal Reserve discounted collateral from the banks in return for supplying banks with cash. In the Y2K case, the Federal Reserve injected \$100 billion into the economy from November through December 1999. Once the Y2K fears proved unfounded, the cash crisis subsided and by February 2000, all the newly printed cash had been returned to the Federal Reserve. The post 9/11 response was more rapid and dissipated just as rapidly. Immediately following 9/11, the Federal Reserve injected \$30 billion in newly printed cash and as the demand for cash dissipated, most of this new money was back at the Federal Reserve in one month.

Figure 1. Two Federal Reserve Liquidity Crisis Responses
Triparty Repurchase Agreements



In addition to the rediscounting of bank assets as a public cash demand solution, the Federal Reserve can directly loan cash and invest in commercial markets. In both the 2008 Great Recession crisis and the Covid-19 Pandemic, the Federal Reserve made direct loans to banks and invested in commercial markets for the first time in its history. In each case, the Federal Reserve invested in the commercial paper market as money market financial firms experienced cash demands that could not be met. Essentially, when all money market firms attempt to sell commercial paper to meet cash demands, the market fails. Since member banks experienced the same cash demand, the Federal Reserve established the Term Auction Facility, a loan facility where banks bid for cash loans that were collateralized with bank assets.

³ Referred to in the Act as “afford means of rediscounting commercial paper”.

Figure 2 shows the path of Federal Reserve repurchase agreements, investments in commercial paper and its Term Auction Facility for the Great Recession. The recession began in December 2007 and its early responses to supplying cash to banks were repurchase agreements and the Term Auction Facility. But the September 2008 financial crisis is clearly seen in the figure with the onset of the Federal Reserve participating in the commercial paper market and a giant increase in the scale of the Term Auction Facility. Within six months of the onset of the financial crisis, the liquidity crisis was over as both the Federal Reserve commercial paper and Term Auction Facility zeroed out.

Figure 2. Early Great Recession Interventions
January 2008 - January 2011, \$Billions

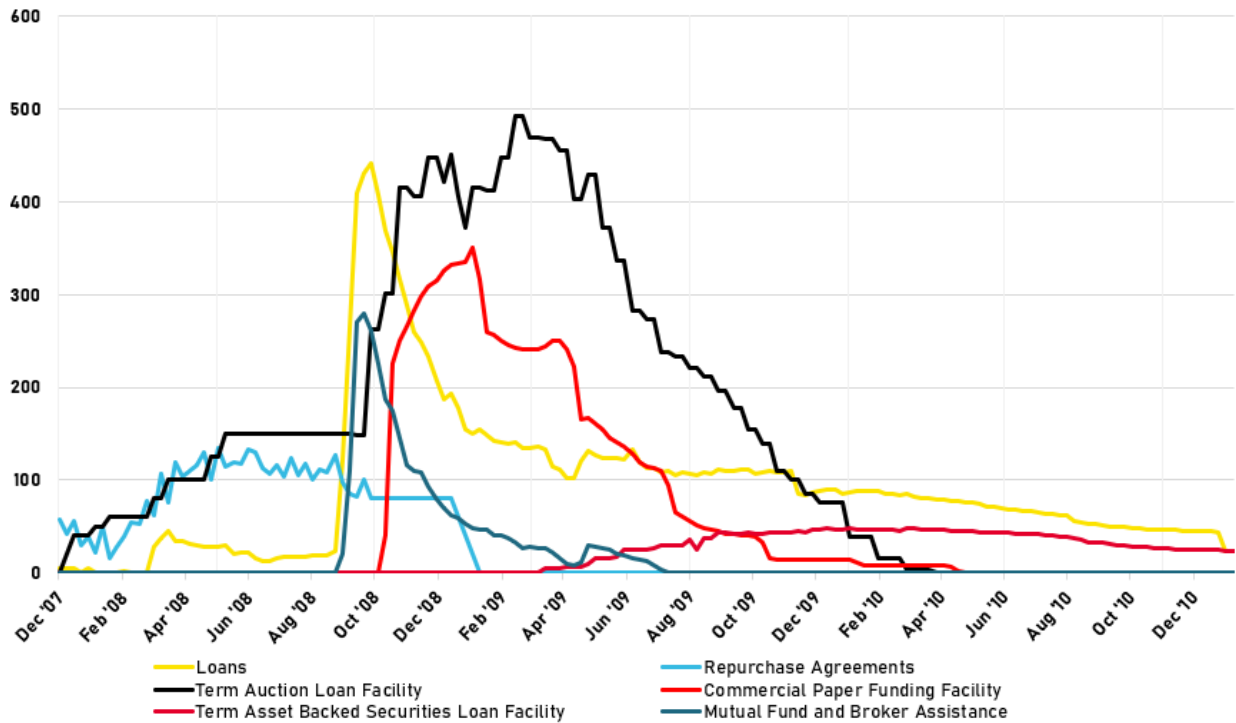
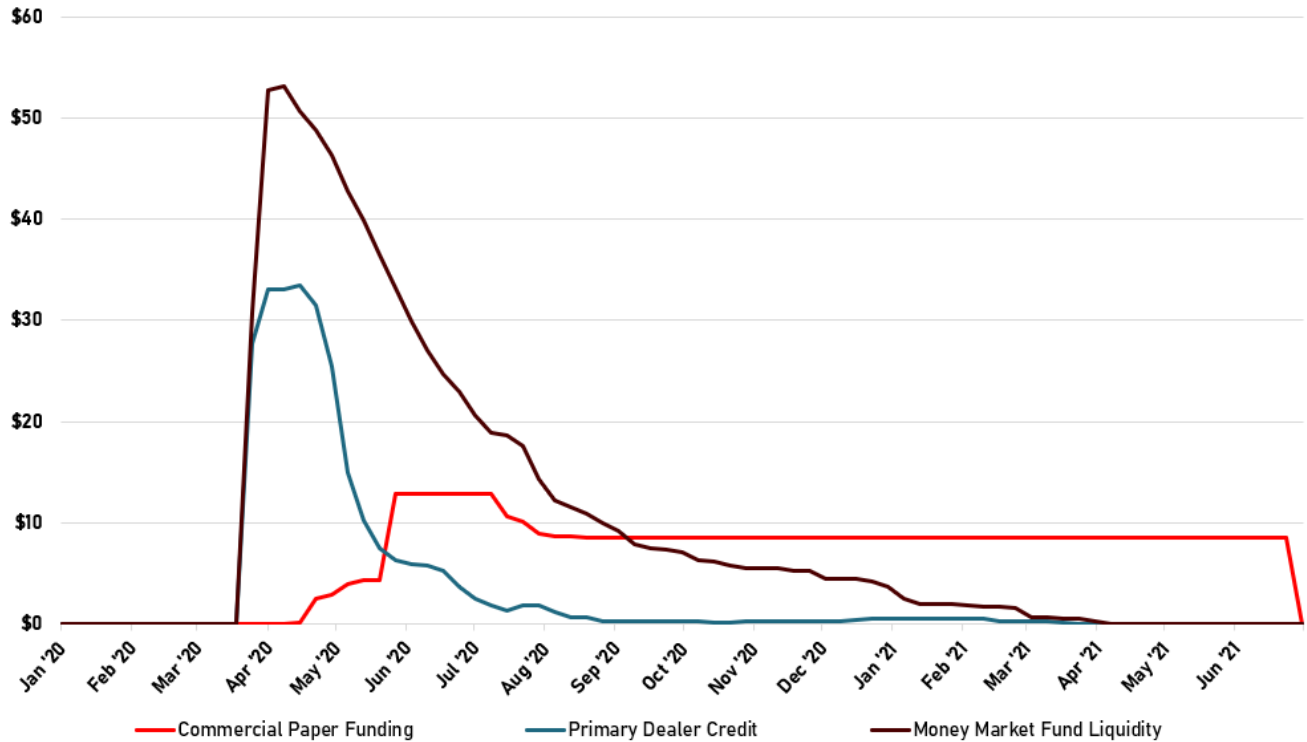


Figure 3 shows the Federal Reserve Covid-19 Pandemic Liquidity Crisis Funding. The shutdown effects of the pandemic really began in late March of 2020 and the resulting dash for cash affected money markets immediately. Figure 3 shows three money market areas supported by the Federal Reserve: a general money market fund facility (MMLF) to assist money market funds in meeting demands for redemptions by households and other investors, a commercial paper market funding facility (CPFF) and a primary dealer credit facility (PDCF) to support smooth market functioning and facilitate the availability of credit to businesses and households.⁴ They were put in place quickly with the onset of the pandemic and lasted 15

⁴ The CPFF was formed to purchase three-month U.S. dollar-denominated commercial paper from eligible issuers and thereby foster liquidity in short-term funding markets and increase the availability of credit for businesses and households.

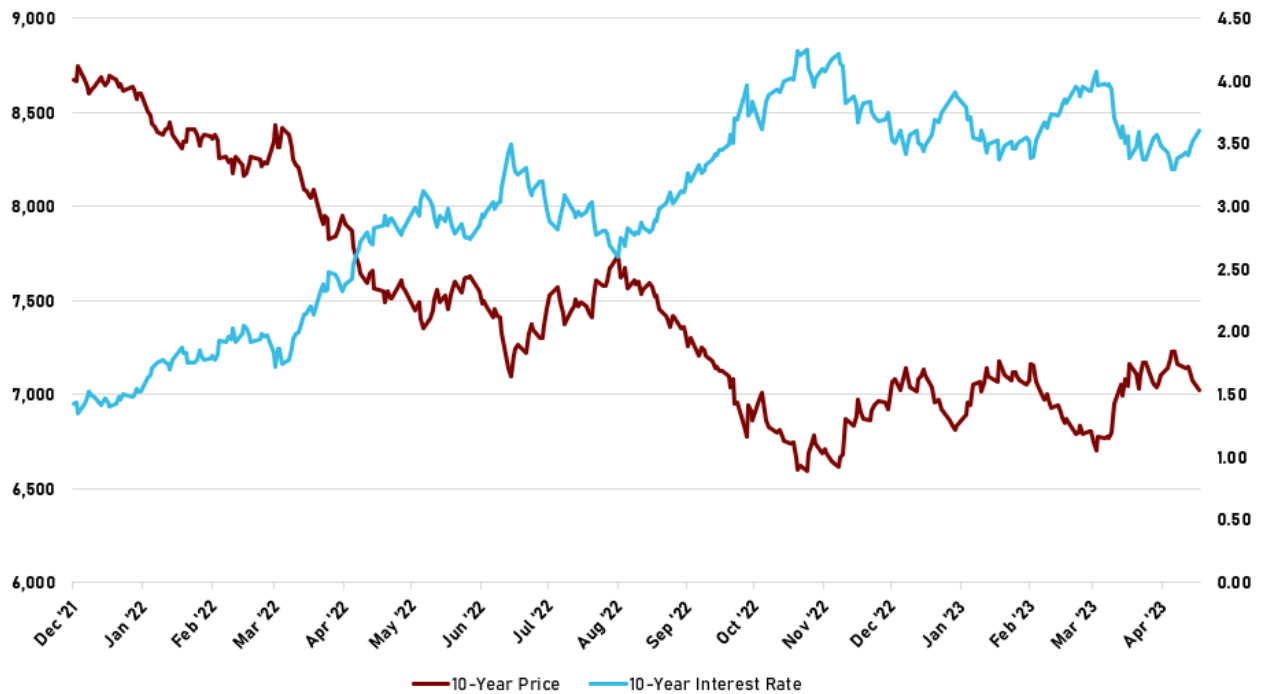
months, just 3 months less than the 18 months of the Great Recession liquidity facilities, and are examples of the Federal Reserve ensuring an elastic currency.

Figure 3. Covid-19 Pandemic Liquidity Crisis Funding
January 1, 2020 to July 1, 2021, \$Billions



In March 2023, we had a bank failure crisis that began with the Silicon Valley Bank in Santa Clara, California on March 10, 2023, followed by Signature Bank, New York, New York on March 12, 2023. Both had huge surges in deposits in 2020 and 2021 and invested heavily in Treasury securities with ten year or longer maturities. Figure 4 shows the path of interest rates and the value of 10-year Treasuries from December 2021 through mid-April 2023. By the close of 2022, the price of 10-year Treasuries had fallen by more than 20%! The pressure to pay depositors with market interest rates rising and the revenue from assets fixed at the purchase date level spelled disaster. As a result, both banks have been acquired by other banks with substantial assistance from the FDIC, the U.S. Treasury and the Federal Reserve.

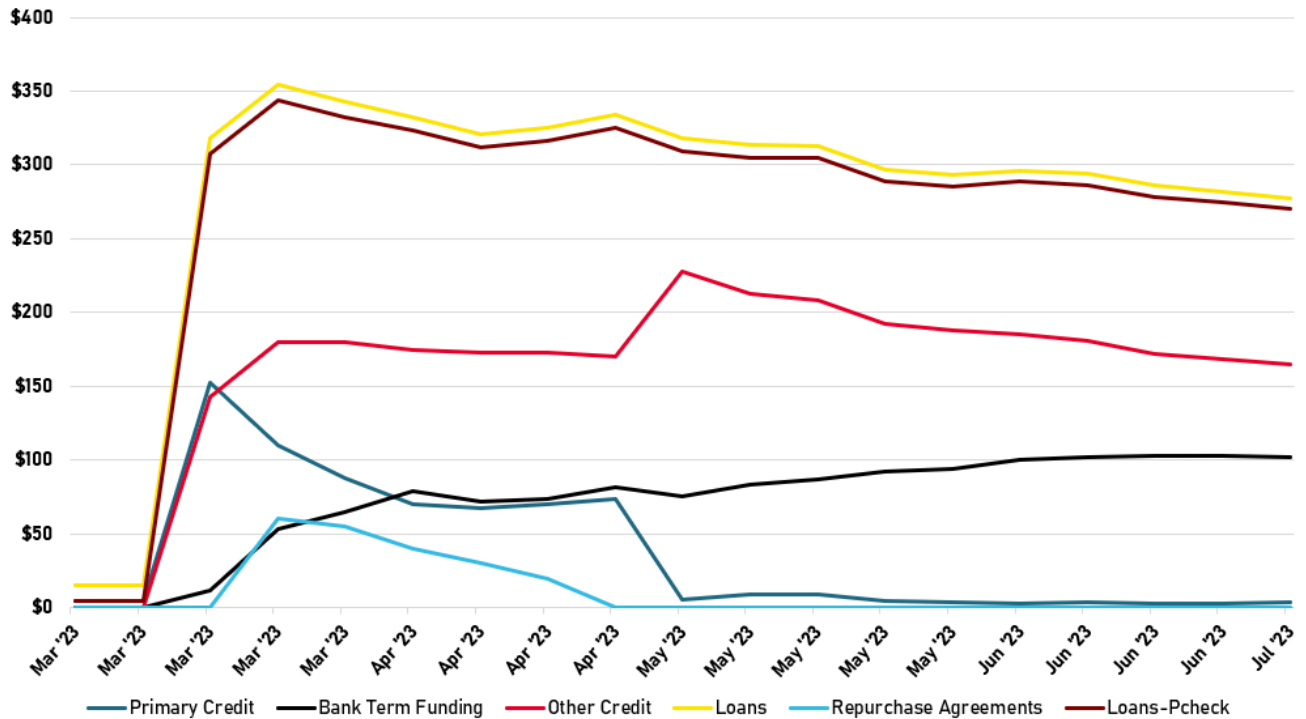
Figure 4. Price of a \$10,000 10-yr Treasury and 10-yr Treasury Interest Rate
December 1, 2021 to April 17, 2023



Both Silicon Valley Bank and Signature Bank had substantial deposits above the level insured by the FDIC, but both represent the reason for the establishment of the Federal Reserve, to achieve elasticity of the currency. To facilitate its elastic currency role, the Federal Reserve established a Bank Term Funding Program (BTFP), offering loans of up to one year in length to banks, savings associations, credit unions, and other eligible depository institutions pledging U.S. Treasuries, agency debt and mortgage-backed securities, and other qualifying assets as collateral. Then the crisis spread internationally, and United Bank Switzerland had to acquire Credit Suisse Switzerland.

Figure 5 shows the path of Federal Reserve actions from March 1, 2023 through May 17, 2023. The two weeks prior to the crisis represent normal Federal Reserve activity with the majority of loans supported by the Paycheck Protection Program that began in April 2020. The first week of the crisis funding saw Federal Reserve loan activity increase from a March 8 level of \$15.1 billion in mostly payroll protection, to the March 22 level of \$354.2 billion. Meanwhile, repurchase agreements rose from \$0 to \$60 billion. Even by June 1, 2023, the Federal Reserve was still supporting the crisis mitigation to the tune of \$286 billion.

Figure 5. 2023 Bank Failure Liquidity Crisis Funding
March 1, 2023 to July 5, 2023, \$Billions



THE BASICS OF MONETARY POLICY FOR MAXIMUM EMPLOYMENT, STABLE PRICES AND MODERATE LONG-TERM INTEREST RATES

As the above five cases demonstrated, ensuring an elastic currency is well within the ability of the Federal Reserve.⁵ On the other hand, monetary policies that affect employment, prices and interest rates are more complex. But they must still be based on the Federal Reserve being the sole owner of both the money printing press and the money incinerator. Essentially, the Federal Reserve has the power to create or to destroy monetary wealth. However, the power to create the supply of goods and services depends on real wealth. Thus, an economic downturn that results from a real change in the production possibility schedule, a reduction in real wealth, cannot be corrected by changing monetary wealth.⁶

On the other hand, changes in monetary wealth can affect a lagging economy because consumer spending has fallen, a reduction in aggregate demand, with no change in real wealth. Such a change results in reduced employment and output, a recession by the usual definition, and can be affected by increasing monetary wealth. The press only discusses monetary policy in terms of changes in Federal Reserve interest rate targets. However, actual monetary policy is conducted by Federal Reserve operations in securities markets and investments in the economy,

⁵ That said, the first time they had a chance to really perform this role was in 1933. If the Federal Reserve had rediscounted the commercial paper held by the perfectly solvent banks the bank holiday would not have been necessary.

⁶ A good example is the effect of the 1974 rise of OPEC, a reduction in world oil production. As all energy intensive products became relatively more costly.

both of which affect the monetary wealth of the public because they are financed by printing new money.

A classic, but unrealistic, way to consider the effect of an increase in monetary wealth is a direct transfer from the Federal Reserve to the public.⁷ The public is wealthier by the amount of the transfer and aggregate demand for goods and services will rise. Since, in general, individuals are lifetime maximisers, the increase in aggregate demand will be less than the total transfer, and perhaps considerably less. Nonetheless, the recognition by the public that they are wealthier will be immediate.

A securities market-based increase in monetary wealth occurs when the Federal Reserve buys securities with newly printed money. The public gives up securities in an even exchange for newly created money. So where is there an increase in wealth? The wealth increase is at the Federal Reserve as the newly acquired securities and their income flow belongs to the owners of the Federal Reserve. Essentially, the owner of Federal Reserve is the U.S. Treasury, as the Federal Reserve must remit all its income net of operating costs to them.⁸

Now the federal government can spend more or reduce taxation. If the choice is to transfer the new income to the public through reduced taxation, then the public's after-tax income rises. This income increase will affect aggregate demand, but the total effect will take many years as the flow of tax reductions last forever. The reduced taxation returns the income flow of the securities the public sold to the Federal Reserve. Thus, the public's after-tax income rises by the total income of the securities purchased. The result is a small but permanent increase in after-tax income and thus aggregate demand.⁹

However, even this effect requires the public to recognize that their after-tax income has risen. In the aggregate, the tax reductions equal the income of the securities the public sold to the Federal Reserve. However, the public owned the source of this income before the Federal Reserve asset purchase. Now they have the cash they received from the securities sale plus a tax reduction equal to the income the securities generated. While in the aggregate, the tax reduction equals the income generated by the securities, individual ownership is absent. Thus, the timing of the effect of an open-market securities-based increase in monetary wealth on aggregate demand is uncertain.

A decrease in monetary wealth occurs when the Federal Reserve sells securities and incinerates the proceeds. The public gives up currency and gets income earning assets, so the public's

⁷ This is different from a government transfer to the public because the Federal Reserve has a money printing press, so no one has to pay for the transfer. A government transfer must come from taxpayers, so it is not a net wealth increase.

⁸ Such transfers from the Federal Reserve to the Treasury are made at the close of each fiscal year. In fiscal year 2021 the Federal Reserve transferred \$107 billion to the Treasury, 30.5% of the net servicing cost of the federal debt.

⁹ Assuming that the Federal Reserve rolls over its assets, the present value of the transfers to the Treasury equals the value of the assets so that the total of the open market sale or purchase represent wealth changes. This was first shown by Boris P. Pesek and Thomas R. Saving, "Monetary Policy, Taxes and the Rate of Interest," *Journal of Political Economy*, August 1963.

wealth is unchanged. But the transfers to the Treasury will fall and either federal spending must also fall, or taxes must rise. Either way, aggregate demand falls, and unemployment rises. But once again, the effect on the economy will take time to play out.

Through open-market operations, the Federal Reserve can affect aggregate demand by injecting monetary wealth into the economy or withdrawing monetary wealth from the economy. It can also affect monetary wealth by supplying funds directly to the economy through loans and through repurchase agreements with banks. Thus, monetary policy by changing Federal Reserve net wealth can affect aggregate demand, employment and prices. If the Federal Reserve could just drop money on the public or just suck up money from the public, the effect would be instantaneous. Importantly, however, the public's recognition of changes in their monetary wealth occurs with a significant lag. That lag in the recognition of monetary wealth changes is due to the transmission of the asset yields from the Treasury to the public.

MONETARY POLICY WHEN THE FEDERAL RESERVE HAS BOTH ASSETS AND LIABILITIES

The Great Recession

For almost the first century of its existence, the Federal Reserve had virtually zero liabilities. When you own the money printing press, you have no reason nor authorization to borrow money. However, that changed when the Federal Reserve established the Overnight Reverse Repo Facility (ON RRP) at the close of the 20th Century, October 1999.¹⁰ This facility allowed the Federal Reserve to borrow reserves from specified financial firms using Federal Reserve owned Treasuries as collateral. While this facility was little used until 2021, it was the first Federal Reserve borrowing facility.¹¹ This facility experienced major use in the second great Federal Reserve asset expansion related to the Covid-19 Pandemic.

The first major use of a Federal Reserve debt program was the introduction of paying banks interest to hold reserve balances. For all intents and purposes, banks were using reserves to buy special Federal Reserve debt. This new debt played an important role in controlling the potential inflation threat of the unprecedented increase in Federal Reserve securities holdings that began in the first quarter of 2009. In all of 2009, the Federal Reserve added \$1.35 trillion in a combination of U. S. Treasuries and for the first time private backed securities in the Mortgage-Backed securities market, MBSs. But that was just the beginning, as Federal Reserve securities holdings continued to rise through 2014, reaching \$4.237 trillion, almost 25% of GDP.

This unprecedented running of the Federal Reserve money printing press began as the elastic currency rescue operation shown in Figure 2. Then the record fiscal \$1.4 trillion federal budget deficit in 2009 added pressure on the Federal Reserve to accommodate the tremendous increase in Treasury debt. During the elastic currency rescue period, the Federal Reserve reduced securities holdings while adding the multiple programs shown in Figure 2. Federal Reserve

¹⁰ The ON RRP offers a broad range of financial institutions that are ineligible to earn IORB, an alternative risk-free investment option.

¹¹ Use of this facility first shows up mid-December of 2002 and the counterparties were foreign official and international accounts. Total Repos on December 18, 2002 were \$21.905 billion.

holdings of securities then remained stable at just under \$500 billion from May 2008 until April 2009 when the Federal Reserve began an unprecedented increase in its securities holdings. This massive open-market operation lasted until the close of 2014 as Federal Reserve securities holdings reached \$4.2 trillion! Federal Reserve total assets rose from their April 2009 level of \$900 billion to \$4.5 trillion at the end of 2014, an annual growth rate of 30.8%!

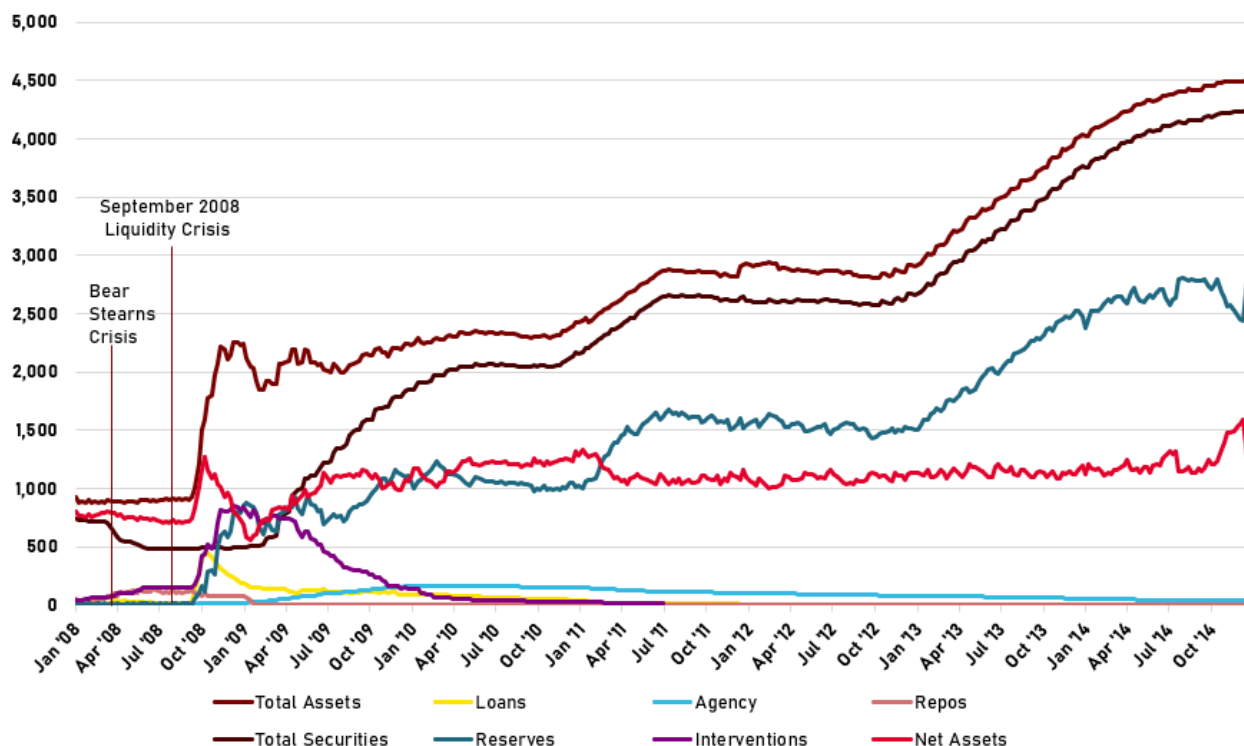
Clearly, a net monetary wealth growth rate in excess of 30% a year would have resulted in an inflation rate never before experienced in the United States. But what would prevent the massive expansion in Federal Reserve assets from becoming a monetary wealth expansion? A major part of the solution was to use the fact that the massive purchases by the Federal Reserve initially wound up as bank reserves and pay banks to hold these reserves rather than use them to increase bank investments in the economy. In October 2008, the Federal Reserve began paying member banks interest on their reserve balances, IORB, turning member bank reserves into short-term Federal Reserve debt. In effect, the increase in monetary wealth resulting from the massive 2009-2014 Federal Reserve purchase of securities and its other market investments was reduced by any increase in what could be termed a closed-market sale of Federal Reserve securities to member banks.

The second largest reduction in scale in the monetary wealth created during the Great Recession was the use of the Federal Reserve's reverse repo facility. In reverse repos, the Federal Reserve offers a rate of return, referred to as the offering rate, to primary dealers, banks, money market mutual funds and government sponsored agencies to give up reserve assets and take U.S. Treasury securities or mortgage-backed securities held in the System Open Market Account (SOMA) portfolio as collateral. The scale of these reverse repo operations in the Great Recession period was less than 1/10 the level of bank reserves. Nevertheless, it contributed to controlling the growth of monetary wealth and in controlling inflation.

Once the Federal Reserve liabilities are netted out, Federal Reserve net assets rose from their April 2009 level of \$900 billion to their close of 2014 level of \$1.191 trillion, an annual growth rate of 4%. With real GDP growing at 2%, the 4% net asset growth rate would have translated to an inflation rate of 2%, the Federal Reserve target. As it turned, out the inflation rate reached the 2% target only in 2011. In all the other years of the expansion, the PCE inflation rate never exceeded 1.6%.

Figure 6 shows the path of Federal Reserve actions from January 2008 through the January 2015. The Federal Reserve actions to alleviate the recession, the beginning of which was dated by the NBER as December 2007, was to reduce its holdings of securities as it increased investment in other assets, the detail of which was shown in Figure 2. Most importantly, the massive open-market expansion in total securities did not turn into a massive expansion in Federal Reserve produced monetary wealth. For the first time in its history, the Federal Reserve issued debt in the form of interest bearing bank reserves. As a result, while Federal Reserve total assets rose over 30% per year, its net of debt assets rose only 4% per year.

Figure 6. Total Assets, Total Securities, Reserves and Net Assets
January 2008 to January 2015, \$Billions



Over the six-year period from 2009 to 2015, the unprecedented expansion of open-market purchases of securities did not result in inflation because the Federal Reserve offset a significant part of the increase in assets by increasing its liabilities. Paying banks to hold reserves and, to a lesser extent conducting reverse repo operations, allowed the Federal Reserve to prevent the 2009 to 2015 tremendous increase in open-market purchases from producing runaway inflation.

It is readily apparent from Figure 6 that the period before the September 2008 financial crisis is characterized by the Federal Reserve substituting investments in private markets for its Treasury securities holdings. Then, as detailed in Figure 2, the September 2008 financial crisis saw a gigantic increase in Federal Reserve actions to ensure that financial markets could meet the public's demand for cash. In fact, it was not until February 2009 that the Federal Reserve began restoring its securities holdings. Then, in just over a year, the Federal Reserve increased its securities holdings from \$500 billion to \$2 trillion! Then two more surges of securities acquisitions increased Federal Reserve securities holdings to their close of 2014 level of \$4.23 trillion.

The debt issued by the Federal Reserve was in the form of setting an interest rate that they pay banks for holding reserves. The banks are free to choose the quantity of this special Federal Reserve debt. That decision depends on the level of market interest rates relative to the IORB. Importantly, since bank reserves are Federal Reserve created monetary wealth-in-waiting, the payment of interest on reserves allows the Federal Reserve to control the rate of increase in its creation of monetary wealth.

Figure 7 shows the effect of the difference between an important market interest rate, the rate on 1-year Treasuries, and the IORB. The period of most rapid growth in bank reserves, from \$1 trillion in early 2011 to over \$2.5 trillion in late 2014 was characterized by the IORB exceeding the 1-year Treasury rate. It is clear from the Figure that member banks respond to the returns from market investments relative to investing in reserves. From a monetary policy perspective, the movement to reserves reduces the level of Federal Reserve-created monetary wealth.

Figure 7. 1yr Treasury - IORB Spread and Reserves
February 2009 - December 2014, \$Billions



Despite the massive Federal Reserve Great Recession open market securities purchases, inflation rates never even reached the Federal Reserve 2% inflation target. The reason is easily seen in Figure 7, as member bank reserves during this period rose from virtually zero to over \$2 trillion. As a result, the over 30% annual growth rate of Federal Reserve assets was converted into a 4% annual growth rate in Federal Reserve net assets. While the tremendous pressure on the Federal Reserve to support the huge federal deficit could have resulted in significant inflation, the ability of the Federal Reserve to offset the asset growth by issuing its own debt absorbed the wealth effect of much of the asset growth.

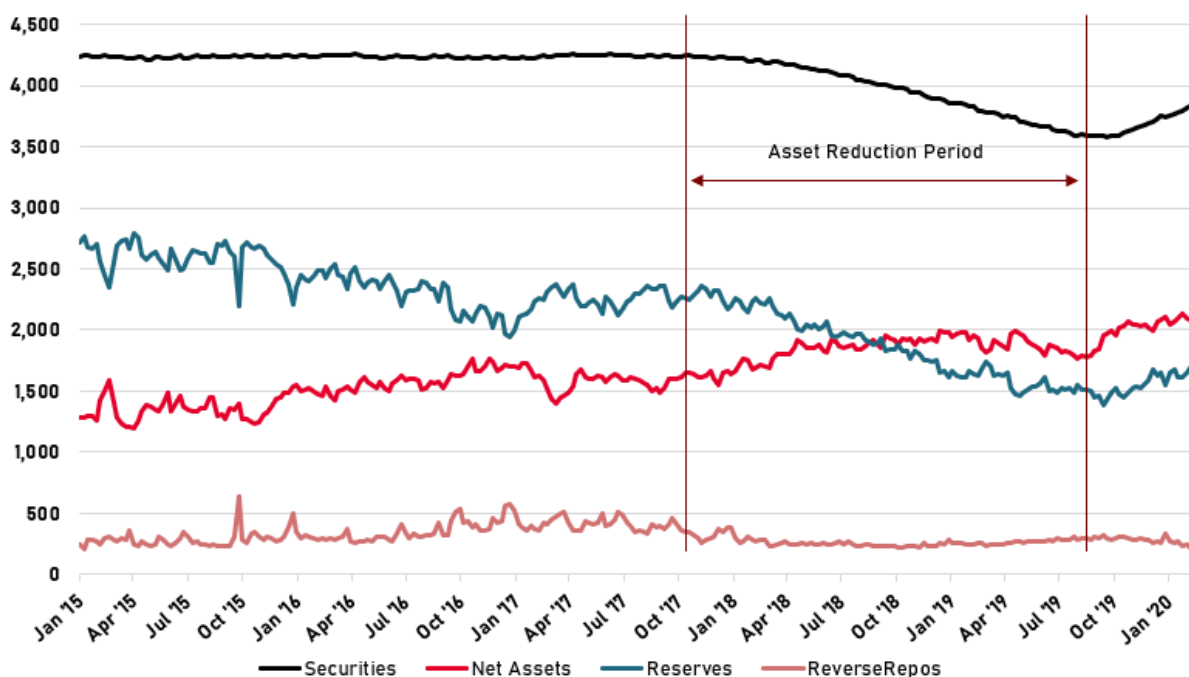
THE GREAT RESET

Federal Reserve securities holdings peaked at the close of 2014 at \$4.2 trillion- an amazing increase of \$3.5 trillion from the January 2008 level of \$700 billion. Securities holdings remained constant from the beginning of 2015 until late 2017. Then, the Federal Reserve decided that in November 2017, they would begin reducing securities holdings to reach a more traditional level relative to the nation's GDP. But how were they to do that and maintain a monetary wealth growth rate of 4%? Once again, it is interest on reserves to the rescue. By reducing the interest on reserves relative to market interest rates enough so that banks would reduce their reserve

holdings by more than Federal Reserve securities sales, Federal Reserve net assets could rise at the desired 4% annual rate.

Figure 8 shows the path of Federal Reserve total securities holdings, reverse repos, bank reserves and net assets (securities holdings net of the level of reverse repos and bank reserves), for the period from January 2015 through January 2020. The period of constant securities holdings is readily apparent. What is also apparent is that during that same period, Federal Reserve net assets rose as bank reserves fell. Now we begin the securities reduction period. What was necessary for net assets to rise during this period was for reserves to fall more than securities sales. That is exactly what happened, at least until January 2019, when bank reserves stopped falling. As securities sales continued, Federal Reserve net assets stopped rising and then actually began to fall. Finally, in August 2019, the Federal Reserve abandoned the securities reduction program and began to add securities to restore net asset growth.

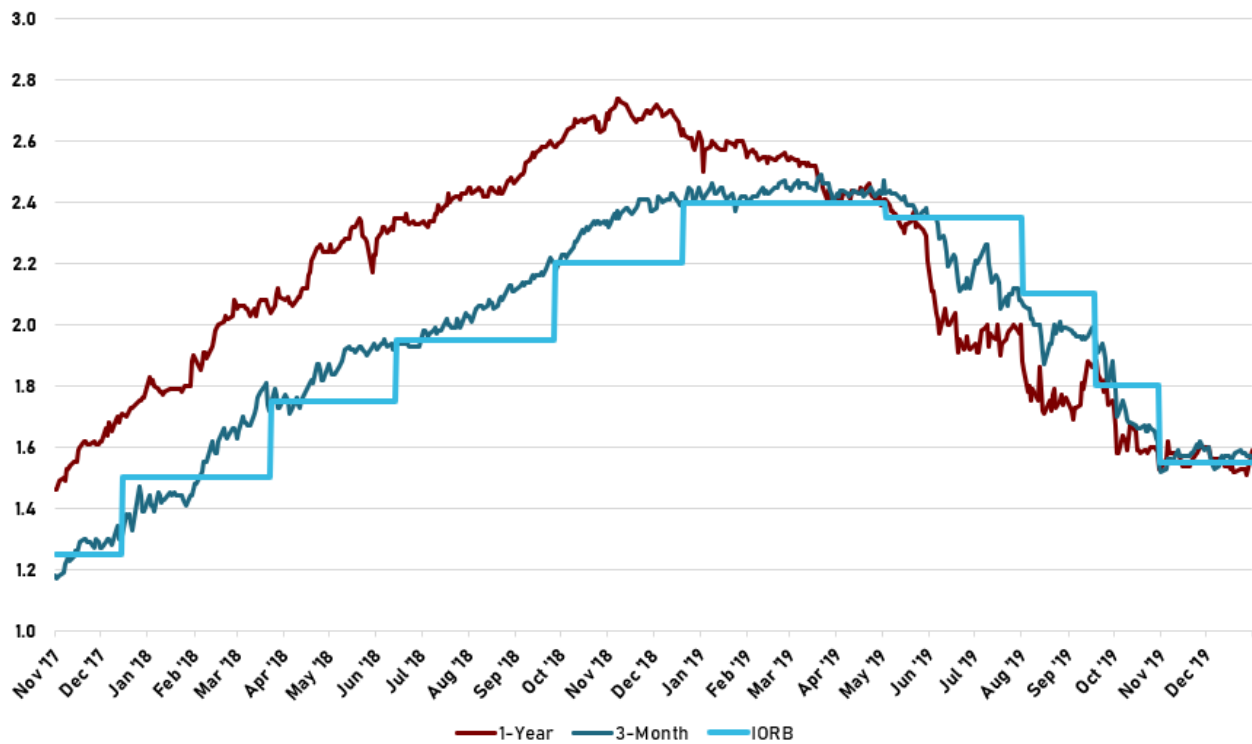
Figure 8. Federal Reserve Net Assets
January 1, 2015 – February 26, 2020, \$Billions



What happened that caused a successful asset reduction program to fail as we entered 2019? Bear in mind that the success of the asset reduction program depended on the Federal Reserve maintaining the difference between market interest rates and the IORB so that bank reserves would fall faster than asset reductions. The cause of the asset reduction program failure is easily seen in Figure 9 which shows the path of 1-year and 3-month Treasuries and the IORB. For the first year of the program, market interest rates were on the rise and had doubled by November 2018. The Federal Reserve followed these rising market rates up by increasing the IORB to maintain a relatively constant market advantage. But in November 2018, 1-year Treasury interest rates peaked and began a rapid decline and 3-month Treasury rates stagnated. Despite falling market interest rates, the Federal Reserve continued raising the IORB and the rate of

decline in bank reserves fell. By the spring of 2019, both 1-year and 3-month Treasury interest rates were in a rapid decline. Finally in May 2019, the Federal Reserve responded with a 5 basis point reduction in the IORB. By that time, the 1-year Treasury interest rate had fallen 32 basis points. The following reductions in the IORB failed to keep up with the market interest rate decline and the IORB rose above market interest rates.

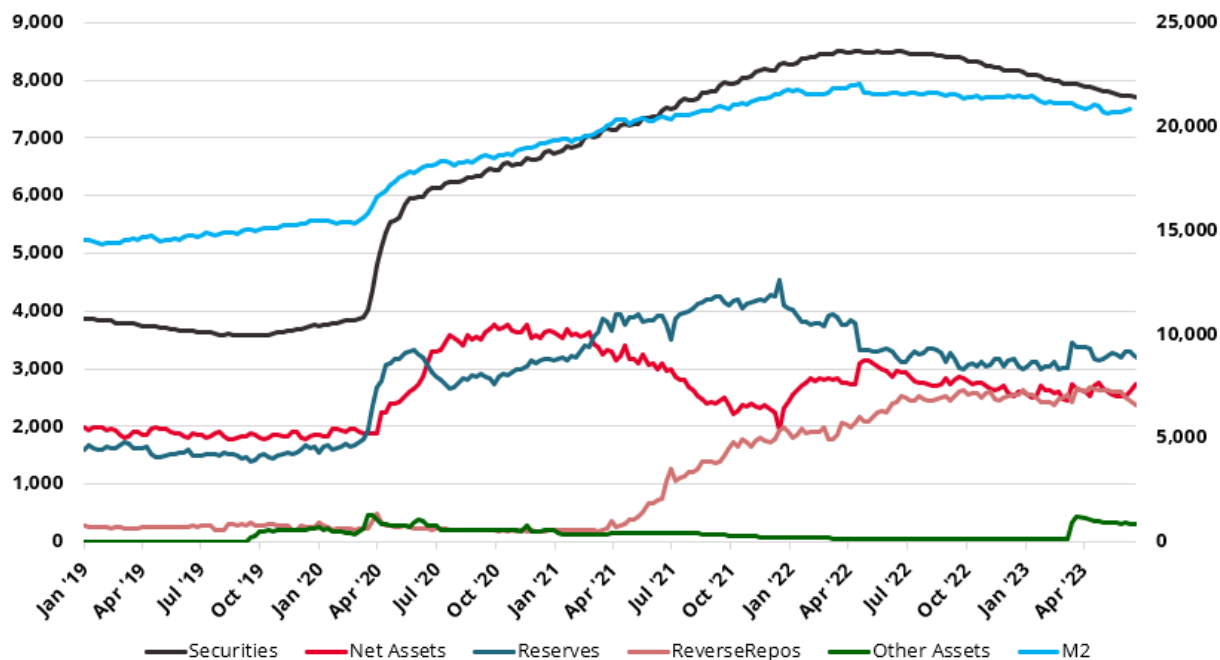
Figure 9. 1yr Treasury and 3mth Treasury Interest Rates and IORB
November 1, 2017 to December 31, 2019



THE COVID-19 PANDEMIC ERA

Figure 6 showed that for the 2008-2015 Great Recession expansion, the Federal Reserve was able to achieve the level of net asset growth consistent with little inflation. But a much bigger challenge was just around the corner with the Covid pandemic in fiscal year 2020. Figure 10 shows the path of Federal Reserve assets (holdings of securities, loans and investments), Federal Reserve liabilities (bank reserves and reverse repos), and Federal Reserve net assets from January 1, 2020 to June 14, 2023. Beginning in April 2021, Federal Reserve reverse repos became a major source of the Federal Reserve’s control of its net assets. The Federal Reserve can determine both the IORB and the ON RRP but not how banks and ON RRP counterparties respond to these rates. These decisions play a major role in determining Federal Reserve net assets. The period covered in Figure 10 allows for discussion of aspects of the Federal Reserve’s ability to control the inflation aspects of its Covid pandemic massive wealth injections.

Figure 10. M2 and Federal Reserve Net Assets
January 2019 – June 21, 2023, \$Billions



The tremendous pandemic expansion in net assets is readily apparent in Figure 10. The expansion began in March 2020 and in just three months, the Federal Reserve added over \$2 trillion to its securities holdings, a more than 50% increase. In those same three months, bank reserves rose by \$1.5 trillion resulting in an increase in Federal Reserve net assets of just over \$0.5 trillion, a 25% increase. In all, Federal Reserve net assets more than doubled from the beginning of the Pandemic expansion until reaching \$3.7 trillion in November 2020.

Furthermore, in the first year of the asset expansion, the M2 money stock rose 29.3%! Then in the next year as the asset expansion continued, the M2 grew another 10%. As the economy began to return to something like normalcy, the financial system where the proceeds of the Federal Reserve asset expansion initially resided would have begun the normal monetary expansion associated with an influx of reserves.

Before the Federal Reserve had liabilities, this massive injection of monetary wealth would ultimately have resulted in never-before-seen rates of inflation. But the Federal Reserve can control the level of financial institutions money expansion with the payment of interest on member bank reserves and the first major use of Federal Reserve overnight borrowings from non-bank financial institutions, reverse repos. In fact, from May 2021 to December 2021, reverse repo transactions rose from \$388 billion to \$1.92 trillion and reached \$2.6 trillion in June 2023.

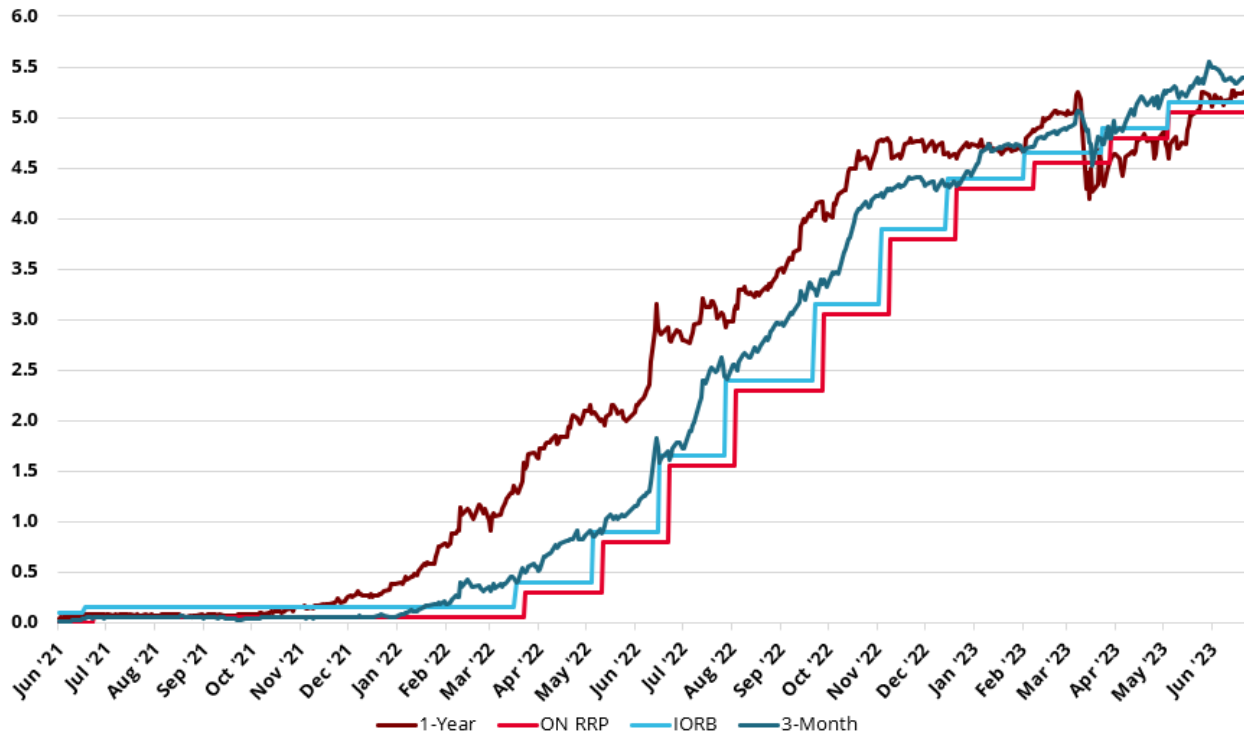
The combination of the reverse repo transactions and rising bank reserve holdings allowed Federal Reserve net assets to fall to their pre-pandemic level. For the 21-month period from the beginning of the pandemic to December 2021, Federal Reserve net assets grew at an annual growth rate of less than 1%, much less than would be consistent with the long-run 2% Federal Reserve inflation target. That net asset reduction ended at the close of 2021 and Federal Reserve

net assets rose as the spread between rising market interest rates and the IORB resulted in falling bank reserves. To stem the effect of the continued market advantage-induced falling reserves on Federal Reserve net assets, in April 2022, the Federal Reserve increased reverse repos and actual securities sales. As a result, Federal Reserve net assets fell \$500 billion from their end of April 2022 level of \$3.149 trillion to a May 31, 2023 level of just under \$2.6 trillion.

By controlling the level of its net assets, the Federal Reserve is controlling the growth in M2 – which has been falling since April 2022. That said, however, the level of M2 in May 2023 is still 32% above its level before the massive Federal Reserve asset expansion, an annual rate of growth just under 10%. Beginning in January 2022, the Federal Reserve began a series of what the press and the Federal Reserve Chairman termed “interest rate increases.” The reason given to the press was that these increases were necessary to fight inflation. In a sense, that explanation was right on the money as the interest rate reported, at least in the press, was the upper bound target for the Fed Funds rate, but just below that rate was the interest rate on bank reserve balances, the IORB. Unreported to the press was that both the IORB and the overnight offer rate on reverse repos, ON RRP, were following market interest rates up to control the growth in M2.

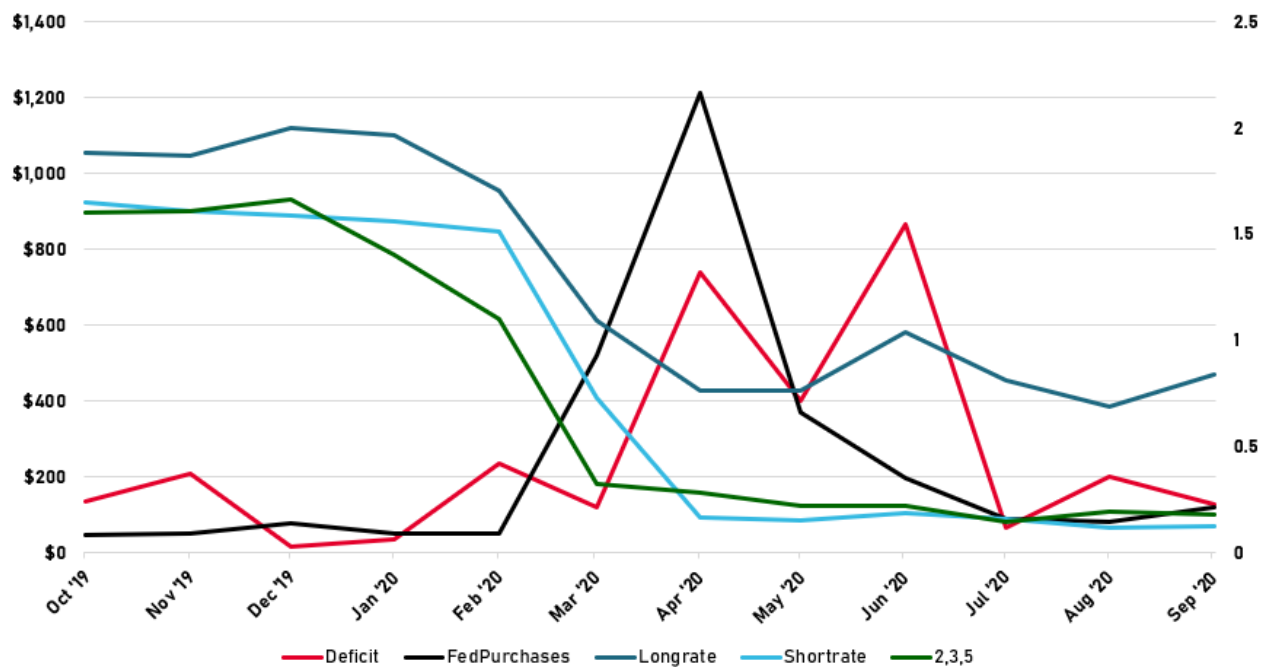
Figure 11 shows these two important rates, with the interest rate on 1-year Treasuries for comparison, for the period June 21, 2021 through June 21, 2023. It is readily apparent that both of these critical monetary policy rates track one another and market interest rates. In this new world of Federal Reserve liabilities, perhaps the most important elements in determining the level of Federal Reserve net assets and M2 are the level of their liabilities, bank reserves and reverse repos. As we entered 2020, bank reserves were still over \$1.5 trillion. On the bank reserve side, banks are free to choose the level of investment in Federal Reserve liabilities and that decision depends on a bank’s market alternatives. The same is true for the reverse repo counterparties as they compare the Federal Reserve award rate with their market alternatives. In this new environment, ensuring net asset growth of 2% above real GDP growth to achieve the Federal Reserve’s 2% inflation goal requires constant vigilance. Thus, in characterizing the increases in their announced interest rate increases as necessary to fight inflation, Chairman Powell was indeed correct as they were necessary to prevent the financial institutions from expanding M2 by paying them to either hold reserves, the member banks, or lend reserves to the Federal Reserve, the non-bank financial institutions.

Figure 11. 1yr Treasury, ON RRP Rate and IORB
June 1, 2021 - June 21, 2023



There is a major caveat in the above discussion of Federal Reserve net assets as it treats the value of securities holdings at their acquisition price and not current market value. In a sense then, if Figure 11 above applied to the failed Silicon Valley Bank, it would not have shown its true value. But a mark-to-market value of securities holdings would and did reveal all. Most of the Federal Reserve 2020 Treasury securities expansion came at historic high prices and resulting low yields for Treasuries. In fact, as Figure 12 shows, the Federal Reserve is responsible for the 2020 Treasuries price surge. In March, April and May of 2020, the Federal Reserve bought \$2.1 trillion in Treasuries. Such a surge in demand for any product or security would result in a surge in prices and in the case of securities, a fall in their yield, the interest rate. The Federal Reserve, with control of the money printing press, can affect the price of securities by buying a large enough share of the market.

Figure 12. Fiscal 2020 Monthly Treasury Deficits and Federal Reserve Treasury Purchases
\$Billions



The Federal Reserve continued to add to its Treasury holdings at these peak prices through all of 2021, buying a total of another \$1 trillion in Treasuries. Overall, almost 60% of Federal Reserve Treasury holdings were purchased at peak prices for Treasuries. Just consider the 10-year Treasury prices depicted in Figure 4. Over the period beginning in January 2022, 10-year Treasuries lost just over 20% of their value. Overall, Federal Reserve Treasury holdings are worth when marked-to-market less than 90% of their purchase cost.

But that is not the entire problem, as 46% of the Federal Reserve’s \$2.6 trillion Mortgage-Backed Securities (MBSs) portfolio was purchased at the peak prices for MBSs. Thus, just as with Federal Reserve Treasury holdings, the mark-to-market value of Federal Reserve MBSs have fallen 15% from their purchase period prices.

Figure 13 is similar to Figure 9 above but emphasizes the IORB as it relates to both the 1-year and 3-month Treasuries. For the first 3 months of 2022, the interest rate on bank reserves remained at 15 basis points, 0.15%. In those same three months, the interest rate on 3-month Treasuries rose from 6 basis points, 0.06%, to 46 basis points, 0.46%, and the 1-year Treasury rate rose from 39 basis points, 0.39%, to 128 basis points, 1.28%. Thus, banks moving out of reserves would gain 30 basis points with 3-month Treasuries or 113 basis points with 1-year Treasuries. During that same period, bank reserves fell by half a trillion dollars and Federal Reserve net assets rose by \$442 Billion. But then the banking crisis resulted in rapidly falling interest rates that the Federal Reserve ignored when it raised the IORB by 25 basis points to 4.9% and then to 5.15%.

Figure 13. 3mo, 1yr Treasury and IORB
December 1, 2021 to May 25, 2023

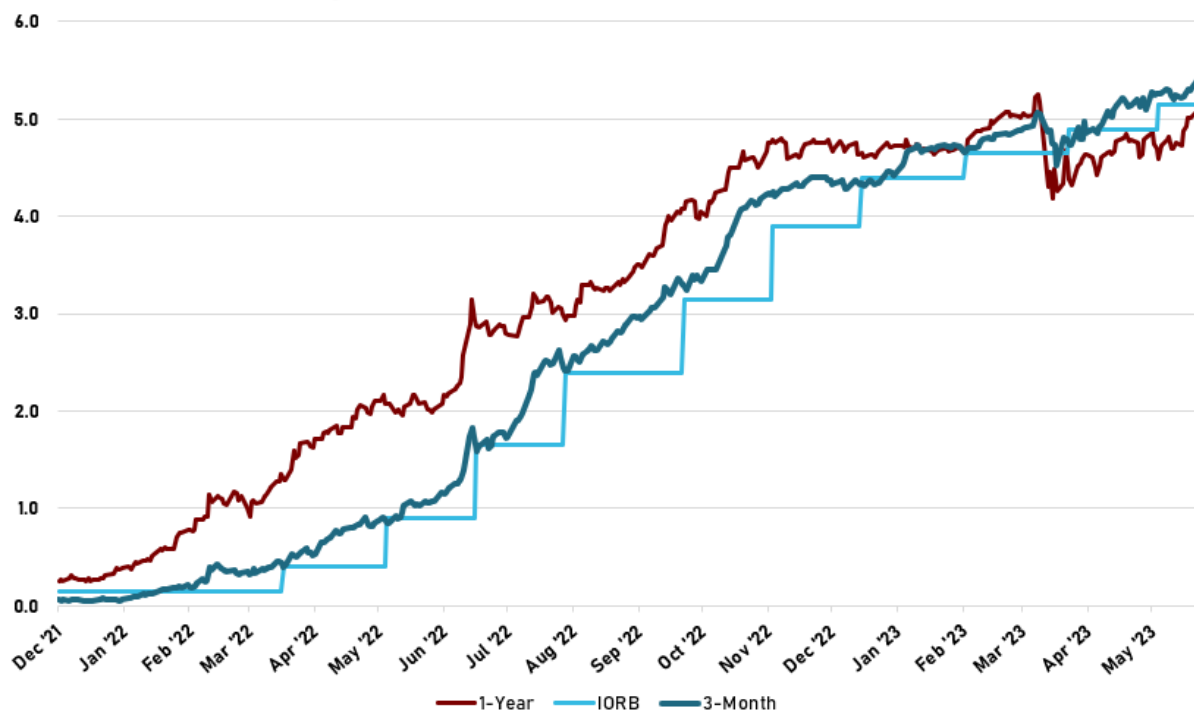


Figure 13 shows that beginning in November 2022, the steady rise in interest rates ceased and as of May 2023, has not rebounded. In fact, at least for 1-year Treasuries, interest rates have fallen rapidly, perhaps partially in response of the banking crisis as the public seeks safer assets. This has increased the demand for Treasuries, raising the price of Treasuries and lowering interest rates. With the current combination of steady market interest rates and a higher interest rate on bank reserves, we should expect bank reserves to begin to rise and Federal Reserve net assets to fall. If the Federal Reserve’s goal is still 2% inflation, then it should get its net asset growth to a level consistent with its inflation goal. If that inflation goal remains 2% then net asset growth goal should be 2 percentage points above the growth of real GDP.

Assuming, generously, that real GDP growth is 2%, the challenge is to use the combination of borrowings from the non-bank financial sector, reverse repos, and actual securities sales on the asset side and the difference between market interest rates and the interest rate on reserves to maintain 4% annual growth in Federal Reserve net assets. As of April 12, 2023, bank reserves were \$3.35 trillion, reverse repos were \$2.68 trillion and Federal Reserve net assets were \$2.53 trillion. Achieving the desired 4% growth in the \$2.53 level of net assets requires additional net assets in the next year of \$108 billion. This increase is achievable by a 3.6% reduction in the over \$3 trillion bank reserves or a 4.5% reduction in the over \$2.5 trillion level of reverse repos.

AN INCOME STATEMENT VERSION OF FEDERAL RESERVE PANDEMIC ACTIONS

For commercial banks such as Silicon Valley, the yield on their assets is fixed and their liabilities, deposits, require interest payments that move with market interest rates. In order to keep depositors as market interest rates rise, they must use capital to cover flow losses. Clearly, the capital required to match the tremendous flow of losses was not available to Silicon Valley Bank. But what about the Federal Reserve? In order to prevent the massive asset expansion of 2020-2021 from entering the economy and causing massive inflation, the Federal Reserve paid banks to keep a part of the expansion as reserves. But part of the expansion wound up in other non-bank financial institutions such as money market funds. Here, the Federal Reserve borrows reserves from these institutions at the reverse repo rate to prevent them from investing in the economy.

Both Federal Reserve issued bonds, bank reserves, and Federal Reserve borrowings from non-bank financial institutions are Federal Reserve liabilities. The total of these Federal Reserve liabilities on June 21, 2023 was \$5.57 trillion. The bank reserve portion, \$3.2 trillion, costs the Federal Reserve the IORB rate of 5.15%, \$165 billion annually. The reverse repo portion of total liabilities, \$2.37 trillion, costs the Federal Reserve the ON RRP rate of 5.05%, \$119.7 billion annually. Thus, Federal Reserve liabilities at current IORB and ON RRP rates imply an annual cost of \$284.7 billion.

On the asset side, Federal Reserve securities held outright on an acquisition cost basis were \$7.701 trillion on June 21, 2023. The Treasury securities portion was \$5.146 trillion, and the MBS share was \$2.576 trillion. The share of the Treasury portfolio purchased prior to 2020, \$2.553 trillion, was acquired when 20-year Treasury interest rates, for example, averaged 3.5%, or an annual income of \$86.59 billion. The \$2.73 trillion of Treasuries purchased since February of 2020 have yields at or below 1.5%. Using 1.5% for this \$2.73 trillion of Treasuries implies an annual income of \$40.94 billion. Thus, the Treasuries portion of Federal Reserve securities holdings is yielding \$127.5 billion annually.¹²

The Federal Reserve's MBS holdings were \$1.371 trillion at the end of February 2020. During the period from the beginning of Federal Reserve purchases of MBS to February 2020, mortgage rates hovered about 4%, which suggests an annual income of \$54.9 billion. The \$1.2 trillion of MBS purchased since February 2020 had higher prices and lower yields that approximated 3%, implying an annual income of \$36.1 billion. Total Federal Reserve MBS annual income is no more than \$91 billion.

The total Federal Reserve annual income from its holdings of securities is \$218.5 billion. Federal Reserve liabilities cost, on an annual basis, \$284.7 billion. Thus, before any other consideration, the Federal Reserve is losing just over \$76 billion a year.

¹² It makes sense to estimate the earnings of the Federal Reserve Treasury holdings in this manner as all Treasury Notes and Bonds, 2, 3, 5, 7, 10, 20, and 30 year maturities, pay interest twice a year at the rate that was established in the original bid auction. Treasury Bills, 4, 8, 13, 17, 26, and 52 week maturities, pay the bid auction interest when the Bills mature.

But the Federal Reserve has other income earning assets that during the period of financial stress related to the Pandemic are significant.¹³ The mid-May 2023 level of these assets was \$350 billion. Assuming these assets earn market short rates of interest that for 1-month Treasuries on May 18, 2023 was 5.59%, the monthly non-securities Federal Reserve investments would yield \$1.65 billion per month. Thus, adjusting for the income other Federal Reserve earning assets still leaves the Federal Reserve with monthly loss of just over \$60 billion annually. Clearly, the long history of Federal Reserve transfers of revenue over cost to the Treasury is over. In fiscal year 2020 the Federal Reserve transferred \$88.8 billion to the Treasury. That amount covered just over 25% of the net interest cost of the federal debt.

If the Federal Reserve was a regular commercial bank, any monthly losses would have to be covered by bank capital. Obviously, at \$6 billion a month, all pre-loss capital would quickly be gone, and the bank would be bankrupt. But the Federal Reserve is not a regular commercial bank. In fact, because the Federal Reserve has exclusive title to the official money printing press, it has, in effect, infinite capital. Thus, the Federal Reserve is printing the equivalent of \$6 billion new dollars a month.

RESERVES AND REVERSE REPOS: MONETARY WEALTH IN WAITING

In a sense, bank reserves and reverse repo borrowings are monetary wealth in waiting. Both represent reductions in the Federal Reserve transfers to the Treasury on which the net benefit to the public of Federal Reserve securities purchases is based. For example, in fiscal year 2022, the Federal Reserve had a total interest expense of \$102.4 billion. An increase of \$96.6 billion from 2021 total interest expense of \$5.7 billion. \$55.1 billion pertained to interest expense on Reserve Balances held by depository institutions and \$41.5 billion related to interest on Federal Reserve borrowings from non-bank financial institutions. Both bank reserves and reverse repo borrowings reduce the price level effect of Federal Reserve pandemic asset purchases.¹⁴ Additionally, the Congressional Budget Office now predicts that transfers from the Federal Reserve Banks to the Treasury (\$107 billion in 2022) will fall to \$1 billion in 2023 and not reach even double digits again until 2027.¹⁵ If the Federal Reserve was a private bank, it would be bankrupt. How did we get to this point?

The tremendous increase in Federal Reserve reverse repo borrowings from \$151 billion in April 2021 to \$1.92 trillion in December 2021 is what allowed the Federal Reserve to eliminate the potential inflationary effect of its huge pandemic securities purchases. In March 2023, the Federal Reserve had more than \$5.5 trillion of monetary wealth in waiting, comprised of \$3.0 trillion in bank reserves and \$2.56 trillion in reverse repos. Given the March 2023 level of Federal Reserve net assets, its' created monetary wealth is \$2.44 trillion, there is a tremendous

¹³ These assets include loans, repos and three special facilities. Municipal Liquidity Facility LLC (MLF), the Term-Asset-Backed Loan Facility (TALF II LLC), the MS Facilities LLC, Main Street Lending Program The three special facilities are co-owned by the Treasury.

¹⁴ See <https://www.federalreserve.gov/newsevents/pressreleases/other20230113a.htm>.

¹⁵ See <https://www.cbo.gov/system/files/2023-02/58848-Outlook.pdf>, page 25.

overhang of potential monetary wealth. Achieving the desired 4% annual growth in net assets will require a release of \$97.6 billion from the combination of bank reserves or reverse repos.

Releasing the monetary wealth in bank reserves requires that the Federal Reserve set the interest rate it pays on bank reserve relative to market interest rates so that banks will reduce reserves. Setting the interest on reserves so that reserves fall just enough to achieve the March 2024 \$2,537.6 trillion would make March 2024 reserves \$2.462 trillion. To achieve the desired 4% annual net asset growth, it will take just over 20 years just to eliminate bank reserves. Clearly, the Federal Reserve has its work cut out for it to avoid the potential inflation of its tremendous pandemic asset growth. However, the Federal Reserve has shown through its actions since mid-2021 that it is capable of controlling the inflationary impact of its asset accumulation strategy with its bank reserve and reverse repo policies.

CONCLUSION

The title of this piece implies that there is something unique about moving into the 21st century that affects Federal Reserve monetary policy. In one sense at least, maintaining an elastic currency while the 21st century has presented many incidents of financial market stress that required Federal Reserve actions. The 21st century elastic currency crises were no different than similar financial issues in the 20th century. But when we come to the Federal Reserve's role in maintaining maximum employment, stable prices and moderate long-term interest rates it has 2 new tools that began in the 21st century.

The first new tool, actually approved at the close of the 20th century, was the introduction of the overnight reverse repurchase tool that allows the Federal Reserve to offer approved non-bank financial firms a return for lending their reserves to the Federal Reserve. The second new tool was allowing the Federal Reserve to pay member banks interest on their reserve holdings.

The first extensive use of either of these was in the Great Recession that began in December of 2007 coupled with the September 2008 financial crisis led to the introduction of the payment of interest on bank reserves. But it was not the financial crisis that required either new tool as the usual elastic currency tools were all that were required. It was the largest expansion of Federal Reserve securities holdings in the history of monetary policy and began in the Spring of 2009. Before the recession, Federal Reserve securities holdings were \$700 billion, just less than 5% of 2007 GDP. By the close of 2014 Federal Reserve securities holdings were \$4.2 trillion, almost 25% of 2014 GDP!

What prevented that massive expansion of Federal Reserve assets from causing an equal expansion in inflation? By the close of 2014, bank reserves were \$2.57 trillion. In fact, before the payment of interest on reserves, bank reserves in excess of the level required by the Federal Reserve were virtually zero. As a result, Federal Reserve net assets at the close of 2014 were only \$1.2 trillion, up only \$389 billion from the \$801 billion level at the beginning of 2008. For the entire seven years of the Federal Reserve expansion, inflation only reached the 2% Federal Reserve target once and was less than 1% for all the other years.

But then the expansion in the first three months of the Pandemic, March, April and May of 2020, was over \$2.1 trillion. That expansion continued throughout 2020 and 2021 for an additional \$2.3 trillion. At the close of 2021, Federal Reserve securities holdings were 35.5% of GDP. As the economy began its recovery from all the Pandemic restrictions, the issue for the Federal Reserve was how to prevent the massive monetary injection from an equal massive inflation. The proceeds of the massive 2020, 2021 securities purchases reside in member banks and other financial institutions.

The challenge was to prevent these institutions from investing in the economy and further increase the already large increase in the M2 money supply. The answer for member banks was the same as in the 2008 episode, pay the banks to hold the reserves rather than invest them in the economy. The answer for the non-member financial institutions was to borrow from them at an offer interest rate. An unanticipated downside to this approach was that while in the 2008–2014 episode, market interest rates remained low so that a 25 basis point interest rate on reserve balance was all that was required, the rapidly rising market interest rates beginning in December 2021 proved to be another matter.

Throughout 2022 and 2023, the Federal Reserve continued to increase the interest rate it paid on reserves and the rate it offered to other financial institutions to lend their reserves to the Federal Reserve rather than invest them in the economy to prevent the massive asset expansion from resulting in an equivalent inflation. As we now understand, while the Federal Reserve Chairman's pronouncements were that they were raising interest to fight inflation, the truth of the matter is, while they were fighting inflation, they were doing so by paying financial institutions not to invest in the economy. Clearly, this approach has succeeded since the beginning of 2022 the M2 money stock stabilized and is currently in decline, although still well above its pre-expansion level.

The only downside of steps necessary to prevent the Federal Reserve's massive asset expansion from resulting in an equivalent inflation is that its payments to the financial institutions exceeds its revenue from its assets. The Federal Reserve is losing \$5 billion a month, so that their annual transfers of \$50 to \$90 billion to the Treasury will cease, at least for now.