

Money Aggregates, Debt, Pent-Up Demand, and Inflation: Evidence from WWII

Federico S. Mandelman

Federal Reserve Bank of Atlanta

Summary:

The COVID-19 pandemic produced a massive decline in U.S. consumption in 2020 and swift fiscal and monetary policy responses. After growing at a rather steady 5 percent rate for decades, the money supply (M2) increased 25 percent over the past year alongside unprecedented fiscal support, raising some inflation concerns. Concurrent with the reopening of the economy as vaccines roll out, this article derives some lessons from the U.S. experience during and after WWII. The debt-to-GDP ratio increased from 40 percent to 110 percent because of the war effort. Most of it was financed by Fed debt purchases, through a de facto yield curve control that held down short-and long-term interest rates. The money supply doubled in size, but inflation was muted during the conflict as private consumption demand was severely restrained: factories were fully devoted to the rearmament effort, food was rationed, and residential construction was practically prohibited. Households' saving boomed as a result. After the war, swift pent-up consumption demand culminated in a short-lived spike in inflation from 2 percent to 20 percent in 1946–47, which quickly returned to 2 percent in 1949. Contractionary monetary and fiscal policies, along well-anchored low inflation expectations inherited from the Great Depression, appeared to have contributed to rapid disinflation. I also discuss the experiences of Japan and Europe in recent decades.

Key findings:

1. The money supply has increased 25 percent in 2020, raising some inflationary concerns. This article derives lessons from the U.S. experience during and after WWII.
2. The war effort caused the U.S. debt-to-GDP ratio to increase from 40 percent to 110 percent, most of it financed by Fed treasury bond purchases. The money supply doubled as a result, but inflation was muted, with households mostly saving this windfall. Consumption demand was suppressed as factories were devoted to the rearmament effort, food was rationed, and private construction was halted.
3. Once the war ended, pent-up consumption demand led to the inflation rate spiking from 2 percent to 20 percent in 1946–47. However, it quickly stabilized in 1949, amid contractionary policies and well-anchored inflation expectations inherited from the Great Depression.

Center affiliation: Center for Quantitative Economic Research

JEL classification: E19, I19

Key words: Money aggregates, inflation, World War II, pent-up demand, COVID-19

<https://doi.org/10.29338/ph2021-04>

**CENTER FOR QUANTITATIVE
ECONOMIC RESEARCH**

CENTER FOR HUMAN
CAPITAL STUDIES

CENTER FOR FINANCIAL
INNOVATION AND STABILITY

CENTER FOR HOUSING
AND POLICY

ECONOMIC RESEARCH
SURVEY CENTER

AMERICAS CENTER



**Federal Reserve
Bank of Atlanta**

The Federal Reserve Bank of
Atlanta's *Policy Hub*

leverages the expertise of Atlanta Fed
economists and researchers to address
issues of broad policy interest.

Our research centers coordinate this work
and seek to influence policy discussions.

Areas of interest include: forecasting,
fiscal policy, and macroeconomics
(Center for Quantitative Economic
Research); financial stability, innovation,
and regulation (Center for Financial
Innovation and Stability); human
capital, labor markets, health, and
education (Center for Human Capital
Studies); and government-sponsored
entity reform, mortgage markets, and
affordable housing (Center for Housing
and Policy). Sign up for email updates at
[frbatlanta.org/research/publications/
policy-hub](https://frbatlanta.org/research/publications/policy-hub).

Money Aggregates, Debt, Pent-Up Demand, and Inflation: Evidence from WWII

Summary: The COVID-19 pandemic produced a massive decline in U.S. consumption in 2020 and swift fiscal and monetary responses. After growing at a rather steady 5 percent rate for decades, the money supply (M2) increased 25 percent over the past year alongside unprecedented fiscal support, raising some inflationary concerns. Concurrent with the reopening of the economy as vaccines roll out, this article derives some lessons from the U.S. experience during and after WWII. The debt-to-GDP ratio increased from 40 percent to 110 percent because of the war effort. Most of it was financed by Fed debt purchases, through a de facto yield curve control that held down short- and long-term interest rates. The money supply doubled in size, but inflation was muted during the conflict as private consumption demand was severely restrained. Private consumption was suppressed, as factories were fully devoted to the rearmament effort, food was rationed, and construction was practically prohibited. Households' saving boomed as a result. After the war, swift pent-up consumption demand culminated in a short-lived spike in inflation from 2 percent to 20 percent in 1946–47, which quickly returned to 2 percent in 1949. Contractionary monetary and fiscal policies, along well-anchored low inflation expectations inherited from the Great Depression, appeared to have contributed to rapid disinflation. I also discuss the experiences of Japan and Europe in recent decades.

About the Author:

Federico S. Mandelman is a research economist and policy adviser at the Federal Reserve Bank of Atlanta.

Acknowledgments: The author thanks R. Anton Braun, Nikolay Gospodinov, Tom Heintjes, Ed Nosal, Will Roberds, Warren Weber, and Jon Willis for helpful comments. The views expressed here are the author's and not necessarily those of the Federal Reserve Bank of Atlanta or the Federal Reserve System. Any remaining errors are the author's responsibility.

Comments to the author are welcome at federico.mandelman@atl.frb.org.

Introduction

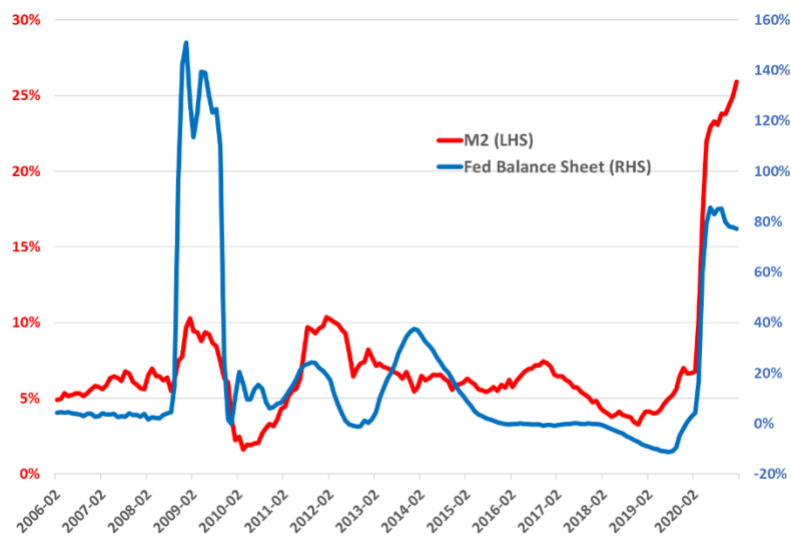
In recent years, central banks in the United States, Japan, and the eurozone responded to financial crises by greatly expanding their balance sheets. The expansion in the monetary base, however, did not result in an increase in the money supply as the private sector deleveraged and private credit steadily contracted. The COVID-19 crisis is different in this aspect, and the remarkable increase in the money supply in 2020 has recently raised some inflationary concerns.

This article discusses the U.S. experience during and after WWII and highlights some *qualitative* similarities with the COVID-19 recession. Namely, a big increase in government debt supported by a Federal Reserve commitment to keep interest rates low, which ultimately caused the money supply to double in size. A record jump in personal savings was recorded as private consumption demand was greatly constrained. Factories were entirely devoted to the rearmament effort, food was rationed, and residential construction was largely halted. Once the war ended, pent-up demand materialized, and inflation jumped from 2 percent to 20 percent, the highest increase ever recorded. However, contractionary fiscal and monetary policies combined with well-anchored inflation expectations helped the United States quickly return to low inflation with only a mild recession.

This article highlights the critical role of two variables shaping the dynamics of inflation during WWII: money velocity and fiscal deficits. The sharp decrease in velocity was a result of the consumption constraints during the war, which kept inflation at bay. Rapid recovery in velocity after the war ended explains the inflationary burst of 1945–46. With that in mind, this article discusses current developments in money velocity and consider some factors that can affect its behavior in the postpandemic recovery. Fiscal deficit projections, and potential interactions between fiscal and monetary policy, are also evaluated. I also use past experiences in Japan and Europe as guidance to analyze these policy interactions.

The Return of Money Aggregates

Closely monitored by central bankers and practitioners during the early 1980s, money supply aggregates have been largely neglected for years. They are now fashionable again for a simple reason: after increasing at a somewhat steady 5 percent annual rate for decades, M2 jumped 25 percent in 2020 (see the red line in figure 1). M2 is usually the preferred measure of money as it includes not only cash and checking accounts but also other instruments that can be quickly converted into means of payments (like savings accounts and money market mutual funds). Figure 1 also shows (using the blue line) the evolution of the Fed's balance sheet in recent years (a proxy for the monetary base). In relative terms, the percentage increase in the balance sheet now is relatively smaller than in 2008–09. So why has M2 followed such a dissimilar pattern this time? The answer requires some elaboration but, for the sake of brevity, we could just say after the 2008 crisis the Fed purchased mortgage back securities in exchange for reserves that remained parked at the Fed.

Figure 1: U.S. M2 and the Fed's Balance Sheet

Note: Data are expressed as a percentage of growth from a year ago.

Source: Board of Governors of the Federal Reserve System

Since households or firms cannot readily convert bank reserves into means of payments, those reserves are not part of M2. Most importantly, the massive increase in reserves did not lead to a burst of bank lending (or private money) once the economy recovered. Instead, in the aftermath of the housing bubble crash, households and firms focused more on repairing their financial position and deleveraging rather than taking on new loans. Banks in turn devoted themselves to writing down losses and revamping their capital ratios, effectively removing the money multiplier effect from additional reserves that commercial banks have under a fractional reserve system.

Instead, during the COVID-19 recession, the expansion in the Fed balance sheet during 2020 roughly coincided with the \$3.4 trillion relief and stimulus package that was passed by Congress that year.¹ The government programs enacted were diverse in nature (ranging from unemployment benefits to stimulus checks, health tax credits, vaccination efforts, small business aid, and direct support to state and local governments, among others) but mostly involved direct payments to beneficiaries, which had a direct correlation to the expansion of the money supply. The Fed balance sheet expansion aimed at securing proper financial market functioning involved the purchase of U.S. Treasury bond purchases—and, to a lesser extent, agency mortgage-backed securities issued by government sponsored enterprises (Fannie Mae and Freddie Mac).

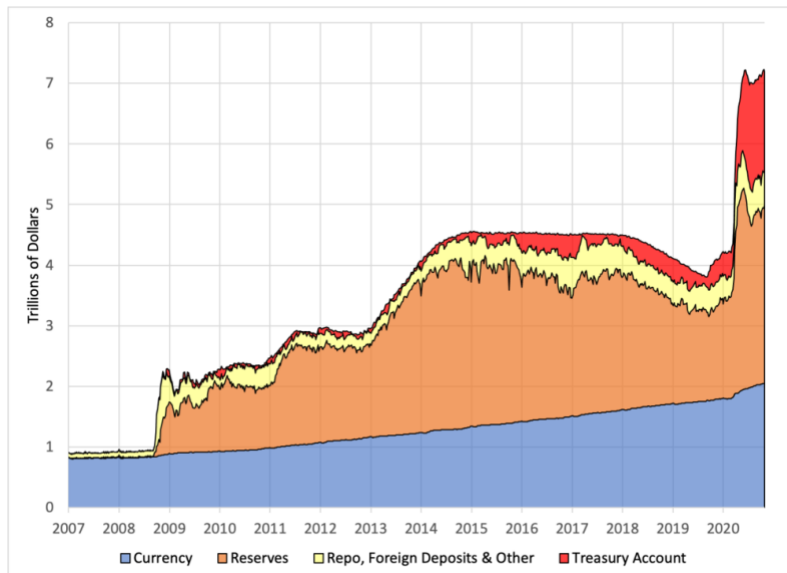
In the near term, M2 is expected to increase further. When inspecting the liability side of the Fed balance sheet, we see that one component gained particular importance in 2020: The U.S. Treasury account at the Fed (displayed in red in figure 2). The Treasury has been overfunding its spending needs by issuing securities and then depositing the excess proceeds with the Fed.² Recently, the Treasury

¹ For details, refer to <https://www.nytimes.com/interactive/2021/02/11/upshot/covid-relief-spending-per-person.html>.

² See Cecchetti and Schoensholtz's *Money and Banking* blog (November 9, 2020) for details.

started to withdraw from this account, which should lead to an additional expansion in the money supply in the coming months.³ In addition, M2 may increase further if the Fed continues with its bond-purchasing program in the future.

Figure 2: Federal Reserve's Balance Sheet Liabilities Composition



Note: Data are expressed as trillions of dollars.

Source: *Money and Banking* blog, <https://www.moneyandbanking.com/commentary/2020/11/8/the-case-of-the-treasury-account-at-the-federal-reserve> (November 9, 2020)

Money, Inflation, and Velocity

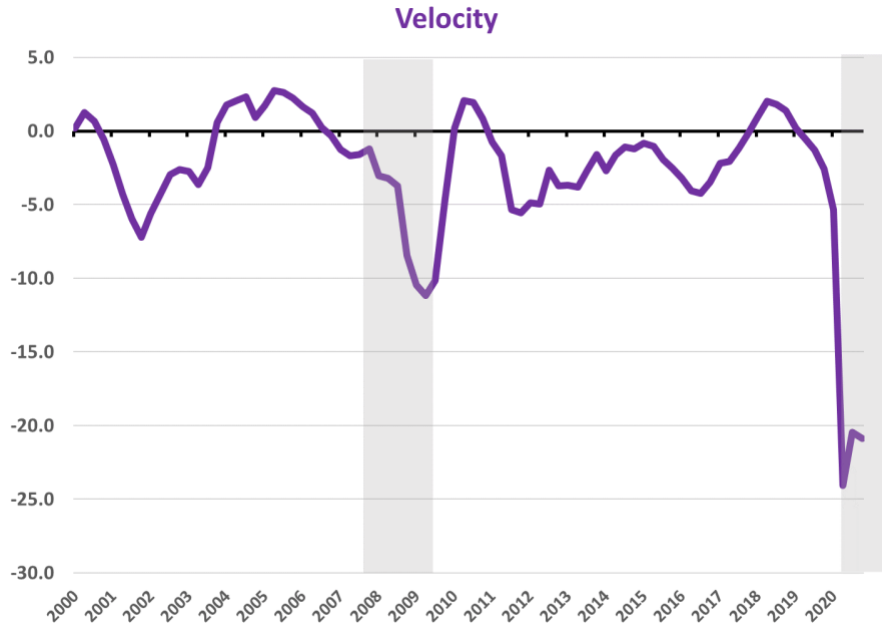
Will the expansion in the money supply lead to an acceleration in the inflation rate? A good starting point for this discussion is Milton Friedman's famous quotation: "*Inflation is always and everywhere a monetary phenomenon.*" This quotation is rooted in the classical exchange identity $M \times V \equiv P \times Y$. Where M is money supply, V is velocity, P the price level, and Y real output. Velocity is the number of time money "exchanges hands" and is inversely related to the demand for money. In other words, money circulates less frequently if agents choose to hoard money (and vice versa). Until the 1970s, velocity was remarkable stable. It was thus sensible to assume that V was constant for practical purposes. If that assumption holds, it must be the case that the percentage increase in money must roughly equate the inflation rate plus the growth in real GDP. (To see this, express the exchange identity in percentage terms.)

This time around, however, the 25 percent increase in the stock of money so far has not led to a rapid acceleration in inflation. As figure 3 shows, velocity declined by about 25 percent, practically offsetting the increase in the supply of money depicted in figure 1. Intuitively, households and firms largely stored the financial windfall. The open question is whether the fall in velocity will reverse after the economy recovers from the pandemic, as it did in the aftermath of the Great Recession. Ultimately,

³ <https://www.bloomberg.com/news/articles/2021-02-16/yellen-shift-on-vast-treasury-cash-pile-poses-problem-for-powell>

households' eagerness to spend their accumulated savings after the mobility restrictions are lifted and the employment situation normalizes will determine how velocity evolves.

Figure 3: Growth in Velocity of M2 Money Stock

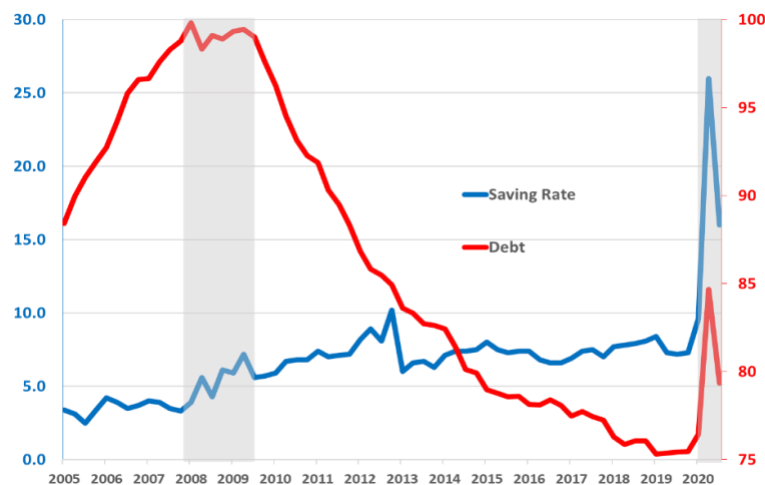


Note: Velocity is expressed as a percentage of change from a year ago.

Source: Federal Reserve Bank of St. Louis

In this context, it is worth mentioning that households on average will emerge from this recession with relatively healthy balance sheets. As figure 4 shows, the recent jump in the savings rate (expressed as a percentage of disposable income) took place after a decade of sustained deleveraging and reducing household debt. In addition, the wealth effect from booming stock and housing markets can further stimulate consumption (and investment) demand. The exit from the Great Recession was very much the opposite of this relatively benign scenario. Balance sheets were weak, and unemployment remained persistently high.

Figure 4: U.S. Households' Debt and Savings, 2005–20



Note: Household debt to GDP ratio is shown on the right-hand axis in red. Personal saving as a percentage of disposable income is shown in blue on the left-hand axis.

Source: Federal Reserve Bank of St. Louis

The Great Reflation? Reflationary and Stabilization Forces at Play

Looking ahead, we could encounter reflationary forces at play. A liberation of *repressed* consumption could lead to a stampede of demand once the vaccination campaign concludes.

One could argue that deep-pocketed households are quite eager to resume spending on restaurants, travel, entertainment, and other services that require face-to-face interactions. Moreover, precautionary savings could quickly fall after the employment picture improves with robust output growth. Supply constraints may emerge as well. For instance, some restaurants may have gone out of business, and some hotel workers industry may have already found employment in different industries. Surviving firms may choose to temporarily boost profit margins both to rapidly repair severely damaged balance sheets and to cover upfront costs needed to restart dormant operations. Supply chains may have been disrupted as well.

Counteracting stabilization forces can play a decisive role, however. For the past three decades, medium- to long-term annual inflation expectations never surpassed 3 percent in the United States. If anything, the Fed had to frequently overcome deflationary bias and repeatedly struggled to meet its 2 percent target. With well-anchored inflation expectations, agents may not validate sustained price increases even if they hold a solid financial position. Recent survey data in Armantier et al. (2021) suggest that households are in no rush to reduce their savings. Specifically, they find that the average share of stimulus payments that households set aside for consumption—or the marginal propensity to consume—declined from 29 percent in the first round, to 26 percent in the second, and then to 25 percent in the third. Uncertainty brought by the emergence of new variants of the coronavirus and sluggish labor markets amid a sizable output gap could further mute inflation. In a recent paper, Beraja and Wolf (2021) argues that pent-up demand may be strong for durables but less so for services.

It remains to be seen whether the reflationary or stabilization forces will ultimately dominate in this extraordinary event, which has little to no resemblance to past recessions. In what follows, I try to infer the inflation rate's future course by examining a historical episode that has some notable similarities with the current situation.

The Covid-19 Recession and the U.S. Economy during WWII: Some Similarities

In principle, the Spanish Flu (1918–20) seems the most appropriate laboratory for lessons on how pandemics affects the economy. But, despite the humanitarian disaster, U.S. GDP fell by just 1.5 percent (Barro et al. 2020), while mobility was barely restricted. Active fiscal or monetary policies were also practically nonexistent.⁴ Absent safety nets and advanced communications technology, leaving home for work was a necessity for most.

While completely different in nature, the U.S. involvement in WWII—initiated in December 1941—shares some similarities with the ongoing COVID-19 recession: (1) a big increase in government debt accommodated by Fed bond purchases under an explicit commitment to keep interest rates at very low levels; (2) a record jump in personal savings (with widespread rationing of consumer goods, including even food, as factories were mobilized to produce goods for the war effort); and (3) households' preference for liquidity, mirrored in a sharp decrease in money velocity, which contributed to tame wartime inflation.

The unprecedented war effort required massive borrowing, which resulted in U.S. government debt-to-GDP ratio increasing from 40 percent to 110 percent. The Federal Reserve financed most of it directly, but it also did so indirectly through the commercial bank system (as I discuss below). As Milton Friedman and Anna Schwartz put it: from the Treasury's perspective, the Fed was its "bond-selling window." To do so, the Federal Open Market Committee implemented a de facto yield curve control (YCC) rule in April 1942, keeping the rate on all Treasury securities fixed: the three-month bill at 0.375 percent, the 13-month note at 0.875 percent, the 54-month note at 1.5 percent, and long-term debt at 2.5 percent.

There was an explicit commitment to buy and sell any quantity of short-term bills. For longer-term bond maturities, no such explicit commitment existed, but the rates were tightly kept at the aforementioned levels for the duration of the war. With this YCC rule in place, the Fed lost direct control of the monetary base and was forced to create whatever quantity of high-powered money that was needed to satisfy this rule. As a result of these policies, both the monetary base and the total money supply roughly doubled in size during the four years of U.S. involvement in WWII. The Fed's holdings of government securities also grew tenfold (see figure 5).

To keep inflation at bay, the government implemented general price controls during war. Not surprisingly, a black market developed, and some prices increased in a concealed form. However, the effect of price controls was rather minor as in reality there was little that households could actually buy. Automobiles, appliances, and most consumer durables simply ceased to be produced during the war (as

⁴ Inflation was low in the decade following the Spanish Flu, its level mostly explained by the decline in the price of agricultural products, which had a heavy weight in the CPI basket at the time. Encouraged by high prices during WWI, farmers borrowed heavily to expand arable land and invest in new equipment, leading to an excess in supply after the conflict ended. Jordà, Singh, and Taylor (2020) find that the equilibrium real interest rate tends to decline and stay low after pandemics (though no expansionary fiscal and monetary policy occurred during these episodes).

factories were completely devoted to the rearmament effort). In turn, construction and private capital formation projects were prohibited or greatly restricted. Most civilians viewed food-rationing cards as a worthy sacrifice. Paradoxically, while private consumption was near subsistence levels, the war-based economy was booming and operating well beyond full-employment levels.

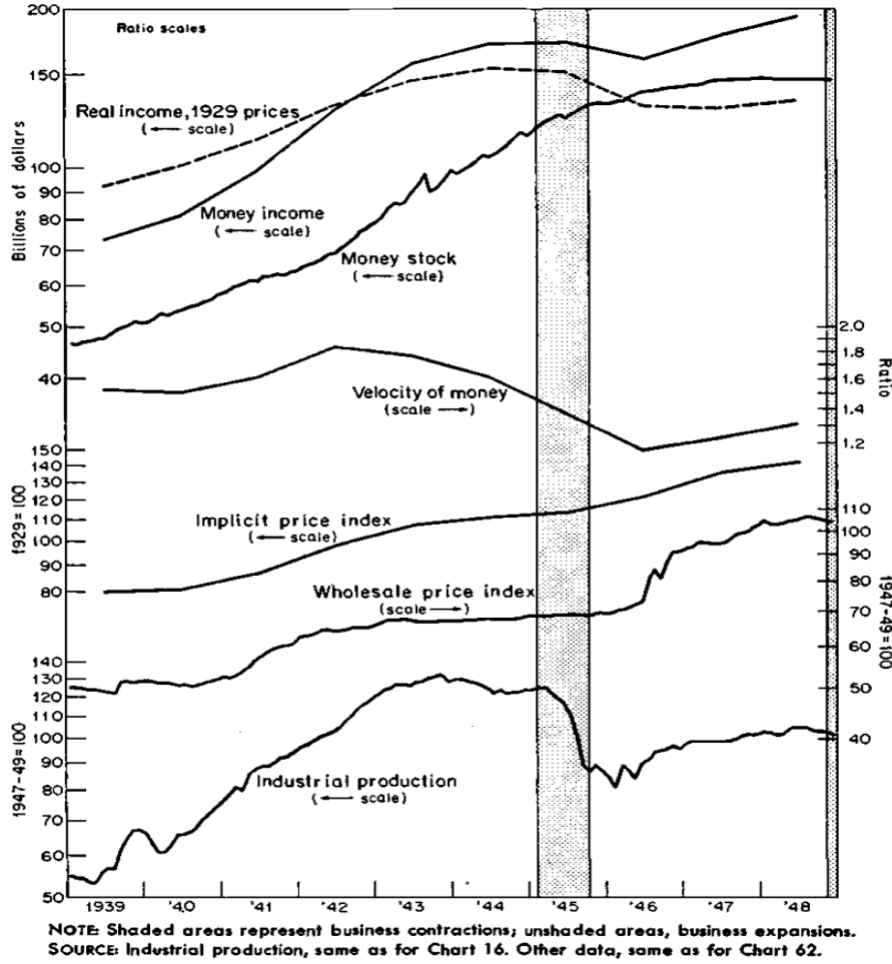
The counterpart of this suppressed consumption with higher disposable income was an unprecedented increase in personal savings and accumulation of liquid assets. The rapid increase in the demand for money was reflected in a decrease in money velocity. The sizable increase in taxes used to fund about half of the war effort failed to overshadow this massive increase in thriftiness. Contributing to this preference for liquid savings was the fact that Great Depression was still a very fresh memory. Most expected the war-based economy to rapidly collapse once the global conflict was over, triggering massive unemployment and the same deflationary spiral that everyone had just recently endured.

Banks had no incentive to hold excess reserves, and the liquidity needs were satisfied by holding long-term bonds that could be quickly sold at a fixed price at the Fed. Indeed, the Fed's support program converted all these long-term government securities to a close substitute for money, allowing the Treasury to sell some of its debt issuance to the commercial banks. Indeed, some people saw the YCC rule as a way to allow the Fed to indirectly finance the Treasury through the banking system. Commercial banks' preference for long-term debt with higher yields implied that Fed purchases of government securities was mostly in short-dated bills. This policy stance, in combination with a decline in reserve requirements in 1943, allowed banks to increase loans despite households' strong preference for currency over bank deposits.

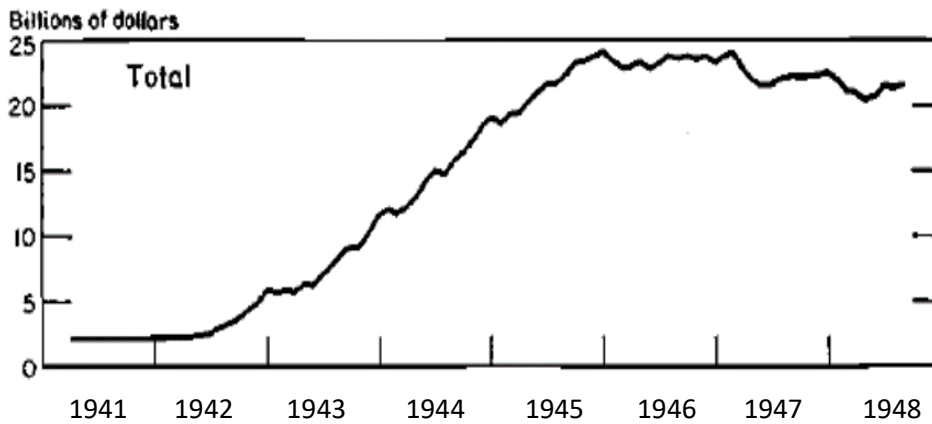
The End of the War and the Great Reflation of 1946–47

The war demobilization in early 1945 marked the beginning of the widely expected postwar recession as the economy made the transition from a war- to a consumer-based system. The recession, however, was relatively brief and mild, and the rapid expansion in economic activity initiated in 1946 was strong enough to generate jobs for the returning troops. The general relief brought by peace, and the rather fluid transition back to the consumer economy, resulted in a sharp increase in demand for consumer goods and services that had not been available to the public for years.

Figure 5: U.S. Macroeconomic Variables, 1939-48



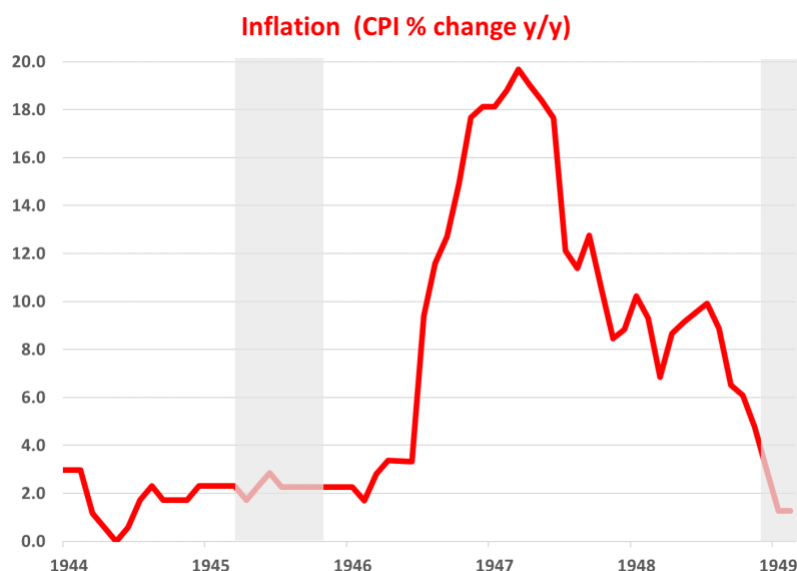
**Government Securities Held by Federal Reserve Banks,
 March 1941–August 1948**



Source: *From New Deal Banking Reform to World War II Inflation* by Milton Friedman and Anna Schwartz (1980)

The government lifted wartime price controls, and in just one year inflation spiked from 2 percent to 20 percent (see figure 6).⁵ With the limited data available, we can't determine today which spending categories experienced greater pricing pressures. However, food and durable goods (such as cars and appliances) likely took the lead, the result of pent-up demand and supply constraints that emerged in these sectors as factories readapted to the new consumer economy (see figure 7).

Figure 6: U.S. Inflation, 1944–49



Note: Data depict year-ago percentage change for all items in a U.S. city average.

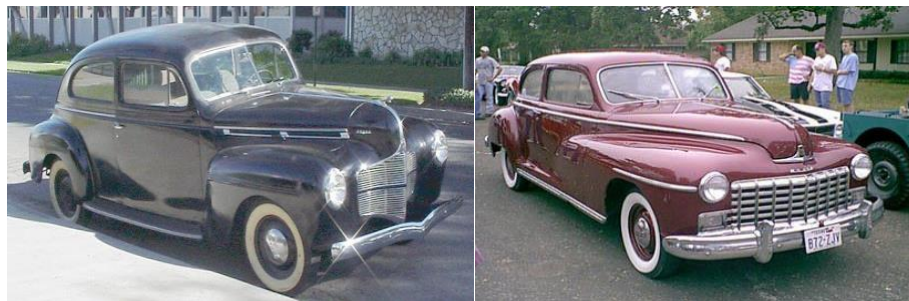
Source: The monthly consumer price index from the Federal Reserve Bank of St Louis

At the Treasury, deficits swiftly became surpluses when the conflict concluded. Money growth suddenly stopped in 1946 as the need to finance the government ceased (see figure 5). Thus, the increase in prices that year was the direct effect of a swift increase in money velocity. Eventually, the jump in prices further contributed to the stabilization in the government finances as it diluted part of its sizable debt burden. Indeed, about 40 percent of the government's real debt burden was deflated away by 1948.

Although Fed officials expressed some concern about the inflation outburst, they took little action at first, discontinuing the YCC rule only in mid-1947. Thereafter, the Fed implemented a series of contractionary policies. These policies mostly involved an increase in reserve requirements and the discount rate. The joint contractionary monetary and fiscal stance culminated in the 1949 recession, with inflation stabilizing again back at 2 percent. The recession was, however, mild and short, and it was followed by robust economic growth and rapid improvement in general living conditions.

⁵ It could be claimed that jump in the price index experienced in 1946 did not involve a corresponding jump in prices, but rather represented the unveiling of price increases that occurred earlier in the underground economy. However, as explained before, the effect of price controls was rather minor and cannot alter the main conclusion that consumer prices rose very rapidly when the economy recovered (Friedman and Schwartz 1980).

Figure 7: U.S. Inflation as Seen in Auto Prices, 1940–49



Dodge D17 (1940), \$755

Dodge two-door sedan (1946), \$1,676



Cadillac sedan (1940), \$1,745

Cadillac Deville (1949), \$3,497

Source: [The People History](#)

One factor that may have contributed to the quick reversal of inflation was that the public never expected an inflationary spiral like they did in the 1970s, and they considered the spike in inflation as temporary. The post-Depression deflationary bias remained in place.

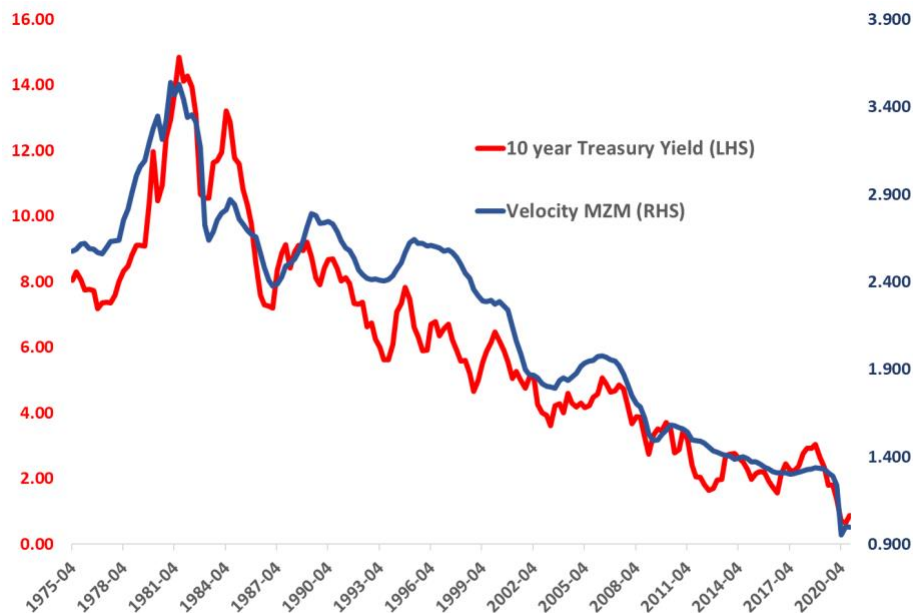
Will Inflation Return? The Role of Money Velocity and Government Debt

One key explanation of the inflationary spike of 1946–47 is the rapid recovery of the velocity of money (or, equivalently, a decrease in money demand), which was a unique episode. Afterward, the velocity of money remained remarkably stable for decades. As I mentioned earlier, stable money velocity is a key assumption in the monetarist hypothesis that links money to inflation. The 1970s, however, brought an end to this assumption as money demand became increasingly unstable (Lucas 1988). Indeed, the instability in money demand was the main reason why monetary policymakers largely abandoned money aggregate targets as a tool for policymaking.

The opportunity cost of holding money is the nominal interest rate. Money's liquidity is convenient but pays zero return. Other financial instruments compensate for expected inflation plus the real interest, both accounted for in the nominal interest rates (as stated in the Fisher's equation). In a recent work, van Kipnis (2021) finds a very tight relationship between money-of-zero maturity (MZM) velocity and the 10-year Treasury yield, which is widely regarded as benchmark for most interest rates (see figure 8). MZM measures the money supply, representing all money that is readily available or in a liquid state. (Generally speaking, it is M2 minus the time deposits that bear interest rates.) This brings us

an important lesson: if inflation returns, higher nominal interest rates may increase, causing velocity to fall and inflation to increase further.

Figure 8: Money Velocity and Nominal Interest Rates



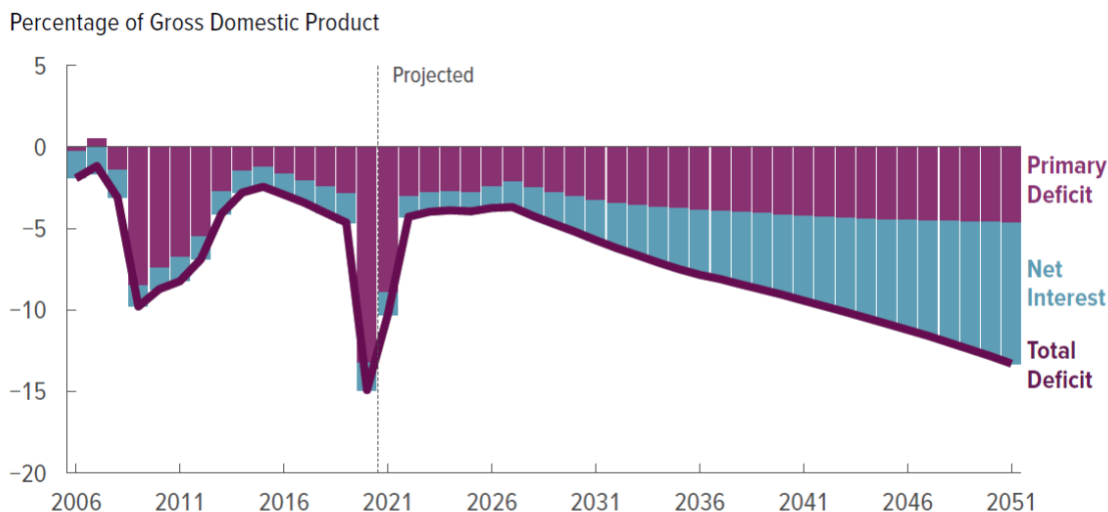
Source: Federal Reserve Bank of St. Louis

Whereas surpluses replaced sizable government deficits after WWII, the fiscal outlook is now remarkably different. Figure 9 displays the Congressional Budget Office’s projections of the debt-to-GDP ratios and government deficits for the next 30 years. Over time, this debt-to-output ratio is expected to double, with the net interest payments on existing debt rapidly surpassing primary deficits as the main cause of indebtedness. In a seminal paper, Sargent and Wallace (1981) highlight one “unpleasant monetary arithmetic.” Namely, if a central bank accommodates fiscal policy with seigniorage revenue, any attempt to control inflation by raising rates will backfire. That is, the net interest expense displayed in panel B of figure 9 will increase further, leading to higher deficits and potentially forcing the monetary authority to monetize an even larger debt. In a recent paper, Andolfatto (2021) suggests that a fiscal regime with high primary deficits may require a more accommodative monetary authority, a higher inflation target, or both.

Figure 9: Projections of Government Debt and Deficits



Source: Congressional Budget Office



Source: Congressional Budget Office

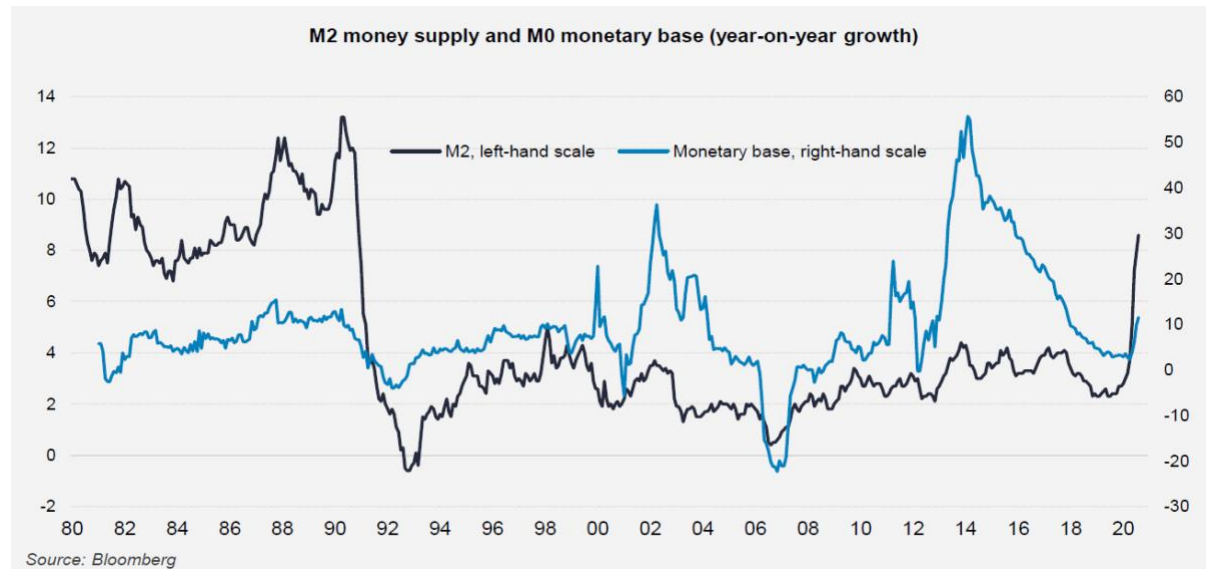
The Japanese Experience

A monetary authority's accommodation of a massive increase in public debt does not always lead to accelerating inflation, however. Japan's deflationary experience in the past three decades is perhaps the best example. During these years, the government has increased its debt-to-GDP ratio from 60 percent to 235 percent. In turn, the Bank of Japan (BOJ) contributed the monetization of this public debt by increasing the size of its assets/GDP ratio from less than 5 percent to 132 percent during the same period. Inflation failed to react since then and remained mired around 0 percent for decades. Not even a very tight labor market with a multidecade, record-low unemployment rate of 2.3 percent in 2020 was sufficient to alter this trend.

The year 1990 not only marks the burst of a massive bubble in Japan's real estate and stock markets, but also a turning point in the evolution of money aggregates (see figure 10). Until 1990, M2

grew at a higher rate, on average, than the monetary base, but thereafter the notable expansion of the BOJ's balance sheet failed to significantly boost M2 growth, which until last year saw annual growth of roughly between 2 percent and 4 percent. Inflation followed a similar pattern, beginning to fall in 1990 and stabilizing around 0 percent a few years later.

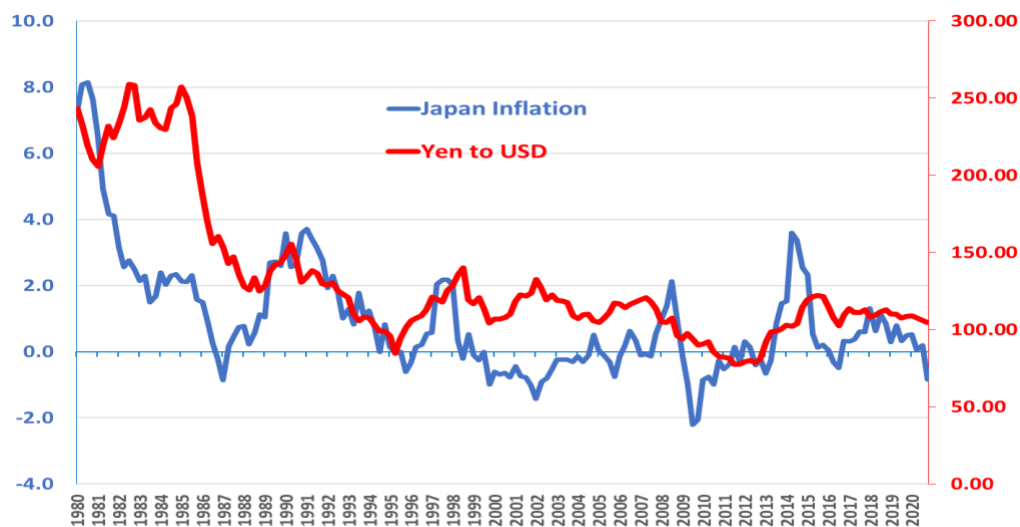
Figure 10: Japan Monetary Aggregates, 1980–2020



Notably, the Japanese bubble, which is seen as starting in late 1985, coincided with both a robust increase in M2 and low inflation (see figure 11). The increase in M2 was the result of a rapid increase in commercial bank lending activities that was supported by bubbly assets. These bubbles, in turn, attracted capital inflows that massively appreciated the yen and contributed to lower import prices.

This “super yen” is considered to be the result of the 1985 Plaza Accord, a set of currency controls that made the price of American and Western European exports more competitive with Japanese-made exports.

Figure 11: Inflation and Exchange Rates in Japan, 1980–2020

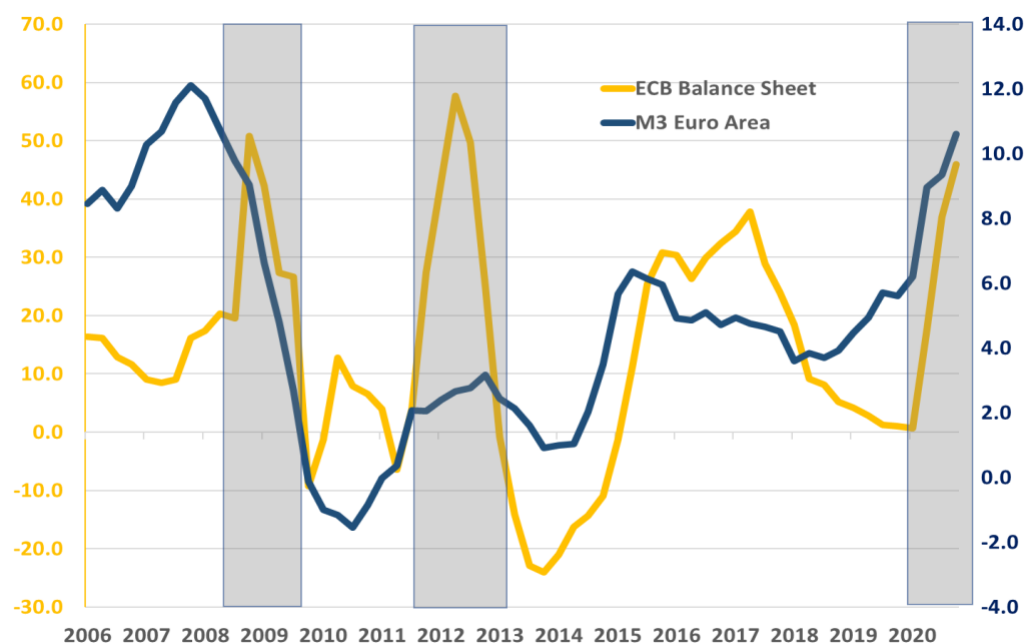


Source: Federal Reserve Bank of St. Louis

The 1990 bursting of the bubble and the subsequent deleverage that followed brought the growth in Japan’s M2 to a rapid halt. A succession of “lost decades” ensued. In 2013, Prime Minister Shinzo Abe launched a battery of measures to fight deflation. The newly appointed governor of Japan’s central bank, Haruhiko Kuroda, undertook a multifaceted approach. Among his measures, he expanded the BOJ’s balance sheet by more than 50 percent, purchasing both government debt as well as real estate investment trusts and equity funds. In turn, consumer taxes were increased with the goal of raising revenues but also inflation expectations. Together, these policies generated a fleeting 2.5 percent blip in inflation, which quickly dissipated. Despite all these efforts, M2 did not increase significantly. As discussed by Maruyama (2017), the large expansion in the monetary base that the BOJ enacted over the past two decades was crowded out by a roughly similar decrease in private investment. In 2020, M2 suddenly started to grow at levels not seen since the 1980s bubble amid constraints on private consumption.

The Case of Europe

Given the eurozone’s institutional characteristics, M3 is a better measure of money than M2 for that area (ECB 2013). M3 is another way of measuring the money supply and is basically M2 plus large and long-term deposits such as repos and institutional money markets, which work as close substitutes for deposits in the eurozone (see figure 11).

Figure 11: Money Aggregates in Europe, 2006–21

Source: Federal Reserve Bank of St. Louis and the European Central Bank

In 2007, at the peak of the housing bubble in the so-called eurozone periphery, M3 grew rapidly, reflecting a large increase in private credit (with a strong euro helping to abate inflationary pressures). The housing crisis that followed in 2008 triggered an extraordinary response from the ECB, increasing its monetary base by about 50 percent. As with the case in Japan, this response was not enough to prevent an absolute fall in M3 as the private sector immediately deleveraged.

The recession was particularly severe in the countries that experienced greater swings in house prices. As a result, very high government deficits developed—for example, Spain's public debt-to-GDP ratio went from 35 percent to 85 percent in just three years—and triggered a succession of sovereign debt crises that tipped the eurozone into a double-dip recession in 2012. The ECB averted a cascade of sovereign defaults by lending money to commercial banks to buy government bonds, a decisive action that resulted in a balance sheet expansion on a similar scale to that seen in 2008. But again, the ECB's measures were not enough to boost the money supply, as private lending continued to retreat. More meaningful results came with the ECB's direct bond-buying programs in 2015. But as in the case of Japan, it wasn't until after 2020 that money growth rates recovered to levels preceding the 2008 crisis, with strong monetary support in response to the pandemic.

Concluding Remarks

In 2020, the U.S. economic situation resembles its situation after WWII. Three factors shaped the inflation dynamics during WWII: money velocity, fiscal deficits, and constraints on private consumption. The drop in velocity during the war resulted in tame inflation, and the sharp recovery afterward led to a spike in inflation.

When we consult survey data, we see that households expect to consume little of the cushion of savings they managed to accumulate during the pandemic.⁶ Moreover, pent-up demand is typically strong for consumer durables, but not for services that the mobility restrictions especially affected. This behavior should slow down the recovery in money velocity, which had already been steadily declining during the past three decades. It bears mentioning, however, that this secular decline in velocity very closely mirrors the decline in nominal interest rates during the same period. If inflation and nominal interest rates increase from these unprecedented rock-bottom levels, velocity could be expected to increase further, accelerating the inflation stance.

During WWII, inflation resulted from an unprecedented increase in money supply that supported the massive increase in government expenditures required to finance the war effort. The WWII-era deficits became surpluses when the conflict ended. A spike in inflation allowed the U.S. government to deflate away 40 percent of its debt. Today, however, fiscal projections are different. Deficits are poised to continue to grow in the coming years, potentially delivering some “unpleasant monetarist arithmetic,” as Sargent and Wallace (1981) phrased it. If the Fed attempts to fight inflation by increasing interest rates aggressively, it might also increase the interest payments on the existing debt (and such interest payments are projected to be the main contributor to government deficits in the coming years). This development could further deteriorate the fiscal situation, potentially prompting the need for more seigniorage and with it, more rather than less inflation. The recent experience in Japan, and to a lesser extent in Europe, however, should to some extent abate these inflationary concerns. In Japan, debt-to-GDP ratios increased from 60 percent to 235 percent, with the Bank of Japan accommodating a sizable part of this increase with an unprecedented expansion of its balance sheet. Inflation, however, remained stuck at near zero even with a tight labor market in an aging society. These matters and related developments will merit further scrutiny, and innovations in economic research might reveal new insights into these important issues.

⁶ <https://libertystreeteconomics.newyorkfed.org/2021/04/an-update-on-how-households-are-using-stimulus-checks.html>

References

- Andolfatto, David. 2021. Is it time for some unpleasant monetarist arithmetic? Federal Reserve Bank of St. Louis, mimeo.
- Armantier, Olivier, Leo Goldman, Gizem Koşar, and Wilbert van der Klaauw. 2021. An update on how households are using stimulus checks. Federal Reserve Bank of New York *Liberty Street Economics*.
- Barro, Robert J., José F. Ursúa, and Joanna Weng. 2020. The coronavirus and the great influenza pandemic: Lessons from the “Spanish Flu” for the coronavirus’s potential effects on mortality and economic activity. National Bureau of Economic Research working paper no. 26866.
- Beraja, Martin, and Christian Wolf. 2021. Demand composition and the strength of recoveries, mimeo.
- Benati, Luca, Robert E. Lucas, Juan Pablo Nicolini, and Warren E. Weber. 2019. International evidence on long-run money demand. Federal Reserve Bank of Minneapolis staff report no. 587.
- European Central Bank. 2013. Estimated M3 holdings by sector, *ECB Notes*.
- Friedman, Milton, and Anna Jacobson Schwartz. 1980. World War II inflation, September 1939–August 1948, from *New Deal Banking Reform to World War II Inflation*, pp. 129–76, National Bureau of Economic Research.
- Gospodinov, Nikolay. 2020. Recent developments in U.S. short-term funding markets, Federal Reserve Bank of Atlanta.
- Jordà, Òscar, Sanjay R. Singh, and Alan M. Taylor. 2020. Longer-run economic consequences of pandemics. Federal Reserve Bank of San Francisco working paper no. 2020-09.
- Lucas, Robert E, 1988. Money demand in the United States: A quantitative review, *Carnegie-Rochester Conference Series on Public Policy* 29(1): 137–67, January. Elsevier.
- Murayama, Haruhiko. 2017. Why does money supply growth not push up prices? Kyoto Research Institute economic report, summer.
- McCandless, George T., and Warren E. Weber. 1995. Some monetary facts. Federal Reserve Bank of Minneapolis *Quarterly Review*, vol. 19: 2–11.
- Sargent, Thomas, and Neil Wallace. 1981. Some unpleasant monetarist arithmetic. Federal Reserve Bank of Minneapolis *Quarterly Review* 5, fall.