

Japan's Low Inflation Conundrum

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Abstract

The paper analyses the reasons for Japan's persistently low inflation since the bursting of the Japanese bubble economy (low inflation conundrum). It is shown that Japan experienced a structural break from a high-growth period with relatively high inflation to a low-growth period with exceptionally low inflation since the early 1990s. We show based on a stylized accounting model, how funds are created in a country open to international capital flows by domestic savings, credit creation of banks and net capital inflows, being absorbed either by rising asset prices, newly issued bonds or more money being held. Government expenditure financed by government bond purchases of commercial banks is shown to be an important channel of money creation in Japan's post-bubble period. With the price level being assumed to be dependent on both goods with free market prices and goods with prices controlled by the government we show that inflation in Japan has been kept low by mainly three factors directly or indirectly influenced by the Bank of Japan: increased money holding of households and corporations, central bank-backed debt-financed price controls and net capital outflows.

JEL-Codes: E310, E510, E580.

Keywords: Japan, inflation, monetary policy, money supply, fiscal policy, asset prices inflation, balance of payments, price controls, subsidies.

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1. Introduction

While inflation is rising strongly in many industrial countries as well as in many emerging markets and developing countries, it has remained significantly lower in Japan. Whereas inflation reached 8.1 percent in the euro area and in 8.6 percent the US in May 2022, Japan reported 2.5 percent in May 2022. Since the turn of the millennium, the average year-over-year inflation has been 0.1 percent in Japan, compared to 1.7 percent in the euro area and 2.2 percent in the US. In this respect the country seems to remain the exception since the burst of the bubble economy in the early 1990s. Broda and Weinstein (2007) argue that Japan's inflation would be even lower, if measured in the same way like in the United States.

Previous research concerning low inflation in Japan since the early 1990s is scarce. Taylor (2000) links the low inflation rate to the low-growth environment since the bursting of the Japanese bubble economy in the early 1990s. Ito and Mishkin (2006) have argued that (despite the high degree of monetary expansion) monetary policy in Japan has remained too restrictive. According to Westelius and Liu (2016) demographics matter, with a shrinking working age population having a negative impact on the price level. McKinnon and Schnabl (2006) have linked the deflationary pressure in the Japanese economy to persistent current account surpluses and lasting appreciation expectations.

What is special about Japan that all policy efforts over the last three decades such as a persistent low-interest rate policy and excessive quantitative easing have failed to lift inflation towards the target of 2 percent. Even the Coronavirus pandemic and the war in Ukraine have not increased inflation to a similar degree as in most other industrialized countries. We analyze the determinants of persistently low inflation in Japan based on a stylized accounting model with a focus on the relationship between money and prices.

We will argue that the burst of the bubble economy in the early 1990s introduced a regime shift towards “lowflation” as inflation expectations remained anchored at a low level. While low inflation is not bad per se – and may even be a good thing under the right circumstances – it came at a cost for Japan, as the regime shift set the stage for sluggish real income growth which, together with wage austerity, characterizes “lowflation” with a strong incentive to hold money.

2. The Conundrum: From a High Inflation to a Low Inflation Environment

In the post-World War II period, the early 1990s marks a structural break in the history of Japan's inflation.

a. The High Growth and High Inflation Period

As Figure 1 shows, the annual inflation in Japan hovered around 5% in the 1960s and early 1970s under the Bretton Woods System when the Japanese yen was tightly pegged to the US dollar (Stage I). During this period, inflation was considerably higher in Japan than, for example, in the U.S. where it averaged less than 3%. The higher inflation in Japan was *inter alia* associated with the postwar economic catch-up process, which generated supply-driven inflation via a productivity growth differential between the tradable and non-tradable goods sectors (Imai 2010).¹

After the exchange rate of the Japanese yen had become flexible in the early 1970s, the period from 1973 to 1990 was characterized by high inflation combined with high inflation volatility in line with a global rise in inflation (Collard and Dellas 2007) (Stage II). During the two oil price shocks of 1973/74 and 1979/80, inflation in Japan surged to more than 25% (1974) and 8% (1980) respectively. When oil prices collapsed in 1985/86 and the yen strongly appreciated following the September 1985 Plaza-Agreement², inflation in Japan fell to -1% in January 1987, but was reanimated in the second phase of the Japanese bubble economy.

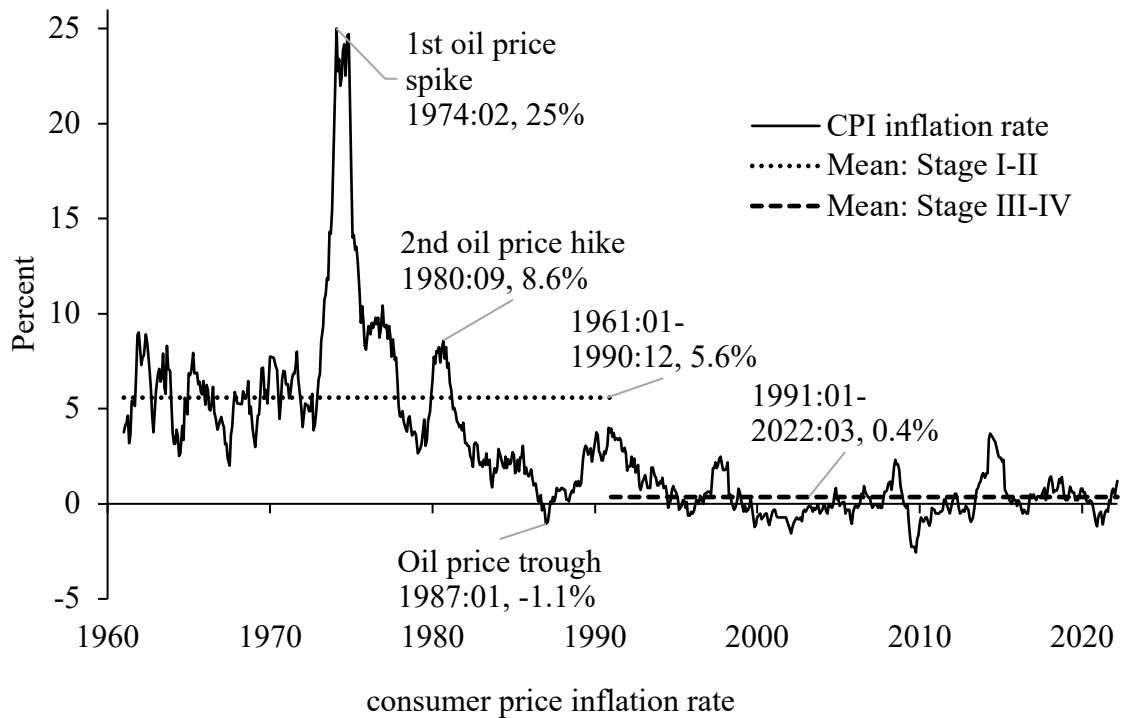
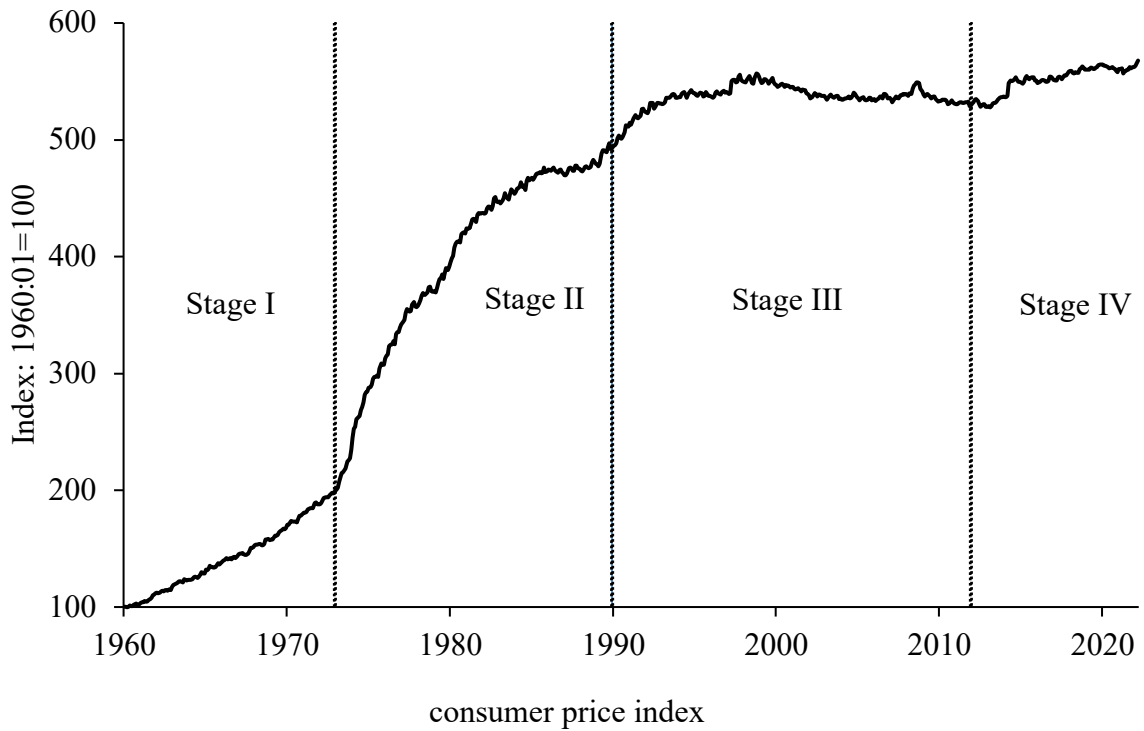
When the Bank of Japan – with the intention to cap the appreciation of the yen against the US dollar following the Plaza-Agreement – lowered its policy rate from 5% in 1985 to 2.5% in 1987, credit growth accelerated and asset prices surged (Noguchi 1992). The Nikkei equity price index doubled between September 1985 and December 1989 (Figure 2). Real estate prices strongly increased, particularly in the metropolitan areas. Asset price inflation was followed

¹ According to the Balassa-Samuelson effect an economic catch-up leads – given a fixed exchange rate to the currency of the country with the higher income level – to supply-driven inflation (Balassa 1964, Samuelson 1964).

² On September 22 1985, the finance ministers of the G5-countries (US, Japan, Germany, France and the UK) met at New York Plaza Hotel and agreed to engineer a depreciation of the US Dollar and an appreciation of the Japanese yen. The yen appreciated much more than intended by about 50%, throwing Japan into a deep recession (Funabashi 1989).

with a lag by rising consumer price inflation with a peak of 4% in November 1990. All in all, consumer price inflation averaged 5.6% in the period from 1961 to 1990 (Stages I-II).

Figure 1: Japan: Consumer Price Index and Inflation

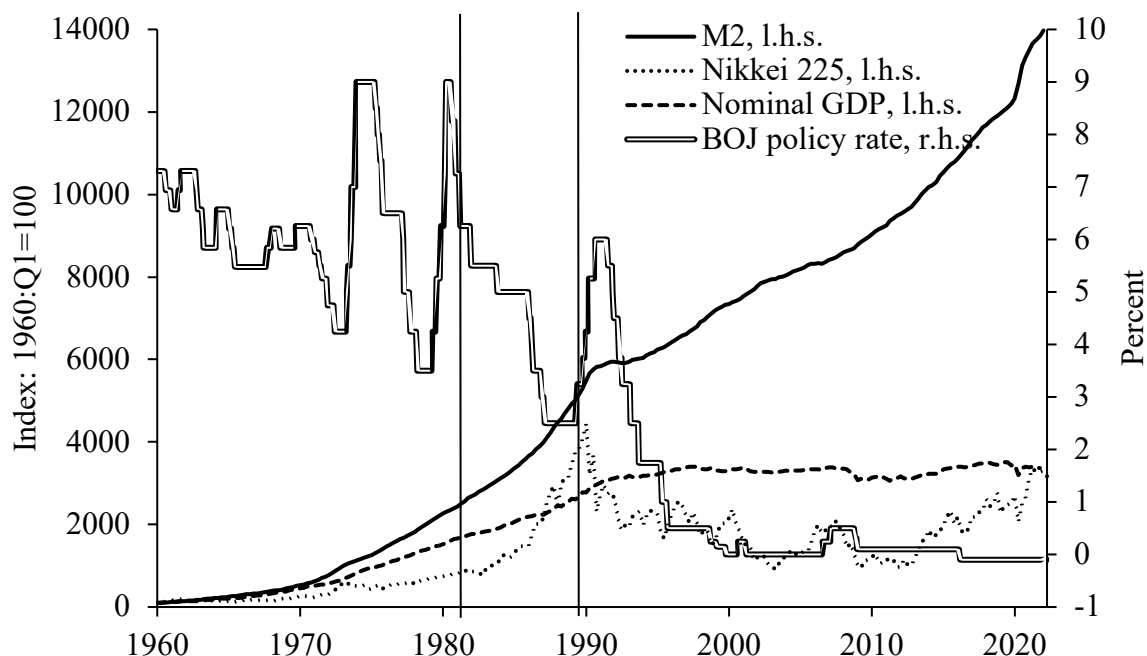


Source: OECD.

b. The Low Growth and Low Inflation Period

In the attempt to engineer a controlled end of the bubble economy, the Bank of Japan gradually raised short-term interest rates from 2.5% in 1987 to 6% in 1990 (Figure 2). The move triggered an uncontrolled crash of stock prices starting in December 1989 and of real estate prices in 1991. The asset price deflation, which lasted until 2013, initiated a regime shift from high to persistently low inflation despite a high degree of monetary expansion (Ito and Mishkin 2006). The move from an environment of high inflation and high inflation volatility to a regime of low inflation and low inflation volatility was accompanied by a simultaneous move from high growth to low growth (Figure 3) (Bayoumi 2000).

Figure 2: Interest Rates, Money, Stock Prices and Nominal GDP in Japan

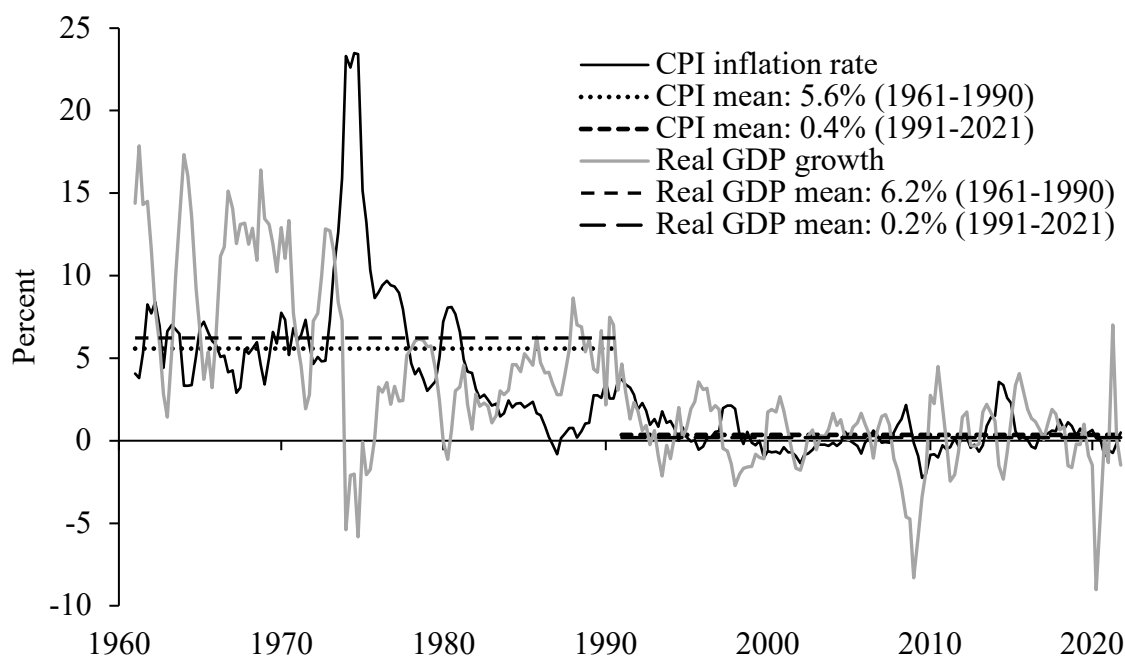


Source: Bank of Japan, Nikkei, OECD.

The Nikkei 225 fell by around 80% between the beginning of 1990 and early 2013 along with real estate prices. Aggressive easing of monetary and fiscal policies combined with regulatory forbearance stabilizing the banking sector prevented a deeper recession, but could not reanimate credit growth and investment (Koo 2003), inter alia because of sluggish credit demand by cautious households and corporations. Contrary to the experience in the US after the stock market crash of 1929, the money stock continued to grow after a short pause, due to persistently

expansionary monetary and fiscal policies (Figure 2).³ The policy mix prevented real GDP from falling, yet preserved the distorted economic structure created during the bubble economy which impeded a more forceful economic recovery and depressed inflation (Figure 3) (Schnabl 2015).⁴

Figure 3: Japan: Real Growth and Inflation



Source: OECD.

Since then, all efforts to reinvigorate the economy and to lift inflation have failed, which has created the feeling of “three lost decades” (Takahashi 2013, Carroll 2022).⁵ In 2013, the then prime minister Shinzo Abe tried to break the spell by a combination of very expansionary monetary and fiscal policies as well as structural reforms, the so-called Abenomics (Hausmann and Wieland 2014) (Stage IV in Figure 1). However, apart from an increase in stock (Figure 2) and real estate prices the Abenomics failed to push the economy out of “lowflation” (Yoshino et al. 2017). Consumer price inflation fell back to its low levels and nominal GDP growth remained sluggish (Figure 3). Unlike in other countries, not even the coronavirus pandemic and the Ukraine war seem to have reanimated inflation in Japan.

³ M2 in Japan encompasses M1 (currency in circulation plus sight deposits in banks) plus short-term time deposits in banks. For the broader concept of M3 only data since 1972 are available.

⁴ The low-interest rate environment during the first phase of bubble economy had encouraged investment with low returns. The low-interest rate policy following the burst of the bubble helped to keep corporations with low profitability alive (zombification) (Caballero et al. 2009, Peek and Rosengreen 2005).

⁵ Mikitani and Posen (2000) provide telling insights of propositions of influential economists how to reanimate the Japanese economy.

3. A Stylized Accounting Model

We model the shift from a regime of high real growth and high inflation before the burst of the bubble economy to a regime of low real growth and low inflation based a small accounting model.

a. The Supply and Demand for Funds

Equation (1) sets the sum of nominal savings (S), new domestic credit (dC) and net credit inflows from abroad (NCF) equal to the sum of the changes in the nominal value of real assets (e.g., shares in companies and real estate) ($P^V \cdot dAR$), newly issued bonds (dB), and changes in money held (dM).⁶ The left hand-side of equation (1) represents the supply of funds in a country open to international capital flows. The right-hand side models the demand for funds for storing value and investing, which is equal to purchases of assets or bonds and money hoarding.⁷

$$(1) S + dC + NCF = P^V \cdot dAR + dB + dM$$

We treat savings and the credit provision of commercial banks as exogenous.⁸ An increase in savings (resulting from a reduction of consumption for a given income) can affect any of the stores of wealth shown in the right-hand side of the equation directly. Against this, new credit provided by domestic and/or foreign banks (dC, NCF) is assumed to increase money (dM), which in turn affects the other stores of wealth through portfolio rebalancing.⁹ Equation (2) expresses changes in the demand for real assets (dAR) as a function of the expected future value of these assets ($E(P^V \cdot AR)$). An expected increase in the future value of the assets induces additional demand:

⁶ S=national savings, C=domestic credit, NCF= net foreign credit provision (a positive sign indicates net capital inflows), AR=real assets, B=bonds, M=money, P^V = prices of real assets, i^B =interest rate on bonds, P^M =market price level, P=aggregate price level, P^C = price level of goods controlled by the government, Y=real GDP, V=velocity of money, i^M =interest rate on money, i^F =foreign interest rate, with “d” denoting absolute changes of stock variables.

⁷ For simplicity we assume that the purchase of domestic capital goods is financed by issuing equity shares, selling bonds, using money and/or acquiring foreign capital through capital imports. Hence, the corollary to equation (1) would be $(1') S^r = I^r - NCF^r$, with S^r , I^r denoting domestic real savings and real investment, and -NCF the export of real savings (i.e. real net capital exports). (1) is transformed into (1') through the nominal variables dC, P^V , dB, dM and the price of NCF.

⁸ Concerning the determinants of the changing saving behavior of Japanese households see Latsos and Schnabl (2021).

⁹ This reflects the operation of banks, which create money through credit extension.

$$(2) \text{dAR} = f(E(P^V * \text{AR})) \quad \text{with } \text{dAR}/\text{dE}(P^V * \text{AR}) > 0$$

b. Price Level Determination

Equation (3) relates the price of real assets (P^V) to the demand for real assets and the interest rate on bonds (i^B). The prices of real assets rise when the demand for real assets increases and/or the interest rate of bonds declines:

$$(3) P^V = f(\text{dAR}, i^B) \quad \text{with } \text{dP}^V/\text{dAR} > 0 \text{ and } \text{dP}^V/\text{di}^B < 0$$

Equation (4) expresses the demand for bonds dependent on the interest rate on bonds. A decrease of interest rates lowers the demand for bonds.

$$(4) \text{dB} = f(i^B) \quad \text{with } \text{dB}/\text{di}^B > 0$$

Equation (5) defines percent changes in market prices (dP^M/P^M) as percent changes of the money stock (dM/M) plus percent changes in the velocity of money (dV/V) (with a decline in V indicating a decline in velocity) minus percent changes in real GDP (dY/Y) following the Quantity Theory of Money (Friedman 1987):

$$(5) \text{dP}^M/\text{P}^M = \text{dM}/\text{M} + \text{dV}/\text{V} - \text{dY}/\text{Y}$$

We assume that there are two types of goods. The prices of one bundle of goods P^M are determined via markets by changes in supply and demand. For the second group of goods the market prices are influenced by the government via price controls (P^C). For instance, subsidies keep market prices low. Government subsidies are for instance very common for agricultural goods in the European Union and other industrialized countries (Koo and Kennedy 2006) and also play an important role for food prices in Japan (section 4). If w equals 1, aggregate inflation is determined entirely via free markets. If w is less than 1, government controls can exert a mitigating influence on the rise of the overall price level. Thus, the aggregate price level P is given by

$$(6) P = w P^M + (1-w) P^C \quad \text{with } 0 \leq w \leq 1^{10}$$

The velocity of money V is assumed to depend on the interest rate on holding money in the bank i^M and aggregate consumer price inflation dP/P . In equation (7), it is assumed that the velocity declines with a decrease in the interest rate on bank deposits, as holding money is encouraged. A decrease in the price level leads to a decrease in the velocity, as holding money is encouraged.

$$(7) V = f(i^M, P) \quad \text{with } dV/di^M > 0 \text{ and } dV/dP > 0$$

Equation (8) explains net credit inflows from abroad (NCF: credit inflows from abroad minus credit outflows abroad) as a function of the domestic interest rate i^M relative to the foreign interest rate (i^F). Private capital imports increase when the interest rate at home (i^M) increases relative to the interest rate abroad (i^F). For simplicity we assume the foreign interest rate to be constant.

$$(8) NCF = f(i^M) \quad \text{with } dNCF/di^M > 0 \text{ and } i^F = \text{const.}$$

With fully flexible exchange rates the changes of the foreign reserves of the central bank ($dRes$) are zero and private net capital flows are equivalent to the current account balance (Branson 1977). A current account surplus is matched with a net capital outflow, a current account deficit with a net capital inflow (McKinnon and Schnabl 2012), as all components of the balance of payments have to add up to zero.¹¹ If the central bank leans against exchange rate appreciation by purchasing foreign currency and selling domestic currency this leads to an increase in foreign reserves ($dRes > 0$) and a monetary expansion ($dM > 0$), which lowers the domestic interest rate. The increase in foreign reserves is equivalent to a public capital export, contributing to an improvement of the current account.

¹⁰ Increases in the consumer price inflation are respectively defined as $P \frac{dP}{P} = w P^M \frac{dP^M}{P^M} + (1-w) P^C \frac{dP^C}{P}$.

¹¹ $CA + NCF = 0$ for a flexible exchange rate system and $CA + NCF + dRes = 0$ in the case of foreign exchange intervention (i.e. exchange rate stabilization) by the central bank.

4. Explaining Low Inflation in Japan

The model contains seven exogenous variables (S , C , $E(P^V*AR)$, P^C , i^F , i^B , i^M) and eight endogenous variables (P , P^M , V , P^V , AR , B , M , NCF). Based on the model we can provide an explanation of how the burst of the bubble economy changed inflation dynamics in Japan towards “lowflation”.

a. The Impact of Macroeconomic Policies on Money Supply

Initially, the Bank of Japan lowered interest rates to lean against a stronger-than-expected appreciation of the yen against the US dollar in the wake of the Plaza Agreement of 1985 (Figure 2). The interest rate cut by the Bank of Japan encouraged credit creation by commercial banks¹², with additional money being created. Lower interest rates raised the expected value of equities and boosted the prices of real estate (equation 3). As shown in Figure 4, until the burst of the Japanese bubble economy in 1989, money supply $M3$ ¹³ grew in parallel with outstanding loans provided by commercial banks.

Given the declining interest rate, demand for bonds declined (equation 4), reinforcing the demand for money as bank rates fell by less. Higher expected values of equities reinforced the asset price increases (i.e. of equities and real estate). The result was in line with equation 5 not only rising asset price inflation but also – with a lag – rising consumer price inflation (part 2 of Stage II in Figure 1), as rising asset prices boosted consumption via a wealth effect.

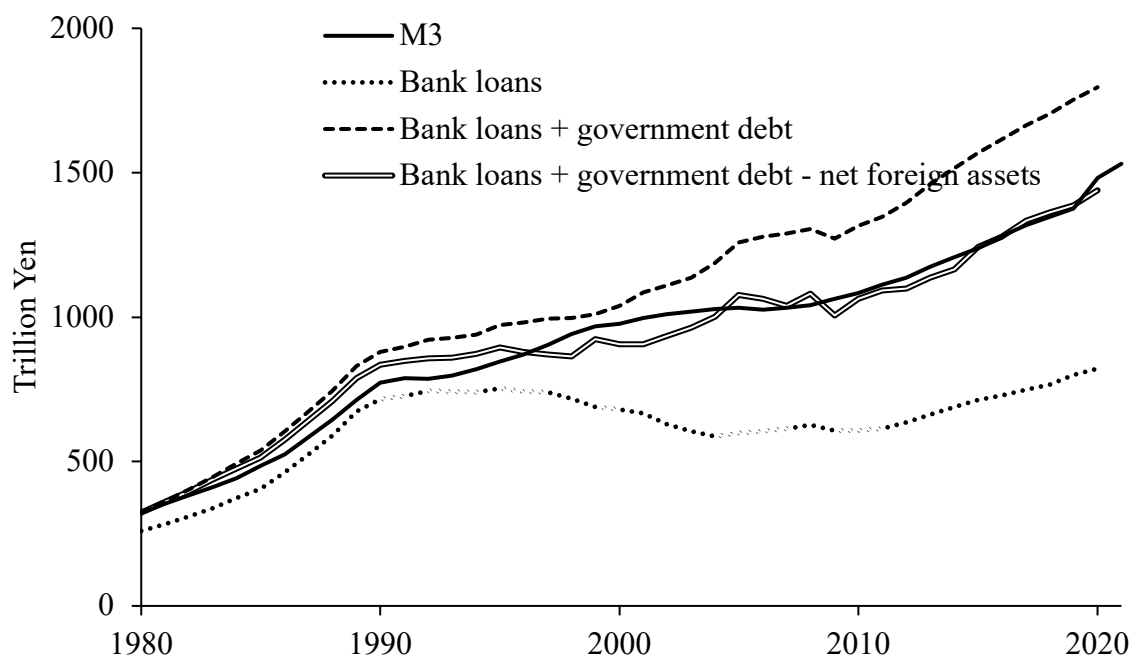
Interest rate increases by the Bank of Japan towards the end of the 1980s slowed down the boom, which finally led to the bursting of the asset price bubble.¹⁴ The sell-off in real assets culminated in a self-reinforcing downward spiral of asset prices. $E(P^V*AR)$ fell and so did dAR and P^V (equations 2 and 3). Banks became destabilized by a growing amount of non-performing loans, as the value of collateral kept shrinking (Koo 2003). The negative wealth effect of falling asset prices had a negative impact on consumption and thereby inflation.

¹² If commercial banks create credit, credit to the private sector on the asset side of the balance sheet grows. When the credit is paid out to a corporation or a household, being used for the purchase of an investment good or a house, the seller of the respective good will receive the amount, which he will pay into his bank account, with deposits on the liability side of the commercial banks' aggregated balance sheet rising.

¹³ M3 is composed of currency in circulation and deposits at depository institutions (time deposits, fixed savings, installment savings, foreign currency deposits and certificates of deposit).

¹⁴ In December 1989 the bubble on the stock market blew up, in 1991 the bubble in the real estate market followed (Noguchi 1992).

Figure 4: Approximation of M3 by Bank Loans, Government Debt and Net Foreign Assets



Source: Bank of Japan. Government debt refers to the outstanding amount of government bonds.

The resulting recession tempted the Bank of Japan to cut interest rates again (Figure 2), with the persisting low- and zero-interest rate policy eroding the ability of banks to provide credit and – due to gloomy growth expectations – also undermining the willingness of corporations to take credit (Schnabl 2015). The interest rate cuts of the Bank of Japan had a negative impact on the demand for bonds again (equation 4). With real asset prices declining and bonds being unattractive due to declining yields, households and corporations chose increasingly money as a store of value (as money market rates were held up by the zero lower boundary).

Money demand rose, and velocity decreased (falling V in equation 5 and 7). The outstanding amount of private credit declined (credit crunch) and only slightly recovered since the start of the so-called Abenomics¹⁵ in 2013. Instead, a new form of money creation emerged, as the newly issued government bonds were purchased by commercial banks.¹⁶ These purchases were encouraged by the announcements of the Bank of Japan to buy large amounts of government

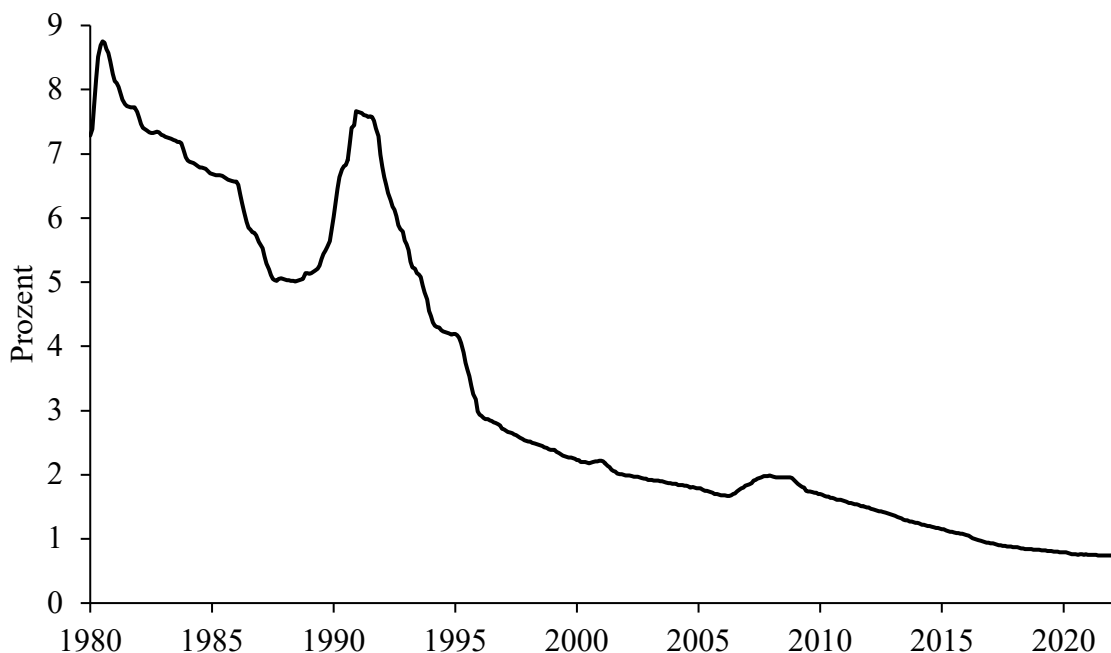
¹⁵ Starting from January 2013, prime minister Shinzo Abe announced a program of expansionary monetary and fiscal policies and structural reforms. In the course of the Abenomics, the rise of Japanese general government debt strongly accelerated. The general government debt has increased to 260 % of GDP. Currently, the Bank of Japan is holding about half of the outstanding Japanese central government bonds.

¹⁶ On the money creation via government bond purchases of banks. See also McLeay et al. (2014).

bonds (quantitative easing). Via quantitative easing, the Bank of Japan increased the commercial banks' credit to the government (equation 1), which in a second step was partially transformed into credit of the Bank of Japan to the government.

The additional government spending in Japan – for instance in form of infrastructure construction, subsidies for the pension system and subsidies for farmers – generated additional income for households and corporations. This raised household savings (despite declining household savings rates) instead of consumer spending given sluggish wage growth (Latsos and Schnabl 2021). Households increased their deposits in banks or held cash, thereby increasing the money stock. The corporations did not invest their profits despite ever-declining financing costs (Figure 5), because of gloomy business expectations (Murai and Schnabl 2021). In particular, small and medium enterprises deposited their profits at banks, thereby significantly contributing to the growth of money (Gerstenberger and Schnabl 2021).¹⁷ Figure 4 shows that in Japan since the early 1990s money (M3) increased together with the rising government debt (albeit government debt increased faster).

Figure 5: Japan: Average Credit Interest Rates

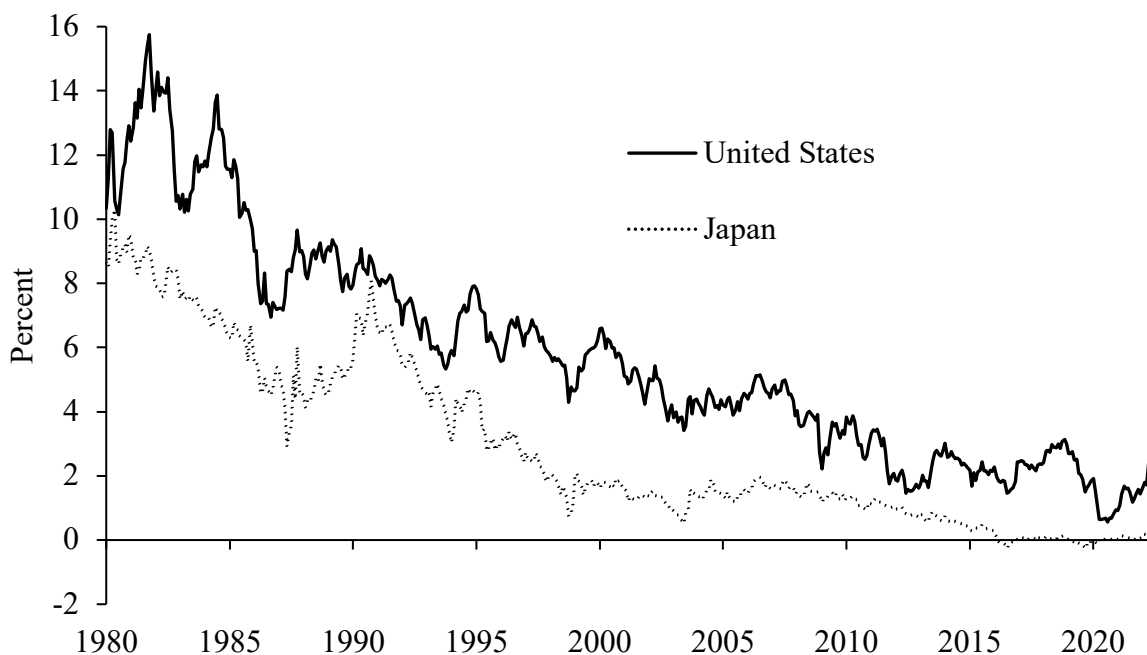


Source: Bank of Japan.

¹⁷ Large Japanese enterprises had a stronger tendency to use their profits for mergers and acquisitions or stock buybacks.

In this environment of subdued credit demand, Japanese commercial banks faced deposit-credit ratios above one (Gerstenberger and Schnabl 2021). Rising deposits did not find sufficient private credit demand despite declining credit interest rates (Figure 5). This remained the case even in the course of the Abenomics, which slightly reanimated credit growth (Figure 4). The sluggish domestic private credit demand provided an incentive for commercial banks to increase credit provision to the government and in the international credit markets, for instance in Southeast Asia. Japanese life insurances tended to purchase US government bonds and also private households had an incentive to hold foreign assets, as the interest rates in Japan were kept by the Bank of Japan substantially below the level prevailing in the United States (Figure 6). Thus, the Bank of Japan encouraged net capital outflows by quantitative easing (Figure 6, McKinnon and Schnabl 2006).

Figure 6: Japan and United States: 10year Government Bonds Yields



Source: IMF.

The net capital exports at the expense of domestic credit extension had a negative impact on the domestic money stock (equation 1). In Figure 4, the net international position – which is the outcome of all accumulated past net capital outflows (both private and public) – is subtracted from the sum of outstanding loans of commercial banks to private sector plus the outstanding government debt. The negative sign is based on the accounting identity of equation 1, stipulating that net capital outflows have a negative impact on domestic monetary aggregates.

The resulting adjusted credit stock (bank loans + government debt – net foreign assets) matches well the development path of money supply M3. This also implies that persistent net capital exports of Japan have helped to reduce the domestic inflationary pressure in form of asset and/or consumer price inflation. Inflation hovered around zero, while real GDP growth remained subdued (equations 5, 6, and Figure 3).

b. Price Controls Via Central Bank-Financed Subsidies

This leads to the question of why money expansion via bank loans in the pre-1990 period was accompanied by consumer price inflation, whereas money creation via sales of government bonds to banks in the post-1990 period did not lead to consumer price inflation. The answer is linked to the use of the additional government spending. Murai and Schnabl (2022) argue that government control of prices helped to contain inflation via two channels.¹⁸ First, the Bank of Japan continued to depress financing cost of enterprises (Figure 5). Public credit guarantees helped to subdue the risk premiums on interest rates. Second, direct subsidies for products represented in the consumer price basket have grown substantially (and depressed the aggregate price level, equation 6).

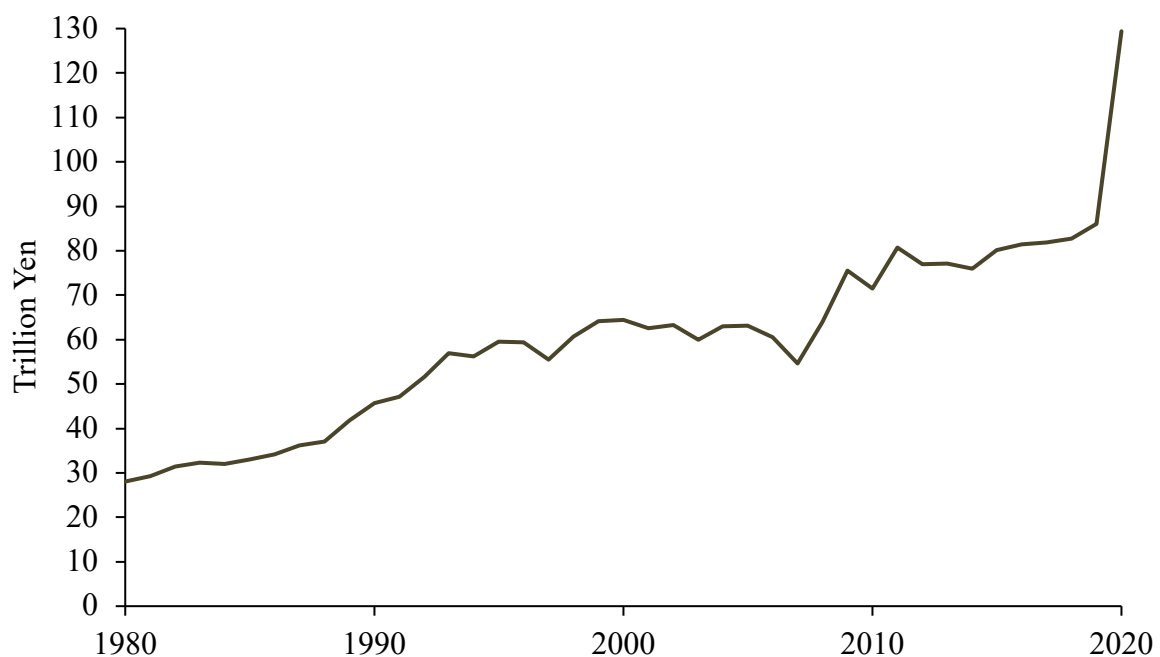
For instance, Japanese farmers profit from generous subsidies, with subsidies for rice farmers having contributed to the substantial decline of rice prices. Many other agricultural products such as wheat, soybeans, buckwheat, and rapeseed are subsidized as well, with food accounting for 26 percent of the consumer price index. Also, subsidies for rail transport and housing helped to keep the price level from rising faster in the face of price shocks from abroad, including phases of yen depreciation. Government aid has pushed down school and university fees since 2009. Subsidies contributed to keeping prices of cars low, most recently for electric vehicles. Prices for water and electricity are controlled by the government and have risen only moderately. In response to the Ukraine crisis, gasoline prices are being kept low thanks to subsidies to gasoline wholesale enterprises (Reuters 2022).

Figure 7 provides an estimation of the subsidies provided by the central and local governments in Japan. The data include the subsidies granted by the state to public and private enterprises as well as to individuals. The prominent examples are the pension and the health care system, sales

¹⁸ They argue that the prices of at least 50% of goods and services in the basket of the consumer price index are government controlled. As government-controlled prices tend to remain stable, any increase in the market price level would raise the overall price level by only half of this increase.

and pricing in the agricultural, fishing and forestry sectors, pricing of energy and water, hiring of workers, export business as well as borrowing and investment of small and medium-sized enterprises. The subsidies further include the financial support of small and medium-sized enterprises in financial difficulties, for the construction of private and public housing, the operations of the railway industry, the operations of schools, universities and research institutes as well as investment in digital, regional and social infrastructure.

Figure 7: Estimated Subsidies in Japan



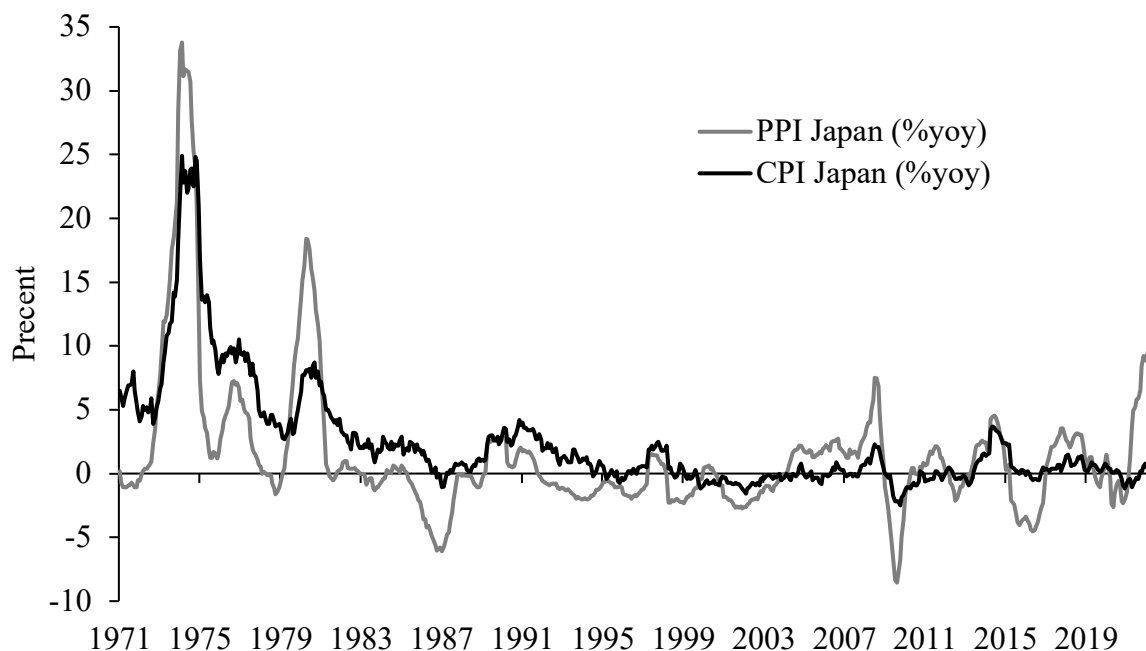
Source: Japan: Ministry of Finance. Central government level (general account, special accounts, budget for government-affiliated agencies) and local governments. For more details see Table 1 in the appendix.

Subsidies have been strongly expanding since 1990, in particularly accelerating in times of crisis (1998, 2008, 2020). The recent peak of about 129 trillion yen in 2020 is equivalent to 24.1% of GDP. The subsidies – which are counter-cyclical, i.e. relatively high in recessions and lower in periods of economic recovery – not only help to smooth the impact of recessions on the profits of corporations. They also facilitate it for corporations not to increase wholesale and retail prices to cover losses faced in recessions.

To the extent that subsidies are provided to corporations or wholesalers they can help to put a wedge between producer prices and consumer prices as shown for the most recent spike of inflation in Figure 8, thereby smoothing consumer prices. As the size of subsidies to

corporations is growing over time, this implies a reduced pressure on enterprises to increase wholesale and retail prices, with a negative impact on consumer prices. Thus, subsidies can be assumed to have substantially helped to slow the increase of the consumer price index.

Figure 8: Japan: Producer and Consumer Price Inflation



Source: Thomson Reuters. The Corporate Goods Price Index / Wholesale Price Index is composed of the Producer Price Index (PPI), Export Price Index and Input Price Index.

c. Implications for Money Supply and Inflation

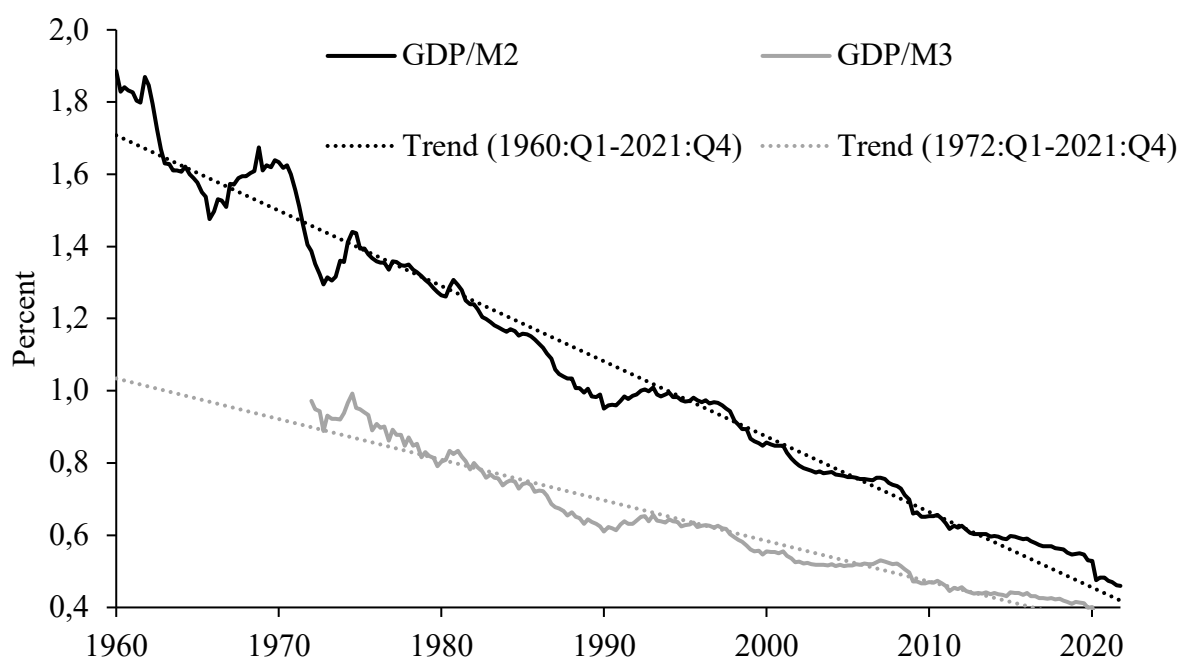
The Quantity Theory of Money is an identity relating the nominal value of output to the flow of money needed to allow goods and services to change hands from producers to consumers (Friedman 1987). The flow of money is given by the stock of available money times the “velocity” of money, which captures the frequency with which money changes hands within a certain period. If velocity is one, the money is identical to the flow of nominal production, i.e., as production moves from producers to consumers, money flows in the reverse direction. However, since raw materials, inputs, and production factors are also exchanged with money, and as money is also hoarded, velocity can take values above or below one, depending on the circumstances.

The Quantity Theory of Money can be used as a model for explaining inflation, if one assumes that production and velocity are given, and the money stock can be controlled by the central bank. Several central banks such as Deutsche Bundesbank (1998) have used money as an

intermediate instrument to steer inflation. Eventually, academics and central banks abandoned the monetarist approach to policy design on the grounds that it was difficult to identify what banks produced and the public used as money, or because the relationship between money supply and prices was seen unstable (De Grauwe and Polan 2005, Constâncio 2018).¹⁹

Concretely, the velocity of money – defined as M2 relative to nominal GDP – has gradually declined in Japan since the 1960s as shown in Figure 9. Over the whole period, the attractiveness of money as a store of value was increased by positive real interest rates on money balances (with 0.9% for 3-month rates on average since 1971, equation 7). This was hardly different from the 1.4% on 10-year government bonds and vastly better than the return from the Nikkei equity index, which is still a quarter below its peak from end-1989. The same trend can be also observed for M3.

Figure 9: Japan: Velocity of Money (Nominal GDP/M2, Nominal GDP/M3)



Source: Bank of Japan, Nikkei, OECD.

We use the identity to relate the consumer price inflation observed in Japan since the end of the bubble economy to the growth of money and real GDP. The residual captures changes in velocity and other factors, such as government control of prices. Thus, we subscribe to the more general monetarist view that money matters and consider the neglect of money in monetary

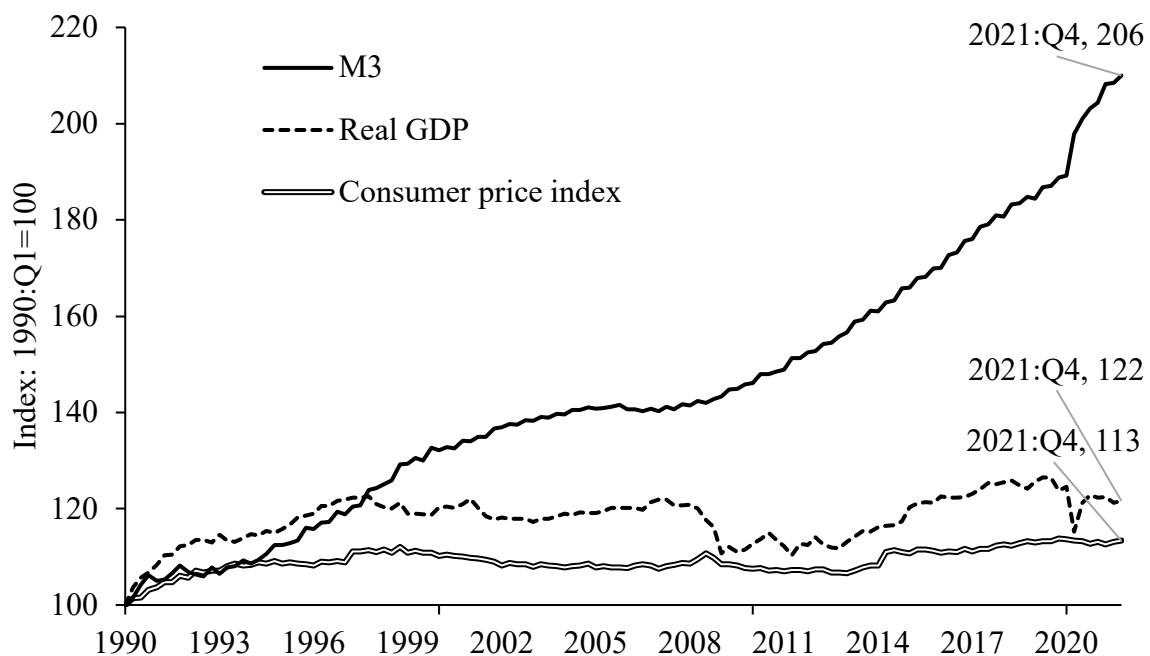
¹⁹ The European Central Bank (2021) sees “a weakening of the empirical link between monetary aggregates and inflation”.

policy as an overreaction to the problems encountered by the policy of monetary targeting. Since we do not intend to relate year-over-year inflation to year-over-year money growth, but put the focus on medium- and long-term trend our exercise is less sensitive to the precise definition of money and the lags in the effects of money growth on inflation.

Based on equations 5 and 6 it holds:

$$(9) \ dP/P = dM/M - dY/Y - \text{Residual}$$

Figure 10: Money M3, Real GDP and Consumer Price Level



Source: Bank of Japan, OECD.

The developments of the observable variables dP/P^{20} , dM/M and dY/Y since 1990 are shown in Figure 10. The enormous increase in the money stock (M3) did not translate into a respective increase in the price level. Out of the increase in the money stock M3 by 106%, only about 13 percentage points were absorbed by an increase in the (officially measured) consumer price level and 22 percentage points by the growth of real GDP. This leaves 71 percentage points for

²⁰ Note that the changes in the price level are linked to the approach to inflation measurement, which is subject to political decisions; which items are included and which items are not included.

the residual, which captures the decline in money velocity, i.e., money hoarding and other unidentified factors.

The fact that such a large part of the increase in the money stock did not translate into either higher prices or real GDP growth points to the importance of money as a store of wealth in an environment of very low inflation. Low inflation has been reinforced by government controls of prices via central bank-financed subsidies, which enhanced the purchasing power of savings in form of bank deposits (and cash) for both households and enterprises. Furthermore, net capital outflows may have played a role in mitigating consumer (and asset price) inflation in post-bubble Japan. Inflation can be assumed to also have a negative impact on wage negotiations, with low (officially measured) inflation eroding the ability of trade unions to demand higher wages.

5. Conclusion

After the burst of the bubble economy Japan has experienced a shift from a period with high growth and relative high inflation to a period of low inflation and low growth. The low inflation was widely regarded as surprising, as it came along with a strong monetary and fiscal expansion and thereby a fast-growing gap between money supply and nominal GDP. We have scrutinized this phenomenon using the Quantity Theory of Money as a theoretical framework.

We explain “lowflation” in Japan as the consequence of the demise of domestic real assets and bonds as stores of value in the wake of the burst of the bubble economy. Thus, the demand for money as a store of wealth increased, while the role of credit extension by banks to the private sector for money creation was weakened by the never-ending low interest rate policy. The attractiveness of bank deposits as a store of wealth was supported by government controls of prices and – for a long time – a low inflation environment on a global scale.²¹

Thus, on average the real interest rate on money balances has been positive since 1971 under both inflation periods. Government price controls also seem to have anchored inflation at a low level and insulated Japan from the recent increase in global commodity prices, increasingly since the burst of the bubble economy. Exchange rate stabilization in the form of foreign

²¹ See Goodhart and Pradhan (2020).

exchange interventions and keeping the interest rate in Japan persistently below the US interest rate have contributed to low inflation by encouraging money outflows.

There is a discussion concerning the “Japanization” of other industrial countries (Schnabl 2015). With respect to the impact of growing money supply on inflation our analysis suggests that the Japanese experience is specific. The reason is that an additional important determinant of low consumer price inflation has been an extraordinary degree of wage austerity, with the nominal wage level falling since the Japanese financial crisis in 1998 (Latsos and Schnabl 2021). Low inflation can be assumed to have contributed to this wage austerity.

Outside Japan, low inflation has not become so entrenched and real rates have in many cases been recently negative. Hence money is not similarly regarded as a safe store of wealth. Strong money creation fueled by extensive programs of “quantitative easing” in the US and Europe allow the initial cost-push inflation from higher commodity and input prices to broaden wage increases and eventually sustained consumer price inflation. Thus, negative welfare effects of persistently loose monetary policies are shifted to the households via inflation in most industrialized countries, whereas in Japan the transmission channel of the negative welfare effects of strong monetary expansion seems to have been nominal wage repression rather than financial repression.

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Appendix:

Table 1: Survey of Positions of Subsidies Provided by Japanese Ministries

農林水産省 Ministry of Agriculture, Forestry and Fisheries		
1	65061-2715-16 農業経営金融支援対策費補助金	Subsidy for interest on farmers' short-term borrowing cost from commercial banks.
2	65061-2715-16 農業者年金給付費等負担金	Subsidy for the farmers' pension system. In order to relieve the young farmers, the state finances the pension of the farmers who joined the farmers' pension system before the year 2001.
3	65061-2815-16 農地利用効率化等支援交付金	Subsidy for agricultural investments of farmers (e.g. 30% of the total investment amount).
4	65061-2405-16 株式会社日本政策金融公庫補給金	Subsidy for the interest cost in taking public loans (Japan Finance Corporation) by farmers.
5	65061-1825-16 農地集積・集約化等対策整備交付金	Subsidy to the local authority (農地中間管理機構), which promotes the agglomeration and renovation of the cultivated areas.
6	65061-2405-16 国産農産物生産基盤強化等対策事業費補助金 持続的生産強化対策事業推進費補助金	Subsidy for farmers and local authorities investing in production capacities, e.g. introduction of robots or artificial intelligence.
7	65061-2305-16 野菜価格安定対策費補助金	Subsidy for farmers when vegetable prices fall. (Consumers benefit from the falling prices and producers benefit from the oversupply because the falling price is compensated by the state).
8	65061-2405-16 鶏卵価格安定対策費補助金	As with the vegetable.
9	65061-2405-16 水田活用直接支払交付金	Subsidy for farmers producing grain, soybean, fodder rice, rice for rice flour, etc. in the wet rice field.
10	65065-2305-16 農畜産業振興対策交付金	Subsidy for farmers who sell cow milk for dairy products, e.g. butter, skim milk powder, etc.
11	65061-1865-16 国産農産物生産基盤強化等対策整備交付金 食肉流通構造高度化・輸出拡大事業交付金	Subsidy for the meat industry (livestock farmers, meat processing companies, meat transport companies).
12	65061-1865-16 農業・食品産業強化対策整備交付金	Subsidy for organizations of farmers for infrastructure of agricultural and food products (facility for collection and delivery).
13	65061-2815-16 日本型直接支払交付金	Subsidy for local authorities and organizations of farmers for agricultural production.
14	46052-1825-00 農業競争力強化基盤整備事業費補助	Subsidy to the local authorities (農地中間管理機構), which are responsible for the agglomeration and renovation of the cultivation areas. The difference to 65061-1825-16 農地集積・集約化等対策整備交付金 is unclear.
15	65061-2815-16 農山漁村活性化対策推進交付金	Subsidy for organizations and local authorities for the revitalization of peasant, mountain and fishing villages.
16	46052-1825-00 農山漁村地域整備交付金	Subsidy for local authorities for infrastructure.
17	13061-2305-16	Subsidy for the public National Agriculture and Food Research Organization.

	国立研究開発法人農業・食品産業技術総合研究機構農業技術研究業務勘定運営費交付金	
18	13061-2305-16 国立研究開発法人国際農林水産業研究センター運営費交付金	Subsidy for the public Japan International Research Center for Agricultural Sciences.
19	13061-2305-16 国立研究開発法人森林研究・整備機構研究・育種勘定運営費交付金	Subsidy for the public Forest Research and Management Organization.
20	13061-2305-16 国立研究開発法人水産研究・教育機構研究・教育勘定運営費交付金	Subsidy for the public Japan Fisheries Research and Education Agency.
21	65061-2405-16 漁業経営安定対策事業費補助金	Subsidy for the fishing association and private organisations for the promotion of the fishing industry and support for fishermen's borrowing (guarantee, guaranteed debt assumption).
22	46052-1825-00 水産物供給基盤整備事業費補助	Subsidy to local authorities for fisheries infrastructure.
経済産業省 Ministry of Economy, Trade and Industry		
1	95062-2305-16 独立行政法人経済産業研究所運営費交付金	Subsidy for research at The Research Institute of Economy, Trade and Industry (RIETI).
2	13062-2305- 国立研究開発法人産業技術総合研究所運営費交付金	Subsidy for research at The National Institute of Advanced Industrial Science and Technology.
3	13062-2405-16 産業技術実用化開発事業費補助金	Subsidy for small and medium-sized enterprises in the space industry.
4	13062-2305-16 医療研究開発推進事業費補助金	Subsidy to research institutes for medical research.
5	60062-2405-16 中小企業経営支援等対策費補助金	Subsidy to the association and private organisation for jobs for young people in regional small and medium-sized enterprises.
6	13062-2305-16 独立行政法人情報処理推進機構一般勘定運営費交付金	Subsidy for the Information Technology Promotion Agency.
7	60062-2125-14 サービス産業強化事業委託費	Subsidy for the companies providing dementia services or products.
8	95062-2305-16 独立行政法人日本貿易振興機構運営費交付金	Subsidy to Japan External Trade Organization (JETRO) for supporting small and medium-sized enterprises' export business and foreign investment in Japan.
9	60062-2305-16 中小企業海外市場開拓支援事業費補助金	Subsidy to Japan External Trade Organization (JETRO) for the support of exports of small and medium-sized enterprises (financing of participation in trade fairs abroad).
10	45052-1925-00 工業用水道事業費補助	Subsidy for the municipality for the infrastructure of service water for industry.
11	95062-2405-16 独立行政法人石油天然ガス・金属鉱物資源機構金属鉱業一般勘定運営費交付金	Subsidy for the Japan Oil, Gas and Metals National Corporation for the stable supply of raw materials.

12	60062-2125-14 中小企業経営支援等 対策委託費	Subsidy for private organisations for the support of small and medium enterprises facing financial difficulties.
13	60062-2405-16 中小企業経営支援等 対策費補助金	Subsidy for private organisation for the support of small and medium-sized enterprises facing financial difficulties or planning M&A.
14	60062-2405-16 中小企業海外展開等 支援事業費補助金	Subsidy for private organisations for the support of small and medium-sized enterprises in export activities.
15	60062-2305-16 独立行政法人中小企業基盤整備機構一般勘定運営費交付金	Subsidy to the Organization for Small & Medium Enterprises and Regional Innovation for the support of small and medium enterprises.
16	60062-2925-16 経営安定関連保証等 基金補助金	Subsidy for the National Federation of Credit Guarantee Corporations for the cost of default on bank loans to small and medium enterprises.
国土交通省 Ministry of Land, Infrastructure, Transport and Tourism		
1	44084-2405-00 優良住宅整備促進等事業費補助	Subsidy for the Japan Housing Finance Agency for construction loan interest rates.
2	44084-1865-00 公営住宅整備費等補助	Subsidy for local authorities for public housing.
3	95016-2405-16 住宅市場整備推進等事業費補助金	Subsidy for private organisations for the development of the housing market.
4	44052-1825-00 無電柱化推進事業費補助	Subsidy for local authorities for the removal of the electricity pylons.
5	45086-1305-00 水道水源開発施設整備費補助	Subsidy for Japan Water Agency for water pipelines.
6	46052-1305-00 農業農村整備事業費 補助	Subsidy for Japan Water Agency for the water pipelines for agriculture.
7	45052-1825-00 都市公園事業費補助	Subsidy for local authorities for the development of parks in cities.
8	45052-1825-00 下水道事業費補助	Subsidy for local authorities for sewers.
9	95016-2405-16 住宅・建築物環境対策事業費補助金	Subsidy to private organisations that build energy-saving houses.
10	44084-1865-00 住宅市街地総合整備促進事業費補助	Subsidy for local authorities for housing in cities.
11	41051-1825-00 治水ダム等建設事業費補助	Subsidy to local authorities for dam construction
12	43052-1925-00 鉄道施設総合安全対策事業費補助	Subsidy for the Japan Railway Construction, Transport and Technology Agency for the railway infrastructure.
13	42052-1825-00 道路更新防災等対策事業費補助	Subsidy for local authorities for road construction.
14	43052-1925-00 整備新幹線整備事業費補助	Subsidy for the Japan Railway Construction, Transport and Technology Agency for Shinkansen rail construction.
15	44052-1825-00 都市構造再編集中支援事業費補助	Subsidy for municipalities for urban construction.
16	47052-1825-00 社会資本整備総合交付金	Subsidy for local authorities for regional development.
17	13054-2305-16 国立研究開発法人土木研究所運営費交付金	Subsidy to the public Public Works Research Institute.

18	13054-2305-16 国立研究開発法人建築研究所運営費交付金	Subsidy for the public Building Research Institute.
19	13054-2305-16 国立研究開発法人海上・港湾・航空技術研究所運営費交付金	Subsidy for the public National Maritime Research Institute.
厚生労働省 Ministry of Health, Labour and Welfare		
1	07086-2125-14 医療提供体制確保対策等委託費	Subsidy for the private organisations for medical services.
2	07086-2815-16 医療施設運営費等補助金	Subsidy for the prefectures for medical facilities.
3	07086-2405-16 国立研究開発法人国立がん研究センター運営費交付金	Subsidy for the National Cancer Center Hospital.
4	07086-2405-16 国立研究開発法人国立循環器病研究センター運営費交付金	Subsidy for the National Cerebral and Cardiovascular Center.
5	07086-2405-16 国立研究開発法人国立精神・神経医療研究センター運営費交付金	Subsidy for the National Center of Neurology and Psychiatry.
6	07086-2405-16 国立研究開発法人国立国際医療研究センター運営費交付金	Subsidy for the National Center for Global Health and Medicine.
7	07086-2405-16 国立研究開発法人国立長寿医療研究センター運営費交付金	Subsidy for the National Center for Geriatrics and Gerontology.
8	03086-2865-16 医療介護提供体制改革推進交付金	Subsidy for the prefectures for the health system.
9	03081-2715-16 全国健康保険協会保険給付費等補助金	Subsidy for the Japan Health Insurance Association for health insurance support.
10	06083-2815-16 保育対策事業費補助金	Subsidy for the local authorities for childcare.
11	06083-1825-16 保育所等整備交付金	Subsidy for the local authorities for the construction of crèches.
12	06083-2815-16 子ども・子育て支援対策推進事業費補助金	Subsidy for the local authorities for child benefit etc.
13	03082-2845-16 医療扶助費等負担金	Subsidy for the local authorities for social assistance.
14	02081-2715-16 国民年金基金等給付費負担金	Subsidy for the Japan National Pension Fund

Source: Ministry of Finance. The survey includes the most important positions of the most important ministries.