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Japan's Low Inflation from a Quantity Theory Perspective

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Japan's Low Inflation from a Quantity Theory Perspective

Abstract

The paper examines the relationship between money and prices in Japan based on Fisher's (1911) transactions version of the quantity theory of money. Money is defined as aggregate debt less net foreign assets. A general price index is constructed from consumer prices, real estate prices, stock prices, nominal wages and the nominal effective exchange rate. Evidence shows a high correlation between money growth and general price inflation for Japan from 1980 to 2022, supporting the view that inflation is a monetary phenomenon. The paper argues that Japan's inflation has remained low since the 1990s because the policy mix of monetary and fiscal expansion led to the fall of private debt and the rise of government debt, resulting in a low money growth at the aggregate level. An exit from monetary and fiscal expansion would contribute to the recovery of private debt creation, which would restore the money, price and growth dynamics in Japan.

JEL-Codes: E310, E520.

Keywords: quantity theory of money, inflation, monetary policy.

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1. Introduction

Japan has been struggling with a persistent deflationary pressure. Despite the low-, zero- and negative interest policy, the quantitative easing of the Bank of Japan, the chronic fiscal deficits and strong debt accumulation by the Japanese government from the 1990s, the average consumer price inflation for the period 1990-2022 was 0.5% per year. In 2023, like in the year 2022, the US and Europe experienced high consumer price inflation (4.1% in the US, 8.5% in the euro area and 5.4% in the UK), whereas Japan saw consumer price inflation at 3.2%.

The paper examines Japan's persistently low inflation from a quantity theory perspective. The modern definition of money is monetary aggregates M1 or M2 (De Grauwe/Polan 2005), which is similar to the monetarist definition of money, i.e. bank deposits plus currency in circulation (Friedman/Schwartz 1963). This definition of money captures the size of debt financed by the banking sector. If the banking sector, for instance, buys corporate bonds, it creates deposits for firms which can be used to finance investment. If the banking sector sells the bonds to the nonbanking sector, e.g. households, it reduces deposits held by the nonbanking sector. The debt financing by the nonbanking sector, in other words, is outside the common definition of money.

Monetary aggregates might be a poor guide to measuring the quantity of money in Japan as the banking sector lost dominance as the financier of private debt. From 1980 to 2022 the share of bank credit in the corporate liabilities fell from 42% to 27%, whereas the share of corporate bonds and stocks rose from 29% to 58%, which are to a large extent held by the nonbanking sector. The shift toward the debt financing by the nonbanking sector is not captured by monetary aggregates. The paper defines money as the aggregate debt of households, firms and general government less net foreign assets. What is central to the quantity theory analysis on the money-price relationship is not how the debt financing by the banking sector affects prices, but how the debt financing by the whole economy including the nonbanking sector affects prices.

Regarding the effect of money on prices, the paper follows Fisher's tradition. Irving Fisher (1911: 105) argued that the effect of a change in the quantity of money is reflected in general prices as "*prices never do move in perfect union. [...] any deficiency in the movement of some prices must cause an excess in the movement of others*".¹ Prices with low adjustability to monetary fluctuations, e.g. prices fixed by law or controlled by the government, were assumed

¹ It contrasts with the Chicago quantity theory which assumes the movement of general prices to be captured by the GDP deflator or the consumer price index (Friedman 1963, 1969, 1987, Friedman/Schwartz 1963, 1970, 1982).

to transmit the monetary effect to prices with high adjustability, e.g. stock, real estate and raw material prices. To capture the heterogeneous price adjustment, the paper constructs a general price index based on consumer prices, asset prices, nominal wages and the nominal effective exchange rate.

Evidence for Japan from 1980 to 2022 shows that changes in the quantity of money measured by total debt are, all else being equal, highly correlated with changes in the general price index (Pearson's $r = 0.78$), supporting the view that Japan's low inflation is first and foremost a monetary phenomenon. Japan's low inflation model would be desirable if it were combined with higher productivity growth (Hayek 1967 [1935]) or higher economic growth (Friedman 1969).² Yet given the falling real wages from the late 1990s and the average real GDP growth of 0.8% from 1990 to 2022, Japan seems to be in an unhealthy deflationary environment.

The paper argues that Japan's expansionary monetary and fiscal policy failed to produce consumer price inflation because the policy mix led to the substitution of private debt by government debt, which depressed the private debt growth. From 1990 to 2022 the government debt has grown in average by 5.3% per year, whereas the household and corporate debt has grown in average by 0.7% per year. Fiscal and monetary tightening are recommended to correct the distorted monetary structure and to restore a healthy money, price and growth dynamics.

2. The Quantity of Money in Japan

With the bursting of the Japanese bubble economy in 1990, Japan left a period of high growth of money and entered a period of low growth of money.

2.1. Definition of Money

The definition of money has evolved over time (Davies 2002). In the field of the quantity theory of money, the classical economists, such as Sir William Petty, John Locke, Alfred Marshall and Knut Wicksell, defined gold and silver as money (Humphrey 1993, 1997). Irving Fisher (1911) extended the definition of money to money consisting of gold, banknotes convertible into gold and bank deposits. Fisher included bank deposits as a rapid growth of bank deposits in the US allowed to settle the considerable volume of transactions without resorting to money consisting of gold and gold convertible banknotes. After the collapse of the gold standard in

² "That there is no harm in prices falling as productivity increases has been pointed out again and again, e.g. by A. Marshall, N.G. Pierson, W. Lexis, F.Y. Edgeworth, F.W. Taussig, L. Mises, A.C. Pigou, D.H. Robertson and G. Haberler ..." (Hayek 1967 [1935]: 106).

the 1930s and the Bretton Woods system in the 1970s, it has become common to view bank deposits and currency in circulation, i.e. M1 or M2, as money (Belongia/Chalfant 1990).³

The modern definition of money revolving around bank deposits reflects the debt financing by the banking sector (Werner 1997). When the banking sector advances loans to or purchases bonds or shares from the nonbanking sector, the debt financing creates bank deposits (McLeay et al. 2014). As banks do not lend savings in the form of existing deposits but create new deposits *ex nihilo* (Wicksell 1935, Holmes 1969, Federal Reserve Bank of Chicago 1994, McLeay et al. 2014, Deutsche Bundesbank 2017), the debt financing by the banking sector equals to the creation of purchasing power (Disyatat 2010, Borio 2012).⁴

Yet the banking sector does not finance the entire debt in the economy. Financial markets have greatly grown through the financial liberalization under the fiat monetary regime since the 1970s (Bayoumi/Macdonald 1995, Borio 2014). The corporate financing developed from own capital through bank credit to a mix of bank credit as well as stock and bond issuances (Demirgüç-Kunt/Levine 1996, Bolton/Freixas 2000). As of 2022, Japan's domestic banking and nonbanking sector (e.g. insurance firms, pension funds, households, foreign investors) hold 64% and 36% of the Japanese government bonds, 41% and 59% of corporate bonds and 25% and 75% of corporate stocks, respectively. The debt financing by the nonbanking sector creates no deposits.⁵ What the debt financing by the banking and nonbanking sector has in common is, in essence, the financing of expenditures which inevitably affect prices.

The paper thus explores an alternative definition of money. The debt financing by the banking sector (deposit creation) and the nonbanking sector (no deposit creation) has both equally important inflationary forces because the borrowers can be assumed to take on debt to finance expenditures. In light of the quantity equation, the quantity of money (M) is defined as total

³ The IMF contributed to the standardization of money statistics from the 1960s (Bank of Japan 2021).

⁴ “... the bank cannot lend in concrete a farthing of the money deposited with it, because it would flow back to the bank in the form of deposits as soon as it had been used. The lending operations of the bank will consist rather in its entering in its books a fictitious deposit equal to the amount of the loan ...” (Wicksell 1935: 84-85); “In the real world, banks extend credit, creating deposits in the process, and look for the reserves later” (Holmes 1969: 73); “In the absence of legal reserve requirements, banks can build up deposits by increasing loans and investments so long as they keep enough currency on hand to redeem whatever amounts the holders of deposits want to convert into currency” (Federal Reserve Bank of Chicago 1994: 3); “Rather than banks receiving deposits when households save and then lending them out, bank lending creates deposits” (McLeay et al. 2014: 1); “... a bank can grant loans without any prior inflows of customer deposits. ... when a bank grants a loan, it posts the associated credit entry for the customer as a sight deposit ... This refutes a popular misconception that banks act simply as intermediaries at the time of lending – ie that banks can only grant loans using funds placed with them previously as deposits by other customers” (Deutsche Bundesbank 2017: 17).

⁵ When a bank buys government bonds from the government it creates bank deposits. When the bank sells the bonds to the nonbanking sector, e.g. insurance firms, the amount of bank deposits returns to the previous level.

debt in the domestic economy. Net foreign capital inflows increase M as the amount of foreign bank deposits flowing into the domestic economy exceeds the amount of domestic bank deposits flowing out of the domestic economy, and vice versa for net capital outflows.

The modification of the definition of money is in line with past theoretical considerations in the quantity theory of money. In his seminal work on the quantity theory *Purchasing Power of Money* (1911) Fisher's definition of the quantity of money encompassed not only money consisting of gold and banknotes convertible into gold, but also bank deposits which Fisher initially did not classify as money. Bank deposits entered the quantity analysis later because Fisher viewed that changes in bank deposits could be responsible for changes in prices and possibly be controllable by policy instruments (see Humphrey 1997, Iša 2002).

Defining debt as money is based on Hayek's (1967 [1935]) view that the quantity of money and the volume of payments made during a given period are equivalent. Hayek saw an increase of transactions not as an acceleration of the velocity of money but as an increase of the quantity of money.⁶ For instance, the quantity of money increases when firms settle payments, irrespective of whether the financing comes from bank borrowing, which inevitably increases deposits, or bond issuances, which may not have the same effect. The view that money and debt are equivalent is also echoed in Gurley and Shaw (1960), Werner (2012) and Hülsmann (2013).⁷

While defining debt as money goes beyond "*currency plus all deposits in commercial banks*" (Friedman and Schwartz 1963: 4), it is not conflicting with the original monetarist view that an appropriate definition of money "*may well vary with time and place and may differ according to the phenomena to be predicted*" (Friedman/Schwartz 1970: 1).⁸ Friedman also noted that "*there is no hard-and-fast line between 'money' and other assets*" (Friedman 1956: 158), expressing the view that the role of financial assets is as important as the role of the narrowly defined money in business cycles (Friedman/Schwartz 1963).

⁶ "Up to this point I have treated the quantity of money in circulation and the number of payments effected during a given period of time as equivalent concepts, a method of procedure which implied the assumption that the velocity of circulation is constant" (Hayek 1967 [1935]: 296). See also Horwitz (2016).

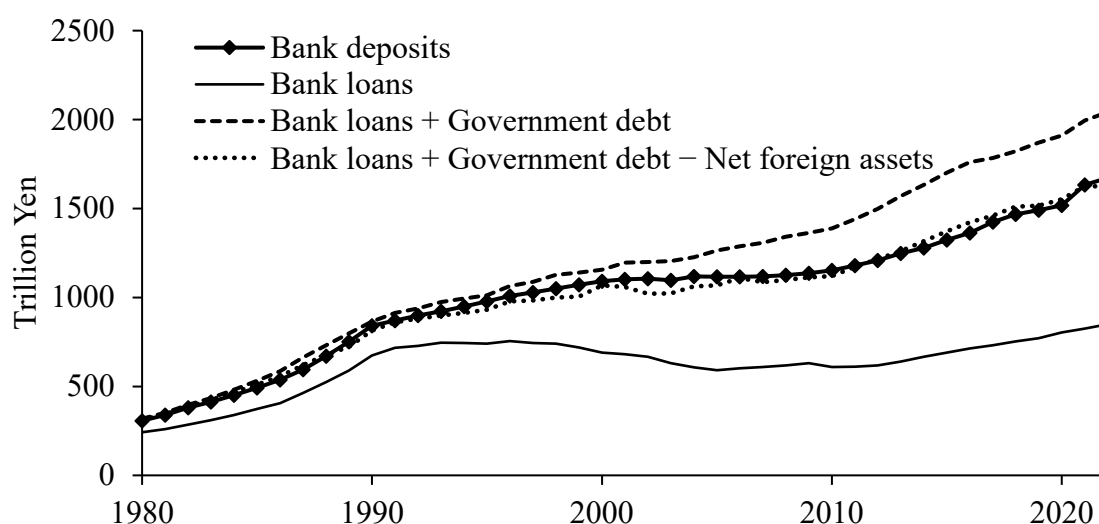
⁷ Gurley and Shaw (1960) argued that deposits at banks and other financial intermediaries are substitutes and thus both liabilities should be viewed as money as opposed to the view of Friedman and Schwartz (1970). Hülsmann (2013: 5) treats money and debt as equivalent: "... fiat money systems such as ours, in which money is being created in the form of debt, financial markets tend to grow faster than in commodity money systems".

⁸ The monetarists chose the narrow definition of money for empirical convenience to analyze the US economy (Friedman/Schwartz 1970). This could be the reason why De Grauwe and Polan (2005) found that there is no consensus on which monetary aggregates should be used in empirical literature.

2.2. Money Creation and Banking Sector

The debt financing by the banking sector involves deposit creation. Figure 1 shows that the development of bank deposits in Japan depends on three determinants: bank loans, government debt and net international investment position.⁹ Until the end of the Japanese bubble economy in the early 1990s, the growth of deposits was closely tied to the growth of bank loans. When the Bank of Japan lowered its policy rate from 5% in 1985 to 2.5% in 1987, households and firms substantially increased bank borrowing, which had been the driver of the Japanese asset price bubble (Iwaisako/Ito 1995, Bordo/Jeanne 2002). The intention of interest rate cuts was to counteract the sharp appreciation of the Japanese yen following the Plaza-Agreement in September 1985 and its negative impacts on the real economy (Noguchi 1992).¹⁰

Figure 1: Three Macroeconomic Components of Bank Deposits in Japan



Source: Bank of Japan. Notes: Bank deposits include bank deposits at all financial institutions (excluding the Bank of Japan) and currency in circulation.

The 1990s mark the beginning of Japan's long-term recession. The policy rate hikes by the Bank of Japan from 2.5% in 1989 to 6% in 1991 curbed the excessive growth of bank loans from the late 1980s, which triggered the collapse of asset prices. The decision on monetary tightening reflected concern over the spillover effect from the growing quantity of money and

⁹ Mayer and Schnabl (2022) find a similar relationship by focusing on M3 and the outstanding amount of government bonds for Japan.

¹⁰ On September 22 1985, the finance ministers of the G5-countries (Japan, US, UK, West-Germany and France) agreed on a depreciation of the US Dollar and an appreciation of the Japanese yen. The resulting yen appreciation by about 50% was more than intended by the Plaza Agreement, throwing Japan into a recession (Funabashi 1989).

the rising asset prices to consumer prices (Okina et al. 2001, Shiratsuka 2005).¹¹ Bank loans have since then lost the relevance of deposit creation as in the past (see Figure 1).

The weak demand for bank lending to firms and households sparked a voluminous literature. Yamaguchi (2002), Woo (2003) and Watanabe (2007) argue that the falling asset prices impaired the banks' balance sheets, resulting in a credit crunch. Hoshi (2000), Saita and Sekine (2001) and Sekine et al. (2003) argue that Japanese banks engaged in forbearance lending to highly indebted firms with low profitability to prevent the entire loans from becoming nonperforming. Peek and Rosengren (2005) called the phenomenon of forbearance lending as evergreening loans, which hindered Japanese banks from extending loans to more productive firms. With focus on the demand side of credit, Koo (2003, 2011) argues that the excessive debt burdens after the bust of the Japanese bubble economy forced firms and households to focus on the debt minimization rather than on profit or utility maximization.

Yet little has been written about the relationship between bank deposits and government debt in Japan. When the banking sector purchases government bonds it leads to the creation of bank deposits in the same way as bank loans (McLeay et al. 2014). Unless the nonbanking sector purchases government bonds from the banking sector, fiscal deficits equal to deposit creation (Deutsche Bundesbank 2017).¹² The persistent fiscal deficits and debt accumulation supported by interest rate cuts and asset purchases by the Bank of Japan (Schnabl 2015, Murai/Schnabl 2021) have sustained the overall growth of bank deposits from the 1990s (dashed line in Figure 1). Put differently, the amount of bank deposits in the Japanese economy until the bursting of the bubble economy had grown because the Japanese banking sector had financed the creation of private debt through bank loans to firms and households. By contrast, the amount of bank deposits from the 1990s has grown because the Japanese banking sector including the Bank of Japan has financed the creation of government debt through government bond purchases.

Furthermore, the persistently low interest rates in Japan relative to other industrialized countries encouraged capital outflows and discouraged capital inflows. The resulting increase of Japan's net foreign assets from 50 trillion yen to 418 trillion yen from 1990 and 2022 implies

¹¹ Several officials at the Bank of Japan had expressed concern over the rapid growth of money and asset prices. Yasushi Mieno, the 26th Governor of the Bank of Japan, viewed Japan as being on dry wood, which could catch fire at any moment, implying the risk of consumer price inflation. See Okina et al. (2001).

¹² From 2020 to 2022, the government expenditures for the coronavirus crisis amounting to about 100 trillion yen roughly matched to the increase of household deposits by 55 trillion yen and corporate deposits by 49 trillion yen (Nihon Keizai Shimbun 2023). The increase of deposits corresponding to the increase of government spending implies that there was little or no money creation by the private sector.

that about one fourth of the amount of bank deposits drained out of the Japanese economy (dotted line in Figure 1). The accumulation of Japan's net foreign assets also represents a divergence between domestic production and money creation. Fiscal deficits increase bank deposits but neither increase nor allocate real resources efficiently in contrast to bank loans to the private sector.¹³

2.3. Money Creation and Nonbanking Sector

The nonbanking sector does not create deposits but contributes to the debt financing. When the banking sector buys financial assets from the nonbanking sector, e.g. corporate bonds, it creates deposits and debt. This equals an increase of assets and liabilities in terms of the balance sheet of the banking sector. If the banking sector sells the bonds to the nonbanking sector, e.g. insurance firms, the assets and liabilities of the banking sector return to the previous level as the amount of deposits held by insurance firms declines. The size of debt in the economy, however, remains at an increased level as the sale of the bonds from the banking sector to the nonbanking sector does not reduce debt. Put differently, the size of debt can exceed the amount of bank deposits.

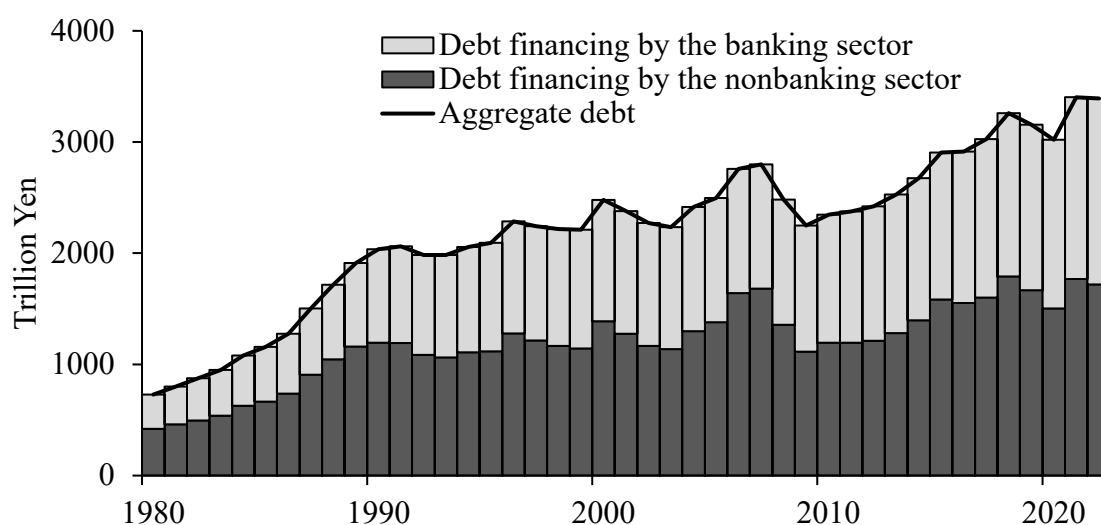
The debt financing by the banking and nonbanking sector are both linked to the financing of expenditures which inevitably affect prices. For the quantity theory analysis of money, it is thus less appropriate to pay attention to monetary aggregates, which only capture the debt financing by the banking sector. It is more appropriate to pay attention to aggregate debt as a proxy for overall money. To put Fisher's (1911) view into our context, the debt financing by the nonbanking sector which involves no deposit creation *magnifies* the monetary effect on prices produced by the debt financing by the banking sector which involves deposit creation.¹⁴

Figure 2 shows that Japan's aggregate debt in the year 2022 was about 3392 trillion yen, or 609% of GDP. 49% of aggregate debt is the debt financing by the banking sector which reflects the amount of bank deposits. 51% of aggregate debt is the debt financing by the nonbanking sector which involves no deposit creation.

¹³ See Hayek (1945) for the advantage of the market over the government in resource allocation.

¹⁴ "The existence of bank deposits merely *magnifies* the effect on the level of prices produced by the quantity of money in circulation" (Fisher 1911: 40; italics in original). See also Section 3.1.

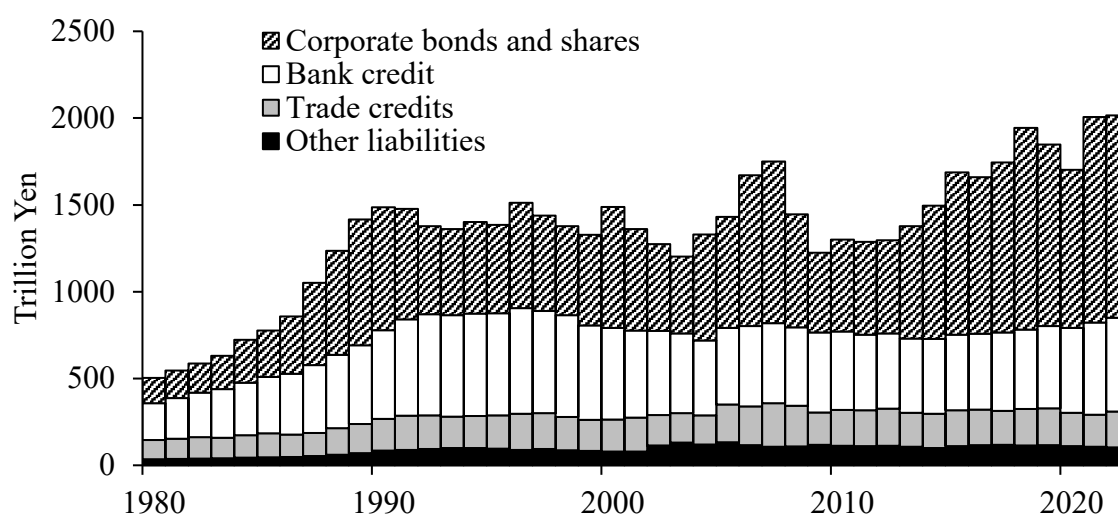
Figure 2: Debt Financing by the Banking Sector and by the Nonbanking Sector



Source: Bank of Japan.

The growing importance of the debt financing by the nonbanking sector is visible in the corporate sector (Figure 3). From 1980 to 2022, the share of bank credit in the corporate liabilities fell from 42% to 27%, whereas the share of corporate bonds and stocks rose from 29% to 58%. This implies that the Japanese corporate financing shifted from bank credit which creates deposits to the financing from the nonbanking sector which creates no deposits. The metamorphosis of the Japanese corporate financing from the bursting of the bubble economy in the 1990s came along with the rise of the Japanese government as the central player of deposit creation (see Figure 1). As the banking sector including the Bank of Japan is the major holder of the Japanese government bonds (65% in 2023), the persistent fiscal deficits and debt accumulation became the main driver of deposit growth, and therefore the creation of money.

Figure 3: Debt Structure of Japanese Firms



Source: Bank of Japan.

Seen through the historical lens, the definition of money was modified in line with the prevalent medium of settlements. Fisher (1911), for instance, included bank deposits as an additional component of changes in the quantity of money to capture the monetary effect on prices. What matters in the context of the modern economy is to capture the monetary effect on prices which can result from changes not only in the debt financed by the banking sector but also in the debt financed by the nonbanking sector. An analysis focusing on the debt financing by the banking sector alone, i.e. the use of monetary aggregates as a proxy for money, is overlooking the effect on prices of the debt creation by the nonbanking sector.¹⁵

3. Two Versions of the Quantity Theory of Money

Japan's low consumer price inflation since the mid 1980s exposes the limitations of Friedman's income version which simplified Fisher's transactions version of the quantity theory of money.

3.1. From the Transactions Version to the Income Version

Humphrey (1997) traces the origin of the quantity theory of money to Spanish scholastic writers of the Salamanca School in the 16th century (see also Johnson et al. 2013).¹⁶ Fisher (1911) cites Newcomb (1885) as the first who made a mathematical expression of the transactions version of the quantity theory of money.¹⁷ In his seminal book *The Purchasing Power of Money*, Fisher presented the transactions version to expose the causation running from money to prices:

$$(1) MV + M'V' = PT$$

where M is the amount of gold and gold convertible banknotes, V is the velocity of circulation of M , M' is the amount of bank deposits, V' is the velocity of circulation of M' , P is the general price level, and T is the total volume of transactions. The left-hand side of the quantity equation shows the total quantity of money spent on all transactions. The right-hand side of the quantity equation shows the total monetary value of all transactions. As expenditures must equal to

¹⁵ The banking sector holds 41% of corporate bonds (Financial Services Agency 2022) and 25% of corporate shares (Japan Exchange Group 2023). Yet the rest of the corporate financing by the nonbanking sector creates no deposits. For the quantity theory analysis of money, it is thus more suited to include the debt financing by the nonbanking sector as it is linked to the financing of expenditures which inevitably affect prices.

¹⁶ There was a consensus among many scholars of the Salamanca School, e.g. de Vitoria, de Soto, and Saravia de la Calle, that the quantity of money is the central determinant of the value of money, or prices (Baeck 1988). The rise of attention to the quantity relationship between money and prices in the Salamanca School is attributed to the influx of American gold and silver, which led to the rise of the price level in Spain (Grice-Hutchinson 1952).

¹⁷ Newcomb (1885: 338) expressed the quantity theory as $VR = KP$: V measures the amount of currency, e.g. coin, banknote, cheque, and credit in circulation. R measures the average number of times which each dollar changes hands. K measures the total transfers of wealth and services. P measures the general scale of prices. Johnson and Cate (2000) note that the work by Locke (1691) influenced the work by Newcomb (1885) and Fisher (1911).

receipts, the quantity equation is an identity (Fisher 1911, Humphrey 1974, Evans/Thorpe 2013).

Fisher distinguished between M and M' as he viewed metallic money consisting of gold and banknotes convertible into gold as money but bank deposits not as money. Yet, bank deposits entered the equation as the growing acceptance of bank deposits was seen as a new inflationary force. The general price level P consists of prices of goods, services, real estates, stocks, bonds, wages and other goods in sales.¹⁸ Fisher focused on general prices based on the view that a change in the quantity of money would never move all prices in the same direction and to the same extent. The monetary effect on prices was assumed to be absorbed less by prices with low adjustability, e.g. prices fixed by law or controlled by the government, and more by prices with high adjustability, e.g. prices of stocks, real estates and raw materials. An increase of money leads to an inflation of general prices, while it may inflate one price and deflate another.

Fisher's transactions version did not become a prevalent framework of the quantity theory of money as there is no statistical measurement for T , the total value of transactions for all goods comprising general prices (Johnson et al. 2013). Therefore, the monetarist school led by Milton Friedman replaced the volume of transactions T with national income Y and proxied general prices P with the GDP-deflator or consumer prices. It gave rise to the income version of the quantity equation which has become synonymous with the quantity theory of money:

$$(2) \quad MV = PY$$

where M is monetary aggregates (bank deposits plus currency in circulation), V is the velocity of circulation of M (the average number of times money is exchanged for goods for a given period), P is the GDP deflator or consumer prices, and Y is the real GDP. Friedman and Schwartz (1982) show a close correlation between the growth rate of the quantity of money as measured by M2 and the inflation rate as measured by the GDP deflator in the US from the 1870s to the 1970s. The income version gained widespread interest and acceptance also because the System of National Accounts was improved. The better data availability of GNP and later GDP sparked a voluminous literature based on the income version.¹⁹

¹⁸ Fisher (1911: 106): "*The term "goods,"... is a collective term comprising all wealth, property, and services, these being the magnitudes designated in sales. [...] Wealth: Real estate, Commodities; Property: Stocks, Bonds, Mortgages, Private notes, Time bills of exchange; Services: of rented real estate, of rented commodities, of hired workers, of some or all these agencies combined*". See also Chapter X "*The Best Index Numbers of Purchasing Power*" (Fisher 1911: 113-130).

¹⁹ Before the switch from GNP to GDP in the 1990s (US in 1991, Japan in 1993, Germany in 1999), GNP was commonly used as a proxy for the volume of transactions in the economy. See also Pigou (1917).

3.2. Problems with the Income Version

The transition from the transactions version to the income version involved two assumptions. First, the income version assumes the total value of output Y to be able to approximate the total volume of transactions T (Mankiw 2010). Fisher's transactions version includes all transactions which involve a transfer of money, regardless of whether a transaction is related to the financial or real side of the economy.²⁰ By contrast, the income version includes only GDP-related transactions (Werner 2005). It excludes all non-GDP-related transactions, such as transactions for intermediate goods and services; financial transactions for real estates, stocks or bonds; transactions for purchases of existing houses or cars; government transfer transactions such as social securities and subsidies.²¹ Put differently, the income version assumes GDP-related transactions to be able to approximate all the non-GDP-related transactions (Friedman 1987).

Second, the income version assumes that the GDP-deflator or the consumer price index are able to approximate general prices. Fisher's transactions version was built on the view that there are prices with low adjustability to changes in the quantity of money, e.g. prices fixed by law or controlled by the government, and prices with high adjustability, e.g. prices of stocks, real estates and raw materials. The income version did not inherit the heterogeneous price adjustability to monetary effects, making little contributions to the approach to general prices.

The transactions and income version would reach the same conclusion if the total value of transactions for all goods T and the total value of output as well as general prices and the GDP-deflator or the consumer price index move in perfect unison. If money growth and stock market transactions both rise by 1%, the transactions version shows no effect on money velocity and general prices. Yet the income version shows a falling velocity as the stock market transactions are outside GDP-related transactions Y . If money growth stimulates stock prices the transactions version shows an increase of general prices. Yet the income version shows a falling velocity as stock prices are outside the GDP deflator or the consumer price index. The income version, in other words, fails to expose the proportional money-price relationship if changes in

²⁰ "In the transactions version of the quantity equation, each intermediate transaction - that is, purchase by one enterprise from another - is included at the total value of the transaction, so that the value of wheat, for example, is included once when it is sold by the farmer to the mill, a second time when the mill sells flour to the baker, a third time when the baker sells bread to the grocer, a fourth time when the grocer sells bread to the consumer. In the income version, only the net value added by each of these transactions is included" (Friedman 1987: 6).

²¹ The GDP statistics captures only a part of real estate transactions (Werner 1992).

the quantity of money are related to the transactions outside the GDP accounting or if changes in the quantity of money affect prices outside the GDP deflator or the consumer price index.²²

The income version also fails to capture the effect of government regulations or subsidies on prices, in particular consumer prices which are politically sensitive to voters. The transactions version suggests that the adjustability of those prices to money growth is lower. The effect of money expansion is *ceteris paribus* transmitted to other prices with high adjustability such as asset prices, leading to an inflation in terms of general prices. By contrast, the income version suggests no or little inflation in terms of GDP-deflator or consumer prices even if the debt-financed government subsidies increase the quantity of money. The income version treats, all else being equal, a decline of price adjustability as a decline of money velocity.

3.3. The Quantity Theory of Money and the Japanese Economy

The income version of the quantity theory of money shaped the quantity theory analysis on the Japanese economy from the end of World War II to the emergence of the bubble economy in the early 1980s. During the fixed exchange rate period (from the start of the Bretton Woods System in 1944 to its demise in 1973), the Bank of Japan set the current account as the primary target of the monetary policy.²³ To examine the monetary policy effects on the current account, scholars relied on the income version (Suzuki 1985, Ueda 1997, and Hetzel 1999). Specifically, the stable relationship between money growth and consumer price inflation – the centerpiece of the income version – was assumed to explain the transmission mechanism for the correction of a current account deficit (surplus) in response to a policy rate hike (cut).

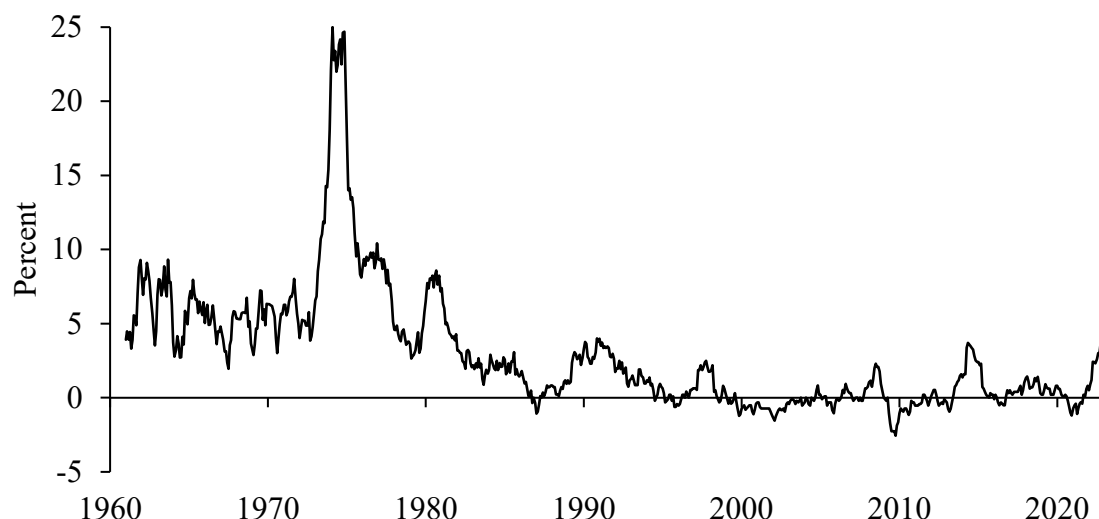
As the world entered a high inflation environment in the 1970s (Collard/Dellas 2007), Japan also experienced high consumer price inflation (Mayer/Schnabl 2022). Ueda (1997) argued that Japan's high inflation in the early 1970s (see Figure 4) was the policy failure of the Bank of Japan and “*clearly a monetary phenomenon*” (1997: 253), because already before the 1973 oil crisis, the monetary base and the prices measured by the GDP deflator had sharply increased. Cargill et al. (1997) argued that the by-then Prime Minister Kakuei Tanaka pressured

²² See also Hayes (1989: 31): “*The income approach ... does indicate changes in prices and quantities as we are looking at the real output of the economy rather than an abstract measure of the total number of transactions that are undertaken. Whether or not it is preferable as a measure of the demand for money is however debatable. If changes in the ratio of intermediate and capital transactions to income affect the demand for money then the transactions approach would appear to be preferable as it takes account of such factors whereas the income approach does not.*”

²³ Under a fixed exchange rate, the role of the monetary policy is to balance the current account, i.e. external balance, and the role of the fiscal policy is to balance aggregate demand in the domestic macroeconomy, i.e. internal balance (see Mundell 1962, McKinnon 1993).

the Bank of Japan to cut the policy rate six times from 1970 to 1972 for his plan for remodeling the Japanese archipelago. Hetzel (1999) argued that the Bank of Japan's purchases of the US dollars under the Bretton Woods System led to the surge of money growth. The mix of monetary easing, fiscal expansion and foreign currency intervention (i.e. dollar purchases and yen sales) caused high money growth and inflation, which gained further momentum with the oil price increases.

Figure 4: Japan's Consumer Price Inflation



Source: OECD.

After the shift to the flexible exchange rate system in 1973, the Bank of Japan set the policy rate based on the development of inflation and GDP rather than the current account balance (Ueda 1997). The Bank of Japan viewed moderate money growth as fundamental for price stability, while it did not adopt any monetary targeting to secure the independence of monetary policy from political pressures (Suzuki 1985). The containment of high inflation driven by the 1979 oil crisis with the interest rate hikes and inflation declining strengthened the view among policymakers and academic circles that inflation is a monetary phenomenon (Hetzel 1999).

With the collapse of oil prices in the early 1980s and the sharp yen appreciation after the Plaza Agreement in 1985, the era of Japan's high inflation ended. The early 1990s mark the advent of a long era of low inflation and deflation of consumer prices persisting to the present. The early 1990s also marks the emergence of skeptical views on the money-price relationship among policymakers and academic circles. The view that inflation is a monetary phenomenon has withered and the view that inflation is a nonmonetary phenomenon has become dominant.

During the Japanese bubble economy in the late 1980s, the consumer price inflation rose only modestly (see Figure 4). The Bank of Japan maintained a relatively expansionary monetary

policy as the price stability was gauged by the consumer and wholesale price indices without considering asset prices (Sawamoto/Ichikawa 1994). A monetary tightening was politically undesirable as well because in the 1987 Louvre Accord the Japanese government agreed fiscal expansion to reduce the current account surpluses with the US. There is a consensus that it was a mistake for the Bank of Japan to tolerate the surges of money growth and asset price inflation (Ueda 1997, Bernanke/Gertler 1999, Jinushi et al. 2000, Okina et al. 2001, Schnabl 2015).

In the light of the prevalent quantity theory of money, or Friedman's income version which does not capture the monetary effects on non-GDP-related transactions and on prices outside the GDP deflator or the consumer price index, the rising asset prices during the Japanese bubble economy were not seen as a monetary phenomenon. Instead, the high money growth was associated with the falling money velocity from the late 1980s.²⁴ Nishizaki et al. (2014) argue that in Japan, the quantity theory only reveals the instable money velocity by pointing a low correlation between M2 divided by nominal GDP from the 1980s to the 2000s.

When the Bank of Japan reduced the nominal interest rate below 1% in 1995 and introduced the zero interest rate policy in 1999 and quantitative easing in 2001, research attention concerning the impact of monetary policy on inflation shifted from monetary aggregates to the monetary base. The expansion of the monetary base was despite the falling money velocity believed to contribute to the fight against deflation (Krugman 1998).²⁵ Yet, Ueda (2001) argued that the expansion of the monetary base M increased neither the real GDP Y nor the consumer prices P nor the money velocity V since the 1990s. Following Krugman, several scholars proposed a further expansion of the monetary base (Bernanke 2003, Ito/Mishkin 2006 and Auerbach/Obstfeld 2005). Shirakawa (2011a), however, observed that, while the Bank of Japan increased the monetary base by 90% from 1997 to 2010, the quantity of money measured by M2 increased only by 30% and the consumer price index even declined by 13%.²⁶

Since January 2013 the Japanese government under the then Prime Minister Shinzo Abe pursued a mix of monetary and fiscal expansions and structural reforms to finally end Japan's

²⁴ Watanabe (1997) finds that the relationship between M2, GDP deflator and nominal GDP in Japan became instable from the late 1980s. Goodhart (1989) states that from the 1980s, the relationship between money growth and the growth of nominal incomes became instable in the US, the UK, Canada, West Germany and France.

²⁵ Krugman (1998) argued that as long as the Japanese economy was in a liquidity trap, the expansion of the monetary base would induce no inflation; however, given the non-zero possibility that Japan would escape from the trap in the future, e.g. due to exogenous shocks, the expansion of the monetary base or the promise to do so would raise inflation expectations which would lead to inflation. See also Akram (2016) and Ueda (1999, 2005).

²⁶ "... significant increases in the monetary base gave rise to neither an equally significant rise in money stock nor inflation, let alone proportional increases" (Shirakawa 2011a: 25).

decades-long deflation (Takahashi 2013, Carroll 2022). By this point of time, the influence of the quantity theory of money on academic research seems to have withered away. Aramaki (2018) dismissed the quantity theory as irrelevant for the analysis of the impact of Abenomics on Japan's prolonged deflation. Hausmann and Wieland (2014), De Michelis and Iacoviello (2016) and Ito (2021) analyzed the contribution of Abenomics to consumer price inflation without making any reference to the quantity theory. Oguro (2014) and Bobowski and Drelich-Skulska (2016) observed a falling money velocity during Abenomics.²⁷

All in all, Japan's missing inflation from the 1990s revealed the limitations of the income version of the quantity theory of money. The relationship between the quantity of money and the GDP deflator or consumer prices had become highly instable, leaving the declining money velocity unaddressed. While Werner (2015) argues that the problem of declining velocity is specific to the income version, the quantity theory had lost its relevance in the academic and policy debate in Japan. Scholars searched for non-monetary explanations for Japan's chronic low inflation. Shirakawa (2011a, 2011b, 2013) attributed the low economic growth to a rapidly aging society (see Westelius/Liu 2016, Diamond et al. 2020) and a fall of firms' productivity increases. Nishizaki et al. (2014) argue that Japan's missing consumer price inflation reflects a combination of structural factors. Yoshino et al. (2017) argue that the monetary policy alone cannot cure the long-term low inflation, which was governed by structural problems.

4. Transactions Version of the Quantity Theory of Money and Japan's Low Inflation

Fisher's quantity theory of money suggests that Japan's persistently low inflation is a monetary phenomenon. The money growth remained weak as monetary and fiscal expansions led to the rise of government debt and the fall of private debt, coming along with asset price inflation.

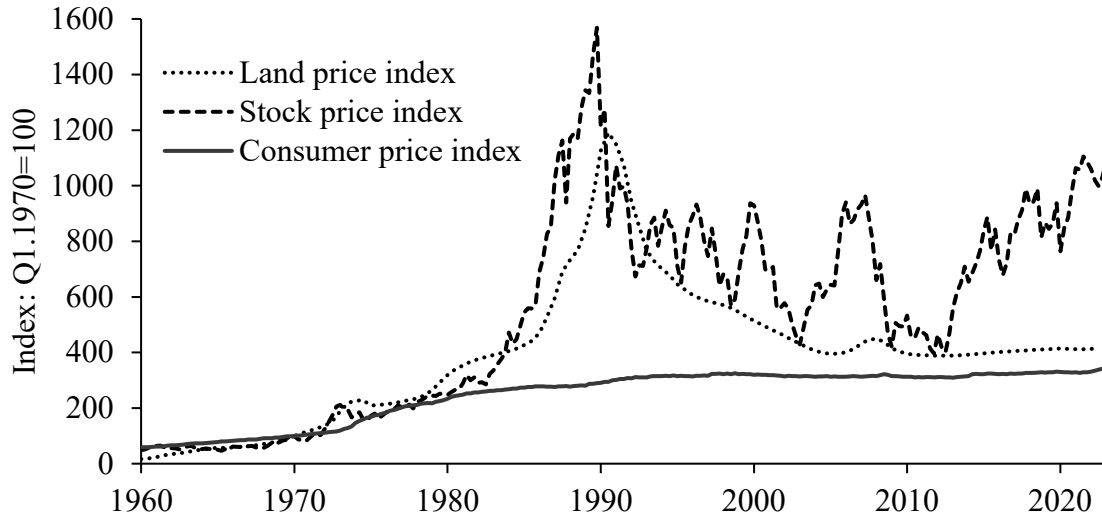
4.1. The Quantity of Money and the General Price Level in Japan

Japan's experience reveals two deficiencies of the income version of the quantity theory of money. First, the assumption that GDP-related transactions approximate non-GDP-related transactions might no longer hold. Compared to the 1960s and the 1970s when the income version gained acceptance, financial markets have developed. GDP-related transactions measured by output Y poorly approximate the volume of all transactions T . Second, the assumption that the GDP deflator or the consumer price index approximate general prices might no longer hold. Since the 1990s, Japan's consumer price inflation has remained low,

²⁷ From the start of Abenomics to the coronavirus pandemic and Russia-Ukraine war (December 2012 – April 2023) the monetary base increased by 412%, M2 only by 47% and the consumer price index by 11%.

whereas asset prices went through boom-and-bust cycles and increased more (Figure 5). The falling money velocity or the instable money-price relationship often suggested by the income version may be a sign of the growing dynamics of non-GDP-related transactions and prices outside GDP deflator. The transactions version implies that Japan's money velocity might have not fallen as much as believed.

Figure 5: Consumer, Stock and Land Prices in Japan



Source: Japan Real Estate Institute, Japan Exchange Group, OECD. Notes: Land price index refers to land prices in six major cities (Tokyo, Yokohama, Nagoya, Kyoto, Osaka and Kobe).

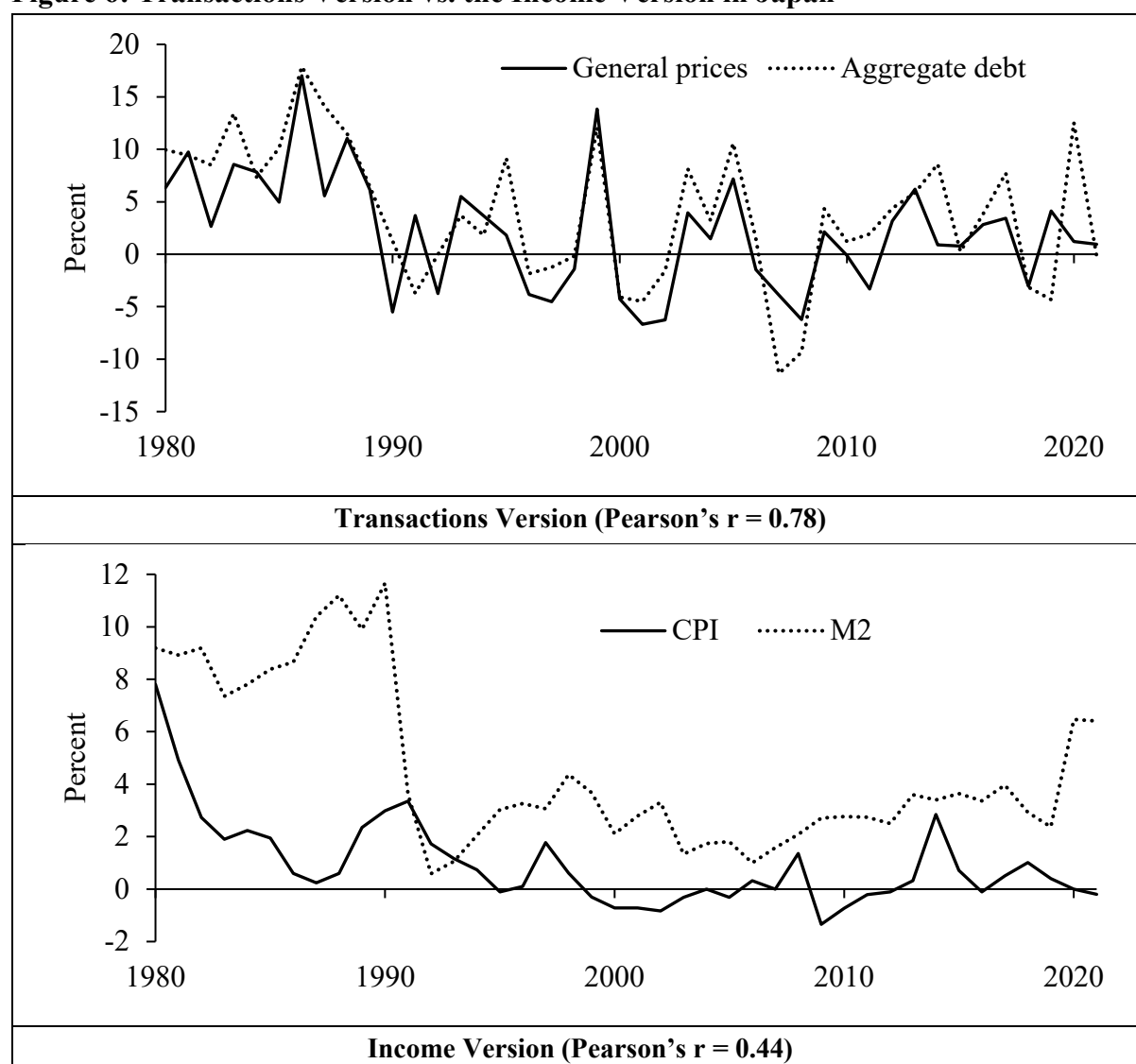
Thus, the money-price relationship based on Fisher's (1911) transactions version is modelled in an alternative way (equation 3). The quantity of money M is defined as aggregate debt of firms, households and the general government less net foreign assets.²⁸ The definition includes both the debt financing by the banking sector which does not involve deposit creation and the debt financing by the nonbanking sector which involves no deposit creation as there is no difference between them with respect to the monetary effect on prices (see Section 2.1.). General prices P is defined as the arithmetic average of consumer prices, real estate prices, stock prices, nominal wages as the price of labor and the nominal effective exchange rate as the external value of the Japanese yen. The money velocity and the volume of transactions are assumed to be constant due the lack of reliable data: \bar{V} , \bar{T} .

$$(3) \quad M\bar{V} = P\bar{T}$$

²⁸ Net foreign assets are deducted from private debt for two reasons. First, Japan's net foreign assets de facto belong to the private sector. As of 2022 the private sector holds 461 trillion yen, while the public sector holds -42 trillion yen (net foreign liabilities). Second, the statistics on gross corporate and household debt include the foreign debt financing by domestic firms and households which in our context corresponds to a decrease of the quantity of money in Japan. Net foreign assets are thus deducted from private debt to show the contribution of the private sector to the quantity of money in Japan.

The upper graph in Figure 6 shows that from 1980 to 2021 in Japan changes in the quantity of money measured by aggregate debt are highly correlated with changes in general price inflation (Pearson's $r = 0.78$).²⁹ The evidence confirms the central statement of the quantity theory that the quantity of money varies inversely with its purchasing power, or the reciprocal of general prices. The close money-price relationship in the transactions version cannot be reproduced to the same extent in the income version which shows a correlation coefficient of 0.44 for the relationship between M2 and the consumer price index (see the lower graph in Figure 6). It implies that the exclusion of the debt financing by the nonbanking sector and the ignorance about the heterogenous price adjustment by focusing on the GDP deflator or the consumer price index may distort the money-price relationship depicted by the income version.

Figure 6: Transactions Version vs. the Income Version in Japan

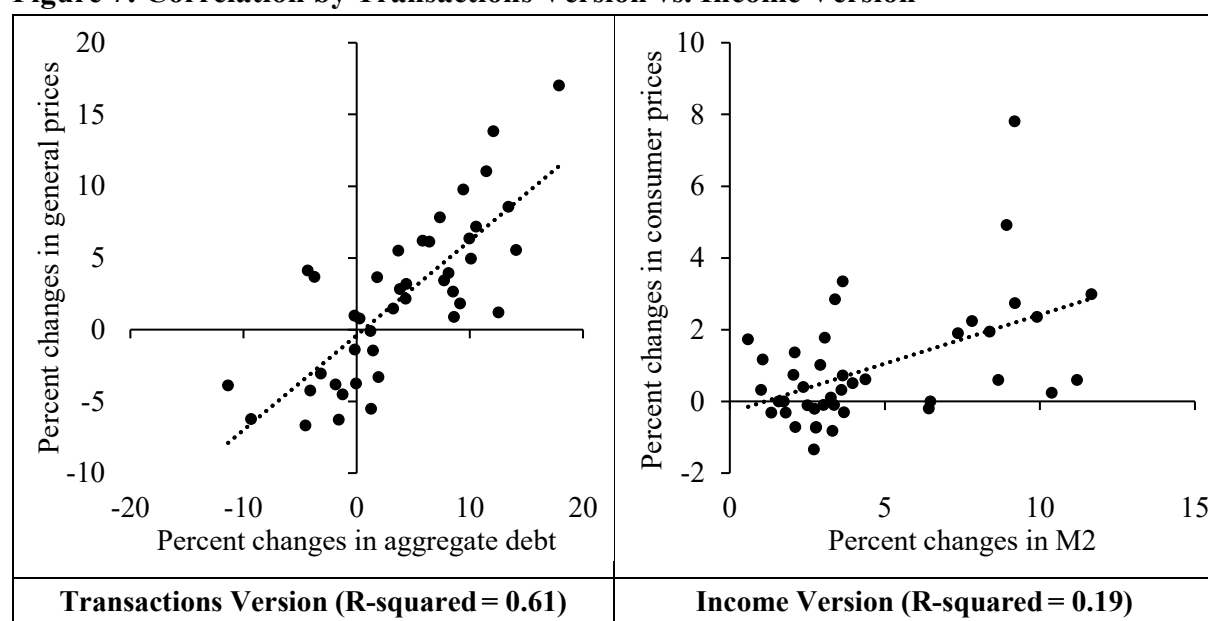


²⁹ Fisher (1911) presented a correlation coefficient of 0.57 as statistical evidence. Fisher noted that the correlation coefficient between the length and breadth of nuts was 0.57. See also Akoglu (2018).

Source: Bank of Japan, Japan Real Estate Institute, Japan Exchange Group, OECD, Ministry of Health, Labour and Welfare of Japan, Ministry of Finance.

The left graph in Figure 7 shows that changes in the quantity of money measured by aggregate debt are well in line with changes in general prices from 1980 to 2021. The upward sloped line supports the common view of inflation: ‘too much money chasing too little goods’. The correlation coefficient of 0.61 suggests that the monetary effect explains 61% of changes in general prices, leaving the explanation of 39% of changes in general prices to changes in the money velocity and the transaction volume.³⁰ By contrast, the correlation coefficient of 0.19 in the income version suggests that M2 only explain 19% of changes in consumer prices, leaving the explanation of 81% of changes in consumer prices to the money velocity and GDP.

Figure 7: Correlation by Transactions Version vs. Income Version



Source: Bank of Japan, Japan Real Estate Institute, Japan Exchange Group, OECD, Ministry of Health, Labour and Welfare of Japan, Ministry of Finance. Notes: Japan, 1980-2021.

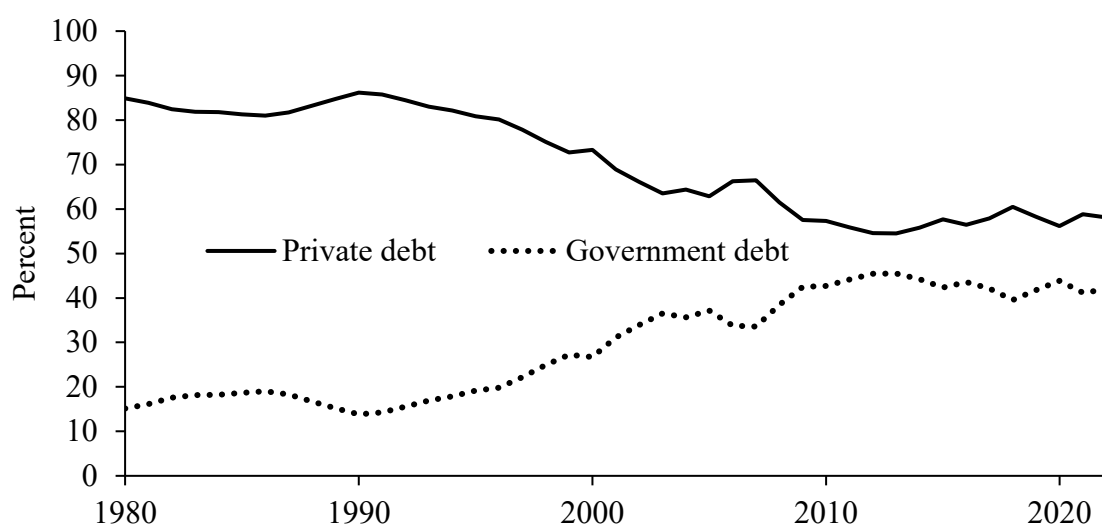
4.2. Japan’s Low Money Growth from Private and Government Debt Perspective

Japan’s persistently low inflation for more than last three decades came with the dramatic change of the debt structure. The fall of private debt and the rise of government debt led to the low money growth at the aggregate level. There are three reasons for looking at the dynamics of the quantity of money from the perspective of private debt and government debt.

³⁰ The general price index presented in this paper certainly does not capture all price movements. A different construction of an index for general prices would yield a different correlation coefficient. It is therefore possible that the money velocity and the transaction volume are responsible for more than or less than 39 percent of variation in general prices. Yet it is “... *absurd to state, as some have stated, that the absence of exact statistical correspondence proves the absence of any influence of quantity of money on price level*” (Fisher 1911: 131).

First, aggregate debt in Japan from the 1990s is characterized by the rise of government debt and the fall of private debt. Figure 8 shows that until the end of the 1980s, the dynamics of debt creation was determined by firms and households. Since the bursting of the Japanese bubble economy, however, the dynamics of private debt creation has weakened. Its share of aggregate debt fell to 55% in 2012 and flattened out to the present. By contrast, the share of government debt of aggregate debt tripled from 14% to 42% from 1990 to 2022. Put differently, while Japan's aggregate debt shows an upward trend from the 1980s (see Figure 3), it is driven by private debt creation before the 1990s and by public debt creation after the 1990s.

Figure 8: Breakdown of Aggregate Debt by Private Debt and Government Debt



Source: Bank of Japan. Notes: Government debt includes gross general government debt (1193 trillion yen in 2022) and other government liabilities (229 trillion yen in 2022). Private debt refers to the sum of gross corporate and household debt less net foreign assets.

Second, the dynamics of private debt creation can be assumed to be governed by economic interests, whereas the dynamics of government debt creation can be assumed to be governed by political interests. Firms or households decide to take debt to finance investment and consumption. Private debt creation can be assumed to be driven by profit and utility maximization. It leads to the coordination of dispersed knowledge (Hayek 1945), which allows for a better capital and resource allocation in the economy (Schnabl 2023).

By contrast, the government has neither incentives to maximize profits nor all the knowledge to encourage individual incentives toward efficiency (Hurwicz 1984), as government debt creation can be assumed to be motivated by political goals. Japan's exceptionally high level of the general government debt (258% of GDP in 2023) may reflect the unwillingness of the government to allow for the destruction of money via debt consolidation as it may endanger economic and political stability.

Third, an excessive dependency on the deposit creation via government debt can be harmful to the dynamics of private debt. The bank deposits created by government debt can enter the economy in the form of corporate or household income. If the debt creation by the government equals the debt repayment by firms and households, the amount of deposits remains unchanged. Put differently, the debt repayment by the private sector would occur without any effect on corporate or household income. As the corporate or household income can be assumed to be used for the financing of corporate or household expenditures, an excessive creation of deposits by the government would have a negative effect on the creation of private debt and therefore on inflation in terms of consumer prices as well as general prices.³¹

4.3. Japan's Low Money Growth and Inflation from Macroeconomic Policy Perspective

From the burst of the asset prices in the 1990s to the coronavirus crisis, Japan has pursued expansionary monetary and fiscal policy to fight against the deflationary pressure.³² The Bank of Japan adopted the low- and zero-interest policy in the 1990s and the quantitative easing in 2001, which terminated in 2006 and was resumed in 2010.³³ Since the start of Abenomics in 2013 the Bank of Japan expanded quantitative easing and adopted a negative interest rate policy and the yield curve control policy in 2016 which kept the yield on ten-year government bonds at around 0%. In response to the coronavirus crisis the Bank of Japan announced in March 2021 the unlimited purchase of ten-year government bonds to keep the yield between -0.25% and +0.25%, which was revised to between -0.5% and +0.5% in December 2022. In October 2023, the Bank of Japan loosened the range of the ten-year government bond yield to -1% and +1% but continued to buy government bonds.

The Japanese government has abandoned fiscal discipline and implemented several fiscal stimulus packages (Ito et al. 2011). Fiscal deficits, which were in average 2.8% of GDP from 1955 to 1989, increased to in average 6.1% of GDP from 1990 to 2020. The coronavirus crisis and the Russia-Ukraine war increased fiscal deficits to in average 14.7% of GDP from 2020 to

³¹ The Financial Statements Statistics of Corporations by Industry shows that from 1990 to 2022 the amount of corporate bank deposits increased from 160 trillion yen to 295 trillion yen, while the bank borrowing only increased from 410 trillion yen to 417 trillion yen. This may suggest an increase of the share of corporate expenditures which requires no financing from the bank. Small and Medium Enterprise Agency (2016) reports that the share of debt-free large (small) firms increased from 15.1% (16.5%) in 1990 to 36.9% (34.2%) in 2017. See also Section 4.3.

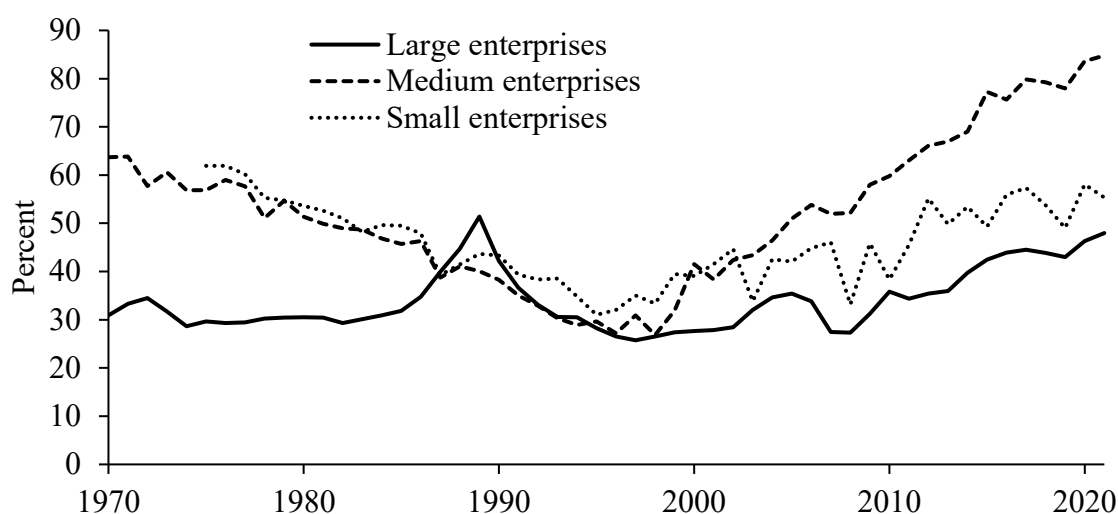
³² Academic research influenced Japan's macroeconomic policymaking to fight against the deflationary environment. Ahearne et al. (2002) argued that the interest rate cuts and the asset purchases combined with fiscal expansions would stimulate inflation and aggregate demand. A similar proposal was made by Feldstein (2002), Posen (2010) and Eggertsson/Krugman (2012).

³³ In 2001 the Bank of Japan embarked on asset purchases for the first time. Long-term government bonds were purchased at a small scale from today's perspective. See Maeda et al. (2005) for more details.

2022. The outcome is the rise of the Japanese government debt from 64% of GDP in 1990 to 258% of GDP in 2023. All the monetary and fiscal expansions since the 1990s, however, failed to change the low growth and low consumer price inflation environment. Both the inflation of general prices and the inflation of consumer prices from 1990 to 2021 were in average 0.4%, whereas the growth of money measured by total debt was in average 1.8%.

Japan's persistently low money (debt) growth and low inflation offer three macroeconomic policy lessons. First, the persistent monetary and fiscal expansions led to the replacement of private debt with government debt. The fiscal deficits and debt accumulation supported by interest rate cuts by the Bank of Japan have been the central driver of bank deposit growth from the 1990s (see Figure 1 and 2). Figure 9 shows the rising ratio of cash and deposits to bank borrowing across all sizes of firms in Japan from the late 1990s. This implies that monetary and fiscal expansions allowed the Japanese firms to finance expenditures and to repay debt. The outcome is a growing number of debt-free Japanese firms which curb the deposit growth via bank credit and impair the transmission of the monetary policy through the banking sector.³⁴

Figure 9: Ratio of Cash and Deposits to Bank Borrowing by Firm Size



Source: Ministry of Finance. Notes: Small enterprises are those with capital of 10 million yen or less; medium enterprises are those with capital of 10 million yen or more and less than 100 million yen, and large enterprises are those with capital of 1 billion yen or more.

Second, the persistent monetary and fiscal expansions undermined the role of commercial banks in the allocation of real resources. After the bursting of the Japanese bubble economy in

³⁴ Cabinet Office of Japan (2022) reported that from 2002 to 2021, the share of net debt-free enterprises, defined as those with cash and deposits greater than their borrowings, grew from 31% to 58% in manufacturing industry (1067 firms in survey) and from 39% to 61% in nonmanufacturing industry (1152 firms in survey).

the 1990s the Japanese banks postponed addressing balance sheet repair (Borio 2012), which constrained the banks' ability to screen productive investment with high expected returns and monitor borrowers. The Japanese banks suffered from the declines of income from bank lending because the interest rate cuts by the Bank of Japan prevented loans to inefficient firms from becoming nonperforming and the increase of deposits through fiscal deficits by the Japanese government reduced corporate and household demand for bank credit.³⁵ In response to the falling income from bank lending, the Japanese banks repeated mergers and acquisitions and developed the purchases and sales of the government debt as a key income source (Schnabl 2020, Murai/Schnabl 2021). The shift of the Japanese banks from the screening and monitoring of productive use of resources by firms and households to the financing of the government debt has distorted the resource allocation.

Third, the persistent monetary and fiscal expansions have come along with an uneven distribution of the monetary effects across prices. When the Bank of Japan successively cut interest rates from 1986 to 1987 the average growth of money measured by aggregate debt recorded 12% from 1985 to 1989. The average consumer price inflation recorded 1.1% as the sharp yen appreciation after the 1985 Plaza Agreement generated deflationary pressures via declining import prices. The dramatic money (debt) growth in the late 1980s was absorbed by assets prices. The real estate and stock prices saw an average growth of 5.2% and 26.6%.³⁶ The government support for housing loans via the Government Housing Loan Corporation of Japan (Cargill/Yoshino 2000) and the deregulation of Japanese financial markets in the 1980s (Sawamoto/Ichikawa 1994) contributed to higher adjustability of real estate and stock prices to monetary fluctuations.³⁷

After the bursting of the Japanese bubble economy, the average consumer price inflation and the average growth of money measured by aggregate debt from 1990 to 2022 was 0.5% and 1.8%, respectively. From the perspective of Fisher's heterogenous price adjustability, Japan's low consumer price inflation implies a low adjustability of consumer prices to monetary

³⁵ Koo (2011) argues that Japan's recession starting from the 1990s turned out to be a long-term phenomenon as excessive debt created prior to the long-term recession prevented the expenditures from further expanding.

³⁶ From 1985 to 1989 the average annual growth of real estate prices measured by land price in six major cities (Tokyo, Yokohama, Nagoya, Kyoto, Osaka and Kobe) was 21.7%.

³⁷ In the Plaza Accord in 1985 the Japanese government was requested by the U.S. government to stimulate housing markets and liberalize financial markets. *"In particular, the Government of Japan will implement policies with the following explicit intentions. ... 4. Intensified implementation of financial market liberalization and of the yen, so that the yen fully reflects the underlying strength of the Japanese economy. ... 6. Efforts to stimulate domestic demand will focus on increasing private consumption and investment through measures to enlarge consumer and mortgage credit markets"* (Plaza Agreement communiqué 1985).

fluctuations. Money growth did hardly affect consumer prices for four reasons. First, the low interest rates and government credit guarantees reduced debt financing costs which took the pressure off firms to raise prices. Second, fiscal deficits took the pressure off firms to raise prices because this stabilized aggregate demand and corporate revenues. Third, the Japanese government increased subsidies on goods represented in the consumer price basket (Mayer/Schnabl 2022, Murai/Schnabl 2022a, 2022b).³⁸ Fourth, the deregulation of labor markets in the early 2000s under the then Koizumi administration reduced the wage costs for firms and the income for households as it reduced the bargaining power of labor unions on the policymaking process and deregulated nonregular employment (Watanabe 2015).

The effect of money growth affected more asset prices which can be considered as the prices with high adjustability to monetary fluctuations (Fisher 1911). The announcement effect of the Abenomics (see Hausman/Wieland 2014) contributed to higher adjustability of stock and real estate prices to money growth, resulting in the recovery of Japanese stock and real estate markets.³⁹ In addition, stock and real estate prices have gained direct support from the Bank of Japan with the purchases of ETFs and J-REITs. The expected trickle-down effect from asset prices to consumer prices via portfolio rebalancing has not unfolded (Hayashi 2014) as the persistent monetary and fiscal expansions over the past decades have lowered the adjustability of consumer prices to monetary fluctuations.

5. Outlook for Japan's Inflation from a Quantity Theory Perspective

Since the mid 1980s, Japan's consumer price inflation has gradually lost its link to monetary fluctuations. The persistently low consumer price inflation strengthened the view that Japan's inflation is not a monetary phenomenon, but a real economic phenomenon driven by structural problems, inter alia a rapidly aging society. The pessimistic view on the validity of the quantity theory of money emerged as the prevalent income version failed to expose a stable relationship between money and prices and suffered from declining money velocity. Among policymakers and academic circles in Japan, attention to the quantity theory of money has withered away.

³⁸ For instance, the Japanese government subsidizes Japanese farmers to keep prices of many agricultural products such as rice, wheat, soybeans, buckwheat, and rapeseed, among others, low. Also, prices of rail transport, housing, school and university fees (since 2009), cars e.g. electric vehicles, water and electricity are subsidized and strongly controlled by the government. In response to the recent Russia-Ukraine crisis, the Japanese government kept gasoline prices low with subsidies to gasoline wholesale enterprises. See Mayer and Schnabl (2022).

³⁹ In 2013 the then Prime Minister Shinzo Abe campaigned for the recovery of Japanese stock markets with 'Buy my Abenomics' in the speech at the New York Stock Exchange in September 2013. The Governor of the Bank of Japan Haruhiko Kuroda (2013) also pledged to "... do whatever it takes to beat deflation" in his first policy speech.

The paper examined Japan's missing inflation based on Fisher (1911)'s transactions version of the quantity theory of money. Fisher's quantity theory deserves renewed attention as financial markets developed compared to the 1960s and 1970s when Friedman's income version gained wide attention and acceptance. Fisher argued that changes in the quantity of money never move all prices in the same direction and to the same extent. The monetary effect is absorbed less by prices with low adjustability, e.g. prices fixed by law or heavily controlled by the government, and more by prices with high adjustability, e.g. prices of raw materials, real estates and stocks. To capture the heterogeneous price adjustments to monetary fluctuations, the paper constructs a general price index composed of the arithmetic average of consumer prices, stock and real estate prices, nominal wages and the nominal effective exchange rate of the Japanese yen.

The paper defines aggregate debt of firms, households and the general government less net foreign assets as money. The definition of money captures the debt financing by the banking sector which involves deposit creation and the debt financing by the nonbanking sector which involves a transfer of the existing deposits. The prevalent definition of money in form of monetary aggregates captures only the amount of bank deposits plus currency in circulation which corresponds to the debt financing by the banking sector alone. Yet the debt financing by the nonbanking sector, e.g. purchases of bonds and stocks by households and firms, equally finances the expenditures of debtors, which affect prices. A prominent example is the shift of Japanese corporate financing from bank credit to stock and bond issuances. The inclusion of a new inflationary force into money conforms with the spirit of both Milton Friedman and Irving Fisher that what should be included in the quantity of money evolves over time.

Evidence for Japan from 1980 to 2022 shows that changes in the quantity of money measured as aggregate debt are, all else being equal, highly correlated with changes in general prices (Pearson's $r = 0.78$), which contrasts with the correlation coefficient of 0.44 between M2 and consumer prices as often used in the prevailing income version. This result supports the view that inflation is a monetary phenomenon, which was said for the high inflation before the 1973 oil crisis due to excessive monetary expansion and for the containment of the high inflation driven by the 1979 oil crisis with the interest rate hikes (Ueda 1997, Mishkin 1997, Goodfriend 1997). Seen through this lens, Japan's missing inflation over more than last three decades is the outcome of an inappropriate measurement of inflation and economic transactions.

The weak money-price relationship shown by the income version implies that the assumptions made in the transition from Fisher's transactions version to Friedman's income version may no

longer be valid. In particular, the assumption that the GDP-deflator or the consumer price index would approximate general prices may no longer be valid for Japan given the growing importance of asset prices from the late 1980s and the growing government intervention in consumer prices.

The fight against Japan's deflationary pressures requires a gradual reduction of the Japanese government debt and a recovery of private debt creation. The mix of persistent monetary and fiscal expansions since the bursting of the Japanese bubble economy allowed the share of government debt in Japan's aggregate debt to triple from 14% in 1990 to 42% in 2022. As the government debt is primarily held by the banking sector including the Bank of Japan, the deposit creation resulting from the government debt has become the central driver of deposit growth in Japan from the 1990s. Accordingly, the amount of bank deposits created by persistent fiscal deficits and debt accumulation, coupled with the low interest rate environment, has become the central driver of distorted resource allocation in the Japanese real economy. The resource allocation suffers from inefficiency because the banking sector, as opposed to bank lending, does not monitor government expenditures.

If Japan's low inflation would have been combined higher productivity growth (Hayek 1967 [1935]) or higher economic growth (Friedman 1969), it would have been a role model for the US and Europe afflicted by the recent return of consumer price inflation. Japan, however, saw declining real wages from the late 1990s which reflect the low marginal productivity of labor and the average real GDP growth of 0.8% from 1990 to 2022. As “[n]o authority can beforehand ascertain, and only the market can discover, the ‘optimal quantity of money’” (Hayek 1976: 77), a gradual monetary tightening and fiscal consolidation would contribute to the recovery of private debt creation, which was the primary source of deposit growth and corporate and household income until the 1980s. It is not government debt creation but private debt creation which is central to the healthy money, price and growth dynamics. Unless Japan pursues a gradual fiscal consolidation and a gradual monetary tightening, the unhealthy deflationary environment is likely to continue or turn out to be uncontrollable inflationary environment with an outbreak of sovereign debt crisis.

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