

**BANK OF JAPAN'S POOR PERFORMANCE**

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**ABSTRACT**

*Japan has experienced deflation for six of the past nine years, as measured by their CPI. The Bank of Japan's (BOJ) objectives include an explicit inflation target: maintaining "price stability." Price stability for the BOJ prior to 2006 apparently meant no inflation and no deflation. The BOJ considered both inflation and deflation as "...a threat to our daily lives."*

*In its current monetary policy framework (since 2006) price stability to the BOJ supposedly means an approximate range in the year-over-year change in the CPI of between zero and two percent. Analysis of growth in monetary aggregates and stability of monetary demand measures, however, suggests that the BOJ is still pursuing a monetary policy that is consistent with bouts of deflation since 2006. BOJ officials may be aiming for periods of both mild deflation and mild inflation to approximate a minimal change in the price level over some medium-term time span.*

*Monetary policy appears to lose its effectiveness at very low levels of inflation or deflation in Japan. The policy implication of this paper is that the Bank of Japan needs to achieve an inflation rate that approximates the upper end of its current target range, two percent. Such an inflation rate is likely to coincide with a more effective monetary policy, financial stability, and sustainable economic growth in Japan. It may be that Japan's deflation problem stems, in part, from the BOJ being unaware that the monetary relationships which held prior to 2000 no longer worked once Japan experienced near zero inflation or deflation in the post-1999 period.*

**Keywords:** *Japan, Monetary Policy, Quantitative Easing, Price Stability, Bank of Japan, Deflation, CPI, Money Demand, Velocity, Correlations*

**1. INTRODUCTION**

The current Bank of Japan Law, in effect since April 1998 when the BOJ became fully independent, mandated that the "Bank of Japan's monetary policy shall be aimed at, through the pursuit of price stability, contributing to the sound development of the national economy," Bank of Japan, (2004.) BOJ officials seem to have taken price stability quite literally to mean zero inflation, as opposed to low inflation or setting an explicit positive inflation target. Price stability was further defined by the Bank of Japan (2004) so that "A continuous rise in the price of goods and services is generally referred to as 'inflation,' and a continuous decline in prices is referred to as 'deflation'." Also, "As you can see from the above, both inflation and deflation are a threat to our daily lives." Further, "The Bank of Japan's mission is to pursue price stability, in other words to maintain an economic environment in which there is neither inflation nor deflation."

Similarly, the European Central Bank (ECB) also has an explicit policy goal of price level stability. But ECB officials have interpreted that to mean a target inflation rate close to, but just below, 2% over the medium term. Apparently in 2006 the BOJ altered their interpretation of price stability to match that of the ECB. In particular, the BOJ (2006) said that "... making use of the rate of year-on-year change in the consumer price index to describe the understanding, an approximate range between zero and two percent was generally consistent with the distribution of each Board member's understanding of medium-to-long term price stability." This range provides a mean annual inflation rate of one percent. The background for that change is that the BOJ implemented a policy of quantitative easing in March 2001, in an attempt to resurrect their economy. That policy ended, though, five years later in March 2006. So it appears their 2006 re-interpretation of the meaning of price level stability may have been made to

coincide with the expected results of their quantitative easing program.

Two major independent central banks – the BOJ and the ECB – both given an explicit target of price stability, initially decided on different interpretations of price stability. It appears the ECB selected the more pragmatic interpretation, allowing them to pursue a goal of economic growth, while maintaining flexibility on their inflation target. BOJ officials, meanwhile, pushed themselves into an inflexible policy position by setting an inflation target of zero. At some point, perhaps as early as 2001, the BOJ realized it may have made a mistake. Finally in 2006 the BOJ officially changed its policy and adopted a position similar to that of the ECB—although whether their actual policy has changed is another matter.

The Federal Reserve System in the U.S., in comparison, has a dual mandate of stable prices and full employment, derived from the Humphrey-Hawkins Act. Fed leaders have not stated an official, public, inflation target. Chairman Bernanke (2007) stated, “the determination of the appropriate long-run inflation rate must take account of factors that may affect the efficient functioning of the economy at very low rates of inflation, such as the risk that the zero lower bound on nominal interest rates might hinder the effectiveness of monetary policy. Thus, the (properly measured) long-run inflation rate that best promotes the dual mandate is likely to be low but not zero.”

Bernanke was talking about the U.S. economy. But since the BOJ at one time had an official inflation target of zero, and because their overnight bank lending rate had hovered near zero in nominal terms for years, Chairman Bernanke may have been concerned about the effectiveness of Japanese monetary policy. In addition, although he did not state an official inflation target, Chairman Bernanke seemed to imply that an inflation rate which was low, but not zero, is likely to better promote economic growth.

We assume here that inflation, ultimately, is a monetary phenomenon. The ECB clearly takes that position, and the ECB incorporates the principle of the quantity theory of money in its framework. See Cosgrove, Singh, and Marsh, (2007). The Bank of Japan (2007) controls the overall volume of money in their economy through open market operations, in a manner similar to the Fed or the ECB. Given that, BOJ officials are likely to have a perspective similar to that of the ECB on the quantity theory of money.

This suggests that the BOJ, like the ECB, is likely to think that income velocity is stable enough to use the growth rate of the quantity of money as a guide to medium-to-long term price level changes. We provide evidence that the BOJ may be following such a conceptual framework, and in addition we show that it is not clear from an operational perspective whether the BOJ altered their procedures to follow the changed inflation guidelines post-March 2006. The time frame is rather short for a meaningful examination of the post-March 2006 performance. But the limited evidence is not encouraging.

First, we review the quantity theory of money, given that the BOJ’s operating policy suggests they view income velocity as stable over time.

## 2. THEORY

We start with Irving Fisher’s (1922) equation of exchange. Fisher originally used transactions velocity, but we will use income velocity, so that

$$1) \quad MV=PQ,$$

where M is the nominal money stock, V is the income velocity of money, P is the average level of prices, and Q is aggregate real output. Differentiating with respect to time, t, we obtain as a first approximation:

$$2) \quad dM/dt + dV/dt = dP/dt + dQ/dt.$$

Fisher believed velocity to be constant, so that the rate of price inflation,  $dP/dt$ , is a function of excess money growth. But it is well known that although the velocity of money may not be constant, its movement over time may be predictable. If so, the implication is that monetary authorities could use growth in the monetary aggregates as a useful predictor of inflation. Since the ECB does explicitly

incorporate the use of monetary aggregates in its deliberations, the ECB apparently believes that velocity is at least predictable, if not stable.

Making the standard Fisherian assumption that velocity is stable in the long run, or that  $dV/dt = 0$ , we obtain,

$$3) \quad dM/dt = dP/dt + dQ/dt.$$

In other words, changes in the money stock  $M$  cause proportionate changes in the price level  $P$  and/or changes in real output  $Q$ . We assume output growth depends on growth in productive factors and technological advancement. With a given resource pool and technology, the percentage change in output is predictable. Hence equation (3) implies that the rate of growth of the money supply determines the inflation rate.

The microfoundation rationale for assuming velocity is stable can be seen by reformulating equation (1) into the Marshallian money demand function. Define  $k = 1/V$  and define  $Y = PQ =$  nominal income. Then equation (1) becomes

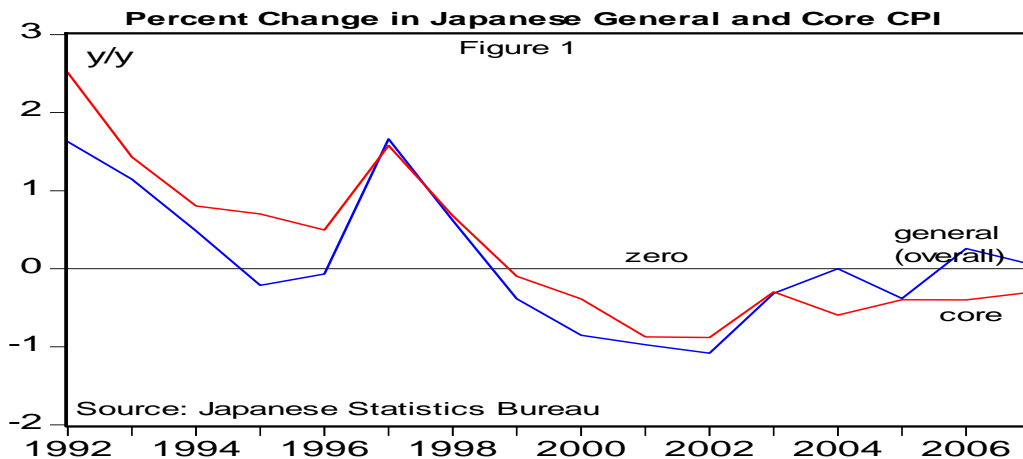
$$4) \quad Md = kY.$$

Marshall's assertion that nominal money demand is strictly proportional to nominal income implies  $K$  is constant, or equivalently, that  $V$  is constant. As indicated, our premise is that velocity is not fixed, but that it is predictable over time. A variable money demand, therefore, depends on factors other than income. Milton Friedman (1956) allows for other factors such as the returns on other assets relative to money to influence money demand. It is within that framework that we review the stability of income velocity.

### 3. ASSESSMENT

#### 3.1 Inflation

An overview on Japanese inflation is provided first, before reviewing the money supply and the stability of velocity. The Bank of Japan (2006) considers price stability to be a state "...where various economic agents including households and firms may make decisions ... without being concerned about fluctuations in the general price level." For this the BOJ uses the year-over-year change in the consumer price index. Figure 1 illustrates both the change in both the general (overall) and core CPI (excluding food and energy).



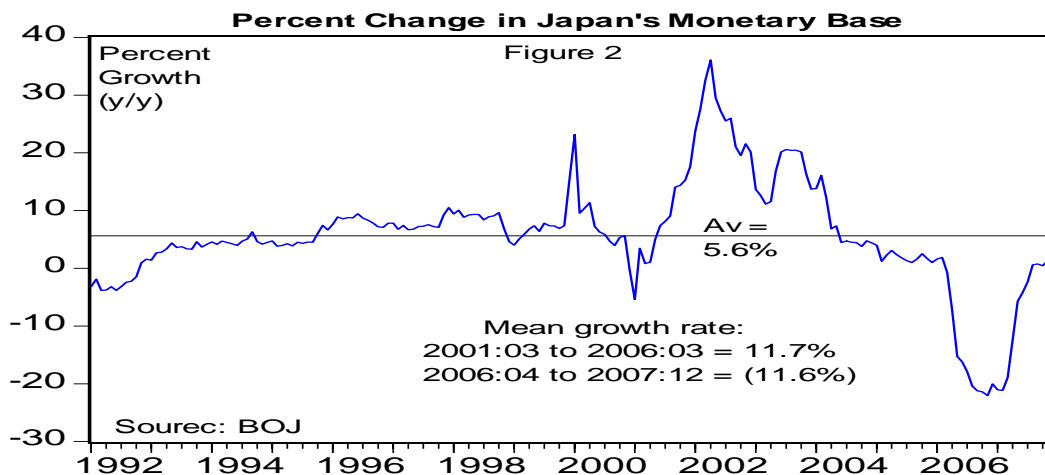
As Figure 1 shows, Japan has experienced deflation, on average, since 1999. Deflation has occurred in each year since 1999 in the core CPI and in all but three years in the general CPI. The target inflation index for the BOJ is the general CPI, not the core CPI. But even by the general index, Japan suffered deflation in 6 out of 9 years, or approximately 2/3 of the time. One year, 2004, had no change in the CPI. In March 2001 the BOJ announced it was implementing a policy of quantitative easing in order to

invigorate their economy and achieve an inflation rate of zero percent or positive on a year-over-year basis. A cursory observation of Figure 1 indicates the BOJ achieved this goal in three out of six subsequent years -- 2004 with zero inflation, and 2006 with a 0.3% inflation rate and 0.06% in 2007. Then in March 2006 the BOJ issued their statement on achieving a price objective of between zero and two percent inflation. However, in 2006, the BOJ also announced the end of the quantitative easing policy -- a seemingly contradictory policy.

Theoretically, the BOJ did alter their explicit inflation target from zero percent to a range of zero to two percent in 2006. But it is unclear if the BOJ is willing to take the decisive steps necessary to actually achieve a positive rate of inflation, as their new target suggests. In 2007 Japan fell back to essentially zero inflation, 0.06%, as measured by the general CPI. Meanwhile, inflation as measured by the core CPI, has recorded consistent deflation every year since 1999. Most neutral observers would likely say that nine straight years of deflation in the core CPI reflects an unusually restrictive money supply growth rate. And they would also likely say that a central bank desiring a mean inflation rate of one percent should take whatever steps are necessary to increase the money supply growth rate.

### 3.2 Money Supply

What has been the BOJ's track record in managing the money supply? Figure 2 shows the annual percentage rate of change in the monetary base in Japan, the variable over which the BOJ has the most direct control.



During the period of quantitative easing – March 2001 to March 2006 – the BOJ increased the monetary base by an average rate of 11.7%. Since the end of quantitative easing, the monetary base has contracted by an average rate of 11.6%. It is clear that the BOJ has direct control over this variable and it also appears to be clear that BOJ officials have returned to a monetary policy that generates bouts of deflation since the end of quantitative easing. The BOJ, since the end of quantitative easing, have acted to offset much of that as BOJ members were apparently concerned about the effects of that ease.

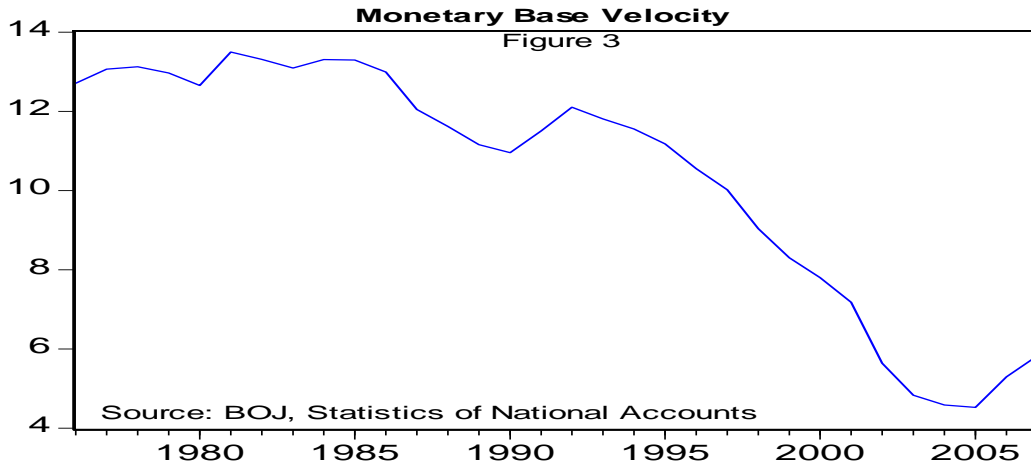
### 3.3 Velocity

We review the stability of income velocity for Japan within a Friedman-type framework of allowing for the return on other assets, or their price, to influence money demand. Stability is assessed for the following monetary aggregates – monetary base, M1, M2, and M3. Historical data on the monetary aggregates – base money, M1, M2, and M3 – are available from 1975 to the present. There is a benchmark change for gross domestic product data in 1994 so that there could be a question of comparison of real GDP data before and after 1994. However, in this study we use only nominal GDP data.

### 3.4 Monetary Base Velocity

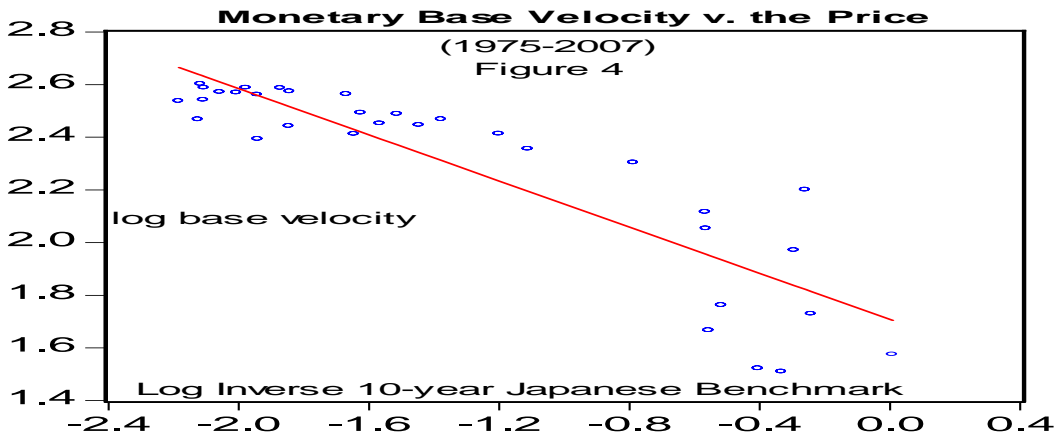
The Bank of Japan, like other central banks, is the monopoly supplier of the monetary base. Emphasis on price level stability by the BOJ implies that they should view income velocity of the monetary aggregates as stable or predictable. Behavior of the monetary base income velocity is important since the BOJ is the

monopoly supplier. Income velocity (hereafter, velocity) of the monetary base has not been constant, as illustrated in Figure 3. As expected, velocity decreased as the opportunity cost of holding money fell over the period. The opportunity cost would be either the nominal interest rate, or the inflation rate.

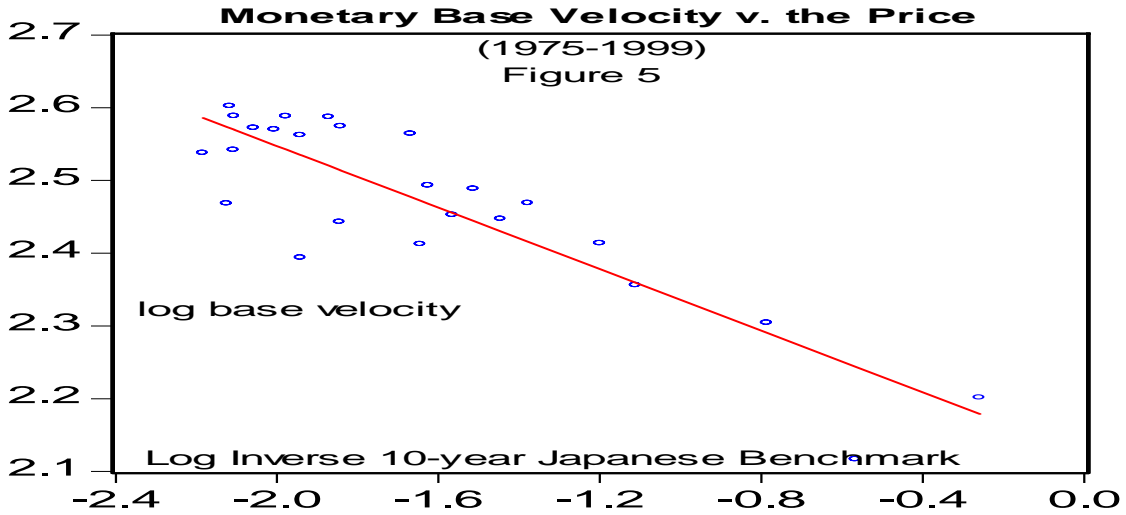


We use the 10-year Japanese benchmark bond yield (a nominal interest rate) as a proxy for the opportunity cost of the monetary base, as well as other monetary aggregates in this study. The Aaa bond yield was used in the U.S. for the Anderson and Rasche (2001) study. The Aaa yield was also used in the study on money demand by Cosgrove, Singh, and Marsh (2007). That study, which focused on the stability of money demand in the U.S., suggests that the monetary base and MZM (money of zero maturity) appear to have a long-term stable relationship.

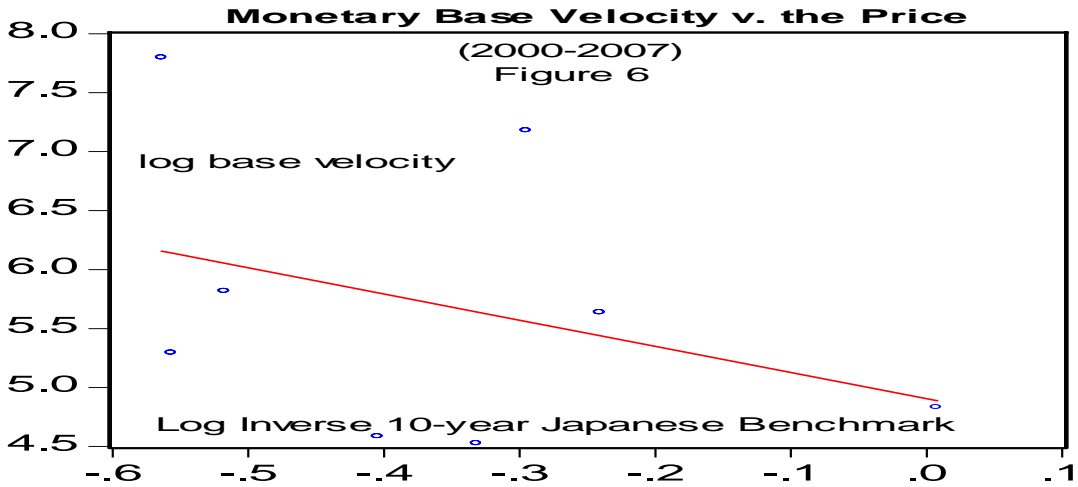
The following graph, Figure 4, shows the relationship between the log of the monetary base velocity and the log of the inverse of the 10-year bond yield, over the period from 1975 to 2007. The data suggest that although the demand for the monetary base is not constant, a stable and predictable relationship does hold. The simple correlation is .89, showing that an increase in the bond yield or nominal interest rate results in an increase in monetary base velocity.



An interesting result occurs, however, once we divide the 1975-2007 time period into two sub-periods. Over the first period, 1975-1999, the same basic relationship holds. Figure 5 shows that over this period, before the BOJ became fully independent, a strong relationship between velocity and bond yields holds. A relatively stable demand for money function or constant interest elasticity existed in Japan at that time. The simple correlation for this period was .87.

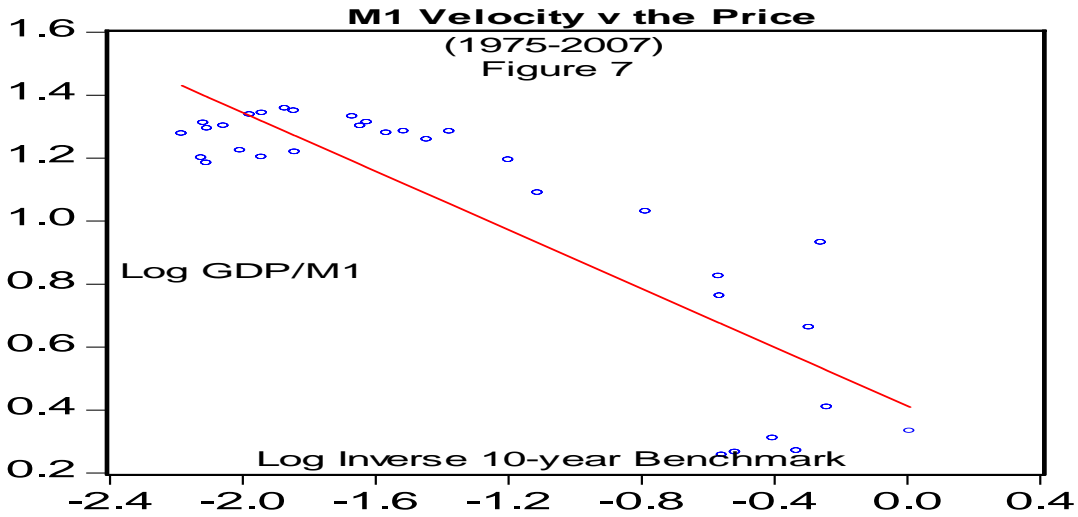


However, once this relationship is examined for the second sub-period, 2000-2007, the relationship becomes much weaker. Figure 6 graphs the log of monetary base velocity against the log of the inverse of the 10-year bond yield for 2000-2007. The simple correlation over this period is only 0.36. This weakness in the relationship between money demand and the nominal interest rate supports the Bernanke position that monetary policy becomes less effective in periods of low or negative inflation and very low nominal interest rates (2007). The most recent Japanese experience suggests that monetary policy aimed at achieving zero inflation may have the unintended result of an ineffective monetary policy.



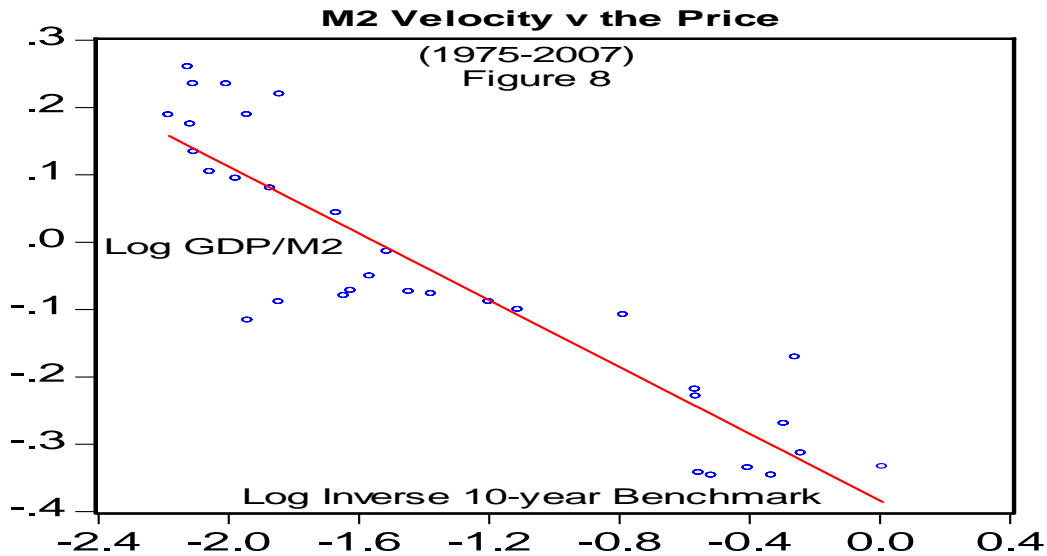
### 3.5 M1 Velocity

The relationship between the log of M1 velocity and the log-inverse of the 10-year yield, Figure 7, does not imply a linear relationship, so there is not a constant interest elasticity over the period 1975-2007. A similar relationship occurs with M1 as with the monetary base when the two sub-periods are compared. In the recent period of deflation, the relationship breaks down. Correlations for each of the monetary aggregates in the two sub-periods are provided in Table 1.



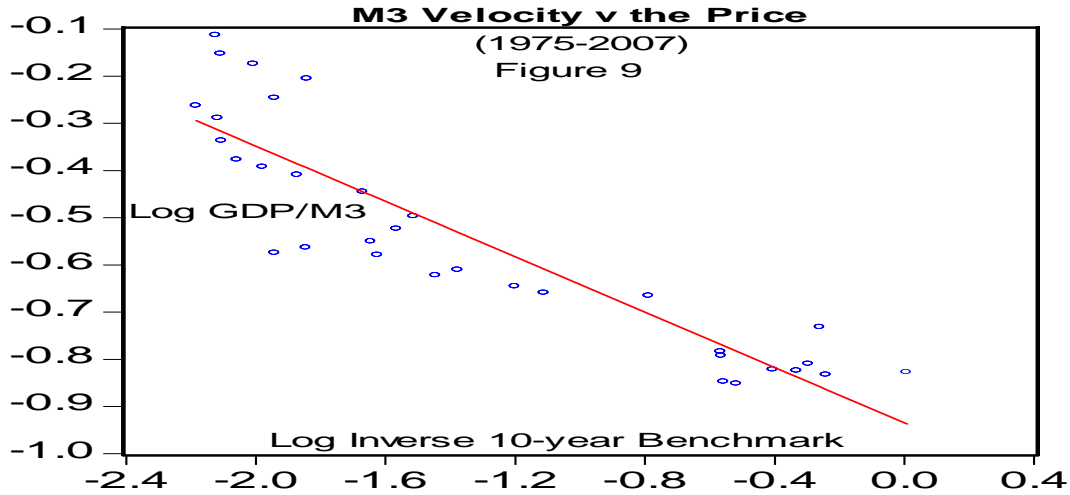
### 3.6 M2 Velocity

M2 velocity and the 10-year yield provide some support for a stable demand function, but there are enough observations in the scatter to suggest that the relationship is unstable. In addition, the 1975-1999 sub-period fit did not suggest a constant interest elasticity. And again the relationship breaks down completely in the sub-period 2000-2007 when deflation occurred.



### 3.7 M3 Velocity

The fit for both M2 and M3 are similar for each of the periods. And while there is some support for a stable money demand function, there are enough observations over the 1975-2007 period, suggesting that the relationship is unstable.



### 3.8 Correlations

Table 1 summarizes the velocity correlations for each of the monetary aggregates in the different time periods and sub-periods. Money demand relationships that held prior to 1999 did not hold for any of the aggregates in the current decade. The implication is that monetary policy instruments that worked relatively well in a period of positive inflation failed to function when deflation became the norm. The policy of quantitative easing, instituted by Japan in 2001, appears to have been mildly effective. However, the truncation of the quantitative easing policy in March 2006 meant that Japan has stayed mired in deflation up to the present time.

**Table 1 Velocity Correlations**

Time period	Monetary Base	M1	M2	M3
1975-2007	0.885	0.864	0.904	0.903
1990-2007	0.812	0.855	0.816	0.921
2000-2007	0.36	0.113	0.179	0.053
1975-1999	0.874	0.783	0.788	0.822

### 4. FINDINGS

Our analysis suggests that the Bank of Japan needs to target the upper end of its inflation range, based on our conclusion that an inflation rate of approximately 2% is more conducive to an effective monetary policy. Japan has experienced deflation in 2/3 of the past nine years, as measured by the general CPI. This analysis lends support to Bernanke's contention that very low or negative inflation rates could make monetary policy ineffective.

It is not clear that Bank of Japan officials understand their current situation. The relationship between monetary base velocity and the yield on 10-year bonds, according to our findings, was stable over the 1975-1999 period. Japan's recurring bouts of deflation since then may stem from BOJ officials thinking that the pre-1999 monetary framework is still applicable in a period of low or negative inflation.

In addition, BOJ officials perhaps think that zero inflation is a proper goal for monetary policy, even though their official inflation target has been broadened to incorporate the zero to two percent range. The BOJ ended its quantitative easing program in March 2006. Perhaps they thought they had solved the deflation problem by then. Inflation data since that time does not support such a belief. Japanese households likely expect deflation to continue, which suggests BOJ officials need to follow an aggressive quantitative easing program for an extended time, in order to change households' expectations. The evidence in this paper suggests that BOJ officials are mismanaging monetary policy. Japan's experience



has implications for other central banks in that very low or negative inflation rates may actually be associated with greater economic and financial instability than a slightly elevated inflation rate.

Japan's problems in getting monetary policy right may not lie entirely with the Bank of Japan and its officials. Events in 2008 suggest that deadlock in the Japanese Diet between the major political parties may be making the conduct of monetary policy more difficult than it should be. Toshihiko Fukui's term as Governor of the Bank of Japan expired on March 19, 2008. The Liberal-Democratic-Party-led government nominated two possible successors for Fukui. Both were rejected by the Democratic Party of Japan-controlled Upper House. Several weeks passed in which had no one was in charge of the BOJ, until the LDP government finally nominated the deputy governor, Masaaki Shirakawa, to serve as governor. The main source of friction between the two political parties seems to be how to deal with Japan's budget deficits and the resulting enormous national debt. The LDP's unsuccessful nominees were all from the Ministry of Finance, which has the political task of managing the debt. Putting MOF people in charge of the BOJ would, as before 1998, make the BOJ subservient to the MOF, and force BOJ policy to support managing the debt. This would undermine the BOJ's independence. See *The Economist* (2008).

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