Credit Paradigm vs. Money Paradigm[*]

——Monetary Policy and Financial Structure——

Akiyoshi Horiuchi

1 : Introduction

How do structural changes in financial markets influence the desirability of particular procedures of monetary policy, i. e., the optimal selection of both intermediate targets and operating tools? Is there any meaningful relationship between the most desirable procedures of monetary policy and the structural characteristics of a given financial system? It is very difficult to give general answers to these questions. Some economists, especially those belonging to the monetarists' camp, seem to claim that the most desirable procedures of monetary policy and the structural characteristics of a finanical system are independent of each other. According to their view, money supply control is most desirable in every financial system, and central banks should choose money supply as their intermediate policy target.

This proposition by the monetarists, however, has come under severe criticism. As a representative article criticizing it, we may cite Modigliani-Papademos (1980) (hereafter M-P). M-P classifies financial structure into two paradigm : The bank credit paradigm (credit paradigm) and the bank deposit paradigm (money paradigm). The credit paradigm refers to those financial system in which the nonbank public (mainly the corporation sector) raises its necessary fund almost entirely by borrowing from the banking system, while the money paradigm refers to those financial system in which the nonbank public raises its necessary funds by relying to a substantial extent on market instruments held directly by the public or by nonbank financial intermediaries[1].

Based on this schema, M-P claims that the procedure of monetary policy proposed by the monetarists, i. e., choice of money supply as an intermediate target, will be effective only when we have a financial system characterized by the money paradigm. In other words, according to M-P, the money supply target will not be most efficient in an economy whose financial structure is that of the credit paradigm. For such an economy, it would be more efficient to control bank loans by some means.

This M-P's argument seems to influence some of those who are concerned with monetary policy in Japan. They argue that because the Japanese financial system has

1) Modigliani and Papademos (1980: p. 120).

had the structural characteristics of the credit paradigm, it has been quite rational for the Bank of Japan to choose bank loans as a *de facto* intermediate policy target and to control the increment of bank loans directly by the so-called window guidance procedure[2]. They also predict that the money supply target will become increasingly important because Japanese financial structure is rapidly changing into that of a money paradigm.

Making use of a very simple macroeconomic model corresponding to the Japanese economy, this paper investigates the relationship between the efficiency of monetary policy and the financial structure. The M-P schema explained above is fundamental to the following investigation. Especially in that a comparison of efficiency between the money supply target and the bank credit target is made in both the money paradigm and the credit paradigm.

Our analysis indicates that the money supply target is just equivalent to the bank credit target in a credit paradigm economy, and therefore that there will not be any substantial difference in efficiency whether the central bank should choose money supply or bank credit as an intermediate policy target. This result clearly contradicts with the M-P proposition mentioned above.

As for the more sophisticated money paradigm economy, this paper derives ambiguous results. It is certain that the efficiency of the money supply target is not equivalent to that of the bank credit target in this economy. However, we cannot conclude that the money supply target is always superior to the bank credit target. Thus, the conclusions of this paper warn us that a straightforward application of the M-P's schema to monetary policy management may be misleading.

This paper is organized as follows. In Section 2, the theoretical framework of our macroeconomic model is presented and equilibrium of the credit paradigm economy is investigated. Although there are some differences, our model has a framework essentially similar to the M-P model. Section 3 is devoted to the analysis of the money paradigm economy which has a more complicated money market system than the credit paradigm economy.

2 : Basic Framework of a Credit Paradigm Economy

General Assumption

Table 1 presents an overview of the financial structure of our macroeconomic model. We assume that the outstanding amounts of the various assets and liabilities held by each sector at the beginning of the current period are predetermined, and that the increments of those assets and liabilities during the current period are endogenously determined along with the level of national income[3].

Although table 1 shows the basic framework clearly, we must explain some important assumptions concerning working of the financial markets.

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2)   See Sakakibara, *et. al.* (1982 : p. 57) and Ueda (1982 : pp. 47–49). As for a *de facto* intermediate target of monetary policy before the 1970s, see Suzuki (1981 : pp. 181–183).

3)   This is an 'end of period equilibrium' approach used by M-P. An example of a very comprehensive analysis based on this approach is given by Tobin (1982). As to the theoretical problems of this approach, see Foley (1975).

Table 1

a) Assets and Liabilities Outstanding at the Beginning of Period

	Central Bank (C)	Private Banks (B)	Nonbank Public (N)
Reserves	R^C	R^B	
Bank Deposits		D^B	D^N
Money Market Instrument	B^C	B^B	$B^{N(*)}$
Bank Loans		L^B	L^N
Real Capital			K
Net Worth	0	0	W

b) Flow of Funds Account during a Period

	Central Bank (C)	Private Banks (B)	Nonbank Public (N)
Reserves	ΔR^C	ΔR^B	
Bank Deposits		ΔD^B	ΔD^N
Money Market Instrument	ΔB^C	ΔB^B	$\Delta B^{N(*)}$
Bank Loans		ΔL^B	ΔL^N
Investments			I
Savings			S

(*) These terms must be always zero in the credit paradigm economy.

Money Markets : It is conventional to classify money markets into the interbank money market where only banks and other financial intermediaries (including the central bank) can make transactions, and the open money market in which not only financial intermediaries but also the nonbank public can participate directly. In this paper, a 'credit paradigm' economy is defined as one which has only the interbank money market within its financial system. The nonbank public in this economy is not permitted to make transactions in the money market. So, corporations and households must finance their deficits by borrowing from the banking system except for by reducing their deposits. It may safely be said that Japan had been a credit paradigm economy until about ten years ago, because its financial system lacked well developed open money markets[4].

On the other hand, we assume that both the interbank and the open money market exist in the 'money paradigm' economy. In this economy, deficit units of the nonbank public can finance their deficits not only by borrowing from the banks but also by borrowing in the open money markets. These definitions of the money and the credit paradigm virtually correspond to those of M-P.

Bank Deposits : We assume that there is only one kind of bank deposit, and that an interest rate on the deposits is institutionally fixed. The banking sector perfectly accommodates the demand of the nonbank public for the deposits. It is, therefore, unnecessary to consider equilibrium of the bank deposits.

Bank Loans : Though more than a few economists disagree, we assume that a flexible loan rate always balances demand with supply in the loan market. However, introduction of the assumption of 'credit rationing' in place of this would not alter

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4) The Japanese open money markets have been rapidly developing for the last decade. The oldest one is the market for repurchase agreements (Gensaki) in which many nonfinancial corporations have been actively participating mainly as lenders. The market for NCDs introduced in 1979 has also been expanding.

essence of the main conclusions which we shall obtain in the following discussion.

Integrated Nonbank Public : For analytical simplicity, we integrate corporations and households into the nonbank public. The amount of deficits of this integrated sector, i. e., an excess of investments (I) over savings (S), corresponds to excess demand in the commodity market. This amount of deficits is not zero *ex ante.* As a result of various adjustments in the macroeconomy during the current period, the deficits become zero.

Behavior Functions of Each Sector : In this paper, behavior of each sector is presented by a linear function. Moreover, for simplicity, every economic variable is assumed to represent a deviation from its level attained in a stationary equilibrium. If an actual equilibrium coincides with its stationary equilibrium, the level of that variable will become zero. Therefore, none of the behavior functions have constant terms.

A Criterion of Monetary Policy Efficiency : In advance, we need to define a criterion by which to assess the efficiency of monetary policy. The efficiency of a monetary policy is evaluated by the degree to which an equilibrium level of national income fluctuates around its stationary equilibrium level. Specifically, we measure monetary policy efficiency by a statistical variance of national income. The smaller this variance is, we regard, the more efficient the monetary policy is.

Behavior of Each Sector

The Nonbank Public : The nonbank public's (*ex ante*) excess demand for the commodity is equal to an excess of investments over savings. We assume this excess demand is as follows ;

$$I-S=a_1 r-a_3 Y+a_4 W_{-1}+u_A ; \quad a_1, a_3, a_4 \geqq 0 \qquad (1)$$

where r and Y denote the bank loan rate and national income respectively, and W_{-1} is the public's net worth at the beginning of the current period[5]. In (1), u_A is a term representing random fluctuation in the nonbank public's excess demand for the commodity. According to (1), the excess demand does not directly depend upon money supply, but depends upon an interest rate of bank loan. In this sense, the model of this paper has a non-monetarist characteristic.

The following (2) is the nonbank public's demand for increases in bank loans. This demand ΔL^N is assumed to be a decreasing function of the loan rate r, and an increasing function of the net worth W_{-1}. The equation (2) includes random disturbance u_B as to borrowing demand of the nonbank public.

$$\Delta L^N = -b_1 r+b_4 W_{-1}+u_B; \quad b_1, b_4, \geqq 0, \qquad (2)$$

From the balance sheet given in table 1, the following constraint (3) is derived;

$$\Delta D^N + (I-S) = \Delta L^N \qquad (3)$$

We can easily deduce the nonbank public's demand for bank deposits ΔD^N based on this constraint and the assumption (1) and (2). That is,

$$\Delta D^N = -(b_1-a_1) r+a_3 Y+(b_4-a_4) W_{-1}-u_A+u_B; \quad b_1-a_1 \geqq 0. \qquad (4)$$

The assumptions we have made so far do not ensure that the nonbank public's demand for bank deposits is a decreasing function of the loan rate. In the following, we assume it.

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5) We can prove that this net worth W_{-1} is equal to the real capital stock K_{-1} at the beginning of this period.

The Banking Sector :　As already assumed, the banking sector accepts the deposits of the nonbank public passively. The banking sector has a reserve demand given by

$$\Delta R^B = k\Delta D^N + u_E;\ \ 0 < k < 1. \tag{5}$$

The reserve requirement ratio is assumed to be known, and u_E is the excess reserves which are assumed to be stochastic[6].

The loan supply by the banking secter ΔL^B is assumed to be an increasing function of the loan rate r and a decreasing function of the money market rate i. Therefore, with a disturbance term u_C, it can be represented by

$$\Delta L^B = c_1 r - c_2 i + u_C;\ \ c_1, c_2 \geqq 0. \tag{6}$$

Later, we shall introduce 'window guidance' into our analysis. By means of the window guidance, the central bank imposes a ceiling X on increases in the banks' loan supply. If the guidance is effective, the actual increment in the bank loan is equal to this ceiling X. In the case in which the window guidance is in operation, therefore, the following (6′) instead of (6) represents the loan supply;

$$\Delta L^B = X. \tag{6′}$$

For the banking sector, the net holding of the money market instrument ΔB^B is an adjuster which makes its portfolio satisfy the balance sheet constraint given by table 1; i. e.,

$$\Delta R^B + \Delta B^B + \Delta L^B = \Delta D^N.$$

From this we can derive the banks' net demand for the money market instrument as follows;

$$\Delta B^B = (1-k)\Delta D^N - \Delta L^B - u_E. \tag{7}$$

In the case of window guidance, the following (7′) must be substituted for (7).

$$\Delta B^B = (1-k)\Delta D^N - X - u_E. \tag{7′}$$

The Central Bank :　We assume that the central bank adjusts its supply of reserves ΔR^C entirely by changing its net holding of the money market instrument B^C. Thus.

$$\Delta B^C = \Delta R^C. \tag{8}$$

Equilibrium of the Credit Paradigm Economy

This paper takes up four financial assets (i. e., reserves, bank deposits, the money market instrument, and bank loans) and one commodity. However, as we assume a perfectly passive supply of the bank deposits, the number of markets whose equilibrium are to be considered is four. Additionally, the well known Walras' Law reduces the number of independent equilibrium conditions to three. These three conditions endogenously determine the loan rate r, the money market rate i, and national income Y.

First, the equilibrium of the bank loan market is represented by

$$\Delta L^N - \Delta L^B = 0. \tag{9}$$

The left hand side of (9) is the excess demand for the bank loans.

Secondly, the banks' demand for reserves ΔR^B must be equal to the supply ΔR^C determined by the central bank. Thus,

$$\Delta R^B - \Delta R^C = 0. \tag{10}$$

Thirdly, the following (11) represents equilibrium in the commodity market;

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6)　It may be conventional to assume the reserves demand to be a function of the money market rate i. However, we cannot find any clear relationship between the banks' reserve demand and the money market rates in Japan. See Horiuchi (1981).

$$I - S = 0. \tag{11}$$

We need to assume a procedure of monetary policy in order to complete our macro-economic model. In this paper, two procedures are considered; i. e., the money supply target and the bank credit target.

Money Supply Target : In the case of the money target, the central bank is assumed to adjust its supply of reserves ΔR^C in order to attain a predetermined increase M in the level of money supply (bank deposits). Thus the following equation holds;

$$M = \Delta D^N = -(b_1 - a_1) r + a_3 Y + (b_4 - a_4) W_{-1} - u_A + u_B. \tag{12}$$

Of course, M is an exogenous variable.

We can summarize the money paradigm equilibrium in the case of the money supply target by the following matrix equation (13).

$$
\begin{bmatrix}
-(b_1 + c_1) & c_2 & 0 & 0 \\
-(b_1 - a_1)k & 0 & a_3 k & -1 \\
a_1 & 0 & a_3 & 0 \\
-(b_1 - a_1) & 0 & a_3 & 0
\end{bmatrix}
\begin{bmatrix}
r \\ i \\ Y \\ \Delta R^C
\end{bmatrix}
=
\begin{bmatrix}
-b_4 W_{-1} - u_B + u_C \\
-(b_4 - a_4) k W_{-1} + k u_A - k u_B - u_E \\
a_4 W_{-1} + u_A \\
M - (b_4 - a_4) W_{-1} + u_A - u_B
\end{bmatrix}
$$
$$\tag{13}$$

From (13), we obtain an equilibrium level of national income as follows;

$$Y = (a_1/a_3 b_1) M - [(a_1 b_4 - a_4 b_1)/a_3 b_1] W_{-1} + (1/a_3) u_A - (a_1/a_3 b_1) u_B \tag{14}$$

Bank Credit Target : In the case of the bank credit target, the central bank determines beforehand a target level of increases in loan supply during the current period X and adjusts ΔR^C so as to attain the target. In this case, therefore, the following equation holds;

$$X = \Delta L^B$$
$$= c_1 r - c_2 i + u_C.$$

Thus, the credit paradigm equilibrium in the case of the bank credit target can be summarized by the following (13′) :

$$
\begin{bmatrix}
-(b_1 + c_1) & c_2 & 0 & 0 \\
-(b_1 - a_1)k & 0 & a_3 k & -1 \\
a_1 & 0 & a_3 & 0 \\
c_1 & -c_2 & 0 & 0
\end{bmatrix}
\begin{bmatrix}
r \\ i \\ Y \\ \Delta R^C
\end{bmatrix}
=
\begin{bmatrix}
-b_4 W_{-1} - u_B + u_C \\
-(b_4 - a_4) k W_{-1} + k u_A - k u_B - u_E \\
a_4 W_{-1} + u_A \\
X - u_C
\end{bmatrix}
\tag{13′}
$$

An equilibrium level of national income in the case of the bank credit target is derived from (13′) as follows;

$$Y = (a_1/a_3 b_1) X - [(a_1 b_4 - a_4 b_1)/a_3 b_1] W_{-1} + (1/a_3) u_A - (a_1/a_3 b_1) u_B. \tag{14′}$$

Bank Credit Target with Window Guidance : In Japan, the central bank (the Bank of Japan) directly controls the bank credit supplied by private banks through 'window guidance'. The Bank of Japan instructs the banking system a ceiling on increases in loan supply during the current period X. The private banks follow this instruction faithfully. If all Japanese banks are assumed to be covered by the window guidance, the banks' loan supply and their net demand for the money market instrument can be represented by (6′) and (7′) respectively. It should be pointed out that, in this case, the aggregate demand for the money market instrument (the left hand side of (10)) becomes completely interest inelastic, because the window guidance prevents the banks from adjusting their loan supply. As the money market rate i cannot clear the market, the central bank must accept the role. That is, the central bank must adjust its supply

of reserves ΔR^C endogenously in order to ensure the equation (10). This means that the window guidance in our credit paradigm economy makes autonomous control of reserves impossible[7]. Although the money market rate cannot be determined endogenously, we can easily prove that an equilibrium level of national income Y is represented by the equation (14′) even in the case of the bank credit target with window guidance.

Money Supply Target vs. Bank Credit Target in the Credit Paradigm

All the stochastic disturbances in both (13) and (13′) are assumed to have zero means. Then, if the central bank seeks to reduce the extent to which national income fluctuates as much as possible, the optimal levels of money supply in the case of the money supply target M^* and bank loan increments in the case of the bank credit target X^* are given by (15) and (15′) respectively.

$$(a_1/a_3b_1) M^* - [(a_1b_4 - a_4b_1)/a_3b_1] W_{-1} = 0 \qquad (15)$$
$$(a_1/a_3b_1) X^* - [(a_1b_4 - a_4b_1)/a_3b_1] W_{-1} = 0 \qquad (15')$$

Clearly, these optimal levels M^* and X^* make a mathematical expectation of national income equal to the stationary equilibrium level assumed in this paper to be zero. We assume that these optimal level of the targets are actually chosen by the central bank. Then, the actual level of national income can be represented by (16) both in the case of the money supply target and in the case of the bank credit target;

$$Y = (1/a_3) u_A - (a_1/a_3b_1) u_B. \qquad (16)$$

It is now clear that the money supply target is as efficient as the bank credit target in stabilizing national income in the credit paradigm economy. In other words, in this economy, which intermediate policy target (money supply or bank credit) is chosen is not essential to obtaining efficiency in monetary policy. We can intuitively explain the reason for this result as follows. From (3), (9), and (11), we obtain the following equation;

$$\Delta L^N = \Delta L^B = \Delta D^N. \qquad (17)$$

This equation means that, regardless of the specific policy target adopted by the central bank, money supply ΔD^N is always equal to the bank loans ΔL^B (or ΔL^N) in the credit paradigm equilibrium. Because of this parallel relationship between money supply and bank loans, it is not substantial for the central bank to choose between them as an intermediate policy target.

3 : A Money Paradigm Economy

In this section, we consider the efficiency of monetary policy in the money paradigm economy, where the nonbank public can participate in the money market. In short, there is an open money market along with the interbank money market in the money paradigm economy. For analytical simplicity, we assume that perfect interest rate arbitrage makes it unnecessary to treat these two money markets separately. That is, a unique money market rate i always prevails in both of these two money markets.

Behavior of Each Sector in the Money Paradigm Economy

We need to alter some of the basic assumptions concerning the nonbank public's activities introduced in the last section. First of all, the excess demand of the nonbank public for the commodity (I-S) depends not only the loan rate but also the money market rate i, because it can borrow in the open money market. Thus,

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7) This is pointed out by Ueda (1982: pp. 17–18).

$$I-S=-a_1r-a_2i-a_3Y+a_4W_{-1}+u_A \; ; \; a_1, a_2, a_3 \geqq 0^{8)}. \tag{18}$$

In the money paradigm economy, the nonbank public's demand for bank loans $\varDelta L^N$ and bank deposits $\varDelta D^N$ are also directly influenced by the money market rate i. Therefore, its demand for bank loans can be represented by

$$\varDelta L^N = -b_1r+b_2i+b_4W_{-1}+u_B \; ; \; b_1, b_2, b_4 \geqq 0. \tag{19}$$

where $\varDelta L^N$ is assumed to be an increasing function of the money market rate. The nonbank public's demand for bank deposits is assumed to be a decreasing function of both r and i, and to be an increasing function of national income Y and net worth W_{-1}. Thus,

$$\varDelta D^N = -d_1r-d_2i+d_3Y+d_4W_{-1}+u_D \; ; \; d_1, d_2, d_3, d_4 \geqq 0, \tag{20}$$

where u_D presents random disturbance.

From the balance sheet given in table 1, we can derive the following constraint (21) ;

$$\varDelta D^N + \varDelta B^N + (I-S) = \varDelta L^N \tag{21}$$

We can easily deduce the nonbank public's net demand for the money market instrument $\varDelta B^N$ based on this constraint and assumptions (18)–(20)[9].

On the other hand, we need not alter basic assumptions concerning the private banks' behavior stated in the last section. That is, their demand for reserves $\varDelta R^B$, supply of the loan $\varDelta L^B$ and net demand for the money market instrument $\varDelta B^B$ are described by (5), (6), and (7) of the last section respectively. When the central bank adopts window guidance, the banks' supply of the loans and their net demand for the money market instrument are represented by (6′) and (7′).

Lastly, we obtain (8) from the balance sheet of the central bank.

Equilibrium Conditions for the Money Paradigm Economy

The money paradigm economy has, just like the credit paradigm economy, three financial assets and one commodity whose equilibrium are to be considered explicitly. Owing to Walras' Law, it is sufficient for us to consider only three markets. Together with a specific assumption with respect to an intermediate target of monetary policy, the three conditions determine equilibrium levels of the loan rate r, the money market rate i, and national income Y, along with the amount of reserves $\varDelta R^C$ to be supplied by the central bank.

Money Supply Target : In the case of the money supply target, the central bank adjusts its supply of reserves $\varDelta R^C$ so as to attain a predetermined increase M in the level of money supply $\varDelta D^N$. Thus,

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8)   Of course, it would be unnatural to assume that the coefficients common in sections 2 and 3 take the same values. This paper does not adopt such an assumption. Merely in order to avoid expository complications, we use the same notations in both sections.

9)   Explicitly, $\varDelta B^N$ can be represented as follows ;

$$\varDelta B^N = -(b_1-d_1-a_1)r+(a_2+b_2+d_2)i+(a_3-d_3)Y-(a_4+d_4)W_{-1}-u_A+u_B-u_D.$$

The assumptions we have made so far ensure that the nonbank public's demand for the money market instrument is an inceasing function of the money market rate i. However, it is ambiguous as to whether this demand is an increasing function of the loan rate or not. In this paper, we assume

$$b_1-d_1-a_1 \geqq 0 ;$$

that is, the nonbank public's demand for the money market instrument varies inversely with the loan rate r. This assumption is not implausible.

$$M = \Delta D^N$$
$$= -d_1 r - d_2 i + d_3 Y + d_4 W_{-1} + u_D. \tag{22}$$

We can derive an equilibrium level of national income Y in the case of the money supply target as follows;

$$Y = -\alpha_0 W_{-1} + \alpha_1 M + \alpha_2 u_A - \alpha_3 u_B + \alpha_3 u_C - \alpha_1 u_D, \tag{23}$$

where

$$\alpha_0 = [(a_1 d_4 - a_4 d_1)(b_2 + c_2) + (a_2 d_4 - a_4 d_2)(b_1 + c_1)]/A$$
$$\alpha_1 = [(b_1 + c_1) a_2 + (b_2 + c_2) a_1]/A$$
$$\alpha_2 = [(b_1 + c_1) d_2 + (b_2 + c_2) d_1]/A$$
$$\alpha_3 = (a_1 d_2 - a_2 d_1)/A$$
$$A = (a_2 d_3 + a_3 d_2)(b_1 + c_1) + (a_1 d_3 + a_3 d_1)(b_2 + c_2).$$

Bank Credit Target with Window Guidance : We consider the case of the bank credit target with window guidance in which the central bank imposes an effective ceiling X on the private banks' loan supply ΔL^{B}[10]. Thus, the following condition holds;

$$X = -b_1 r + b_2 i + b_4 W_{-1} + u_B. \tag{24}$$

Thus, an equilibrium level of national income Y' in the case of the bank credit target can be given by

$$Y' = -\alpha_0' W_{-1} + (\alpha_1'/k) \Delta R^C + \alpha_3' X + \alpha_2' u_A - \alpha_3' u_B - \alpha_1' u_D - (\alpha_1'/k) u_E, \tag{23'}$$

where

$$\alpha_0' = [(a_2 d_4 - a_4 d_2) b_1 + (a_1 d_4 - a_4 d_1) b_2]/A'$$
$$\alpha_1' = (a_1 b_2 + a_2 b_1)/A'$$
$$\alpha_2' = (b_1 d_2 - b_2 d_1)/A'$$
$$\alpha_3' = (a_1 d_2 - a_2 d_1)/A'$$
$$A' = (a_2 d_3 + a_3 d_2) b_1 + (a_1 d_3 + a_3 d_1) b_2.$$

We cannot ensure whether the coefficient of X is positive in (23'). In other words, it is ambiguous whether a reduction in the ceiling X of the banks' loan supply will bring down an equilibrium level of national income. In the money paradigm economy, the central bank cannot exert unambiguous polilcy effects by directly controlling private banks' loan supply through the window guidance. This result seems intuitively plausible because the nonbank public can borrow its necessary funds from the open money market in this economy.

Money Supply Target vs. Bank Credit Target in the Money Paradigm

As in the last section, the central bank is supposed to choose the target levels of M and X so as to equate the expected value of national income Y to zero. So, the equilibrium levels of national income in the case of the money supply target and in the case of bank credit target are given by the following (25) and (25') respectively.

$$Y = \alpha_2 u_A - \alpha_3 u_B + \alpha_3 u_C - \alpha_1 u_D \tag{25}$$
$$Y' = \alpha_2' u_A - \alpha_3' u_B - \alpha_1' u_D - (\alpha_1'/k) u_E \tag{25'}$$

Which is more efficient, the money supply target or the bank credit target, in the money paradigm economy? It is not easy to answer this question even in the simple

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10)　Because of the private banks' obedience to window guidance, it is unnecessary for the central bank to adjust its supply of reserves ΔR^C endogenously. However, if reduction of income variance is desirable, the central bank cannot choose ΔR^C arbitrarily. It must be determined along with bank credit target X so as to equate the expected value of Y to zero.

model postulated in this section.

First, it is certain that the money supply target can perfectly eliminate the influence of stochastic fluctuation in the banks' reserve holdings u_E on Y, which the bank credit target cannot eliminate, and that while the bank credit target can prevent stochastic variation in the banks' loan supply u_C from influencing national income, the money supply target cannot. These are trivial from (25) and (25′).

Secondly, stochastic disturbance as to the nonbank public's choice of financing methods between borrowing from banks and borrowing in the money market, which is represesed by u_B, makes national income fluctuate more widely in the case of the bank credit target than in the case of the money supply target. This is immediately clear because $|\alpha_3| < |\alpha_3'|$[11]. Therefore, if there are no disturbances except for u_B in our money paradigm economy, the money supply target is more efficient than the bank credit target.

However, generally speaking, it cannot be determined that the money supply target is always superior to the bank credit target in money paradigm economy. It is quite possible that the bank credit target will prove to be more efficient than the money supply target under some additional conditions. We shall show this in the remainder of this section.

We consider the case in which stochastic disturbance on the macroeconomy come entirely from the nonbank public's *ex ante* excess demand in the commodity market u_A. The nonbank public is assumed to cope $100(1-q_B)$ percent of this deficits disturbance by changing its demand for the bank loans and the remaining $100(1-q_B)$ percent by u_A changing its borrowing in the money market (or its net holding of the money market instrument). That is;

$$u_B = q_B u_A, \ (0 \leqq q_B \leqq 1).$$

Moreover, the private banks are assumed to accommodate the change in the nonbank public's demand for bank loans u_B by altering their loan supply by $q_C u_B (0 \leqq q_C \leqq 1)$. Therefore,

$$u_C = q_C u_B$$
$$= q_B q_C u_A.$$

Neglecting all other stochastic disturbances, we obtain the following equations from (25) and (25′).

$$Y = [\alpha_2 - (1-q_C) q_B \alpha_3] u_A$$
$$Y' = (\alpha_2' - q_B \alpha_3') u_A$$

Therefore, the variances of national income in the case of the money supply target and the bank credit target are given by (26) and (26′) respectively;

$$\text{Var}(Y) = [\alpha_2 - (1-q_C) q_B \alpha_3]^2 V_A \text{[12]}, \tag{26}$$
$$\text{Var}(Y') = (\alpha_2' - q_B \alpha_3')^2 V_A, \tag{26'}$$

where V_A denotes a variance of u_A.

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11) In the case of the money supply target, the influence of irregular change in the public's choice of financing methods u_B will be to some extent mitigated by the adjustment of the banks' loan supply. However, in the case of the bank credit target, such an adjustment of the loan supply cannot be permitted. Consequently, income Y is influenced by u_B much more in the latter case than in the former.

12) As can be seen from (26), the larger part of random fluctuation in the nonbank public's deficits u_A is coped with by accompanying changes in its bank loan borrowing (i.e., the larger is q_B), and the smaller is the extent to which the banks accommodate the nonbank public's loan demand (i.e., the smaller is q_C), variance of national income Y in the case of the money supply target becomes smaller.

Though it is ambiguous as to which of these two variances is smaller, we can determine it by adding a few assumptions. The first additional assumptions is

$$a_1 d_2 - a_2 d_1 > 0. \tag{27}$$

This assumption means that, on the one hand, the nonbank public's excess demand for the commodity is relatively more sensitive to the loan rate r than to the money market rate i, and on the other hand, its demand for the bank deposits is relatively more sensitive to i than to r. This does not seem implausible[13]. The second additional assumption is

$$b_1 c_2 - b_2 c_1 < 0. \tag{28}$$

This means that while the bank's loan supply is comparatively more sensitive to the loan rate r than the money market rate i, the nonbank public's demand is more sensitive to i than to r. Is this plausible? We should refrain from giving an *a priori* decision on it.

Marking use of these two additional assumptions, we can easily prove

$$\alpha_2 > \alpha_2'\text{[14]}. \tag{29}$$

Moreover, the assumption (27) ensures the following (30).

$$0 < \alpha_3 < \alpha_3' \tag{30}$$

Therefore, from (29) and (30),

$$\alpha_2 - \alpha_3 > \alpha_2' - \alpha_3' > 0\text{[15]}. \tag{31}$$

As $0 \leqq (1-q_C) q_B \leqq q_B \leqq 1$, so

$$\alpha_2 - (1-q_C) q_B \alpha_3 > \alpha_2' - q_B \alpha_3' > 0.$$

Thus, we obtain

$$\mathrm{Var}(Y) > \mathrm{Var}(Y'),$$

which means that the bank credit target is more efficient in stabilizing national income than the money supply target[16].

Of course, we should admit that the result obtained above is just a special case of the money paradigm equilibrium. It only suggests that even in the money paradigm economy, a monetary policy procedure aiming to control the banks' loan supply directly may be no less efficient that aiming to control money supply[17]. However, it is

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13) This assumption ensures that both α_3 and α_3' are positive. That is, an autonomous increase in the banks' loan supply (i. e., an increase in u_C) will, ceteris paribus, raise an equilibrium level of Y.

14) This is because

$$\alpha_2 - \alpha_2' = - (b_1 c_2 - b_2 c_1) (a_1 d_2 - a_2 d_1) d_3 / AA'.$$

15) The following equation holds;

$$\alpha_2' - \alpha_3' = [(a_2 + b_2) d_1 + (b_1 - a_1) d_2] / A'.$$

Thus, from an assumption $(b_1 - d_1 - a_1) \geqq 0$ given in footnote 9, we can derive

$$\alpha_2' - \alpha_3' > 0.$$

16) As

$$\alpha_1 - \alpha_1' = (a_1 d_2 - a_2 d_1) (b_1 c_2 - b_2 c_1) a_3 / AA',$$

additional assumptions (27) and (28) ensure

$$\alpha_1 < \alpha_1'.$$

This means that the influence of stochastic disturbance as to the nonbank public's choice between bank deposits and the money market instrument (i. e., u_D) on national income Y can be more efficiently suppressed by the money supply target than by the bank credit target.

17) As shown by equation (1), this paper adopts a Keynesian assumption that monetary policy transmission from the financial markets to real sector is entirely supported by the interest rates. Probably,

noteworthy that we cannot prove the general superiority of the money supply target in the money paradigm economy.

4 : Concluding Remarks

Making use of a simple macroeconomic model, this paper has investigated how the efficiency of various monetary policies is affected by differences in financial structure. Specifically, we have made a comparison between cases of the money supply target, in which money supply is adopted as an intermediate policy target, and the bank credit target, in which the central bank directly controls the banks' loan supply.

In the credit paradigm economy, which has a rather simple money market system, contrary to M-P's conjecture that the bank credit target is superior to the money supply target, we found that the latter is as efficient as the former in suppressing undue fluctuation in national income. This is because money supply precisely corresponds with bank loans in this economy.

In the money paradigm economy, which has relatively sophisticated money markets, we cannot prove the general validity of the conjecture emphasized by M-P that the money supply target is superior to the bank credit target as a monetary policy procedure. Complicated interactions in the money paradigm economy's financial markets may make the money supply target less efficient than the bank credit target.

We cannot deny M-P's general message that the comparable efficiency of various procedures of monetary policy are closely related with financial structure. Our analyses in this paper support it. According to our simplifid model, however, the policy implications M-P derives from the schema of money paradigm vs. credit paradigm cannot be supported theoretically.

The following two facts seem to be, at least indirectly, supporting our conclusions. The first is that doubt on the efficiency of money supply control has gradually been prevailing in the United States, which M-P regards as a money paradigm economy. It is often argued that recent complicated developments in the money markets has greatly reduced efficiency of money supply target in that country. For instance, B. Friedman (1982) claims that much more attention should be paid to the behavior of total non-financial debt (credit).

The second is that the money supply control and the bank credit control are very closely related with each other in the framework of monetary policy in Japan, which we may regard as a credit paradigm economy. Though the Bank of Japan has officially acknowledged importance of money supply control since the mid-1970s, it has also emphasized necessity of window guidance[18]. There is no evidence to indicate that procedures of Japanese monetary policy have been fundamentally altered since the mid-1970s. This suggests that it has not been a substantial problem for the Bank of Japan which should be chosen as a policy target, money supply or bank credit.

Of course, our conclusions in this paper are far from decisive. Our model, following M-P's, is extremely simple. Thus, making the model more sophisticated might force us

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this assumption contributes to make our results somewhat more unfavorable to the money supply target.

18)   The Bank of Japan (1975).

to alter most of our conclusions in this paper. However, it would probably be very difficult to derive any operational meanings from the theoretical analyses of a more complicated model than ours.

<div align="right">(The Institute of Economic Research, Hitotsubashi University)</div>

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