From Debt Money to Public Money System
– Modeling A Transition Process Simplified –
(A Revised Version)

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Abstract

In the book "Money and Macroeconomic Dynamics (2013)" by this author, our current economic system, being dubbed as the *debt money* system, is shown to be currently facing systemic failures of financial and debt crises, and, as its alternative system, a *public money* system is proposed. Yet, a transition process from the debt money system to the public money system has been left unanalyzed, though vehemently called for by those who wish to implement the alternative economic system. Under the situation, this paper discusses its transition process by constructing a simple macroeconomic model based on the accounting system dynamics. It turns out that this model can briefly handle main features of the debt money system, in 8 steps, that cause "booms and depressions", debt accumulation and failures of the recent quantitative easing financial policy. It then offers a transition process to the public money system in 6 steps. These analyses are carried out by focusing on the behaviors of monetary base and money supply as their rationales are laid out in the above book.

1 Debt vs Public Money System in a Nutshell

In the book "Money and Macroeconomic Dynamics" [4, 2013] (hereafter called the Book), the current macroeconomic system, being dubbed as the *debt money* system, has been shown to be currently facing systemic failures of possible financial meltdown, defaults and hyper-inflation; that is, it has been analyzed as a dead-end system.

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As its alternative system that can overcome these systemic failures, the *public money* system is proposed as having the following three features:

- Governmental control over the issue of money
- Abolishment of credit creation with full (100%) reserve ratio
- Constant flow of money into circulation to sustain economic growth and welfare

In Chapter 15 of the Book[1], the comparative analyses of these two system structures and their behaviors are succinctly summarized. Yet, a transition process from the debt money system to the public money system is left unanalyzed, though vehemently called for by those who wish to implement the public money system. The purpose of this paper is, therefore, to present a transition process to the public money system of macroeconomy in order to get out of the current dead-end system.

System Structures

For the readers who are not familiar with these two systems mentioned above, let us start with a brief description of these systems. Table 1, excerpted from Chapter 15, encapsulates the system structures of these two systems.

	Public Money System	**Debt Money System**
Money Issuer Its Owner	Public Money Administration Government (Public)	Central Bank Private Banks and Financiers
Bank Reserves	100% Reserve	Fractional Reserve
Money Supply	Public Money directly put into Circulation as Economy Grows Private Banking unaffected	Base Money: by Central Bank Deposits: by Bank Loans Money in Circulation: by Public
Interest	Interest-free	Interest-bearing Debt
Economic Policies	Public Money Policy (Public Money Financing)	Monetary Policy: Central Bank Fiscal Policy: Government

Table 1: Public Money vs Debt Money System Structures

System Behaviors

System structures of the public and debt money thus outlined above produce very different system behaviors. These system behaviors are compared in Table 2. The detailed descriptions are referred to Chapter 15 of the Book mentioned above.

[1]This chapter as well as the whole text of "Money and Macroeconomic Dynamics" is freely available at: www.muratopia.org/Yamaguchi/MacroBook.html.

	Public Money System	**Debt Money System**
Monetary Stability	Stable Money Supply Stable Price Level	Bubbles and Credit Crunches Inflation & Deflation
Financial Stability	No Bank-runs	Business Cycles (Booms and Depressions)
Employment	Full Employment	Involuntary Unemployment
Government Debt	No Government Debt	Built-in Debt Accumulation → Recession & Unemployment
Inequality	Income Inequality between Workers and Capitalists	Income Inequality between Financiers and Non-financiers
Sustainability	Sustainability is Possible	Accumulated Debt → Forced Growth → Environmental Destruction

Table 2: Public Money vs Debt Money System Behaviors

2 Volatile Behaviors of Debt Money System

In order to present a transition process, we have constructed a simple macroeconomic model[2], consisting of four sectors such as central bank, commercial banks, producers and government, on the basis of the analytical method of accounting system dynamics developed by the author. Consumer sector is not included here as inessential for the purpose of this paper.

The model thus constructed turned out to be able to describe main features of the debt money system such as "booms and depressions", debt accumulation and failures of quantitative easing policy, etc., by focusing on the behaviors of monetary base and money supply. Accordingly, our analysis in this section starts with the presentation of these features of the debt money system in the following 8 steps.

(0) Initial Base Money into Circulation (t=0): M=180

Let us assume that our simple macroeconomy sets out with the initial base money of $180 billions[3] which is initially put into circulation. Figure 1 illustrates how the initial base money is booked both as the asset of the balance sheet of the central bank and as its liability of currency outstanding.

This amount of initial base money could be assumed to be printed as convertible bank notes (or historically gold certificates) against gold asset held by the central bank (or goldsmiths), or printed as legal tender in exchange for the government securities as collateral asset. This initial base money is the only tangible real money we can touch and feel physically.

[2]The model is available through the contact with the author by email. It runs on the free software: Vensim Model Reader, Version 6.3.

[3]The unit of billions of dollar will be hereafter omitted.

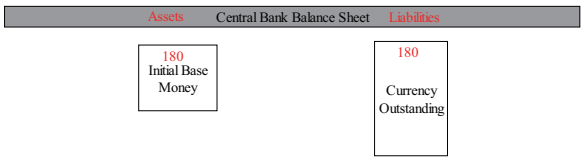

Figure 1: (0) Initial Base Money

In this paper money supply is simply defined as the sum of currency outstanding and deposits (including credits) under the debt money system, while it is defined as the sum of currency outstanding and demand deposits under the public money system, as displayed in Figure 2.

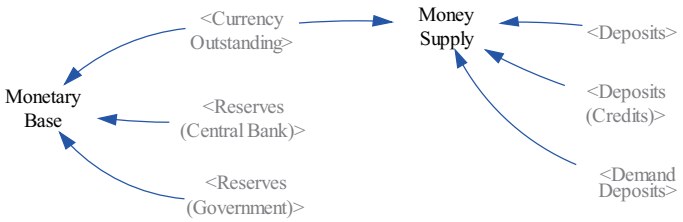

Figure 2: Definition of Money Supply

Money supply at this stage is thus depicted as M=180 in the subsection title.

(1) Fractional Reserve Banking System (t=5): M=680

Now suppose a portion of initial base money, say $100, is deposited as savings out of the currency in circulation, and commercial banks hold this full amount as their reserves with the central bank. Under the fractional reserve banking system, this amount allows the banks to create credits out of nothing according to the following formula:

$$\text{Credits (Banks)} = \frac{1-\beta}{\beta} \text{ Reserves (Banks)} \tag{1}$$

where β is a required reserve ratio. The required reserve ratio in our economy here is assumed to be 10%. Then, the maximum amount of credits to be created by the banks becomes $900 (= (1 - 0.1)/0.1 x $100).

Under the debt money system, however, credits can be created only when someone in the economy come to borrow. Let us assume that producers come to borrow $500 for their real investment at t = 5. Then, their deposit account is instantaneously opened up with $500 being typed in by the computer keyboard of the banks, instead of $500 being handed over directly to the producers in cash. In this way, $500 is newly created, through the fractional reserve banking system, out of nothing to provide the investment activities. As a result, money supply in the economy now increases to M=680. Figures 4 and 12 below

illustrate these transaction processes. Numerical numbers (in reds, green etc,) that appear in the stock boxes of the Figures hereafter represent the amount of monetary values that exist at each step.

Due to this process of credit creation, the fractional reserve banking system has been historically justified by its proponents as an efficient system of providing enough funds to meet the need for growing economy. They pose that without the fractional reserve banking system our economy could not have developed as it has been today.

(2) Making Bubbles (t=10): M=1,080

Yet, this fractional banking system has been the root cause of "booms and depressions" as Irving Fisher and five co-authors of the "Program for Monetary Reform (1939)" claimed in its section 9:

> (9) Fractional reserves give our thousands of commercial banks the power to increase or decrease the volume of our circulating medium by increasing or decreasing bank loans and investments. The banks thus exercise what has always, and justly, been considered a prerogative of sovereign power. As each bank exercises this power independently without any centralized control, the resulting changes in the volume of the circulating medium are largely haphazard. This situation is a most important factor in booms and depressions [1, p.19].

Under the fractional reserve banking system, bubbles could be easily created by making inessential (unproductive) loans to the financial and real estates sectors who are eager to borrow money whenever favorable loan conditions such as low interest rates are offered. Such aggressive loans have been beneficial to the banks as well for further streams of their interest incomes.

In our economy, the maximum loanable credits are \$900, out of which \$500 is already loaned to the producers for real investment. Let us now assume that the additional loans of \$400 are made for financial investment such as stocks and real estates at t = 10. Figures 5 and 12 below show how values of financial assets bubble to \$400. Deposits of the banks increase to the maximum loanable amount of credits of \$900, out of which banks can derive maximum amount of interest incomes. Money supply at this step increases to M=1,080.

(3) Bubbles Burst and Bank-runs (t=14): M=990

Bubbles always pop! As a result, financial assets of producers (\$400) become valueless at t= 14, and their net assets suffer from the deficits of -\$400, yet their accumulated debts remain as high as \$900.

The immediate consequence of the burst of bubbles may be the bank-runs by depositors. In our economy, depositors are assumed to withdraw \$10, and accordingly bank deposits are constrained to shrink by \$90 (=(1 - 0.1)/0.1 x

$10), and money supply to $990 from $1,080. Figures 6 and 12 below show how financial assets collapse and bank-runs occur.

Irving Fisher observed this shrinkage of money supply as follows:

> The boom and depression since 1926 are largely epitomized by these three figures (in billions of dollars) – 26, 27, 20 – for the three years 1926, 1929, 1933.
>
> The changes in quantity were chiefly in the deposits. The three figures for the check-book money were, as stated, 22, 23, 15; those for the pocket-book money were 4, 4, 5. An essential part of this depression has been the shrinkage from the 23 to the 15 billions in check-book money, that is, the wiping out of 8 billions of dollars of the nation's chief circulating medium which we all need as a common highway for business.
>
> The shrinkage of 8 billions in the nation's check-book money reflects the increase of 1 billion (i.e. from 4 to 5) in pocket-book money. The public withdrew this billion of cash from the banks and the banks, to provide it, had to destroy the 8 billions of credit.
>
> This loss, or destruction, of 8 billions of check-book money has been *realized by few and seldom mentioned* (Italics are emphasized by the author). [2, pp. 5,6]

Check-book money here is the same as demand deposits, and pocket-money implies currency outstanding (and in circulation). Thus, in a similar fashion, $90 in bank deposits is "destroyed" by the bank-runs of $10, which re-entered into the currency outstanding in our economy. Indeed, the fractional reserve banking system has become the root cause of booms and depressions.

Whenever bank-runs are triggered, banks as credit lenders are forced to withdraw deposits, causing credit crunch. This type of credit crunch is depicted as the loop of Lenders Credit Crunch in Figure 3. Depression of this type, however, has been avoided thanks to the introduction of deposit insurance by the governments in 1930s after the Great Depression.

(4) Credit Crunch (t=17): M=790

On the other hand, another type of depressions caused by the shrinkage of money supply or credit crunch has been observed recently by Richard Koo [3]. He called this type of credit crunch "Balance Sheet Recessions." This type of credit crunch is depicted as the loop of Borrowers Credit Crunch in Figure 3. Whenever bubbles burst, negative net assets in the balance sheet become obstacles to the producers who want to continue their business activities. Accordingly, they are forced to repay their debt at all cost to restore their sound balance sheet. For instance, they may be forced to reimburse their debt partially, we assume, by feeding in $200 out of their operating revenues at t = 17. This reimbursement reduces their net assets to -$200 (= -$400 + $200), and their debt decreases to $700 from $ 900.

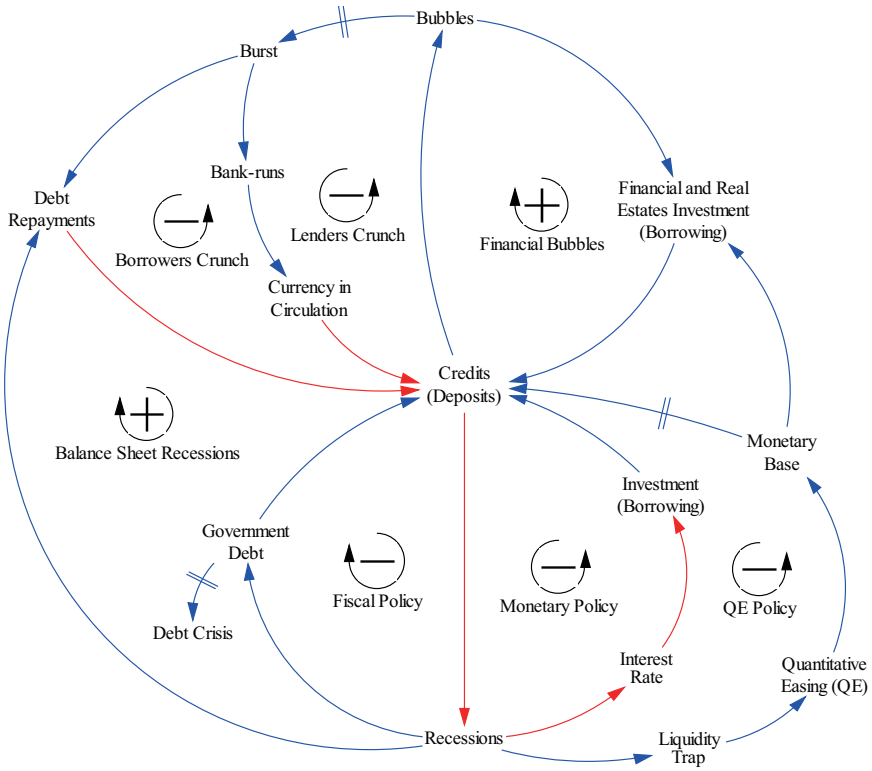

Figure 3: Bubbles and Recessions under the Debt Money System

This repayment simultaneously reduces their bank deposits by $200, and bank assets of loans to $610. As a result, money supply of the economy reduces to $790 from $990; that is, M=790, and credit crunch of $200 is triggered as illustrated by Figures 7 and 12.

Reduction of debt by producers is a favorable management to restore healthy state of the balance sheet at the microeconomic level, yet it causes credit crunch at the macroeconomic level collectively, which plummets GDP and triggers depressions and unemployment. In other words, debt money system of fractional reserve banking constitutes to be the root cause of "booms and depressions" since the Great Depression in 1929.

(5) Issuing Government Sequrities (t=20): M=1,190

In the wake of economic depressions caused by credit crunches, government is forced to bail out financially troubled producers by newly issuing securities; that is to say, it is forced to borrow from the banks. This is illustrated as the loop of Fiscal Policy in Figure 3. In our economy here we assume that the government issues securities of $400 at t = 20. As a result, loan assets of the banks increases

by $400 and their deposits increase to $1,010, as illustrated by Figures 8 and 12.

Under the debt money system, money supply only increases whenever someone comes to borrow from banks. This time the government comes to borrow, instead of the financially troubled producers. In this way, money supply has temporarily increased to, say, M=1,190.

(6) Bailout → Debt Accumulation (t=22): M=790

The government is now forced to spend this newly-raised fund to bail out the financially troubled private sectors. Assume that producers receive the amount of $400 as bailouts and use it to reimburse their debt at t = 22. Accordingly, their net assets now recover to $200(=-$200 + $400) and their debt reduces to $300.

This reimbursement simultaneously reduces the deposits of banks to the previous level of $610, and money supply shrinks to the level before the issuance of securities by the government; that is, M=790, only leaving the government debt of $400! Figures 9 and 12 show these behaviors.

Since money supply remains at the same level in spite of the huge amount of government debt expenditures, economy fails to be reactivated. This is exactly what happened to the Japanese economy between 1990 and 2010, causing long-term depressions of the so-called "Lost Two Decades". On the other hand, government debt continued to accumulate. This debt accumulation is exactly what has been happening among many OECD countries, specifically after the collapse of Lehman Brothers in 2008.

The accumulation of government debt under the fractional reserve banking system was warned as early as 1930s by the Irving Fisher, etc, as the following statement of section 17 demonstrates:

> (17a) Under the present fractional reserve system, the only way to provide the nation with circulating medium for its growing needs is to add continually to our Government's huge bonded debt [1, pp.39,40].

(7) Collapse of Securities → Defaults

Accumulated debts of the government eventually cause difficulties of further borrowing by the government, which forces to raise interest rates, which sooner or later leads to the collapses of security prices, triggering bank insolvencies.

Simultaneously, these chaotic situations of possible financial meltdown make it difficult for the government to repay its accumulated debt, which means defaults of the government eventually. Figure 10 illustrates the case of bank insolvencies due to the deficit of net assets of banks (illustrated as a shaded stock). The reader may revisit the causal loop analysis of these situations in Figure 12.2 in Chapter 12 of the Book.

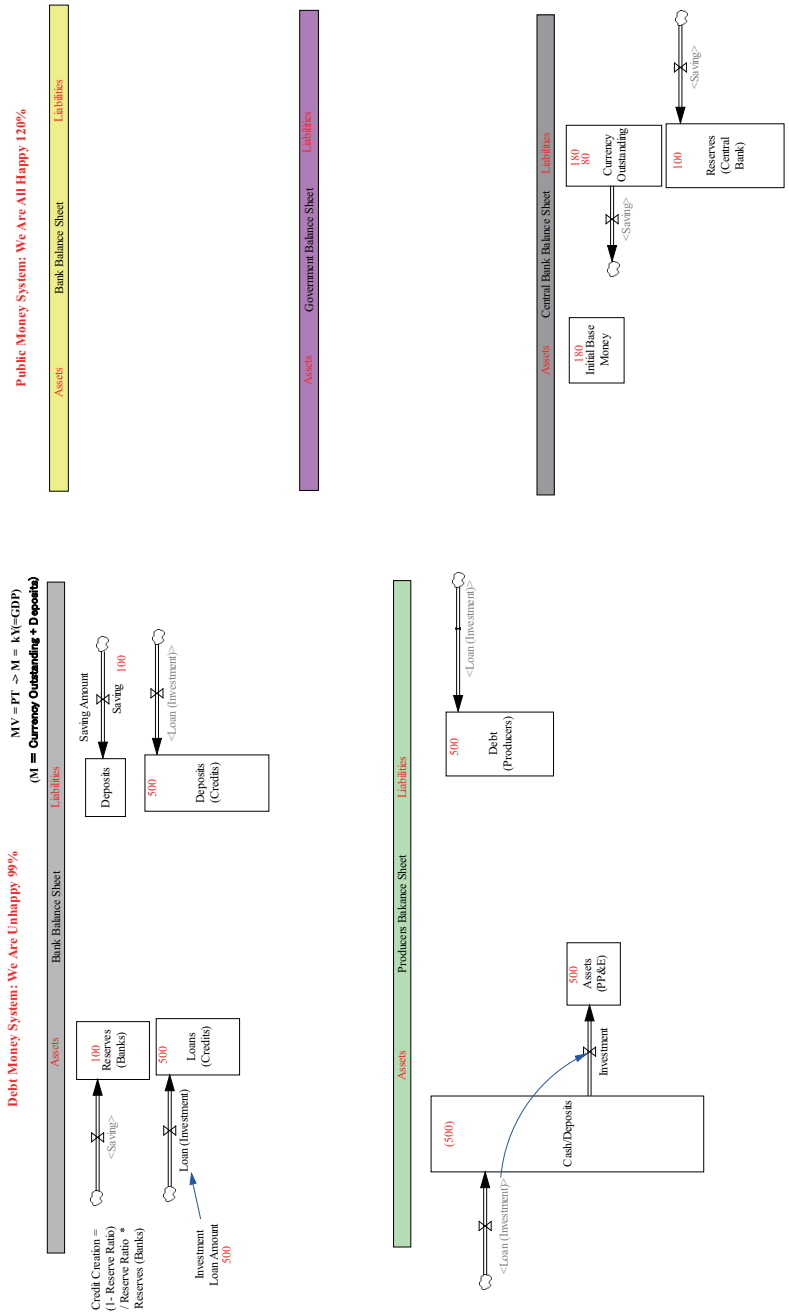

Figure 4: (1) Fractional Reserve Banking System

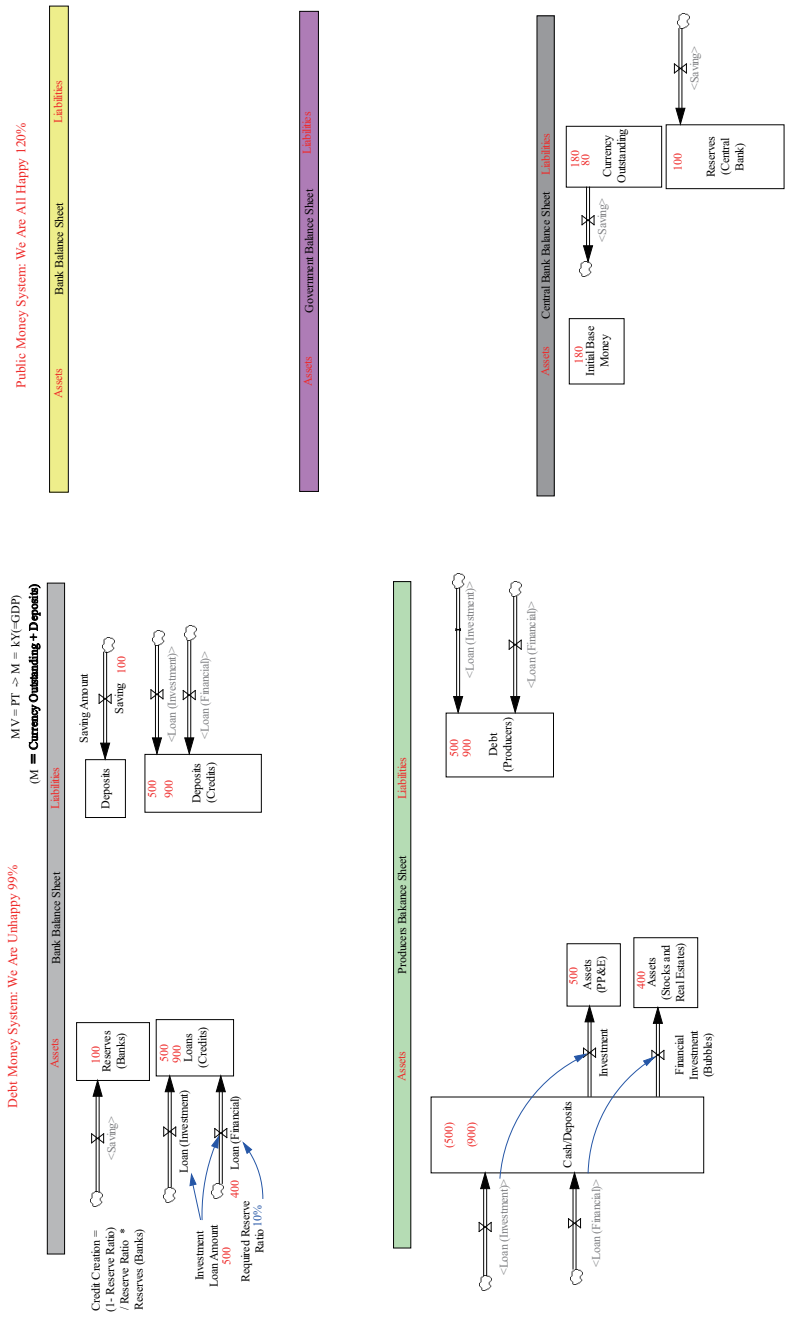

Figure 5: (2) Making Bubbles

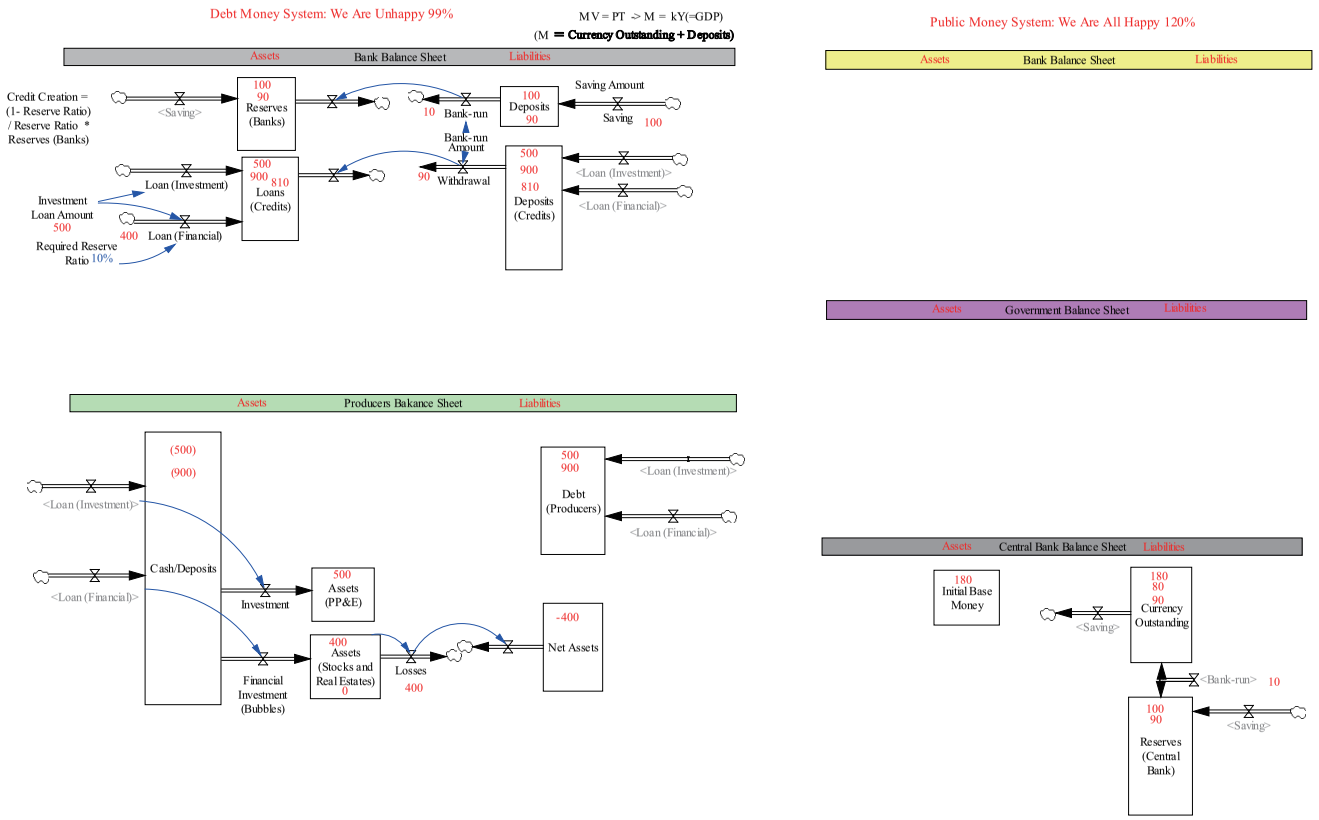

Figure 6: (3) Bubble Burst and Bank-runs

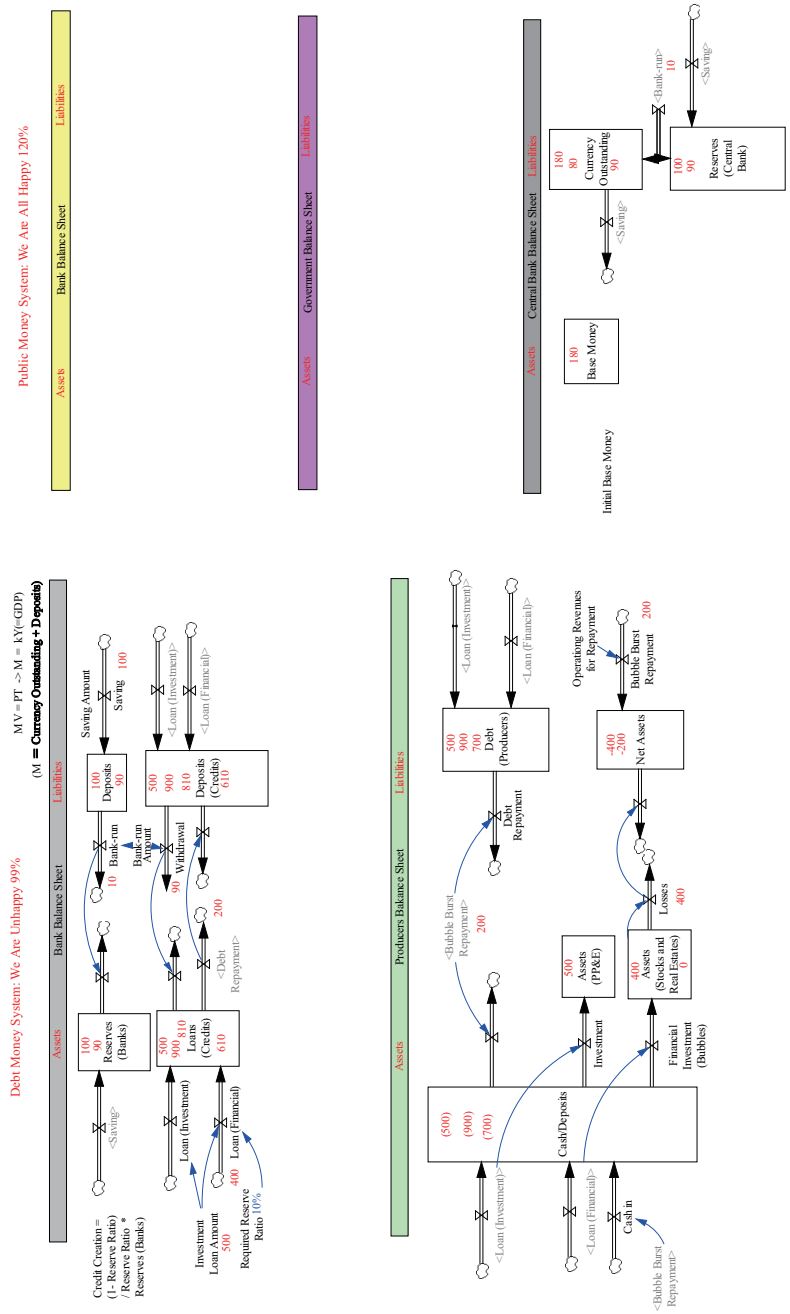

Figure 7: (4) Credit Crunch → Depressions

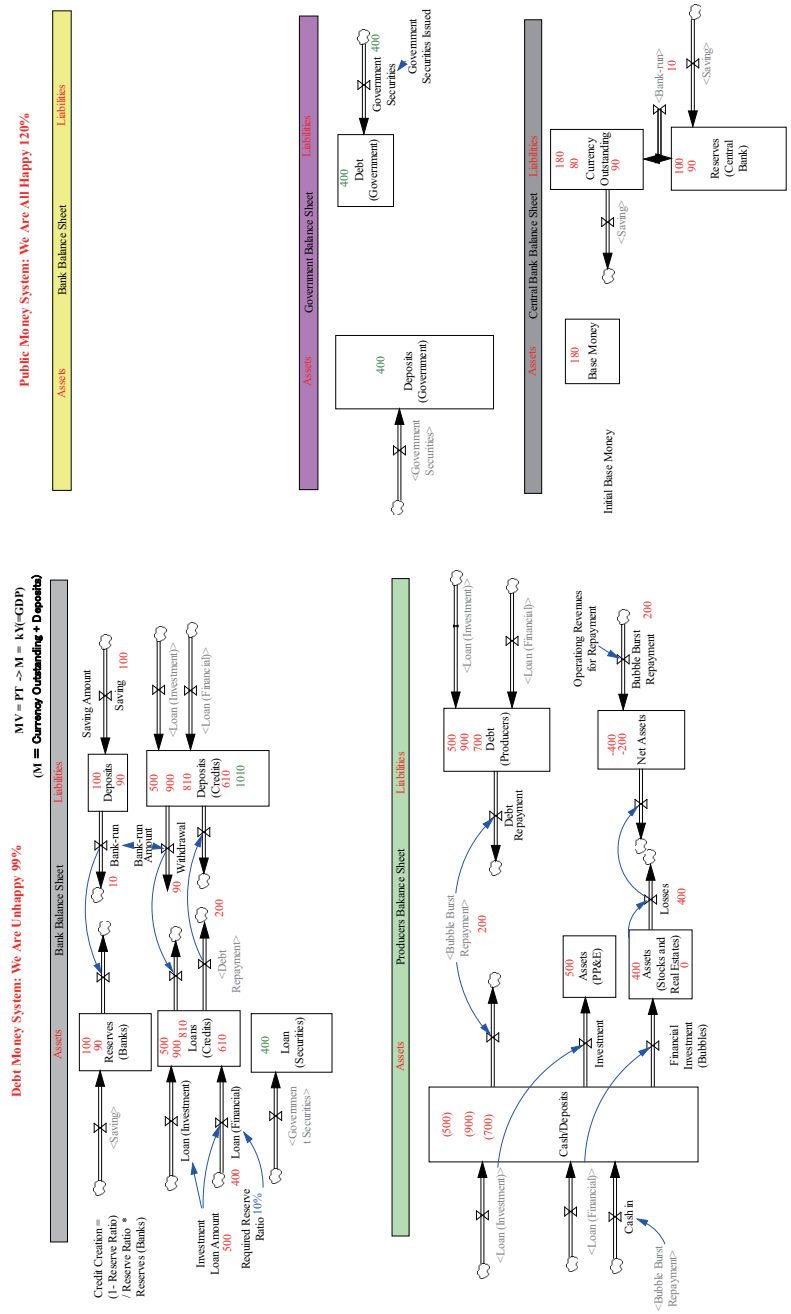

Figure 8: (5) Issuing Securities → Restore Money Supply

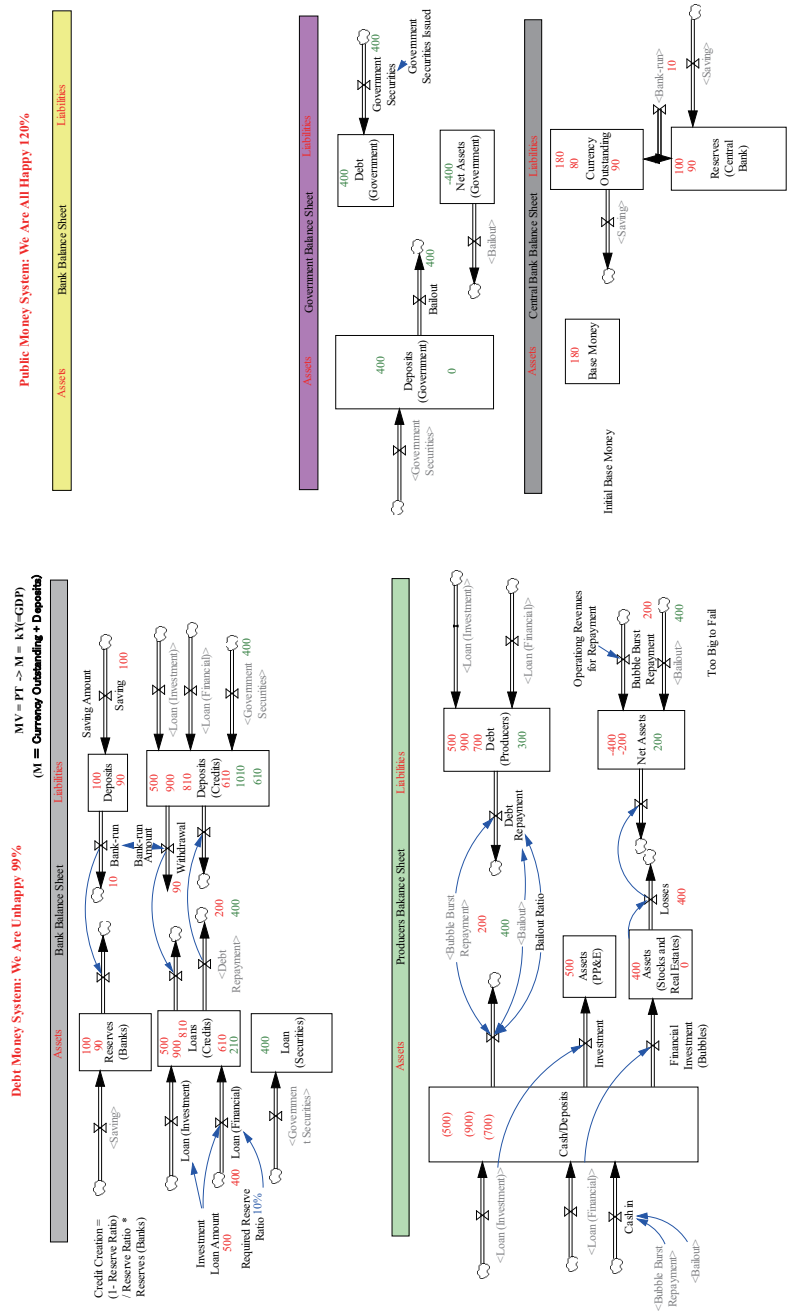

Figure 9: (6) Bailout → Accumulated Debt

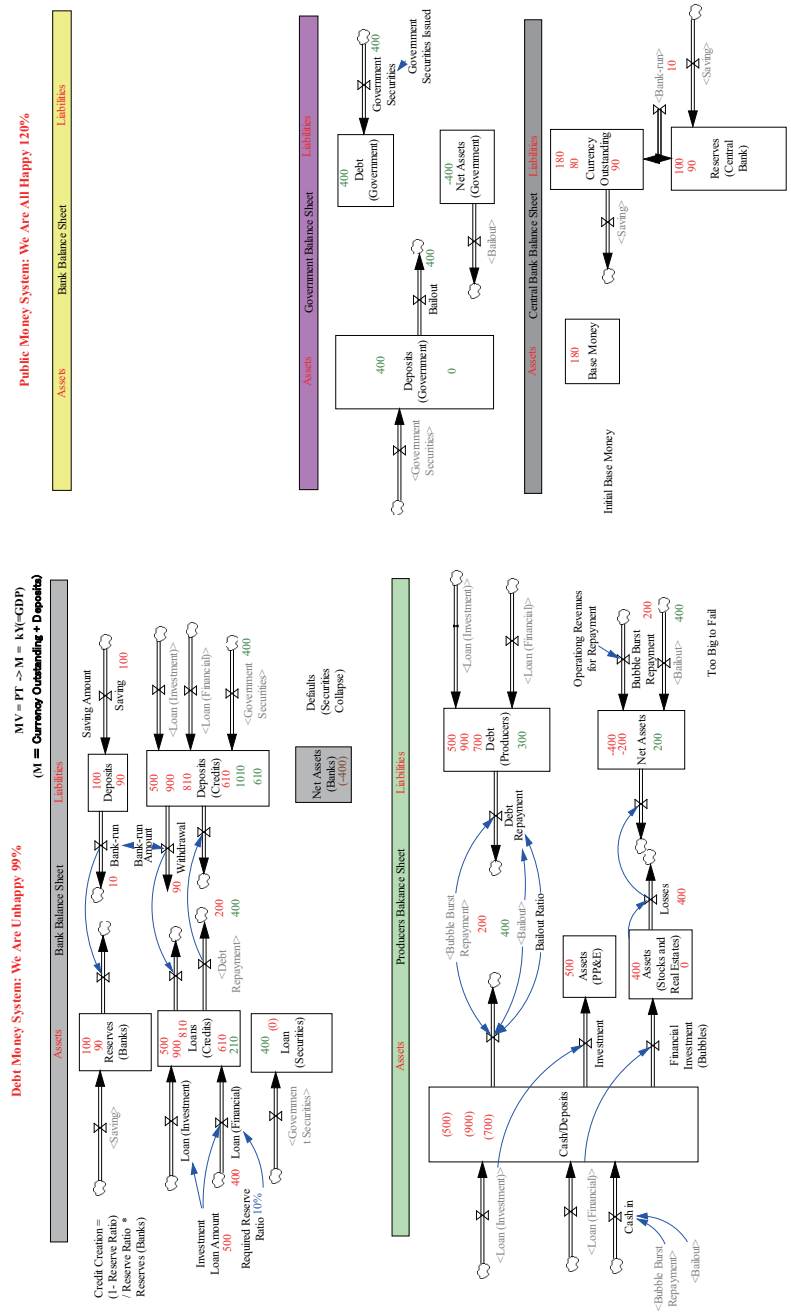

Figure 10: (7) Collapse of Securities

(8) Financial Quantitative Easing (QE) (t=25): M=790

In this way, after the financial crises of Lehman shock in 2008, which we have called "the Second Great Depression", traditional fiscal and monetary policies of Keynesian economics have totally failed to function. The prolonged economic depression of the lost two decases in Japan is called the "Balance Sheet Recessions" by Richard Koo [3], as already pointed out in the step 4 above.

Under the circumstances, the only policy left to the government is to ask the central bank to expand its monetary base through the purchase of government securities, with an expectation that the increased monetary base will increase banks' loans and money supply in due course. This policy is called "quantitative easing (QE)', which is illustrated as the loop of QE Policy in Figure 3.

In Figure 11, the central bank is shown to have purchased government securities of $100, and banks' reserves increased by the same amount at t = 25. The purpose of this QE policy is the expectation of new credit creation up to the additional $1,000 (= $100/0.1).

Unfortunately, the quantitative easing failed to increase money supply, simply because banks become extremely reluctant to make loans to the financially troubled produces, and relatively healthy producers are forced to reimburse their accumulated debts out of their operating cash flow under the current economic recessions. This implies that the reinforcing loop of the Balance Sheet Recessions in Figure 3 dominates the balancing loop of QE Policy so that the increase in Monetary Base fails to expand Credits (Deposits).

In this way, as illustrated in Figure 12, the expected QE policy has failed to stimulate the real economic activities such as consumption and investment demand, leaving the GDP in a stagnated state.

Unstable Money Supply under the Debt Money System

Behaviors of the debt money system are now investigated collectively in terms of monetary base and money supply. It is emphasized in the Book that money sits all the time in the center of macroeconomic activities so that the availability of sufficient money stock is crucial to the sustained economic activities.

Figure 12 illustrates, under the fractional reserve banking system, how monetary base (line 1) creates it money supply (line 2) out of nothing from the step 0 through step 8; that is, t=0∼30. The behaviors of money supply thus created become very unstable.

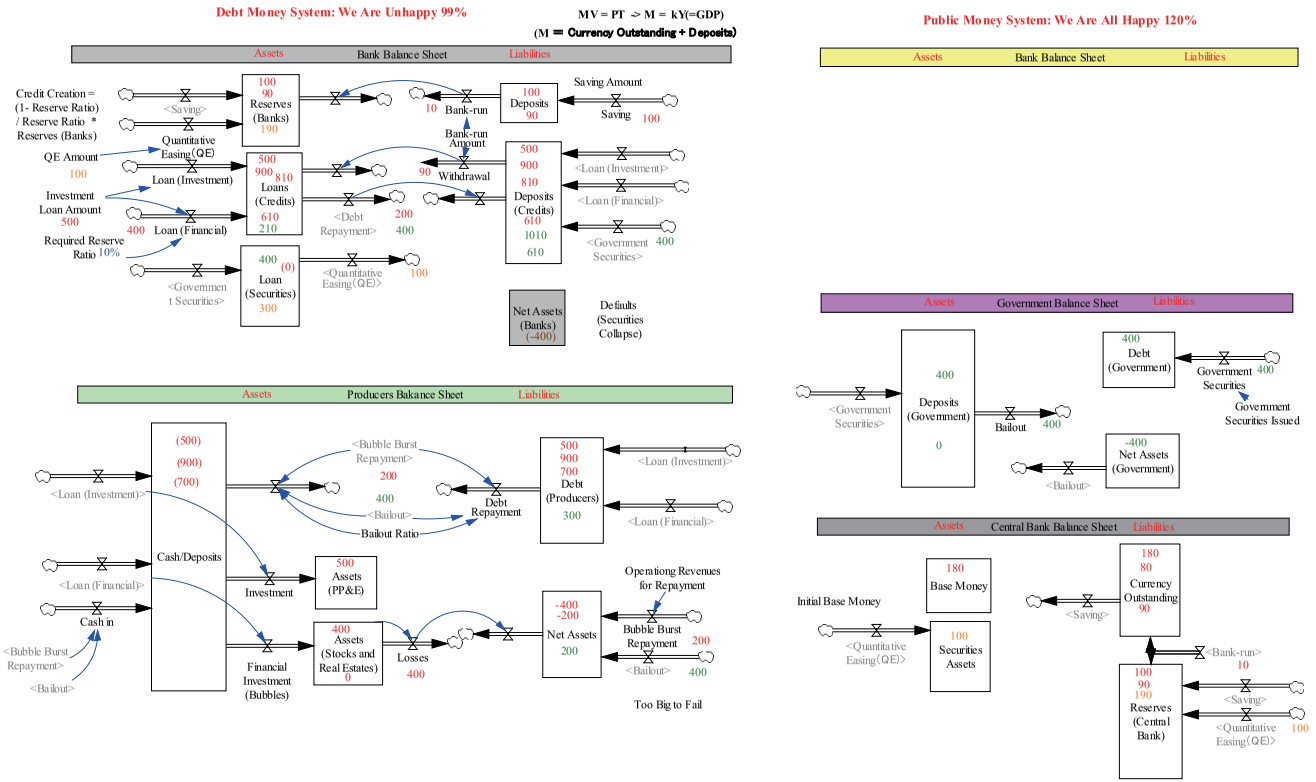

Figure 11: (8) Financial Quantitative Easing (QE)

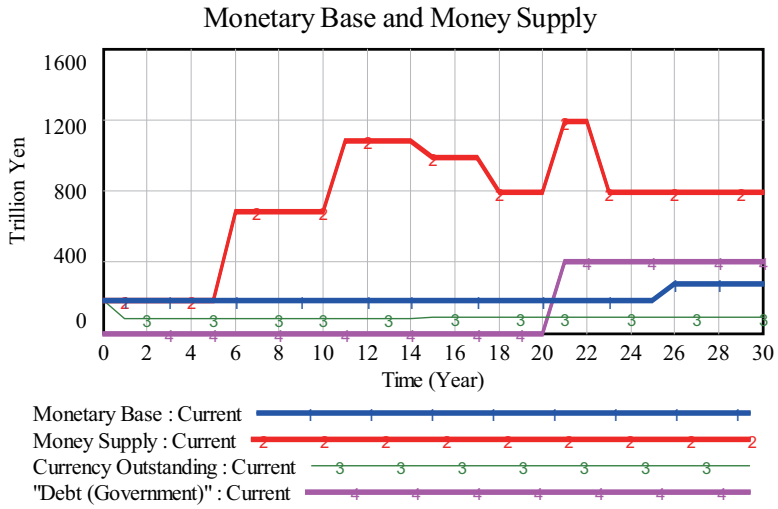

Figure 12: Monetary Instability under the Debt Money System

Such fluctuations of money supply can be also caused by changing the economic values of the model sliders that are illustrated in Figure 13. Try to change

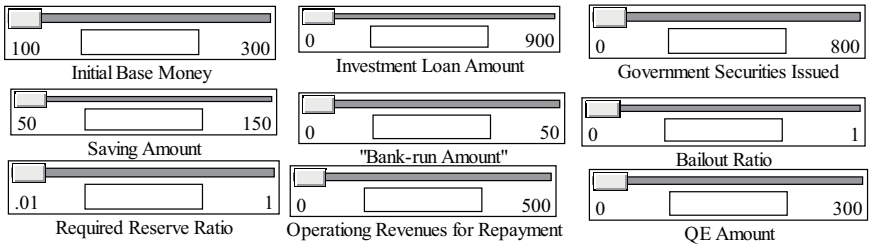

Figure 13: Parameters under the Debt Money System

the values of initial base money, saving amount, required reserve ratio, bank-run amount and operating revenues for repayment, and see how money supply fluctuates. This indicates that money supply under the debt money system can get easily fluctuated by these factors. Booms and depressions are frequently triggered by these changes in money supply, yet many of these changes are not under the control of the central bank and government.

On the other hand, changes in the values of government securities and QE amount also fail to increase money supply, which indicates the failures of the Keynesian fiscal and monetary policies. Indeed, the current debt money system is dead-end in the sense that unstable money supply cannot be well controlled.

Unstable Money Multiplier

Let us further investigate the unstable nature of money supply in terms of money multiplier since money supply is also calculated by the following equation:

$$\text{Money Supply (Base)} = m * \text{Monetary Base} \tag{2}$$

where money multiplier (m) is defined as

$$\text{Money Multiplier } (m) = \frac{\alpha + 1}{\alpha + \beta} \ . \tag{3}$$

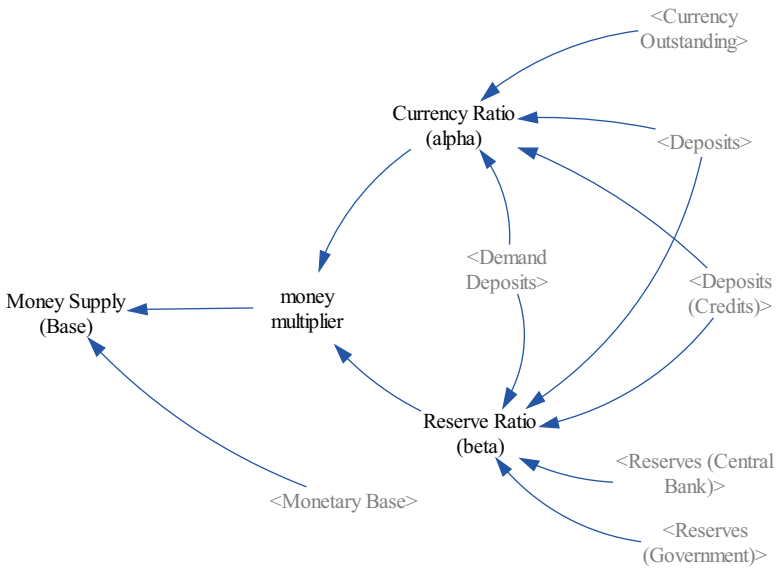

Figure 14: Definition of Money Multiplier

Currency ratio (α) and reserve ratio (β) are defined here according to our model definitions in Figure 14 as follows[4]:

$$\text{Currency Ratio } (\alpha) = \frac{\text{Currency Outstanding}}{\text{Deposits} + \text{Deposits (Credits)}} \tag{4}$$

$$\text{Reserve Ratio } (\beta) = \frac{\text{Reserves (Central Bank)}}{\text{Deposits} + \text{Deposits (Credits)}} \tag{5}$$

Values of Money Supply (Base) thus obtained are confirmed to be the same as those of Money Supply in Figure 12, that is, Money Supply = Money Supply (Base). Behaviors of money multiplier, currency ratio and reserve ratio are

[4]At time = 0, the amount of deposits and deposits (credits) are zero, and division by zero needs be avoided. Accordingly, these ratios are set to be 1 without losing generality.

shown in Figure 15 as lines 1, 2 and 3, respectively. Since monetary base is constant until t = 25, instability of money supply has been caused by the instability of money multiplier. The instability of money multiplier is in turn caused by the instability of currency ratio and reserve ratio as Figure 15 demonstrates.

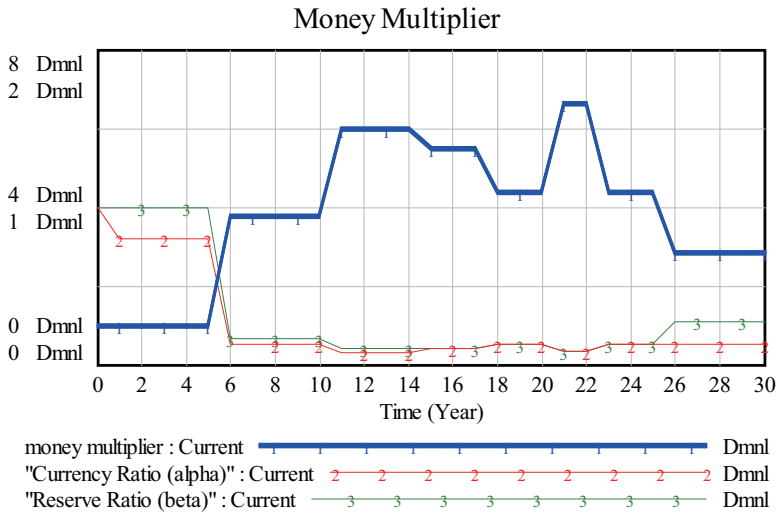

Figure 15: Instability of Money Multiplier

What causes their instability, then? Currency ratio is affected by the consumers' attitudes to save or hold money in cash, which are in turn affected by the (expected) interest rate, stability of bank management, etc. An extreme case is a bank-run of consumers as depositors when bubbles pop. On the other hand, reserve ratio is influenced by the bankers' stances to make loans or withdraw them, or producers' perspectives to borrow money. As already explained in steps 2 through 4 above, these attitudes of consumers, producers and bankers cause instability of money multipliers and money supply, triggering economic instability in due course.

When QE is introduced at t= 25, monetary base increases from 180 to 280, yet, reserve ratio also soars from 0.128 to 0.271 at t = 26. And, money multiplier decreases from 4.39 to 2.82. Hence the increase in monetary base is canceled out by the decrease in reserve ratio and money multiplier so that money supply stays constant at 790 (= 2.82 * 280) as illustrated in Figure 12

It is now clear that the stability of money supply is beyond the control of the central bank and government, and hard to be obtained under the debt money system. It has to be replaced with more stable and sustainable public money system as analyzed in Chapter 14 of the Book.

3 A Transition to the Public Money System

(T1) Public Money Conversion (t=31): Base Money=88

We are now in a position to explore a transition process to the public money system from the current dead-end debt money system. As already pointed out in section 1, three conditions have to be met to attain the public money system. First condition is the following:

- Governmental control over the issue of money.

To meet this condition, privately-owned central bank has to be legally converted to the publicly-owned organization, which we have called the Public Money Administration (PMA). The PMA is, then, able to create public money, consisting of coins and public notes as legal tender. This legal step has to be performed in a democratic manner through our legal process of establishing a new monetary law we propose such as the Public Money Act, for instance.

As pointed out in the footnote of Chapter 12 of the Book, on Dec. 17, 2010, a bill based on the American Monetary Act was introduced to the US House Committee on Financial Services as H.R. 6550 by the congressman Dennis Kucinich. This bill is called "The National Emergency Employment Defense Act of 2010 (NEED Act)". The bill was re-submitted on Sept. 21, 2011 as H.R. 2990 by the congressman Dennis Kucinich. This NEED Act is exactly to implement the public money system in the United States.

To promote a smooth conversion of the currency outstanding to the public money upon the implementation of the Public Money Act, it becomes more effective, we pose, if a favorable exchange rate between the current debt money and the public money is offered such that

$$\$10 \text{ (Debt Money)} = \$11 \text{ (Public Money)}. \tag{6}$$

10% increase in the amount of base money would not only encourage the currency conversion faster but also stimulate the discouraged consumption and reactivate the economy. Figure 16 illustrates the conversion process of currency outstanding so that its original amount of \$80 (before the bank-runs) increases to \$88.

(T2) Securities as Reserves Collateral (t=31): M(p)=588

Next transition step is to implement the second condition of the public money system:

- Abolishment of credit creation with full (100%) reserve ratio,

and attain 100% money according to the Irving Fisher [2]. He vehemently proposed this process as follows:

> Let the Government, through an especially created "Currency Commission," *turn into cash* enough of the assets of every commercial

> bank to increase the cash reserve of each bank up to 100% of its checking deposits. In other words, let the Government, through the Currency Commission, issue this money, and with it, buy some of the bonds, notes, or other assets of the bank or lend it to the banks on those assets as security[5]. Then all check-book money would have actual money – pocket-book money – behind it. [2, p.9]

Since this process may turn out to be a source of confusion, let us explain this transition process in three steps; that is, T2, T3 and T4. Let us being with the step T2 here. For the implementation of 100% reserves, it is essential at this stage to classify deposits into two types of deposits: demand (and checking account) deposits and time deposits. Demand deposits were called "check-book money" by Irving Fisher. Under the full reserve ratio, banks are only required to hold demand deposits fully and are not allowed to make loans out of them. That is, demand deposits are owned by the depositors and banks only keep them safely on behalf of the depositors for the convenience of their transaction payments.

On the other hand, time deposits are trusted with the banks, which in turn invest them on risky projects for higher returns. In this way, time deposits become the main source of loans for banks, and time depositors share the returns from the investment as well as losses.

Hence, 100% reserves only imply the 100% reserves of demand deposits, In our economy, let us assume that among the deposits of $700, $500 are demand deposits and $200 are time deposits, while the current bank reserves are $200. (We have started with the public money supply of M(p)=588; that is, demand deposits of $500 and currency outstanding of $88). Under the situation, if 100% reserves are required in the transition process to the public money system, banks have to raise additional $300 to attain 100% reserves. In reality, almost all banks will have to face similar situations when the public money system is implemented.

There are two paths that meet this 100% reserves as Irving Fisher, etc. proposed in the quotation above. The first path is to "let the Government issue this money, and with it, buy some of the bonds, notes, or other asets of the bank"; that is, to allow the banks to convert government securities they hold to the required reserves. The second path is to "let the Government issue this money, and lend it to the banks"; that is, to allow the banks to borrow public money unconditionally from the PMA at zero interest for unlimited period until they can reimburse the debt out of their financial assets such as loans, government securities, corporate stocks and bonds (since most of these financial assets are purchased by banks as financial investment through their credit creation processes out of nothing).

The first path will reduce liability burdens to the banks, compared with the second path. Accordingly, we recommend the first path, because in reality

[5]In practice, this could be mostly "credit" on the books of the Commission, as very little tangible money would be called for – less even than at present, so long as the Currency Commission stood ready to supply it on request.

banks hold enough government securities to cover their demand deposits. For instance, Japanese banks as a whole hold government securities of about 500 trillion yen, while their demand deposits are around the same amount. Therefore, they need not borrow money from the PMA. In our economy, banks hold $300 of government securities, which are now converted to the reserve assets as illustrated in Figure 17. Then, the securities assets of the central bank (now the PMA) becomes $400. This transition can be easily carried out without causing any troubles.

Moreover, banks can get benefits from this conversion of government securities to the collateral of full reserves, because they can avoid possible collapse of security values to be triggered by financial and debt crises in the future; that is to say, once their securities are converted, their values can remain frozen against the risk of defaults in the future. At the same time, interest incomes from the securities are guaranteed by the PMA until they become due.

In this way financial sector is stabilized as Irving Fisher claims:

> I have come to believe that the plan, "properly worked out and applied, is incomparably the best proposal ever offered for speedily and permanently solving the problem of depressions; for it would remove the chief cause of both booms and depressions, namely the instability of demand deposits, tied as they are now, to bank loans." [2, p.xviii]

(T3) Temporal Increase in Base Money (t=33): M(p)=588

As the second step, the PMA now newly issues public money of $400, which is put into the net assets of the government balance sheet as well as its deposits assets. Simultaneously, the Public Money assets of the PMA is increased by the same amount, which is also balanced by the Government Reserves as its liability. Accordingly, monetary base temporarily increases to $988, yet public money supply stay the same at M(p)=588, as illustrated in Figures 18 and 22.

(T4) Debt Liquidation (t=35): M(p)=588

Government now spends the deposits of $400 to liquidate its debt of $400 as the third step. In the PMA's balance sheet, Securities Asset is cleared, which is in turn balanced by the same amount of reduction from the Government Reserves as illustrated in Figure 19. Accordingly, monetary base reduces to the original amount of $588, and again coincides with the public money supply of M(p)=588 as illustrated in Figure 22. Hence, the liquidation of government debts by printing public money electronically does not increase money supply, simply because the public money banks have received electronically stay as their bank reserves at the PMA. Therefore, no inflation is triggered at all under the liquidation of the government debt!

This liquidation process of the government debt is explained by Irving Fisher, etc. as follows.

> (17b) As already noted, a by-product of the 100% reserve system would be that it would enable the Government gradually to reduce its debt, through purchases of Government bonds by the Monetary Authority as new money was needed to take care of expanding business [1, p.41].

(T5) Time Deposits Conversion (t=37): M(p)=588

In this way, through the three steps of T2 through T4 demand deposits of $500 are fully backed by the 100% reserves in our economy. As the next step, the conversion of time deposits of $200 can be easily done by simply regarding them as the time deposits of public money without further transactional changes as illustrated in Figure 20. This conversion surely does not change public money supply.

Under the public money system, loans are made out of time deposits (cash), and repayments of loans implies the increase in cash assets. Accordingly, no credit crunches occur under the public money system. The public money, once put into circulation, stays in the economy, causing no bubbles and recessions.

(T6) Public Money Added to Circulation (t=40): M(p)=888

The third condition of the public money system is the following:

- Constant flow of money into circulation to sustain economic growth and welfare.

Public money can be further put into circulation according to the need for economic growth and government expenditure for welfare, etc. Let us assume that the additional amount of $300 is put into circulation. This amount is first put into Deposits and Net Assets accounts of the Government, and Public Money and Reserves(Government) accounts of the PMA as in the process of (T3). Then, whenever government spends it out of its Deposits (and Net Assets), it is simultaneously put into the Currency Outstanding account out of the Reserves(Government) according to the PMA's double bookkeeping rule.

Figure 21 only illustrates the final process of putting the additional amount of public money into circulation under the PMA balance sheet. Figure 22 shows that the public money supply is increased to P(p)=888 [6].

[6]To be precise, if time deposits are further added to this public money supply, we have M(p)1=888 and M(p)2=1,088, respectively. On the other hand, M1 and M2 have not been distinguished in our debt money system so that M1=M2=790.

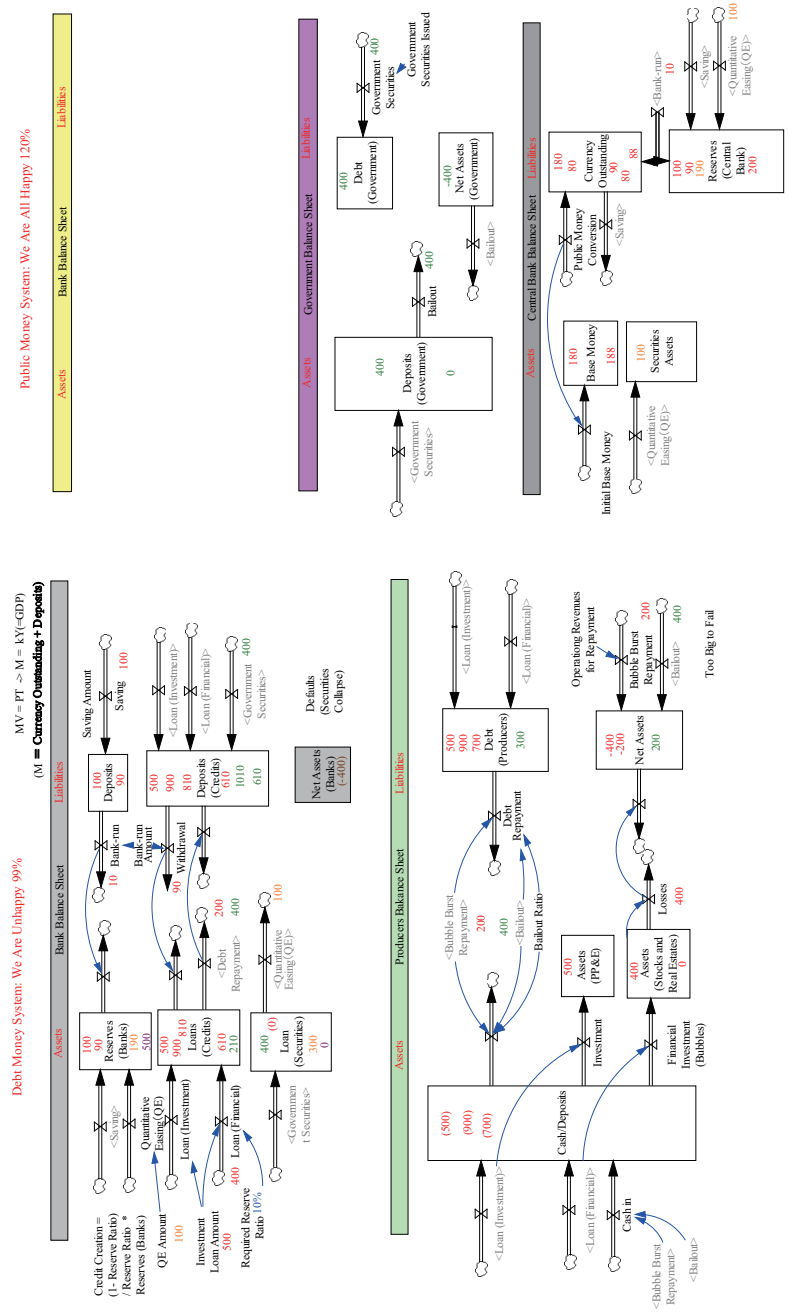

Figure 16: (T1) Conversion to the Public Money

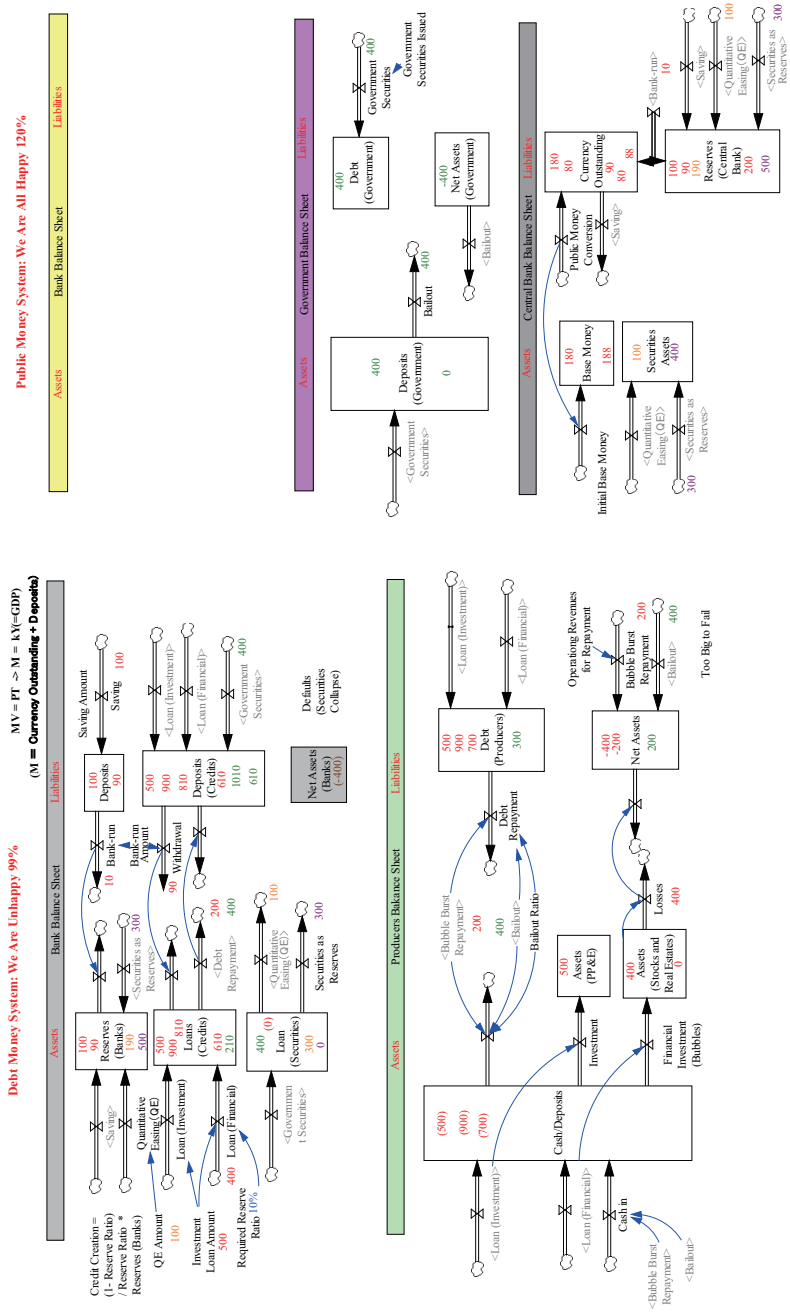

Figure 17: (T2) Securities as Reserves Collateral

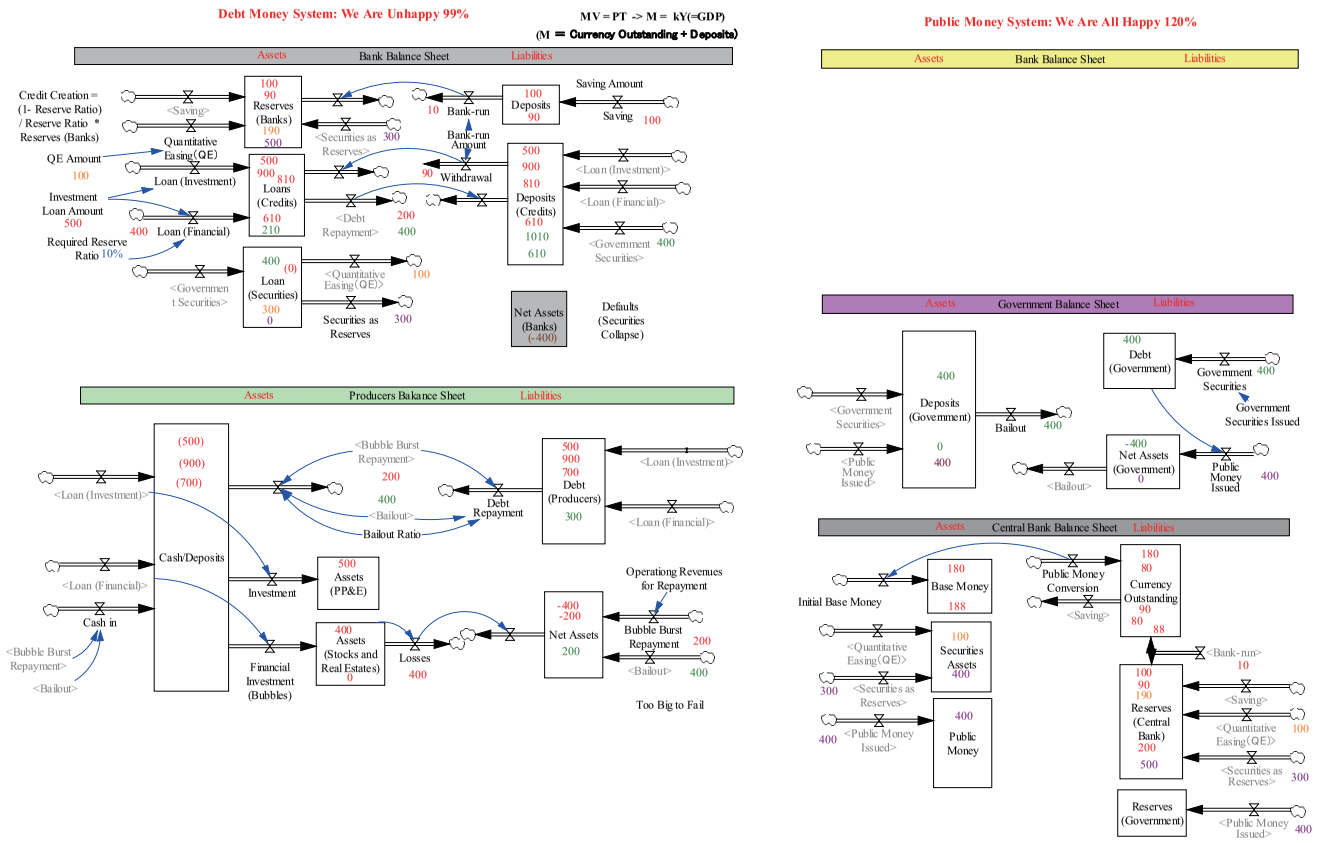

Figure 18: (T3) Public Money Issued

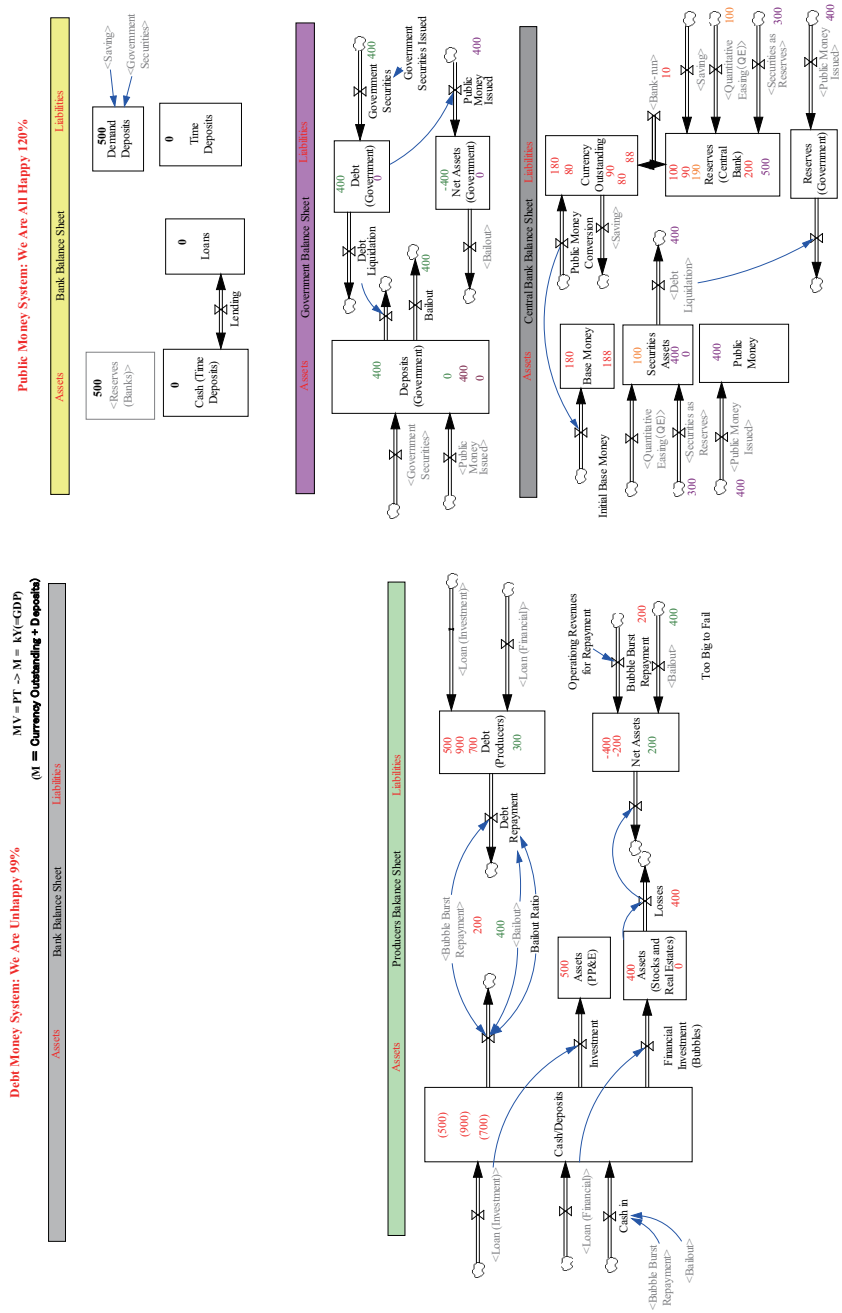

Figure 19: (T4) Debt Liquidation: Money Supply Unchanged

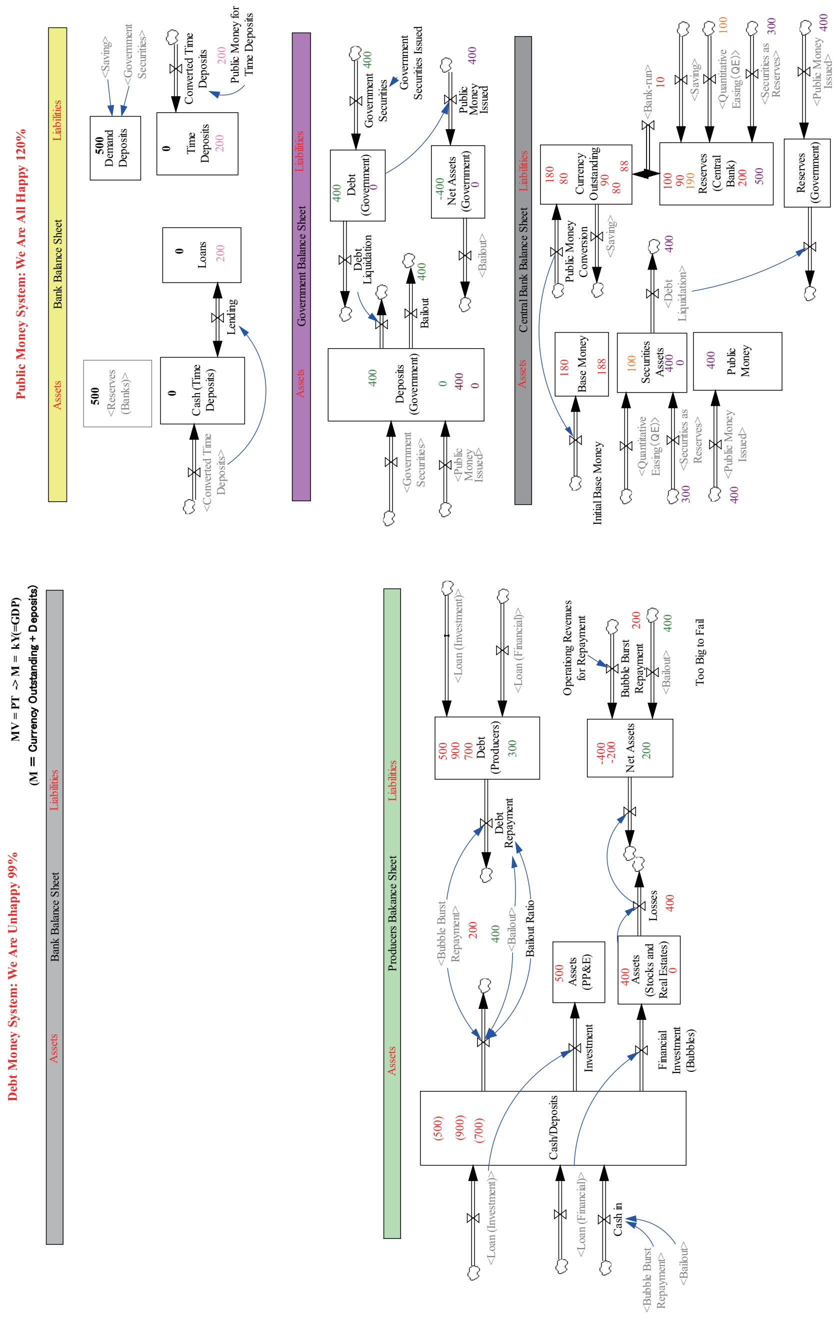

Figure 20: (T5) Public Money Converted to Time Deposits

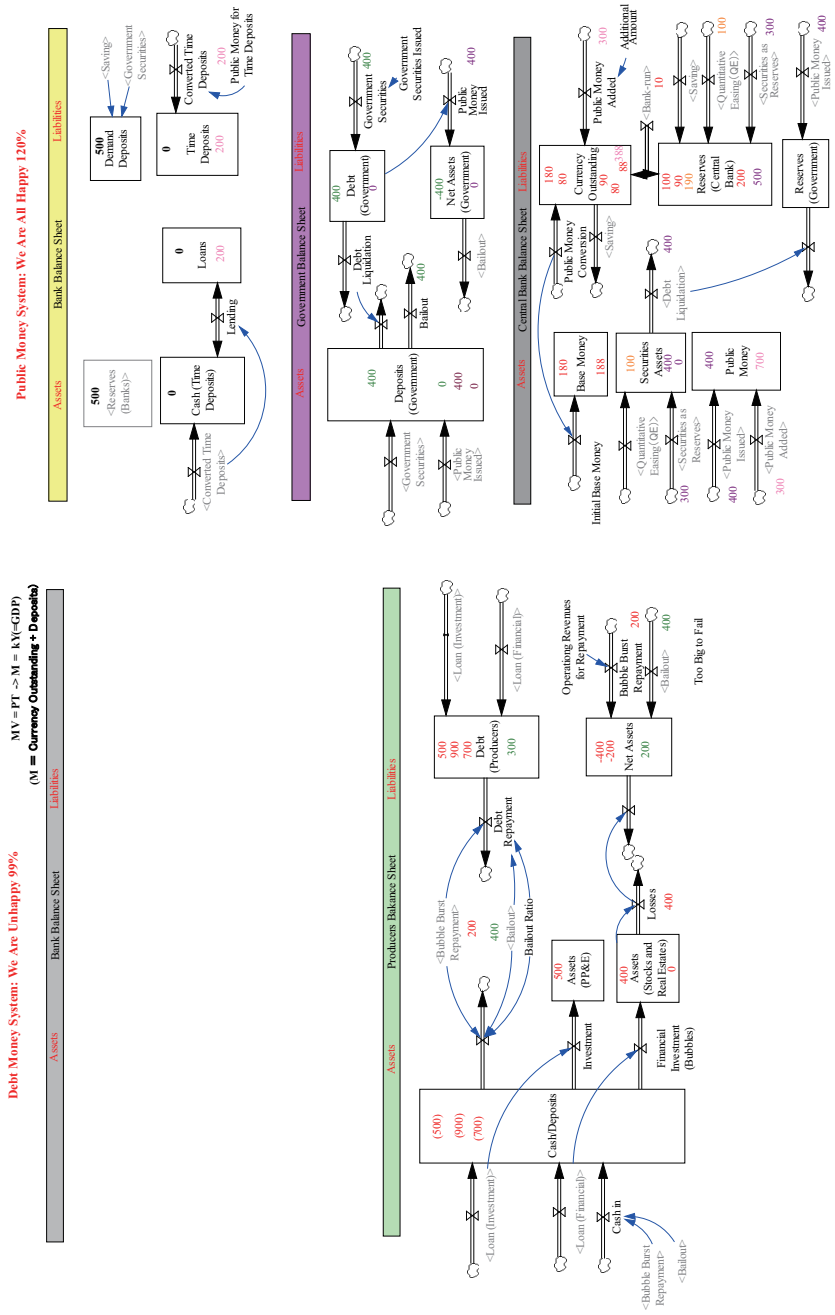

Figure 21: (T6) Public Money Added into Circulation for Welfare and Growth

Stable Money Supply under the Public Money System

We have now successfully presented a transition process from the debt money system to the public money system in 6 steps. Figure 22 illustrates this transition process in terms of the changes in money supply.

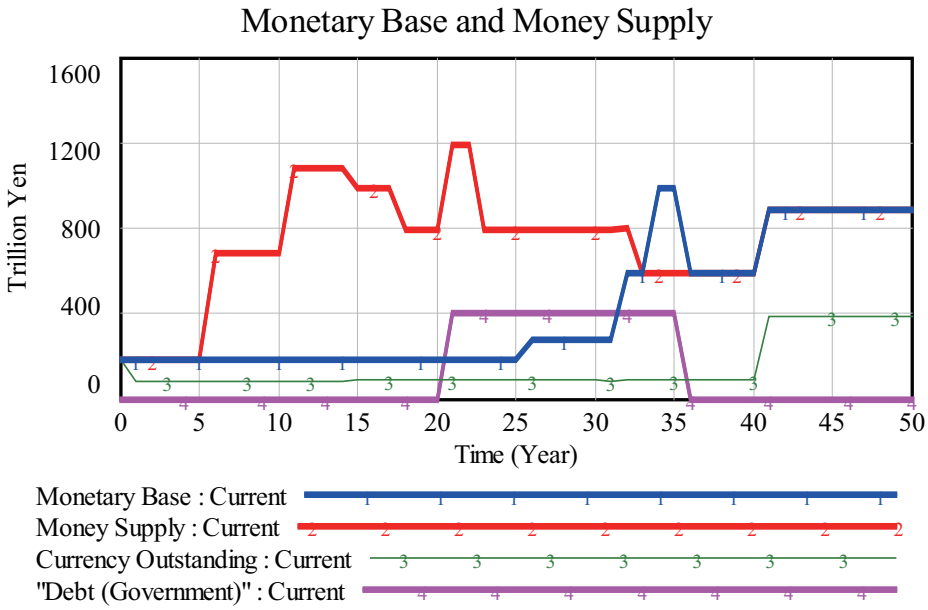

Figure 22: From Debt Money to Public Money System

Let us review the entire process over 50 years (time unit of year used in the model does not necessarily apply to the actual length of year).

Debt Money System (t=0∼30) This is the period of booms and depressions, caused by the fractional reserve banking system; that is, monetary base (line 1) is utilized to create unstable money supply (line 2) out of nothing, generating volatile money supply.

Transition Period (t=31∼37) This is the period of transition from the current debt money system to the public money system; that is, bank credits are converted to the 100% money, and government debt (line 4) is liquidated without causing inflation and chaos!

Public Money System (t=38∼50) This is the period of monetary stability; that is, stable public money supply (line 1 = line 2) is attained by unifying monetary base (line 1) and money supply (line 2) under the public money system.

As the reader can easily identify in Figure 22, under the public money system monetary base (line 1) and money supply (line 2) do no longer get split under

the public money system, and money supply becomes all the time equal to monetary base.

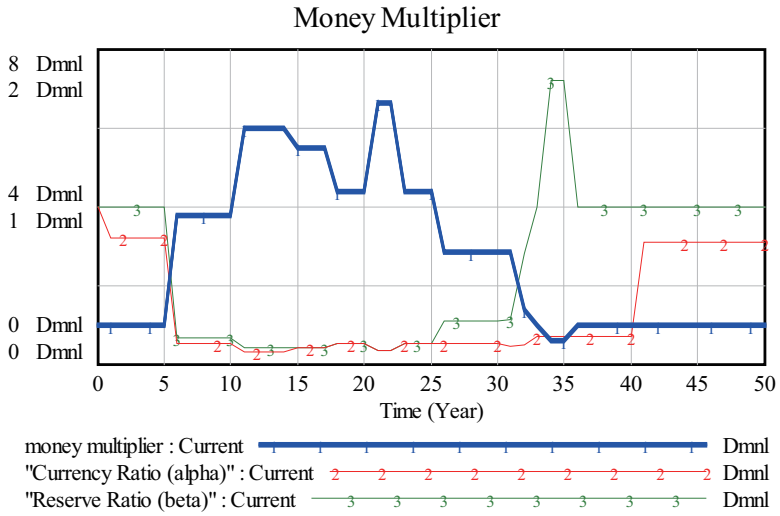

Figure 23: Money Multiplier from Debt Money to Public Money System

To understand this in detail, let us examine the behavior of money multiplier. Under the public money system, currency ratio and reserve ratio are defined as follows:

$$\text{Currency Ratio } (\alpha) = \frac{\text{Currency Outstanding}}{\text{Demand Deposits}} \tag{7}$$

$$\text{Reserve Ratio } (\beta) = \frac{\text{Reserves (Central Bank) + Reserves (Government)}}{\text{Demand Deposits}} \tag{8}$$

Figure 23 shows that except the transition period of t = 34 and 35, the reserve ratio (β) (line 3) becomes 1, and, from the equation (3), money multiplier (line 1) also becomes $m = 1$ [7]. Accordingly, money supply becomes equal to monetary base and gets very stable. Moreover, it never gets affected by the volatile behaviors of the currency ratio, as in the case of the debt money system. In other words, volatile behaviors of consumers to hold cash does not cause credit crunches and trigger recessions. Public money system has realized stable money supply, followed by stable economic behaviors.

However, this does not imply that the public money system fully secure monetary and financial stability and becomes free from "booms and depressions". Yet, as demonstrated in Chapter 13 of the Book, monetary and financial instabilities, if triggered, can be better managed by simply applying public money

[7]Notice that in the Figure multiplier is illustrated with a scale of 8, while reserve ratio is illustrated with a scale of 1.

policies under the public money system than traditional Keynesian monetary and fiscal policies under the current debt money system.

Figure 24 illustrates how monetary stabilization is attained in a very simple but effective way, compared with the complicated loops, under the debt money system in Figure 3, such as credit crunches of lenders and borrowers, balance sheet recessions, monetary and fiscal policies and QE policy.

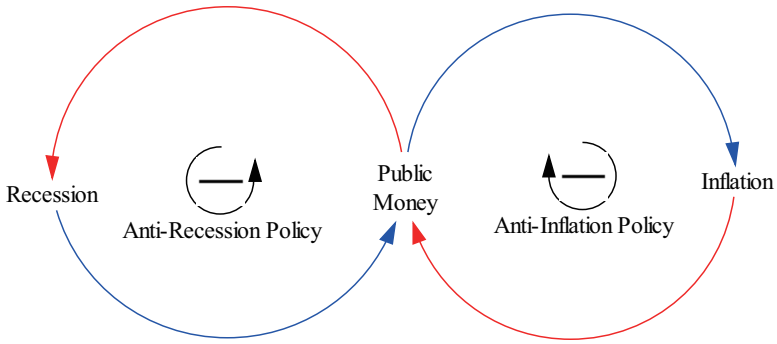

Figure 24: Monetary Stabilization under the Public Money System

In addition, other advantages obtained from the behaviors of the public money system and summarized in Chapter 15 of the Book such as full employment, debt-free government, income equality and sustainability, provide another rationales for our advancing this transition process urgently toward the public money system, without losing time to create a better world.

Let me here stop my long off-road journey in the Book, with this paper, since the early 1980s. I truly thank the reader who have traveled on this long journey with me. Please keep on moving forward to the peak of our HOPE.

Conclusion

This final paper in my long off-road journey tries to propose a transition process from the debt money system to the public money system. For this purpose, a simple macroeconomic model is constructed on the basis of accounting system dynamics in order to focus on the comparative behaviors of money supply.

This simple macroeconomic model turned out to be powerful enough to convince why our current debt money system has become a dead-end systemic failure. Specifically, booms and depressions, accumulation of government debts, and failures of quantitative easing are systematically explained to be caused by the privately-owned central bank and the fractional reserve banking system that creates credits out of nothing; that is, the current debt money system itself. Indeed, fractional reserve banking system has been, for centuries, the root cause of many socio-economic instabilities and disasters such as unemployment, inequality, wars, and environmental destruction, though not analyzed here.

Then, a transition process to the public money system is explained in 6 steps. It is shown that this transition process can be carried out peacefully without causing inflation and systemic chaos. It is our hope that under the public money system we will be finally freed from the calamities of debt money system, and be able to establish peaceful societies for the welfare of humanity, present and future. This completes the author's long journey for a better world in the Book.

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