

Part IV

Macroeconomic Systems of Public Money

Chapter 12

Designing A Public Money System

This chapter ¹ first discusses government debt crisis as a systemic failure, and examines that it is structurally built in the current macroeconomic *system of debt money* which is founded on the Keynesian macroeconomic framework. Then it argues that it becomes very costly to reduce it, within the current scheme, by raising tax or cutting expenditure. On the other hand, it demonstrates how the government debt could be liquidated without cost under an alternative macroeconomic *system of public money* that is proposed by the American Monetary Act. Finally, it is posed that public money system of macroeconomy is far superior to the debt-burden current macroeconomic system in the sense that it can liquidate government debt without inflation.

12.1 Search for An Alternative System

While my macroeconomic modeling series in Part II and III was advancing, world-wide financial crises, called *the Great Recession* in [64], were triggered by the bankruptcy of Lehman Brothers in September, 2008, and the US government has been forced to bail out the troubled financial institutions with \$800 billion out of taxpayers' pockets, which in turn caused furious angers among American people.

These financial turmoils gave me, as a system dynamics researcher, a chance to re-think about the effectiveness of current macroeconomic system as a system

¹This chapter is based on the paper: On the Liquidation of Government Debt under A Debt-Free Money System – Modeling the American Monetary Act – in “Proceedings of the 28th International Conference of the System Dynamics Society”, Seoul, Korea, July 25 - 29, 2010. With a modest revision, the paper was presented at the 6th Annual Monetary Reform Conf. in Chicago, organized by the American Monetary Institute, on Oct. 1, 2010, for which the following award was given; “Advancement of Monetary Science and Reform Award to Prof. Kaoru Yamaguchi, Kyoto, Japan, For his advanced work in modeling the effects on national debt of the American Monetary Act”.

design, since system dynamics is a methodology to help design a better system as Jay Forrester, founder of system dynamics, emphasized in 1961:

Labor turmoil, bankruptcy, inflation, economic collapse, political unrest, revolution, and war testify that we are not yet expert enough in the design and management of social systems [13, p.1].

Being enlightened by the books such as [33] and [96], my search for an alternative macroeconomic system design took place immediately in place of the currently dominant macroeconomic system. What's wrong with the current system, I posed. Without exception almost all of macroeconomic textbooks such as [47], [48], [51], [34], which have been referred to my modeling works, justify the current macroeconomic system without mentioning an alternative system, if any.

Indeed, nothing may be wrong if the current system provides economic stability, full employment, fair income distribution and environmental sustainability. On the contrary, the current system behaves oppositely, as theoretically analyzed in the model in chapter 11, and historically evidenced by the Great Depression in 1929 and the recent financial crises, to pick up some major ones. It is because the current macroeconomic system has been structurally fabricated by the Keynesian macroeconomics, in which it is proposed that monetary and fiscal policies can rescue the troubled economy from recession, as discussed in previous chapters.

Yet, it fails to analyze why such policies, specifically a fiscal policy, are destined to accumulate government debt as already analyzed in Part III. Pick up an example. Japanese economy has been suffering from serious recessions for the last two decades, which is mockingly called *lost two decades*, and its GDP gap remained very huge. Yet due to the fear of runaway accumulation of debt, the government is very reluctant to stimulate the economy and, in this sense, it seems to have totally lost the discretion of public policies for the welfare of people even though production capacities and workers have been sitting idle and ready to be called in service. In addition, in face of the zero interest rate, Keynesian monetary policy has already lost its discretion as well. In other words, Keynesian policies can no longer be applied to the troubled Keynesian macroeconomy. Isn't this an irony of the Keynesian theory? Macroeconomic system of debt money seems to have fallen into the dead-end trap.

12.2 Debt Crises As A Systemic Failure

Debt Crises Looming Ahead

Let us now examine how the current macroeconomic system faces its systemic failure in terms of government debt. Being intensified by the recent financial crisis following the collapse of Lehman Brothers in 2008, severe crisis of sovereign or government debts seems to be looming ahead. Let us explore how serious our accumulating debts are. Table 12.1 shows that, among 33 OECD countries,

18 countries are suffering from higher debt-to-GDP ratios of more than 50% in 2010. Average ratio of these 33 countries is 66.7%, while world average ratio of 131 countries is 58.3%². This implies that developed countries are facing debt crises more seriously than many developing countries.

Country	Ratio(%)	Country	Ratio(%)
Japan	196.4	Israel	77.3
Greece	144.0	Germany	74.8
Iceland	123.8	Hungary	72.1
Italy	118.1	Austria	68.6
Belgium	102.5	United Kingdom	68.1
Ireland	98.5	Netherlands	64.6
United States	96.4	Spain	63.4
France	83.5	Poland	50.5
Portugal	83.2	OECD	66.7
Canada	82.9	World	58.3

Table 12.1: Public Debt-GDP Ratio(%) of OECD Countries in 2010

Let us now take a look at the US national debt. Following the Lehman shock in 2008, US government is forced to bail out troubled banks and corporations with taxpayers's money, and the Fed continued printing money to purchase poisoned subprime and related securities. In fact, according to the Federal Reserve Statistical Release H.4.1 the Fed assets jumped more than doubles in a year from \$905 billion, Sept. 3, 2008, to \$2,086 billion on Sept. 2, 2009. This unusual increase was mainly caused by the abnormal purchase of federal agency debt securities (\$119 billion) and mortgage-backed securities (\$625 billion). In addition, US government is obliged to spend more budget on war in Middle East. These factors contributed to accumulate US national debt beyond 14 trillion dollars as of Feb. 2011, more than 4 trillion dollars' increase since Lehman shock in Sept. 2008. Figure 12.1 (line 2) illustrates how fast US national debt has been accumulating almost exponentially³. From a simple calibration of data between 1970 through 2011, the best fit of their exponential growth rate is calculated to be 9%!, which in turn implies that a doubling time of accumulating debt is 7.7 years. If the current US national debt continues to grow at this rate, this means that the doubling year of the 14 trillion dollars' debt in 2011 will be 2019. In fact, our debt forecast of that year becomes 29 trillion dollars. Moreover, in 2020, the US national debt will become higher than 31 trillion dollars, while US GDP in 2020 is estimated to be 24 trillion dollars according to the Budget of the U.S. Government, Fiscal Year 2011; that is, the debt-to-GDP ratio in the US will be 129%!.

²Data of 131 countries for 2010 are taken from CIA Factbook at <https://www.cia.gov/library/publications/the-world-factbook/rankorder/2186rank.html> except USA Data, which is taken from US National Debt Clock Real Time on Feb. 12, 2011 at <http://www.usdebtclock.org/>

³Data illustrated in the Figure are obtained from TreasuryDirect Web page, <http://www.treasurydirect.gov/govt/reports/pd/histdebt/histdebt.htm>

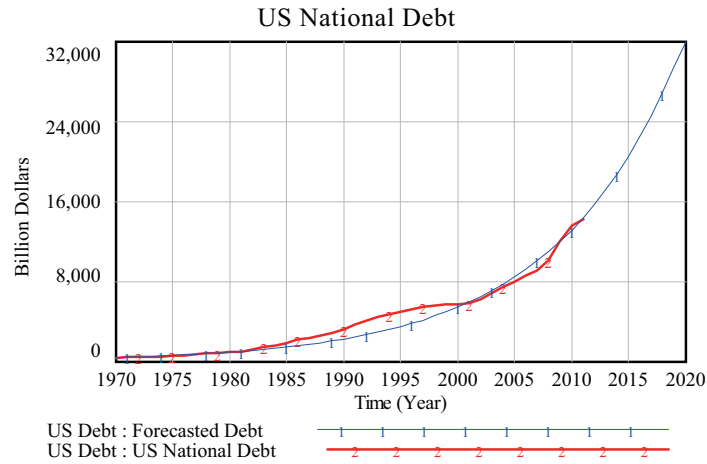


Figure 12.1: U.S. National Debt and its Forecast: 1970 - 2020

Can such an exponentially increasing debt be sustained? From system dynamics point of view, it is absolutely impossible. In fact, following the financial crisis of 2008, sovereign debt crisis hit Greece in 2009, then Ireland, and now Portugal is said to be facing her debt crisis. Debt crises are indeed looming ahead among OECD countries.

A Systemic Failure of Debt Money

From the quantity theory of money $MV = PT$, where M is money supply, V is its velocity, P is a price level and T is the amount of annual transactions, it can be easily foreseen that transactions of a constantly growing economy PT demand for more money M being incessantly put into circulation. Under a debt money system this increasing demand for money has been met by the following monetary standards.

Gold Standard Failed (1930s) Historically speaking gold standard originated from the transactions of goldsmith certificates, which eventually developed into convertible bank notes with gold. Due to the limitation of the supply of gold, this gold standard system of providing money supply was abandoned in 1930s, following the Great Depression.

Gold-Dollar Standard Failed (1971) Gold standard system was replaced with the Bretton Woods system of monetary management in 1944. Under the system, convertibility with gold is maintained indirectly through US dollar as a key currency, and accordingly called the *gold-dollar standard*. Due to the increasing demand for gold from European countries, US president Richard Nixon was forced to suspend gold-dollar convertibility in 1971, and the so-called *Nixon Shock* hit the world economy.

Dollar Standard Collapsing (2010s?) Following the Nixon shock, flexible foreign exchange rates were introduced, and US dollar began to be used as a world-wide key currency without being supported by gold. As a result, central banks acquired a free hand of printing money without being constrained by the amount of gold. Due to the exponentially accumulating debt of the US government as observed above, US dollar is now under a pressure of devaluation, and the dollar standard system of the last 40 years is destined to collapse sooner or later.

As briefly assessed above, we are now facing the third major systemic failures of debt money, following the failures of gold standard and gold-dollar standard systems. Specifically, our current debt money system seems to be heading toward three impasses: defaults, financial meltdown and hyper-inflation. By using causal loop diagram of Figure 12.2, let us now explore a conceivable systemic failure of the current debt money system.

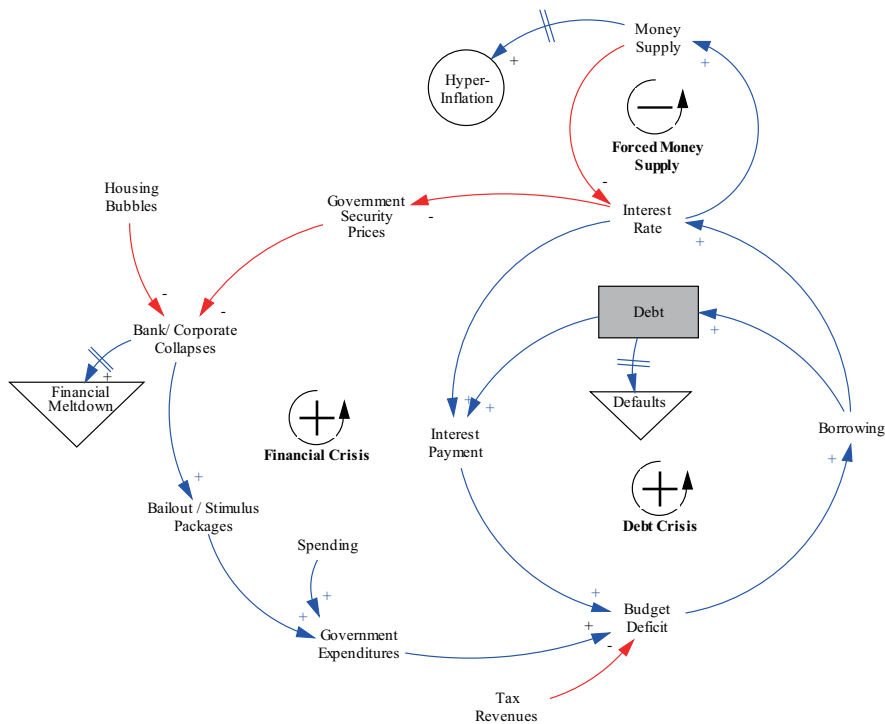


Figure 12.2: Impasses of Defaults, Financial Meltdown and Hyper-Inflation

Defaults

A core loop of the systemic failure is the debt crisis loop. This is a typical reinforcing loop in which debts increase exponentially, which in turn increases interest payment, which contributes to accumulate government deficit into debt. In fact, interest payment is approximately as high as one third of tax revenues in the US and one fourth in Japan. Eventually, governments may get confronted with more difficulties to continue borrowing for debt reimbursements, and eventually be forced to declare defaults.

Financial Meltdown

Exponential growth of debt eventually leads to the second loop of financial crisis. To be specific, a runaway accumulation of government debt may cause nominal interest rate to increase eventually, because government would be forced to keep borrowing by paying higher interests⁴. Higher interest rates in turn will surely trigger a drop of government security prices, deteriorating values of financial assets among banks, producers and consumers. Devaluation of financial assets thus set off may force some banks and producers to go bankrupt in due course.

Under such circumstances, government would be forced to bail out or introduce another stimulus packages, increasing deficit as flow and piling up debt as stock. This financial crisis loop will sooner or later lead our economy toward a second impasse which is in this paper called *financial meltdown*, following [77]. Recent financial crisis following the burst of housing bubbles, however, is nothing but a side attack in this financial crisis loop, though reinforcing the debts crisis. Tougher financial regulations being considered in the aftermath of financial crisis might reduce this side attack. Yet they do not vanquish the financial crisis loop originating from the debts crisis loop in Figure 12.2.

Hyper-Inflation

To avoid higher interest rate caused by two reinforcing crisis loops, central banks would be forced to increase money supply (balancing loop), which inevitably leads to a third impasse of hyper-inflation. Incidentally, this possibility of hyper-inflation in the US may be augmented by the aftermath behaviors of the Fed following the Lehman Shock of 2008. In fact, monetary base or high-powered money doubled from \$905 billion, Sept. 3, 2008, to \$1,801 billion, Sept. 2, 2009, within a year (FRB: H.3 Release). Thanks to the drastic credit crunch, however, this doubling increase in monetary base didn't trigger inflation so far. In other words, M1 consisting of currency in circulation, traveler's checks, demand deposits, and other checkable deposits, only increased from \$1,461 billion in Sept. 2008 to \$1,665 billion in Sept. 2009 (FRB: H.6 Release), which implies that money multiplier dropped from 1.61 to 0.92. As of Feb. 2011, it is 0.91. In short, traditional monetary expansion policy by the Fed didn't work to restore

⁴This feedback loop from the accumulating debt to the higher interest rate is not yet fully incorporated in our model below.

the US economy so far. Yet, these tremendous increase in monetary base will, as a monetary bomb, force the US dollars to be devalued sooner or later. Once it gets burst, hyper-inflation will attack world economy in the foreseeable future. One of the main subject of G20 meetings last year in Seoul, Korea was how to avoid currency wars being led by the devaluation of dollar.

As discussed above in this way, current economies built on a debt money system seems to be getting trapped into one of three impasses, and government may be eventually destined to collapse due to a heavy burden of debts. These are hotly debated scenarios about the consequences of the rapidly accumulating debt in Japan, whose debt-GDP ratio in 2009 was 196.4% as observed above; the highest among OECD countries! Greece has almost experienced this impasse in 2009.

With the above analysis of system failure of the current economic system in mind, we are now in a position to search for an alternative system of macroeconomy in place of the current debt money system.

12.3 A Public Money System

Two Lessons from the Great Depression in 1930s

The Great Depression in 1929 was a severe challenge from the real economy to the dominant classical economic theory that poses that market economies have self-restoring forces to recover equilibrium, and money is neutral to such economic activities. Economists in those days tried to derive lessons from the event theoretically to avoid further disasters of economic recessions and unemployment in the future. The lessons they learned resulted in the publication of two books symbolically in the same year of 1935⁵; John M. Keynes's book: *The General Theory of Employment, Interest, and Money* [41], and Irving Fisher's book: *100% Money* [9].

Keynes proposed that the Great Depression was caused by the deficiency in the effective demand of macro economy by presenting the innovative framework of macroeconomy, which eventually revolutionized the economic analyses, up to the present days, under the so-called *Keynesian Revolution*. Our macroeconomic analyses in Parts II and III are essentially based on his macroeconomic framework. Yet, he paid little attention on the role of money as debt, and overlooked possible debt crises, as discussed above, that are being built in our debt money system.

On the other hand, Fisher, a great monetary economist in those days, argued that the Great Depression was caused by the debt money system itself; specifically, money that is created by the privately owned central bank, and credit(as money) that is created by commercial banks out of nothing through the fractional reserve banking system. He has regarded the debt money system

⁵Strictly speaking, Keynes' Preface to the book was written on December 13, 1935, and Fisher's Preface to the first edition of the book was written in March, 1935.

as a root cause of the Great Depression by refuting the classical theory of the neutrality of money. The lesson he learned is known as “100% Money Plan”

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.” [9, p. 9]

His proposal, however, had been preceded by the plan that was privately prepared and handed over to the Hon. Henry A. Wallace, Secretary of Agriculture, Washington, D.C. and “the forty odd who get this who will not think we are quite loony”. It was written in the face of collapsing banking system of the early 1930s under the title of *The Chicago Plan for Banking Reform* by eight economists at the University of Chicago such as G.V. Cox, Aaron Director, Paul Douglas, A.G. Hart, F.H. Knight, L.W. Mints, Henry Schultz, and H.C. Simons [53, pp. 191-199]. Irrespective of the support of these economists, the Chicago Plan failed to be implemented.

Being disappointed by this failure, in July 1939, Irving Fisher had written his own version of a mimeograph called *A Program for Monetary Reform* [9, pp. 157-183], co-signed this time by five professional colleagues: Paul H. Douglas (University of Chicago), Frank D. Graham and Charles R. Whittlesey (Princeton University), Earl J. Hamilton (Duke University), and Willford I. King (New York University). It was then sent to “the completest available list of academic economists... Up to the date of writing (July 1939) 235 economists from 157 universities and colleges have expressed their general approval of this Program; 40 more have approved it with reservations; 43 have expressed disapproval. The remainder have not yet replied [9, p. 158].“

In this way, the second lesson from the Great Depression resulted in the movement of banking/monetary reform, which has been sometimes called the Chicago Plan as its representative name collectively to honor the original efforts of the economists at the University of Chicago. Among those proponents of the monetary reform, Irving Fisher stayed very active all his life in establishing his monetary reform to stabilize the economy out of recessions such as the Great Depression. In spite of his devotion, being supported by many academic economists, his monetary reform also failed to be implemented. This vividly contrasts with the Keynes’s influences on the economic policies later on.

The implementation of the Chicago Plan was taken over by the more moderate banking reform that tried to save the collapsing banking system by avoiding political oppositions from the Wall Street bankers and financiers. It was established as the Banking Act of 1933, known as the Glass-Steagall Act later, followed by its revised Banking Act of 1935. The Glass-Steagall Act was intended to separate banking activities between Wall Street investment banks and depository banks.

These two novel lessons obtained from the Great Depression, however, have been gradually denuded. First, Keynesian revolution lost its influential power

in the face of stagflation in the 1970s, and has been gradually replaced with the neoclassical market fundamentalism. This counter-revolution, this time, began to take over the financial markets as well with the introduction of the Efficient Markets Hypothesis, which claims that financial markets have a tendency to attain market efficiency only when they are deregulated. Under such circumstances, the Glass-Steagall Act, though more moderate than the Chicago Plan, was repealed in 1999 by the Gramm-Leach-Bliley Act.

As early as 2000, these two lessons from the Great Depression have been entirely denuded, and the economic situations became very similar to those of the 1920s before the Great Depression. History has repeated! This time the repeal of the Glass-Steagall has triggered the financial crisis of subprime mortgage loans, followed by the collapse of Lehman Brothers in 2008, which may be more appropriately called the “Second Great Depression”.

The American Monetary Act: A New Lesson

What lessons can we learn from the Second Great Depression, then? On-going movement of financial reforms in the US may be an attempt to bring back a little bit stricter banking regulations in the spirit of the Glass-Steagall Act. Yet, this cannot be our lesson, because we are facing a systemic failure of debt crises as discussed in the above section. Keynes’ lesson of the General Theory cannot be our lesson either, because it turned out to be a root cause of debt crises.

Our new lesson in face of the looming debt crises has to be the modern version of the Chicago Plan of monetary reform which has failed to be implemented so far. The Chicago Plan has indeed fully predicted the fixing power of national debts “as a by-product of the 100% reserve system”, as the following 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. Under the 100% reserve system the needed increase in the circulation medium can be accomplished without increasing the interest bearing debt of the Government [9, p. 181].

(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 [9, p. 182].

In the United State, the American Monetary Act⁶ has been endeavoring to restore the proposal of the Chicago Plan and monetary reform by replacing the

⁶Its full text is available at <http://www.monetary.org/wp-content/uploads/2011/09/32-page-brochure.pdf>. 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,

Federal Reserve Act of 1913. Accordingly, it has become our new lesson after the Second Great Depression; the lesson and the only remaining one that once failed to be implemented.

In our terminology in this book, it is nothing but the restoration of a *public money* system from a *debt money* system. Specifically, the American Monetary Act tries to incorporate the following three features based on the Chicago Plan. For details see [96, Chap. 24] and [97].

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

As a system dynamics researcher, I have become interested in the system design of macroeconomics proposed by the American Monetary Act, and posed a question whether this public money system of macroeconomy can solve the most imminent problem our economy is facing; that it, accumulation of government debt. Accordingly, next objective of this chapter is to construct a macroeconomic model which incorporates the above three features and examine if this alternative system could help liquidate government debt or not. Before moving on, let us take a closer look at these features in detail.

Governmental control over the issue of money

In macroeconomics, the amount of money to be issued by the central bank is called *monetary base* or *high-powered money*. In order for the government to control the issue of money and monetary base, the American Monetary Act suggests as follows:

First, the Federal Reserve system becomes incorporated into the U.S. Treasury. This nationalizes the money system, not the banking system. Banking is *not a proper function of government*, but control and oversight of the money system *must be done by government* [97, p.12].

In Japan, the government owns 55% of the shares of the Bank of Japan. Accordingly, its incorporation to the government could be rather smoothly done, though the government, its major shareholder, is currently prohibited from the bank's decision-making process by law. In Europe, two incorporation processes could be possible. First, EU member countries are politically integrated into, say, the United States of Europe, which in turn establishes its own federal European government and incorporate the current European Central Bank into its branch. Or the ECB is once again disintegrated and incorporated into the governments of member countries, respectively.

2011 as H.R. 2990 by the congressman Dennis Kucinich. Its full text is available at <http://www.govtrack.us/congress/billtext.xpd?bill=h112-2990> .

On July 26, 2011, about two months before its submission, I was invited to the US Congressional Briefing by the congressman to present the findings of my macroeconomic simulation results based on this chapter and next chapter.

Abolishment of credit creation

Credit can be created by the lending of commercial banks, and becomes a part of money supply, because it plays a role of means of exchange. The credit creation has been called *money out of nothing* or *money out of thin air* by Keynes. It is made possible because banks are required to hold only a fraction of deposits (with the central bank) and can lend the remaining larger portion. This system is called a *fractional reserve banking system*. Heavily-criticized practice of leveraged investment that led to the recent financial crises is made possible by the credit creation. Under a public money system, this fractional reserve banking system is abolished; that is, a fractional reserve ratio has to be 100%. The American Monetary Act suggests as follows:

Second, the accounting privilege banks now have of creating money through fractional reserve lending of their credit is stopped entirely, once and for all. Banks remain private companies and are encouraged to act as intermediaries between their clients who want a return on their savings and those clients willing to pay for borrowing those savings, but they may no longer create any part of the nation's money supply [97, p.12].

When full reserve system is implemented by the Act, bank reserves become equal to deposits so that we have

$$\begin{aligned} \text{Money Supply} &= \text{Currency in Circulation} + \text{Deposits} \\ &= \text{Currency in Circulation} + \text{Reserves} \\ &= \text{High-Powered Money} \end{aligned} \tag{12.1}$$

Accordingly, under the public money system, money is created only by the government, and money supply becomes public money⁷.

It will be worthwhile to clarify a position of money in an economy. Suppose there exists N commodities in an economy. Under gold standard or commodity money standard, one of the commodities becomes money against which the remaining $N-1$ commodities are exchanged. Hence, quantity of money is limited by the production of gold or commodity money. Under a fractional reserve banking system, credit is created and used as *low-powered* money in addition to monetary base or high-powered money. In other words, 2 types of money are being used for the exchange of N commodities; that is, currency in circulation and deposits. Finally, under a system of public money, only the government-issued fiat money is used to exchange for N commodities. Schematically, positions of money under different monetary system is summarized as follows:

⁷Money supply is also defined in terms of high-powered money as

$$\text{Money Supply} = m * \text{High-Powered Money} \tag{12.2}$$

where m is a money multiplier. Under a full reserve system, money multiplier becomes unitary, $m = 1$, so that money can no longer be created by commercial banks.

Gold or Commodity Money Standard
 (N - 1) + Gold

Debt Money
 N + Currency in Circulation + Credits(Deposits)

Public Money
 N + Money

Constant inflow of money

Growing economy demands for a growing amount of money as a means of exchange if monetary value is to be sustained. This can be easily verified from the following quantity theory of money:

$$MV = PT = kPY \quad (12.3)$$

where M is money supply, V is a velocity of money, P is a price level, T is the amount of transaction, Y is real GDP, and k is a so-called Marshall's k .

Assuming that V and k are constant, we have

$$\frac{\dot{M}}{M} = \frac{\dot{P}}{P} + \frac{\dot{Y}}{Y} \quad (12.4)$$

Thus, to sustain a monetary value by avoiding inflation or deflation, we have to attain $\dot{P}/P = 0$. This implies that $\dot{M}/M = \dot{Y}/Y$; that is, money has to be issued and put into circulation in accordance with the economic growth.

Under a system of debt money, the injection of new money into circulation has only been carried out by the privately-controlled central bank at its discretion and for its interest. Under a public money system, two channels for money injection becomes available. First, the government can directly distribute newly issued money into circulation as an additional expenditure according to its public policies supported by voters in the field of infrastructures, education, medical care, green technologies and environment. Second, the central bank, now as a part of government, can make loans to commercial banks, free of interest, according to a guideline set by governmental growth strategies for the interest and welfare of people.

As to the new issue of money, American Monetary Act suggest as follows:

Third, new money is introduced into circulation by government spending it into circulation starting with the \$2.2 trillion the engineers tell us is needed for infrastructure repair and renewal. In addition, health care and education are included as human infrastructure. Everyone supports the infrastructure, but they worry how to pay for it. That becomes possible with the passage of the American Monetary Act [97, p.12].

Battles to Control A Money System

Human history could be, in a sense, said to be a history of battles to control the issue of money; that is, the battles between a debt money system and a public money system in our terminology here, or between interest-bearing money and interest-free money.

Science of money, according to [96], was founded by Aristotle (384-322 BC). He viewed that “Money exists not by nature but by law(nomos)“ . His view has been supported through the church’s condemnation of usury up to the work by the philosopher George Berkeley⁸ in his 1735 book of questions “Querest”. Neglecting his work, Adam Smith, father of economics, ended the battle by supporting the Bank of England, founded in 1694, as a system of debt money in his book *The Wealth of Nations* in 1776.

This battle is summarized as Aristotle’s science of money vs. Adam Smith’s metallic view of money. . . . Whether money should be tangible wealth and thereby be privately controlled to benefit the wealthy (Smith), or be an abstract legal fiat power publicly controlled to promote the general welfare (Aristotle) [97, p.6].

In the United States, this battle was finalized when the Federal Reserve Act was approved and system of debt money has been introduced [33]. Since then science of money has been lost and economists showed no doubt on the role of debt money, including Keynes. The lost science has been reflected in many macroeconomics textbooks, including the ones as briefly mentioned above.

The dominance of current macroeconomic system is being challenged again with the introduction of the American Monetary Act under the recent financial crises. As a system dynamics researcher and a professionally trained economist, I’m of the opinion that it is a reclaiming process of *the lost science of money* to construct macroeconomic models which enable us to compare these two systems and evaluate them impartially in terms of economics as a science.

12.4 Macroeconomic System of Debt Money

For the comparative analysis of the two macroeconomic systems, the integrated macroeconomic model developed in chapter 8 is revisited in this chapter⁹. According to the discussions above, the model is classified as a macroeconomic system of debt money, in which five macroeconomic sectors are assumed to play

⁸University of California at Berkeley, where I studied mathematical economics in late 70’s and early 80’s, was named after the philosopher Berkeley.

⁹This choice of the model is in accordance with my viewpoint that labor market should be abolished from a market economy as a better economic system, which is proposed as the MuRatopian economy in [78]. The MuRatopian economy is presented as an alternative system, beyond capitalist market economy and planned socialist economy, suitable for the information age of the 21st century. However, money system is missing in the economy, I admit. While writing this chapter, I become convinced that a public money system should be indeed a monetary system of the MuRaopian economy.

interdependent activities simultaneously; that is, producers, consumers, banks, government and the central bank [Companion Model: Design Macro.vpm]. Foreign sector is excluded from the model.

Under the current macroeconomic system of debt money, transactions by producers, consumers, government, banks and the central bank remain the same as already explained in Chapter 8. Yet, transactions of government, banks and central bank are repeated here as a comparative reference to the revised transactions under a macroeconomic system of public money to be presented below.

Government

Transactions of the government are illustrated in Figure 12.3, some of which are summarized as follows.

- Government receives, as tax revenues, income taxes from consumers and corporate taxes from producers as well as excise tax on production.
- Government spending consists of government expenditures and payments to the consumers for its partial debt redemption and interests against its securities.
- Government expenditures are assumed to be endogenously determined by either the growth-dependent expenditures or tax revenue-dependent expenditures.
- If spending exceeds tax revenues, government has to borrow cash from banks and consumers by newly issuing government securities.

Banks

Transactions of banks are illustrated in Figure 12.4, some of which are summarized as follows.

- Banks receive deposits from consumers, against which they pay interests.
- They are obliged to deposit a fraction of the deposits as the required reserves with the central bank (which is called a fractional reserve banking system).
- Out of the remaining deposits loans are made to producers and banks receive interests for which a prime rate is applied.
- Their retained earnings thus become interest receipts from producers less interest payment to consumers. Positive earning will be distributed among bank workers as consumers.

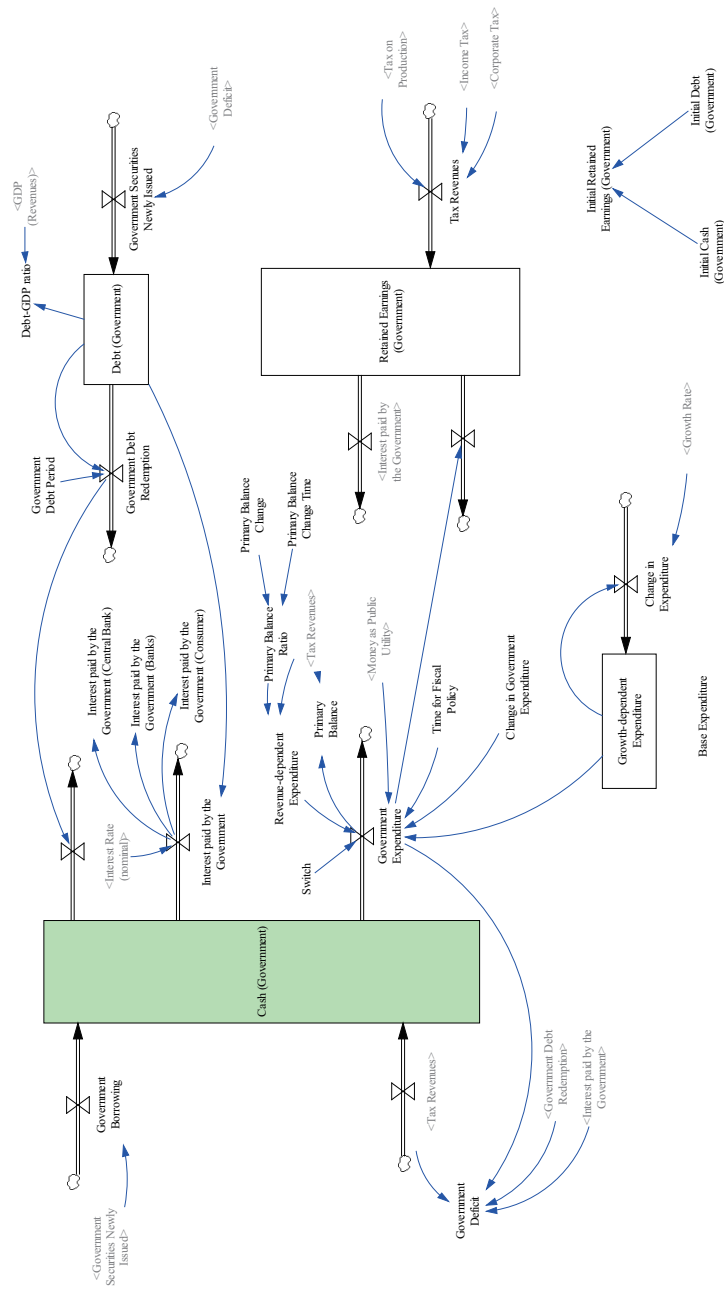


Figure 12.3: Transactions of Government

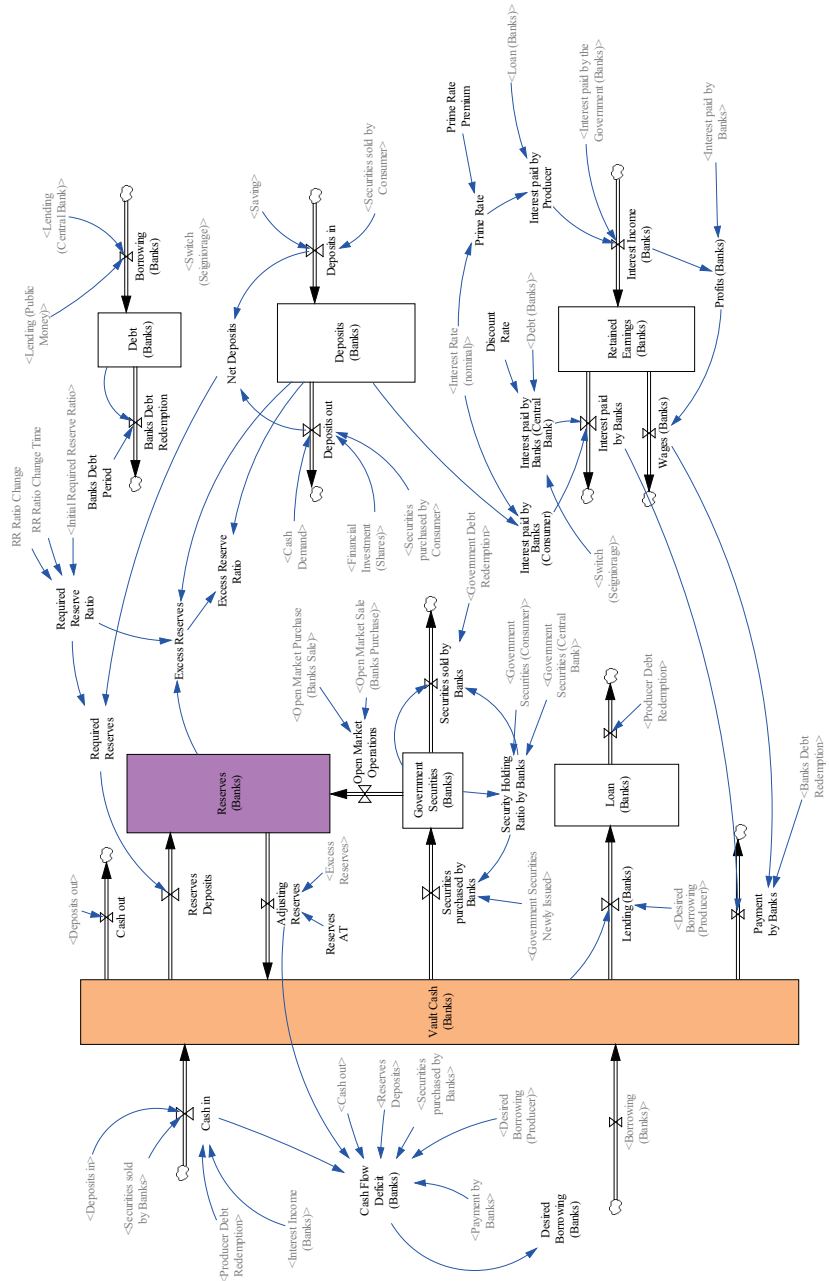


Figure 12.4: Transactions of Banks

Central Bank

The central bank plays an important role of issuing money or currency. Sources of its assets against which money is issued are simply confined to gold, discount loans and government securities. The central bank can control the amount of money supply through the amount of monetary base consisting of currency outstanding and bank reserves. This monetary control can be carried out through monetary policies such as a manipulation of required reserve ratio and open market operations as well as direct control of lending to the banks. Transactions of the central bank are illustrated in Figure 12.5, some of which are summarized as follows.

- The central bank issues money (historically gold certificates) against the gold deposited by the public.
- It can also issue money by accepting government securities through open market operation, specifically by purchasing government securities from the public (consumers) and banks. Moreover, it can issue money by making discount loans to commercial banks. (These activities are sometimes called creation of *money out of nothing*.)
- It can similarly withdraw money by selling government securities to the public (consumers) and banks, and through debt redemption by banks.
- Banks are required by law to reserve a certain fraction of deposits with the central bank. By controlling this required reserve ratio, the central bank can control the monetary base directly.
- The central bank can, thus, control the amount of money supply through monetary policies such as open market operations, reserve ratio and discount rate.
- Another powerful but hidden control method is through its direct influence over the amount of discount loans to banks (known as *window guidance* in Japan.)

12.5 Behaviors of A Debt Money System

Mostly Equilibria in the Real Sector

The macroeconomic model of debt money is now complete. It is a generic model, out of which diverse macroeconomic behaviors will be generated. Let us only focus on an equilibrium growth path of the macroeconomy. As already discussed in chapter 8, an equilibrium state is called a *full capacity aggregate demand equilibrium* if the following three output and demand levels are met:

$$\text{Full Capacity GDP} = \text{Desired Output} = \text{Aggregate Demand} \quad (12.5)$$

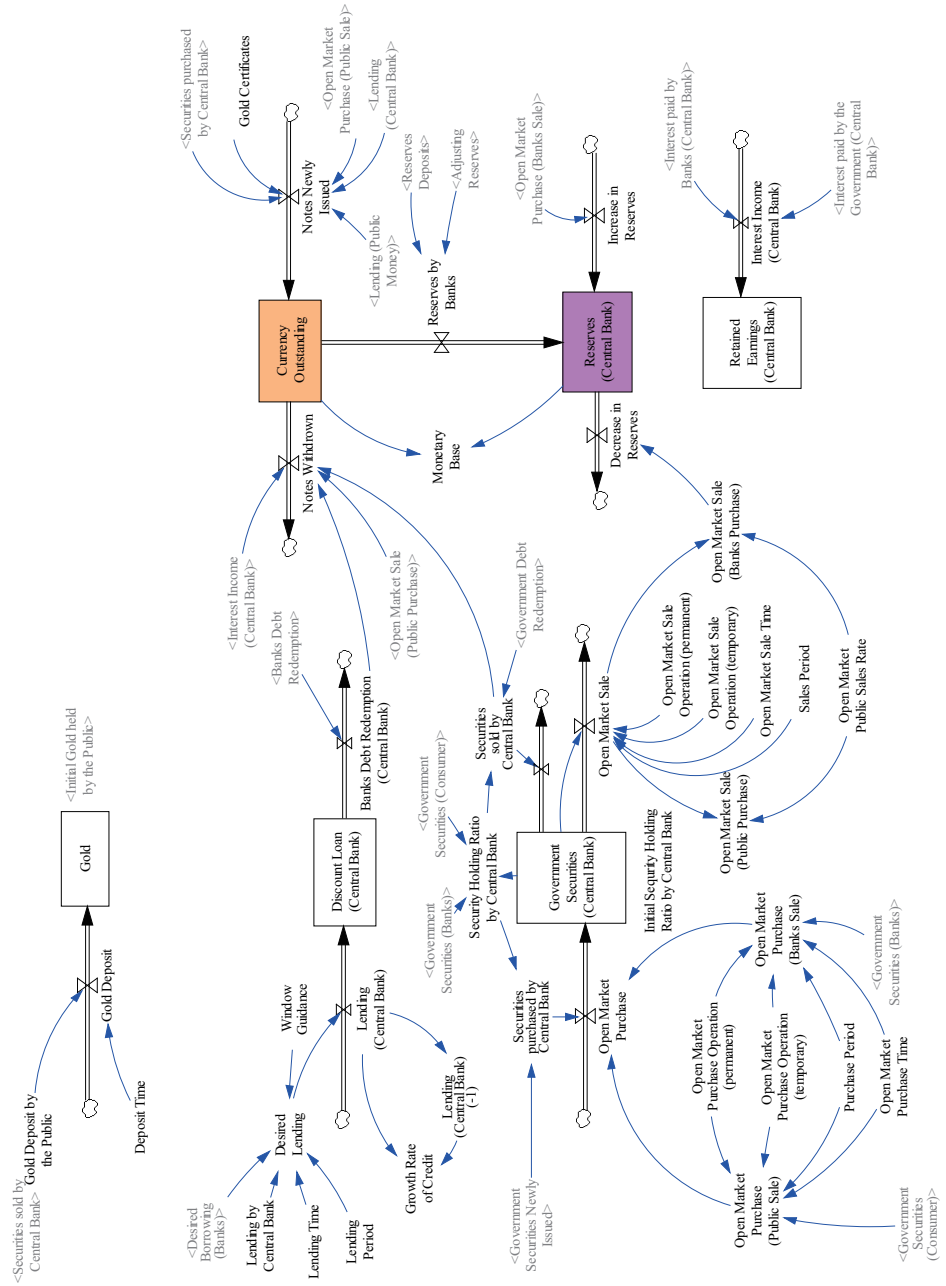


Figure 12.5: Transactions of Central Bank

By trial and error, mostly equilibrium states are acquired, as in chapter 8, when a ratio elasticity of the effect on price e is 1, and a weight of inventory ratio ω is 0.1, as illustrated in Figure 12.6.

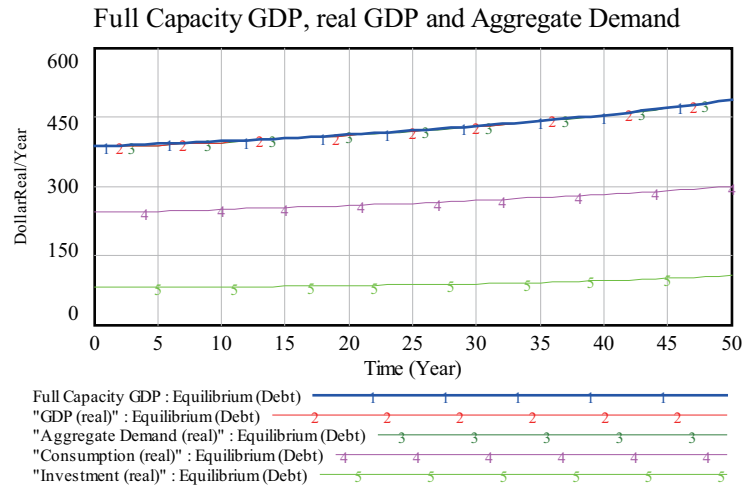


Figure 12.6: Mostly Equilibrium States

These equilibrium states are used in chapter 8 as a benchmarking state for comparisons with various disequilibrium cases such as fix-price disequilibria, business cycles caused by inventory coverage and elastic price fluctuation, and economic recession caused by credit crunch. Moreover, these disequilibria are shown to be fixed toward equilibria through monetary and fiscal policies. In this chapter, our analysis is confined only to the case of liquidation of government debt.

Money out of Nothing

For the attainment of mostly equilibria, enough amount of money has to be put into circulation to avoid recessions caused by credit crunch as analyzed in chapter 8. Demand for money mainly comes from banks and producers. Banks are assumed to make loans to producers as much as desired so long as their vault cash is available. Thus, they are persistently in a state of shortage of cash as well as producers. In the case of producers, they could borrow enough fund from banks. From whom, then, should the banks borrow in case of cash shortage?

In a closed economic system, money has to be issued or created within the system. Under the current financial system of debt money, only the central bank is endowed with a power to issue money within the system, and make loans to the commercial banks directly and to the government indirectly through the open market operations. Commercial banks then create credits under a fractional

reserve banking system by making loans to producers and consumers. These credits constitute a major portion of money supply. In this way, money and credits are only created when commercial banks and the government as well as producers and consumers come to borrow at interest. If all debts are repaid, money ceases to exist. This is an essence of a system of debt money. This process of creating money is known as *money out of nothing*.

Figure 12.7 indicates unconditional amount of annual discount loans and its growth rate by the central bank at the request of desired borrowing by banks. In other words, money has to be incessantly created and put into circulation in order to sustain an economic growth under mostly equilibrium states. Roughly speaking, a growth rate of credit creation by the central bank has to be in average equal to or slightly greater than the economic growth rate as suggested by the right hand diagram of Figure 12.7.

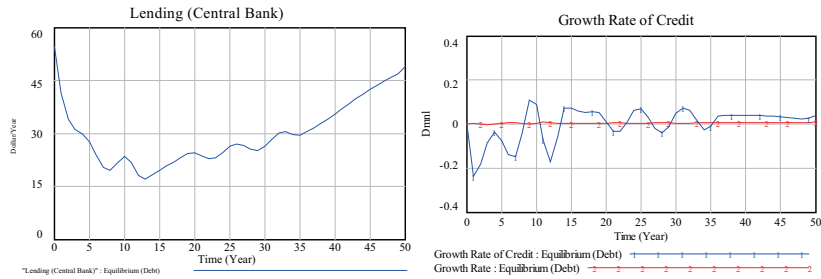


Figure 12.7: Lending by the Central Bank and its Growth Rate

In this way, the central bank begins to exert an enormous power over the economy through its credit control. What happens if the central bank fails to supply enough currency intentionally or unintentionally? An economic recession by credit crunch as analyzed in chapter 8. An influential role of the central bank which caused economic bubbles and the following burst in Japan during 1990's is completely analyzed by Werner in [72] and [73].

Accumulation of Government Debt

So long as the mostly equilibria are realized in the economy, through monetary and fiscal policies in the days of recession, no macroeconomic problem seems to exist. This is a positive side of Keynesian macroeconomic theory. Yet behind the full capacity aggregate demand growth path in Figure 12.6 government debt continues to accumulate as the line 1 in the left diagram of Figure 12.8 illustrates. This is a negative side of the Keynesian theory. Yet most macroeconomic textbooks neglect or less emphasize this negative side, partly because their macroeconomic frameworks cannot handle this negative side of the system of debt money.

Primary balance ratio is initially set to be one and balanced budget is assumed here; that is, government expenditure is set to be equal to tax revenues,

and no deficit seems to arise. Why, then, does the government continue to accumulate debt? Government deficit is, as discussed in chapter 8, precisely

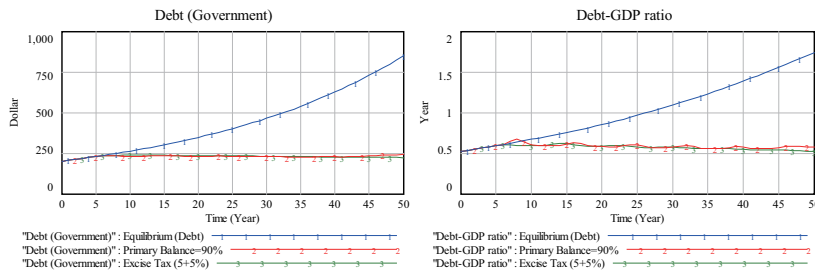


Figure 12.8: Accumulation of Government Debt and Debt-GDP Ratio

defined as

$$\text{Deficit} = \text{Tax Revenues} - \text{Expenditure} - \text{Debt Redemption} - \text{Interest} \quad (12.6)$$

Therefore, even if balanced budget is maintained, the government still has to keep paying its debt redemption and interest. This is why it has to keep borrowing and accumulating its debt. Initial GDP in the model is obtained to be 386, while government debt is initially set to be 200. Hence, the initial debt-GDP ratio is around 0.52 year (similar to the current ratios among EU member countries). Yet, the ratio continues to increase to 1.74 year at the year 50 in the model as illustrated by the line 1 in the right diagram of Figure 12.8. This implies the government debt becomes 1.74 years as high as the annual level of GDP.

Can such a high debt be sustained? Absolutely no. Eventually this runaway accumulation of government debt may cause nominal interest rate to increase, because the government may be forced to keep borrowing by paying higher interests, which may eventually cause hyper-inflation¹⁰.

Higher interest rates may in turn trigger a sudden drop of government security price, deteriorating values of financial assets owned by banks, producers and consumers. The devaluation of financial assets may force some banks and producers to go bankrupt eventually. In this way, another financial crisis becomes inevitable and government is eventually destined to collapse as well. This is one of the hotly debated scenarios about the consequences of the rapidly accumulating debt in Japan, whose debt-GDP ratio in 2009 was 1.893 years; the highest among OECD countries! Compared with this, debt-GDP ratios in the model seem to be still modest.

Remarks: if this scenario of financial breakdown due to the runaway accumulation of debt fails to be observed in the near future, still there exist some legitimate reasons to stop the accumulating debt. First, it continues to create

¹⁰This feedback loop from the accumulating debt to the higher interest rate is not yet fully incorporated in the model.

unfair income distribution in favor of bankers and financial elite, causing inefficient allocation of resources and economic performances, and eventually social turmoils by the poor. Second, forced payment of interest forces the indebted producers to continue incessant economic growth to the limit of environmental carrying capacity, which eventually leads to the collapse of environment. In short, system of debt money is unsustainable as an economic system.

Liquidation of Government Debt

Let us now consider how to avoid such a financial crisis and collapse. At the face of the financial crisis as discussed above, suppose that the government is forced to reduce its debt-GDP ratio to less than 0.6 by the year 50, as required to all EU members by the Maastricht treaty. To attain this goal, only two policies are available to the government; that is, to spend less or tax more. Let us consider them, respectively.

Policy A: Spend Less

This policy assumes that the government spends 10% less than its equilibrium tax revenues, so that a primary balance ratio has to be reduced to 0.9 in our economy. In other words, the government has to make a strong commitment to repay its debt annually by the amount of 10 % of its tax revenues. Let us assume that this reduction is put into action at the year 6. Line 2 of the left diagram of Figure 12.9 illustrates this reduction of spending.

Under such a radical financial reform, debt-GDP ratio will be reduced to around 0.6 at the year 25, and to around 0.58 at the year 50 as illustrated in line 2 in the right diagram of Figure 12.8. Accordingly, the accumulation of debt will be eventually curved as shown in line 2 in the left diagram.

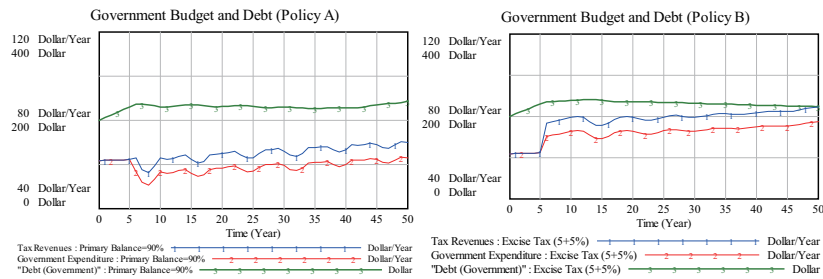


Figure 12.9: Liquidation Policies: Spend Less and Tax More

Policy B: Tax More (and Spend More)

Among various sources of taxes to be levied by the government such as income tax, excise tax, and corporate tax, let us assume here that excise tax is increased, partly because an increase in consumption (or excise) tax has become a hot

political issue recently in Japan. Specifically the excise tax is assumed to be increased to 10% from the initial value of 5% in our model; that is, 5% increase. Line 1 of the right diagram of Figure 12.9 illustrates the increased tax revenues.

Out of these increased tax revenues, spending is now reduced by 8.5% to repay the accumulated debt. Though spending is reduced in the sense of primary balance, it has indeed increased in the absolute amount, compared with the original equilibrium spending level, as illustrated by line 2 of the same right diagram of Figure 12.9. Accordingly the government needs not be forced to reduce the equilibrium level of budget.

As a result this policy can also successfully reduces debt-GDP ratio to around 0.575 at the year 25, and to around 0.52 at the year 50 as illustrated in line 3 in the right diagram of Figure 12.8. Accordingly, the accumulation of debt will also be eventually curved as shown in line 3 in the left diagram.

Triggered Recessions

These liquidation policies seem to be working well as debt begins to get reduced. However, the implementation of these policies turns out to be very costly to the government and its people as well.

Let us examine the policy A in detail. At the next year of the implementation of 10 % reduction of a primary balance ratio, growth rate is forced to drop to minus 6 %, and the economy fails to sustain its full capacity aggregate demand equilibrium of line 1 as illustrated by line 2 in Figure 12.10. Compared with the mostly equilibrium path of line 1, debt-reducing path of line 2 brings about business cycles. Similarly, line 3 indicates another business cycle triggered by Policy B; though a recession is triggered to minus 2.6 % of growth rate with a delay at the year 13.

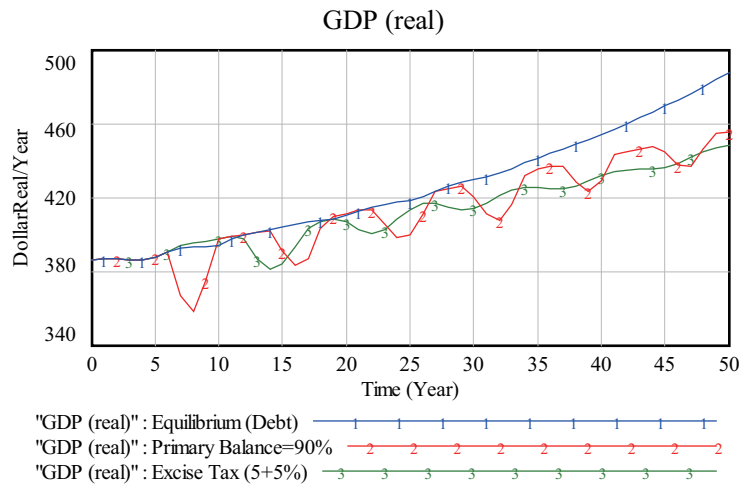


Figure 12.10: Comparison of GDP paths

12.6 Macroeconomic System of Public Money

We are now in a position to implement the alternative macroeconomic system discussed in the introduction, as proposed by the American Monetary Act, in which the central bank is incorporated into the government and a fractional reserve banking system is abolished. Let us call this new system a macroeconomic system of public money. Money issued in this new system plays a role of public utility of medium of exchange. Hence the newly incorporated institution may be appropriately called *the Public Money Administration*.

Under this incorporation, transactions of the government, commercial banks and the public money administration (formally the central bank) need to be revised slightly. Let us start with the description of the revised transactions of the government.

Government

- Balanced budget is assumed to be maintained; that is, a primary balance ratio is unitary. Yet the government may still incur deficit due to the debt redemption and interest payment.
- Government now has the right to newly issue money whenever its deficit needs to be funded. The newly issued money becomes seigniorage inflow of the government into its equity or retained earnings account.
- The newly issued money is simultaneously deposited with the reserve account of the Public Money Administration. It is also booked to its deposits account of the government assets.
- Government could further issue money to fill in GDP gap.

Revised transaction of the government is illustrated in Figure 12.11. Green stock box of deposits is newly added to the assets.

Banks

Revised transactions of commercial banks are summarized as follows.

- Banks are now obliged to fully deposit the amount of deposits they owe as the required reserves with the public money administration. Time deposits are excluded from this obligation.
- When the amount of time deposits is not enough to meet the demand for loans from producers, banks are allowed to borrow from the public money administration free of interest; that is, a former discount rate is now zero. Allocation of loans to the banks will be prioritized according to the public policies of the government. (This constitutes a market-oriented issue of new money. Alternatively, the government can issue new money directly through its public policies to fill in a GDP gap, if any, as already discussed above.)

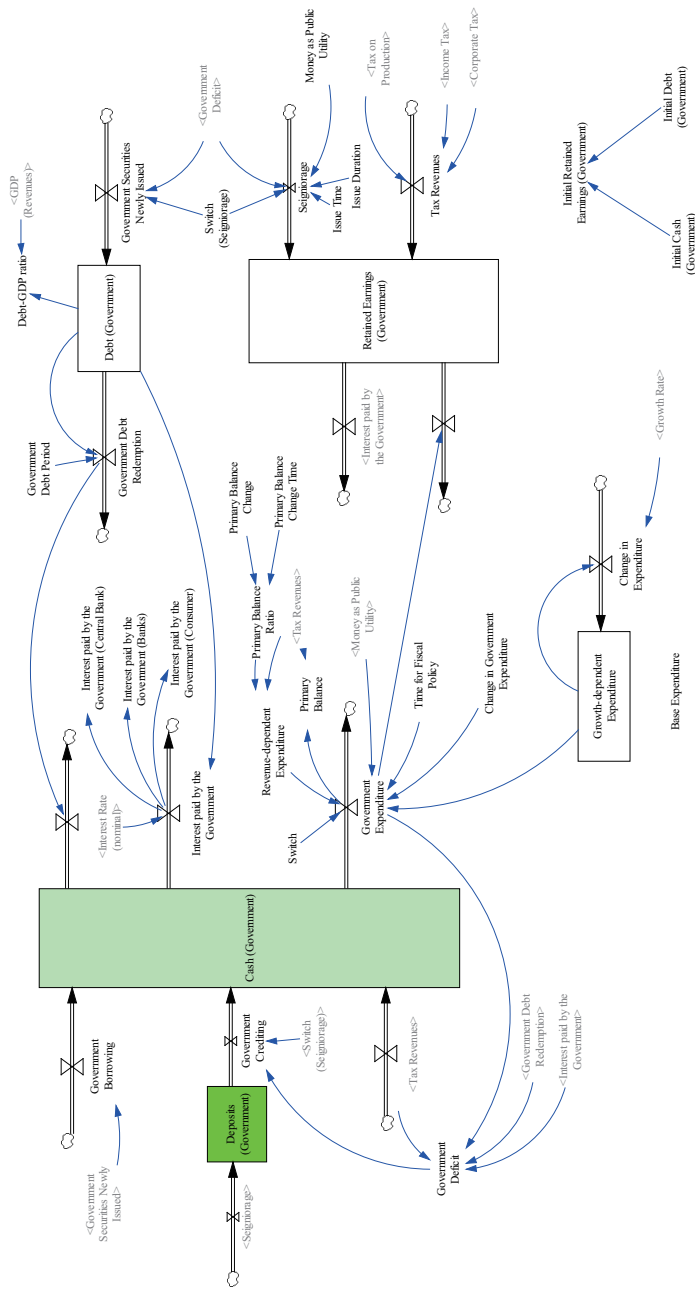


Figure 12.11: Transactions of Government

Line 1 in Figure 12.12 illustrates the originally required reserve ratio of 5%. In addition, three different ways of abolishing a fractional reserve banking system are illustrated, starting at the year 6. Line 2 shows that the 100% fraction (full reserves) is immediately attained in a year. Line 3 shows it is attained in 5 years, and line 4 shows it is gradually attained in 10 years. In our analysis here, 5 year's attainment of 100% fraction will be mainly used as a representative to avoid a complexity of illustration.

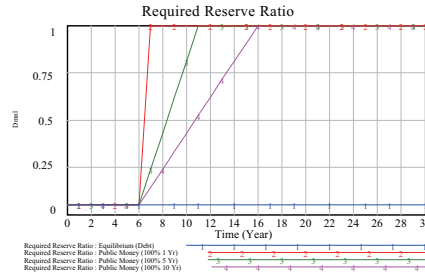


Figure 12.12: 100% Required Reserve Ratios

Public Money Administration (Formerly Central Bank)

The central bank now gets incorporated as one of the governmental organizations which is here called the Public Money Administration (PMA). Its revised transactions now become as follows.

- The PMA accepts newly issued money of the government as seigniorage assets and enter the same amount into the government reserve account. Under this transaction, the government needs not print hard currency, instead it only sends digital figures of the new money to the PMA.
- When the government wants to withdraw money from their reserve accounts at the PMA, the PMA could issue new money according to the requested amount. In this way, for a time being, former central bank notes and government money coexist in the market.
- With the new issue of money the PMA meets the demand for money by commercial banks, free of interest, according to the guideline set by the government public policies.

Under the revised transactions, open market operations of sales and purchases of government securities become ineffective, simply because government debt gradually diminishes to zero. Furthermore, discount loan is replaced with interest-free loan. This lending becomes a sort of open and public *window guidance*, which once led to the rapid economic growth after World War II in Japan [72]. Accordingly, interest incomes from discount loans and government securities are reduced to be zero eventually. Transactions of the public money administration are illustrated in Figure 12.13. Green stock boxes of seigniorage assets and government reserves are newly added.

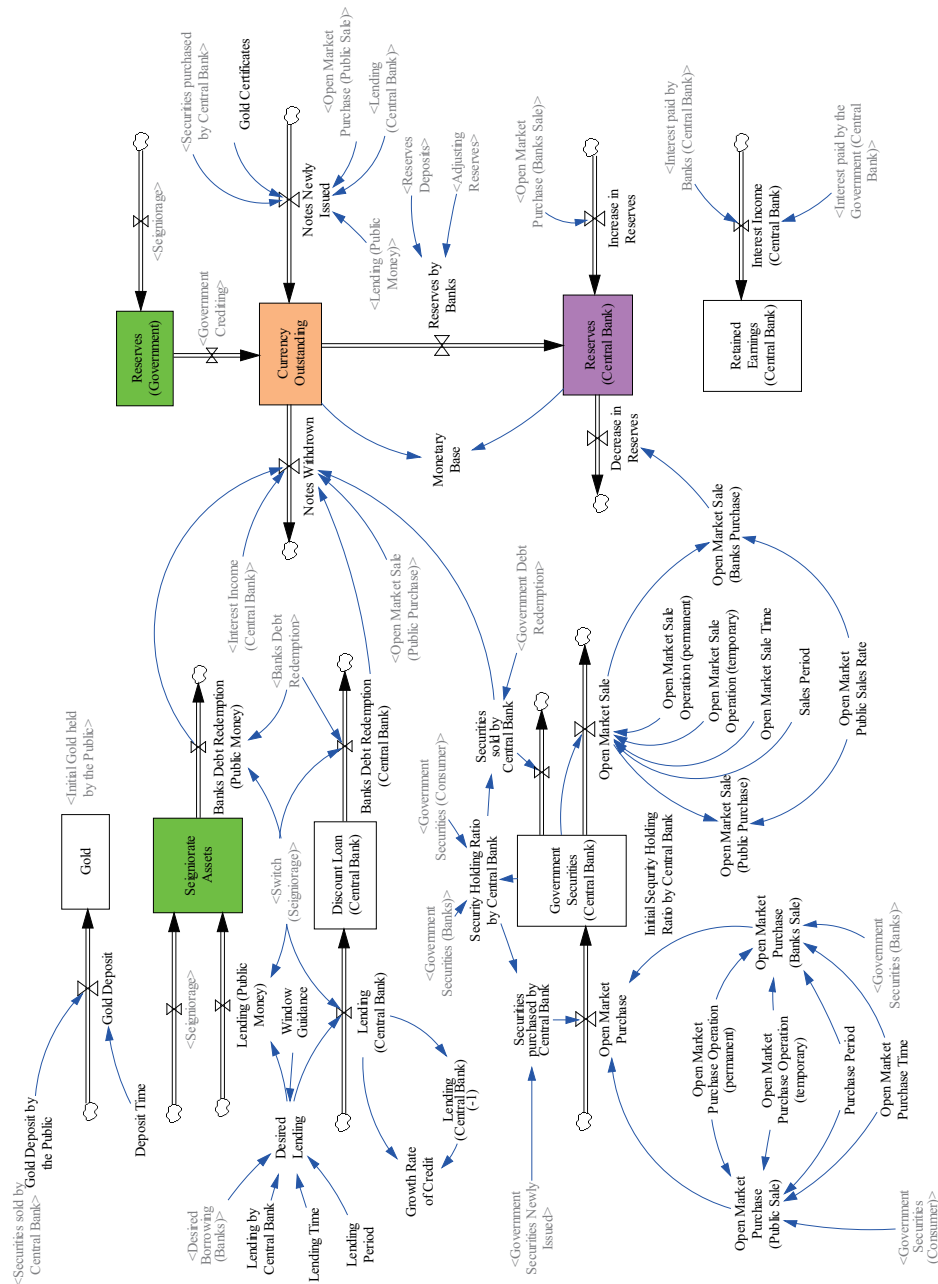


Figure 12.13: Transactions of the Public Money Administration

12.7 Behaviors of A Public Money System

Liquidation of Government Debt

Under this alternative macroeconomic system of public money, the accumulated debt of the government gets gradually liquidated as demonstrated in Figure 12.14, which is the same as Figure 12.8 except that line 3 is added here. Recollect that line 1 was a benchmark debt of the mostly equilibria under the system of debt money, while line 2 was the decreased debt when debt-ratio is reduced under the same system. Now newly added line 3 indicates that the government debt continues to decline when a 100% fraction ratio is applied in 5 years starting at the year 6. The other two fractional reserve cases - 100% attainment in 1 and 10 years - result in the exactly same declining tendencies. This means that the abolishment methods of a fractional level do not affect the liquidation of the government debt, because banks are allowed to fill in the enough amount of cash shortage by borrowing from the PMA in the model.

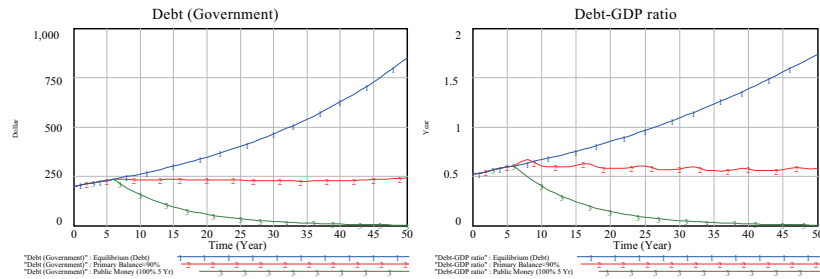


Figure 12.14: Liquidation of Government Debt and Debt-GDP Ratio

Figure 12.15 compares how real GDP growth and growth rates will be affected during the liquidation process under debt money and public money systems. GDP growth path under the public money system (line 3) stays closer to the original equilibrium path (line 1), as illustrated by the left diagram, without triggering economic recession, as illustrated in the right diagram (line 3). In this sense, a public money system can be said to be a far better system because of the accomplishment of higher economic growth compared with the one under a debt money system.

Moreover, this liquidation of government debt can be done without causing inflation. In fact, left diagram in Figure 12.16 illustrates that price of line 3 continues to decrease, and inflation rate of line 3 in the right diagram is constantly below 0

Inflation and GDP Gap

Persistent objection to the system of public money has been that government, once a free-hand power of issuing money is being endowed, tends to issue more

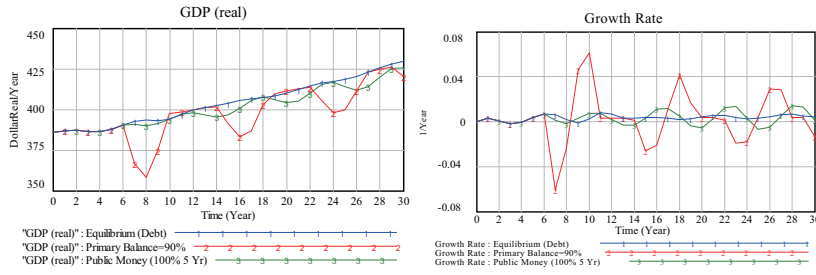


Figure 12.15: Comparison of GDP and Growth Rates

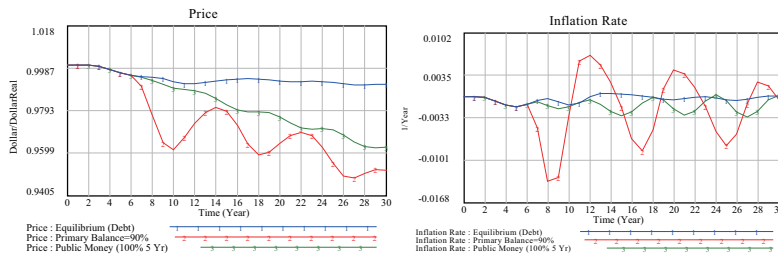


Figure 12.16: Price Level and Inflation Rate

money than necessary, which tends to bring about inflation eventually, though history shows the opposite [96].

Theoretically, under the existence of GDP gap, increase in the government expenditure by issuing new money would not cause inflation, but stimulate the economic growth instead. To examine this case, let us first create a GDP gap by changing the exponent of capital from 0.4 to 0.43 as illustrated by line 1 in Figure 12.17, in which the GDP gap is observed between the year 5 and 10. Faced with this recession, public money is being newly issued by the amount of 23 for 20 years starting at the year 6. This corresponds to a continual inflow of money into circulation as proposed by the American Monetary Act. As a result equilibrium is attained again as illustrated by line 2 in the left diagram, yet inflation does not seem to appear as line 2 of the right diagram indicates.

Inflation could occur only when government mismanages the money supply. To examine this case, let us take a benchmark state attained by the equilibrium, then assume that the government increases its spending by mistakenly issuing new money by the amount of 10 for 4 years, starting at the year 10; that is, the government expenditure continues to increase to 75 from 65 for four years.

As being expected, the increase in the government expenditure under the equilibrium state surely causes inflation, 1.8% at the year 13, as illustrated by line 2 of the left diagram of Figure 12.18, followed by the deflation of -3% at the year 17. To be worse, this inflation triggers economic recession of -13% at the year 16 as illustrated by line 2 in the right diagram. Figure 12.19 shows

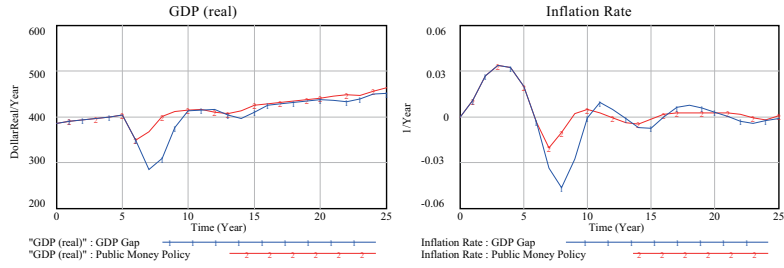


Figure 12.17: No Inflation under GDP Gap

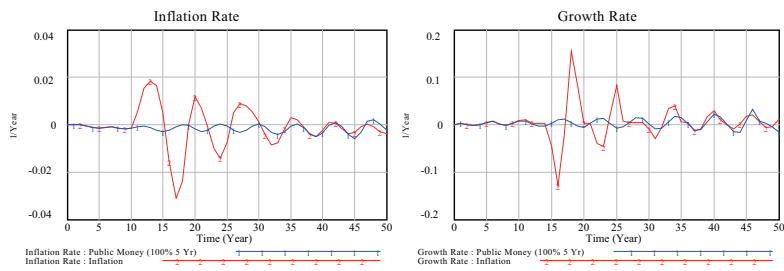


Figure 12.18: Inflation under No GDP Gap

business cycles caused by the mismanagement of the increase in money supply when no GDP gap exists.

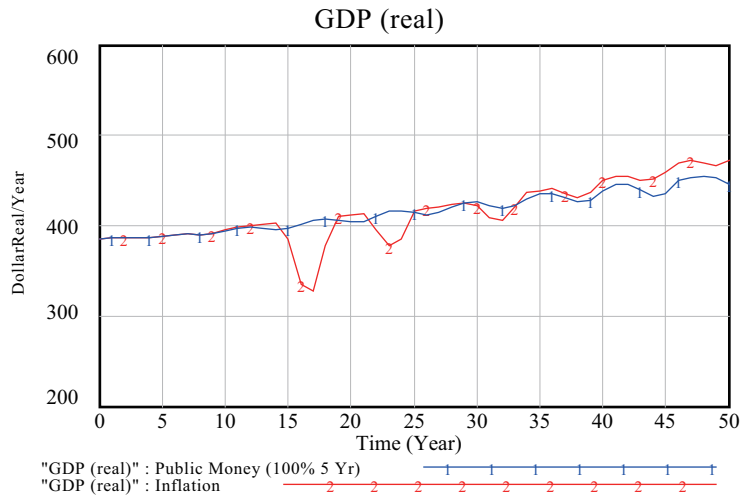


Figure 12.19: Business Cycles caused by Inflation under No GDP Gap

Maximum Tolerable Inflation

This could be a serious moral hazard lying under the system of public money, because the incumbent government tries to cling to the power by unnecessarily stimulating the economy in the years of election as history demonstrates. Business cycle thus spawned is called *political business cycle*. “There is some evidence that such a political business cycle exists in the United States, and the Federal Reserve under the control of Congress or the president might make the cycle even more pronounced [51, p.353].” Proponents of the central bank take advantage of this cycle as an excuse for establishing the independence of the central bank from the intervention by the government. On the contrary, recent financial crises and runaway accumulation of government debt are caused, indeed, by the independence of the central bank under the system of debt money.

How can we avoid the political business cycle, then, without resorting to the independence of the central bank? As a system dynamics researcher, I suggest an introduction, by law, of a feedback loop of stabilizing monetary value which forces a resignation of the government in case of higher inflation, or at least the head of the Public Money Administration to step down.

How high inflation, then, can we be tolerant of? The American Monetary Act stipulates the maximum interest rate of 8% per year, including all fees.

Because before 1980/1981, forty nine States had “anti-usury” laws which limited normal interest rates to a maximum of between 6% and 10% p.a. (one state had 12%). The American Monetary Act takes the middle of this range to represent a restoration of the interest limits prevailing across the country prior to 1980/1981 [97, p.27].

From the following relation,

$$\text{Nominal interest rate} = \text{Real interest rate} + \text{Inflation rate} \quad (12.7)$$

we have, for non-negative real interest rate ≥ 0 ,

$$\text{Maximum Nominal interest rate (= 8\%)} \geq \text{Inflation rate} \quad (12.8)$$

That is to say, the maximum tolerable inflation rate becomes 8% under the system of public money. The success of the system depends on the legalization of a forced step down of the government in case of an inflation rate higher than 8%.

Public Money Policy

The role of the public money administration under the macroeconomic system of public money is to maintain the monetary value, similar to the role assigned to the central banks under the system of debt money. Interest rate is no longer controlled by the public money administration, and left to be determined in the market. History shows that an economic bubble and its burst have been caused by the purposive manipulation of the interest rates such as overnight call rate

and federal fund rate by the privately-owned central bank for the benefits of financial elite. In this sense, we will be finally freed from the control of the central bank.

Accordingly, the only tool to stabilize the monetary value is through the public management of the amount of money in circulation. This could be carried out through the control of lending money to commercial banks and through the fiscal policy. Specifically, in case of an inflationary state, lending money to the banks may be curbed, or the money in circulation could be sucked back by raising taxes or cutting government spending. In case of deflation, demand for money by the banks would be weak, so that government has to take a strong leadership by spending more than tax revenues with newly issued money. In this way, complicated monetary policies such as the manipulation of required reserve ratio, discount ratio, and open market operations under the system of debt money are no longer required.

Finally, it would be worth mentioning that system of public money is ecologically friendly to the environment, because forced payment of interest will be replaced with interest-free money, and borrowers of money, mainly producers, need not be driven into forced economic growth at the cost of environmental destruction. System of public money is indeed a foundation for sustainability.

12.8 Conclusion

This chapter investigates how to liquidate runaway government debt under the current financial crises. First, the current system is identified as a macroeconomic system of money as debt, under which the accumulation of government debt is built into the system by the Keynesian theory, and the reduction of debt-GDP ratio becomes, it is demonstrated, very costly, triggering economic recessions and business cycles.

Then, an alternative system is suggested as the system of public money, in which only the government can issue money, and the government debt, it is shown, can be gradually eliminated. Moreover, it turns out that higher economic growth is simultaneously attained.

In this sense, the alternative macroeconomic system, from a viewpoint of system design, seems to be worth being implemented if we wish to avoid accumulating government debt, unfair income distribution, repeated financial crises, war and environmental destruction.