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Defining Thetical Economy and Antithetical Economy—Analyzing Behaviors of Corporations, Government and Central Bank, Using Macroeconomic Statistical Data

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Abstract: Based on the concept "Thetical Economy and Antithetical Economy in Macro-Economics", which has been proposed by Kinoshita, we find we have two different, mutually contradicting economic phases to deal with. Viewed from the perspectives of OR (Operations Research), the two phases have their respective theorems. The theorem in "Thetical Economy" is Say's Law (supply creates demand), and the theorem in "Antithetical Economy" is the principle of effective demand (demand creates supply). It is possible to assume that corporate behaviors can dramatically change between the two economic phases from time to time. In "Thetical economy", private companies seek to maximize their profit and increase their investment expenditure, because the efficiency of investment is high during this phase. In "Antithetical Economy", however, companies aim to minimize their debt and stay away from (or reduce) investment, because the efficiency of investment is low in this phase. In this paper, the authors attempt to propose a simple and explicit definition of Thetical economic phase and Antithetical economic phase, by analyzing combined data of simple macroeconomic statistics concerning behaviors of companies and a central bank, in order to establish a method which enables an automatic judgment as to whether government behavior is appropriate or not.

Key words: macro economics; thetical economy; antithetical economy; quantity equation of quantity theory of money; economic growth

JEL code: E2

1. Introduction

Kinoshita (2012) has earlier proposed the integration of two conflicting theoretical systems in the economics, or Keynesian theory which supports market intervention by the government based on the principle of effective demand, and monetarist theory which opposes to government intervention, saying that the economy would continue to grow if interest rate is appropriately controlled by a central bank, into a single methodical system by applying the method of operations research (OR). The authors call this proposed theory "Thetical Economy and

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Antithetical Economy in Macroeconomics" in this paper.

According to the theory, a state in which private companies behave within the scope of what was assumed by Capitalism is defined as "Thetical Economy". It is a phase where Say's law, or "supply creates demand", functions. And in this phase, it is correct to advance economic growth simply through the control of interest rates by a central bank, without government intervention, just as claimed by monetarist theory. On the other hand, a phase in which private companies behave in a manner which goes exactly against the original assumption of Capitalism is defined as "Antithetical Economy". And in this phase, it is appropriate if effective demand is supplemented by government fiscal expansion, in accordance with Keynesian theory.

In this paper, the authors first carry out a study concerning a simple and clear definition for judging the direction of central bank's monetary policy: Whether it is heading toward "easing" or "tightening" (through interest-rate and/or money supply control). Then, they would discuss another definition for identifying if private companies behave within the framework of original assumption of Capitalism.

The above-mentioned definitions, the authors say, would help determine whether an economic condition is in "a state where monetary control is effective enough to induce private companies to behave just as capitalism originally assumed", in other words, "a state where the economy grows autonomously without government intervention", which is in short, "Thetical Economy".

In this manner, the authors propose a method which enables an automatic determination as to whether an economy is "Thetical Economy" or not, based on macroeconomic statistical data publicized by public organizations.

The authors in the paper aim to open up the possibility for establishing an automatic methodology, which is free from any arbitrary attributes, to help the government decide on an appropriate basic fiscal policy (either fiscal expansion or fiscal restraint).

2. Behavior of Corporations and Government in Thetical/Antithetical Economy

In this section, Kinoshita[1] formulates the behavioral principle of private companies and the government in "Thetical Economy" and "Antithetical Economy" as shown below.

2.1 Behavior of Corporations and Government in Thetical Economy

In "Thetical Economy" in macroeconomics, corporate behaviors are expressed by an objective function that maximizes profit. It should also be noted that corporate behaviors in a thetical economic phase can be expressed by using a formula for the primal problem of linear programming (see Formula (1)). In other words, companies will behave in such a way as to maximize profit, which is expressed by the objective function under various conditions.

Formulation of the primal problem:

$$\begin{aligned} &\max \textstyle\sum_{j=1}^{n} c_j x_j \\ &\textit{s.t.} \\ &\textstyle\sum_{j=1}^{n} a_{ij} x_j \le b_i, i = 1,2,\cdots,m \\ &x_j \ge 0, j = 1,2,\cdots,n \end{aligned} \tag{1}$$

Where, x_j : The number of units produced for product *j;*

$c_j\ (profit\_rate) = P - (1+r)h$, where *P* is price, *r* is interest rate, and *h* is the cost,

a_{ij}: The amount of cost incurred for the production of a unit of product *j* under the cost category *i*;

b_i: Required funds (debt) under the cost category *i*.

2.1.1 Conclusion: Maximization of Profit

In "Thetical Economy", the government would behave in a manner shown in Formula (2). It demonstrates that the government would inject minimum amounts of taxpayer money into administrative services to satisfy its nation's aspiration level (minimum satisfying level). It also signifies that the government would take actions to reform its finance (cutting back government deficits), as is expressed by the objective function in Formula (2), under its conditions.

Formulation of the dual problem:

$$\min \sum_{j=1}^{n} r_j y_j \quad (2)$$

$$s.t.$$

$$\sum_{j=1}^{n} \alpha_{ij} y_j \geq \beta_i, i = 1,2,\cdots,m$$

$$y_j \geq 0, j = 1,2,\cdots,n$$

Where, y_j: Unpaid balance rate of a national debt for administrative service product *j*;

r_j: The amount of injected tax payer money (the amount of tax payer money spent for the production of a unit of administrative service product *j*);

α_{ij}: The level of satisfaction of a resident *i* achieved by the production of a unit of administrative service product *j*;

β_i: Aspiration (satisfaction) level of a resident *i* towards overall administrative services.

Company behaviors and government behaviors in a thetical economic phase show a relationship of duality. As a result, corporate behaviors can be explained by the theorem of the primal problem of linear programming, whereas government behaviors are explainable by that of the dual problem of linear programming.

2.2 Behavior of Corporations and Government in Antithetical Economy

In "Antithetical Economy" in macroeconomics, private companies head toward the minimization of debt. Such corporate behaviors in an antithetical economic phase can be expressed by using the dual problem formula of linear programming (see Formula (3)). In other words, companies will behave in such a manner as to minimize debt, which is expressed by the objective function under its conditions.

Formulation of the dual problem:

$$\min \sum_{i=1}^{m} u_i b_i \quad (3)$$

$$s.t.$$

$$\sum_{i=1}^{m} a_{ij} u_i \geq c_j, j = 1,2,\cdots,n$$

$$u_i \geq 0, i = 1,2,\cdots,m$$

$$u_i : \text{Unpaid balance rate for the cost category } i$$

$$u_i = 1 - amortizati\ on\_rate$$

2.2.1 Conclusion: Minimization of Debt

In an antithetical economic phase, the government would behave in such a manner as shown in Formula (4). It demonstrates that the government can borrow money (it can issue government bonds), which is worth r_j, from financial institutions, and that it can increase public spending to construct social infrastructure. There is good demand for funds (government bonds) in this economic phase, and the government would continue to increase deficits, by expanding public spending to fill the supply-demand gap emerged during this phase.

Formulation of the primal problem:

$$\max \sum_{i=1}^{m} v_i \beta_i \quad (4)$$
$$s.t.$$
$$\sum_{i=1}^{m} \alpha_{ij} v_i \leq r_j, j = 1,2,\cdots,n$$
$$v_i \geq 0, i = 1,2,\cdots,m$$

Where, v_i: The amount of tax payer money spent for raising the level of satisfaction of a resident *i* by a unit

In other words, company behaviors and government behaviors in an antithetical economic phase show a relationship of duality. As a result, corporate behaviors can be explained by the theorem of the dual problem of linear programming, whereas government behaviors are explainable by that of the primal problem of linear programming.

3. Judging the Direction of Monetary Policy

As the first step to judge whether an economic phase is in “Thetical Economy”, the authors examine a means to determine whether the central bank’s monetary policy direction is heading toward “easing” or not.

As was shown in the previous section, private companies in “Thetical Economy” would naturally seek to maximize profit. In other words, in this economic phase, companies would maximize the amount of investment as long as the rate of return of their businesses surpasses the interest rate. Thus, companies would naturally expand investment if the central bank lowers the interest rate by easing the supply of money in this phase.

Next, the authors touch upon some basic issues concerning monetary ease policy. Generally speaking, monetary control by a central bank is conducted through open market operation, about which a macroeconomics textbook explains as follows:

“A central bank can control the interest rate through open market operation in bond market. When the central bank purchases bonds and increases monetary supply, the price of bonds would go up, while the interest rate would go down. Whereas, the price of bonds would go down and the interest rate would go up when the central bank sell bonds and decreases monetary supply.” (Blanchard O., 1997). That is to say, in monetary easing, a central bank increases monetary base, boosts the price of bonds by purchasing more bonds from the market, while lowering the interest rate. On the contrary, in monetary tightening, the central bank decreases monetary base by selling bonds in the market, bringing the price of bonds to go down while boosting the interest rate.

Thus, it is significant to check the following two points in judging whether the central bank’s monetary policy direction is heading toward “easing” or not:

(1) Whether a central bank has lowered the interest rate or not

(2) Whether a central bank has increased monetary base or not

Under a normal circumstance, checking A’s “whether a central bank has lowered the interest rate or not” seems to be sufficient enough in judging whether it is “easing” or not. However, from 2001 onward, Japan’s policy interest rate has remained zero percent or near zero. Besides, the Bank of Japan (BOJ) has gone further to take quantitative easing measures, or increasing monetary base. Therefore, it is impossible to tell, just by checking the interest rate, whether the BOJ is heading off either to “ease more” or to “tighten more”.

Globally speaking, a central bank of each country seeks to control the short-term interest rate through open market operation, while leaving the long-term interest rate to the market. However, the BOJ from 2001 and

onward, as well as the Federal Reserve Board (FRB) of the United States from 2008 and onward, with an aim of stimulating domestic economy, have been continuing to increase monetary base, purchasing longer-term bonds, and even intentionally lowering long-term interest rates, while setting short-term interest rates at zero or near zero percent. Under such circumstances, it is almost impossible to determine whether the central bank's monetary policy direction is heading toward "easing" or "tightening" just by checking the rise and fall of long-term interest rates, particularly when BOJ and FED disclose no specific targeted long-term interest rate. Therefore in such cases, the authors believe that it is valid to check B's "whether a central bank has increased monetary base or not" to judge if the central bank's monetary policy direction is heading toward "easing" or "tightening".

However, the authors think it is wrong to say that checking B's "whether a central bank has increased monetary base or not" is only necessary when the target short-term interest rate is set at zero percent. This is because while the overnight call rate, which is subject to the BOJ's target rate, remained roughly around zero percent between 2001 and 2006 when BOJ took quantitative easing measures, it has hovered around 0.07 percent since the BOJ embarked on the second round of quantitative easing in April 2013 (Figure 1).

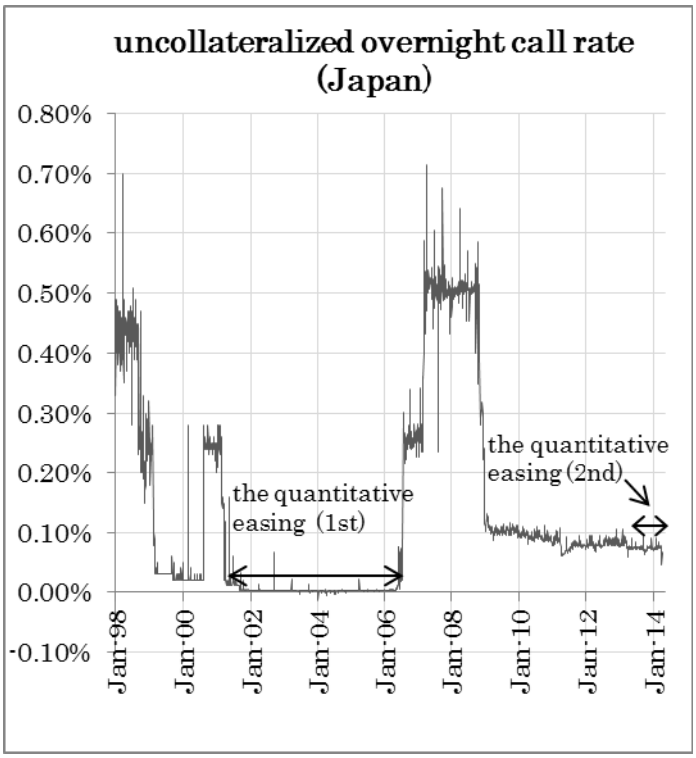

Figure 1 Uncollateralized Overnight Call Rate (Japan)

Source: Bank of Japan

Thus, the authors propose the following criteria.

- Criterion 1 for judging the direction of monetary policy

It is possible to determine that monetary policy heads toward "easing" when a central bank lowers the target interest rate compared with before.

- Criterion 2 for judging the direction of monetary policy

It is possible to determine that monetary policy heads toward "easing" when monetary base increases

compared with before, with the target interest rate remaining unchanged.

- Criterion 3 for judging the direction of monetary policy

It is possible to determine that monetary policy heads toward “tightening” when neither Criterion 1 nor Criterion 2 is applicable.

It should be noted that in the above-mentioned criteria, what should be checked is only the target interest rate and not the market interest rate, which is a result of central bank control. This is because the market interest rate fluctuates daily as shown in Figure 1, affected by various elements, thus making it quite difficult to find if it is “lowered”, “increased”, or “kept unchanged”. On the other hand, since the target rate is usually left unchanged for a certain period of time, without being affected by other elements, thus befitted for judgment.

Table 1 shows the above-mentioned criteria.

Table 1 Determining Condition of Monetary Policy Direction

Target interest rate	Monetary base	Determining monetary policy direction
Rate cut	Increase	Easing
	Decrease or unchanged	
Unchanged	Increase	
	Decrease or unchanged	Tightening
Rate increase	Increase	
	Decrease or unchanged	

4. Lag from Monetary Policy

Generally speaking, it takes a long time before the visible effect of monetary policy appears in the real economy. Accepting this fact as a given, the authors pursue their discussion on the premise that “sticky inflation assumption” is correct. As a basis for proving the assumption’s validity, it might be useful to cite macroeconomics textbook statements as follows:

“The price of pizza does not frequently change. One of the reasons for this is that it could be just a waste of time and money if a pizzeria owner collects all the detailed information that might affect the business to update and maintain the price of pizza at an appropriate level on a daily basis.....Generally speaking, it is better for a pizzeria owner to focus his or her efforts on making and selling pizza, instead of paying greater attention to the actual conditions of monetary policy. It would be enough if he or she tries to find out the most appropriate way to modify pizza prices every two to three months (more or less frequently in response to economical impact and the fluctuation of inflation rate which could affect pizzeria business)” (Jones C. I., 2011).

Gruen et al. (1997) estimate that in the Australian economy, there will be a lag of 6.4 quarters before the enforcement of monetary policy (change in the actual interest rate) affects production growth rate, in a model in which they calculated the real interest rate by using underlying CPI (i.e., core CPI), and 5.8 quarters in a model in which they used headline CPI, although they added that there is “considerable uncertainty”.

They add, “For the underlying CPI model, we use the overnight cash rate set by the Reserve Bank minus underlying consumer price inflation over the past year to measure the short-term real interest rate, while for the headline CPI model, we subtract headline consumer price inflation over the past year.” In other words, Gruen et al. adopted inflation rate of the previous year as an alternative to an expected inflation rate which originally should

have been used for the calculation of the real interest rate.

They also state, "we find no evidence that the average lag from monetary policy to output growth has become any shorter in the 1990s."

Supposing that such a time lag is fairly constant over time, and that it may be applicable to different countries and areas, the authors presume that an average lag from monetary policy to the real economy is about six quarters. By doing so, it is possible to define "Antithetical Economy" as "a state in which private companies have yet to show behaviors which are typical of 'Thetical Economy' even six quarters after monetary policy direction has been found heading toward 'easing'", and its reverse state as "Thetical Economy".

5. Judging Company Behavior by Macroeconomic Statistical Data

Private companies naturally head toward "maximization of profit" in "Thetical Economy". That is to say, it is a state in which the whole economy shows continual growth, or a state in which companies collectively believe that it is possible to return to a growth track even when the economy slows down to a certain degree.

Hereof, we would like to examine quantity equation of quantity theory of money as shown below.

$$MV = PY \tag{5}$$

M signifies quantity of money, *V* denotes velocity of money, *P* is level of prices and *Y* stands for production. It is generally said that "velocity of the money, defined as M2, is almost constant" (Jones C. I., 2011). Suppose *V* as constant v_0, and when dividing the both sides of Formula (5) by *P* and v_0, it turns out to be as follows:

$$\frac{M}{P} = \frac{1}{v_0} Y \tag{6}$$

Formula (6) signifies that production bears a proportional relationship to quantity of money in real terms. In other words, continual economic growth means that the expansion of both production and quantity of money in real terms continues. "Thetical Economy" is a state in which private companies aggressively expand investment and production, whereas the government must behave in a passive manner in this phase. That is to say, it is companies that should have a key role in expanding production and quantity of money at the same time in "Thetical Economy".

In this, production *Y* is expressed as follows:

$$Y = C + I + G + X - Q \tag{7}$$

Here, *C* denotes private consumption, *I* signifies private investment, *G* stands for government expenditure, *X* is export and *Q* is import. The right side of Formula (7) accounts for the amount of domestically produced goods, or real gross domestic products, out of all the goods in demand at home and abroad.

Of private investment *I*, capital investment (private non-residential investment) I^{NR} is a primary index which shows that private companies are making aggressive contribution to "the expansion of both production and money quantity in real terms". This is because, of corporate expenditures, it is only capital investment I^{NR} which falls into a category of production *Y*. And its continual expansion suggests the fact that private companies collectively have a high expectation that domestic and overseas demand should grow. In other words, in "Thetical Economy", it is considered a normal state in which the amount of capital investment I_t^{NR} during period *t* surpasses the amount of capital investment I_{t-1}^{NR} during the previous period *t-1*.

This is expressed by the following formula.

$$I_t^{NR} > I_{t-1}^{NR} \tag{8}$$

By the same token,

$$I_t^{NR} > \max_{0 \le x \le t-1} I_x^{NR} \tag{9}$$

also signifies a normal state in "Thetical Economy", because it is considered a basic condition in which private-led economic growth continues on a long-term basis. Formula (9) signifies that I_t^{NR} marks a record high level. If Formula (8) and Formula (9) continue to be fulfilled, the right side of Formula (6), or production *Y* is estimated to continue growth, basically led by the private sector.

Let's turn our eyes to the left side of Formula (6). If velocity of money *V* is constant v_0, increase in quantity of money in real terms, or *M/P*, is indispensable for a long-term growth of production *Y*. When looking at quantity of money in nominal terms, or *M*, M2, for example, is defined in the BOJ's statistics on money stock as follows:

M2 = Currency in circulation + deposits

As to its realm, the BOJ states "money stock is basically defined as the quantity of money held by money holders (corporations, households, and local governments including municipal enterprises). Corporations exclude depository institutions, insurance companies, government financial institutions, securities companies, Tanshi companies (money market broker and dealer firms), etc. —Deposits, etc. held by financial institutions and the central government are not included." (Bank of Japan, 2013)

Because quantity of money *M* is defined as above, the central bank's increase in monetary base would not lead to its growth. This is because the expansion of monetary base by the central bank will only increase cash and deposits possessed by financial institutions, but cash and deposits of financial institutions do not constitute quantity of money *M* (cash and deposits possessed by the central government are also outside the range of quantity of money *M*. Thus, buying up government bonds by the central bank should increase the amount of deposits the central government possesses; however, doing so would not lead to an increase in quantity of money *M*. Quantity of money *M* could grow only after the central government spends money which it acquired by selling bonds to the central bank, and that the money spent by the central government is transferred to "money holders".)

In order to increase both quantity of money *M* and production *Y* , someone (this "someone" includes the central government, in addition to corporations and individuals) must cause credit creation by increasing borrowings from financial institutions and transferring the borrowed money to other "money holders" by buying goods and services. In other words, it is vital that someone increase debts and spend them, instead of saving them or purchasing financial assets.

Just as stated earlier, in "Thetical Economy", private companies collectively head toward profit maximization, expecting that demand at home and abroad should grow. Thus, as for quantity of money *M*, checking if companies are increasing their borrowings could be an important factor in judging whether a state is in "Thetical Economy". And as to the expansion of production in macro economy, it is appropriate to pay attention to the borrowings of non-financial firms, and not those of financial institutions whose role is to promote financial dealings in non-financial sector. But ultimately, it is necessary to check their degree of contribution to quantity of money in real terms, or *M/P*.

In checking the degree of contribution by non-financial sector to quantity of money in real terms, or *M/P*, the authors in this paper propose using data concerning borrowings by non-financial sector, such as the BOJ's flow of funds accounts in Japan, FRB's financial accounts in the United States, and OECD's financial accounts which cover data for other developed nations, due to the following two reasons:

(1) All the above-mentioned data are based on the System of National Accounts (SNA), an international standard just like GDP statistics, which include data for capital investment I^{NR}.

(2) Utilizing such data enables the authors to evaluate government behaviors based on statistics of the same standard.

In using such data, however, it should be noted that it would not be rational to obtain real value by dividing stock level of borrowings directly by level of prices. This is because stock level data of borrowings are measured at fair value. And such value constantly fluctuates due to factors which are different from level of prices of goods and services. Thus, the authors insist that flow data of borrowings, which are immune to market value fluctuation, should be used. The authors add Formula (10) and Formula (11) as necessary conditions to be fulfilled in determining whether a state is in "Thetical Economy".

$$F_t^L \geq 0 \tag{10}$$

Here, F_t^L signifies "flow of debt by non-financial companies". And "flow of debt" denotes a net increase in debt, excluding market value fluctuation of debt, during a certain period (a fiscal year and/or a quarter).

$$F_t^N \leq 0 \tag{11}$$

Here, F_t^N stands for "flow of financial net asset of non-financial companies". "Flow of financial net asset" (called "flow of financial surplus or deficit" by the BOJ) stands for data concerning amount of money, in which flow of debt is subtracted from a net increase in financial asset, which is obtained by excluding market value fluctuation of financial asset during a certain period of time(a fiscal year and/or a quarter).

The following are reasons for adopting Formula (10) and Formula (11):

- When inflation rate is minus, in other words, when it is in a deflationary state, level of price *P* goes down, bringing quantity of money in real terms, or *M/P*, to grow without an increase in money supply in nominal terms, or *M*. This signifies that both financial asset and debt grow in real terms. However, even when quantity of money in real terms in the whole economy increases, an individual economic entity would seek to increase the amount of financial assets he or she possesses, namely cash and deposits, whose value in real terms grow, while attempting to reduce debt outstanding, which could otherwise constitute an increase of burden in real terms. If a company behaves in such a manner, this is exactly a pattern which is common in "Antithetical Economy". In a deflationary phase, debt flow (net increase in debt, excluding fluctuation of market value) should be at least more than zero, in order to determine that company behaviors are typical of "Thetical Economy". Companies are found to make contribution to an increase in quantity of money in real terms, or *M/P*, when debt flow is over zero and inflation rate is minus. And this signifies that a minimum condition for determining that company behaviors are typical of "Thetical Economy" is satisfied for the first time. And this is what Formula (10) signifies.
- A minus value of flow of financial net asset $\mathrm{F_t^N}$ of non-financial companies is brought about in case they spend capital, procured by new borrowings or by additional issue of stocks, for purchasing tangible assets, and not financial assets (stocks fall into a category of debt according to flow-of-fund statistics). On the contrary, $\mathrm{F_t^N}$ will be zero in case companies keep capital, procured by net increase in debt, on hand, or spend it to purchase financial assets. Thus if $\mathrm{F_t^N}$ is minus, the figure suggests that companies are fairly aggressively making contributions to the expansion of production and quantity of money.
- However, it is natural to assume that many companies retain a massive amount of funds as the economy matures. Theoretically, it is possible to think that the whole process of expansion of money supply as the result of an increase in expenditure/production and debt/credit creation is to be completed within the corporate sector.

- When counting up all the financial net asset flow of all economic entities, the sum would inevitably be zero. And here, suppose there is "a pure capitalist model", both the flow of the government and that of overseas sector should turn out to be zero. In this, the flow of companies would also be zero, if the flow of household sector is zero. In such a case, it is at least theoretically possible to think that the whole process of money supply expansion through growth in expenditure/production and debt/credit creation, can be completed within the corporate sector, by increasing both financial assets and debts.
- Thus, in "Thetical Economy", non-financial companies should aggressively seek to bring the value of flow of financial net asset F_t^N to a minus level, or zero at the very least, which is expressed by Formula (11).
- Flow of financial net asset F_t^N of non-financial companies is denoted by the balance of net increase in financial asset and net increase in debt, excluding the influence of fluctuation of market value. It is possible to consider that both net increase in financial asset and that in debt are equally affected by inflation rate, regardless of how large it is. When Formula (11) is fulfilled, on top of this, the outcome would suggest that net increase in debt surpasses net increase in financial asset, even when taking the impact of inflation into consideration. That is to say, regardless of whether inflation rate is high or low, this means that non-financial companies are aggressively making contributions to the growth of production and quantity of money in real terms.
- It is possible to presume that companies are making steady contributions to the process of expansion of quantity of money through growth in production and credit creation, if they continue to increase capital investment on real terms, or I_t^{NR}, on top of the results obtained by Formula (10) and Formula (11).

6. Defining "Thetical Economy" and "Antithetical Economy"

Based on the above discussion, the authors show below a method to automatically determine if a state is in "Thetical Economy" or in "Antithetical Economy", as well as clear definitions of respective economy (Bank of Japan, 2006).

6.1 Definition of "Antithetical Economy"

A state in which private companies cease to show behaviors which are typical of "Thetical Economy" for more than six quarters, even more than six quarters after monetary policy direction is found to be heading toward "easing", is "Antithetical Economy". For your information, company behaviors are found to be typical of "Thetical Economy" "when all the following four conditions are evaluated to be true:

$$I_t^{NR} > I_{t-1}^{NR} \tag{8}$$

$$I_t^{NR} > max_{0 \le x \le t-1} I_x^{NR} \tag{9}$$

$$F_t^L \geq 0 \tag{10}$$

$$F_t^N \leq 0 \tag{11}$$

6.2 Definition of "Thetical Economy"

The reverse state of "Antithetical Economy" is "Thetical Economy" (that is to say, when single or more of the four conditions shown by Formula (8) through to Formula (11) are not fulfilled, and under such a circumstance, if a state, in which direction of monetary policy is found to be heading toward "easing", continues less than six consecutive quarters, it can be determined as being in "Thetical Economy").

Figure 2 shows the relationship between the above-mentioned definitions of "Antithetical Economy" and "Thetical Economy".

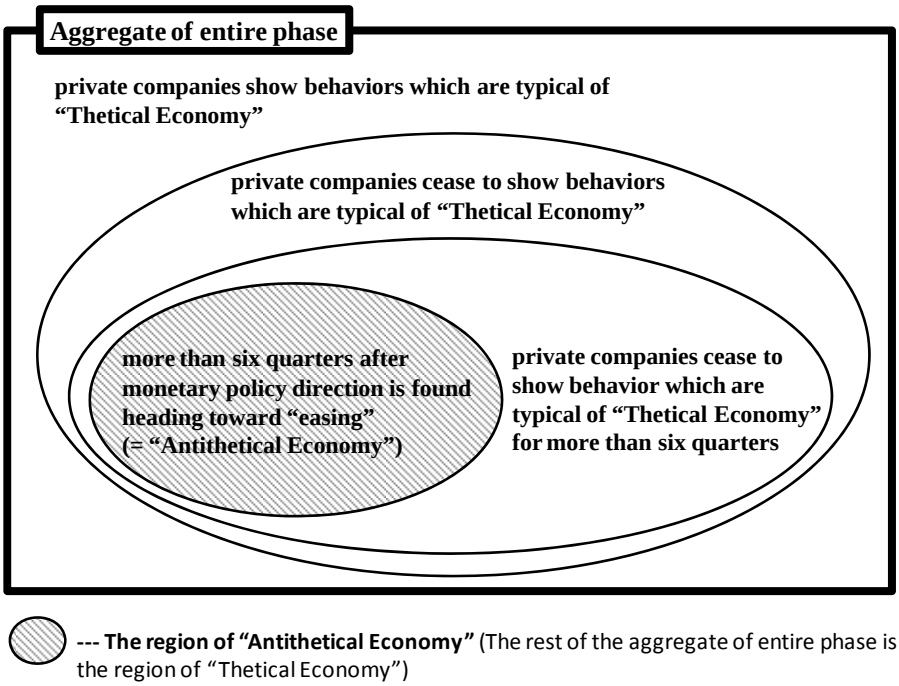

Figure 2 Relationship between "Antithetical Economy" and "Thetical Economy"

7. Determining Governmental Behavior by Macroeconomic Statistical Data

It is possible to describe how the government should behave in "Antithetical Economy" and in "Thetical Economy", respectively, by applying the same conditions used for judging corporate behaviors, as was shown in Section 5. Suppose G_t denotes government expenditure, F_t^{GL} stands for flow of government debt, and F_t^{GN} signifies flow of government financial net asset, during period *t*, the following demonstrate how the government should behave in respective economic phase:

7.1 Appropriate Government Behavior in "Antithetical Economy"

$$G_t > G_{t-1} \tag{12}$$

$$G_t > max_{0 \le x \le t-1} G_x \tag{13}$$

$$F_t^{GL} \ge 0 \tag{14}$$

$$F_t^{GN} \le 0 \tag{15}$$

All the four conditions shown above are evaluated to be true.

7.2 Appropriate Government Behavior in "Thetical Economy"

All the four conditions shown by Formula (12) through to Formula (15) are evaluated to be false.

It should be noted that the reason for using the sum of government expenditure, or G_t, in other words, the sum of government investment and government consumption, instead of government investment alone, in Formula (12) and Formula (13) is because doing so corresponds to the treatment in Formula (8) and Formula (9), in which corporate capital investment I_t^{NR} is used for the purpose of checking the degree of corporate expectation for demand at home and abroad.

"Antithetical Economy" is a state in which private companies turn their behavior from "maximization of profit" to "minimization of debt" after demand at home and abroad shrinks against their expectation. Thus, in

"Antithetical Economy", the government needs to prompt private companies to head toward "maximization of profit" again, by encouraging their anticipation for expansion of domestic and overseas demand. The authors, based on this point of view, believe that it is appropriate to apply government expenditure G_t, or the sum of government investment and government consumption, instead of applying government investment alone, to Formula (12) and Formula (13).

It should be noted that Formula (12) through to Formula (15) are instrumental in judging whether the government is making aggressive contribution to "the expansion of both production and quantity of money in real terms", just like Formula (8) through to Formula (11) are used as a measure for determining whether private companies are striving to "expand both production and quantity of money in real terms". In fact in "Thetical Economy", it is private firms that make contributions to this end. Thus, under such circumstances, it is best if the government keeps a low profile attitude. On the contrary, in "Antithetical Economy", it is ideal if the government behaves aggressively.

8. Examples of Determining whether in "Thetical Economy" or "Antithetical Economy": Japan's Case

In this section, the authors demonstrate how to judge whether a state is in "Thetical Economy" and "Antithetical Economy", by using actual Japanese data.

8.1 Judging the Direction of Monetary Policy

8.1.1 Target Interest Rate

In Japan, interest rates had been regulated, and the official discount rate functioned as a Japanese policy rate which moved in tandem directly with various interest rates before 1994, when it was deregulated. And after that, the target rate for uncollateralized overnight call rate has replaced the official discount rate as a policy interest rate (Bank of Japan, 2006).

This means that Japan lacks long-term contiguous data concerning a target interest rate. On top of this, as to a target interest rate for uncollateralized overnight call rate, no well-organized statistics based on contiguous data exist even after 1994, making it difficult for use.

In the meantime, the official discount rate (which is now called "basic discount rate and basic loan rate"), once used as the official interest rate, still effectively stands as "de facto upper limit on the overnight call rate" (Bank of Japan, 2006) even today, complete with long-term uninterrupted data. The "basic discount rate and basic loan rate" are the basic overnight rate, applied when the BOJ offers loans to a financial institution facing difficulty in raising funds in the financial market, due to a temporal fall in its credibility. We can consider that monetary policy is tightened when this rate is up, and that monetary policy is heading toward easing when the rate is down.

Thus, in this paper, the authors utilize official discount rate, which is presently called "basic discount rate and basic loan rate", in judging the direction of monetary policy. But because statistics concerning GDP, debt, and financial net asset are of quarterly basis for judging corporate and governmental behaviors, the authors should utilize quarterly average calculated from monthly average data of official discount rate.

8.1.2 Monetary Base

Monetary base can be volatile over the short run in an unstable market; however, such short-term volatility could be treated as meaningless information in judging the direction of monetary policy as a whole. Therefore, it is appropriate to get rid of such useless information as much as possible by using a long-term average and so forth.

The authors also believe that it is valid to obtain a quarterly average because quarterly-based statistical data, such as GDP, debt and financial net asset, are used in judging the behaviors of companies and the government.

Since the BOJ keeps monthly term-end balance and average data in its data base, it is better to use monthly average data, and then to calculate the quarterly average. On top of that, the authors decide to adopt the moving average of four consecutive quarters as data for judgment, for the aim of getting rid of such unnecessary information like seasonal fluctuation effects.

Figure 3 demonstrates the official discount rate (alternative data to target interest rate) and monetary base modified as stated above. The shaded area in this figure denotes the period when it is found that monetary policy is heading toward "easing", based on conditions shown in Table 2.

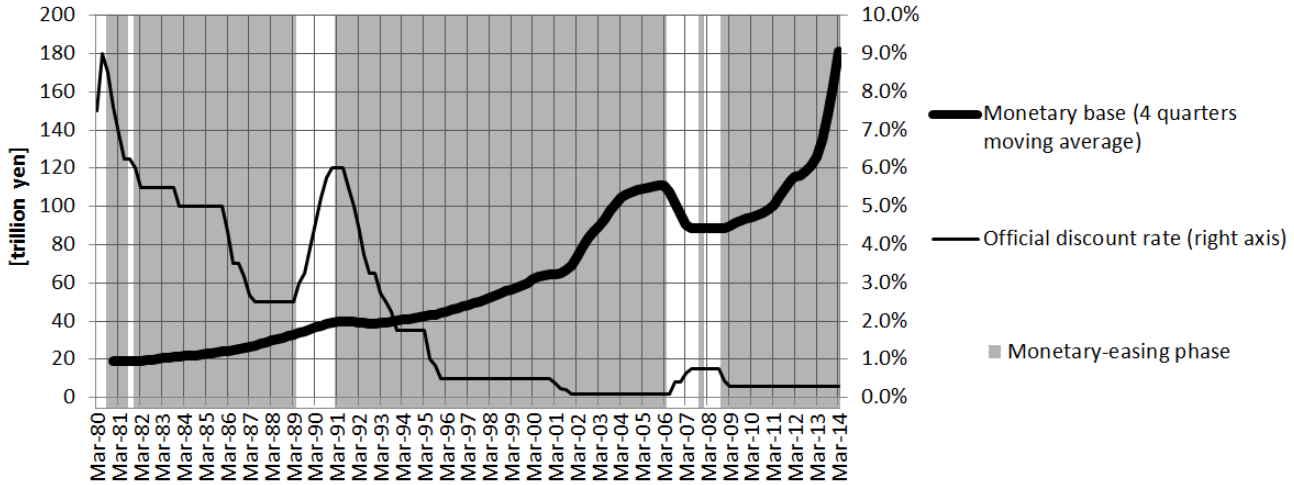

Figure 3 The Direction of the Monetary Policy—Judgment Result

Source: calculated by the authors based on the data from Bank of Japan "Flow of Funds Accounts"

8.2 Judging Company and Government Behaviors

8.2.1 Data Used for Judging Company and Government Behaviors

As to such data like capital investment I_t^{NR} debt flow of non-financial companies F_t^L, financial net asset flow of non-financial companies F_t^N, government expenditure G_t, government debt flow F_t^{GL}, flow of government financial net asset F_t^{GN}, the authors utilize the moving average of four quarters based on raw quarterly data, which is not seasonally adjusted.

By using the moving average of four quarters, it is possible to avoid not only effects of seasonal fluctuation, but also any impact of temporary fluctuation which can take place during a quarter period. Adopting the average of four quarters would also be beneficial for conducting a cross-national research in the future, because it is possible to get rid of any impact of seasonal fluctuation even in case some countries hold seasonally-adjusted data, while others own data without seasonal adjustment, thus, making it possible to make a comparison almost on the same basis.

It should be noted that if only data on annual bases is available, the authors should divide the data by four and adopt it as quarterly data, in obtaining a four-quarter moving average.

Modified data concerning companies and the government, stated above, are shown respectively in Figure 4 through to Figure 9. As to F_t^L, F_t^N, F_t^{GL} and F_t^{GN}, each of them denotes cumulative value (in the chart, an upward moving curve signifies a positive value, and a downward moving curve denotes a negative value, making it easier to identify whether a curve signals a long-term positive trend or a long-term negative trend in one glance).

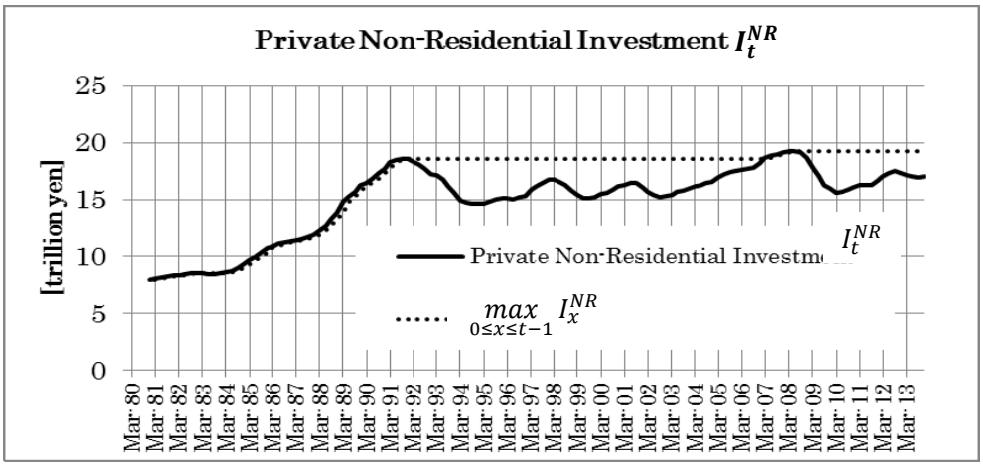

Figure 4 Private Non-residential Investment (4 Quarters Moving Average)

Source: Calculated by the authors based on the data from Cabinet Office, Government of Japan "SNA (National Accounts of Japan)"

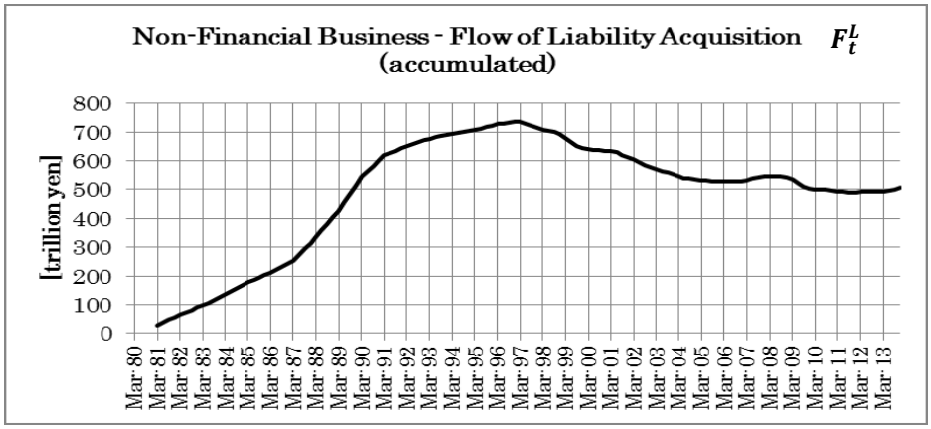

Figure 5 Non-Financial Business—Flow of Liability Acquisition (Accumulated, 4 Quarters Moving Average)

Source: Calculated by the authors based on the data from Bank of Japan "Flow of Funds Accounts"

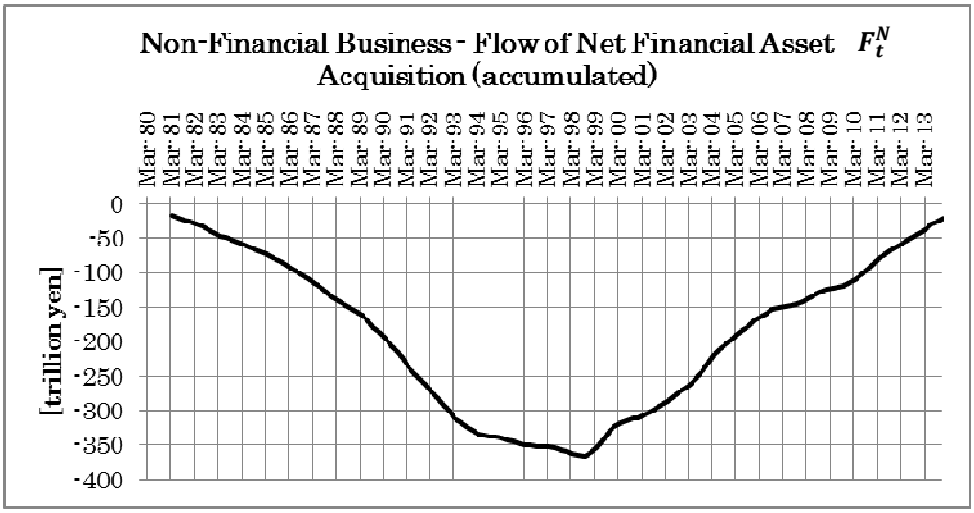

Figure 6 Non-Financial Business-Flow of Net Financial Asset Acquisition (accumulated, 4 quarters moving average)

Source: calculated by the authors based on the data from Bank of Japan "Flow of Funds Accounts"

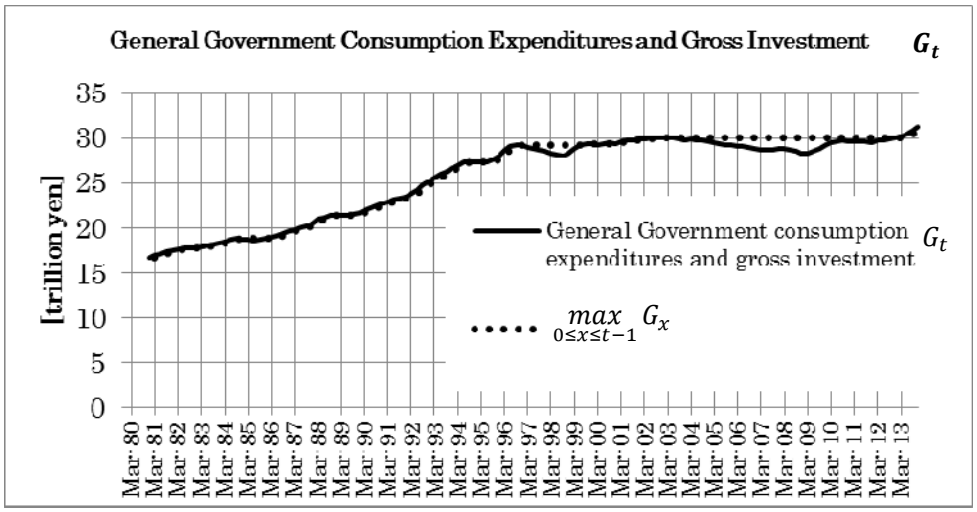

Figure 7 General Government Consumption Expenditures and Gross Investment (4 quarters moving average)

Source: Calculated by the authors based on the data from Cabinet Office, Government of Japan "SNA(National Accounts of Japan)"

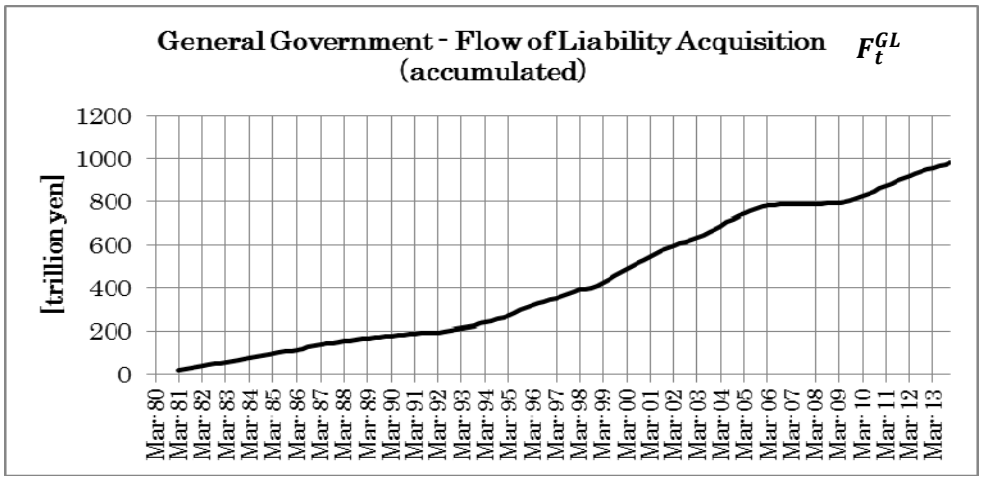

Figure 8 General Government - Flow of Liability Acquisition (accumulated, 4 quarters moving average)

Source: calculated by the authors based on the data from Bank of Japan "Flow of Funds Accounts"

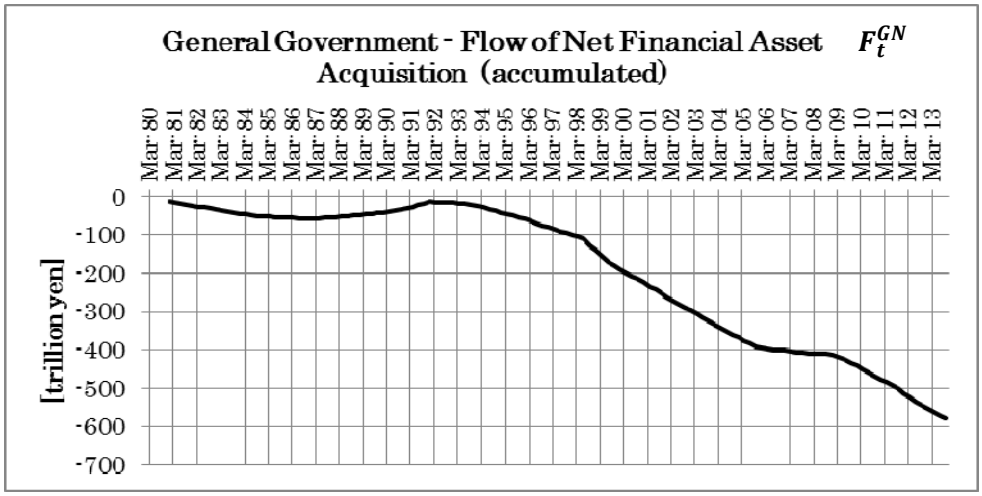

Figure 9 General Government - Flow of Net Financial Asset Acquisition (accumulated, 4 quarters moving average)

Source: calculated by the authors based on the data from Bank of Japan "Flow of Funds Accounts"

8.2.2 Judging Company and Government Behaviors

Figure 10 shows the results of analysis of behaviors of non-financial companies by using Formula (8) through to Formula (11), and those of government behaviors by using Formula (12) through to Formula (15). Longitudinal axis shows the number of conditions that turn out to be true. This is because the greater the number of true conditions is, the more aggressive they are in making contributions to "the expansion of both production and quantity of money in real terms".

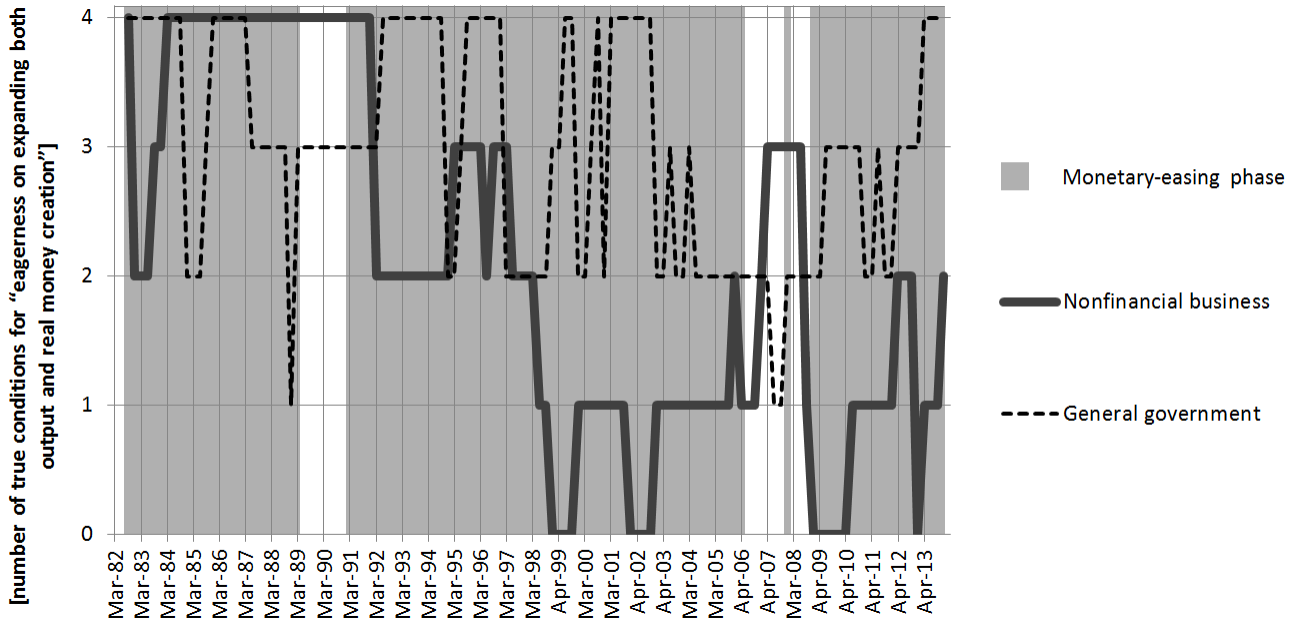

Figure 10 Analysis Results on Behaviors of Corporations, Government and Central Bank

8.3 Judging "Thetical Economy" and "Antithetical Economy"

Figure 11 is a flow chart showing the process of judging whether a state is in "Thetical Economy" and "Antithetical Economy", based on the definition of the two phases described in Section 6.

When applying this process to the Japanese economy between the third quarter of 1982 and the fourth quarter of 2013, it is found to have been in "Thetical Economy" from the third quarter of 1982 through to the second quarter of 1993, and in "Antithetical Economy" from the third quarter of 1993 through to the fourth quarter of 2013. The results, in comparison with Figure 10, are shown in Figure 12.

8.4 Discussing How Judged Results to Be Used

Based on Figure 12, it is possible to demonstrate how non-financial companies, the government and central bank behave, in a single chart. Japanese economy after the 1980s, for instance, can be interpreted as below:

(1) In Japan, a stock market bubble collapsed at the end of 1989, and a land price bubble burst in 1991, followed by a chronic deflationary slump called "the lost two decades".

(2) Figure 13 shows that non-financial companies, as well as the government, were making aggressive contributions to "the expansion of production and quantity of money in real terms" from the early 1980s through to the end of the 1980s, when Japan was in "Thetical Economy", and that the central bank consistently continued "easing". And this could have been a major cause which induced a bubble economy in Japan from the end of 1980s through to the early 1990s.

(3) On the other hand, while negative attitudes of non-financial companies have remained unchanged since Japan entered "Antithetical Economy" in 1993, the government also failed to be aggressive enough. Namely in the 2000s and onward, private companies and the government alike demonstrated fairly negative attitudes. It was only in 2013 that the government started serious efforts for making aggressive contributions; however, Japan is yet to break away from "Antithetical Economy" which has lasted more than 20 years.

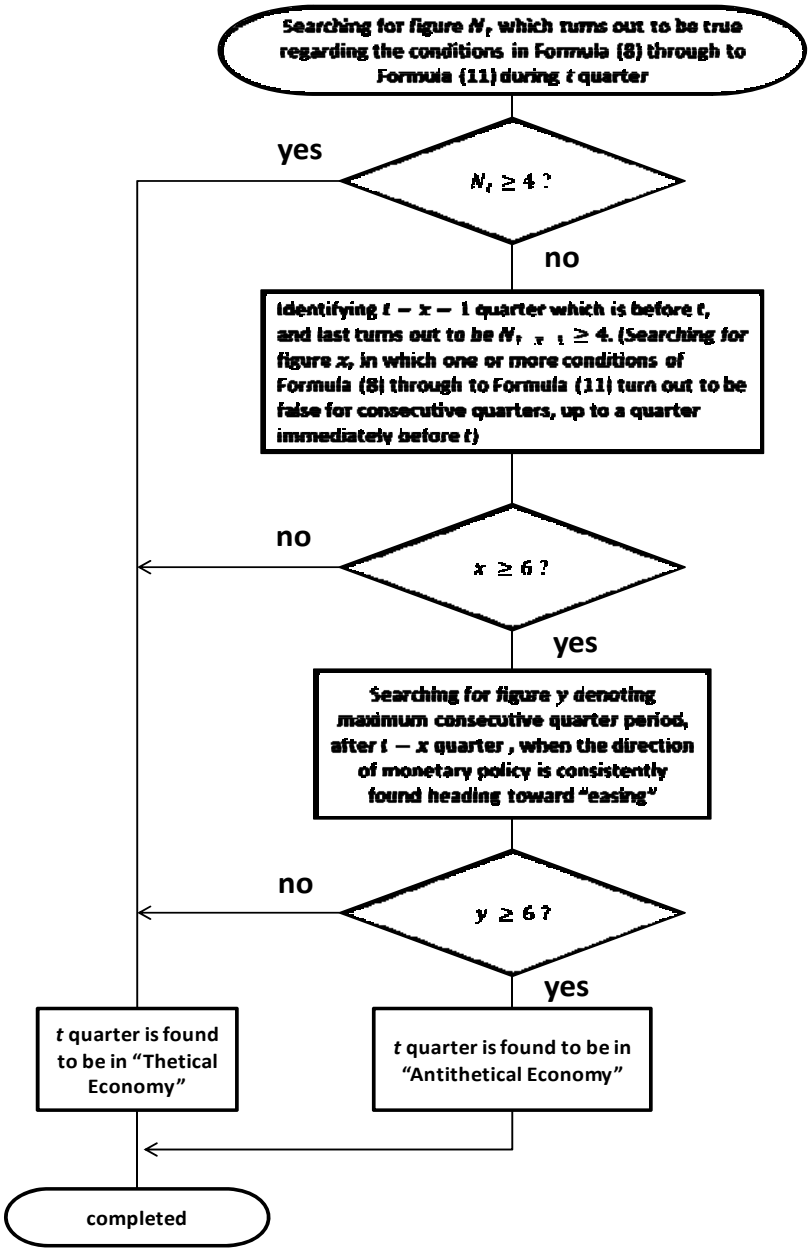

Figure 11 The Flow Chart to Judge "Thetical Economy" and "Antithetical Economy"

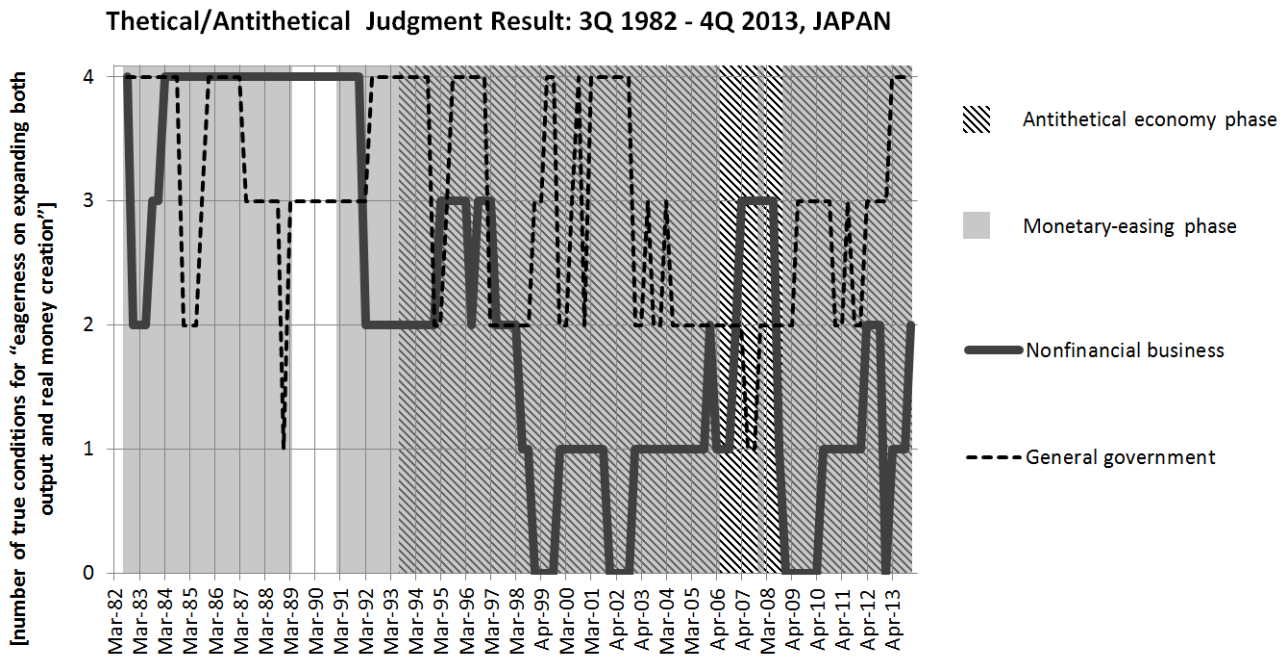

Figure 12 Thetical/Antithetical Economy—Judgment Result: 3Q 1982-4Q 2013, Japan

9. Conclusion

The authors demonstrate the following accomplishment in this paper:

- They created a method for applying the theory of "Thetical and Antithetical Economics", proposed by Kinoshita, to actual statistical data.
- In creating the method, they demonstrated how significant it is to view statistical data from an angle that "how aggressively private companies are making contributions to macro economy in terms of the expansion of production and quantity of money in real terms."
- In this, they provided an easy and visual method for confirming and appraising the degree of private companies' aggressive contributions to macro economy in terms of the expansion of production and quantity of money in real terms.
- In this manner, they created a method for judging behaviors of private companies. By combining with it a method to judge the direction of monetary policy, they described clear definitions of "Thetical Economy" and "Antithetical Economy", and demonstrated a method for finding which of the two economic phases the economy is in.
- They also demonstrated how it is possible to evaluate the degree of contribution of the government to macro economy in terms of the expansion of production and quantity of money in real terms, by utilizing the same method they applied to private companies. They also showed how it is possible to check behaviors of private companies, the government and central bank, by using a single chart.

9.1 Future Tasks

- Because only Japanese examples were used in this paper, the authors believe they should conduct evaluation and analysis by using as much international data as possible in the future, in order to reveal problems of the methods demonstrated in this paper, with an aim of increasing their usefulness.

- The discussion of fiscal capacity of the government was set aside in this paper. In other words, in the course of their discussion, the authors assume that the government always owns a fiscal capacity large enough to behave appropriately. Unfortunately, modern-day economics fails to demonstrate a clear standard concerning a borrowing limit of the government. A macroeconomics textbook also states, “there is no magic number denoting critical point” concerning government deficit in relation to GDP. By the same token, “there is no magic number signifying critical level which can trigger crisis” concerning foreign debt of whole domestic sectors including the government and the private sector. It should also be noted that “Economists are split over the issue of how serious trade deficit and foreign debt are”. The authors believe it is vital to get discussions over this matter of fiscal capacity of the government straight, for greater utility of the methods for judging whether the economy is in “Thetical Economy” or “Antithetical Economy”, and for overall evaluation of behaviors of non-financial companies, the government and central bank. It would be ideal if they could develop a method which enables automatic judgment of government fiscal capacity.

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