Currency Wars and A Possible Self-Defense (II) : A Plan of Self Protection

Jeffrey Forrest[1], Zack Hopkins[2] and Sifeng Liu[3]
[1]*Department of Mathematics, Slippery Rock University, Slippery Rock, PA 16127, USA*
[2]*11934 Route 89, Wattsburg, PA 16442, USA*
[3]*School of Economics and Management, Nanjing University of Aeronautics and Astronautics, Nanjing 210016, PR China*

Abstract
Continuing what is presented in part one (Forrest,Hopkinsand Liu, 2013)[1], and based on how a currency war could be potentially raged against a nation, this sequel makes use of the results of feedback systems to develop a self-defense mechanism that could conceivably protect the nation under siege.
Keywords purchasing power, supply and demand of money, feedback system, economic sector, monetary policy

1 Introduction

When combining the previous theoretical analysis in (Forrest and Hopkins, 2013)[1] with the recent cases of speculative attacks in the arena of international finance, we surely see the following predicament. When a nation tries to develop economically, due to its loosening economic and monetary policies, large amounts of foreign investments would be welcomed ; and at the same time, a lot of such foreign investments would strategically rush into the nation in order to ride along with the forthcoming economic boom. Now what we have shown earlier is that if a large amount of foreign investments leaves suddenly, then the nation would most likely suffer from a burst of the economic bubble with a large percentage of economic activities interrupted either temporarily or indefinitely. So, a natural question at this junction is : How could we possibly design a measure to counter such sudden leaves of foreign investments in order to avoid the undesirable disastrous consequences ? We will address this problem in the rest of this paper.

2 A Model for Categorized Purchasing Power

Let us look at the following model that relates the purchasing power of money with the demand and supply of the money of a national economy :

$$\frac{dP}{dt} = k(D - S) \tag{1}$$

where D stands for the demand for money,$S$the money supply, P the purchasing power of money, $k > 0$ is a constant,and t represents time.

What this model says is that the rate of change in purchasing power is directly proportional to the difference between the demand and supply of money. In particular, the model says that with all other variables staying constant, if the money supply S increases by a large amount and satisfies $S > D$, then the purchasing power of the money P decreases so that more money is needed to buy essentials of living and inflation will increase due to the increase in the money supply S.

Now, let us divide the overall national economy into three sectors E_1, E_2 and E_3 as follows : E_1 stands for the goods, services, and relevant production of these goods and services that are needed for maintaining the basic living standard, E_2 he goods, services, and relevant productions that are used to acquire desired living conditions, and E_2 the goods, services, and relevant productions that are used for the enjoyment of luxurious living conditions.

The reason why we divide the economy in such a way is that according to (Allen and Goldsmith, 1972)[2],the following are four base requirements that allow for a stable society to be achieved and maintained :

(1). Minimum disruption of ecological processes ;

(2). Maximum conservation of materials and energy, or an economy of stock rather than flow ;

(3). A population in which recruitment equals loss ;

(4). A social system in which individuals can enjoy rather than feel restricted by the first three conditions.

So, in terms of economics, to maintain a stable society, a relative stability of the economic sector E_1 has to be achieved first.

Next, let us accordingly divide the overall demand D of money into three corresponding categories as follows :

D_1 = the demand of money for meeting the minimum requirement to maintain the basic living standard ;

D_2 = the demand of money for acquiring desired living conditions ;

D_3 = he demand of money for enjoying luxurious living conditions.

Assume that in a stable economy, we have the following allocation of the money demand :

$$D = D_1 + D_2 + D_3 = \alpha_1 D + \alpha_2 D + \alpha_3 D \tag{2}$$

where the weights α_i, i=1,2,3, stands for the average allocation of the citizens of the economy over the three categories as described above, satisfying $\alpha_1+\alpha_2+\alpha_3 = 1$, and $D_i = \alpha_i D$, i=1,2,3. For instance, in the stable economy, an average family allocates half of its monthly income on necessities of living, such as food, utilities, etc., 4 tenth of the income on acquiring the desired quality of life, and one tenth of the income on luxurious items, then $\alpha_1 = 0.5$, $\alpha_2 = 0.4$ and $\alpha_3 = 0.1$.

If the money supply S increases drastically, along with the decreasing purchasing power of money, all goods will cost more. If somehow the goods in the category

of living necessities rise more rapidly, then a re-allocation of household income will appear. For instance, due to rumors about potential interruptions in the supply of food and clean water accompanying a substantial increase in the money supply, the average family has to reallocate its income as follows :$\alpha_1 = 0.625$, $\alpha_2 = 0.3$ and $\alpha_3 = 0.075$.

When such a reallocation of income of the average family is forced to take place, the stability of the economy would very likely be in trouble. So, to stabilize the economy, the purchasing power of money in category D_1 should stay relatively constant, while in D_2 increases somehow slightly, and in D_3 it should be allowed to increase in order to attract and trap the additional money supply away from category D_1. So, let us assume

P_1 = the purchasing power of money in category D_1 ;
P_2 = he purchasing power of money in category D_2 ;
P_3 = the purchasing power of money in category D_3.

Similarly, let us define

S_1 = he money supply that goes into category D_1 ;
S_2 = the money supply that goes into category D_2 ;
S_3 = he money supply that goes into category D_3.

So, equ.(1) would look as follows :

$$\begin{cases} \frac{dp_1}{dt} = k_{11}(D_1 - S_1) + k_{12}(D_2 - S_2) + k_{13}(D_3 - S_3) + \sum_{j=1}^{n} q_{1j}x_j \\ \frac{dp_2}{dt} = k_{21}(D_1 - S_1) + k_{22}(D_2 - S_2) + k_{23}(D_3 - S_3) + \sum_{j=1}^{n} q_{2j}x_j \\ \frac{dp_3}{dt} = k_{31}(D_1 - S_1) + k_{32}(D_2 - S_2) + k_{33}(D_3 - S_3) + \sum_{j=1}^{n} q_{3j}x_j \end{cases} \tag{3}$$

where $(k)_(ij)$, and $(q)_(ij)$ are constants, and $(x)_(j)$ stands for monetary policies, i=1,2,3, and j=1,2, . . . ,n,By using matrix notations, equ.(3) can be rewritten as follows :

$$\dot{P} = Kz + Qx \tag{4}$$

where $P = [P_1\ P_2\ P_3]^T$, $\dot{P}$ is Newton's original notation for derivatives such that $\dot{P} = [\frac{dp_1}{dt}\ \frac{dp_2}{dt}\ \frac{dp_3}{dt}]^T$,$K = [K_{ij}]_{3\times 3}$ the coefficient matrix of the variables $(D_i - S_i)$, i=1,2,3, Q= $[q_{ij}]_{3\times n}$ the coefficient matrix of the variables x_j, j=1,2, . . . ,n.

In terms of systems research, the mode in equ.(2) can be seen as a feedback system as depicted in Fig.1, where S represents the initial state of the economy. After the monetary policies $x_1, x_2, \ldots, x_n$ are introduced, the participants of the economy introduce either consciously or unconsciously a feedback component system S_f so that the overall system with the added feedback produces the desired output P_1,P_2 and P_3.

What is shown in Fig.1 is the fact that each and every market economy, where the participants are allowed to design their own methods (without violating the

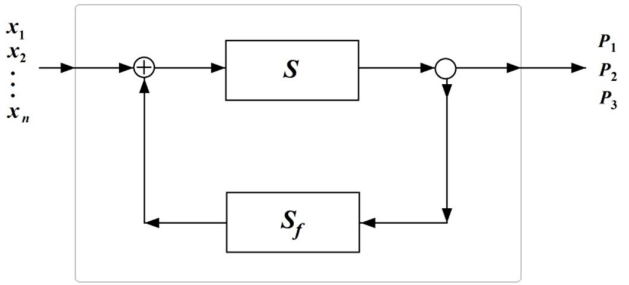

Fig.1 The feedback loop between monetary policies and categorized purchasing powers

established laws) to achieve their individually defined financial successes, then the economy constitutes a "rotational" field. Here, the word of rotation means that as soon as a monetary policy is introduced, the market participants will find ways to take advantage of the policy so that the policy and the individually designed methods jointly produce the individually desired outputs.

3 The Functional Relationship between P and $(D - S)$

In this section, we investigate the relationship between the purchasing power vector $[P_1\ P_2\ P_3]^T$ of money and the difference vector $[D_1 - S_1\ D_2 - S_2\ D_3 - S_3]^T$ of demand and supply of money. In particular, we discuss why the trends found in purchasing power of money could righteously be described by using linear models, although the purchasing power is clearly not linear in terms of the difference of the demand and the supply of money.

To this end, let usintroduce the following three models, the first oneis linear, the second one quadratic, and the third one cubic, to demonstrate the effects of supply and demand of money on purchasing power of money in each case :

$$P(t) = a(D(t) - S(t)) + \varepsilon \tag{5}$$

$$P(t) = a(D(t) - S(t))^2 + b(D(t) - S(t)) + \varepsilon \tag{6}$$

and

$$P(t) = a(D(t) - S(t))^3 + b(D(t) - S(t))^2 + c(D(t) - S(t)) + \varepsilon \tag{7}$$

where $P(t)$ stands for the purchasing power of money, $D(t)$ the demand of money, $S(t)$ the supply of money,ε a random variable with mean $C \neq 0$,and a, b and c are constant. More specifically, the random variable is the error term in the sense that it compensates for any unpredicted event or factor that could impact the purchasing power and that is not taken into account in the model.

When the nonlinearity in the trend of purchasing power is considered, such as

in the case of Japanese yen (Fig.2), the quadratic and cubic models in equs.(6) and (7) seem to model adequate. In particular, the non-linear graph of the purchasing power of Japanese yen has two distinguishable patterns : one is parabolic and the other cubic. These two types of general patterns are respectively depicted by the nonlinear models in equs.(6) and (7).

Fig.3 depicts both the purchasing power and the amount of money in circu-

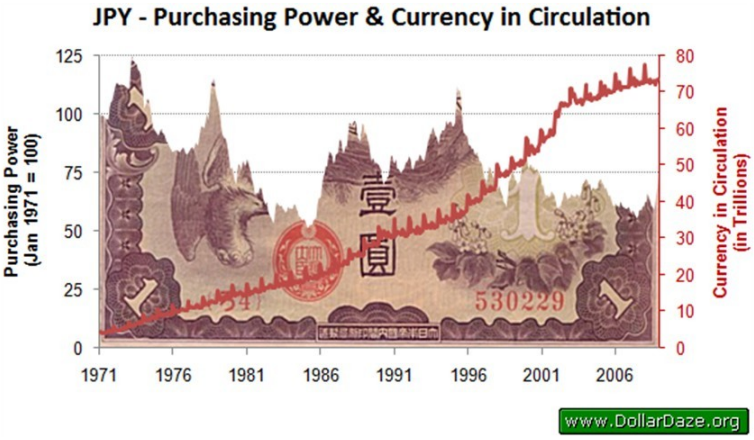

Fig.2 urchasing power and currency in circulation, from www.dollardaze.com as accessed on April 4, 2012

lation of the U.S. dollars over time. Here a clear inverse relationship between the currency in circulation, supply of money, and the purchasing power of money can be seen. That is to say, as the amount of money in circulation increases the purchasing power of the US dollars decreases. The graph of purchasing power is fairly linear, especially if broken up into two segments : from 1971 to approximately 1981 and from 1981 until the present day. This trend in the purchasing power of U.S. dollars suggests that the linear model in equ.(5) seems to adequately reflect what happened to the purchasing power over time.

In particular, if we employ the linear model in equ.(5) to describe the relationship between the purchasing power of the U.S. dollars and the difference between the demand and supply of the money with respect to time, then this model well explains how the U.S. dollar declines in purchasing power. For instance, the initial high purchasing power was due to the fact that the currency in circulation was fairly low and the value of the U.S. dollar was fixed at $35 an ounce of the gold. However, starting in May 1971 the U.S. dollar suffered from a major crisis, and consequently began to depreciate against the gold from the initial $ 35 an ounce to $38 an ounce on August 15, 1971, then to $42.22 an ounce at the start of 1973, and then to as high as $96 an ounce in March of the same year (Wang and Hu,

2005, p.12)[3]. In 1976 a new international agreement was reached in the capital city Kingston of Jamaica ; with several rounds of modifications the international financial system entered the Jamaica system in 1978. Within this new system, gold is no longer considered as a form of money. That is, when the demand for the U.S. dollars is brought into the equation, it can justify why there are more severe or gradual drops in purchasing power as the amount of money in circulation increases. For example, if the change in the supply of money is equal to the increase in demand of money, then the purchasing power of the money should remain constant. To cause the severe drop in purchasing power as seen from 1971 until approximately 1981, there was an increase in the money supply accompanied by a decrease in the demand for money. This decrease in the demand for money was caused by the transition from the U.S. dollar being backed by gold to that not having gold backing (dollardaze.org). This also makes sense intuitively. If we already know that a rise in the money supply decreases the purchasing power of money, then people wanting the money less would further exacerbate that decrease in purchasing power. From that point on, the demand of money must have increased but still not greater than the supply of money because the decline in the purchasing power flattens out instead of becoming more severely negative. As the graph of the stock prices of the Dow Jones Industrial Average indicates, Fig.4, the stock market began to rise in the early 1980s and had a sharp incline until the start of the 21^{st} century. This rise is an indicator
that supports the claim that the demand for money increased during this time

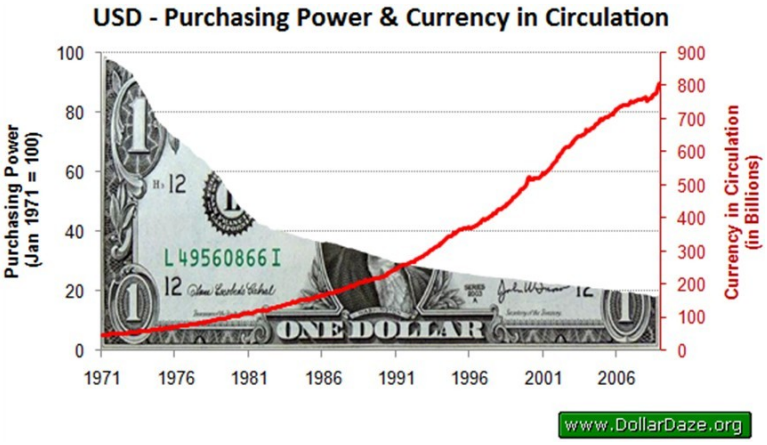

Fig.3 The feedback loop between monetary policies and categorized purchasing powers

period and, in conjunction with the supply of money, influenced the purchasing power to decrease less severely than during the time period from 1971 to 1981.

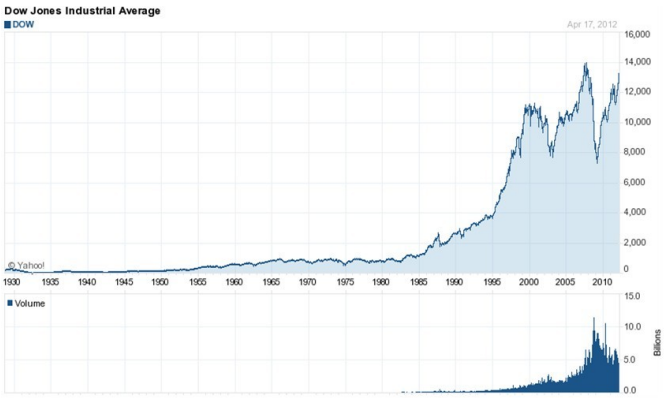

Fig.4 Historical data of DJIA (from Yahoo finance, accessed on April 17, 2012)

Looking at the same graph created for the Japanese economy, Fig.2, we see a similar but different story. By breaking the graph up into more intervals, Fig.5 we

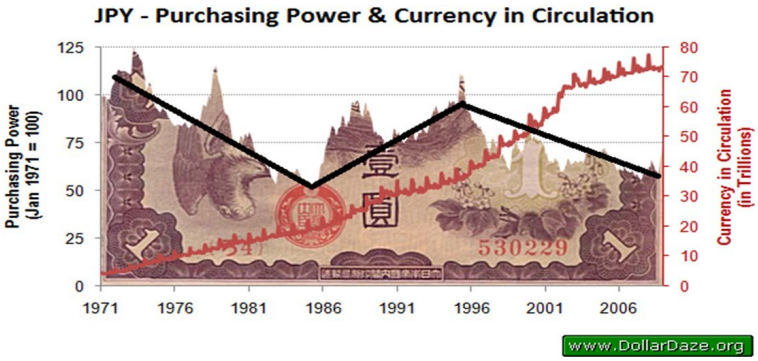

Fig.5 The fluctuation in the purchasing power of Japanese ye

are able to form various linear patterns. From 1971 until around 1986 there was a general decline in the purchasing power of Japanese yen. Then once it came to a peak again in 1996 there again was an overall decline in the purchasing power. These are clearly not linear graphs; but looking at the general motion of the purchasing power in the graph they are fairly linear in two segments, like the situation with the U.S. dollar. Therefore, it is also reasonable for us to use the linear model in equ.(5) to explain the evolutionary trends in the purchasing power of Japanese yen.

Under the assumption that the supply and purchasing power of money are inversely related when all other factors remain constant, we can see that the purchasing power is a function of the demand and supply with respect to time. By using the linear model in equ.(5) and by breaking up the graph in Fig.5 into two

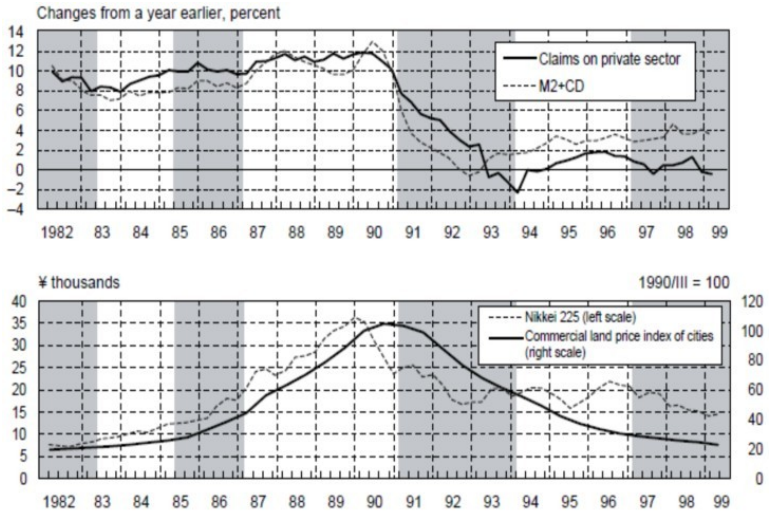

Fig.6 The money supply and the Nikkei 225 stock market (Okina, Shirakawa and Shiratsuka, 2001)[4]

intervals, we see a similar relationship that was discussed with the supply and demand of money in the U.S. dollar. If both the supply and demand increase at the same rate, then the purchasing power will remain constant. If the supply increases with the demand increasing at a faster rate than before but still less than the increase in he supply, then a less severe decline in the purchasing power would be observed. However, if the demand increases at a rate greater than that of the supply of money, then this would lead to an increase in the purchasing power. Furthermore, an increase in the supply matched with a decreasing rate in demand would result in a more severe decrease in the purchasing power. These explanations help explain varying linear slopes that are reflected in the purchasing power of money in the Japanese economy. For example, notice that for Japan 1986 was the first year of the asset pricing bubble. In the graph of the money supply and the Nikkei 225 stock market,Fig.6, for details,see (Okina, Shirakawaand Shiratsuka, 2001)[4], during this time there was a small increase in the money supply while the Nikkei 225 increased drastically. With the stock market increasing during this time, the demand for money also increased because people wanted to take advantage of the market rise. As we mentioned earlier, a relatively low increase in the money supply accompanied by a large increase in the demand for money would result in an increase in the purchasing power. This explanation corresponds with the depiction of the purchasing power of Japanese yen until 1990 when it burst reflecting the sharp decline in the purchasing power as reflected in the graph and by our model.

The sharp rise in the purchasing power that appeared at around the year of 1973, Fig.3, could have been due to the oil crisis which caused a shift in Japanese economy toward huge investments in the electronic industries. From (Hutchison, 1986)[5], we can see that Japan's money supply was fairly constant in the year of 1973 but the demand of money from the oil crisis increased drastically. That made the purchasing power of the money to increase drastically during the early 1970s ; this conclusion is further validated by the discussions of(Okina, Shirakawa and Shiratsuka, 2001)[4]. Fig.7 is a graph that reflects the Japanese inflation rate over the time period from April 1971 until April 2012, where we can notice the continuing patterns and similarities with those of the purchasing power.

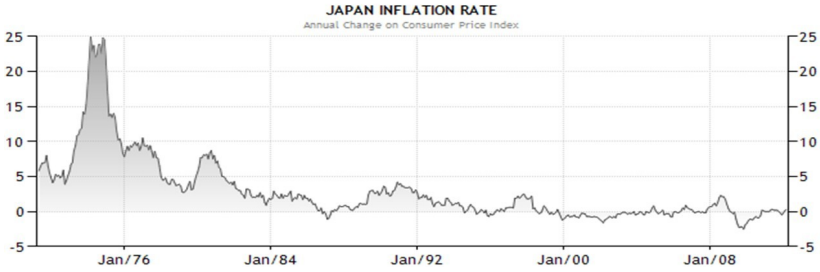

Fig.7 Japanese inflation rate from April 1971 to April 2012. The original source was accessed on April 4, 2012

As a matter of fact, the similarities between the graphic patterns of the purchasing power of money and the inflation rate, as described above, are also seen in the current movements of oil prices. On the Ed Show of the MSNBCat 11 :00 p.m., Barny Frank referenced certain people who bought crude oil to drive up the prices only to sell it at a later time for a windfall of profits. The market system unconsciously allows the oil prices to riseand to consequently manipulate the gasoline prices, Fig.8. That situation works in conjunction with the demand and supply of money.

Summarizing what is discussed above we conclude that it is theoretically reasonable for us to analyze the relationship between the purchasing power of money and the difference of the demand and supply of money by using the linear model in equ.(5), where the random variable accounts for all the unexpected factors that are not included in the model.

By combining what is obtained in Section3 with the linear model in equ.(5), we have the following relationship between categorized purchasing power $[P_1\ P_2\ P_3]^T$ of money and categorized difference $[D_1 - S_1\ D_2 - S_2\ D_3 - S_3]^T$ of demand and

supply of money :

$$\begin{bmatrix} P_1 \\ P_2 \\ P_3 \end{bmatrix} = R_{3\times 3} \begin{bmatrix} D_1(t) - S_1(t) \\ D_2(t) - S_2(t) \\ D_3(t) - S_3(t) \end{bmatrix} + \begin{bmatrix} \varepsilon_1 \\ \varepsilon_2 \\ \varepsilon_3 \end{bmatrix} \tag{8}$$

where $R_3 \times 3$ is a constant square matrix with real entries, and $[\varepsilon_1\ \varepsilon_2\ \varepsilon_3]^T$ a random vector with a none zero mean.

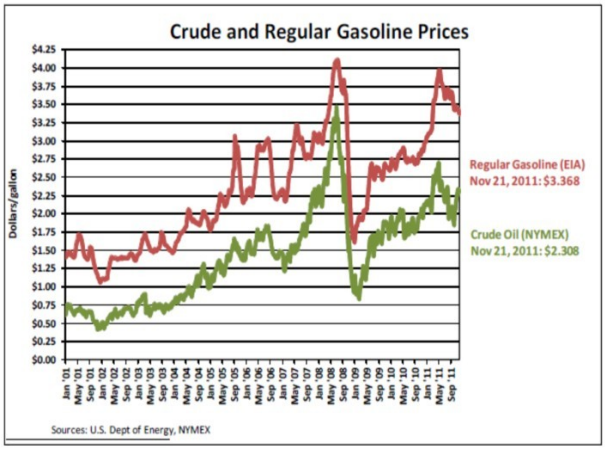

Fig.8 The prices of crude and gasoline move in concert, the original source was accessed on April 17, 2012

4 Separating Economic Categories Using Feedback Component Systems

If we consider the mathematical expectations of the variables in equ.(8), we have

$$\begin{bmatrix} P_1 \\ P_2 \\ P_3 \end{bmatrix} = A_{3\times 3} \begin{bmatrix} D_1(t) - S_1(t) \\ D_2(t) - S_2(t) \\ D_3(t) - S_3(t) \end{bmatrix} + \begin{bmatrix} c_1 \\ c_2 \\ c_3 \end{bmatrix} \tag{9}$$

where$E_{\varepsilon_i} = c_i \neq 0$, i = 1, 2, 3. By substituting equ.(9) into equ.(4), we have

$$R_{3\times 3}\dot{z} = Kz + Qx \tag{10}$$

Without loss of generality, we assume that $R_{3\times 3}$ is invertible. That is, we assume in general the categorized purchasing power of money is completely determined by the categorized differences of demand and supply of money. Then, equ.(10) can be rewritten as follows :

$$\dot{z} = Az + Bx \tag{11}$$

where$A = R^{-1}K$ and $B = R^{-1}Q$. To make the model in equ.(11) technically manageable, we assume without loss of generality that B is a 3×3 matrix, meaning that the monetary policies $x_1, x_2, \ldots, x_n$ are accordingly categorized into three groups :

X_1=the set of all those monetary policies that deal with the population meeting the minimum need to maintain the basic living standard ;

X_2=the set of all those monetary policies that deal with the populationą́s need for acquiring desired living conditions ;

X_3=the set of all those monetary policies that deal with the populationą́s need for enjoying luxurious living conditions.

Without loss of generality, we will still use the same symbol x to represent the vector $[X_1\ X_2\ X_3]^T$ of categorized monetary policies.

Similar to the concept of consumer price index (CPI), let us introduce an economic index vector $y = [y_1\ y_2\ y_3]^T$ such that y_i measures the state of the economic sector i, $i = 1, 2, 3$. Then from equ.(11) we can establish the following model for the national economy of our concern :

$$\begin{cases} \dot{z} = Az + Bx \\ y = Cz + Dx \\ z(0) = 0 \end{cases} \tag{12}$$

where z is the 3×1 matrix $[D_1 - S_1\ D_2 - S_2\ D_3 - S_3]^T$ of the categorized difference of demand and supply of money, referred to as the state of the economic system, A, B, C, and D are respectively constant 3×3 matrices, such that D is non-singular (meaning that each introduction of monetary policies does have direct, either positive or negative, effect on the performance of the economy), and the input space X and output space Y are following :

$$X = Y = \{r : [0, +\infty) \to R^3 : r \text{ is a piecewise continuous function}\} \tag{13}$$

where R stands for the set of all real numbers and R^3 the nth dimensional Euclidean space.

What is described by equ.(12) is that the state of the national economy is representable through the use of the state variable z that helps the economy to absorb the positive and negative effects of the monetary policies X_1, X_2 and X_3.Then, both the internal mechanism z of the economy and the monetary policies x jointly have a direct effect on the overall performance y of the economy. The condition, as imposed on the input space X and the output space Y means that monetary policies, which form the input space X, are introduced based on the effects of the previously implemented policies, while the overall performance, indexes of which constitutes the output space Y, of the economy evolves from previous

states mostly continuous. Such assumptions historically speaking are not always true, while failures occur rarely in terms of frequencies. For instance, in modern China, the so-called Cultural Revolution occurred abruptly (MacFarquhar and Schoenhals, 2008)[6] ; and several times in the history of Russia, the Tsars had introduced rushed social reforms creating a torn country (Huntington, 1996)[7].

Geometrically, the systemic model in equ(12) of the national economy is depicted in Fig.9. The monetary policy input X splits into two portions $F_1F_2F_3F_4$ and $F_5F_6F_7F_8$.The portion labeled $F_1F_2F_3F_4$ directly affects the performance Y of the economy. The other portion, labeled $F_5F_6F_7F_8$,is fed into the initial state of the economy S, leading to the introduction of the feedback component systemS_f,which stands for the market reactions to the introduced monetary policies, and the formation of a feedback loop within the economy. This feedback loop in fact constitutes the main body of the economy, while the overall performance vector Y of indexes is merely an artificially designed measure. What needs to be noted is that within each of our three economic sectors E_1, E_2 and E_3,the market reactions, which constitute parts of the feedback component system S_f,to monetary policies in general are unique and economic sector specific. That is, the market reactions in one economic sector are different from those of another sector. The inner most loop $F_1F_2F_3F_4$ is the second stage of the economy after the introduction of new monetary policies. They by the joint effect of the mar-

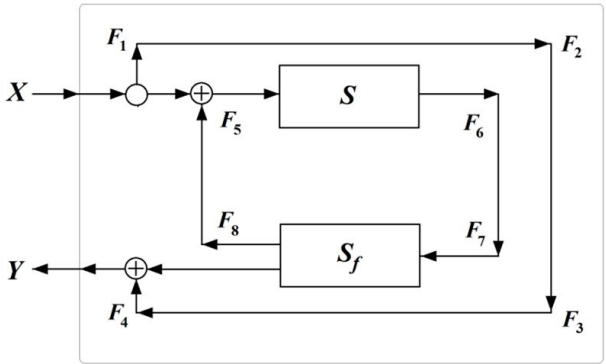

Fig.9 The geometry of the systemic model of the national economy

ket reactions the introduction of new monetary policies. They by the joint effect of the market reactions (S_f) and the non-reactionary aspects ($F_5F_6F_7F_8$) of the monetary policies, the final numerical readings Y of the economy are produced.

To see how monetary policy input X could have aspects, one is reactionary and the other non-reactionary, let us assume that X stands for such a monetary policy that allows the inflation to inch higher. Therefore, the price of crude oil is expected to rise accordingly. Now, the reactionary aspects of the policy X make

the gradual and calculated increase in the price of crude oil more or less random. On the other hand, the expected outcome of the policy is the theoretical, non-reactionary aspect of the policy. When the actual outcome deviates from the expectation, the difference is caused by the market reactions to the policy.

According to (Lin, 1994)[8], the 3-dimensional system in equ.(12), meaning that both the input x and the output y are elements from R^3, can be decoupled into three independent systems of the same kind with one-dimensional input and out. Specifically, if we let

$$\begin{aligned} S &= \{(x,y) \in X \times Y : \exists z \in z\text{such that x, y, z satisfy equ.(12)}\} \\ &= \text{ the system of all the ordered pairs (x,y) satisfying equ.(12)} \end{aligned}$$

where the state space $Z = \{r : [0, +\infty) \to R^3 : r$ is a piecewise continuous functi -on$\}$, and for each $i = 1, 2, 3$, define a system S_i as follows :

$$\begin{cases} \dot{z} = Az + B_i x_i \\ y = C_i z_i + D_i x_i \\ z(0) = 0 \end{cases} \tag{14}$$

where B_i is the ith column of B,C_i the ith raw of C, D_i a non-zero constant, and the input space $X_i$and the output space Y_i are given as follows :

$$X_i = Y_i = \{r : [0, +\infty) \to R^3 : r \text{ is a piecewise continuous function}\}$$

In particular, the system S can be decoupled through feedback into the factor systems S_i, $i = 1, 2, 3$, as follows. Let

$$\alpha = \begin{bmatrix} A & 0 & 0 \\ 0 & A & 0 \\ 0 & 0 & A \end{bmatrix} \beta = \begin{bmatrix} B_1 & 0 & 0 \\ 0 & B_2 & 0 \\ 0 & 0 & B_3 \end{bmatrix} \gamma = \begin{bmatrix} C_1 & 0 & 0 \\ 0 & C_2 & 0 \\ 0 & 0 & C_3 \end{bmatrix} \delta = \begin{bmatrix} D_1 & 0 & 0 \\ 0 & D_2 & 0 \\ 0 & 0 & D_3 \end{bmatrix}$$

Then, the Cartesian product system $S_d = S_1 S_2 S_3$ is represented by the set of all ordered pairs (x, y) satisfying

$$\begin{cases} \dot{z} = \alpha z + \beta x \\ y = \gamma z + \delta x \\ z(0) = 0 \end{cases} \tag{15}$$

Because δ is non-singular, the inverse system ${S_d}^{-1}$ is obtained as follows :

$${S_d}^{-1} = \{(y, x) : (y, x) \text{ satisfies equ.(16)}\}$$

where equ.(16) is given as follows :

$$\begin{cases} \dot{z} = (\alpha - \beta\delta^{-1}\gamma)z + \beta\delta^{-1}y \\ x = \delta^{-1}\gamma z + \delta^{-1}y \\ z(0) = 0 \end{cases} \tag{16}$$

The particular feedback component system $S_f : Y \to X$ used in this decoupling is given as follows :

$$\begin{cases} \begin{bmatrix} \dot{z} \\ \dot{z'} \end{bmatrix} = \begin{bmatrix} A - BD^{-1}C & 0 \\ 0 & \alpha - \beta\delta^{-1}\gamma \end{bmatrix} \begin{bmatrix} z \\ z' \end{bmatrix} + \begin{bmatrix} BD^{-1} \\ \beta\delta^{-1} \end{bmatrix} y \\ x = [-D^{-1}C \ \delta^{-1}\gamma] \begin{bmatrix} z \\ z' \end{bmatrix} + (D^{-1} - \delta^{-1})y \\ \begin{bmatrix} z \\ z' \end{bmatrix} (0) = 0 \end{cases} \tag{17}$$

In terms of economics, what the concept of decoupling the 3-dimensional system S into component systems S_i,$i = 1, 2, 3$,as discussed above, implies is that when monetary policies are established individually and respectively for each of the three economic sectors E_1, E_2, and E_3, although these economic-sector specific policies will most definitely have joint effects on the economy, there is at least one way to design a feedback component system S_f so that the overall feedback system $F(S, S_f)$, which represents the whole system as depicted in Fig.1, can be controlled through adjusting individually each of the economic sectors $E_1, E_2$and E_3.

5 A Strategy for National Defense

The significance of the previous discussion is that we can now propose based on the sound analytical reasoning presented above a strategy for national defense against currency warfare in case that initial'friendly' foreign investments turn out to be an aggressive act of war by suddenly withdrawing all or significant amount of the investments.

In particular, let us assume that at time period t, the total money supply of the specific nation of our concern is \$1,000, \$100 of which is from foreign investments. That is, the foreign investments amount to 10% of the total domestic money supply. With the additional money supply (due to the foreign investments) the speed of money circulation increases, signaled by increased spending and elevated levels of economic activities. If these foreign investments leave the nation suddenly, then it is reasonable to expect that more than 10% of the economic activities from around the nation will be more or less affected adversely due to the sudden exhaustion of the money flow, because accompanying the foreign investments there

tends to be domestic investments attached too, making the total investments on the related economic activities more than 10% of the national economy.

Now, if before the foreign investments depart while leaving behind disastrous aftermath, the national government has been keeping the exchange rate (to this end not all nations from around the world are currently able to do this successfully) the same while gradually and strategically increased its money supply, say, to the level of $10,000, then in the entire monetary circulation around the nation the proportion of the foreign investments shrinks to about 1% from the original 10%. And if the money supply had been increased to the level of $1,000,000, then the proportion of the foreign investments would have shrunk from the original 10% to about 0.01%, which is nearly zero. So, if at this moment of time the foreign investments are suddenly withdrawn as an aggressive act of war, only around 1% or 0.01% of the consumption and economic activities of the nation will be affected adversely and the overall economic health of the nation will be relatively stable.

On the other hand, along with the drastically increased money supply, all prices in the nation will most certainly go through the roof, placing a large portion of the national population in financial crises due to the run-away inflation. For instance, a certain commodity A, which is piece of living necessity, used to cost $1.00 a unit ; now it requires $10.00 or even $1,000 to purchase. Such dramatic increase in prices will surely cause hardships for a good number of citizens of the nation. To this end, the national government needs to work on how to redistribute the additional money supply. In fact, as long as the distribution of the increased money supply does not cause social upheaval, then to this nation, nothing disastrous will really happen and the potentially damaging impacts of sudden departure of the foreign investments will be under control, too.

However in reality, the distribution of the extra money supply could easily lead to major societal instabilities to the nation due to the increased unevenness in the economic scene : The rich become richer while the poor become poorer. The situation here is similar to that of the normal inflation, which has been employed to make the economic structure more uneven than before so that the yoyo structure of the economy spins with more strength. In other words, with additional money supply injected into the economy, the redistribution of the wealth that is represented by the increased money supply is surely uneven, where some people receive more than their share, some simply keep pace with the decrease of the purchasing power of their income, while others fall behind or further behind with their financial status. So, if our suggested measure is adopted to counter the damaging effects of sudden departure of foreign investments, the nation needs to develop a practical plan to distribute the extra money supply in order to :

(1). Keep societal peace and national stability so that a normal and operational economy can be maintained.

(2). Increase the nation's economic prosperity by taking advantage of the foreign investments even though they leave sooner or later either slowly or suddenly.

Specifically, as suggested by the systemic model in the previous section, to help protect the innocent citizens of the nation from suffering from the potential economic turmoil, the national government could purposely divide the economy into three sectors E_1, E_2, and E_3 as described earlier to meet the following goals. In Sector E_1, which consists of living necessities, the sector performance, such as the sector specific CPI, evolves as normally as possible ; in Sector E_2,which consists of such goods, services, and relevant productions that are used by citizens to acquire desired living conditions, the sector performance index, say the particular CPI of E_2, could outpace that of Sector E_1 by a large amount ; and critically, the national government needs to manage to trap most of the additional money supply in the economic sector E_3, which consists of such goods, services, and relevant productions that are used by the citizens for their enjoyment of luxurious living. The previous discussion on the systemic model of the national economy indicates that by managing the market reactions correctly, that is the design of the feedback component system S_f, these three economic sectors can be well separated from each other.

When the economic sector E_1 evolves normally as expected based on the history of the nation, the citizens would not need to worry about their basic living and survival. That naturally leads to the desired societal stability and peace. Although the prices in the economic sector E_2 increase drastically when compared to those in E_1, that in general should not affect the mood or the happiness of the population much, because desired living conditions change from time to time and vary from one family to another. In other words, isolated, temporary personally desires,which are not yet satisfied and which are generally inconsistent with each other and even contradictory to each other, could not amalgamate into a political force to cause turmoil. Now, the key is how to keep most of the additional money supply in the economic sector E_3.To address this problem, let us pay attention to our earlier assumption that a large amount of foreign investments entered the nation. That means commercial products and services that are new to the people in the specific nation are expected to and will become available soon. Because these products and services are brand new to the region, high prices can of course be charged for these commercial goods and services. The situation is similar to the scenarios with developed nations, where the focus has been placed on innovations, design and production of unprecedented products and services. It is these never-seen products and services that generate the most profits.

At this junction, let us address the problem of how to classify a product or a service into one of the three economic sectors E_1, E_2, and E_3. First of all, goods and services that should be classified into E_1 are clear.They represent such commodi-

ties that directly relate to the survival of any human being, such as foods, utilities, and shelters of the basic quality. Now, if a family lives in a rented two-bedroom apartment and wants to own a house, then houses to that particular family will be in the economic sector E_2.f the people in a community go to work, shopping, and entertainment mostly on foot, then individually owned transportation tools, such as bicycles, motorcycles, cars, private jets, etc., will belong to the economic sector E_3.That is, as time evolves forward, what belongs to the economic sector E_3 gradually lowers itself into the economic sector E_2, and what used to be in E_2 also gradually moves to E_1.That is, the classification of one particular product or service is a function of time and space. Just by looking around shopping centers, one can see vividly that such classification of commercial goods and services have been successfully done by merchants throughout the world without much trouble.

Now, let us consider the scenario that when the nation purposefully and strategically increases its money supply in order to prevent disastrous aftermaths that could be potentially left behind by sudden withdrawals of foreign investments, additional foreign investments could continue to pour in. In this case, if the nation could not pick up its corresponding speed of economic development, then it will be taken over by the run-way high rate of inflation. In this case, if the foreign investments depart strategically, then the nation will be in real major political, societal, and economic crises. To prevent such disastrous consequences, the continued inflow of foreign money has to been managed so that they cannot depart quickly.

Another practical scenario that is different of what has been discussed above is that at a high speed develops the nation itself into a super economic power such that there is no longer such a single amount of foreign investments that can amount to an influencing percentage in the nation's domestic consumption and/or economic activities. In this case the nation will be safe in the face of any potentially sudden withdrawal of foreign investments.

6 A Few Final Words

Similar to how many different methods are there to invest money in life, there should be that many different ways to launch a currency war. What is presented in this work of two parts simply considers only one possible way to launch a currency war and one possible way to protect oneself against the disastrous consequences of such an attack. In other words, more scientific efforts should be devoted to the studies of financial attacks (or wars) along the line as outlined in this work in the spirit of how conventional warfare is conducted, analyzed, and planned strategically. The purpose of doing so is not to launch financial attacks on the innocent people who simply work hard to make a living ; instead, one should always be prepared for the worst that might be imposed upon him by those who always look for

ways to take advantage of others. In this regard, we hope that our presentation in this work of two parts will play the role of a brick that has been thrown out there to attract beautiful and practically meaningful gemstones.

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Corresponding author
Jeffrey Forrest can be contacted at : e-mail : Jeffrey.forrest@sru.edu.