ENTROPY INCREASE THROUGH MODERN MONEY CREATION OF FRACTIONAL RESERVE SYSTEM IN BANKING

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ABSTRACT

Money is simply treated as one of constraints when engineers solve their problems throughout different layers of a system engineering processes without usually questioning the effect of modern money creation in their problems. However, almost all engineering efforts are directed and affected by this modern money creation system of Fractional Reserve System (FRS), causing the entropy increase in all economies due to globalized world.

Vast majority of money in modern economies is created by private banks through a set of processes called Fractional Reserve System (FRS). In order a bank to be able to create money, someone is needed to borrow from this bank. In FRS, private banks keep only a small fraction of money given them by their depositors and lend out the remaining. Hence, the amount of money created in an economy depends on the fractional ratio of money to be kept usually kept in Central Bank accounts.

This study shows how FRS causes the entropy increase in economies and suggests solutions to overcome the problem.

Keywords: Entropy and Economics, Monetary System, Fractional Reserve System

SOCIO-ECONOMIC SYSTEMS ENGINEERING APPROACH TO MODERN MONETARY SYSTEM

Money is simply treated as one of constraints when engineers solve their problems throughout different layers of a system engineering processes without usually questioning the effect of modern money creation in their problems. However, almost all engineering efforts are directed and affected by this modern money creation system called *Debt Based Monetary System* [1]. The paper examines how the systems approach might be applied with top-bottom manner to solve Socio-economic systems engineering problems.

The role of money and its creation in the fifth layer as being the socio-economic systems engineering that is related to government regulations and control is not taken into considerations usually. However, its role is so unique that some paradigms such as planned obsolescence are direct results of modern monetary system [2].

As explained in [1], money is created by banks as debt in modern monetary system. Central banks create only a small proportion and remaining is created directly by commercial banks.

Vast majority of money in modern economies is created by private banks through a set of processes called Fractional Reserve System (FRS). In order a bank to to create money, someone is needed to borrow from that bank. In FRS, private banks keep only a small fraction of money given them by their depositors and lend out the remaining. Hence, the amount of money created in an economy is said to be dependent on the fractional ratio of money to be kept usually kept in Central Bank accounts. However, in practice more debts, i.e. money may be created by many financial tools created simply to create more money such as electronic gold, a future contract etc.

How banks create money is explained in Modern Money Mechanics book explaining Fractional Reserve System (FRS) in detail [3]. The Figure 1 shows monetary expansion through money creation process by a bank under Fractional Reserve System. As seen, under the reserve requirements of 10 percent, a bank may create an amount of 100,000 USD based on an initial deposit of 10,000 USD. Money contraction is also follows similar pattern as explained in the document.

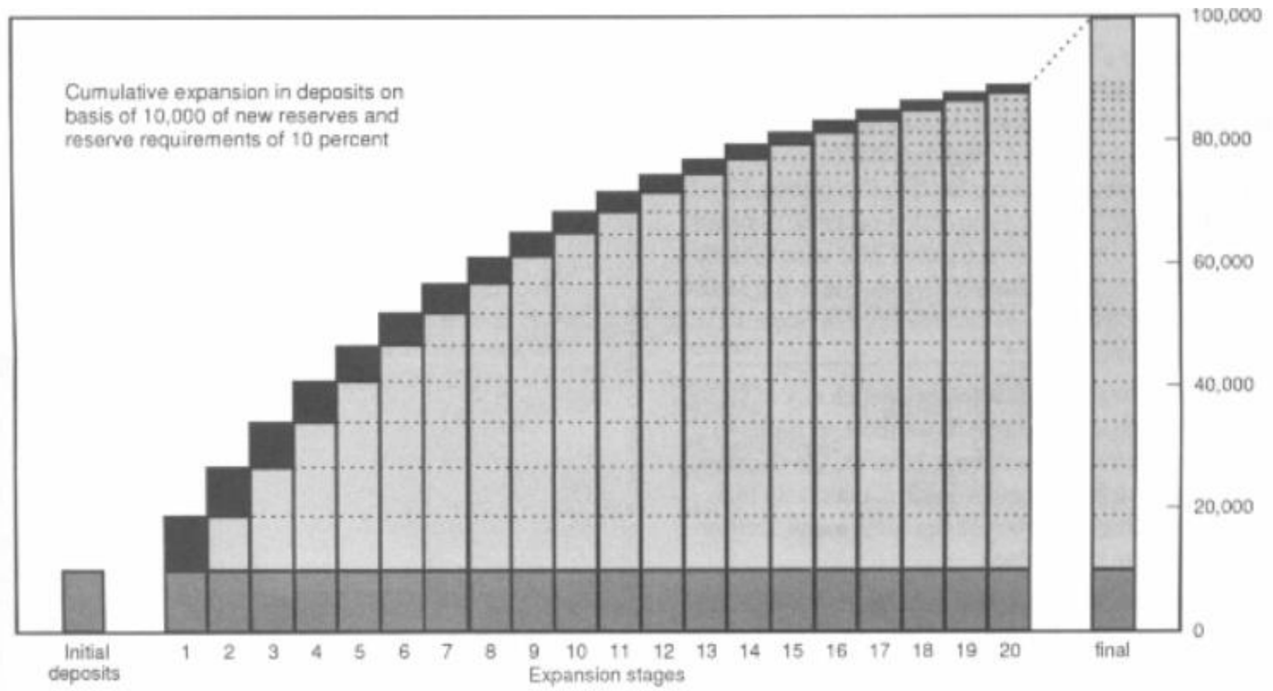

Figure 1: Monetary Expansion through money creation by a bank via FRS [3]

How does the money creation process occur? First, a bank Customer-1 brought to a bank a banknote (money) of 10,000 USD to deposit. Bank gives a receipt for the money. 1,000 USD (10 percent of 10,000) is deposited to Central Bank account as reserve requirement. S/he then leaves the bank confident that s/he can spend her/his money in the marketplace with security.

Suppose next that Customer-2 comes to the bank because s/he wants to purchase Customer-3's car and s/he is short of money with 9,000 USD. S/he would like borrow a certain amount of money. The bank finds her/him credit-worthy and, therefore, lends her/him the money asked. Customer-2 pays the money to Customer-3 and then Customer-3 becomes the bank's second depositor, leaving his money (9,000 USD) to the bank. The bank gives her/him a receipt and customer-3 leaves also the bank confident that s/he, too, can spend her/his money in the marketplace with security. 900 USD is left for Central Bank as reserve requirement and remaining 8,100 USD is lent to another Customer-4. Customer-4 buys, say another item from Customer-5. Customer-5 brings that 8,100 USD again to bank to deposit. The process is repeated until a total value of 100,000 USD within a chain (10,000+9,000+8,100+7,290+.....).

What is now the bank's position? The bank has one amount of money deposited in the bank and have issued two receipts against it. What is the collateral? By issuing two claims against the same amount of money, the bank would also have misled the marketplace into believing that one more amount of money exists than actually exists. This practice of banks can go on as much as they want. They can create as much money as they want with a stroke of a pen i.e. giving credit! Do they have the right of creating new ownership out of nothing? With the current FRS mechanism, de facto, yes.

This mechanism of money lending makes money appear to reproduce itself. But money does not reproduce itself, nor can it. Bankers are also aware of the risks they are taking. From time to time, depositors at particular banks became worried about whether there was sufficient amount of money available to meet their claims and went to those banks to remove their deposits. If too many arrived at the same time the bank could not honour them all and the business of that bank was disrupted. Depositors who had not succeeded in withdrawing their deposits before the disruption lost their deposits and the owners of the banks lost their own investments.

The FRS mechanism motors on relentlessly, increasing simultaneously both the money supply and the burden of debt [1].

ENTROPY AND FRACTIONAL RESERVE SYSTEM OF BANKING

Relationship between entropy and and the role of money in economies was brought into attention by Frederick Soddy [4,5]. He was not originally from economics (a radiochemist) and won Nobel Price in Chemistry in 1926. While he was working on social problems during a period after World War I, he came out with unique ideas where he stated that real wealth is subjected to the second law of thermodynamics with an increase in entropy causing a decay in wealth. He was extremely critical about Fractional Reserve System of banking where banks create and destroy money. Soddy applied the laws of thermodynamics to economics and pointed out that as energy cannot be created or destroyed out of nothing, so it is with wealth. He found very weak relation between wealth and money but a close relation between Gibbs free energy (available energy) and wealth. If money represents (and should represent) real goods, then creation of money -out of nothing- by banks should be stopped. He correctly identified how money supply was controlled by private banks and profits of the monetary expansion benefited only.

Economists of his time described Soddy's commonsense analysis as quixotic work of an outsider. Today, similarly people from other disciplines especially engineering are not welcome to area of economics occupied by mainstream economists (also called as Orthodox economists). In fact, it is too important to leave it to economists only [6]. The most important question to ask here is why we need money? Thinking in an extreme case, if, for example, every single individual in a society would be able to produce his/her own needs, would there be really need for money at all? Existence of money is to support the production cycle of goods and services acting as a common denominator for exchange. Today, those mainstream economists may not suggest any real solution to problems that were addressed by Soddy in 1920's.

The monetary supply today do not represent real wealth. Anyone may see it without any single course on economics. The World GDP is around 70 Trillion USD but global monetary supply including derivatives is exceeding 700 Trillion USD with a “value” of buying World 10 times [7]. The result is a hyperconsumerism taking the World people to a social and ecological disaster. What money represents today is only a debt contract, or a promise that borrower must confine with future economic activities which are not existing during time of borrow. Survival of system depends on a perpetual growth of economies in accordance with expansion of money supply growing exponentially. It is a well-known fact that during crisis times, wealth is not actually destroyed. It is mass-transferred to others especially banks which have created money in the first place. Another question to be asked here is regarding the negative growth, i.e. contraction of an economy. We could understand the shrinkage of an economy during war times due to buildings and infrastructure wrecked. If, other times, wealth is actually not destroyed, how could an economy contract? The answer is the FRS of banking where banks create money and destroy. If an economy has come to a saturation point in growth, or a financial crisis occurs, then people do not get new loans. Meanwhile, the loans taken previously are paid back which means destroy of money by banks. The real wealth are transferred to other bodies since new money may be created by new debts only. As a result, monetary supply is shrunk in economy illustrating the findings of Soddy about very weak relation between money and wealth under Fractional Reserve System. Figure 2 shows Total Money Supply vs GDP growth in USA. As seen from graph, the real GDP growth depicts a linear pattern while growth of money supply is exponential one.

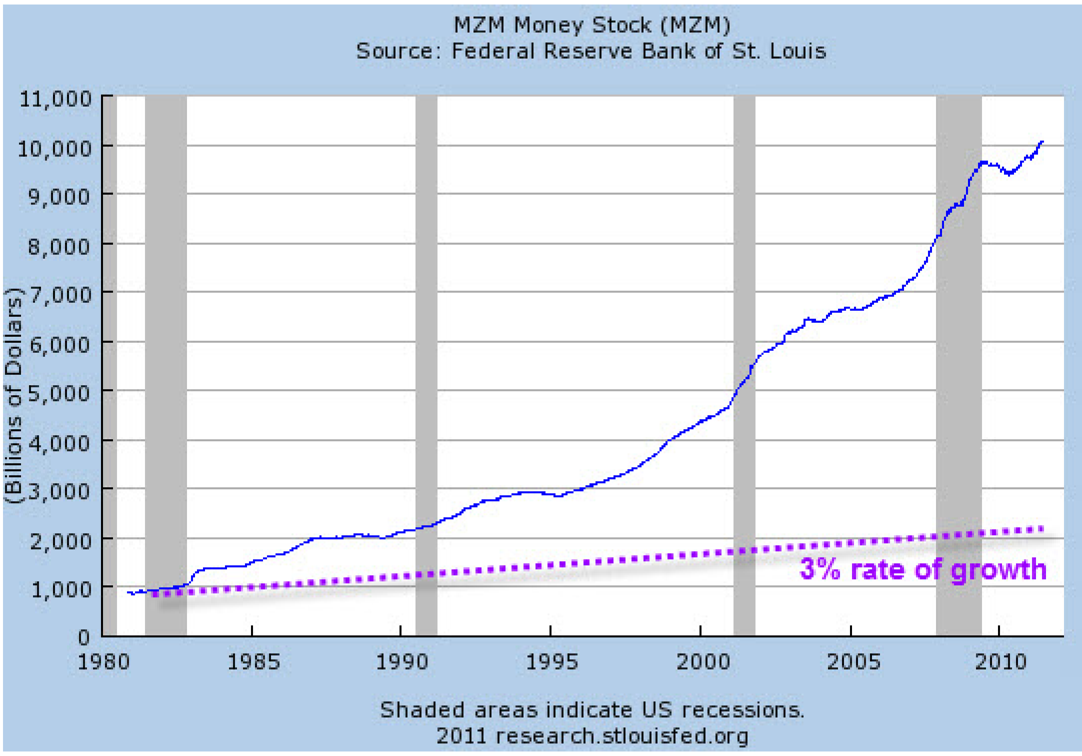

Figure 2: Total Money Supply vs real GDP Growth (USA, Fed/St Louis)

Both credit money and interest added to it are not actually measure of value of existing goods or services. They are promises by borrowers to bring in a predefined period of future time to banks which creates money out of nothing. Interest part added to credit money (usually compound one) is not existing in economies and destroys the measurement feature of money since it does not really reflect the current goods and services.

SOLUTION IS NATURAL ECONOMIC CYCLE

In [8], human society is regarded as a "superorganism", analogous to colonies of social insects. The digestive system of the human superorganism is the global economy,which ingests both free energy and resources, and later excretes them in a degraded form causing an increase in entropy. He suggests an interference by governments with responsible actions to shift labor to projects needed for a sustainable economy, dividing the available work fairly among those seeking employment, and reforming the practices of the financial sector. Soddy has suggested an index system to replace the gold standard. In this system, the Bank of England would print more money and lend it to private banks whenever the cost of standard items indicated that too little money was in circulation, or conversely destroy printed money if the index showed the money supply to be too large.

We suggest herein that the government has to control the creation and control of money in a country and not based on debt. Economies are similar to biological organisms like human bodies. The fifth layer is the socio-economic systems engineering that is related to government regulations and control. This is also including legal and political influences. There should be some reasonable relationship between the two parts, namely amount of money and production, of a socio-economic system [1].

The money creation should not be based on debt. FRS should be completely banned which means that creation of money by banks will not be allowed. Government should decide and control dynamically the amount of money in the market. The amount of money should be aligned with goods and services in an economy in such a way that balance and measurement should be maintained in a dynamic and continuous way. Taxation is needed to take out excessive money from circulation. Creation and distribution of money should be maintained through Natural Economic Cycle. Two important factors destabilizing NEC are waste and interest, respectively. Waste is the phenomenon destroying the balance by overproduction of goods and services whereas the interest is the reproduction of money by itself. Furthermore, the speed of inner cycle regarding production of goods and services is actually determined by amount of money. Excessive money in outer cycle causes faster cycles of production causing hyperconsumerism. Need for excessive money is unavoidable in FRS and interest.

CONCLUSION

Debt Based Monetary System and Fractional Reserve Systems result in an imbalance in Natural Economic Cycle between money and production of goods in favor of excessive production. Study has shown how the creation of money by the system itself and FRS cause entropy increase. It also suggests solutions to overcome the problem based on Natural Economic Cycle.

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