

## IN SEARCH OF A SOLUTION TO FIND AN EXACT BASIS OF CURRENCY PRINTING: AN APPROACH FROM ECONOPHYSICS

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### ABSTRACT

Breakdown of the world economy in the year 1920 was associated with the consideration of gold standard to create an additional circulation in money. Then that Gold standard became undesirable. Additional liquidity generation by means of quantitative easing gets a set back as it results an excess reserve causing thereby financial crisis in 2007-2010. In this paper, an idea is proposed to find an exact basis of currency printing by making a thought to analyze all the basic human needs fitted with Gaussian bell shaped curve.

**KEYWORDS:** Econophysics, Quantitative Easing, Statistical Mechanics, Liquidity, Gaussian Distribution Function

### INTRODUCTION AND EVOLUTION OF MONEY

According to the Greek philosopher Aristotle every object has two uses- one for its original purpose and the other as an item to sell or barter. A man harvested more crops than that he would need, exchanged the excess crops with other things from another person to meet the other needs. In ancient times, Cattle were reckoned as the commodity money because of certain advantages of moving for itself, reproducing and rendering services etc. Salt was also used as commodity money. The word money is derived from pecus (cattle) and the word *salário* (salary of an employee) is originated from the word *sal* [salt], in Rome.

Later, the above means of commodities was found to be inconvenient for commercial trades due to frequent changes in their values and after the discovery of metal, for its advantages of treasuring, divisibility, ease of transportation and beauty, people had chosen metal money as an exchange of trade. Gold and silver coins were minted in Greece and in the history; Gold and silver were compared with Sun and the moon, respectively by the priests of Babylon. In the middle Ages, the goldsmith used to deliver a receipt as a guaranty and as time passes, those receipts came to be used to make payments, circulating from hand to hand which gives rise to paper money. Currently, all countries have their central bank in charge of issuing coins and notes.

### EXISTING BASIS OF CURRENCY PRINTING

The quantum of bank notes that is required to be printed, are estimated on the basis of the growth rate of the economy, the replacement demand and reserve requirements by using statistical models. In India, the Reserve Bank serves the role of currency printing management on the basis of the Reserve Bank of India Act, 1934. A certain percentage of gold was kept in the safe deposit vaults of RBI keeping at par with every additional currency to be minted and directed into the circulation. Those gold standards seemed to prevent inflation by disallowing creation of unlimited extra money supply in a “fiat” currency.

Expansionary monetary policy also suggests purchasing of financial assets in order to introduce new money into the monetary system. In open market operations any additional circulation of currency is associated with buying and selling of financial assets like treasury bills, and government bonds etc.

Quantitative easing involves the additional liquidity generation in the economy by way of printing currency. In case of any failure to inject liquidity by decreasing interest rates, an open market operation is conducted to buy short-term bonds, foreign currency and even long-term government bonds, company bonds, asset backed securities, stocks during financial crisis. Quantitative easing acts as a tool to prevent deflation. But, printing more money causes inflation.

## **PRESENT PROBLEM**

The gold standard has been considered disagreeable because of its direct link with the breakdown of the world economy in the late 1920's. Since, fiat money's value is not related to the value of any physical quantity such as gold, any issue of bank notes does not fulfill the legal requirements in gold-backed economic system. A metal coin with higher face value can also be considered as a fiat currency.

The central bank can pull money out by restricting central bank money but cannot always push money out by expanding central bank money, since this may result in excess reserves, as occurred in financial crises of 2007-2010, in the United States. Economists should search for a new suitable basis against which money can be issued to meet the actual demand of the market and a sustainable growth of economy can be developed in a calculative way.

## **IN SEARCH OF A SOLUTION**

In search of an actual demand of money for smooth functioning of the economy we need to search for the actual demand and the basic needs of the people for his / her actual satisfaction in life. But the term actual satisfaction is an abstract one which can't be quantified so easily. Solution in line with the statistical averaging of certain facts under the heading of econophysics can be applied to get an ensemble average of all kind of needs of human being. To deal with the problem, the most popular Gaussian normal distribution curve (bell-shaped curve) can be used to cope up with each and every type of needs in human life. The needs for the development works can also be added as an error function and after proper fitting the ensemble average can be calculated to have an exact analysis of the problem.

In our schooling, we have learnt about the traditional needs of a human being which rotates basically around four major needs in our life- Bread, Cloth, and Shelter and Education. In our life, we run for the fulfillment along with the development of our family. The great economist Amartya Sen turned his focus on capabilities of a person rather than consumption. The fundamental need of a family varies with the number and age of children and adults. Moreover, any economic phenomena are the results of the interaction among heterogeneous agents which has a close resemblance with statistical mechanics. Many families are unable to earn self-sufficiency level income but managed to survive taking help from others. Medical and other some kind of need is time dependent. In this context it is to mention that the similarity of statistical mechanics with the economic phenomena was first noted by Maghnad Saha and B. N. Srivastava [1] And then by Benoit Mandelbrot [2]. An exchange model depicting the statistical mechanics of money was proposed by Dragulescu [3] In the year 2000. Chakraborti-Chakrabarti model [4] Gave an idea of conservative transactions of money and introduced the concept of savings, taxation in line with the steady state distribution of money. Microeconomics of the ideal gas like market models were discussed by A. S. Chakrabarti [5] In the year 2009.

Mathematical structures of the class of models to combat with the present problem in search of an exact basis of currency printing can be dealt with the Gaussian distribution function from where one can have an idea of the average essential expenditure of a family. Real data is essential to deal with the problem. It is found that a power law model can well describe the tail of a wealth distribution. But an exact model to describe the real basis of currency printing is still pending.

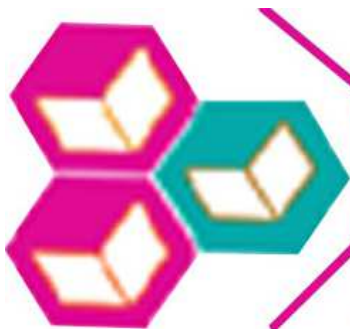
Since each parameters of human need depends on all the other parameters in a continuous fashion the Gaussian function may be well fitted to deal with the problem. The best sequence of data can be derived from the Gaussian function by fitting a real set of data along with the arbitrary numbers. By knowing the base of the Gaussian curve and measuring the tilt of that curve, one can develop a model to solve the present problem. Since the sampling errors are random, the sum of squared deviations method can be adopted as it does not change the Gaussian parameters of a curve.

## **CONCLUSIONS**

An idea is given to solve the present problem of world economy. The subject is not confined within the limit of economics, rather it is now an interdisciplinary subject and specially the Physicists and the Mathematicians should come and joined hand in hand to find an exact model so that an exact basis for currency printing can be obtained and the inflations, deflations or hyperinflations can be avoided in the long term.

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