

BIBO “@” Currency

A Stable Passive Currency System

Presentation (notes)

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“It is no measure of health to be well adjusted to a profoundly sick society.” Jiddu Krishnamurti 1895-1986

Introduction

The goal of this presentation is to provide exact technical knowledge that most anyone can understand about the true nature of the financial system that underlies the world economy. With this knowledge, it will be possible for most to confidently define, independently of political, religious or ethnic concerns, what exactly constitutes a stable currency system and what does not and why. To achieve this, we first demystify the current state of the art by identifying clearly which are the consequences of the system design alone. In this regard, we take note of the following axiom:

System design affects user behaviour but user behaviour does not affect system design unless it expressly acts to alter or replace it.

Thus just as in the game of musical chairs, the design of the game itself can be the cause of the inequity rather than the nature of the players, so too the design of our currency system can be the cause of similar undesired outcomes.

This presentation is based on a control system engineering analysis available at (www.bibocurrency.org) and thoroughly analyses the stability of the conventional money system the core of the world financial system and economy. Herein, we show exactly why this system is inherently unstable by its design alone and how that instability systematically permeates throughout all human endeavours small and large public and private. At the heart of this system, is the practice of creating all new money as principal sums of loans to which an added interest sum is applied to any outstanding

principal at any point of time of any loan term. This is illustrated by the simple interest formula as follows:

$$\text{Debt} = P(1+ik)$$

Where **P** is the Principal amount received at the beginning of a loan term, **i** is the interest rate and **k** is any given period within the loan term when payments are due.

In layman terms this means that any payment due in any period within the term or life of a given loan has both principal and interest due and the demand of interest always is in addition to the principal.

From a system's point of view this "design", has a profound affect on the viability of economic activity in general and is used to concentrate power over all aspects of economic activity. However and although it concentrates power, it does not provide control over the dynamics of its outputs. Therefore, even with the best intentions at heart, the system is simply not viable and any currency system that incorporates arbitrary unbounded growth of debt beyond the amount of money in circulation will systematically preclude long-term sustainability of any activity that depends on it.

But we don't stop at describing the problem, we also point to a simple and viable solution in the form of a "Passive BIBO standard stable currency specification" that can be found at: <http://bibocurrency.org/BIBO%20currency%20specification%20v4.5.pdf> BIBO stands for the acronym derived from "Bounded Input Bounded Output" a sine qua non requirement for linear system stability in engineering, bounded means fixed or limited within a predetermined range. Further to stability, passivity is required to guaranty that not only will the currency be stable, but that it will not be destabilising to real economic activity i.e. it will not cause systemic inflation. Passivity means that the system's inputs and outputs are not only bounded but that also outputs will not exceed inputs.

As a passive stable currency, BIBO currency cannot and will never control economic activity but this does not detract from its value to act as a stable and dependable tool to assist control by all contributors in direct proportion to the wealth they bring to transactions. Simply put, BIBO currency only acts to keep track of the amount of currency and corresponding wealth associated with that currency. BIBO is dependable because it maintains a constant ratio between units of currency, pledges of specific wealth and corresponding debt or liability. Thus, it can be said that BIBO currency @ units represent the value attributed to wealth by users and once a transaction has been realised the value attributed for that transaction remains fixed. As a consequence, the BIBO currency system as a whole is generally immune to bankruptcy providing there are people and resources to maintain wealth.

Thus, by applying the notion of stable passivity used in mathematical and control systems engineering, it is entirely possible to define a money system that, as long as there is a society capable of creating or maintaining wealth, can never go broke and yet serves us in the task of accurately keeping records of the contribution and distribution of wealth when and if so desired. By formally adopting a BIBO currency compliant spec, we provide the precedent for all future generations to enjoy a standard means for representing value in a stable, fair and dependable manner.

Because of the intimate role currency plays in all our lives, the perpetuation of the current design has led to profound psychological disorders as we in our ignorance, have developed a whole culture that unsuccessfully tries to reconcile the underlying instability of our money system with our better wisdom and sentiments. Examples include attempts to reconcile sustainable development and ecology with economy without addressing the financial system design, futile because it simply is not possible to sustain projects if our behaviour is governed or rather constantly perturbed by the present unstable design. Similarly, all attempts to configure caring and balanced social safety nets through government, are doomed if government does not adhere first to a stable financial system.

Those who understand the knowledge provided here will find that as a result they will develop an uncanny ability to navigate all the economic mumbo jumbo in ways that would have seemed to them impossible or even prophetic before. By using a systems engineering approach to defining the present system design, it is possible to capture a big picture where trends produced by the design itself that might be considered of little importance, take on a greater significance as consequences of identified cumulative processes that, to the untrained eye, only noticeably impact suddenly and at the last moment when they culminate. Like a lake with a population of water lilies that have the odd property of doubling their population exponentially every day requiring a million years for half the lake to be covered by lilies but then just one more day for the second half! And, just weeks before that million year half way point, the lake would appear much as it always has i.e. far from having half its surface covered. By studying currency design in the context of basic engineering know how, root sources of instability that can lead to such doubling trends, can be spotted and fully taken into consideration in the design of currency systems without loss of utility or functionality.

As with the population of lilies in the above example, instability of today's economic design manifests ever so gradually throughout the lifecycle of an economy producing growing unbounded outputs that feedback. At the beginning, the feedback is small and goes unnoticed but like a frog sitting complacently in a slow heating pot of water until "suddenly" it boils to death, so too we are lulled into accepting gradually increasing levels of instability until we are faced with an apparently unmanageable crisis.

The key to overcoming this is to understand the failure that is necessarily a product of the system's design alone and that the system is logical not physical. This presentation, in language most all can understand, will show in no uncertain terms how the vast

majority of serious and perilous economic ills have their root in the design of the system itself and not in the behaviour of its users.

Finally, there are many other resources available that together provide more than sufficient material for understanding and technically validating what this presentation conveys. Those who capture the complete message herein will easily be able to distinguish which of those resources are on the mark, which are close but miss and which are simply completely off the radar.

For example, promoters of a return to the gold standard recognise the need for a stable currency unit but ignore other aspects of system stability and design issues such as how a system can maintain a stable relationship between currency and many types of wealth without a gold standard and that even with a gold standard a system can still prove unstable or destabilising by design. In other words, whether backed by gold or not the issue is the logical design of the system. Others describe well the conventional money system but fail to explain the exact mechanism of inherent inflation because they interpret the system according to incomplete or erroneous knee jerk definitions of inflation. As you will find later on, inflation is only systematically induced by underlying growth of debt and any related increase in the money supply is only a symptom of that root cause not the cause.

As users we are key elements in the system where the winners, always decreasing in number, are heralded as examples of some or other virtue while losers, always increasing in number, have been charged with the responsibility of failure and the consequences it brings to society. But as this presentation will show and indeed real events certainly indicate, the distribution of success and failure is not compatible with the heralded morals and ethics of the day and as long as our ignorance of the knowledge herein is maintained, it is easy for us to cast a blind eye on the inequity that the current system continues to breed. In any case and whether deliberate or not, most have been kept in the dark regarding the complete picture of how money works and the role each of us truly plays in its design. This presentation hopefully will provide that sorely needed big and complete picture.

Some Important Definitions¹:

Money/Currency: Any unit accepted as a common medium of exchange by parties to transactions of wealth

¹ For more definitions see: <http://bibocurrency.org/BIBO%20currency%20specification%20v4.5.pdf>

Legal tender: Any currency deemed by legal authority to be irrefutable as payment for any and all debts.

Bounded-Input-Bounded-Output (BIBO): Refers to the sine qua non systems engineering criteria for stability. That is all systems that have bounded or fixed pre-determined values or ranges of values for inputs and outputs are stable all others are not stable.

Passive: Passivity of a currency system refers to outputs not exceeding the inputs.

Lesson one - The root source of currency or creation of money:

Presently, where do units of currency come from? How are they and how can they be “created” and how can they be related real articles of wealth?

When a bank finally concedes a loan the following takes place:

- 1) First and foremost, the bank will require that something of wealth that is free of any liens or previous debts be submitted as a guaranty called collateral.
- 2) The submitted collateral through a process called asset evaluation, is assigned a fixed (bounded) value in currency units that is maintained for the duration or term of the loan.
- 3) It then adds a fixed (bounded) positive number equal to the principal amount of the loan to the client’s current account. This number has a fixed (bounded) ratio with the number attributed to the collateral guaranty established in the previous step.
- 4) Simultaneously, the bank creates a special account associated with the borrower to which it enters a negative number of the same magnitude as that of the principal amount entered into the current account.
- 5) No other accounts are subtracted from in order to effect the loan.

Now, because positive numbers in current accounts can be used to:

- a) Transfer units to any other account for any reason;
- b) Obtain physical currency representing legal tender (bills and coins);
- c) Cancel negative numbers in loan accounts;
- d) Etc.

Then, the creation of those positive current account entries represents new money that is backed by a fixed ratio to the wealth that has been provided as collateral. In fact and since debt free money is no longer practiced, presently almost all currency in circulation including currency bills, coins and legal tender, are put into circulation only after first creating positive account entries backed by borrowers' pledged wealth.

The case of "Fiat" currency

Fiat currency refers to issuing money by decree i.e. by an authority usually the state or government. It has two means by which it does this:

- a) By issuing public debt
- b) By simply spending newly printed money directly into circulation to pay for public works and services.

In the first instance (public debt) the collateral is a portion of the collective value of the state or society as a whole and thus the process of money creation is identical to that described above. In the second, the money is created directly by the state and its value is equal to what the state purchases with it, it is worth noting that most if not all modern banking practices no longer support such debt free creation of money by the state.

Conclusion: In essence, currency or money is simply the medium by which "value" is perceived numerically by individuals in the course of transacting the things to which such value is or can be attributed to. These processes represent what are commonly called "money systems". These "systems" have clear and precise rules that together constitute logical designs that can be determined to be either stable or unstable by virtue of whether or not their inputs and outputs are both bounded values i.e. whether or not they satisfy the BIBO criteria for stability.

Lesson two – Destruction of money:

How is money destroyed?

Whenever loan account entries are cancelled, corresponding positive current account entries must also be subtracted or deleted. Hence, money is deleted from the system when principal debt is cancelled.

Conclusion: Since by design there is always a one to one ratio of loan account entries to current account entries, then when all loan accounts in the system are cancelled, all corresponding current account entries will also have been deleted and thus ALL such currency will have been removed from circulation. So, without loan account entries there can be no money in circulation in the form of current account entries.

Lesson three – From stable to unstable:

Ok, so where is the problem? So far everything seems balanced and stable, we have bounded inputs and outputs for every fixed (bounded) amount of wealth pledged, right?

Correct, so far everything indeed is BIBO because as long as we stay within the bounds of principal amounts, the system is stable because all inputs and outputs are indeed bounded:

1. All real physical wealth is bounded
2. The principal sums entered into current accounts are all bounded
3. And all principal debts are bounded.

But if we talk about the Total Debt due i.e. according to the simple interest formula²:

$$\text{Total Debt} = P(1+ik)$$

Then the debt output no longer is bounded because it grows as a function of interest i multiplied by the number of periods k measured in units of time, resulting in an unbounded output making the system no longer BIBO and therefore unstable by design.

Since any loan account entry cancellation requires an equal cancellation of corresponding current account entries, at ALL times the magnitude of loan account entries is ALWAYS equal to the corresponding number of current account entries, then any interest demands are at ALL times in addition to the available current account entries. Simply put, at ANY point in time both principal and interest can never be satisfied.

Such a system invariably produces residual unbounded debt comprised of both principal and interest that without issuance of new units remains un-payable.

Lesson four – From linear to exponential

Exponential defined:

² **Simple Interest Equation:** Where P is the Principal amount received at the beginning of a loan term, i is the interest rate (a fraction) and k is any given period within the loan term where payments are due.

Consider a lake with a population of water lilies that have the odd property of doubling their population every day. Depending on the size of the lake it could take a very long time even a million years for half the lake to be covered but following such a long period it will only take one more day for the second half to be covered. Note also that just weeks before the million years half way point, the lake will have appeared much as it always had i.e. far from half of its surface being covered. Such a growth pattern is far from being intuitive to the observer.

Mathematically the process is simply the periodic summing of previously summed values. If one takes a stack of cards and adds a card periodically the stack will grow in a linear fashion but if instead one adds always as many cards as already are in the stack, then the growth of the stack will be exponential growing much faster than the linear counterpart and much less intuitively.

Lesson five – Inflation explained:

Ok, common lending practices are not stable and each cycle produces an excess debt seed that must be assumed in subsequent rounds, but what are the effects on the economy as a whole?

As illustrated above, from the very first loan an arbitrary excess debt “seed” is planted in the economy and this debt seed must somehow be dealt with.

Like the first “lily” of our population that doubles and doubles in time, so too as we shall see, this excess debt seed bearing a minimum of past interest must be compounded with future interest bearing loans. This rolling over of initial and subsequent debt seeds has an important effect on the system as a whole, particularly with regards to the relationship between amount of money in circulation (current account entries), wealth (pledged) and minimum prices.

Thus, from the onset and by system design alone, excess debt i.e. without any previously stipulated wealth backing it nor any corresponding current account entries is perpetually generated every cycle and as it is compounded the system’s unbounded debt output ceases to be linear but rather becomes exponential in nature as the following system walkthrough illustrates.

System walkthrough

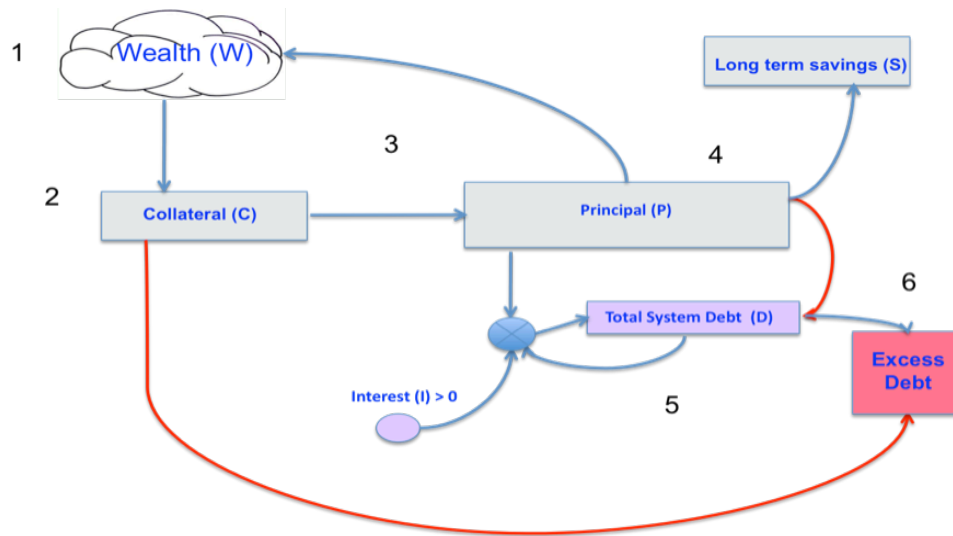


Figure 2 Financial System walkthrough

1. Wealth is generated by ingenuity, human effort and resources made available through past investment of units of currency.
2. Through the process of asset evaluation, a fixed amount of existing wealth is attributed a fixed collateral value in the form of a sum of units of currency.
3. The fixed collateral sum is used as the basis for the creation of new currency in the form of a second fixed value i.e. the principal sum of loans issued into circulation through current account entries. Since both the collateral and principal loan sums are fixed, they maintain a constant ratio to the wealth pledged.
4. Current account units are distributed back to wealth producers through purchasing transactions or may be saved or stored (at a compounding interest rate) or used to cancel debt thus reducing the total amount of money in circulation.
5. Total debt due is the principal sum entered as a negative number in a loan account to which interest is added such that the debt grows as a function of time.
6. Because the total debt created always exceeds the amount of money available to satisfy it, the system produces a minimum residual debt that must be refinanced in subsequent cycles leading to a compounding effect.

Conclusion:

The system's logical design is inherently unstable because it does not satisfy the BIBO criteria. The cause of this instability is clearly the growth component of the total debt output that includes always an additional interest that is never represented in the money supply. This growth creates a chronic deficit of currency units in the system requiring that the system constantly produce more money irrespective of whether or not new wealth is added. But, if no new wealth is added and the unpaid past debt is added as a cost to the value attributed to past collateral, the previous proportion of wealth to currency is altered causing inflation. Every time this occurs debt is compounded and subsequent inflation grows faster and faster over the lifecycle of an economy. As the debt/inflation accelerates the probability of generating new wealth to compensate decreases but to avoid collapse the system must continue to refinance past debt but with less and less new real wealth. This can only culminate in a point of debt saturation where virtually all the economy's real wealth becomes simultaneously caught in pledge (or withdrawn from circulation) so that little or no wealth (collateral) remains available for the creation of new current account entries (money). It is precisely this that leads to uncontrollable run away inflation (continuous debt money without real wealth) or other forms of system collapse.

Lesson six – Solutions

Many community currency systems provide useful models of what is needed but these systems all are faced with tremendous practical handicaps preventing them from being effective solutions to the problem described above. These handicaps can be listed as follows:

- 1) They do not express a common standard specification and therefore are not interoperable limiting their ability to significantly compete with the present unstable system. For instance, the question of value is treated differently in each, some use units of time as in "Time Dollars" others peg the value of the unit to that of conventional national currencies (LETS) in an attempt to make them compatible. Then there are issues of what is a community (is it a group defined by a set of common interests or is it geographically determined?) and how to clear payments between systems. All of these systems would greatly benefit from sharing a common standard specification and unit so that each can be expressed and governed locally while at the same time being entirely interoperable with each other.

- 2) It is often invoked that the problem of the present system is that it is too large and global and therefore it is best to have many unique and non interoperable systems. This argument is logically flawed in the same way the following argument is a logical fallacy: Because my house collapsed and it is bigger than Peter's then all houses bigger than Peter's will also collapse.
- 3) Finally, these systems do not interoperate with the worldwide de facto currency standard that already has most of the wealth tied up in legal contracts with national legislation supporting those common lending practices, leaving little wealth to back alternative currencies once again maintaining the effect of these marginal compared to the impact the prevalent unstable system design has on the world economy.

Another practical solution is simply that the present financial system adopt a Passive BIBO standard specification i.e. produce interest free credit against any and all tangible assets including human work hours charging only a service charge up front. This would immediately stabilise the system at its present price levels as interest-bearing debt would quickly be replaced by interest free debt and as long as the interest function is not introduced again, the currency system would remain stable. This solution has the added advantage of maintaining intact existing infrastructures, currencies, credit and debit cards etc. but sustainably.

Finally and as a matter of basic human rights as we all have the right to freely negotiate our value beginning with our time and our labour; it is our right to directly implement a stable and dependable currency standard. Furthermore, it is the obligation of all public representatives to guaranty such to all their constituents. Since the knowledge of the design problems of the present system are now known and more importantly a clear viable alternative design is offered, ignorance is no longer an excuse and all leaders, professionals and anyone capable of understanding the contents herein are required to take stock and to act accordingly and responsibly. This means, that all that is required to resolve the problem is that a minimum infra-structure be provided to:

- a) Maintain account balances for every entity in the system
- b) Keep track of the wealth transacted as the minimum required value to back the transactions
- c) Allow users to pledge their wealth as backing for the transactions they are responsible for

Present System's End Game (Epilogue)

The present system's endgame, which we are all experiencing today is when the whole world is caught in a web of impossible debt as all or most of the real wealth is either locked or has been siphoned out into the hands of few. Yet, debt continues to be

created but on less and less corresponding wealth until, as is the case today, it is based merely on the promise to pay old debt considered to be “productive” only because it is expected to provide a monetary “return” which is perceived as “value”. However, the direct and pure link between the pledge of real wealth and the units of current account money has been severed because attention is only given to monetary “return” while losing sight of the link between the new money being created, what ever real wealth remains associated (now only indirectly) and the burgeoning debt growth (root cause of inflation).

In this sense, the system can be likened to a vacuum that continues to aspirate pure air after all particles (real wealth) have been aspirated. Similarly the banking system extracts wealth out of its freehold status until it is all tied up in debt contracts (or parked aside) leaving only past debt instruments (pure air) as the “value” that inevitably just produces more money backed by more debt (pure air).

By everyone verifying the money system design, we all can clearly see that we indeed have the option to implement an alternative stable currency design immediately. Thus, it is in our grasp to instantly repair the system for as long as we maintain the principle of Passive BIBO stability, all may enjoy a stable and dependable medium of exchange.

So, either the Bankers step in and provide morally acceptable stability for all or we ourselves must directly institute the Passive BIBO standard. Either way, welcome to the real prospect of a new age of stable, fair, dependable currency, available at all times to all and for all and any transaction.