

White Paper:

A New Theory of Money & the Resulting Implications

Introduction

CST sets out here a new definitive theory of money that explains the current and past issues and predicts the future for commerce, work and wealth creation.

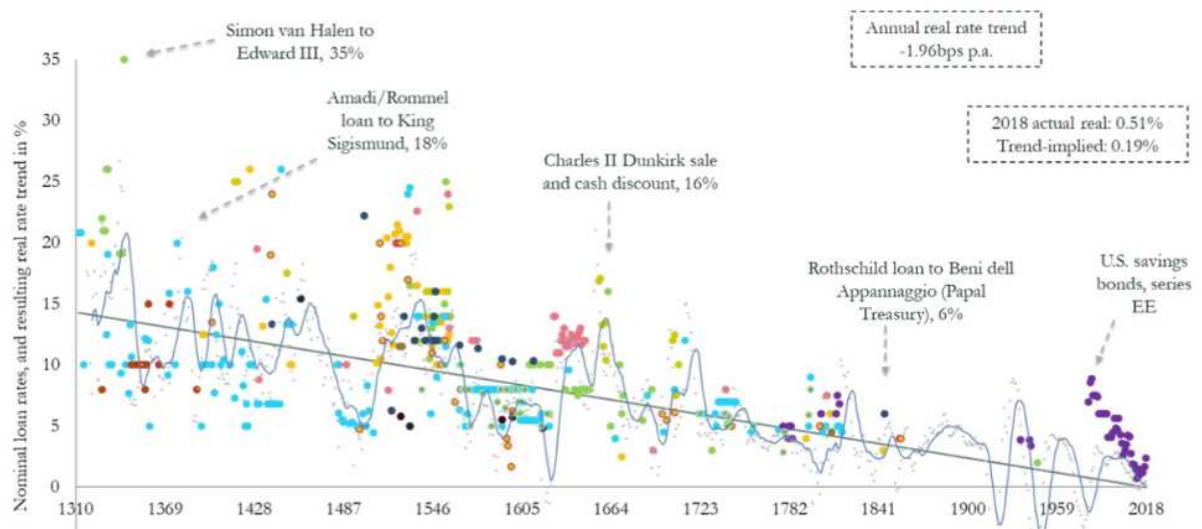
This new theory is built upon two basic defining concepts:

- 1) The value and measure of money (or equivalents)
- 2) The relationship between money and human tool-making

Firstly, we consider the historical path of the value of money. This provides the data from which our new theory is derived.

The graph from the BOE below identifies the declining trend from 1300's to present day. (Bond yields show a similar decline.)

<https://www.bankofengland.co.uk/-/media/boe/files/working-paper/2020/eight-centuries-of-global-real-interest-rates-r-g-and-the-suprasecular-decline-1311-2018>



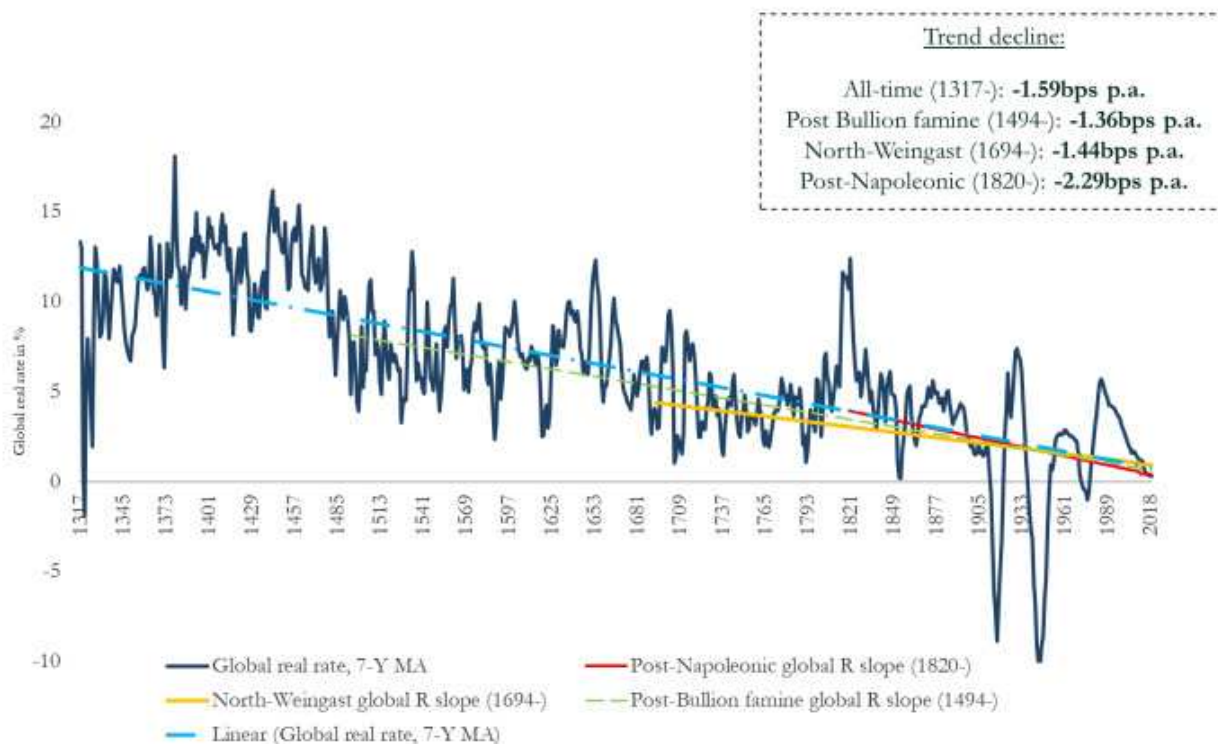


Figure IV: Headline global real rate, GDP-weighted, and trend declines, 1317-2018.

Such a long term trend is likely to be driven by some basic factors. This paper considers that the main factor at work in this declining value of money is the increase in efficiency of human work output due to changing technology.

We simplify money value in terms of future work output. This paper sets out each step of these definitions and concludes that as tool efficiency tend towards infinity over the next fifty to hundred years, the value of money must trend to zero.

Summary of the Theory

Our theory is based on a core concept of **'total work output per human per day'** we define this work output per day as a **'Work-Day'** multiplied by the **'Capital Employed'**.

We use these terms as they represent real world terms within western capital systems prevalent during the period under consideration.

Due to the conclusion that money is simply **the value of future work output (see below)** We can therefore define the basic unit for the valuation of **all** money systems as **'Work-Day' multiplied by the 'Capital Employed'**, where the capital employed is the actual tool process carried out at the (future) time of the employment.

Capital Employed is the multiplier that turns the work input (of one individual) to the total output of their work time. This is dependent on the efficiency of the **tools** applied, (in the widest sense).

We define capital employed (see below) as a function of tool efficiency which is itself based upon the work-days required to create those tools employed. **This means we can define money value simplified to the terms of work-days and an efficiency function (fe).**

We conclude that the increasing efficiency of tools from the 1300's, (efficiency function fe), leads to the reduction in money value seen in the graph above during the same period.

Defining 'money value':

Money is a strange concept. We can understand the value of things such as food, building materials, transport systems etc, and we can understand the process of arriving at these things by inputting human endeavour with the use of capital employed such as machinery, energy or special tools. We can also understand that if some useful or revered material or process is scarce, humans will value them depending upon their scarcity.

Attempting to value money itself is conceptually difficult. Much of our money systems are based on future values for money. We save for the future, we create systems for such savings such as bank deposits and pension funds and we create debt, (which is simply the future liability to deliver goods or processes). We consider money therefore as future wealth, i.e. the ability to create this wealth at some point in time in the future.

Putting aside the money value based on scarcity, (we return to this later), we need to define money value in real terms of this wealth creation process.

We know today's value of money as it equates to the price of materials and processes we can purchase today and we can define our basic money value at any point in time, present or future, by:

$$\text{Money Value} = (\text{Work-Days} * \text{Capital Employed})$$

The relationship between money and tool making:

We understand and accept that humans have progressed along the ages. Our wealth creation processes do indeed stand upon the shoulders of our forefathers. Humans invent tools and refine tools along the generations. Such progress is iterative, in the sense that to make a more efficient tool requires a tool and so on.

Over the period from 1300 humans have seen massive iterative progression in tools and in the efficiencies of one worker output. This is clear even from the simplest view of history; from the scythe, the river boat, the windmill, the horse and cart, to the ships, steam trains to the phone and computer driven machinery and currently to the automated data systems.

We can see that this progression has been continuous over an extended time period. It may have had ups and downs derived from local actors such as wars and changing political and social systems, but the trend to increasing efficiency of each worker has been unstoppable.

Our theory requires us to define this tool efficiency increase. We do this in the term of 'capital employed' as the multiplier of employment time input. This is because capital employed is a real value that encompasses the iterative nature of all tools and all processes involved in any production of wealth.

Our definition of money also requires us to define Capital Employed. This can be achieved by considering the required input to create the Capital Employed. The capital employed is essentially the set of tools in the broadest sense employed to create the material or process.

As these tools themselves require Work-Days to provide, we can define capital employed thus:

$$\text{Capital Employed} = (\text{Work-Days} * fe)$$

Where fe is a complex function of tool efficiency and the work days are the total work days required to provide the tools employed. As the iteration of tool making requires the application of other tools, this efficiency function is complex, but can still be defined as work-day input multiplied by the overall efficiency of the tools employed.

Thus we can define final Money Value as:

$$\text{Money Value} = (\text{Total Work-Days} * fe)$$

If the value is based on the production of material and processes as we have defined already ($\text{Work-Day} * fe$), then the future money valuation can be also be defined at some point in time, and this value will be based directly by the tool efficiency available at that time.

The larger fe becomes the less time is required to finalise the final material or process as the tools become more efficient. Thus as fe increases the overall Work-Days tend to decrease. As the efficiency tends towards infinity, one Work-Day produces a wealth output also tends towards infinity.

Since throughout the ages, tool making efficiency has increased with time and we see that Money Value is simply dependant on the Work-Days necessary to create materials and processes. Thus over time, these Work-Days tend toward zero as the tool efficiency (fe) increases.

We can see therefore that as humans have steadily increased the effectiveness of their tools, the value of money will have decreased. This is what the graph above is indicating, the value of money is tending towards zero as the tool efficiency tends towards infinity where there is only one Work-Day input required for infinite wealth output.

The complex function fe is likely to be an exponential function. This is because tools are used to create improving tools. So we can expect the pace of increasing efficiency to increase over time. This leads to accelerated (step) changes as new tools lead to a sudden reduction in Work-Days for a given output. This was clearly the case in the period of the industrial revolution period and in the more recent computerisation period.

A current accelerated step change has also likely begun. The use of robotics and AI is almost certainly going to bring an accelerated change equal to, or greater than the industrial revolution. This means that our efficiency function fe significantly increase and our Money Value takes an accelerated step change towards zero.

The greatest step change in efficiency will occur when the robotic and AI systems become effective enough to create a cycle of tool making that requires zero Work-Days input. In terms of our money definition:

$$\text{Money Value} = (\text{Total Work-Days} * fe)$$

Where Total Work-Days are simply the Work-Days required at that point in time, as the Capital Employed is reduced to the efficiency function alone:

$$\text{Money Value} = (\text{Local Work-Days} * fe)$$

Such a process can be contemplated now, where new tool making tools could be made by a robotic factory system that requires zero human input. This change is likely to happen over many years as these technologies improve, but at some future point the above expression will be valid.

As the progression of tool making and efficiency is likely to continue, at some future date, there will be effectively zero Work-Days. We must conclude therefore that at this point in time, both savings and debt become zero too. How quickly this will occur is not clear, but there is likely to be over the next 50 years or so an accelerating trend towards zero Work-Days.

Scarcity Money Value

This can simply be defined as:

$$\text{Money Value} = (\text{Work-Days} * \text{Scarcity function})$$

Mostly, for materials such as gold, works of art, the Work-Days are small and can effectively be ignored. Thus, we can write:

$$\text{Money Value} = (1 * \text{Scarcity function})$$

The scarcity function is based upon two factors:

- 1) The human desire for the scarce resource
- 2) The actual physical resource and its ongoing availability

Defining the 'human desire' is complex and changes over time due to human perception. Gold in future, while scarce, may not be considered as important. Or, indeed it could become much more sought after if some future society considered it necessary to own.

As most of these scarce resources do not make a real difference to the overall wealth production process, we do not need to complicate our definitions with this scarcity money valuation. And as these scarce resources are based on human desire, these cannot be used as a long-term valuation as they are by definition likely to change due to changing cultural issues.

Resource Scarcity Implications

There are a few scarce or physically limited resources that impact significantly on real societal values and human needs. These have a direct impact on the future implications of money value as and when the efficiency (fe) function tend towards infinity.

Such resources are finite world resources such as accessible land, farming land, available coast lines, river resources, inland water resources, building and housing land, travel air space, travel road or other transport system availability, water.

As the money value tends towards zero, these real world scarce resources will continue to rise in price and become exponentially expensive. This impacts upon the very core of societal behaviour and consequential political processes.

Our money value definition provide a wake-up call for this coming scenario. The covid pandemic created increased house price valuations across the world, especially where there was a perceived improved lifestyle. This perhaps provides some indication of how quickly humans can re-evaluate their perceived values when their situation changes and when the

new money valuation definition proposed here has been widely accepted there will be rush to purchase these resources.

Notes:

Savings & Debt - an Explanation

Many people view savings and debt in terms of future money value. There is little consideration of what this really reflects in the real future economy or how the value is made good in some future time.

We have shown above that money value is simply based on a function of Work-Days. Both savings and debt are therefore the future Work-Days that can be purchased at that time. If this seems counter-intuitive, consider what other than money can actually be saved (kept) for a lengthy period such as 30 years to provide for say a pension. You could try to hoard specific items that will not deteriorate such as gold, platinum etc. You could try to keep valuable items such as works of art or scarce products or land, property etc. However, lets say that whatever you kept the future society had found much more of your material (gold etc) or that your work of art depreciates due to damage or just goes out of fashion or your property goes underwater. We can see that this attempt to save is not reliable. Thus we can safely say that most future savings do rely on the Work-Day definition applied to some future date, where the actual money value is dependant on the future human work output.

The Future of money

The timescale for the changes considered above where the efficiency function is so large that it reduces the money value to approximate to zero is the most difficult thing to predict. Many issues may prevent a simple progression, from wars, global warming, famine and the likely prevarication of many societies to accept that humans are no longer required in many wealth creation processes.

It is likely that such changes will occur during the lifetime of our children today. The industrialised societies must contemplate this change and accept that as the money value tend towards zero, societies find solutions to the issues of replacing the current money systems and creating new challenges for their people that do not rely on Work-Day input. The wealth creation process will still occur, materials and processes will still be created albeit with little human input.

For much of history humans have accepted they need to work. We have also accepted in western cultures the acquirement of capital as a result of this work. Capital has been the driver of new tools and this has created a divide between those able to put capital to work, (interesting phrase as it captures informally the money value definition above), and those without capital. The industrial revolution created a significant divide in many societies due to its effectiveness at creating and harnessing new tools.

We are seeing now the creation of a similar set of people who own the robotic, communication and AI systems (google etc al). This is again driving a deepening divide in many western societies.

As this current revolution reaches its climax, where robotic systems can provide new robotic systems without any worker input, all these western societies will need to change fundamentally as it is clear from the above analysis that the money values within these societies becomes worthless.

Future options

What are the options for western societies? There seems to be a number of potential ways forward that would keep these societies from disintegrating entirely:

- Replace the money system with another type of exchange process
- Create a two tier society that has capital owners and non-workers without capital
- Change the political process to a single party system that imposes the rules and regulations

CST's preferred route has always been to create a new exchange process that is based on resources rather than money. The difficulty is within the change process that is likely to be drawn-out over many years. Robotics is not suddenly going to become fully efficient requiring zero human Work-Day input. During this extended period, societies face increasing unemployment and dissatisfaction with capital owners. This is the challenge facing our societies probably over the next 50 years. It has almost certainly begun already, but like many such changes, it will be much easier to see with hindsight.

What is interesting at current times, few politicians or economists seem to understand the enormity of this coming change or that it is a culmination of the historical tool making process. They do not understand that this started when the first tool created a reduction of Work-Day input needed to create a given wealth output and it has continued relentlessly ever since.

Until this process is more widely understood and accepted, the basis of why the money value is tending towards zero, will not be understood and accepted and this will continue to hamper political change to find an acceptable solution.

Other non-western societies

Interestingly, this analysis looks better for countries that have imposed totalitarian political systems. Countries such as China & North Korea that can dictate the value of money without recourse to the means of production are likely to be able to manage this change more easily. Their economies will eventually utilise similar robotics and create the need for zero Work-Day input, but they can simply decree a money standard centrally and provide the wealth created from the robotic systems via their central political controls.

Current misunderstandings

Work Efficiency:

The current issue with attempting to measure work efficiency is skewed. Many 'workers' have a very high efficiency, for instance companies such as Google create data processes that would have required millions of Work-Days with just a handful of employees over a few days. Other workers have been pushed towards very inefficient jobs where the tools used do not necessarily provide for an improvement over the standard Work-Day. In our analysis this means that fe approximates to one. So we can see that workers are being split between two extremes, one where fe is tending towards infinity and the other where fe is tending towards one.

Due to this any measurement of overall efficiency does not provide a sensible value. What is becoming clear already is that because many processes have now been already replaced by technology (very efficient tools), many people are seeking alternative employment in areas that are very low level (ie that have very low efficiency).

This trend is likely to continue as technology replaces more and more higher level jobs. There is little incentive for the capital owners to improve low level employee efficiency, especially those on zero hours as the cost of employment is so low any efficiency saving is not worthwhile for the employer.

Pay rates:

Many low level, zero hour or self employment jobs cannot easily be made more efficient due to their very nature.

Higher level jobs are currently associated with data processes and these are subject to efficiency measures by applying modern technology. The trend is likely to continue until most of the higher level jobs have been replaced by technology and the low level jobs achieve lower level hourly rates due to increasing competition. Even if the minimum hourly rate is increased by law, the rates for self employment will continue to fall in areas that become increasingly competitive with a low skill entry level.

The predicted acceleration due to AI and robotics will eventually remove most of these low level jobs also due to robotic systems becoming increasingly able to achieve a similar result. As an example, some human cleaners will have already been replaced by robotic vacuum cleaners.

Levers for change

From this analysis there does not seem to be many natural levers for moving these free commerce societies in the right direction for the trend of zero money value. The basis of the capital society is the owner / worker duopoly. Much of the power within the society, both political and social is derived from the owners of the employers and owners of the capital.

For this group to acquiesce to the working group requires a leap of faith. It is unlikely to happen until it becomes a necessity for the survival of this capital ownership group.

Universal Living Wage

One possible solution is a move towards a universal living wage for everyone. This would help alleviate the main survival requirements of the non capitalised group and allow the forward motion of technology to continue to improve efficiencies without recourse to being blocked politically. This is important as already some observers wish to see such levers as taxing the new technology (a robot tax for instance) that will just create a slower change process and prolong the agony for much of the society. A universal living wage would provide the space and time to allow the technology to continue at pace, it may even speed up this process as very low level workers would be removed from the work equation completely, thus requiring technology to replace them as the effective hourly rate would be increased in competition with the living wage.

Future areas of difficulty

The main area of concern in future is even if we find a way of averting a major societal breakdown, as the future unfolds and it becomes increasingly obvious that money is effectively worthless in the wealth creation process, the people will naturally grab at other values to hold onto their wealth and future leverage. These are few and far between but include land and property. The capital class will seize upon these to provide a leverage on others for their personal needs.

Thus we are likely to see significant difficulty for the reasonable sharing of such land and property. Adding to this difficulty will be the fact that few people will be spending their time working and their lifestyles will assume the increasing use of such property and land, this includes beaches and open spaces such as parkland. It is clear that a solution must be found if we are to prevent escalating tensions or land wars.