On the Relationship of Money Supply, Consumer Demand and Debt

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Abstract

This article assesses economic growth in the context of consumer saturation. We show that consumer based economies tend to suffer from demand saturation after an initial and prolonged period of growth. However, structural demand saturation irrevocably triggers a Minsky-type super cycle that is characterized by high debt, high income inequality, stagnation and financial instability. We show that controlled debt deflation through negative interest rate policies can be effective in combating recessionary conditions and resolving the debt crisis.

Moreover we show that monetary policy can help to mitigate the effect of consumer saturation through yield curve targeting. The idea is to ensure that economies do not grow too quickly, but maintain a growth rate which corresponds to the demand growth rate at which consumers replenish their stock of goods in the long run. We argue that such a policy avoids boom and busts and smooths out the business cycle.

Keywords: Monetary policy, fiscal policy, inflation, money supply, debt deflation, GDP, T-bills.

1. Introduction

One of the central challenges of monetary and economic policy over the past decade has been to find ways to effectively combat the recessionary conditions and cushion the financial turbulences of the great recession after 2008. As a result, governments and central banks of leading economies have designed massive emergency debt relieve programs and bailout packages to buy distressed assets and inject liquidity into banks and financial institutions to stabilize credit markets.

Although, these measures arguably helped to temporarily deflect the onset of a wide-scale economic depression, yet, they fell short of substantially reviving economic activity. One reason is that, instead of stimulating business and lending to consumers, banks have mainly accumulated money in their deposits or in safe government bonds, even though nominal interest rates have been pushed down by central banks to rock bottom lows. Thus, financial intermediaries still remain largely dysfunctional as a channel to transmit credit to the *real economy* and stimulate growth.

As a result, central banks face the monetary conundrum that monetary tools start to run out of options when nominal interest rates reach the zero bound while the, at the same time, prospects of increased inflation and/or economic growth still remain low. This problem has been highlighted by former Fed-Chair Bernanke (2016) who admittedly states that the current monetary system faces *"very low nominal interest rates, excess global saving, low inflation, and high demand for safe assets like government debt."*

In this article, we explore the role of negative interest rates to stabilize financial markets and incentivize increased lending to business and consumers and thus sustained economic growth. We argue that negative interest rates help to revive economic activity in the long run through a necessary process of debt-deflation in the medium term.

Our argumentation follows three fundamental presumptions. First, consumer based economies naturally tend to saturate in the sense that growth phases are superseded by a gradual decline in growth rates and return in capital investments. We argue that this economic saturation naturally arises from a decline in residual demand for goods as consumers gradually accumulate the stock of desired goods during their lifetime.

Second, we argue that the process of consumer saturation irrevocably triggers a Minsky-type super-cycle preparing the ground for financial instability and recessionary type of conditions. The reason is because real economic saturation increasingly and gradually incentivizes a shift of investment capital into the financial sector and, thus, a growing expansion of debt. As the rate of return in the real economy diminishes, investors, in pursuit of high returns on investments, take on more risks and

thus exacerbate speculative bubbles and debt inflation.

Debt inflation increasingly sets off a self-defeating cylce of wage-cutting and demand shortage. Â´Firms have to increasingly cut down costs and reduce wage salaries to serivce their debt payments. This has two important consequences. First, in the late stage economy, real wages decline and unemployment, income and wealth in-equality rises while economic output stagnates or even faces the risk of recession. Secondly, the imbalance in money transfers or cash flows between the financial economy and the real economy are likely to grow to unsustainable proportions. The real economy is faced with a dis-proportionately growing and unsustainable burden of debt loan payments that exceed revenues from operational income in the real economy. Ultimately, while the real economy faces a shortage in money, the financial economy piles up cash and debt obligation that have to be serviced by the real economy.

Therefore as economies converge to structural demand saturation, economies are subject to financial instability. Minsky (1977) argues that financial instability results from a gradual shift from traditional financing to Ponzi financing schemes that is due to over-optimism or over-speculation. We argue that this shift arises from a different reason.

When the real economy faces structural demand saturation, firms and consumers increase their savings rate and cash holdings and thus precipitate the demand for financial products and financial markets. Therefore, as economies face saturation, a substantial portion of money and wealth does not participate in the production and exchange of real goods but in the creation of financial bubbles. Thus, the expansion of financial markets is a result of stagnating real economies.

One of the key implications of Minsky's *financial instability hypothesis* is that policymakers should rein the financial innovations and practices, enforce tighter market regulation and regulatory oversight.

We propose two alternativce policy approaches that address the problem at different stages of maturization. The first adresses the problem of resolving the financial crisis when an economy already faces saturation and financial instability. We argue that enforcing a strict negative interest rate policy can resolve economic stagnation through a necessary process of debt deflation. Negative interest rates deflate debt and mitigate the imbalance in money supply between the real and financial economy. This ensures that debt payments reduce to the extent that they remain redeemable by businesses and consumers.

This implies that central banks have to switch from traditional inflation targets to yield curve targeting to ensure that yield curve remain steep even when they cross the zero bound. In this paper, we show that money market interventions are more effective in combating recessionary conditions than typical inflation targeting

policies.

The second policy initiative is aimed at preventing saturative conditions in the first place. We argue that central banks have to conduct an interest rate policy that is aimed at smoothing structural demand out in time. Precisely, economies should not be allowed to grow too quickly, rather economic activity should be forced to align closely with the natural rate at which consumers replenish their stock of goods.

This requires that interest and yield rates should neither significantly over-shoot nor under-shoot expected natural growth rates. In such a setting business cycles flatten out and converge to smooth steady state economic trajectories.

Saturation can be both, global and local in time. Global or long term saturation corresponds to the long run decline of economies from their start. This is best illustrated in Figure 2. Short term saturations correspond to declines of economic activity on the scale of typical business cycles.

Thus, one important implication is that central banks have to align closely their long and medium term monetary policy with expectations of structural demand to thin out the process of saturation as much possible so that it maintains a natural and sustainable growth rate.

As interest rates and bond yields reflect expectations of future economic output, economic activity in the short and long run interrelate with the corresponding short and long run yields. We show that financial instability in the short run arises after a phase of economic recovery, when short run yields start to price growing revenue expectations. When expectations of revenue grow faster and surpass the structural future demand, economies will face recession. Therefore recessions are likely to occur when the yield curve inverts.

Thus, to avoid recession in the long run, we argue that central banks can prevent short term yields to appreciate too quickly during the growth period using yield curve targets.

Our paper is a contribution to the literature that assesses the the linkage of *financial* markets and *real* economy by assessing the role of negative interest rates under recessionary conditions. The relationship between money markets and good markets has already been subject of early theoretical studies. Rostow (1959) explains the stages of economic growth by looking at different historic and social-economic conditions under which a *take-off* may happen. He finds that the leading sectors of an economy tend to have a rapid growth phase early in their life.

Empirical research has shown that the linkage between real and financial markets is profound and such that money markets have substantial predictive power over economic output (eg., Kozicki (1997), Haubrich and Dombrosky (1996)). Yield curves, in particular, have been shown to possess substantial explanatory power over economic output and inflation (e.g., Estrella (2005), Giacomini and Rossi (2006)).

Our economic setting is briefly explained in the next section. In section 2 we discuss the growth and saturation phase. In section 3 we provide some major implications and finally we conclude.

2. The Economy

We consider an economy with consumers, manufacturers, investors and banks. Consumers buy goods and services provided by manufacturers or producers of these goods. Manufacturers pay wages to employees which allows employees to act as consumers. We assume that all active participants in the economy are endowed with something that has value, such that it could be traded or exchanged for receiving money.

For the purpose of our analysis, it is helpful to categorize economic activity into two groups. The *real economy* consists of all participants that are directly involved in the production and exchange of goods or services that are closely related to goods. (i.e., consumers and manufacturers of goods). The *financial economy* on the other hand consists of institutions that do not operate businesses to produce physical goods directly, but to sell, buy, issue and manage claims on cash flows and loans to participants of the real economy or other financial institutions.

The issuance of loans and money supply is fundamental to the economy in order to facilitate the exchange of goods. Money supply is guaranteed through banks and the financial sector. Banks provide consumers and manufacturers money as a mean to facilitate the exchange of desired goods either through financing investments in the production of goods or through consumer-based credits. In general, credit injections, either way, lead to economic activity. We will show below, however, that there is an exception to this general rule when consumer demand is *saturated*.

The central bank is the key facilitator in the supply of money as it *injects* money into the economy through a system of financial intermediaries or banks. Thus banks may serve as either a hindrance or multiplicator of money supply into the real economy depending on their proclivity to issue credit. Generally, central banks have two monetary options to control the supply of money and thus to control the level of economic activity: 1. Purchasing bonds issued by the consumer/investor economy or by the government. 2. Shifting interest rates. Since banks are limited in giving out loans due to reserves constraints, direct financing, or direct purchasing of issued bonds, conducted by the central bank are a way to surpass this constraint. Whereas the purchase of bonds automatically increases the amount of money in circulation, the shifting of interest rates does not, but has important implications on future spending and consumption behavior as we will discuss further below.

Figure 1 shows the flow of debt obligations between the two channels, the capital market and the real economy, from issuance until redemption. The central bank

issues these debt obligations, or money, in order to control money flow in the capital market. Capital market distributes via banks the money into real economy or to private consumers or investors. But money injections can also be executed by the central bank using direct injections into real economy. This is conducted by the purchase of bonds which are issued by real economy. This way of direct financing is one measure to increase money supply. Therefore it is only applied when expected rate of returns are declining or negative. This means that the interests paid on bonds issued by real economy never exceeds the interest rate which real economy has to pay to capital market in order to redeem debt.

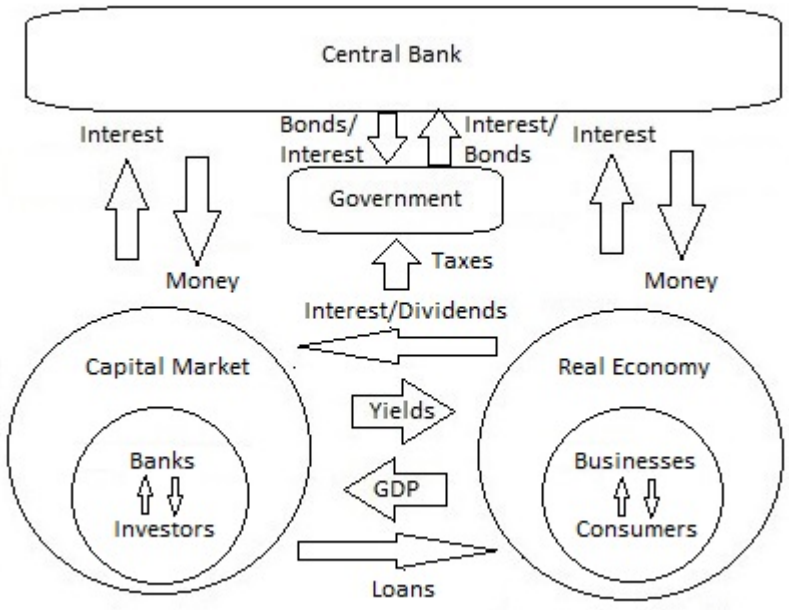

Figure 1: General and inter-temporal money supply balancing between capital market and real economy.

2.1. Phase 1: Growth

At the initial stage of our economy, we assume a very rudimentary and basic economy. That is, we assume that consumers are in need of very essential goods that provide maximal marginal utility among all goods that are available. These goods are typically elementary or essential in one way or the other. Such a situation may arise after war or any other social process of expropriation of goods either through complete destruction, natural dis-integration or obsolescence.

In such a setting, clearly, the economy faces a strong demand for goods. Consumers are willing to exchange money for essential goods and investors are willing to borrow money from banks to produce these goods. As production capacities increase, employment rises, as do wages. This re-amplifies the initial demand for

goods and initiates a positive feedback cycle in economic growth and demand for money. Therefore growth phases are characterized by an increase in outstanding loans, money supply and debt obligations. As this is a self-perpetuating mechanism, growth can sustain over longer periods. We will further show below that a natural process, called *economic saturation*, gradually diminishes the demand for goods and thus ends the growth phase.

Yet, growth phases are phases of debt accumulation. This is because demand for the exchange of goods and production of goods requires capital on both sides of the exchange. Therefore, growth not only critically depends on sufficient money supply and credit but, at the same time, is also highly susceptible to money injections. That is, every unit of injected money is expected to contribute to an additional realization of marginal growth in demand and economic output.

The reason is simple. During growth phases, money injections are mostly channeled forward to the real economy and thus facilitate growth and exchange of goods. The deeper reason behind this is that the return of capital investments in a growing real economy generates substantial revenues and profits that make an investment worthwhile. Similarly, revenues and profits from the exchange and production of goods are more likely to be re-invested to operational growth. Growth phases, therefore generate self-perpetuating and persistent economic growth cycles.

This has an important implication for the role of financial markets in organically growing economies. Because the level of cash hoarding and saving rates is minimal, less money is delegated to the financial market and invested in financial assets. Hence, the role of financial markets is reduced to act as a lender to the real economy and not to provide assistance in the trading, management and exchange of financial assets. Therefore, growth phases largely preclude the existence of speculative bubbles. With an innocuous abuse of language, we might say that during the growth phase, naturally, financial markets are less developed.

Yet, because of demand of money, growth phases are characterized by inflation of debt and credit. And as long as consumers continue to demand goods, firms are likely to perpetuate borrowing to earn future profits.

During the growth phase, demand for money also affects borrowing costs. Borrowing costs such as corporate or treasury yields and interest rates reflect earnings expectations (and thus growth rates) of the real economy. Thus as long as the outlook on growth rates is positive, the cost of money and borrowing will gradually reflect the higher demand in money. Therefore during the growth phase, yields, interest rates and coupon levels of newly issued bonds are likely to increase.

Borrowing costs can substantially adversely affect growth phases even when consumers are willing to pay for goods. For instance, cost of borrowing can surpass the revenue expectations due to over-speculation or over-optimism of financial agents or

because demand of money exceeds its supply. In such a case, banks effectively create money shortage and do not fulfill their role as credit lenders. Money shortage or high borrowing costs can ultimately lead to recessionary conditions and precipitate an end to the growth phase in the short-run as well as in the long-run.

This mechanism is best illustrated by the dynamic inter-relation between yield curves and the onset of recessions over the past hundred years. Most recessions over the past century have been preceded by an inversion of the yield curve, that is, by a substantial increase of short-term bond yields (see Figure 2).

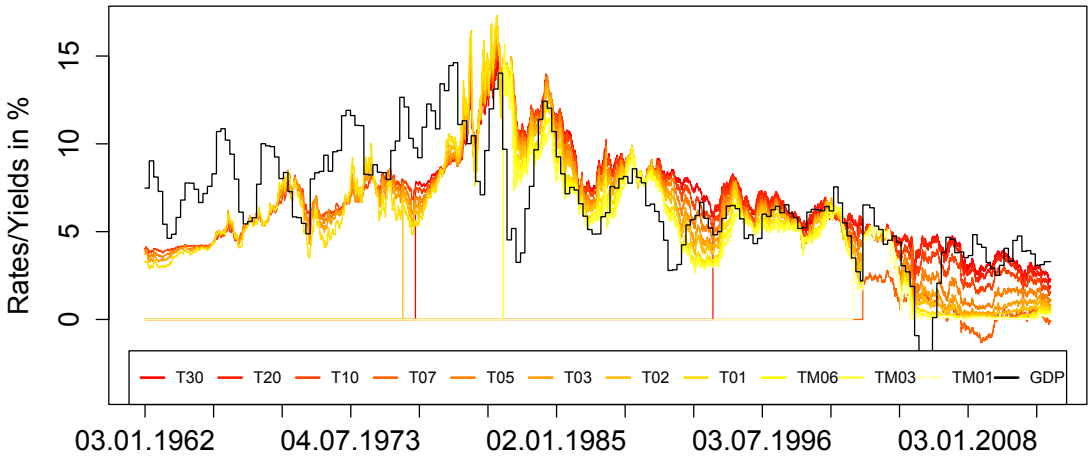

Figure 2: Time evolution of long and short term US treasury bills and GDP since 1962. TM corresponds to US bills with monthly maturity, T corresponds to US bills with annual maturity. For instance, $T20$ corresponds to the yield of the 20 year US treasury bill.

Therefore, to avoid recession during the growth phase, central banks and governments can intervene to keep borrowing costs within reasonable bounds via yield curve targeting. In such a scenario, traditional approaches like inflation targeting may be ineffective in preventing a shortfall in money supply.

However, yield curve targeting is only effective in the presence of structural demand for goods, i.e., when there is no demand shortage. This is because, lack of demand for physical or real goods, causes excess money to flow into the financial markets as explained above. Therefore, reducing borrowing costs in such a setting, only amplifies speculative bubbles or hoarding of cash. We will discuss which monetary options are effective to combat recessionary conditions under economic saturation in the next section.

2.2. Phase 2: Saturation

Saturation arises very naturally in a consumer based economy. There is abundant evidence that business strategies and economic processes in developed countries have gradually adapted to saturative conditions to mitigate its effect as much as possible over the past three decades. The emergence of marketing and mass media as a key art of "convincing" the consumer to buy products, increased efforts and investments in new technology and innovations (internet and electronics) and even more crude approaches like shortening the lifetime of goods (obsolescence), are all reactions to consumer saturation with regards to primal or more essential goods.

To understand that saturation arises naturally in a consumer based economy, consider that employees provide labor force for the exchange of money which allows them to acquire desired goods that provide some sort of utilitarian value. Thus naturally, the desire for goods (i.e., consumer demand) is at the base of economic exchange and economic activity. Therefore, the latter is not an end in itself but serves the purpose of allocating wealth and goods in a socially desirable way. However, once such a socially desirable outcome is achieved, there is no incentive to perpetuate economic activity as participants would not express demand for goods when they are already in possession of such goods. This is what we call *demand saturation* or simply *saturation*.

Demand saturation arises gradually by the sequential accumulation of desired goods over longer business cycles. Because goods of highest utilitarian value tend to get acquired first, the process of good accumulation implies that the marginal utility of acquired goods gradually declines. Thus, over longer time periods, outstanding gross demand for goods decreases as consumers pile up their stock of desired goods. [1]

The important point to note is that, in the long run even the richest and technologically most advanced economies cannot avoid a decline in economic activity that is due to saturation. In fact, by this reasoning, a stagnant economic state due to saturation is a manifestation of wealth and happiness as all economic agents are in possession of desired goods and thus do not generate demand for extra goods. Even when goods are short-lived, the residual demand for *new* goods that is due to the replenishing of the stock of goods (food, cars, etc.) does not suffice to generate growth beyond the socially desirable steady state. Therefore, economy reaches its *demand* limits.

There is abundant empirical evidence that supports this line of thought. Many

[1] Our point is most best illustrated when we think of goods being perfectly durable and long lived, extending the lifetime of consumers. Without stretch of imagination, the reader will understand that saturation arises naturally. We will later discuss how in a more realistic setting were not all goods are perfectly durable, the effect does not vanish but at best mitigated.

technologically and economically advanced nations on earth have entered a state of structural demand shortage and low economic activity, while at the same time its consumers can be considered rich, having piled up physical goods and assets (cars, real estate, electronic goods, etc.) that is unparalleled on a historic time scale.

Economies do not automatically converge to the saturation stage. There are two fundamental mechanisms preventing consumer demand to get saturated. First, consumers do not have the purchasing power to acquire all desired goods. Second, manufacturers can not provide desired goods.

In the first case, consumers have an intrinsic desire for a good, however, they can not express their demand for that good in absence of sufficient income. In the second case, consumers may have an intrinsic desire for a good, however, firms do not provide such goods for several possible reasons: lack of technological innovations or capital. In both cases a decrease in economic output is not due to a shortage in structural demand but because of money shortage or because of technological stagnation.[2]

In case of money shortage, economic stagnation can be averted through credit-based financing. Therefore, any economy that is not subject to structural demand shortage is in a latent growth state that is susceptible to money injections. Thus, in these cases money supply is an effective tool to ensure economic growth and increase social welfare.

However, when economies are structurally saturated or economies hit technological limits, money injections do not lead to increased spending or increased investments in good production and therefore do not translate into higher economic activity. Instead, it is conceivable that money supply increases savings rates and cash hoarding. When economies gradually converge to structural demand saturation, growth rates slowly decline and cash savings increase. This sets off a self-defeating cycle of cost-reduction strategies by firms that ostensibly try to maintain profitability at stagnating revenues to service their outstanding debt payments. Lowering wages, increasing income inequality and increasing unemployment re-amplifies the effects of structural demand shortage in the long run.

Therefore, at this stage, high savings rates, low growth and earnings expectations increasingly generate a flow of capital into the financial sector and, thus, precipitates a growing expansion of the financial market. As the rate of return of investments in the real economy diminishes, investors, in pursuit of high returns, take on more risks and thus exacerbate speculative bubbles. As a result, income and wealth in-equality

[2]Technological stagnation may arise because physical limits prevent goods to increase their performance in a sustained way. For instance, worldwide sales of personal computers has seen a decline over the past decade as it becomes increasingly difficult to increase processing power on nano-scales.

pairs with high volatility in financial markets and a high debt burden, preparing the ground for financial instability and exacerbates recessionary conditions.

Thus we argue that the saturation process in a consumer based economy naturally triggers a Minsky-type super-cycle. While more and more money is invested in the financial market and less is channeled to stimulate the production and exchange of goods, the real economy faces a shortage of money.

Thus, the real economy increasingly faces difficulties in meeting debt payment commitments increasing the risk of debt deflation. Debt deflation is triggered by defaults on debt which re-amplifies downward pressures on structural demand and good prices. Price reduction, in turn, magnifies the real outstanding debt obligations and thus accelerates and reinforces recessionary conditions. Lenders demand more interest when the expectation of profits is high just as in the growth period. This is because interest rates reflect expectations of future profits and earnings. Therefore, economies that are subject to demand saturation face low costs of credit (i.e., interest rates and bond yields). [3]

3. Policy Implications

3.1. Imposing negative interest rates

The central bank as only source of money generation injects money into a closed economic system by lending it to economic entities. They may use the money for transactions, lend it (typically the role of banks), or invest it, etc. However a closed system can not create additional money without getting additional injection from outside, such as from the central bank. Therefore the money which was borrowed by the economic entities has to be paid back at a certain time at a positive interest rate which means that the economic entities have to pay back more money than it was injected into the system. For a strictly positive interest rate the monetary system will face a decline in economic activity unless a phase of negative interest rate is implemented into the system, which boosts turnover velocity of money and therefore economic activity. The corresponding proof is trivial.

Theorem: For strictly positive interest rates, obligations subject to this rate can not be paid back in a long term.

– Insert proof here –

3.2. Contraction of debt

The effect of a negative expected rate of returns leads to an inverse equilibration effect. Companies encounter a relief of their debt obligations, since a negative

[3] In contrast, during the growth phase, the cost of money gradually increases.

expected rate of return on the capital market leads a contraction of their debt obligations.

As a result of a decrease in debt obligations, real economy is now able to increase prices again since purchasing power increases again. This leads to an increase in expected rate of returns in real economy. Due to the adaption requirement of capital market returns, these returns will again start to increase too. For the real economy an increase in the expected rate of return means the ability to raise wages and therefore also to increase purchasing power. The phase of debt contraction will last until the marginal rate of return in real economy exceeds the marginal rate of return in financial market. This situation makes a redemption of debt obligations possible.

In order to be able to come by economic growth shortage, central banks usually inject money into the economy. If the injected money is circulated within the economy, debt is being deflated due to inflation of money. If the money is hoarded within the financial sector, negative expected rate of returns in real economy lead to negative level adaption on the capital market which means that outstanding debt obligation are devalued. In both cases outstanding debt is then subject to decrease. But the problem with money expansion is the emergence of bubbles. In order to prevent the occurrence of bubbles, the key federal funds rate could be set negative without performing bond purchases. Therefore negative interest rates lead to shrinking debt levels which allows to control the ratio of debt to demand growth.

3.3. Equilibrating money injection rate with natural growth rate of demand

According to Schumpeter (1939), the Kondratieff cycles (Kondratieff and Stolper (1935)) correspond to the lifetime of durables goods and occurrence of technological innovations. The Kondratieff cycle corresponds to the growth phase of an economy as well as to the level of economic saturation, which in turn effects demand intensity. Neo-classic and Neo-keynesian models yield at not only satisfying, but also stimulating this demand intensity by injecting money into the system regardless of the saturation level. In order to evoke sustainable growth the money injection rate should correspond to the growth rate of demand. The same holds for interest rate levels since they are an important channel to control money demand.

3.4. Implementation of digital currency

For a fiat money based economy the fundamental condition to operate properly is to maximize economic activity. For economies with strictly positive interest rates the maximum economic activity can only be achieved by imposing negative interest rates to counterbalance non-circulating capital. Negative interest rates serve as an incentive to hoard cash. Therefore, in order to prevent cash hoarding and to stimulate credit lending activity, the substitution of cash by a digital currency would

be crucial. Further the exodus of capital could be prevented by digital capital transaction controls. By imposing a declining time value for non-circulating money, credit lending, thus economic activity, as well as turnover velocity of goods would be maximized.

4. Conclusion

In this article, we show that traditional monetary policy tools built on money expansion are ineffective in stimulating growth when economies have already reached their point of saturation as can be seen in the case of Japan's economy. Instead of supplying money into the real economy, inflationary policies lead to cash and money hoarding on bank accounts precipitating increased levels of financial instability and money shortage in the real economy.

One way of reducing money shortage is to ensure controlled debt deflation through negative interest rate policies. Once debt deflation leads to reduced debt service payments by the real economy, investments and product demands can be serviced through the issuance of new credit. This effect is subject to a long-term cyclical pattern which emerges subsequent shifts from the creditor to the debtor side and vice versa.

The greater challenge is to avoid premature economic saturation in the first place. Central banks should therefore supply money at a rate that avoids product demand to get saturated too quickly. Rather product supply should be mitigated and smoothed out on a longer economic growth trajectory that avoids short term "overheating". Too strong growth phases tend to self-cannibalize on the economy in the long run.

Therefore, we argue that central banks should align their policies to smooth out the business cycle such that growth rates equal the natural rate by which consumers replenish their stock of goods in the long run.

We come to the conclusion that in a consumer based economy all measures taken to raise GDP result paradoxically into a temporary shift of wealth, e.g. the shift from the creditor to the debtor side. Refinancing at positive rate of returns relieves the accumulation of compounded debt payments whereas refinancing at negative rate of returns enables a controlled debt deflation. In both cases new money would need to be issued. The issuance of money leads to inter-temporal growth phases, associated with wealth. During a growth phase expected rate of returns increase and make it more costly to refinance existing debt obligations.

Therefore we find that high rate of returns are subject to a cyclical occurrence of saturation, associated with decreasing marginal rate or returns in real economy. Declining rates, in turn, come with a massive expansion of money supply and lead to

negative rate of returns because of feedback effects of capital market to real economy and vice versa.

Appendix

Proof: Assume a one-period model in which B is the budget and C is a possible claim. In order to create a claim from a budget, the budget needs to be endowed with some money M, created by the central bank. Then following conditions hold for a monetary system with interest rate r:

$$B \geq C \text{ for } r \geq 0, \tag{1}$$

$$B = M, \tag{2}$$

$$C = M(1 + r), \tag{3}$$

$$M \geq M(1 + r), \tag{4}$$

$$1 \geq 1 + r \rightarrow 0 \geq r. \tag{5}$$

which is a contradiction to condition (1). □

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