

Towards a Wicksellian Pure Credit Economy

Andre Lara Resende

Columbia University – Dec.15th, 2018

Preliminary – for comments¹

1.

According to John Hicks, monetary theory is less abstract than most economic theory, "it belongs to monetary history, in a way that economic theory does not always belong to economic history."² The specific institutional arrangement, the always arbitrary definition of what constitute money and the prejudice of the debaters all play a crucial role in the construction of a theoretical framework for monetary theory.

In the last decade of the twentieth century, monetary theory took a major turn. Monetary aggregates and the Quantity Theory of Money (QTM) were sidelined and money disappeared from new mainstream macroeconomic models, such as the Real Business Cycle (RBC) and the neo-Keynesian Dynamic Stochastic General Equilibrium (DSGE). In the last two decades, DSGE models in which there is no money, no financial sector, no liquidity and no defaults, became as ubiquitous as they are unrealistic. After the financial crisis of 2007, under the sheer power of evidence, money and the financial sectors were tentatively reintroduced into macroeconomics, but monetary policy now faces both an institutional anachronism and an analytical deadlock. Central banks are watching the loss of efficacy of their main instrument of monetary policy, the interest rate on reserve deposits, and there is no longer a theoretical anchor to the price level and to inflation. Major financial crisis have always led to a renewed debate about money and monetary theory. It is Hicks again: "monetary theories arise out of monetary disturbances". This time is not different.

2.

Money has no role in the analytical reference model of economic theory. In Walras-Arrow-Debreu general equilibrium model, the instantaneous equilibrium solution determines relative prices and quantities. Money and absolute prices are irrelevant; they have always been a posteriori add-ons that do not affect the real economy. Therefore, the "money as a veil" expression. Until the end of the twentieth century, mainstream monetary theory has always assumed that money determines absolute

¹ I would like to thank Edmar Bacha for comments since the early versions - with the usual caveats

² *Monetary Theory and History - an attempt at perspective*, in Hicks (1967) p.156. Arion Arnon, in a detailed and erudite book, *Monetary Theory and Policy from Hume and Smith to Wicksell*, also quotes Sir John Hicks, according to whom monetary theory, even more than general economic theory, is related to economic facts and institutions.

prices. This assumption, which is the essence of the QTM, became the analytical framework of reference for monetary policy. The general price level, inflation and deflation, were considered pure monetary phenomena. The controversy of the 1960's and 1970's between Keynesians and monetarists focused mainly on the degree that monetary policy was able to affect economic activity. There was no major disagreement on the influence of money as the main variable behind the determination of the price level and inflation. Friedman's adagio that "inflation is always and everywhere a monetary phenomenon" went undisputed until very recently.

The QTM remained the basic analytical framework of monetary policy for decades. In spite of its almost universal acceptance, the supposedly stable relation between money and prices - to say nothing about the difficulty in identifying causation - never had a strong empirical underpinning. No matter how many epicycles were added to fit the data, only a long run correlation between two nominal variables, which is a mere truism, was observable. After the financial crisis of 2007, with the advent of Quantitative Easing (QE), the belief in the QTM became untenable. With QE central banks performed the ultimate laboratory experiment. Lags and identification problems could no longer be claimed against the lack of empirical support for the proportionality between money and prices. The Fed increased the monetary base from tens of billions to near two trillion of dollars - an increase of the order of several thousand percent - and inflation did not manifest itself. The experiments of the Bank of Japan, the Bank of England and the European Central Bank were of the same order of magnitude with similar results.

3.

The usual definition of money lists as its main functions to serve as means of payment, as unit of account and as store of value. The function as means of payment to facilitate transactions, to eliminate the necessity of the double coincidence of wants, has always been perceived as an essential function of money. Money also plays a role in intermediation, in the transfer of resources from surplus to deficit agents. It is a function associated to its store of value and credit properties. Pure exchange is more relevant in primitive economies and the importance of intermediation grows with the sophistication of the economy and the financial system. This is probably why the first conceptualization of money dealt mainly with its exchange and payment role. However, to start monetary analysis from money as means of payment, in the sphere of commodity exchange, fails to acknowledge that the role of money as a unit of account should take precedence over all its other functions. All kinds of assets may be used as means of payment if their liquidity premium is paid for. It is the fact that money serves as a standard of value in which prices are quoted that defines money and makes its liquidity premium nil, not the fact that it is used as means of payment.

The early theoretical emphasis on the role of money as a mean of payment led to a long disregard, in mainstream monetary theory, to the role of credit and liquidity. According to Schumpeter the inquiry into the role of money may start from money to theorize about credit or, alternatively, from credit to theorize about money.³ While the first leads to "monetary theories of credit", the latter leads to "credit theories of money". These different starting points lead to different understandings of money and of monetary policy. It is more natural to understand money as a special kind of commodity in its exchange-payment role and it is easier to associate money to credit in the sphere of intermediation. The roots of Western World monetary theory are closely associated with the history of the English banking and financial system. In the seventeenth century, when David Hume and Adam Smith started to discuss monetary questions, the financial system was relatively unsophisticated and the role of money in exchange and in payments was perceived to be the most relevant one. Additionally, in their time, money was indeed a commodity. The financial system was relatively unsophisticated; it is therefore

³ Schumpeter, J.A. (1954) p.717

understandable that their departure point was the system of exchange and payments, carried out by the transfer of a commodity-money. The physicality of a commodity-money, the fact that it had intrinsic value, was also seen as the natural starting point to analyze more complex and sophisticated credit systems. Each step in the road to a more complex payment system, like the issue of bank notes, at first fully and then only partially convertible, as well as the introduction of bank deposits, gave reason for new debates and controversies in monetary theory. The analytical difficulties were eventually overcome by redefining the lines of demarcation between pure money, near money and credit. These demarcations were perceived to be important because the stock of commodity money - and only of pure commodity money - was considered to play a crucial role, both as determinant of the price level and in the international linkages between economies.

4.

The Quantity Theory of Money (QTM), according to which the stock of money determines the price level, $MV=PT$, is probably one of the oldest and better-known theoretical relations in economics. It was originally formulated by David Hume, in the seventeenth century. It is based on the observation that there must be a proportionality V , between the stock of currency M , used to pay for all transactions T , and the price level P . This is indeed an identity - true by definition - if we assume that all transactions are effectively paid for in currency and that the stock of currency is fully utilized to pay for transactions. In the commodity-money economy of the seventeenth century, in which financial markets were relatively unsophisticated, this was probably a good approximation of reality. Even so, to leap from the quantitative identity, $MV=PT$, to the affirmation that the stock of M determines P requires two crucial additional hypotheses: first that V , the velocity of circulation of money, is constant and second that M is an exogenously determined variable. Keynes questioned the constancy of V under especially recessive conditions, in his Liquidity Trap hypothesis. The stability of the velocity of circulation of money became the center of the fierce monetarists versus Keynesians debate in the 1960s and 1970s. Velocity emerged out of the debate not as a constant but as a stable function of known variables, the nominal interest rate above all, in a given institutional context. However, the view that M is an exogenous variable has been taken for granted by mainstream macroeconomics until very recently. Since the early monetary debates, there were always voices that questioned the exogenous character of M , but they never managed to predominate and make it into mainstream theory.⁴

Even with money as an exogenous variable, an explanation is needed as to why and how an increase in the stock of money translates into an increase in absolute prices. The QTM never had well-defined transmission mechanisms from money to prices. It never had an explicit explanation of how money would affect aggregate demand and the price level. In David Hume's time, under the mercantilist view, according to which wealth was associated to the country's stock of gold, it made sense to believe that an increase in money – or in the stock of gold – was indeed an increase in the country's wealth that would increase aggregate demand and put pressure on prices. In an economy with a more sophisticated financial system, with at least one debt instrument, as for example an interest-paying bond, the transmission mechanism would require one further step: it would have first to go from more money to lower interest rates and then from lower interest rates to higher aggregate demand.

5.

The Restriction period, from 1797 until 1821, when convertibility of money into gold was suspended in England, gave rise to a fierce controversy known as the Bullionist debate. While

⁴ Henry Thornton: "That an enlarged emission of paper may often fairly be considered as only, or chiefly, an effect of high prices, is not meant to be denied" in *Paper Credit* (pp.197-198), quoted in Arnon (2011) p.111

Bullionists sustained that monetary stability required convertibility, several of the participants in the anti-Bullionist camp, that did not see convertibility as a guaranty of financial instability, questioned the independence of M and the causality link from money to prices. Later in the mid-eighteenth century, in the second round of the monetary debate in England, the Banking School, as opposed to the Currency School, argued along the same lines, questioning the direction of causality from money to prices.⁵

Thomas Tooke, for example, one of the leading exponents of the Banking School, argued in his pamphlet of 1844, *An Inquiry into the Currency Principle*, that the quantity of money needed for circulation was an endogenous, not an exogenous variable, and that, contrary to what the QTM posits, it is the quantity of money that is determined by prices. At the time, Tooke's criticism of the Currency School and of the QTM was received with great interest by among others John Stuart Mill, who saw Tooke's view as "irreconcilably at variance" with the accepted doctrine. Stuart Mill asked his contemporaries to give Tooke's innovative view "a respectful hearing".⁶ Apparently, his contemporaries did not agree, since Tooke's ideas were never incorporated into monetary orthodoxy.

Henry Thornton, before Tooke, was another anti-Bullionist with innovative heterodox ideas who was almost completely forgotten. Hicks and Hayek are two exceptions who have called attention to the anti-Bullionists point. Hicks dedicated a chapter of his *Essays on Monetary Theory*⁷ to Thornton's ideas and Hayek considered that "although Thornton's merits have long been overshadowed by the greater fame of Ricardo, it has now come to be recognized that in the field of money the main achievement of the classical period is due to Thornton."⁸

The same kind of questions and doubts resurfaced, one century later, in Cambridge England, with names like N. Kaldor and J. Robinson⁹. The Latin American Structuralist School of the 1950s, associated with names like J. Olivera, J. Noyola and others, developed a "non-monetary" theory of inflation, but mainstream monetary theory never took notice¹⁰. In mainstream monetary theory, the hypothesis of M as an exogenous variable and the direction of the causality from money to prices went on unchallenged for decades, until the twenty-first century.

It is understandable that those who take the fiat money position, as opposed to the convertibility position, tend to question the the exogenous character of M, as well as the causality from money to prices. If we start from a credit-theory of money, rather than from a money-theory of credit, it is easier to accept fiat money and to understand that the stability of the monetary system does not necessarily depend, nor is guaranteed, by convertibility in a commodity-currency. David Hume, who provided the analytical framework upon which the classical monetary theorists like David Ricardo relied, started from a currency-theory of credit. The adoption of a logical structure that proceeds from money to credit was the natural route followed by classical economists. This explains the long dominance of the money-theories of credit in monetary theory. Classical economists started their monetary analysis from the exchange process in an economy in which payments were carried out by the transfer of a commodity-currency and only then revised it to include bank notes and deposits, at first fully convertible, then partially convertible and finally unconvertible. Financial evolution led to successive redefinitions of money, near-money and credit. Commodity-currency remained, however, the cornerstone of the classical analytical framework. Hume influenced the work of the Bullionists, among them Ricardo and those of the Currency school, who were the original Quantitativists. Other participants in the monetary debate, associated with the anti-Bullionist and the Banking School camps, like Thornton and Tooke, who contrary to Hume and Ricardo, started from a credit-theory of money,

⁵ See Arion (2011), chapter 7 on the anti-Bullionists, particularly on Henry Thornton, and chapter 12 on the Banking School versus the Currency School debate in mid-nineteenth century England, particularly on Thomas Tooke.

⁶ See the reference for J.S.Mill's review of Tooke's book in Arion (2011), chapter. 12, pg. 217

⁷ Hicks, J. *Thornton's Paper Credit* in Hicks (1967) pp.174 -188

⁸ See Arion (2011) chapter 7, pg. 97

⁹ Nicholas Kaldor (1970) is a devastating critic of the dominant Friedmanian QTM of the sixties.

¹⁰ See J. Olivera (1959); J. Noyola (1956) and also O. Sunkel (1958)

had a different understanding. If we start from credit to define money, we do not overestimate the importance of the materiality of money; it is also easier to understand that the essential property of money is not its role as mean of payment, but the fact that it is the universal standard of value.

6.

Until recently, most studies of the evolution of exchange and payment systems assumed that money preceded credit in history.¹¹ This assumption, however, fails to acknowledge that money cannot exist before the emergence of a universal measure of value and that a universal measure of value cannot be dissociated from the notion of debt and credit. Currency, or money, is not essential to the existence of credit and debt, but credit and debt are essential to define money. Units of credit and debt, units of account or a standard of value, define money. That is probably the reason why Hicks argued that credit preceded money in history¹². Merchants only started to use a general accepted medium of exchange after they had adopted a unit of account¹³.

The essential property of money lies its general acceptance at face value to redeem debt. This perfect liquidity property of money cannot be dissociated from its standard of value, or unit of account, property. It is the fact that it is the unit of account that makes money perfectly liquid by definition. Money cannot be defined before a standard of value is established, and a standard of value is an abstract unit used for book-keeping, that is, to keep track of debit and credit. The existence of money requires the existence of a unit of account, but the reverse is not true, the existence of a unit of account does not require the existence of money. Those who start from a commodity-money, from money-theories of credit, to construct their analytical framework tend to miss this crucial logical point.

Money may lose purchasing power, or devalue with respect to a reference commodity like gold under partial convertibility, but it is still money as long as it is used as the standard of value in which prices are quoted¹⁴. In the history of monetary theory, this was a source of much confusion for those who mistook the commodity value of a convertible currency - gold coins for example - with money itself. As long as prices are not quoted in units of gold, even under convertibility gold is not money; it is simply the margin guarantee for credit-debt units of fiat money. Money is a unit of debt/credit in which prices are quoted. It might or not have a commodity guarantee - as in the cases of convertible and pure fiat money respectively - but it is essentially a debt whose issuer carries sufficient credibility and in which prices are quoted.

7.

That credit takes logical precedence over money is a controversial idea that was never fully incorporated in mainstream monetary theory. With anti-Bullionists like Thornton and Tooke sidelined and forgotten, the understanding that materiality is not an essential characteristic of money, and that exchange and payments can be executed by pure debits and credits, had to wait for Knut Wicksell to be revived.

In the preface to his *Interest and Prices: A Study of the Causes Regulating the Value of Money*, first published in 1898, Wicksell says that his original purpose was to examine “the case for

¹¹ Goodhart, C.A.E (2003) and (2009) argues that the origin of money was not, as originally developed by Menger (1892), a private initiative to cut transaction costs, but rather a social phenomenon that predates the development of formal markets; money facilitated the rise of markets, not vice versa.

¹² See Arnon (2011)

¹³ See Arion (2011) chapter 4, pgs. 51, 52.

¹⁴ The view that what defines money is that it is used as the reference of value in which prices are quoted is the main point of Calvo's Price Theory of Money. See Calvo, G. (2013) and Lara Resende, A. (2016).

and against the Quantity Theory". According to him, critics of the QTM, like Tooke and his followers, were right in their criticism of the QTM, since the QTM, "even in the form in which it is presented in Ricardo's truly classical writings about money, is open to too many objections...to be accepted without modification", but that they did not have a coherent theory to replace it.

Wicksell argued that payment systems could be classified according to its level of sophistication, from a pure cash economy to an organized credit economy. The QTM is a relatively good description of the pure cash payment system, but becomes a less and less accurate approximation of reality as the payment system in the economy develops towards a pure credit payment system. As we approach the pure credit or pure accounting system of payment, the velocity of money becomes endogenous and may tend to extreme values like zero and infinity. A pure credit payment system does not require the existence of physical money to - endogenously - create any quantity of liquidity.

Having proposed an original and coherent alternative to the QTM, Wicksell was then confronted with the question that always puzzles macroeconomics once the QTM is discarded: if not money, what determines absolute prices? Wicksell never had a satisfactory answer to this question, as he was the first to recognize. In his last paper, "The Monetary Problem of the Scandinavian Countries" (1925), Wicksell comments of his puzzlement in face of "irrational" general price fluctuations. He goes on and "confess that I would far sooner listen to somebody who could express an authoritative opinion of these matters than essay an explanation myself".¹⁵

Wicksell innovative approach, according to which credit affects aggregate demand through the interplay of the natural rate and the market rates of interest, remained overshadowed by the complete dominance of the QTM until one century later, when Michael Woodford, in his book also named *Interest and Prices*, adopted a so-called neo-Wicksellian approach to new-Keynesian macro modeling¹⁶. In the Woodfordian new-Keynesian macroeconomic model, money was left out of the picture and the interest rate became the policy variable to influence aggregate demand and prices. Like in the conceptual pure-credit economy of Wicksell, in the moneyless new-Keynesian world, there is nothing capable of anchoring absolute prices to a specific level. The price level, according to an analogy used by Wicksell himself, is subject to an equilibrium similar to that of a cylinder in a rough plane surface: it has some inertia, but follows the inclination of the surface. The price level indeterminacy when there is no exogenous money supply is a simple logical implication of the fact that there is an infinitely number of combinations of money, M , and prices, P , compatible with a given money real balance equilibrium. This indeterminacy, which was very clear to Wicksell, was rediscovered in the early twenty-first century, when it was finally understood that the interest rate, not the money supply, was the instrumental variable for monetary policy¹⁷.

8.

In the history of monetary theory there is a clear correlation between those who support the QTM and those who have commodity-money as their analytical point of departure. Those who had fiduciary money as their starting point, on the contrary, have always tended to be critical of the QTM. This is the reason why anti-Bullionists and the Banking school were less prone to be Quantitativists. The pure exchange economy, with a commodity-currency and no credit in one extreme, and the pure fiduciary economy, with a pure accounting system of exchange on the other extreme, are two radical

¹⁵ See Arnon (2011) p.365

¹⁶ Woodford, M. (2003)

¹⁷ John Cochrane (2011) after a detailed review of the literature on the price level indeterminacy in the post-Keynesian world, concludes that "the Taylor rule, in the context of the new-Keynesian models, leave the same price level indeterminacy as with fixed interest targets".

Woodford (2003) says: "this means that there are an infinite number of different possible equilibrium responses of the endogenous variables to real disturbances..." see Lara Resende (2016) for a discussion of price level indeterminacy.

abstract cases. Real modern economies have always been somewhere in between these extremes. The English economy in the seventeenth century was already more sophisticated than a simple pure commodity-money exchange economy, but its banking sector was still rudimentary if compared to the financial sector of a developed economy in the second half of the twentieth century. This probably explains the practical victory of the Bullionists' camp and the intellectual victory of the QTM at that time. The intuitive appeal of the case for a commodity backed money system was much stronger two or three centuries ago.

At the very end of the nineteenth century, when Wicksell was developing his monetary theory, financial systems were far more sophisticated and probably closer to the pure fiduciary than to the pure commodity exchange ideal-type. However, his sophisticated and coherent alternative framework for monetary theory, in which the QTM could be understood as a valid special case of a pure exchange system, took more than a century to come to the forefront. The long dominance of the QTM is indeed puzzling. In modern times there was never supporting evidence of a constant or even a stable money velocity as well as for the causality from money to prices. The best explanation for the long dominance of the QTM is probably that a satisfactory theoretical alternative to anchor absolute prices did not exist. As long as there is no satisfactory alternative, a simple and well-established theory can resist, contrary to evidence, for much longer than we would like to believe.

9.

In today's world, with the digital technological revolution at full steam, developed economies are closer than ever to the extreme ideal-type pure-credit system of exchange. The cashless economy is no longer just a theoretical possibility, but also practically feasible. In some countries, like Sweden and Korea, the process towards a cashless economy is already in advanced stages, but everywhere the trend towards a pure accounting system of payments is clear and irreversible.¹⁸ The end of cash is probably near, but cash is not the only component of today's accepted definition of money that is on its way to extinction; so are bank deposits. Like tradable bank notes in earlier times and checks until a few decades ago, bank deposits will eventually be replaced by a centralized or interconnected universal accounting system of payments. Intermediation could also dispense with money altogether, through a pure accounting payment system integrated with an electronic system of custody for financial assets. The role of money, both as means of payment and intermediation, would have then disappeared, but money's essential property, namely its standard of universal value in which prices are quoted, would remain indispensable.

In a moneyless pure-credit economy, monetary policy is necessarily an interest rate policy, but with the disappearance of bank deposits, mandatory reserves at the central bank will have to be redefined. The so-called market for bank reserves, the Fed-funds market in the USA, will shrink to irrelevance, as it is indeed shrinking.¹⁹ The abolition of fractionary reserves, as proposed by the Chicago Plan of 1933, combined with compulsory reserves based on bank assets, would probably always have been a better alternative for financial stability, even when demand deposits were more important than they are today. In a pure-credit economy, the basic interest rate would continue to be the rate on reserves at the central bank, but as the economy approaches the pure credit ideal type, monetary policy will have to be conducted through interest rates paid on deposits at the central bank. It does not

¹⁸Ken Rogoff (2016.) argues in favor of abolishing cash as a way to overcome the zero bound on nominal interest rates and to fight crime.

¹⁹ The Fed Funds market has been reduced from \$250 billion a day in 2007, to less than \$60 billion a day in 2016. As the Fed Fund market becomes irrelevant, the actual base rate of the Fed, its main policy rate, in practice, is no longer the Fed Fund rate, but a band with a floor defined by the interest rate paid on excess reserves (IOER) and a ceiling defined by the interest rate charge and on insufficient reserves, the reverse repo rate.

need to be restricted to the very short overnight rate, as it is mostly done today, but it could be conducted through the definition of a complete term structure of interest rates, paid or charged, on deposits at the central bank for different maturities. A monetary policy conducted by a term structure of interest paid on deposits at the central banks would be at least as powerful as traditional monetary policy based on the basic overnight rate and open market operations. It would also have the advantage of more clearly separating the interest rate component and the liquidity component of monetary policy. The interest rate component would be conducted by the time structure of interest rate paid for deposits in the central bank, while the liquidity component would be conducted through open market and QE operations.

In a Wicksellian pure-credit economy, with no basic monetary aggregate to anchor it, credit is endogenously created or destructed and in principle unbounded. Since the end of the seventeenth century, this was understood by monetary theorists who took the credit approach to money. Once it is understood that money is essentially the unit of account of a debit and credit system in which prices are quoted, monetary aggregates no longer anchor credit and prices. This result was rediscovered in modern macroeconomics, at first by Sargent and Wallace (1975), and later, in the 1990s, by neo-Keynesian macroeconomics. The neo-Keynesian macro model of the twenty-first century, along the lines adopted by Woodford (2003), pushed money aside and adopted the interest rate as the monetary policy instrument. Although self-declared Wicksellian, the Woodfordian approach left also credit, the financial sector and the investment function out of the picture. This is a major sin with respect to Wicksell's original "coherent alternative" to the QTM.

Wicksell's original and sophisticated description of macroeconomic dynamics was based on the interplay of the financial market interest rate and the real return on capital. It results in an endogenous and "cumulative" mechanism of credit creation, which is eventually reversed, leading to the destruction of credit and liquidity. This endogenous and cumulative character of credit is crucial to explain economic cycles in economies with developed financial markets. The failure to understand the endogenous, cumulative and eventually brutally reversible character of credit misses completely the central point of Wicksell's pure-credit economy. Given that the contemporaneous developed economies are closer to the pure-credit ideal-type, a model that does not incorporate the financial system and Wicksell's cumulative process misses the point. It can certainly not serve as a reference to guide monetary policy. Monetary policy based on a true Wicksellian model would adopt countercyclical macro-prudential measures way before the credit cycle reverses itself. The endogenous reversal of the credit cycle may lead to bubbles and traumatic liquidity crashes. That is why leverage limits and asset price targeting are clearly advisable. The cyclical instability of financial markets has been stressed by Charles Kindleberger and takes central stage in Hyman Minsky's financial theory, but until very recently, when not completely ignored, they have been treated as no more than a curiosity by mainstream macroeconomics²⁰.

10.

The Wicksellian pure credit model still leaves unanswered the question of the indetermination of absolute prices. Wicksell's analogy of the price level as a cylinder on a rough surface plan is probably the best we have. The price level is indeed unanchored, a function of its history that feeds itself on expectations. This is equally true for the price level and for its rate of change; like absolute prices, once in motion, inflation has high inertia. As long as the interval between price revisions is not so short that money loses its unit of account essential property, inflation tends to repeat its past behavior. Stable rates of inflation are harder to alter by monetary policy than the old Phillips curve

²⁰ See Kindleberger, C. (1978) and Minsky, H. (1986)

used to indicate.²¹ Whether inflation is moved out of its cylindrical equilibrium mainly by the interest rate, as current mainstream macro models have it, or through supply shocks, like many anti-Bullionists, later Cambridge-England macroeconomists and the Latin-American Structuralist School have argued, it is still an open question. Inertia is, however, stronger when inflation expectations are well anchored. Anchored expectations are the result of inflation having been stable for a period of time and it does not matter at what level inflation is stable. However, if inflation has been unusually low or unusually high it will be considered to be chronic deflation or chronic inflation, while if it has been stable around the target rate, it is simply considered evidence of monetary policy effectiveness.

In a pure-credit framework, it becomes clear that the causality might not always be from money or liquidity to prices. Once inflation is out of the comfort zone of normal times, the causality may run in reverse, from expected prices or inflation to liquidity. This is indeed the case of chronic inflation, when high expected inflation feeds into financial contracts and leads to monetary expansion. If liquidity does not increase accordingly, the result is higher ex-post real interest rates and wealth transfers from debtors to creditors. Defaults and a banking crisis may follow, very much in the spirit of Irving Fisher's Debt Deflation mechanism. The attempt to control chronic inflation through a liquidity squeeze is therefore more likely to provoke recessions and banking crisis than to reduce the rhythm of inflation.²² Similarly, as we have learned with the radical experiment with monetary policy since the financial crisis of 2007, the exogenous increase of liquidity through QE may avoid a deep depression when - endogenously - credit and liquidity are drastically reduced, but it is incapable of restarting the upward credit cycle. Both aggregate demand and inflation may remain chronically below policy targets.

11.

Monetary policy in the twenty-first century will have to take into account that contemporaneous economies are much closer to the pure credit than to the pure commodity-money ideal-type. After the financial crisis of 2007, the new monetary experiments of QE, made it clear that the QTM could not have remained until very recently the backbone of monetary theory. It might have been a reasonable approximation of reality for the pure commodity-currency economies of the past, but it had a much longer life than deserved by the empirical evidence. Since Woodford's book of 2003, it disappeared from the frontier of macroeconomics. Monetary policy has adopted the Woodfordian moneyless model as a reference, and inflation targets coupled to an interest rate rule - the Taylor rule - as its main policy instruments. Unfortunately, the post-Keynesian macro models, after Woodford's so-called Wicksellian approach, left aside the essence of Wicksell's innovative contribution: the interplay of the financial and the real rate of returns, leading to endogenous and cumulative cycles that may eventually end up in bubbles and crashes. The new-Keynesian DSGE models that have dominated mainstream macroeconomics since the mid-1990 have proven to be as irrelevant as they are unrealistic. The appeal of the DSGE model, as that of Quantity Theory before it, are due to the fact that they provide relatively simple formal frameworks to analyze monetary questions, but money and monetary questions are complex and dependent of specific institutional contexts.

In 1936, Bertil Ohlin, in the introduction to the English first edition of Wicksell's *Interest and Prices*, says that "by means of his brilliant assumption of a pure credit economy, Wicksell successfully escaped from the tyranny which the concept "quantity of money" has until exercised on monetary theory". Unfortunately, this tyranny had a much longer grip on monetary theory and policy and even when finally abandoned, the so-called neo-Wicksellian approach, failed to incorporate the essential lessons of Wicksell. The digital information revolution is rapidly approaching today's economy to the

²¹ Evidence of a weak impact of output gap on inflation, of a relatively flat Phillips curve, can be found in Blanchard, Cerutti and Summers (2015)

²² See Lara-Resende, A. (2015)

pure-credit ideal-type economy. A new reference model for monetary theory will have to scrap the money-theory of credit tradition and restart from a credit-theory of money. Classical Wicksell is the natural starting point.

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