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Title:

# The theoretical and empirical credibility of commodity money*

## Abstract

The recent extreme instability in financial markets demonstrated the inadequacy of the mainstream treatment of the relationship between the money economy and the underlying production base (the "real economy"). This inadequacy has stimulated interest in non-neoclassical treatments of money, which has given fresh importance to understanding the possible role of a money commodity in the financial system. This paper first demonstrates that the most fundamental function of monetary theory, an explanation of the "general price level", can be provided through only two analytical mechanisms, quantity-based valueless money or a money commodity which is unique. It then demonstrates that the quantity-based explanation is theoretically unsound even by neoclassical logic. This is followed by a demonstration that the theoretical argument for commodity-based money is analytically consistent. This theoretical superiority of commodity-based monetary theory has had little practical impact because of a perceived empirical absurdity of the commodity money hypothesis. The final analytical section demonstrates the *prima facie* credibility of a link between gold and aggregate prices in the United States since the end of World War II. This credibility should motivate Marxists and other critics of mainstream economics to treat seriously commodity-based monetary theory.

## I. Introduction

The recent instability in national and global money markets demonstrated the inadequacy of the mainstream treatment of the relationship between finance and the underlying production base.[1] This inadequacy has stimulated interest in non-neoclassical treatments of money, which has given fresh importance to understanding the possible role of a money commodity in the financial system.[2] The theoretical analysis of commodity

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Marx, Karl 1970a [1844] *A Contribution to the Critique of Political Economy,* Moscow: Progress Publishers.

* This paper benefited from comments from many people, and I wish to thank Alfredo Saad-Filho, Jan Toporowski, Ben Fine, Costas Lapavitsas and Tony Smith.

[1] Mainstream or neoclassical economics uses the terms "money economy" and the "real economy". I have analyzed the theoretically fraught attempts by neoclassicals to integrate them in Weeks (1989, Chapters 4-7), which is in the process of being re-written.

[2] One manifestation this increased interest is the rediscovery of the work of Hyman Minsky. Toporowski (2005) provides a concise analytical treatment of heterodox views.

money is typically and correctly associated with Karl Marx,[3] who was influenced by earlier and contemporary advocates of commodity money who were not critics of capitalism.[4]

I shall not review the long running debate over commodity money, though persistent repeatedly results in a consensus to dismiss its practical significance. My purpose is to demonstrate that the recurring discussion of commodity-based monetary analysis reflects its theoretical superiority over quantity-based monetary theory,[5] and, more important, its real role in the global financial system.

Every monetary theory must explain the determination of the level of prices. While this may not appear to be the most important task of a monetary theory, no other monetary issue of substance can be seriously treated if it is not resolved. Without success in this analytical task, an economic theory cannot move beyond a barter economy. Over two and one-half centuries, economics has offered only two formal solutions to the explanation of the level of prices, a quantity-based monetary theory and a commodity-based monetary theory. While a third, new explanation cannot be dismissed as impossible, it can be judged as unlikely. When both are considered critically the commodity-based theory must be assessed as the more analytically consistent. The advantage in abstract logic would seem to gain commodity-based theory very little in

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[3] See the essays in Moseley (2005), some of which are cited below. Recent heterodox theoretical work on money, with a strong focus on empirical applications, can be found at the website of the Research on Money and Finance Group of the School of Oriental and African Studies of the University of London. www.researchonmoneyandfinance.org/

[4] See Cottrell (1997). The two most important were Thomas Tooke (1844) and James Steuart (1767). The works of both can be accessed from the internet. Karl Marx was an innovative thinker who wrote in a powerful style that comes through even in translation. When dealing with any issue he addressed there is a great temptation to quote from him repeatedly. Yielding to this understandable temptation has been the source of considerable bad writing and superficial analysis for over one hundred years. Therefore, the references to and quotations from Marx are consciously minimized in this paper. His contribution is treated in detail elsewhere (Weeks, forthcoming, Chapters V and IV; Weeks 1981, Chapter IV). A clear statement of his rejection of quantity-based monetary analysis is found in Chapter 34 of volume 3 of *Capital*.

[5] Arguments for an actual, functioning link between a commodity, usually gold, and valueless money is not limited to Marxists. Indeed, a survey is likely to show that most Marxists reject such a link. Among non-Marxists gold-is-money arguments are usually to be found on somewhat eccentric websites, such as http://uk.ibtimes.com/articles/20100319/gold-is-money.htm. Equally eccentric are those who do not think that there is a link, but that there should be (for example, the far-right candidate for president of the United States in 2008, Ron Paul).

practice, because each cohort of analysts, if they consider it at all, rejects it as irrelevant in practice.[6]

The theoretical superiority of commodity-based theory is more than an intellectual curiosity, because it reveals itself to provide the explanation of nominal prices in the global financial system. I shall use the term "nominal anchor as shorthand for "that which determines the absolute level of prices". I shall show that such an anchor is necessary, and the anchor is a money commodity.

Commodity money, which is central to the irresolvable contradiction between value in use and value in exchange, proves the key to unlock both the mysteries of the increasingly esoteric financial system and why capital generates periodic financial disruption. Analogously to the values of a commodities being the hidden, underlying basis of their prices of production and, therefore, relative prices, the money commodity is the underlying basis for nominal prices. To paraphrase Marx when he discussed the relationship between concrete and abstract labor, the money commodity acts to determined absolute prices "by a social process that goes on behind the backs of producers", and being obscured by the mediation of fiat money[7] the functions of commodity money "appear to be fixed by custom" and habit, not material necessity.[8]

Central to this paper are two analytical and practical distinctions not always appreciated in exchanges over quantity and commodity-based monetary analysis. First, there are at least two versions the so-call quantity theory, the assumption-laden version of the modern, neoclassical economists, and that of the Classicals such as David Ricardo. Second, discussion of the role of commodity money must distinguish between the abstract analysis of its relationship to the circulation of capital, and its concrete role in the national and global financial system. This distinction can be concisely stated in two questions: “must money have a commodity base?”, and “does money serve as money?”

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[6] In the introduction to his influential collection of essays on Marx's theory of money, Moseley wrote, “The most important conclusion is that most of the authors agree…that money does not have to be a commodity in Marx’s theory, even in the fundamental function of measure of value (even though Marx himself may have thought that money as a measure of value does have to be a commodity). Pure paper money (not backed by gold) can also function as a measure of value” (Moseley 2005, 9).

[7] I use the term "fiat money" to mean currency (paper or coin) issued by or guaranteed by a government which has a production value that is trivial.

[8] The quotation is found in Chapter One, Section 2 of *Capital*, volume I (Marx 1970b).

It shall be demonstrated that the answer to the first is “yes”, while the answer to the second can be either “yes” or “no”.

The conclusions from my analysis are as follows. Quantity-based theory has no nominal anchor; therefore, its monetary analysis is entirely dependent upon demonstrating the existence of an exogenous "money supply" whose amount is determinate.[9] In neoclassical monetary analysis theory sets no limit to how low or how high prices can be; this is directly implied by the hypothesis of a fixed supply of money. However, neoclassical analysis cannot establish the fixity of supply either in theory or practice. By contrast, commodity-based theory provides an unambiguous nominal anchor, and it cannot on the basis of that anchor alone construct a general theory of inflation. This failing can be overcome by a non-neoclassical quantity link between fiat money and the money commodity.[10]

## II. The Neoclassical Quantity Theory

The hypothesis that prices respond to the quantity of money available for circulation is hundreds of years old. The analytical and practical issue is not whether the hypothesis is valid, but to what extent, under what social and institutional circumstances (“the monetary regime”), and for what definition of money. In various manifestations this hypothesis is consistent with commodity-based monetary theory.[11]

Neoclassical economics has a version of the quantity theory that the Classical economists would neither have recognized nor accepted. Indeed, the neoclassicals have given quantity-based monetary arguments such a bad name among heterodox writers that the term “quantity theory” is used with a disdain bordering on contempt.[12] This section treats the neoclassical version because unlike the Classical it has pretensions to be a

[9] By "exogenous" I mean determined independently of the level of exchanges.

[10] This paper with its emphasis on the importance of a nominal anchor benefited from discussions with and writings of Costas Lapavitsas (see Lapavitsas 1997, 2004, 2009a, 2009b and 2010, and Fine, Lapavitsas and Saad-Fihlo 1999).

[11] David Ricardo might be interpreted as unsuccessfully attempting to have a commodity-based monetary analysis that incorporated a quantity element. Ricardo stated clearly that the quantity of a money commodity is determined by its value, "The quantity of money that can be employed in a country must depend on its value" (Ricardo 1951, 352). His use of a monetary mechanism in the analysis of trade (“comparative advantage” theory) is discussed in Shaikh (1979).

[12] Early non-Marxist alternatives to quantity-based monetary theory are briefly treated in Likitkijsomboon (2005).

comprehensive explanation of the level of output and employment as well as prices and interest rates. As a result it is completely inconsistent with commodity-based monetary analysis.

The analysis of prices and money within the neoclassical framework presents two difficulties from the outset. The first and simpler is whether the term "price level" refers to a system with one or more than one commodities. The second more complicated ambiguity arises because no theorizing is possible without abstraction, and the analyst must specify the simplifications. The simplifications required in neoclassical money analysis prove so severely restrictive that even pretence to generality is lost. These will present themselves as our analysis of neoclassical monetary theory proceeds.

We begin as capitalist exchange presents itself. In a given time period, the sum of all sales is equal to the sum of all purchases. The sum of sales equals the quantity sold of each commodity times the price at which it was sold, and the sum of all purchases is the aggregation of the means of payment used for those purchases. Money is the means of payment, no matter what form it takes. We can write,

1) [sum of all purchases] = [sum of all payments]

$\Sigma(P_iQ_i) \equiv \Sigma M_i$

$P_i$ = sale price of commodity i, and i = 1, 2, etc.

$Q_i$ = quantity sold of commodity i, and i = 1, 2, etc.

$M_i$ = sum of all the means used to make the purchases.

All the $M_i$'s can be measured in the same units, so we can simplify and by division obtain the following, $v \equiv \Sigma P_iQ_i/M$. The letter v is the turnover rate of means of payment or turnover rate of money.[13] Moving from this to the behavioral relationship among money, prices and quantities requires a clarification of $\Sigma(P_iQ_i)$ and $\Sigma M_i$. The $\Sigma(P_iQ_i)$ we observe is the sum of all transactions, exchanges of means of production as well as of consumption commodities. This was the measure used in theoretical

[13] In the analysis of the circuit of capital in volume II of *Capital*, the turnover rate of money is one. This is not an assumption, but results from his choice of analytical time period.

specifications of the two greatest post-Classical economists, Leon Walras and John Maynard Keynes.[14]

The standard approach in the neoclassical quantity-based monetary framework is to assume that the hypothetical economy has only one product, and that the quantity of the means of payment is determined *ex machina* by an entity usually identified as the "monetary authority". The symbol v is assumed to be a constant, designated the "velocity of money". While the assumption of a single, composite commodity may seem absurd (which it is for most purposes),[15] it is essential in the neoclassical monetary theory. The price-quantity-money relationship is reduced to a simple behavioral equation, in which v is constant and the single commodity is designated as Y.[16]

2) $PY = vM^*$

and the price *level* is

$P = vM^*/Y$

When ($\Sigma M_i = M$) is fixed at M* by the monetary authority and v is constant, causality runs from money to price and quantity. If output is not at full potential, an increase in the quantity of money will increase price and the quantity of the output in some unspecified combination, determined by one's theory of macroeconomic adjustment. Therefore, if Y is not at full potential, the level of price is in part determined by the level of output. In what might be called the pure neoclassical quantity theory of money, Y is fixed at full potential. The price level is unique with respect to the quantity of money, and changes in the quantity of money result in an equal proportional change in

[14] Walras' analysis of general equilibrium (Walras 1926) is discussed in Weeks (1989, Chapters 3 and 11). Keynes explicitly argued for including all transactions in the appendix on "User Cost" in *The General Theory* (Keynes 1936), and is treated in detail in Weeks (1989, Annex to Part I). The input-output distinction is irrelevant for the general equilibrium analysis of Walras because buyers and sellers appear in the market with the commodities previously produced. The theoretical inconsistencies that result from treating the circulation of capital as the circulation of value added are treated in Weeks (1983).

[15] By making this assumption one can avoid two types of complications. The more immediately important is that associated with establishing the neutrality of money; i.e., that at full utilization of resources the relationship between changes in the quantity of the means of circulation and changes each commodity price is strictly proportional (Weeks 1989, Chapter 8). Of more profound methodological significance is that assuming one commodity eliminates means of production, so that the total price of the only commodity is P = [wages] + [profit].

[16] The composite commodity is, in effect, value added which in the simple case is national income.

the price.[17] In principle price can be anything because it has no nominal anchor. It has a unique value because the quantity of money is fixed by a monetary authority.

The neoclassical "price level" in equation 2 has no empirical counterpart. It is a purely theoretical construction that cannot be measured. Ignoring for the moment the difficulty of defining M*, the simple form in equation 2 requires a physical measure of output which exists only in the case of an economy with one product. In the full version of equation 1 the price level cannot be defined because the prices of commodities cannot be separated from their quantity weights.

Because it may seem to the non-specialist that it required a great deal of space and unnecessarily tedious discussion to present the obvious, I summarize why the basic quantity equations, PY = vM and P = vM/Y, are not obvious, though neoclassicals wish us to believe so:

> Complication 1: The observed sum of transactions involves many commodities and many prices, and some of these commodities are inputs into other commodities. Over any discrete time period a commodity is likely to reappear subsumed within the price of another. This complication is eliminated by assuming there to be only one commodity.
>
> Complication 2: Some money may be held idle, and this idle amount may vary over time.[18] In other words, the quantity of money circulating in exchange may not equal the quantity created by the monetary authority. This complication is eliminated by calling v the velocity of money and assuming it to be constant.
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> Complication 3: The equation PY = vM is valid only if Y is constant. This complication is eliminated by assuming that the system is always at full potential.[19]

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[17] This proportionality is an extremely important analytical outcome in neoclassical analysis, named "the neutrality of money", but proves very difficult to establish theoretically. Its importance lies in its reactionary implications for policy. For example, if changes in the quantity of money have no impact of relative prices, then full employment is consistent with any price level, even a lower one achieved by a deflationary process. Even with one commodity, neutrality does not hold if the financial system includes bonds (Weeks 1989, Chapters 7 and 8).

[18] This possibility was central to the critique by Keynes of the monetary theory of his time, a theory which changed very little as a result of that critique.

[19] A full explanation of this complication is beyond the scope of this paper. To state the problem concisely, the neoclassical money market adjustment process implied by PY = vM is inconsistent

Complication 4: Not even in theory can there exist a monetary authority that determines the quantity of money. This is the focus of the rest of this section.

Quantity-based monetary theory might survive by eliminating the first three complications through assumptions, but it cannot assume that the quantity of money is fixed. That the quantity of money is determinate and independent of the prices it is alleged to determined is the *raison d'etre* of the framework. In order that the theory not assume what it seeks to establish, it must provide a logically consistent explanation of what determines the quantity of valueless money. Further, it must link this theoretical explanation to a process in actual economies.

No neoclassical economist believes that even in theory, much less in practice, there exists a money supply determined by a monetary authority. Their theoretical and practical argument is that this simplistic assumption produces a monetary analysis whose conclusions are not fundamentally altered by the complexities of reality.[20] The critique that follows accepts the simplistic assertion of a monetary authority that can regulate a form of money. A concrete example would be a central bank granted the monopoly to print paper currency and strike coins. For clarity, we shall call this the "monetary base".

The problem in proceeding further for neoclassical monetary theory begins with its definition of money, of which the monetary base is a part. Following on from the tradition of the American monetary economist Irving Fisher, neoclassical theory defines money in terms of exchanges: money is anything generally accepted as medium of exchange. Using this definition, a leading monetary theorist wrote that money is anything acceptable "as such", and "as such" refers to the property of general exchangeability (Johnson 1972, chapter 7). The difficulty with this apparently sensible

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with the aggregate demand adjustment process implied by the necessity to equate consumption plus investment to the supply of the single commodity. This inconsistency is summarized in the term the False Dichotomy. "Dichotomy" refers to the analytical separation of the two markets. Resolving this contradiction within neoclassical monetary theory requires introduction of at least one variable that mediates between the money market and the commodity market. The contradiction was pointed out in a rigorous manner by the neoclassical Pigou (1941).

[20] Developing in detail the neoclassical analysis of the money supply is unnecessary for this paper. The process is one in which the monetary authority (central bank) determines the money base, which is sometimes called "high powered money". From this monetary base, banks create credit in a multiple determined by the amount of the money base which banks must hold as assets (the reserve ratio). This process is based on several restrictive assumptions, including that bank maximizing behavior implies that reserves will not be held idle. The issue of banks and idle money is considered in a famous article by the Keynesian James Tobin (1958).

definition is it implies that money literally can be *anything*. If money can be anything, then its amount is indeterminate. In the absence of a money commodity as the anchor for nominal prices, and in the absence of a determinate quantity of money, the theory is left with nothing.

As serious as it is, this definitional indeterminacy reflects an even more serious problem in neoclassical monetary theory, accounting for the existence of money. The theoretical ambiguity is implied, since something which can be anything has no separate existence from all other things. The existence problem derives from the methodological core of neoclassical economics, the combination of the assumptions of individual utility maximization and full knowledge of the information generated by markets. If people have full knowledge of all markets, they will know the money price at which each commodity would be bought and sold. If they know this, they can exchange commodities directly without passing through the intermediary of money.[21]

As mad as this argument is, it is the necessary collateral damage arising from the equilibration process in competitive markets. If people do not have full knowledge, then ignorance can result in a commodity being sold at different prices during a market period and commodities going unsold.[22] If this happens, then markets do not generate economically and socially optimum outcomes,[23] and there is a *prima facie* case for public intervention to correct their failings.[24]

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[21] Graziani provides a clear and concise explanation for why the neoclassicals are unable to account for the existence of money (Graziani 2003, Introduction). This theoretical impasse provides perhaps the clearest demonstration of the analytical failings of mainstream monetary theory: people use money in all aspects of life, it takes many forms, and neoclassical analysis struggles to account for its existence.

[22] In what might be considered a triumph of imagination over reality, J. R. Hicks assigned the term "false trading" to markets in which the same product sells at different prices (Hicks 1939). Since this phenomenon occurs in all markets, we have a case of reality being false and the ideal being true.

[23] This efficiency condition is called "Pareto Optimality" and is explained in non-technical terms in Weeks (1993), which is also available in Spanish (Weeks 2009).

[24] Two neoclassical proposals to account for money further indicate the theoretical quandary, that money is used because of many commodities are not adequately divisible, and a seller may be unable to find a buyer that wants your commodity. Both have some ahistorical appeal, since one can image the difficulty of finding a buyer for a 1958 Edsel, especially if the seller sought a specific set of commodities in exchange. However, both problems imply market failure, which opens the door not only to money but to public intervention also.

Neoclassical writers have for the most part resolved the problem, in principle money can be anything, but for rigorous theory it must be something quite specific, by reference to practice. In practice, anything does not serve as money. By some process commodity producing societies sort out a limited number of things to serve as money. Neoclassical textbook writers are content to leave the issue as settled: anything can be money, but in practice only a few things are. Custom and time have resolved the indeterminacy. On this basis theory proceeds with a supply of money that is exogenous with respect to the level of economic activity.

Without recognizing it, neoclassicals have refuted their definition of money. One is first offered a definition: anything can serve as money. This theoretical generalization proves to be absolutely central to the theory, for it is the basic defence of the argument that money has no value. However, this generalization creates a potential analytical problem of major importance: how are limits to be set on the definition of money so that its quantity can be treated as exogenous with respect to the transactions it finances? Second, one discovers that the theoretical prediction, "anything can be money", is refuted in practice because very few things serve as money. Third, the empirical rejection of the definition is taken as the vehicle to solve the major analytical problem created by the definition; empirical rejection of the definition is used to reconcile its own contradictory nature.

People in the street, and even most students of economics, go about their affairs largely unaware that the mainstream economics profession cannot resolve something as basic as why there is money and what it is. The hypothesis that there exists a supply of money which can be effectively adjusted by a monetary authority is not only unproved, it cannot be rigorously formulated. The essence of the neoclassical monetary problem can be simply stated: the theory provides no nominal anchor for prices. Without a nominal anchor, the need to define and restrict what can serve as money is absolute. With a nominal anchor, the quantity of money and the quantity of representations or substitutes for money remains important, but need not be subject to such analytical limitations. The next section shows why and how a produced commodity can function as the necessary nominal anchor, and how it related to its representations.

## III. Commodity-based Theory: Value and the nominal anchor

This section develops commodity-based monetary theory, which despite the intractable problems in quantity-based analysis has been discarded by the vast majority of each successive generation who have sought to explain how money economies function. This is not a treatment of Karl Marx's theory of money, though he made the most important contributions to the understanding of money. It is a contribution to the explanation of what determines the level of prices and their rate of change over time in capitalist exchange, inspired primarily but not exclusively by the work of Marx. Once one overcomes the analytical taboo associated with commodity money, Marx emerges as the greatest monetary theorist.

The underlying basis of prices is values. Commodities fall into three categories, those that are produced to be inputs (designed as 1), those produced for consumption (designed as 2) and the commodity which is the general equivalent (noted as commodity "e", for general equivalent). The general equivalent emerges from other commodities in a process treated in detail elsewhere (Weeks 1981, Chapter IV; Lapavitsas 2004), and we assume that it has no other use.[25] The abstract socially necessary labor time[26] required to produce each is given by the following equations:

3) $$\Lambda_1 = (a_1\Lambda_1 + w_1n_1\Lambda_2) + \pi_1$$

$$\Lambda_2 = (a_2\Lambda_1 + w_2n_2\Lambda_2) + \pi_2$$

$$\Lambda_e = (a_e\Lambda_1 + w_en_e\Lambda_2) + \pi_e$$

Symbols:

$\Lambda_i$ = abstract socially necessary labor, measured in units of time;

$a_i$ = amount of the input required in production, measured in physical units;

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[25] The algebra can be expanded to many consumption and production commodities without changing the conclusion we reach. I make the simplifying assumption that there are no consumption commodities that only capitalists buy.

[26] "Abstract" because the interaction of production and circulation abstracts from the specific skills and abilities applied in each production process. "Socially" because the process of abstraction generates a normal that rises from and applies to all producers. "Necessary" because the social process of abstraction disciplines each producer to use his/her workers and means of production with maximum efficiency. And "labor" because human toil is the source of all value expansion. See Weeks (1981, Chapters II and III).

$w_i$ = amount of the consumption commodity paid to a worker during the time period, measured in physical units (the "real wage");

$n_i$ = amount of abstract socially necessary labor time required to produce the output; and

$\pi_i$ = surplus value arising in the production of each commodity.

To further simplify, we assume that the consumption of workers is the same in each sector, and define a unit of each commodity as the amount produced by one worker in one day. This implies that the production of each commodity differs only by the amount of the input (means of production) required, the $a_i$ terms.

4) $\Lambda_1 = (a_1\Lambda_1 + w\Lambda_2) + \pi$

$\Lambda_2 = (a_2\Lambda_1 + w\Lambda_2) + \pi$

$\Lambda_e = (a_e\Lambda_1 + w\Lambda_2) + \pi$

If all three commodities have the same labor input and, therefore, the same surplus value, but different amounts of the material input, the rate of profit will be different for each. This inequality results in a process by which surplus value is distributed through the realization of commodities, the so-called transformation problem.[27] Marx named the unit values that result when each commodity yields the capitalist the same profit rate "prices of production". We designate these as $\lambda_i$ and the common rate of profit as r, and re-write the commodity equations as:

5) $\lambda_1 = (a_1\lambda_1 + w\lambda_2)(1 + r)$

$\lambda_2 = (a_2\lambda_1 + w\lambda_2)(1 + r)$

$\lambda_e = (a_e\lambda_1 + w\lambda_2)(1 + r)$

We can now define the price of means of production and consumption items in terms of the general equivalent as the ratio of their values to the value of the general equivalent:

6) $p_1 = \lambda_1/\lambda_e$

[27] The clearest presentation of the transformation process that considers money is Fine, Lapavitsas and Saad-Fihlo (1999).

$p_2 = \lambda_2/\lambda_e$

In both cases the commodity price is expressed as an amount of the general equivalent commodity. In general, the price of production of the money commodity is not equal to its value ($\lambda_e \neq \Lambda_e$). This implies that it is imprecise to conclude that prices are determined by the *value* of the money commodity, though this is a close approximation. The value of total production, measured in labor time, is the sum of the price of production weighted by their quantities. The price of this output in units of the money commodity, which could be called the commodity money value of total output is:

7) $\Sigma(p_i x_i) = \Sigma(x_i \lambda_i)/\lambda_e$ for i = 1, 2…n.

The algebra of prices is completed by specifying the ratio of fiat money to units of the money commodity. Let $\alpha$ be the number of currency units ("dollars") per unit of the money commodity. The prices of the commodities in fiat money are:

8) $P_1 = \alpha\lambda_1$

$P_2 = \alpha\lambda_2$

$P_e = \alpha\lambda_e$

As explained in the previous section, in neoclassical analysis the term "price level" refers to a purely theoretical construction that has no empirical counterpart. Some have tried to produce the equivalent of P = vM/Y for commodity money, but it is not possible to do so in an analytically meaningful way.

Neoclassical monetary theory can construct an abstract concept it calls the price level because at the aggregate level it is a one commodity model in which there is a strict dichotomy between quantities and money, "real" and "nominal" variables. No such dichotomy is possible with commodity money, because the value of the money commodity is determined in the same process as the values of all other commodities. Even in theory commodity production cannot be reduced to a one product system.

In commodity-based monetary analysis there is no simple specification of a general price level, nor is there a simple formulation of the aggregate average value that a unit of the money commodity purchases, except as a tautology.[28] As an empirical measure, the price *level* is an index in which prices vary over each period during which it is measured while the quantities are held constant. The similar calculation for the price level measured in commodity money would be:

8) $I_p = \Sigma(p_{it}x_{ib})/\Sigma(p_{ib}x_{ib})$, t is the current and t-1 a previous time period, and b is some earlier base period.

In words, the level of prices measured in the money commodity (or fiat money) is expressed like all empirically relevant price levels, as the current price of each commodity denominated in the money commodity (or fiat money), with these prices weighted by their production level in the base year.

The money commodity provides a determinate, unique level of prices. The money commodity formally provides the nominal anchor for each price and, therefore, all prices taken together as the general level of prices. The unique level of prices results from the prior determination of the abstract socially necessary labor time for each commodity, so each price is a ratio of two sets of commodity values, one the money commodity. It is now obvious that the law of value is the basis of the determination of the price level, not commodity money as such.

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[28] Moseley (2005, Introduction) approaches the calculation of the price level with a concept he calls the "monetary equivalent of labor time" (MELT). He measures the commodity money price for product i using the notation, $P_i = (1/L_g)L_i$. This is the same as in equations 6 with L for $\lambda$. Except in the neoclassical one commodity case one cannot move from this equation to an average across commodities because there is no common measure for the quantities. He obtains the aggregate average price ("MELT") by use of two additional concepts, the quantity of fiat money in circulation ($M_p$) and the quantity of the money commodity (M*). The aggregate "MELT" is [1/Lg][Mp/M*]. At an earlier point he refers to the "sum of prices", which is given algebraically as $P = \Sigma P_i$. This sum is valid only for the special case in which there is only one commodity so no need arises for quantities to weight the prices. The MELT formula suffers from the corresponding neoclassical problem. In the Moseley equation the term M*, the quantity of the money commodity, is clear and in principle could be measured. However, the term $M_p$ is the equivalent of the neoclassical money supply (this is designated as M* in equations 1 and 2). Whatever notation is used for the amount of money in circulation, it cannot be defined in a manner that restricts its actual or potential supply, as explained in Section II. Therefore, Mp/M*, the relationship between commodity money and fiat money, only exists after exchanges have occurred, which was noted by Foley (Foley 1983). Because all commodities are specific quantities of abstract socially necessary labor time, one could substitute $\lambda_i$ for $x_i$ in equations 7 and 8. However, the result is a tautology, that the price level is equal to the inverse of the price of production of the money commodity.

Commodity money is directly derivative from the law of value. This relationship distinguishes Marx's treatment of money from the approach of other "anti-quantity theorists" of his time, Tooke being the most prominent. Tooke, a member of the so-called banking school, objected to quantity-based monetary analysis on empirical grounds, arguing that valueless money could not in practice serve the needs of finance and exchange (Tooke 1844). While Marx agreed, his was not an empirical argument; it was an analytical inference from value theory.

If the composition of production does not change and the rate of profit equalizes across commodities, the level of prices will rise if the productivity in production of the general equivalent increases relatively to productivity for all other commodities ($\lambda_e$ falls more than for all other commodities).[29] I shall refer to this subsequently as the "productivity differential" and in the specific case of gold, the "gold productivity differential". It is the implied prediction about productivity in production of the money commodity and fiat prices that more than any other that prompts rejection of commodity-based monetary analysis. The more commonplace objection, that "gold (or some other metal) is not used as money", that we cannot see or track the regular use of some commodity such as gold in modern economies, cannot be taken as a serious argument. There are many aspects of economies that cannot be observed but are recognized as analytically valid, neoclassical money being the most obvious in this context.[30]

What would appear to undermine commodity-based monetary analysis beyond salvation is that even casual observation makes it obvious that inflation cannot be explained by changes in the value of the money commodity; i.e., by changes in the abstract socially necessary labor time required to produce it. It is impossible to avoid the conclusion that in some manner price levels are affected by the quantity of a valueless

[29] The algebraic analysis assumes that the commodity which serves as the general equivalent is not used in consumption or production. Therefore, changes in the value of the money commodity do not change the relative prices among the other commodities. In this special case, commodity could be characterized as "neutral", similar but not identical to the neoclassical concept of neutrality of money. Neoclassical neutrality also applies to interest rates, which would not in general be the case for commodity money.

[30] A concept which cannot be adequately defined (a money supply controlled by a monetary authority) can hardly be considered real and concrete.

means of circulation. The next section seeks to reconcile the apparently irreconcilable tension between commodity-based and quantity-based monetary analysis.

## IV. Commodity-based Theory: The circulation of fiat money

The fatal flaw in all versions of quantity-based monetary theory is the definition of money. The definition must establish a money supply which is quantitatively determinate and has an empirical manifestation. The task is impossible in the simple analysis in which money serves only as a means of circulation, and the flaw creates an increasing number of contradictions for other functions of money. In contrast, the analytical strength of commodity-based monetary theory increases as these functions are elaborated. In the simplest function of money, as means of circulation, commodity-based theory is internally consistent (unlike quantity-based analysis), but appears to be irrelevant (exchanges are not done with commodity money).

Analysis of the other functions of money dispel this appearance of irrelevance, and reveal commodity money as the basis of all manifestations of money, the underlying basis for the level of prices, while value is the underlying basis of relative prices. Elsewhere I have shown that other functions of money, especially money as means of payment, require a money commodity. Here I restrict the discussion to money as means of circulation, where quantity based analysis would appear to on its strongest ground, and commodity-based analysis weakest.[31]

It is convenient to specify the money commodity to avoid confusing and repetitive terminology. The money commodity will be gold in the following discussion, though limiting the money to one commodity is an oversimplification if the link between fiat money and the money commodity is not formally legalized. The essential characteristic of exchanges in gold (or any money commodity) is that the means of payment has an

[31] Means of circulation is the strongest ground of quantity-based analysis because it is possible to treat circulation as if it the simple circulation of commodities (commodities sold for money, money purchases other commodities, C-M-C). Were this the nature of circulation, many things (if not "anything") could serve as money. Elsewhere I have argued that it is not possible to make a convincing theoretical or practical argument for commodity money without reference to money as capital (Weeks 1981). While raising interesting issues, Germer's defense of commodity money, which in presentation is a defense of Marx's treatment of commodity money, suffers from the absence of capital in the analysis (Germer 2005).

intrinsic value equal to that for which it is exchanged either immediately or through conversion.

Many argue that gold cannot and does not serve as money because, among other reasons, of the inconvenience implied by its use. Indeed, it may be more convenient for people to conduct their exchanges in representations of gold rather than gold itself because of its weight, potential to deteriorate, or some other reason. However, the development of representations of money comes in response to the needs of capital, not for the convenience of the subjects of capital. As part of the accumulation process, the circulation of capital requires a form of money to redistribute value among capitals, as some expand and others contract. Credit is this form of money, which allows a capitalist enterprise to expand beyond the limits of the value it realizes in the sale of its production. Credit derives from reserves of money held by commercial banks, and somewhere in the financial system these reserves take the form of gold that has accumulated in hoards.[32]

In each of the volumes of *Capital*, Marx treats the role of money held idle by capitalists. The usual interpretation of his discussion is that hoards function as a residual depository of money that increases and decreases in response to the need to circulate commodities whose value is fixed prior to realization (see Campbell 2005, Likitkijsomboon 2005). To put that hypothesis simply, all prices are a multiple of the value of gold, and when more or less gold is need to circulate commodities, the amount in hoards decreases or increases.

Another interpretation of Marx's treatment of hoards is possible, that links hoards to the creation of credit.[33] While hoards of money have various functions, one of the most important is to serve as the reserves for the expansion of bank credit. These reserves can and do take many forms depending upon a country's monetary regime. Commodity money serves this function particularly well because it is the real basis of all other forms of money, and it is less suited for transactions both routine and complex than its representations. When the state guarantees a conversion rate for representations of

[32] Monetary systems or regimes can take many forms. For example, a state controlled central bank may assume a monopoly over gold, as was the case in the United States until the early 1970s. In order to be general, the discussion considers the hypothetical case in which there is no central bank and commercial banks hold the gold reserves.
[33] Marx demonstrates his understanding of credit and the financial system of his time in volume 3 of *Capital* (Chapter 19 and all of Part V).

gold into gold, it is unnecessary for capitalists to hold gold themselves, and the gold accumulates in hoards either in banks or in the coffers of the state.

Moving from the abstract demonstration that the nominal price anchor is a money commodity and a commodity is the basis of fiat money and credit, to the concrete, that the prices we observe are determined by the relationship between the money commodity and fiat money, requires specification of the institutional context for the analysis.

Currencies are fiat money issued by national governments. The few currencies that are used for the vast majority of international transactions are also national currencies, managed by the governments. The price anchor for the national currencies of all but a few countries is one or a combination of those currencies that finance international transactions. For twenty-five years, 1945-1970, national currencies were formally linked to the United States dollar by a treaty agreement that was part of membership in the International Monetary Fund.[34] Gold was the legal anchor for the US dollar, and all other currencies operated a fixed exchange rate to the US dollar. To explain the inflationary process in any specific country during that period one must first explain inflation in the United States.

In 1970 the US government announced it would no longer purchase gold at a fixed price, which ended the postwar period of fixed exchange rates. Several years of international monetary instability followed as governments sought an alternative global exchange rate mechanism including the fictitious Special Drawing Right. In the second half of the 1970s the current arrangement emerged, in which all of the major economic powers operate "floating" rates that are managed to varying degrees.[35] If commodity-based monetary analysis is valid, it should apply to both before and after 1970.

To be empirically credible, the commodity money hypothesis should as a first step be consistent with the measured rate of inflation in the United States. An accurate test of the hypothesis requires adjustment of the standard price indices,[36] because they do

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[34] The Soviet Union set its currency, the Ruble, on par with the US dollar. This peg was of limited importance because the great majority of Soviet trade was through material exchanges (so-called barter). The currencies of the allies of the Soviet Union were pegged to the Ruble.

[35] The IMF categorizes countries by exchange rate "regime", and the *Annual Report* for 2007 listed thirty-five out of over 150 as having an "independently floating" exchange rate. All advanced countries are in this category.

[36] Such as those in the annual Economic Report of the President.

not adequately incorporate quality changes in existing products and introduce new products in an *ad hoc* manner. In 1996 an expert commission established by the United States Congress estimated that the commonly calculated aggregate indices overestimated actual price changes in the United States by slightly more than one percentage point per annum.[37] Therefore, the commodity money hypothesis should be consistent with an annual rate of inflation in the United States that is adjusted downward by this amount.

From 1947, after wartime price controls, through 1969, the trend rate of change in the US national product deflator was 2.1 percent per annum, while the trend for aggregate productivity was almost exactly two percent.[38] To confront the hypothesis with the evidence, 1947-2008 is divided into three periods (see chart): 1947-69 when the US dollar link to gold was formal at US$ 35 an ounce; 1970-1987, almost two decades from the end of the formal link which I call the "instability period"; and 1988-2009, which I designated the "reversion to gold" period.

The theoretically-based prediction of the commodity money hypothesis is that the observed trend in quality-adjusted prices should be equal to the difference between the rate of growth of aggregate productivity (two percent) and the rate in the production of gold. If one accepts the interpretation that the years of a formal link (1947-1969) would have been followed by a period of instability as the monetary regime sought to re-define the price anchor, then the commodity money hypothesis performs well. For 1947-1969 and 1987-2009 the necessary productivity differential would need be only one percent.[39]

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[37] The commission was chaired by Michael Boskin of Stanford University, and the report, *Toward a More Accurate Measure of the Cost of Living* (Boskin Report), can be found at http://www.ssa.gov/history/reports/boskinrpt.html. The conclusions are briefly summarized at http://www.highbeam.com/doc/1G1-20897236.html. The estimate of upward bias was extremely controversial for its political implications, which implied, for example, that social security adjustments of inflation should be reduced.

[38] The trend in prices falls slightly, to two percent for 1953 through 1969, when one excludes the Korean War, during which some price controls were re-introduced. The productivity trend is for the production of commodities, agriculture, mining and manufacturing. The relevant statistics for calculation can be found in the Economic Report of the President, various years. This trend rate is reported in the entry on productivity in the *Concise Encyclopedia of Economics* (Nasar nd).

[39] There is a surprising lack of employment and productivity data despite the importance of gold to the South African economy. A declassified US Central Intelligence Agency report covering 1946-1967 reported monetary cost rather than physical productivity. The results of its calculations are consistent with the hypothesis of a one percent differential (CIA 1968, 13). I am currently searching for other statistics on productivity in gold production, in South Africa and elsewhere.

Thus, quantity-based analysis passes the test of being consistent with inflation rates when the 1970s and 1980s are interpreted as decades of adjustment to a different monetary regime. The policy shift by the Nixon administration occurred in the context of several complicating changes which required substantial adjustment in a gold-based monetary regime. The most important was the decline United States as the overwhelming world economic power as the powers defeated in World War II recovered. Over the long term this reduced the role of the dollar as the fiat currency of international transactions. This had important implications for the determination of inflation in the rest of the world, because the international monetary system had to adjust to the end of a formal price anchor and a world of several major economy powers.

Second, and conjunctural, were the large increases in petroleum prices during 1973-1974 and 1978-1979, which were denominated in US dollars. The decline of US economic hegemony weakened the role played by the dollar as the intermediary between gold and other national currencies, while the oil "shocks" prompted large adjustments in relative prices among commodities. The third complicating factor affected the value of gold. The share of world production of gold from South Africa suffered a sharp fall, from eighty percent in 1970 to less than ten percent in 2008.[40] This decentralization of gold production resulted in a more complex process for the determination of the international value of gold. The combination of these three changes required a period of adjustment in prices, price levels and exchange rates within and among countries, to a new intermediary or a reformulation of the nominal anchor for the dollar. A new global value for gold was being established at the same time that relative international exchange values of commodities changed dramatically.

Demonstrating that the trend in the US GDP price index is consistent with a credible trend in the value of gold is not an explanation of the level and rate of change of aggregate prices in the United States by the value of gold. The price statistics demonstrate only that the hypothesis that in practice gold is the nominal anchor for prices is credible. Important issues remain: 1) empirically establishing the link between a measure of the value of gold and aggregate prices; 2) explaining the relationship between

[40] The largest producer in 2008 was China, with 12.2 percent. The sharp declines for South Africa came after 1975 (http://www.goldsheetlinks.com/production.htm)

the value of gold and the fiat price of gold;[41] and, therefore, 3) the relationship between the fiat price of gold and the fiat price of all other commodities. The importance of these issues follows from demonstrating the empirical credibility of a link between aggregate US prices and the value of gold.

## V. Credibility of Commodity-based Monetary Analysis

For all but the true-believing neoclassical, the theoretical superiority of commodity-based monetary analysis over quantity-based analysis is obvious. The latter, with neither a nominal anchor nor a theoretical limit to the quantity of money, has no explanatory power. Its apparent analytical prowess is an illusion created and sustained through repetition. All neoclassical monetary analysis is based on the specific repetition that the quantity of money is limited by a "monetary base" that some authority regulates. Such a base exists, but its link to the quantity of means of circulation cannot be established *ex ante* either in theory or practice (Foley 1989).

In the eighteenth and nineteenth centuries many argued that a commodity, usually gold, was the basis or "backing" for the circulation of fiat money. Their view was swept aside by quantity-based arguments that eventually metamorphosized into the neoclassical Quantity Theory of Money. One reason the supporters of commodity-based money lost the argument was that they had no theoretical explanation for why money should be a commodity. That explanation is the labor theory of value, from which commodity money emerges at an early stage of the analysis.

Perhaps Marx's single most important insight into capitalism was and remains that the appearances of capitalism are not only misleading, but, more importantly, its appearance is frequently the direct contradiction of the underlying relationships.[42] There is no better example than money, which appears to be valueless, but is a commodity. It is

[41] In *A Contribution to the Critique of Political Economy*, Marx explicitly analyzed inflation in the context of commodity money:

> It is these contradictory functions of money, as measure, as realization of prices and as mere medium of exchange, which explain the otherwise inexplicable phenomenon that the debasement of metallic money...causes a depreciation of money and a rise in prices. (Marx 1970b, 212)

[42] Marx repeatedly refers to the process of competition causing relationships to appear as their opposite (see, for example, Marx 1973, 657).

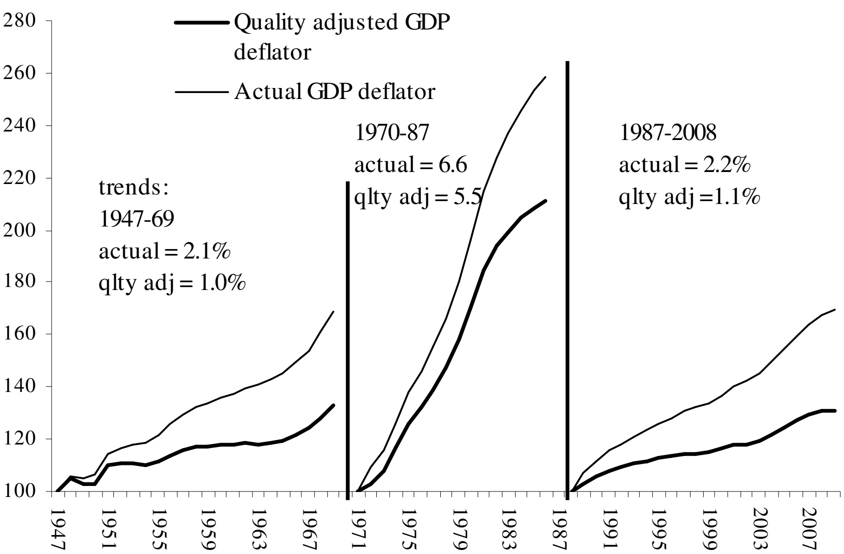
a mystery why this powerful insight has been rejected by Marxian writers. As a result of the distribution of surplus value as profit on the basis of total capital advanced, it appears that capital itself is a source of value along with labor, but no Marxist is misled by this appearance. Certainly no Marxist has ever argued that the exploitation of labor was a phenomenon of Marx's time that no longer applies to capitalism.

Yet, this is what is argued for Marx's treatment of money. Marx's theory of exploitation is directly derivative from his theory of value, and that theory of value explains the process by which one commodity is differentiated from all the others as the general equivalent. This differentiation is not a historical event, but a continuous social process which is constantly repeated, just as the process and relations of exploitation are repeated.

This article has taken a step towards establishing the credibility of the empirical link between commodity money and the prices one observes. Moving beyond credibility to demonstrate causality is untaken in a subsequent study. Conan Doyle has his famous detective, Sherlock Holmes, say, "after eliminating the impossible, whatever remains, no matter how improbable, is the truth".[43] Quantity-based monetary analysis is the impossible, and commodity money is what remains, though it is improbable only if one discards or fails to understand Marx's labor theory of value.

[43] From "A Scandal in Bohemia".

Index of actual GDP price deflator and the "quality adjusted" price deflator, 1947-2008




Source: Council of Economic Advisors 2010.

Notes: The quality adjusted GDP deflator is explained in the text. The actual GDP deflator is the index for the private sector. The trends are derived from regressions. For each period both indices begin at 100.

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