Coins, Currency and Crisis from c. 2000 BC – c. AD 2000: Silver, paper money and trust in historical perspective.
International Workshop, Free University of Amsterdam
Organized by Prof. dr. Bert van der Spek (University of Amsterdam)
And Dr. Bas van Leeuwen (Utrecht University)
12-13 December 2014

==========

"Economic Theory from/for Silver History"

Dennis O. Flynn
University of the Pacific

Origins of the Monetary/Non-Monetary Dichotomy in Modern Economic Theory

Having originated from Utilitarian philosophy in the late-19th century, Neoclassical economic theory today is strictly bifurcated into Microeconomics and Macroeconomics components. Utilitarianism furnished the philosophical foundation for construction of a *subjective* theory of value that remains a cornerstone of Neoclassical economics to this day. Subjective value theory supplanted the *objective* value theory of Classical economics over a century ago. "Microeconomic" and "Macroeconomic" terminology never existed prior to the 20th century. It was the rise to preeminence of subjective value theory that caused economic theory to split into distinct Microeconomic and Macroeconomic branches.

Creation of two separate branches of economic theory became necessary because numerous attempts to integrate monies directly within the new utility-based-subjective-value theory failed. Since direct fusion of monetary theory was eventually deemed hopeless, an *indirect* route for integration of monies and non-monies had to be found. Because monies could not be united within the new framework of subjective theory of value (later known as Microeconomics), a second branch of theory had to be created. In other words, Macroeconomics was founded in order to provide a conceptual home for monetary items. Economists would have preferred to retain a singular, unified theoretical approach, but no theory was could be found to accommodate monetary and non-monetary items simultaneously. Absent an all-embracing theory, Macroeconomics evolved as an indirect and imperfect solution. In short, subjective utility analysis became the foundation of a new Microeconomics branch of theory, while Macroeconomic theory evolved into a set of conceptual devices applicable to monies (and certain other items) that defied inclusion under the umbrella of subjective utility theory. The goal of this essay is twofold: (1) to explain why the resultant Microeconomics/Macroeconomics dichotomy has failed to adequately resolve central theoretical issues, and (2) to offer an alternative model that permits unification of monetary and non-monetary items within a singular theoretical framework.

Objective versus Subjective Theories of Value

Classical value theory was "objective" in the sense that determination of any item's relative price – its market exchange value – was believed to depend upon the amount of labor time embodied in its production. Thus, price of a table would

be three times greater than price of a chair if labor time embodied in table production (e.g. 24 hours) were triple labor time embodied in chair production (e.g. 8 hours). It is not surprising that diverse Classical economists disagreed among themselves about specific details surrounding competing versions of the labor theory of value (not discussed here), yet it is nonetheless accurate to characterize Classical value determination in general as an *objective* cost-of-production theory. In principle, many thought that labor hours could be calculated and compared. Unfortunately, quantification of a "unit of labor" turned out to be essentially impossible, since no such thing as a "standard labor hour" could be found. Another core criticism of objective Classical cost-of-production theory had to do with an inability to account for changes in a product's price (value in exchange) as time progressed. Price of any good is liable to rise or fall after the good's production, notwithstanding embodiment of *fixed* labor time expended during its production. For example, prices of paintings and houses routinely appreciate or depreciate after completion. How can cost-of-production-value theories explain changing prices *after* production, while maintaining simultaneously that price is determined by production costs *fixed* in terms of labor time? Short answer: It is not possible to maintain simultaneously that price is fixed by production costs, yet price also varies after completion of production. Although cost-of-production Classical theory seemed to provide a plausible explanation for prices of newly produced items, in other words, cost-of-production analysis could not account for *changes* in market price after completion of an object's production. Embodied labor time is *fixed* at termination of production, yet prices vary after production.

Neoclassical *subjective* utility theory seemed to offer an avenue of escape from the fixed-price conundrum that vexed Classical theory. A good's price could certainly rise or fall after production, according to subjective utility theory, since subjective personal preferences can and do change over time. Utility theory was subsequently embellished with "indifference curve" analysis that illustrated in straightforward fashion how changes in subjective consumer tastes and preferences alter market prices over time. Thus, based upon subjective utility analysis rather than objective production costs, Neoclassical value theory supplanted Classical economic theory in part because Neoclassical theory offered flexibility in explaining changes in product prices over time. Neoclassical utility-theory mechanisms demonstrate how changes in personal tastes and preferences lead to alterations in market valuations (i.e. prices) over time via shifts in Microeconomic demand. (Neoclassical production theory subsequently provided explanations for price shifts emanating from supply-side shifts as well, an issue ignored here.) In sum, *subjective* Neoclassical value theory replaced *objective* Classical value theory because the new subjective theory was perceived superior in key respects.

What about Valuation of Monies?

Utility-based Neoclassical value theory swept the economics discipline by storm during the late-19th/early-20th century, giving birth to what today goes by the name of Microeconomic Theory. Yet an intractable problem remained: Monies could not be accommodated within emerging Neoclassical utility analysis, despite repeated attempts at theoretical integration of monetary and non-monetary

objects. Insightful writings by Sir John Hicks reflect frustration with repeated failure to integrate monetary and non-monetary analysis within a coherent system:

> Now, to an *ingénue,* who comes over to monetary theory, it is extremely trying to be deprived of this sheet-anchor. It was marginal utility that really made sense of the theory of value; and to come to a branch of economics which does without marginal utility altogether! No wonder there are such difficulties and differences! What is wanted is a 'marginal revolution'! (Hicks 1935, p.47)

> It was obvious, when coming back to money after working on consumer demand, that there was a parallel; the same technique that we had been using in demand theory could be used in this other context. The former was a flow problem, while this was a stock problem... But these differences were no obstacle to the use of a similar method. (Hicks 1982. pp.8-9)

Hopes for integration of monetary theory and value theory did not materialize, however, because the flow-stock distinction mentioned by Hicks represented an insuperable obstacle to unification. Utility theory applies exclusively to *flows* of non-monetary items, since a core Neoclassical assumption remains to this day that happiness (i.e. utility) can only be generated through consumption. The a assumption of consumption as the sole source of satisfaction is so deeply embedded in the fabric of modern economic theory that every household buyer on earth today is categorized simply as a "consumer." This core Neoclassical claim today of consumption as the sole source of utility is contradicted by an alternative model offered later in this essay, but let us proceed first to discussion of a key issue involving consumption and time.

Time is of the essence: Consumption is a Flow Concept

Consider the market for some common, yet specific table wine. Statement that a person consumes ten bottles of wine makes sense only if a time interval is specified for wine consumption. Consumption of ten bottles of wine per year clearly differs from consumption of ten bottles of wine per day, so statement to the effect that someone "consumes ten bottles of wine" lacks meaning unless a period of time is specified. The point is that subjective utility analysis, based upon assumption that the sole source of utility is consumption, requires specification of a time dimension. Specification of a time dimension, in turn, implies that every Microeconomic quantity axis must exhibit time such as "10 bottles of wine/*week*" consumed at price P_1. (Figure 1)

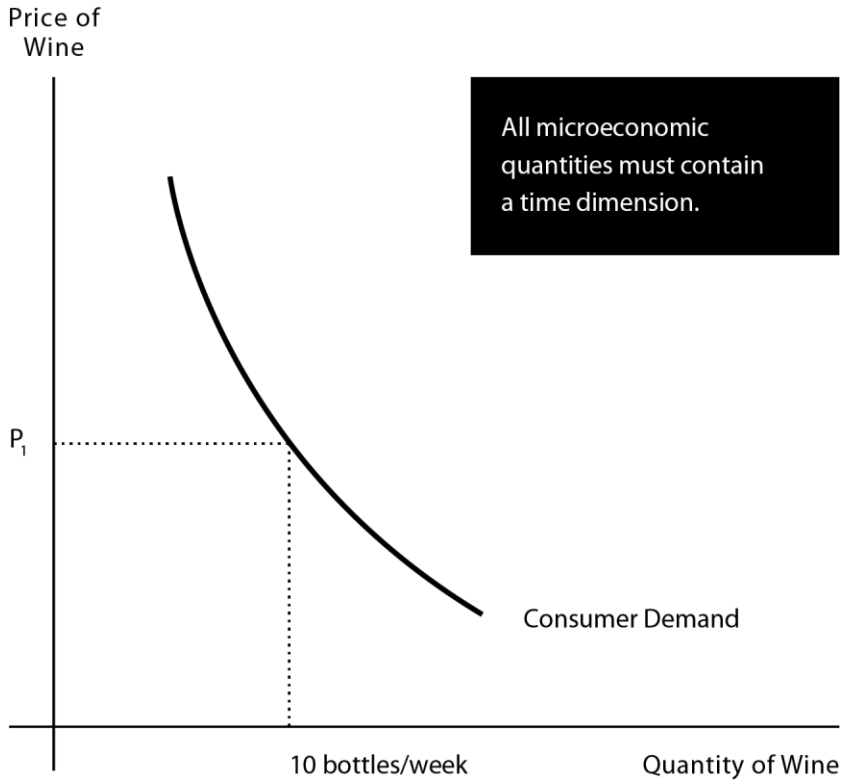

Figure 1. Microeconomic Demand Involves Time-Dimensioned Quantities

Neoclassical value theory posits that all individuals maximize utility (i.e. happiness), and that the *only* source of utility is consumption. Thus, Neoclassical value theory is restricted solely to goods and services that are "consumable" over a specified time period.

Neoclassical Monies: Non-consumable Inventory Stocks

Monies are excluded from Neoclassical value theory for two reasons. First, monies are not considered consumable items. Yet consumption is the sole source of utility, so monies are therefore incapable of generating utility directly. Readers will never find money supply and money demand functions in Microeconomics textbooks because monies are considered non-consumables (that therefore cannot generate utility). People hold monetary balances (according to *Macroeconomics* textbooks), not because they generate happiness directly, but because monies can be exchanged for consumable items that can generate utility directly at a future date. In short, monies cannot be inserted directly into individual utility functions, and therefore monies are excluded from microeconomic analysis.

Since it is unacceptable to simply ignore monies, invention of a conceptual space within which to locate monetary items is required. Thus, Macroeconomic theory developed in order to furnish a conceptual home for monies (and certain other non-consumable items). Since monies (non-consumables) could not generate utility directly, Macroeconomists had little choice but to posit indirect justification for holding monetary balances. Motivation for holding monetary stocks could not be attributed to monies themselves, since monies are non-consumables and thus incapable of generating utility directly. Instead, Neoclassical economists postulated that monetary holdings provide utility indirectly at an unspecified later date. *Only when the monies are no longer held* – that is, when they are later traded away in exchange for non-monetary consumables – can satisfaction be derived. In sum, monies do not generate utility directly and therefore are excluded from normal microeconomic supply-demand analysis. The history of monetary theory contains much discussion about whether it is rational to hold non-zero monetary balances, since monetary holdings themselves are sterile in terms of utility generation. One solution to this problem has been to impute indirect usefulness to monetary items, but only at an unspecified future date when the monetary items themselves are *no longer* held.

Stocks versus Flows

A second reason for exclusion of monies from Microeconomic demand-and-supply analysis is an inherent requirement that monetary quantities be treated as inventory stocks. Inventories must be measured at a point in time. Think about inventory activities at a small neighborhood grocery store. Owners require assessment of inventory stocks on hand in order to know exact quantities of each product to order for the coming week. Weekly inventory are normally conducted after regular business hours, since it is impossible to accurately determine inventory numbers while ongoing deliveries and sales constantly add to/subtract from inventory stocks during operating hours. This is why stocks on hand are often assessed while an enterprise is closed. If weekly inventory reveals that five one-pound bags of a certain coffee are in stock, for instance, then the inventory supply of coffee on hand at this particular point in time equals five bags. The inventory quantity at issue is 5 bags, *not* 5 bags/week or 5 bags/month! Inventories are measured *at a point in time* (as in a freeze-frame picture) and therefore inventory quantities contain no time dimension.

Money supply and money demand functions in Macroeconomic theory are depicted as inventory stocks. Look no further than your pocketbook to see that holdings of various coins and paper bills are inventory stocks inherently. Each coin and paper bill displays the year of its minting or printing. The inventory stock of monies on hand – produced during prior years – is an accumulation. The stock of money is clearly not restricted to those coins and paper bills *currently* produced this week or this month; the stock of monies includes survivors of monies previously produced. In this fundamental respect, inventory supply of any money contrasts sharply with Microeconomic supply. Microeconomic supply refers strictly to the "profit-maximizing rate of production"; and the "rate" of production refers to units produced during a specific (current) time period. As indicated in Figure 1, all quantities on Microeconomic supply-demand axes refer to units of the product *per time period*. Money supply/money demand graphs depicted in Figure 2

(below), however, specify quantities of money on the horizontal axis *without* reference to a time dimension. In summary, monetary theory is excluded from value theory for two reasons: (a) monies are non-consumables and therefore incapable of generating utility, and (b) money supply and demand functions involve monetary quantities that contain no time dimension whatsoever (they are stocks, not flows). Since Microeconomics cannot accommodate non-consumable stocks, monetary theory was forced to split from Neoclassical value theory. There have been numerous attempts to integrate monies and non-monetary items under a unified theory, but all failed.

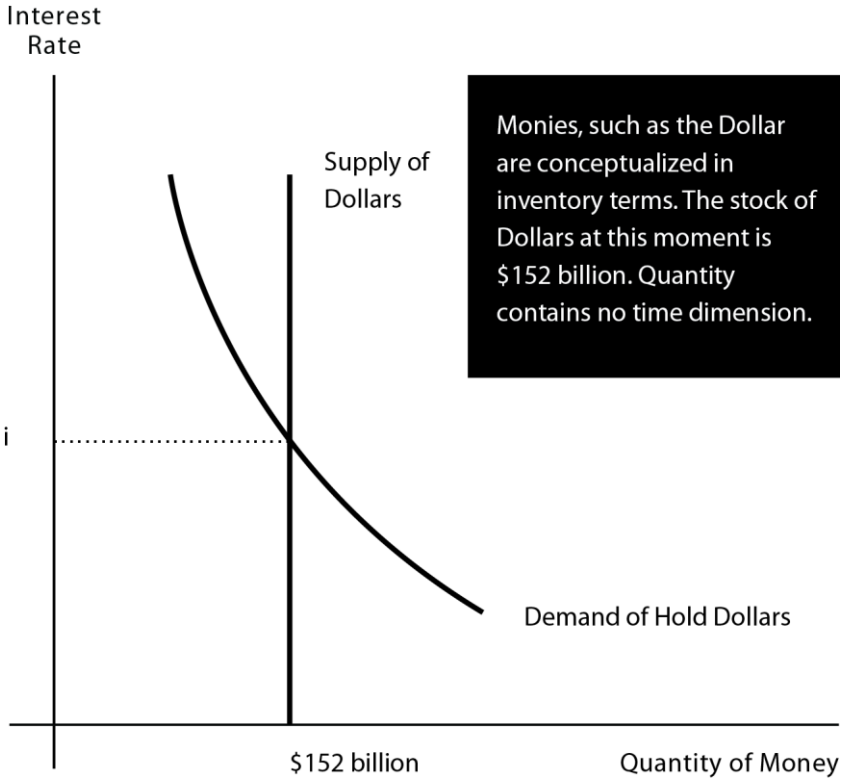

Figure 2. Money Supply and Money Demand in Macroeconomics

Construction of a new conceptual home for monetary theory as chief resident was a piecemeal process that has evolved into modern "Macroeconomics." "Microeconomics" became the utility-based theoretical home for non-monetary substances. "Macroeconomics" became a conceptual place to house monies, and also to house "investment," "saving" and other concepts that likewise resisted accommodation within microeconomics.

Monetary Neutrality

It bears repeating that no fundamental Neoclassical monetary/non-monetary dichotomy ever existed within the Classical economic framework, since Classical cost-of-production reasoning applied equally to monetary products (such as coins) and non-monetary products (such as chairs). Classical economics unified all

monetary and all non-monetary items within a singular theoretical structure; the value of, say, a particular coin was determined by embodied labor time, as was the case for non-monetary items. Divorce of monetary theory from production theory was forced because of the structure of Neoclassical economics. A coherent theory of monetary production could not fit within Microeconomic production theory because monies involved inventory stocks, while production of non-monies are treated as time-dimensioned flows. Since monies have been excluded from modern production theory (i.e. Microeconomics), it is perhaps unsurprising that the most prominent Monetarist of the 20th century, Milton Friedman, theorized about a simplified world that contained only fiat paper money with an initial money supply equal to $1,000. He postulated doubling of the money supply as follows:

> Let us suppose now that one day a helicopter flies over this community and drops an additional $1,000 in bills from the sky, which is, of course, hastily collected by members of the community. Let us suppose further that everyone is convinced that this is a unique event which will never be repeated.
>
> To begin with, suppose further that each individual happens to pick up an amount of money equal to the amount he held before, so that each individual finds himself with twice the cash balances he had before. (Friedman 1969, pp.4-5)

Friedman then explains conditions under which the price level would double, precisely in proportion to doubling of the stock of money. To illustrate symmetry of the argument, he subsequently hypothesized halving the money supply via government taxation of 50% of all money balances, whereupon the money taxed is incinerated; the price level falls 50% in response. Although he did not invoke "monetary neutrality" terminology in this essay, his conclusion is that alteration of the money supply has no effect whatsoever on any non-monetary output in the long run. Changes in the money stock alter the value of money alone – that is, price inflation or price deflation results – but increase or decrease in the money supply cannot influence production of goods or services in the long run. Friedman spoke of doubling the stock of money, but he discussed neither production of the initial stock, nor production of additions to the stock.

Setting aside political opinions, Milton Friedman was arguably the most influential monetary theorist of the second half of the twentieth century, and his monetary theory merits serious attention. This particular Friedman passage is cited for two reasons. First, it hints at the fact that modern monetary theory generally contains no serious theory of monetary production. Second, "neutrality reasoning" is highlighted in order to emphasize widespread acceptance of a theoretical dichotomy between the "monetary sector" and the "real (i.e. non-monetary) sector" in modern economics. It has become conventional to maintain that changes in the monetary sector only affect prices expressed in terms of money; in other words, monetary changes have zero influence over "real variables" such as quantities and relative values of land, labor and machinery. This means that changes in the value of money – that is to say, price inflation and price deflation – can only be discussed in the context of Macroeconomic theory. Ultimately, changing monetary supply or monetary demand has no effect whatsoever on non-monetary markets. Conversely, changes in the "real" value of non-monetary items can only be discussed in the context of Microeconomics and have nothing to do

with money markets. In a nutshell, this is the gist of the fundamental Microeconomics-Macroeconomics dichotomy: Microeconomics deals with values of things while abstracting from money, while Macroeconomic monetary theory deals with the value of money (indirectly through aggregated price indices) while abstracting from non-monies.

I adopted this monetary-versus-real-price dichotomy myself some thirty years ago while arguing against claims by proponents of the Population Thesis who argued that population growth caused the sixteenth-century Price Revolution: "It is essential to remember that relative prices have to do with the values of goods with respect to other goods, while nominal-price indexes measure the value of goods in general with respect to money." (Flynn 1984, p.368) McCloskey had previously emphasized this criticism of the Population Thesis: "The central flaw in the revisionist argument [i.e. Population Thesis] is that it repeatedly uses the theory of relative prices as a theory of absolute prices… They do not perceive that, however much the price of one commodity may rise relative to others, its absolute rise – and it is the absolute rise that is at issue in the Price Revolution – is governed by whatever governs the general level of prices." (McCloskey 1972, pp. 1323-24) Mainstream economic theory does indeed fortify such criticisms of the Population Thesis claim to explain general price inflation/deflation, on the basis that "real-sector" arguments (Microeconomics) cannot be properly utilized to support changes in "monetary-sector" outcomes (Macroeconomics). I have come to realize over the past few decades, however, that the conventional) real-versus-monetary theoretical dichotomy – which I previously adopted – is erroneous. Note that I am *not* proclaiming that the Population Thesis view of the Price Revolution is correct, since it is contradicted by a preponderance of empirical evidence. What I am saying is that one particular line of argument used against the Population Thesis – the real-versus-monetary orthodoxy – is also contradicted by historical evidence. Commodity monies were just as "real" as any non-monetary commodity, as argued below, and monetary impacts upon non-monetary markets have been both global and of immense impact.

Monetary Theory versus Historical Realities

Mountains of evidence from monetary history contradict modern monetary theory. First, monetary neutrality states that changes in money supply or money demand can only affect the price level (i.e. the purchasing power of money) in the long run. Increase or decrease in the stock of money cannot affect markets for ordinary goods, or markets for productive inputs (such as markets for raw materials or labor) over time. But this conclusion thoroughly contradicts historical evidence. Production of intrinsic contents (along with alloys) of the most important monetary substances over the past few thousand years – silver, gold, copper, and cowry shells – required hundreds of thousands (and eventually millions) of miners working worldwide at the same time. How could employment of hundreds of thousands of workers in mines (and aquaculture in the case of cowry shells) *NOT* have an enormous impact on markets for non-mine products? But wait, mined ores also require smelting and other forms of processing. Also, coinage of mined metals involved highly industrialized processes that employed huge arrays of inputs from "real" economic sectors, including water, timber, all sorts of machinery, and workers with diverse levels of technical expertise. And what about vast

agricultural sectors required for feeding hundreds of thousands of miners? Forty thousand draft animals were sent annually just to Potosi (Upper Peru) from Tucuman, Argentina (600+ miles away) in the early 17th century, beasts required for transportation of raw materials as well as end-product silver. In addition, environmental consequences of mining and minting of metals around the world were (and remain) devastating at a global level. Moreover, transportation of coins to end-markets worldwide – via land and sea – also required immense resources. Values produced and exchanged for the worldwide silver market were probably greater than markets for any product in the world during the 16th through 18th centuries; indeed, virtually the entire value of all Asian imports into Europe involved transfers of silver eastward. It is difficult to imagine how any student of commodity money history could take seriously the independent "monetary sector" versus "real sector" distinction offered routinely in modern economics textbooks. Viewed in its entirety, the global silver market of the 16th-18th centuries must have employed more workers than any industry on earth. Profits from silver financed the Spanish Empire and also unification (and subsequent consolidation) of Japan by the Shogun in 1600. (Flynn 1991) Monetary neutrality is a fiction, created by economists whose thinking was perhaps restricted to recent fiat money issues such as paper U.S. dollar bills. But how can anyone accept such a theoretical dichotomy that blatantly contradicts centuries of historical facts? Just as gravity theory must apply to present *and* past matter, viable monetary theory must apply to present *and* past circumstances. Unfortunately, modern monetary theory precludes clear thinking about monetary history, including its inability to address core issues surrounding mining production and minting production. Mining and minting are complex "real" industries that require careful investigation, rather than casual dismissal as "neutral" phenomena. Neoclassical dichotomization of economic reality into "real" and "monetary" components is a dangerous fantasy.

*Existing Monetary Stocks versus **Change** in Existing Monetary Stocks*

Whether a tangible monetary stock is increased via Friedman's helicopter scenario or some alternate mechanism, the origin of that money must be explained. How did the initial stock of the money come to be? While explanation for *growth* in an existing stock of money is important, in other words, the magnitude of the initial stock of money itself must also be explained. Simple assumption that an initial stock of money is "given" is unacceptable; the initial stock requires explanation. In short, there is need for a production theory of monies, as well as a theory of accumulation of these monies over time. Will Mason focused on this central issue:

> The classical school explained the value of money (which they defined as specie) in the analytical short run by its supply and demand, and, in the analytical long run, by the real cost of obtaining it. Neoclassical quantity theorists, on the other hand, explained the value of money only in the *historical long run*, and although that explanation was in terms of classical conception of the quantity of money (to which they merely added banknotes), the quantity of money was not explained. In other words, the received "supply theory" of the value of money lacks a theory of "supply." Hence the quantity theory was left suspended in mid-air – without visible means of support. Postclassical writers have perforce resorted to…describing the *results of assumed* changes in the quantity of money…

(Mason 1974, pp.567-568)

Monetary historians cannot be satisfied with any monetary theory that begins by "assuming that the monetary stock increases by… [any number of] units." What mechanisms generate the specific *existing* stock of monetary units? What motivated original production and subsequent accumulation of particular quantities of monetary units? What forces determine geographical dispersion of particular monetary units that migrate to, and settle within, specific locations? At what rates do specific monies wear out, thereby depleting stocks? In short, there is need for a theory of monetary production, as well as theoretical mechanisms that explain magnitudes of stocks that come to rest in particular markets; exploration of these mechanisms should be preconditions for discussion of *changes* in existing monetary stocks. In sum, explanation for existence must precede explanation for *change* in existence. Monetary items, including coins, have been produced for profit for millennia, as have their intrinsic contents such as silver, gold, and copper. Unfortunately, modern monetary theory's axiomatic structure precludes discussion of manufacture of coins and their contents, a point emphasized indirectly by Mason:

> The unintentional – and generally unrecognized – substantive alteration of classical monetary theory by neoclassical inversion of the classical monetary theory, the relative values of goods and the value of money relative to goods no longer had a common explanation. Since different methodologies were employed by neoclassicists in value theory and monetary theory, respectively, each theory required abstraction from the other. Consequently, relative values were subsequently explained in real terms, abstracting from the value of money, while the value of money was illuminated in abstraction from relative values. (Mason, 1974, p. 568)

The "relative values" referenced by Mason refer to so-called "real" microeconomic prices that abstract from the value of money. The "value of money" became an entirely distinct topic addressed by Macroeconomic methodology that is divorced from (and also incongruous with) Microeconomic methodology. Let's turn next to discussion of how relative values of goods vis-à-vis each other came to be perceived differently from values of monies vis-à-vis values of goods.

Prices of Monies Expressed in Terms of What Referent?

Search for an invariant measure of value preoccupied economists for generations, including pre-twentieth-century thinkers who proposed versions of the Labor Theory of Value. Search for an invariant metric applicable to everything seems to have ended during emergence of the Microeconomics/Macroeconomics dichotomy in the early twentieth century. Consider Figure 3, a slight extension of microeconomic demand presented in Figure 1. Figure 1 and Figure 3 are identical, except that price in Figure 3 specifies the price of wine in terms of Dollars, as normally shown in Microeconomic textbook treatment of the Law of Demand.

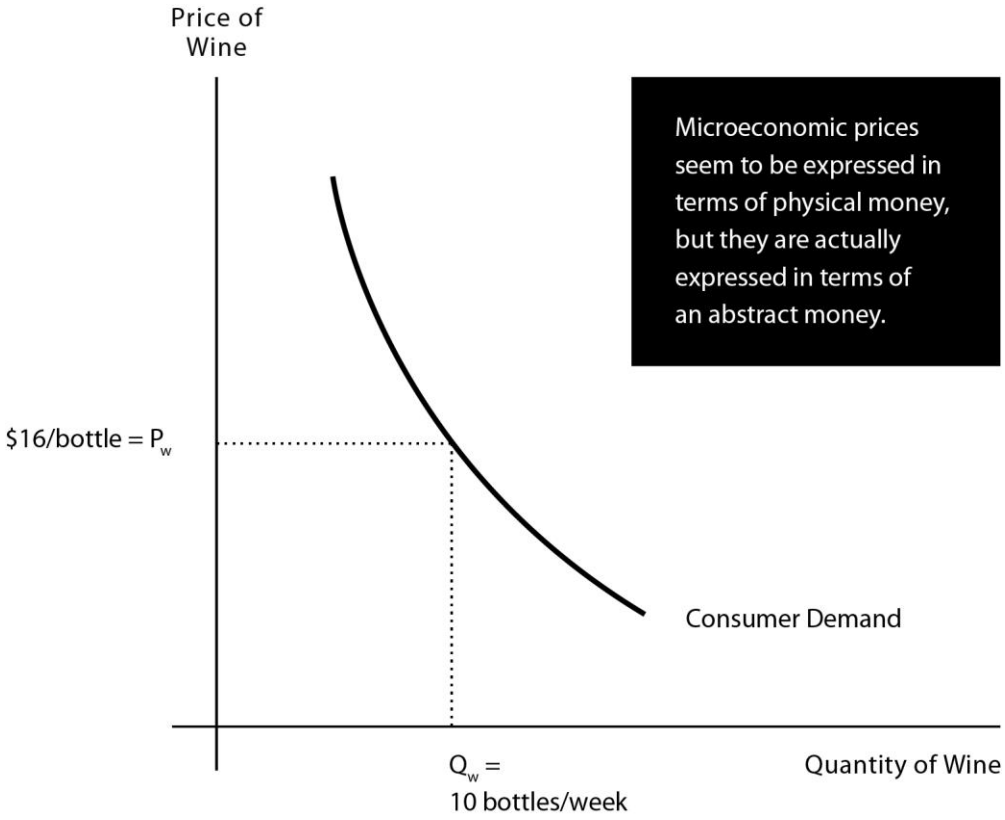

Figure 3. Microeconomic Law of Demand, with Price Expressed in Dollars

The reader might understandably wonder: How can the Dollar (a specific money) appear prominently in representation of the value of wine in Microeconomic demand depicted in Figure 3, when it has been established that monetary theory is the sole purview of Neoclassical Macroeconomics? In other words, how can the value of the Dollar be simultaneously discussed *solely* in the context of Macroeconomic Theory – as indicated by Neutrality of Money reasoning discussed earlier – while that same Dollar also seems to appear in Microeconomics as the yardstick for measuring all non-monetary values? The answer to this essential question is rarely, if ever, addressed directly in textbooks. While true that the Dollar appears in both Microeconomic and Macroeconomic frameworks, roles played by Dollars are different in each case. Indeed, these distinct roles go to the heart of the Neoclassical synthesis. Consider the special *intangible* Dollar that appears in Microeconomic analysis.

Although Figure 3 specifies $16/bottle as the price of this particular wine, the $16 number refers to a "relative price" only. In order to appreciate this "relative price" vis-à-vis "nominal price" distinction, Figure 4 displays market-level prices for two goods – wine and bread. Note that this $16/bottle price of this wine is the same as shown in Figure 3, while the price of a particular bread is $8/loaf. Division of the Dollar price of wine ($16/bottle) by the Dollar price of the bread ($8/loaf) yields the "relative price" of wine: one bottle of wine equals to 2 loaves (= 2 loaves/bottle of wine). This simply implies that the value of the wine is double

the value of the bread. Microeconomic Laws of Supply and Demand concern *relative* prices only – the value of one non-monetary good *relative to* the value of another non-monetary good. This relative price has nothing to do with the value of any tangible Dollar, since monetary value is a topic of Macroeconomics (not Microeconomics). Indeed, division of the price of wine ($16/bottle) by the price of bread ($8/loaf) causes intangible Dollars in the numerator and intangible Dollars in the denominator to cancel out. The Intangible Dollar disappears. Dollar cancellation in Microeconomic analysis implies that each author is permitted to arbitrarily assign any absolute intangible Dollar number to each Microeconomic price. Only price ratios matter.

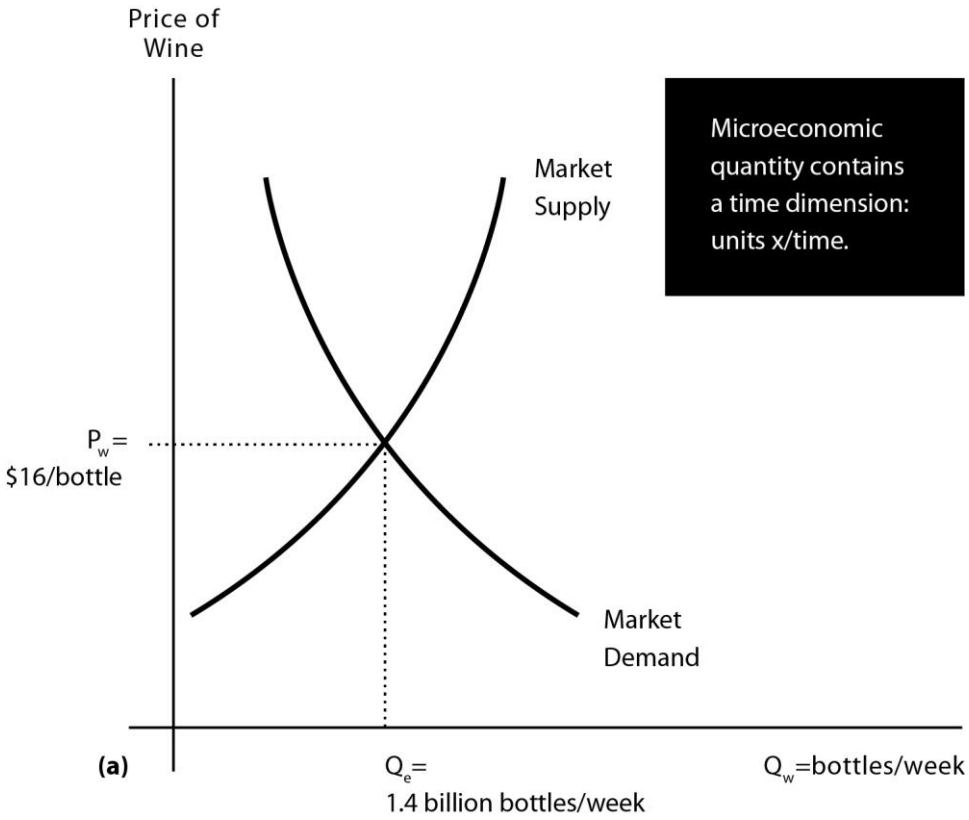

Figure 4. Relative Prices in Microeconomic Analysis

Intangible Dollar price of $16/bottle wine is replicated in Figure 5, along with introduction of an Intangible Dollar price of $8/loaf for (a specific) bread. Division of $16/bottle by $8/loaf yields what economists call the relative price of wine: 2 loaves/bottle, since the Intangible Dollar ($) cancels out. The take-away message is this: Microeconomic prices have nothing to do with the value of the *Tangible* DOLLAR relative to the value of goods, since *Tangible DOLLARS* never appear in Microeconomics. Microeconomic prices have solely to do with the value of one good relative to other goods. The *Intangible Dollar* is an abstract yardstick (in the sense of measurements in terms of inches, grams, and other abstract measuring devices in the physical sciences) used to represent relative magnitudes of things that are physical. In Microeconomic theory, the Dollar's role is restricted to what I

call the abstract "ratio-unit-of-account function of money" (RUAM). This RUAM function plays a crucial role in the Price Theory of Monies model presented later in this essay, but let us first discuss additional aspects of conventional monetary theory.

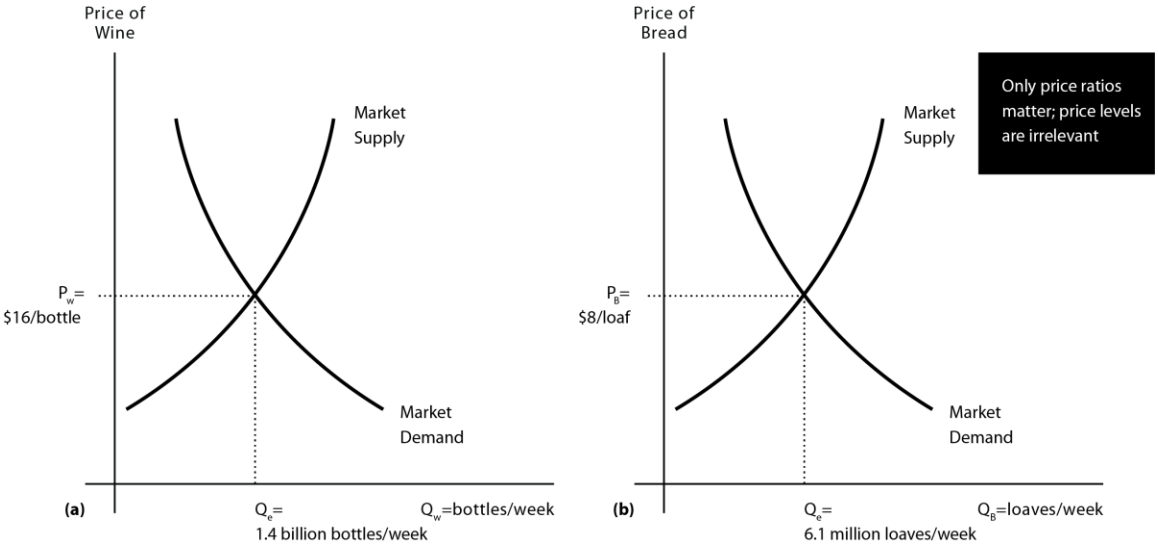

Figure 5. Relative Prices in Microeconomics: Only *Ratios* Matter

Why Do People Hold Any Monetary Balances?

Since Neoclassical theory maintains that monies cannot generate utility directly because they are not consumable goods, economists have long pondered why individuals hold positive money balances at all. One proposition has already been discussed: although monetary items are not directly useful, they are *indirectly* useful in that monies can be surrendered for consumable items *later on*. According to this line of reasoning, the motivation for holding tangible money today rests with the prospect of *not holding that money* in the future, since satisfaction can be gained only upon surrender in favor of a consumable product. (for example, von Mises, 1924 [1971]) This round-about logic is dictated by the assumption that the only source of utility/satisfaction is consumption.

Based upon the nearly-forgotten work of Greidanus (1932), George Selgin insists (correctly in my view) that money itself must generate utility:[1]

> Greidanus undertook a systematic critique of earlier attempts to explain the value of money, showing how most of them failed to acknowledge its yield – a return from liquidity of marketable services. Because they ignored this yield,

[1] While Greidanus imputed utility via monetary services (a time-dimensioned flow), the Price Theory of Monies advocated herein considers inventory stocks themselves (including stocks of monies) to generate utility directly, thus eliminating the need to impute utility via time-dimensioned flows.

> past theorists made the mistake of identifying the marginal utility of money with the marginal utility of goods that can be purchased with it. Theories of the value of money based on this starting point were, Greidanus showed, inadequate. He then went on to elaborate in detail a 'yield theory' of the value of money in which the marginal utility of money is identified with the utility of liquidity services provided by another unit of it. (Selgin, 1994, p.140)

Monetary Theory According to Keynes: Liquidity Preference

John Maynard Keynes offered a Liquidity Preference model in the mid-1930s that continues to dominate Macroeconomics textbooks today. Interest rates provide the crucial link between the "monetary" sector and the "real" sector, according to Keynes, a lesson that drives Central Bank policies worldwide to this day. According to Keynes, currency and checking balances essentially offer zero rate of interest, whereas financial instruments such as bonds paid positive interest rates. Keynes listed advantages to holding ready cash, but emphasized a central disadvantage of monetary holdings: they pay zero interest. Therefore, when interest rates on bonds are low, people give up almost nothing in foregone interest earnings (had interest-bearing bonds been held instead). In other words, the "opportunity cost" of holding money is low when the interest rate is low. When bond interest rates are high, however, it makes sense to switch into ownership of more interest-bearing bonds, which thereby implies reduced holdings of money in the process. Figure 6 shows Keynesian logic. Notice that whereas Classical economists focused on the *value of money*, Keynes shifted attention to the relationship between *interest rates* and the demand for money, dubbing the advantage of holding money over other assets "liquidity preference." Since money is the most flexible (i.e. liquid) of assets, people instinctively assign money an advantage Keynes labeled a

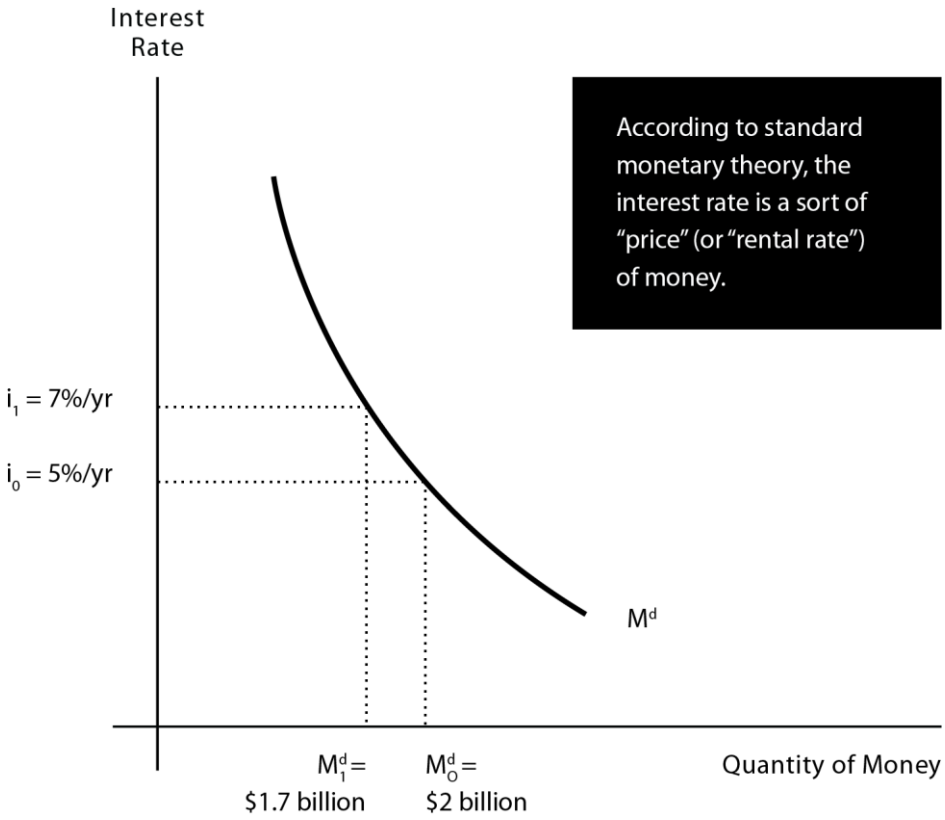

Figure 6. Money's Liquidity Premium

"liquidity premium." In order to induce voluntary surrender of this liquidity premium through reduced monetary holdings, compensation must be offered. That is, the interest rate must rise in order to compensate for loss of liquidity premium (in addition to risk from potential loan default). If the interest rate were 5%/year (= i_0), for instance, let's say demand to hold money equals $2 billion Dollars (Figure 6) at a particular point in time. If the interest rate were 7%/year (= i_1) rather than 5%/year, however, money holders would then re-balance portfolios in favor of holding more interest-bearing bonds. Purchase of more bonds in turn implies a fall in societal demand to hold money balances (to, say, $1.7 billion) as the interest rate rises to 7%/year. In short, the Keynesian money demand function has a negative slope, which simply means that there is substitution between holding tangible money (a non-interest bearing asset) versus holding bonds (interest-bearing assets). Money offers unparalleled liquidity, yet bonds offer compensatory interest payments to those willing to accept reduced liquidity. It is the ***interest rate*** that connects the monetary sector with real-sector borrowing and investment spending, according to Keynesian theory. In sum, changing monetary *stocks* influence investment *flows* via alteration of the rate of interest. The interest rate furnishes the transmission mechanism that connects monies to the "real" economy.

The market rate of interest is determined by intersection of money demand and money supply functions, as shown in Figure 7, drawn arbitrarily to show an equilibrium interest rate of 6%/year. Monetary authorities could stimulate

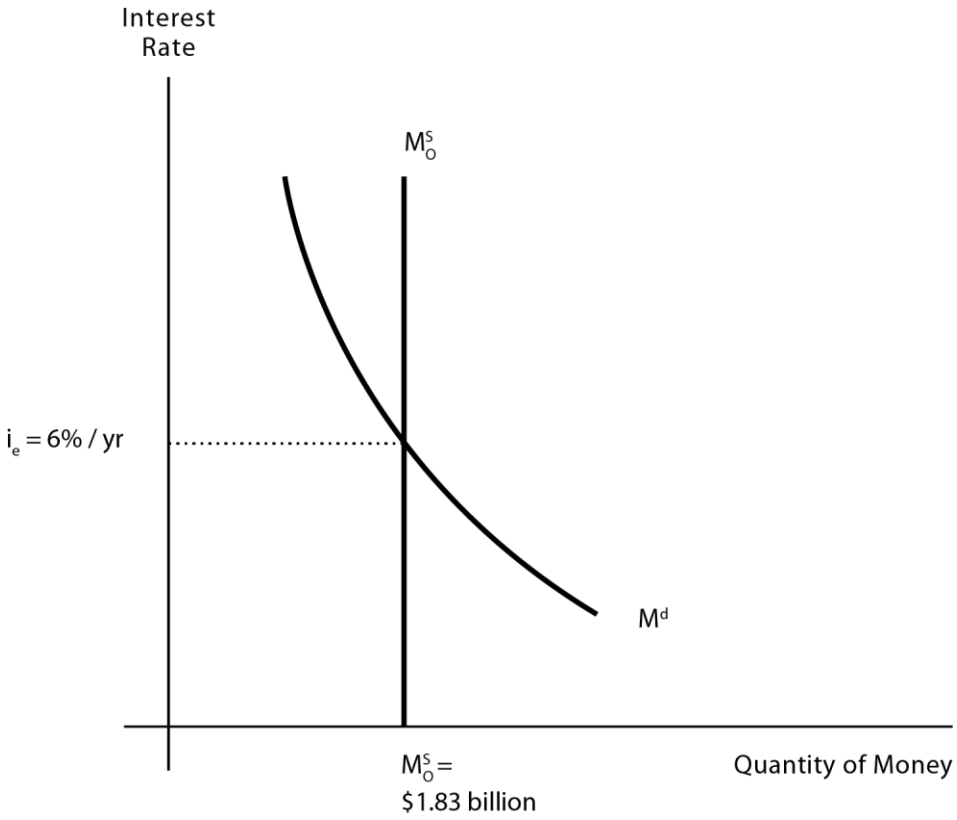

FIGURE 7. Macroeconomic Determination of the Interest Rate

economy-wide spending by pushing the interest rate down to 5%/ year, say, via increase in the stock supply of money from M^s_0 to M^s_1 in Figure 8. The idea is to manipulate the interest rate lower in order to stimulate borrowing and investment spending, which in turn stimulates growth in jobs and incomes. (Stimulation of investment via interest-rate reduction is not shown graphically here; consult any Macroeconomics textbook for demonstration.) Eschewing detail, central banks worldwide today routinely stimulate economies via this sort of monetary logic.

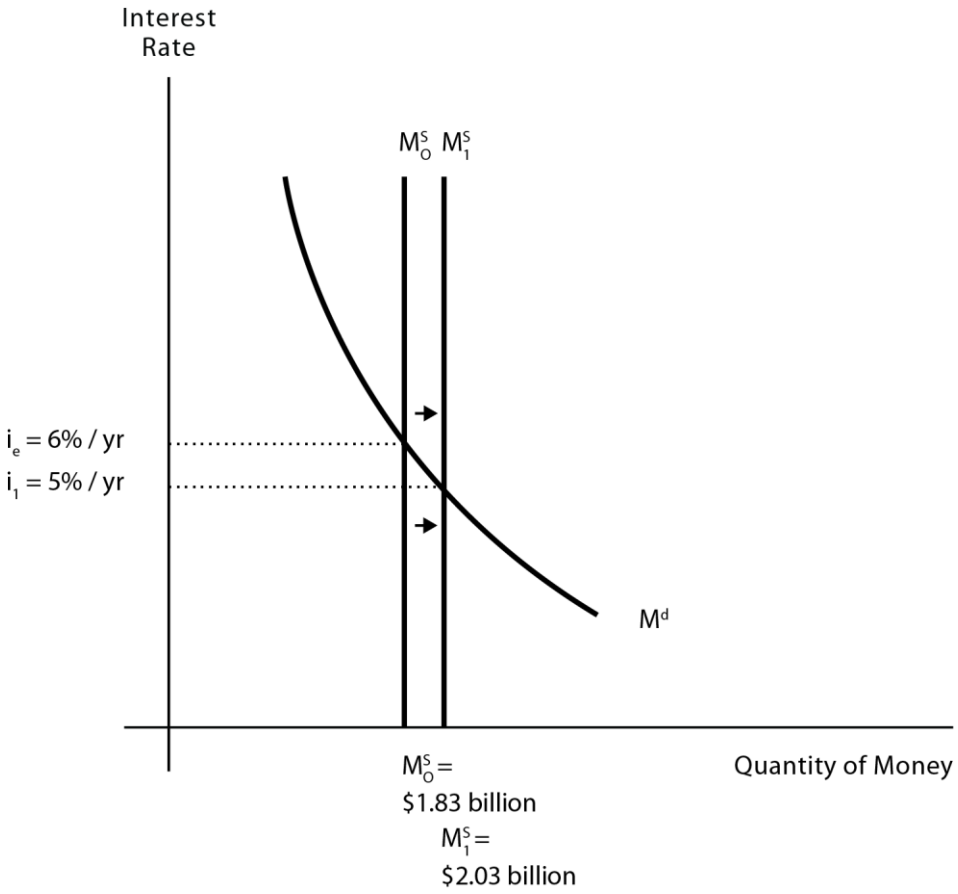

Figure 8. Central Bank Manipulation of the Interest Rate

Inadequacy of Keynesian Monetary Theory for Global Monetary History

Classical economics came with theoretical limitations, as mentioned earlier, but it tried to explain market values of individual tangible monies (via cost-of-production logic). Modern monetary theory abandons the goal of explaining values of individual monies, on the other hand, notwithstanding need to explain values of individual monies throughout global history. Minting throughout history depended upon valuation of each money above its respective cost of production (except in instances of deliberate government mint subsidies). The profit motive drove production of each raw material input into the money creation process, and the profit motive also drove money production itself (mint activity for coins, aquaculture for cowries). Profitability is achievable only when a product can be sold at a price above the cost of acquiring it, a truism that applies to monies and non-monies alike. Since neither Classical nor Neoclassical monetary theories adequately explain price determination for individual tangible monies, alternative theoretical explanations deserve consideration.

Keynes was brilliant, but his liquidity-preference approach precludes consideration of issues that are central to monetary history. The mechanism that connects the monetary sector to the 'real' (non-monetary) sector, according to

Keynes, is the interest rate. Inventory supply and inventory demand for money determine the market rate of interest. The market rate of interest, in turn, determines 'real' investment spending (a time-dimensioned flow concept). Thanks to Keynesian monetary theory, modern economics spawned a second theoretical dichotomy (within the Microeconomics/Macroeconomics dichotomy). Focus on the interest rate as the key linkage (or "transmission mechanism") has contributed to an artificial "Monetary-Sector/Real-Sector" dichotomy that permeates Neoclassical economics today. Concentration upon fiduciary, paper monies presumably led Keynes and others to ignore the need to construct a general theory of monetary production. Urging primacy of the connection between money and the interest rate, and thereupon investment, Keynes argued:

> The first characteristic which tends towards the above conclusion [centrality of money rate of interest] is the fact that money has, both in the long and in the short period, a zero, or at any rate a very small, elasticity of production, so far as the power of private enterprise is concerned, as distinct from the monetary authority; elasticity of production meaning, in this context, the response of quantity of labour applied to producing it to a rise in the quantity of labour which a unit of it will command. Money, that is to say, cannot be readily produced; -- labour cannot be turned on at will by entrepreneurs to produce money in increasing quantities as its price rises in terms of the wage-unit. (Keynes 1964 [1935], p.230)

Keynes turned away from the need to explain values of individual monies and monetary accumulations over time. Widespread acceptance of Keynesian monetary theory has contributed to the artificial "real sector" versus "monetary sector" distinction that prevails today. Yet private (and government) entrepreneurs worldwide have in actuality increased/decreased mine and mint production repeatedly in response to price and production-cost pressures for millennia. Rather than deny need for a theory of monetary production, monetary historians need models designed to explain prices and quantities across the entire productive process, including production of raw materials and production of individual monies themselves.

Monetary Disaggregation versus Monetary Aggregation

Note that the quantity axis for Keynesian monetary analysis in Figures 6, 7, and 8 refers to "Quantity of Money" in place of "quantities of monies" (plural) terminology employed throughout this essay. The "Quantity of Money" label on Neoclassical horizontal axes implies *aggregation* of diverse monetary substances. M1 is the narrowest definition of money to appear in textbooks today: M1 includes diverse coins and paper currencies, checkable deposits, and travelers checks. M2 is broader, since it includes savings deposits, and higher-numbered M designations include additional financial items (that, to me, are not monies). The main point I am driving at here is that even the narrowest Macroeconomic definition of money (M1) involves aggregation of multiple distinct monies.

"Quantity of Money" terminology automatically precludes cost-of-production logic, since it is meaningless to discuss *the* cost of producing a hodgepodge of diverse monies, each of which had a distinct market valuation at particular points in history. Monetary historians know that bimetallic silver-gold ratios varied widely throughout

history, for instance, due to conditions surrounding market valuation of silver vis-à-vis conditions surrounding market valuation of gold at particular times. These divergent market valuations throughout history require explanation. Instead, market dynamics are hidden in a conceptual fog due to Neoclassical insistence that myriad silver monies, myriad gold monies, and myriad other distinct monies be added together. Formation of Macroeconomic "monetary aggregates" precludes application of production theory, since only specific items are suitable for production analysis (as in Microeconomics). Horizontal-axis aggregation disqualifies "money" as a topic of production theory.

The "interest rate" label on vertical ("price") axes in Figures 6, 7, and 8 presents yet another insurmountable obstacle to consideration of monetary production. Unprecedented influx of Spanish American silver into Europe during the sixteenth century drove important European silver mines out of business, for instance, yet Macroeconomic monetary theory is useless for understanding such phenomena. The reason European mines shut down has been clear for centuries: Vast accumulations of silver across the globe – including in huge Chinese markets – drove the price of silver down such that profitable production in older European silver mines became impossible. Yet this general narrative cannot be addressed via conventional monetary theory. First, Neoclassical monetary theory adds together silver monies, gold monies, copper-based monies, cowry shells, and endless other forms of money. What in fact happened was an unprecedented silver explosion beginning in the sixteenth century because cost of production in Spanish American silver mines was exceedingly low relative to the high price of silver in world markets (thanks in large part to expanding demand for silver in China). Adam Smith acknowledged these facts at great length in the *Wealth of Nations*, as had leading scholars for two centuries before Smith wrote his famous treatise. Yet, low mining costs for silver in Spanish America do not necessarily imply anything about mining costs for gold, copper, lead, zinc, cowries or myriad other non-silver monies. Each of the monetized substance requires independent analysis in its own right. Macroeconomic practice of aggregating diverse monies together precludes analysis of each money separately, and thus cannot contribute to explanation of spectacular monetary events that spanned centuries at a global level.

Modeling Values for Individual Monies

Modern monetary theory precludes production theorizing for another reason: It is impossible to discuss the cost of producing, say, a specific Mexican peso coin with a graph contains the "Interest Rate" label on its vertical axis. What sense could possibly be made of a statement to the effect that the market value of a Mexican peso coin declines to some "interest rate" cost of production? Interest rates refer to percentage divided by time, not value per unit, so the vertical-axis label for conventional monetary theory also eliminates any possibility of a general theory of monetary production.

A Price Theory of Monies

The remainder of this essay outlines a Price Theory of Monies that permits conceptualization of monies and non-monies within a singular theoretical framework that can be considered a Unified Theory of Prices. Like Classical economic theory, this

model dispenses with need for the Microeconomics-Macroeconomics dichotomy at the core of Neoclassical theory. Monies are fundamentally re-conceptualized. First, the market for each monetary item is treated independently; that is, aggregation across distinct monies is strictly avoided. Second, demand for each monetary substance is treated within a utility-maximization framework, due to assumption that monetary holdings generate utility directly. Third, the price of each tangible money is expressed in terms of an intangible ratio-unit-of-account money (RUAM).

Disaggregation and Global Monetary History

In *Metals and Monies in an Emerging Global Economy*, Flynn and Giráldez (1997) view the world's four main monetary substances – silver, gold, copper, and cowries – from a global perspective from the 16th through 18th centuries. While a conventional approach would aggregate diverse monies within each nation state, we intentionally focused on distinct markets for each monetary substance viewed in global (as opposed to national) context. Section 1 dealt with "Source Areas" for each of the four substances. Section 2 focused on "End Markets" for each of the four substances. Section 3 examined "Intermediary Trade Routes" that connected centers of production with ultimate end-markets. In other words, we *disaggregated* silver from gold from copper from cowries. Section 1 examined distinct sources of production for each substance. Section 2 looked at final destinations for each distinct substance. Section 3 inquired about trade routes through which each substance traveled from production source to final destination. Although circumstances changed over time, sixteenth and seventeenth century production of silver was heavily concentrated in Spanish America and Japan. A substantial fraction of that silver ended up in China. Gold production was concentrated in Africa, the Americas, Japan (later on) and certain parts of Southeast Asia; gold not only failed to travel to end-markets in China, gold was a consistent Chinese export for periods lasting up to a century (simultaneous with massive silver imports). Sweden was the leading European copper producer during this period, but Japanese copper production surged to world dominance during the second half of the seventeenth century. China was the main end-market for Japanese copper, yet large quantities of Japanese copper also flowed elsewhere (including into Europe). Aquaculture production of cowry shells was concentrated in the Maldive Islands (Indian Ocean), millions of pounds of which were destined for West Africa via European ports. The takeaway message from this global survey is twofold. One, *disaggregation* of each monetary substance reveals production of each to have been concentrated in specific locations determined by geological forces (that tend to ignore national boundaries). Second, each of the four monetary substances was destined for distinct end-markets. Third, not only did these four monetary substances fail to travel in tandem together, they often traded for each other (for up to a century) in opposite directions. It quickly became clear to us that conceptual aggregation of distinct monetary substances would have led us to conceptual disaster. Each substance must be studied independently and at a global (not nation-state) level. Given that Neoclassical monetary theory is predicated upon aggregates at the level of nation-states, its framework represents a formidable obstacle to clear thinking about global monetary history.

Disaggregation of distinct monetary substances provides a step in the right direction. Recent research in global monetary history reveals that aggregation within a category such as silver can also be misleading, however, so conceptual disaggregation

must be carried further than mere segregation into silver, gold, copper and cowry shell components. To take one example, Irigoin (2013) points out that massive imports of Mexican pesos into China, after Mexican independence from Spain in the early 19th century, consisted overwhelmingly of Mexican pesos accepted in specific Chinese markets due to a specific mint mark. Pesos produced simultaneously by other Mexican mints were either rejected outright, or were accepted at significant discount within China. Moreover, silver *bullion* was *exported* from China at the same time that special Mexican pesos were *imported*. Not only is it a mistake to aggregate across silver coins, in other words, it is a mistake to aggregate across diverse peso coins minted within Mexico at the same time. Specific Mexican pesos coins were valued differently within specific marketplaces. Kishimoto (2011), Kuroda (2008), von Glahn (2011) and other leading monetary historians have found repeatedly that market participants placed distinct values on specific monies. Monetary theories that portray individual monies as distinct entities must be created. The Price Theory of Monies offers a conceptual framework that is consistent with empirical evidence of specific monies with distinct values in market regions that need not be confined to nation-state boundaries.

Monies Generate Utility Directly

Assumption of consumption as the sole source of utility forced Ludwig von Mises ( ) and other scholars to conclude that holding money makes sense only if money can be exchanged for a consumable product at a future date. But the following statement by John Hicks contradicts this conclusion:

> We now realize that the marginal utility analysis is nothing else than a general theory of choice, which is applicable whenever the choice is between alternatives that are capable of quantitative expression, and therefore the objection that money has no marginal utility must be wrong. People do choose to have money rather than other things, and therefore, in the relevant sense, money must have marginal utility. (Hicks 1982 [1935], p.48)

The Price Theory of Monies presented next is consistent with the contention of Hicks that monies generate utility directly. Two distinct sources of utility exist in general: (1) utility from consumption (the standard assumption), as well as (2) utility from ownership. This assumption of dual sources of utility allows value theory to be refashioned in a general sense, which in the process permits monetary theory to be refashioned as well.

Unified Theory of Prices: The Laws of Supplies and Demands

Application of the Unified Theory of Prices (UTP) to a non-monetary good is briefly sketched next in order to introduce key concepts and terminology. The UTP yields three distinct demand functions:

1. Inventory Demand (ID): Number of units a decision maker wishes to hold at each price.
2. Purchase Demand (PD): Number of units purchased per time period at each price. Other things equal, units purchased increase inventory holdings of the individual.
3. Consumption Demand (CD)*: Number of units consumed per time period at

each price. Other things equal, units consumed deplete inventory holdings of the individual. (Asterisk indicates generation of utility)

The model incorporates three distinct functional counterparts on the supply side:

1. Inventory Supply (IS)*: Number of units owned by decision maker. (Asterisk indicates generation of utility)
2. Production Supply (PS): Number of units produced per time period at each price. Other things equal, additional units produced add to Inventory Supply.
3. Sales Supply (SS): Number of units sold per time period at each price. Other things equal, units sold deplete inventory holdings of the seller.

Figure 9 demonstrates highly simplified interrelationships among these three supply functions and three demand functions for a family-operated small winery. Assume $10/bottle is the market price for Fine Wine, the sole product of this vintner family.[2]

[2] The "Dollar" in this example is restricted to an intangible unit-of-account money, such as the Dollar used in conventional Microeconomic analysis, to be discussed later in this essay.

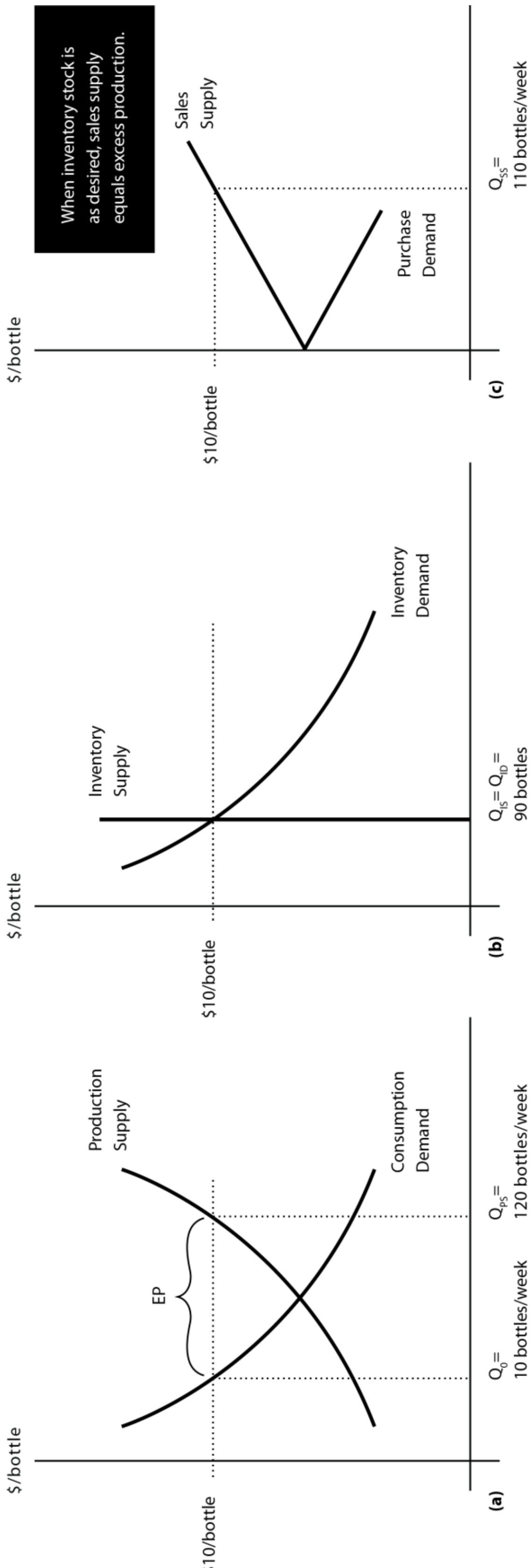

Figure 9. Fine Wine Vintners

As shown in Figure 9, the family is willing and able to produce 120 bottles/week (= Q_{PS}) of Fine Wine at the prevailing price of $10/bottle, while they are also satisfied consuming (i.e. drinking) 10 bottles/week of their own wine when its market price is $10/bottle (= Q_{CD}). Since family consumption is only 10 bottles/week out of 120 bottles/week produced, the remaining 110 bottles/week (i.e. bottles not consumed by the family) can be described as "excess production" (EP = Q_{PS} – Q_{CD}).

Assuming zero breakage/wastage for simplicity, the 110 bottles/week of excess production could either be (a) added to family wine storage, or (b) the excess production could be sold outside of the family. The family would not wish to add the 110 bottles excess to family storage, however, because Figure 9 indicates that 90 bottles of wine (= Q_{IS}) are already held in the family wine cellar, which precisely equals 90 bottles of wine that the family wishes to hold (= Q_{ID}). Since inventory holdings match desired inventory holdings, the 110 bottles of "excess production" (= Q_{PS} – Q_{CD}) would be sold to non-family members in the external marketplace (Q_{SS} = 110 bottles/week). Other things equal, the situation depicted in Figure 9 represents a "steady state" equilibrium that would be replicated indefinitely week after week.

Now assume a change in market sentiment for this wine at the beginning of week 2, perhaps due to endorsement by a local celebrity. Assume that this endorsement causes the wine's market price to rise from $10/bottle to $12/bottle, as shown in Figure 10. Quantity of Production Supply increases from the previous rate of 120 bottles/week (= Q_{PS}) to 135 bottles/week (= $Q_{PS'}$), while the family cuts back on family wine consumption from 10 bottles/week (= Q_{CD}) to 9 bottles/week (= $Q_{CD'}$). As a result of enhanced production and subdued family consumption, excess production now rises from 110 bottles/week (= EP at $10/bottle) to 126 bottles/week (= EP' at $12/bottle). Simply selling off the new excess production (EP') alone will not place the family back into a steady-state equilibrium, however, because the family now wishes to hold in storage only 85 bottles of wine (= $Q_{ID'}$) in the family cellar, whereas they are in fact still (momentarily) holding 90 bottles of wine (= Q_{IS}) in storage. In other words, the family sales supply function shifts out from SS to SS', such sales rise from Q_{SS} (= 110 bottles/week) to $Q_{SS'}$ (= 131 bottles/week), since the family wishes to sell off its excess production (EP' = 126 bottles/week) *plus* its excess inventories (EI' = 5 bottles) during week 2.

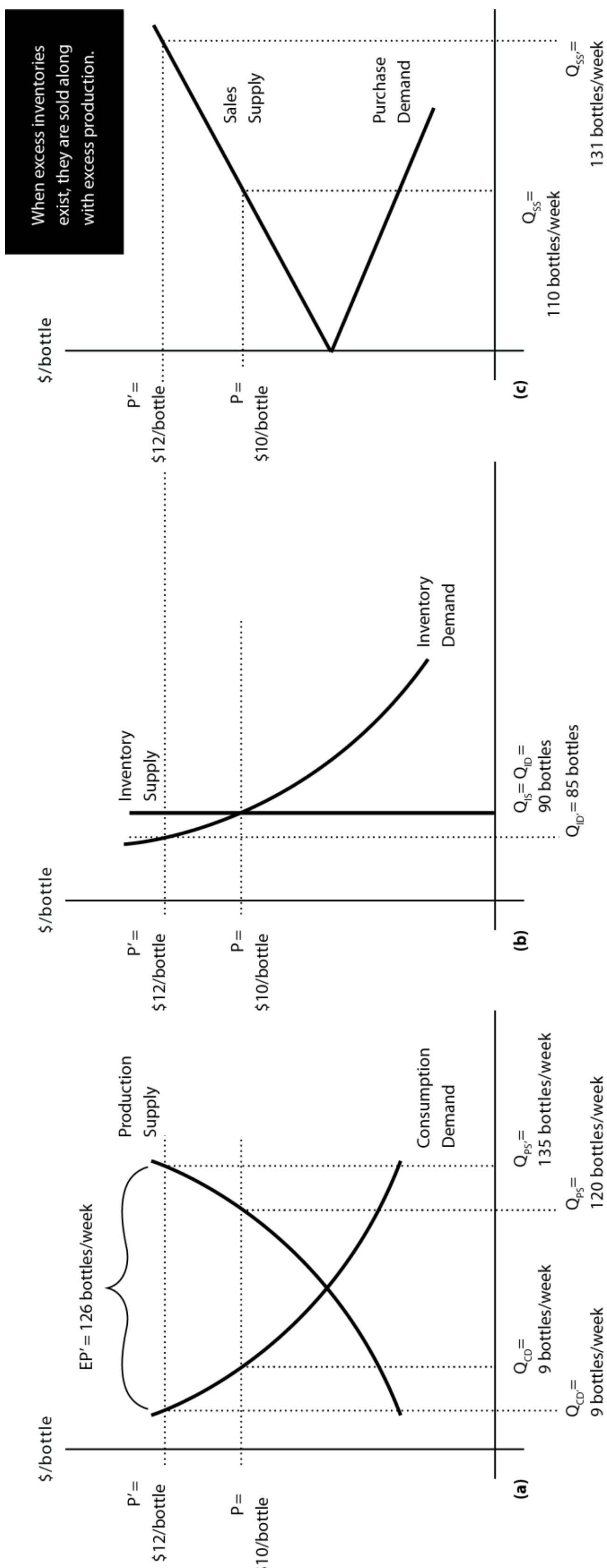

Figure 10. Temporary Disequilibrium for the Family Winery

Figure 11 shows the family winery back at a new steady-state equilibrium similar to, but distinct from, the non-steady-state situation shown in Figure 10. Non-steady-state sales supply ($Q_{SS'}$) in Figure 10 (at the beginning of week 2) equaled 131 bottles/week, while steady-state sales supply ($Q_{SS''}$) = 126 bottles/week) in Figure 11 (at the beginning of week 3). In both cases excess production (EP') equals 126 bottles/week). Difference between Figure 10 and Figure 11 has to do with excess inventory supply, which is 5 bottles (= EI') in the case of non-steady-state Figure 10, whereas excess inventory is zero (because $Q_{IS'} = Q_{ID'} = 85$ bottles) in the case of steady-state Figure 11 (at the beginning of week 3). Because excess inventory equals zero in Figure 11, sales supply ($Q_{SS'}$) equals excess production only at (EP' =) 126 bottles/week.

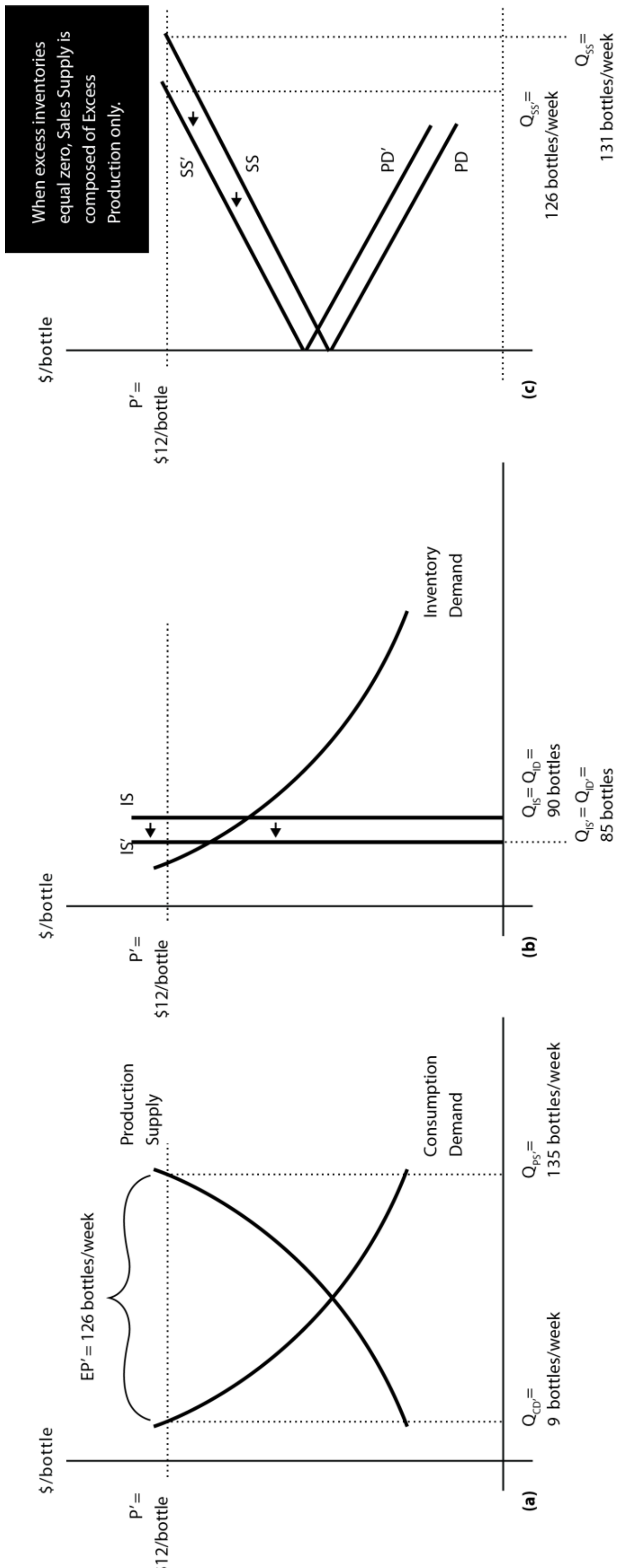

Figure 11. Back to Steady-State for the Family Winery

The take-away message from Figure 11 is that Inventory Demand rules the roost! In other words, Inventory Supply adjusts to Inventory Demand in steady-state equilibrium. This view of Inventory Demand dominance permeates Unified Theory of Prices logic. It is Inventory Demand that determines the quantity of any product that settles (i.e. Inventory Supply) within each end-market location. This conclusion explains why far greater quantities of wine (as well as goods generally) currently reside within homes in Los Angeles than quantities of wine held in homes in, say, Flagstaff, Arizona. Inventory Demand in Los Angeles is much larger because LA's population of humans is larger than that of Flagstaff, and perhaps tastes and preferences differ as well (in addition to differences in weather, wealth, and other determinants of Inventory Demand). *Inventory Demand determines the number of units of each good that ultimately resides (i.e. populates) each end-market location.* This principle also applies to monetary goods, will be shown.

A Price Theory of Monies

As mentioned early in this essay, monies cannot be integrated within Neoclassical value theory (Microeconomics) because monetary supplies are inherently point-in-time inventories. Coins minted in times past accumulate for years (indeed, centuries in some cases), so economists have little choice but to conceptualize money supplies in inventory terms. Formulation of money in inventory-theoretic terms, however, creates a fundamental incompatibility with Neoclassical Microeconomics, which fails to incorporate inventories within its Laws of Supply and Demand. Utility analysis is the backbone of Microeconomic supply-and-demand theory, and the sole source of utility is assumed (wrongly, I argue) to be Consumption. Since Consumption is a time-dimensioned activity – as opposed to point-in-time inventory stocks – no level of creative thinking permits compatibility between monies and Neoclassical Microeconomic principles. First, monies are not considered consumable goods. Second, Microeconomics is not equipped to handle inventory concepts. Third, Microeconomics is unable to integrate the "price of monetary goods" into its Laws of Supply and Demand (a point to be discussed below). In summary, Neoclassicists were compelled to create separate conceptual space for monetary goods within Macroeconomic theory.

The Unified Theory of Prices of this essay was created explicitly in order to incorporate inventory stocks by expanding the scope of utility analysis. It is inclusion of inventory stocks within the purview of the Unified Theory of Prices – namely, expansion of utility analysis – that explains our ability to include monetary items (while Neoclassical utility theory cannot incorporate monetary goods). We assume existence of two sources of utility in this essay: (1) utility is generated through Consumption Demand (as in conventional Microeconomics), and (2) utility is also generated through Inventory Supply (a possibility *excluded* by Microeconomics assumption). Previous discussion of wine furnishes a clear example. It is agreed that wine consumption provides pleasure, of course, but it also stands to reason that a wine drinker would prefer to have, say, 36 bottles of a particular wine in her/his cellar compared with 24 bottles of that same wine, other things equal. In other words, ownership is satisfying (i.e. it generates utility). It would seem odd to argue against the assumption that ownership is enjoyable, given that hundreds of millions of us live in societies with self-storage industries that house colossal inventories of personal

items. Since people voluntarily pay monthly storage fees, they evidently receive enjoyment through ownership of items that are stored! The standard definition of wealth (= net worth) involves adding together all things owned (assets), minus debts (liabilities). The mathematical version of our model describes conditions necessary for generation of an optimal mix of goods, given personal preferences, personal wealth, and other conventional considerations. Preferences peculiar to university professors, for instance, propel them to accumulate more extensive libraries than are typical for non-academic families. Who would argue that academics do not enjoy ownership of books? People collect all sorts of objects, depending upon individual wealth, tastes and preferences, and prices. The extent to which any specific good becomes a component of personal wealth depends upon the stock of all personal assets, personal liabilities, projected revenues, tastes and preferences, and relative prices. Our model simply offers a formal description of conditions necessary for optimization of the mix of all goods owned. (See Doherty and Flynn, 1989, Appendix A)

Assumption of two sources of utility – consumption and inventories themselves – provides a key step necessary for inclusion of monies within a general theory of value. We agree with Neoclassicists that monies are normally not consumable goods, but our model states that inventory accumulations yield satisfaction through ownership, including ownership of monetary stocks. Thus, monetary stocks are candidates for inclusion within utility analysis. Yet derivation of an Inventory Demand function suitable for application to monies must overcome a barrier peculiar to monetary theory: How can one speak of the "price" of a tangible money when prices are conventionally expressed in terms of that very money? In a sense (to be explained momentarily), distinct treatment of money in conventional Microeconomics vis-à-vis treatment of money in conventional Macroeconomics provides a clue to unlocking a difficult mystery of monetary economics.

Recall that textbook discussion of tangible monies – say, a physical Dollar – occurs exclusively within a Macroeconomics framework, which portrays money supply and money demand functions as inventory stocks. Money supply is drawn as vertical function, since it refers to a specific quantity of money that exists at a point in time (irrespective of the rate of interest). Money demand must therefore also be depicted in inventory theoretic terms; its negative slope simply refers to quantities of money people wish to hold, subject to the rate of interest. When the interest rate is high, people choose to hold small monetary balances (because they benefit by switching to interest-bearing bonds instead); when the interest rate is low, they hold larger monetary balances (because they switch away from bonds that no longer offer an attractive yield).

Macroeconomic monetary analysis frustrates monetary historians for several reasons. As mentioned, monetary history is replete with examples of production and subsequent flows of *individual monetary items that gravitate to specific end-markets* due to forces that clearly do *not* apply to monetary aggregates as a group. Rather, highly specific monies were produced and transported to highly specific markets under conditions that existed during unique time periods. What is needed is a theory of *monies*, *not* a theory of *money*. Macroeconomic monetary theory renders proper conceptualization of monies impossible because individual monies are aggregated into a group, when they should be considered independently. Macroeconomics approaches further confuse measurement of the *quantity of money* by speaking of "Real

Balances," which refers to division of a monetary aggregate (M) by a price index (P) that is also an aggregate. Monetary historians aspire to understand physical monies that were already "real" in their own right (without need to be divided by any price index), so distinctions among aggregated Macroeconomic "nominal balances" versus aggregated Macroeconomic "real balances" simply muddies already-opaque theoretical waters. In contrast, the Price Theory of Monies insists upon *disaggregation* of individual monetary components to the maximum extent possible. When market forces yield distinct values for individual coins that were identical at mintage, yet subsequently diverged in intrinsic content for any number of reasons – many examples of which exist in monetary history literatures – then a proper model of monies should follow historical reality by aggregating coins together only in cases where actual market participants treated them as perfect substitutes. When weaker coins in fact commanded lower prices in real-world markets, then separate supply-and-demand analysis is appropriate for such (uniformly-weak) coins. When discussing the price (or value) of a coin or a group of coins, in other words, only commensurate coins (i.e. coins valued equally in the marketplace) should be placed within the group for which supply and demand analysis is applied. To do otherwise encourages unrealistic imposition of a singular value upon items for which market forces clearly assign different values. Aggregation across dissimilar items is anathema to clear thinking.

Recall that the "Dollar" that appears under Microeconomic analysis is entirely distinct from the entirely separate "Dollar" discussed under Macroeconomic analysis. The Microeconomic Dollar is a ratio-unit-of-account money that is intangible. The Microeconomic analyst then arbitrarily assigns prices expressed in terms of these Intangible Dollars. The Macroeconomic Dollar, on the other hand, refers to a tangible Dollar that physically exists; for instance, Macroeconomists routinely speak of wages expressed in terms of, say, 2007-Dollars or expressed in terms of 2013-Dollars. Expression of wages in this fashion does indeed represent "real" purchasing power since wages are formulated in terms of 2007-Dollars and 2013-Dollars that exist physically and are therefore monies valued by market forces (albeit at different points of time). The take-away point here is that Macroeconomic Dollars physically exist, while Microeconomic Dollars are mental constructs without any physical existence whatsoever. In over forty years of teaching Microeconomics and Macroeconomics, I do not recall a single textbook discussion of the fact that Microeconomic Dollars are intangible abstractions, while Macroeconomic Dollars exist in the physical world. These distinct tangible versus intangible Neoclassical Dollars seem to be (implicitly) portrayed as the same Dollar. They in fact have almost nothing in common.

Expression of Every Price in Terms of RUAMs

Monetary theory is a subset of Macroeconomics generally. Macroeconomic textbooks insist that that an item can be considered "money" only if it fulfills all three monetary *functions* simultaneously: (a) medium of exchange, (b) unit of account, and (c) store of value. *All* monetary functions must be satisfied simultaneously in order for an item to qualify for inclusion in any of several monetary aggregates. If an item serves one or two of the three functions required, according to accepted theory, then it cannot be considered "money."

The Macroeconomic three-pronged-functional qualification for money is constantly violated within Neoclassical theory itself, since the Microeconomic Dollar is

an intangible money restricted to unit-of-account capabilities, but zero capacity to perform either the medium-of-exchange function or the store-of-value function of money. In order to put something into storage for future withdrawal, the stored item must physically exist. And in order to exchange the stored item for something else later on, the stored item must exist. Similarly, tangible existence is a requirement for performance of medium-of-exchange and store-of-value functions of money, so the Microeconomic Dollar fails to qualify as money on the basis that it is intangible. The Microeconomic Dollar does serve the unit-of-account function of money, on the other hand, so perhaps it functions to express nominal prices, rather than real prices. The term "nominal price" refers to price expressed in terms of money; the Intangible Microeconomic Dollar serves as numeraire and it therefore can represent nominal prices only. The term "relative price" refers to division of the nominal price of one good (i.e. $4/good-x) by the nominal price of another good (i.e. $2/unit-y). Dollars in the numerator cancel Dollars in the denominator, yielding a "relative price" (2 good-y/good-x) that represents comparative values of those goods. Calculation of relative prices, in other words, requires getting rid of the Dollar-numeraire, or converting out of nominal prices. As its name suggests, the Microeconomic *Dollar* functions as a certain type of money, one qualified to serve the unit-of-account function of money alone. The Intangible Dollar serves as money for Microeconomic purposes, in other words, while only tangible monies can qualify under Macroeconomic requirements. Incongruence across the Microeconomic-Macroeconomic divide exists, including inconsistent views on the nature of money. Intangible monies of Microeconomics do not qualify as "money" under Macroeconomic rules. And tangible monies are excluded under Microeconomic rules, since the Microeconomic Dollar is characterized by arbitrary valuation.

The 17th century is sometimes called the "Dutch century" due to powerful Dutch enterprises worldwide, including Dutch East India Company (VOC) Asian operations centered in Batavia (Jakarta). The Dutch were – and remain – astute businesspeople. Pragmatic business people and government officials over the centuries were compelled to create so-called 'imaginary monies' – that is, to theorize via intangible, non-physical unit-of-account monies – in order to record and consolidate routine business transactions for accounting purposes. Practical people were forced into theorizing because they functioned within a context of business and government receipts/expenditures conducted via a bewildering assortment of coins (and other monies) manufactured of diverse substances at various times and from numerous jurisdictions. How was an accountant supposed to record transactions denominated in hundreds of diverse coins (as well as other monies) minted throughout the world? Not only were coins fabricated from various metals, intrinsic content also varied in terms of weight and purity for a given metal. Worse yet, routine wear-and-tear as well as clipping and sweating (in addition to other methods of intentionally adulterating coin content) persistently transformed originally-identical coins into items of distinct intrinsic content. How were practical people supposed to keep track of transactions conducted via numerous, diverse and mutating monetary 'measuring sticks'? Monetary stocks were amorphous heaps of coins of diverse contents. Of thousands of contenders, what specific coin could claim unique suitability as *the* system-wide measuring stick? The short answer: none.

The Dutch addressed this accounting conundrum through creation of intangible unit-of-account monies – so-called 'imaginary monies" – a time-honored European

tradition that Luigi Einaudi (1953) claims dates back to the time of Charlemagne. The Dutch recorded transactions in terms of the guilder, even though no guilder coin physically existed between the 1570s and 1681. (Wolters 2008, p.42) The 'imaginary guilder' nonetheless unified Dutch bookkeeping. The *intangible* guilder converted distinct real-world receipts/expenditures into accounting entries that represented grams of fine silver. Standardization was accomplished through a 'link coin system' that defined the Riksdollar (hereafter designated Rx$) – a physical medium-of-exchange 'link' coin – in terms of a specific number of non-physical unit-of-account Guilders. (Wolters 2008, pp.38-39) A perfect, freshly-minted Rx$ in 1606 contained precisely 25.7 grams of fine silver. This $Rx\$_{1606}$ was arbitrarily assigned a value of 47 intangible unit-of-account stivers (English spelling) in 1606 (hereafter $UASt_{1606}$), which implied that each $UASt_{1606}$ *represented* precisely one-forty-seventh of 25.7 grams fine silver (i.e. .5468085 grams fine silver per stiver). Since the unit-of-account guilder (hereafter UAG) equaled 20 UASt by definition, each UAG_{1606} therefore *represented* precisely $20/47^{th}$ of the fine silver contained in a perfect Rx$ of 25.7 grams fine silver (i.e. each UAG_{1606} represented 10.93617 grams fine silver). Since all coins (as well as non-coin monies) received and expended were similarly recorded in terms of UASt/UAG equivalence – while the UASt and UAG in turn represented specific amounts of fine silver – this 'imaginary money' accounting system permitted Dutch and VOC bookkeepers to effectively translate all transactions into equivalent *representations in terms of grams of fine silver*. Problems in putting this system into practice must have been formidable, yet 'imaginary' unit-of-account monies provided an effective conceptual device that enabled practical people to keep track of an otherwise-overwhelming bookkeeping nightmare.

Two aspects of the foregoing discussion deserve elaboration. First, no money existed for a thousand years of European history, according to the standard Macroeconomic definition of money. 'Imaginary' unit-of-account monies, such as the UASt and UAG, do not qualify because they could fulfill neither the medium-of-exchange function of money nor the store-of-value function of money. Coins (and other physical monies) also fail to qualify because they did not serve the unit-of-account function of money (the job for which the guilder was created). All three monetary functions must be fulfilled, according to Neoclassical textbooks, yet fulfillment of all three requirements would have required Dutch money to be both tangible and intangible simultaneously. We are left with a monetary theory with no counterpart in the world it alleges to describe, since nothing could satisfy Neoclassical requirements for "money-hood." Second, it is necessary to recognize that particular types of money perform some, but not all, monetary functions. Not only should monies be disaggregated to the maximum extent possible, it is also essential to disaggregate monetary functions themselves. For example, the Intangible Guilder served the unit-of-account function of money up to 1681, notwithstanding the fact that it was incapable of serving medium-of-exchange or store-of-value functions. Likewise, the physical Rx$ (not necessarily the ideal Rx$ of 25.7 grams fine silver) served medium-of-exchange and store-of-value functions, but was incapable of serving the unit-of-account function. The importance of conceptual *disaggregation* throughout economic theory cannot be overstated.

Monetary Functions and Sub-Functions

It is tempting to conclude that *intangible unit-of-account monies*, such as Dutch UASt

and UAG examples discussed above, serve the same function as the intangible unit-of-account Dollar ($) found in Microeconomics textbooks. Such is *not* the case. While it is true that the RUAM and Microeconomic Dollar ($) both serve the unit-of-account function, each serves a distinct *sub-function* of the unit-of-account function of money. Need for sub-functions of the unit-of-account function is illustrated in Figure 12, which presents a standard Microeconomic depiction of the silver bullion market. Microeconomic Laws of Supply and Demand determine the world price of silver today

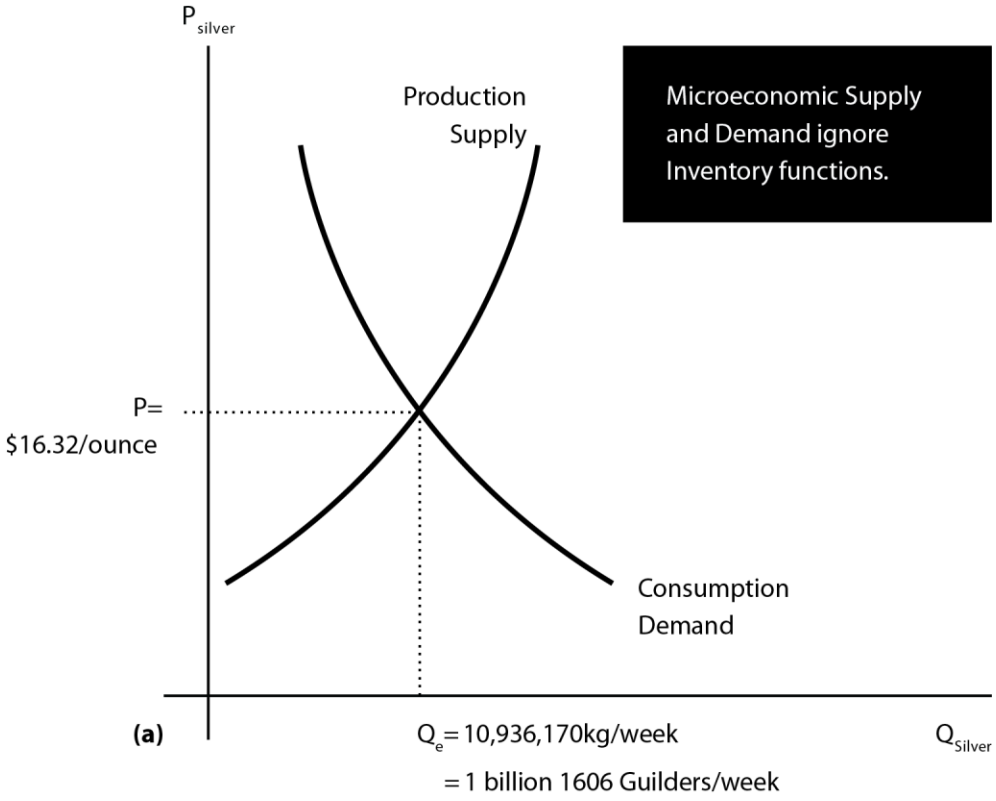

Figure 12. Price of Silver according to the Laws of Supply and Demand

at, say, an equilibrium price of $16.32/ounce. This is the only price at which the quantity of silver supplied (Production Supply) equals the quantity of silver demanded (Consumption Demand). Numerous complications lie behind these simple supply and demand functions, yet Figure 12 does represent a conventional overview of the market process.

It has already been established that any Dollar ($) displayed on the vertical axis of Figure 12 is an intangible Dollar that serves the unit-of-account function of money only. This Dollar ($) clearly can perform neither the medium-of-exchange function nor the store-of-value monetary function, since performance of these physical tasks requires a money that is tangible. Thus, the $16.32/ounce price of silver In Figure 12 should *not* be mistaken for the price of silver in terms of physical money such as the actual United States DOLLAR. [Thus, $16.32/ounce ≠ US$16.32/ounce.] Textbooks should make clear that Microeconomic Dollar values are abstract expressions that reveal nothing about values expressed in terms of the physical DOLLAR. Tangible DOLLARS that people actually carry around appear nowhere in Microeconomics, and

thus Microeconomics is mute concerning the physical DOLLAR.

The equilibrium quantity of silver depicted in Figure 12 is deliberately and arbitrarily set at 10,936,170 kilograms/week for the world silver market. Only at price $16.32/ounce (= $576/kg approximately) are producers willing to sell 10,936,170 kilograms of silver per week, while households are simultaneously willing to buy 10,936,170 kilograms of silver per week. This $16.32/ounce price clears the market.[3] The peculiar number 10,936,170 kilograms has been deliberately specified in order to simplify arithmetic. Recall that the UAG_{1606} (Guilder in 1606) *represented* 10.93617 grams of fine silver. Equilibrium quantity in Figure 12 (10,936,170 kilograms) therefore can be represented in translation as 1 billion ideal 1606 Guilders (UAG_{1606}). Irrespective of which yardstick is chosen – kilograms or 1606 Guilders – both numbers refer to the identical quantity of silver. This manipulation emphasizes the fact that the ideal 1606 Guilder (UAG_{1606}) is a link-unit-of-account money that represents quantities of silver, numbers of which Guilders therefore are measured along the *quantity axis* for silver depicted in Figure 12. It is permissible to express the (vertical axis) price of silver in terms of the Dollar (= $16.32/ounce = $576/kilogram), as shown, but *only with strict understanding that this Dollar* serves only the abstract ratio-unit-of-account money sub-function. Since the vertical-axis label contains the *ratio*-unit-of-account Dollar, while the horizontal-axis label contains the *link*-unit-of-account Guilder, these two unit-of-account monies clearly do not perform the same sub-function. The Intangible Guilder translates actual physical-money transactions into *quantity-of-silver equivalents* in order to simplify and unify accounting for practical purposes. The intangible Dollar, on the other hand, is an abstraction used to represent relative values of non-monetary goods; this intangible Dollar does not represent the absolute quantity of anything whatsoever. In summary, the LUAM is a quantity metric, while the Dollar is a relative-value metric. Both monies serve in abstract unit-of-account capacities, but each device does so while also serving separate and distinct sub-function of the unit-of-account function of money. The LUAM cannot serve the role of an *intangible* Dollar because it represents *tangible* quantities of silver. In other words, not only is it necessary to disaggregate monies by monetary function, it is additionally necessary to disaggregate monies further by monetary sub-function.

A Price Theory of Monies

While we were able to use Figure 12 to distinguish the ratio-unit-of-account sub-function (vertical axis) from the link-unit-of-account sub-function of money (horizontal axis), portrayal of market-price determination in Figure 12 is the source of widespread reader misunderstanding. As shown in Figure 11, it is intersection of Inventory Supply and Inventory Demand that determines market price (*not* Production Supply and Consumption Demand as shown in Figure 12). Inventory Supply represents accumulation of silver throughout history: Production Supplies from all past years minus quantities lost, worn out, or converted into non-bullion forms (including silver coins). Inventory Demand represents silver quantities that people are willing and able

[3] Note that Micro-economists treat production supply and sales supply as synonyms (PS = SS) – rather than distinct concepts within the Unified Theory of Prices – and that inventory supply (IS) does not exist in Microeconomics. Similarly, Micro-economists treat consumption demand and purchase demand as synonyms (CD = PD), and inventory demand (ID) is not recognized in Microeconomics.

to hold. Inventory Supply and Inventory Demand jointly determine the market price of silver. Figure 13 represents point-in-time inventories and thus its horizontal axis contains no time dimension (in contrast to time-dimensioned quantities in Figure 12). In addition, the vertical axis of Figure 13 is labeled RUAMs/ounce, as opposed to the $/ounce of silver label of Figure 12. While true that the intangible Dollar in Microeconomics (Figure 12) is in fact a RUAM (ratio-unit-of-account money), a major source of confusion can be eliminated by avoiding "Dollar" terminology. By definition, a RUAM cannot be tangible, so the abstract nature of the intangible RUAM is clear from the beginning. Confusion of tangible vis-à-vis intangible monies is promoted by the conventional Micro-Macro dichotomy, on the other hand, since Microeconomics presents an intangible Dollar while Macroeconomics presents a tangible DOLLAR. Confusion is widespread because textbooks fail to mention this crucial distinction. As a result, readers are likely to wrongly conclude that the Dollar and the DOLLAR are one and the same money. In truth, distinction between the two is fundamental.

Disaggregation of monies according to function and sub-function permits construction of a Price Theory of Monies, one advantage of which is that monetary goods can be accommodated within the same Inventory Supply/Inventory Demand framework that applies equally to non-monetary goods.[4] The price of silver in Figure 13 is arbitrarily set at 57.12 RUAMs/ounce of silver.

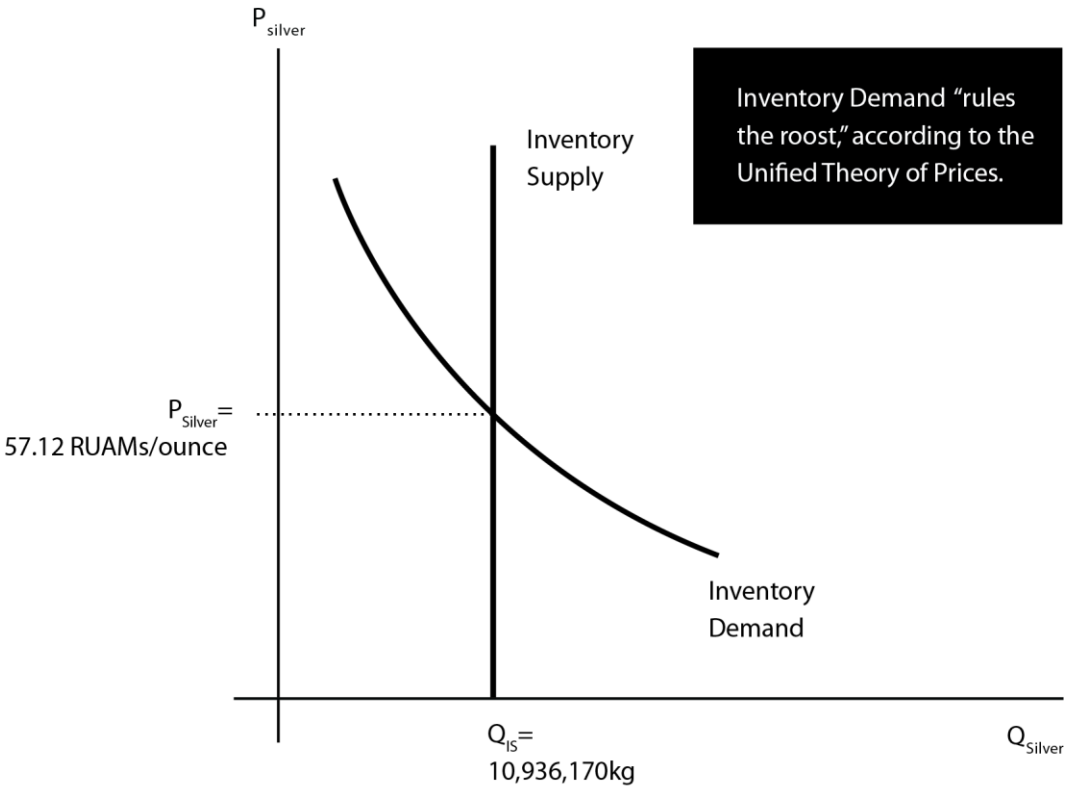

Figure 13. Price of Silver according to Inventory Supply and Inventory Demand

[4] The word "Unified" in Unified Theory of Prices terminology is meant to signal a sense of inclusion of monies along with non-monies within a singular framework.

The term "*monetary good*" here refers to tangible money. Figure 14 illustrates market price determination for the physical dollar, hereafter referred to as the DOLLAR. The market value of the physical DOLLAR is determined by intersection of Inventory Supply (IS_{DOLLAR}) and Inventory Demand (ID_{DOLLAR}), as is true for all goods. Market-clearing price is arbitrarily set at 3.5 RUAMs/DOLLAR. Since the price of silver in Figure 13 equals 57.12 RUAMs/ounce, converting this RUAM-price into a DOLLAR price of silver involves straightforward division of the RUAM price of silver (= 57.12 RUAMs/ounce) by the RUAM price of the DOLLAR (= 3.5 RUAMs/DOLLAR). Since RUAMs in the numerator cancel RUAMs in the denominator, the price of an ounce of silver is thus expressed in terms of physical DOLLARs (= $16.32/ounce of silver). As stated previously, assignment of absolute RUAM prices – such as 57.12 RUAMs/ounce and 3.5 RUAMs/DOLLAR – is arbitrary because it is *the ratio 16.32:1* that matters. The extent to which absolute RUAM numbers are scaled up or down is irrelevant because the numerator scalar always cancels the identical scalar in the denominator. Since both scaled-numbers and RUAM letters cancel while converting to DOLLAR price, DOLLAR prices are revealed to be "relative prices." In this example, Market forces indicate that the value of one ounce of physical silver is 16.32 times greater than – *relative to* – the value of one physical DOLLAR. The DOLLAR is a physical object subject to Inventory Supply/Inventory Demand analysis like any other good.

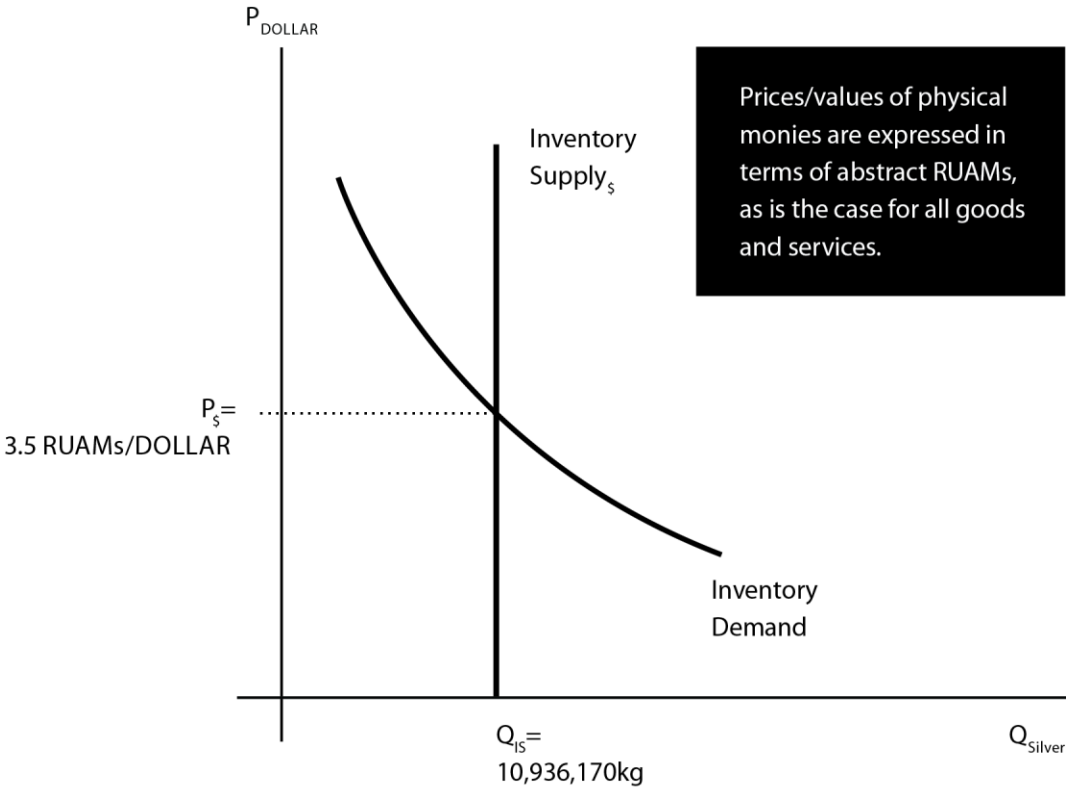

Figure 14. Price of the DOLLAR according to the Price Theory of Monies

==========

$$P_S^{\$} = P_S / P_{\$} = \$/oz.$$

$$\text{Price of Silver in DOLLARS} = \frac{57.12 \text{ RUAMs/ounce}}{3.5 \text{ RUAMs/DOLLAR}} = 16.32 \text{ DOLLARS/ounce of silver}$$

This DOLLAR price is a relative price, since nominal RUAMs cancel

Equation 1. Conversion into Familiar DOLLAR price

==========

Meaning of "Nominal Price"

Microeconomics textbooks refer to "dollar" prices as "nominal" prices because the dollar is the name attached to the abstract unit of account. Since this intangible dollar serves as numeraire, it is natural to think of the price of silver shown in Figure 12 above -- $16.32/ounce – as a "nominal price." But Microeconomics focuses upon "relative" prices, since this Microeconomic dollar is ephemeral. If the price of a bottle of beer were $2/bottle, division of $16.32/ounce by $2/bottle yields a relative price of 8.16 bottles/ounce of silver. Division of some dollar price by another dollar price causes the numeraire-dollar to vanish via cancelation, so Microeconomics actually only concerns relative prices. Whether the numeraire is called a "dollar," a "ghost," or any other name, is irrelevant because the numeraire disappears during calculation of relative prices. The Microeconomic numeraire is an intangible abstraction, the only purpose of which is to establish ratio-values that economists label "relative prices."

I prefer to call the numeraire "RUAM" rather than "dollar" or "ghost" because each of them in fact functions as a ***r***atio-***u***nit-of-***a***ccount ***m***oney. The RUAM-acronym cancels during conversion to relative prices anyway, so the reader is free to substitute any name s/he wishes to represent the numeraire (e.g. "XYZ"). Unlike textbook authors, I deliberately avoid the word "dollar" in reference to the numeraire because physical dollars are ubiquitous in daily life. Widespread conflation of intangible Microeconomic "dollars" and actual physical "dollars" is unsurprising and probably subconscious, given the fact that textbooks virtually never call reader attention to this tangible-intangible dollar distinction. Since the Microeconomic numeraire is an abstraction, it is best to choose a name that conveys its non-physical nature. Although the Unified Theory of Prices advocated in this essay models relative prices in a manner reminiscent of relative prices in conventional Microeconomics, it diverges sharply from Neoclassical theory in that prices of physical monies are treated the same as prices of non-monetary objects (in terms of RUAMs). Thus, physical DOLLARS are placed on the horizontal, quantity axis. Numeraire RUAMs belong on the vertical axis, since this *intangible* unit of account disappears during conversion from intangible RUAM prices to prices expressed in tangible DOLLARs. Since abstract RUAMs disappears via cancellation – rather than "dollars" that may or may not be recognized as abstractions – the probability of confusion is reduced. Physical DOLLARs remain after cancellation of abstract RUAMs. In short, DOLLAR prices *are* relative prices, the value of any item vis-à-vis the value of the DOLLAR, according to our Price Theory of Monies. RUAM

terminology eliminates need to distinguish intangible Dollars (Microeconomics) from tangible Dollars (Macroeconomics), a source of deep confusion in Neoclassical theory, simply because mention of the intangible Dollar is avoided. Nor can Neoclassicists rightly complain about expression of nominal prices in terms of the RUAM, since intangible Dollars have functioned as RUAMs for generations within Microeconomic theory. The Intangible Dollar *is* a RUAM, so why not reduce confusion through substitution of the RUAM in place of the abstract Dollar?

Designation of DOLLAR prices as relative prices simplifies analysis for several reasons. Physical monies are disaggregated to the maximum extent possible, and one can see more clearly forces that determine distinct market valuations for various DOLLARs: Australian DOLLAR, Canadian DOLLAR, Hong Kong DOLLAR, US DOLLAR, Thalers, Pesos etc. Physical monies fit into the same conceptual framework as non-monetary goods under the Price Theory of Monies, eliminating need for the cumbersome Microeconomics/Macroeconomics Dichotomy. Goods (including monetary goods) are revealed as components of accumulated wealth. In addition, the "nominal price" versus "relative price" distinction comes into focus: Prices expressed in terms of ordinary physical monies (e.g. the DOLLAR) are interpreted as "relative prices" (*not* "nominal prices").

In combination, Figure 13 and Figure 14 illustrate that one ounce of silver is valued 16.32 times greater than the value of one DOLLAR in *relative terms* determined by market forces. If this 16.32-to-1.00 ratio of market valuations were to change (not shown) to, say, 17.00-to-1.00, then this *relative*-devaluation of the DOLLAR (or *relative* increased valuation of silver) could result from (a) an increase in silver's value via shifts (not shown) in market supply or market demand for silver in Figure 13, or (b) from a decrease in the DOLLAR's value via shifts (not shown) in market supply or market demand for DOLLARs in Figure 14. The DOLLAR loses value relative to silver, as reflected in the new 17.00-to-1.00 ratio, but this outcome could result from enhanced valuation of silver (numerator), or from reduced valuation of the DOLLAR (denominator) in Equation 1. This simple formulation in Equation 1 implies that price inflation – in terms of a physical money such as the DOLLAR – could arise because of decline in value of the DOLLAR, or price inflation could arise because of increase in value of any non-monetary good in question (e.g. silver). In other words, determination of whether a particular historical era of price inflation was of monetary origin versus non-monetary origin (or a combination of both) depends upon empirical evidence. If price inflation/deflation is fairly uniform across products, then causation is likely of monetary origin (the denominator). If price movements are concentrated in relatively few markets, then causation is likely of non-monetary origin (numerators). The Price Theory of Monies calls into question Milton Friedman's famous dictum that "price inflation is, and always has been throughout history, a monetary phenomenon." If "monetary phenomenon" implies monetary causation, then Friedman's assertion contradicts the Price Theory of Monies, as well as a great deal of historical evidence. While true that the Price Revolution of the sixteenth century was of monetary origin, a good argument can be made that US price inflation of the 1970s was initiated by OPEC's ability to raise oil prices globally in terms of the US dollar. The point is that each episode of price inflation/deflation requires independent analysis, which itself necessitates disaggregation of constituent components in order to assess degrees of causation.

Application of the Price Theory of Monies to Mine Activities

Ever since the second half of the 16th century, it has been known that the massive influx of silver from Spanish American mines caused serious difficulties for silver mine operations in Central Europe, eventually causing some to cease operations entirely. The Price Theory of Monies provides an approach consistent with this mining phenomenon. Imagine (in the absence of a graph) an arbitrary world price of silver set at 100 RUAMs/ton, which lies beneath the 110 RUAM/ton cost to produce silver in certain traditional Central European mines (that had already extracted easily-accessible deposits). It was logical to shut these mines down, rather than operate at a negative rate of profit. Two forces were at work: (a) a glut of silver in European markets depressed the price of silver to 100 RUAMs/ton, while (b) cost of extracting ores in older European mines rose ineluctably (to, say, 110 RUAMs/ton).

This 100 RUAMs/ton price is consistent with the simultaneous mining boom in Spanish America, on the other hand, since New World mining costs (= 40 RUAMs/ton, for the sake of argument) were far lower than European counterparts. Prodigious output from Spanish American mines steadily augmented world silver inventory-stocks during the early seventeenth century, however, such that decline in silver's market value (to perhaps 45 RUAMs/ton) eventually descended to American mine production costs (which had risen, say, to 45 RUAMs/ton) by around the year 1640.

> The discovery of abundant mines of America seems to have been the sole cause of this diminution in value of silver in proportion to that of coin. It is accounted for accordingly by every body; and there has never been any dispute about the fact, or about the cause of it. The greater part of Europe was, during this period, advancing in industry and improvement, and the demand for silver must consequently have been increasing. But the increase of supply had, it seems, so far exceeded that of the demand, that the value of that metal sunk considerably. (Smith, 1937 [1776], p. 191)[5]

Silver's decline in value globally was offset by relentless pursuit of new cost-saving-mining technologies, thereby forestalling the squeeze on mine profits for a while. Although inevitably vanishing over time, silver mine profits in the meantime supported the Spanish Empire, enabled the Shogun to unify Japan, while initiating and then stimulating trade at a global level.

These facts show that studies of the conjuncture which assume the predominant

[5] Had Adam Smith adopted a more global perspective on silver mines, emphasis on American mines would be shared with attention to Japanese silver mines, which produced perhaps half as much silver as did Spanish America up to the middle of the 17th century. Despite seemingly endless demand for silver in China (and elsewhere), accumulations eventually pushed the global price of silver down to its cost of production in Japanese mines as well. The so-called 'closure' of Japan (*sakuko*) in the 1630s signaled demise of trade in silver. Indeed, Japanese exports of copper and gold surged in the late seventeenth century. (Flynn 1991)

role of precious metals, have underestimated the importance of the problems involved in their production. Imports to Seville, European prices, the tonnage of Atlantic shipping, and mercury consumption have all been studied. What has not been examined is the problem of production in the different mines (in Mexico and Peru), the different phases of mining, technical innovations and rate of profit. The value of a product, whether of metals or anything else depends on its cost of production. (Vilar (1976 [1969], p. 191)

Application of the Price Theory of Monies to Mint Activity and Coin Melting

A bewildering variety of coins were minted around the world, both with government sanction (e.g. authorized mints) and without (counterfeiting). The Price Theory of Monies permits basic modeling of both. Like any other industry, Mint profitability required that coin (or other monetary device) price exceed its cost of production. Even royal mints with monopoly rights were subject to competition, since owners of silver could sell to foreign mints or into bullion markets. While market forces reflected the fact that large internationally-traded silver tended to fetch a premium (perhaps 5%) over silver as bullion, values of each form generally moved together.

In general, the Mint price had to match price offered in the bullion market in order to attract silver as an input into its production process. Excessive mint production would lower the value of coins produced, which implies depreciation in coin value in relation to silver bullion (i.e. a rise in the bullion price of silver). Were the price of silver bullion to rises more than enough to offset seigniorage charges (imbedded in coins produced previously), it then makes sense to melt full-bodied coins. In sum, the Price Theory of Monies permits identification of market mechanisms that determine precisely when it was profitable to mint coins (and how profitable), as well as when it was profitable to melt coins (depending upon respective intrinsic contents). This theory is applicable to non-silver monetary substances, of course, as well as non-monetary goods generally. This model can be referred to as a Unified Theory of Prices because it is applicable to any product, monetary and non-monetary alike, without having to resort to the kind of circuitous logic imbedded in the Microeconomics-Macroeconomics Dichotomy that plagues conventional economic theory now.

Conclusions

The argument of this essay is that conventional monetary theory impedes understanding of fundamental issues throughout monetary history. Improved historical evidence is always desirable, of course, yet the most serious problems stem from theoretical misperception. Neoclassical monetary theory broke decisively from Classical tradition during the late nineteenth century, as a consequence of integration of Utilitarian Philosophy within the core of economic theory. Prior to Utilitarianism, Classical economists had generally viewed determination of values of individual monies in the same manner as determination of values of individual non-monetary products: Embodied labor time ultimately determined relative values. Monetary theory and value theory were unified.

Development of Utility Analysis disrupted this Classical unity from the late-19th century onward, leading to the fundamental Microeconomics-Macroeconomics Dichotomy in economic theory today. Originating from utility analysis, Microeconomic Laws of Supply and Demand are said to apply to "real" (i.e. non-monetary) products alone. Laws of Supply and Demand are not applicable to monies because (a) monies have not been considered "consumable" products, (b) monies accumulate as inventory stocks (not time-dimensioned flows), and (c) values of tangible monies cannot be measured in terms of themselves. Repeated failure to unify monies and non-monies within one conceptual framework forced monetary theory to break away from Microeconomic value theory. Originally a conceptual container for money, "Macroeconomics" subsequently served as home for other concepts that could not be included within Microeconomic theory.

Macroeconomic monetary theory has itself bifurcated into Short-Run theory and Long-Run theory. For both Short-Run and Long-Run theories *the initial stock of money is assumed given* (at whatever point in time is chosen by the analyst). Assumption of a given monetary stock immediately creates two problems for monetary historians: (1) useful theory should describe/explain the accumulated stock of each monetary item (rather than assume its existence), and (2) aggregation of diverse monies into a unit labeled "money" makes it impossible to speak of "the value of" or "the price of" hodgepodges of diverse monetary instruments. A summary list of cause-effect logic employed in monetary theory textbooks today is useful, beginning with Short-Run analysis:

➔*Given* an initial stock of Money (M^s, an aggregate of diverse monies),

➔There is a *Policy* Increase in a nation's Money Stock ($\Delta M^s\uparrow$), which leads to

➔Decline in the Market Rate of Interest ($i\downarrow$), which causes

➔Increase in demand for Physical plant and equipment (Investment) ($I\uparrow$), which stimulates

➔ Production of **Physical** Capital (production of plant and equipment, *not* production of physical money), which raises

➔ Gross Domestic Product (**Real GDP**$\uparrow$), thereby

➔ reducing Unemployment ($U\downarrow$).

➔Take Away Message: Money matters in the Short Run. Interest rate adjustments provide the key transmission mechanism that connects the "monetary sector" with the "real sector" of the economy. Impact channels through investment in plant and equipment.

Mechanisms of Long-Run monetary theory differ from mechanisms at play in Short-Run monetary theory in key respects:

➔*Given* an initial stock of Money (M^s, an aggregate of diverse monies),

➔There is a *Policy* Increase in a nation's Money Stock ($\Delta M^s\uparrow$), which leads to

➔**Zero** impact on "Real" variables in the Long Run, according to Neutrality reasoning; thus, the interest rate (i) does *not* link the monetary sector to the physical sector in the Long Run. Rather,

➔Increase in M^s can only impact nominal variables, including nominal prices, in the Long Run. Thus, Long Run M^s and M^d functions depict 1/P (one divided by a general Price Index) on money's vertical "price" axis (in contrast to the interest rate "i" label displayed for Short Run monetary analysis).

➔Take Away Message: Money is a "veil" in the Long Run. Changes in monetary variables make *zero* difference for "Real" variables in the Long Run. The concept of Long-Run Neutrality explains why economic variables are bifurcated into so-called "real" versus "monetary" components. Monetary issues are viewed as irrelevant over extended time periods.

This outline of textbook monetary theory, both Short-Run and Long-Run versions, should make clear that historical realities thoroughly contradict Neoclassical textbook theory. Historians of mining, money, numismatics, precious metals – and other fields of inquiry – know that creation and dispersal of metals and monies has been anything but "neutral" with respect to "real" variables. What could be more "real" than metallic substances buried within the bowels of the earth? How could the labor of hundreds of thousands (indeed, millions) of miners required to extract and bring ores to earth's surface not be "real"? Were the tens of thousands of tons of Spanish American and Japanese silver shipped to China alone from the sixteenth through eighteenth centuries "unreal"? What could be more "real" than the millions of pesos worth of Chinese exports exchanged annually in payment for Chinese imports of silver bullion and silver specie? What could be more "real" than (previously unknown in the Old World) American plants and seeds that revolutionized geographies throughout the world, precipitating unprecedented population explosions across planet earth (plants and seeds transported upon galleons motivated by trade in metals and monies)? It is impossible to understand the "birth of modern globalization" in the absence of worldwide trade in silver metals and monies. A strong argument can be made that silver alone (aside from myriad non-silver monetary substances) was the world's most significant single trade commodity by value for centuries after initial circumnavigation. Indeed, monetary substances have played central roles for thousands of years. Confinement of attention to variables such as the interest rate (in the short run) and frictionless price movements (in the long run) preludes understanding of key factors driving monetary history and history in general.

The Price Theory of Monies offers a dynamic conceptual framework that emerged from decades of study of historical evidence drawn from a few centuries of global interaction. Rather than apply conventional theory to history, historical information guided formulation of a more inclusive theory. The idea is to visualize

the creation and disposition of individual monies in the broadest historical and interdisciplinary context possible, including insights drawn from astronomy, cosmology, chemistry, geology, geography, history, economics, engineering, politics, cultural studies, the arts, philosophy and literature. Although beyond the scope of this essay, the general idea is to investigate connected issues, such as:

➔Origins of silver: All elements heavier than iron were created by exploding supernova, sources of massive volumes of silver thrust into the cosmos, a small fraction of which showered upon a small planet called Earth.

➔Geological forces led to dense concentrations of silver in highly specific locations across Earth, accessible to humans due to evolving mining technologies.

➔Profitable silver mining requires that the market price of silver-containing ores exceed the cost of silver-ore production.

➔Profitable processing of silver ores (e.g. smelting) requires that the price of silver bullion (an output) exceed the purchase price of silver-containing ore (an input) in order to justify the transformation.

➔ Silver bullion can be sold either in the Bullion Markets or to Mints, depending upon convenience and competitive prices.

➔Mint profit (seigniorage) can only exist when the value (price) of a specific coin manufactured (an output) exceeds the cost of producing it, including the cost of acquiring bullion (an input).

➔ When the price of silver bullion surges sufficiently above the value of silver coins as money (enough to offset coin seigniorage), melting of full-bodied coins begins.

➔ Silver bullion, as well as specific silver coins, traveled to particular end-markets scattered throughout the world based upon culturally-determined Inventory Demand for each specific object.

➔Efforts of millions of miners, farmers, merchants, artisans, scientists, political leaders, and others toiled in response to incentives emanating from silver markets.

➔When the value of silver bullion fell, values of silver monies generally fell as well (i.e. there was price inflation in silver-content terms). This logic holds for commodity monies in general.

➔ Commodity monies have been "real" for thousands of years. The Price Theory of Monies recognizes the reality of tangible monies (that serve as media-of-exchange and stores-of-value) through invocation of an abstract,

intangible money – the RUAM – a procedure utilized (presumably subconsciously) in conventional Microeconomics.

➔Monies and non-monies can be analyzed via a Unified Theory of Prices, a substitute for the Microeconomics/Macroeconomics Dichotomy, an unsatisfactory concoction that obstructs historical understanding.

In the absence of abstract units of analysis – such as the inch, meter, gram, ounce, and so on – the physical sciences are unimaginable. How many inches exist in the world today? This is a nonsense question, of course, because the inch serves as an intangible ratio-unit-of-account measure. Had the inch been defined at half its current length, the physical sciences would be unaffected. Such metrics simply permit comparison of things that do exist. I view Economics as a physical science. Accumulations from the past are physical: I label them "inventory supplies." In order to become a true science, Economics will have to confront inventory accumulations directly.

Accountants define "wealth" as assets (value of things owned) minus liabilities (value of amounts owed). Liabilities (i.e. debts) are claims on assets, so wealth has to do with assets minus claims on assets. Wealth rules the world, as reminded by Forbes Magazine each year. The Price Theory of Monies recognizes monies (plural) as assets, as components of wealth. Homes, automobiles, furniture, clothing, art objects, libraries, retirement plans, medical coverage, and other assets are also components of wealth. All components of wealth accumulate through time. History is everything. Conventional Laws of Supply and Demand ignore assets (inventories), except a few assets that are assumed "given" – such as an initial stock of aggregated money. Yet Economic History ought to explain accumulations, rather than circumvent this crucial issue through assumption that accumulated assets are "given." The Unified Theory of Prices focuses upon production and accumulation of assets, in contrast, and therefore upon history's core. Silver has played a prominent role in human history for thousands of years. The Price Theory of Monies offers one vantage from which to glimpse the white metal's evolving roles through time.

References

Doherty K.W. and D.O. Flynn (1989), "A Microeconomic Quantity Theory of Money and the Price Revolution," in E. van Cauwenberghe (Ed.), *Precious Metals, Coinage and the Changes of Monetary Structures in Latin America, Europe and Asia*. Leuven: Leuven University Press, pp.185-208.

Enaudi, L. (1953), "The Theory of Imaginary Money from Charlemagne to the French Revolution," (trans, by George Tagliacozzo) in F.C. Lane and J.C. Riemersma (eds.), *Enterprise and Secular Change: Readings in Economic History. London: George Allen and Unwin*.

Flynn, D.O. (1984), "The Population Thesis View of Sixteenth-Century Inflation Versus Economics and History," in F. Irsigler and E. H.G. Van Cauwenberghe (Eds.), *Munzpragung, Geldumlauf und Wechselkurse/Mintage, Monetary Circulation and Exchange Rates. Akten der C7-Section des 8th International Economic History Congress Budapest 1982*. Trier: THF-Verlag (Trierer Historische Forchungen, Bd.7), pp. 361-382.

Flynn, D.O. (1991), "Comparing the Tokugawa Shogunate with Hapsburg Spain: Two Silver-Based Empires in a Global Setting," in James D. Tracy (Ed.), *The Political Economy of Merchant Empires*. Cambridge: Cambridge University Press, pp.332-359.

Flynn, D.O. (2015), "Link-Unit-of-Account Versus Ratio-Unit-of-Account Moneys: Seventeenth-Century Dutch Mint Policy," in J.K. Leonard and U. Theobald (eds.), *Money in Asia (1200-1900): Small Currencies in Social and Political Contexts*, pp. 41-70. Leiden, Brill.

Flynn, D.O. and A. Giráldez, eds. (1997), *Metals and Monies in an Emerging Global Economy* (Volume in the series, An Expanding World: The European Impact on World History, 1450-1800.) Aldershot: Ashgate/Variorum Press.

Flynn, D.O. and A. Giráldez (2010), *China and the Birth of Globalization in the Sixteenth Century*. London: Ashgate.

Flynn, D.O. and M.A. Lee (2013), "A Restatement of the Price Theory of Monies," in G. Depeyrot (ed.), *Three Conferences on International Monetary History*, pp.293-314. Wetteren: Moneta.

Flynn, D.O. and M.A. Lee (2015), "Hydraulic Metaphor: A Model of Global and Local Connectivity," in T. Mizushima, G. Souza, and D.O. Flynn (eds.), *Hinterlands and Commodities: Place Space and Time and the Political Economic Development of Asia over the Long Eighteenth Century*, pp. . Leiden: Brill.

Friedman, M. (1969), *The Optimum Quantity of Money, and Other Essays*. Chicago: Aldine Publishing Company.

Greidanus, T. (1932) *The Value of Money: A Discussion of various Monetary Theories and an Exposition of the Yield Theory of the Value of Money*. London: King and Sons.

Hicks, J. (1935), "A suggestion for Simplifying the Theory of Money," *Econometrica* (February), reprinted in Hicks, J. (1982), *Money, Interest & Wages: Collected Essays on Economic Theory Volume II*, pp.46-63. Oxford: Basil Blackwell.

Hicks, J. (1982), *Money, Interest & Wages: Collected Essays on Economic Theory Volume II*. Oxford: Basil Blackwell.

Irigoin, A. (2013), "A Trojan Horse in Daoguang China? Explaining flows of Silver in and out of China," Working Paper 173, Department of Economic History, London School of Economics.

Keynes, J.M. (1964 [1935]), *The General Theory of Employment, Interest, and Money*. New York: Harcourt, Brace & World.

Kishimoto, M. (2011), "Foreign Silver and China's Domestic Economy," paper presented for session "The World Upside Down: The Role of Spanish American Silver in China during the Daoguang Reign Period 1821-50." Third European Congress for World and Global History, April 14-17.

Kuroda, A. (2008), "Concurrent but Non-Integrable Currency Circuits: Complementary Relationships among Monies in Modern China and Other Regions," *Financial History Review* 15.1.

Mason, W. (1974), "The Neoclassical Dichotomization of Economic Theory," *Economic Inquiry* XII, 4 (December), pp. 567-576.

McCloskey, D.N. (1972), "Review of Ramsey," in: *Journal of Political Economy* 80, pp.1332-1335.

Selgin, G. (1994), "The Yield from Money Held Revisited: Lessons for Today," in P.J. Boettke and D.I. Prychitko (eds.), *The Market Process: Essays in Contemporary Austrian Economics*, pp.139-65. Aldershot: Edward Elgar.

Smith, A. (1937 [1776]), *An Inquiry into the Nature and Causes of the Wealth of Nations.* New York: Random House (Modern Library Edition).

Vilar, P. (1976 [1969]), *A History of Gold and Money, 1450-1920*. London.

Von Glahn, R. (2011), "Money Demand and Silver Supply in 19th-Century China," *Empires, Systems, and Maritime Networks: Reconstructing Supra-Regional Histories in Pre-19th Century Asia*, pp.67-85. Working Paper Series 05, Ritsumeikan Asia Pacific University, Beppu, Oita, Japan.

Wolters , W.G. (2008), "Heavy and light money in the Netherlands Indies and the Dutch Republic: dilemmas of monetary management with unit of account systems," *Financial History Review* 15.1, pp. 37-53.