Price Theory of Monies, from Global History

Dennis O. Flynn
PhD
Pacific World History Institute & University of the Pacific,
San Francisco, USA
doflynn@PACIFIC.EDU

Abstract. This essay suggests replacement of all current monetary theories with a "Price Theory of Monies" (PTM). The PTM specifies four monetary functions: (1) Medium of Exchange, (2) Unit of Accounting, (3) Store of Value, and (4) Measure of Relative Values. The first three functions correspond with macroeconomic textbook counterparts. The Measure of Relative Values function, in contrast, corresponds with money in microeconomic analysis. Combination of all four monetary functions yields a theory without need for the microeconomics-macroeconomics dichotomy characteristic of conventional economic theory since the early 20th century. It is impossible for any single money to simultaneously fulfill all four monetary functions because the "Measure of Relative Value" is restricted to an *intangible* money, whereas the other three monetary functions require *tangible* monies. Application of the PTMs to monies today reveals that monies and credit instruments are distinct. In addition, non-credit-monies are distinct from credit-monies. Finally, trust plays a critical role in establishment and maintenance of market values of all tangible monies as well as market values of all credit instruments.

Keywords: Disaggregation, laws of supplies and demands, monetary production, monetary functions, Mesopotamia, price theory of monies, quantity theory of money, tangibility/intangibility, utility theory, wealth.

Теория цены денег. Из всеобщей истории

Денис О. Флинн
кандидат наук
Тихоокеанский университет, Тихоокеанский институт всемирной истории
Сан Франциско, США
doflynn@PACIFIC.EDU

Аннотация. В данной статье предлагается заменить все существующие монетарные теории «теорией цены денег». Предлагаемая теория определяет четыре функций денег: (1) средства обращения; (2) средства учета; (3) средства сохранения стоимости и (4) меры относительных стоимостей. Три первые функции совпадают с обычно перечисляемыми в экономических учебниках по макроэкономике. В отличии от них, функция меры относительных стоимостей принадлежит к сфере микроэкономики. Комбинация этих четырех функций позволяет избежать дихотомии макроэкономического и микроэкономического подходов, что является характерным еще с начала XX века. Невозможно выполнение деньгами одновременно всех четырех функций, поскольку мера относительных стоимостей ограничена к неосязаемым деньгам, тогда как остальные три функции требуют осязаемых денег. Применение предлагаемой теории позволяет обнаружить различие между деньгами и кредитными инструментами. Кроме того, некредитные деньги отличаются от кредитных денег. В конечном счете доверие играет критическую роль в установлении и поддержании рыночных стоимостей всех осязаемых денег, а также рыночных стоимостей всех кредитных инструментов.

Ключевые слова: дезагрегация; закон спроса и предложения; монетарная продукция; функции денег; Mesopotamia; теория цены денег; количественная теория денег; осязаемость/неосязаемость; теория полезности; богатство.

DISAGGREGATION REQUIRED

Discussion of silver's pivotal role during the sixteenth-century birth of globalization necessitates construction of monetary theory based upon disaggregation[1]. Moreover, evidence from global history contradicts aggregation practices of mainstream monetary theorists (and their critics). Consider the four main monetary substances — silver, gold, copper, and cowry shells — traded globally from the 16th through 18th centuries[2]. Most silver was mined in Spanish America and (before the 18th century) Japan, while silver's principal end-markets were in China and (to a lesser extent) India. Gold production was more broadly dispersed, although concentrated in West Africa, Columbia/Brazil, Japan (late 17th century) and Southeast Asia. Although not a major gold producer, China exported gold to Europe and Japan while simultaneously importing silver (1540s-1640 and 1700–1750). Leading world producer in the late 17th century, Japanese copper was exported mainly to China, but also to Europe. Production (aquaculture) of cowry shells was concentrated in the Maldive Islands (Indian Ocean) and cowries were exported mainly to end-markets in Asia, but also up to a million pounds per year were destined for end-markets in West Africa (via European ports). In short, each monetary substance followed distinct patterns over centuries. Thus, aggregation of these and other diverse monetary substances into a catch all category "money," as instructed by economics textbooks, conflicts with evidence from global monetary history. Unique locations of supply and demand concentrations characterized individual monetary substances, implying need to practice theoretical disaggregation to the maximum extent possible.

Evidence also contradicts aggregation within monetary subsets such as "silver monies." Irigoin (2013) points to Chinese imports of Mexican pesos after Mexican independence early in the 19th century, for instance, yet Chinese customers clearly preferred the Carolus peso in particular. Inferior non-Carolus coins were rejected, melted,

or significantly discounted within Chinese end-markets. Moreover, silver *bullion* (*sycee*) was *exported* from China while silver Carolus coins were simultaneously *imported* into China. Prices of specific forms of silver bullion and silver coins clearly depended upon detailed characteristics of each type of silver[3].

MONETARY FUNCTIONS: INTANGIBLE MONIES VERSUS TANGIBLE MONIES

Ancient bookkeepers chose fine silver weight as accounting unit for expression of values of things owned/owed. As is true today, ancient accountants preferred monetary standards anchored to objects of relatively stable value through time. Silver often served as the Monetary Standard. The shekel, *representing* c8.33 grams fine silver, was the Mesopotamian unit-of-accounting money around 3000 BCE. This unit-of-accounting-money shekel was *intangible*. Keep in mind that *tangible* coins are first known to have appeared over two thousand years later in Lydia (around 600 BCE). Alexander the Great subsequently introduced Greek coins (drachm, didrachm, and tetradrachm) after conquest of Babylonia in 331 BCE. An *ideal* didrachm "coin" *represented* 8.6 grams fine silver (slightly more than the ideal 8.33 gram unit-of-accounting shekel), yet virtually no tangible didrachm coin actually *contained* 8.6 grams fine silver, because physical didrachm coins suffered wear and tear (and adulteration). Thus, one tangible didrachm coin *contained* different intrinsic content than another tangible didrachm coin *contained*; this explains why coins were weighed rather than counted during transactions. Virtually no tangible didrachm coin *contained* as much silver as the intangible 8.6 grams that the didrachm "link-money" *represented*. Tangible didrachm coins and the intangible didrachm "coin" were fundamentally different.

Despite almost identical weight representations, the intangible shekel and the intangible didrachm served separate monetary functions.

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[1] See Flynn and Giráldez (1995; 2002; 2008) for elaboration on silver's pivotal role in originating globalization.

[2] Flynn and Giráldez (1997) provide an overview of these four monetary substances in global context.

[3] Aggregation of coins and non-coin monies aggravates the problem. Kishimoto (2011), Kuroda (2008), von Glahn (2011) and other leading monetary historians state repeatedly that specific monies commanded distinct market values at particular locations and times.

The unit-of-accounting shekel represented a quantity of fine silver (8.33 grams) *directly*. The link-money didrachm represented a specific quantity of fine silver (8.6 grams) *indirectly* via a conceptual "coin" that rarely had a counterpart in a physical sense. Unit-of-accounting shekel entries referred directly to specific quantities of fine silver; an entry valued at two shekels, for instance, signaled a transaction (or asset held) market value equal to the market value of 16.66 grams fine silver. The "link-money function" of the *ideal* didrachm "coin" was similar, but distinct from unit-of-accounting shekel entries that existed millennia prior to emergence of coinage[4]. The unit-of-accounting shekel *directly* represented a quantity of silver without need for any intermediary "coin." The quantity of silver *indirectly* represented by an intangible didrachm required existence — at least in a conceptual sense — of a perfect didrachm intermediary "coin" that *would contain* a certain quantity of fine silver (were such an idealized coin to physically exist). Intervention of an *ideal* coin in service of the link-money "coin" function evidently emerged after invention of physical coins; the unit-of-accounting function, however, existed both before and after invention of coins. Although each of these two functions represented nearly the same quantity of fine silver, the intangible shekel served one monetary function while the intangible didrachm "coin" served a different monetary function.

The medium-of-exchange monetary function necessarily involves tangible monies, including physical didrachm coins (of various weights), barley, dates, and numerous other commodity monies. Moreover, the Mesopotamian monetary system sketched above is properly characterized as on a Silver Standard, since market values of accounting entities corresponded to market values of specific quantities of fine silver represented. A Monetary Standard based upon *tangible* silver implies conceptual translation of

each accounting entry into equivalent value of a particular quantity of fine silver[5].

To summarize, four distinct monetary functions have been identified thus far. The intangible shekel served (1) the unit-of-accounting function. The intangible didrachm "coin" served (2) the link-money function. Tangible silver served (3) the monetary-standard function. And various tangible substances served (4) the medium of exchange function. Note that monies within each of these four categories performed one — and only one — monetary function. The intangible unit-of-accounting money could not function as link-money, and vice versa. Similarly, tangible medium-of-exchange monies served a different function than did the object serving as monetary standard (except that a quantity of fine silver could act both as exchange medium and standard of value). Thus, no specific money could in principle satisfy all four monetary functions simultaneously, given that tangible and intangible classifications are mutually exclusive. Disaggregation of monies — as well as disaggregation of monetary functions — is required for proper conceptualization.

The conventional macroeconomic definition of (aggregated) money, of course, includes a fifth (5) store-of-value monetary function. Storage of value is a feature common to all tangible "goods," as opposed to "services" which are non-storable by definition. In our case, application of this store-of-value function is restricted to individual tangible monies, not "money" (in the aggregate sense) because some components of "money" can rise in market value while other components of "money" can simultaneously fall in market value. Our crucial sixth and final (6) measure-of-relative-values monetary function warrants separate consideration in the following section.

MEASURE-OF-RELATIVE-VALUES MONETARY FUNCTION

Relative stability in silver's market value over extended periods of time rendered the Silver Standard a useful monetary benchmark against which to gauge market values of other things for thousands of years. As true for all tangible goods, the market value of silver

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[4] Similar to the Mesopotamian shekel thousands of years earlier, intangible Dutch guilders (representing 10.93617 grams fine silver) served the "unit-of-accounting" function, while an ideal Riksdollar (25.7 grams intrinsic content silver) served the "link money" function (between 1570 and 1681 CE). Together, the link-money Rixdollar and unit-of-accounting Guilder — both intangible — anchored Dutch accounting during the 16th and 17th centuries CE. See Flynn (2015b, p. 80).

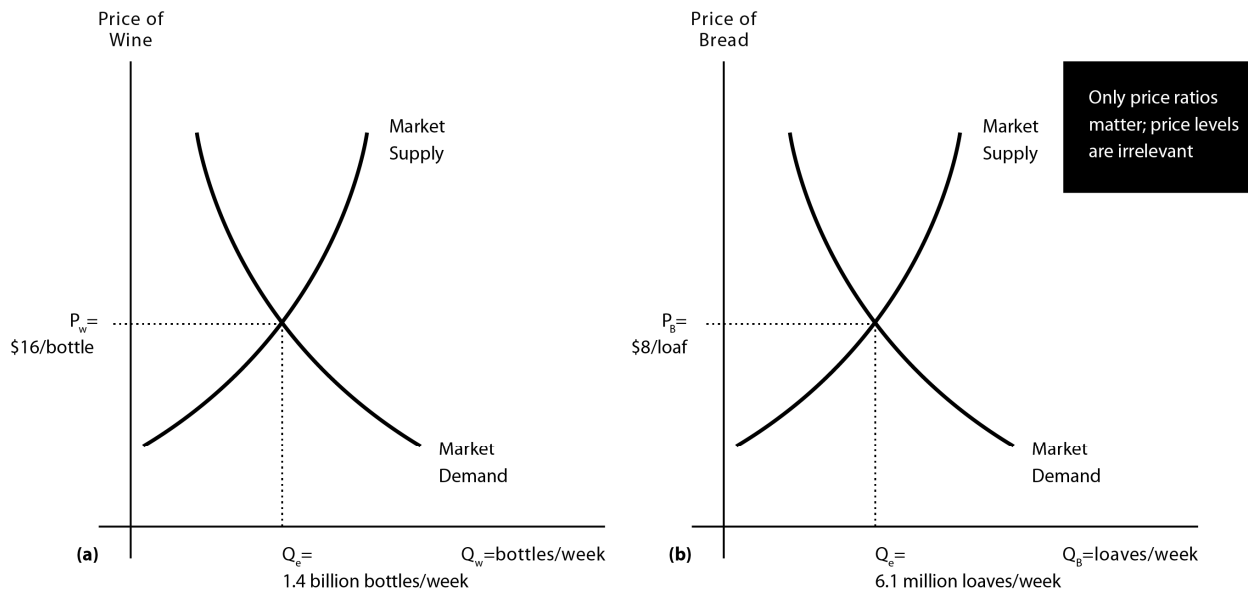[5] For thorough treatment of the (currently ignored) monetary-standard function, see Mason (1963).

Figure 1. **Relative Prices in Microeconomics: Only *Ratios* Matter**

varied over historical time, however, so no monetary standard could serve as a perfectly stable benchmark. When market value of silver (and thus silver monies) fell — e. g. during the Price Revolution of the long sixteenth century — the result was price inflation (prices expressed in tangible silver monies of fixed contents). Historical episodes of price inflation/deflation have usually been analyzed via macroeconomic theory, on the other hand, a practice that immediately plunges the analyst back into the monetary aggregation morass alluded to above. Market values of gold (and gold coins) changed relative to market values of silver (and silver coins) over time — as continues to be true today — so statements to the effect that there was some percentage change in market value of "the money" are inherently ambiguous. There could be price inflation relative to a tangible silver coin, for instance, while price deflation could simultaneously occur relative to a tangible gold coin. There are countless historical examples whereby the intrinsic content of one money gained (or lost) market value relative to another money constructed of a different intrinsic substance. What is needed is a supply-and-demand model that describes price determination specific to the distinct tangible money at issue; only then can observed price movements be disentangled in order to identify the extent to which specific monetary and non-monetary components are responsible for a change in price.

Determination of relative market values for specific products is, of course, the purview of Microeconomic analysis. As illustrated by historical contradictions listed above, however, exclusive relegation of monetary theory to macroeconomics since the early twentieth century remains a formidable obstacle to understanding. It behooves us to think deeply about the nature of the peculiar intangible money of microeconomic analysis: The "ratio dollar." The intangible ratio dollar displayed in microeconomics fulfills an indispensable sixth (6) Measure-of-Relative Values Monetary function that is crucial for construction of the non-standard Price Theory of Monies proposed in this essay[6].

Monetary aggregates in macroeconomics textbooks directly contradict the ratio money displayed in microeconomics textbooks: the microeconomic ratio-dollar is intangible, while "money" in macroeconomics must be tangible in order for value to be stored or exchanged. Absolute numbers chosen to represent microeconomic prices, such as $16/bottle and $8/loaf shown

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[6] I was mistaken when I previously labeled this "ratio dollar" a Ratio-Unit-of-Account Money (RUAM) in Flynn (2015b) and elsewhere. The "ratio dollar" has never been used for *accounting purposes*. Indeed, "ratio dollars" can never be recorded by an accountant because absolute values are arbitrarily chosen (only ratios matter). Thus, the label "Measure of Relative Values Money" (MRVM) used here is a better choice of terminology because it reduces risk of confusing this intangible "ratio money" with intangible Unit-of-*Accounting* Monies that pragmatic accountants have written down for thousands of years.

in Figure 1, are arbitrary: The central point is that division of the price of wine by the price of bread yields a *relative price* of 2 loaves/bottle. All economists know that microeconomics concerns relative prices, not absolute prices. The price of each item could be arbitrarily doubled (to $32/bottle and $16/loaf), cut in half (to $8/bottle and $4/loaf), or multiplied by any scalar: Relative price remains 2 loaves/bottle. Money in microeconomics is portrayed as a "veil" in the sense that the ratio-dollar cannot *contain* value. Rather, the intangible microeconomic ratio-dollar fulfills the sixth (6) Measure-of-Relative Values Monetary function because calculation of "relative prices" involves cancelation of intangible ratio-dollars.

Tangible monies cannot be accommodated within microeconomic analysis for several reasons. First, tangible monies are conventionally (and correctly) viewed as inventory stocks. Current rates of monetary production matter only to the extent that they influence accumulated monetary stocks (based upon past production). Microeconomic quantities such as bottles/*week* or loaves/*week* are time-dimensioned concepts that concern current (profit-maximizing) production and current (utility-maximizing) consumption. Microeconomic analysis does not acknowledge inventory supply and inventory demand functions that play essential roles in monetary theory. Second, microeconomic theory involves analysis of singular products one-by-one, and therefore macroeconomic-style aggregation across dissimilar products is impermissible. Third, the market value of money cannot be expressed relative to that same money itself; the price of a dollar bill is one — expressed in terms of that same dollar bill — irrespective of changes in its purchasing power. For these and other reasons, it was deemed impossible to integrate monetary theory within utility analysis. As a result, economic theory bifurcated into (incommensurate) "microeconomic" and "macroeconomic" branches, terminology fabricated during the early 20th century.

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. (Mason1974, p. 568)

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)

Actually, this flow-stock distinction posed an insuperable barrier to unification of monetary theory and value theory. Monies are stocks. Microeconomics cannot handle stocks. Moreover, monies are non-consumables incapable of utility generation. People hold monetary balances (according to *Macroeconomics* reasoning), not because monies generate happiness/utility directly, but because monies are exchangeable for consumables *at a future date*[7]. Justification for holding current monetary balances is ironically based upon *not holding* those monetary balances in the future, an unavoidable conclusion based upon assumption that the sole source of utility is consumption[8]. Also, given that production theory resides within (time-dimensioned) microeconomics, inventories-focused monetary economics offers no theory of monetary production.

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[7] For example, Ludwig von Mises (1971 [1924], p.98): "Consideration of the subjective value of money without discussion of its objective exchange-value is impossible. In contrast to commodities, money would never be used unless it had an objective exchange-value or purchasing power. The subjective value of money always depends on the subjective value of other economic goods that can be obtained in exchange for it."

[8] The Price Theory of Monies refers to application of the Laws of Supplies and Demands to monies. The Laws of Supplies and Demands assume two sources of utility — (1) inventory holdings themselves and (2) consumption — necessary for derivation of Inventory Demand functions. See Doherty and Flynn (1989 Appendix) for mathematical derivation of inventory demand. Please note that the title of this three-decade old 1989 essay is misleading on several counts. First, the model is a "price theory," and not a "quantity theory." Second, it is not "microeconomic" (although utility-based). Third, it is a theory of "monies," and not a theory of aggregate "money."

The neoclassical "quantity theory," unlike the classical, contained no elucidation of the "quantity." 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 the preclassical technique of describing the *results* of *assumed* changes in the quantity of money — a process eschewed by the classical school (Mason 1974, p. 567–568)

Mason states accurately that no Macroeconomic theory of monetary production exists. Without explaining origins/production of monetary stocks, pre-existing stocks are simply assumed to exist, followed by "*results* of *assumed* changes in the quantity of money." Furthermore, monetary stocks are viewed as policy variables subject to current manipulation by authorities, thereby avoiding a theory of monetary production. In essence, history is avoided.

SIX MONETARY FUNCTIONS SUMMARIZED

Six monetary functions are listed below, with asterisks indicating three functions currently acknowledged in conventional monetary theory:

• *Historical Functions of Monies (Price Theory of Monies)*
• Unit of Accounting* (intangible)
• Medium of Exchange* (tangible)
• Store of Value* (tangible)
• Standard of Value (tangible)
• Link Money (intangible)
• Measure of Relative Values (intangible)

Mainstream monetary theory requires simultaneous fulfillment of *all three* conventional functions of money — Unit of Accounting, Medium of Exchange, and Store of Value — for qualification as "money." The 3000 BCE accounting shekel and Dutch Guilder are disqualified from conventional canon, since these (intangible) unit-of-accounting monies *contained* zero value. Intangible shekels and intangible guilders fulfilled the Unit-of-Accounting function alone, whereas a quantity of silver fulfilled the Standard-of-Value function alone, and various tangible silver and non-silver objects served Medium-of-Exchange and Store-of-Value monetary functions only. Monetary functions involving storage and exchange require tangibility. Simultaneous fulfillment of all three mainstream monetary functions is impossible in principle; thus, macroeconomic requirements force one to adopt the ridiculous conclusion that zero monies have existed throughout history.

The Unit-of-Accounting must be *tangible*, according to mainstream theory; otherwise, the intangible Unit-of-Accounting function would contradict tangible Medium-of-Exchange and tangible Store-of-Value functions. Contrary to this implicit conventional claim, the Price Theory of Monies asserts that the Unit-of-Accounting function requires an *intangible money*[9]. Someone is wrong. Functions 2 and 3 — "Medium of Exchange" and "Store of Value" — are essentially the same for conventional monetary theory and the Price Theory of Monies. The "Standard of Value" monetary function (#4) was jettisoned from mainstream monetary theory a few generations ago, notwithstanding that this Standard-of-Value function use to play a key role in discussions of monetary theory[10]. In any case, monetary history requires resuscitation of the Standard-of-Value function. The Link-Money function (#5) commonplace in Europe (e.g. intangible Dutch guilder) was preceded millennia earlier in the form of ideal didrachm coins (and no doubt many others). Unacknowledged in mainstream discussions of monetary theory today (to my knowledge), the (#6) "Measure-of-Relative-Values" monetary function has paradoxically served as intangible "ratio-dollar" in microeconomic theory for about a century, albeit *deus-ex-machina* since microeconomics offers no theory of money.

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[9] All accounting balance sheets today are expressed in terms of intangible monies. Assets, liabilities, and net worth numbers expressed in US dollars, for instance, involve market value *estimates* of tangible US dollars that perhaps could be generated/paid *if complete liquidation were to occur*. But current ownership of assets and obligations indicates that liquidation has not occurred. The issue of *intangible* units-of-accounting is further discussed in Flynn (forthcoming). The central point is that all units-of-accounting are intangible monies past and present (as was the accounting shekel five thousand years ago).

[10] See Mason (1963) for discussion of monetary standards, as well as evolution from Classical to Neoclassical monetary theory generally. Jursa (2010, p.504) distinguishes medium-of-exchange versus monetary-standard functions: "Barley was also used as money medium, as a means of payment, but not as a standard…"
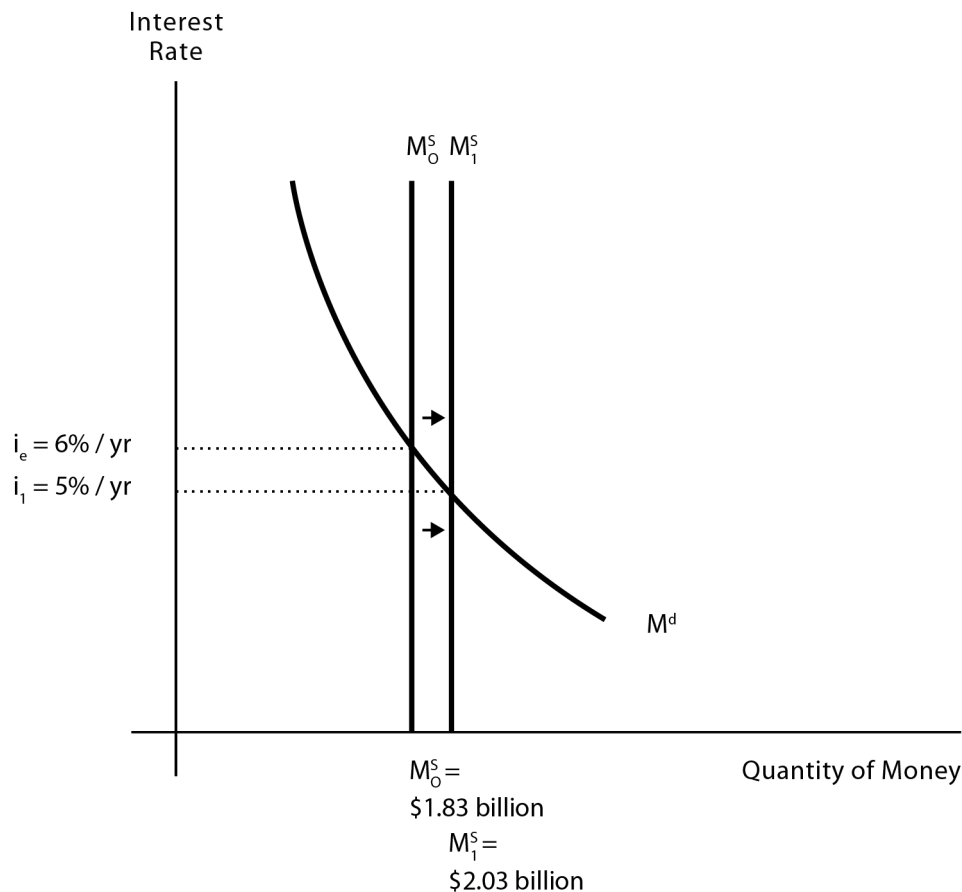
Figure 2. **Central Bank Manipulation of the Interest Rate**

PRICE THEORY OF MONIES VERSUS QUANTITY THEORIES OF MONEY

Relative prices cannot exist within modern monetary theory because macroeconomics excludes the *intangible*-ratio dollar (ir$) of microeconomics. Moreover, macroeconomic methodology subsumes individual items within analytical *aggregates* such as Consumption, Investment, GDP and Monetary Stocks. It thus makes no sense to discuss "the" relative price or "the" cost of producing hodgepodges of dissimilar monies congealed within monetary aggregates. Also, monetary quantities are point-in-time inventory stocks whereas microeconomic quantities are time-dimensioned flows.

Based upon work of John Maynard Keynes (1920s–1930s), mainstream economists settled on "the interest rate" as textbook "rental price of money." *The* interest-rate transmission mechanism connected "monetary" and "real (i.e. non-monetary)" sectors, thereby inadvertently creating formidable obstacles for monetary historians. For instance, it is impossible to develop

a theory of coin production based upon a coin's "price" vis-à-vis "cost of producing that coin" while conceptualizing "the interest rate" as a cost/rental price of coin-money[11]. Be that as it may, this interest-rate channel at least furnished mainstream monetary theorists a patchwork route whereby monies could be included in policy debates. Worldwide focus of monetary policy on interest rates today indeed reflects dominance of Keynesian prescriptions, leading to relentless pursuit of monetary policy stimulation through impacts of low interest rates upon investments. This worldwide strategy *appears to have been effective* over recent decades, but unprecedented global debt escalations prompt many today to ponder whether mounting debt regimes are sustainable, particularly in context of dramatic wealth concentrations (e.g. Piketty 2014). Prominent policy makers worldwide exude

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[11] Rather, the Price Theory of Monies expresses price of each tangible money in terms of an intangible measure-of-relative-values "ratio money", thereby enabling expression of distinct prices for each specific money. This procedure eliminates need for artificial imposition of "the" abstract interest rate as rental-price of amorphous aggregations of dissimilar monies.
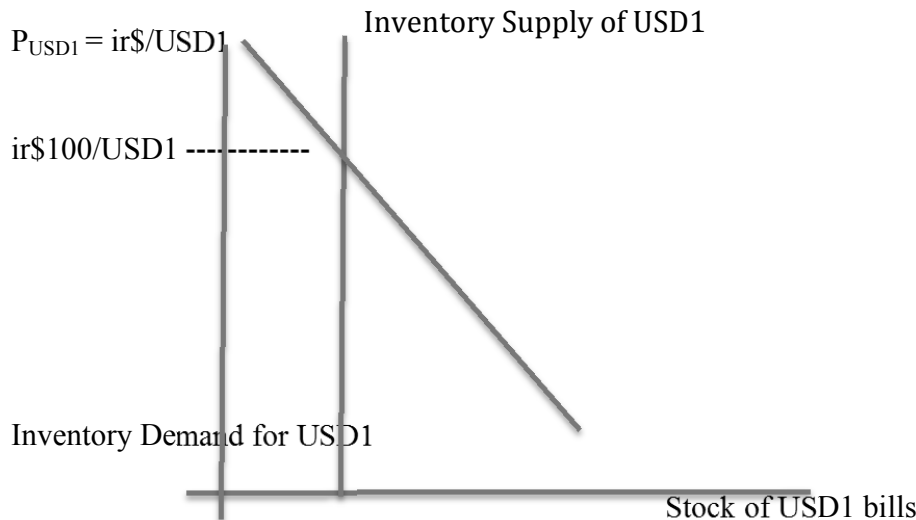
$P_{USD1} = ir\$/USD1$ Inventory Supply of USD1

ir\$100/USD1 ------------

Inventory Demand for USD1

Stock of USD1 bills

Figure 3. **Determination of the ir\$-price of a One-Dollar bill**

confidence in global financial solidity nonetheless. Incompatibility between monetary theory and historical evidence, on a more somber note, suggests that confidence in mainstream theory is misplaced. Interest rates are not determined by intersection of aggregate money supply and aggregate money demand[12]. Moreover, accumulated monetary stocks must be explained, rather than simply assumed to exist, and the same holds for accumulated stocks of non-monetary goods as well. History must occupy the center of analysis. This morning has already faded into history. Inventory stocks today are historical artifacts that belong center stage in all analyses that claim to portray central features of economic reality.

A PRICE THEORY OF MONIES

For more complete description of the Laws of Supplies and Demands, see Flynn (2015). Application of these Laws to tangible monies is sketched here. Laws of Supplies and Demands represent a "Unified Theory of Prices" in the sense that prices of all goods and services — including tangible monies — are expressed in the same intangible-ratio dollar (ir\$). All goods are treated as inventory stocks, including tangible monies. While conventional money sup-

ply and money demand are already couched in Inventory Supply and Inventory Demand terms, mainstream labeling of axes contrasts sharply with labeling under the Price Theory of Monies.

Conventional monetary axes are labeled "the interest rate" and (aggregate) "money stock" (Figure 2)[13]. Price Theory of Monies labels are fundamentally different. The price of each tangible money — e.g. US one-dollar bill, Figure 3 — is expressed relative to intangible-ratio dollars (ir\$). The quantity axis label in Figure 2 refers to accumulated US one-dollar bills at an instant in time[14]. Price is, not "the interest rate," but the exchange value at which US one-dollar bills could be *purchased/sold*. Market price of the US one-dollar bill (P_{USD1} = ir\$100/USD1) is arbitrarily posited in Figure 3.
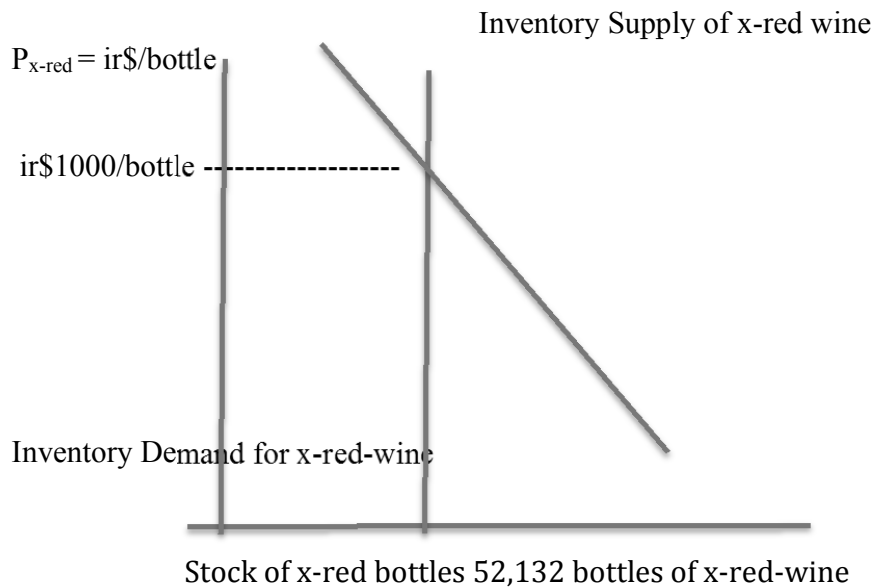
The price of a hypothetical brand of red wine is likewise determined by interaction of Inventory Supply and Inventory Demand (Figure 4). There exist 52,132 bottles of x-red-wine at market price (= $P_{x\text{-red-wine}}$ = ir\$1000/bottle x-red-wine). Division of the ir\$ -wine price by the ir\$-US dollar price cancels intangible-ratio dollars (ir\$), yielding price of (tangible) 10 USD1/bottle of x-red-wine. This exchange rate is 10:1[15]. A non-

[12] Open-market operations these days increase stocks of certain types of money through purchase of debt instruments. Purchase of debt instruments increases prices of financial instruments bought, thus lowering interest rates in the process. Stocks of monies could be increased through purchases of non-financial assets instead, however, which would avoid this interest-rate channel. See Flynn (forthcoming) for discussion of this point.

[13] Textbooks sometimes label quantity "real balances" (M/P), a monetary aggregate divided by a weighted Price Index. The Price Theory of Monies insists upon disaggregation of individual monies already considered inherently "real" (obviating need for any divisor such as P).
[14] Monetary units are counted in the same fashion as non-monetary items, eliminating need for "real balances" as in M/P.
[15] Van der Spek (2016, p. 139) correctly refers to Babylonian price lists as "exchange rates" vis-à-vis a quantity of silver.

Inventory Supply of x-red wine

$P_{x\text{-red}} = $ ir\$/bottle

ir\$1000/bottle ------------------

Inventory Demand for x-red-wine

Stock of x-red bottles 52,132 bottles of x-red-wine

Figure 4. **ir\$ Price of x-red-wine**

economist would (accurately) state that this wine's price is ten bucks/bottle.

While this presentation of price determination may appear uncontroversial, it is unconventional. First, Inventory Supply and Inventory Demand determine the wine's price; wine price is *not* determined by intersection of "production supply" and "consumption demand" as depicted in conventional (flows-only) microeconomic analysis. Second, conversion of intangible-ratio dollar price (= ir\$1000/bottle in Figure 4) into a 10 *tangible* one-dollar-bill price per bottle is achieved through simple division of the ir\$ wine-price by the ir\$ USD1-price. Conventional Microeconomic wine-price is expressed as 10 *intangible dollars/bottle*, whereas Unified Theory wine-price is expressed as 10 *tangible dollars/ bottle* (calculated via ratio of intangible dollars). In sum, physical/tangible dollars and physical/tangible non-monetary goods unite within Laws of Supplies and Demands. Conventional isolation of monetary aggregates within the silo Macroeconomics — divorced from "real good" disaggregates within the silo Microeconomics — is unnecessary. The Unified Theory of Prices accommodates all goods and services. Tangible inventory stocks of all monetary and non-monetary goods are brought into unified focus[16].

MINT ACTIVITY AND COIN MELTING

A bewildering variety of coins have been minted around the world throughout history, both with government authorization and via counterfeiting. The Price Theory of Monies permits modeling of both types. Mint profitability required that price of a coin (or any tangible money) exceed cost of production. Even monopolistic royal mints faced competition, since owners often sold bullion to foreign mints or within bullion markets. Large internationally-traded silver coins tended to yield a small premium (perhaps 5%) vis-à-vis silver bullion due to competitive forces, while silver-bullion and specie values normally moved in tandem over time.

In general, attraction of bullion required that the mint price match bullion-market price. Vigorous mint production raised silver coin stocks, on the other hand, implying downward pressure on silver coin value vis-à-vis silver bullion value. Once silver bullion price roses enough (relative to coin) to overcome silver surrendered during initial seigniorage charges, full-bodied coins were melted. The Price Theory of Monies describes market mechanisms that determine mint profitability, as well as when profitable to melt coins[17]. Laws of Supplies and Demands apply to

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[16] The Laws of Supplies and Demands specify three supply functions: production supply, inventory supply, and sales supply. Three demand functions — purchase demand, inventory demand, and consumption demand — interact in

dynamic fashion. For an outline that is too long to include here, see Flynn (2015a, pp. 74–77).

[17] For more detail on minting and melting of coins, see Flynn (2015a).

any monetary substance, whether produced with or without authorization, and to non-monetary goods in general.

CONCLUSIONS

The Price Theory of monies was developed in response to historical evidence that contradicts mainstream economic theory; Laws of Supplies and Demands emphasize point-in-time inventory analysis (while integrating conventional flow concepts). Classical economists treated individual monies and non-monetary products with the same tools; relative values of monies and non-monies could be viewed, for instance, relative to embodied labor time.

Today's Microeconomics-Macroeconomics Dichotomy replaced Classical coherence. (Mason 1974) Utility analysis yielded microeconomic Laws of Supply and Demand applicable to "real" (non-monetary) products. Laws of Supply and Demand cannot apply to tangible monies that are (a) not "consumables," (b) accumulate as inventory stocks, and (c) cannot be valued relative to themselves. Monetary theory was forced from Microeconomic value theory, while Macroeconomics evolved as conceptual space for monies and other items likewise incommensurate with Microeconomic theory.

The initial stock of money is assumed given in macroeconomics. This assumption is unacceptable for two reasons: (1) accumulated stocks of each monetary item require explanation (not assumption), and (2) monetary aggregation renders impossible consideration of "the value of" or "the price of" aggregates of dissimilar monies.

Consideration of monies over the past five thousand years reveals at least six monetary functions, rather than the mere three functions acknowledged in textbooks. Moreover, three of the six monetary functions involve intangible monies, while the remaining three refer to tangible monies. Thus, simultaneous fulfillment of all monetary functions is impossible in principle. Monetary disaggregation is central. According to the Price Theory of Monies, unification of analysis of tangible monies with analysis of non-monetary goods can only occur if everything is evaluated relative to an intangible-ratio-money: A Relative Measure of Value. Physical sciences depend upon abstract measurement units, such as inch, meter, gram, ounce, etc. Abstract relative-measure metrics are essential for science in that they permit comparisons among tangible things. Economics should become a physical science, with an abstract measure of value (ir$) and also focus upon inventory accumulations.

Accountants define "wealth" as assets (owned) minus liabilities (owed). Liabilities are claims on assets (i.e. debts). The Price Theory of Monies recognizes monies as components of wealth, along with other assets such as homes, automobiles, furniture, clothing, and retirement plans. The Unified Theory of Prices focuses upon production, deterioration and accumulation of assets over time. Wealth and wealth distribution over time, including monetary components, ought to occupy center stage in economic analysis. In other words, economic analysis must focus on history in order to become a physical science.

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