

“Global Monies and Global Inflation: A Price Theory of Money”

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**CONCEPTUAL OUTLINE ONLY**  
**(14 February 2002)**

*I. Theoretical Background: The Birth of Macroeconomics*

This study focuses on the period 1540 to 1640, but the theoretical views provided herein pertain to all time periods that involve commodity monies (and are arguably extendable to fiat money regimes as well). Commodity monies are monies that are mined or otherwise produced for profit, and which may or may not be minted in order to obtain additional profit. We define monies in this way in order to follow the reasoning of pre-1870s Classical economists, theorists who (a) treated monies with the same theoretical apparatus as was applied to non-monetary commodities, and therefore reasoned (b) that the cost of producing an individual money ultimately determined its market price (or value). We believe that fundamental insights yielded by this Classical approach to monetary theory have been mostly lost over the past 130 years or so. Our goal is to persuade monetary historians to abandon conventional Neoclassical approaches to money that have come to dominate over the past 130 years. In their place, we offer an updated, Classical version designed to once again give primacy to a cost-of-production approach to the study of monies and monetary history. We believe that the model described herein is much simpler to understand, and is consistent with evidence throughout the world, than is the case for standard monetary theory.

The theoretical foundation that underlies our monetary vision – and therefore our approach to global price histories – was published in skeletal form in 1989 in an essay entitled “A Microeconomic Quantity Theory of Money and the Price Revolution.”<sup>1</sup> There are at least two reasons why it is unfortunate that the authors chose “Quantity Theory of Money” terminology for that particular article: (a) The reader is likely to think that our theory is simply a variation of other ‘Quantity Theories’ commonly found in the Price Revolution literature (when we in fact reject Quantity Theories and offer ours as an alternative), and (b) it is more accurate to describe our theory as a ‘Price Theory of Money’. We focus on ultimate determinants of the price (or purchasing power) of money. Monetary production quantities are epiphenomena; quantities are themselves determined by the price of a particular money, in conjunction with its cost of production. Just as there is no “Quantity Theory of Rice or Cotton,” we can see no justification for a Quantity Theory of Money either.

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<sup>1</sup> Kerry W. Doherty and Dennis O. Flynn, “A Microeconomic Quantity Theory of Money and the Price Revolution,” in E. van Cauwenberghe (ed.), *Precious Metals, Coinage and the Changing Structures in Latin America, Europe and Asia*, pp.185-208. Leuven: KUL Press [reprinted as Essay XI in D.O. Flynn, *World Silver and Monetary History in the 16<sup>th</sup> and 17<sup>th</sup> Centuries*. Aldershot: Variorum, 1996].

Classical economists (including Adam Smith, David Ricardo, Karl Marx, and many others) treated monies with the same theoretical apparatus as was applied to non-monetary commodities. The labor theory of value states that the price of any commodity is ultimately determined by the amount of labor embodied in it; a product that contains twice as much embodied labor as another will ultimately be priced twice as high in the marketplace. The same logic applied to any monetary substance: if an ounce of gold contained ten times more embodied labor than did a bushel of wheat, for example, then the price of a bushel of wheat would eventually be 1/10 the price of an ounce of gold. Stated differently, an ounce of gold would exchange for ten bushels of wheat. Now imagine that a new mining technology reduced the cost of producing gold by half (i.e. half as much labor was embodied in an ounce of gold); the price of gold would eventually fall by 50% as well. Continuing with our hypothetical example, an ounce of gold would now contain only five times more embodied labor than a bushel of wheat. That is, the price of a bushel of wheat would rise to 1/5 of the price of an ounce of gold (compared with 1/10 of an ounce of gold previously). This is nothing more or less than a description of price inflation, when prices are expressed in terms of the commodity-money gold. More pieces of gold must be surrendered to purchase the same quantity of wheat. Whether or not a piece of gold is stamped with a king's face on one side and a coat of arms on the other (i.e. is monetized), the underlying logic holds. Monies are special commodities, to be sure, but then again wheat, vaccination for measles, and all other products are also special in some way. Yet a common theoretical apparatus is applied to each of them.

Classical economists could see that the cause of the price inflation sometimes rested with a fall in the cost of producing gold (the monetary substance) and therefore a fall in the purchasing power of gold, as indicated in the example above. Of course, a similar rise in the gold-price of wheat could occur had the cost of producing wheat doubled (instead of the cost of gold having fallen in half). If the amount of labor time embodied in wheat were to double, in other words, then a bushel of wheat would command twice as much gold as before (1/5 of an ounce of gold, say, rather than 1/10 of an ounce before). This development (perhaps caused by soil exhaustion, or expansion to poorer land resources) would result in price inflation too. That is, in any particular circumstance price inflation might arise from a fall in the price of gold-money or it could arise from elevation of the price of the wheat (as opposed to the famous dictum of Milton Friedman to the effect that all inflations throughout history have been strictly monetary phenomena.). Determining which is the case –whether price inflation is a monetary versus a non-monetary phenomenon in origin (or a combination of the two) – requires empirical investigation of the circumstances surrounding a particular historical episode. If there were convincing evidence that the cost of producing gold had fallen, then responsibility for gold-content price inflation would be placed primarily on commodity-money (gold) market. If convincing evidence suggested instead that there were an increase in the cost of producing wheat, on the other hand, then an appropriate share of the responsibility for price inflation would be shifted away from the gold market and toward the wheat market. Classical monetary theory was unified with the rest of value theory. There was no need to treat monetary substances with a different analytical apparatus than non-monetary substances. All commodities were produced using land, labor, and capital in a commodity

money world, so there was no theoretical reason for Classical economists to treat monetary substances any differently from non-monetary substances. We believe that the Classical economists were correct. Moreover, since the time period under consideration (for Session 15 at this IEHA conference) was dominated by commodity monies, we insist that a Classical approach is most appropriate for the study of early-modern price history.

A monumental shift in economists' thinking occurred in the last third of the 19<sup>th</sup> century when 'utility analysis' was conceived; utility analysis, of course, became a fundamental building block of what is nowadays called Microeconomic Analysis. A fundamental problem arose during the evolution of utility-based Microeconomic Analysis. As all microeconomic textbooks make clear today, utility-based demand functions are derived subject to *an income constraint*. This income constraint is a central issue because income can only be defined over a specific time period (e.g. \$20/hour, or \$4,000/month, or \$100,000/year, and so on). Such income constraints imply that all quantity axes for basic Microeconomic supply and demand functions also contain the time dimension that is specified in the income constraint. Thus, the quantity axes of microeconomic supply and demand functions must always be time-dimensioned. On the demand side, quantities of the product are consumed at certain rates per time period (e.g. loaves of bread per week). On the supply side, quantity refers to *current* production rates per time period (e.g. number of cars produced per year).

The problem is that money is inherently a 'stock' concept. Inspection of a pile of coins pulled out of one's pocket makes clear at once that individual coins contain various year-dates. In other words, the monetary stock includes coins accumulated from various production periods from the past. The 'money supply' refers not to the current rate of production of the money in question – which is what microeconomic supply means – but rather to the stock of money in existence at a particular point in time. This is why Macroeconomics textbooks always show money supply functions as vertical, point-in-time functions. Consistency demands that money demand functions also must be point-in-time stock demand functions – otherwise, money supply and demand functions could not be superimposed in the same space. The point is this: Microeconomic analysis is built upon a utility-analysis foundation that forced micro supply and demand functions (because of the income constraint) to be strictly time-dimensioned. Since money is inherently a subject that requires point-in-time stock (i.e. inventory) analysis, money could not be integrated into mainstream microeconomic analysis. One cannot very well have an economic science that leaves out the topic of money, of course, so some kind of accommodation for money had to be found. It no longer fit in with Neoclassical value theory (which the Marginalist Revolution had converted into time-dimensioned analysis strictly, as opposed to the point-in-time analysis of Classical economics).

Tremendous battles were fought over the proper way to conceptualize money in order to integrate monetary theory somehow with the flow-analysis that streamed out of utility analysis, since Neoclassical economics had displaced Classical economics. Monetary stocks could not be integrated into microeconomic utility analysis (for mathematical reasons having to do with an inability to handle stock and flow functions simultaneously), either a broader version of utility analysis would have to be developed within

microeconomics (which is what the 1989 Doherty-Flynn model attempts), or money had to be placed in a separate category and approached totally differently than utility theory. Reformulation of microeconomics required techniques of dynamic mathematics developed only in the second half of the twentieth century, however, so it was not possible to integrate money into microeconomic analysis around the dawn of the 20<sup>th</sup> century. Utility analysis was not about to be dumped in the late-19<sup>th</sup> and early-20<sup>th</sup> century, on the other hand, so Macroeconomics was born (as a place to put money). This microeconomics-macroeconomics dichotomy never existed under Classical Economics because Classical economists tended to focus on point-in-time accumulation (e.g. the *Wealth of Nations*, rather than time-dimensioned *income and production* rates in GDP). In other words, Classical economists already focused on inventory stocks of all commodities, so commodity monies fit right into their schemes. This was no longer true under the new Neoclassical regime that arose out of utility analysis. Yale's Irving Fisher attempted to turn point-in-time monetary stocks into monetary flows by focusing on the rapidity with which monetary units change hands ( $MV = PT$ ). British monetary theorists at Cambridge University (e.g. Edwin Cannan) argued vehemently against Fisher and his followers, insisting (correctly) that monies must be treated as stocks, not as flows; indeed, the so-called Cambridge-k focuses on determinants of the *stock demand for money to hold*. If one imagines taking a snap shot picture of an economy, all money is being held by someone at all times. The demand-side issue is to understand the determinants of holding particular monies, rather than limiting oneself to consideration of time-dimensioned issues such as the time-rate of spending and receipt of monies (as did Irving Fisher and countless others after him). It turns out that the Cambridge group was correct. They quite properly won the eventual argument against Fisher, but economists today are unaware of this development. Along came the Great Depression and John Maynard Keynes, however, and the focus of attention shifted to the new theory of Keynes and his focus on aggregate spending. Since Keynes, attention shifted to debates about Fiscal Policy versus Monetary Policy. There are debates within monetary theory obviously, but all monetary theorists at least adopt stock, point-in-time models. In short, a fundamental dichotomy born some 130 years ago remains: monetary stocks are treated in a completely different fashion than are non-monetary items (which are seen from a utility-based flows perspective). The former is a topic of Macroeconomics, while the latter are studied with distinct Microeconomic methods.

Keynes adopted the Cambridge approach in the sense that money is treated strictly in terms of stock demand and stock supply. The price of money became "the interest rate" for Keynesians, however, and this is how mainstream economics conceptualizes money to this day. And therein lies a serious problem for the monetary historian: it is not possible to use today's monetary theory to analyze a particular money from cost-of-production points of view (as did Classical theorists). What would it mean to state that the price (or cost of production) of an ounce of silver declined from 10%/year to 9%/year? Nine percent of what: itself? The interest rate is not the price of anything. It has become clear to us that modern textbook approaches to money are of no use in helping us to understand the most fundamental monetary forces throughout the world during the early-modern world. Thus, we have been forced to seek an alternative route to conceptualize monies in a commodity-money world.

We understand that monetary historians will resist our suggestion to abandon the standard monetary apparatus that appears in every modern economics textbook, but there is no alternative if we are to make progress in discovery of monetary forces that acted at a global level throughout the modern world. We know for certain that monetary substances were produced for profit and that they certainly had costs of production; conceptualizing the interest rate as the ‘price of money’ obscures mechanisms that determined monetary values (and thus episodes of price inflation/deflation). A leading monetary theorist such as Nobel Laureate Milton Friedman can apparently get by with assuming a one-time increase in the money supply by hypothetically dropping money out of a helicopter. However, monetary historians are stuck with the more difficult task of trying to understand forces responsible for the production and distribution of hundreds of thousands of tons of monetary substances throughout the globe for centuries. We do not enjoy the luxury of assuming that money supplies are exogenous variables. We have to explain the mechanisms that led to production of specific quantities of particular monetary commodities. We also must explain why such substances gravitated to specific markets at particular times. And we have to explain the evolution of values of these monetary substances over time. These issues must become the subject matter of price history.

## *II. Textbook Definitions of Money*

Textbook monetary theory has unwittingly erected obstacles to understanding the evolution of monetary history during the early modern period. The most fundamental building blocks of modern monetary theory continue to mislead historians. Basic definitions of monetary units of analysis are themselves sources of trouble. Textbooks today define “M1” as the narrowest, most restrictive monetary aggregate.<sup>2</sup> M1 includes various coins, denominations of paper money, and checking account balances (i.e. demand deposits). While it is true that the sub-category “coins” can involve distinct intrinsic contents such as copper, silver, lead, gold, or a variety of alloys and other materials, theorists today generally ignore the specific content of each coin. Indeed, disparate coins are themselves grouped with paper monies to form a monetary sub-category referred to as “cash” or “currency.” Note that cash/currency is a subset of the most restrictive textbook definition of money, M1, since demand deposits (i.e. checking account balances) are not always considered cash or currency. Moreover, when monetary theorists speak of cash or currency, it is not deemed necessary to specify the particular type of metal or paper contained therein because all such coins and paper denominations comprise but portions of M1 (the narrowest monetary unit of analysis). The monetary theorist considers irrelevant whether monetary aggregates are comprised mainly of nickels, dimes, quarters, paper dollars, or any other specific monetary denomination. It is the total quantity of money that is judged crucial, not whether this total is comprised of this or that particular substance. Thus, the metallic content of each coin is considered a trivial matter unworthy of concentrated attention.

Unfortunately, adoption of modern concepts of monetary aggregates such as “M1” – with their conscious decision to downplay the roles of specific types of monetary substances – has contributed widespread confusion for monetary history in general.

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<sup>2</sup> P.A. Samuelson and Nordhaus W.D., *Economics* (New York: McGraw-Hill, 1995).

Faithful to the teachings of mainstream economic theoreticians, historians routinely add together specific monies in order to obtain aggregated monetary constructs that they label “the money supply,” irrespective of whether such aggregates are comprised of silver, gold, copper, cowry shells or other specific substances. It is generally believed that it is the size of the monetary aggregate that matters, not its composition.<sup>3</sup> We maintain, on the other hand, that following this expert advice prevents historical understanding of fundamental monetary forces at work throughout the 16<sup>th</sup>, 17<sup>th</sup>, and 18<sup>th</sup> centuries.

### *III. Rejection of ‘Balance-of-Trade-Deficit Reasoning’*

The most common explanation for the flow of monies from Europe to Asia during the 16<sup>th</sup> through the 18<sup>th</sup> centuries has been that Europeans exhibited intense demand for Asian goods (including Asian textiles, ceramics, spices, teas, and so on), whereas Asian people did not reciprocate with a correspondingly lively import demand for European wares. This asymmetry is said to have caused a European balance-of-payments deficit vis-à-vis Asia. There was “imbalance” in the sense that European imports from Asia were huge, while European exports to Asia were simultaneously small. Large European imports and small European exports implied a balance of trade deficit for Europe as a whole. The only way to pay for this trade deficit, according to this line of reasoning, was for Europeans to export monies to Asian sellers in order to balance the books. Thus, monies flowed off to Asia – as passive balancing items – in response to a European trade deficit. Notice that economic dynamism emanates from Europe (the vibrant source of demand) according to this scenario. Asian demand conditions are generally depicted as traditional and static.

Historical facts contradict mainstream thinking about the flow of specie from Europe to Asia.<sup>4</sup> The balance of trade deficit explanation outlined above is simply wrong. Money in general did not, in fact, flow from Europe to Asia. Between the 1540s and 1640, and again, between 1700 and 1750, silver flowed persistently from Spanish America and Japan mainly to China **simultaneous with** systematic Chinese exports of gold to Japan, Europe, and (via the Pacific Ocean) to Mexico during both of these time periods.<sup>5</sup> In addition, Japanese copper also flowed to Europe late in the 17<sup>th</sup> century, while American silver simultaneously continued to flow to China. Huge amounts of Maldivian cowries from the Indian Ocean flowed into West Africa, again during times when silver flowed toward China. In sum, it is abundantly clear from historical evidence

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<sup>3</sup> It is only fair to acknowledge long-standing literatures on the “monetary approach to the balance of payments,” “currency substitution,” and other strands that focus on the composition of national monetary stocks; these constructions nevertheless operate within modern conceptions of national money supplies in the form of monetary aggregates such as M1, M2, and so on.

<sup>4</sup> D.O. Flynn, “The Microeconomics of Silver and East-West Trade in the Early Modern Period,” in W. Fischer, R.M. McNinnis, and J. Schneider, *The Emergence of a World Economy. Part I: 1500-1850*, pp. 37-60, Stuttgart: Steiner-Verlag-Wiesbaden-GmbH, 1986

<sup>5</sup> Note that silver also flowed in volume to China between 1640 and 1700, and again after 1750. We are emphasizing here, however, that **gold** systematically flowed in the opposite direction (from China) during the periods 1540s-1640 and again between 1700 and 1750. (Instances can be found when silver and gold moved in opposite directions at times other than 1540s-1640 and 1700-1750 as well, but not in the systematic fashion characteristic of these special periods. For a more complete treatment of the “Potosí/Japan Cycle” and the “Mexican Silver Cycle,” see Flynn and Giráldez (forthcoming).

that abstract “money” did not flow together anywhere during these centuries, whether as “trade-deficit balancing items” or otherwise.<sup>6</sup> The ubiquitous “balance of trade deficit” argument needs to be expunged from the explanatory arsenal of early modern historians. Evidence contradicts its predictions at every turn. Historical misinterpretation in this case results from aggregating diverse monies – as monetary theory indeed urges of us all – as opposed to looking at each monetary substance as a distinct entity itself.

Our research has tended to concentrate specifically on silver as a key monetary substance, yet by consciously narrowing focus to silver we have been forced to consider broad issues that extend far beyond our initial and specific inquiries. The world’s most dynamic center of end-market demand for silver was China, certainly not Europe. Silver flowed to China (in various forms) in exchange for Chinese silks, ceramics, tea and other exports. Neither Chinese nor European “trade imbalances” existed whatsoever. There was simply straightforward exchange. Disaggregating monies enables us to see this process clearly. We treat each individual monetary substance as a distinct entity and as a commodity (the procedure followed by Classical economists prior to the 20<sup>th</sup> century). We see this trade as “balanced.”

It is worth calling attention to the fact that K.N. Chaudhuri’s classic *The Trading World of Asia* long ago recognized the necessity of conceptual separation of intercontinental movements of gold from intercontinental movements of silver.<sup>7</sup> K.N. Chaudhuri was the only twentieth-century scholar we have found to consistently apply the Classical bimetallic-flows arguments of David Ricardo to independent, intercontinental movements of specific monetary substances like gold and silver. As mentioned earlier, the Doherty-Flynn model (1989) follows in this Classical tradition and was in good measure inspired by Chaudhuri’s pioneering work.

It should be made clear that we are not denying the existence of balance of trade deficits *per se*. Evidence seems to indicate that import values in the U.S. today do, in fact, exceed U.S. export values by hundreds of billions of dollars per year. We have no objection to calling this a trade deficit. Today’s U.S. trade deficit is financed through borrowing by entities in the U.S., or (which is the same thing) lending/investing by entities outside of the U.S. Trade deficits involve loans (or other Capital Account flows). But there was never any similar borrowing on the part of European entities from Chinese entities during the early modern era. Europeans were involved in a straightforward exchange of commodities; silver was simply swapped for Chinese silks, ceramics, tea and so forth. There was no need to finance trade relations that involved a straightforward swap of one set of products for another set of products. As long as the marketplace valued exports and imports equally, there was no ‘imbalance’ that needed financing. The fact that the dominant commodity forwarded by Europeans to China – namely, American and Japanese silver – happened also to be the monetary standard of much of the world, is beside the point. There was no borrowing or lending involved. There was straight exchange. Thus, no European-Asian balance of trade deficit existed. Ubiquitous claims that ‘money’ flowed from Europe to Asia in order to balance a European trade deficit are based upon confusion between ‘money’ and ‘credit’. Money and credit are

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<sup>6</sup> Copper and cowry monies also flowed to distinct destinations around the globe. For a summary of the independent flows of the four great monies of world, see Flynn and Giraldez (1997).

<sup>7</sup> K.N. Chaudhuri, *The Trading World of Asia and the English East India Company, 1660-1760*. Cambridge: CUP, 1978; for example, see p.156.

distinct concepts that are often confused in monetary history. Moreover, if there had been such a balance of trade deficit (which there was not), then various types of monies should have flowed eastward to ‘Asia’. This never occurred. Instead, silver alone persistently flowed eastward to China (and westward to China from Mexico and the Viceroyalty of Peru). Moreover, Japan was a major exporter of silver to China, so it makes no sense to frame the issue in “East-West” or “Europe-Asia” terms in any case. Rather than view commodity monies as passive items that are forced to ‘balance’ in reaction to imbalances in the non-monetary sector, we view the monies themselves as both cause and consequence of changes at a global level.

The mining, processing, transportation, and marketing of silver has always required application of physical resources with profit maximization in mind, just as has been the case for innumerable non-silver products. We therefore focus on silver’s price, its cost of production, profits obtained in its production, and the role of accumulated silver stocks at a global level. In today’s jargon, we adopt a microeconomic approach to monetary substances. Classical monetary theorists proceeded in this same fashion; for them, there was no micro-macro dichotomy. In contrast, modern Neoclassical monetary theorists focus primarily on neither the microeconomic price of monetary substances, nor their costs of production, nor on their profitability. How could they do so? They aggregate (i.e. add together) various distinct types of monies into an abstract category called ‘money’. While it does indeed make sense to discuss the price, cost of production, and profitability of a particular monetary substance (like silver or gold), it is difficult to conceptualize the cost of producing, for example, a hodge-podge of individual monies when each one contains a distinct intrinsic content. Each substance has a unique cost of production.

#### *IV. Four Main Monies Prior to the 20<sup>th</sup> Century*

Our conviction that monies must be conceptually disaggregated by substance type has been strengthened while editing a volume entitled *Metals and Monies in an Emerging Global Economy*. (Flynn and Giraldez 1997) Work on that volume made clear to us that each of the four most important monetary substances in the world prior to the 20<sup>th</sup> century – silver, gold, copper, and cowries – must be analyzed in terms of the distinct history of each individual substance. The bulk of the silver produced in Spanish America and Japan, for example, ended up in China. On the other hand, gold produced in Africa, Southeast Asia (including the Philippines),<sup>8</sup> and America was at times involved in direct, intercontinental exchange for silver (and therefore moved in precisely the opposite direction as silver in global markets during extended periods). Sweden and Japan were leading world producers of copper during certain time periods; but again, copper failed to move in tandem with other monetary substances in global markets. The same held true for cowry shells, which poured forth in abundance from the Maldivian Islands into Asian and African markets; yet, the monetary standard in the Maldives was itself based upon the Persian larin (mostly comprised of American silver). An unavoidable conclusion from study of the world’s four great monies, in other words, is that the four principal monetary substances **never** moved in tandem systematically anywhere in the world during these centuries. On the contrary, each substance was governed by its own specific

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<sup>8</sup> Refer to Reid

supply and demand conditions. Like non-monetary substances, each of these four great monetary substances moved in response to market forces that applied specifically to it. Production locations were dispersed in specific geographic locations about the globe, and end market concentrations were also located in distinct regions of the world. The intrinsic substance of each monetary type requires and deserves separate study. However, since monetary historians have been instructed by theorists to aggregate specific monies into an abstract category labeled “money,” they seem generally unaware that each monetary substance has a distinct history that requires separate consideration. Failure to disaggregate to the individual substance level has resulted in confusion in the monetary history literature. Again, fault lies not in historians' inability to apply theory properly, but rather within mainstream theory itself.

#### *V. The Price Revolution Literature*

A decade prior to development of the 1989 Doherty-Flynn model that underlies all of our work today, Dennis O. Flynn (1978) entered an ongoing argument about the cause of the Price Revolution. Consistent with mainstream Eurocentric thinking at the time, he looked at the price history of the nation-state of Spain. In the mid-1950s, Carlo Cipolla initiated an argument against Earl J. Hamilton's monetary interpretation of the Price Revolution. Using the standard monetary theory of his day, Hamilton had argued that American treasure would enter a particular country, raise its price level (via a Quantity Theory of Money), and then lose the treasure to nearby states via a balance-of-trade mechanism that is sometimes called the Humean price-specie-flow mechanism. Without delving into details here, suffice to say that the money enters a country, increases its monetary stock, raises domestic prices, which leads to a balance-of-trade deficit (because foreign goods are now relatively cheaper), thereby causing the money to flow to a neighboring country. The neighboring country, in turn, goes through the identical process: treasure enters first, prices rise domestically, and the treasure flows out to other jurisdictions. Through this price-specie-flow mechanism, the Price Revolution was thought to have spread throughout Europe. But as Cipolla and many others subsequently pointed out, historical facts contradict this general view. Italy experienced its highest rates of price inflation *prior to* arrival of American treasure in Italy; moreover, when the American treasure finally did flow into Italy in quantity, the Italian rate of price inflation subsided. The historical evidence contradicted the price-specie-flow predictions, and the same contradictory pattern was shown to hold for English, Low Countries, Swedish, Russian, and other countries' historical evidence. Hamilton was never able to respond effectively to this criticism because the evidence did in fact contradict his price-specie-flow explanation.

Flynn (1978) applied Cipolla-inspired logic to criticize Hamilton's explanation for price inflation in Spain itself (his case study). Using stock-demand-for-money reasoning, Flynn used the Monetary Approach to the Balance of Payments to explain why Spain – so-called “fountainhead” of American treasure for the rest of the world – contained virtually none of its own prodigious mint output of the famous pieces of eight. Flynn's argument was simply that the demand for money can be conceived as a certain volume – say, 10 million pesos worth – and that this demand can be satisfied with more than one type of

money. Since the Spanish Mint had filled up the entire Spanish-economy stock demand for money with *vellón* (mostly copper) money, the full-bodied silver pesos were pushed out of the Spanish marketplace. Spain had experienced a Price Revolution despite the fact that the country contained virtually none of its own silver coins by the early 17<sup>th</sup> century. Spain was on a copper-money standard domestically, notwithstanding the fact that it produced more silver money than any jurisdiction in the world. Thus, Spain itself was more susceptible than any country to the anti-monetary argument used against Hamilton by Cipolla et al for other European countries. There was an absence of American treasure during the Spanish Price Revolution. Even so, Flynn maintained that the Spanish Price Revolution was a monetary phenomenon because the American treasure caused prices to rise internationally. In other words, he argued that it is a mistake to view price inflation on a country-by-country basis. Monetary forces were responsible for the Price Revolution; whether a particular jurisdiction did or did not happen to contain American metals depended upon whether alternative monies (like copper) had supplanted monies made of precious metals. Flynn's application of the Monetary Approach to the Balance of Payments – a theory that emerged only in the 1970s – seemed to offer salvation for monetary causation for the Price Revolution.

While Flynn's 1978 argument contained appealing elements, it did not even begin to address many fundamental and vexing questions. What determined the international price level (which is simply relayed to Spain and other countries and regions)? One is tempted to answer: interaction of monetary supply and demand at the global level. But there is an even more fundamental issue: What are the ultimate causes of the world monetary stock itself? Dropping money out of a Friedmanian helicopter will not do here! Commodities are endogenous components of the world economy. Treating monetary stocks as exogenous begs the question of what determines the stocks themselves. Once one begins to inquire about what causes specific production quantities of particular monetary substances, logic forces usage of microeconomic reasoning. It is not enough to speculate about *consequences* of an increase in monetary stock of this or that magnitude. What causes those magnitudes to begin with? The answer for silver – as for gold or copper or cowry shells – is profit. But analysis of the profitability of a particular commodity requires methodologies based upon cost-of-production reasoning that is applied to specific substances, an approach that lies outside of the reach of conventional macroeconomic analysis.

Our research focuses mainly on silver, but the model applies to any monetary (or non-monetary) substance. What we observe in the sixteenth century is that Spanish American and Japanese silver mines were immensely profitable for a considerable time period because of two developments: (1) the price of silver was high (thanks mainly to Chinese demand), and (2) the cost of producing silver was exceedingly low. The difference between price and cost of production is profit. Why else would an estimated 160,000 people around 1605 decide to live in the remote and hostile environment presented by a place like Potosí, at some three-miles altitude in the Andes? The greatest production rate of silver in the history of the world occurred in Potosí after 1545 because its mines were astoundingly profitable; and most of the silver from Potosí headed for its best end-markets, in China. Vast production of American and Japanese silver mines flooded world

markets, which, of course, eventually drove down the price of silver throughout the world. Everyone recognizes that this is why silver mines in Central Europe and elsewhere curtailed or stopped silver production in the 16<sup>th</sup> century. Eventually, by 1640 the world price of silver had declined to the cost of producing the white metal even in the New World and in Japan. The price of silver could not continue to fall once it had reached cost of production at the most efficient mines. A century-long fall in the price of silver – especially between the 1540s and 1640 – had ended. The Price Revolution was over.

In the 1930s, Hamilton and his fellow price historians wisely agreed to standardize individual countries' price histories by agreeing to report price data in 'silver-content' terms. In doing so, prices reported in their studies were adjusted according to the quantity of silver contained in the monetary unit under consideration. Thus, prices expressed in a silver currency that had been debased by 50%, for example, would be calculated to be only half the price that was actually recorded in the documentary source. Similarly, the calculated price would be increased proportionately when the intrinsic content of a coin were increased by monetary authorities. The idea was twofold: to eliminate the effect of currency debasement (recognized as a separate issue) and to permit easier comparisons of price histories in individual country studies. The procedure of unified reporting of prices in silver-content terms was a propitious development for the field of price history. In the process, these 'fathers of price history' essentially reduced price history to study of the value of silver vis-à-vis the value of whatever documented good was under scrutiny. This procedure is especially convenient in terms of the issues we deem central to the study of price history. Using a microeconomic approach to specific monetary substances – silver in this case – we can see more clearly what forces might cause the value of silver to fall relative to the value of non-silver products. We know for a fact that the cost of producing silver in 16<sup>th</sup> century New World and Japanese mines was lower than had been the case before the 1540s: (a) the mines were the richest in world history (read: cheap cost of production) and (b) many new technologies lowered production costs further (including the famous mercury amalgam process). We also know that these mines eventually lost their ability to produce extraordinary profits by 1640. Well over 100,000 tons of silver came out of New World mines alone during the 16<sup>th</sup> through 18<sup>th</sup> centuries. The value of silver did indeed fall between 1540 and 1640, just as Adam Smith and virtually all other classical economists discussed at length. The Price Revolution was undoubtedly a monetary phenomenon.

#### *VI. Relative Prices versus Nominal Prices: Real and Monetary Sectors*

Non-monetary forces may have also contributed to the Price Revolution. To the extent that a particular region experienced a rise in the cost of producing wheat or any other product during this time period, then there is room for non-silver contributors to the Price Revolution too. This comment may seem strange to the price historian because we are supposed to belong to either the "monetary" or "real school" camp when discussing the underlying causes of price inflation. But we reject the 'real' versus 'monetary' distinction. We can imagine nothing more 'real' than silver or gold, nor anything more 'monetary' than gold or silver coins. The 'monetary' versus 'real' distinction is yet

another artifact of the macroeconomics/microeconomics dichotomy discussed above. Since we reject the macroeconomics/microeconomics dichotomy, we are also forced to reject its real-versus-monetary offspring. Similarly, we reject the conventional theoretical distinction between ‘nominal prices’ and ‘relative (or real) prices’. All prices are relative prices. If a price were expressed as one Peso for a barrel of wine, then we could say that the *nominal* price of the wine is 1 Peso per barrel. But this is also a relative price: one Peso exchanges for one barrel of wine (the exchange rate is 1:1). An increase in price to two Pesos per barrel of wine (assuming no debasement) could occur because the value of the silver fell in half, or because the value of the wine doubled, or due to some combination of the two influences. Whatever the mix of causes, both the nominal and relative price of the wine doubled with respect to the Peso.

How would the wine market depicted above be influenced by an increase in the quantity mined of some other monetary substance – say, gold? Our model suggests that there would be no impact on prices referenced in the preceding paragraph. Why should a flood of gold be expected to raise or lower the market value of a *silver* Peso relative to a barrel of wine? Most likely it would not. One might reason that a flood of new gold supplies could cause gold coins to replace silver coins in usage, much as a flood of cheap tea could cut into the market for coffee (and thereby lower the price of coffee). In this way, the silver-content price of wine could be affected. Such a linkage is indeed possible, but economists maintain that the price of any reproducible product would eventually gravitate toward its cost of production in the long run (i.e. at a rate that yields normal profits). Since a flood of new gold would not be expected to alter the long-term cost of producing silver or wine, there is no *a priori* reason to suspect that additional gold stocks would have anything to do with the Peso price of wine. The hypothetical flood of new gold supplies could result from discovery of new sources of cheap gold (or lower-cost gold-mining technology), of course, and in this case the price/value of gold itself would certainly be expected to decline over time. That is, there could be a rise in the gold-content price of wine as well as the gold-content price of silver (i.e. the bimetallic ratio would change), but this is an entirely separate matter from issues involving alteration in prices expressed in silver-content terms.

The distinction between prices expressed in silver-content versus gold-content terms is fundamental because it makes no sense to aggregate monies that are manufactured out of distinct substances. Price historians should always make clear whether they are talking about silver-content prices, gold-content prices, copper-content prices, or prices expressed in terms of other monies. A case in point involves a study of Chinese rice prices by Michel Cartier ( ). Cartier converted Chinese rice prices that were originally recorded in terms of copper cash into rice prices expressed in silver-content terms. No explanation was offered to justify this conversion of copper-content prices into silver-content terms, but his results are instructive and useful for our purposes. Cartier’s research establishes that there was indeed a Price Revolution in China in silver-content terms, one that roughly paralleled its widely discussed European counterpart. Cartier’s findings are consistent with our argument that a worldwide Price Revolution was caused primarily by a fall in the market value of silver. It is not surprising to us that silver-content Chinese rice prices did not mimic exactly silver-content price patterns that are

well known for European jurisdictions, since products consumed in different societies themselves experienced distinct cost structures. The value of silver declined worldwide between 1540 and 1640, in other words, but it is unreasonable to expect that the values of European wheat and Chinese rice would experience uniform movements in production costs. Indeed, abundant evidence exists for divergent costs for similar products within a single country (e.g. because of transportation costs). Each region throughout the world requires detailed analysis of its own unique conditions, in other words, but all of them witnessed a fall in the market value of silver. Thus, there was a worldwide Price Revolution in silver-content terms. This does not imply that every area experienced a rise in nominal prices, however, because some in some places prices may have been expressed in terms of a non-silver money.

The distinction of the previous paragraph is important because most readers are likely to misunderstand statements about price inflation by scholars such as Andre Gunder Frank. Frank can correctly claim that there was no Price Revolution in China (in terms of a non-silver currency) while Cartier simultaneously argues that there was a Price Revolution in China in silver-content terms. Patterns in price history are determined by the choice of the monetary unit used to express the prices reported. If the secular value of silver falls, other things equal, then silver-content price inflation results. If the secular value of copper falls, other things equal, then copper-content price inflation results. It is incorrect to state that massive silver mining caused price inflation in Europe, while the transshipment of most of this silver to China did not have the same effect in China. In fact, the silver-content prices did inflate in China (as Cartier and others report). Why in the world should a fall in the cost of producing silver result in copper-content price inflation in China? If one is interested in copper-content price inflation, one of the first places to look is at the cost of producing copper (not silver). The point again is that one must analyze each market independently. Aggregating various monetary substances together precludes understanding of the causes of general price movements in a commodity money world. The production costs and prices of various monetary substances were never moving in step with each other, so commingling these monies simply causes conceptual and empirical confusion.

Although we are not experts on the issue, there seems to be little consensus about the price history of India during our period. Some scholars claim that there is no evidence in support of silver-content price inflation in India. Even if this turns out to be the case, such evidence does not defeat our interpretation of the impact of silver on world markets. It is not at all impossible that a halving of the market value of silver around the world, for example, could occur simultaneous with a halving of the market value of some important agricultural commodity within an area of India. In such a case, the silver content price of that agricultural product in India would not change. Such a development would be consistent with observations of a Price Revolution elsewhere in the world where the cost of producing agricultural products differed from the Indian experience. Our counterfactual argument is simply that India would have experienced a silver-content Price Revolution if that country had not simultaneously experienced other market forces that may have masked decline in the market value of silver. Arguing otherwise would

suggest that the Indian marketplace was not intimately connected with the global silver market. Everyone knows this was not the case.

We suspect some to criticize our argument on the basis that that it cannot be empirically tested. This criticism is true if one's definition of empirical testing is restricted to statistical testing of the econometric sort. If one adopts a broader conception of empirical testing, which is what we urge, then the issue is transformed into the question of whether our theoretical propositions are consistent with known facts throughout the world. To our knowledge at this point in time, they are. It is worth noting that some of the most fundamental propositions in microeconomic theory are not testable in a statistical sense. All economists will tell you, for example, that the reason that prices for personal computers continue to drop over time is because technological innovations continually reduce PC production costs. This is what conventional microeconomic theory states, and it is true. People have observed this principle throughout history. It is empirically verifiable in that sense. If one were to ask an econometrician to support this proposition for products in general, however, s/he would look at you like you were crazy. It would be similar to demonstrating in all cases that gravity pulls all objects to the earth at the same rate (when we know that a feather falls slower than a brick). What would the R-square be? We doubt that econometric testing of our Price Theory of Money would yield interesting results, but maybe someone can convince us to change our minds.

Finally, our Price Theory of Money is superior to all Quantity Theories of Money in that it helps us to understand why silver-content price inflation throughout the world subsided (and even reversed) during the second half of the 17<sup>th</sup> century even though Spanish American silver mines continued to produce huge (though reduced) quantities of silver. Our model says that the world price of silver declined up to 1640, at which time its value had subsided to the cost of producing silver at American silver mines. The fact that super-profits no longer existed does not negate the existence of normal, mundane profits in the silver industry. There are many examples today of products that are produced in large quantity, but with precious little profit per unit. Producers cannot persistently produce things at prices short of production costs (including subsidies), of course, and this same logic applies to silver. There is no inconsistency in stating that 10 million pesos per year of silver production could be inflationary during one time interval, in other words, while production of 10 million pesos per year of silver production in a later year would not be inflationary. It depends upon the relationship between the price of silver and its cost of production (as is true for any other product). Quantity Theories of Money, on the other hand, face more formidable problems when confronted with the same facts because they state that it is the "quantity" of money that matters. Again, monetary quantities (mined and minted) are themselves determined by fundamental underlying forces normally ignored by macroeconomic theory. In other words, Quantity Theories start the clock in the middle of the game by simply asserting monetary growth. We seek to understand the entire game, including forces that lead to production decisions; we seek to understand the process from beginning to end.. This job requires a Price Theory of Money.

## *VII. Summary and Conclusions*

We believe that there are many fundamental conceptual problems in the price history literature, problems that stem from conflicts in the basic building blocks of the economics discipline. Modern economics contains a microeconomics-macroeconomics dichotomy that did not exist for Classical economists up to the last third of the 19<sup>th</sup> century. Classical economists used the same Value Theory (as it was called) to address supply and demand analysis of monetary and non-monetary items alike. Whatever its deficiencies, at least Classical economics was unified. Modern Neoclassical economics is not unified. It is divided into microeconomics – geared toward description of non-monetary (and non-financial) demand and supply mechanisms – and macroeconomics, which tries to integrate monetary and financial stocks into the story. The problem is that these two segments of economic theory do not dovetail; they are not unified. It might be possible to overlook this fundamental disunity between microeconomics and macroeconomics, if it were not for the fact that the dichotomy has made a shambles of precious metals history as well as price history. The macroeconomic practice of aggregating diverse substances into a catchall category called ‘money’ precludes understanding of the fundamental forces driving global monetary history. It is historical fact that each of the four main monies in early-modern history – silver, gold, copper, and cowries – never flowed together anywhere. Each one was produced in specific locations around the globe. Each one was destined for particular markets. The price of each one was distinct, as was the cost of production of each. Profits were never the same in each industry. In some cases they partially substituted for each other; in other settings, they were not substitutes at all. Aggregating them into a unit of analysis called ‘money’ is guaranteed to obscure the nature and function of each monetary substance.

The model we use is ‘unified’ in the sense that it applies to monetary and non-monetary substances alike. It does this by offering a utility-based model that incorporates inventory stocks into the basic building blocks of supply and demand. A dynamic mathematical model underpins the analysis, but most aspects of the history of concern to us can be explained verbally in simple language that sounds like old-fashioned Classical economics (like the labor theory of value, for example). If the cost of producing silver were to decline (i.e. its production involves application of less labor, in a Classical sense), other things equal, then more units of silver would be needed to purchase items whose costs of production did not decline. This is called price inflation in silver-content terms. This development does not imply price inflation in gold-content terms, or copper-content terms, or cowrie-content terms; price inflation in terms of these substances depends on what is happening to the cost of producing each one of them respectively. Aggregating these dissimilar monies together has created endless confusion and misunderstandings about the nature and causes of episodes of price inflation and price deflation throughout history. Our unified theory is much simpler and far more consistent with the historical evidence.

Our view is a ‘price theory of money’ rather than a ‘quantity theory of money’. We do not begin the analysis with a ‘quantity’ of money because we are trying to describe the forces that lead to particular quantities of production and particular quantities that are

accumulated throughout the world. Production quantities are determined by profitability in the industry in question (like any non-monetary market); and per-unit profit is defined as price minus cost of production. The silver industry boomed when profits signaled the boom, and it busted when the price of silver declined to its cost of production. Circumstances in the gold industry usually produced phases that were quite distinct from those in the silver industry. Japanese monetary history offers a clear example of this phenomenon in the second half of the 17<sup>th</sup> century when its silver industry collapsed simultaneous with impressive surges in Japanese gold and copper industries. Combining these substances together makes no sense. Moreover, it is dangerous to over-concentrate on quantities of even a single monetary substance. Two million Spanish pesos in the middle of the 16<sup>th</sup> century possessed more than double the purchasing power of two million pesos in the middle of the 17<sup>th</sup> century (i.e. the Price Revolution happened, in silver-content terms). Far too much attention has been focused upon quantities of silver, gold, and other monetary substances, and far too little attention on the value and profitability of each substance. And value and profitability changed over time; there were cycles that can be identified. This distinction is important for price history because many have wondered how it could be that Spanish-American silver mines could continue to pump out massive (although reduced) quantities of silver during the second half of the 17<sup>th</sup> century, yet silver –content prices did not seem to rise as they had previously. Well, the answer lies in the fact that the price of silver had fallen to its cost of production by the middle of the 17<sup>th</sup> century. Substantial silver production occurred in the face of fairly stable silver prices during the second half of the 17<sup>th</sup> century. This is perfectly consistent with our price theory of money (but not the quantity theory of money). Why would one expect the quantity of silver to correlate with the relative value of theory, when no one hypothesizes that the quantity of, say, rice should correlate (in lock-step fashion) with the price of rice over time? And why do not analysts speculate about the ‘velocity’ of rice as it changes hands in the marketplace? People don’t analyze rice and other non-monetary substances in this fashion because doing so sheds no light on the behavior of these markets. We argue that the same can be said for markets for the commodity monies that are the focus of early-modern history. We believe that a ‘price theory of money’ offers the best vehicle for analysis of price history and the best hope for a unified theory of economics.