A Simple Model of the Theory of Money Prices

Joseph T. Salerno

Ludwig von Mises (1981; 1998) is generally and properly credited by contemporary Austrians with having reintegrated monetary theory with general economic theory from which it had been severed by the neoclassical quantity theory.[1] However, broader recognition of Mises's contribution in merging monetary and value theory has been hindered by certain deficiencies in the organization of his exposition and the absence of a straightforward heuristic for conveying his achievement.[2] Indeed, it is questionable whether Mises himself was completely aware of what he had accomplished in this area. In fact he had implicitly demonstrated that *there is no theory of money properly speaking, but only a theory of money prices*. It was left to Mises's leading follower in monetary theory, Murray N. Rothbard (1993), to formulate a mode of exposition that facilitated the clear delineation of economics as a unified theory of money prices.

The aim of this paper is to construct a simple model that epitomizes Rothbard's contribution and captures the essential elements and relationships that

---

Joseph T. Salerno is professor of economics at the Lubin School of Business at Pace University and editor of the *Quarterly Journal of Austrian Economics*. I am indebted to William N. Butos, John B. Egger, Jeffrey M. Herbener, and Israel M. Kirzner for their perceptive comments on an earlier draft of this paper which helped me to improve the structure and clarity of my argument. I bear sole responsibility for any errors and ambiguities that still remain.

[1]In a neglected work, Mason (1963, pp. 41-63) argued compellingly that the unity of monetary and value theory in classical economics was sundered by early neoclassical quantity theorists such as Francis A. Walker and Joseph S. Nicholson.

[2]For example, in *Human Action* Mises (1998, pp. 286-311, 324-36) dealt with entrepreneurial profit and loss, the general pricing process and the pricing of the factors of production in chapters that preceded the chapter on "Indirect Exchange" in which he discussed the origin and subjective valuation of money. This unfortunate order of arrangement tended to obscure the central role of money prices in entrepreneurial appraisement and allocation on factor markets. Also, Mises (1998, pp. 398-402) provided only a very sketchy discussion of the demand for money which cannot bear the full weight of a theory of money prices.

constitute the theory of money prices. It is hoped that this simple model will also serve as a useful pedagogical device for those who are interested in introducing the unique Austrian view of the central role of money in the economy to their intermediate macroeconomics classes.

In section 2 of the paper, Rothbard's formulation of the theory, including his innovative conceptualization of the demand for money, is presented in the form of an equation. Section 3 shows the implications of the theory within a simple exchange economy. The restrictive assumptions of this model are dropped and the analysis is applied in the context of the real-world economy in section 4. The concluding section of the paper briefly discusses the implications of the theory for the meaning of Say's Law and of the quantity theory of money.

ROTHBARD'S EQUATION

> The exchange demand for each good—the amount of money that will be spent in exchange for the good—equals the stock of money in the society minus the following: the exchange demands for all other goods and the reservation demand for money. In short, the amount spent on X good equals the total money supply minus the amount spent on other goods and the amount kept in cash balances. . . . Now, when all goods are considered, the exchange demand for goods equals the stock of money minus the reservation demand for money. . . . The exchange demand for money equals the stock of all goods minus the reservation demand for goods.[4]

Now the equation implicit in the above quotation from Rothbard (1993, p. 713) may be written as follows:

$$1.\ (P_1 \times Q_1) + (P_2 \times Q_2) + \ldots + (P_N \times Q_N) = MS - MD_R$$

Since the exchange demand for money is the obverse of the exchange demand for all goods and therefore equal to the total receipts of money for the sale of goods:

$$2.\ MD_E = (P_1 \times Q_1) + (P_2 \times Q_2) + \ldots + (P_N \times Q_N)$$

Substituting equation 2 into equation 1 gives us

$$3.\ MD_E = MS - MD_R$$

---

[4]Rothbard (1993, pp. 350–56, 662–67) was the first to analyze the demand for money in terms of its exchange demand and reservation demand components. In 1913, Herbert J. Davenport (1968, pp. 267–73) also clearly identified these two partial demands for money but ultimately failed to integrate them into an overall theory of the demand for money. The exchange demand for money bears no relation to the Keynesian transactions demand for money, which is an attempt to classify the motives for *holding* cash balances, i.e., "transactions," "precautionary," and "speculative."

Rearranging terms, we get the supply of money equals the total demand for money, the familiar condition of equilibrium in the market for cash balances:

4. $MS = MD_E + MD_R = MD$

For purposes of our analysis, we substitute equation 2 and the equilibrium condition becomes

5. $MS = (P_1 \times Q_1) + (P_2 \times Q_2) + \ldots + (P_N \times Q_N) + MD_R$

where:

MS = Money Supply

MD = Total Demand for Money

MD_E = Exchange Demand for Money

MD_R = Reservation Demand for Money

$P_1 \ldots N$ = Market-clearing price of nonmonetary commodities 1 to N

$Q_1 \ldots N$ = Market-clearing quantity of nonmonetary commodities 1 to N[5]

3. The Analytical Framework in a Simple Model

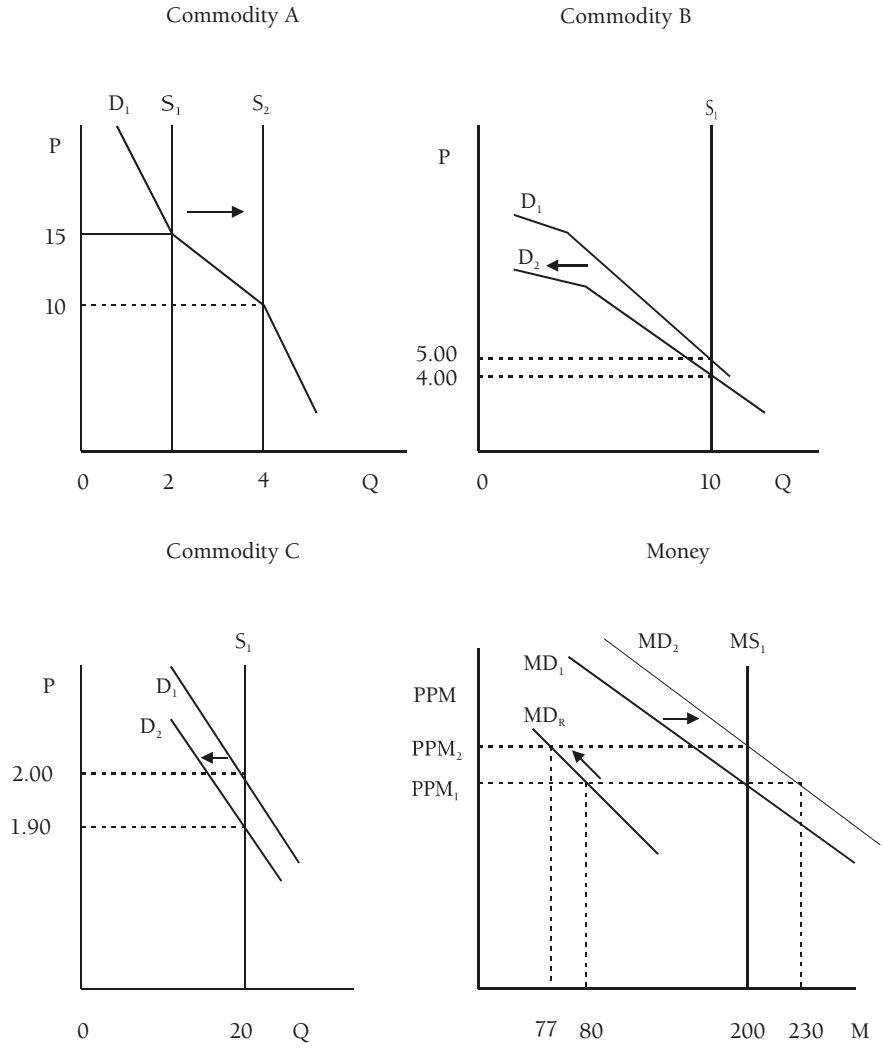
What we might call Rothbard's Equation defines simultaneous equilibrium in all goods markets and the market for cash balances, yielding a set of money prices that embodies both relative prices and the purchasing power of money. We illustrate the application of Rothbard's Equation with the accompanying four graphs below, which represent an economy comprising three commodities (A, B, and C) and a general medium of exchange. The commodities are directly produced by the households in the economy so that there are no factor markets or payments. In addition we assume that leisure is not a consumer's good, although each individual's labor is absolutely limited by total exhaustion after a fixed number of hours per day. It is also assumed that each good is produced by labor and a completely specific land factor owned by the household and that none of the producing households consumes any of the

[5]It is important to be clear on precisely the sense in which the concept of "market-clearing price" is used in the theory of money prices and what it implies for the formulation of supply and demand schedules. Since the theory of money prices deals with quantities of money that are actually transferred in exchange, i.e., what Mises (1998, p. 327) called "actual market prices" and Marget (1966, vol. 2, p. 222) labeled "realized prices," the demand and supply curves that are relevant to the determination of money prices are instantaneous curves whose shape and position inevitably embody speculative forecasts and incomplete knowledge of arbitrage opportunities. See Marget (1966, vol. 2, pp. 221-318) for a deep analysis of this issue; also see Salerno (1994, pp. 100-03) for a summary of Marget's analysis.

good it produces. These assumptions ensure that production is costless and the supply curve of each good is perfectly inelastic with respect to its price.

We further assume that the money commodity is permanently fixed in supply and has no use as an input in any production process. The markets for the three commodities run simultaneously on Sunday of every week, when all exchanges are made, and the commodities purchased are then consumed over the course of the week. All markets clear over the course of the market day and there is no false trading. There are no credit transactions; all payments are made in money. Finally, household consumption and liquidity preferences, resource endowments, and technical knowledge are liable to change from week to week resulting in uncertainty regarding future commodity prices and the purchasing power of money.

Figure 1



In the initial equilibrium position of our simple economy, determined by the intersection of demand and supply curves D_1 and S_1 respectively in the goods' markets and MD_1 and MS_1 in the market for cash balances:

P_A = \$15.00; Q_A = 2 units

P_B = \$5.00; Q_B = 10 units

P_C = \$2.00; Q_C = 20 units

MS = \$200

And therefore:

$$MD_E = (\$15 \times 2) + (\$5 \times 10) + (\$2 \times 20) = \$30 + \$50 + \$40 = \$120.$$

This represents the total amount of money demanded by household-producers in exchange for commodities each week.

Subtracting the exchange demand from the existing money stock yields:

$$MD_R = MS - MD_E = \$200 - \$120 = \$80.$$

This is the total amount of money that households reserve in cash balances each week.[6]

Thus Rothbard's Equation is satisfied, the entire stock of money is demanded in exchange or reserved in cash balances and the money market clears along with all commodity markets:

$$MS = MD_E + MD_R \text{ or } \$200 = \$120 + \$80.$$

Now let us assume that there is an increase of productivity in industry A due, e.g., to discovery of more accessible sources of the specific land input, and the supply curve of commodity A shifts out to 4 per week or S_2 and its market-clearing price falls from \$15 to \$10. We further assume that the demand curve for A is elastic over this range of prices and that the total expenditure on A therefore rises. This implies that in the new equilibrium position there must be a net reduction in total expenditure on commodities B and C or a reduction in dollars reserved in cash holdings or a combination of both.

On the market for money, the increase in the overall stock of goods offered in exchange at the initially existing money prices represents an increase in the exchange demand for money, causing the total demand curve for money to shift to the right to MD_2 and a temporary excess demand for money to develop equal to \$30, the current total price of the two additional units of A. Given the

[6]A positive reservation demand for cash balances is motivated by general uncertainty associated with the possibility of exogenous changes in the data, i.e., technological advances that increase goods or result in the availability of new ones, organizational innovations, changing availabilities of original resources, autonomous changes in consumer tastes and preferences including time preferences, all of which result in unforeseeable alterations in money prices, incomes and wealth.

fixed supply of money, the purchasing power of money (PPM) must rise, i.e., commodity prices must fall, to accommodate the increased total demand.

In our example, the demands for B and C both decline to D_2 on the relevant market. Note also that, as the PPM rises, the nominal quantity of dollars reserved in cash balances is decreased along the reservation demand curve (MD_R) from \$80 to \$77, and the release of these dollars moderates the fall in money prices. This latter effect permits total spending on commodities, that is, the exchange demand for money, to increase from \$120 to \$123.

The new overall market equilibrium is as follows:

P_A = \$10.00; Q_A = 4 units

P_B = \$4.50; Q_B = 10 units

P_C = \$1.90; Q_C = 20 units

MS = \$200

And therefore:

MD_E = (\$10 x 4) + (\$4.50 x 10) + (\$1.90 x 20) = \$40 + \$45 + \$38 = \$123 (the total amount of money demanded by household-producers in exchange for commodities each week) and

MD_R = MS - MD_E = \$200 – \$123 = \$77 (the total amount of money households reserved in cash balances each week)

Thus Rothbard's Equation is once again satisfied and the money market clears along with all commodity markets:

MS = MD_E + MD_R (= \$200 = \$123 + \$77)

Interestingly, although the reservation demand for money has fallen in nominal terms, as pointed out above, it has increased in terms of all three commodities, i.e., in real terms, as shown by the calculations below:

Equilibrium 1	Equilibrium 2
MD_R/P_A = \$80/\$15/A = 5.33A	MD_R/P_A = \$77/\$10/A = 7A
MD_R/P_B = \$80/\$5/B = 16B	MD_R/P_B = \$77/\$4.50/B = 17.11B
MD_R/P_C = \$80/\$2/C = 40C	MD_R/P_C = \$77/\$1.90/C = 40.53C

Since the nominal money supply has remained fixed at \$200, these calculations imply that the total real money supply in the economy has increased. Thus, in our example, real cash balances and commodity A are complements, while commodities A and B and A and C are substitutes. The example could easily have been constructed to show different patterns of relationships between A and the other commodities and real cash balances while still satisfying Rothbard's Equation. We could have assumed, for example, that the range of the demand curve for A from 2 to 4 units was inelastic, resulting in a decreased

expenditure on A and an increased demand and price for B while the demands for C and cash balances remained unchanged. In this case A and B would be complements, the cross price elasticity between A and C would equal zero, and the nominal reservation demand for cash balances would be unaffected.

The analytical framework provided by Rothbard's Equation makes clear that the own price and cross price elasticities of demand for and between the various commodities and money are not exogenous and objective determinants of market outcomes but are themselves the product of the interaction of subjective value scales that constitute the dynamic market process. This allows us to finally recognize precisely where the strict marginal utility foundations of Austro-Wicksteedian theory of supply and demand clash with the Hicksian-neoclassical theory based on income and substitution effects. In our original example, the raw fact is that there appear on the market 2 more units of good A. The structure of people's value scales determines that the demand curve for A is elastic below the former equilibrium price resulting in a greater expenditure on A and less on B and C and fewer dollars reserved in cash balances. Had value scales of market participants been structured differently so that the marginal utilities of additional units of A had declined more rapidly relative to those of B, C, and money balances, then the new equilibrium price of A might have settled at $2 per unit. In this case, total spending on A would have dropped dramatically from $30 to $8 (rather than increasing to $40) and the outcomes on the other markets would have been radically different. Any attempt to decompose the changes on these various markets into "substitution" and "income" effects are meaningless and irrelevant to our understanding of how the market process determines actual money prices. Prices at any moment are determined by the existing stocks of the various goods and money and existing value scales of buyers and sellers (which incorporate available though imperfect knowledge and speculative and fallible anticipations of future market conditions).

Lastly, we note that at the end of the market day there prevails in the market equilibrium in the sense that a different pattern of allocation of the *existing* stocks of commodities and money would not be mutually beneficial to any pair of market participants. This Mengerian exchange equilibrium is a real state of affairs that comes into being again and again in particular markets. This state was referred to as "momentary equilibrium" by Böhm-Bawerk (1973, p. 133) and "the plain state of rest" by Mises (1998, p. 245).[7] The analysis

[7]Menger was perhaps the first to recognize exchange equilibrium or "rest" as a real condition of the market, writing:

> [W]e therefore observe the phenomenon of a perpetual succession of exchange transactions. But even in this chain of transactions we can, by observing closely, find *points of rest* at particular times, for particular persons, and with particular kinds of goods. At these *points of rest*, no exchange of goods takes place because an economic limit to exchange has already been reached. (1976, p. 188; emphases added)

based on Rothbard's Equation thus reveals that the concept of the plain state of rest is a recurrent condition that punctuates the pricing process in the overall market.[8]

4. From the Simple Model to the Real World

For purposes of pedagogical clarity, we have formulated the analytical framework of Rothbard's Equation in the context of an extremely simplified model. We can now drop the model's restrictive assumptions and show that the analysis applies to the real-world pricing process in a market economy with continuous markets for a multitude of consumer goods, factor services, capital assets and credit instruments. At any moment in time, there are buyers and sellers consummating exchanges across all markets in the economy. As noted above, the pattern of prices and quantities that define the momentary exchange equilibria in these markets are rigidly governed by Rothbard's Equation. That is, at any moment, the total stock of money in the economy must equal the exchange demand for money, or the total money expenditure on all goods, plus the reservation demand for money or the portion of his money assets that everyone retains in his cash balance rather than exchanges on the market. Moreover, since at a given point in time on the market there is always a stock of previously produced goods in inventory and ready for sale, the assumption of costless production in our model may be dispensed with without altering our analytical conclusions. (We will deal with the assumption of a vertical market-day supply curve below.)

For instance, on October 31, 2005, the total money supply as defined by M2 was $6,631 billion (Federal Reserve Bank of St. Louis 2005, p. 15). Assuming for the sake of argument that this aggregate correctly identifies the stock of money in the U.S. economy, if $500 billion of transactions took place between 1:00 pm and 1:05 pm that day, then the stock of money retained in cash balances was 6,131 billion (= $6,631 billion minus $500 billion). The prices paid times the quantities exchanged in all markets sum to $500 billion thus satisfying Rothbard's Equation. Note that this equation is not a mere tautological accounting identity that somehow exogenously constrains prices and quantities in market transactions. Rather it is the product of the moment-to-moment interaction of subjective rankings of goods and money on individual value scales in the unitary market process that coordinates all elements of supply and demand.

---

[8]Of course, in the real-world economy with continuous and costly production, this state of rest is ephemeral not merely because of recurring exogenous changes in the data, but because the pattern of prices it defines invariably results in profits and losses, which in turn unleash forces of endogenous change that reshape the supply and demand schedules that will emerge in the future.

If we suppose that, during this historical interval, the marginal utilities of cash balances ranked lower on people's value scales because of, for example, a general fear of an imminent rise in the inflation rate, then, all other things equal, the reservation and therefore the total demand for money would have been lower. Total spending on goods would have been higher, say $800 billion instead of $500 billion, as people disgorged an additional $300 billion from cash balances during that five minute period and caused a higher level of overall prices. At a lower PPM, the exchange demand for money would thus have been higher—*in a quantity and not a schedule sense*[9]—and exactly equal to $800 billion since it is the obverse of total spending on goods. Rothbard's Equation would be satisfied as the $300 billion decline in the reserved money supply corresponded to an upward shift in the demand schedules in commodity markets that raised market-clearing prices and expanded the exchange demand for money by precisely the amount of the actual transfer of newly released cash balances necessary to pay these higher prices.

Of course the foregoing example does not imply that the full adjustment of commodity prices to a change in the demand for money occurs immediately. Rather it is meant to lead us to conceive of the monetary adjustment process as a sequence of momentary states of rest that, *ceteris paribus*, will reach a final state of rest only after a definite lapse of time in which all prices and incomes have been affected.[10] It is important to reiterate, however, that every succeeding step of the adjustment process following the initial step discussed above is defined by a specific pattern of commodity prices and quantities and money transfers and holdings that culminates in an exchange equilibrium and is fully described by Rothbard's Equation.

Let us now examine the effect on our analysis of dropping the other main assumptions of our simple model. Introducing capitalist ownership of production processes and corresponding markets for both original (land and labor) and intermediate (capital goods) factors would increase the exchange demand for money as laborers and land owners supply their factor services in exchange for money rents. Likewise, in a structure of production consisting of multiple stages, the capitalist-producers of intermediate goods will exert a positive influence on the exchange demand for money as they sell or rent their assets to capitalists in immediately lower stages.[11] Capitalist-entrepreneurs

---

[9]As illustrated in our simple model, Rothbard's Equation implies that an increase in the exchange demand *schedule* for money occurs only as a result of the increase in the total stock of goods available net of the reservation demand for goods and results in a *decrease* of overall prices.

[10]For the classic exposition of the monetary adjustment process, see Hayek (1971, pp. 17–25). Salerno (1994, pp. 96–106) delineates the monetary adjustment process in terms of plain and final states of rest.

[11]On the effect on the exchange demand for money of a transition to a more "capitalistic" structure of production see, Hayek (1967, pp. 53–54, 66–68) and Rothbard (1993, pp. 478–79, 891–92 n. 11, 12).

will also reserve some of their money earnings in cash balance for business uses due to the unavoidably uncertain nature of production for the market, especially uncertainty regarding the amount and timing of their monetary revenues and expenditures. This will raise the overall reservation demand for money.

What about our assumption of the vertical market supply curve for all goods? In reality, producers and other owners (e.g., wholesalers, retailers, second-hand dealers, etc.) of more or less durable goods generally exercise a short-run speculative inventory or reservation demand for their own products, most commonly by setting minimum reservation prices.[12] This means that a portion of the total stock of goods that are technologically finished and ready for sale or rent at any moment to lower-order capitalists or consumers may be retained in inventory and therefore does not have an effect on the exchange demand for money. Using Wicksteedian analysis of the goods-side of the economy, this reservation demand for a given good raises the total demand curve along the vertical total stock curve of the good, thereby increasing its price.[13] Economy-wide, the phenomenon of inventory demand by owners of existing goods tends to lower the exchange demand for money and exert upward pressure on overall prices. Thus, as Rothbard (1993, p. 713) reminds us, "The exchange demand for money equals the total stock of all goods minus the reservation demand for all goods."[14]

Jettisoning the assumption of the absence of credit transactions leads to a decrease in the reservation demand for money. With ready access to credit markets provided, e.g., by credit cards and overdraft facilities, households and businesses need to retain less of their income in cash balances to meet both anticipated and unforeseen events. Also, highly liquid securities including high-grade debt instruments with a short maturity function as what Rothbard (1993, p. 723) calls "quasi money" that permit their owners to economize on the holding of cash balances. The emergence and growth of a credit market thus results in a decline in the PPM and a corresponding increase in overall spending on goods and services per period. The higher total expenditure on goods resulting from the increase in prices constitutes a greater exchange demand for money whose total when summed together with the reduced reservation demand will equal the total money supply.

---

[12]In the case of labor, the reservation demand may also, or even mainly, be driven by considerations of leisure which, contrary to the assumption of our model, is in the real world desired as a consumer's good.

[13]Wicksteed's total demand-stock analysis of price determination can be found in: Wicksteed (1967, vol. 1, pp. 213–38; vol. 2, pp. 493–526, 784–88); Boulding (1941, pp. 52–79); and Rothbard (1993, pp. 118–40).

[14]Strictly speaking, the exchange demand for money is calculated by summing up the series of products of the price of each good multiplied by the amount of the existing stock of that good and then subtracting the sum of the series of products of the price of each good multiplied by the number of units of that good retained in sellers' inventories.

It should be noted that credit transactions themselves, e.g., the sale of a bond for present money, do not directly affect the overall demand for money during the period in which they occur, because they constitute the transfer of money from one person's cash balance to another's so that any effect on the reservation demand for money nets out. The seller of a security accumulates the proceeds of the sale in his cash balance until a later time when he spends it on productive factors or on consumers' goods, while the buyer of a security necessarily reserved the sale price of the security from income earned in an earlier period. Thus there is no net effect on the exchange or reservation demand for money in the current period although the transaction does influence the current rate of interest.

5. Some Implications

The analytical framework based on Rothbard's Equation bears important implications for a number of central issues of macroeconomic theory. Two of the more salient issues will be briefly dealt with in this section.

A. Rothbard's Equation and Say's Law

Rothbard's Equation facilitates a clarification of the precise meaning of Say's Law. The postwar controversy over this law, which involved Oskar Lange and Don Patinkin among other notables, revolved around the conditions under which "absolute prices" (i.e., money prices) as opposed to "relative prices" are determinate.[15] In their classic article summarizing the debate, Becker and Baumol (1960, p. 758) concluded:

> The Cambridge [quantity] equation implies that for every relative price structure there exists a unique absolute price level at which the money market will be in equilibrium (Say's Equality). This is equivalent to stating that for every set of relative prices there exists a price level which brings about *over-all* equilibrium in the commodity markets, i.e., the total quantity of money offered for commodities is equal to the total value of commodities supplied. Thus it is clear that his version of Say's Law is compatible with determinacy of an absolute price level.

The problem with the formulation of Say's Law as Say's Equality is that it relies on a meaningless concept, the absolute price level, and an unnecessary equation (M = kPQ) that effectively dichotomizes the pricing process. As our simple model above indicates, Rothbard's equation is based on an analysis that treats the structure of money prices as the real and elemental outcome of an ongoing pricing process. The pattern of "relative" prices is embedded in

[15]A very clear textbook exposition of the meaning of this controversy for Austrian-oriented macroeconomic analysis can be found in Baird (1981, pp. 63–78). I am indebted to John Egger for bringing this source to my attention.

the constellation of actual money prices and only becomes meaningful as subjective inferences by participants during this process. The supply of and demand for money are thus codeterminants equally with the respective supplies of and demands for commodities of an integrated structure of money prices. A price that exists in absolute isolation from other prices is inconceivable; every price is meaningful only in its relation to all other prices.[16] Money prices are simply pieces of property that are exchanged for other kinds of property and, as such, their purely abstract interrelations are meaningless to human actors. The entrepreneur is guided in his choices by the actual quantities of money he expects to pay out and receive for alternative combinations of goods and never by an immaterial pattern of relative prices. The distinction between absolute and relative prices is redundant at best and grossly misleading at worst. It is completely irrelevant to Say's Law.

Using Becker and Baumol's terminology, let us assume that "the demand for money flow" (or the overall supply of commodities at given prices) exceeds "the supply of money flow" (or the overall demand for commodities at given prices). Expressing this glut in commodity markets in terms of Rothbard's Equation,

$$(P_1 \times Q_1) + (P_2 \times Q_2) + \ldots + (P_N \times Q_N) = MD_E > MS - MD_R,$$

reveals that the total demand for money is greater than the stock of money and thus,

$$MD_E + MD_R > MS.$$

Given that the marginal utilities of money and commodities are intertwined on unitary individual value scales, then, "commodity demand functions" are not "homogeneous of degree zero in prices alone." This means that the demand schedules for individual goods must inevitably be influenced by an "excess demand" for cash balances. Thus any insufficiency of cash balances will manifest instantaneously as a surplus of particular commodities resulting in a fall in commodity prices and a corresponding increase in the purchasing power of money until exchange equilibrium is simultaneously reestablished in the money and commodity markets. This is illustrated in the simple model in section 3 above, where "an increase in the supply of goods

[16]Mises (1998, p. 389):

> It would be absurd to look upon a definite price as if it were an isolated object in itself. A price . . . does not indicate a relationship to something unchanging, but merely the instantaneous position in a kaleidoscopically changing assemblage. In this collection of things considered valuable by the value judgments of acting man each particle's place is interrelated with those of all other particles. What is called a price is always a relationship within an integrated system which is the composite of human valuations.

creates its own demand" by precipitating adjustments in the commodity and money markets that result in the actual flow demand for money (MD_E) being brought into equilibrium with the flow supply of money ($MD_E = MS - MD_R$), while the stock of money and the total demand for money are likewise equilibrated (MS = MD).

B. The Vacuousness of the Quantity Theory

Once we have gained the analytical vantage point of Rothbard's Equation, we can see that the Quantity Theory of Money as expounded in terms of the Quantity Equation gets matters exactly wrong: it is not the flow of spending that determines the price level, given a level of output that is exogenously determined in some separate and mysterious real process. Rather the money prices and quantities of goods exchanged, which are codetermined in the overall market process, are the causal determinants of the spending flow. This bears elaboration.

Let's begin with the Quantity Equation as conventionally stated: MV = PQ. Our simple model above reveals that the real action is on the right side of the equation. Individuals' utility rankings of money and the various kinds of commodities give rise to schedules of monetary bids and offers in commodity markets. The interaction of these momentary supply and demand schedules determines a system of money prices and, simultaneously, the value of the monetary unit, since, as we saw, the latter is nothing more or less then the array of exchange ratios obtained by inverting money prices. The mechanical passing of a specific sum of money from one hand to the next in exchange, that is, "spending," is completely governed by the money price that has been antecedently established by the exchanging parties. Thus the money spent is merely an outcome of the pricing process and in no sense a causal factor. In other words, the aggregate flow of money spending is determined by the value of money and not the other way around.

The argument may be restated mathematically. Let P represent a vector whose elements, the lower case p's, are the money prices of all goods in the economy, and let Q represent a vector whose elements, the lower case q's, consist of the simultaneously determined quantities of goods exchanged at each of those prices. The multiplication of these two vectors yields an inner product. This product is equal to the total money spent by all buyers and received as income by all sellers in the economy during a given period of time.[17] As noted above, the total amount of money spent cannot be said to be a causal influence on the value of money, because the latter is already completely

[17]Although contemporary monetary theorists interpret P as some kind of statistical construct, the influential forerunner of modern monetarism Clark Warburton (1966, pp. 106-07) defined the right side of the equation similarly to Rothbard as "the summation of a series of arithmetic products obtained by multiplying the price of each type of product by the quantity sold at that price."

embedded in the structure of money prices, i.e., the elements of P, which were previously determined in exchanges on goods' markets. Now, we may, if we like, divide total spending, the inner product PQ, by the existing stock of money, M, and label the resulting quotient "V." Then, by transposing the terms of our equation, we will have MV = PQ. But this will not alter the fact that the variations of the product on the left side of the equation, MV, are never independent of changes originating in the price and quantity vectors. More fundamentally, MV is not even knowable until these vectors have been determined.

Note carefully that this does not mean that the quantity of money is "endogenous" or that it is irrelevant to the pricing process. To the contrary, as Rothbard's Equation has made clear, *the stock of money is one of the immediate determinants of the structure of money prices and the purchasing power of money*—in conjunction with its immediately past purchasing power, the existing stocks of goods, and the distribution of ownership and the relative rankings of goods and of money among market participants. In other words, the effect of a change in the stock of money on its purchasing power is direct and unmediated by a change in spending, because valuing and pricing are the logical and temporal antecedents of spending. Thus, any reference to a specific magnitude of total spending without first having specified the value of money is completely vacuous.

This argument can be illustrated with two examples. First assume that there occurs an increase in the stock of money. All other things equal, this will lower its marginal utility relative to the marginal utilities of goods on the value scales of the immediate recipients of the new money. The immediate result will be a shift to the right in demand curves and a corresponding rise in money prices on goods markets.[18] Now, by definition, this depreciation of the money unit means that a greater amount of money than before will be given in exchange for particular goods. We may express this fact by saying that total

[18]Perhaps it is better to say "rise," instead of "shift to the right," in demand curves, because this older terminology directs attention to the correct causal chain linking the increase in money to increased spending. On the individual level, the rise in his demand curve for a particular good reflects the fact that the individual is now prepared to offer greater sums of money than previously for each successive unit of the good. *Ceteris paribus*, the increased monetary bids for the good by those experiencing a rising demand for it will result in a higher market price and this, in turn, will cause greater aggregate spending by all who wish to obtain units of the good. On the other hand, "a shift to the right in the demand curve" is often misinterpreted to mean that it is the increased spending on the good at the previous equilibrium price that "drives" its price up. Earlier Mengerian price theorists employed the terminology of rising and falling demand (and supply) curves. See, for example, Frank A. Fetter (1937, p. 492) and Herbert J. Davenport (1968, p. 49). Even as late as 1959, Henry Hazlitt (1959, p. 271) clung to the terminology of rising and falling demand curves in preference to "the fashionable technical jargon, 'moved to the right' or 'to the left'."

spending has increased, but it remains a trivial implication of the general rise of money prices, which, in turn, was directly caused by the lowered marginal utilities for money.[19]

The second example that undermines the quantity theorists' emphasis on spending as the proximate cause of fluctuations in the value of money is the case of a large redistribution of cash balances between groups in the economy, let us say laborers and capitalist-entrepreneurs, which leaves the overall demand for money unchanged. Assume laborers place higher valuations on money and choose to build up their cash balances by restricting their demands for goods, while capitalist-entrepreneurs seek to run down theirs by increasing reservation demand for their own products. These changed dispositions would be manifested in a sharp leftward shift of supply and demand curves on all goods' markets. Assuming that both supply and demand are reduced proportionally in each market, the final outcome would be a sharp decrease in the number of exchanges with no alteration in the value of money. In Rothbard's Equation this would be expressed as a reduction in the exchange demand for money on the part of business firms that is simultaneously and exactly offset by an increase in the reservation demand for money by households. The *outcome* would be that less money changed hands or was "spent" during the market day.

In terms of the Quantity Equation, all elements of Q would decline precipitously while the elements of P remained unchanged, causing a severe constriction of total spending or MV. Now, presumably, quantity theorists would respond that a fall in spending does not affect the value of money if real output declines proportionally. But this is beside the point. For in this example real output did not change at all. Q declined because there was a revolution of the relative positions of money and goods on various individuals' value scales that was expressed in a reduction of the number of monetary transactions. The fall in Q implies, but was not caused by, the fall in spending.

---

[19]Although he wrote little on money, Eugen von Böhm-Bawerk (2005, pp. 136–37, 143, 145, 153–54) was one of the first to emphasize that the "subjective value of the medium of exchange" for buyers and for sellers were two of the direct determinants of money prices and that aggregate spending was an outcome of the pricing process. Böhm-Bawerk (2005, p. 145) wrote, for example,

> At such moments [of crisis], [sellers] place especially high value on the medium of exchange, money, and for that reason are compelled to reconcile themselves to accepting small amounts of money for the goods they offer for sale. Herein lies part of the explanation of inordinately low prices at forced sales or in economic crises.

For an enlightening treatment of Böhm-Bawerk's remarks on the determination of money prices, see Greidanus (1932, pp. 137–44).

6. Conclusion

The goal of this paper is not to present a comprehensive restatement of the theory of money prices as it developed in the Austrian tradition from Menger to Mises and Rothbard. Rather it is to formulate a heuristic device that facilitates a concise delineation of the theory's main points and helps in illustrating a few of its major implications. This endeavor is crucial to disseminating the theory to a broader audience and stimulating further interest in refining and advancing it.

References

Baird, Charles W. 1981. *Elements of Macroeconomics*. 2nd ed. New York: West Publishing.

Becker, Gary S., and William J. Baumol. [1952] 1960. In *Essays in Economic Thought: Aristotle to Marshall*. Joseph J. Spengler and William R. Allen, eds. Chicago: Rand McNally. Pp. 753–71.

Böhm-Bawerk, Eugen von. 2005. *Basic Principles of Economic Value*. Hans F. Sennholz, trans. Grove City, Penn.: Libertarian Press.

——. 1973. *Value and Price: An Abstract*. 2nd ed. George D. Huncke, trans. Grove City, Penn.: Libertarian Press.

Boulding, Kenneth E. 1941. *Economic Analysis*. New York: Harper and Brothers.

Davenport, Herbert J. [1913] 1968. *The Economics of Enterprise*. New York: Augustus M. Kelley.

Federal Reserve Bank of St. Louis. 2005. *U.S. Financial Data* (November 10, 2005). Available at research.stlouisfed.org.

Greidanus, Tjardus. 1932. *The Value of Money: A Discussion of Various Monetary Theories, and an Exposition of the Yield Theory of the Value of Money*. London: P.S. King and Son.

Fetter Frank A. 1937. "Markets and Prices." In *Economic Principles and Problems*, 3rd ed. Vol. I. Walter E. Spahr, ed. New York: Farrar and Rinehart. Pp. 478–502.

Hayek, F.A. [1937] 1971. *Monetary Nationalism and International Stability*. New York: Augustus M. Kelley.

——. [1935] 1967. *Prices and Production*. 2nd ed. New York: Augustus M. Kelley.

Hazlitt, Henry. 1959. *The Failure of the "New Economics": An Analysis of the Keynesian Fallacies*. Princeton, N.J.: D. Van Nostrand.

Marget, Arthur W. [1938–42] 1966. *The Theory of Prices: A Re-Examination of the Central Problems of Monetary Theory*. 2 vols. New York: Augustus M. Kelley.

Mason, Will. 1963. *Clarification of the Monetary Standard: The Concept and Its Relations to Monetary Policies and Objectives*. University Park, Penn.: Pennsylvania State University Press.

Menger, Carl. 1976. *Principles of Economics*. James Dingwall and Bert F. Hoselitz, trans. New York: New York University Press.

Mises, Ludwig von. 1998. *Human Action: A Treatise on Economics*. Scholar's Edition. Auburn, Ala.: Ludwig von Mises Institute.

——. 1981. *The Theory of Money and Credit*. 3rd ed. H.E. Batson, trans. Indianapolis, Ind.: Liberty Classics.

Rothbard, Murray N. [1962] 1993. *Man, Economy, and State: A Treatise on Economic Principles*. Auburn, Ala.: Ludwig von Mises Institute.

Salerno, Joseph T. 1994. "Ludwig von Mises's Monetary Theory in Light of Modern Monetary Thought." *Review of Austrian Economics* 8 (1): 71–115.

Warburton, Clark. 1966. *Depression, Inflation, and Monetary Policy: Selected Papers, 1945–1953*. Baltimore: The Johns Hopkins Press.

Wicksteed, Philip H. [1932] 1967. *The Common Sense of Political Economy and Selected Papers and Reviews on Economic Theory*. 2 vols. Lionel Robbins, ed. New York: Augustus M. Kelley.