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international commodity standard, by the monetary authorities, under a fiduciary standard; (2) the ratio of bank deposits to bank holdings of high-powered money—this is determined by the banking system subject to whatever requirements are imposed on them by law or the monetary authorities; and (3) the ratio of the public's deposits to its currency holdings—this is determined by the public (Friedman and Schwartz 1963*b*, pp. 776–98; Cagan 1965).

#### 4. The Demand for Money

J. M. Keynes's liquidity preference analysis (discussed further in section 5, below) reinforced the shift of emphasis from the transactions version of the quantity equation to the cash-balances version—a shift of emphasis from mechanical aspects of the payments process to the qualities of money as an asset. Keynes's analysis, though strictly in the Cambridge cash-balances tradition, was much more explicit in stressing the role of money as one among many assets, and of interest rates as the relevant cost of holding money.

More recent work has gone still further in this direction, treating the demand for money as part of capital or wealth theory, concerned with the composition of the balance sheet or portfolio of assets.

From this point of view, it is important to distinguish between ultimate wealth holders, to whom money is one form in which they choose to hold their wealth, and enterprises, to whom money is a producer's good like machinery or inventories (Friedman 1956).

##### *a) Demand by Ultimate Wealth Holders*

For ultimate wealth holders, the demand for money, in real terms, may be expected to be a function primarily of the following variables:

i) *Total wealth.*—This is the analogue of the budget constraint in the usual theory of consumer choice. It is the total that must be divided among various forms of assets. In practice, estimates of total wealth are seldom available. Instead, income may serve as an index of wealth. However, it should be recognized that income as measured by statisticians may be a defective index of wealth because it is subject to erratic year-to-year fluctuations, and a longer-term concept, like the concept of permanent income developed in connection with the theory of consumption, may be more useful (Friedman 1957, 1959; Brunner and Meltzer 1963; Meltzer 1963).

The emphasis on income as a surrogate for wealth, rather than as a measure of the "work" to be done by money, is conceptually perhaps the basic difference between more recent work and the earlier versions of the quantity theory.

ii) *The division of wealth between human and nonhuman forms.*—The major asset of most wealth holders is their personal earning capacity, but the conversion of human into nonhuman wealth or the reverse is subject to narrow limits because of institutional constraints. It can be done by using current earnings to purchase nonhuman wealth or by using nonhuman wealth to finance the acquisition of skills but not by purchase or sale and to only a limited extent by borrowing on the collateral of earning power. Hence, the fraction of total wealth that is in the form of nonhuman wealth may be an additional important variable.

iii) *The expected rates of return on money and other assets.*—This is the analogue of the prices of a commodity and its substitutes and complements in the usual theory of consumer demand. The nominal rate of return on money may be zero, as it generally is on currency, or negative, as it sometimes is on demand deposits subject to net service charges, or positive, as it sometimes is on demand deposits on which interest is paid and generally is on time deposits. The nominal rate of return on other assets consists of two parts: first, any currently paid yield or cost, such as interest on bonds, dividends on equities, and storage costs on physical assets, and, second, changes in their nominal prices. The second part will, of course, be especially important under conditions of inflation or deflation.

iv) *Other variables determining the utility attached to the services rendered by money relative to those rendered by other assets—in Keynesian terminology, determining the value attached to liquidity proper.*—One such variable may be one already considered—namely, real wealth or income, since the services rendered by money may, in principle, be regarded by wealth holders as a "necessity," like bread, the consumption of which increases less than in proportion to any increase in income, or as a "luxury," like recreation, the consumption of which increases more than in proportion.

Another variable that is likely to be important empirically is the degree of economic stability expected to prevail in the future. Wealth holders are likely to attach considerably more value to liquidity when they expect economic conditions to be unstable than when they expect them to be highly stable. This variable is likely to be difficult to express quantitatively even though the direction of change may be clear from

qualitative information. For example, the outbreak of war clearly produces expectations of instability, which is one reason why war is often accompanied by a notable increase in real balances—that is, a notable decline in velocity.

Still another variable may be the volume of capital transfers relative to income—of trading in existing capital goods by ultimate wealth holders. The higher the turnover of capital assets, the higher the fraction of total assets people may find it useful to hold as cash. This variable corresponds to the class of transactions neglected in going from the transactions version of the quantity equation to the income version.

We can symbolize this analysis in terms of the following demand function for money for an individual wealth holder:

$$\frac{M}{P} = f\left(y, w; r_m, r_b, r_e, \frac{1}{P} \frac{dP}{dt}; u\right), \quad (7)$$

where  $M$ ,  $P$ , and  $y$  have the same meaning as in equation (6) except that they relate to a single wealth holder;  $w$  is the fraction of wealth in nonhuman form (or, alternatively, the fraction of income derived from property);  $r_m$  is the expected nominal rate of return on money;  $r_b$  is the expected nominal rate of return on fixed-value securities, including expected changes in their prices;  $r_e$  is the expected nominal rate of return on equities, including expected changes in their prices;  $(1/P)(dP/dt)$  is the expected rate of change of prices of goods and hence the expected nominal rate of return on real assets; and  $u$  is a portmanteau symbol standing for whatever variables other than income may affect the utility attached to the services of money. Each of the four rates of return stands, of course, for a set of rates of return, and for some purposes it may be important to classify assets still more finely—for example, to distinguish currency from deposits, long-term from short-term fixed-value securities, risky from relatively safe equities, and one kind of physical assets from another.<sup>4</sup>

The usual problems of aggregation arise in passing from equation (7) to a corresponding equation for the economy as a whole—in particular, they arise from the possibility that the amount of money demanded may depend on the distribution among individuals of such variables as  $y$  and  $w$  and not merely on their aggregate or average value. If we neglect these distributional effects, equation (7) can be

<sup>4</sup> Under some assumed conditions, the four rates of return may not be independent. For example, in a special case considered in Friedman (1956, pp. 9–10),

$$r_b = r_e + (1/P)(dP/dt).$$

regarded as applying to the community as a whole, with  $M$  and  $y$  referring to per capita money holdings and per capita real income, respectively, and  $w$  to the fraction of aggregate wealth in nonhuman form.

The major problems that arise in practice in applying equation (7) are the precise definitions of  $y$  and  $w$ , the estimation of *expected* rates of return as contrasted with actual rates of return, and the quantitative specification of the variables designated by  $u$ .

b) *Demand by Business Enterprises*

Business enterprises are not subject to a constraint comparable with that imposed by the total wealth of the ultimate wealth holder. The total amount of capital embodied in productive assets, including money, is a variable that can be determined by an enterprise to maximize returns, since it can acquire additional capital through the capital market. Hence, there is no reason on this ground to include total wealth, or  $y$  as a surrogate for total wealth, as a variable in the business demand function for money.

It may, however, be desirable to include a somewhat similar variable defining the "scale" of the enterprise on different grounds—namely, as an index of the productive value of different quantities of money to the enterprise. This is more nearly in line with the earlier transactions approach emphasizing the "work" to be done by money. It is by no means clear what the appropriate variable is: total transactions, net value added, net income, total capital in nonmoney form, or net worth. The lack of availability of data has meant that much less empirical work has been done on the business demand for money than on an aggregate demand curve encompassing both ultimate wealth holders and business enterprises. As a result there are as yet only faint indications about the best variable to use.

The division of wealth between human and nonhuman form has no special relevance to business enterprises, since they are likely to buy the services of both forms on the market.

Rates of return on money and on alternative assets are, of course, highly relevant to business enterprises. These rates determine the net cost to them of holding the money balances. However, the particular rates that are relevant may be quite different from those that are relevant for ultimate wealth holders. For example, rates charged by banks on loans are of minor importance for wealth holders yet may be extremely important for businesses, since bank loans may be a way in which they can acquire the capital embodied in money balances.

The counterpart for business enterprises of the variable  $u$  in equation

(7) is the set of variables other than scale affecting the productivity of money balances. At least one of these—namely, expectations about economic stability—is likely to be common to business enterprises and ultimate wealth holders.

With these interpretations of the variables, equation (7), with  $w$  excluded, can be regarded as symbolizing the business demand for money and, as it stands, symbolizing aggregate demand for money, although with even more serious qualifications about the ambiguities introduced by aggregation.

### 5. The Keynesian Challenge to the Quantity Theory

The income-expenditure analysis developed by John Maynard Keynes in his *General Theory* (Keynes 1936) offered an alternative approach to the interpretation of changes in nominal income that emphasized the relation between nominal income and investment or autonomous expenditures rather than the relation between money income and the stock of money.

Keynes's basic challenge to the reigning theory can be summarized in three propositions that he set forth:

1. As a purely *theoretical* matter, there need not exist, even if all prices are flexible, a *long-run equilibrium* position characterized by "full employment" of resources.
2. As an *empirical* matter, prices can be regarded as rigid—an institutional datum—for *short-run economic fluctuations*; that is, for such fluctuations, the distinction between real and nominal magnitudes that is at the heart of the quantity theory is of no importance.
3. The demand function for money has a particular empirical form—corresponding to absolute liquidity preference—that makes velocity highly unstable much of the time, so that changes in the quantity of money would, in the main, simply produce changes in  $V$  in the opposite direction. This proposition is critical for both propositions (1) and (2), though the reasons for absolute liquidity preference are different in the long run and in the short run. Absolute liquidity preference at an interest rate approaching zero is a necessary though not a sufficient condition for proposition (1). Absolute liquidity preference at the "conventional" interest rate explains why Keynes regarded the quantity equation, though perfectly valid as an identity, as largely useless for policy or for predicting short-run fluctuations in nominal and real income (identical by proposition [2]). In its place, Keynes put the income identity supplemented by a stable propensity to consume.