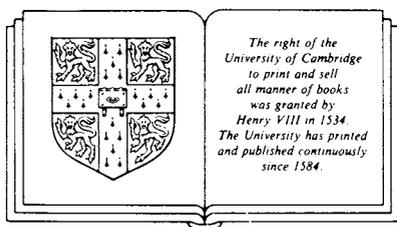


Money capital in the theory of the firm

A preliminary analysis

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The firm in a monetary economy

Time, uncertainty, and money form an analytical triad that economic theory, if it aspires to realism and relevance, must take seriously into account. The historic, unidirectional flow of time carries with it the inescapable reality of uncertainty and the ignorance in which we are bound. Our analytical constructions that aim to explain the world must confront the influence, the ineluctabilities, with which the passing of time presses on our experience and understanding. Knowledge, it has been said, cannot be gained before its time (Lachmann, 1959, p. 73). Alfred Marshall, the architect of English neoclassical economics, cautioned that “we cannot foresee the future perfectly. The unexpected may happen” (1920, p. 347), and he pointed to the difficulties that arise, as a result, for economic decisions and action. Keynes’s observation, when contemplating the impact of the future on economic behavior, that “we simply do not know” (1937, p. 185), recalls his well-known indictment of the classical economics and its attempt to evade the future by a probabilistic reductionism.

Many issues in the theory of the firm are brought into focus by these considerations. Terence Hutchison, whose work has provided luminous perspectives on economic thought, has seen these issues laced together in their interdependence. Noting that “uncertainty is present . . . in principle . . . with any piece of conduct in this world” (1960, p. 86), Hutchison observed with reference to the classical analysis based on its “Fundamental Assumption” of maximization that “the only way to make sense of most formulations of the Fundamental Assumption is to add the assumption of ‘perfect expectations’ ” (p. 105). But perfect expectations, we shall argue at length, evade the real questions that claim our analytical attention.

If, in fact, uncertainty in economics could be escaped by allowing the assumption of perfect expectations to abolish the future, we would abolish also the third element of our analytical triad. There would in that case be no need for money. For there would then be no function for money to perform. Money, we shall see, is a time-and-uncertainty phenomenon. “An analysis of a world with any uncertainty in it,” Hutchison has argued, “and particularly an analysis which takes into account the factor of money (which can be construed as a sign that uncertainty is present . . .), cannot start from the same assumption of ‘sensible’ or ‘rational’ conduct as that applicable in a world without uncer-

tainty, with which, consciously and explicitly or not, the bulk of pure economic theory from Ricardo onwards appears to have been concerned” (1960, p. 88). Moreover, “the assumption of a tendency towards equilibrium implies, on the usual definition, the assumption of a tendency towards perfect expectations . . . and the disappearance of money” (1960, p. 107).

But the issues of time, uncertainty, and money have not adequately informed the theory of the firm in its received traditions. Notwithstanding the achievements of the Robinsonian–Chamberlinian revolution of the 1930s, the theory of the firm quickly accommodated to the timeless, static, competitive assumptions of the Walrasian equilibrium analysis (Robinson, 1969; Chamberlin, 1933).¹ A slightly fuller, but at this stage intentionally incomplete, consideration of some aspects of these questions will provide a basis for the argument of the following chapters.

Time

The theoretical problem of time is highlighted by the briefest look at the history of our subject. Marshall had insisted, at the high tide of neoclassicism, on “the great importance of the element of time . . . the source of many of the greatest difficulties in economics” (1920, pp. 347, 109). But his theory of the representative, or “average,” firm, though it was introduced in a context that took account of the evolution and decline of actual firms, served, as did Pigou’s notion of the optimum or equilibrium size of the firm, as an intellectual construct designed to accommodate the realities of historic time to what was to become a timeless and static theory (see Robinson, 1969, pp. v–vi). Marshall had, of course, proposed the notion of economic equilibrium as analogous to “the mechanical equilibrium of a stone hanging by an elastic string, or of a number of balls resting against one another in a basin” (1920, p. 323), and he spoke of “equilibrium price” and “equilibrium amount” as these described possible market outcomes (p. 345). He went a good distance in accommodating his argument to the reality of the actual time span in which economic events transpired, and his conception of the short-run and the long-run period has become a familiar part of the analytical economist’s tool kit (1920, p. 369f.).

But Marshall hoped that all of his arguments about equilibrium, along with his use of biological and mechanical analogies and “all suggestions as to economic rest,” could be seen as “merely provisional, used only to illustrate

¹ Advances beyond the earlier static equilibrium theory, in the direction of intertemporal analyses, sequence models, and temporary equilibrium, can be inspected in Weintraub (1979). Weintraub observes, however, that while “the path through [Walrasian] disequilibrium theory requires one to step through analytic time . . . ‘real time’ adjustment is badly handled in all these models” (pp. 125, 127).

particular steps in the argument, and to be thrown aside when that is done” (1920, p. 366). His cautions, however, were substantially ignored. The analogies absorbed the substance in the main body of economic analysis. The Marshallian concern for the real and actual passing of time was transmuted in the 1930s in the manner of Joan Robinson’s influential *Economics of Imperfect Competition*, where she stated, in elevating the equilibrium theoretic tradition, that “the technique set out in this book is a technique for studying equilibrium positions. No reference is made to the effects of the passage of time” (1969, p. 16). She did refer at a later time, in an admirable passage in the second edition of her book, to her “shameless fudge” in having made an “analysis which in reality consists of comparisons of static equilibrium positions . . . dressed up to appear to represent a process going on through time” (p. vi).

Robinson’s pathbreaking work in the theory of the firm, however, still informs the traditional textbook treatments of the subject. She had directed attention away from the pervasive notion of perfect competition in economic analysis to the notion of monopoly, or to the concept of the economic uniqueness of the firm. Commenting on the catalytic significance of Sraffa’s famous article of 1926 (Sraffa, 1926) and dissatisfied with the confusion in theory stemming from “the logical priority of perfect competition,” Robinson observed that “no sooner had Mr. Sraffa released the analysis of monopoly from its uncomfortable pen in a chapter in the middle of the book than it immediately swallowed up the competitive analysis without the smallest effort. The whole scheme of analysis, composed of just the same elements as before, could now be arranged in a perfectly uniform manner, with no awkward cleavage in the middle of the book” (Robinson, 1969, pp. 3–4). John Hicks, whose *Value and Capital* in 1938 (Hicks, 1946) had substantially awakened English economics to the Walrasian general equilibrium theory, has recently reflected on this line of theoretical development by observing: “Why is it that the theory of monopolistic competition, or imperfect competition, to which so much attention was paid in the thirties, now looks so faded? Because it is quite shockingly *out of time*” (1976, p. 149, italics in original).

Walras himself had recognized that time had to come into the picture. Consider the manner in which he specified his models of economic exchange and production. “In *exchange*,” he said, “commodities do not undergo any change. When a price is cried, and the effective demand and offer corresponding to this price are not equal, another price is cried for which there is another corresponding demand and offer. In *production*, productive services are transformed into products. After certain prices for services have been cried and *certain quantities of products have been manufactured*, if those prices and quantities are not the equilibrium prices and quantities, it will be necessary not only to cry new prices *but also to manufacture revised quantities of prod-*

ucts” (1953, p. 242, italics added). In the italicized clauses, the realization of a process and a lapse of time emerges. “Production,” Walras acknowledged, “requires a certain lapse of time.” But the “complication” is immediately assumed away. “We shall resolve the . . . difficulty purely and simply by ignoring the time element at this point” (1953, p. 242). For Walras, there could be, in the economics of exchange, no false trading, or the consummation of transactions at other than equilibrium prices (see Hicks, 1946, p. 128), and in the production model there could be no false production. All bids and offers on all markets, and all tentative decisions, were understood to be notional so long as the search for the equilibrium price and quantity vectors continued, and transactions were effected only at the finally announced equilibrium prices (see Vickers, 1978, p. 14f.).

This structure of thought, from Robinson and Chamberlin through Hicks and the neo-Walrasians, has continued to influence the theory of the firm. It has failed to distinguish between what can be referred to as logical or analytic and real historic time. When the analysis has departed from the earlier assumptions of perfect expectations or certainty or certainty-equivalents, the future has generally been collapsed to the present by probability reduction methods. It has been imagined that although the future is unknown (and unknowable), nevertheless it is possible to assume, for decision purposes, that the future-dated variables in which we are interested can be described by subjectively assigned probability distributions and that the expected values of those variables can be unambiguously discounted to the present. By these methods, both uncertainty and the future are effectively abolished. True residual uncertainties have been metamorphosed to probabilistically reducible risks. We live, it is supposed, in risky conditions. But we know, or can assume that we know, the forms of the probability distributions that describe the possibilities ahead of us. In that strong assumption, we have effectively abolished ignorance. For we know, if that is the case, the general shape of things to come and we are no longer able to be surprised.

Progress is possible, we shall argue, if we recapture the sense of history and of historic time that gave credence to the earlier Marshallian analysis, and which has informed the work of Knight (1933), Keynes (1937), Robinson (1974), Shackle (1969, 1972, 1974, 1983), Hutchison (1937, 1978), Loasby (1976), Davidson (1978), Bausor (1982, 1984), Vickers (1981, 1983), and others. The relevance of time for the theory of the firm calls for analysis for several reasons:

1. The decision maker himself is locked in the process of actual time, with implications for his knowledge possibilities and his economic status and decision potential.

2. Production in the firm takes time, and cash outflows for the purchase of factor services occur before the completion of the firm's output and the inflow of sales revenues.
3. The firm's investment that structures the production process includes durable assets whose economic lives extend over more than a single operating time period.
4. The firm's investment in liquid assets, notably cash and marketable securities, is influenced by the intertemporal price of money or the rate of interest, as well as by the need to provide a refuge from the pressures of uncertainty and ignorance that real time involves.
5. As a means of raising money capital, the firm may borrow in the debt capital sector of the money capital market, and intertemporal valuations determine the cost and availability of such funds.
6. The firm's residual owners, the holders of its equity capital, receive its residual income after the payment of all costs of operation and interest on debt capital, and as the residual risk bearers they are vitally concerned with the intertemporal prospects of the firm and its income-generating ability over time (see Vickers, 1977, 1978, 1981, 1983, 1984, 1985b).

I Real-time choice-decision point

To escape from the timelessness of earlier analysis, the breakthrough to a new logical construction must be made at one specific point. The significance of historic time enters economic analysis because the actual flow of it, and the unknowable expanse of it spread out ahead of us, impinge on the taking of decisions and the making of real-world choices. Historic time is significant because of the way in which it, or more precisely *our imaginative perception of the possibilities inherent in it*, determines what we do in our choice-decision moments and because of the way in which the passing of time qualifies our stance at successive decision points. The individual at his decision points in time does not choose between what exists or between probability distributions of what will exist, as though future possible outcomes are determined by a random generating device that churns out the results of replicable acts and experiments. Rather, choice creates history. Choice is between acts that hold out before them skeins of possible outcomes *constructed in the imagination of the person choosing*, skeins of imagined outcomes that are constrained to what the individual recognizes as possible. Expectations are thus subjective in the sense that they are highly personal and individual *imaginative constructions*, and in a given situation one individual will construct *imagined possibilities of outcomes* that do not occur, and could never have

occurred, to other individuals (see Shackle, 1969, 1979; Vickers, 1986; Littlechild, 1979; O'Driscoll and Rizzo, 1985).

In his decision moment, the individual is perforce ignorant of the future, but he is able to conceive of "imagined possible outcomes" and assign to each of them a degree of "potential surprise." We refer to *potential* surprise because the decision maker can assign to possible future outcomes the degree of surprise he imagines *now* that he would experience *at a future date* if a contemplated event were to occur. He does this, in ways we shall consider more fully, because the decision he confronts is, in the general case, a "unique" decision. It is unique in the sense important for economics that the making of it precludes forever the possibility of its being made, or even contemplable, again. In many areas of economic choice, decisions are what in this sense we call "self-destructive" decisions.

The decision to increase the amount of real capital employed in a firm, for example, along with the raising of money capital to finance that investment, must be regarded as a unique, nonreplicable decision. For the taking of it forever changes the firm from what it would have been if the decision to invest had not been made. Similarly, the annual rate of return on a firm's common stock cannot properly be considered a random variable that can be described by an assigned probability distribution. The firm that generated that rate of return this year was not the same firm, in many economic respects, that it was last year, or two years ago, or five years ago. Firms change their operating and financial structures, their product mix and input use, their market posture and penetration, and their technological orientation. Firms change, grow, decline, and die. The uniqueness of the decision maker's stance at his decision point in historic time, the uniqueness of his inheritance of endowment and environmental structures, and the uniqueness of his knowledge and epistemic status converge to determine the value he places on the actions he conceives to be possible and the choices that, as a result, he makes.

In the flow of time, knowledge is acquired by the decision maker. That knowledge cannot be unlearned in the sense that the individual can revert, after the lapse of time, to what he was and the position he was in, in every relevant epistemological sense, before. In their unfolding in time, successive decisions are, in their character and potential, unique, since situations, knowledge, and imagined possibilities change. We are therefore concerned with "an economics of movement and change, not in the sense of a mathematical dynamic system, in which time itself has been reduced to a serially dated variable, or in which equilibrium dynamic *paths* may simply have replaced equilibrium *states* without any basic reconstruction of the thought forms employed. Rather, I am interested in change in the sense of the next steps that, in more or less well understood situations, individuals might take to their best advantage" (Vickers, 1978, p. 21).

2 *Production time period*

The fact that production takes time raises the problem of financing the production process for the period between the hiring of factor inputs and the sale of their product output. The firm accordingly faces a cash flow problem, and this implies the need to obtain money capital in the required amounts and at a satisfactory cost. The firm's production process and product mix, along with its policies on marketing and market penetration, generate a demand for money. Its optimum holding of cash depends on the rate of interest or, as we have referred to it, the intertemporal valuation of money. This is so because the debt incurred in raising the money capital to finance the firm's asset investment will have to be repaid at a later time, and the rate of interest associated with it will depend on the spectrum of money market opportunity costs of making that money capital available.

We shall keep in mind, however, not simply, or even mainly, the firm's demand for money as such. In order to sustain its operations at any desired level and structure, the firm will need to maintain an asset mix that is itself, in some sense, optimal. Among its assets, the amount that is held as money, or the proportion of the money capital available to the firm that is invested in money balances, will depend on a number of complex considerations related to the optimal use of the money capital market. This in turn will determine the structure of the liabilities reported on the firm's balance sheet. For liabilities are employed to finance the acquisition of assets. The intertemporal costs we have referred to can therefore be interpreted as the costs of raising, or varying under designated circumstances, the liabilities to which the firm has access. The costs of money capital will partly determine, also, the structure of production and marketing processes that the firm undertakes, the timing of its input and output, and the degree of real capital intensity it decides upon.

3 *Real capital asset investment*

The firm's decision regarding the real capital intensity of its production process implies the acquisition of fixed capital assets. In technical economic terms, the firm's production function will be considered a flow-flow function, meaning thereby that the flow of attainable output depends functionally on the flow of factor inputs. The input to the production function is not the *stock* of capital assets actually held by the firm but the *flow* of services per period of time that those assets provide. If, for example, it was technologically necessary or desirable for the firm to employ, during a designated time period, a specified number of machine tool hours of a certain technological specification, that flow of machine tool hours would properly be regarded as the input flow of factor services. At the same time, an asset would appear on the firm's balance

sheet designated as the machine tool that provided the flow of services. But in the flow–flow production function, the machine tool is not the factor of production. If it were so regarded, we should be working not with a flow–flow production function but with a stock–flow function.

The question of time enters this capital usage problem in a number of ways. First, the durability of real capital assets again gives rise to the need to acquire money capital to finance the asset investment. Considerations of money capital sources and the distribution of available money capital over different possible asset mixes again come into view. Second, it may be desirable, under different possible conditions as to technology and the markets for real capital assets, to consider the optimum lives of the assets actually being used. The asset investment decision may confront a trade-off between an asset with a relatively short economically useful life that did not call for a high periodic maintenance expenditure to keep it in efficient operation and another asset, of comparable technological capacity, that had a longer economic life but required a larger periodic maintenance and servicing expenditure.

The capital asset investment decision depends critically on the level and stability of the future cash inflows that the asset is expected to generate and on the present discounted value of those cash flows. That present discounted value, or present capitalized value, will at times be referred to as the economic value of the asset. A relevant investment decision criterion will compare that economic value with the money capital outlay necessary to acquire the asset and bring it to operating or income-generating condition in the firm. Involved, therefore, is a discount factor (or rate of interest or cost of money capital) at which future possible cash flow magnitudes are reduced to present values. Alternatively, the future cash flows that an asset is expected to generate might be analyzed to determine the implicit rate of return they would provide on the money capital invested in the asset. Then that rate of return, which will be referred to under appropriate conditions as the marginal efficiency of investment, might be compared with the rate of interest or the cost of raising the necessary money capital. In either event, the intertemporal value of money, or the opportunity cost of money capital as determined by the complex of money capital market conditions, and the real-time dimension of the capital usage problem come prominently into view.

4 *Liquid asset portfolio*

An investment in money balances is required by the firm in order to enable it to pay flow costs of production and other maturing liabilities if the timing of cash inflows from the sale of products does not mesh precisely with the demands for cash outflows (see Davidson, 1965; Baumol, 1952; Miller and Orr, 1966; Brealey and Myers, 1984, p. 677). The demand for money is, however,

a demand for a non-income-earning asset. The effective cost of investing in it must be interpreted as an opportunity cost measured by the income sacrificed by not allocating the firm's investable money capital to alternative asset forms that offer a comparable degree of risk. If, for example, an asset existed, such as a short-term government security, that promised a high degree of marketability and liquidity, it would conceivably make sense for the firm to hold a portion, probably a significant proportion, of its liquid asset requirements in such a form.

Investing liquidity in such income-earning assets, however, does involve a degree of risk, and a trade-off exists between expected rates of return on such assets and the risks they incur. In the case of short-term marketable securities, the so-called market or interest rate risk refers to the possibility that a rise in the general level of interest rates may occur during the time for which the asset is held, causing a decline in the asset's market value. In such an event, the holder of the asset will have incurred a capital loss. The firm might therefore be advised to hold liquidity in a diversified portfolio of marketable assets and not only, or even mainly, in cash (see the seminal paper, Tobin, 1958). The risks involved in such portfolio decisions have generally been assessed in terms of the dispersion of a subjectively assigned probability distribution of possible rates of return. This gives rise to what has become widely referred to as the risk–return trade-off in asset portfolio construction.

As a result of recent developments in the banking and financial sector, a wider range of income-earning liquid assets has become available. Firms are able to invest temporarily surplus cash in bank certificates of deposits, which may, under certain arrangements, be negotiable or saleable in the money market, thereby permitting access to cash funds at any time. Additionally, banks and other financial institutions are now permitted to pay interest rates on business firm deposits, and such rates, following the deregulation legislation of the early 1980s, are not subject to regulatory ceilings (see Vickers, 1985a).

The uncertainties inherent in the flow of time make the holding of liquid transactions balances necessary, and cash balances provide a cushion against unforeseen and unfavorable developments that would otherwise cause financial embarrassment or loss. The holding of money also provides a refuge from the pressures of uncertainty and ignorance that inhibit real economic activity. In this respect, it has potentially significant implications for the employment of real resources in the firm and in the economy. As Keynes has observed, “our desire to hold money as a store of wealth is a barometer of the degree of our distrust of our own calculations and conventions concerning the future. . . . The possession of actual money lulls our disquietude” (1937, p. 187). Money may be held when the uncertainties surrounding economic prospects make it desirable to defer the commitment of resources to real investment and the pursuit of real economic activities. To the extent that this is so, available

real resources will not be utilized as fully as would otherwise be possible. The firm and the economy are in that case operating within, rather than on the boundary of, attainable production opportunity sets. In this sense, the firm's holding of money and liquidity is defensive. But it may also be offensive, in the sense that the holding of money imparts a degree of flexibility to the firm's production and factor use decisions, and may permit it to take advantage of previously un contemplated investment opportunities.

5 *Debt capital financing*

The possibility of the firm's use of borrowed funds and the prospects of profit on the one hand and the risks and dangers of losses due to excessive indebtedness on the other have given rise to a distinguished literature in economic theory (see Kalecki, 1937; Copeland and Weston, 1983; Minsky, 1975). The economic significance of the firm's use of debt capital is due largely to the contractual nature of the arrangements entered into in connection with it. Loans are obtained by the firm from the debt capital sector of the money capital market, from both financial intermediaries and individual investors who purchase the debt securities as a means of allocating their savings funds. Certain kinds of loans, such as short-term commercial paper issued by corporations with undoubtedly high credit ratings and some short-term loans from financial institutions, may be unsecured. But in the general case, and certainly in the case of long-term corporate debt, the loans will be contractually secured. They may be secured against certain specific assets of the firm or by specifying the order of ranking of their claims against the general income-generating ability of the firm.

In exchange for money capital, the firm will issue debt certificates that specify (i) the length of time between the date of issue and the maturity date, or the date in the future on which the amount borrowed and described in the certificate will be repaid to the lender, and (ii) the rate of interest (stated on the face of the debt certificate and referred to as the "coupon rate") that the firm undertakes to pay each year on the amount of the loan. Additionally, the contract entered into between the borrowing firm and the trustees of the debt (or bond) issue will specify the nature of the rights of the debt holders in the event of the insolvency or dissolution of the firm. The debt holders, then, have what is referred to as a prior claim against the annual income and the assets of the firm. This means that the firm must pay the interest on the debt capital out of whatever income remains after paying operating costs, before any residual income can be paid to the common stockholders in the form of dividends. Moreover, in the event of the dissolution of the firm, the debt holders will have a claim against the liquidation value of the firm's assets before any distribution can be made to the equity holders.

Time and risk are interwoven in this nexus of contractual obligations. The lenders of debt capital will need to evaluate the prospective income-generating ability of the firm over the period of time for which the debt will be outstanding. They will be concerned with the level of the firm's earnings, the possible trend in earnings, and the stability of the income stream in the face of economic fluctuations. The greater the assessed or envisioned risk in the contemplated income stream, the greater will be, in general, the rate of return the lenders will require in order to induce them to hold the debt.

At the same time, the borrowing firm will make its own estimates of the likely level, trend, and stability of earnings and the proportion of its net operating income that will be absorbed by the contractual interest payment on the debt. If, as will generally be hoped, the rate of return earned on the money capital raised in the form of debt is greater than the rate of interest payable on the debt, the additional earnings will accrue to the residual owners, the common stockholders of the firm. In such an event, the stockholders are said to be realizing the benefit of favorable financial leverage. At the same time, however, the overall riskiness of the common stockholders' position may be increased by virtue of the additional fixed-cost financing sources (debt capital) employed in the firm.

6 *Residual ownership investment in the firm*

In the theory of the firm, a confusion and ambiguity frequently surrounds the treatment of capital as a factor of production. Most usually, the discussion of the factor combination problem considers capital as a factor coordinate in every analytical sense with, say, labor or other variable factors. Adequate attention is not always given to the "price" at which the capital factor is obtainable or to the manner in which its durability over time influences the specification of its cost. This analytical hiatus has stemmed from a failure to distinguish clearly between what we shall call real capital on the one hand and money capital on the other. Moreover, when that necessary distinction is established, a further question arises. In what sense, we can ask, is capital to be understood as a factor of production? Real capital, we have already said, is a factor of production. But we have indicated the sense in which, in a flow-flow conception of the production function, it is not the actual real capital assets held by the firm that enter the production function as arguments or are regarded as factors of production. The capital factor is described by the flow of services that those capital assets provide per period of operating time. Money capital, on the other hand, is not a factor of production. Money capital functions as a constraint in that it provides the purchasing power that gives the firm control over factors of production and necessary cooperating assets.

This distinction between real capital and money capital raises the question