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Comments welcomed

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This paper uses the disciplinary matrix of economics to analyze
the debate on the valuation method employed in accounting reports. No
attempt is made to provide a balanced review of the contributions of
individuals; the focus of attention is upon some of the issues involved
in selecting from among the various proposals for valuation. No attempt
is made to cover all issues. For example, no discussion is provided on:
the extent to which the share prices of firms engaged in information
production can be used in assessing the optimality of that information;
the use of the Pareto criterion or other criteria in the definition of
"optimality"; and the issue of what method of valuation is optimal.

For the purposes of this paper, economics is taken to be the
discipline imposed by the assumptions of rational behaviour (i.e., behaviour
in accordance with an assumed model) and perfect markets (i.e., markets
in which transactions costs do not exist). Note that all markets are
assumed to be perfect, including all product and factor markets (of which
the capital market is one example). The perfect-market assumption is
relaxed in several places for illustrative purposes only.

With one exception, the paper does not attempt to justify its
choice of the economic discipline. As explained by Kuhn (1969), such
debates are seldom fruitful. The single exception comes in section IV.2,
one objective of which is to persuade readers that anomalous evidence for
the economic discipline is scarcer than they might believe, and in
particular that many contrived examples of market imperfections can only
be seen as examples of difficulty in asset definition.

Four major arguments are proposed. In section I, the argument
is that only current market prices are relevant to users' decisions,
in the sense that current market prices are perfect guides to the
preference-orderings of all choices by all users. Other prices, such as
"historical costs", are not relevant in this sense. In section II, the
argument is that information is not a free good and, as a result users obtain less-than-perfect information about current prices. Other prices, such as "historical costs", are reported to users, though only in their capacity as estimators of current market prices. Section III introduces the debate concerning three allegedly-different valuation methods (buying prices, selling prices and present value), and proves that the debate is empty. Section IV speculates that the debates seen in the literature are not empty, because they are about more important issues than the empty issue of defining prices.

I THE RELEVANCE OF CURRENT MARKET PRICES

Current market prices provide utility-free decision rules for all users. This proposition is demonstrated first for shareholders and then for other users. Prices and present values are shown to be equivalent. The cases of perfect certainty and uncertainty are both treated. Several examples of market imperfections are used to illustrate a world in which current market prices (and accounting reports themselves) are not relevant. Because the development in this section does not proceed beyond that required for the present purposes, the interested reader is referred to Hirshleifer (1970) and Fama and Miller (1972) for extensive proofs.

1.1 A Simple Model of Shareholders' Decisions. Consider the simple case of perfect certainty, no taxes, a single type of security (called "shares"), and two points in time (now and the future). Denote the present as time t, and the single future point in time as (t+1). Assume that each shareholder s=1,...,S, orders various consumption possibilities in accordance with the utility function $U_s(C_t, C_{t+1})$, where $C_t$ denotes total dollar-value of consumption at time t, and chooses the pair $(C_t^*, C_{t+1}^*)$ which gives him maximum utility. Each shareholder has an initial endowment of assets denoted by $A_s$, which constrains his choice.

Let there be N firms i=1,...,N in which shareholder s can invest
the unconsumed portion of his endowment \((A_t - C_t)\) at time \(t\). The proceeds from this investment are consumed at time \((t+1)\), and are:

\[
C_{t+1} = E_i X_{is} (1+r_{i,t+1})
\]

where \(X_{is}\) is the amount invested by \(s\) in security \(i\), \(r_{i,t+1}\) is the rate of return on security \(i\) over the interval \((t,t+1)\), and the summation is across all securities \(i=1,\ldots,N\). Note the constraint:

\[
A_t - C_t = E_i X_{is}
\]

and the definition:

\[
(1+r_{i,t+1}) = p_{i,t+1}/p_{it}
\]

where \(p_{it}\) is the price of security \(i\) at time \(t\). The wealth constraint (2) does not include transactions costs.

The consumption decision can be modelled in terms of the Lagrangian function:

\[
\max_{C_t, X_{is}} \quad L_s = U_s (C_{t+1}) - \lambda_s (A_t - C_t - E_i X_{is})
\]

the \((N+1)\) first-order conditions for which are:

\[
\frac{\partial L_s}{\partial C_t} = \frac{\partial U_s}{\partial C_t} + \lambda_s = 0 \quad \text{(4a)}
\]

and:

\[
\frac{\partial L_s}{\partial X_{is}} = \frac{\partial U_s}{\partial X_{is}} + \lambda_s = 0 \quad \text{for all } i.
\]

Note that:

\[
\frac{\partial U_s}{\partial X_{is}} = (\partial U_s/\partial C_{t+1})(\partial C_{t+1}/\partial X_{is}) \quad \text{for all } i,
\]

which, due to (1), simplifies to:

\[
\frac{\partial U_s}{\partial X_{is}} = (\partial U_s/\partial C_{t+1})(1+r_{i,t+1}) \quad \text{for all } i.
\]

The first-order conditions (4a) and (4b) can thus be simplified, using (4c), to:

\[
-\frac{\partial U_s}{\partial C_t} + (\partial U_s/\partial C_{t+1})(1+r_{i,t+1}) = 0 \quad \text{for all } i.
\]

Because the marginal utility of present and future consumption are both independent of \(i\), equation (5) and the identity (3) together imply:

\[
\frac{P_{i,t+1}}{P_{it}} = \frac{P_{j,t+1}}{P_{jt}} = \frac{\partial U_s/\partial C_t}{\partial U_s/\partial C_{t+1}} \quad \text{for all } i \text{ and } j.
\]

This in turn implies that all rates of return are equal and that present
prices are proportional to future prices, which is the "present value" model:

\[ \frac{P_{it}}{P_{jt}} = \frac{P_{i,t+1}}{P_{j,t+1}} \quad \text{for all } i \text{ and } j. \] (6)

For simplicity (e.g., to allow the construction of "discount tables"), we can postulate a reference security which has a present price of $1. From (3), its future price is seen to be \((1+r_{t+1})\), where the first subscript is omitted for this security only. Since (6) holds for all securities, including the reference security, we can write:

\[ P_{it} = \frac{P_{i,t+1}}{1+r_{t+1}} \quad \text{for all } i. \] (7)

This is commonly interpreted in terms such as: "the present value of a single future amount is the discounted value of that amount at the market interest rate \(r\)". Alternatively, it states that present prices are proportional to future prices, as one would expect in a perfect market [see Fisher (1906, p.13 and p.369)]. This proportionality can only occur in a world without transactions costs. Transactions costs imply, among other things, that prices are not invariant with respect to volume, in which case (5a) would not hold, unless \(i\) and \(j\) were traded in identical amounts.\(^1\)

For compound future sums we must relax the two-period assumption and complicate the notation. If a security \(i\) produces the sequence of separate future market prices \(\{t+nP_{i,t+n}; n = 1,2,\ldots\}\), then the present

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\(^1\)The "discounting" model of equation (7) differs only in a notational sense from the proportionality models (5a) and (6). But the notation can be deceiving. For example, when using the "discounting" formulation it is easy to overlook the assumption that transactions costs do not exist. This assumption is implicit in speaking of the interest rate. If large sales depress market prices, as they do in an imperfect market, then "discount rates" are a function of the amount being "discounted". The process of "discounting" not only involves the use of "discount tables" which imply the yield on a price equal to $1; with imperfect markets the process also involves some functional (or tabular) relationship between "amount discounted" and the "discount rate", and I have yet to see such a function or table in a finance or accounting text.
prices of the elements of the sequence can be termed \( t^{P_i,t+n} n = 1,2, \ldots \), where \( t^{P_i,t+n} \) is the present price (at time \( t \)) of the \((t+n)\)th element of the sequence of separate future prices (at times \( t+n \)) for security \( i \).

In a perfect capital market, any such sequence of prices can be "unpackaged" by costless borrowing and lending, and hence the present price of one element is independent of its "packaging" with other elements in the sequence. Hence, the present value of the sequence is the sum of the present prices of the elements of the sequence:

\[
P_{it} = \sum_{n=1}^{\infty} t^{P_i,t+n} = \sum_{n=1}^{\infty} \frac{t^{nP_i,t+n}}{(1+t)^n},
\]

where \( t^{n}_t \) is the \( n \)-period rate of interest prevailing from \( t \) to \((t+n)\).

If interest rates are constant over time, then the perfect market assumption can be shown to imply [Fama and Miller (1972), pp.29-31]:

\[
P_{it} = \sum_{n=1}^{\infty} \frac{t^{nP_i,t+n}}{(1+r)^n},
\]

where \( r \) is the constant rate of interest and \((1+r)^n = (1+r_{t+t})^n \). These equations simply say that prices are present values [see Fisher (1896, p.19)].

Equation (8a) is commonly interpreted in terms such as:

"the present value of a sequence of future amounts is the sum of those amounts, discounted in each case at the market interest rate". Alternatively, it states that present prices are proportional to future prices and that the present price of a sequence of future amounts is no different than the sum of the present prices of each amount, both of which statements one would expect in a perfect market, and neither of which is consistent with the existence of transactions costs.

The first conclusion is therefore that, with rational behaviour and perfect markets, current market prices are present values. A second conclusion is also of interest: that only current market prices are relevant to shareholders' decisions. This is demonstrated for: the two
decisions involved in (4), which are the allocation of consumption over time and the portfolio amounts in which various securities are held; and the choice of particular consumption goods, which has been ignored in (4) for simplification of exposition.\(^2\) Involvement of shareholders in firms' production and investment decisions is dealt with in I.2 below.

First, the decision to allocate consumption over time depends upon the current market price of capital. From (5a) and (b), consumption is adjusted to the point where marginal utilities of present and future consumption are proportional to \((1+r_{t+1})\), which is the inverse of the present or current price of a dollar of capital for future delivery.\(^3\) Second, the decision on the set of investment amounts \(X_{1s}\) is also dependent only upon current market prices. By law, equity is a residual claim; shareholders' buy-or-sell decisions depend upon whether, in their assessment, the current market price of the equity claim differs from the residual of the current market prices of all assets (properly defined) and obligations of the firm. In other words, shareholders' use of accounting information in the buy-or-sell decision stems from their role as arbitrageurs across markets: accountants provide data from product and factor (including bond) markets, for shareholders' use in making share prices consistent with other prices. Obviously, only current market prices are relevant to this role. Note that in equilibrium, when arbitrage is completed, this role no longer exists, and shareholders' decisions no longer utilize accounting information in the portfolio composition decision, as demonstrated by the Portfolio Separation Theorem of Cass and Stiglitz (1970). An "efficient" market is one which obtains this equilibrium immediately a report is released.

\(^2\)Fama and Miller (1972, pp.17-20) demonstrate the consistency of the time-choice model with choice defined over consumption goods.

\(^3\)That is, the inverse of the "present value factors" given in discount tables. See Fama and Miller (1972, pp.24-27).
Third, the choice of specific consumption goods, while not modelled here, depends upon the current market prices of those goods. With perfect goods markets, shareholders are not interested in matters such as the prices that the firm has paid in the past for goods or the prices that they themselves have paid. Their interest is confined to utility considerations and current market prices.

1.2 Production and Investment Decisions. Shareholders (or their agents) engage in firms' production and investment decisions, as well as their own consumption and portfolio decisions. What prices are relevant in this case?

Under the same assumptions of rational behaviour and perfect markets, Fama and Miller (1972, pp.64-67 and 72-73) show that the production/investment decisions of the firm and the consumption decisions of its shareholders can be seen as a two-stage process: first, maximization of the firm's market value (which is equal to the present value of future dividends); and second, the selection of optimum consumption plans by each of the shareholders.

The separation of production/investment decisions from consumption decisions has become known as the Fisher Separation Theorem. Present values, which are market prices, provide firms with a utility-free decision-rule, which is simply to maximize the market prices of their shares. All production/investment decisions are made in accordance with this rule. It is "utility-free" in the sense that firms need no direct recourse to the preference-orderings of feasible consumption plans by their various shareholders, and leave these decisions entirely to the shareholders themselves. Value-maximization allows each shareholder to attain maximum feasible utility. The current market price is a perfect surrogate for utility, in the sense that various production/investment plans for the firm, when ranked in order of market value, are perfectly-ranked in order of utility for every shareholder. They are relevant in this sense. No other prices can duplicate such a ranking, except by chance.
The conclusions therefore are that current market prices are present values, and that they are the only prices which are relevant to users' decisions in the sense that only they are guaranteed to be perfect guides to the effect of firms' production and investment decisions on the preference-orderings of all choices by all shareholders, and for all types of decisions.

Two examples will clarify this general proposition. Suppose initially that an individual shareholder is contemplating a management change. Regardless of whether the plans of potential managers include producing commodities to which the shareholder attaches great utility as a consumer, and regardless of whether the plans give rise to dividends in the time periods when the shareholder has a great preference for consumption, the rule is the same: select the management which maximizes the current market value of the firm. The only relevant information is about current market prices.

Suppose next that an agent for the shareholders (a manager) is contemplating a production or an investment decision. Regardless of the utilities of the shareholders of the firm and regardless of his own utility, the rule is the same: maximize the current market value of the firm. Again, the only relevant information is about current market prices. 4

1.3 Relaxation of Assumptions. Most of the assumptions used above can be relaxed, without altering the conclusions. Tax differentials and different types of securities together complicate, but do not alter the character of, the exposition. Nor does the introduction of uncertain future prices alter the conclusions, contrary to several claims. 5 This is

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4 At this stage, the principle that only current market prices are relevant might seem divorced from the practice of reporting to shareholders with prices concerning individual (or groups of) assets, liabilities and equities, rather than the prices of the total firm. This issue is addressed in section IV.4 below.

5 See, for example, Ball and Brown (1969).
easily demonstrated in the Miller-Modigliani (1958) style, assuming a
two-period analysis for simplicity. Consider two securities i and j,
which are in the same risk class: their future prices are perfectly
positively correlated and differ at most by a scale factor:

\[ \tilde{P}_{i,t+1} = \gamma \tilde{P}_{j,t+1} \]  

(9)

where \( \gamma \) is some constant and the tilde (\( \tilde{\cdot} \)) denotes that the future prices
are random variables. In a perfect market, the present price of security
i must be \( \gamma \) times the price of j, since its future price is \( \gamma \) times j's:

\[ P_{it} = \gamma P_{jt} \]  

(10)

Substituting for \( \gamma \), (9) and (10) imply:

\[ \frac{P_{it}}{P_{jt}} = \frac{\tilde{P}_{i,t+1}}{\tilde{P}_{j,t+1}} \]  

(11)

which, by utilizing a reference security in i's risk class with a present
price of $1, becomes:

\[ P_{it} = \frac{\tilde{P}_{i,t+1}}{1 + \mu_{k,t+1}} \]  

(11a)

where k is security i's risk class.

Viewed outside of the Miller-Modigliani device of comparing two
equivalent-risk securities, (11a) can be interpreted in this fashion:
the relationship between the random future price and the present price of a
security determines the random rate of return on the security; the
relationship is described by such methods as the two-parameter model of
Sharpe (1964), but this is not of relevance here; the relevant point is
that, in a perfect market, the relationship is quantity-invariant for any
individual security, and hence multiplication of the random future price
by a constant results in the multiplication of the present price by the
same constant. Which is merely to say that present and future prices are
proportional, even under uncertainty, or that prices remain present values.

Bear in mind the distinction between current prices and information about current prices. Chambers (1968) draws this distinction in his replies to Staubus (1967) and Iselin (1967), though in different words. But Chambers himself (1968, p.240) fails to observe the distinction in dealing with present value under uncertainty, where he equates present values with discounted estimates of future cash flows. Perhaps this is merely a reflection of the error of Staubus and many others, but the important point is that estimates of present values will depend upon estimates of future prices, whereas the concept of present value depends upon the concept of future price. In particular, the concept of present value does not require any estimates. For this reason, the random variable $\delta_{t+1}$ has not been defined one way or the other in the above discussion. Whether it is defined as one person's own estimate, or as an objective probability function thrown up by Nature, the conclusion remains that a perfect market sets present prices in accordance with (11). The simple proportionality statement that present price is quantity-invariant, which can be restated as "prices are present values", does not depend upon the definition of uncertain future price. It only requires that markets are perfect and people are rational.

1.4 Perfect Markets and Rational Behaviour. The sufficient and necessary assumptions, for prices to be present values and to be relevant to shareholders' and their agents' decisions, are that capital markets are

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Care must be exercised with this statement. For the RHS of (11) to be a proportion (in this case $\gamma$), the numerator and denominator must be in the same risk class (that is, $i$ and $j$ must be either two securities of the same risk, or different amounts of the same security). Otherwise, the RHS will be random. Care must also be exercised in avoiding the erroneous treatment of present prices as random variables, as for example in Bierman and Hass (1973), Brumelle and Schwab (1973) and Jean (1973). The error can be seen in two ways. First, it makes sense to speak of future prices as random variables, with (say) means and variances, but present prices are known and hence are constants. Second, the condition required for the present price on the LHS of (11a) to be random is that the discount rate on the denominator of the RHS be less-than-perfectly-correlated with the numerator: i.e., an incorrect discount rate, of inappropriate risk, must be chosen, for present prices to be random.
perfect and that shareholders act rationally (in this case, in accordance with the model (4)). Sufficiency can be demonstrated, as in I.3 above, by relaxing all other assumptions. Necessity can be demonstrated by introducing market imperfections and irrational behaviour, and showing that the present-value equations (6,7,8a,8b,11,11a) then do not hold, and that market prices then cannot be related to shareholders' and agents' decisions.

Consider first the effects of the standard imperfection in the capital market which is created by costs of transacting.\(^7\) One effect of transactions costs is to make borrowing rates exceed lending rates, and hence an equality such as (5a) cannot be asserted when either security involves borrowing and the other involves lending. In general, the effect of transactions costs is to make the market rate a function of the amount (including the sign of the amount) being invested. For example, it is a common belief that share-market imperfections cause large parcels of shares to influence share prices. In terms of equation (5a), suppose that a large parcel of security \(i\) is sold by shareholder \(s\) at time \((t+1)\) in order to meet his consumption plans. If that sale depresses \(p_{j,t+1}\) then the equality in (5a) does not hold: higher rates of return are earned in securities other than \(j\). In general, if price is not independent of quantity then (5a) and the following equalities do not hold, and prices are not present values.\(^8\)

This is the first effect of capital-market imperfections.

The second effect of capital-market imperfections is to deny the conclusion that current market prices are relevant to either shareholders' or their agents' decisions. Consider first the case of divergent borrowing

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\(^7\)See Fama and Miller (1972, pp.76-77) and Hirshleifer (1970, pp.195-202) for a fuller treatment.

\(^8\)In some sense of the term "present value", prices will always be "present values". However, the statement is that, with market imperfections, prices are not consistent with the present value model in (6) through (8b), because that model of "present value" is an assertion about proportionality.
and lending rates due to transactions costs. There is then no price which summarizes the future dividend payments of the firm in a manner which is relevant to all shareholders: each shareholder, before allocating his wealth to consumption over time, now requires information about the time sequence of future dividends, because it is no longer costless to "unpack" the sequence offered by the firm, through private borrowing and lending. Each shareholder now requires information about more than the present value of future dividends, which (where there are no imperfections) would have amounted to information about the market price. He wants information about the sequence, because his private opportunity cost of capital, period-by-period, depends upon his private liquidity position. This is merely another way of saying that prices are not present values: there are at least as many potential "present values" as shareholders.

The same conclusion holds for production and investment decisions: maximizing current market price does not provide a utility-free decision-rule for the firm. Shareholders and their agents now face potentially as many desirable production/investment plans as there are actual and potential shareholders in the firm, because each shareholder desires a sequence of dividend payments which best matches his intertemporal preference for consumption, in order to minimize transactions costs. Decisions by both shareholders and their agents therefore cannot rely upon price criteria, and current market prices are not reported to them. They have no relevance to decisions, except by chance.

Consider next the effect of imperfections in the goods market, where the prices for buying and selling consumption goods differ. A shareholder who consumes a good which is produced by the firm is no longer equivalent to one who does not. The first shareholder will prefer a dividend paid in kind, whereas the second will not. Shareholders will require information about goods held by the firm, as well as their prices, and about future dividend payments in kind.
The third, and more general, effect of market imperfections is to deny the existence of any rule which is relevant to all shareholders, including any rule about reporting prices which are relevant to their decisions. This proposition is known as Arrow's Impossibility Theorem.\(^9\) Arrow's theorem, roughly-stated, is this: whereas prices (present values) provide a utility-free decision-rule in perfect markets, there exists no such decision-rule in imperfect markets because, in general, there is no sensible rule for combining the utilities of various shareholders.\(^10\) There is no general type of accounting report which is relevant to all shareholders and agents, in the sense that no reported information can provide a perfect guide to the preference-ordering over all choices by every shareholder. Thus, if there is any theoretical justification for reporting any information to shareholders as a group, then that information must be current market prices, and a necessary condition for this to take place is that all markets be perfect. The same argument applies to reporting to agents who act on behalf of shareholders as a group.\(^11\)

\(^9\)See: Arrow (1963); Fama and Miller (1972, pp. 67-68) for a very brief exposition; and Fishburn (1970) for a short proof which, while adding little by way of interpretation, gives insight into the structure of Arrow's proof.

\(^10\) There will be some isolated exceptions. The most famous is Arrow's dictator: in the unlikely event that all people order all feasible alternatives in the same way (i.e., all have the same "weak" preferences), then one person can play dictator, imposing his own orderings and therefore optimizing for all. There might also be some alternatives for which prices are relevant for all persons, but these will arise purely by chance and cannot form the basis of general rules of accounting.

One qualification must be noted in respect of the above characterization of Arrow's theorem. Competitive price equilibrium is not optimal in the production of public goods. One application of this result is due to Marschak (1966), who argues that, due to costs of excluding non-purchasers, information is a public good. This qualification does not influence the conclusion that no utility-free criteria (such as prices) exist outside of competitive price equilibrium.

\(^11\) The above discussion does not deal with the assumption of rational behaviour. If shareholders do not behave in accordance with some model such as (4), then there clearly can be no rules to be followed in reporting to them. Likewise, one cannot prove the present value model (6) through (8b) in the absence of rationality: the proof must begin with some version of (4).
To illustrate the application of Arrow's Impossibility Theorem to accounting reports, consider a world of perfect certainty and no taxes, and a firm which has two shareholders (each owning one share), no liabilities, and assets consisting of two bushels of a certain grade of wheat. The firm has contracted at time $t$ to sell the wheat for $18 per bushell at time $(t+1)$, and is preparing a report to shareholders at time $t$. Suppose further that the $18 figure is the price for both buying and selling wheat at time $(t+1)$, and that the capital market at time $t$ is sufficiently-imperfect to quote a borrowing rate of 80% and a lending (investing) rate of 20%. What does the firm report to shareholders who must allocate their consumption over time? Specifically, what prices does the firm report?

Assume that shareholder A is a net borrower of funds at time $t$. An accounting report which states at time $t$ that his equity in the firm is $10 gives him correct guidance in his consumption decision. For shareholder A, $10 of consumption or of assets at time $t$ is equivalent to $18 of consumption or of assets at time $(t+1)$, by equation (5a). Acting on the report, he could (for example) increase his consumption by $10 at time $t$ by borrowing $10 at 80% and repaying $18 from his dividend at time $(t+1)$. In contemporary terms, shareholder A is not misled if he is told that his equity is worth $10.

Assume that shareholder B is a net lender at time $t$. An accounting report which states at time $t$ that his equity in the firm is $15 gives him correct guidance in his consumption decision. For B, $15 of consumption or of assets at time $t$ is equivalent to $18 of either at $(t+1)$, again by equation (5a). Acting on the accounting report, he could increase his consumption by $15 at time $t$ by selling investments worth that amount, thereby sacrificing proceeds of $18 from the investment at $(t+1)$, which is equal to his dividend from the firm. In contemporary terms, shareholder B is not misled if he is told that his equity is worth $15.
In this example, there are no prices at time $t$ for either the wheat or the firm. There is no feasible present price equilibrium. Given the known future price of $18$ per bushel of wheat, there is no present price which either or both borrowers and lenders do not attempt to change: both will attempt to change a price outside of the $10$-$15$ range, but they will not agree (and there will be no equilibrium) within that range. The conclusion that the firm has more than one "financial position" cannot be escaped, when "financial position" is defined as the price of the firm's equity that is relevant to shareholders' two-period consumption decisions, and when capital markets are imperfect.

The above example deals with the allocation of consumption over time, and the failure of accounting rules arises from the failure of the market which allows that allocation: the capital market. Examples could be constructed of failure in the goods market, and the same result would occur: there would be failure of accounting rules. Rules which are based upon market prices must themselves fail when there is market failure.

1.5 Summary. With perfect markets and rational behaviour, the Fisher Separation Theorem shows that there are two independent types of decisions: those made by shareholders or their agents concerning production and investment, and those made by shareholders concerning consumption. The relevance of current market prices for each of these decisions has been discussed.

No new ground is broken in the discussion. Except for the minor extension of known results to the issue of accounting reports, all of the above propositions exist in the economics/finance literature. The major conclusions are:

a. With perfect markets and rational behaviour, current prices are present values;
b. With perfect markets and rational behaviour, only current market prices provide perfect guides to the
preference-orderings of alternatives by all shareholders and therefore only information about current market prices is reported to shareholders and their agents;
c. Without perfect markets and/or rational behaviour, the "present value rule" does not hold: there is then no utility-free rule; and
d. Without perfect markets and/or rational behaviour, there can be no optimum method of reporting to all shareholders and agents, current market prices included.

Together, these conclusions imply the following proposition:

Proposition (1): The only information reported to all shareholders or their agents is information concerning current market prices.

The task remains of determining what that information is.

II THE IRRELEVANCE OF CURRENT MARKET PRICES

In some sense, section I establishes that only current market prices are relevant to shareholders' and their agents' decisions. The sense is this: that only current market prices can be perfect guides to the preference-orderings of alternatives by all shareholders. Section II establishes that, in a different sense, current market prices are not relevant: that, bearing in mind the cost of accounting reports, the optimum method of reporting to shareholders involves less-than-perfect information about current market prices, possibly in the form of out-of-date prices. It does not involve reporting precise, current prices themselves.

II.1 Information Costs. The existence of information costs is not difficult to demonstrate. The information industry is among the largest in the economy. For accounting reports, the costs include: research and development
in accounting methods; costs incurred by firms and their auditors in searching prices, in processing and disseminating information on prices and quantities to shareholders, and in determining quantities; and the policing costs of governments and their regulatory bodies, stock exchanges, auditors and analysts, all of which are incurred in policing fraud, error and the like. The business of providing shareholders and other users with current-market-price information clearly is not without cost.\textsuperscript{12}

Yet it is exceptional to find a contribution to the debate on valuation in accounting reports which explicitly introduces information costs. Given that there is no case for the relevance of information concerning anything other than current market prices, one would have thought that a major part of the debate would concern the optimum method of searching, processing, reporting and policing such information, bearing in mind that those activities are not costless. One conclusion must therefore be that the existence of information costs is anomalous evidence for most contributions to the debate.\textsuperscript{13}

\textsuperscript{12} Stigler (1961, 1964) and others have modified the standard textbook models of price theory to incorporate costs of searching current market prices as part of the consumption decision. There are many problem areas in the economics of the information industry, such as Musgrave's (1959) "exclusion principle", which Gonenes and Dopuch (1974) introduce to the accounting literature along with their intriguing review of evidence. Stigler's model presents no problems in the present context: we need only generalize it to include search costs for prices relevant to production/investment, as well as consumption, decisions. Income statements and balance sheets are, after all, weighted sums of factor and product prices (though, under present accounting rules, these prices go through some strange transformations).

\textsuperscript{13} To say that it is intellectually unappealing to introduce information costs, because one does not then derive the "best" accounting method, is merely to provide a circular statement of allegiance to a community in which such costs are ignored [see Kuhn (1969)]. For it is apparent that, within the context of a world with positive information costs, there exists an optimum, or "best", method of accounting, and it involves an optimum estimator of current market prices. The issue is one of defining "best".
II.2 Policing Costs. The reason for including policing costs among the various costs of supplying an accounting report is simple. The aim of this paper is to investigate the types of prices actually included in accounting reports, not the types of prices which regulatory bodies, stock exchanges, professional bodies or other entities recommend to include in those reports. It is the actual reported prices which influence shareholders' and their agents' decisions. As a result, the costs of policing those recommendations are relevant to the debate on what is actually included in the reports.

An example will help clarify this point. Chambers (1973) presents what he claims to be evidence of the need to report current market prices (the precise definition of a current market price is, for the moment, a separate issue, though it is raised below). Accept for the sake of discussion that, in several cited instances, evidence was available to firms at zero marginal cost, which provided a better estimate of current market prices than the numbers actually reported in the accounts. (The better estimate might even have the current market prices themselves). The question is whether these instances are anomalous. The answer is qualified. If policing costs are assumed to be positive, then no matter what the professional bodies etc. recommend to report, be they historical costs or current market prices themselves, there will be instances of failure to actually implement that recommendation. It simply will not pay to have infinite policing, and it is only with infinite policing that we are guaranteed that there will be complete compliance with any method of reporting. Only when policing costs are zero does it become anomalous to discover instances of fraud or error in reporting.

The existence of fraud and error, therefore, is not anomalous when policing is assumed to involve the deployment of scarce resources. Furthermore, the existence of reporting costs in general is itself anomalous for hypotheses in which accountants invariably report the current market prices themselves.
II.3 Summary. There are many feasible schemes for reporting information about current market prices. They can be viewed as various production possibilities for accountants. These schemes differ in the quality of their estimates of current prices, and they also differ in cost. A scheme is defined to include searching, processing, disseminating and policing information about current prices, and the cost of a scheme must therefore include the costs of each of those activities.

The most important conclusions from the discussion in this section appear to be:

a. It is anomalous to ignore information costs;

b. Whereas only current market prices are relevant to users' decisions, information costs imply that less-than-perfect information about current prices is reported to them;

c. Research on the optimum method of reporting by accountants must incorporate costs of the various methods, lest it encounter substantial anomaly; and

d. The literature indicates that researchers have almost systematically failed to do so in an explicit, rigorous fashion.

The major proposition is:

Proposition (2): The information reported to all shareholders or their agents concerning current market prices is less than perfect, and therefore does not consist of precisely current prices themselves.

III THE VALUE OF A DEBATE

There can be no debating the relative relevances, to users' decisions, of "present value", "buying prices" and "selling prices". This section shows that any such debate is either empty, or inconsistent (and therefore empty).14

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14 Sidney Davidson undoubtedly would have entitled this section: "Old Wine in Empty Bottles".

At the terminological level at least, the competitors for relevance are legion. They include present value, "value to the owner", market selling prices ("current output prices", "net realizable value", "current cash equivalent", "liquidation values") and market buying prices ("current input prices", "current costs", "replacement costs"). Which is the relevant concept of value?

III.2 Its Value. The answer is: Either all or none.

Markets are either perfect or imperfect and behaviour is either rational or irrational. Suppose initially that all markets are perfect, which means that transactions costs do not exist, and that all shareholders are rational. There can then be no difference between buying and selling prices. There is one market price for both buyers and sellers, and by conclusion I.5a, that price is a present value. Thus, with perfect markets and rational behaviour, there can be no sensible debate: the various prices and present value all are equivalent, and thus any debate about their differences is empty.

Suppose next that either some (or all) markets are imperfect, or that shareholders are not rational. Then, by conclusion I.5d, there is no theoretical basis for reporting any single type of market price to all shareholders (there are no reporting rules at all), and by conclusion I.5c there is no conceptual basis for present values (it can be shown that the proportionality assertion of the present value rule is false). Thus, without both perfect markets and rational behaviour, there can be no sensible debate. To generate differences between buying and selling prices
one must introduce assumptions which are inconsistent with Arrow's Impossibility Theorem and which imply that there can be no single, relevant reporting method. Any debate about the differences is then internally inconsistent (and therefore empty).

III.3 Summary. Whether or not both of the assumptions of the economic disciplinary matrix are made, the debate concerning the relevances of various valuation concepts to users' decisions is empty. The various prices are either relevant and identical, or irrelevant.

**Proposition (3):** There can be no debate concerning the concept of value about which accountants provide information.

The concluding section argues that the actual debate concerns how best to provide information about current market prices, how best to define assets, and other matters.

### IV A REVISED VIEW OF THE LITERATURE

If there can be no debate about the prices that are relevant to users' decisions, what can be (or has been) debated? This section discusses five areas in which debate is possible and, in some instances, has been conducted (though usually in different terms). The debate is reinterpreted in terms of the economic discipline.

**IV.1 Price Versus Price-Information.** With few exceptions [I understand Chambers (1968) to be one], the literature has failed to distinguish the notion of a price, and its role in a market mechanism, from the notion of an estimate of a price. If there are costs of providing information about prices, including costs of policing the system, then the distinction is crucial.

Penman (1970) illustrates the point, with the familiar argument that present value is the single "model [which] survives the test of relevance" but, because men do not know the future, it has problems with "the second constraint of objectivity" (p.339). If present value is relevant, then so are prices, because the necessary and sufficient assumptions for the
one are the same for the other. The issue is better seen in different terms: in a world with information costs, does an attempt (by men), to estimate and then discount future prices, provide a cost-efficient approximation to today's price, relative to alternatives such as searching today's price directly?

IV.2 Asset Definition. One of the major areas of debate appears to be asset definition, though it is couched in terms of valuation. Under the assumptions of rational behaviour and perfect markets, economics views all matters in terms of implicit or explicit prices. Therefore, the problem of asset definition is viewed, under these assumptions, as a problem of defining the sequence of future prices for which a present price is to be determined. Several examples will help to clarify this point. They will also indicate some confusion in the literature.

First, consider the "blastfurnace example". Suppose that a blastfurnace has two known future prices: as part of a steel plant and as scrap. The need to perform a marginal analysis (as discussed below) is incidental, and price is still interpreted at the conceptual level rather than as a specific price quotation or estimate. The prices are thus equivalent to marginal cash flows, in both cases. A common argument is that the buying price of the blastfurnace will usually exceed its selling price, the reason being that the "thin" market for blastfurnaces as parts of steel plants will usually ensure their sale as scrap, which will bring in much less than their buying price. This argument is alleged to demonstrate the lack of perfection of the market for blastfurnaces, because a perfect market cannot have different contemporaneous buying and selling prices.

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15 This corresponds to the definition of Canning (1929, p.22): "An asset is any future service in money or any future service convertible into money". That is, the asset is not bricks and mortar, but its price. Because of the present value equation, Canning might equivalently have defined an asset as: "anything presently convertible into money (i.e., with a price, however implicit)."
The argument is fallacious. It confuses asset definition and asset pricing. There is no reason to suspect, from the data in the example, a difference between the buying and selling prices of a certain number of tons of scrap, with a certain quality and delivered at a certain place under certain terms. Nor is there reason to suspect a difference between the buying and selling prices of the future prices of a well-defined source such as a blastfurnace operating under certain conditions. However, there is good reason to suspect that the present prices of part of a steel plant and a quantity of scrap are different, because there is good reason to suspect that their future prices are different (and possibly their risks, too).

In economics, the physical form of the scrap or the steel plant is irrelevant. Economics deals in prices. The common analysis of the "blastfurnace example", in comparing the buying price of one future price and the selling price of a different future price, confuses the notions of asset definition (which future price?) and asset pricing (buying or selling?).

Second, consider the "ice cream van" example. Suppose that a van has been converted for the retailing of ice cream, and that the demand for ice cream goes to zero. The van can produce no cash flows in retailing ice cream. The cost of removing the refrigeration, displays, etc. to convert the van to all other uses is exactly equal to the price it will obtain if converted. A common argument is that the present value of the cash flows from the van is zero, its selling price is zero, yet its buying price (including its conversion for retailing ice cream) is positive. Again, the argument is fallacious. With perfect markets and rational behaviour, the buying and selling prices of a zero cash flow is zero, and there is nothing in the example to have us suspect otherwise. In different words, the buying price of any apparatus which will sell no ice cream must be zero, unless there is something wrong with either markets
or people. Again, the reason for the fallacy is the failure to preserve a constant definition of an asset, except in irrelevant physical terms, when alleging differences among prices. Again, physical form is irrelevant and the literature has not treated it as such.

Third, consider the "profitable purchase example". Suppose that a firm buys an item for $10,000 and its "discounted" future price is $15,000. Is there a debate about prices here? There cannot be: under the assumptions which are necessary for prices to be relevant, they cannot differ. The present buying and selling prices must be $15,000, unless prices (and present values) are irrelevant. The $5,000 difference must be due to some shift in asset definition. For example: the firm might have engaged in advertising, display or demonstration of the item; it might have offered credit, delivery or guarantees; or it might have engaged in any production activity on the item. Unless there is some explanation of this type, in which the difference between buying and selling prices is due to a change in the asset (if not in its physical form), then the example itself is internally-inconsistent: the data which it supposes are not consistent with its very debate about prices, because prices cannot then be relevant.

Fourth, consider the "Nth asset example". Consider a firm which uses multiple homogeneous assets in its production of a certain product. There is a functional relationship between N (the number of assets used) and the present value of the firm, and therefore there is a functional relationship between N and the marginal present value of N assets. An argument is that the buying and selling prices do not differ among the firm's homogeneous assets (assuming perfect factor markets), and that their present values do (applied at the margin). Thus, for any individual asset, it is alleged that (marginal) present value and market price can differ, and will only agree for the marginal asset.

The fallacy in this instance is simply exposed: with homogeneous
assets, the marginal present value of the Nth asset does not exist; there
is only the marginal present value of N assets. If assets are correctly-
defined and if they are homogeneous, then there can be no difference
between their present values, if their present values exist. Otherwise,
they could not possibly be homogeneous. In contrast, the marginal present
value of N assets is well-defined as the effect on the present value of
firm of adding an Nth asset; and the marginal buying and selling prices
of N assets are well-defined as the effect on the buying and selling
prices of the firm of adding an Nth asset. The alleged difference between
present value and market price results from a fallacious attempt to define
different present values for homogeneous assets. If the assets are
homogeneous, and if "asset" is defined correctly and without confusion
with physical form, then each asset must have a homogeneous effect on
value as well as price, and price and value have not been shown to differ
by the example. 16

Many more examples could be cited, with much the same effect. 17

In each of the four samples, the usual analysis fails to distinguish the
issue of asset definition from the issue of price definition. In purporting
to show differences among definitions of prices, each example either fails
to control for differences among the assets whose prices are analysed, or
provides data for the prices which are not consistent with the use of
prices in the first place. Four conclusions are drawn from the examples:

  a. One must define an asset in consistent terms when
discussing various prices for it;

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illustrates the same fallacy when applied to the marginal product of labour.
Note that the fallacy is related to the physical definition problem encountered
in the first and second fallacies: In this case, the assets have no distinguishing
features except their numbers: their effects on price are homogeneous.

17 Much of what is said to be anomaly for the economic discipline is of
this sort. For example, the statement: "An automobile loses one-fourth of
its value when it is driven out of the showroom" is fallacious, from the economic
view, because the comparison is of two prices of two different automobiles. The
contingent automobile in the statement would have a lesser warranty on resale,
for example.
b. Some alleged differences among various prices
(such as buying and selling prices and present
values) are due to shifts in asset definition;
c. Some alleged differences among various prices are
inconsistent with the assumptions which are necessary
to justify worrying about prices; and
d. Apart from the examples in which the data are inconsistent
with the use of prices, the examples investigated in this
subsection can be reinterpreted as examples in problems of
asset definition.

IV.3 Asset Aggregation. A problem in asset definition is that of aggregation:
do accountants report prices of nuts and bolts, of groups of items, or
of the firm itself?

Conventional accounting utilizes two basic principles: historical
cost and historical aggregation. In reporting primarily on the basis of
transactions entered into by firms, accountants accept both the prices and
the levels of aggregation of those transactions.\(^\text{18}\) Historical cost is
merely one of the two major features of conventional accounting. Most
analyses appear to ignore the historical aggregation principle.

The aggregation issue only becomes important when deviating from
historical cost, so it is not surprising that Chambers appears to be one
of the few to provide arguments on the optimal method of aggregation. For
example [Chambers (1970, p.51)]:

\begin{quote}
I would be satisfied to consider the prices of assets in the quantities, parcels or combinations in
which the firm customarily sells or offers them for sale. If we are concerned with the production of
figures which may be embodied in a variety of distinctive calculations, what we seek is their
most probable values; or perhaps the values which depend on the fewest ad hoc stipulations. It seems
to be incontestable that the quantities, parcels and
\end{quote}

\(^{18}\) There are departures from transactions analysis, principally in the
form of accruals.
combinations within the usual and ordinary experience of the firm best meets this test.

Both the test(s) and the solution are far from incontestable.

Consider first the test: what theory allows one to stipulate "most probable" or "the fewest ad hoc stipulations" as criteria for deciding upon the level of aggregation? We could provide such theory: the consumption decision of section I.1 and the production/investment decision of section I.2. The two-stage decision mechanism of the Fisher Separation Theorem implies that shareholders define assets on the assumption that the value of the firm is maximized, and hence the level of aggregation assumed in a report to shareholders is that which maximizes the value of the firm.

Consider next the solution. The assumption that "the usual and ordinary experience of the firm" is the best solution is an assumption of temporal invariance in the optimal use (according to our criterion) or in the most probable use (according to Chambers') for the asset. This assumption is similar to the historical-aggregation principle of conventional accounting. It has similar appeal, on a priori grounds, to historical cost. Contemporary evidence of a change in the level of aggregation which maximizes the value of the firm seems as relevant to shareholders' consumption decisions as changes in the prices which also influence the value of the firm.

IV.4 The Rationale for Dated Price Information. It is feasible to consider different reporting schemes as providing different information about current market prices. By the argument in section I that only current market prices are relevant to users' decisions, it is not only feasible but also necessary to consider different reporting schemes (such as historical cost) in this light. This subsection deals with one property of such reporting schemes: the degree to which the information about current prices which they provide...
is dated. The objective is to illustrate the mechanics of selecting an optimum reporting scheme in a world where information about current prices is reported at a positive cost. No attempt is made to arrive at the optimum scheme.

The issue is how frequently the reported price information about current prices will be updated. At one extreme, no price information is collected at all, and no accounting reports are prepared. This is a costless scheme. At the other extreme, all price information is collected and updated in continuous time, all accounting reports are issued continuously with instant price information, and all reports issued on Dec. 31 require all product and factor markets to be open and providing current price information for all goods at precisely midnight on that date. This is a very expensive scheme.

Between these extremes, there are different schemes providing more-or-less-dated information about current market prices, and involving more or less cost. It seems reasonable to postulate a positive relationship between the frequency of revision of prices (which determines the extent to which they are dated at any point in time) and the cost of the reporting scheme. There is then an inverse relationship between cost and the extent to which price information is dated.

In a perfect market, it also seems reasonable to postulate that the most recent prices are the best estimators of the current price. There is then a trade-off between cost and the accuracy of the information about current market prices. In such a world, a corner-point solution is

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A second property, not considered here, is heterogeneity: the issue of aggregating information about current prices which is dated in different degrees. This issue would seem to provide no insurmountable problem, in that the various dated current-price estimators can be made homogeneous by the introduction of a "dating decay function" which they share in common.

This is certainly true in the random walk model of an "efficient" capital market. Note the issues raised in IV.5 below, and the implicit assumption that the asset remains constant.
unlikely: the most likely solution is an interior solution in which less-
than-perfect information about current market prices is reported. It simply
will not pay to keep all markets open at midnight on the balance date to
obtain absolutely contemporary information.\(^{21}\)

Near one extreme (in relation to cost) is a scheme whereby market
prices in the last day (as distinct from the last moment) of the fiscal
year are permitted. This requires markets to open every day for every good,
and accountants to report last-day prices. Moving away from that extreme,
another scheme is to accept market prices from the last week of the fiscal
year. Yet another scheme is to accept the most-recent market price, allowing
for natural variation in turnover among goods and over time.\(^{22}\) Finally,
another scheme is "historical cost accounting", in which price information
is not sought subsequent to the date of purchase, and the extent of dating
is therefore determined by the level of turnover of the specific good.
Historical cost is a scheme in which search costs are zero (prices are
supplied along with the historical transaction), but where other costs
(processing, policing, etc.) are positive.\(^{23}\) Where it lies on the cost
spectrum is not obvious. It is even feasible, though by no means proven,
that "historical cost" provides the optimum reporting scheme, all costs
considered.\(^{24}\)

\(^{21}\) Chambers' (1966, p.204) use of "orderly liquidation" prices can be
seen as a recognition of costs of providing information on the prices as at
balance date. Alternatively, it can be seen as an exercise in asset definition,
as per section IV.2 above, or as both.

\(^{22}\) This scheme encounters the heterogeneity issue discussed in fn. 14,
since not all "last prices" occur at the same time. Strictly speaking, any
scheme other than the extreme of instant prices encounters this issue. This
includes Chambers' "orderly liquidation" scheme.

\(^{23}\) Modified historical-cost schemes, such as depreciation, LIFO and FIFO,
retain this property.

\(^{24}\) For the record, my personal view is that it does not, for reasons due
to Stigler (1971).
IV.5 A Rationale for Price Indexes. Section IV.5 considers the optimal
frequency with which prices are searched for reporting to users. Applying
the general conclusion of section II, the optimal frequency is not infinite,
and reported prices are therefore dated on average. This subsection
considers a related issue: the optimal method of providing information
about current prices without searching specific prices. If, at time t,
the most recently-searched prices of the firm's assets and liabilities
are from time \((t-r)\), then indexes provide a source of information
concerning price variation over the intervening period \((t,t-r)\).\(^{25}\)

Price variation could be modelled in a similar fashion to the model
of share-price variation in King (1966) and the model of income variation
in Brown and Ball (1967). Denoting the general price index by \(\bar{p}_g\), the
specific price index for a class of goods by \(\bar{p}_c\), and the price of a
particular factor in that class of goods by \(\bar{p}_f\), we could postulate that:

\[
\bar{p}_{ft} = \alpha_0 + \alpha_1 \bar{p}_{gt} + \alpha_2 \bar{p}_{ct} + \bar{c}_{ft}
\]

where \(\bar{c}_{ft}\) is a well-behaved disturbance term. Because the indexes are
calculated from a less-than-exhaustive sample of prices, it is cheaper to
construct indexes than it is to search every individual price. Once the
proposition of section II is admitted (that information about current prices
is less than perfect), a rationale is provided for adjusting dated individual
prices in accordance with changes in samples of prices which are correlated
with the individual prices.

IV.6 Summary. This section deals with five areas of debate on valuation.
Each has been reinterpreted in terms of a world view in which buying and
selling prices are equal to present values, and in which costs of providing
information about current prices are positive.

\(^{25}\) The heterogeneity issue is again relevant and not discussed. See
fn. 19.
Proposition (4): The debate on valuation in accounting is either empty or it must be reinterpreted in terms of the application of, not the definition of, prices.

V CONCLUSION

No balanced review of either topics or authors has been attempted. The aim of the paper is to apply economics to accounting. It should be clear that prior attempts to do so have not been notable for their rigour.
REFERENCES


