



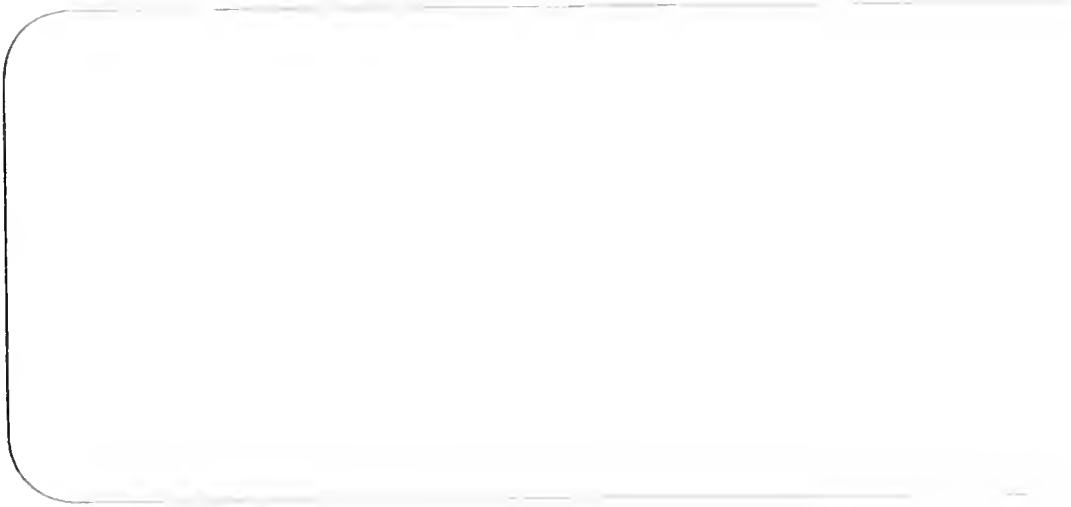
Faculty Working Papers

INFORMATION TO ALLOW APPRAISAL
OF MANAGEMENT'S FIXED ASSET DECISIONS

James C. McKeown

#103

College of Commerce and Business Administration
University of Illinois at Urbana-Champaign



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**Information to Allow Appraisal
of Management's Fixed Asset Decisions**

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Information to Allow Appraisal
of Management's Fixed Asset Decisions

The need of external financial statement users for information that will facilitate an evaluation of management performance has been noted by several authors. These authors range from accounting committees ("The prediction of such [management] effectiveness would appear to be highly important to virtually all groups of external users of accounting information . . ." ¹) to individual accountants ("Security analysts, searching for key criteria for use in predicting business success, are interested, of course, in measured profit and statements of financial condition. Yet they usually give even greater recognition to management capability and human technical know-how." ²) to statement users ("the [financial and other] information ought to enable a competent person to judge the abilities of the corporate management." ³).

No uniform list of information requirements emerges from these writings, but all indicate an interest in (accounting) information which will aid the external user in his attempt to judge the effectiveness and efficiency of management. Since managerial decisions and actions related to the acquisition and use of fixed assets are extremely important to the success of the firm, an examination of the opportunities for improvement of accounting disclosure with regard to this area seems particularly appropriate.

¹Committee to Prepare a Statement of Basic Accounting Theory, A Statement of Basic Accounting Theory (American Accounting Association, 1966), p. 25.

²R. Lee Brummet, "Accounting for Human Resources," Journal of Accountancy, December 1970, pp. 62-63.

³Corliss Anderson, "The Financial Analyst's Needs," Berkeley Symposium on the Foundations of Financial Accounting (School of Business Administration, University of California, Berkeley, 1967), p. 100.



Although the objectives of financial statement users have not been determined, the assumption will be made that the statement user (particularly a stockholder) desires management to take actions which will maximize the present value of the future cash flows to the company.⁴ Therefore, to evaluate the effectiveness of management, the reader will wish, possibly among other uses, to utilize financial statements to determine whether management has made any decisions which result in a lower present value of future returns than the present value which would have resulted from a known alternative course of action. In order to identify incorrect asset acquisition or disposition decisions, an external financial statement user would need information which would enable him to answer the following questions:

1. Did the management acquire fixed assets which it should not have acquired?
2. Did the management pass up profitable opportunities to acquire fixed assets?
3. Did the firm dispose of fixed assets which should have been held?
4. Did the firm hold fixed assets which should have been disposed of?

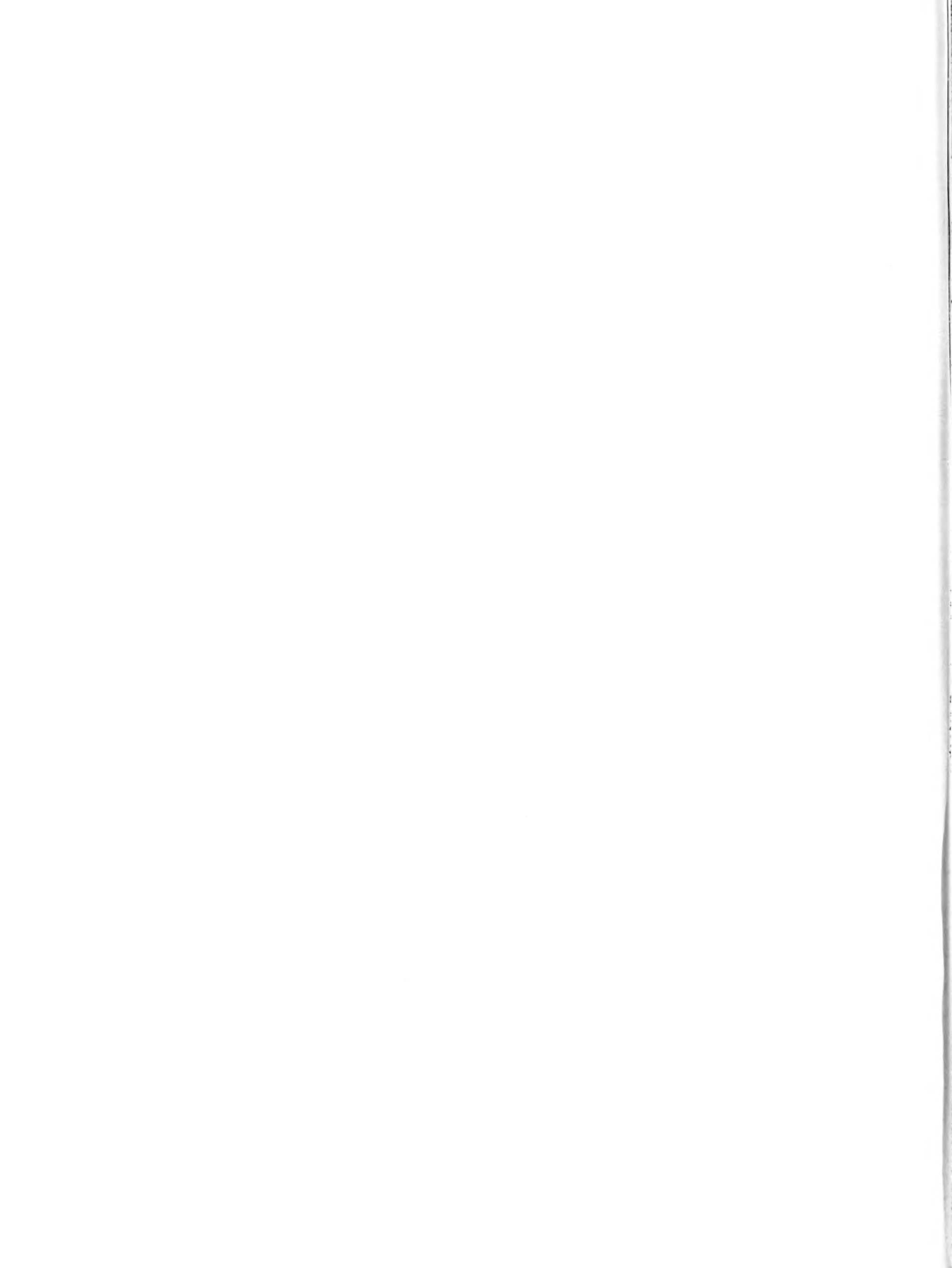
⁴Alternatively, it can be assumed that although a particular reader may not desire management to take actions which will maximize the present value of future returns to the company, he will assume that management's goal is to maximize present value of future returns and evaluate management's effectiveness in achieving their perceived goal. Another view leading to the same conclusion indicates that although investors may have non-economic goals, these motivations cannot "form any part of the basis for a structure of ideas about how to account. If a firm has liabilities stemming from its social responsibilities, those liabilities are relevant to investment decisions aimed at maximization of returns, but the political and social views of the management are not within the realm of accounting except as they affect the firm's finances."



It is suggested in this paper that the use of accounting valuations based on net realizable value measurements, with income determined by deducting a type of imputed interest (defined below) as an expense, would provide information useful in developing answers to some of these questions. To support this suggestion, information believed to be appropriate in developing answers to each of these questions will be identified, defined, and analyzed. This information will then be compared with that provided by the proposed net realizable value reporting system.

"Net realizable value" is defined here as the maximum net amount which can be realized from the disposal of that asset within a short period of time (not forced sale situation but not long enough to allow disposal of fixed assets through ordinary use of services). "Net amount" is defined as the selling price less disposition costs including tax effects, all discounted to the point of measurement. The imputed interest expense to be deducted in determining income is computed by the application of an interest rate (discussed later) to the beginning owner's equity--net realizable value of assets minus net realizable value of liabilities.

It is assumed throughout most of the paper that the returns attributable to a particular fixed asset can be determined for all past periods during which the company has held the asset. This assumption is not as restrictive as it may seem since all that is required is the determination of the incremental contribution of the asset. That is, the measurement required is the amount of the reduction of a past cash flow which would have occurred had the firm not sold a particular asset. This amount should, in general, be determinable. Although, in some cases, practical problems might occur in attempting to



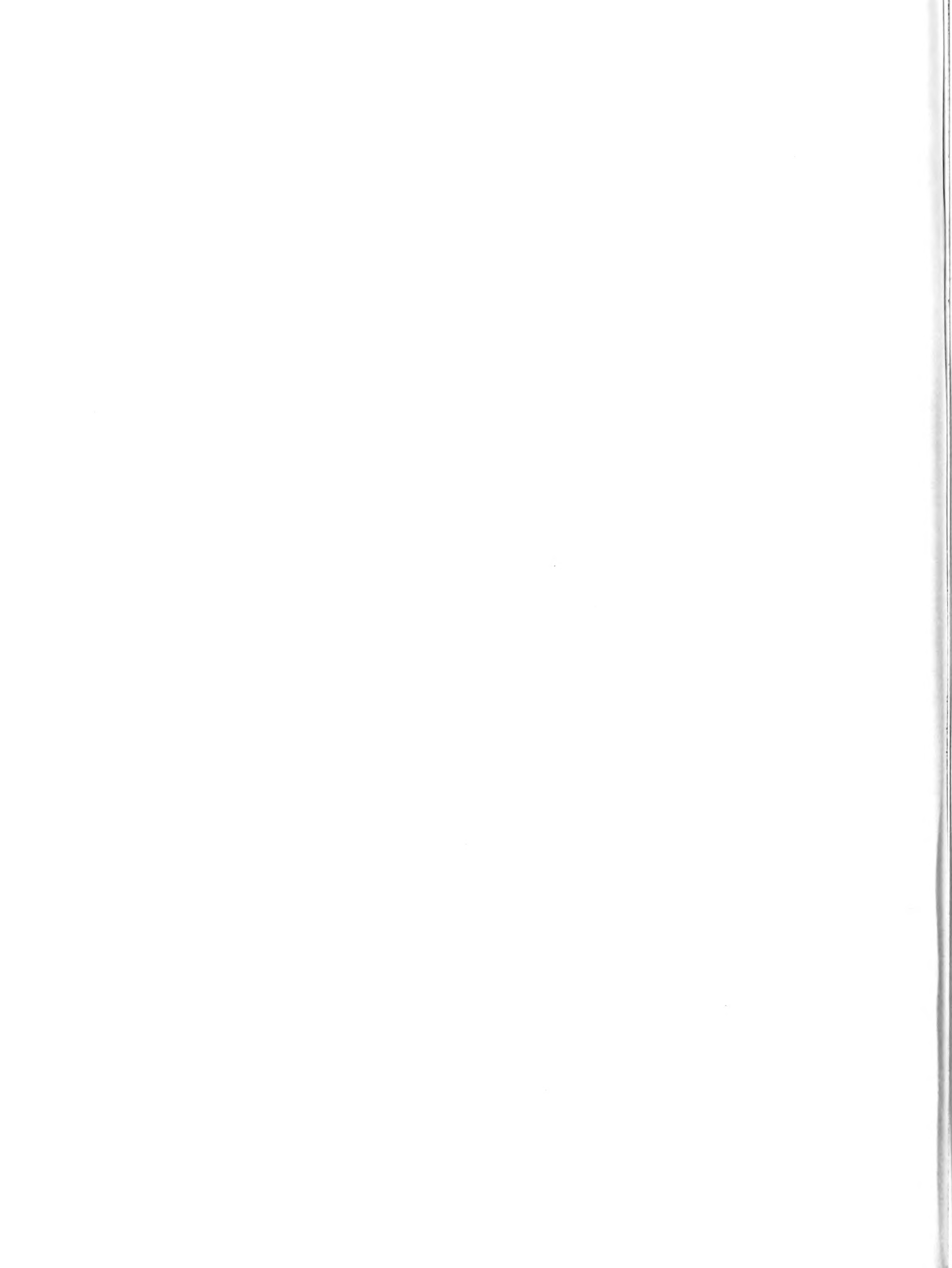
determine it, this measurement appears likely to be feasible in most cases, and it is certainly conceptually valid in that it does not require an arbitrary allocation of the total cash flow of the firm among all of its assets with the condition that the sum of the cash flows assigned to the individual assets is equal to the total cash flow of the firm.

1. Did the management acquire fixed assets which it should not have acquired?

Evaluation of past decisions to acquire fixed assets requires, for each asset acquired, comparison of two values: the acquisition cost of the asset and the sum of net cash receipts attributable to the asset discounted to the time of purchase. If the cost was greater than the discounted value of the receipts, the acquisition decision must be judged incorrect. While the argument may be made that the decision might have appeared correct based upon the estimates of future returns which were available at the time of purchase, this argument ignores the fact that these estimates are one of two distinct areas of managerial performance involved in a decision of this type:

- a) The preparation of accurate estimates of the increase in future returns which would result from the purchase of the asset;
- b) The determination of the correct acquisition decision based upon the estimates prepared in (a).

Unless management is prepared to publish the long-range estimates which were used in their fixed asset decisions, the accountant will not be able to provide information to permit evaluation of the two areas separately. The appraisal of management will have to be based upon the evaluation of the



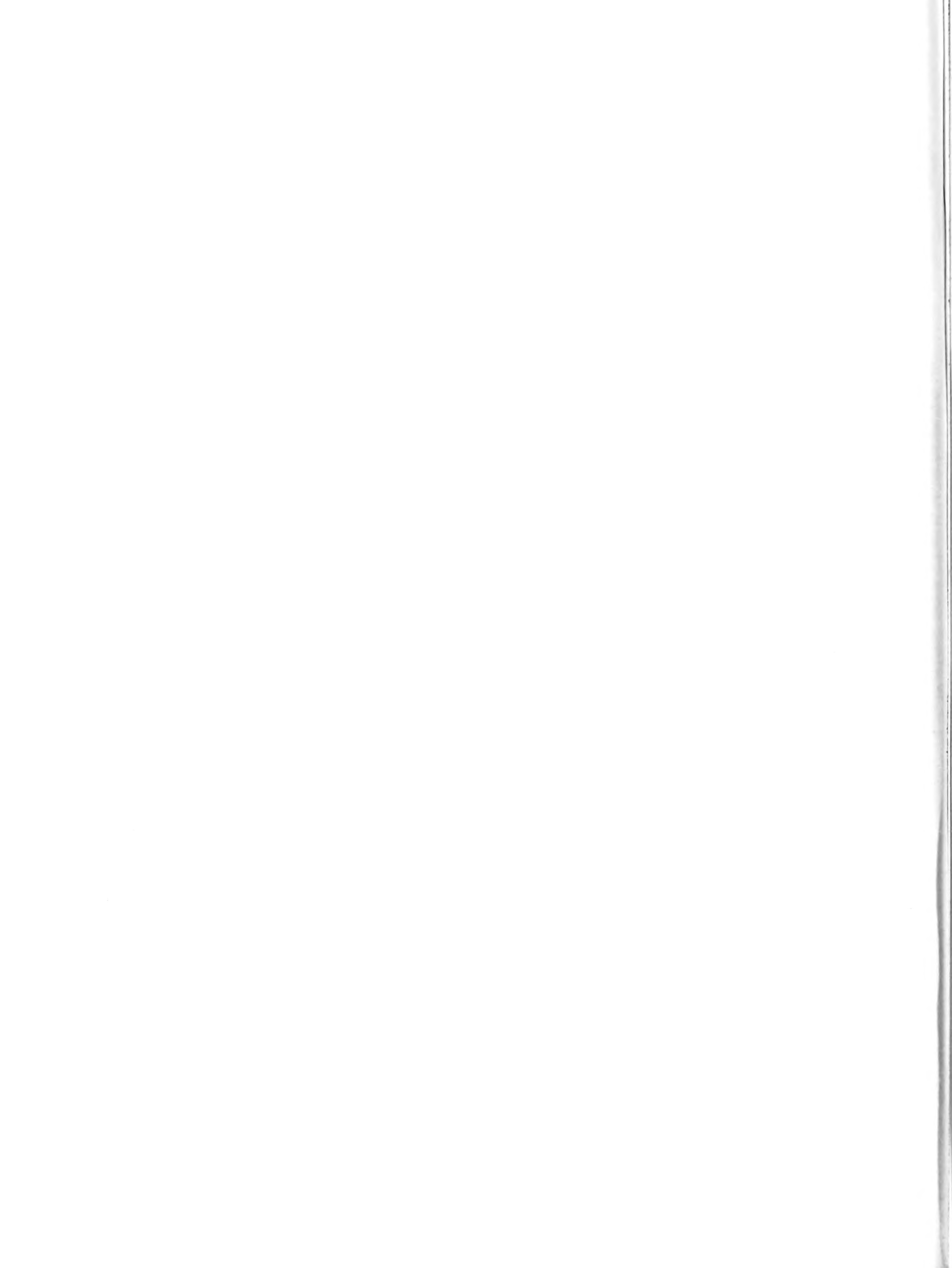
decision made. The cause of an incorrect decision may lie with either the estimates or the decision based upon the estimates or both. The fact remains, however, that the wrong decision was made.⁵

In attempting to supply the information necessary to evaluate past management decisions to acquire fixed assets, the accountant may encounter four situations requiring measurement of different attributes:

1A. If the asset is still held at the time of measurement, computation of the sum of net returns attributable to this asset discounted to the time of purchase will require knowledge of receipts subsequent to the end of the period. In general, this projection of future receipts will be a difficult one to make. If the accountant could make this projection for all assets, he could measure directly the change in discounted value of future receipts of the firm and would simply present that information to the user.

1B. In certain cases where the asset is still held at the time of measurement, projection of future returns would not be necessary. The purchase of a fixed asset can be evaluated simply by knowledge of the relationship between the acquisition cost of the asset and the sum of the discounted returns due to the asset. The acquisition decision can be established as correct if the information presented enables the user to determine that the sum of the discounted returns will be greater than the acquisition cost even if the information presented does not allow the user to compute the amount of the

⁵ Although this evaluation criterion may seem rather harsh, no management is expected to be clairvoyant. Thus, a good management performance would be indicated by a low percentage of incorrect decisions rather than a complete avoidance of incorrect decisions.

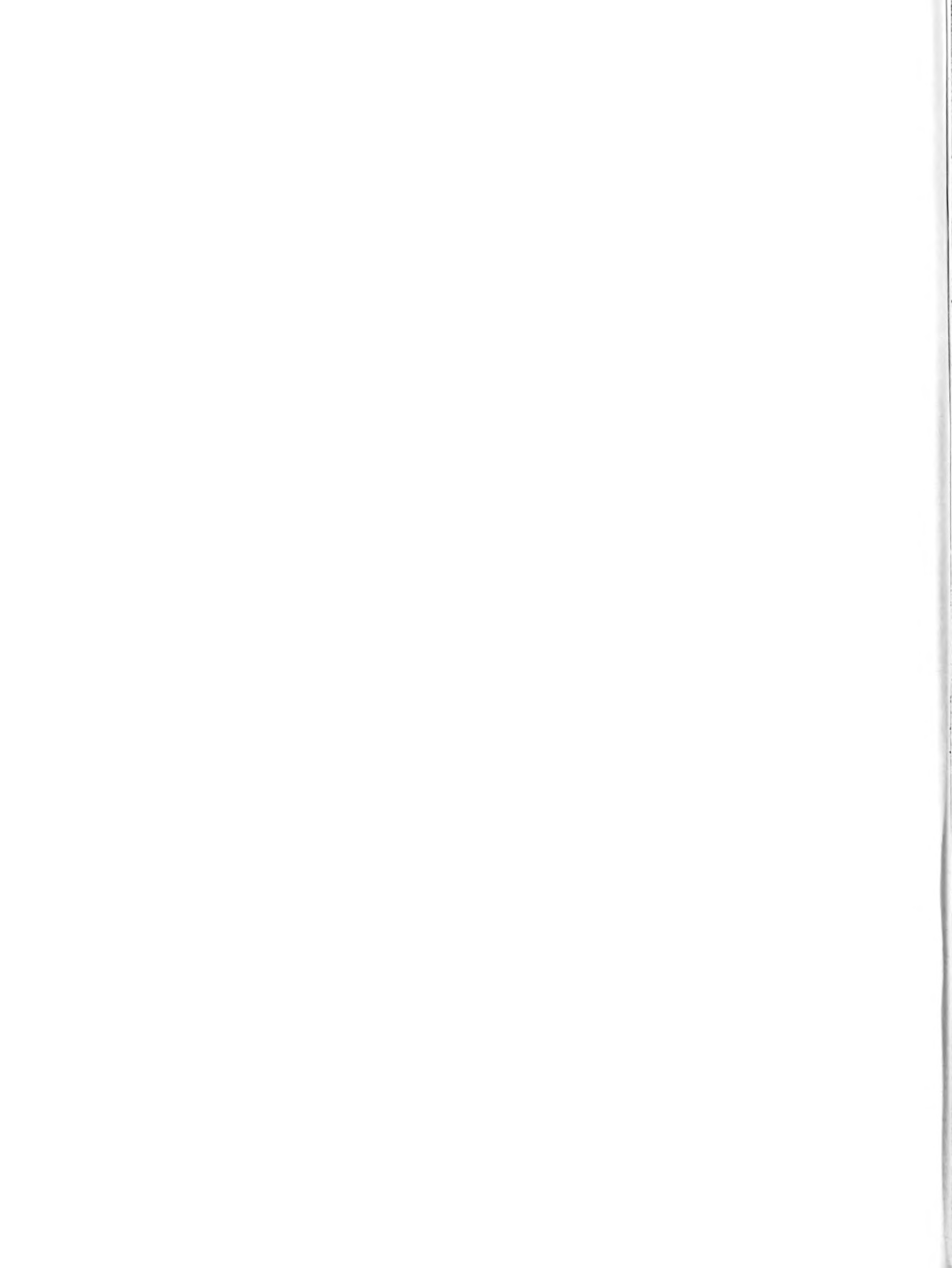


discounted returns. This will be the situation if the sum of the past receipts plus the current net realizable value, all discounted to the time of purchase, is greater than the cost. Since the asset could be sold immediately to gain a total discounted return greater than the cost, the acquisition decision can be judged correct without projection of future returns. The proposed accounting system would help the user reach this conclusion by reporting the current net realizable value.

It may appear that the analysis in the previous paragraph ignored the possibility that the firm may hold the asset for some period subsequent to the reporting date and receive returns that result in a sum of returns discounted to the time of purchase which are less than the asset's cost. This possibility exists, but could only occur if the sum of the receipts subsequent to the current reporting date, discounted to the current reporting date, were to be less than the current net realizable value. (See Appendix)

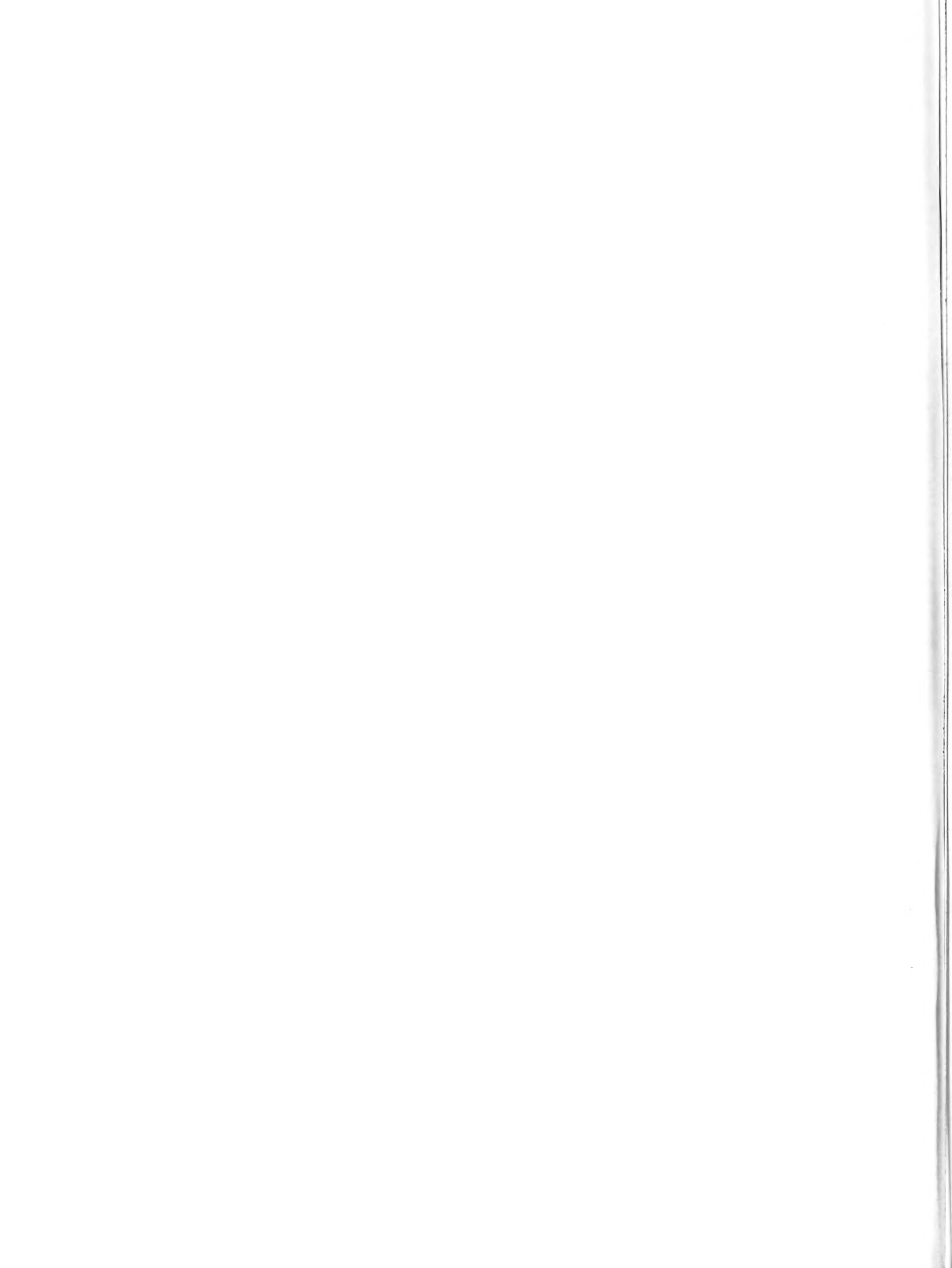
1C. If the asset has been sold, the receipts (including net receipts from the sale) are known and the sum of the receipts discounted to the point of purchase can be computed. If this amount is greater than the acquisition cost, the acquisition decision was correct although the statement user may wish to investigate intervening decisions to hold the asset (as discussed in section 4) or the decision to sell the asset. Most accounting systems would enable the user to evaluate this situation if sufficiently disaggregated information is provided.

1D. If the asset has been sold and the sum of receipts discounted to the point of purchase is less than the cost, management has made at least one incorrect fixed asset decision. The original decision to acquire the asset was probably incorrect, but it is also possible that the present value, at the time



of sale, of receipts which could have been gained had the asset been held, might have been greater than the net amount realized from the sale. In this case, the decision to dispose of the asset was incorrect, and the purchase decision might have been correct. The possibility of a correct decision to hold the asset at some point before the sale has been discussed above in section 13. Although the proposed system would facilitate identification of previous incorrect hold decisions, most accounting systems would provide information which would enable the statement user to determine that at least one incorrect fixed asset decision had been made.

The analysis above indicates that the proposed system would allow identification of one class of correct fixed asset decisions, those cases where the cost of each asset was less than the discounted sum of past receipts plus current net realizable value. Only a system which discloses net realizable values will permit identification of this class of decisions. The validity of acquisition decisions where the assets have been sold can be judged by using sufficiently disaggregated information which would be generated by almost any accounting system although classification of the incorrect decision may be facilitated by the fact that the proposed system provides information which allows increased statement user evaluation of decisions to hold fixed assets. The proposed system does not help to determine the validity of acquisition decisions where the assets are still held and the cost of each asset is greater than the discounted sum of past receipts plus current net realizable value. The validity of these decisions can only be determined by use of projections of future returns. Therefore the proposed system does as well as any other in providing information which permits judging of acquisition decisions related to

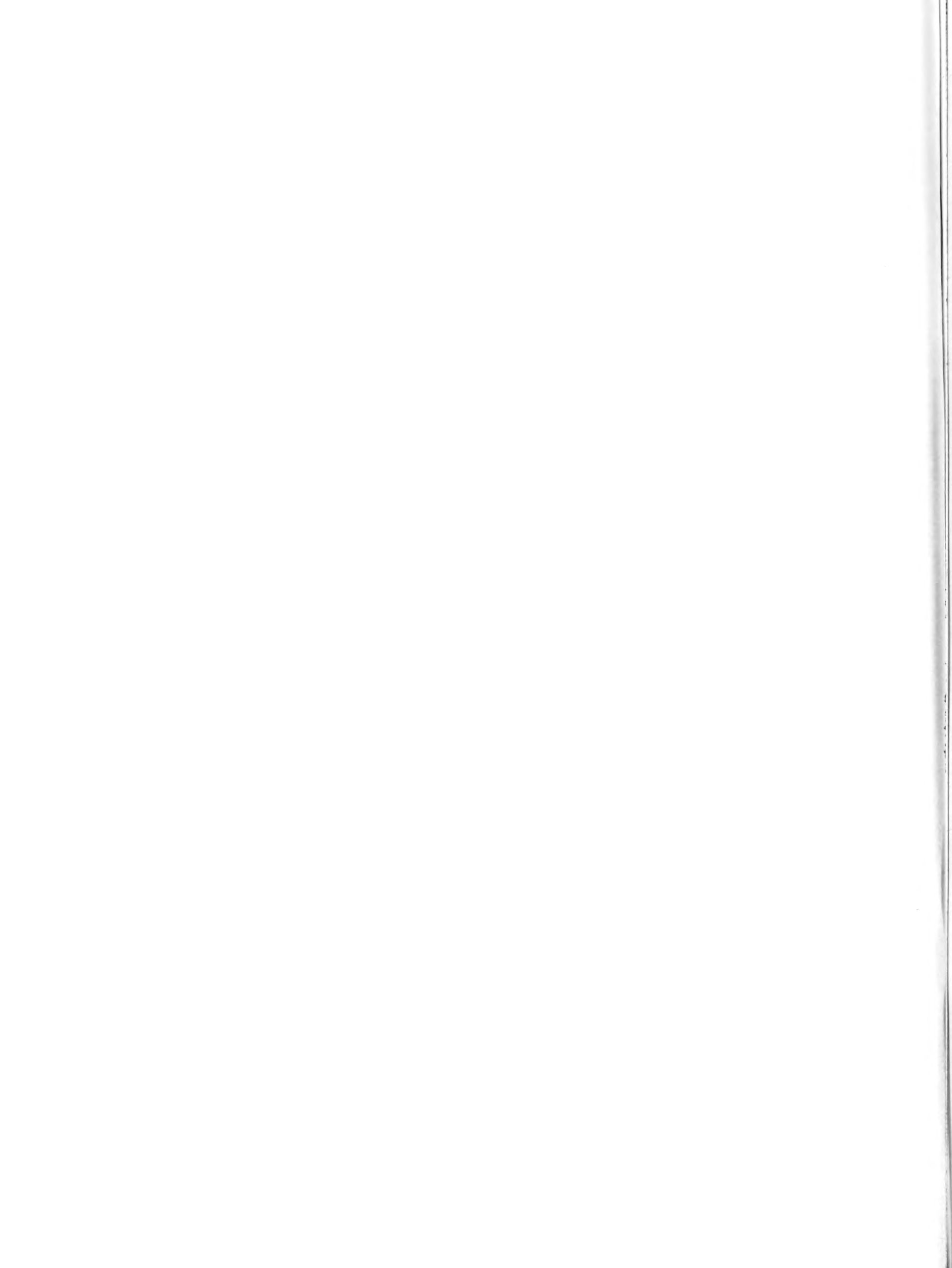


assets which have been sold and provides better information than systems not providing net realizable value measurements for some of the other acquisition decisions.

2. Did the management pass up profitable opportunities to acquire fixed assets?

Evaluation of past decisions to refuse to purchase assets requires, for each asset not purchased, the comparison of two amounts: the cost which would have been incurred had the asset been purchased and the sum of net cash receipts which could have been gained, discounted to the time at which the asset could have been purchased. The first problem the accountant has in presenting this information to the external user is the determination of the assets about which information is desired. The assets of interest need not be limited to those which management considered purchasing, since failure to even consider a profitable opportunity is as much a mistake as a conscious decision to pass up the same opportunity. Since this unlimited approach would require information related to numerous diverse assets, the practical user would probably be content to evaluate the refusal to purchase fixed assets similar to those used in the firm or some other proper subset of total asset purchase opportunities.

Even if the subset of assets of interest to all external users could be determined, the information required by the users could generally not be provided by any accounting system. Although the amount of the hypothetical cost might be approximated by use of the cost of a similar asset purchased at the same time, this situation will generally not be true. The determination of the benefits which were relinquished would require the same type of information needed to measure the benefits of assets which were purchased (Question 1) with the additional difficulty that the receipts foregone in the past would be hypothetical. Measurement of the hypothetical past receipts would require a

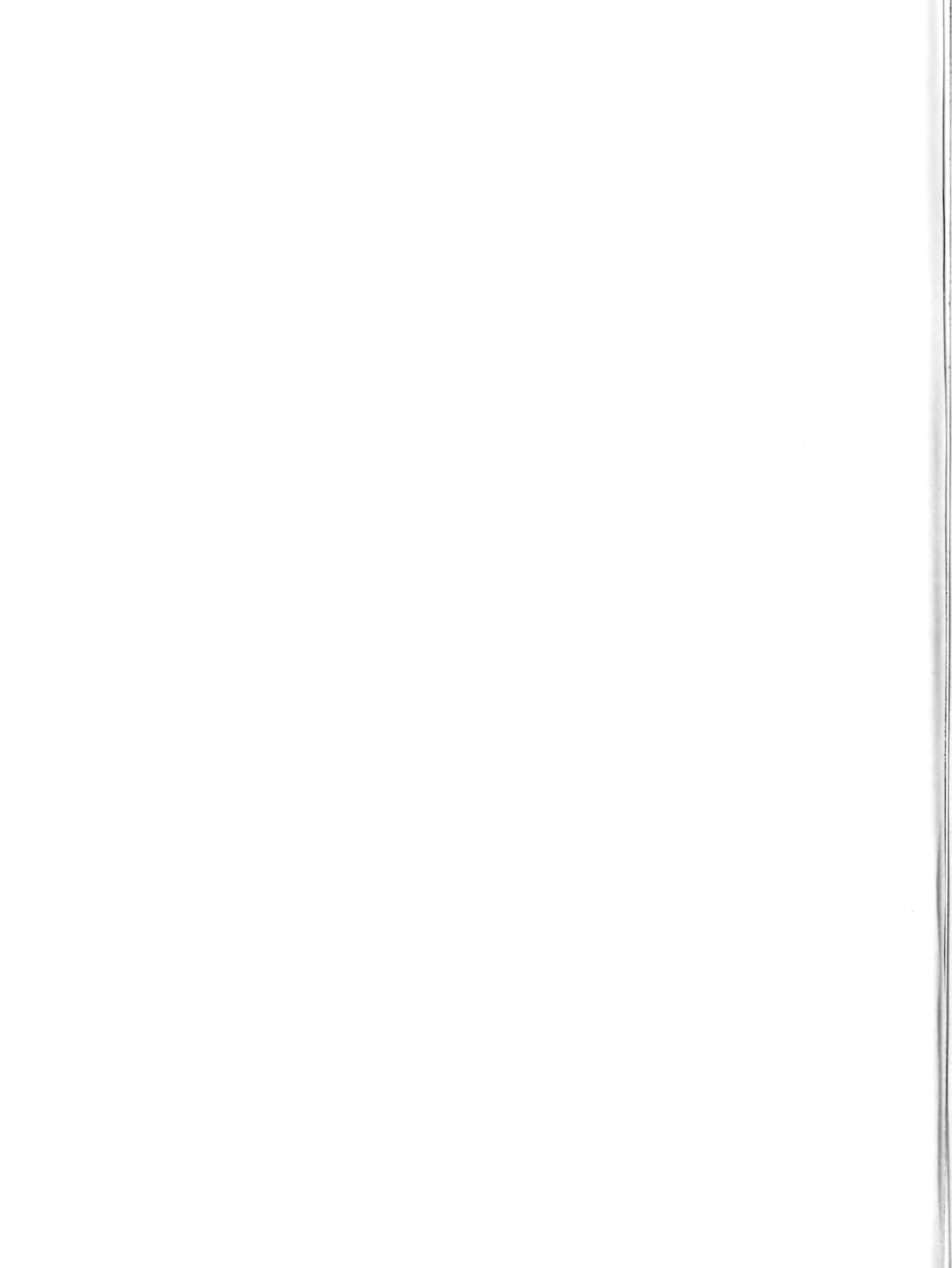


knowledge of the receipts generated by a similar asset in a similar company. The similar firm could, of course, be our firm although this would require verification that the asset not purchased could have been used in the same manner as the similar asset which was held.

In summary, the information required to determine whether profitable opportunities to purchase fixed assets have been neglected is not likely to be provided by any accounting system due to the difficulties of selecting assets of interest to report upon and measuring their hypothetical returns. The proposed system does not provide the information necessary to evaluate management actions in this area.

3. Did the firm dispose of fixed assets which should have been held?

The information required to evaluate each decision to dispose of an asset is the relationship between the net amount realized from the disposal and the sum of the receipts, which could have been secured had the asset been held, discounted to the point of sale. If the net proceeds from the sale are less than the discounted net returns foregone, the disposal decision was incorrect. While most accounting systems would report the proceeds of the sale, the presentation of the receipts foregone would require solution of the problems outlined above (Question 2) concerning measurement of hypothetical receipts foregone by refusing to purchase an asset. That is, the past receipts relinquished could only be approximated by measurement of the receipts generated subsequent to the time of sale by a similar asset in a similar company while future receipts foregone must be estimated. The proposed system and other accounting systems do not provide sufficient information to evaluate management decisions in this area. (The proposed system has one related advantage. Although



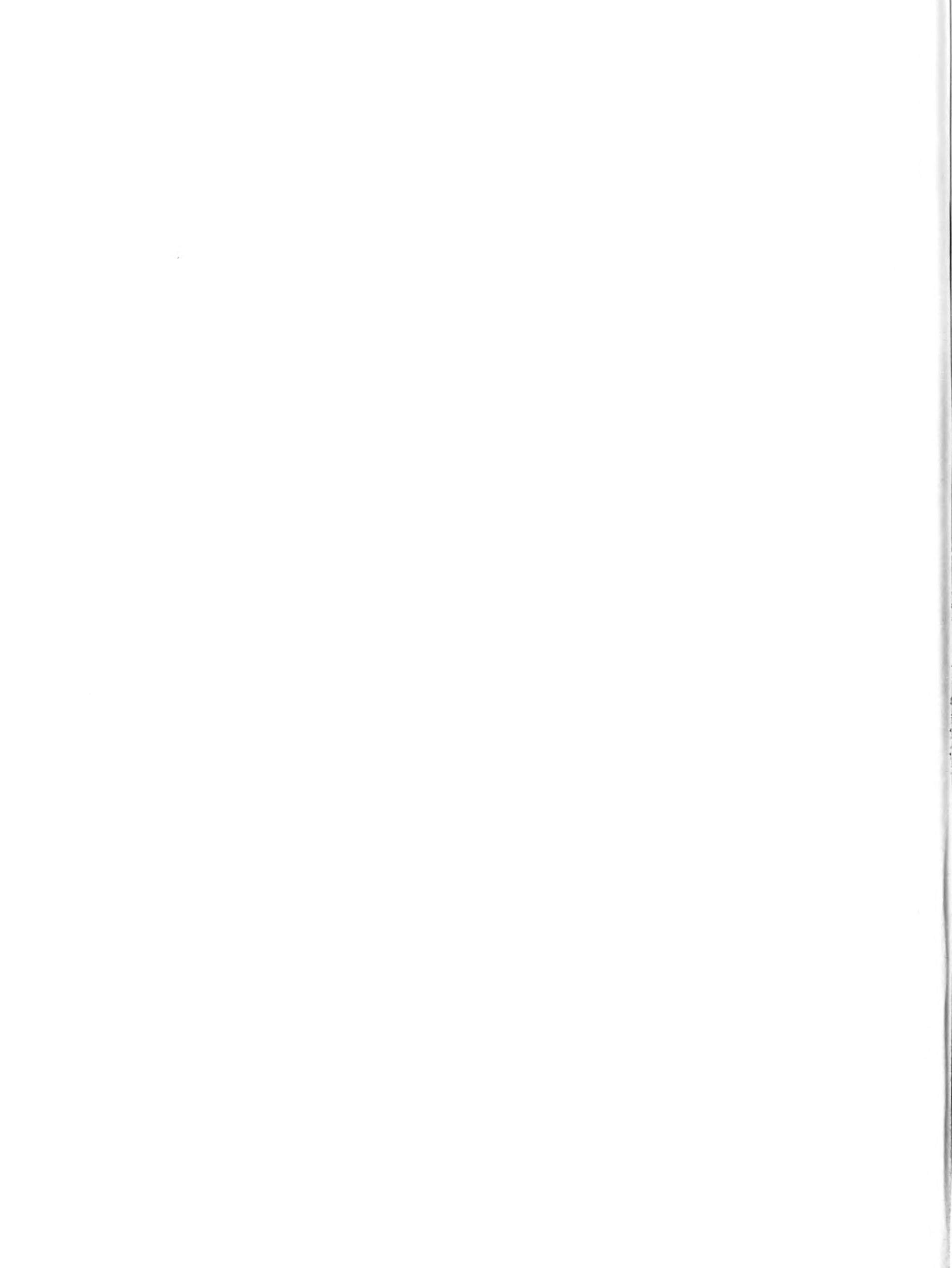
the method of disposal is not the focus here, the proposed system would allow some evaluation of this. If the disposal occurred at or near the beginning of a period, knowledge of the net realizable value at the end of the preceding period would give some indication of the effectiveness of the disposal method.)

4. Did the firm hold assets which should have been disposed of?

Evaluation of decisions made to hold fixed assets requires, for each such decision, knowledge of the relationship between the net amount which could have been realized at the time the decision was made (net realizable value) and the sum of later receipts which could be generated from the asset, discounted to the time of the decision (economic value). If the net realizable value of the asset at the time of the decision was greater than the economic value of that asset at the same time, the asset should have been sold. While the proposed system will obviously report the net realizable value at each balance sheet date, the system will not present the economic value.

Fortunately, as discussed previously, it is not always necessary to know the value of two numbers to determine their relationship. It is possible using the proposed accounting system to obtain some information concerning the accuracy of management's decision made at the end of a period to hold an asset. (The probably superior function of more frequent evaluation of hold decisions could only be accomplished by increasing the frequency of financial reports. That is not the focus here.)

To demonstrate this, assume the user wishes to evaluate a decision to hold an asset at the end of a previous period and let:



r = interest rate

NRV_i = net realizable value of asset at the end of period i

IPV_i = present value (at the end of period i) of receipts generated subsequent to period i by the internal use with the maximum present value of future receipts. (Internal use is defined as any use which does not involve disposal at time i .)

TPV_i = maximum present value at the end of period i

CF_i = net cash flow into the firm during period i attributable to the asset (either occurring at the end of the period or translated to the end--it is only necessary to know when the cash was received).

Y_i = income for period i measured according to the proposed accounting system

$$= CF_i + NRV_i - NRV_{i-1}(1+r)$$

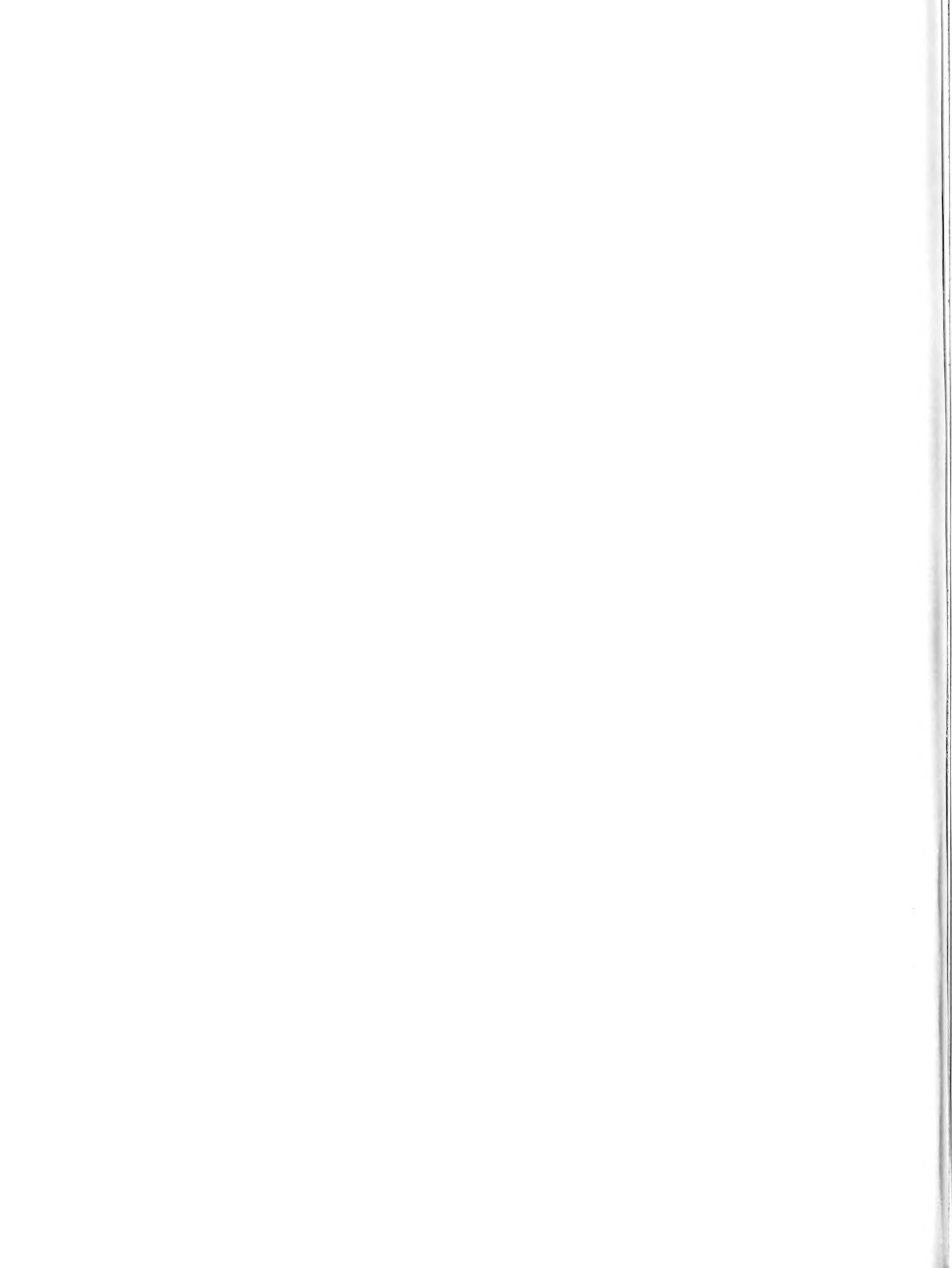
Assume that the current time is the end of period T . Since the asset could be sold immediately,

$$TPV_T \geq NRV_T \quad (1)$$

This does not assume that management will make the correct decision at the end of period T . It simply means that the maximum discounted present value of receipts available to management is no less than NRV_T .

Since $IPV_{T-1} = \frac{TPV_T + CF_T}{(1+r)}$, (1) implies that

$$IPV_{T-1} \geq \frac{NRV_T + CF_T}{(1+r)} \quad (2)$$



The income reported under the proposed system for period T would be

$$Y_T = CF_T + NRV_T - NRV_{T-1}(1+r)$$

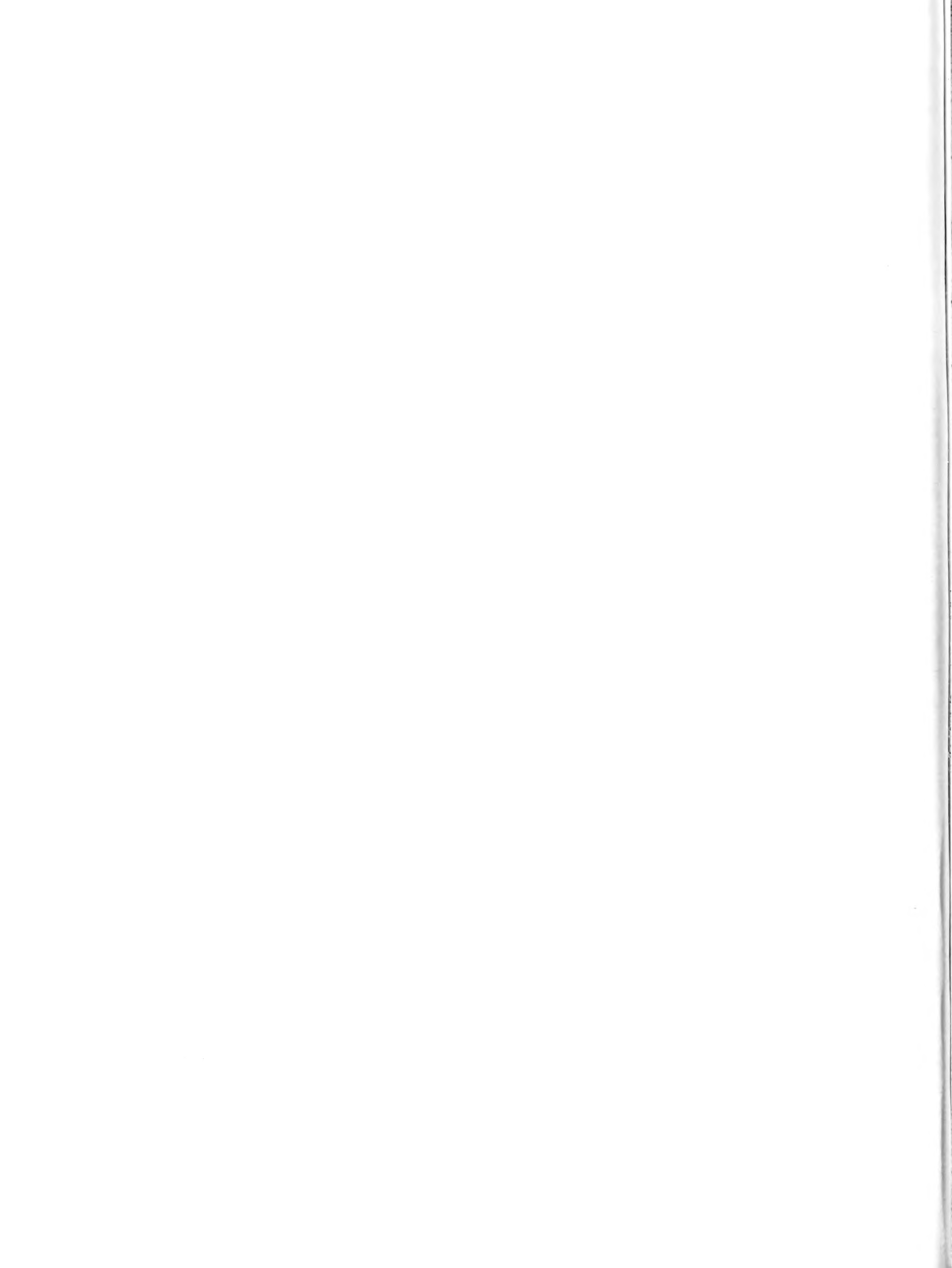
or

$$\frac{Y_T}{(1+r)} = \frac{CF_T + NRV_T}{(1+r)} - NRV_{T-1} \quad (3)$$

From (2) and (3)

$$\frac{Y_T}{(1+r)} \leq IPV_{T-1} - NRV_{T-1} \quad (4)$$

If $Y_T \geq 0$, then $IPV_{T-1} - NRV_{T-1} \geq 0$, or the discounted present value of the asset at the beginning of the period was greater than the net realizable value at that point. Thus, if the income reported for the period was positive, the decision to hold the asset at the beginning of the period is known to have been correct. Reported income of zero would mean that the rate of return on equity was at least r . If r is a satisfactory rate of return, the hold decision at T-1 is still known to have been correct. Even though the inverse is not true (negative reported income does not mean that an incorrect decision was made), the user is still able to determine that those assets for which the income figure is positive should have been held. This conclusion is possible, without knowledge of the future, simply by reference to current markets. The user is able to divide the hold decisions at time T-1 into those which he knows were correct and those which might have been correct. If it is possible to make estimates of discounted present value at some expense and the user wishes to evaluate all hold decisions at time T-1, he need only incur the expenditure necessary to estimate economic values of the assets whose reported incomes were negative.



Before discussing the rate problem, the conditions under which the correct decision was made to hold the asset at time T-1 but for which the reported income was negative will be examined. For the hold decision at time T-1 to have been correct,

$$IPV_{T-1} \geq NRV_{T-1} \text{ and } TPV_T > NRV_T \text{ or } TPV_T = IPV_T \quad 6 \quad (5)$$

Since $IPV_{T-1} = \frac{IPV_T + CF_T}{(1+r)}$,

$$IPV_{T-1}(1+r) = IPV_T + CF_T$$

or $IPV_{T-1} - IPV_T = CF_T - r IPV_{T-1} \quad (6)$

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If $IPV_T = NRV_T$

then $IPV_{T-1} = \frac{CF_T + NRV_T}{(1+r)} \quad (a)$

Since $Y_T = 0$

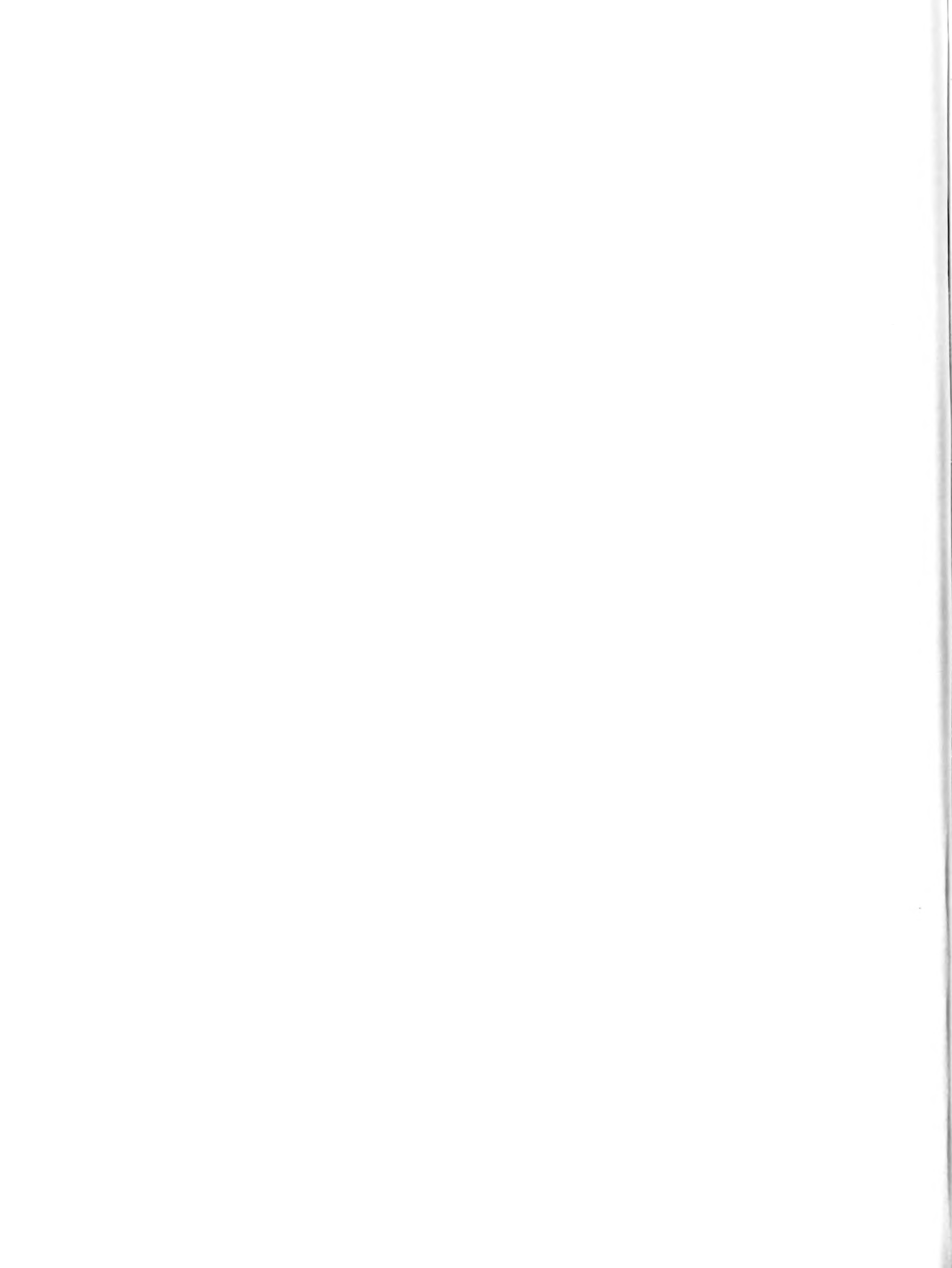
$$CF_T + NRV_T - NRV_{T-1}(1+r) < 0$$

$$CF_T + NRV_T < NRV_{T-1}(1+r)$$

$$\frac{CF_T + NRV_T}{(1+r)} < NRV_{T-1} \quad (b)$$

From (a) and (b) $IPV_{T-1} < NRV_{T-1}$

Therefore the hold decision cannot have been correct if the income under the proposed method is negative and there exists at the end of period T no internal use with greater present value of receipts than the NRV_T .



From (3) negative reported income implies

$$\frac{CF_T + NRV_T}{(1+r)} < NRV_{T-1}$$

or
$$NRV_{T-1}(1+r) > CF_T + NRV_T$$

or
$$NRV_{T-1} - NRV_T > CF_T - r NRV_{T-1} \quad (7)$$

(7) - (6) gives

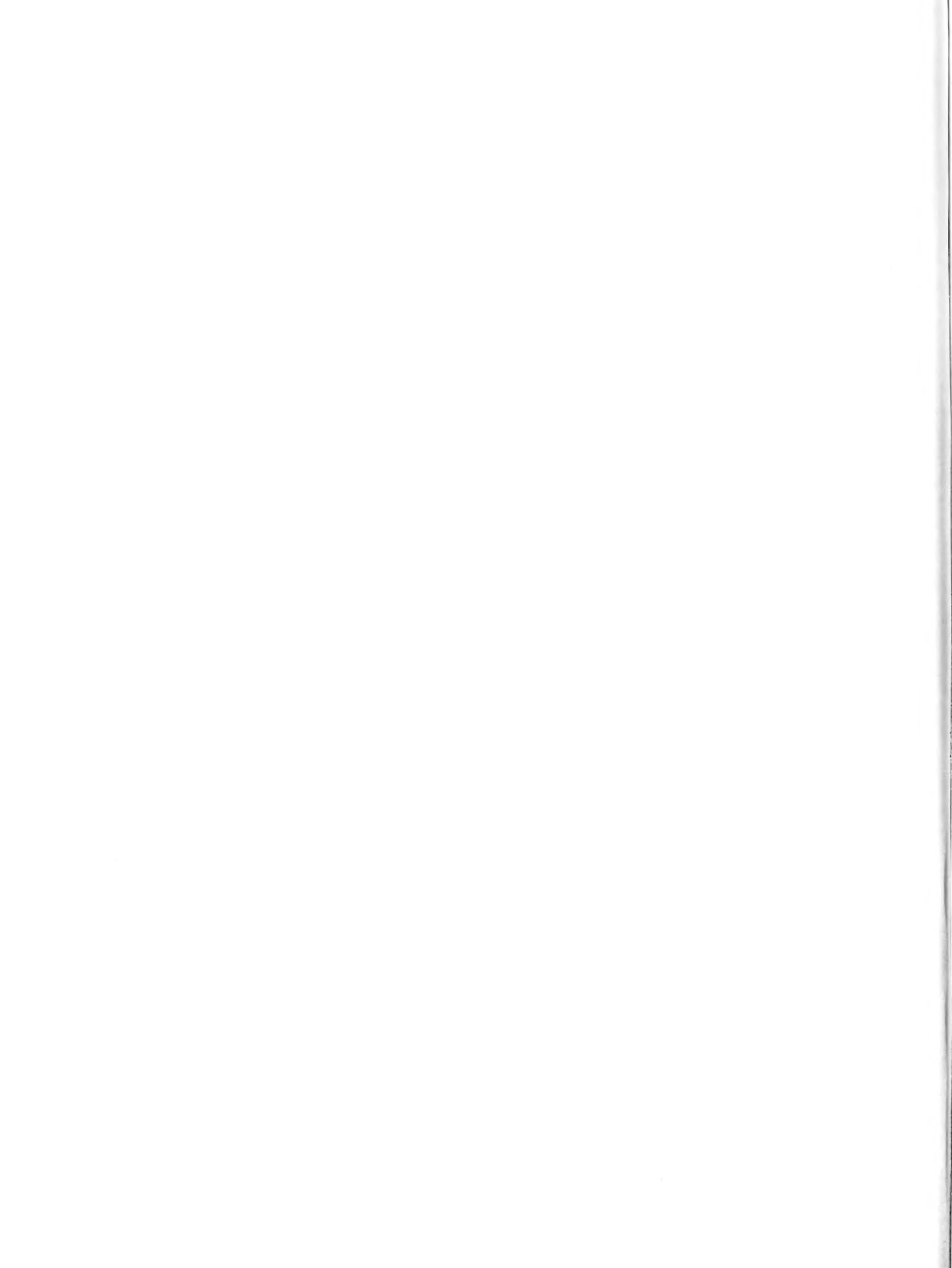
$$(NRV_{T-1} - NRV_T) - (IPV_{T-1} - IPV_T) > (CF_T - rNRV_{T-1}) - (CF_T - rIPV_{T-1})$$

or
$$(NRV_{T-1} - NRV_T) - (IPV_{T-1} - IPV_T) > r(IPV_{T-1} - NRV_{T-1}) \quad (8)$$

This means that the decrease in net realizable value during period T must exceed the decrease in economic value in internal use to the firm by more than the discount rate times the difference between the economic value at time T-1 and the net realizable value at time T-1. The right side of inequality (8) is non-negative since r is positive and $(IPV_{T-1} - NRV_{T-1}) \geq 0$ by inequality (5). The frequency with which this situation will occur can only be determined empirically, but a priori reasoning would indicate a fairly low frequency. Further, a negative reported income would not arise each time inequality (8) was satisfied, since that inequality represents a necessary but not sufficient condition for a negative reported income resulting from a correct hold decision. The difference at time T between the economic value to the firm and the net realizable value is likely to be greater than (1+r) times that difference at time T-1 for two reasons.⁷

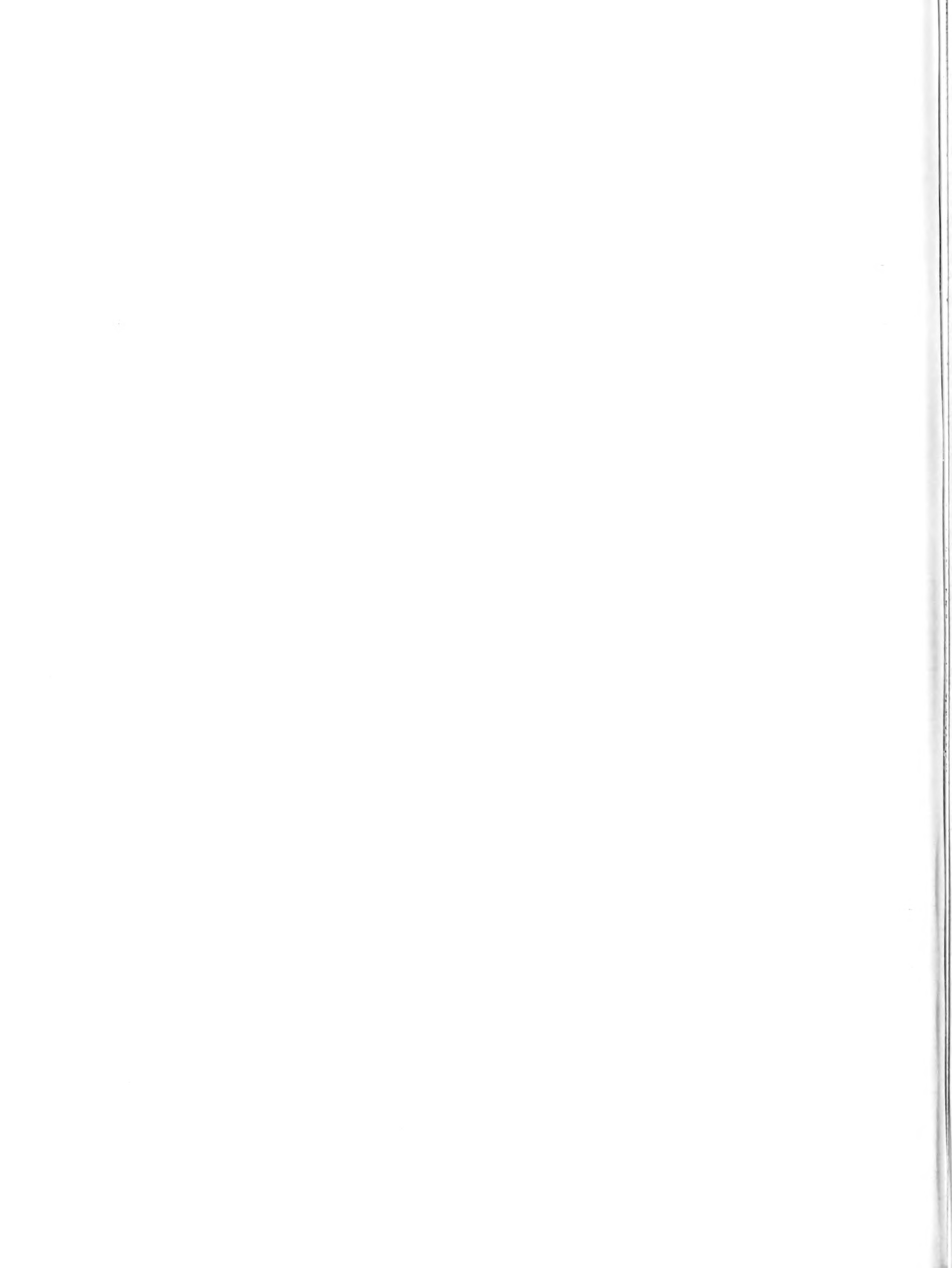
⁷Inequality (8) can be rearranged to

$$(IPV_T - NRV_T) > (1+r) (IPV_{T-1} - NRV_{T-1})$$



1. The market structure has changed to cause the difference between discounted present value and net realizable value to increase either due to an increase in proportionate frictions or an increase by more than a factor of $(1+r)$ in the value of the asset. Frictions include such costs as commissions on purchase and sale, costs of preparation for sale, effect on seller's tax liability and purchaser's cost of preparation for use. Many frictions decrease as the asset value decreases. Therefore an increase in asset value might cause a larger difference between economic value and net realizable value. In either case the entire market for similar assets should be affected in the same way and the effect should be apparent from statements of other firms in the same industry. The increase in value of the asset would probably not result in negative reported income anyway since that could only result from negative cash flow if the net realizable value increased by a factor greater than $1+r$.

2. The management's estimate of the returns which the firm can realize from future use of the asset is higher than the estimate of other actors in the market. Given that the friction structure remains the same and asset value does not increase, if the other actors in the market hold an estimate of the economic value of the asset equal to management's estimate, then net realizable value should be driven up to that estimate minus the total friction of purchase and sale. The difference between economic value and net realizable value would then be held to an amount no higher than the corresponding difference at time $T-1$. It is entirely possible for management to correctly hold an estimate of economic value higher than that held by other actors in the market, but the negative reported income would only appear in a period during which the difference between management's estimate and other estimates increases. The users of the financial statement may wish to examine these situations closely in their appraisal of management.



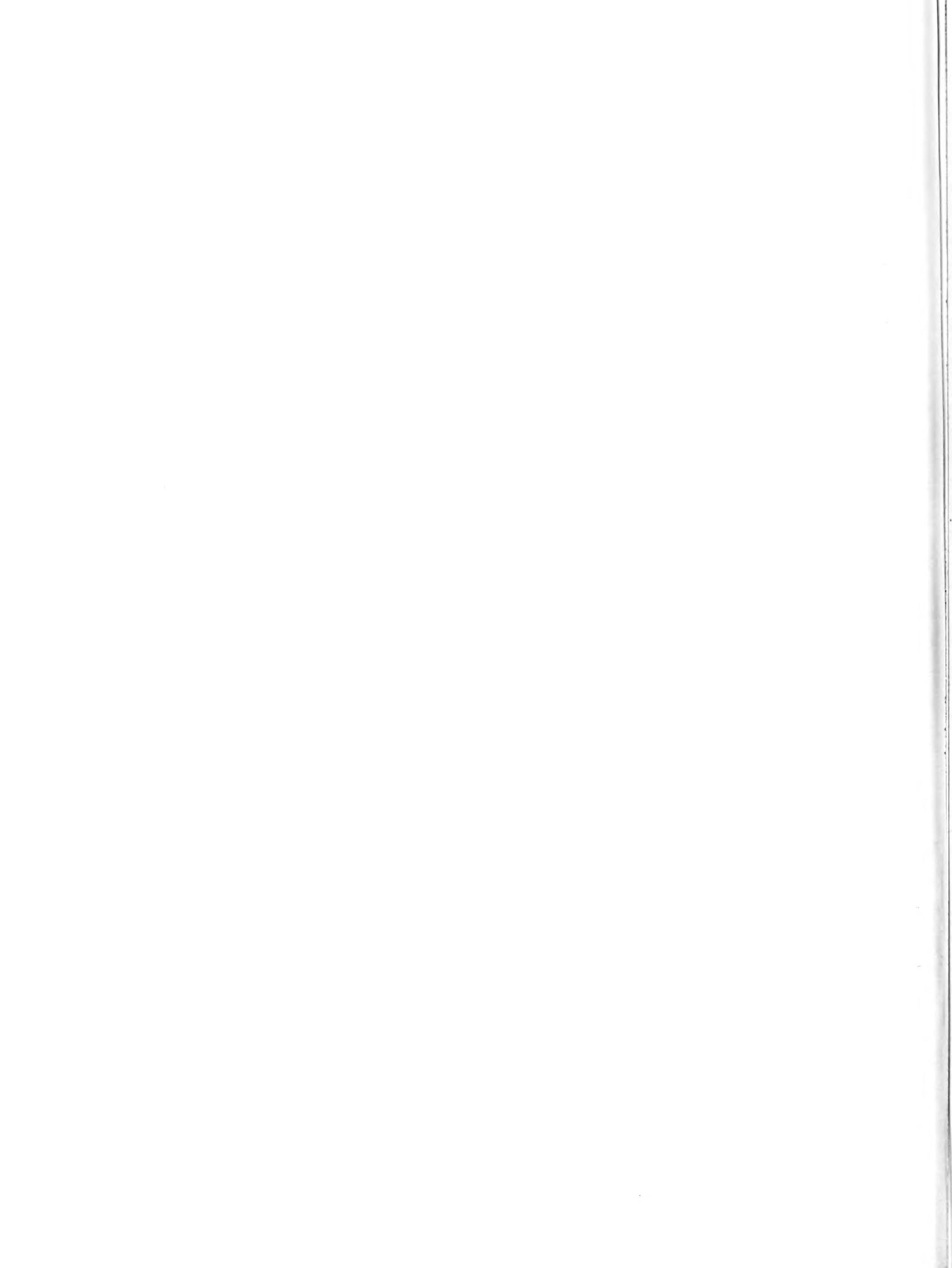
The proposed accounting system therefore enables the user to divide the management's decisions to hold assets at the beginning of the period into two sets. The first set contains those decisions affecting assets for which a non-negative income figure was reported. These decisions are known to have been correct. The second set contains decisions concerning assets for which a negative income figure was reported. There are three possible causes of these negative income figures.

a) The friction structure in the market was altered (or much less likely, the value of the asset increased by a factor of more than $1 + r$). This effect should be apparent on the financial statements of other firms in the same industry.

b) Management's estimate of the economic value of the asset at the end of the period is higher than the estimates held by other actors in the market. The user will probably wish to follow these situations closely to determine the accuracy of management's estimates.

c) The decision to hold the asset at the beginning of the period was incorrect.

Thus the user can investigate the second set of decisions to determine which of the three causes was responsible for the negative reported income figure. The relative frequency of decisions which fall into the first set and the various subsets of the second set can only be determined empirically, but the number of decisions in the first set should be large enough to significantly reduce the expense of evaluating management's hold decisions. It is possible that the frequency of negative reported income figures would provide a good practical surrogate to the answer to question 4. The information necessary to evaluate refusal to purchase is unlikely to be provided by any accounting system while the



proposed system, by presenting the net realizable value of assets as of the end of the period, will provide the information necessary to evaluate purchase and sale decisions if it is possible to evaluate them (cases where the sum of past receipts plus current net realizable value discounted to the time of purchase or sale respectively is greater than the consideration given or received). The claim can be made that the proposed system would provide users with information more suitable for appraising the individual fixed asset decisions of management more accurately than the information provided by current accounting practice.

None of the discussion above concerning evaluation of hold decisions depends on the asset being an individual asset rather than a group of assets which are used jointly to produce revenues. One problem concerning the use of the proposed system to evaluate buy, sell, and refusal to buy decisions for groups of assets is that purchases and sales are made at different points in time for different assets in the group. For evaluation of purchase decisions, at least, the problem might be solved by simply considering replacement expenditures as negative cash flows of the period concerned. Therefore the proposed system could be used to help evaluate hold decisions even when the past returns attributable to each individual asset could not be determined. In this way, statements prepared as suggested for the entire firm could provide a basis for an evaluation of management. In addition, information concerning separate "profit centers" could be analyzed and either presented in detail or summarized. In this context, a "profit center" is a group of assets whose returns stream can be segregated from the returns attributable to other assets or groups of assets held by the firm. Even for those firms whose total reported income was positive, the disclosure of individual profit center analysis could provide users with information for the appraisal of management in greater detail.

In response to the legitimate objection that publication of financial statements containing the disaggregated information necessary to evaluate hold decisions for individual assets or small groups of assets is impractical, the financial statement reader can be given almost as much information by including in the report a table indicating frequency of observation of the various exit value rates of return of individual assets or small groups computed by:

$$\frac{\text{exit value (end of period)} + \text{cash flow (during period)} - \text{exit value (beginning of period)}}{\text{exit value (beginning of period)}}$$

This rate can be calculated without knowing the user's discount rate. The user can then consult the table and determine the number of assets (or groups) for which the income figure suggested above was non-negative by computing the number of assets (or groups) which had an exit value rate of return greater than or equal to the user's discount rate.

Interest Rate

The determination of the rate to be used in the calculation of the imputed interest is likely to be the most difficult part of the application of the proposed accounting system. The rate which should be used is the minimum money rate of return which management should be willing to accept on any investment. The problem of the determination of this minimum rate can be approached from two viewpoints--management's or the investor's.

Working from the viewpoint of management, the appropriate rate should be known since it is the rate which management should be using as the cutoff rate in capital budgeting decisions. Accepting the argument that management may either not use a cutoff rate of return, not use the correct cutoff rate, or be unwilling to disclose to the accountant the rate in use, the accountant would probably have

to compute the cutoff rate of return, generally considered to be the marginal cost of equity capital. This approach takes a strict stockholder interpretation of capital budgeting where the investment in a project is considered to be the equity funds required for the project. Payments to creditors are considered negative cash flows. Since the determination of the marginal cost of equity capital has been discussed at length in the finance and management accounting literature, only two points will be mentioned here.

1. The computational formulas which have appeared in the literature are, at best, approximations of the marginal cost of equity capital.

2. Most of the formulas use, as one parameter, market price of the common stock of the firm. Since the objective here is to determine by inference the rate which measures the investor's time preference for cash, the market price of the firm's common stock will not be relevant for all investors. This fact is obvious because the market price represents the highest price which potential stockholders are willing to pay for one share of stock. Other potential stockholders might not be willing to buy the stock for any price greater than one-half the market price. It is true, however, that the market price should theoretically represent the value placed upon one share of stock by all current stockholders. If a current stockholder believes the stock is worth more than the market price, he should purchase more until the price rises to his subjective value. This reasoning assumes no capital constraints but does allow for a rising cost of capital due to increased borrowing. If a stockholder believes the stock to be worth less than the market price, he should sell his stock until he either has no more or the price is reduced to his subjective value. (There could be tax and control considerations which would make a difference, but the

statement should still be approximately true.) Practically, capital and portfolio planning constraints prevent some stockholders, whose subjective value of the stock is higher than the market price, from purchasing enough stock to raise the market price. Since the number of subjective values above and below the market price may be very high relative to the total number of investors, any estimate based on the market price can only be a very rough approximation of the true discount rate employed by many investors. For this reason, an interest rate determined by inference from the management viewpoint would not be accurate for all investors. (This also implies that management's task of computing a cutoff rate based on stockholders' objectives for capital budgeting is an extremely difficult one.)

The best source of information concerning the rate which measures an investor's time preference for money is the investor himself. He is also in the best position to adjust his personal time preference rate, for such items as tax considerations, to determine the discount rate which management should be using in their capital budgeting to most effectively protect this investor's interests. Therefore, it would probably be more useful from the investors' viewpoint for the accountant to simply report income determined with assets measured at net realizable value. The investors could then compute the imputed interest based on beginning residual equity.

The accountant could provide information concerning "profit centers" either by reporting the income from each center with no imputed interest adjustment (letting the investor provide his own interest computation) or by charging imputed interest using a rate estimated from the market price of the stock and disclosing the rate. The investor could compare the rate used with his own rate

to evaluate the data. A major problem with either "profit center" approach is that stockholders' equity is not the only source of the investment in each center. Some adjustment would have to be made for the use of debt capital. Two possible ways of adjusting for the presence of debt capital are:

- a) computing or letting the investor compute a weighted-average cost of capital and using that as the interest rate.
- b) assuming that each center is financed by equity and debt in the same proportion as all other centers and deducting from the cash flow of each center the tax-adjusted interest charge paid to creditors for the assumed amount of debt capital in the center.

Under most methods of computation of weighted-average cost of capital, the two approaches would yield the same results.

Conclusion

Despite the problems mentioned above, it is clear that income reported with assets measured at net realizable value would give investors considerable information useful in evaluating management's decisions to hold assets. The maximum benefit from this measurement method could probably be obtained by leaving the computation of imputed interest to the individual user since he is best able to determine the rate appropriate to him. The accountant could, of course, clearly present income before imputed interest on equity and then deduct his best estimate of the proper interest. The advocated system also gives more information for evaluation of management decisions to acquire and dispose of fixed assets than any system currently in use for reporting to investors.

Appendix

To demonstrate that if the sum of past returns plus current exit value all discounted to the time of purchase is greater than the acquisition cost, the sum of all returns (including proceeds from eventual sale) of the asset can be less than the acquisition cost only if the sum of returns subsequent to the current reporting date discounted to the current reporting date were to be less than the current exit value, let

r = rate of return

NRV_i = net realizable value of asset at the end of period i

AC = acquisition cost of asset (at end of period 0)

CF_i = net cash flow into the firm during period i attributable to the asset (either occurring at the end of the period or translated to the end)

n = period whose end is the current reporting date

N = end of period in which the asset is sold

At the current reporting date, the discounted sum of past returns plus current net realizable value is greater than the cost.

$$\sum_{i=1}^n \frac{CF_i}{(1+r)^i} + \frac{NRV_n}{(1+r)^n} > AC$$

$$\frac{NRV_n}{(1+r)^n} > AC - \sum_{i=1}^n \frac{CF_i}{(1+r)^i} \quad (1)$$

When the asset is finally sold at the end of period N , the discounted sum of past returns is less than cost.

$$\sum_{i=1}^N \frac{CF_i}{(1+r)^i} < AC \quad (CF_N \text{ includes proceeds from the sale, } NRV_N)$$

$$\sum_{i=1}^n \frac{CF_i}{(1+r)^i} + \sum_{i=n+1}^N \frac{CF_i}{(1+r)^i} < AC$$

$$\sum_{i=n+1}^N \frac{CF_i}{(1+r)^i} < AC - \sum_{i=1}^n \frac{CF_i}{(1+r)^i} \tag{ii}$$

(i) and (ii) produce the transitive inequality

$$\frac{NRV_n}{(1+r)^n} > AC - \sum_{i=1}^n \frac{CF_i}{(1+r)^i} > \sum_{i=n+1}^N \frac{CF_i}{(1+r)^i}$$

or

$$\frac{NRV_n}{(1+r)^n} > \sum_{i=n+1}^N \frac{CF_i}{(1+r)^i}$$

Multiplying both sides by $(1+r)^n$ assuming $r > -1$ gives

$$NRV_n > \sum_{i=n+1}^N \frac{CF_i}{(1+r)^{i-n}}$$

which clearly shows that an incorrect decision to hold the asset was made at or subsequent to the reporting date. (The evaluation of decisions to hold fixed assets is discussed in more detail in section 4.) Therefore, even if this situation occurs, the original conclusion that the purchase decision was correct is still valid.

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