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SERVICE POTENTIAL OF ENTERPRISES:

A REPORT OF DISCOUNTED CASH FLOW TO INVESTORS

DISSERTATION

Presented in Partial Fulfillment of the Requirements for the Degree Doctor of Philosophy in the Graduate School of The Ohio State University

By

John Charles Gray, B. B. A., M. B. A.

* * * * * *

The Ohio State University
1963

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CHAPTER I

THE PURPOSE AND ECONOMIC BACKGROUND OF THE STUDY

Purpose

This chapter will develop the accounting background for reporting service potential. It will also outline the usefulness of a report of service potential to investors. The chapter reviews the economic background of service potential and concludes with a consideration of the scope, methodology and limitations of this dissertation.

Accounting acceptance of service potential

The purpose of this dissertation is to develop the concept of reporting discounted future cash flows and to examine the possible uses of a periodic report of discounted future cash flow. The concept has been considered by many accounting authorities and accepted in many cases as a norm from which to judge accounting practice. The concept has rarely been implemented because of measurement difficulties. The hypothesis of this dissertation is that a conceptually sound periodic report of discounted future cash flows can be prepared and that a basis for auditing such a report can be established.
The acceptance of the concept of discounted future cash flows can be seen in examples from accounting literature. The American Accounting Association in its most recent statement on accounting standards comments that

The value of an asset is the money-equivalent of its service potentials. Conceptually, this is the sum of the future market prices of all streams of service to be derived, discounted by probability and interest factors to their present worths.¹

The term "service potential" is often used in accounting literature to describe discounted future cash flows. It will be used in this dissertation in the sense it is used in the quotation of the Committee on Accounting Standards.

In 1940 Paton and Littleton said

"Service" is the significant element behind the accounts, that is, service-potentialities, which when exchanged, bring still other service-potentialities into the enterprise.²

In addition to these general statements, certain recognized accounting practices involve these concepts. The valuation of bonds is simply a discounting of future cash flows to present value. The


position taken in Accounting Research Bulletin 47, published in September, 1956, by the American Institute of (Certified Public) Accountants, is that the liability for pension costs for services rendered should be recognized on an actuarially calculated basis even though this may not be required by a strict legal interpretation of the plan. This involves recognizing the present value of a future cash outflow.

Accounting Research Study Number 4 suggests that many leases should be reported on balance sheets in much the same manner as property acquisitions financed by long-term debt. At one point Dr. Myers states

Commitments under bond contracts have long been recognized as ones which should be shown on the balance sheet at their present (discounted) value—a value which on the date of issue is equal to the cash proceeds received. The finance element of lease contracts is but little different from a bond contract to a going concern.³

In other words, reporting discounted future cash flows is just as applicable to the reporting of leases as it is to the reporting of bonds.

The cases of bonds, pensions and leases are concerned primarily with cash outflows. It is normally assumed that the probability of

occurrence of such contractual outflows is relatively high and that therefore the discounting for probability factors is relatively small. These are, however, valid applications of the service potential concept.

Other uses of service potential

In analysis of business problems, care must be taken in generalizing about groups associated with the business such as investors or management because of the diversity of goals which the members of the group may have and because the lack of organization of these groups may prevent effective action of the group in achieving its goals. If, however, we are to provide the most relevant information to a group, their goals must be considered in each step of the formulation of the reporting system. Staubus has said

... studies have identified parties considered to be principal users of accounting statements, but these studies have stopped short of analyzing the reporting requirements of those parties. 4

Staubus then observes that often accounting reports have failed to provide relevant information to various parties that make use of accounting statements.

The reporting of service potential for management decisions has been widely accepted. The bulk of the literature of capital budgeting is built on this acceptance. The primacy of the profit maximization goal has been questioned, but the importance of profit as at least one goal has been generally accepted. Accepting the importance of profit, the capital budgeting literature demonstrates that the reporting of the service potential of a project is the best means of evaluating the profitability of a proposed capital expenditure.

The reporting of service potential in the capital budgeting case is a report of the marginal service potential of the proposed capital expenditure (dealing usually with a small segment of the business) and the report is prepared on an ad hoc basis. Since this is the information relevant to the capital budgeting decision, it appears that a periodic report of service potential prepared for the firm as a whole or for relatively broad segments of the firm would be less relevant than the ad hoc report. In special cases, the periodic report of service potential for the whole firm might be relevant, as in the case of the decision to liquidate the firm, but in general, for management decisions, the ad hoc report on the marginal basis would seem more relevant than the periodic report considered in this dissertation.

A periodic report of service potential would seem to have little relevance to external groups such as regulatory or taxing agencies. Generally such groups have specific objectives and
specify the reporting system that seems suited to the accomplishment of those objectives. Presently none of these agencies have required a report that approximates the reporting of service potential. It is conceivable that a periodic report of service potential could be related to the objectives of such agencies. These objectives are usually socially determined and poorly defined. Acceptance of a periodic report by these agencies would probably follow, if at all, after acceptance by some other user group.

**Investor use of service potential**

Probably the reporting requirements of investors can be analyzed better than the reporting requirements of any other group because investors probably come closer than any other business group to having a common goal. When the term "investor" is used in this dissertation, it will mean external investors in ownership securities of the business. It will be noted that management acts as an investor when it purchases ownership of another business.

Possible investor goals might be control of the business, prestige among his peers and return on investment in the form of dividends and market appreciation (both positive and negative). If we confine our consideration to large business corporations, the bulk of investors exercise no significant control of corporate policy. Further, the investor probably isn't interested in control
since, if he does not agree with corporate policy, the simplest alternative is normally to terminate his investment in the corporation. It is also doubtful that in our present society the individual gains much prestige among his peers by investment in business corporations. The number of individuals investing in business has grown large enough that this is accepted as a means of earning additional income.

There remains, then, the goal of return on investment as the main benefit which the investor receives from his investment in the large business corporation. If we are to provide the most relevant report to the investor, it must be a report that enables him to evaluate the return that he will receive on his investment in the future. It is the hypothesis of this dissertation that a report of service potential can be prepared that does this.

The investor is concerned with the marginal return resulting from his investment just as the manager of a business is in considering a capital expenditure. But for the investor, the total return of a firm is the marginal return for him. As in the case of management decisions, it would be desirable to have ad hoc reports. Every time the investor considered an investment, he would call for a report on the firm he was considering. This would be an inefficient procedure with present data processing procedures, however, because of the large number of reports that might be required every
Further, unlike the management, the investor is not in a position to enforce his demand for a report. Probably the best compromise between the investor needs and the cost of meeting these needs is a periodic report of service potential.

The investor in evaluating his investment compares his cash investment to the cash that he will receive over the period that he holds the investment. The computation of service potential is normally based on cash flows because cash flows are relatively unambiguous. Occasionally, a non-cash transaction takes place between the investor and the business. An example would be the investment of machinery or the receipt of a dividend in bonds of another company. In these cases the amount to be reported is the present worth of the receipts that the asset will generate. The future cash received will have two components, the future cash payments that will be received from the firm during the period in which the investor holds the investment (dividends) and the cash that will be received when the investor terminates his investment in the business (selling price less transaction costs). It will be assumed that the selling price when the investment is terminated is determined by all dividends to be paid on the shares of stock from the time of termination, forever.

Conceptually, the value of any investment at any particular time depends on the future cash payments that the business will
make to investors (dividends). In particular, the value of the investment at the time the investment is terminated will be determined by all cash payments that the business will make to the investor after that date. If this new buyer sells the shares of stock, the selling price at that time will depend on all future cash payments that will be received after the date of sale. One can, therefore, at a conceptual level, examine the cash return that any investor will receive by considering all the payments (dividends) that the business will pay to investors from the time the investor makes the investment, forever into the future.\(^5\)

For practical purposes it is desirable to consider the value of the investment to depend on all future dividend payments even though it must be admitted that the market value at any one time is determined by a variety of factors such as general investor outlook, and other societal factors. It can be maintained that an inherent value is determined by all future dividend payments and that societal factors cause the market value to vary from this inherent value at any one time. For planning purposes, no models have been developed to permit prediction of the societal factors. It is therefore necessary to work with the inherent value which can be predicted.

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\(^5\)This idea is developed by Diran Bodenhorn in "The Concept of Profit in a Dynamic Theory of the Firm," Columbus, Ohio: The Ohio State University, 1962 (Mimeographed).
In summary, the return on investment is the basic investor objective. This return can be measured with minimum ambiguity by examining future cash flows. Finally, while a variety of factors may cause deviation, the inherent value of a share of stock is determined by all future dividends to be received on the share.

The dividends that the firm will be able to pay depends on the future cash flows of the firm. In order to provide the investor with information about the future dividends, it is necessary to examine the future cash flows of the firm. A careful definition of cash flows of the firm will be deferred to Chapter II. It might be noted here, however, that future cash flows will be generated both by assets that the firm now holds and by assets that the firm may acquire in the future. For the investor, cash flows from assets not held and cash flows from assets to be acquired are equivalent, except that the cash flows from assets to be acquired may (but not necessarily) be less certain than the cash flows generated by assets presently held. It is necessary to find a means of incorporating into the report the effect of any asset acquisitions that can be foreseen with a degree of confidence that permits audit. In a business situation the future cash flows will never be known with certainty, but this does not mean that a report based on the best prediction of future cash flows cannot be relevant to the investor's decision.
Economic models of value under certainty

Examination of economic models of value under certainty indicates that there is general agreement that value (or wealth) is the present value of the certain, future receipts discounted at the market rate of interest. As Alexander puts it in the case where future receipts are known with certainty:

Then, to measure the value of any asset, we need merely capitalize its future receipts; that is, find the sum of the present value of those future receipts.\(^6\)

Alexander goes on to observe that:

\[ \text{\ldots to compare two enterprises, it is sufficient for almost any purposes to know the present value of the future earnings of each.}\] \(^7\)

Bodenhorn relates the use of discounted future cash flows to the traditional theory of the firm. He concludes in part:

The cash flow theory coincides with the traditional earnings theory in a static equilibrium with certainty. The theories differ, however, in the absence of static equilibrium. In this case, the cash flow approach is correct while the earnings approach is not. The cash flow approach has not yet lead to new insights into problems associated with risk and uncertainty. It has the advantage, however, of focusing on the relevant variables.\(^8\)

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\(^7\)Ibid., p. 49.

\(^8\)Bodenhorn, op. cit., p. 28.
In view of this, it appears that the development of a report of service potential would be useful in further empirical evaluation of economic models.

In considering the effect of certainty on accounting and business operations we find that conditions of certainty are far removed from the world in which business operates. If all future events were known with certainty, all decisions affecting the operation of the business would have been made when the business was formed. There would be no job for management since all decisions would have been previously made. Since the future was known with certainty, there would never be a need to revise any decisions because the future would unfold exactly as forecast.

Accounting would occupy a limited role in conditions of certainty. Accounting could provide information for the initial decisions when the business was formed. Thereafter, accounting would be of value only as a historical curiosity which no one would really need, since the business would follow the plan set forth when it was organized.

Adaptations to uncertainty

Businessmen must operate in a world of uncertainty. The world of certainty is so far removed from reality that it can only serve
as a limiting case. The contrast in the state of conceptual development can be seen by comparing two statements of Gordon.

Under certainty

An intuitively plausible definition of income is the amount a person can spend or a corporation can pay out in dividends during a period and be as well off at the end of the period as it was at the start. The measurement rules for implementing this definition of income have been well stated from a conceptual point of view by Hicks and other economists.9

Under uncertainty

Few writers have gone very far in considering the problem of measuring income, capital, and rate of return under uncertainty, and those that have done so have not reached a consensus of opinion of the appropriate measurement rules.10

This points to the problems that will be encountered in reporting service potential.

In a business situation, the management can see only a limited distance into the future, and even for this limited distance they cannot see with certainty. Because of this, making new decisions as more of the future comes into view, and revising old decisions as new facts become known, is perhaps the most important function


10 Ibid., p. 85.
of management. We must recognize, as Lutz and Lutz\textsuperscript{11} point out, that under uncertainty we must think in terms of a distribution of possible future cash flows from which we draw an expectation of future cash flows rather than the single valued distribution of future cash flows that we deal with under certainty.

This part of the dissertation has been an outline of the value of a report of service potential and an indication of some of the problems that will be encountered in preparing such a report. It is expected that this discussion has laid the foundation of the importance of the study.

Scope, Methodology and Limitations

This dissertation will develop a periodic report which will fill the needs outlined in this chapter. Since the prime user of such a periodic report would be investors, the major criterion to be applied in the development of the report will be providing the investor with information useful in determining the present worth of the dividends he will receive from the firm. Other criteria that will be applied are constraints of auditability and of avoidance of competitively damaging disclosure.

The complete development of such a topic could be divided roughly into three stages. First, the logical development of the usefulness of a periodic report of service potential. Second, the development of the report from the basic concepts. Finally, the problem of whether or not a basis for auditing such a report can be established. Clearly these three stages are closely related. This dissertation will, however, concentrate on the latter two stages. In this chapter by a consideration of the statements of accounting and economic authorities and by an outline of the usefulness of a periodic report of service potential to investors, the plausibility of an assumption of usefulness is established. As has been traditional in accounting, the usefulness of the report will be shown only in the adoption of such a reporting system in accounting practice. The development of the second two stages of the topic should lay the foundation for the practical testing of the usefulness of the report.

While the dissertation is expected to demonstrate the need for improvements in statistical forecasting and the statistical quantification of risk, this dissertation will not undertake the development of such statistical techniques. The development of these techniques is thought to be of such significance that it warrants a separate research project.
It will be necessary to determine the measurements that must be made. Then a method for making the measurement that seems to best suit the needs of the investor will be selected. In the absence of new statistical techniques for making measurements, there might be alternative means of making the measurements, several of which would be considered feasible. Often one technique might satisfy some criteria well while some other technique would best satisfy some other criteria. The criterion of auditability (to limit the effect of the biases of the group preparing the report) may well be in opposition to a criterion which would bring the report closer to the procedures that would be used under conditions of certainty.

In some cases the absence of improved statistical techniques will probably make it necessary to use as an approximation a variable which is really a function of several more basic variables. In discounting the expected cash flows, it will probably be necessary to combine in the discounting factor the discounting for the risk-free cost of capital and the additional discounting necessary because of the risk that the expected cash flows may not materialize. If the more basic variables of the risk-free cost of capital and the risk could be measured directly, the results of the measurement would probably be more accurate.

The method of this dissertation is primarily deduction. From the concept of service potential and the economic definition of
value, the report will be developed in view of the needs of investors. This method of approach is selected in part because this logical development has not been made. No development has followed the acceptance of the service potential concept for external reporting. Yet until this development is made, we have only vague ideas of what has been accepted and how it should be used.

Two case studies will be used as a part of this dissertation for two basic purposes. First, they will help demonstrate the practicability of preparing such a report. Second, they will help to force the dissertation to face all of the significant problems. The companies will be chosen to obtain an example of a stable industry and an example of a less stable industry.

Consideration will be given to the taxes paid by the business firm. The taxes which must be paid by the investor will not be considered.

A proposal to develop a periodic report of service potential for an enterprise represents a step beyond capital budgeting. There is evidence that the concepts of capital budgeting are just beginning to be understood and accepted. Acceptance of the proposed report probably cannot be expected before the acceptance of capital budgeting.

The dissertation will attempt the development of a basis for auditing the proposed report. No attempt will be made to determine
the extent to which practicing certified public accountants would be willing to accept the proposed basis for auditing.

Finally, note that the statement of the hypothesis is that a conceptually sound periodic report of discounted future cash flow can be prepared and that a basis for auditing such a report can be established. This form of the hypothesis requires that the proof of the hypothesis be a matter of judgment based on a careful consideration of the report and auditing.
CHAPTER II

THE SELECTION OF THE PREDICTION TECHNIQUE

In Chapter I, a case was outlined that the report of service potential would provide the investor with information relevant to the future dividends that would be received on a share of stock. It was argued that future expected future dividends determine the inherent value of the stock. It was stated that the cash flows of the firm determine the dividend that the firm is able to pay. The meaning of the cash flows of the firm will be examined to develop the relation of these cash flows to the dividend that the firm is able to pay.

The first step in implementing the periodic report of service potential for a firm is to obtain predictions of these future cash flows of the firm. Traditional accounting methods do not provide such predictions. It is therefore necessary to apply some technique beyond that which accountants presently apply. Initially, this must be done for the total cash flows of all segments of the firm. Thereafter, the emphasis must be on the changes in cash flow of the various segments of the firm as changes in the planned operation of the firm bring about changes in the future cash flows of the firm.
Three topics bearing on prediction will be discussed in this chapter. The first topic is the definition of what is to be predicted. The second topic is establishing the need to select a point at which changes in service potential will be recognized in the report. The final topic is the selection of a prediction technique to be used in this study.

Many possible prediction techniques exist. They can be classified in several ways. One such classification would be to distinguish the techniques which extrapolate past data from the techniques based on econometric models. Econometric models make direct use of exogenous factors in predicting. Most of these models are not well developed and for this reason will not be used in this study. Extrapolation of past data can be done in many ways. Some general extrapolations of past data will be considered for use in this study.

Another approach would be to make use of management predictions regardless of how they were obtained. It appears that additional research into the area of prediction techniques might lead to new prediction techniques which are superior to those now known. When such a new technique is developed, it would be applied in preference to the technique selected for this study.
The Relationship Between Net Cash Flow of the Firm and Dividends

In this section we shall study the relationship between the cash flows of a firm and the dividends that the firm will pay. By the cash flows of the firm is meant everything that brings cash into and out of the business except transactions with the common shareholders including dividends and stock issues. These transactions are excluded to aid in developing the relationship of the dividends to the other cash flows of the firm. Probably the main source of cash inflows are payments from customers for products or services that the firm has provided to the customer. Also generating cash inflows are receipts from sale of equipment, buildings and land no longer needed by the firm. Another significant source of cash inflows is financing transactions. The issue of bonds, for example, brings about a cash inflow to the firm.

Similar transactions bring about cash outflows. Cash payments are made to suppliers of material, labor and other services. Equipment purchases normally require cash payments. Financing transactions such as payment of preferred stock dividends or repayment of indebtedness are examples of cash outflow created by financing transactions. Again payment of dividends on common stock are excluded for the purpose of aiding the exposition.
As was recognized in the first chapter, occasionally an exchange occurs between the firm and some outsider where a non-cash asset is received or given up. An example would be the investment of machinery by an investor. It is consistent and unambiguous to deal only with cash flows (properly discounted). In the case where a non-cash asset is exchanged, the future cash flows to be generated by that asset will be predicted and incorporated into the report of service potential. Hereafter when reference is made to cash flows, it will be understood to mean all cash flows, whether generated by direct cash payments or whether generated by exchange of non-cash assets.

A brief example will aid the following discussion. Consider a firm which is expected to have the following cash flows in the next three years.

<table>
<thead>
<tr>
<th>Year</th>
<th>Cash Inflows</th>
<th>Cash Outflows</th>
<th>Net Cash Flow</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$200</td>
<td>190</td>
<td>$10</td>
</tr>
<tr>
<td>2</td>
<td>$210</td>
<td>200</td>
<td>$10</td>
</tr>
<tr>
<td>3</td>
<td>$230</td>
<td>200</td>
<td>$30</td>
</tr>
</tbody>
</table>

If a report of service potential were being prepared, it would be necessary to predict all future cash flows rather than just the cash flows for the next three years. These limited figures will illustrate the points that are to be considered in this section.

We wish to investigate the significance of the net cash flow figures. There are three possible dispositions of these net cash flows. They might be paid to the shareholder as a dividend. They
might be reinvested in new projects which will cause a cash outflow now and generate cash inflows in the future. The third possibility is that they will be allowed to accumulate idle in the bank with no productive use being made of them. In the investor's view, the third possibility is undesirable. Above a desired level of liquidity, cash that stands idle forever does not benefit him. It is only when the cash is paid to the investor as a dividend or invested in such a manner that it will create future dividends that it has any value to the investor.

Abstract for a moment to a world of certainty. The firm would not need to maintain any idle cash balances. Since the future was known with certainty, the timing of all cash receipts and cash disbursements would be known with certainty. There would be no need to maintain a cash balance in reserve for unforeseen events because there would not be any unforeseen events. Any temporary imbalance of the cash receipts and disbursements would be anticipated and balanced through temporary financing such as bank loans. If the future were known with certainty, all future investments and the cash flows that these investments would generate would be known. In predicting the future cash flows, the cash flows resulting from all future investments would have been included in the cash inflow and cash outflow figures.
Of the three possible dispositions of the net cash flow, under certainty two (the need to maintain a cash balance and reinvestment not recognized in the report) would not exist. The only remaining disposition would be dividends. The conclusion is that the relationship between the net cash flow and dividends under conditions of certainty is that the dividends of the firm and the net cash flow of the firm are the same. Since this net cash flow figure is the same as the dividends that will be paid, the relevance of the net cash flow of the firm to the investor is established by the acceptance of the relevance of dividends to the investor. The dividends in the example would have to be $10, $10 and $30 for the three years.

What conclusion is reached under the real world conditions of uncertainty? In this case it is necessary to maintain some balance of idle cash in reserve for unforeseen events because all events cannot be foreseen with certainty. It is also necessary to distinguish between planned events and actual events. Planned and actual events are not the same as they were in the case of certainty. In addition, as management plans further into the future, all events are not planned. The firm may anticipate making additional investments but they are so uncertain about the need for additional investment that they may not have specific plans for the investment.

Although firms maintain an idle cash balance, it is normally possible to determine a desired level of liquidity to provide for
unforeseen events. The rationally managed firm does not allow the cash balances to build significantly above this level for any period. There is considerable evidence in business practice that firms are highly conscious of this problem and that corporate treasurers spend considerable time in managing cash to avoid exceeding the desired level of liquidity.

To the extent that firms must allow these idle balances to exist to meet unforeseen events, when the cash is committed to this use it must be considered to be a cash disbursement. It occupies exactly the same status as cash disbursed for the equipment that the firm has acquired. Both are necessary to the operation of the firm. Any time that changes in the operations increase the desired level of liquidity, the additional amount must be treated as a cash disbursement in the report just as an increase in inventory would be treated as a cash disbursement.¹

¹Much of this discussion is based on the work of Diran Bodenhorn in "The Concept of Profit in a Dynamic Theory of the Firm," Columbus, Ohio: The Ohio State University, 1962, (mimeographed). He carries the analogy further when he likens idle cash balances to the purchase of an asset which he refers to as "liquidity." He points out that liquidity should be purchased only if it is worth the price, which is the interest foregone. He also points out that in cases where the future is known with certainty, liquidity is worthless. p. 5.
The discussion above and the emphasis that business firms place on cash management makes it reasonable to assume that even in cases of uncertainty, the net cash flow does not represent additions to an idle cash balance. If any additions to idle (minimum) cash balances are necessary, they would have been included among the cash outflow figures appearing in the example.

In the case of certainty it was argued that all investments were foreseen and that all cash inflows and outflows resulting from all future investments were included in the cash inflow and outflow amounts appearing in the example. Under uncertainty, this argument cannot be maintained. The firm will make an effort to foresee the investments that it will make, but as it plans further into the future it is more difficult to see the specific investments that the firm will make. At some point, the firm will stop planning specific new investments. All predicted cash inflows and outflows thereafter will be based on investments made or planned up to this point. Since there will be no planned cash outflows for investment after this point, we would expect that the net cash outflow amounts after this point would rise. Before this point, the net cash flow necessarily represents the dividends that the firm will pay. After this point, the net cash flow represents the dividends that the firm could pay and still carry out the present and planned investments. This does not mean, however, that dividends will rise after this point as the
net cash flow rises. While this could happen, it is more likely that as time passes, the firm will make investment plans for these years which will result in increases in cash outflows (from investments) such that the net cash flow predicted will become equal to the dividends that are expected to be paid. The ability to plan investments for these years will have the effect of increasing the cash outflow in these years and increasing the cash inflows in later years and thus reducing the net cash flow in the years for which the specific plans are made.

Often it is possible to predict directly the dividends that the firm is expected to pay. If the net cash flow for a year is greater than the dividend predicted for that year, the difference is a measure of the investment that must be planned for the year in order to avoid building the idle cash balance.

Should the investor object to the new investment that is planned? Should he insist on the dividend that could be paid? While a number of considerations condition his feelings, as long as the investment results in a rate of return at least as great as the discount rate he feels is appropriate for investment in this firm, the value of the firm to him will be maintained or increased by the new investment.

Returning to our example, suppose that it is predicted that the firm will pay a dividend of $10 for each of the three years shown.
Since in the first two years the dividend is equal to the net cash flow, this means that plans have been made to invest all of the net cash flow generated. In the third year, the $20 difference between the predicted net cash flow and the predicted dividend means that reinvestment of the $20 will be necessary in the third year in order to avoid building an idle cash balance.

Further investigation might indicate that the company will enter a new market area during the third year. During that year it will be necessary to make $30 cash disbursements to acquire facilities, to produce the additional product sold in Year 3, and to pay salesmen for efforts that will result in sales over a period of future years after the initial contacts are established. During the third year it is expected that a small amount of sales to customers will result in receiving $5 cash from the customers during the third year. Much larger amounts are expected in future years. In order to provide the needed cash to establish these facilities it will be necessary to borrow $5 which will be repaid in future years. When the cash flows for future years are recomputed, including these new predictions we get the following result for Year 3.

<table>
<thead>
<tr>
<th>Year 3</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Cash inflows</td>
<td>$240</td>
</tr>
<tr>
<td>Cash outflows</td>
<td>230</td>
</tr>
<tr>
<td>Net Cash Flow</td>
<td>$ 10</td>
</tr>
</tbody>
</table>
The cash inflows have increased by $10, the $5 received from customers and the $5 borrowed. The cash outflows have increased by $30, the amount spent in establishing and operating the new facilities in Year 3. If predictions were shown for years beyond Year 3, they would presumably show increasing cash inflows from customers in the new market area, increasing cash outflows resulting from producing more product to sell in the new market area, and increased cash outflow when the loan and interest borrowed in Year 3 is repaid. When it is possible to predict all investments and the cash receipts and disbursements related to the investments, the net cash flow figure again becomes equal to the predicted dividend.

In summary, the future dividends are held to be relevant to the investment decisions about a share of stock. As long as it is assumed that the firm will not build cash balances above an established desired level of liquidity for any significant period of time, the net cash flow of a firm is equivalent to the dividends which the firm could pay and still carry out present plans. The management may divert some of the net cash flow to investment rather than pay the dividends which they could. If the net cash flow is invested at a discount rate which is at least as great as the rate of return that the investor feels is appropriate for investment in the firm, the value of the investment to the investor will be maintained. It is therefore relevant to predict the future cash flows and report them to the investor in a periodic report of service potential.
The Need to Select a Point at Which Changes in Service Potential will be Recognized in the Report

A problem which must be considered is the timing of the recognition of changes in service potential in the report of service potential. Under certainty, this problem would not exist. It would be possible to predict all future events and all future investments that the firm would make forever with certainty. Since all future cash flows are relevant to the future dividends, all would be included in the report.

When uncertainty exists, all future events cannot be predicted with certainty. Some future events may be predicted with a relatively high degree of certainty, such as cash flows for which the firm has contracted with reliable parties. The firm may also be fairly certain of other cash flows even though no contract exists, because of past patterns of business operations. Somewhat less certain are plans which have been made which will produce cash flows, where there is as yet, no experience to validate the predictions. A step less certain are plans which will be developed from present research activities. These plans may not have been formulated and will be shaped largely by the results of research which cannot yet be specifically foreseen. The basis of a prediction
where no specific plan exists is the expectation that the firm will be able to develop desirable investments in the future because it has been able to do so in the past.

More degrees of certainty about future plans could be inserted, but in preparing the report of service potential under uncertainty it is necessary to choose some point, some level of certainty, and decide that events of this level of certainty will be recognized in the report of service potential. Other events with less certainty will not be recognized until they become more certain.

Another problem that arises out of the uncertainty in which the report must be prepared is the problem of auditability. Since the events cannot be foreseen with certainty and the investor is using a report prepared normally by management, the investor demands evidence that he is justified in relying on the report. Auditors have traditionally provided such evidence. They have made an examination designed to detect management biases entering the report. They have given their opinion that one of several generally accepted procedures have been followed. Unless the user is willing to rely on a report, there is little point in preparing such a report.

One means of permitting the auditor to make his examination with a high degree of confidence is to limit the report to only historical events, whose occurrence can be verified. Such a procedure would be far removed from the concept of reporting service potential, however, which suggests that it is future events
(dividends) that are relevant to the investor. Under uncertainty a choice must be made which weighs the nearness to the conceptually correct position against the auditability necessary so that the investor can rely on the resultant report. Alexander, an economist, says

Faced with a choice between precision of operation and precision of concept, the accountant has chosen the former . . . ²

Alexander seems to feel that accountants have made the correct choice, but accountants may have sacrificed too much to auditability. If the major problems of accountants are those of measurement and auditability, to measure something that is conceptually weak because it avoids some measurement difficulties merely disguises the real problem. More progress can be expected by choosing to measure something that is conceptually strong, so that it is clear that the problems of measurement and auditability are the areas where research should be concentrated.

The importance of the choice of when an event becomes certain enough to be included in the report of service potential can be seen by an example. Several possible points at which a change in

service potential might be recognized and included in a report are considered. At one extreme, recognition might occur on the basis of the rate at which management is expected to be able to generate changes in future cash flows. At the other extreme would be failure to recognize service potential; recognizing only the increase in net asset value as it occurred each year.

The following example should clarify the extremes and the nature of some of the intermediate possibilities that seem worth considering. Suppose that over a period of years the management of a firm has consistently been able to increase the net cash flow from operations $7,000 per year. There is no reason to believe that this pattern cannot be continued. In Year 1, the board of directors decides that the company should add a new product which will result in increased net cash flows in future years. This product is one of a series of products which will provide the $7,000 annual increase in net cash flow. During Year 2, the company prepares the facilities which will permit it to add the new product line, but does not produce or sell any of the new product. In Year 3, production and sales of the new product begin. In following years production and sales continue.

Since there will be an increase in net future cash flows from operations, there will be an increase in the service potential of the company. This increase might be recognized before Year 1 on the basis of the $7,000 per year increases in cash flow expected for each
future year. It might be recognized in Year 1 when the board of directors makes the decision to undertake a new product. The increase might be recognized in Year 2 when the physical facilities are made ready for production and sales. Finally, recognition of the increase in service potential in the report might be deferred until Year 3 when actual production and sales begin. Accounting has traditionally not recognized increases in service potential but recognized the events only in Year 3 and in later years in the form of net income for the year.

Suppose we consider our position in time as Year 1. The company has been able to generate an increase in net cash flow over past years of $7,000 per year. The net cash flow for Year 1 will be $630,000 (all of which will be paid as a dividend). In the future years it is expected that the $7,000 per year increase in net cash flow will continue as a result of a continuing program of new investment. The expectation of the $7,000 increase per year in the future has not yet been recognized in the report of service potential. In Year 1 the board of directors decided on one of these investments which is predicted to add to the cash flows of the firm as follows.
<table>
<thead>
<tr>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5 and all future years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cash inflows</td>
<td>-</td>
<td>100,000*</td>
<td>25,000</td>
<td>35,000</td>
</tr>
<tr>
<td>Cash outflows</td>
<td>-</td>
<td>100,000</td>
<td>18,000</td>
<td>22,000</td>
</tr>
<tr>
<td>Net Cash Flow</td>
<td>-</td>
<td>0</td>
<td>7,000</td>
<td>13,000</td>
</tr>
</tbody>
</table>

The first alternative would suggest that as soon as the investor decided that the $7,000 increase in net cash flow would continue forever into the future he would immediately recognize all future increases (at least until they were so far into the future that the discounting resulted in an immaterial present worth). There would be no other change in service potential reported as a result of the investment illustrated above or any subsequent investments that the board of directors might decide to make. The reported service potential would change only when the investor concluded that the cash flows would increase at some rate other than $7,000 per year. Using continuous discounting at 10 per cent and assuming that only the

*This represents external financing of the new investment. Any method of financing the $100,000 investment could be assumed. If for example the firm decides to finance the investment by issuing bonds, there is the additional cash inflow created in Year 2 representing the receipt of the proceeds of the bond issue and additional cash outflows in future years representing the payment of interest and principal of the bonds. These are included in the cash inflow and outflow for the years given.
changes occurring in the next 25 years have a material effect on service potential, the increase in service potential that would be recognized is $642,530. The $7,000 increase in net cash flow forever that occurs in the first year has a present worth of $70,000 ($7,000/0.10). Each year will have a similar increase. Each of these future increases must be discounted back to the present, however, which means that the present worth of all of the increases for the next 25 years is equivalent to an annuity of $70,000 per year. The present worth of this annuity is $642,530.

If the increase were to be recognized in Year 1, when the decision is made by the board of directors, on the basis of the specific predictions made, there would be a discounting of the net cash flow figures shown above. Using continuous discounting at 10 per cent, the present worth of the specific future cash flows at Year 1 is $111,057. If we fail to recognize the change until Year 2 when the physical facilities are prepared, no change in service potential occurs in Year 1. In Year 2, the cash inflows and outflows are closer to the present than they were in Year 1, and therefore the present worth of each is increased. The present worth of the net cash flow in this case is $122,257.

In contrast, the traditional accounting method would recognize no change in the net asset value of the firm until Year 3 when the project began to generate "net income." If straight line depreciation
of the $100,000 investment is assumed over a 50 year period, and cash payments from customers and to suppliers is assumed, the reported net income would be zero for Years 1 and 2. It would be $5,000 for Year 3, $11,000 for Year 4, and $13,000 for Year 5 and all years thereafter.

It is clear from the example that the point which is chosen for recognizing changes in service potential will effect the reported service potential. If all of the predictions for the firm in the illustration prove correct, the firm will have found investments over the years in addition to the one illustrated such that the net cash flows will have increased $7,000 per year. In such a case any method will have recognized the change in service potential, but each would have recognized it at a different time. (Because the amounts are recognized at differing times the present worth and service potential will differ.) Each method also has differing audit problems associated with it.

Evaluation of the Possibilities

The choice between the alternate points of recognition will depend on which alternative best serves the investor in determining the future dividends from the investment. From the economic standpoint, the following quotation from Gordon highlights the meaning of value.
... we must become accustomed to dealing with "well-offness" as being an expectation with respect to future events and not a known set of future events. A person becomes more or less well off if he expects more or less in the future.\textsuperscript{3}

What a person expects in the future is meant to be a reasoned expectation rather than just whimsy. The economic concept of value is based on expectation of future events and not on the known occurrence of those events. It follows then, that from the economic standpoint, as soon as we can reasonably modify our expectations of future cash flows, we should modify the value of the entity being considered.

The investor might say that his concern is with the actual cash flows because these actual cash flows are the basis for the dividend which he will receive. If the investor waits until the actual cash flow materializes to measure it, the measurement may no longer be meaningful. He must make a decision at present based on what he expects the future cash flows to be. This rules out recognition of the change in Year 3 or later.

The arguments from both the economic and investor's view would seem to favor the recognition of changes in service potential on the basis of the expectation that management will be able to generate

changes in future cash flows. In the case of our example, it would seem to favor recognizing continued changes in service potential based on the past increase in net cash flows of $7,000 per year. Yet, intuitively, such an approach has limitations. It seems unreasonable to expect such a change to continue forever into the future but there is no basis for any other prediction. As Spencer points out, a method of forecasting should be judged on its ability to predict the turning points in a time series. To predict that the pattern of the present will be continued will result in a perfect prediction record until the pattern changes, but this means little if the change is not foreseen.

Since recognition of the change in service potential on the basis of the changes which management has generated in the cash flows in the past is not acceptable because it does not predict the turning points, we must examine some of the other possibilities. Waiting to recognize the change in service potential until changes in facilities have been made or production and sales have occurred both have a common limitation. By this time, the changes in value have already occurred. As the excerpt from Gordon points out, value is

based on expectations. Certainly the expectations of the board of directors have changed even before the changes in facilities were made. If the board's expectations had not changed, the decision to alter the facilities would not have been made. The fact that the decision has been made by the board is evidence that they expected a change in cash flows to result from the decision. By the time some physical evidence of change has occurred, the value has already changed and probably could have been recognized earlier. This leads us to reject recognizing the change in service potential in Year 2 or any later year (including present accounting net income) for the investment decision.

The best approximation of certainty would be obtained by recognizing changes in service potential as soon as possible. We are constrained by the need for objective evidence such that the report can be audited so that the investor can rely on the report. A compromise which seems to go as far as possible toward the certainty position within the auditing constraint is to recognize changes in service potential at the time that the board of directors makes a decision.

At the time the decision is made, management should have projections of the future cash flows on which the decision is based. When the board of directors acts, the plan is more than speculation. The board of directors should be the best informed group on the
future of the company. They should also be as well informed as the investor would be on the outside environmental factors that will effect the firm. It seems that investors cannot do better than to base their expectations on the predictions of the board unless there is reason to believe that the board is unwilling to disclose its true expectations, or is disclosing only biased expectations. It is the function of the audit to give assurance that management is not reporting biased expectations. This argument leads us to accept recognition of the change in service potential in Year 1.

In summary it can be argued that investors should change their expectations as soon as the board of directors changes its expectations, because the board is best informed on the future course of the business. While it might be correct to change expectations on the basis of changes in cash flows that management was expected to be able to generate, the only basis for determining the change is the past change. The limitations of projecting the past change forever into the future can be seen. There remains, the alternative that investors should change expectations at the time when the board of directors expectations change. Changes in future cash flow should be expected as the board of directors makes the decisions that will result in the changes in future cash flow. In the example, the change in service potential would be recognized in Year 1.
Relating Prediction Technique to
Timing of Recognition

Perhaps the relation of prediction technique to timing of recognition of change in service potential can best be seen by examining the results of various methods of prediction. When the term "extrapolation" is used in the following discussion, it is taken to mean the forecasting of future amounts as a function of past amounts. The procedure of projecting a trend obtained through time series analysis is an example of extrapolation in this sense.

If one were to extrapolate the cash flow from operations for the entire firm as a unit, he would implicitly be assuming that new means of generating cash flows would be developed at the same rate as they were developed in the past. Extrapolating the trend of the series would have this effect, since the trend would be based on the development of cash flows in the past. Extrapolation for the firm as a unit would have the advantages of permitting errors in prediction in one segment of the firm to average out against other possible errors in other segments of the company. It would not provide information on segments of the firm. The need for information by segments will be discussed in Chapter IV. In the discussion of the recognition of changes in service potential, recognition on the basis of the rate at which management is able to generate changes in future cash flows was rejected. It is therefore necessary to
reject extrapolation for the firm as a unit as the prediction technique for our purposes since as is pointed out above, it would recognize changes in service potential on the basis of the past rate at which management was able to generate changes.

To extrapolate for individual segments of the firm is to rule out the possibilities of any new developments until the new development actually begins to generate cash flows. In discussing the recognition of changes in service potential it was argued that investors need to recognize changes before the development began to actually generate cash flows. In this case there would be no past data to extrapolate until the cash flows began. Over a long period of time, the use of this prediction technique would lead to unduly low reports of service potential if any new developments were being made by the firm. This method also has the shortcoming of failing to predict the turning point of the series.

For investors to base their expectations on the board of director's predictions would be in accord with the timing of recognition that was selected. As was argued earlier, the board should be best informed on the future of the business. If decisions are being made in accordance with the techniques that many authors and businessmen consider normative (that is, the use of discounted future cash flow), the information needed for reporting service
potential would be available as the basis of the decision made. Investors could not do better than to base their expectations on the board of director's predictions.

The Planning Horizon

One final problem must be resolved in the discussion of prediction techniques. It has been recognized that the firm cannot foresee all future investment decisions that it will make. This is the major reason that the net cash flow of a firm (based on planned investments) may be different from the predicted dividends.

It is also necessary to recognize that there is a limited period of the future in which specific predictions can be made even for the cash flows of investments which the board of directors has already approved and implemented. In general, the predictions of the firm become less certain the further that the firm plans into the future. At some time, the firm stops making predictions. This is probably due to the uncertainty of the results. At some future time the predictions become so uncertain that the management feels that the cost of extending the predictions is greater than the value of the uncertain predictions. When the uncertainty of predictions of the future reaches a certain level, management feels that it is not justified in making plans in so uncertain a future. The likelihood that changes in the plans will be necessary
is so great that management feels that there is little point in making plans. This point in time at which management stops making specific predictions has been referred to by Lutz as the "planning horizon."^5

When it is possible to develop better techniques of making predictions and quantifying risk, a direct approach to this problem can be made. The increasing uncertainty of predictions further into the future will be recognized and the effect of these events on the value of the firm would gradually decrease until they reach a point where they make no material contribution to the value of the firm. This would parallel the gradual reduction of management's ability to plan further into the future. At present, management acts as though predicted events were certain up to the planning horizon and then remain constant after the planning horizon.

Although some writers have been willing to estimate when the planning horizon will occur,^6 most writers have recognized that it will vary with the nature of the firm, and Lutz feels that it will vary with the nature of the management.

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The extent of the "horizon" will differ as between persons according to their individual psychological attitudes, and cannot be explained on economic grounds.\(^7\)

It seems plain that in some businesses, demand, the methods of operation and the cost of the factors of production are so stable that it is possible to plan well into the future. The planning horizon might be ten or fifteen years into the future in such a business. In other businesses demand and new research and development limit planning to only several years into the future. In these cases, the planning horizon might be less than five years into the future. It might be that the planning horizon would differ in different segments of the same firm. In any case, even though the management may not think in terms of a planning horizon, the planning horizon can definitely be seen by looking at the firm's long range budgets and other plans.

Events occur beyond the planning horizon which create cash flows and thereby effect dividends. This means that events beyond the planning horizon which cannot be specifically foreseen, nevertheless affect the value of the firm. Events beyond the planning horizon cannot, therefore, be ignored.

For the purpose of preparing a report of service potential, it is necessary to make some assumption about the cash flows that will

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\(^7\) Lutz, loc. cit.
occur after the planning horizon. Gordon has assumed that the cash flows of the firm will continue to rise as a result of retention and reinvestment of earnings after the planning horizon. This assumption implies acceptance of the extrapolation of past data to obtain predictions. This method of making predictions was rejected because it seems reasonable to assume that there is a limit to the amount of investments that the firm can make and still achieve a rate of return which justifies the risk free cost of capital and the probability of loss.

Lutz assumes that beyond the planning horizon only a normal rate of return can be expected. Specific plans do not exist to justify any other assumption. Two previous positions taken in this chapter lead us to adopt the Lutz position. Earlier the extrapolation of the rate at which management is expected to make decisions was rejected for predictions in the time period before the planning horizon. It would be inconsistent to adopt Gordon's position for predictions in the time period after the planning horizon. Probably more important, it was assumed that the net cash flow generated before the planning horizon that was not disbursed in the form of dividends would be invested by the firm. For these reinvestments a normal rate of return was assumed.

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Gordon, op. cit.

Lutz, loc. cit.
The assumption of a normal rate of return after the planning horizon will be implemented by assuming that the cash flows which occur in the last year before the planning horizon will continue forever into the future, with one modification. These cash flows of the last year before the planning horizon are predicated on the existence of a group of capital assets that have been accumulated up to the planning horizon. In order for these cash flows to continue forever into the future, it will be necessary to make additional cash expenditures in future years to replace existing assets as they are retired from use.

It would not be likely that the cash outflow of the last year would contain any significant amount of capital expenditures. By definition, events occurring beyond the planning horizon cannot be specifically foreseen so there would be no knowledge of the future on which to base a capital expenditure decision. Assuming that the cash flows of the last year will continue forever into the future assumes no future capital expenditures. Modification of this prediction must therefore be made to include a cash outflow for capital expenditures that must be made in the future to maintain the level of cash flows. By definition, specific capital expenditures cannot be foreseen after the planning horizon. It is necessary to accept an approximation of the capital expenditures that will be made.
For the purpose of this dissertation, the capital expenditures to be made after the planning horizon will be predicted by estimating the total fixed assets of the firm as they will appear on the balance sheet at the planning horizon. This total will then be divided by the average life of the fixed assets of the firm. The amount obtained will be taken as an approximation of the average annual capital expenditures that will be necessary to maintain the cash flows after the planning horizon. This amount will be added to the other fixed cash outflows predicted for the last year before the planning horizon and projected forever into the future.

Summary of the Prediction Technique to be Used

The discussion in this chapter has demonstrated the need to select a time at which changes in service potential will be recognized. Recognition of changes on the basis of management decisions was selected as the best compromise between the recognition that would occur under certainty and the requirements of auditability.

On the basis of this, the cash flow predictions of management will be used for the period up to the planning horizon. After the planning horizon, it will be assumed that the cash flows of the last year before the planning horizon will continue forever into the future, modified by an estimate of future capital expenditures.
The cash outflows of the last year before the planning horizon will be augmented by approximating the annual future capital expenditures necessary to maintain the cash flows of the last year before the planning horizon. This approximation will be made by dividing the estimated total fixed assets at the planning horizon by the average life of fixed assets.

The discounting of these predicted future cash flows and their incorporation into a report of service potential will be discussed in the following two chapters. The audit problem will be considered in Chapter V.
CHAPTER III

DISCOUNTING

Having obtained the prediction of cash flow for future years, it is necessary to discount these amounts by "probability and interest factors"\(^1\) to their present worths to obtain the service potential. In this chapter the need for discounting and the basic nature of the process will be examined. This is done to point to the need for additional research in quantification of risk. A more immediate purpose is to permit the analysis of the discounting process in order that the role of accounting in the discounting can be determined. The discounting procedures to be applied in this study will be discussed.

The Nature of Discounting

The interest factor

From the investor's view, the need for discounting arises from the opportunity cost of committing his funds to a particular investment. If he did not make this particular investment, he could make

some other investment that would yield some return. In order to induce him to invest in a particular firm, he must expect to receive a return that is at least as great as the opportunity cost of this investment, giving due weight to the relative risk involved in each investment.

The nature of the opportunity cost can be seen more clearly if we think first in terms of an investment where there is no significant risk that either the amount invested will be lost or that the expected return will fail to materialize. In comparing such risk free investments, the only relevant consideration would be the return to be received on the investment. In a market as good as our security markets, there is reason to believe that all such investments would yield the same return. Business investments all contain some element of risk. If the investor is to invest in a business corporation, he must expect to receive a return greater than the risk free return. Otherwise he would select the risk free investment.

United States bonds are often taken as a standard for a risk free investment. While a United States bond is not risk free in an absolute sense, for practical considerations, investment in United States bonds represents the minimum level of risk. Excluding the inflation risk, there are no other practical alternatives which represent a lower amount of risk, so United States bonds can be considered as a basis from which to measure. As Keirstead puts it
The power of government in borrowing is so great that its announced price for loans cannot be disputed. No private borrower can hope to obtain loans for less. The government rate becomes a minimum price. It forms the opportunity cost for all users of funds. Entrepreneurs must offer this price plus some further amount to compensate for the loss in security and in liquidity which is suffered by anyone who holds private rather than government stock.²

All other investments have a higher degree of risk and should therefore yield a higher rate of return than United States bonds.

The return that the United States bonds pay does not represent compensation for assumption of risk but compensation for deferral of consumption or compensation for surrendering liquidity. The rate of interest earned on United States bonds at any one time varies with the maturity of the bond. For the purpose of determining the risk free interest rate for this study, the rate on United States bonds of about 30 years maturity will be used. The longer maturity is selected because investment in a business is basically a long-term investment. It is possible to terminate the investment in a business in a short period by selling in the secondary securities market, but the same possibility exists with bonds, so that the parallel remains.

The probability factor

As soon as investments other than United States bonds are considered, there are conceptually two factors in the return expected. One is the risk free return that could have been earned on United States bonds. The other factor is the compensation for the risk that the amount invested may not be recovered and that the expected return may not materialize.

Evaluation of risk is a subjective matter. This probably explains the lack of progress in quantification of risk. It can be examined in some detail, however, in order that an approach to quantification can be suggested. Setting aside the interest factor and considering only the risk factor, the investment in any particular security contains two aspects. One aspect is the dispersion associated with the cash flows of this particular firm. It is the cash flows of the firm which must permit the recovery of the amount invested and the payment of the return on the investment. The other aspect of the risk factor is somewhat akin to a sampling problem where the sample size is very small.

For each future year, we are not certain of the cash flows that will occur. There may be a wide range of possible cash flows for each year. Some may seem unlikely to occur and others may seem quite likely to occur. From these various possibilities, we must
draw a single amount of cash flow which can then be discounted for the investor's attitude toward assuming risk and the interest factor, to determine the service potential of the firm.

Consider the cash flows of a firm for one year. Excluding dividend payments, there may be a very small likelihood of a net cash outflow or of a very large cash inflow. There may be a high likelihood of some particular cash inflow between these extremes, and a variety of intermediate possibilities. If enough possible cash flows, with their associated likelihood (or probability) of occurrence can be determined, one can usually find a statistical probability distribution of known mathematical characteristics which approximates the distribution of cash flows for that particular year. For example, one might conclude that the possibilities and their associated probabilities represent a "poisson" distribution or some "beta" distribution. Knowing the type of distribution (poisson, beta, etc.) that we have, we can also estimate the parameters of the distribution. The parameters determine the characteristics of the distribution. The most widely computed parameters of probability distributions are the mean and the standard deviation of the distribution.

Having approximated the distribution of possible cash flows with a known probability distribution, and having estimated the parameters of the distribution, we can draw a single cash flow
figure from the distribution in a manner that permits us to evaluate our confidence in the single amount that we have selected. This is, however, a complex statistical problem for each year. It is made even more complex, statistically, by the fact that the distribution for each year is dependent on the results of prior years. This problem is alleviated if one can assume that the cash flow of each year depends only on the cash flow of the one immediately preceding year. If this is true, mathematical Markov Chain theory may keep the problems within manageable bounds. The assumption is probably warranted since the immediately preceding year is the resultant of events of prior years.

In summary, one aspect of dealing with the probability factor is to determine the probability distribution (and its parameters) which describes the possible future cash flows for each year. The other aspect of dealing with the probability factor is of the nature of a sampling problem where the sample size is very small.

The second aspect of the probability factor can be seen by first considering a situation where we have a statistically "large" number of statistically independent investments. Each investment is assumed to have the same probability distribution (with the same parameters) for the future cash flows of each future year. We also assume that we can solve all the statistical problems that are a part of the first aspect of the probability factor. We could then compute a mean for the probability distribution of the cash flows
of each investment. The actual mean cash flow of our investments would equal the expected mean cash flow. In some investments the actual cash flow would be low, but in other investments the cash flow would be high, so that we would receive the mean cash flow we expected. If we could make the large number of investments of this type, we would not need to be concerned with the second aspect of the probability factor.

In making investments, however, we make only one investment that has certain probability distributions. If we diversify our investments, we never achieve investments that are completely independent of each other, and probably never make enough investments so that we have a statistically large number of investments. When we make only one or a few independent investments, we are adding a new aspect to our risk. Having a small sample we cannot expect that the cash flow in each year of the life of this firm will be equal to the mean of the possibilities of cash flow for each year. We can expect this only when we have a large independent sample. The investor must ask himself how he feels about assuming the risk that the actual events may not be the same as the mean of the possibilities. To say that the probability of a cash outflow is 0.01 does not mean that it cannot happen. It means that over a very large number of trials, this cash outflow will tend to occur one time in one hundred. What will the investor's position be if
this cash outflow occurs after he invests and its occurrence results in no return on his investment and the failure to recover his investment? The answer to this question depends on the psychology of this particular individual, his financial resources and financial needs at the time. The answer to this question may well be different for the same individual at different times. One example of the consideration of this problem in the literature is by Friedman and Savage. This manner of the investor's attitude toward accepting risk is the second aspect of the probability factor.

At present, we lack a means of quantifying either aspect of the probability factor. Although it is beyond the scope of this research, it would appear that there is some hope that additional research would permit significant progress in determining the probability distributions and parameters which describe the possible future cash flows for each year. The determination of these probabilities may be subjective, and if so will bring additional audit problems. Even so, this is a problem on which accountants and statisticians should be working.

The second aspect of the probability factor is very individual, depending on the characteristics of the investor rather than

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characteristics of the investment. The personal nature of the problem, and the changeability of individual attitudes toward risk create a problem such that accountants will have to satisfy themselves with providing information on the probability distributions of possible cash flows. The investor can then use this information to formulate his attitude toward the risk of a particular investment. Lutz and Schlaifer suggest possible means that the individual might use in formulating his attitude toward the risk of any particular investment.

Approaches to Determining a Discount Rate

Several authors have considered the problem of determining a discount rate. Gordon and Benishay have suggested empirical approaches to determining a discount rate. Both rely on the use of market data. This market data is, of course, determined by

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many investors interacting in the market. These empirical methods therefore result in an average discount rate, that is, an averaging of the feelings of the many investors who have entered or failed to enter the market.

Such a discount rate might be very useful to management. In evaluating capital expenditure decisions, capital expenditures which failed to produce this rate of return (when averaged with other sources of capital), might be rejected. If this rule is followed, the firm would be rejecting those investments which would lower the value of the firm in the eyes of the "average" investor.

For the investor, however, the use of such an average discount rate is of little value. Because the investor's attitude toward risk must be incorporated into the discount factor, the proper discount rate for each investor is an individual matter. The investor cannot use an average discount rate because he has no means of comparing his attitude toward risk to the average investor's attitude toward risk. Like most averages, the average investor is a statistical myth. The investor could perhaps use the average discount rate if it were possible to determine the average investor's attitude toward risk. This cannot be done, however, since the empirically determined discount rate includes in one figure, the interest factor and both aspects of the probability factor. The use by the investor of an empirically determined average market discount rate must be rejected.
Graham, Dodd and Cottle take another approach. They recognize the essentially individual and subjective nature of the necessary discounting in the discussions of their "multiplier." In doing this, however, their approach results in nothing that the accountant can apply in determining a discount rate.

Fertig, in effect, rejects an attempt to determine a discount rate to be applied to determine the value of the firm. He approaches the firm as a capital expenditure in the manner of the discussions of the capital budgeting literature. He determines the discount rate necessary to equate the present value of the future cash flows to a current market value of the firm. On the basis of the best predictions available, if an investor invests in shares of the stock at the current market price, he can expect to receive a rate of return on his investment equal to the discount rate thus determined. The investor then determines whether he considers this rate of return adequate in view of the interest and probability factors inherent in the investment.

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With the present state of development of application of statistics to determination of a discount rate, Fertig's approach seems well taken. In evaluating an investment, the investor must compare some desired result with some expected result. Often the investor does this by comparing some computed value with the market price. The essential aspect, however, is the comparison. Another means of making the same comparison is to compare a desired rate of return on an investment with the rate of return he can expect to receive if he buys the shares of stock at the current market price. The desired rate of return on the investment is determined by the investor in view of the risk free cost of capital and the risk inherent in the investment. The expected return is computed as Fertig suggests.

Returning to the comparison of a computed value to a market value, if the investor computes the value of the investment by discounting the future cash flows, this comparison is equivalent to comparing a desired rate of return to the computed expected rate of return. The first method is to compare the computed value of the shares, \( CV \), to the market value of the shares, \( MV \), where

\[
CV = \sum_{1 \leq i < \infty} \frac{CF_i}{(1 + dr)^i}
\]

and \( dr \) is the desired rate of return. The second method is
of compute the expected rate of return, er,

\[
MV = \sum_{\substack{1 \leq i \leq \infty}} \frac{CF_i}{(1 + er)^i}
\]

and compare it to the desired rate of return, dr. For either comparison, the symbols would have the same numerical value. The difference is simply the question of which variable is to be treated as the dependent variable in the calculation. The second computation assumes a reinvestment of cash generated at the rate er. The first calculation assumes a reinvestment of cash generated at rate dr. The difference in these rates would not normally be great enough to cause a significant effect. The advantage of the second comparison is that it leaves the determination of the desired return to the investor, who can individually determine it. The expected return can be computed by the accountant without having to know the desired return which might be different for each investor.

In the case of securities not traded in the regular market, the market value, MV, needed to compute the expected return is not as easily available. Such a report would be needed, however, only when a sale of the stock was contemplated. At this point, the investor could specify the market value for which he expects to be able to purchase the stock.
The Discounting Method to be Used

Because of the advantage of permitting the accountant to make the calculation without reference to the individual investor, Fertig's approach will be followed in this study. The future cash flows of the firm as defined in Chapter II will be computed in time periods of one year to facilitate the discounting process. It will be assumed that one-twelfth of the annual cash flow will be received in each month in determining the rate of discount that will equate the present worth of the future cash flows to a current market value of the shares of stock. To eliminate the effect of day-to-day irregular fluctuations, the current market value of the stock will be computed as the average market price in the month preceding the date of the report. To provide a means of comparison, a discount rate will also be computed which represents the rate of return that would have been received if the shares had been purchased at the highest market price and at the lowest market price that existed in the year immediately preceding the date of the report.

The following chapter will discuss the form that the periodic report of service potential will take.
In this chapter the form of the report of service potential will be established. A summary of the reporting system as developed in Chapters II, III and IV will be presented. A discussion of some ways in which the report might be used follows with a hypothetical example illustrating the report.

If it were possible to quantify both aspects of the probability factor, the effect of the dispersion of the cash flows and each investor's attitude toward risk, in such a manner that the investor had full confidence in the quantification, a report of a single figure, the service potential of the firm would provide all the information that the investor really needs. As has been pointed out in the earlier chapters, prediction techniques are not yet developed which provide the required information. It will require significant additional research before such investor confidence is warranted. The individual nature of the investor's attitude toward risk may always prevent the acceptance of a one figure report.

Following the arguments of the previous chapters, the failure to obtain a means of quantifying both aspects of the probability factor does not mean that the reporting of service potential must
be abandoned. The report must merely be modified in such a manner that the investor can make his own adaptations from the information which the accountant is able to provide. As investors and other users have needed to adapt his information from accounting reports in the past, it will be necessary for him to continue to do so in the future. The advantage of the report of service potential is that it is conceptually the information which the investor needs and therefore should require less adaptation. In addition, it should serve to focus the attention of accountants on research that is necessary to improve measurement techniques, rather than submerging the measurement problems in a group of conceptual problems.

The prediction technique selected develops only a single value of net cash flow for each future year. As additional research permits, it will be desirable to make use of not only a single value of net cash flow for each year, but to also report some indication of the dispersion of the cash flows in future years. This might be done by reporting the statistical variances of the distribution of cash flows for future years or by reporting an interval with a report of the statistical confidence that the true cash flow lies within the reported interval. For the present, it is necessary to report service potential in a manner that provides the investor the best possible basis for estimating the possible variance in the cash flows
on a completely intuitive basis. As discussed below, reporting by segments of the firm, rather than a single figure will assist the investor in making his estimate of the possible variance in the future cash flows.

It is possible that investors would find a cash budget prepared for as long as management can predict to be a useful report. That is, report the expected cash flows without any discounting. There are two reasons that a report of service potential is preferable to a cash budget. First, the discounting is necessary for the investor to determine a value for the investment. The discounting is a substantial mechanical chore that the accountant can perform for the investor. Second, firms may feel that disclosure of plans in as specific a form as a cash budget would be damaging competitively. The discounting process merges the cash flow forecasts in such a manner that they cannot be reconstructed from the service potential figures. This form of disclosure should be useful to investors and not competitively damaging.

Reporting Service Potential for Segments of the Firm

The possibilities

The conventional balance sheet, except in the case of specific items such as bonds, does not attempt to report service potential. Usually the balance sheet is described as a reservoir of historical
costs that have not yet been consumed in the operation of the business. There is, therefore, no a priori argument that the report of service potential should appear in the same form as the balance sheet. Further, it would be in error to assign service potential to a specific asset such as a machine. Service potential has been defined as a cash flow, properly discounted. A machine by itself, has no power to generate cash flows (other than its salvage value). It is only when the machine is used in conjunction with other assets such as inventories, supplies, labor services and receivables that any cash flows are generated. Service potential is therefore an attribute of a group of assets rather than an attribute of most of the assets that appear on balance sheets. If one is to prepare a statement of service potential for various segments of the firm, it must be for groups of assets of the firm.

Even so, in a full sense, it is not possible to segment a firm for reporting of service potential. It is difficult to conceive of any firm which does not have some cash outflows that benefit all segments of the firm. The costs of top management would benefit all segments. To fully segment the service potential of the firm it would be necessary to allocate these cash outflows to various segments of the firm. This is simply a parallel of the joint cost problem which accountants have considered for many years. The accepted view of the joint cost problem seems to be that while it is
possible to agree that some procedures for treating joint costs are unreasonable and other procedures seem reasonable, there is no non-arbitrary manner of treating joint costs. But as Hill and Gordon point out

... the cost distribution (in this case) has no bearing upon either (1) the decision to acquire and process ..., or (2) any subsequent decision relative to the disposition . . . .

The same seems to be true for joint cash outflows, for decision making purposes, the marginal cash flows are the significant cash flows, so there is no need to make the allocation of the joint cash outflows. Reporting can be accomplished on the basis of the present worth of the marginal net cash flow which the particular segment being considered contributes to the total cash flow and service potential of the firm.

In order to avoid arbitrary distinctions, to be considered a segment for the purpose of reporting service potential, the activity must generate identifiable cash inflows. Normally this will require that the segment market its own product. There are some cases, however, where reasonable transfer prices can be established and thereby identify cash inflows with an activity of the firm. If an activity does not generate identifiable cash inflows it is an integral part

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of a larger unit. This being the case, no decision about liquidation of this segment or no evaluation of the risk of this activity can be made without reference to the larger unit. This removes the reason for reporting the activity as a segment.

Breaking the service potential into the present worth of the marginal cash flow of each segment can be accomplished and is advocated for the reasons outlined below. An illustration of the proposed report form is contained in Figure 1.

In this discussion, the term "marginal" means the change in cash flows (and service potential) that would result if the particular segment being considered were eliminated. If several segments were eliminated at the same time, the total change in cash flow might be different than the sum of the marginal cash flows reported. The marginal cash flows, however, refer only to changes in cash flow that would result from the elimination of one segment.

The need for reporting for
segments of the firm

A question that the economic theory of the firm tells us should be posed continuously is whether or not the firm should be liqui-
activity of the firm should be liquidated. Paraphrasing Edwards and Bell,\(^2\) the firm (or any segment thereof) should be liquidated when the service potential of the firm (or segment) is less than the market value of the assets committed to it. The service potential is an essential part of such a decision.

Even more basic for the investor is the segregation of cash flows of differing variances. Many firms sell products with substantially different sales stability. One product may be established with a steady demand through the years. Another product may be new, with considerable possibility of large success or complete failure. These two products have widely differing probability factors and the investor may want to evaluate them in that light. Reporting for segments will permit the investor to adjust each product for its variance better than if service potential were reported for the firm as a whole.

As was pointed out in Chapter II, different products of the firm may have different planning horizons. In this case, computation of service potential must be done by segments. There is no additional burden in reporting by segments.

Classification of Items Making Up the Service Potential

Within segments of the firm and for the cash outflows which benefit the entire firm, there are differing variances for certain classes of cash flows. With present prediction techniques, a very fine separation of the cash flows on the basis of differing variances is not possible. It is possible to recognize two main categories, however. These categories are the variable cash flows and the fixed cash flows.

Most cash inflows are variable. In those cases where there are fixed cash inflows, the investor is likely to feel quite different about them than he feels about the variable cash inflows because of the higher degree of certainty associated with fixed cash inflows. In the same vein, certain cash outflows are related to the cash inflows. These cash inflows and outflows are intuitively and statistically dependent, and enter into an evaluation of the risk associated with the particular segment of the firm which generates them.

In the normal situation, there may be certain fixed cash outflows that change only periodically, independent of the level of cash inflows. Within a segment, there are fixed cash outlays that must be deducted in determining the marginal net cash flow of that
segment. If the segment were liquidated, they would be eliminated. On the other hand, as long as the segment continues to operate, this cash outflow will not vary with normal changes in the cash inflows to the segment. An example of this might be the salary of the segment manager.

For the firm as a whole, there are certain fixed cash outflows which benefit all segments of the firm. An example of this type of cash outflow is the cost of operating the general offices of the firm. Financial transactions such as bond payments and interest are another example of a similar transaction. As long as the firm continues to operate, these amounts will not change with the level of cash inflows. The variance of such flows is quite different from the likely variance of the variable inflows and outflows. This will be of value to the investor in evaluating the risk inherent in the investment and his attitude toward that risk.

As was noted in the preceding chapter, the present worth figures will be presented for several discount rates. In light of the discussion in this chapter of the differences in risk associated with the various segments of the firm, it would be desirable to use differing discount rates for the various segments of the firm. An investor may want to value highly a stable segment of the firm but assign only limited value to an unstable segment in determining the total value of the firm. Since a range of discount rates are presented for all segments, the investor can chose to use differing
discount rates for different segments of the firm. The total value
is then simply the sum value of the segments at whatever discount
rate is used for each segment, less the present worth of the fixed
cash outflows related to the entire firm and the present worth of
the financing transactions.

Summary of the Preparation
and Use of the Report

The first step in preparation of the report is to determine the
segments of the firm for which cash inflows can be identified. The
next step is to obtain the management predictions of the cash flows,
for as long a period as management planning extends. The time period
which plans cover may vary in different segments. At the point at
which management's plans terminate, it is assumed that the cash
flows continue forever at the amount existing in the last planned
year. An estimate of the average annual capital expenditure nec-
essary to maintain these cash flows forever will be included. Pre-
dictions will be obtained for the fixed and variable cash flows
attributable to each segment and for the firm as a unit.

The discount rates will be determined that equate the present
worth of the future net cash flows of the firm to the high, low and
average market price of the shares of common stock of the firm. The
average price of the shares of common stock will be computed as the
average market price for the month preceding the date of the report.
To make use of the report of service potential, the investor must evaluate for himself the risk he is assuming and determine his attitude toward that risk. He should then quantify these aspects of the investment with the risk free cost of capital to arrive at an over-all personal required rate of return for this investment.

From the report of service potential the investor can determine the rate of return he can expect if he invests at a given market price. The investment decision is made by comparing his personal required rate of return to the expected rate of return. Alternately the personal required rate of return can be used as a discount rate to determine the value of the investment for the investor. A comparison of this value with the market price should permit the investor to make his investment decision.

The report is organized to assist the investor in evaluating the possible dispersion of the future cash flows. The division of the report by segments permits the investor to value each segment with a different discount rate if he feels that there is a significant difference in the dispersion of the future cash flows of each segment. The investor has two main means of evaluating the risk of each segment. The first is his general knowledge of the sales variability of the product or service of each segment. The second is the relationship of the fixed and variable cash flows.
The report in Figure 1 is based on the predictions in Figure 2 and the discount rates computed assuming market prices of $133,000, the high price; $104,000, the low price; and $96,000, the average price. The firm is assumed to have two segments, one an established product, the other a new venture which will not produce any cash inflows until 1964.

Looking at the report of Figure 1, suppose that Segment II of the firm represents a real estate operation on which the company intends to embark. The firm presently owns land in a desirable location and intends to construct a medical center on the land. An investigation of the type of construction, operating costs and potential rentals was made before the board of directors decided to construct and operate the center. Lease agreements will be made with tenants over a 20 year period. This knowledge would lead the investor to expect that there will be little variance in the future cash flows. There is an upper limit on the cash inflows set by a maximum rent per unit and the number of units constructed. The lower limit is set by a minimum rent per unit and a minimum level of occupancy. The bulk of the cash outflows are fixed and are stable enough that it is relatively easy to predict them.

The fact that the fixed cash outflows are relatively high, however, would lead the investor to consider the investment somewhat more risky if there is any reason to believe that it will not be possible to maintain a high level of occupancy. From these
## STATEMENT OF SERVICE POTENTIAL

**December 31, 1962**

<table>
<thead>
<tr>
<th></th>
<th>Segment I</th>
<th>Segment II</th>
<th>Total</th>
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<td>at 10%</td>
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<td>Present worth of fixed cash outflows related to the entire firm</td>
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<td></td>
<td></td>
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<tr>
<td>Present Worth of Net Cash Generated</td>
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<td>Present worth of financing transactions (excluding transactions with shareholders)</td>
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<tr>
<td>Present Worth of Shareholder's Equity</td>
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<td>25</td>
<td>31</td>
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**Figure 1. Illustration of the Report of Service Potential.**

The planning horizon for Segment I is December 31, 1969.
The planning horizon for Segment II is December 31, 1974.
### ANNUAL CASH FLOW PREDICTIONS

**December 31, 1962**

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<td>2</td>
<td>2</td>
<td>2</td>
<td>2^b</td>
</tr>
</tbody>
</table>

*Planning horizon reached. This amount assumed to continue forever into the future.*

*This amount continues through 1969 when payment of 50 maturity amount is made.*

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Figure 2. Hypothetical Predicted Future Cash Flows.
considerations, the investor must determine, on a subjective basis, the amount of return he must receive on his investment in order to be willing to make the investment. If the investor is "conservative," he may require a rate of return on this segment of the business which is relatively close to the risk free interest rate because he expects little dispersion of the cash flows of this segment. If, however, the investor likes risk this investment may not appeal to him because of the limited potential for high return. The investor who likes risk may either dismiss the investment or use a discount rate which is higher than that of the conservative investor because he does not value highly any investment that does not contain a fair possibility of a large return.

Assume that Segment I represents a portion of the firm which is concerned with the distribution of gasoline and oil products to independent service stations. This business may be very competitive. The service stations must be able to compete with the service stations of other gasoline brands (with a product that, in the minds of its customers, is very similar to that of his competitors). The company for whom the report of service potential is prepared must also face the competition of other distributors who would like to sell to the service stations. For this segment there might be considerable variance in the future cash flows. On the other hand, this possible wide variance in cash flows is offset somewhat by a low
level of fixed cash outflows. If the cash inflows were reduced by the pressures of competition, there would be a considerable reduction of variable cash outflows, thus reducing the impact of the reduced cash inflows on the value of the firm.

In view of these factors, the investor must determine the rate of return which he must receive in order to induce him to make such an investment. The conservative investor is likely to require a high rate of return in order to induce him to assume this risk. This means that the value of Segment I to him may be relatively low. The investor who likes risk will probably not find Segment I too appealing. Even though there is a higher degree of risk, the limits of the market in the area and the competition probably will prevent a very high return. The wildcat oil exploration is the type of investment that this type of investor is likely to value highly.

Having determined his personal required rate of return for each segment of the business, the investor can then use the statement to determine the value of the business to him. The value of the investment is the sum of the values of each segment of the firm. If the discount rate that the investor has chosen is one of the three contained in the report he can determine the value of the segment directly. If not, the investor must interpolate or extrapolate to determine the value of the segment. It would be hoped that the three
discount rates presented would be fairly close to the discount rate that the investor chooses so that he would not have to interpolate or extrapolate to a discount rate much different than those reported.

Other Implications of the Report

Assume that the risk associated with a particular segment justifies a 9 per cent discount rate. If the market value of the assets comprising a segment exceeds the present worth of the marginal cash flow of that segment, there is a presumption that the segment should be liquidated unless some change in the use of the assets can be devised that will increase the marginal net cash flow of the segment, or unless some non-profit objective of the firm dictates retention of the segment.

If the segment is liquidated, the proceeds of the liquidation could either be paid to the investors as a dividend or invested in the remaining segments or in some new segment. If the proceeds were paid as a dividend, the present worth of the remaining shareholder's equity would be the present worth of the marginal net cash flow of the remaining segments less the present worth of the fixed cash outflows related to the entire firm and the present worth of the financing transactions. Presumably none of these amounts would change as a result of liquidating the segment. Following the logic of the timing of the recognition of change in service potential
developed in Chapter II, as soon as the board of directors decided to liquidate the segment, the service potential of that segment would be recognized as the present worth of the net amount to be received in liquidation.

The firm may choose to reinvest the amount received in the liquidation. When the board of directors makes the reinvestment decision there would be recognized the present worth of the cash outflows and the cash inflows that are expected to result from the reinvestment.

Along with the possible liquidation of a segment of a business, the possibility of adding segments to the business is a major decision that businessmen frequently face. One important means of adding segments to a business is through merger with some other existing firm. In the case of merger with no changes in method of operation, the statement of service potential for the resultant company would simply be the sum of the statements of service potential of the merging companies (unless the new management was able to make better predictions than the old management of a merging company).

Normally, however, a merger is undertaken with the expectation of changing the method of operation of the merging companies into a more efficient operation. There would probably be a reduction in the fixed cash outflows related to the entire firm as the separate
administration of the companies was merged into one administration. This would reduce the present worth of the fixed cash outflows related to the entire firm appearing on the statement of the resultant company to below the sum of these amounts appearing on the previous separate reports of service potential. There might be some changes in financing plans which would make the present worth of the financing transactions different from the sum of the amounts appearing on the separate statements.

Often we would expect some changes in the operations of the segments. One segment in each of the separate companies might be combined into a single segment of the merged company. If for example, the company in Figure 1 merged with a chain of independent gasoline service stations. The service station operations would become a part of the gasoline and oil distributing segment appearing on the statement of our hypothetical firm. When we begin to "sell" gasoline and oil exclusively to our own service stations, there is only one cash flow into the firm, that is, from the sale of products to the customers of the service stations. All of the cash outflows related to the operation of the stations and the distributing facilities are necessary to bring about this cash outflow. Any attempt to assign cash inflows to the distributing division would necessarily be arbitrary.
In such a case, often the service potential of the new gasoline distributing-retailing segment would be higher than the sum of the service potential of these segments operating separately. Probably the major force behind the merger would be to enable the total operation to be carried on more efficiently. The former salesmen of the distributing segment might be eliminated. The service stations could adopt uniform policies which might increase sales. Deliveries to the service stations could be scheduled in such a manner as to have an efficient delivery route rather than delivering to each station on demand. The elimination of competition in sales to the service stations might permit more steady and economical purchase of gasoline to be distributed. These are a few of the possible efficiencies which might increase the cash inflows of the segment, reduce the cash outflows, and increase the service potential of the new segment above the sum of the service potentials of the formerly independent segments.

Even if these operating efficiencies are not achieved, the value of the combined segments to the investor would probably be greater than that of the sum of the separate segments because it is likely that the investor will be willing to use a lower required rate of return in valuing the investment. Before the merger, the distributing company faced added risk resulting from competition for sales to the independent service stations. After the merger the
service stations are captive. There is no uncertainty of where the 
服务机构将购买其产品。销售的竞争对零售客户的销售仍然存在，因此风险并未完全消除。合并可能也会影响固定和变动流出的平衡，从而影响投资者所要求的回报率。

任何购买现有公司的行为将被处理为与上述合并相同的方式。段II是一个内部扩张的例子。这些扩张的融资可以作为单独的项目来处理。

考虑报告服务潜力的方式会反映债券发行。"杠杆效应"的影响已被金融学生研究多年。杠杆效应在服务潜力的声明中会以直接改变预期回报率或直接改变股东权益的现值的方式出现。

如果可能以面值发行债券，而折现率在报告中使用的利率高于这个数，则股东权益的现值将直接增加。假设折现率为8%。增加股东权益的原因在于折现现金流量（发行、偿还和息票支付）时的假设。
that the borrowed cash will earn at the rate of 8 per cent during the period that the firm has the cash. Yet, it is necessary to pay only 4 per cent for the use of the funds.

Consider the case of the issue of $10 million in bonds maturing in 20 years. The coupon rate of the bond is 4 per cent. If a report of service potential is prepared on the date that the bond is issued, there is a cash inflow whose present worth is $10 million. There is a corresponding cash outflow (all of the bond coupons and the payment of $10 million at maturity) whose present worth is $6 million. The difference of $4 million is the addition to the shareholder's equity resulting from the favorable leverage. This would appear in the statement of service potential under the present worth of financing transactions. If the investor felt that the additional fixed cash outflows required in payment of the bond coupons and the amount due at maturity added significantly to the risk of the investment, he might increase his required rate of return on the firm thereby reducing the value of the firm from his point of view. Under some conditions this could offset or even overshadow the increase in service potential resulting from the assumptions just discussed.

Occasionally changes occur in the business environment that could not reasonably have been foreseen or the effect on cash flows could not reasonably have been predicted. These events, however, may have a significant effect on the service potential of the firm.
Probably the major element of change in business environment which management cannot always foresee clearly is government action. While management should plan for these actions as much as possible, the actual occurrence is often a political event which makes prediction very difficult.

If, for example, the government imposes an excise tax on the sales of a product, this will effect the cash flows of a business engaged in selling this product. To the extent that the tax can be passed on to the consumer the cash inflows will increase and the cash outflows (the tax payment) will also increase. The firm may not be able to pass the full amount of the tax on to the consumer. The main factor governing the possible shifting is the elasticity of demand for the product. It is also possible that some of the tax can be shifted backward to suppliers of labor or materials. If bargaining can force price concessions from the suppliers of these factors some of the tax may be shifted backward. It is likely, however, that the firm will have to absorb some of the tax itself, resulting in a reduction of the present worth of the shareholder's equity.

Another example of changes in the business environment would be the expropriation of a portion of the business operating in some foreign country by the government of that country. This would have the effect of eliminating some (or all) of the cash inflows and
cash outflows of some segments of the business. This would reduce the present worth of the marginal net cash flow of those segments and thereby reduce the present worth of the shareholder's equity.

Other examples could be cited, but the discussion above should provide some grasp of the possible uses of the periodic report of service potential. The examples should also show how various events would effect the reported service potential of a firm.
CHAPTER V

THE PLACE OF THE REPORT IN PRESENT ACCOUNTING

In this chapter consideration will be given to the relationship of the report of service potential to present accounting reports. Possible audit techniques will be discussed.

The Place of the Report

Accounting in the past has tended to prepare a few reports that were designed to serve all users to some degree. The discussion in this dissertation has concentrated on the reporting of service potential to investors. As was pointed out in the first chapter, this was based on the premise that if accounting reports are to achieve a higher degree of usefulness they must be prepared with a particular use in mind. Following from this, the proposed periodic report of service potential (as opposed to an ad hoc report) is prepared from the investor's point of view because it seems to be of greatest value to the investor. Because the periodic report of service potential is seen as one of perhaps several reports prepared for special uses, it does not supplant any existing general purpose report now prepared by accountants.
The report of service potential is most like the balance sheet. It reports the status of certain aspects of a firm at a given date. The function of the balance sheet is not well defined, probably because it is a general purpose report. If the balance sheet is thought of as a report of unexpired costs, the report of service potential is very different. The report of service potential does not attempt to identify service potential with the specific assets that are shown on the conventional balance sheet. As pointed out earlier, the identification would be arbitrary and would be of little use to the investor.

Sprouse and Moonitz define the term "asset" in such a manner that not all of the items included in service potential would be assets.

Assets represent expected future economic benefits rights to which have been acquired by the enterprise as a result of some current or past transaction.

It was decided in Chapter II that the change in service potential should be recognized when the board of directors makes the decisions which will bring about changed cash flows. Sprouse and Moonitz agree that expected future economic benefits are the important characteristic of an asset but apparently would prefer the degree of certainty

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associated with an exchange that brings the asset into the business. Their definition would not seem to exclude recognizing service potential of assets acquired after the exchange has occurred. Their definition of a "financial statement" would seem to include the periodic report of service potential.²

Some users of balance sheets seem to view them as measures of value of the firm. The report of service potential should be much more useful in helping the reader determine the "going concern" value of the business. To facilitate the comparison of service potential and market value suggested in Chapter IV, it would be desirable to develop a report of the market value of the assets, classified in the same segments as used in the report of service potential. This should be fairly easy to do since the segments of the firm are identifiable within the organization even though they probably would not correspond to the detailed organizational segments of the firm.

The classification of assets that appears in the balance sheet provides for uses that the report of service potential does not. The amounts and nature of the current assets and current liabilities would continue to be of interest to readers of balance sheets.

²Ibid., p. 8.
The reported income of a firm as shown in the conventional income statement is often thought of as a measure of management performance. Some have questioned the maximization of long run profit as the primary motive for business management. Most agree, however, that the profit is an important aspect of management performance. Maximization of reported profit is not a satisfactory goal, however, because of its essentially short run nature. Management can take many actions which will effect the reported profit for any particular year. Some of these management actions may merely shift income from one year to another. Other actions that management may take to increase the reported profit for a current year may be detrimental to the total profit of the firm over a longer period.

The accounting convention of recognizing income at the point of sale permits shifting of income from one year to another by timing the sales occurring at year end. Management may select depreciation and inventory methods which may have a significant effect on the income reported in one year as opposed to another year.

Profit in current years may be increased by reduction of research and development or marketing expenditures in that year. Such reductions may have adverse effects on the ability of the firm to meet its competition successfully in future years. The motive for affecting the reported profit for a particular year may be strong, however, since management's survival as management may depend on the information which is reported to the owners.
Because of the relationship of service potential to future dividends discussed in Chapter II, a greater service potential is indicative of greater dividends (assuming the same discount rate). Since it was suggested that return on investment was the shareholder's primary motive, it is in the shareholder's interest for management to attempt to maximize the service potential of the firm. This represents a definition of performance from the investor's point of view.

If the future were known with certainty, the investor would presumably not be interested in management performance. His return would be determined by the future dividends which would not be affected by management performance if the future were, in fact, certain. In real world uncertainty, the future dividends will depend not only on management plans, but their ability to make new plans and implement plans. Management performance becomes important to the investor in determining management's ability to do this.

Using this definition of performance, a report of changes in service potential would be an important measure of management performance. Since the report of service potential is concerned with all future periods, the management would not be in a position to artificially affect the report of current years at the detriment of future years. A reduction in advertising expenditures would presumably result in a reduction of new sources of cash inflows in the
future. The current reduction in cash outflows would be shown with its effect on future cash inflows. The problems of computing depreciation or selecting various inventory methods would not be encountered.

Not all changes in service potential reflect the performance of management. In addition to changing in response to management decisions, service potential can change as a result of events occurring in the business environment over which management has no control. An example of this would be the general business cycles of the economy. Changes in the position of domestic and foreign governments which affect business would be another example. While management may have no control over these events, to the extent possible they should foresee the effects of these events in making decisions. To the extent that these events are predictable, and mitigation of their effect is possible, they must be considered in evaluating management performance.

The statement of changes in service potential could be organized in several ways as long as the categories included all of the possible means by which service potential could change. The categories should be established in a manner that facilitates the determination of the amount of control which management could have exercised over the changes. One possibility would be as follows.
1. Major decisions made by management during the current period.

2. Changes in the business environment.

3. Changes in the discount rate applicable to the company due to changes in the (risk free) interest rate and changes in the probability factors.

4. The operation of the company through the year in the pattern anticipated at the beginning of the year, that is, the realization of some of the predicted cash flows.

5. Changes resulting from changes in predicted cash flows for decisions made in prior periods, that is, changes resulting from improvements in predictions.

Other categories would be possible. This suggestion is based on the timing of recognition adopted in Chapter II, and serves to suggest the possibilities of a report of changes in service potential.

One final observation should be made in considering the place of the periodic report of service potential in contemporary accounting. The future cash flows which form the basis of the report of service potential are based on exchanges which are expected to occur in the future. The predictions used are simply predictions of exchanges which are expected to occur and generate cash flows. It is
this type of data that was specifically allowed in the Moonitz study of the basic postulates of accounting. Postulate B-2 is:

Market prices, accounting data are based on prices generated by past, present, or future exchanges which have actually taken place or are expected to.\(^3\)

The report of service potential would be an example of a new report allowed by the postulate.

In summary, the periodic report of service potential is prepared to meet a specific informational need. There is no reason to believe that the periodic report of service potential would replace existing general purpose reports such as the balance sheet or income statement. It is possible that the use of the periodic report of service potential might speed the modification of existing reports to fulfill more specific informational needs. The possibility of other special purpose reports to be used in conjunction with the periodic report of service potential can be seen. From the investor's point of view, there is good reason to assume that his primary goal in investment is maximization of service potential. If so, a statement of changes in service potential would be very important in evaluating management performance.

The Audit Problem

The nature of the problem

Whenever one group reports some of the results of its operations to some other group, an audit problem arises. In the case of accounting reports, the audit problem is that of preventing the biases and errors of the group preparing the report (management) from having a significant effect on the reported results. These biases may be conscious or unconscious. An unconscious bias would be a result of the general attitude of the management. Management may tend to be generally optimistic or pessimistic about the future. This effects their interpretation of the events that form the basis of the report.

Conscious bias results in a deliberate effort of management to prepare the report in such a manner that the investor receives the information that the investor hopes for. Even without an audit, there are some constraints on management's ability to report in this manner. Income shifting which is possible in the conventional income statement always effects the reported income of subsequent years. There are some rather wide limits on the computation of depreciation which is acceptable. Nevertheless, the motivation for such conscious bias is very strong since management's survival may depend on the information they report to investors.
Auditing techniques

Auditing has developed at two levels to eliminate the effects of bias and to detect errors. At one level, a body of "generally accepted accounting principles"\(^4\) has been developed to limit possible management latitude in reporting. While some would argue that the latitude allowed by the generally accepted accounting principles is too wide, they do limit the alternatives available to management for reporting to the public. At the other level, two basic auditing techniques have been developed to help the auditor render his opinion that management has followed generally accepted accounting principles with no material biases or errors.

The body of generally accepted accounting principles apply to the preparation of the conventional balance sheet and income statement. This body was developed as the reporting was developed and has been modified from time to time. The auditing techniques have also gradually evolved. The two techniques are applied in various balances in all auditing. The first technique is to obtain independent confirmation of the amount appearing in the reports. The other technique is a verification of the basic data and the procedures followed in incorporating this data into the report.

\(^4\)This phrase is taken from the auditor's short form report. See, Committee on Auditing Procedure, Codification of Statements on Auditing Procedure, New York: The American Institute of (Certified Public) Accountants, 1951, p. 16.
The confirmation technique is applied by going to sources outside the firm whose report is being audited and ask for confirmation of amounts appearing in the statement. This audit technique is almost always applied to cash and other assets held by an independent custodian. It is applied imperfectly to the receivables of the firm.

Another variation of the confirmation technique is for the auditor to confirm amounts by making direct observations. This is applied to marketable securities which are held in the firm's custody. It is applied on a sampling basis to the firm's inventories.

In the second audit technique, the procedural verification, the auditor traces the data from the time it enters the accounting records until it appears in the report. This technique is often referred to as the testing of internal control. It is based on the logic that if the data handling procedures function correctly and if the source data entering the system is correct, the output (in this case the accounting report) must be correct. This technique has received greater emphasis in recent years and probably comprises the greater part of audits which are performed today.\(^5\)

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Any audit is a blend of these two techniques. The blend selected is based on the auditor's judgment in the circumstances. Often both techniques are applied to the audit of a single asset such as cash. There has been only limited application of statistical methods to audit which would permit the auditor to back his opinion with a statistical confidence in the results of his tests of accounting systems and reported amounts.

A basis for auditing the report of service potential

The body of generally accepted accounting principles applies to the preparation of the conventional balance sheet and income statement. No such body of principles has been developed for the preparation of statements of service potential. The development of the body of principles generally follows the adoption of the report as more firms face the measurement problems of implementing the report.

It may be in the future that the importance of general acceptance of accounting principles will decline. Such principles may be established by some body within or outside accounting, perhaps in accordance with some axioms. Such a development could make almost any report almost immediately auditable by the body's establishment of principles for preparation of the report. This development might also prevent establishment of principles regardless of the popular appeal of a report based on the principles.
The audit of the report of service potential is critical because it depends directly on the future which cannot be known with certainty. Through acceptance of the "going concern" concept, however, accountants have made many predictions. Estimates of service lives of assets and establishment of deferred tax accounts are examples of these predictions. Perhaps there is merit in recognizing explicitly that a report is based on predictions.

In the absence of generally accepted principles for preparation of the report itself, the auditor must satisfy himself with preparation of standards by which the user of the report of service potential judges the acceptability of the report. That is, until a body of generally accepted principles for preparation of reports of service potential is established, the auditor cannot audit the report itself. He does perform a necessary service by validating the standards which the investor can use to judge the report. As better means of prediction and discounting are developed, their acceptance may permit the auditor to begin to audit the report. At present, however, the auditor can perform a necessary service by validating the standard. The investor can then decide whether or not to place his reliance on the report as a result of the auditor's work.

Since methods of obtaining predictions are not better developed, the predictions used are those of management, obtained in a manner which in the judgment of management is the best available. Methods
of obtaining predictions are not yet well enough developed that one method can be stated to be the best. Management, therefore, must be allowed wide latitude in selecting the method for making the prediction. Standards must be developed and validated by the auditor such that the investor can evaluate the predictions of management.

Two such standards are suggested. Both are akin to the audit technique of confirmation. Both rely on past data. Since the data used is past data, management biases would not affect the data.

The first is a comparison of past management predictions with actual events that occurred. As this information is developed and reported with the service potential, it would provide the investor with some information of the prediction ability of management. This would be a factor that the investor would wish to consider when evaluating the risk. One requisite for the successful management of a business is the ability to make reasonably accurate predictions. Without these predictions management cannot plan to deal with future events. Such a comparison would also serve as a damper on extravagant management predictions which would later be reported to be a wide variance with developments that actually occurred.
This comparison could take a tabular form as shown below.

<table>
<thead>
<tr>
<th>Year</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
<th>Year 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actual amounts</td>
<td>12</td>
<td>0</td>
<td>14</td>
<td>15</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>Predictions made in</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year 1</td>
<td>10</td>
<td>11</td>
<td>12</td>
<td>16</td>
<td>17</td>
<td>19</td>
</tr>
<tr>
<td>Year 2</td>
<td>-</td>
<td>0</td>
<td>13</td>
<td>16</td>
<td>17</td>
<td>18</td>
</tr>
<tr>
<td>Year 3</td>
<td>-</td>
<td>-</td>
<td>15</td>
<td>17</td>
<td>18</td>
<td>17</td>
</tr>
<tr>
<td>Year 4</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>15</td>
<td>17</td>
<td>17</td>
</tr>
<tr>
<td>Year 5</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>15</td>
<td>16</td>
</tr>
</tbody>
</table>

In order to make the comparison, a history of predictions and actual events would have to exist. This might prevent immediate use in some companies.

This comparison would have to be interpreted carefully. Most people would feel that there are some aspects of a business operation over which management has no control. If an event occurred over which management had no control and which could not have been reasonably foreseen, a variance between management predictions and the actual events does not mean that management has poor predictive ability. If, for example, an unusual flood occurred in year 2 which prevented operation of the segment shown in the table, this presumably would be the reason for the zero amount appearing in year 2. The auditor would be able to render his opinion that the table contains the actual amounts and the predictions made in the year indicated. He could also give his opinion of the impact of the flood on
the amounts shown for year 2. The work necessary to support this type of auditor's opinion would be similar to present audit work.

The other method of confirmation which could be used to establish a standard by which the investor could judge the report of service potential is a straight line extrapolation of the net cash flows for the entire firm based on past net cash flow. The weakness of using this device as a means of obtaining predictions (mainly failure to predict turning points) was discussed in Chapter II. This type of extrapolation of past data predicts changes in the future net cash flow at the same rate that changes have occurred in the past. While the same rate of change may not be expected to occur in the future, it would seem to be incumbent on management to explain any deviation of management predictions from the past pattern. In this case, the auditor could not be expected to give his opinion on the management's explanations, but he could verify the extrapolation method and the data extrapolated.

The use of these two procedures would provide the investor with an independent standard by which to judge the predictions made by management. If these procedures failed to confirm management predictions, the responsibility for justifying the predictions would be placed on management. The use of these procedures to provide a basis for auditing the predictions is recommended.
The remainder of the report of service potential is subject to audit by the technique of verification of the data handling procedures. The mathematical nature of the procedure permits the expression of the procedures so precisely that it should be possible to obtain general acceptance of those procedures. Problems of measurement are not encountered after the predictions of the future cash flows are obtained. The determination of the discount rate is based on published data which is a matter of record used in conjunction with the predictions. The procedures by which the published data is obtained and the discount rate determined is subject to procedural verification.

The actual discounting process is described earlier in a mathematical formulation. Because the formulation of the process is so precise, a procedural verification is easily accomplished. This phase of the audit can be performed with a higher degree of precision than many audits of present accounting statements.

In summary, because generally accepted prediction techniques do not exist in the accounting sense, at present only a basis for auditing a statement of service potential can be presented. The predictions of management which are incorporated into the report may be judged by comparison with a standard which the auditor has validated. This is of a similar nature to the confirmation audit technique. The confirmation is accomplished by reference to past data rather
than reference to sources outside the firm but should permit the detection of bias entering the report. Every other aspect of the report of service potential can be verified through the audit technique of procedural verification, similar to the test of internal control. Because of the precise formulation of the procedures for handling the data, this verification should be very satisfactory. Rather than the auditor expressing his opinion on the report as a whole, he expresses his opinion on the standards established for evaluating management's predictions and on the procedures used for processing these predictions into the final report.
CHAPTER VI

THE CASE STUDIES

This study has been greatly benefited by the cooperation of the companies providing data for the case studies. Mr. Carl Scarbrough, Treasurer of Owens-Corning Fiberglas Corporation authorized the cooperation of the corporation. Mr. Len Jacobs greatly aided in the collection of the data. Mr. William Randall, Treasurer of the Columbus and Southern Ohio Electric Company authorized the cooperation of that company. At Columbus and Southern Ohio Electric Company, Mr. John Emery facilitated the collection of the data. Mr. Q. E. Bowers, auditor of the Columbus Transit Company, was most helpful in securing data. Especial thanks are due to these gentlemen.

Owens-Corning Fiberglas Corporation

The corporation was formed in 1938 by the spin-off of the fiber glass divisions of two glass companies. Some of the company growth has been due to the growth in the general economy, but most of the corporation growth is the result of research and sales efforts that have permitted the company to continuously enter new markets.
The corporation operates mainly in two industries. One is the insulation industry in which the general products division of the corporation operates. This includes insulation for various types of buildings and various products such as refrigerators. The other industry is the synthetic fiber industry. At present the firm markets a fiber for certain textiles and for the reinforcement of fiberglas reinforced plastics used in a variety of applications. One such application is in automobile bodies. These fibers are manufactured in the textile division of the corporation. The corporation management feels that the textile division will grow in relative importance because the penetration in the insulation industry is already relatively high. The lower penetration in the synthetic fiber market at present is expected to permit a higher rate of growth. New applications of textile products are also expected to be found more rapidly.

The manufacturing operations of the textile division and the general products division are almost completely independent. The marketing operations are less independent. In cases where one customer buys the product of both the textile division and the general products division, one salesman sells both products.

The formal planning of the corporation extends three years into the future. Beyond this point trends in sales of products are estimated without specifically forecasting costs of operation and related data. The planning horizon is therefore at the end of three years.
The need for only limited planning beyond this planning horizon is explained by three factors. Technology is changing rapidly, specialized equipment has a very limited life, and finally construction time for new production facilities is quite short. The technology of production has changed rapidly in the past and is expected to change rapidly in the future. This makes it difficult to foresee the means of production that will be in use much beyond the planning horizon or to predict operating costs beyond the planning horizon.

The major element of a new production facility is the furnaces. These furnaces require rebuilding on the average of every two years. If it is necessary to change the character of production, this can normally be accomplished at the time that the furnaces are rebuilt. In building these facilities, the company is not committed for a long period of time to a given technology of production.

The need for long range planning is also reduced by the short construction time for new facilities. Construction time for a new production facility averages seven or eight months. This being the case, the need for additional facilities does not need to be recognized far in advance. In some industries, the need for additional facilities must be foreseen well in advance because of the long construction time required for new facilities.

The nature of the production process adds some need for long range planning. The use of the furnaces requires a continuous 24 hour per day operation. It is quite expensive to stop operation of
a furnace and later resume operations. This means that the company must operate at relatively high capacity at all times. It is not possible to increase production by addition of a second shift. Particularly in the insulation products, the bulk makes any significant storage very expensive.

Figure 3 presents the service potential of the Owens-Corning Fiberglas Corporation based on company predictions using a three year planning horizon. The high total market price for the stock during 1962 was $586,098,831. The low total market price was $311,914,979. The average total market price for December, 1962, was $390,730,590.

The amounts shown in the various divisions are based on rough approximations to the proper divisions. More precise information could have been developed from the company records but the manpower was not available to do this. This information could be made available on a routine basis with little additional effort. In any case, the approximations serve to illustrate the report. The treasurer's office had prepared cash budgets for three years and most of the information for the report was taken from this budget. It was necessary to reconcile the corporation engineering plan to the cash budget in order to separate the capital expenditures and maintenance expenditures into the two segments of the corporation. The property
Owens-Corning Fiberglas Corporation
Statement of Service Potential
(000 omitted)
December 31, 1962

<table>
<thead>
<tr>
<th></th>
<th>General Products Division</th>
<th></th>
<th>Textile Division</th>
<th></th>
<th>Total</th>
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<tbody>
<tr>
<td></td>
<td>at 4% at 6% at 7%</td>
<td>at 4% at 6% at 7%</td>
<td></td>
<td>at 4% at 6% at 7%</td>
<td></td>
</tr>
<tr>
<td>Present worth of cash inflow</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>from sale of products</td>
<td>4,211,403</td>
<td>3,130,997</td>
<td>2,660,941</td>
<td>2,748,193</td>
<td>2,048,766</td>
</tr>
<tr>
<td>Present worth of variable cash</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>outflows</td>
<td>2,946,208</td>
<td>2,166,298</td>
<td>1,875,964</td>
<td>2,186,298</td>
<td>1,629,895</td>
</tr>
<tr>
<td>Present worth of fixed cash</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>outflows related to the</td>
<td>61,977</td>
<td>60,500</td>
<td>59,540</td>
<td>29,806</td>
<td>29,180</td>
</tr>
<tr>
<td>Total</td>
<td>3,006,183</td>
<td>2,256,798</td>
<td>1,935,533</td>
<td>2,216,097</td>
<td>1,659,084</td>
</tr>
<tr>
<td>Present Worth of Marginal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Net Cash Flow</td>
<td>1,203,210</td>
<td>882,192</td>
<td>745,608</td>
<td>745,408</td>
<td>532,096</td>
</tr>
<tr>
<td>Present worth of cash outflows</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>related to the entire firm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Present Worth of Net Cash</td>
<td>1,193,820</td>
<td></td>
<td>829,705</td>
<td></td>
<td>1,735,315</td>
</tr>
<tr>
<td>Generated</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Present worth of financing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>transactions (excluding</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>transactions with shareholders)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Present Worth of Shareholder's</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equity</td>
<td>9,400</td>
<td>9,140</td>
<td>9,010</td>
<td></td>
<td>532,095</td>
</tr>
</tbody>
</table>

Figure 3. Statement of Service Potential for the Owens-Corning Fiberglas Corporation

The planning horizon for both divisions is December 31, 1965.
taxes and insurance were distributed on the basis of the cost of fixed assets in each segment. The other cash inflows and outflows were divided on the basis of past percentage relationships.

The discount rates presented yield present worth of the shareholder's equity which approximates the total market value of the shares at the high market price for 1962, the low market price for 1962, and the average market price prevailing in the month of December, 1962. In other words, based on the predictions of the net cash flow of management for the years 1963, 1964 and 1965, and the assumption that the cash flows of the third year will continue forever into the future (adjusted for expected capital expenditures), the following conclusions can be reached. If an investor were to purchase the shares at $79 per share he could expect a return on his invest of 4½ per cent. If he were to purchase the shares at $57 per share, he could expect a return on his investment of 6 per cent. Finally, if he were to purchase the shares at $48 per share he could expect a return of 7 per cent.

The investor in evaluating the risk of the investment might decide that for the relatively stable general products division he is willing to invest at a low rate of return. In the more volatile textiles division, he might decide that the risk warrants a higher rate of return. He can determine the value of the investment on this basis by adding the present worth of the marginal cash flows at the desired rates of return and subtracting the present worth of
the firm wide and financing cash outflows. He must decide on a
discount rate to apply to the firm wide and financing cash out­
flows. He might decide to use the lowest discount rate for these
cash outflows giving a low value to the firm. He might also decide
to use an average rate between the rates he is applying to the
segments.

Suppose that in this case an investor decided that he would be
satisfied with a 4½ per cent return on the general products division
and 7 per cent return on the textile division. The firm wide and
financing cash outflows he decides to discount at a rate of 4½ per
cent. On this basis the value of the firm to him would be computed
as follows.

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Present worth of the marginal cash flow of the general products division</td>
<td>$1,203,219,000</td>
</tr>
<tr>
<td>at 4½ per cent</td>
<td></td>
</tr>
<tr>
<td>Present worth of the marginal cash flow of the textile division at 7 per cent</td>
<td>328,282,000</td>
</tr>
<tr>
<td>Total</td>
<td>1,531,501,000</td>
</tr>
<tr>
<td>Less: Present worth of cash outflows rated to the entire firm at 4½ per cent</td>
<td>1,193,820,000</td>
</tr>
<tr>
<td>Present worth of financing transactions at 6 per cent</td>
<td>9,400,000</td>
</tr>
<tr>
<td>Total Present Worth of the Firm</td>
<td>$328,281,000</td>
</tr>
</tbody>
</table>

This represents a value of $49 per share.
In the case of the Owens-Corning Fiberglas Corporation, the limited long range planning in the corporation probably limits the report of service potential prepared on predictions of only three years. The market price of the shares has been at times high enough that it would appear that investors anticipate a sustained rate of growth for some period into the future. In this case, reflecting the expected growth for only the next three years probably undervalues the corporation. Further, since the textile division is growing more rapidly than the general products division, the relative importance of the general products division is probably overstated. This emphasizes the need for improved prediction techniques which would take the predictions beyond a three year period in the predictions forming the basis of the report.

In attempting to carry out the audit procedures which were recommended for confirmation of management predictions it was found that there was no past history of previous predictions which permitted a judgment of the predictive ability of management. It was possible, however, to carry out the other procedure suggested for the confirmation of the predictions.

The area of predictions which most needs confirmation is the cash flow generated by operations. The other cash flows are largely contractual in nature which makes their prediction more reliable. The cash generated by operations was extrapolated using a least squares
fitting of a straight line trend to the cash generated by operations for the five years from 1958 to 1962. A comparison of the computed amounts \( Y_c \) for the years 1963, 1964 and 1965, to the amounts predicted \( Y \) is given below.

<table>
<thead>
<tr>
<th>Year</th>
<th>( Y_c )</th>
<th>( Y )</th>
</tr>
</thead>
<tbody>
<tr>
<td>1963</td>
<td>$29.9 million</td>
<td>$28.0 million</td>
</tr>
<tr>
<td>1964</td>
<td>31.7 million</td>
<td>30.3 million</td>
</tr>
<tr>
<td>1965</td>
<td>33.5 million</td>
<td>32.5 million</td>
</tr>
</tbody>
</table>

In each year the amounts on which the report was based were lower than a straight line extrapolation of the data for the previous five years.

Columbus and Southern Ohio Electric Company

The Columbus and Southern Ohio Electric Company is a long established electric company. The Columbus Transit Company is a wholly owned subsidiary company. The Electric Company serves a large geographic area in central and southern Ohio. Columbus is the largest city served. Columbus is the seat of the government of the state of Ohio and the site of The Ohio State University. These groups make the residential and commercial load of the company relatively larger than in most electric companies. It also adds an element of stability to the operations of the Electric Company. The relative importance of the various revenue sources are shown below.
The Transit Company operates under a franchise from the City of Columbus, providing service to the greater Columbus area. The company fares are set such that the company earns a specified rate of return on its rate base. For this reason, there is a high element of stability in the cash generated by operations of the company. In an instance such as this, the revenues and the operating cost predictions are not as important as the prediction of the rate base. This prediction is relatively accurate. The company is now in the process of gradually replacing its trolley busses with motor busses.

Since the Transit Company is wholly owned by the Electric Company, when an investor purchases shares in the Electric Company, he is also purchasing an interest in the Transit Company. Because the operations of the Transit Company are almost completely independent of the Electric Company, the form of the statement of service potential presented as Figure 4 does not show any cash flows related to the entire firm. It was possible to assign all of the cash flows to the individual companies.
## COLUMBUS AND SOUTHERN OHIO ELECTRIC COMPANY

### Statement of Service Potential

(000 omitted)

#### December 31, 1962

<table>
<thead>
<tr>
<th></th>
<th>The Electric Company</th>
<th>The Transit Company</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Present worth of cash inflows from sale of service</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>at 6%</td>
<td>1,254,664</td>
<td>1,082,023</td>
<td>727,700</td>
</tr>
<tr>
<td>at 7%</td>
<td>151,825</td>
<td>81,614</td>
<td>56,398</td>
</tr>
<tr>
<td>at 11%</td>
<td>319,321</td>
<td>104,895</td>
<td>7,311</td>
</tr>
<tr>
<td><strong>Present worth of variable cash outflows</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>256,559</td>
<td>678,969</td>
<td>220,615</td>
</tr>
<tr>
<td><strong>Present worth of fixed cash outflows related to the companies</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>678,969</td>
<td>509,024</td>
<td>61,950</td>
</tr>
<tr>
<td></td>
<td>81,614</td>
<td>32,797</td>
<td>22,175</td>
</tr>
<tr>
<td></td>
<td>935,528</td>
<td>400,052</td>
<td>220,615</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>1,933,193</td>
<td>1,489,041</td>
<td>1,163,630</td>
</tr>
<tr>
<td><strong>Present worth of net cash generated</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>319,321</td>
<td>4,271</td>
<td>1,601</td>
</tr>
<tr>
<td></td>
<td>272,386</td>
<td>3,063</td>
<td></td>
</tr>
<tr>
<td></td>
<td>176,649</td>
<td>81,523</td>
<td></td>
</tr>
<tr>
<td><strong>Present worth of financing transactions (excluding transactions with common shareholders)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>106,895</td>
<td>90,653</td>
<td>61,615</td>
</tr>
<tr>
<td></td>
<td>4,271</td>
<td>870</td>
<td>500</td>
</tr>
<tr>
<td></td>
<td>105,852</td>
<td>81,523</td>
<td>61,615</td>
</tr>
<tr>
<td><strong>Present Worth of Shareholder's Equity</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>216,626</td>
<td>181,733</td>
<td>115,234</td>
</tr>
<tr>
<td></td>
<td>7,311</td>
<td>2,193</td>
<td>1,101</td>
</tr>
<tr>
<td></td>
<td>224,937</td>
<td>183,926</td>
<td>116,335</td>
</tr>
</tbody>
</table>

**Figure 4. Statement of Service Potential for the Columbus and Southern Ohio Electric Company**

The planning horizon for the Electric Company is December 31, 1967.

The planning horizon for the Transit Company is December 31, 1974.
Detailed cash budgets are prepared by the treasurer's office of the Electric Company for three years. This provided the needed information for those three years. Beyond this, planning is done primarily in the engineering offices of the company. It was necessary to convert their production predictions into revenue. From this point, the cash inflows and outflows were determined on the basis of past percentages which in the past have been very stable. Some arbitrary divisions were necessary to break the cash outflows into the fixed and variable portions. The nearness of the planning horizon did not seem to have a marked effect on the reported service potential of the Electric Company as it did in the Fiberglas Corporation. This is probably due to the slower growth of the Electric Company.

For the purposes of the report, the Transit Company had a planning horizon at the end of 12 years. While normal planning does not extend this far into the future, the company has made plans this far into the future in connection with the conversion from trolley busses to motor busses.

The high market price for the stock of the Columbus and Southern Ohio Electric Company during 1962 was $203,350,000. The market low was $114,800,000, and the average during the month of December, 1962, was $188,792,800. Again the discount rates selected result in a present worth of the shareholder's equity which approximates the total market value of the shares at these market prices. Based on the
predicted cash flows, if the investor were to purchase the shares at $79 per share he could expect a return of 6½ per cent. If the investor purchased the shares at $66 per share he could expect a return of 7½ per cent, and if he purchased the shares at $42 per share, a return of 11 per cent.

In the case of the Columbus and Southern Ohio Electric Company, the history of past predictions was not obtained. The cash generated by operations for the past five years was extrapolated using a least squares fit of a straight line. The computed amounts for the next three years, $Y_c$, are compared with the predicted amounts, $Y_p$, used in preparing the report of service potential.

<table>
<thead>
<tr>
<th>Year</th>
<th>$Y_c$</th>
<th>$Y_p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1963</td>
<td>$20.4$ million</td>
<td>$17.5$ million</td>
</tr>
<tr>
<td>1964</td>
<td>22.0 million</td>
<td>18.3 million</td>
</tr>
<tr>
<td>1965</td>
<td>23.6 million</td>
<td>19.4 million</td>
</tr>
</tbody>
</table>

Summary

The application of the proposed report to actual companies demonstrates that the report can be prepared for actual companies. This can be done without significant addition to record keeping. Two improvements could be made in budgeting procedures which would facilitate the preparation of the report. First, records needed for the
report could be kept more readily available. In general, it seemed that the predictions were prepared by the firms on the basis of the segments and then combined to make a total budget. The information developed before combination could be made available if the report were to be prepared regularly and thus most of the estimates necessary to reporting for segments could have been avoided. There was also evidence that the budgeting process develops the distinction of fixed and variable costs and that this information could be made available at very little additional effort if the report were being regularly prepared.

The second improvement in procedures is more basic. It is suggested that the preparation of the report of service potential which is based on predictions for all phases of the firm's activity would demonstrate the need for coordination of the planning that takes place in the various departments in the company. Planning may take place in a long range planning department, in an economist's office, the engineering department and in the treasurer's office. Other offices may also be making predictions about the future course of the business. There often exists, however, only limited exchange of information and plans between the various planning groups. The result is that duplication of effort may exist and that different predictions of the same basic data may form the basis for decisions
in different planning activities. The various planners may not fully appreciate the effect on other areas of the firm of the plans that they are making. A coordinated planning effort should result in better plans for all areas of the firm.
CHAPTER VII

SUMMARY AND CONCLUSIONS

Summary

The purpose of this dissertation was to take the widely accepted concept of service potential and develop a report to investors based on the concept. It was argued that the investor's major interest in an investment was the return that he would receive. This return can be measured in the long run as all future dividends to be received on the investment. Any retention of earnings is presumably justified by the expectation of increased future dividends and should be reflected in the market value in the long run. An examination of the net cash flow of the firm led to the conclusion that the net cash flow of the firm is equal to the dividends that the firm can pay. In order to determine the future dividends that the firm can pay it is necessary to predict the future net cash flows of the firm.

Under conditions of certainty all future cash flows, forever, would be recognized in the report of service potential. Under conditions of uncertainty it is necessary to select a point at which a change in future cash flows becomes certain enough that it should be
recognized in the report of service potential. As predictions are made further into the future, the confidence in the predicted events grows lower. The point in time at which the board of directors has made a decision that will change future cash flows was selected as the point at which changes in service potential should be recognized. This appears to be the earliest point at which changes in the future net cash flows could be recognized and still provide a basis for audit of the report.

It was discovered that the means selected for making the predictions would determine the timing of recognition of the changes in service potential. Since no one prediction technique is clearly superior, it was decided that management should make predictions which are, in its judgment the best predictions, based on the decisions which the board of directors has made. This is consistent with the timing of recognition of changes in service potential that was selected.

In order to compare the future cash flows that will be received to the present investment, it is necessary to discount the future cash flows. The discounting must allow for the risk free interest cost, the risk that the future cash flows may not materialize, and the investor's attitude toward accepting that risk. Since each investor's attitude toward risk is an individual matter, it was
concluded that the accountant cannot determine the discount rate. The accountant can, however, determine the rate of return that is expected to be earned on the investment if it is bought at a given market price. The investor can compare this expected return on the investment to his personal discount rate for this investment. That is, the investor determines the rate of return which he requires to induce him to invest in this firm. He can then make his investment decision by comparing this required rate of return to the expected rate of return computed by the accountant.

The accountant can compute the expected rate of return by treating the investment in the firm as a "capital expenditure" decision. The accountant determines the discount rate necessary to equate the present worth of the predicted net future cash flows (dividends) with the total market value of the shares of stock. In order to give the investor some idea of the expected rate of return at differing market prices, it was suggested that the expected rate of return be computed on the basis of the low and high market prices which occurred in the year preceding the date of the report, and on the basis of the average market price prevailing in the month preceding the date of the report.

The form of the report was established and illustrated in Chapter IV. The criterion for establishing the form of the report was to provide the investor with a means of evaluating the dispersion
of the expected future cash flows to use in determining his required rate of return. It was determined that it would be useful to break the cash flows into fixed and variable portions. The report also shows the marginal contribution of major segments of the firm to service potential if the future cash flows of the various segments of the firm have significantly different dispersions.

The place of the report in present accounting was examined. While it was found that the periodic report of service potential would not replace any existing report, it would probably better meet the needs of some users now relying on the balance sheet. A report of changes in service potential should be useful in evaluating the performance of management.

In order to audit any accounting report, the existence of a body of generally accepted accounting principles on which the report is prepared seems necessary. In the case of any new report, the lack of accepted principles for preparation of the report seems to prevent the report from being considered auditable. In the case of the report of service potential, since there are no generally accepted principles of prediction, audit of the report is not possible in the context of present auditing. It was suggested, however, that the auditor could validate standards which the investor could use to judge the predictions of management. Two such possibilities were suggested.
The proposed report was prepared for a hypothetical firm and for two actual firms. The difficulties encountered and the results were presented in Chapter VI.

Conclusions

The hypothesis of this dissertation is that a conceptually sound periodic report of discounted future cash flows can be prepared and that a basis for auditing such a report can be established. The proposed report seems to warrant the conclusion that the first part of the hypothesis is true. Whether an adequate basis for audit of the report has been established is a matter of judgment. It seems that the only manner in which a report can become auditable is for its manner of preparation to become generally accepted. The potential value of such a report to the investor seems to justify reporting even when auditability in the strictest sense has not been established. In view of this, it is the author's opinion that a basis for audit has been established which is adequate to support the acceptance of the second part of the hypothesis.

There is evidence that the investor needs the information presented in the report and that he predicts such information very imperfectly on the basis of very limited evidence. The investor should therefore be benefited by such a report. The preparation of such a report, even with a lack of present auditability should spur
interest in developing generally accepted prediction principles that would permit the audit of the report. It would focus the attention of the accounting profession on the need for improved measurement techniques.

Within the firm, a periodic report of service potential should provide a better means of measuring management performance. In many business firms, the prediction and long range planning functions are broken into many areas, each operating semi-independently. The preparation of the periodic report of service potential would focus the attention of management on the need for coordinating the efforts of these various groups engaged in prediction and planning.

Future Research Implications

A most pressing need exists for a prediction technique which is so clearly superior that its use can become generally accepted. Such a prediction technique would possibly permit changes in service potential to be recognized even earlier than is recommended in this study.

Closely related to the means of prediction is a means of quantifying the dispersion of the predicted future cash flows. If the various possible cash flows of each future year can be determined, it will be possible to use statistical means to evaluate the effect of this dispersion on the value of the firm. This would mean that the accountant could take the investor one step closer to the determination of the value of a particular investment.
Finally, research should be undertaken to explore the usefulness of the periodic report of service potential to investors. Accountants have traditionally done this by putting the report into use. The proposed report should be implemented for a variety of firms. Only after more experience with the report is obtained will it be possible for the investor and the accountant to evaluate the usefulness of the report. This would seem to be a prerequisite to the eventual acceptance of the report and the general acceptance of a means for preparing the report. This might be a first step in the preparation of other special purpose accounting report, which could eventually increase the usefulness of the accounting function.
BIBLIOGRAPHY

BOOKS


PERIODICALS


UNPUBLISHED MATERIALS

Bodenhorn, Diran, "The Concept of Profit in a Dynamic Theory of the Firm," Columbus, Ohio: The Ohio State University, 1962, (mimeographed).


I, John Charles Gray, was born in Jamestown, New York, July 6, 1931. I obtained my secondary-school education at Monroe High School, Monroe, Michigan. The University of Michigan granted me the Bachelor of Business Administration degree in 1953 and the Master of Business Administration degree in 1958. I was designated a Certified Public Accountant by the State of Michigan in 1959.

In September, 1959, I was appointed Instructor in Accounting at Wayne State University. In September, 1960, I was appointed Instructor in Accounting at The Ohio State University. I held this position for three years while completing the requirements for the Doctor of Philosophy degree. While at The Ohio State University I taught accounting and economics.

I have accepted a position as Assistant Professor of Accounting at the University of Minnesota.