

THE RELEVANT COSTING
APPROACH TO ASSET
VALUATION AND INCOME
DETERMINATION: A CRITIQUE

THESIS FOR THE DEGREE OF Ph. D.

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HARRY I. WOLK

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Harry I. Wolk

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B. C. Lente
Major professor (SBA)

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William Gioia P.H.D.

ABSTRACT

THE RELEVANT COSTING APPROACH TO ASSET VALUATION AND INCOME DETERMINATION: A CRITIQUE

By Harry I. Wolk

Charging fixed manufacturing overhead to product on a pre-determined basis has been the source of several problems for the cost accountant. For example, there are several possible capacity levels that might be employed when determining fixed overhead (burden) rates.

From the standpoint of managerial analysis, however, fixed manufacturing overhead is less important than those costs which vary with productivity because they are either allocations of sunk costs or out-of-pocket costs which are unavoidable in the short-run. Consequently, the method known as "direct" or "variable" costing has received increasing popularity for management purposes though it is still not generally accepted from the standpoint of usage in published financial statements.

A proposal rather similar to direct costing, relevant costing, was proposed in 1961. Under this approach, a charge is inventoried if and only if it either leads to the avoidance of the same charge again in the future or it

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leads to an increase in the firm's incremental income. In terms of manufacturing costs, this proposal would result in the continuation of inventorying variable costs since these same costs can be avoided to the extent completed for the ending inventories. For fixed overhead, however, adherents of relevant costing basically see these costs expiring with time rather than productivity. Consequently, fixed costs have not been viewed as scarce economic resources in the short-run. Hence these costs would be charged against periodic revenues under relevant costing except in two particular situations: (1) revenues will be lost in a future period because sales are expected to exceed productive capacity unless inventories are increased during the intervening period; (2) expected variable factor cost increases are avoided by building inventories prior to the anticipated price rise. Only in these situations do relevant costing proponents see fixed factor services as scarce economic resources during the short-run.

The research included a survey of the direct costing literature as well as an intensive analysis of arguments presented both for and against the relevant costing approach, a study of the theory of opportunity costs insofar as it pertains to the measurement of expired services, an examina-

tion of how the relevant costing approach would affect the classification of charges between the balance sheet and income statement outside of the area of manufactured inventories, and a survey undertaken in the Milwaukee area to ascertain the possible effect of relevant costing upon profits and the attitudes of industrial accountants in terms of the potential usefulness of relevant costing to management.

Major findings were the following: (1) relevant costing sprung from direct costing as a result of a shift in emphasis in the direct costing dialogue away from income statement considerations back to the problem of defining asset attributes; (2) from the opportunity cost standpoint, costs of expired fixed asset services would theoretically be significantly less than presently determined historical cost allocations due to the appearance in the market of technologically improved equipment which, in turn, would result in lowering the acquisition and usage costs of older equipment; (3) charges arising at the end of factor life such as bond redemption premiums and fixed asset removal costs would be carried forward on the balance sheet under relevant costing; (4) relevant costing does not appear to be useful to management in planning and control oriented areas such as intra-firm pricing and break-even analysis; (5) the great

Harry I. Wolk

majority of the individuals responding to the questionnaire saw little difference between relevant costing and direct costing in terms of measuring annual income; (6) problems arose in every case where profits would be affected due to expected future sales exceeding productive capacity as a result of either difficulty in accurately predicting future sales or measuring plant capacity.

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By

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The debts accumulated along the way to completion of a thesis, I have found, simply cannot be repaid.

First of all, to my committee chairman, B. C. Lemke, who managed to get far more out of me than I originally thought was in me.

To the other committee members, Adolph Grunewald and Stuart B. Mead, for their continuing interest and helpful suggestions.

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I. MANUFACTURING OVERHEAD, AN INTRODUCTION

The Nature of Fixed Manufacturing Overhead

Accountants have separated the inputs used in manufacturing enterprises into three separate groups: direct materials, direct labor, and manufacturing overhead. In terms of cost control and product costing, manufacturing overhead has been the source of the most difficult problems.¹ It is by nature a residual, being comprised of all charges deemed to be production costs with the exception of direct materials and direct labor. Some of the charges included in manufacturing overhead would be the following: indirect materials and supplies; indirect factory labor; maintenance; depreciation; taxes; insurance; power, heat and light; service department costs applicable to producing departments; and spoiled goods.² These over-all categories

¹Overhead discussions virtually always require far more space than is needed for labor and materials. See for example S. Paul Garner, Evolution of Cost Accounting to 1925 (University: University of Alabama Press, 1954) and Robert I. Dickey (ed.), Accountants' Cost Handbook, 2nd ed. (New York: The Ronald Press Company, 1960). The Garner work devotes 132 pages to the evolution of the accounting for manufacturing overhead whereas only 17 and 12 pages are devoted to the evolution of the accounting for raw materials and direct labor respectively. The handbook devotes four chapters to the various aspects of overhead accounting and only one each to materials and labor.

²Dickey (ed.), op. cit., Section 7, pages 3-5.

can, in turn, be broken down into literally hundreds of individual charges.

The pronouncements of accounting organizations and governmental agencies have quite forcefully hewn to the idea that manufacturing overhead should be inventoried for income determination purposes where financial statements are prepared for outside users.³ Implementation of this so called full costing approach is most difficult for that segment of manufacturing overhead designated as fixed. Fixed overhead can be briefly defined as those manufacturing charges which are unresponsive to changes in output during any given short-run period.

Length of Period and Degree of Factor Cost Variability

This definition presents two principal conceptual difficulties: (1) meaning of the word "period" and (2) degree

³Restatement and Revision of Accounting Research Bulletins, referred to commonly as "ARB 43," (New York: American Institute of Certified Public Accountants, 1953), pp. 28-9; Accounting and Reporting Standards for Corporate Financial Statements and Preceding Statements and Supplements (Madison, Wisc.: American Accounting Association, 1957), p. 4, but note the two dissents on page 10; -Louis H. Rappaport, S E C Accounting Practice and Procedure (New York: The Ronald Press Company, 1963), Section 9. p. 3, and Section 21, p. 20. For a comprehensive view of legal problems arising from omission of fixed overhead costs from inventory see Robert W. Hirschman, "Direct Costing and the Law," The Accounting Review, XXX (January, 1965), 176-183.

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of responsiveness of input factors to changes in output.

Concerning the first point, as the time period is lengthened, more costs will become responsive to changes in output. For example, a machine may be capable of producing a total of 100,000 units of output if properly maintained. Assume that average annual productivity is 20,000 units. Considering only the net capital cost of the machine itself (cash cost plus transportation and installation costs minus net salvage value), once the firm has consummated its purchase, only one aspect of net capital cost is affected by increases in productivity, the decline in salvage value. Thus for a five year period where total output is 100,000 units or less, net capital cost is largely fixed as the term was originally defined above. Assume, however, a ten year period with productivity exceeding 100,000 units of output. Within the ten year period, net capital cost of the type of machine considered here will increase at about the 100,000 level as the old machine is replaced by the new one. Total machine cost has become more responsive to changes in output as a result of lengthening the time period beyond the productive life of one machine. Generalizing from this example, it becomes clear what is meant by the statement that all costs become

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variable in the long-run.

Two minor points should be added relative to the above analysis. Firstly, if the five year period were being viewed from a planning standpoint with none of the investment costs having been incurred, then from this standpoint we could say that the cost of the machine under consideration, as well as all other costs, will increase as output is undertaken. For purposes of annual income determination, the more important conception of the five year period is the first one presented, the sunk cost viewpoint, because the accountant's determination of periodic charges to productivity for capital costs must be from the viewpoint of the prior incurrence of these capital charges.⁴ Secondly, the accountant may occasionally charge the machine costs to product on a units of input or output basis so that the annual depreciation charge varies. While this is entirely commendable from the aspect of attempting to match costs with revenue on a benefits performed basis, it in no way negates the original contention presented here that taking the five year period as a whole, net capital cost is largely

⁴Problems of ascertaining whether to invest in new plant and equipment can be related to the planning viewpoint mentioned above.

unaffected by changes in output. For purposes of this paper, time periods, unless otherwise stated, will refer to the usual short-run periods of up to one year that the accountant continually faces when attempting to measure income.

The second difficulty posed by the definition of fixed overhead concerns the degree of unresponsiveness of input factors to changes in productivity within any given short-run period. For example, rental costs for a factory will be the same from a zero level of productivity up to the maximum amount that can be produced within the factory during the given short-run period. If the firm desires to produce above the factory's maximum output level, it will be forced to seek additional rental facilities. Thus, for any given period, it can be seen that costs for this type of input will remain stable over an extremely wide range of output.

On the other hand, labor may be needed for purposes of inspecting output. One man may be capable of inspecting up to 5,000 units of output during any given annual period. With productivity ranging between 20 and 25 thousand units per period, a maximum of five inspectors may be needed. If the range of productivity per period increased to the 25 - 30 thousand unit bracket, an additional man would probably

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have to be hired. However, if it decreased to the 15 - 20 thousand level, an inspector could be dismissed.

In the two examples used here, costs remain fixed within a given range. If periodic output were to increase beyond that range, costs would rise. However, the range of productivity where inspection labor costs remain fixed is much narrower than exists for factory rental costs. Therefore, assuming no changes in technology or periodic factor costs, if the level of output remained frozen at the same numerical level period after period, all costs of production would be the same for each input factor and in total. Or to put the case slightly different, costs that vary on a unit for unit basis with output such as direct material costs may be said to have the narrowest possible ranges where costs are unaffected by changes in output. Factors behaving in this latter fashion are called "variable factors" and their costs are described as "variable costs."

Inspection labor combines elements of the other two cost patterns, hence it is a semi-fixed factor.⁵ It can

⁵Factors whose costs rise in steps have been called both semi-fixed and semi-variable. William L. Ferrara, "Overhead Costs and Income Measurement," The Accounting Review, XXXVI (January, 1961), 66 uses the latter designation. These costs should be terminologically distinguished from costs having relatively distinct fixed and variable segments. An excellent example of this distinction appears in William A. Terrill and Albert W. Patrick, Cost Accounting For Management (New York: Holt, Rinehart and Winston, Inc., 1965), pp. 338-9.

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be seen that no cost for any period could be truly fixed--remaining absolutely the same--assuming an infinite possible level of productivity. Of course, as the length of the time period is shortened, it becomes more difficult to add factors of production. For example, in a one month period, a new factory could not be built. Factor costs tend to become fixed the shorter the time run under consideration. This last statement is the corollary of one previously made: as the time period is lengthened, factor costs tend to become more variable.

It can therefore be seen that differences between fixed and variable costs are differences of degree rather than kind. Inspection labor cost can be defined as being semi-fixed. Whether to treat it as a fixed or a variable cost is a question of relation between potential periodic production range and width of productivity range where number of factor inputs remain stable. More will be mentioned on this problem in Chapter II (see pages 61-64).

The two conceptual problems arising in conjunction with the definition of fixed overhead are closely related. In considering the time period, we held the level of productivity constant (100,000 units produced during each five year time span) and increased the length of the period. In the second situation, problems arising as a

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result of hypothetically increasing productivity within a given time period were discussed. Problems of definition aside, the nature of fixed overhead presents practical difficulties when attempting to charge it to product. This aspect will be considered in the following sections.

Indirect Character and Randomness of Occurrence of Fixed Manufacturing Overhead Costs

Both fixed manufacturing overhead and variable manufacturing overhead are indirect in relation to product. That is to say, the benefits derived from manufacturing overhead cannot easily be associated with particular jobs or units of output; these factor costs are usually not incurred in relation to specific segments of output. Therefore, if manufacturing overhead costs are to be charged to product, the necessity of a method to accomplish this purpose becomes obvious.

The nature of the fixed portion of manufacturing overhead costs usually makes it necessary to charge these costs to product on a pre-determined basis.⁶ Some fixed manufacturing costs appear during random moments or intervals

⁶In a recent study, 53 out of 88 participants, or 63%, used actual burden rates determined at the end of the year. Since this result is sharply in conflict with previous studies and general surmise, the author concluded that differences in sample may well be responsible (pp. 115 and 117).
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throughout the year but they are actually applicable to productivity of the entire year. Property taxes, for example, may be paid only once or twice a year; regular maintenance may be performed during slack intervals.

Furthermore, the problem of seasonal fluctuations within a calendar year would cause an inverse relationship between productivity and unit cost of output if costs were to be applied on a monthly basis. When productivity is low, fixed costs are spread over fewer units of output with a higher cost per unit resulting. The converse would occur during periods of high productivity.

Closely related to this problem of seasonal fluctuations in output is the problem of seasonal changes in cost. For example, it might be more expensive to manufacture during winter due to greater heat needs.

In summary, the indirect nature of manufacturing overhead plus the uneven incurrence of some fixed cost factors,

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In addition, several other possibilities were noted: (1) firms using actual overhead costs determined at the end of the year tended not to desire to smooth the effects of fluctuating volume upon unit costs within or between years (pp. 123-4); these firms were also more interested in actual cost disclosure than income determination (p.124); (2) these firms tended to feel that prices were basically set by price competition rather than cost (p. 131). Charles R. Purdy, The Concept of Capacity and Overhead Costing (unpublished Ph.D. dissertation, School of Business Administration, University of Minnesota, 1963), pp. 105-33.

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seasonal differences in others and seasonal fluctuations in output make it highly necessary to treat a period of at least a year in length as a unit for the purpose of charging manufacturing overhead to product.

Finally, managerial considerations require the charging of manufacturing overhead or burden to product in relation to the incurring or completion of the output itself. This must be done if management is to have meaningful monthly or quarterly income statements. In addition, management may want estimates of the total manufacturing costs of jobs prior to undertaking them for purposes of price setting or bidding.⁷

For a large proportion of manufacturing firms, then, overhead must be charged to product on a pre-determined basis. The difficulties of this task have led to a multiplicity of possible solutions. Some of these will be discussed in the next section.

Problems of Charging Fixed Manufacturing Overhead to Product on a Pre-Determined Basis

Three principal problems arise in regard to charging

⁷Pre-determination would be important in process industries where it is desired to level seasonal or annual effects of volume fluctuations upon unit costs. George Hillis Newlove and S. Paul Garner, Elementary Cost Accounting (Boston: D. C. Heath and Company, 1949), p. 30 But see also footnote 6 of this chapter.

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burden to product on a pre-determined basis.⁸ The first concerns the type of factor used to associate manufacturing overhead with product. This will be referred to here as the "burden factor." The three most commonly used burden factors are probably machine hours, direct labor hours, and direct labor dollars. Estimated overhead charges made to product on the basis of the actual or standard amount of burden factor occurring during any segment of the year should supposedly represent a fair measure of benefits received by the product from the actual manufacturing overhead.

Secondly, the burden factor must be related to a time period, a capacity level of operations during that time period and estimated manufacturing overhead costs applicable to the time period and capacity level of operations. Estimated variable manufacturing costs per unit of burden factor

⁸The words "burden" and "overhead" appear to be virtually synonymous in the early cost accounting literature: there is a "misconception that burden and overhead are different things. They are merely different terms for the same thing, namely, everything in a manufacturing plant that is not direct labor, direct material, or selling expense." Clinton H. Scovell, Cost Accounting and Burden Application (New York: D. Appleton and Company, 1917), pp. 10-11. In the sense that the term "burden factor" is used in this section--the basis for loading or charging overhead (or burden) to product--the term seems more descriptive than "overhead factor" or "manufacturing overhead factor."

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will remain the same at different possible levels of capacity unless the efficiency of usage of the variable manufacturing overhead changes in relation to the given scale of plant. We will assume here that no change in efficiency is present relative to variable burden factor usage as the given scale of plant is used more intensively. Under this assumption, then, the variable portion of the burden rate will remain the same at all capacity levels. Therefore, only the fixed overhead portion of the burden rate will be discussed here.

If a year is selected as the time period to be encompassed by the pre-determined burden rate, two possible capacity levels might be used as the burden base. The first, practical capacity, relates to the maximum capacity of the plant that could be forthcoming during the year after allowing for conditions such as number of shifts worked, normal disruptions, bottlenecks, and similar types of usual occurrences. The rate per unit of burden factor (the burden rate), is then found by dividing the burden factor at the practical capacity level into the estimate of annual fixed and variable manufacturing overhead that would be expected at the practical capacity level of operations. Since practical capacity, by definition, is gauged at the maximum productivity level (after allowing for the

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previously mentioned considerations), fixed cost per unit of burden factor will be relatively low. Hence, this type of burden rate includes no allowance for idle facilities.

The second possibility with a year as the given time period would be to compute the burden rate on the basis of the productivity expected during the year, again measured in terms of the burden factor. The burden rate must be higher when the burden base is expressed in terms of expected capacity as opposed to a practical capacity base (unless productivity is expected at the practical capacity level). Whereas the practical capacity method attempts to eliminate fixed costs of idle equipment and the unutilized costs of other fixed factors from product costs when productivity is below the practical capacity level, expected capacity endeavors to charge the entire amount of the annual fixed costs to product.⁹

Practical and expected capacity are related to a yearly time period. However, a period greater than a year may be selected as the time factor applicable to the burden rate. It was noted previously that within a year the presence of seasonal fluctuations makes monthly or quarterly attempts

⁹Adherents of practical capacity take the position that an expected activity rate charges idle facility costs to product. See C. F. Schlatter and W. J. Schlatter, Cost Accounting (New York: John Wiley & Sons, Inc., 1954) p. 476.

to assign overhead to product undesirable. By treating the year as a unit, however, seasonal fluctuations are eliminated. The same exact reasoning can be made in reference to cyclical business fluctuations. A period of time greater than a year can be used as a unit in order to eliminate cyclical differences that are present in burden rates based upon expected capacity. Since the burden base in this method, the normal capacity method, is computed upon the basis of sales expectations during a cyclical period (approximately three to five years), the resulting burden rate is an average for the cycle period.¹⁰

Some charge for idle factors is included in the normal capacity burden rate. Justification for this is made on the grounds that when purchasing fixed assets, potential lifetime productive capacity will be greater than expected lifetime productivity. Productive capacity must be geared somewhat to cyclical output peaks. Thus, the idle capacity cost resulting from fixed factor indivisibility is properly included in the burden rate according to normal capacity advocates.¹¹

¹⁰Don T. DeCoster, "Measurement of the Idle-Capacity Variance," The Accounting Review, XLI (April, 1966), 298.

¹¹Though not a normal capacity advocate, Ferrara has expressed a similar point of view. See William L. Ferrara, "Idle Capacity as a Loss--Fact or Fiction," The Accounting Review, XXXV (July, 1960), 490-496 and William L. Ferrara, "Overhead Costs and Income Measurement," The Accounting Review, XXXVI (January, 1961), 63-70.

The third principal problem concerns the disposition of the differences between actual manufacturing overhead and estimated manufacturing overhead applied to product by means of multiplying the burden rate by the actual or standard amount of the burden factor incurred during the period. Actual overhead and applied overhead differ for two reasons: (1) actual cost of overhead input units differs from their estimated cost used in the determination of the burden rate, (2) actual amount of the burden factor incurred during the period disagrees with the amount used in the burden base when arriving at the burden rate amount. Differences in the second item may be due to the efficiency of the usage of the burden factor for the given level of output or it may be attributable to the fact that attained capacity (measured in terms of burden factor usage) differed from capacity used in the burden rate computation. These differences are very often analyzed in the form of budget, efficiency and volume or capacity variances.¹²

Several possibilities exist for the elimination of the over or under-applied overhead. It may be allocated

¹²DeCoster states that a gap presently exists in terms of understanding the meaning of the volume variance. It is too often seen as a measure of costs incurred rather than being simply a function of the burden factor planned and attained. See DeCoster, op. cit., 299 and 302.

among inventories and cost of goods sold on a basis such as the proportional amount of the burden factor included in the totals of inventories and cost of goods sold. This solution is intended to return the accounts to an actual cost basis.¹³ A second method advocates closing the entire amount into the cost of goods sold. Disposition of the total variance into expense can perhaps best be justified where standard costs are used or the amount is relatively small. The burden rate would be the standard cost in burden

¹³Actual cost would appear to have the greatest significance where "tight" standards are employed for motivation purposes. See Gordon Shillinglaw, Cost Accounting: Analysis and Control (Homewood, Ill.: Richard D. Irwin, Inc., 1967), pp. 351-2. Also, actual costs meet federal income tax requirements. It has been pointed out that "a search of tax decisions dealing with inventory valuation has not revealed any case dealing with standard costs. It is generally recognized that the Bureau has a marked fondness for 'cost or market whichever is lower' and that the cost referred to is actual costs...." George W. Lafferty, "The Auditor and Standard Costs, N.A.C.A. Bulletin, XX X(March 15, 1949), 821. The situation does not appear to have changed judged by statements in current cost accounting texts and federal tax texts. See, for example, John J. W. Neuner and Samuel Frumer, Cost Accounting Principles and Practices (Homewood, Ill.: Richard D. Irwin, Inc., 1967 corrected edition), p. 585 and Prentice Hall Federal Tax Course (Englewood Cliffs, N. J.: Prentice-Hall, Inc., 1968), pp. 2603-11. The question of the supremacy between tax requirements and other needs is, of course, a much discussed topic in the accounting literature.

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factor terms and variances would represent deviations from the "commitment implicit in management's decision to manufacture the product."¹⁴

Hybrids of these two methods as well as other possibilities relative to volume variance may occasionally be recommended. For example, where practical capacity is used, volume variance might be treated as a period loss with the budget and efficiency variances allocated between inventories and cost of goods sold as noted above. Another variation might be used with normal capacity. The volume variance might be held open on the balance sheet over the entire normal capacity time span on the grounds that this cyclical period is a unit. Favorable and unfavorable volume variances should presumably come close to cancelling in this situation. An additional problem here concerns the balance sheet interpretation of volume variance debits or credits carried on the balance sheet.

These are the three principal problems that arise when we attempt to assign manufacturing overhead to product. The very concise discussion here should nevertheless indicate the myriad of possible income determination solutions which arise when burden is charged to product on a

¹⁴Gordon Shillinglaw, op. cit., p. 534.

pre-determined basis. In addition, many other burden problems exist which further affect the periodic income picture: estimating overhead including the problem of allocation of service department and general plant costs; possibility of using departmental rather than plant-wide overhead rates; possible revision of rates, particularly where normal capacity is used.

The confusion caused by the multiplicity of possible income figures under absorption costing methods was strongly conducive to attempts to simplify the accounting for the fixed segment of manufacturing overhead.

Direct Costing and Relevant Costing Alternatives

An alternative first presented in the literature thirty years ago is known as "direct" or "variable" costing.¹⁵ Conceptually, the method is extremely simple: variable manufacturing overhead would still be charged to product on a pre-determined basis, but fixed overhead costs, the source of the previously mentioned problems, would simply become an expense of the period when incurred. Treatment

¹⁵Jonathan Harris, "What Did We Earn Last Month?," N.A.C.A Bulletin, XVII (January 15, 1936), 501-26 and reprinted in Raymond P. Marple (ed.), National Association of Accountants on Direct Costing, (New York: The Ronald Press Company, 1965), pp. 17-40.

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would be exactly the same as that accorded to other non-inventoriable charges such as selling and administrative costs.

In addition to eliminating much of the confusion caused by absorption costing, direct costing presumably gives a more useful figure to management for planning purposes because it is closer to a cash flow concept of income.¹⁶ Aspects of absorption costing that would be useful for planning or control purposes such as variance analysis and full cost information for pricing could still be used on a basis supplementary to the cost accounts. Perhaps the very simplicity of this method caused a desire among many accountants to use it for published financial statement

¹⁶There appear to be two contradictory movements present in contemporary accounting. One is a sharpening of the accrual process for income determination purposes. Income tax allocation and pension accounting are two examples of areas where expense measurements have become divorced from the related periodic cash expenditures. The counter movement is the rise of the contribution notion and funds-flow analysis for decision making purposes. For two strong statements emphasizing the latter viewpoint see David Solomons, "Economic and Accounting Concepts of Income," The Accounting Review, XXXVI (July, 1961), 383 and Colin Park, "Funds Flow," Modern Accounting Theory, ed. Morton Backer (Englewood Cliffs, N. J.: Prentice-Hall, Inc., 1966), p. 304. For an excellent article showing the use of funds-flow statements for analytical purposes, see Edgar O. Edwards, "Funds Statements For Short-and Long-Run Analyses," The Journal of Business, XXV (July, 1952), 156-74.

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purposes after it was initially proposed for managerial or internal uses only.

A proposal rather similar to direct costing has been suggested by Professor Charles T. Horngren, then of the University of Chicago and presently at Stanford University, and George H. Sorter of the University of Chicago (throughout this paper they will be referred to as "Horngren and Sorter" when ideas stemming from their three joint papers are being discussed.)¹⁷ The cornerstone, perhaps, of their recommendation, the relevant costing concept, lies in their definition of assets. The word is defined by the use of phrases such as "service potential" and "revenue producing power."¹⁸ As we shall see, this denotes the ability of the factor represented by the cost to directly and favorably affect future income. This simple test was applied to the presently acceptable components of manu-

¹⁷Charles T. Horngren and George H. Sorter, "'Direct' Costing for External Reporting," The Accounting Review, XXXVI (January, 1961), 84-93; George H. Sorter and Charles T. Horngren, "Asset Recognition and Economic Attributes--The Relevant Costing Approach," The Accounting Review, XXXVII (July, 1962), 391-99; Charles T. Horngren and George H. Sorter, "An Evaluation of Some Criticisms of Relevant Costing," The Accounting Review, XXXIX (April, 1964), 417-20. These will be cited hereafter as "Direct Costing," "The Relevant Costing Approach," and "An Evaluation of Some Criticisms" respectively.

¹⁸Horngren and Sorter, "Direct Costing," op. cit., 85.

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facturing inventories: direct materials, direct labor, variable manufacturing overhead and fixed manufacturing overhead. The first three items pass their asset test. Costs applicable to these types of factors do not have to be incurred again (for the inventory units only, of course).

The same is not true, however, for the fixed burden factors. Fixed factors relate primarily to the provision of plant capacity but are generally unaffected by output changes during particular short-run periods. They are thus related to the long-run and are not avoidable or escapable in the short-run. Time is the primary element causing the expiration of these costs. Future fixed factor costs are not avoided by producing for inventory. Consequently, fixed factor costs should not adhere to units of inventory from the relevant costing viewpoint. They should be charged against revenue instead of to product.

There are two possible exceptions to the write-off of fixed manufacturing costs on a period basis according to Horngren and Sorter.¹⁹ Since costs are assets if they provide service potential in the form of additional or incremental future revenues or the avoidance of incremental

¹⁹Horngren and Sorter, "Direct Costing," op. cit., 88.

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costs, the existence of a future period where sales capacity is expected to exceed productive capacity means that sales revenue will be lost if inventory is not built up in the intervening time. In this situation the use of fixed capacity in a given short-run period is necessary if future revenues are to be maximized. Particular benefits are attributable to a particular short period here. Ordinarily though, as previously stated, where productive capacity exceeds sales potential in future periods, no increase in revenues can be correlated with any particular short period usage of fixed overhead factors.

A second possible situation where future income could be adversely affected if fixed manufacturing facilities are not utilized in a given short-run period arises if variable factor costs are expected to increase in the future. By producing immediately to take advantage of present lower priced variable factors, some future incremental expenses may be avoided. The present use of fixed factors is again necessary to maximize future income.

Except for these two general exceptions, relevant costing provides exactly the same income results as direct costing.

Appendix A of this chapter presents examples comparing absorption, direct, and relevant costing.

Organization and Scope of the Present Work

The importance of fixed manufacturing overhead as an element of production and the confusion caused by the diversity of possible accounting treatments require that new proposals relative to burden accounting be subjected to careful scrutiny.

It is the contention of this work that relevant costing has sprung from direct costing. Consequently, the literature of both areas has been scrutinized in Chapter II with the connecting links between the two costing methods stressed. The chapter highlight is an evaluation and comparison of the views of Horngren and Sorter with those of two absorption costing adherents, Professor Philip E. Fess of the University of Illinois and Professor William L. Ferrara, then of the University of Illinois, and presently at Pennsylvania State University (when ideas presented jointly by the latter group are being discussed in this paper, the authors will be referred to as "Fess and Ferrara"). The opposing viewpoints of these two groups crystallized in a vigorous debate within the journals.²⁰

²⁰The dialogue would include the following articles as well as those noted previously in footnote 17: Philip E. Fess and William L. Ferrara, "The Period Cost Concept for Income Measurement--Can It Be Defended?," The Accounting Review, XXXVI (Oct., 1961), 598-602; William L. Ferrara, (cont.)

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Both advocates and opponents of relevant costing have noted its relationship to opportunity costs. Therefore, opportunity cost measurements of expired factors are examined in Chapter III in order to determine the effects of obsolescence upon relevant costing measurement if the latter is to conform to the tenets of opportunity costs.

Relevant costing is not conceived to be a departure from cost methods of valuation by its proponents. Therefore, since consistency has generally been advanced as a criterion for evaluating accounting methods, exploration of the applicability of relevant costing to accounting charges outside of manufactured inventories is attempted in Chapter IV.

Little has been said in the journals about the possible use of relevant costing by management. The results of a survey attempting to probe the attitudes of industrial accountants toward relevant costing are discussed in Chapter V. In addition, current thinking concerning the potential effect upon users of accounting information of changes in accounting methods over time will be briefly

²⁰"Relevant Costing--Two Points of View," The Accounting Review, XXXVIII (Oct., 1963), 719-22; Philip E. Fess, "The Relevant Costing Concept for Income Measurement--Can It Be Defended?," The Accounting Review, XXXVIII (Oct., 1963), 723-32.

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discussed. This subject is important in terms of relevant costing because it is essentially a hybrid of absorption and direct costing.

The summary and conclusions are presented in Chapter VI including new areas of investigation implied by this study.

Throughout this dissertation, the phrase "relevant costing" refers to the asset and expired cost measurement technique discussed in this chapter. The term has also been employed in reference to the planning function.²¹ Proper modification will be made where the latter usage is intended.

²¹In the planning context it refers to out-of-pocket costs which differ between alternatives. See Charles T. Horngren, Cost Accounting, A Managerial Emphasis, (Englewood Cliffs: Prentice-Hall, Inc., 1967), pp. 405-26.

APPENDIX A

INCOME MEASUREMENT AND ASSET VALUATION UNDER DIFFERENT COSTING METHODS

The following example is intended to clarify the problem of income measurement and asset valuation under relevant costing, direct costing and two methods of absorption costing.

The example covers a two year period and is specifically intended to demonstrate the service potential test where productive capacity is limited in relation to expected sales under the relevant costing approach.²²

Assume the following general facts, conditions, and projections:

- (1) ABC Co. manufactures one product which sells for \$40 per unit.
- (2) The firm has two production departments.
- (3) The firm's annual productive capacity is 16,000 units of product.
- (4) Variable production costs per unit of product are \$12 and are composed of:

	<u>Dept. 1</u>	<u>Dept. 2</u>
Direct materials	\$3	-
Direct labor	4	\$ 2
Variable overhead	<u>1</u>	<u>2</u>
	<u>\$8</u>	<u>\$4</u>

²²Hornsgren and Sorter, "Direct Costing," op. cit., 88.

(5) Total fixed overhead costs per year are \$64,000 in Department 1 and \$96,000 in Department 2.

(6) Sales projections in units for the next four years are:

<u>Year</u>	<u>Sales</u>
1	10,000
2	20,000
3	15,000
4	10,000

(7) Stocks at year end for both finished goods and work in process are normally equal to 10% of the following year's sales.

(8) The balance sheet at the beginning of the four year period where absorption costing is used is made up of the following components:

a. Work in process and finished goods inventories equal 40% of other current assets.

b. Total current assets equal 25% of total assets.

(9) Fixed overhead is made up entirely of sunk cost allocations (depreciation).

(10) Operating expenses consist entirely of fixed out-of-pocket costs.

(11) Return on investment under the normal capacity method of absorption costing equals 10% of the

firm's assets for the first year based upon assets owned at the beginning of the year.

Other methods will utilize the same figures except for the cost of goods sold which will depend upon the specific cost accounting method employed.

- (12) All earnings are distributed to stockholders.
- (13) No additional investments of capital are made.
- (14) Costs and revenues are static throughout the four year period.
- (15) Actual results are in complete accordance with all projections and budgetary estimates

Case 1: Absorption Costing - Normal Capacity

Fixed overhead rates for the two departments are based on a four year cyclical period. The rates are based on direct labor hours in Department 1 and machine hours in Department 2. It requires two labor hours per unit of product in Department 1 and one machine hour per unit of product in Department 2. The finished goods and work-in-process production schedules appear below in Tables 1 and 2:

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Table 1

Finished Goods Production Schedules

Year	(1)	(2)	(3)	(4)
Sales	10,000	20,000	15,000	10,000
End-of-year inventory	2,000	1,500	1,000	1,200 ²³
Relevant costing needs due to capacity shortage in following year	<u>4,000</u>	<u>--</u>	<u>--</u>	<u>--</u>
Total	16,000	21,500	16,000	11,200
Less - Beginning-of- year inventory	<u>1,000</u>	<u>6,000</u>	<u>1,500</u>	<u>1,000</u>
Production for the year	<u><u>15,000</u></u>	<u><u>15,500</u></u>	<u><u>14,500</u></u>	<u><u>10,200</u></u>

Table 2

Work-in-Process Production Schedules

Year	(1)	(2)	(3)	(4)
Beginning balance	1,000	2,000	1,500	1,000
Ending balance	<u>2,000</u>	<u>1,500</u>	<u>1,000</u>	<u>1,200</u>
Net change	<u><u>1,000</u></u>	<u><u>(500)</u></u>	<u><u>(500)</u></u>	<u><u>200</u></u>

Four year schedules have been provided because the burden base under the normal capacity method of determining burden rates is based upon a three to five year average of

²³ Projected sales for the fifth year are 12,000 units.

sales or productivity. Total direct labor hours for Department 1 based upon finished goods needs and the work-in-process differential from Tables 1 and 2 are shown next in Table 3:

Table 3

Annual Direct Labor Hours, Department 1

Year	(1)	(2)	(3)	(4)	Total
Finished goods	30,000	31,000	29,000	20,400	110,400
Work-in-process	<u>1,000</u>	<u>(500)</u>	<u>(500)</u>	<u>200</u>	<u>200</u>
Total	<u>31,000</u>	<u>30,500</u>	<u>28,500</u>	<u>20,600</u>	<u>110,600</u>

We assume that work-in-process is always one-half complete relative to the application of all productive factors. Hence in Table 3 direct labor hours are equal to the change in the number of work-in-process units whereas direct labor hours are equal to twice the finished goods needs for the year. The burden rate for Department 1 per hour of direct labor is found by dividing the average annual direct labor hour needs for the four year period into the estimated fixed manufacturing overhead for the year:

$$\frac{\$64,000}{27,650} = \$2.315$$

The burden rate for Department 2, this time on the basis of machine hours, is derived from the production

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schedules shown previously and Table 4:

Table 4

Annual Direct Machine Hours, Department 2

Year	(1)	(2)	(3)	(4)	Total
Finished goods	15,000	15,500	14,500	10,200	55,200
Work-in-process	<u>500</u>	<u>(250)</u>	<u>(250)</u>	<u>100</u>	<u>100</u>
Total	<u>15,500</u>	<u>15,250</u>	<u>14,250</u>	<u>10,300</u>	<u>55,300</u>

The burden rate per machine hour in Department 2 is:

$$\frac{\$96,000}{13,825} = \$6.944$$

The finished goods and work-in-process inventories at the beginning of Year 1 are computed next. We assume that the same cost structure prevailed in the previous year. The inventory, in units, is equal to 10% of the sales of Year 1.

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Table 5

Inventory Valuations at the
Beginning of Year 1

Finished goods:	
Total variable costs (1000 x \$12)	\$12,000
Fixed overhead:	
Department 1 (1000 x 2 hrs. x \$2.315)	4,630
Department 2 (1000 x \$6.944)	6,944
	<u>23,574</u>
Work-in-process:	
Total variable costs (1000 x 12 x $\frac{1}{2}$)	6,000
Fixed overhead:	
Department 1 (1000 x 2 hrs. x \$2.315 x $\frac{1}{2}$)	2,315
Department 2 (1000 x \$6.944 x $\frac{1}{2}$)	3,472
	<u>11,787</u>
	<u>\$35,361</u>

The balance sheet at the beginning of Year 1 can now be constructed on the assumption that manufacturing inventories are equal to 40% of other current assets and total current assets are equal to 25% of total assets:

Table 6

Balance Sheet, Beginning of Year 1

Manufacturing inventories	\$35,361
Other current assets	88,402
Total current assets	<u>123,763</u>
Long-lived and other assets	371,289
Total assets	<u>\$495,052</u>

The income statement for Year 1 has been constructed to show a 10% return on total assets at the start of the year:

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Because we are assuming a static situation--all income distributed as dividends and no further investment occurring--the firm's total assets will remain at \$495,052 though their composition will differ. This can be seen from the following cash flow type schedule:

Table 9

Net Asset Changes

Cash or receivable inflows provided from sales		\$400,000
Cash outflows:		
Variable manufacturing costs	\$120,000	
Operating expenses	134,141	
Dividends	<u>49,505</u>	<u>303,646</u>
Net cash inflows		96,354
Fixed asset costs expensed:		
Depreciation:		
Dept. 1 (per Table 7)	\$ 46,300	
Dept. 2 (per Table 7)	<u>69,440</u>	
	115,740	
Less - favorable volume variance (per Table 7)	<u>19,386</u>	<u>96,354</u>
Total change in the firm's total assets		<u><u>0</u></u>

Finally, we show the income statement for the firm in Year 2:

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Income Statement Year 2,
Normal Capacity

Revenues (20,000 x \$40)		\$800,000
Cost of goods sold:		
Variable costs (20,000 x \$12)	\$240,000	
Fixed overhead:		
Dept. 1 (20,000 x 2 hrs. x \$2.315)	92,600	
Dept. 2 (20,000 x \$6.944)	138,880	
	<u>471,480</u>	
Less - favorable volume variance ²⁴	<u>16,493</u>	<u>454,987</u>
Gross margin		345,013
Operating expenses		<u>134,141</u>
Net income		<u><u>\$210,872</u></u>

²⁴Attained hours exceed normal hours by 2,850 in Dept. 1 and by 1,425 hours in Dept. 2. The excess hours multiplied by the respective pre-determined rates gives the favorable volume variance. See Tables 3 and 4 and the burden rates determined previously.

Case 2: Absorption Costing - Practical Capacity

This variation of absorption costing minimizes the fixed overhead per unit of product by computing the burden rate in terms of the maximum productivity that could be produced annually after considering the number of shifts worked, normal down-time and bottlenecks. Annual burden rates, again calculated in terms of direct labor hours in Department 1 and machine hours in Department 2, would be:

<u>Dept. 1</u>	<u>Dept. 2</u>
$\frac{64,000}{32,000} = \2	$\frac{96,000}{16,000} = \6

In order to facilitate comparisons to be made later, we assume that the beginning manufacturing inventories are valued the same under the practical capacity method as they were under normal capacity. We will further assume a FIFO (first-in, first-out) inventory flow clearing all of the beginning inventories into cost of goods sold expense. Despite the different incomes under normal and practical capacity, total assets will be the same under both methods due to the assumption that dividends equal income. The composition of the asset structures will differ, however, due to the different valuation placed upon ending inventories which in turn affects both income and cash due to

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the difference in dividends. Thus the smaller ending inventories under practical capacity are exactly offset by greater cash holdings due to lower dividends.

The income statements for the two years appear in Tables 11 and 12:

Table 11

Income Statement Year 1,
Practical Capacity

Revenues (10,000 x \$40)		\$400,000
Cost of goods sold:		
Variable costs (10,000 x \$12)	\$120,000	
Fixed overhead:		
Dept. 1 { 1,000 x 2 hrs. x \$2.315	4,630	
{ 9,000 x 2 hrs. x \$2	36,000	
Dept. 2 { 1,000 x \$6.944	6,944	
{ 9,000 x \$6	54,000	
	<u>221,574</u>	
Add - Unfavorable volume variance ²⁵	5,000	<u>226,574</u>
Gross margin		173,426
Operating expenses		<u>134,141</u>
Net income		<u>\$ 39,285</u>

²⁵	Excess of maximum over attained hours	x	Burden rate	-	Volume variance
Dept. 1	1,000	x	\$2	=	\$2,000
Dept. 2	500	x	\$6	=	3,000
					<u>\$5,000</u>

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Table 12

Income Statement Year 2,
Practical Capacity

Revenues (20,000 x \$40)		\$800,000
Cost of goods sold:		
Variable costs (20,000 x \$12)	\$240,000	
Fixed overhead:		
Dept. 1 (20,000 x 2 hrs. x \$2)	80,000	
Dept. 2 (20,000 x \$6)	120,000	
	<u>440,000</u>	
Add - Unfavorable volume variance ²⁶	<u>7,500</u>	<u>447,500</u>
Gross margin		352,500
Operating expenses		<u>134,141</u>
Net income		<u><u>\$218,359</u></u>

	²⁶ Excess of maximum over attained hours	x	Burden rate	-	Volume variance
Dept. 1	1,500	x	\$2	=	\$3,000
Dept. 2	750	x	\$6	=	4,500
					<u>\$7,500</u>

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Case 3: Direct Costing

We change slightly one assumption in this section. Beginning manufacturing inventories contain only variable costs; hence, they are smaller than in the two previous cases. All other asset components are the same as before. Hence, total assets in this case are lower than previously due to the elimination of all fixed overhead from inventories. The balance sheet at the beginning of year one and the two income statements appear in the next three tables:

Table 13

Balance Sheet - Year 1,
Direct Costing

Manufacturing inventories	\$ 18,000
Other current assets	88,402
Total current assets	<u>106,402</u>
Long-lived and other assets	371,289
Total assets	<u><u>\$477,691</u></u>

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Table 14

Income Statement Year 1,
Direct Costing

Revenues (10,000 x \$40)		\$400,000
Variable manufacturing costs		<u>120,000</u>
Contribution margin		280,000
Less fixed costs:		
Fixed manufacturing costs	\$160,000	
Fixed operating expenses	<u>134,141</u>	<u>294,141</u>
Net loss		<u><u>\$ 14,141</u></u>

Table 15

Income Statement Year 2,
Direct Costing

Revenues (20,000 x \$40)		\$800,000
Variable manufacturing costs (20,000 x \$12)		<u>240,000</u>
Contribution margin		560,000
Less fixed costs:		
Fixed manufacturing costs	\$160,000	
Fixed operating expenses	<u>134,141</u>	<u>294,141</u>
Net income		<u><u>\$265,859</u></u>

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Case 4: Relevant Costing

Relevant costing statements are the same as direct costing ones except where inventory production is in anticipation of needs arising from capacity shortages or expected variable factor cost increases. In the example given here, if 4,000 units above normal inventory needs were not produced in the first year, sales would be lost in the second year due to short capacity. Income will therefore differ in this situation between direct and relevant costing by the amount of the fixed overhead costs held back in the ending inventory. The fixed overhead component of inventories could be based upon either the normal or practical capacity concepts but it should certainly not exceed the present value of the increased contribution margin since this would represent the maximum service potential provided by the fixed factors. In this example we have used practical capacity valuations.

The integration between balance sheet and income statement can also be perceived from this example. The increase in the first year's income where relevant costing is employed rather than direct costing is offset by higher ending inventories of the same difference.

Relevant costing income statements are presented in

Tables 16

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Tables 16 and 17:

Table 16

Income Statement Year 1,
Relevant Costing

Revenues (10,000 x \$40)		\$400,000
Variable manufacturing costs		<u>120,000</u>
Contribution margin		280,000
Less fixed costs:		
Fixed manufacturing costs	\$160,000	
Less - fixed costs inventoried due to Year 2's sales needs exceeding productive capacity (4,000 x 2 hrs. x \$2)		
(4,000 x \$6)	<u>40,000</u>	
	120,000	
Fixed operating expenses	<u>134,141</u>	<u>254,141</u>
Net income		<u>\$ 25,859</u>

Table 17

Income Statement Year 2,
Relevant Costing

Revenues (20,000 x \$40)		\$800,000
Variable manufacturing costs (20,000 x \$12)		<u>240,000</u>
Contribution margin		560,000
Less fixed costs:		
Fixed manufacturing costs	\$160,000	
Add - fixed manufacturing costs in beginning inventory under the relevant costing assumption	<u>40,000</u>	
	200,000	
Fixed operating expenses	<u>134,141</u>	<u>334,141</u>
Net income		<u>\$225,859</u>

Summary
of income
Tables 18

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Summaries of results comparing all methods in terms of income and return on total investment are shown in Tables 18 and 19:

Table 18

Asset Valuation and Income Measurement

<u>Method</u>	<u>Total Assets</u>	<u>Income Year 1</u>	<u>Income Year 2</u>
Absorption - normal capacity	\$495,052	\$49,505	\$210,872
Absorption - practical capacity	495,052	39,285	218,359
Direct Costing	477,691	-14,141	265,859
Relevant Costing	477,691	25,859	225,859

Table 19

Return on Investment

<u>Method</u>	<u>Year 1</u>	<u>Year 2</u>
Absorption - normal capacity	10%	42.6%
Absorption - practical capacity	7.9%	44.1%
Direct Costing	-3.0%	55.7%
Relevant Costing	5.4%	47.3%

Relevant costing offers a smoother return on investment than direct costing when short capacity exists due to the hold-back of **fixed overhead in inventories**. Productivity as well as sales becomes a variable affecting income in the short capacity period and expected variable cost increase

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situations only. Otherwise the results are the same between the two methods.

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II. THE DEVELOPMENT OF THE DIRECT COSTING CONCEPT FOR EXTERNAL PURPOSES AND THE OUTGROWTH OF RELEVANT COSTING--A SURVEY OF THE LITERATURE, 1936-67

Introduction

A review of the literature of any well exploited topic must usually be selective. The present effort is no exception. The literature on direct costing, covering a thirty year period, is rather vast. Consequently, the selection and criticism here reflect the author's purposes. Articles concerned exclusively with managerial uses of direct costing were usually avoided with the exception of the earliest years of development. Concentration has been stressed upon factors and problems concerning the use of direct costing for published financial statements and the evolvement of relevant costing from direct costing. Even within this narrower context, comments have been restricted to the most valid and important points with footnotings indicating corroborations and related but less important ideas.

For purposes of emphasis, the thirty year era examined has been broken down into three periods. The periods selected show at least an emphasis if not a unity on the characteristic selected as the title for the period. Analysis of the first two periods has been accomplished

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by a simple chronological approach. Two factors required the abandonment of this method in the third period. One was the increasing complexity of ideas. The second was the appearance of several articles by two important groups of protagonists in the relevant costing controversy. For purposes of smoothness the ideas of each team of co-authors has been examined as a unity.

Finally, a brief summary of the most important ideas concerning both subject matter itself and the way the accountant has approached it is presented.

Early Development, 1936-40

Occasional examples have been noted of the use of direct costing for internal purposes prior to 1936.¹ However, the first formal presentation of the idea occurred in the famous article entitled "What Did We Earn Last Month?" by Jonathan Harris.²

The principal source of Harris' discontent with

¹Raymond P. Marple (ed.), National Association of Accountants on Direct Costing (New York: The Ronald Press Company, 1965), pp. 8-9 and 185.

²Jonathan Harris, "What Did We Earn Last Month?," op. cit. Reprinted in Raymond P. Marple, ed., op. cit., pp. 17-40. Footnotes in this chapter are keyed to the latter source.

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absorption costing is that the level of productivity affects income. By charging the fixed overhead of the period to product (work in process) and in turn having it reach expense (cost of goods sold) in accordance with the flow of inventory through the accounts, uneven amounts of fixed overhead become expensed in different periods in accordance with inventory changes. In any given period, if inventories increase, greater amounts of fixed overhead are left in the inventory accounts with a smaller amount becoming expense than would have been the case if inventory levels did not change. Likewise, the converse applies to an inventory decrease. Therefore, both the level of productivity and the level of sales affect income under absorption costing.

Harris' direct costing solution eliminates the effect of productivity on income by charging fixed overhead to period and not to product. Thus fixed overhead will still affect income but the periodic amount will be independent of productivity in the sense that absorption costing meters this charge to expense on the basis of productivity and disposition of inventory.³ Therefore, assuming other factors

³Of course changes in plant capacity during any given period would cause fixed costs to change. The same comment applies to increases or decreases in the use of semi-fixed factors such as supervisory labor. See R.L. Brummet, "Direct Costing--Its Weakness and Strength," NAA Bulletin, XXXXIII (March, 1962), 61-8.

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as equal, income must fluctuate directly (though not necessarily proportionately) with sales.

Harris presents the main points of this argument in the form of a discussion between the controller and the chief executive of a firm. The conversation and the participants indicate an orientation that is managerial or internal in approach. Furthermore, the emphasis, as indicated by the title of the article and the examples used is on the monthly financial statement.

Nevertheless, there are some indications that Harris desired to see the method used in published as well as internally oriented statements. For example, he indicates that a disadvantage of his plan is that working capital would not include all of the elements ". . . which are acceptable under present day banking and accounting practice."⁴ This statement, if used today, would definitely indicate that an external use of financial statements using direct costing was intended but in 1936 the distinction between "managerial accounting" and "financial accounting" had not as yet crystallized.⁵

⁴ Harris in Marple, ed., op. cit., p. 22.

⁵ The similar term "management accounting" was probably first used in the following work: R.N. Robnett, T.M. Hill, and J.A. Beckett, Accounting: A Management Approach, (Homewood, Illinois: Richard D. Irwin, Inc., 1951).

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More seriously, however, Harris makes the following defense of inventory valuation under direct costing:

The logical conclusion is that 'cost' for production credit and inventory valuation purposes should embrace only controllable items which can be calculated in advance by engineering methods to stand as bogies to be attained. This view places manufacturing companies and merchandising companies on a similar basis as far as 'cost of product' is concerned, because production volume and/or sales volume do not affect the⁶'procurement' cost of either type of company.

The idea of consistency among firms, particularly firms differing in basic operations--merchandising versus manufacturing--at least implies that externally used statements are being discussed.

The following comments also apply to the above quoted passage:

- (1) He appears to be equating the control concept with inventory valuation. What is applicable to one is not necessarily applicable to the other.
- (2) The consistency factor between manufacturing and merchandising firms from the standpoint of "procurement" cost may not hold on other bases. For example, fixed overhead would not be included in the manufacturing firm's

⁶Harris in Marple, ed., op. cit., p. 20.

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inventory cost by Harris but in most cases purchase price of inventory will include an allowance for the selling firm's manufacturing overhead (as well as non-manufacturing costs). This discrepancy may be particularly confusing when comparing manufacturing and merchandising firms carrying the same product lines.

- (3) Implicit in his statement is an argument that has been repeated many times by direct costing adherents as a rationale for according different treatment to fixed and variable manufacturing costs.⁷ Since the "procurement" cost of a manufactured produce does not, as Harris says, include fixed overhead then these charges must be capacity or "getting ready" costs rather than product costs. This view takes a short-run, sunk cost approach toward product cost determination. This point is discussed in detail later in this chapter.⁸

⁷See for example Philip Kramer, "Selling Overhead To Inventory," NACA Bulletin, XXVIII (January 15, 1947), 587 (reprinted in Marple, ed., op. cit., 52-66), and Cecil L. Clark, "Fixed Charges in Inventories," NAA Bulletin, XXVIII (April 15, 1947) (reprinted in Marple, ed., op. cit., pp. 67-77), pp. 68-9.

⁸See pp. 80-83 of this dissertation.

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Finally, it should be noted that in summarizing his argument, Harris spoke in terms of unwarranted certitude:

On general principles, I am sure you will agree that a statement which reflects a loss when a profit really was made is not much of a statement, to say the least.⁹

Of course, no principle could be justified which leads to an erroneous profit figure. But profit (or income), at least as a short-run concept, is not a phenomenon capable of being scientifically measured.¹⁰ Rather it must be developed through pragmatic means stressing in the words of George O. May, ". . . usefulness and practicability."¹¹ Admittedly, Harris was faced with

⁹Harris in Marple, ed., op. cit., p. 31.

¹⁰At least one accountant, Arthur C. Kelley, has taken a contrary position. However, he equates scientific measurement or determination with a narrowing of income alternatives. Kelley's scientific determination would exclude price level adjustments because "the art of accounting has always been applied on the assumption of a relatively stable value of the dollar because to do otherwise and cut loose from the moorings of historical cost would open up a Pandora's box of confusions, . . . objective measurements beginning with the historical cost of fixed assets would be set aside and be superseded by subjective measurements . . ." in Arthur C. Kelley, "Can Corporate Incomes Be Scientifically Ascertained," The Accounting Review, XXVI, (July, 1951), 290. See also Arthur C. Kelley, "Definitive Income Determinations: The Measurement of Corporate Incomes on an Objective Scientific Basis," The Accounting Review, XXIII (April, 1948), 148-53.

¹¹As quoted in Kelley, ibid.

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the task of selling an unconventional and daring proposal so perhaps his situation warranted a hard sell approach.

Unfortunately, however, the literature on direct costing, both pro and con, is strewn with many statements exhibiting this closed-minded approach to the subject, the Harris statement quoted above being by no means the worst.¹² It is quite possible that this rigidity or inflexibility of accountants in the inter-play of ideas may have prevented them from making more rapid progress in the particular area being examined here and in other aspects of accounting, also. One important reason behind this aggressive approach is that many accounting articles are aimed toward audiences that include a substantial percentage of practitioners. Where this is the case, as it most certainly was with the Harris article, appeals of this type may be far more effective than dispassionate presentations.

¹²A good example of this is the following quotation: "The only true measure of the correctness of a balance sheet inventory figure is whether or not that amount represents working capital of the company tied up in unsold products." Robert Seiler, "Improvements in External Reporting by Use of Direct Costing," The Accounting Review, XXXIV (January, 1959), 63. The author does not explain in his article why his alternative is the only true one. His thinking probably reflects that of the conservatively oriented "disposable income" school mentioned in Stephen A. Zeff, "Replacement Cost: Member of the Family, Welcome Guest, or Intruder?" The Accounting Review, XXXVII, (October, 1962), 617-20.

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Nevertheless, despite the shortcomings of his arguments and approach, the Harris article was not merely important but was virtually pathbreaking. No more proof of this statement need be offered than the fact that direct costing arguments have been reverberating within the accounting literature down to the present day with the outcome still far from decided.

The Harris article produced an almost immediate reaction in the form of letters appearing in the N.A.C.A. Bulletin.¹³ The general tenor of these letters concerns the fact that full costs are not shown and idle plant capacity is no longer a distinguishable item under direct costing.¹⁴

In reply, Harris adopted a peculiar defense:

The goal of the plan is to state monthly profits correctly. The title of the article, 'What Did We Earn Last Month?' certainly conveyed this idea, not to mention the textual matter which further emphasized this point.

However, the article did not bring out the fact that under the direct cost plan of accounting annual profit is exactly the same as under orthodox standard costing!¹⁵

¹³"The Author Replies and Other Letters," NACA Bulletin, XVII (March 15, 1936), 753-755.

¹⁴Ibid., 753-754.

¹⁵Ibid., 757.

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The last sentence, of course, requires an important qualification which Harris supplies after providing a numerical example to prove his point:

Under the direct costing plan an adjustment has to be made at the end of the year only when the ending inventory is larger or smaller than at the beginning of the year, . . .¹⁶

Harris seems to desire a peculiarly narrow base to support direct costing. He soft-pedals the importance of inventory change thus minimizing problems of applicability to annual statements.

The first public presentation and discussion of direct costing took place at the 17th International Cost Conference meeting in June of 1936.¹⁷ Howard Cooper's explication of direct costing was based exclusively on the Harris article and it emphasized the lack of sympathy between sales and income as a result of inventory changes. Cooper's illustrations used quarter year time periods.

Coincident with Harris' work on direct costing was that of G. Charter Harrison though his ideas appeared in

¹⁶Ibid., 759.

¹⁷Howard C. Cooper, "Elimination of Fixed Overhead Expense From Inventory and Production Costs Under the Standard Cost Plan," NACA Yearbook, 1936, pp. 310-20.

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a privately printed booklet published in 1937.¹⁸ Harrison, like Harris, had installed a direct costing system in a firm just prior to the appearance of Harris' article. Harrison's development of direct costing proceeded independently of Harris.¹⁹ The independent simultaneous development almost hints that the time was ripe for the presentation of this important and controversial idea.

Only one other full length article on direct costing appeared in America between the publication of the original statement and the inception of World War II in 1939. Clem Kohl's piece gave a rousing second to Jonathan Harris.²⁰ The article is framed exclusively in managerial terms with little of a new nature added. It is interesting to note, however, that Kohl, unlike Harris, stressed the importance of annual inventory changes and annual financial statements thus eliminating a possible source of ambiguity that Harris

¹⁸G. Charter Harrison, New Wine in Old Bottles, publisher unknown, 1937. This monograph is not listed in the holdings of the following universities: University of Chicago, Northwestern University, University of Michigan, Michigan State University, University of Wisconsin.

¹⁹Marple, ed., op. cit., p. 8.

²⁰Clem N. Kohl, "What Is Wrong With Most Profit and Loss Statements?" NACA Bulletin, XVIII (July 1, 1937), 1207-19.

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With accounting research both curtailed and channeled into defense oriented problems, nothing was published in the area of direct costing from the period of 1940-44 in the United States.²¹ At the threshold of the post-war period direct costing had been formally presented but had hardly been digested.

The Emergence of Direct Costing
For External Purposes, 1945-57

The first attack on direct costing in article form was made by Charles Schlatter in reply to the Kohl article.²²

Schlatter's defense is formulated in terms of capacity usage:

A legitimate increase or decrease in volume of production brought about by normal changes in business requirements has no effect on the operating profits of the period but should affect

²¹Marple suggests another possible reason for the tapering off of direct costing articles during the war. English writers emphasized practical managerial uses of direct costing whereas writing in the United States mainly took the negative aspect of criticism of absorption costing. As a result, the writing on the subject increased during the war years in England. Marple, ed., op. cit., pp. 10-11.

²²Charles F. Schlatter, "Fixed Expenses," The Accounting Review, XX (April, 1945), 156-63.

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the amount of the net income. If the fixed manufacturing expense for capacity used in production is considered to be cost, and if that for capacity not used is considered to be loss, then an increase in production without an increase in sales of the same period will convert into assets some fixed expenses that would otherwise have been losses. The operating profit is no greater than if volume of production had not been increased, but, because the loss of fixed expense on idle facilities is less, the amount of that profit retained as net income is greater.²³

Schlatter's defense is interesting. He tries to shift attention away from the final income figure to an intermediate one, the operating profit. His statement presumes that the volume variance for the period is treated as an item of "other expenses and revenue" on the income statement, a somewhat questionable assumption. Granting him this peculiar presumption, under absorption costing the operating profit could be affected by additional productivity only in a very special case: the burden rate would have to be based upon expected productivity; furthermore, the increase in productivity resulting from the inventory buildup would have to be included in the determination of the burden rate. The result of this ex-ante anticipation of the inventory rise would be a lower burden rate and a higher

²³Ibid., 160.

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operating profit. Burden rate determination based upon expected activity of the forthcoming period is largely frowned upon today because of the inverse relationship between productivity and overhead per unit resulting from this method.²⁴

Schlatter's defense is cast along traditional lines.²⁵ It strongly affirms the idea that the level of productivity should be a determinant of periodic income. Concurrently, Schlatter accepts the complementary definition of assets which must stem from the absorption costing view of income determination: inventory includes a full cost component of all factors defined as costs of production or manufacturing costs.

The dogmatism mentioned previously in regard to Harris also has some applicability to Schlatter. Direct and absorption costers have both used arguments relative to income determination that implicitly embody a definition

²⁴For example, see Adolph Matz, Othel J. Curry, and George W. Frank, Cost Accounting, (Cincinnati: South-Western Publishing Company, 1962), p. 291.

²⁵It is basically the same as the Fess-Ferrara defense though considerably less refined. However, because he favors the inclusion of the volume variance in "other expense and revenue," his argument curiously parallels that of direct costers: changes in productivity should not affect the firm's net operating income (see pages 84-92 of this dissertation).

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of assets. The accompanying asset side of the picture was not searchingly investigated for many years.²⁶

Schlatter did, perhaps, put his finger on one of the difficulties of deciding between alternate costing methods because he saw the artificiality of the short income period:

Other things being equal, the total net income over the life of the business will be the same whether fixed manufacturing expenses are treated as costs or as expenses. The differences come in the interim reports.²⁷

Kramer's N.A.C.A. article of 1947 broke no new ground but re-emphasized and brought out some of Harris' points.²⁸ Kramer was also the first direct cost advocate to suggest the possibility of ethical problems being present as a result of management's ability to influence income by means of productivity.²⁹

The year 1947 was notable because it marked the appearance of the first book on direct costing, Marginal Costing by two Englishmen, F. C. Lawrence and E. N.

²⁶See pages 73-81 of this dissertation.

²⁷Schlatter, op. cit., 161.

²⁸Philip Kramer, "Selling Overhead to Inventories," NACA Bulletin, XXVIII (January 15, 1947), 587-603. (re-printed in Marple, ed., op. cit., pp. 52-66).

²⁹Ibid., 589-90.

Humphreys.³⁰ Their intention, as stated in the opening sentence of their preface, is to ". . . interest the whole business community in the principles of Marginal Costs and Accounts."³¹ The book is wholly oriented toward management uses but the authors favor the conservative inventory values arrived at under direct costing for all purposes.³²

Public accountants became actively interested in direct costing during this period. Writing in the Lybrand Journal, Arno Kassander was generally against direct costing but he did mention in passing that if something is useful, generally accepted accounting principles should be flexible enough to adopt it with adequate disclosure being made in the balance sheet.³³

Nevertheless, the appearance of an article by Theodore Lang at this time illustrates the lag effect in the transmission of ideas.³⁴ The article deals with the

³⁰F.C. Lawrence and E.N. Humphreys, Marginal Costing, (London: Macdonald and Evans, 1947), p. 1.

³¹Ibid.

³²Ibid., 49.

³³Arno Kassander, "Some Thoughts on the Direct Costing Method for Valuing Inventories," Lybrand Journal, (Sept., 1947), 1-7, 18.

³⁴Theodore Lang, "Concepts of Cost, Past and Present," NACA Bulletin, XXVIII (July, 1947), 1377-90.

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historical development of costing. He brings us up to standard costs used in conjunction with normal overhead rates but nothing is mentioned about the still burgeoning direct costing controversy. For our purposes, then, the article is noteworthy for what it doesn't say rather than for what it does say.

Jonathan Harris repeated his ideas in an article in *The Controller* during 1948.³⁵ However, he brought up an additional point of importance which had not been mentioned previously and has not been satisfactorily resolved as yet:

Critics will say that certain factory expenses fall in a no-man's land between direct and indirect, and, therefore, cannot be properly put into either of these classes. Practical experience has made this argument untenable. . . . If indirect expenses are cut down when production falls off, this in itself is an indication that the eliminated charges belong in direct production expense, not in fixed factory expense.³⁶

Proponents of direct costing speak about dividing manufacturing costs into fixed and variable components.³⁷

³⁵Jonathan Harris, "Direct Costs as an Aid to Sales Management," *The Controller*, Vol. 16 (October, 1948), 499-502 and 524 and following.

³⁶Ibid., 528.

³⁷The often quoted definition of Waldo Neikirk is expressed in these terms. See Waldo Neikirk, "How Direct Costing Can Work for Management," *NACA Bulletin*, XXXII (January, 1951), 525.

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Costs which cannot be neatly categorized into these divisions are assumed to be of the semi-variable type with quite definite fixed and variable segments.³⁸ However, little has been mentioned about step or semi-fixed costs, though Harris may be alluding to them in the last sentence quoted above.³⁹ The factors representing these costs must be added in "lumps" or "chunks" at different capacity levels within a given time period. The lumpiness is caused by the indivisible nature of the particular production factors relative to output. That is to say these resources must be added in relatively large doses at different productivity levels as capacity of plant utilized within a given period increases. Within the intervals between these levels, step factor usage remains constant. Usage in fact becomes more efficient as output increases but units of the semi-fixed resource input remain stationary. Of course this effect may be somewhat blurred because different step

³⁸Potential difficulties are admitted, however. See John J. Brausch, "Progress or Folly," The Journal of Accountancy, Vol. 112 (August, 1961), 59.

³⁹But see William Ferrara, "Overhead Costs and Income Measurement," The Accounting Review, XXXVI (January, 1961), 63-70 and R. Lee Brummet, "Direct Costing--Its Weakness and Strength," op. cit.

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resources may be added to production at different levels.

Presumably, as Harris noted, these costs must be charged to product because they vary, though not directly, with output. However, because of the fixed nature of these costs within intervals, the problem of applying these costs to product will be analogous to the charging of fixed overhead to product in an absorption costing system: applied costs will differ from actual costs because the actual level of capacity attained differed from the expected level used in the burden computation. Thus a factor of over or under absorbed burden may be present in a system purportedly charging only "variable" costs to product.

Furthermore, attention might be called to the extreme case of the step charge: a cost which will not vary as long as the firm produces up to the capacity limits imposed upon it by its scale of fixed plant but one which can be dispensed with if the firm ceases production in the short-run. Factors of this type would not be contractually tied to the firm beyond the short-run nor could they be of a type enabling legal ownership by the firm (i.e., fixed assets). Examples might include some kinds of supervisory, maintenance or service department functions. Complete indivisibility of the factor (number of workers needed to perform the

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function) from an infinitesimal fraction above the zero level of output to the upper capacity limit of production would have to prevail in these cases. Admittedly, examples of this extreme type of semi-fixed cost would be quite rare but it is of conceptual importance because it demonstrates that defining a cost as fixed if the cost doesn't vary with output overlooks the degree of the fixity of the factor itself, that is, the ease of disposition of the factor (and hence of its period costs) from the firm's scale of plant in the short-run.⁴⁰ Direct costing should by no means be ruled out as a result of this discussion but the presence of step costs means that direct costing does not have an absolute advantage over absorption costing relative to ease of applying costs to product.

The flow of articles on direct costing increased during the ensuing years. A significant article appeared in the January, 1951, N.A.C.A. Bulletin. Neikirk, the author, in his definition of direct costing, lays stress on it as ". . . a segregation of manufacturing costs between those which are fixed and those which vary directly with

⁴⁰For an extended discussion of factors and cost patterns, see Milton Friedman, Price Theory, A Provisional Text (Chicago: Aldine Publishing Company, 1962) especially p. 97 and following.

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volume. Only the prime costs plus variable factor costs are used to value inventory and cost of sales. The remaining factory expenses are charged off currently to profit and loss."⁴¹ The point the author stresses in this often quoted definition is that inventory valuation takes a back seat to income determination.⁴² Only with an emphasis on asset definition could the direct costing theory be refined into the relevant costing alternative. Neikirk's article is also noteworthy because it is the first one to use the term "direct costing" in its title.

Beckett, in an appraisal of direct costing in the same year, mentioned briefly outside users of financial statements but it was Heiser in 1952 who first specifically mentioned the use of direct costing in externally used financial statements in a separate section of an article.⁴³ Virtually all of the writing on direct costing

⁴¹Waldo Neikirk, op. cit., 525.

⁴²For example, Neikirk's definition is used in Direct Costing, (New York: National Association of Accountants, Research Report No. 23, 1953), p. 2 and W.B. Lawrence, revised by John W. Ruswinckel, Cost Accounting, (New York: Prentice-Hall, Inc., 1954), p. 372.

⁴³John W. Beckett, "Appraisal of Direct Costing," NACA Bulletin, XXXIII (December, 1951), 407-15 and Herman Heiser, "What Can We Expect of Direct Costing as a Basis for Internal and External Reporting," NACA Bulletin, XXXIII (April, 1952), 1546-60.

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up to this point stressed internal uses but distinctions between published and managerial statements were not sharply demarcated. Certainly we would expect an idea having managerial usefulness to be subjected to the possibility of usage in external financial statements. However, the drift toward the use of direct costing in external statements which occurred around this time may have occurred partially as a result of the lack of clarity.

Heiser himself offers us nothing particularly significant in his statement. His view is one of acceptance by consensus: the more it is accepted for managerial purposes, the greater the chances of external acceptance and adoption.⁴⁴ Heiser ignores a possibly important point here. Are the purposes of inside users the same as those of external users?

An extremely significant publication, N.A.C.A. Research Report No. 23, entitled Direct Costing, appeared in April, 1953.⁴⁵ N.A.C.A. (N.A.A.) reports have been termed ". . . descriptive, empirical investigations of what is

⁴⁴Heiser, ibid., 1556.

⁴⁵Direct Costing, op. cit., (referred to in footnote 42 above).

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going on."⁴⁶ Many practicing accountants undoubtedly make an effort to keep up with the literature but it is very likely that many more become familiar with a problem area by reading these special reports.

The report does not take a strong stand on the matter of direct costing for managerial purposes:

The statements above seem to indicate that such a justification exists for the direct costing approach to income measurement. However, in the final analysis, the choice between direct and absorption costing must rest upon the comparative usefulness of figures produced by the two methods to reflect the transactions which occur. As to this, each⁴⁷ company must arrive at its own conclusions.

Of special interest is the separate chapter on the question of direct costing for external purposes. However, there can be little doubt about where the report stands on this question as evidenced by the following reasons:

- (1) In discussing whether direct costing is in conformity with existing generally accepted accounting principles, qualification has

⁴⁶Stephen A. Zeff, "A First Guide to the Literature of Accounting," *Financial Accounting Theory*, ed. Stephen A. Zeff and Thomas F. Keller (New York: McGraw-Hill Book Company, 1964), p. 6.

⁴⁷Direct Costing, op. cit. This report is reprinted in Marple, ed., op. cit., p. 225.

occasionally been made in defining "full cost." For example, the Committee on Accounting and Auditing Research of the Dominion Association of Chartered Accountants in a statement on the meaning of cost for inventory valuation has stated that "Similarly, in some cases, fixed overhead is excluded where its inclusion would distort the profit for the year by reason of fluctuating volume of production."⁴⁸

- (2) The second section of this chapter is entitled "Advantages Advanced for Costing Inventory at Direct Cost." No separate section enumerating reasons against direct costing occurs but within this same section exactly one sentence is devoted to the con side of the question.⁴⁹
- (3) While making only a tentative statement, the report states that the decline in the dollar value of working capital, as a result of eliminating fixed overhead from inventory, should not be a serious obstacle to direct costing.⁵⁰

⁴⁸Marple, **ed.**, op. cit., 226.

⁴⁹Ibid., 227.

⁵⁰Ibid., 229.

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- (4) The chapter concludes with a section entitled "Problems of Changing to Direct Costing."⁵¹

This statement alone should indicate the sentiments of the writers.

The appearance of this report plus its means of expression were quite probably responsible for both disseminating information about direct costing and influencing readers about its usefulness for purposes of published statements.

With the increasing dissemination of information about direct costing, criticisms of it became more pointed. George Frank noted that where production is undertaken with different factor combinations by firms producing the same product, the use of direct costing will bring about a lack of comparability relative to inventories.⁵² Moreover, if different proportions of cost are being inventoried with the remainder written off as period costs the same lack of comparability would affect the income statements of the firms.

Somewhat related to Frank's criticism is a point

⁵¹Ibid.

⁵²George Frank, "Will Direct Costing Theory Stand Inspection," NACA Bulletin, XXXIV (December, 1952), 495.

mentioned by Norton Bedford. Over time, as technology improves and the automation of manufacturing processes increases, more costs, proportionately speaking, will be considered to be fixed.⁵³ Whereas Frank spoke of an essentially short-run lack of comparability among similar firms, Bedford talks about lack of comparability over the long-run in regard to the statements of a given firm. Moreover, with the appearance of the guaranteed annual wage, direct labor would become stable in relation to output except for overtime premiums and possible expansion or contraction of the firm's labor force. Thus not only would automation make fixed plant and equipment more important as a productive factor but, in addition, institutional arrangements could result in a second input becoming largely fixed in the short-run.

By 1955 considerable emphasis on direct costing for published statements was being made.⁵⁴ Blough, in a

⁵³Norton Bedford, "Another Look at Direct Costing," Cost and Management, (January, 1954), 20-27.

⁵⁴Unfortunately, accountants have been somewhat vague on the matter of whether they are speaking of internal or external uses but the following articles appear to at least touch upon external uses. These citations include both favorable and unfavorable opinions: Robert Beyer, "Is Direct Costing the Answer?" The Journal of Accountancy, (cont.)

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comment in his column in the Journal of Accountancy, strictly rejected it for published statements on the grounds of lack of compatibility with generally accepted accounting principles as derived from Accounting Research Bulletin No. 43.⁵⁵

During this period, beginning with the immediate post-war years, information on direct costing became widely disseminated and arguments both pro and con became widespread.

It should also be noted, in passing, that this post-war period saw the development of a group taking a middle ground between absorption-only costers and direct costers. An excellent example appears in the case of Joseph A. Mauriello and would also include, among others, R. Lee

⁵⁴ Vol. 99 (April, 1955), 45-9; R. Lee Brummet, "Direct Costing--Should It Be A Controversial Issue?" The Accounting Review, XXX (July, 1955), 439-43; Ted Hosick, "Effect of Direct Costing on Asset Accounting and Income Reporting," The Journal of Accountancy, Vol. 96 (October, 1953), 444-48; H.W. Luenstroth, "The Case for Direct Costing," NACA Bulletin, (August, 1952), pp. 1479-95; Raymond Marple, "Direct Costing and the Uses of Cost Data," The Accounting Review, XXX (July, 1955), 430-38; Roger Wellington, "Direct Costing and Its Implication in Financial Reporting," Canadian Chartered Accountant, (May, 1955), 277-88.

⁵⁵ Carmen Blough, "Comments on Direct Costing," The Journal of Accountancy, Vol. 99 (April, 1955), 64.

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Brummet and John L. Beckett.⁵⁶ The position of these people can be summed up in the famous phrase of John Maynard Clark in his Economics of Overhead Costs: "different costs for different purposes."⁵⁷ This group realizes the importance of the differences between fixed and variable costs for managerial purposes such as control of costs and the setting of prices and production quotas for the period. However, the costs needed for these purposes may differ from the costs needed for income determination, particularly where income figures are to be used by external financial statement readers.

The Emergence of Relevant Costing, 1958-67

A very short article in the N.A.A. Bulletin in 1958 signalled the beginning of a turn in emphasis in the direct

⁵⁶ Joseph Mauriello, "Convertibility of Direct and Conventional Costing," NACA Bulletin, XXXV (March, 1954), 888-94, (reprinted in Marple, ed., op. cit.), R. Lee Brummet, "Direct Costing--Should It Be A Controversial Issue?" The Accounting Review, XXXIV (July, 1959), 439-43; John Beckett, "Direct Costing in Perspective," NACA Bulletin, XXXVI (January, 1955), 651-60.

⁵⁷ John Maurice Clark, Studies in the Economics of Overhead Costs (Chicago: The University of Chicago Press, 1923), p. 175.

costing controversy.⁵⁸ Wetnight noted the de-emphasis on the balance sheet shown by the American Institute of Certified Public Accountants' Terminology Bulletin defining an asset as ". . . something which is represented by a debit balance which is properly carried forward."⁵⁹ The criterion of what an asset itself is or when a charge is properly carried forward is not made clear by the definition. Wetnight uses a standard of "future benefit" as a test of whether a charge can properly be booked as an asset.⁶⁰ He views fixed overhead charges as largely expiring with time. No future savings are to be attributed to these charges. Variable costs, on the other hand, mean future cost savings because ". . . these costs will not be incurred in a future period."⁶¹

David Green further developed the ideas mentioned by

⁵⁸Robert Wetnight, "Direct Costing Passes the Future Benefit Test," NAA Bulletin, XXXIX (August, 1958), 83-4.

⁵⁹Ibid.

⁶⁰Ibid.

⁶¹Ibid.

Wetnight.⁶² Green examined selected definitions of the word "asset" as it has been used in accounting thought. From these selected definitions he accepts the notion that "costs attach" based on phrases such as "they (assets) are aggregates of service potentials available for or beneficial to expected operations."⁶³ Because of the difficulty of attaching some costs to product, Green then asks which costs should attach to product and which to time period. In addition, he sees what he refers to as ". . . a suggestion of choice of orientation . . ." between period and product in Paton and Littleton though it is quite clear from their language that for income determination purposes, attaching of manufacturing costs to product is definitely superior to assignment to time period.⁶⁴ He then infers, in effect, that fixed overhead

⁶²David Green, Jr., "A Moral to the Direct-Costing Controversy," The Journal of Business, XXXIII (July, 1960), 218-26. Reprinted in Sidney Davidson, David Green, Jr., Charles T. Horngren, and George H. Sorter (eds.), An Income Approach to Accounting Theory, (Englewood Cliffs: Prentice-Hall, Inc., 1964), pp. 183-193. Footnotes here are keyed to the latter source.

⁶³ Ibid., 186-187.

⁶⁴ Ibid. Paton and Littleton state: "Ideally, all costs incurred should be viewed as ultimately clinging to definite items of goods sold or service rendered. If this (cont.)

expires mainly in accordance with passage of time rather than use of the assets with which these costs are associated. After this orientation he comes back to his original formulation, the question of what is an asset, and presents the idea of "cost obviation."⁶⁵ Cost obviation refers to a currently incurred cost's ability to lead to future cost avoidance.⁶⁶ Green appears to see cost obviation as one possible aspect of the future benefits notion of asset valuation developed by John Canning.⁶⁷ Green looks at asset valuation not from the view of utility or value added to inventory by productive factors but rather from the aspect of the effect of use of present productive services on the use of future productive services. Since fixed overhead charges largely expire with passage of time, in his view, future costs are not affected by

⁶⁴conception could be effectively realized in practice, the net accomplishment of the enterprise could be measured in terms of units of output rather than of intervals of time." W.A. Paton and A.C. Littleton, An Introduction to Corporate Accounting Standards (Columbus, Ohio: American Accounting Association, 1957), 15.

⁶⁵David Green, Jr., op. cit., 189-90.

⁶⁶Ibid.

⁶⁷John Canning, The Economics of Accountancy (New York: The Ronald Press Company, 1929), pp. 11-23.

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the present usage of these factors hence cost obviation is not present and these costs should be expensed on a period basis and not added to product. Wetnight and Green arrive at a theoretical justification of direct costing based upon asset attributes though Green's primary purpose was to bring the whole asset picture into focus. It is inconceivable in his view to talk about the inappropriateness of periodic fixed manufacturing cost write-offs when an even better case can be made against the practice of not booking advertising and research and development costs as assets because of the stronger certainty of future benefits adhering to these charges.

The pinpointing of asset valuation stressed by Wetnight and Green as opposed to cost expiration set the stage for the relevant costing theory of Horngren and Sorter. Their position was stated in a group of three articles appearing in *The Accounting Review* between 1961 and 1964.⁶⁸

However, George Sorter's disenchantment with absorption costing was indicated by a previous article appearing

⁶⁸See footnote 17, Chapter I, for full citations. Abbreviated article titles are used in this chapter.

in 1959.⁶⁹ The depression or recession of 1957-58 was accompanied by a decline in manufacturing and trade inventories of 5.4 billion dollars from 91.3 billion to 85.9 billion.⁷⁰ Furthermore, Sorter states that preliminary results of a study show that at least 500 million of this decline was caused by the accounting treatment of manufacturing inventory.⁷¹ The "accounting treatment" refers to the absorption costing method of charging overhead to inventory. Thus Sorter is concerned with the fact that accounting profits arrived at by conventional methods will be further reduced as a result of inventory liquidations. The natural concomitant of this fact is the question of the possible effect of the level of accounting profits upon the recession itself.

The theory of relevant costing was effectively stated in the first of the three articles by Horngren and Sorter.⁷² Taking asset and expense definitions directly from the definitions put forth by the Committee on Concepts and

⁶⁹George H. Sorter, "Reported Income and Inventory Change," The Journal of Business, (January, 1959), pp. 47-51.

⁷⁰Ibid., 47.

⁷¹Ibid.

⁷²Horngren and Sorter, "Direct Costing", op. cit.

Standards Underlying Corporate Financial Statements (American Accounting Association) and Paton and Littleton's monograph, they present the following asset definition and statement:⁷³

According to these definitions, costs are assets if they can justifiably be carried forward to the future, if they bear revenue-producing power, if they are beneficial to future operations--if they possess service potential. Thus the justification for treating fixed factory overhead as an asset must meet the test of service potential. The issue becomes service potential versus no service potential.⁷⁴

The element of future expectations is thus an integral aspect of the problem of asset valuation. In support of their position in relation to the future, the authors marshal the "going concern" assumption as justification for their position:

The going concern postulate is surprisingly the only assumption about the future needed to demonstrate service potential for any unexpired cost--except in the case of fixed factory overhead, as we shall soon see.⁷⁵

⁷³Committee on Concepts and Standards Underlying Corporate Financial Statements, "Accounting and Reporting Standards for Corporate Financial Statements 1957 Revision," The Accounting Review, XXXII (Oct., 1957), 538 and 540 and W.A. Paton and A.C. Littleton, op. cit., p. 65.

⁷⁴Horngren and Sorter, "Direct Costing," op. cit., 85.

⁷⁵Ibid., 85-6.

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For a cost to be beneficial in future terms, total future costs must be reduced either "(1) by avoiding the reincurrence of the same type of cost or (2) by reducing a different cost (possibly an opportunity cost) in the future."⁷⁶ Costs having these characteristics are termed "relevant costs" and are further described:

Relevant costs are those costs that will be different between two or more future actions, those costs that may be avoided by not undertaking a given alternative. Irrelevant costs are those that have no influence on a decision because they remain the same for all alternatives regardless of the choice.

If a given cost has no influence on future operations, it is irrelevant and not helpful for decision-making. Therefore, assets should consist only of relevant costs, costs that will influence future results. If costs will not have an impact on future results, they have no service potential because they cannot affect future cost incurrence.⁷⁷

Fixed factory overhead, as previously stated, usually does not meet the Horngren and Sorter asset classification test:

The salient factor is that production in advance of sale usually does not avoid any fixed overhead costs in future periods. The incurrence of fixed

⁷⁶Ibid., 86.

⁷⁷Ibid.

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costs in a current period ordinarily has no bearing on the reincurrence of the same kind of fixed costs next period. As the clock ticks, fixed costs expire, to be replenished by new bundles of fixed costs that will enable production to continue in succeeding periods.⁷⁸

Two situations or assumptions concerning the future are stated where it would be justifiable to charge fixed factory overhead to inventory:

- (1) Future production at maximum capacity with future sales in excess of capacity by the amount of increase in ending inventory.⁷⁹
- (2) Variable production costs are expected to increase.⁸⁰

The authors conclude that these two conditions are quite exceptional hence fixed overhead should only infrequently be charged to inventory.

Horngren and Sorter do not deny that fixed overhead is necessary to produce inventory.⁸¹ However, costs to them are future oriented and have an opportunity cost flavor. Their view is that fixed overhead, by mainly expiring with time, is really not a scarce resource. It is largely sunk in nature and is not affected by the level of productivity

⁷⁸Ibid., 88.

⁷⁹Ibid.

⁸⁰Ibid.

⁸¹Sorter and Horngren, "The Relevant Costing Approach," op. cit., 393.

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attained. If, however, fixed overhead expired with usage rather than passage of time, it would become a scarce economic resource. Use of factors to produce inventory today would mean that productivity by these same factors on units at some time in the future must be foregone. The service of these factors would unquestionably be of value and the cost of these services would have to be inventoried.

Their time expiration viewpoint of fixed overhead is related to the obsolescence ideas mentioned by Isaac N. Reynolds in regard to depreciation.⁸² In the usual situation, obsolescence arises as a result of improving technology.⁸³

If obsolescence were the primary factor causing decline in the valuation of an asset, justification for writing the asset off on a time basis would be quite strong.⁸⁴

⁸²Isaac N. Reynolds, "Selecting the Proper Depreciation Method," The Accounting Review, XXXVI (July, 1961), 239-48.

⁸³Ibid., 242.

⁸⁴Some assets such as railroad ties and telephone poles may be consumed in accordance with the passage of time due to corrosion and decay. Eugene L. Grant and Paul T. Norton, Jr., Depreciation (New York: The Ronald Press Company, 1949), p. 26. This cause of depreciation would appear to be applicable mainly to those assets exposed to the natural elements.

The extent of usage would affect only the salvage value. In addition to usage and obsolescence, Reynolds mentions the trend in maintenance costs over the asset's life and its physical efficiency as factors affecting the asset's "net service value."⁸⁵ The ideal depreciation rate would take into account these factors and would spread them over the life of the asset in a manner that would "produce a uniform return on remaining unamortized investment in all periods at the rate of return implicit in the original transaction by which the asset was acquired."⁸⁶ According to Reynolds' analysis, time is an important factor but only one among several which should be considered for depreciation purposes. It is largely used in practice as an expedient means of assigning original cost to later periods or products. Furthermore, even if fixed overhead costs did largely expire with time passage, there would still be justification for charging it to product (rather than directly against revenue of the period) from a long-run

⁸⁵Reynolds, op. cit., 240-42.

⁸⁶Ibid., 244. However, see pages 173-176 of this dissertation for some qualifying remarks in relation to the "uniform return on remaining unamortized investment" criterion.

income determination standpoint: the possibility of providing a better matching of costs and revenues.

The relevant costing theory is completely stated in this first article by Horngren and Sorter. Though the term "relevant costs" is used, their ideas were not labeled here as the relevant costing theory. Their ideas here were set forth, interestingly enough, as a means for theoretically justifying the usage of direct costing for externally used financial statements.

Their second article added little of a new nature to what they had previously stated.⁸⁷ The most important point in this article is the presentation of their previous ideas under the title of the relevant costing approach. As stated above, the presumptions of relevant costing had previously caused them to opt for direct costing rather than absorption costing. Though relevant costing was presented as a middleground between direct and absorption costing from a formal theoretical point of view, their discussion makes it clear that in actual application, they believe that relevant costing would be much closer to the direct costing end of the spectrum.

⁸⁷Sorter and Horngren, "The Relevant Costing Approach," op. cit.

The third article by the pair is largely a rebuttal to Fess' article in the October, 1963 Accounting Review and likewise adds nothing new though it further clarifies the Horngren-Sorter position.⁸⁸

The writings of Horngren and Sorter can be juxtaposed against another pair of co-authors, Philip E. Fess and William Ferrara.⁸⁹ Each separately defended absorption costing with their views being quite similar. In these articles they see all manufacturing factors contributing to productivity and hence the creation of revenue. The idea that the fixed factors are sunk in short-run situations is not important to the income determination process in their view. Ideally then, all costs including those attributable to fixed factors should expire with productivity rather than by means of poor substitutes such as time which result in fixed periodic expense charges.⁹⁰ Fess and Ferrara

⁸⁸Charles T. Horngren and George H. Sorter, "An Evaluation of Some Criticisms," op. cit.

⁸⁹See footnote 20, Chapter I, for complete citations of articles by Fess and Ferrara in rebuttal to the relevant costing concept.

⁹⁰This idea is perhaps best brought out in William L. Ferrara, "Overhead Costs and Income Measurement," The Accounting Review, XXXVI (January, 1961), 63-70.

thus take an essentially long-run view of cost expiration in contrast with the short-run position of Horngren and Sorter.

The corrolary to these views of how cost should expire is the matching principle. Fess and Ferrara believe that their long-run view of cost expiration will give the best matching of costs and revenues where matching is done in accordance with the realization of revenue.⁹¹ Revenue, according to Paton and Littleton, is earned during the entire operating process.⁹² However, due to problems of estimation and uncertainty, it is not ordinarily recognized or "realized" until cash or receivables arise in accordance ~~with~~ the sale of the product.⁹³ Therefore, in order to achieve the best matching of costs and revenues, all applicable costs including those attributable to fixed overhead factors should be assigned to inventories. Horngren and Sorter, in contrast, ordinarily see the best matching resulting where costs of fixed factors

⁹¹See especially Fess and Ferrara, "The Period Cost Concept for Income Measurement--Can It Be Defended?," op. cit., 598-601.

⁹²W.A. Paton and A.C. Littleton, op. cit., p. 48.

⁹³Ibid., p. 49.

are assigned to period rather than to units of product.⁹⁴

Fess, like Horngren and Sorter, marshals the going-concern assumption to his defense. He simply equates the previously mentioned long-run view of cost expiration with the idea of the continuity of the firm:

From the going concern or long-run view, all costs are variable costs and any purchased services remaining at the end of one accounting period should be deferred for matching against future revenue because an accounting period is but one segment in the life of a business. Thus, direct costing is in violation of the going-concern assumption in that the benefits received through fixed manufacturing expenditures are not charged to inventory to be recovered by future revenue. Absorption costing adheres to the going-concern assumption, while⁹⁵ direct costing violates this basic assumption.

The views of Fess and Ferrara were further clarified in their article defending the traditional viewpoint.⁹⁶

The springboard of their defense is the fact that utility is added to product by all factors of production, regardless of the life pattern of the individual factors. In

⁹⁴ The rationale of matching under relevant costing is discussed in Sorter and Horngren, "The Relevant Costing Approach," op. cit., 392-4.

⁹⁵ Philip E. Fess, "The Theory of Manufacturing Costs," The Accounting Review, (July, 1961), p. 450.

⁹⁶ Philip E. Fess and William L. Ferrara, "The Period Cost Concept for Income Measurement--Can It Be Defended?," op. cit.

their words, ". . . inventory valuation is based on cost plus value added to date."⁹⁷ Furthermore, ". . . income earned during a period would be considered equivalent to the value added to productive factors during the period."⁹⁸

The distinction between the value added concept and conventional absorption costing has to do with the timing of the recognition of revenue and income. Objectivity is presumably acquired if we wait until sale takes place since receivables or cash can be easily measured at that particular point in the operating process. But, if income recognition is delayed, then all costs attributable to the suspended income items must also be delayed:

If one desires to delay the recognition of income in order to obtain objectivity, he must also delay the recognition (in the income statement) of all costs related to the delayed income. This is as it should be because all costs are incurred for the same basic reason, i.e., the anticipated use of the service acquired in the production of income. Once the service potential of costs are used up in the production of income, such costs must be related to the income produced. If the recognition of income is delayed, the recognition of costs related to that income must be delayed.⁹⁹

⁹⁷Ibid., 599.

⁹⁸Ibid.

⁹⁹Ibid., 600.

Fess and Ferrara deny, however, that the delayed costs have future benefit or utility:

It should be pointed out that these 'delayed costs' have no relationship to future benefit or utility. Quite to the contrary, these 'delayed costs' are related to the entire process of production and sale and represent the costs of form, time, and place utility which have been used up in the process of acquiring revenue, the recognition of which is being delayed. In other words, these 'delayed costs' are related to earnings, the recognition of which is delayed, and not to some future benefit or utility.

. . . . Future benefits have nothing to do with the valuation of inventories. Inventories are simply an expression of all costs used up in the process of acquiring revenue which has not yet been recognized.¹⁰⁰

The point made in the above quotation is subtle but important. Because of the need for objectivity, recognition of revenue is delayed until point of sale. However, as was stated previously, revenue is earned through the whole process of operations. Therefore, cost of factors used up in producing inventory add value or benefits to product immediately at the time of production though these benefits are both received and recorded in the future. Service potential of factors embodied in inventory is used up rather than delayed. It is included in inventory for the most accurate measurement of costs because revenue

¹⁰⁰Ibid., 600-01.

recognition applicable to inventory is delayed until the realization point, the time of sale. Even as astute an observer as Fremgen is not overly clear in distinguishing between revenue realization and revenue production:

As indicated above, the essential point in the argument presented by Horngren and Sorter is the identification of the service-potential concept of asset valuation with the concept of future cost avoidance. . . . Hence, the service-potential concept ought to be reinterpreted in the light of an incurred cost's capacity to contribute to the production of revenue. . . . All production costs are equally essential to the completion of a salable product. There is no distinction between variable and fixed costs in this respect. Each is essential to the production of the good or service which will eventually result in the realization of revenue. Thus, revenue producing potential should be the test for the separation of expired and unexpired components of cost:.. . . .¹⁰¹

Fess and Ferrara separately answered the second of the Horngren and Sorter articles in the October, 1963, Accounting Review.¹⁰² Ferrara attempted to establish the idea that the basic assumption of relevant costing is that revenue is not earned by means of the whole process of production

¹⁰¹James M. Fremgen, "Variable Costing for External Reporting--a Reconsideration," The Accounting Review, XXXVII (January, 1962), 77.

¹⁰²William L. Ferrara, "Relevant Costing--Two Points of View," op. cit., and Philip E. Fess, "The Relevant Costing Concept for Income Measurement--Can It Be Defended?," op. cit.

but is instead earned at the time of sale.¹⁰³ It is Ferrara's contention that from this basic assumption flows the concept that costs which either favorably affect future revenues or reduce future costs are the only charges which qualify as assets.¹⁰⁴

Ferrara's contention appears to be basically correct but it must be properly qualified. The relevant costing thesis does not deny the statement that revenue is produced throughout the firm's entire operating process but it does abandon it as a criterion for the measurement of assets and expenses. Absorption costing can be viewed as a near substitute for the value added approach because it holds back as assets all applicable manufacturing costs associated with the production of inventory. Relevant costing, however, attempts to use a managerially oriented tool, the contribution notion, as a basis for dividing costs of the period between asset and expense.

The point made by Ferrara can also be explained in terms of time distinctions. Absorption costing makes no essential difference between short and long-lived factors

¹⁰³Ferrara, ibid., 719.

¹⁰⁴Ibid., 720.

of production. All factors are necessary to complete product; all add value to product. Consequently, from period to period costs will be distributed to revenues roughly on the basis of benefits received by product sold during the period. The similar treatment accorded fixed and variable factors by absorption costing may be equated with the economic dictum that in the long-run all costs are variable. Thus, absorption costing adopts a long-run view of factor cost expiration.

In the case of relevant costing, however, a fundamental distinction is made between factors whose costs are unaffected by the level of productivity in the short-run and all other factors of production. To the relevant coster the former are not true product costs because in the short-run they expire primarily on the basis of time passage rather than usage. The fact that fixed overhead inputs are necessary to complete product is not reason enough to justify treating them as product costs. The fixed factors, those factors whose costs expire primarily on the basis of time, are treated as product costs by relevant costers only when the use of these factors provides certain strategic advantages. Therefore, the economic doctrine that in the short-run costs of some factors will not vary with output

is a critical postulate of relevant costing. Relevant costing is thus closely tied to the concept of the short-run.

Ferrara also states in this article that in cases where fixed factory overhead is inventoried, it is really the opportunity costs that are being charged to product. Fixed factory overhead costs in these situations are merely doing stand-in duty for the opportunity costs.¹⁰⁵

Fess, in his accompanying article, does not appear to bring anything of a new nature to the dialogue though his use of terms such as "fundamental error" and "misinterpreted and misused" elicited the previously mentioned reply from Horngren and Sorter.¹⁰⁶

Other writers have also replied to the relevant costing issue. Perhaps the most interesting of these was an article by George Staubus.¹⁰⁷ Drawing from his own work, A Theory of Accounting to Investors, he states that methods of accounting measurements ". . . must be oriented to

¹⁰⁵Ibid., 721.

¹⁰⁶ Philip Fess, "The Relevant Costing Concept for Income Measurement--Can It Be Defended?," op. cit.

¹⁰⁷ George J. Staubus, "Direct, Relevant or Absorption Costing," The Accounting Review, XXXVIII (January, 1963), 64-74.

the future and to cash flows."¹⁰⁸ It, therefore, follows that cost is a good valuation only if selling prices in a particular industry are related to costs in that same industry. As a general proposition, we would expect this to be applicable to industries where perfect competition prevails. However, the "costs" that would prevail in these circumstances would be opportunity costs of factors used up in production. The older the composition of the accountant's original or historical money cost the less we would expect it to conform to current cost of factors used up in production. The accountant's historical cost would, of course, not include the non-manufacturing segments of cost. Despite these shortcomings of historical cost as a method of valuation for investors, Staubus concludes this section with the following remarks:

Cost, then, is useful in asset measurement only to the extent that it is an indication of service potential. Accordingly, we must attempt to obtain that cost data that is most likely to be representative of the contribution the asset will make to the firm's future cash balance. The basic problem of cost accounting is not the most precise calculation of what the product did cost, but the processing of cost data in such a way as to produce a representative cost figure. Those aspects of the past which are most indicative of the future are of most interest. Since the typical firm covers its minimum average total cost,

¹⁰⁸Ibid., 65-66.

including both fixed and variable (if one cares to attempt such a distinction), finished goods available for sale typically are worth at least full cost¹⁰⁹ of production calculated at optimum volume.

In summary, Staubus, like Horngren and Sorter, accepts the service potential definition of an asset, but as a method of valuation which will be useful to external users, he prefers absorption costing methods to direct costing because the notion that the firm will usually cover its minimum average total cost makes the former a preferable method of valuation. It is likewise of interest to note that the Staubus formulation is in strong opposition to the idea that inventories should include only ". . . working capital of the company tied up in unsold products."¹¹⁰ This latter view appears to be tied firmly to the idea of balance sheet conservatism. It likewise seems to deny that value can be added to product through the usage of fixed factors of manufacturing.

Staubus next attacks the idea that fixed productive factors which expire primarily with time have no future cost saving benefits, an idea of central importance to

¹⁰⁹Ibid., 66.

¹¹⁰Robert Seiler, op. cit., p. 63.

the Horngren-Sorter thesis. The presence of fixed factors enables a firm to produce goods for inventory. In turn, this means that present productivity of fixed factors plus inventory carried into a period which have been partially produced by means of these same fixed factors in a previous period enables the firm to sell an amount of inventory above the amount which could be produced in the given period with the firm's existing productive capacity. Staubus, therefore, concludes that the presence of inventory makes it possible for the firm to forego the acquisition of more fixed plant and equipment.¹¹¹ Thus costs of fixed factors should be considered to be relevant to future cost savings. Staubus' point is completely within the framework of the relevant costing idea. The crucial point of difference between Staubus and the relevant costers lies in the frequency of occurrence of the cost obviation potential of fixed factors. Staubus sees this phenomenon occurring relatively frequently whereas Sorter and Horngren do not. Staubus bases his reasoning on the wide swings in the demand for fixed factors of production.¹¹² Presumably,

¹¹¹Staubus, op. cit., 68.

¹¹²Ibid., 69.

the swings would be much wider if inventories were not present as a buffer. On the other hand, it would appear that the opposite statement could have equal validity: the presence of inventories has not been able to prevent wide swings in the demand for fixed productive factors. Ability of the contribution of fixed factors by means of inventory production to prevent or obviate future cost increases remains a debatable point.

Staubus then enumerates his views in the area of inventory measurement and idle capacity. His analysis asks the question, in substance, is it not fixed assets rather than inventory which should be written down when fixed factors expire without creating service potential. Staubus' hypothesis can be summarized in the following table showing three possible states of plant capacity in conjunction with each of three possible levels of ending inventory leading to nine possible combinations of plant capacity and inventory:

Table 20

Relation of Inventory Levels
and Plant Capacity¹¹³

<u>Ending Inventory Level</u>	<u>Sufficiency of Plant Capacity</u>		
Normal inventory level	Normal plant capacity	Insufficient plant capacity	Excessive plant capacity
Insufficient inventory level	Normal plant capacity	Insufficient plant capacity	Excessive plant capacity
Excessive inventory level	Normal plant capacity	Insufficient plant capacity	Excessive plant capacity

Only where inventory levels were excessive in combination with either normal or excessive plant capacity would Staubus advocate carrying the inventory at less than full normal cost and even here his comments are highly qualified. In these two cases he would be willing to advocate ". . . a possible write-down of part of an inventory from full normal cost to variable costs."¹¹⁴ Even in these cases, however, the write-down is necessitated by the fact that excess production facilities had not been written off. Thus inven-

¹¹³Staubus, op. cit., p. 72.

¹¹⁴Ibid., 73.

tory write-down is really caused by overvalued plants. In any event, however, in these two cases Staubus would advocate carrying inventory at an amount below historical cost.

Horngren and Sorter replied to Staubus in a short postscript immediately following the latter's article.¹¹⁵ They quite rightly point to Staubus' willingness to write some asset down when the situation demands. At the same time, they state the inapplicability of write-down of fixed factors where excessive when these are of the out-of-pocket variety:

A bothersome aspect of the Staubus approach is its general inapplicability to accounting for costs other than depreciation, such as insurance, property taxes, salaries, or rent.¹¹⁶

Though Horngren and Sorter attempt to show essential agreement between their approach and Staubus' ideas on a conceptual level, the important policy question of frequency of occurrence remains unanswered. For the relevant costers, write-off of fixed costs is the usual case while it is abnormal to Staubus.

¹¹⁵George H. Sorter and Charles T. Horngren, "A Reply To a Postscript," The Accounting Review, XXXVIII (January, 1963), 73-74.

¹¹⁶Ibid., 74.

Other Writings During the 1958-67 Period

In passing, it should be noted that the emergence of the relevant costing idea has not assuaged the flow of articles on direct costing. Brief mention will be made of some of the more important works in this section.

Bierman suggests the possibility of charging fixed overhead costs to product if they have a current opportunity cost only.¹¹⁷ However, when probing the weaknesses of absorption costing, his following statement is open to question:

There is no question that accounting theoreticians do not intend to have income a function of production or the level of inventory which is carried (especially where the higher the inventory the higher the resulting income).¹¹⁸

A. W. Patrick, for example, has a completely different viewpoint:

For those who accept . . . absorption costing, the inverse fluctuation of profits and sales when production and sales move in opposite directions is expected. They believe such a fluctuation is not absurd . . . but that the results portrayed are correct and reflect the theory that profits are a function of production, or the lack of it, as well as sales.¹¹⁹

¹¹⁷Harold Bierman, Jr., "A Way of Using Direct Costing in Financial Reporting," N.A.A. Bulletin, XXXXI (Nov., 1959) 13-21.

¹¹⁸Ibid., 16.

¹¹⁹A.W. Patrick, "Direct Versus Absorption Costing," The Controller, Vol. 29 (April, 1961), 171-2.

Perhaps the most balanced perspective and best summary of the whole problem was made by Fremgen.¹²⁰ He sees both traditional absorption costing views and relevant costing interpretations as being internally consistent.¹²¹ However, he is unable to make any choice in terms of the needs of external financial statement users on the grounds of an inability to define what is useful to them.¹²²

Hirschman looks at direct costing from the legal environment and arrives at the following conclusions:

A company considering the use of direct costing as an all-purpose accounting technique cannot afford to overlook the threat of all possible legal entanglements. Although the use of direct costing might be condoned for tax reporting purposes, there have been few successful rulings to date. There is even less likelihood that the SEC will accept financial statements prepared from direct costing records. And the relationship of direct costing to Robinson-Patman accounting is still another area characterized by uncertainty.¹²³

The National Association of Accountants continued

¹²⁰James M. Fremgen, "The Direct Costing Controversy--An Identification of Issues," The Accounting Review, XXXIX (January, 1964), 43-51.

¹²¹Ibid., 49.

¹²²Ibid., 50.

¹²³Robert W. Hirschman, "Direct Costing and the Law," The Accounting Review, XXXX (January, 1965), 183.

their strong interest in direct costing during the period. N.A.A. Research Report 37 entitled Current Application of Direct Costing appeared in 1961.¹²⁴ It has a chapter devoted to the use of direct costing in external financial statements but adds little in the way of new or provocative ideas. A book of readings made up of articles on direct costing appearing in the N.A.A. Bulletin was published during 1965.¹²⁵ In addition, it contains an excellent concise history of direct costing.

After thirty years the argument has not abated. Probably the only way of settling what to do with fixed overhead in external statements is to resort to empirical testing designed to answer the question of what is useful for statement readers.

Summary and Conclusions

1. Direct costing arose as a result of managerial needs but the demarcation between managerial and outside needs was not made very clear.

¹²⁴Current Application of Direct Costing, (New York: National Association of Accountants, Research Report No. 37, 1961).

¹²⁵Raymond P. Marple (ed.), op. cit.

2. There was a slow but perceptible drift toward the idea of using direct costing in outside financial statements beginning in the early 1950's.

3. The change in emphasis from income statement ideas to concentration on asset definitions set the stage for the emergence of the relevant costing idea from its parent, direct costing.

4. The direct costing argument as it relates to external uses has continued down to the present day and is still largely unresolved.

5. Theoretical differences between absorption and relevant costing are summarized in the table on the following page.

Table 21

Comparison of Absorption
and Relevant Costing

	<u>Absorption</u>	<u>Relevant</u>
Time concept from which income determination is viewed	Long-run	Short-run
Factor primarily accounting for the expiration of fixed overhead costs	Usage	Time
Viewpoint toward users of financial statements	Different statements for internal and external users	No difference between managerial and external users
Method by which matching of costs and revenues is accomplished relative to fixed overhead costs	Matched against revenue primarily by being charged to product during period of incurrence	Primarily matched against revenue of period when incurred
Economic view of fixed overhead factors and inventorability of their costs	Add value to product	Sunk costs; no benefits received from their use in the short-run from standpoint of effect upon future incremental income unless rising variable factor costs are expected or short capacity exists in relation to expected sales of a future period.
Reliance on the going-concern assumption	Yes	Yes

	<u>Absorption</u>	<u>Relevant</u>
Reliance on the cost principle	Yes	Yes, with some absorption costing figure as a maximum valuation. Tries to lean toward opportunity cost idea.
Characteristics of assets (specifically, manufactured inventories)	<p>Services must add value to product at time of usage; thereafter they are expired but their costs are inventoried for a better matching of costs and revenues in accordance with the revenue realization postulate (Fess and Ferrara). Since full costs are typically recovered, fixed charges should be inventoried because "full cost" is a better indicator of future revenue inflows than lesser figures. Also, inventories help minimize the investment in fixed facilities hence all services embodied in inventories contribute to the minimization of long-term commitments (Staubus).</p>	<p>Inventoried costs must have service potential: costs must increase the firm's incremental income and must also stem from scarce resources.</p>

III. RELEVANT COSTING AND OPPORTUNITY COSTS

Introduction

A point of agreement between the Fess-Ferrara and Horngren-Sorter groups is the opportunity cost orientation of relevant costing. Ferrara has said:

The idea of opportunity costs inherent in the Sorter-Horngren thesis was quite clear in their original article but it was more abundantly clear in the second article. This idea of opportunity costs is probably the main ingredient in the Sorter-Horngren thesis which distinguishes their argument from the usual direct costing argument.

For example, even a quick review of the Sorter-Horngren articles reveals that the conditions under which they say fixed factory overhead might be capitalized relate more to opportunity costs than to fixed factory overhead In each of these cases which relate to the Sorter-Horngren assumptions under which fixed factory overhead could be inventoried there seems to be a clear indication that it is not the fixed factory costs of this period which are being inventoried, it is the opportunity costs (fixed or variable) which will be inventoried.¹

Likewise, Horngren and Sorter acknowledge the kinship existing between relevant costing and opportunity costs:

Furthermore, we considered future revenue as an important aspect of our relevant costing approach. Yet we apparently failed to make the breadth of our concept (it included opportunity cost!) clear. . . .²

¹William L. Ferrara, "Relevant Costing-Two Points of View," op. cit., 721.

²George H. Sorter and Charles T. Horngren, "The Relevant Costing Approach," op. cit., 393.

If we are to have a complete understanding of the relevant costing approach, it behooves us to examine its relationship to opportunity costs. In this chapter we shall present a synthesis of views. After some brief introductory comments, opportunity costs applicable to services deriving from short-lived assets, typically inventories, will be discussed. The more complicated problem of measuring opportunity costs stemming from fixed assets will then be examined. Finally, the relationship of relevant costing to opportunity costs will be probed. We shall be viewing opportunity costs here principally from the standpoint of their use in measuring current income.³ The scope of their potential use is actually much wider.⁴

The opportunity cost principle is not new to economics.

³By "current income" we mean an income which matches the current cost of expired factor services against revenues. However, the question of whether holding gains and losses should be treated as separate elements of income or as capital adjustment factors is outside the scope of this work. See Stephen Zeff, "Replacement Cost: Member of the Family, Welcome Guest, Or Intruder?" The Accounting Review, XXXVII (October, 1962), 611-25 for an excellent presentation of the different current income schools of thought and their distinction from the adjusted historical cost view of income (general price level adjustments only).

⁴The term "decision making" virtually denotes the use of opportunity costs. See J.M. Samuels, "Opportunity Costing: An Application of Mathematical Programming," Journal of Accounting Research, Vol. 3 (Autumn, 1965), 182-91.

Hayek gives primary credit for the formulation of the theory to the Austrian economist, Friedrich von Wieser, tracing it back in his work to 1876.⁵

Lord Robbins has cogently described opportunity costs as economic sacrifice:

The conception of costs in modern economic theory is a conception of displaced alternatives: the cost of obtaining anything is what must be surrendered in order to get it. The process of valuation is essentially a process of choice, and costs are the negative aspect of this process. In the theory of exchange, costs reflect the value of the things surrendered. In the theory of production they reflect also the value of alternative uses of productive factors - that is, of products which do not come into existence because existing products are preferred.⁶

The Robbins definition clearly brings out the idea that opportunity cost is measured in terms of the best alternative foregone. However, the time and market availability horizons applicable to the factor should be borne in mind when determining opportunity cost. If, for example, a manufactured inventory item is in short supply and cannot

⁵Friedrich A. von Hayek, "Hayek on Wieser," The Development of Economic Thought, ed. Henry William Spiegel (New York: John Wiley & Sons, Inc., 1952), pp. 556-58.

⁶Lionel Robbins, "Remarks upon Certain Aspects of the Theory of Costs," Economic Journal, XLIV (March, 1934), 2 as quoted in John S. Gambs, Man, Money and Goods (New York: Columbia University Press, 1962), pp. 101-02.

be produced promptly enough to enable the firm to accept two potential offers, the opportunity cost of Offer A would be the revenue foregone by not accepting Offer B. On the other hand, if the firm were a retailer and it either had enough inventory to satisfy both offers or it could acquire units rapidly enough to enable the acceptance of both offers, then the economic sacrifice of either order would be the replacement cost of the goods. These rather simple examples elicit an extremely important point: the measurement of economic sacrifice is not restricted to markets in which the firm sells its particular goods.⁷ Economic sacrifice

⁷There are two views of opportunity cost. The narrower definition sees it as the best opportunity foregone in exit markets only (markets in which the firm sells goods or services) while others adopt the idea that economic sacrifice can also be related to entry markets (markets in which the firm acquires goods and services). The latter viewpoint accepts the possibility of a wider action horizon dictating the amount of economic sacrifice. The broader viewpoint is accepted here purely for the purpose of inclusiveness. Representative of the narrower viewpoint are J.R. Gould, "The Economist's Cost Concepts and Business Problems," Studies in Accounting Theory, ed. W.T. Baxter and S. Davidson (Homewood: Richard D. Irwin, Inc., 1962), pp. 218-35 and Edgar O. Edwards and Philip W. Bell, The Theory and Measurement of Business Income (University of California Press, 1964), pp. 74-81. Edwards and Bell have attempted to categorize every possible value concept facing the firm in terms of date, market and form of the asset (if the asset is in the inventory class). Obviously their purposes were best served by limiting opportunity cost to one value category. Proponents of the wider definition of opportunity cost are (cont.)

as the best alternative foregone for a particular factor, good or service depends upon the particular circumstances inhering in each individual situation. If damaged or obsolete goods are being sold, opportunity costs may be zero. The same may apply where fixed factors have excess capacity during the required time period. The opportunity cost of taking an extra passenger on a trolley would be virtually zero, for example.

Two distinctions must be drawn here before setting down the parameters of opportunity costs. Firstly, the longer the time period open to the firm, the more flexible would be its potential response. A period of time in which the firm does not have recourse to markets in which it buys production factors must be shorter than one in which this possibility is present. When a decision must be made, the time horizon applicable to the opportunity costs must be consistent with the decision. This is simply a matter of common sense. However, the answer is not clear cut when

⁷R.H. Coase, "Business Organization and the Accountant," Studies in Costing, ed. David Solomons (London: Sweet & Maxwell, Limited, 1952), pp. 105-59, especially page 125 and David Solomons, "Economic and Accounting Concepts of Cost and Value," Modern Accounting Theory, ed. Morton Backer (Englewood Cliffs: Prentice-Hall, Inc., 1966), pp. 125-33.

the discussion turns to the appropriate opportunity cost measurements to use for the purpose of determining income. Secondly, assets are of value to a firm for the services they provide in the fulfillment of the firm's economic objectives.⁸ Short-lived or current assets often completely expire in conjunction with the receipt of their beneficial services by the firm.⁹ Long-lived assets only partially expire as their services are received. The presence of the residual services adds further dimensions to the opportunity cost valuation of services received from long-lived assets. With these distinctions in mind, we shall examine opportunity cost valuation of services deriving from short-lived assets before proceeding to the more difficult situation.

⁸A similar distinction has been made by Edward G. Nelson, "The Relation Between the Balance Sheet and the Profit-and-Loss Statement," Financial Accounting Theory, ed. Stephen A. Zeff and Thomas F. Keller (New York: McGraw-Hill Company, 1964), p. 77: "We must distinguish between the agent and the asset. The former is merely an instrument which will render a service. The latter is the future service or services."

⁹Unexpired insurance would be an example of a short-lived asset for which this statement is not true because of the indivisible nature of the services.

Opportunity Cost Valuation of Services
of Short-Lived Assets

Depending upon the recourse of the firm to markets in which assets are acquired, opportunity costs of services received from short-lived assets would be either: (1) income foregone as a result of not accepting the next best alternative where the asset's services are in short supply or (2) current acquisition cost of the services where they are not in short supply and the firm has alternative uses for the services provided by the asset.¹⁰

For the purpose of measuring economic income, an average of current acquisition costs for each of the various services appears to be the most appropriate measurement because the firm is not ordinarily constricted by supply shortages.¹¹ In the case of manufactured inventory ex-

¹⁰Solomons has pointed out that very often accounting costs and opportunity costs are the same for short-lived asset services. It is only where time gaps are present between acquisition and usage or where acquisition price differs from current market price that the equality between accounting costs and opportunity costs is broken. Solomons also mentions another opportunity cost measure for short-lived assets: (1) discounted revenue foregone in the future as a result of using the service now. This case would be a rarity for short-lived assets unless replacement were not contemplated. David Solomons, "Economic and Accounting Concepts of Cost and Value," op. cit., pp. 130-131.

¹¹In their encyclopedic array of value concepts, Edwards and Bell draw a distinction, in terms of manu-

penses an additional complication arises. Not only would they include current costs of raw materials, direct labor and variable overhead but also depreciation charges. Hence manufactured inventories are short-lived assets but long-lived asset services are included in their costs. Therefore, part of their costs must be determined by methods discussed in the following section.

The comparative elasticities of supply curves of different run lengths can be easily understood from the foregoing analysis. In the extreme short run situation of (1) above, the firm's supply curve is completely inelastic because it is unable to bring forth increased units of the product or service in the given time period in response to increased prices. Market price in these situations is

¹¹manufactured inventories, between the current costs of the inputs constituting the inventories (current costs) and the current cost of the inventories if acquired from competitors in their present form (present costs). They point out that the latter measure results in breaking the realization criterion because some profit would be recognized as long as present costs exceed current costs. See Edgar O. Edwards and Philip W. Bell, op. cit., pp. 91-2. Also, it would appear more appropriate to keep expense measurements consistent with economic functions performed. Thus firms manufacturing inventories would use current costs whereas firms acquiring inventories in the market place would adhere to present costs. Of course, as Edwards and Bell indicate, if current costs exceed present costs, it is a signal to management to abandon their present production process because it is economically inefficient.

wholly dependent upon the structure of demand. As the time period lengthens the supply curve becomes more elastic as possibilities open in terms of acquiring by purchase or production the particular product or service.

Opportunity Cost Valuation of Services
of Long-Lived Assets

We turn now to long-lived asset services, typically depreciation. In addition to the possibility of valuing these services in terms of an acquisition or input cost, two potentialities of valuation arise in regard to the holding of a long-lived asset: (1) expired services of these assets may be figured in terms of the decline in value of their remaining services available to the firm or (2) these services may be valued in terms of the decline in saleability of the assets as a result of holding and using them during the period.

We shall again list the potential opportunity costs applicable to fixed asset services in terms of length of period of adjustment implied by the measuring criterion. The shortest of all periods must be one in which no adjustment is possible. Consequently, opportunity cost of fixed asset services in this situation would be measured by the decline in the present value of the asset's services as a

result of holding and using the asset during the period. Adjustment in the form of sale of the asset or purchase of the asset or its services would imply a lengthening of the time period appropriate to the supply curve of factor services. The selection of the time horizon applicable to the expired costs of a past period is an important problem along the path of developing more meaningful income statements.

The possible opportunity cost valuations applicable to fixed factor services in approximate lengthening order of time run would be:

- (1) Decline in the present value of remaining future services of the fixed asset as a result of holding and using it during the period.
- (2) Costs of services as a result of holding and using a fixed asset gauged in terms of changes in the market selling price of the asset.
- (3) Current acquisition cost of the fixed asset services if these services were produced by the firm's present productive means.
- (4) Current acquisition cost of the fixed asset services by the most economical means presently available on the market.

Discussion of the pertinence and measurability of these potential opportunity cost bases is in order. Method (1) would undoubtedly be the most difficult to measure. Because it requires knowledge of future events as well as the appropriate rate of discount, it is of no practical use. But there is worse to come. Even if future income could be accurately predicted, the joint product problem would rear its head.¹² Income usually results from the services of many assets. Allocations of this type are usually quite arbitrary. Consequently, this measurement of opportunity cost is of academic interest only.

Moving to the second method of valuing fixed asset services, it should be noted that the cost of services used are valued indirectly when the basis is the decline in the selling price of the asset itself as a result of holding and using.¹³ The first element of cost to consider in the

¹²Arthur Thomas has shown that where assets produce revenues jointly, certain mathematical problems arise which prevent the use of the discounted present value approach for the firm's individual assets except in the rarest of circumstances. See Arthur Thomas, "Discounted Services Again: The Homogeneity Problem," The Accounting Review, XXXIX (January, 1964), 1-11.

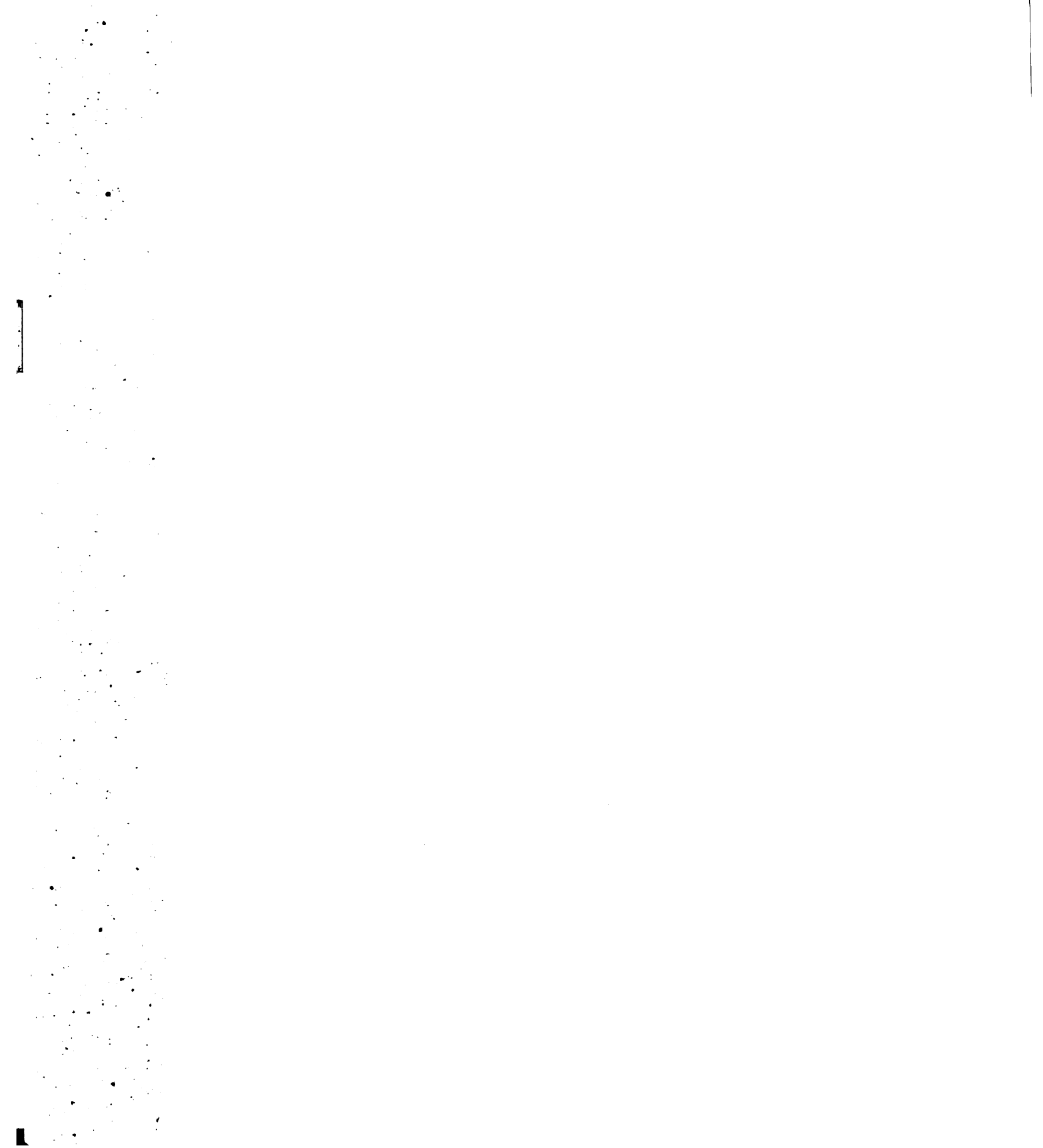
¹³The two methods of valuing long-lived asset services discussed thus far are based upon W. Arthur Lewis' (cont.)

present category is the decline in the selling price of fixed assets as a result of wear and tear arising from usage during the period. In the case of many fixed assets that are already partially obsolescent as a result of either the appearance in a prior period of more economical ways of producing the given services (production obsolescence) or a decline in demand prior to the present period of products requiring the particular services (demand obsolescence), the cost of using may be negligible. Holding costs, the second element of the present category, arise as a result of the firm retaining the asset during the period. Included here would be (a) interest charges based upon the asset's market value at the beginning of the period and (b) declines in the market valuation of the asset as a result of either production or demand obsolescence occurring during the current period.¹⁴

Turning to method (3), current acquisition cost of services produced by the firm's presently existing means, we are concerned with valuations deriving from markets

¹³user cost concept. See W. Arthur Lewis, Overhead Costs (New York: Rinehart & Company, Inc., 1948), pp. 10-11. Avoidable maintenance and repair costs arising as a result of usage should also be included. See Myron W. Ross, "Depreciation and User Cost," The Accounting Review, XXXV (July, 1960), 423-424.

¹⁴This method of valuation is dependent upon the (cont.)



where goods and services are acquired, "entry markets" in the terminology of Edwards and Bell.¹⁵

Evaluation of long-lived asset service costs from the firm's present technology might be measured by any of the following:

- (a) Current rental or lease costs for similar assets with the same patterns of use and maintenance as those owned by the firm.
- (b) Where second hand markets for the firm's assets exist, the change in market value (acquisition price) during the period for similar assets with the same pattern of use and maintenance as those owned by the firm.

¹⁴ presence of second hand markets for used equipment. In some industrial centers, at least, this type of market is fairly well established. For example, Mr. Charles Welch of the Plant Engineering Department of the Cutler-Hammer Corporation, a large heavy equipment manufacturer in Milwaukee, estimates that valuations could be obtained for 80% - 90% of the firm's machinery and equipment by getting quotations from used equipment dealers either in Milwaukee or Chicago. The firm, in fact, does this to arrive at a valuation when equipment is transferred between departments. The market itself appears to become more active as delivery time on new equipment lengthens (personal correspondence with Mr. Welch).

¹⁵ Edgar O. Edwards and Philip W. Bell, op. cit., p. 75.

- (c) Adjusting the assets to current cost by means of special price indexes. Service charges would then be based upon the current cost of the assets.
- (d) Periodic appraisals with service charges based upon the appraised cost.

Many modifications would have to be made before these potential measures could become operational. Some of these problems are worth mentioning here.

Regarding the first two measures, valuation estimates would have to take into account the myriad of maintenance policies combined with various degrees and intensities of usage affecting the valuation of similar assets.¹⁶ The difficulties here would not be insurmountable. Estimation is certainly not new to the fixed asset realm.

In the case of the lease or rental services, these charges would ordinarily exceed their cost of production because suppliers would have to be compensated for factors such as the risk of obsolescence and interest on the investment.¹⁷

¹⁶Edgar O. Edwards and Philip W. Bell, op. cit., pp. 175-180 for examples of different maintenance and repair policies affecting asset values and current service costs.

¹⁷F.K. Wright, "Depreciation and Obsolescence," Journal of Accounting Research, Vol. 3 (Autumn, 1965), 170-71.

Several alterations have been made to (b) above in order to separate realized holding gains from the current operating costs.¹⁸

If second hand markets are not present for long-lived assets, special price indexes might be used to adjust original cost to current replacement cost.¹⁹ Current cost of services would be based upon the adjusted figure. Among the problems encountered in the specific price index are such broad ones as the type of specific index to employ and one of particular importance here, the possible overstatement of the service costs of partially technologically

¹⁸Edgar O. Edwards and Philip W. Bell, op. cit., p. 175 suggest arriving at the depreciation pattern by reference to values in the second hand market for each particular asset and relating this pattern to the current purchase price of a new asset of the same type. F.K. Wright, op. cit., 172 goes one step further. He would deduct the service cost arrived at by Edwards and Bell from the opening book value of the asset. If this amount exceeded the end of period second-hand market value of the asset it would indicate that actual obsolescence exceeds normal obsolescence. If the converse occurs it would indicate a "price change in the equipment market," a capital gain. His thinking here is not clear because he would apply the depreciation pattern to "the current cost of that machine which is most nearly equivalent to the asset being depreciated" indicating that he may have abandoned Edwards and Bell's basic assumption of valuing the services produced by the firm's existing asset structure in favor of the same services produced by current technology.

¹⁹See Eldon S. Hendriksen, Price-Level Adjustments of Financial Statements-An Evaluation and Case Study of Two Public Utility Firms (Pullman: Washington State University Press, 1961), Chapters III-V for an extended discussion of price index selection and application.

obsolescent assets.

In the case of periodic appraisals, one of the principal questions concerns business' willingness to undertake the costs of this alternative.²⁰

It was previously stated that methods of determining service costs applicable to long-lived assets would be listed in the approximate order of length of period of adjustment implied by the measuring criterion. No real difference appears to be present between methods (2) and (3) where valuations of the firm's existing long-lived asset structure (and the resulting opportunity costs of services) are made in terms of values coming from either exit markets (Edwards and Bell's terminology for markets where goods and services are sold) and entry markets.²¹

However, there is a difference in implied time run lengths between methods (3) and (4) and it has led to

²⁰Edgar O. Edwards and Philip W. Bell, op. cit., pp.186-188 suggest the possibility of using both appraisals and special price indexes for obtaining current cost of long-lived services where second-hand markets are nonexistent.

²¹Edgar O. Edwards and Philip W. Bell, op. cit., pp.75-77 point out that valuations in exit and entry markets for a given asset will usually not be the same due to market imperfections ordinarily operating against firms that do not specialize in the product and also the possibility of different transfer costs (removal, delivery and installation costs).

considerable controversy.²² Edwards and Bell have stated their preference for valuing services in terms of method (3):

It must be remembered that it is not the current cost of equivalent services provided by the fixed asset over some time period which we wish to measure, but the current cost of using the particular fixed asset which the entrepreneur chose to adopt and is still using. It is that particular decision that the entrepreneur wishes to evaluate on the bases of accounting data.²³

F.K. Wright has taken the opposing position:

. . . the most appropriate concept of profit is one which indicates what the firm can expect to earn in the long-run if it continues to follow its present general policies. In the case of our hypothetical firm, those general policies require the replacement of equipment as soon as this is economically justified; it would, therefore, be misleading to report a profit figure which shows what may be expected if existing equipment were²⁴ to be retained in use for an indefinite period.

It appears from Wright's position that he puts strong

²²The Committee to Prepare a Statement of Basic Accounting Theory (1965) of the American Accounting Association has emphasized the importance of current cost data for external users in its recent monograph. Their discussion of equipment and machinery indicates a preference for current cost of services produced by the most economical means. Committee to Prepare a Statement of Basic Accounting Theory, A Statement of Basic Accounting Theory (Evanston: American Accounting Association, 1966), pp. 73-79, especially p. 75.

²³Edgar O. Edwards and Philip W. Bell, op. cit., p. 186.

²⁴F.K. Wright, op. cit., 175.

emphasis upon the future income predicting function of the income statement whereas Edwards and Bell stress the control function since their measure is intended to reveal how well management has performed with its given asset structure. Let us see whether these positions are reconcilable, at least in theory.

The crux of Wright's objection to using the current cost of the services produced by the same means that the firm is presently employing is grounded in the obsolescence proposal of Green and Sorter.²⁵ Their recommendation relates to the situation of, in their terminology, "partial extraordinary obsolescence." The characteristics of this type of obsolescence are twofold: (1) it was not predictable at the time of acquisition; (2) estimated service life of the asset is unaffected.²⁶ Partial extraordinary obsolescence, then, is specifically related to the situation where improving technology provides more economical means of producing the given services but the potential savings to the firm owning an older type of asset producing the

²⁵David Green, Jr., and George H. Sorter, "Accounting for Obsolescence--A Proposal," The Accounting Review, XXXIV (July, 1959), 433-41.

²⁶Ibid., 434. Any shortening of service life would come under the category of "total extraordinary obsolescence."

same services are not great enough to warrant an investment in the newer asset at the present time.²⁷

However, a paradox arises in situations of partial extraordinary obsolescence: as a result of making the presumably correct decision not to invest in the newer machine, the firm will show a smaller annual profit than would occur if the presently unwarranted investment were made.²⁸

As a result of this inconsistency between managerial decision making and the reporting of management's performance, Green and Sorter advocate writing the cost of the firm's asset down to the point where the combined annual operating costs (depreciation, maintenance, direct materials, direct labor, direct overhead and interest costs) per unit of output would be equal to that of the newer more efficient machine.

Thus Green and Sorter say that the way to reconcile managerial decision making with income reporting is to use

²⁷Partial extraordinary obsolescence could also arise as a result of unfavorable unforeseen shifts in demand.

²⁸David Green, Jr. and George H. Sorter, op. cit., pp. 438-39.

the current costs of equivalent services produced by the most economical available alternative. Sidney Davidson, as well as F.K. Wright, has been influenced by the thinking of Green and Sorter.²⁹

However, Green and Sorter's response is directed to a cost based system of accounting. Methods such as those proposed by Edwards and Bell for measuring the current cost of services produced by the firm's existing asset structure abandon the cost standard. One such method, noted previously, would be based upon the acquisition price of the particular asset in the second hand market. David Solomons has attempted to find out the relationship of asset prices on the second hand market to prices of new assets of the same type and also technologically improved assets providing similar services.³⁰

Solomons' thesis can be briefly summarized: an asset should be operated up to the point where all associated operating costs including interest and purchase price of the asset are minimized per unit of output. In a world

²⁹Sidney Davidson, "The Day of Reckoning: Accounting Theory and Management Analysis," Journal of Accounting Research, Vol. 3, (Autumn, 1963), 117-26.

³⁰David Solomons, "The Determination of Asset Values," The Journal of Business, XXXV (January, 1962), 28-42.

of certainty and no market imperfections, second hand markets for a particular asset should result in prices which maintain parity with new assets of the very same type in terms of cost per unit of output.³¹ That is, depending upon the age of the asset and the future patterns of usage and maintenance, price of the second hand asset should be such that when it is apportioned over the remaining economic life, cost per unit of output, including all operating costs as well as interest and depreciation, should be the same as the cost per unit of output of the same asset new.

Similarly, as more technologically efficient assets come on the market producing essentially similar services, cost of second hand assets of the original type would be depressed to the point where cost per unit of output would be equal to that of the improved asset. It should thus be apparent why partially obsolete assets often have an extremely small user cost. Depreciation per unit of use or output is considerably shrunk as the type of adjustment occurs in the market that Solomons has described.

Thus a reconciliation appears over the question of

³¹Uncertainties concerning the condition of second-hand assets would drive the price below the parity point. Solomons, ibid., 35.

what type of current costs should be used in obtaining a valuation applicable to fixed asset services. If second hand markets existed for fixed assets, costs per unit of output would tend to be the same whether method (3) or (4) were used (See Appendix A of this chapter for an arithmetical explanation of this process). Consequently, if indexes applicable to the cost of particular fixed asset services are constructed, as Edwards and Bell suggest, they should take into account the appearance of more efficient means of producing the same services.

Opportunity Costs of Incremental Fixed Asset Services

After this concentrated exploration of opportunity costs we are now ready to examine the relationship of relevant costing to opportunity costs. The discussion here will pertain exclusively to the question of fixed cost allocations to inventory, the context of the presentation of the problem by Horngren and Sorter.

The most obvious and important distinction is actually least important from our present vantage point. The use of opportunity costs represents an abandonment of the cost standard whereas relevant costing does not abandon histo-

rical costs. While inventories may not include a full allocation of costs necessary to produce them, full costs would not be exceeded under relevant costing.³² This limitation is accepted by all parties to the dispute. All parties would also admit that if fixed facilities were not used to build up inventories due to the impending excess of sales needs over productive capacity, there would certainly be an opportunity cost involved.

The opportunity cost would consist of the present value of the lost revenues minus the additional out-of-pocket costs of producing the inventories and the user cost of the fixed assets involved. However, the opportunity cost that we should be concerned with if production is undertaken for future use is the economic sacrifice of producing immediately.

The two situations mentioned by Horngren and Sorter where fixed factor costs of production should be inventoried

³² Relevant costing has "a replacement cost flavor with, however, original cost as a maximum boundary." Horngren and Sorter, "Direct Costing," op. cit., 86. However, it need not be proscribed by the cost standard. Horngren and Sorter, "An Evaluation of Some Criticisms," op. cit., 419.

involve the loss of future income and the incurrence of increased variable costs. Let us examine the more important case (sales potential expected to exceed productive capacity in a future period). Because of the firm's limited response, it must produce in the current period if it is to avoid losing revenues in the future.

The economic sacrifice incurred if the firm makes the ostensibly correct decision to produce for inventory in order to avoid losing future sales would include the following:

- (1) Current costs of materials, labor and variable overhead.
- (2) Interest costs on (1) from the time of production until sale.

There is no argument relative to (1) above. These costs would all be charged to the inventory, though the amount of the charges for raw materials would quite likely not be the opportunity costs under our present conventions. Imputed interest is not presently included as a charge in conventional accounting systems nor do Horngren and Sorter advocate its inclusion. Hence relevant costing advocates nothing different relative to two of the opportunity costs.

What would be the opportunity costs of fixed factor

services, the area of dispute between the relevant costers and their opponents? Whether we value the services from the standpoint of current replacement costs or decline in valuation in exit markets, another question must be asked: are the fixed assets partially obsolete? If so, current costs applicable to income measurement may be much smaller than an allocation of overhead to inventory using customarily accepted depreciation accounting.

From the planning standpoint, the opportunity costs of fixed assets would be either:

- (1) If present use of fixed assets advances replacement, interest charges on the cost of the new asset over the period of the advancement in replacement discounted to its present value.³³
- (2) If replacement is not advanced as a result of producing inventory for the short period, the present value of the decline in exit market valuation as a result of the excess usage plus the present values of increased operating costs

³³This would also cause current costs of using the new asset to advance a period as a result of the more rapid replacement reducing the opportunity cost slightly.

if the fixed assets have become more inefficient as a result of the excess usage for the short period.

From the income measurement standpoint, current valuation of expired fixed asset services must take into account the effect of obsolescence created by the appearance in the market of technologically improved assets providing the same services as presently owned equipment. (See Appendix A of this chapter, particularly Table 24 for an illustration of this effect.)

Once again, at least in the case of partially obsolete fixed assets, it is being contended that the opportunity costs of producing for short periods may indeed be rather negligible. Allocations of fixed overhead to inventories under relevant costing without taking into account partial obsolescence may greatly overstate the true opportunity costs.

The conclusion being drawn here is that from the opportunity cost standpoint, relevant costing may well overstate inventory costs. Therefore, if relevant costing were to be adopted as an acceptable method of valuing inventory, the obsolescence proposal of Green and Sorter must likewise be adopted. To adopt an inventory valuation measure purporting to be grounded in opportunity costs without bringing in the wider opportunity cost measure related to obsolescence would be quite unrealistic.

Summary and Conclusions

1. Current valuations of expired services are essentially opportunity cost measurements.

2. Opportunity cost valuations, whether from the standpoint of income measurement or decision making, must take into account the potential action horizons (adjustment possibilities) open to the firm.

3. Relevant costing, though not a departure from historical costing, is an opportunity cost type of measurement for manufactured inventories.

4. Since relevant costing is related to opportunity costs, the effect of partial obsolescence upon fixed asset service costs must be taken into account.

5. By accepting the effect of partial obsolescence upon fixed asset service costs, the problem of whether to measure expired costs of services of the firm's currently owned assets or of the most efficiently produced services of the same type appears to be resolved.

APPENDIX A

THEORETICAL ASSET VALUE DETERMINATIONS
AND OBSOLESCENCE WRITE-DOWNS

The inter-relationship between the obsolescence proposal of Green and Sorter and Solomons' asset valuation thesis can be perceived from the following circumstances.

Assume that the firm presently owns a machine which has three remaining years of life. During each of these three years it is expected to contribute to the output of 10,000 units of the firm's product. However, the machine will become increasingly inefficient over these three years as evidenced by expected increases in direct materials and direct labor required per unit of output as well as rising maintenance costs. These facts are summarized in Table 22:

Table 22

Remaining Output and Operating Costs
of the Presently Owned Machine

Year	(1)	(2)	(3)
Annual output	10,000	10,000	10,000
Direct materials and labor	\$8,000	\$10,000	\$12,000
Maintenance	\$600	\$800	\$1,000

At the beginning of the first year of the remaining three year period, a new machine producing essentially the same services is brought onto the market at a selling price of \$20,000. At an assumed output rate of 10,000 units of product it has a technical life of 4 years. Like the firm's presently owned machine, it becomes increasingly inefficient as it grows older. Expected operating costs at an annual output rate of 10,000 units are shown in Table 23:

Table 23

Expected Output and Operating Costs
of the Challenger

Year	(1)	(2)	(3)	(4)
Annual output	10,000	10,000	10,000	10,000
Direct materials and labor	\$5,000	\$7,000	\$9,000	\$16,000
Maintenance	\$200	\$500	\$500	\$1,500

The ideal usage level and cost per unit of output produced by the new machine are shown below in Table 24:

Table 24³⁴Time Weighted Annual Costs
of the Challenger

1. Year	(1)	(2)	(3)	(4)
2. Output	10,000	10,000	10,000	10,000
3. Total operating costs for year	\$5,200	\$7,500	\$9,500	\$17,500
4. Present value of operating costs @ 10% ³⁵	\$5,200	\$6,818	\$7,847	\$13,143
5. Present value of cumulative costs ³⁶	\$25,200	\$32,018	\$39,865	\$53,008
6. Capital recovery factor @ 10% ³⁷	1.10	.576	.4021	.3155
7. Costs per 10,000 units of output per year ³⁸	\$27,720	\$18,442	\$16,030	\$16,724
8. Costs per unit of output per year	\$2.772	\$1.8442	\$1.6030	\$1.6724

³⁴For an explanation of the method of annualizing costs while also taking into account the time value of money see Morton Backer and Lyle E. Jacobsen, Cost Accounting: A Managerial Approach (New York: McGraw-Hill Book Company, 1964), pp. 560-4. In this example both the present value and capital recovery factors assume that all costs are incurred at the beginning of the year.

³⁵Present values are as of the beginning of the first year.

³⁶For year one, line 5 is composed of the outlay of \$20,000 plus \$5,200 from line 4. For all other years line 5 is the total of line 5 of the prior year plus line 4 of the current year.

³⁷From Backer and Jacobsen, op. cit., p. 669.

³⁸Line 5 multiplied by line 6.

Under the present assumptions of maintenance and usage, costs per unit of output are minimized at \$1.603 (including interest costs) if the new machine is used for only three years rather than four years, as revealed by Table 24.³⁹ That is, the operating costs rise so steeply in the fourth year that it becomes cheaper to employ the machine for less than its possible technical life.⁴⁰

What effect should the appearance of the newer machine have on the second hand market price of the given older machine? To begin with, let us assume that the presently owned machine is one year old and likewise cost \$20,000 when new. We shall assume that inefficiency does not set in till the third year of usage. Cost per unit of usage when new is determined from Table 25:

³⁹For the sake of simplicity, income taxes are not considered here.

⁴⁰Over a twelve year period, it would be cheaper to use the challenger for three years (leading to four capital acquisitions) rather than the technically possible four year life (with three capital acquisitions), assuming the same interest rate and no further improvements in technology.

Table 25⁴¹

Time Weighted Annual Costs of the
Presently Owned Machine at Acquisition

1. Year	(1)	(2)	(3)	(4)
2. Output	10,000	10,000	10,000	10,000
3. Total operating costs for year	\$8,600	\$8,600	\$10,800	\$13,000
4. Present value of operating costs @ 10%	\$8,600	\$7,817	\$8,921	\$9,763
5. Present value of cumulative costs	\$28,600	\$36,417	\$45,338	\$55,101
6. Capital recovery factor @ 10%	1.10	.576	.4021	.3155
7. Costs per 10,000 units of output per year	\$31,460	\$20,976	\$18,230	\$17,384
8. Costs per unit of output per year	\$3.1460	\$2.0976	\$1.8230	\$1.7384

Assuming that the machine has no scrap value and the improved machine was not foreseen, total annual operating costs including interest and depreciation are shown in Table 26:

⁴¹See footnotes to Table 24 for the explanation.

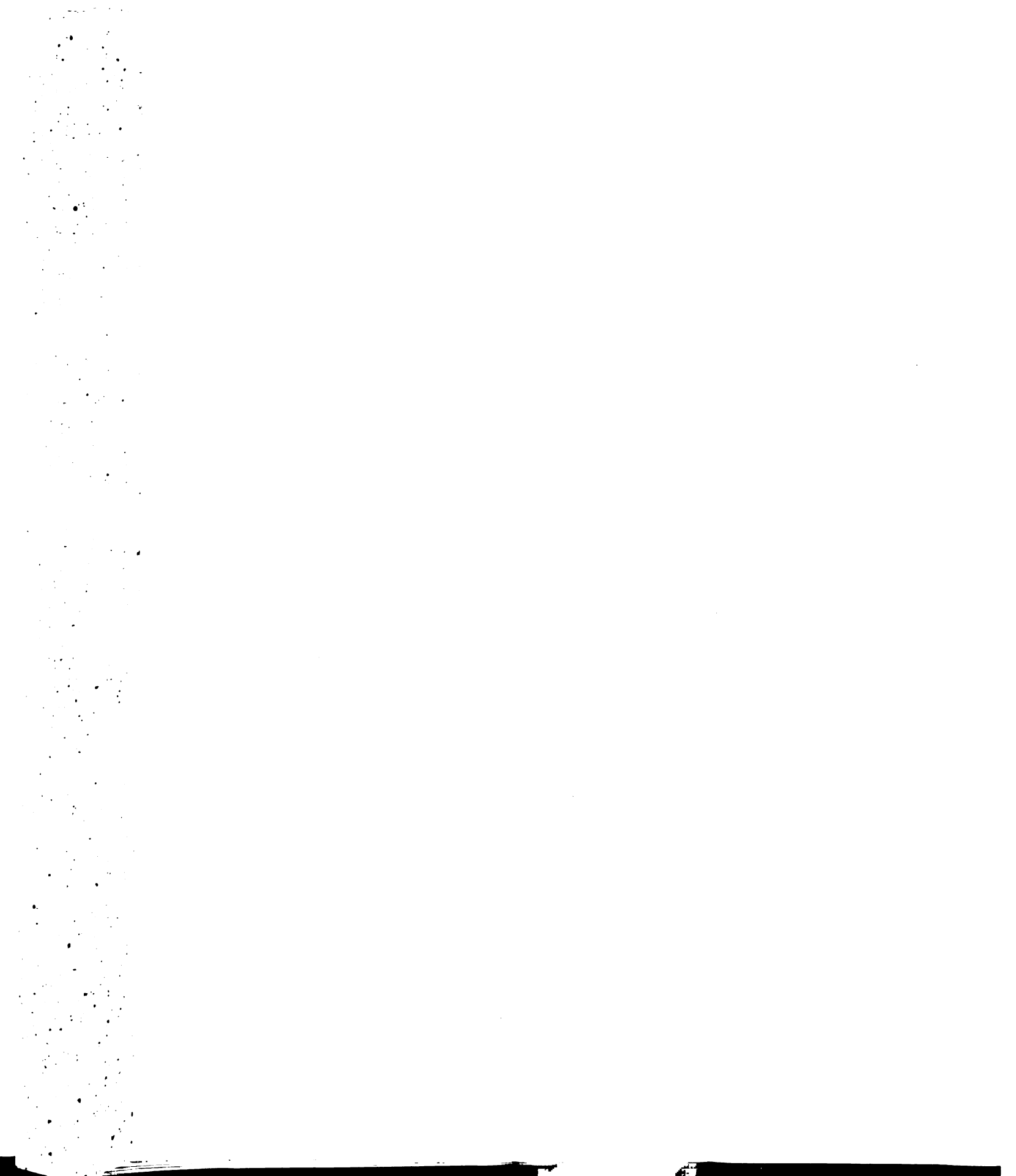


Table 26

Total Annual Operating Costs
of the Presently Owned Machine
Including Interest and Depreciation

1. Year	(1)	(2)	(3)	(4)
2. Total annual operating costs	\$8,600	\$8,600	\$10,800	\$13,000
3. Interest on operating costs @ 10%	860	860	1,080	1,300
4. Interest on beginning balance of machine @ 10%	2,000	1,408	756	281
5. Depreciation (by deduction)	<u>5,924</u>	<u>6,516</u>	<u>4,748</u>	<u>2,812</u>
6. Total annual operating costs including depreciation and interest	<u>\$17,384</u>	<u>\$17,384</u>	<u>\$17,384</u>	<u>\$17,393</u> ⁴²

The second hand value of the original asset should be \$14,076 (\$20,000 - \$5,924, the first year's depreciation) at the beginning of the second year. However, the appearance on the market of the improved machine at this time should cause the second hand price of the old machine to be depressed to the point where its total cost per unit of output equals the cost per unit of output of the new

⁴²Slight rounding errors are present in this table and the following one.

machine (\$1.603) per Table 24).

The theoretical second hand value of the used asset at the end of its first year of life can now be determined by substituting in the capital recovery formula the new lower annual cost per 10,000 units of output of \$16,030 (see Table 24):

$$\begin{array}{l} \text{Capital recovery} \\ \text{factor for 3 years} \\ \text{at 10\%} \end{array} \times \left(\begin{array}{l} \text{Scrap} \\ \text{value} \end{array} + \begin{array}{l} \text{Present value of operating} \\ \text{costs for three years @10\%} \\ \text{excluding depreciation} \end{array} \right)$$

$$= \text{Costs per annum of 10,000 units of output}$$

Substituting, we have:

$$\begin{array}{r} .4021 \quad x \left[+ \$8,600 + .909 (\$10,800) + .826 (\$13,000) \right] \\ - \$16,030 \end{array}$$

and $x = \$10,709$, the theoretical second hand value of the asset.⁴³ Values of the asset at the beginning of the two

⁴³Green and Sorter would write the asset down from \$14,076 to \$10,709 if the minimum annual cost method were being used. If straight-line were used, write-off would be \$15,000 minus \$10,709. David Green, Jr. and George H. Sorter, op. cit., 436-38.

It is also interesting to note that the \$10,709 theoretical second hand value serves as a break-even point as long as the interest rate remains at 10%. If this were the value in the market, the holder would be indifferent between trading and keeping since costs per unit of output including interest are exactly the same. If the cost is above \$10,709 it becomes advantageous but if it goes below \$10,709, the future savings do not justify the present outlay. Partial obsolescence is present in the latter situation and a write-down to \$10,709 is justified if the asset is carried above this amount. This analysis excludes income tax and risk factor noted previously.

succeeding years can be determined in the same fashion.

Depreciation per year can be proved from Table 27 which is based upon the lower annual total cost of \$16,030 and the assumed second hand value at the beginning of year 2 of \$10,709.

Table 27

Total Annual Operating Costs
of the Presently Owned Machine
Including Interest and Depreciation
After the Challenger Comes on the Market

1. Year	(2)	(3)	(4)
2. Total annual operating costs	\$8,600	\$10,800	\$13,000
3. Interest on operating costs @ 10%	860	1,080	1,300
4. Interest on beginning asset balance @ 10%	1,071	521	157
5. Depreciation	5,495	3,641	1,573
6. Total annual operating costs including depreciation and interest	<u>\$16,026</u>	<u>\$16,042</u>	<u>\$16,030</u>

Let us compare annual depreciation amounts for the original machine under three different assumptions: (1) straight-line with no obsolescence adjustment, (2) the minimum annual cost method, (3) the minimum annual cost method with a write-down at the beginning of year two due

to partial extraordinary obsolescence. These relationships are shown in Table 28:

Table 28

Comparison of Depreciation Methods

Year	(1)	(2)	(3)	(4)	Total
Straight-line	\$5,000	\$5,000	\$5,000	\$5,000	\$20,000
Minimum annual cost method	\$5,924	\$6,516	\$4,748	\$2,812	\$20,000
Minimum annual cost method with obsolescence write-down	\$5,924	\$5,495	\$3,641	\$1,573	\$16,633

In the example given, the difference between straight-line depreciation and depreciation determined by the minimum annual cost method with an obsolescence write-down appears to be significant. The specific importance of partial obsolescence is beyond the bounds of this work but several general statements can be made. Obsolescence will become more important:

- (1) The greater the annual operating cost savings of the improved asset
- (2) The lower the purchase price of the improved asset
- (3) The lower the interest rate.

IV. RELEVANT COSTING AND CONSISTENT ACCOUNTING FOR CHARGES

Introduction

The relevant costing approach states that "any cost is carried forward as an asset if, and only if, it has a favorable economic effect on expected future costs or future revenues."¹ It is thus stated as a general concept in terms of asset valuation. However, virtually the entire dialogue has revolved around the problem of whether or not to inventory fixed overhead charges. This peculiarity can be explained in terms of the philosophical distinction between accounting costs or charges and the factors or services that these charges represent. In this chapter we shall first undertake to explain this distinction. It will then become apparent that the differences between absorption and relevant costers lie in the area of what Paton and Littleton have described as "subsequent internal movements and regroupings" and, in addition, after-costs.² We shall then examine two after-costs, bond redemption premiums and fixed

¹George H. Sorter and Charles T. Horngren, "The Relevant Costing Approach," op. cit., 393.

²W.A. Paton and A.C. Littleton, op. cit., p. 25.

asset removal costs, and analyze them from the standpoint of relevant costing in order to determine how the treatment of these charges would differ from currently accepted conventions. A brief examination will then be made of areas where, from the standpoint of theory, conventional accounting and relevant costing do not differ. Finally, we examine two situations, income tax allocation and fixed asset disposals, where relevant costing has, in effect, been introduced as a criterion for the proposed accounting treatment.

The "Costs Attach" Concept

In order to understand the significance of the distinction between accounting charges and the factors, entities or services represented by these charges, we must examine the idea that "costs attach."

Perhaps the definitive statement of the costs attach concept is the following:

When production activity effects a change in the form of raw materials by the consumption of human labor and machine-power, accounting keeps step by classifying and summarizing appropriate portions of materials cost, labor cost and machine cost so that together they become product-costs. In other words, it is a basic concept of accounting that costs can be marshaled into new groups that possess real significance. It is as if costs had a power of cohesion when properly brought into contact.³

³W.A. Paton and A.C. Littleton, op. cit., p. 13.

What is this "real significance" behind the classification and merging of costs into new groups? One aspect is concerned with the phenomenon of physical association. The manufacturing firm transforms raw materials into finished products by the application of labor and other manufacturing elements. Some resources actually become embodied in output as in the case of raw materials. Other factors contribute, either directly or indirectly, to the transformation of raw materials to finished goods though their physical presence cannot be seen in the final product. Rent, depreciation, supervision, inspection costs and even direct labor would be examples of the latter type of factor. The cost behavior of the factors contributing to the manufacture of product may be termed "fixed" or "variable" but there is no difference between these two types of factors from the standpoint of their necessity as inputs if output is to be forthcoming. All productive factors are necessary to manufacture output of final product.

Both relevant and absorption costers would agree with these statements but only absorption costers accept them as a rationale for their treatment of costs. These comments upon the embodiment of all productive factors in output will be referred to in this paper as the "physical association"

viewpoint. Physical association will also be used here to describe the relation between the charges arising from an economic or financial transaction and the entity most directly connected with that transaction. For example, a bond redemption may require the payment of a penalty to bondholders to compensate them for the premature retirement of their holdings. The bond redemption premium would be physically associated, in the sense that the term is being used here, with the refunded bond issue. The physical association relationship of any factor of input to product forthcoming is quite similar to the affinity of the redemption premium to the bonds being retired. The service arising in the latter case is directly in connection with the refunded bonds.

Concerning manufactured inventories, from the absorption costing position, all productive factors make a contribution to revenue because of the above stated idea that all productive factors are necessary to the manufacture of final output. If factors contribute physically to productivity of the firm, they also contribute to the benefit of the firm from an economic standpoint.

The approach advocating the unity between the physical necessity of productive factors to output and their economic

benefit to the firm may be termed the "future benefits" approach.⁴ Paton and Littleton have expressed this idea quite strongly, while also bringing out the differences between this view and the still unborn relevant costing concept:

It is sometimes assumed that no expenditure may be capitalized. . . unless an increase in the volume of revenue or decrease in cost per revenue unit may be expected to appear as a result. This position is untenable. Not infrequently additional investment in plant facilities is required when there is no prospect of either an expansion of revenue or a reduction of operating costs. In working the lower levels of a mine. . . it may be necessary in order to continue operations to install equipment not needed at earlier stages of the process of extraction. To refer again to the general test: all costs prudently incurred which can reasonably be associated with future production are subject to deferment. Needless to say, no additional investment should be made unless the available data indicate that the enterprise will be advantaged thereby--will be in a more favorable condition than would be the case if the proposed charges were not incurred.⁵

Paton and Littleton were unequivocally opposed to relevant costing as evidenced by the first sentence in the above quoted paragraph. However, the last sentence in the paragraph could easily be construed as an endorsement of

⁴The term is used by Paton and Littleton, op. cit., pp. 73-4.

⁵Paton and Littleton, op. cit., p. 74.

relevant costing if taken out of context. The confusion arises because the authors were dealing in this entire passage with the problem of initially incurred costs where differences do not arise between relevant costers and future benefits advocates.

Under absorption costing, physical association presumes economic benefits and the necessity of attaching costs. However, with relevant costing a much more stringent test of economic benefits is applied: does the service that the charge represents specifically add to future incremental revenues or decrease future incremental costs. Though necessary from the standpoint of completing product, services performed for Paton and Littleton's second stage of costs, may either be unavoidable within wide ranges of output, present to an excess degree in relation to output needs, or have a minimal cost due to the case that asset factors providing these services are subject to a significant level of demand or technological obsolescence. In these circumstances the services are not scarce, economically speaking, in the short-run. Therefore, despite the necessity of these fixed factor services in terms of product completion, relevant costers would not attach them to product except in the particular circumstances previously mentioned (short capacity in terms of sales or expected rising

variable factor costs).

However, for Paton and Littleton's first stage of cost treatment--"initial recognition, measurement and classification"--all costs, whether for the factor from which services will derive or for costs providing services which will get newly acquired factors ready to produce, scarce resources are expended whether viewed traditionally or from the relevant costing outlook.⁶ Questions may later arise in terms of whether scarce resources are expended in terms of their application to inventories but not to their acquisition. We shall briefly examine initially incurred costs but first we turn our attention to after-costs, costs physically associated with factors which are incurred at the close of factor life, in order to determine their treatment from the relevant costing standpoint.

Costs Incurred at the End of
Factor Life (After-Costs)

Transportation and installation charges are examples of factor costs arising prior to the use of the assets with which they become associated. As noted above, no differences appear to exist between physical association and

⁶Quoted from ibid., p. 25.

economic relevance from all viewpoints in these cases. They are identical. Another type of charge occurs at the end of the life of certain assets and equities. Prominent in this category are bond redemption premiums and fixed asset removal costs. The possibility of cleavage between the two concepts arises in these cases and has led to confusion over disposition, particularly in regard to the redemption premium.

Chapter 15 of Accounting Research Bulletin No. 43 mentions three methods for disposal of unamortized discount and issue costs and redemption premium on bonds refunded:⁷

- (a) A direct write-off to income or retained earnings
- (b) Amortization over the remainder of the original life of the issue retired, or
- (c) Amortization over the life of the new issue

As was previously stated, relevant costers favor carrying costs forward only if the factor which the cost represents has a beneficial economic effect upon future income in the form of higher revenues or lower costs.

⁷ Restatement and Revision of Accounting Research Bulletins, (New York: American Institute of Certified Public Accountants, 1953), p. 130. This will be referred to hereafter as Bulletin No. 43.

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Bulletin 43 actually takes this approach in stating its preference for amortization over the remainder of the original life of the issue retired:

This method is based on the accounting doctrine that when a cost is incurred the benefits of which may reasonably be expected to be realized over a period in the future, it should be charged against income over such period. In behalf of this method, it is argued that the unamortized bond discount represents the cost of making a more advantageous arrangement for the unexpired term of the old agreement. . . .⁸

At the same time, however, Bulletin 43 equivocates because direct write-off at the time of refunding is deemed to be "acceptable." Paton has strongly favored this procedure reasoning that costs cannot be carried forward if the physical entity that gave rise to them is no longer in existence, a physical association interpretation.⁹

Bulletin 43 rejects the third alternative, write-off over the life of the new issue. Nevertheless, four committee members disagreed with their associates on this rejection:

They believe there are circumstances in which the unamortized discount and redemption premium applicable to an issue being refunded can properly

⁸Ibid., p. 132.

⁹William A. Paton, Corporation Accounts and Statements, (New York: The Macmillan Company, 1955), pp. 256-57.

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be considered as a cost of the opportunity of issuing new bonds under more favorable terms.¹⁰

These minority members wish to give full priority to economic relevance of the redemption premium to the new issue as a criterion for write-off with no importance attached to original physical association.

Certainly relevant costers would have to give careful consideration to the viewpoint of the minority members of the committee. Unquestionably they would modify the minority opinion by distinguishing between (1) the unamortized discount and issue costs of the refunded bonds, and (2) the redemption premium. The former are sunk costs while the latter are incremental out-of-pocket costs. The redemption premium appears to have all of the requisites of a relevant cost. It is an enabling cost allowing the firm to reduce its future interest expense. Carry-forward as a charge against the new issue appears to be quite appropriate under the relevant costing interpretation.

Acceptance of the relevant costing treatment in the above case would create a linkage between difference transactions that does not arise where physical association pre-

¹⁰Bulletin No. 43, op. cit., p. 133.

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vails. Relevant costing implies the breakdown of the separation of transactions where replacement occurs and after costs are present judging from the example of bond redemptions.

In the second area of examination, fixed asset removal costs, the position usually adopted is that these costs are applicable to the entire life of the asset that is being removed.¹¹ Theoretically then, they should be spread over the useful life of the asset to which they pertain or deducted from salvage costs when the latter are deducted from asset costs in determining the amount to be depreciated. The same analysis concerning the relevancy of the bond premium to future cost reductions is applicable here. The reaping of the future benefits is just as dependent upon the removal of the old asset as it is upon the installation of the new asset. Other unamortized costs of the old asset are simply sunk costs that are not relevant to the decision or the cost saving.

Despite the similarity between the redemption premium and the removal costs, one important distinction between

¹¹Carl T. Devine, "Asset Cost and Expiration," Handbook of Modern Accounting Theory, ed. Morton Backer (New York: Prentice-Hall, Inc., 1955), p. 352.

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them exists. If we assume a going concern, then fixed asset removal costs are foreseeable at the time of purchase or construction of the original asset. Removal will arise whether the fixed asset is retired prematurely or even kept beyond the end of estimated life.

Redemption premium, however, arises only when bonds are retired prior to expiration date. They are not foreseeable at the time of original issuance and arise only if refunding prior to expiration occurs. Since removal costs must be incurred, they could be economically tied to the asset with which they are physically associated.

There are, however, at least two justifications for treating fixed asset removal costs as relevant costs applicable to the replacement. In the first place, though the incurrence of removal costs are certain under the going-concern assumption, the timing of these costs is uncertain. Hence in capital budgeting replacement analysis, these costs are genuinely crucial to the decision of determining whether to keep or replace.

Secondly, assume that a hotel and land upon which it stands are sold with the purchaser intending to construct an office building upon the site. In this case removal costs would be capitalized as part of the land on the theory that

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removal costs are "getting ready" costs which increase the value of the land. In fact, if the original owner had himself torn down the hotel, he presumably would have been able to recover the removal costs in the form of a higher selling price for the land because the new owner is now able to avoid these costs. However, had the original owner not sold the land but removed the hotel and constructed the new office building himself, then traditional accounting theory, as was stated previously, would rest upon physical association and not carry these costs forward. The change in ownership does not seem to be a crucial point, however, relative to the determination of economic relevancy.

The foreseeability of fixed asset removal costs under the going concern assumption does not appear to create a significant difference when compared with the bond redemption premium case. Both meet the sole test of economic relevancy set down by relevant costers. However, if economic relevancy were made a necessary but not a sufficient condition for carry-forward, with physical association being a second necessary test, the problems relative to after-costs would disappear. If this were the case, the theory would still be applicable to the fixed overhead realm.

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Initially Incurred Costs of Services

There is, in a sense, a curious paradox in terms of initial costs for factors providing future rather than immediate services. Two principal costs of this type are research and development costs, and advertising. Whether for reasons of conservatism, agreement with income tax procedures, uncertainty as to future benefits, expediency, or the fact that countervailing errors have a tendency to offset, these costs have typically been expensed in the period when incurred.¹² The paradox, as pointed out by David Green, is that the accountant is carrying forward fixed overhead, yet a better case might well be made for research and development, and advertising, though these have largely been ignored.¹³

The problem is not a theoretical one between opposing groups but rather one concerning the lack of adequate means

¹²See Allan R. Drebin, "Accounting for Proprietary Research," The Accounting Review, XLI (July, 1966), pp. 413-25 for a more detailed discussion of this point. For an excellent summary article see Norton M. Bedford, "Research, Selling and Administrative Costs," Modern Accounting Theory, ed. Morton Backer (Englewood Cliffs: Prentice-Hall, Inc., 1966), pp. 213-31.

¹³David Green, Jr., "A Moral to the Direct-Costing Controversy," The Journal of Business, XXXIII (July, 1960), 224-25.

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of measuring when the benefits of these various costs are received. Drebin has suggested categorization according to "pure" or basic research where the benefits are expected to last far into the future, new product development with a shorter number of periods in the immediate future benefitted, and technological improvements on existing products with the quickest pay-off and the shortest relative useful life of the three.¹⁴ After these basic categories are established, projects could be classified and performance by category noted by means of frequency distributions relating research input expenditures to the resultant increases in income.¹⁵ Drebin thus presumes an ability to trace cause and effect, perhaps a somewhat questionable assumption particularly at the pure research level. Another difficulty concerns whether we could expect past patterns to prevail in the future. The answer here might be that some estimation is better than the conservative write-off approach which appears to say that the problem does not exist.

Admittedly, however, we are still groping about in the dark and the last statement above is very much open

¹⁴Drebin, op. cit., 418.

¹⁵Ibid.

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to question as revealed by Orace Johnson's recent study.¹⁶ Johnson attempted to find the highest correlation between research and income using various patterns of amortization including immediate write-off. His rather dismal conclusion is that "the results of this study suggest that (as an arbitrary accounting rule) amortizing R & D may not be more useful than expensing. The differences in the size of correlation coefficients are not significant."¹⁷

In any event, further study of amortization for initial cost incurrences where potential future, as opposed to current, benefits are present is sorely needed.

Relevant Costing and Inter-Period
Allocation of Income Taxes

The service potential concept of asset valuation has been applied to determine the efficacy of inter-period allocation of income taxes.¹⁸ In constructing his argument,

¹⁶Orace Johnson, "A Consequential Approach to Accounting for R & D," Journal of Accounting Research, Vol. 5 (Autumn, 1967), 164-72.

¹⁷Ibid., 170.

¹⁸David F. Drake, "The Service Potential Concept and Inter-Period Tax Allocation," The Accounting Review, XXXVII (October, 1962), 677-84.

Drake uses the definition of service potential propounded by the American Accounting Association's Concepts and Standards Committee in 1957 as ". . . the sum of future market prices of all streams of service to be derived, discounted by probability and interest factors to their present worths."¹⁹ From this definition of an asset, it would follow that the expired portion of an asset's value during any given period of time would be equal to the difference between the discounted stream of remaining net services provided by the asset measured at the beginning and end of the particular period for which the expense is to be determined.

The term "service potential" is one also mentioned by both David Green and Horngren and Sorter.²⁰ The final

¹⁹American Accounting Association, Accounting and Reporting Standards for Corporate Financial Statements and Preceding Statements and Supplements (Columbus, Ohio: American Accounting Association, 1957), p. 4.

²⁰David Green, Jr., "A Moral to the Direct Costing Controversy," op. cit., 186 and Charles T. Horngren and George H. Sorter, "Direct Costing," op. cit., 84. Green notes here that the term "service potential" was first used by William J. Vatter in his The Fund Theory of Accounting and Its Implications for Financial Reports (Chicago: The University of Chicago Press, 1947), p. 17 and that Vatter probably adopted the term from "service-potentialities" used by W.A. Paton and A.C. Littleton, op. cit., p. 13. That Horngren and Sorter rely heavily upon it can be seen from the following quote from the citation in this footnote coming from the first page of their (cont.)

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criterion arrived at by the co-authors of the relevant costing concept for the justification of classifying any given charge as an asset concerns the ability of the resource underlying the charge to make an incremental contribution to future income. It has been generally accepted that asset valuation based upon the discounted value of the stream of net services provided by the asset is a non-operational concept.²¹ It might therefore be construed that the relevant costing idea has been proposed as a potential operational substitute for the unattainable ideal.

Taking the service potential definition of an asset noted above, it logically follows that the annual tax deductible depreciation allowances are an essential element

²⁰first article in the series referred to throughout this dissertation: "Although many definitions of assets have been advanced, there seems to be wide acceptance of the concept of assets as service potential...." and "The concept of service potential depends on expectations. Some assumptions about the future are necessary to make the idea of service potential meaningful." (same source as above on page 85).

²¹Edgar O. Edwards and Philip W. Bell, op. cit., pp. 43-4 and Felix Kollaritsch, "Future Service Potential," Journal of Accountancy, Vol. 119 (Feb., 1965), 57-62, for example.

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of the asset's stream of service potential.²² Accepting this notion, we shall, in this section, examine Drake's reasoning of why income tax allocation becomes obsolete in relation to a single asset assuming perfect knowledge and a criterion of an equal annual return on investment pattern for the asset. Still accepting this criterion, we shall then show that tax allocation may help to bring about a more equalized return on investment pattern when we abandon the Drake assumption that depreciation represents a decline in the present value of remaining future asset services. Drake's definition makes depreciation an after tax concept whereas our analysis accepts the normative definition of a cost allocation before taxes. We shall conclude by discussing two considerations which make the equalized return on investment criterion disputable and vague: jointness of revenue production and multi-asset analysis rather than individual asset analysis.

To analyze Drake's thinking, we start by noting that under the service potential assumption, asset valuation

²²For an example of this approach see Harold Bierman, Jr., "A Problem in Expense Recognition," The Accounting Review, XXXVIII (January, 1963), 61-3.

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would be determined by the following formula:²³

$$V = \frac{1}{(1+p)^1} \left\{ R_1 - T [R_1 - d_1 (V_{t_1})] \right\} \\ + \frac{1}{(1+p)^2} \left\{ R_2 - T [R_2 - d_2 (V_{t_2})] \right\} \dots \\ + \frac{1}{(1+p)^n} \left\{ R_n - T [R_n - d_n (V_{t_n})] \right\}$$

where

V = Value of the asset

$\frac{1}{(1-p)^1}$ = Discount factor applicable to the net stream of services provided by the asset in the first period after measurement takes place assuming for simplicity that all monetary transactions are executed on the last day of the period.

R_1 = Net cash flow before taxes provided by the asset during the first period after measurement occurs (assume that depreciation is the only non-cash revenue or expense).

T = Rate of taxation.

d_1 = Depreciation percentage applicable to the asset for income taxes during period one.

V_{t_1} = Value of the asset for income taxes in period one.

The discount factor in the above formula could be defined in several possible ways. If it were the rate of

²³This formula, with modifications to include the income tax reduction potential, is the same as that used frequently in capital budgeting analysis where the rate of return method is used. See, for example, Victor H. Brown, "Rate of Return: Some Comments on Its Applicability in Capital Budgeting," The Accounting Review, XXXVI (January, 1961), 50-1.

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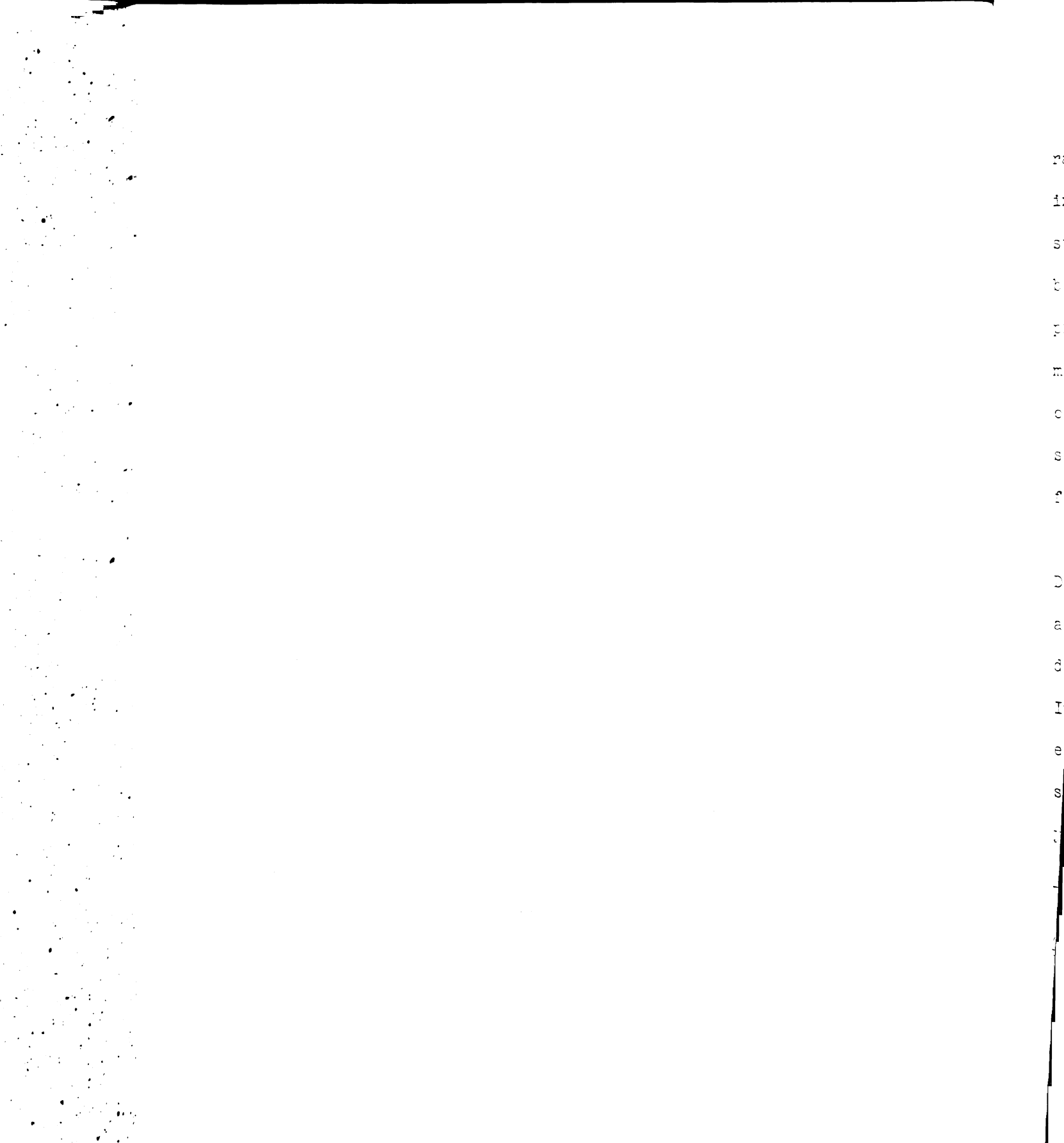
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return of the asset itself (r), then the statement that "cost equals value at the time of acquisition" would be a tautology. To discount a stream of estimated revenues and cost savings of an asset by its earnings rate would, of course, reduce the asset to its cost.

If, however, the firm's cost of capital (i) were substituted for the earnings rate as the discount factor, as is done in the excess present value approach to capital budgeting, then as long as $r > i$, value will exceed cost at the date of acquisition which is, indeed, exactly what we attempt to ascertain in capital budgeting computations where the cost of capital is used as the discount factor.²⁴

²⁴In his excellent essay on cost and value, Solomons David Solomons, "Economic Concepts of Cost and Value," Modern Accounting Theory, ed. Morton Backer (Englewood Cliffs: Prentice-Hall, Inc., 1966), pp. 117-140, especially, pp. 122-127. correlates value at acquisition with "value to the owner." He defines this last term as "the adverse value of the entire loss, direct and indirect, that the owner might expect to suffer if he were to be deprived of the asset." He also equates value of an asset with the present value of its future stream of net services, not mentioning that the two values will not be the same as long as r and i differ. He does, however, take this into consideration when he discusses the jointness of different assets relative to their need in the revenue production process. As a result of the jointness condition the sum of the present value of services provided by each individual asset would exceed the present value of their services as a collectivity. For this reason he opts for the replacement cost of an asset as an upper limit to value as opposed to the present value of the individual service potentials.



The cost of capital has been construed as a "hurdle rate" which incremental project revenues must exceed if an investment is to be justified. It is a necessary but not a sufficient condition to warrant the undertaking of a project because where capital limitations are a restrictive factor, projects offering returns above the cost of capital rate may be rejected. Perhaps the most generally accepted method of computing the rate is to use a weighted average for all sources of capital to the extent that they are available for usage during some forthcoming period of time.²⁵

To return to the main aspect of the valuation problem, Drake's thinking can be illustrated by assuming that an asset with a three year life, net income before taxes and depreciation of \$20,000, and no salvage value were purchased. In Drake's perfectly competitive situation with static equilibrium, both r and $i = 10\%$.²⁶ No risk factor is present. The prevailing tax rate is 50% and the sum-of-the years' digits depreciation (referred to hereafter as SYD)

²⁵A.J. Merrett and Allen Sykes, The Finance and Analysis of Capital Projects, (New York: John Wiley & Sons, Inc., 1962), p. 118-122.

²⁶Because we assume static equilibrium, p (from the asset valuation formula here, page 160) = $r = i$.

is allowed for tax purposes. Cost of the asset is \$43,422 which will lead to a return of 10% when the income stream is discounted as shown in Table 29:

Table 29

Present Value of Income Stream of an Asset
at Acquisition Date. ($r = 1$)

1. Year	(1)	(2)	(3)
2. Net income, before taxes and depreciation	\$20,000	\$20,000	\$20,000
3. Income tax expense 50% of net income	10,000	10,000	10,000
Depreciation savings based on SYD ²⁷	<u>10,855</u> (855)	<u>7,237</u> 2,763	<u>3,618</u> 6,382
4. Total annual flow, net income after taxes	20,855	17,237	13,618
5. P.V. factor @ 10%	<u>.909</u>	<u>.826</u>	<u>.751</u>
6. Present value of annual income streams	<u>\$18,957</u>	<u>\$14,238</u>	<u>\$10,227</u>
	= \$43,422		

²⁷Tax savings resulting from the SYD method would be:

<u>Year</u>	<u>Cost</u>	x	<u>Fractional Component</u>	x	<u>Marginal Tax Rate</u>	=	<u>Savings</u>
1	\$43,422		3/6		50%		\$10,855
2	43,422		2/6		50%		7,237
3	43,422		1/6		50%		3,618

Tax savings in later **tables** are similarly computed.

The value of the assets at the beginning of years two and three can be similarly determined. At the beginning of year two, only two flows remain. Timewise, however, they are one year closer to fruition. Hence the discount factor for one fewer periods is applied to the two remaining income streams at the beginning of year two (see Table 30 below). Using the same technique, value of the asset at the beginning of year three would be $.909 (\$13,618) = \$12,379$.

Table 30

Present Value of Income Stream of an
Asset One Year After Acquisition

	2	3
1. Total annual flow, net income after taxes (same as line 4, Table 29)	\$17,237	\$13,618
2. P.V. factor @ 10%	.909	.826
3. Present value of annual income streams	<u>\$15,668</u>	<u>\$11,248</u>
	= \$26,917	

From these computations, annual depreciation amounts (in the sense used by Drake as a decline in service potential) are determined by deducting end of period asset value (i.e., value of the asset at the beginning of the following period) from beginning of the period asset value. Thus depreciation

for year one would be \$43,422, the present value of the future stream of earnings at the beginning of year one (see Table 29) minus \$26,917 (see Table 30), the present value of the remaining stream of earnings at the end of the period. When each annual depreciation amount is deducted from the appropriate annual undiscounted stream of income, the asset produces a return of 10% based upon beginning of year asset valuation. The method used here and by Drake is nothing more than the compound interest method of computing depreciation which provides a fixed return on investment throughout the life of the asset in a world of complete certainty.²⁸

However, there is a more basic point involved here. Inter-period income tax allocation arises due to differences of timing of factors between the books and the tax return. Under the service potential approach, depreciation from the standpoint of the books would be, by definition, on an after tax basis. Hence it would not be strictly comparable with the before tax depreciation used on the tax return. Any reconciliation to "let the tax follow the income" would result in breaking the asset's constant return on invest-

²⁸William A. Paton and William A. Paton, Jr., Asset Accounting, (New York: The Macmillan Co., 1951), pp. 272-77.

ment after taxes. In Drake's perfect world, income tax allocation would become an obsolete procedure.

Is income tax allocation useless from the return on investment criterion in our own imperfect world?

The answer to this question must remain indeterminate because of the number of variables affecting return on investment in practical situations. In order to appreciate this point let us examine the depreciation theory formulated by Isaac Newton Reynolds.²⁹ The determinants of depreciation in his system consist of the pattern of revenues produced by the asset or asset group throughout its useful life and the pattern of operating costs necessary to produce the given revenue flow exclusive of depreciation.³⁰ Deducting the annual operating costs of an asset from its revenues gives a figure which Reynolds calls the "net service values" of the asset.³¹ It further follows that net service values for particular assets may be increasing, decreasing or constant. Reynolds theory strives for depre-

²⁹Isaac N. Reynolds, "Selecting the Proper Depreciation Method," The Accounting Review, XXXVI (April, 1961), 239-48.

³⁰Reynolds, op. cit., 240-43. Reynolds also mentions physical efficiency of the asset and the onset of obsolescence but these can be subsumed under the general headings of expected revenue and cost patterns.

³¹Ibid.

ciation patterns that result in equalizing the annual return on investment of each asset.³² Return on investment would be determined by dividing the unamortized cost of the asset at the beginning of each year into the net service values for the year minus that depreciation amount which satisfies the desired condition (equal return on investment for each year).

To understand the possible role of income tax allocation where equalized patterns of return on investment are desired and depreciation is defined as a before-tax concept, we shall examine one possible pattern of net service values. Considering the fact that many assets become less efficient in terms of producing a given amount of services as they age and, furthermore, that assets are subject to the incursion of demand obsolescence for their services, the declining pattern of net service values would certainly appear to be rather common. In order to fully comprehend the problems facing us we shall postulate a pattern of declining net service values which require straight-line depreciation in order to satisfy the requirement of equal annual return on investment figures. Furthermore, in order to bring the

³²Ibid., 243-4.

income tax allocation situation into the picture we shall assume that sum-of-the-years' digits depreciation is used for tax purposes with straight line kept on the books.

We are defining net service values here on an after tax basis. Assume the following facts:

Cost of asset	\$30,000
Annual direct operating costs	\$10,000
Tax Rate	50%
Expected life	3 years
Salvage value	0

These facts are shown below in Table 31:

Table 31

Declining Net Service Values

1. Year	(1)	(2)	(3)
2. Revenues	\$30,000	\$30,000	\$30,000
3. Operating costs	10,000	10,000	10,000
4. Total income taxes where SYD is used ³³	<u>2,500</u>	<u>5,000</u>	<u>7,500</u>
5. Total expenses exclusive of book depreciation	<u>12,500</u>	<u>15,000</u>	<u>17,500</u>
6. Net service values	17,500	15,000	12,500
7. Depreciation	<u>10,000</u>	<u>10,000</u>	<u>10,000</u>
8. Net income of asset	7,500	5,000	2,500
9. Asset value at beginning of year	\$30,000	\$20,000	\$10,000
10. Return on investment (line 8 divided by line 9)	<u>25%</u>	<u>25%</u>	<u>25%</u>

Since income tax allocation would increase the expense of early years and decrease the expense of later years, it is evident that allocating income tax would break the equal return on investment condition if the increased income tax expense is charged against the revenue of the asset. Income tax allocation computations are shown in Table 32:

³³Depreciation for tax purposes under SYD would be \$15,000, \$10,000, and \$5,000 respectively for the three years.

Table 32

Income Tax Allocation

1. Year	(1)	(2)	(3)
2. Depreciation per tax return (SYD)	\$15,000	\$10,000	\$5,000
3. Depreciation per books (straight-line)	<u>10,000</u>	<u>10,000</u>	<u>10,000</u>
4. Excess depreciation	5,000	0	(5,000)
5. Excess tax benefits foregone in future years (multiply line 4 by 50%)	<u>\$2,500</u>	0	<u>(\$2,500)</u>

When the income tax expense charge resulting from the allocation is deducted from income (added for year three), income, asset values, and return on investment are:

Table 33

Declining Net Service Values With
Income Tax Allocation

1. Year	(1)	(2)	(3)
2. Net income of asset (from Table 31, line 8)	\$7,500	\$5,000	\$2,500
3. Allocation of income tax expense	<u>2,500</u>	<u>0</u>	<u>(2,500)</u>
4. Net income of asset after allocation	5,000	5,000	5,000
5. Asset value at beginning of year	\$30,000	\$20,000	\$10,000
6. Return on investment	16 2/3%	25%	50%



Now, we can easily envisage net service value patterns having various degrees of "steepness," where steepness refers to the percentage of decline from year to year. Using the pattern just discussed as a norm, we can construct two other patterns:

Table 34

Various Declining Net Service
Value Patterns

	Previous Pattern	Steeper Pattern	Flatter Pattern
Year 1	\$17,500	\$20,000	\$16,000
Year 2	15,000	15,000	15,000
Year 3	12,500	10,000	14,000

Assuming that asset cost and book method of depreciation are the same as given previously, the following return on investment figures result:

Table 35

Return on Investment for Various
Declining Net Service Value Patterns

	Previous Pattern	Steeper Pattern	Flatter Pattern
Year 1	25%	33 1/3%	20%
Year 2	25%	25%	25%
Year 3	25%	0	40%

The flatter pattern requires an increasing depreciation charge to equalize the annual return on investment. Obviously, income tax allocation would result in further tipping the annual return on investment the wrong way. On the other hand, income tax allocation evens out the steeper pattern as shown in Table 36:

Table 36

"Steep" Pattern of Declining Net
Service Values With Income Tax Allocated

1. Year	(1)	(2)	(3)
2. Net Service Values	\$20,000	\$15,000	\$10,000
3. Depreciation	<u>10,000</u>	<u>10,000</u>	<u>10,000</u>
4. Net income	10,000	5,000	0
5. Allocation of income tax expense	<u>2,500</u>	<u>0</u>	<u>(2,500)</u>
6. Net income of asset after allocation	7,500	5,000	2,500
7. Asset value at beginning of year	\$30,000	\$20,000	\$10,000
8. Return on investment	25%	25%	25%

Income tax allocation may be beneficial in helping to equalize return on investment patterns. The exact circumstances would be dependent upon the values of the following variables:

- 1) The total and pattern of net service values
- 2) Cost of the asset
- 3) Life of the asset
- 4) Marginal income tax rate

We can say that income tax allocation would increase the rising return on investment pattern with level and increasing net service value patterns. Also, with declining net service value patterns income tax allocation will be beneficial in helping to accomplish the desired end with relatively steeply sloped net service values curves.

Income tax allocation, as a theoretical concept, is consistent with the service potential idea: greater tax reductions now mean benefits foregone later hence a higher expense charge is currently warranted; but the additional requirement of equalizing return on investment posed by Reynolds and Drake would leave income tax allocation in an accounting limbo. However, the equal return on investment criterion is subject to sharp attack on two grounds.

Many assets are joint revenue producers. Arthur Thomas has demonstrated mathematically that marginal revenues cannot be associated with the individual assets producing these revenues unless a situation of proportional returns to scale exists in terms of the production function of the

combined assets.³⁴ Along this same line it is interesting to note that current formulations of depreciation theory are abandoning the equalized annual return on investment standard.³⁵

A further reason why this criterion may have little validity for individual assets stems from the fact that many organizational units operate with large aggregates of assets. To the extent that depreciation and replacement tend to equalize, annual return on investment for the aggregate asset package will be equalized no matter what depreciation method is used for the individual assets. For example, an asset with a cost of \$40, constant net

³⁴Arthur L. Thomas, "Discounted Services Again: The Homogeneity Problem," The Accounting Review, XXXIX (January, 1964), 1-11.

³⁵F.K. Wright and Howard Lowe stress opportunity costs of expired factors. See F.K. Wright, "Towards a General Theory of Depreciation," Journal of Accounting Research, Vol. 2 (Spring, 1964), 80-90 and Howard D. Lowe, "The Essentials of a General Theory of Depreciation," The Accounting Review, XXXVIII (April, 1963), 293-301. Wright, op.cit., pp. 88-9, even rejects equalized return on investment where the project benefits are in the form of reduced differential cash outflows because capital budgeting formulations (the basis for an equalized return on investment computation) are determined by measuring the cash flows against "the best alternative not involving capital expenditure" whereas his method compares the "existing situation with the best alternative currently available whether that alternative involves capital expenditure or not."

service values of \$20 per year, and a life of 4 years will show an increasing return on investment pattern if straight line depreciation is used. However, if a package of four is owned and replacement is level each year, depreciation and return on investment will eventually stabilize. In the following example we assume that a new asset is acquired each year. After the fourth year net investment levels off because total depreciation equals the cost of a new acquisition. For simplicity, assume no income tax:

Table 37

Return on Investment of an Aggregate
Asset Package

1. Year	(1)	(2)	(3)	(4)	(5)
2. Total net service values for the year	\$20	\$40	\$60	\$80	\$80
3. Total depreciation	<u>10</u>	<u>20</u>	<u>30</u>	<u>40</u>	<u>40</u>
4. Net income	10	20	30	40	40
5. Total net investment at beginning of year	\$40	\$70	\$90	\$100	\$100
6. Return on investment	25%	28.6%	33 1/3%	40%	40%

In conclusion, we maintain that income tax allocation, as a concept, is consistent with the service potential approach to asset valuation and expense determination because equalized return on investment is a dubious criterion.

We hold aside, however, other aspects of the tax allocation problem such as definition of the credit and the realization thereof if it is interpreted as a liability in situations of continuing inflation or continuing growth of the firm.³⁶

Relevant Costing and Fixed Asset Dispositions

We previously discussed the relevant costing treatment of fixed asset removal costs. Bierman has, in effect, brought up the question of relevant costing in terms of the factor cost itself when presently owned fixed assets face the challenge of potential replacements:

A crucial question is whether any of the costs of the old equipment should be assigned to the revenues of the subsequent five years (the remaining life of the old equipment). The justification is this: the old equipment has economic usefulness in the absence of the new equipment, and we are foregoing the earnings attributable to the old when we purchase the new equipment.³⁷

Bierman's statement implies that he is using the relevant

³⁶See Sidney Davidson, "Accelerated Depreciation and the Allocation of Income Taxes," The Accounting Review, XXXIII (April, 1958), 173-180.

³⁷Harold Bierman, Jr., "Recording Obsolescence," Journal of Accounting Research, Vol. 2 (Autumn, 1964), 231.



costing argument as a justification for carrying forward the cost of the old equipment: "any cost is carried forward as an asset if, and only if, it has a favorable economic effect on expected future costs or future revenues."³⁸

However, his reasoning appears to be fallacious because the earnings that the old asset would generate if kept will also be generated by the replacement. Therefore, to carry forward the costs of the disposed machine would result in including within the firm's assets two sets of costs, either of which would separately lead to the same revenue production. Carry-forward of the costs of the disposed machine as an asset would therefore clearly duplicate the relevant costs leading to the production of revenue. Let us examine Bierman's figures.

His analysis includes the following circumstances. A presently owned piece of equipment has book value of \$5,000 and an estimated remaining life of five years. During this period it makes annual contributions to revenue of \$3,500 with out-of-pocket operating costs of \$1,500. A new type of equipment enters the market with a cost of \$5,000 and an estimated life of five years. During the

³⁸Sorter and Horngren, "The Relevant Costing Approach," op. cit., 393.

five year life it will contribute the same annual revenue amount of \$3,500 at a zero out-of-pocket cost.

With an interest rate of 6% the present value of the net revenues of the existing equipment would be \$8,425 ($\$2,000 \times 4.2124$). This amount would be carried forward over the period that the old equipment would have been in use if it were not superseded by the new equipment.

The revenues attributable to the old machine which express the positive aspect of its presumed carry-forward valuation is a non-strategic factor relative to the replacement decision. Both machines will produce the annual revenue of \$3,500. Only the differences in operating costs and initially required purchase outlay are crucial to the replacement decision. The future annual revenues of \$3,500 are common to both the old and new asset. Since the benefits are not unique to the presently owned asset they could not be relevant costs from the Horngren-Sorter standpoint (as well as from the capital budgeting aspect). The only relevant cost of the old asset is its value in trade or fair market value on the used equipment market once the decision to replace is made. Hence the book value of the old machine, like all aspects of retired bonds, except for any redemption premium, should leave the accounts.

Summary and Conclusions

1. Absorption costing maintains a unity between the physical association of factor costs incurred for product and the test of economic benefits.

2. Relevant costing adopts a narrower test of economic benefits, tending to reject the attaching of those factor costs to product which are not deemed to be economically scarce resources in the immediate short-run period.

3. When the relevant costing test of economic benefits is applied to after-costs such as bond redemption premiums and fixed asset removal costs, the indicated treatment appears to be carry-forward rather than physical association with the factors from which they originate.

4. If physical association, as well as economic relevance, were made a necessary condition for carry-forward, the problem would disappear in regard to after-costs but not for fixed manufacturing costs of inventories.

5. One of the principal problems of accounting concerns initially incurred costs having future benefits such as research and development costs and advertising. Further investigations are needed in order to find meaningful patterns of amortization.

6. Income tax allocation, as a concept, does not appear to be inconsistent with the relevant costing approach when viewed from the criterion of equalizing return on investment patterns. However, whether income tax allocation would tend to equalize return on investment patterns depends upon a number of variables including the "steepness" of the curve of net service values.

V. RELEVANT COSTING AND MANAGERIAL USES

Introduction

Our examination of relevant costing has thus far been concerned with its development and applicability in relationship to opportunity costs and other financial statement areas. Nothing has been said relative to its possible managerial application.

Earley has noted the emergence of techniques such as direct costing and cost-volume-profit analysis which he sees as a viable adaptation of the economist's theoretical tool of marginal analysis.¹

We maintain here that relevant costing would have little use to management for either control, short-term planning or long-term planning; that it would, in fact, be a step backward toward what Earley might refer to as the traditional cost accounting because it would tend to merge costs crucial to planning and control with those costs bearing no strategic importance to these functions.

¹James S. Earley, "Recent Developments in Cost Accounting and the 'Marginal Analysis,'" Journal of Political Economy, LXIII (June, 1955), pp. 227-42.

In this chapter we shall first briefly examine current developments within the field of management accounting concentrating on the effect upon users of changes in accounting methods over time, a consideration of extreme importance for relevant costing. Secondly, the results of a survey attempting to break ground in the area of (a) management attitudes toward relevant costing and (b) possible significance of profits for firms or segments thereof determined by relevant costing as opposed to direct costing will be discussed.

Decision Makers and Adjustment to
Changes in Accounting Method

The field of management accounting is beginning to be influenced by other disciplines which threaten to add new dimensions and change the shape of old ones.

One arm of pressure which may effect changes in managerial accounting concerns the affect of alternative accounting techniques upon decision making and control. Several studies in this area have employed the methods of computer simulation or laboratory experiment to assess the influence of accounting alternatives upon executive action.² At the present time the findings of these experiments must be

²For example, Charles P. Bonini, Simulation of Information and Decision Systems in the Firm, (Englewood Cliffs: (cont.)

viewed inconclusively because the tests have been so few in number and, in turn, these few conclusions conflict somewhat with each other.³

The problem of the effect of alternative accounting techniques upon managerial planning and control has been viewed from a more general framework by Ijiri, Jaedicke, and Knight.⁴ Their behavioral assumptions appear to be that managerial man is constrained by human factors which necessarily prevent him from carrying out the presumed organizational goal of profit maximization.⁵

²Prentice-Hall, Inc., 1963), especially pages 104-109; William J. Bruns, Jr., "Inventory Valuation and Management Decisions," The Accounting Review, XL (April, 1965), 345-57; and Thomas R. Dyckman, "The Effects of Alternative Accounting Techniques on Certain Management Decisions," Journal of Accounting Research, Vol. 2 (Spring, 1964), 91-107.

³Dyckman, ibid., and Bruns, ibid., both used business games with one of the variables being different inventory costing methods. Both were in general agreement that varying the inventory method did not affect decision making. Bonini, ibid., reach the opposite conclusion relative to the effects of different inventory methods in his computer simulation study.

⁴Yuji Ijiri, Robert K. Jaedicke, and Kenneth E. Knight, "The Effects of Accounting Alternatives on Management Decisions," in Research in Accounting Measurement, ed. Robert K. Jaedicke, Yuji Ijiri, and Oswald Nielsen (American Accounting Association, 1966), pp. 186-199.

⁵This point has also been noted in Jacob G. Birnberg and Raghu Nath, "Implications of Behavioral Science for Managerial Accounting," The Accounting Review, XLII (July, (cont.)

Their starting point and first assumption is that decision outputs are a function of decision inputs.⁶ A subtle distinction must be made, however, between "principal inputs" and "surrogate inputs."

By a principal input. . . we mean a decision input upon which the decision-maker wants to base his decision ultimately. A surrogated input. . . is a decision input upon which the decision-maker bases his decision only insofar as the surrogate reflects a principal.⁷ (emphasis supplied)

A surrogate input, then, is a substitute for a principal input. Obviously, there are good or stable surrogates and bad or unstable surrogates. For example, the average rate of return method for evaluating potential capital investment projects where the timing of cash flows is not considered would be an unstable surrogate for the time weighted rate of return. On the other hand, the excess present value index would be a stable surrogate for the time weighted rate of return.

It is apparent that decision makers would rather use

⁵1967), 469. For an excellent discussion of "traditional" and "modern" behavioral assumptions of management and the implications for managerial accounting see Edwin H. Caplan, "Behavioral Assumptions of Management Accounting," The Accounting Review, XLI (July, 1966), 496-509.

⁶Ijiri, Jaedicke, and Knight, op. cit., p. 188.

⁷Ibid.

principal inputs than surrogates as the basis for planning and control decisions. However, principal inputs may be too expensive, not available at the time when decisions must be made or there may be so many principal inputs actually needed in terms of a particular decision that the decision-maker is simply unable to use them effectively so he settles for a simplified surrogate.⁸

After discussing these basic concepts, the authors then ask a key question: when can a decision-maker adjust to a change in accounting method over time. One consideration which would quite probably impede the decision making function after a change in accounting method occurs would arise if a lack of feedback to the manager were present.⁹ It is the contention of Ijiri, Jaedicke, and Knight that it is virtually inconceivable to have a situation where a zero level of feedback exists.¹⁰ However, does the manager use the available feedback to come to grips with the change in the accounting method? In situations where managers do

⁸Ibid., p. 190.

⁹Ibid., p. 193. Jaedicke has been particularly concerned with attempting to build feedback into the control system. See Robert K. Jaedicke, "Accounting Data For Purposes of Control," The Accounting Review, XXXVII (April, 1962), 181-188.

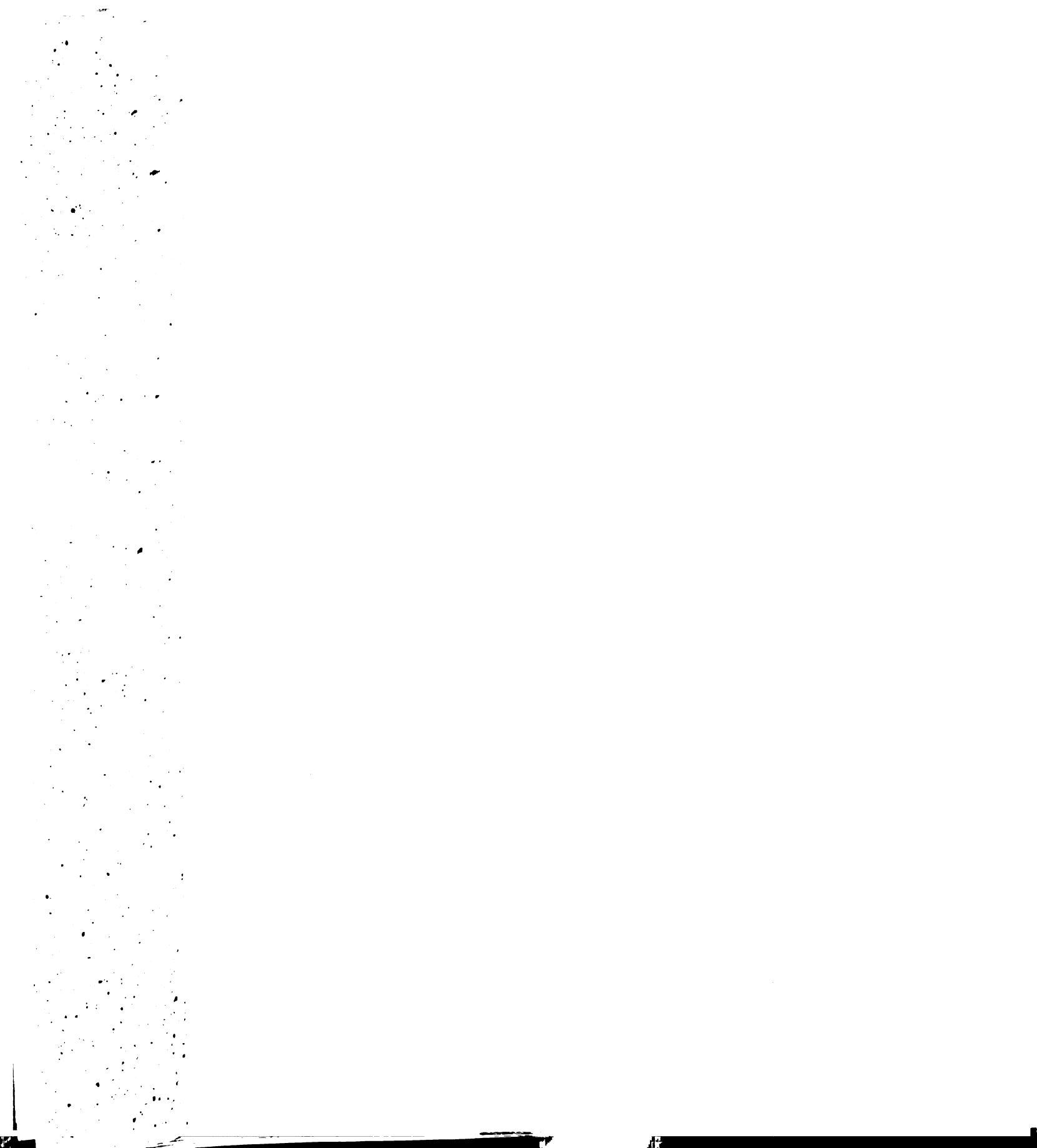
¹⁰Ibid., pp. 193-4.

not avail themselves of the existing feedback, a psychological factor called "functional fixation" is said to be present:

Psychologists have found that there appears to be functional fixation in most human behavior in which the person attaches a meaning to a title or object (e.g., manufacturing cost) and is unable to see alternative meanings or uses. People intuitively associate a value with an item through past experience, and often do not recognize that the value of the item depends, in fact, upon the particular moment in time and may be significantly different from what it was in the past. Therefore, when a person is placed in a new situation, he views the object or term as used previously. If the outputs from different accounting methods are called by the same name, such as profit, cost, etc., people who do not understand accounting will tend to neglect the fact that alternative methods may have been used to prepare the outputs. In such cases, a change in the accounting process clearly influences the decisions.¹¹

The implications of these ideas toward relevant costing should be quite apparent. Since the word "income" is such a highly subjective concept, any formulation, with the possible exception of the change in the present value of the firm's assets occurring during the period (assuming, for simplicity, no capital distributions), must be viewed as a surrogate for the firm's real income. While relevant

¹¹Ibid., p. 194.



costing is an accounting method or process which can be viewed as being logically consistent, the fact is that in reality it is an amalgamation of two other contradictory ideas, absorption costing and direct costing. When either of the two appropriate relevant costing criteria becomes applicable, we, in effect, go from a direct costing based income to an absorption costing oriented income figure.¹² Moreover, these same remarks would apply even more forcefully in the case of external users of financial statements. If the functional fixation idea has wide applicability, the effect of relevant costing upon decision making could be extremely chaotic.

Managerial Responses and Related Considerations

In order to determine the potential usefulness of relevant costing to management, a survey was prepared which is reproduced here as Appendix A to this chapter. Basically, the survey attempted to explore two propositions: (1) does relevant costing have any potential for management; (2) how frequently and for what reasons would

¹²Ijiri, Jaedicke, and Knight in the sections quoted here concentrated upon the problems arising from a change in accounting methods over time whereas Bonini, Bruns, and Dyckman emphasized the effect upon decisions of maintaining different accounting methods in their works cited previously. See page 80 of this work for the two relevant costing criteria.

relevant costing cause a materially different income to arise than if direct costing were used. Questions 2 and 3 of the survey probe the first proposition and questions 1 and 4 the second.

The questionnaire itself is of the "open end" variety rather than being of the "fixed-alternative" type because it was felt that basic attitudes would be more clearly revealed by means of a verbal response.

In selecting an audience for the survey, several conditions were desired: (1) a relatively large audience in numbers; (2) a diversified group in terms of considerations such as type of product (producer goods versus consumer goods) and type of manufacturing operation (job order versus process); (3) relative ease of accessibility if follow-up were desired.

The group selected was the current members of the Milwaukee Chapter of the National Association of Accountants who are presently employed in manufacturing firms. The universe comprised 477 individuals currently working in 244 manufacturing firms. It was felt that this group adequately met the first and third of the previously mentioned conditions. The main weakness is that the group, like the industrial structure of Milwaukee itself, is over-balanced

toward the producers' goods end of the spectrum. Nevertheless, the other advantages of the group more than compensated for this potential weakness.

Sixty-nine usable responses came back or 14.5% of the universe selected. The respondents represented 44 companies or 18% of the total number of companies included in the survey.¹³

In terms of the managerial usefulness of relevant costing, the results are summarized below in Table 38:

¹³The 477 individuals included in the survey represented 244 firms. One-hundred and ninety-two of the individuals, or 40.3% of the total came from 23 firms or 9.4% of the total firms. These 23 firms had from 4 to 28 members in the Milwaukee Chapter of the N.A.A. Thirty-three of the survey respondents (or 47.8% of the total of 69 respondents) came from these largest firms in terms of membership. The membership roster of the chapter also showed that several of the city's leading firms had three or fewer members enrolled in the chapter. Many of these were among the other 36 respondents. Hence the city's major firms appear to be well represented among the respondents.

Table 38

Evaluation of the Managerial
Usefulness of Relevant Costing

	Number of Responses		Number of Responses		Negative		Positive	
	Not Considering	It Useful	Considering It	Useful	Responses as % of Total	Responses as % of Total	Responses as % of Total	
Overall Response	36		31		53.7%		46.3%	
Specific Areas Mentioned:								
Pricing	--		1		--		1.5%	
Intra-firm pricing	--		8		--		11.9%	
Cost-Volume-Profit analysis	--		8		--		11.9%	
Return on investment	--		16		--		23.9%	
Profits of firm, division or product line	1		4		1.5%		6.0%	
Inventory turnover	1		--		1.5%		--	
Gauge of capacity usage for planning or control	40		21		50%		40%	

The over-all response category was strictly the positive or negative reaction to question 2. Tabulation for the individual planning and control areas listed in the table was based upon specific mention of the category in the open ended response ("specific mention" here also includes assenting to the three techniques mentioned in question 2) with the exception of "gauge of capacity usage for planning and control." This category was tabulated from the responses in question 3.

Perhaps the most striking statistic revealed by the table is the fact that almost half of the respondents saw relevant costing as being potentially useful for management.¹⁴ Three possible reasons may account for this interesting statistic:

- (1) Many respondents may have thought that relevant costing was the idea of the present author; hence they were favorably biased toward it.
- (2) A possible tendency to be favorably biased toward ideas simply because of their newness or novelty.
- (3) Despite the definition in the body of the accompanying letter of the term "relevant costing"

¹⁴Two respondents stating "no" to question 2 had "yes" answers to question 3. Reclassifying them as "yes" in terms of over-all response would have resulted in a virtually even split.



as used throughout the context of this dissertation, respondents may have confused it with the wider and more general term "relevant costs," in the planning sense, meaning out-of-pocket costs that differ between alternatives.

Evidence for the last mentioned possibility was revealed by the following reply to question 2 from the controller of the special products division of a diversified heavy equipment manufacturer:

We have used a method approaching relevant costing for analytical purposes within the marginal income of cost alternate concepts, leading into selected return on investment decisions and cost-volume-profit analysis. . . . The factoring out of irrelevant costs highlights the source of cost on margin change, as well as allowing critical evaluation of the degree of change. A major problem is determining which costs are irrelevant within a centralized accounting complex.

A personal interview with the respondent revealed that the practices described basically have to do with splitting costs between the fixed and variable categories and, furthermore, distinguishing between those fixed costs which are direct in terms of product being evaluated and those which are joint when making pricing decisions.

A further substantiation of the possible bias on the

part of "yes" respondents to question 2 concerns the relative paucity of comments on the usefulness of relevant costing as it might apply to specific control and decision making areas. The breakdown of these areas as shown by Table 38 is, again, quite revealing. The areas of most plausible applicability would appear to be determining profits of firms and segments thereof and also return on investment for exactly the same reasons put forth by relevant costers in relation to externally used financial statements (see pages 77-84 of this work). On the other hand, as will be discussed below, relevant costing appears to be of little benefit for intra-firm pricing purposes and cost-volume-profit analysis. The relatively high number of assents (8 each) for intra-firm pricing and cost-volume-profit analysis can be traced to the supposition that respondents were merely "seconding the nomination" because they were specifically listed in the body of the question. Profit measurement, on the contrary, was not specifically mentioned and suffered accordingly despite the more logical reason for its mention. Return on investment is both specifically mentioned in the question and also a highly logical choice, attested to by the fact that half of the "yes" respondents specifically singled it out either actively or passively.

The unexpectedly high number of favorable responses to the potential usefulness of relevant costing for management prompted a telephone follow-up.¹⁵ The telephone call was preceded by a short letter again giving the definition of relevant costing and also containing their answers to questions 2 and 3 of the survey. Twenty-one of the favorable respondents were reached. Despite some equivocation, all of the respondents backed their original answers. At the same time, however, caution was shown in expressing opinions, a condition certainly to be expected, given the uniqueness of the relevant costing measure of inventories. No other cases were found where the term "relevant costing" was interpreted as the planning concept though this circumstance may have occurred as a result of the follow-up itself. Several respondents indicated an interest in relevant costing for monthly as opposed to annual income statements. They noted that the short capacity situation occurred at points prior to seasonal peaks during the year but not necessarily at the end of the fiscal year. An interesting phenomenon of the relevant costing approach to inventories

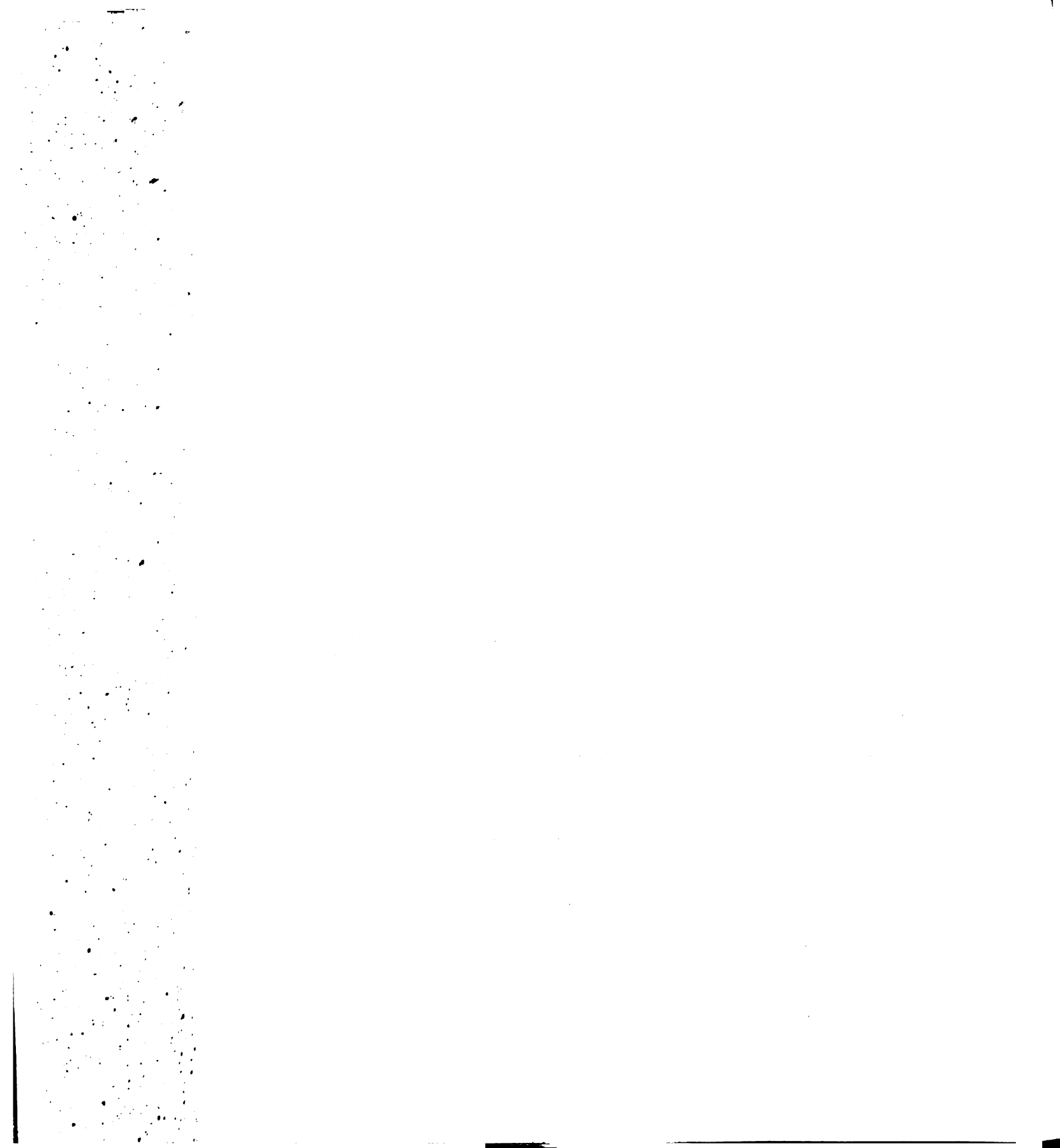
¹⁵Charles Horngren indicated, in personal correspondence, an unlikelihood, in his opinion, that the idea would be favorably received by practitioners because of a tendency on their part to oppose radical change (Feb. 13, 1968).

concerns the effect of period length upon short capacity. The shorter the length of the period, the higher the possible likelihood that sales needs cannot be met without the help of inventory. As the period is lengthened, the greater the possibility of adjusting to extreme short period discrepancies. With fiscal years ending after peak season needs and inventories at their ebb, a rather typical pattern, short capacity is not present. In any event, the original tabulation of favorable responses to the potential usefulness of relevant costing appears to be correct. This may indicate dissatisfaction with present methods and a desire to experiment with new techniques, a healthy situation.

As mentioned above, relevant costing appears to have limited significance or is a source of potential confusion to the user of the tools and reports coming under the scope of the administrative control system. For example, let us briefly examine cost-volume-profit analysis reports.¹⁶ One of the basic assumptions underlying these reports is that there is no change in the level of the firm's inventory.¹⁷

¹⁶The term "cost-volume-profit analysis" is virtually synonymous with "break-even analysis." The latter has a connotation of restrictiveness hence is rejected in favor of the more inclusive term.

¹⁷A.W. Patrick, "Some Observations on the Break-Even Chart," Administrative Control and Executive Action, (cont.)

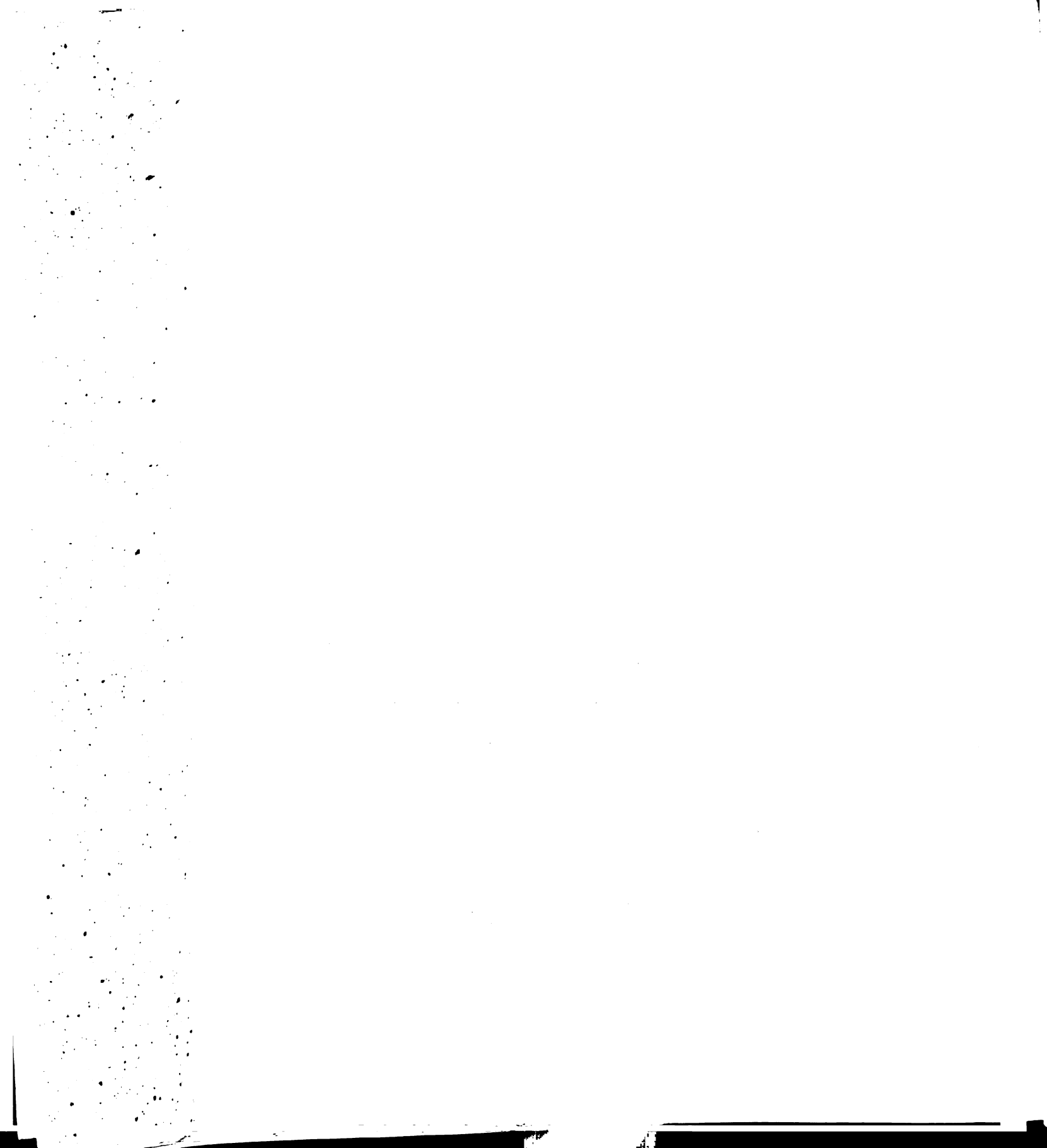


Basically, then, cost-volume-profit analysis tacitly accepts the direct costing assumption of no fixed overhead charged to product. Acceptance of the absorption costing assumption in these graphs would entail the difficulty of presenting a second variable affecting income, change in the level of inventories.¹⁸ Moreover, this second variable would comprise sunk and unavoidable costs, adding another possible dimension of confusion for information users. This same basic confusion would arise in cost-volume-profit charts whenever either of the specific relevant costing criteria arise causing fixed overhead costs to be inventoried prior to becoming expense.

The case of intra-firm pricing appears to be one in which relevant costing would play little or no part. The two basic goals of intra-firm pricing are maximization of firm profits and evaluation of divisions of the firm from the standpoint of being independent profit producing centers.

¹⁷ed. B.C. Lemke and James Don Edwards (Columbus: Charles E. Merrill Books, Inc., 1961), p. 635.

¹⁸Brummet has devised a set of cost-volume-profit graphs with the second variable affecting income. See R. Lee Brummet, Overhead Costing, (Ann Arbor: Bureau of Business Research, University of Michigan, 1957), pp. 94-96.



Perhaps the most thorough treatment extant of intra-firm pricing has been done by Solomons.¹⁹ He has constructed a series of possible situations in which the basic variables are: (1) presence or absence of a competitive outside market; (2) degree of materiality of the amount of transferences in the absence of a competitive outside market; (3) capacity availability in the event of lack of a competitive market structure and the presence of a material amount of transferences.²⁰ Solomons, like most of the writers in this area, favors using outside competitive market prices where available.²¹ Where outside prices are not competitive or are non-existent, capacity is not constricted and transferences are material, Solomons advocates a marginal costing

¹⁹David Solomons, Divisional Performance: Measurement and Control, (New York: Financial Executives Research Foundation, 1965), pp. 171-228.

²⁰Ibid., p. 198.

²¹Ibid., p. 199. Substantially in agreement with Solomons are Nicholas Dopuch and David F. Drake, "Accounting Implications of a Mathematical Programming Approach to the Transfer Price Problem," Journal of Accounting Research, Vol. 2 (Spring, 1964), 11-13 and Robert N. Anthony, "Notes on Transfer Prices," Management Control Systems, ed. Robert N. Anthony, John Dearden, and Richard F. Vancil (Homewood: Richard D. Irwin, Inc., 1965), p. 259. However, for a different viewpoint see Billy E. Goetz, "Transfer Prices: An Exercise in Relevancy and Goal Congruence," The Accounting Review, XLII (July, 1967), 435-440. Goetz believes in (cont.)

type system using standard variable costs.²² Reverting to a cost measurement means that supplying divisions cannot be evaluated from the perspective of being profit oriented segments and they must be judged in terms of cost efficiencies. The case of most interest to us is that of short capacity, lack of competitive market prices and substantial transfer-ences. Solomons advocates a linear programming solution for output.²³ A by-product of the linear programming solution is the derivation of shadow prices for scarce inputs of the selling division. While there may be some superficial similarity between this method and relevant costing, there are significant differences: (1) shadow prices of scarce

²¹the exclusive use of incremental costs, foregoing the possibility of evaluating the performance of divisions selling internally by means of profit and return on investment criteria. His contention is based upon the following type of cost benefit structure which could lead to a sub-optimization result if external prices are used:

External price of product or service	>	Incremental revenues or benefits to the acquiring unit	>	Incremental cost to the selling unit
--	---	--	---	--

²²Solomons, ibid., pp. 201-204. Where outside competitive prices are not available, some have advocated negotiated prices in order to maintain a profit basis of evaluation for the selling division. See Paul W. Cooke, "Decentralization and the Transfer Price Problem," Journal of Business, XXVIII (April, 1955), 87.

²³Solomons, ibid., pp. 187-191 and 204-205.

factors are based upon revenue producing ability while relevant costing adheres to a full cost maximum; (2) relevant costing is concerned with future capacity shortages whereas the linear programming solution involves maximization in terms of the present period's usage of limited capacity. Relevant costing, thus, plays a neutral role in all cases of arriving at intra-firm transfer prices.²⁴

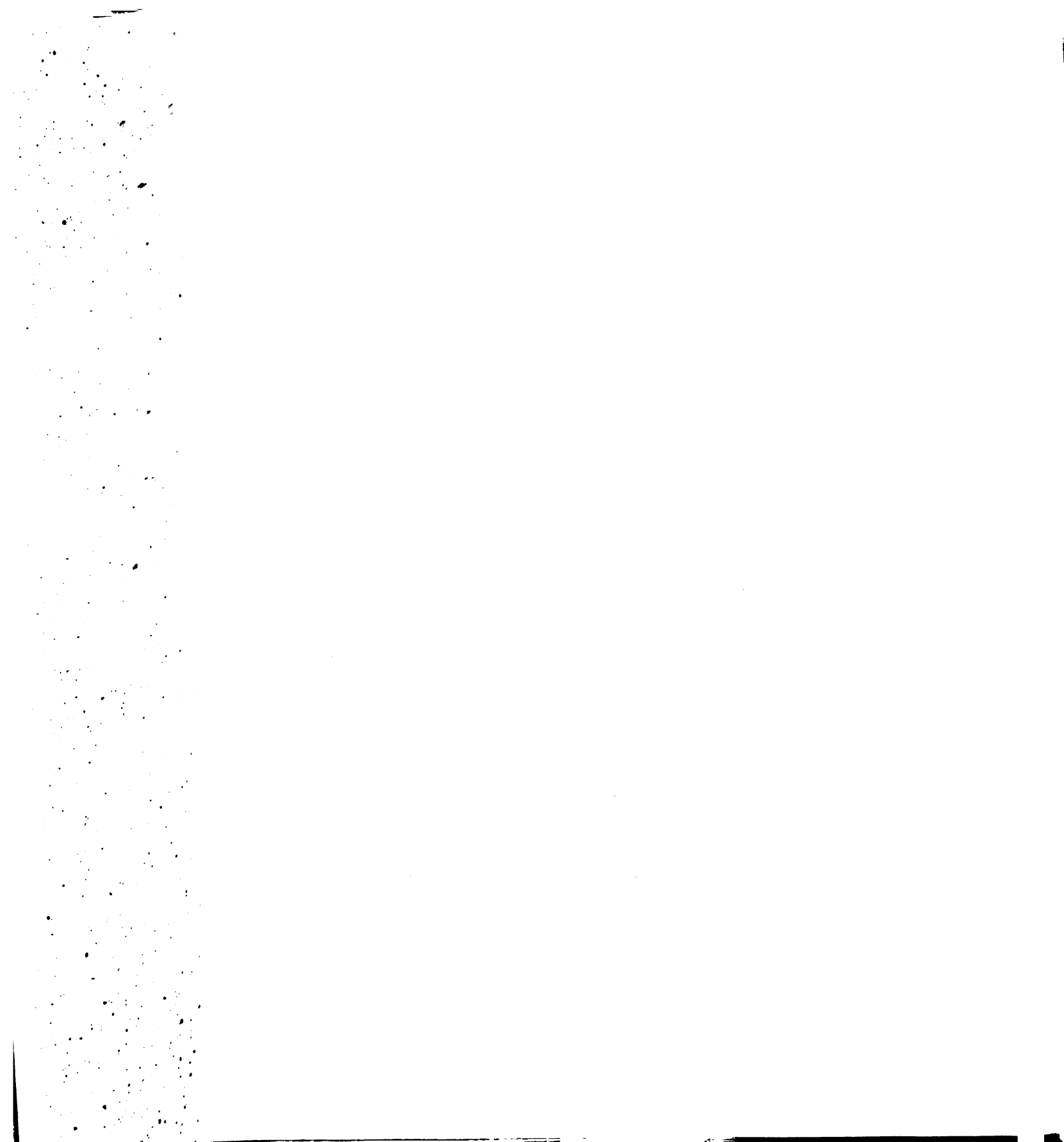
This last comment also applies to the external pricing decision. In terms of long-range pricing aimed at maximizing return on investment, it would likewise have no importance.

From the standpoint of planning, the conditions leading to the holding back of fixed costs from expense under relevant costing--short capacity or expected rising variable factor costs--are of great importance to management, but not the method itself. This is the case because the technique results in the inventorying of sunk and unavoidable costs in response to the above mentioned conditions. Relevant costing

²⁴Several respondents to the survey saw potential usefulness for relevant costing in intra-firm transfer pricing situations. It would play no role where either outside prices were used or marginal or standard variable costs were used. It might, however, play a role where negotiated prices were used. However, sub-optimization could result if the buying division is willing to pay more than an outside division but its contribution margin is less than the revenues that would have been forthcoming from the outside firm.

is a technique proposed for income determination and asset valuation and appears to lack flexibility when applied to other areas of administrative control. Finally, the very idea of measuring past performance in terms of future expectations could often lead to internal bickering, attempted manipulation and confusion (functional fixation).

A few further qualifying comments should also be made in terms of relevant costing oriented income statements. As noted many times throughout this paper, relevant costers would inventory fixed overhead in only two circumstances. One circumstance (sales expected to exceed productive capacity) may be defined as "good" whereas the other, expected rising variable factor costs, can be termed "bad." Though it is true that the firm would inventory overhead hence increasing profits as a result of hedging against the "bad" action, the results are certainly open to question if the income statement is expected to give a good indication of future earnings trends. In this situation it appears that relevant costers should be examining selling markets as well as buying markets. If prices in variable factor markets are expected to rise without a proportionate rise in selling price of product then inventorying fixed overhead costs in response to increasing productivity could be quite misleading



to income statement readers. Only if expected selling price increases at least equal anticipated variable factor cost increases would it appear wise to inventory fixed overhead under the relevant costing approach. We shall now return to our discussion of the survey.

A wide range of answers was received in response to the second part of question 3. These included the following:

1. Monthly fixed cost reports.
2. Break-even analysis and cost-volume-profit analysis.
3. Facility utilization reports.
4. Direct costing.
5. Unit productivity reports.
6. Direct labor hours for product lines.
7. Budgets and operations forecasts.
8. Capacity variance.
9. Daily capacity reports to alert management to voids in machine backlogs.
10. Plant capacity estimations for two years based upon an assumed product mix.
11. Capital budgeting.
12. Direct labor efficiency.
13. Indirect costs during seasonal peaks.
14. Monthly financial statements appearing within ten days after the close of the month.

15. Working liaison between top management, production control and factory supervisors.
16. Sales reports.

It is quite apparent from these answers that the problems of minimizing the investment in fixed plant and maximizing its utilization are evaluated by several methods which are, in the language of Ijiri, Jaedicke and Knight, surrogates for better measures (numbers 12, 14, and 16, for example). It is also of interest to note that many of the methods were related to evaluating a past degree of utilization (numbers 1, 8, 13, 14 and 16) whereas others are related to the planning function (numbers 2, 9, 10 and 11). The question itself was purposely left vague but in view of the future orientation of relevant costing, the planning phase was certainly implied. More attention may well be merited for all phases of the capacity problem but it is by no means certain that relevant costing is a feasible means of effecting this result.

In summary, despite the high percentage of individuals assenting to the importance of relevant costing for management purposes, we must retain a skeptical viewpoint.

The responses from questions 1 and 4, pertaining to the effects upon income of relevant costing (as opposed to direct costing), are summarized in Table 39:

Table 39

The Effect of Relevant Costing
Upon Income

	Number of "yes" Responses	Number of "no" Responses	Percentage of "yes" Responses to Total Responses
1. Annual income would differ significantly from direct costing determined income	12	56	17.6%
2. If "yes" to 1, fixed overhead is a significant part of total costs	9	NA	13.2%
3. If "yes" to 1, variable factor costs are expected to increase:			
Materials	5	NA	7.3%
Labor	4	NA	5.9%
4. If "yes" to 1, sales prediction is difficult	7	NA	10.3%
5. If "yes" to 1, capacity measure- ment is difficult	9	NA	13.2%

As can be seen from Table 39, the great majority of individuals, 82.4%, felt that the use of relevant costing, as opposed to direct costing, would not significantly affect



annual income.²⁵ Several generalizations can be made from these responses and, in addition, a follow-up survey to the twelve firms indicating a significant affect upon profits of relevant costing, reproduced here as Appendix B:

- (1) Relevant costing appears to have little significance for firms producing to order.
- (2) All firms in this survey indicating a "yes" response to question 1 had constraints in the form of either difficulties of predicting future sales or measuring capacity.
- (3) A strong correlation exists between the potential significance of relevant costing and the difficulty of predicting future sales hence the method is to some extent self-defeating. Capacity shortages occur because of cyclical conditions in turn making annual prediction subject to a high degree of error.
- (4) For those firms answering "yes" to question 1,

²⁵While the difference in percentage terms between the "yes" responses in Table 39 and those considering relevant costing to be useful from Table 38 is rather large, no real inconsistency is present because the question of usefulness is a general and subjective one whereas the other question applies specifically to the individual's firm. It is interesting to note, however, that nine of the twelve "yes" respondents from Table 39 also considered relevant costing to be potentially useful.

of the original survey, question 4 of the follow-up survey was intended to shed further light. Of the seven written respondents and two others reached by telephone, four felt that they could not even "guesstimate" and the remainder indicated from a one to five percent profit differential from direct costing.

Certainly we do not mean to imply that relevant costing would never give different profit figures than direct costing. The aluminum industry, for example, has frequently suffered from a shortage of capacity.²⁶ After the 1920-21 depression, Alcoa was reluctant to expand capacity and the firm was faced with a demand beyond its productive capacity during the 1920's.²⁷ Military circumstances likewise caused shortages from 1940 to 1945 and 1950 to 1955.²⁸ However, the aluminum case may be considered an atypical one because of immediate pressures to build additional capacity in order to avoid losing sales and two other potentially important considerations: (1) desire to move to larger scales of plant in order to take advantage of potential economies of scale,

²⁶Leonard W. Weiss, Economics and American Industry, (New York: John Wiley & Sons, Inc., 1961), p. 199.

²⁷Ibid., pp. 199-200.

²⁸Ibid., p. 199.

and (2) possible psychological desires to management for bigness.

A further, though not insurmountable obstacle to the implementation of relevant costing in the short capacity situation, concerns occasional difficulties of measuring capacity. The question of defining capacity is itself one that is fraught with considerable difficulties.²⁹ Of the four economic concepts of capacity mentioned by Purdy, the maximum profit output level (maximization of total revenues minus total costs) is of most importance from the relevant costing standpoint.

The problem of measuring capacity, however, is more than one of simply selecting an appropriate definition of capacity.³⁰ In the aircraft industry, for example, measurement of physical capacity is virtually impossible largely because product specifications are constantly changing. The difficulty of the problem is indicated by the fact that square footage of plant space and pounds of output have been used as indices of capacity and output respectively. Measurement

²⁹ Charles Roland Purdy, The Concept of Capacity and Overhead Costing, (unpublished doctoral dissertation, University of Minnesota, 1963), pp. 7-42.

³⁰ See Evan B. Alderfer, "X-Excess Capacity," Business Topics, Vol. 10 (Autumn, 1962), 67-72.

of physical capacity is further complicated by extensive subcontracting practices and the fact that capital equipment has sometimes been supplied by the government.³¹ In some cases, capacity is affected by the quality of the inputs such as in sawmills.³²

Another closely related factor to capacity measurement is the question of rapidity of adjustment of capacity to predicted changes in demand. Adjustment may be rapid where sub-contracting or acquisition of components or sub-assemblies can be accomplished or even where capacity can be increased by duplication of existing machinery in the same plant.³³ On the other hand, several years may be required to increase existing capacity as in the case of petroleum refineries.³⁴

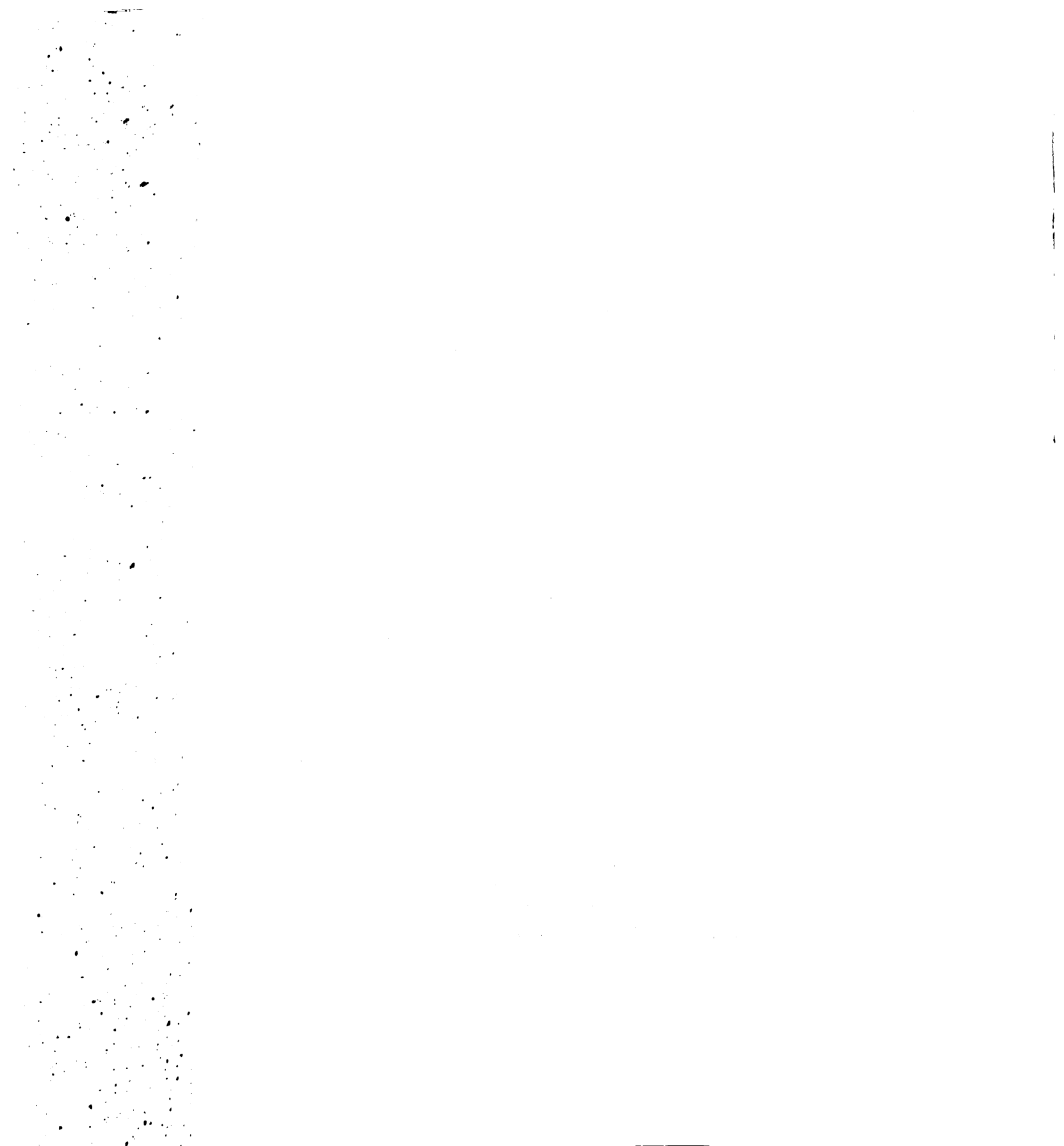
The problem of capacity measurement would effectively

³¹Charles R. Purdy, "Industry Patterns of Capacity or Volume Choice: Their Existence and Rationale," Journal of Accounting Research, Vol. 3 (Autumn, 1965), 237.

³²Ibid., 238.

³³The well known case of tapered integration in the automobile industry is a good example of how capacity is effectively maintained in the form of independent satellite companies. See E.B. Alderfer and H.E. Michl, Economics of American Industry, (New York: McGraw-Hill Book Company, Inc., 1950), pp. 162-163.

³⁴Charles R. Purdy, "Industry Patterns of Capacity or Volume Choice: Their Existence and Rationale," op. cit., 238.

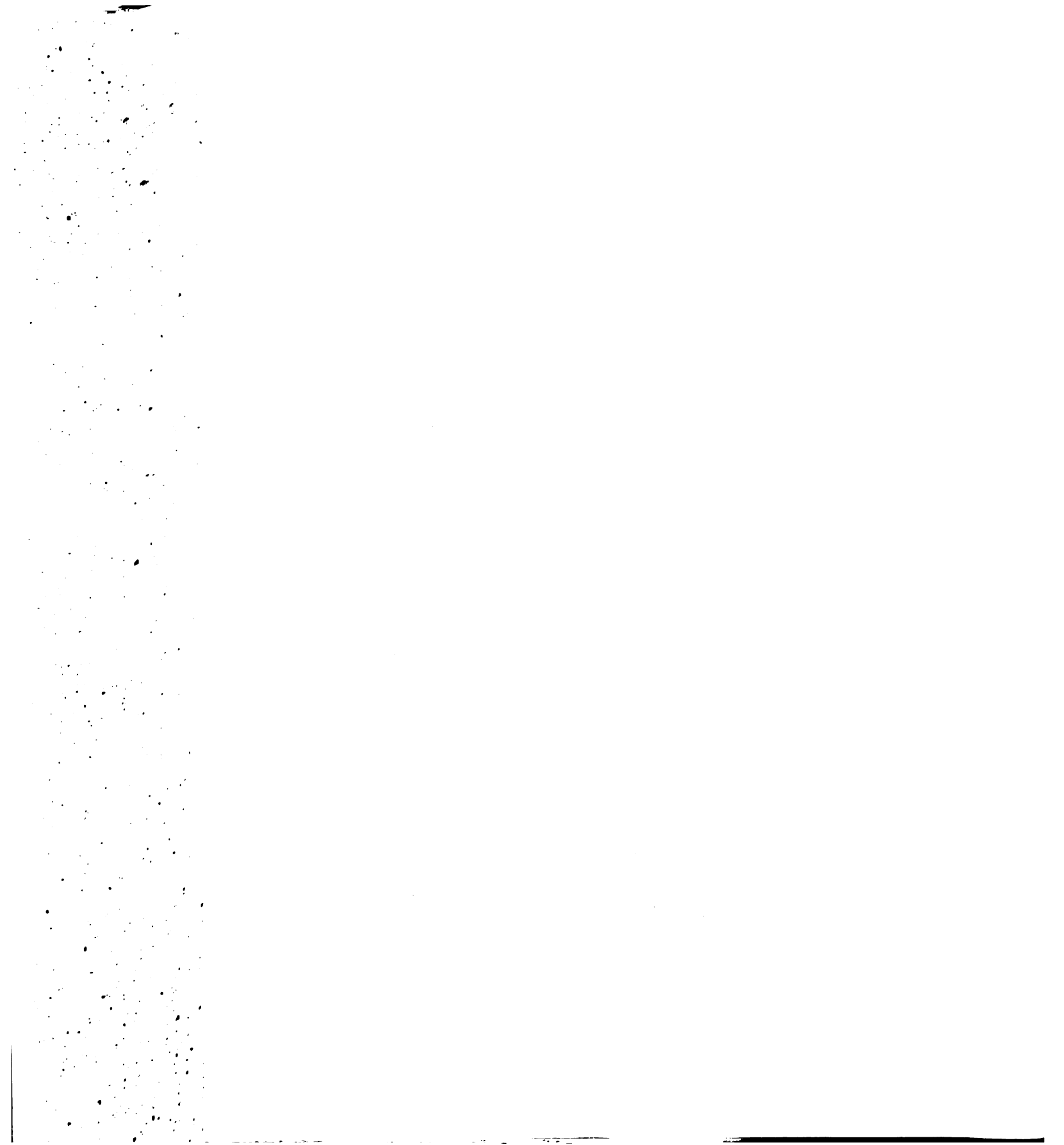


restrict some companies exclusively to the direct costing side of the relevant costing coin thereby, in effect, further promoting a form of divisiveness in terms of the related problems of inventory measurement and income determination.

It is, of course, a well known fact that demand prediction is subject to a wide degree of uncertainty.³⁵ The American Management Association in 1956 surveyed almost 300 companies broken into nine over-all product classes. Only within the consumer nondurable group did all firms have an accuracy within 10%. "In all the other groups, however, the scatter of errors was rather wide, and while some companies seemed to enjoy an accuracy of zero to two per cent, others seemed to be off the mark by 30 and even 50 per cent. The average error was 8 per cent, while the median was down to 5 per cent."³⁶ Moreover, the largest average error, as would be expected, occurs in the producer goods industries where the accelerator effect can cause a high degree of

³⁵See for example Samuel Eilon, Elements of Production Planning and Control, (New York: The Macmillan Company, 1962), p. 135. For a more optimistic view see Milton H. Spencer and Theodore H. Mattheiss, "Forecasting Sales of Consumers' Durable Goods," California Management Review, IV, no. 2 (Spring, 1962), pp. 75-101.

³⁶This report was summarized and the quotation taken from Eilon, ibid., p. 135.



annual variation in sales. It is thus in those industries where sales variability is greatest, hence relevant costing would play its most important role, that sales predictability is weakest.

The preceding paragraphs have not been intended as a diatribe against the planning process. They are intended, however, as a cautionary warning against basing periodic profits on the estimated course of future events. From the standpoint of externally published financial statements, the extremely important problem of confidence in published financial statements would have to be carefully evaluated before such a step could be taken.

What of the future? Might the computer be able to neutralize the forecasting difficulty enabling relevant costing to become operationally feasible? John Dearden has commented upon the computer and the forecasting task:

The proposition is that the future size and speed of computers will allow us to measure and manipulate causes in a way never before possible, thus considerably improving forecasting results. Clearly, a more accurate look into the future would be of the greatest importance to management. . . .

The question is whether this will ever be possible. Isn't the real world so complex that even the largest and fastest computer cannot begin to simulate it? Even if such improved forecasting came about, wouldn't the very existence of these techniques, in itself, set into

motion changes that would invalidate the forecast? If each firm had the ability to forecast, would this create a new strategy--and how could this be taken into account? Consequently, my conclusion is that the nearly perfect forecast is too far away to be of consequence to the business manager of today.³⁷

Finally, a few words remain to be said about inventory build-ups in anticipation of rising variable factor costs. The relevant costing rule calls for the inventorying of fixed overhead in this situation. However, limitations have not been properly designated by relevant costers. An important component of variable factors comprises items which can be inventoried. This category includes direct materials and that portion of materials or supplies which vary with output but for convenience are classified as overhead. If cost increases are anticipated for these factors, then the crucial action is stockpiling these items. The manufacturing process is completely irrelevant to the cost minimization action. Relevant costing, then, does not apply to inventoriable variable factors when a rise in their cost appears imminent. The case of expected rising labor costs is an interesting one, however. The extent of the inventory increment will be based upon maximizing the total difference

³⁷ John Dearden, Computers in Business Management, (Homewood: Dow Jones-Irwin, 1966), p. 289.

between the estimated avoided variable labor cost increases as opposed to the increased inventory carrying charges and labor costs of the build-up (including overtime and shift differentials). Other factors such as the adverse effect upon the firm's cash position must also be kept in mind.

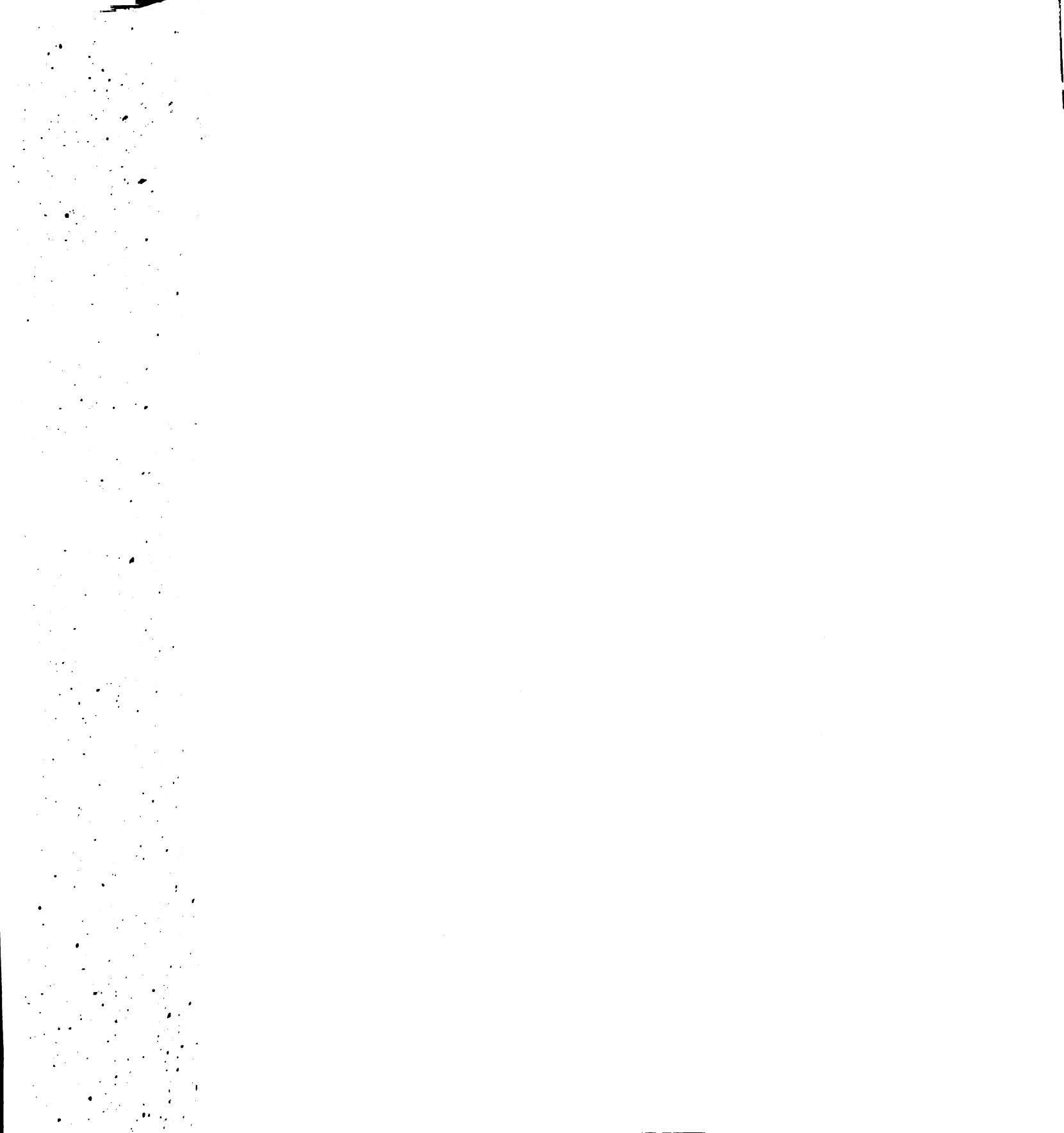
A related question arising from the anticipated rising labor cost situation is this: will labor be able to estimate management's evaluation of the expected wage rate and would this, in turn, affect the bargaining process. If so, management's estimates of future labor rates included in the inventory computations might tend to be rather conservative.

Summary and Conclusions

1. Because relevant costing is a hybrid of two methods, confusion may be created (functional fixation) in terms of the meaning of income.

2. Relevant costing could have importance of management in extremely short income period reports because the likelihood of having short capacity in relation to sales increases as the period is shortened.

3. If relevant costing were used, one of the two circumstances where fixed costs would be inventoried occurs in



the face of expected variable factor cost increases. When variable factor costs are expected to increase, if prices in exit markets (markets where the firm's product is sold) are not expected to rise, the firm faces a profit squeeze. Increasing income (by inventorying fixed overhead) where a profit squeeze is expected, is a highly debatable proposition if income is expected to serve as an indicator of future trends.

4. For variable factors of an inventoriable nature, the crucial action is acquisition when costs are expected to rise and not production after the acquisition occurs.

5. Less than 20% of the respondents to a survey taken in the Milwaukee area indicated that income would be significantly affected if relevant costing were used rather than direct costing.

6. Firms whose income would be most affected by relevant costing in 5 above would be most likely to have the greatest difficulty in predicting future sales.

APPENDIX A

LETTER AND SURVEY QUESTIONNAIRE

THE UNIVERSITY OF WISCONSIN-MILWAUKEE
School of Business Administration
Milwaukee, Wisconsin 53201

Donald W. Asplund
Treasurer-Controller
Ambrosia Chocolate Co. Division W. R. Grace & Co.
1133 North 5th
Milwaukee, Wisconsin 53203

Dear Mr. Asplund:

You are being asked to participate in an opinion and information gathering survey on the subject of relevant costing as a result of your position and experience in manufacturing operations.

"Relevant costing" is the name of a concept relating to the accounting treatment of the fixed overhead costs of production. The proponents of the concept favor charging these costs to product only if the present use of the firm's fixed productive capacity provides future benefits in either of two very specific ways:

- 1) Sales potential of a future period or periods is expected to exceed productive capacity either for the firm as a whole or for departments thereof. (In order to make relevant costing operational in this particular situation, two conditions must be present:
(a) Sales of future periods must be subject to a relatively high degree of prediction,
(b) Productive capacity of the firm in future periods must be known).



- 2) Cost of variable factors (raw materials and direct labor, principally) are expected to rise in the future. Therefore, producing for inventories avoids the anticipated future cost increases to the extent of the additions to stock.

Only in these specific situations would relevant costing proponents charge the costs of fixed manufacturing overhead to product. If these conditions were not present, they would be charged against current revenues as period costs, exactly as would occur under direct costing.

With this information as background, would you please answer the questions on the following pages and return them in the enclosed stamped envelope? Feel free to make your comments as lengthy as necessary. All responses will be treated confidentially. Your participation and prompt response is very much desired and appreciated.

Sincerely,

Harry I. Wolk
Assistant Professor
Business Administration

HIW:bh
enclosures

Questions

Note: Please give explicit answers, wherever possible, in the light of conditions in your own particular firm or industry.

1. Would the use of relevant costing result in a materially different annual net income than would arise if direct costing were used in your particular firm?

If "yes" to the above, how frequently would you expect material differences to arise?

If "yes" to the above, which of the following circumstances would cause the difference between direct costing net income and relevant costing net income?

- a) Fixed overhead is a significant part of total cost, annual sales are subject to a high degree of fluctuation and productive capacity is not geared to maximum sales needs.
- b) Anticipated variable factor cost increases in the next period (please specify the specific factors).
- c) Other



If "no" to the above, what management techniques are presently used to keep you aware of the situation?

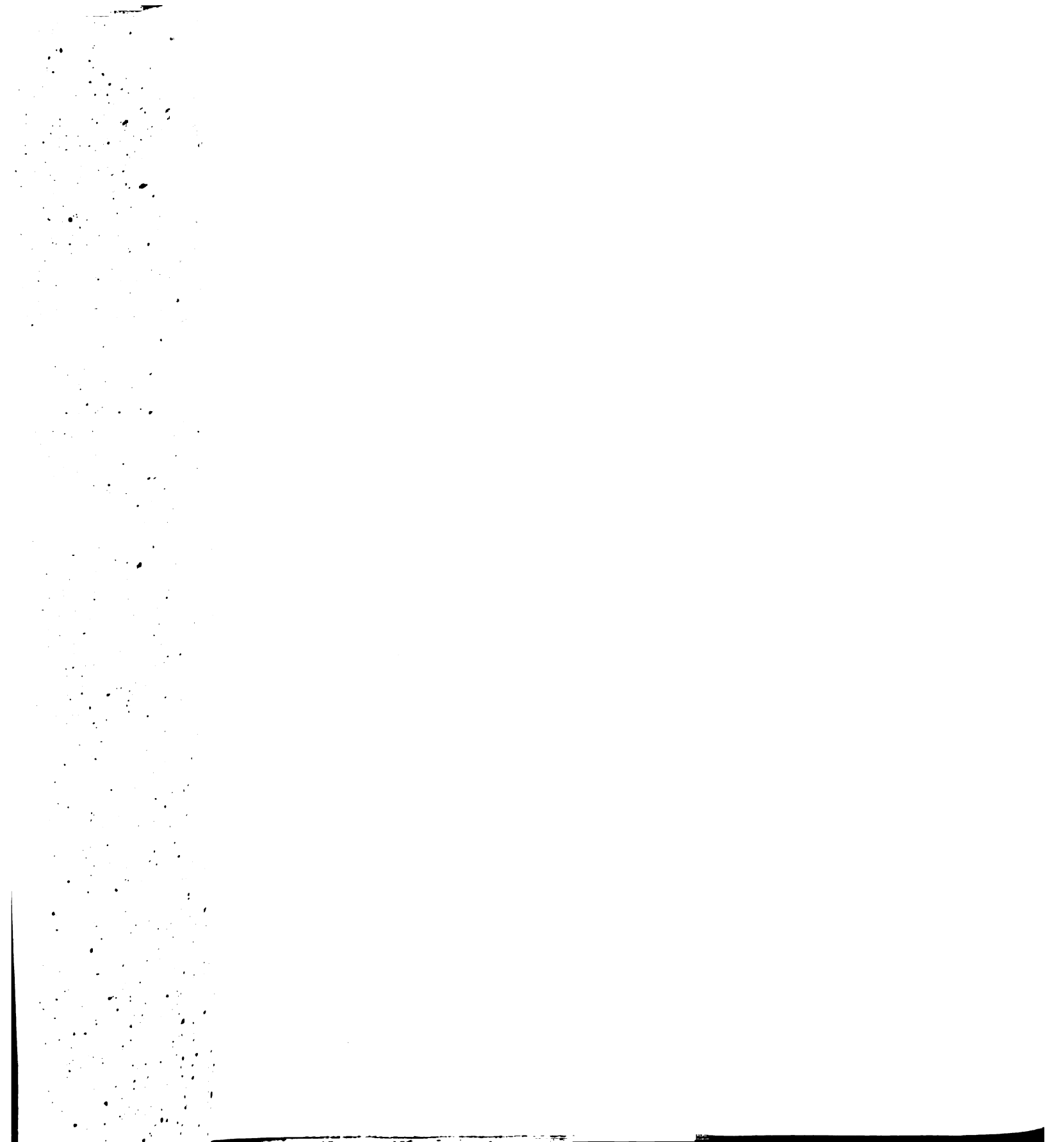
4. If relevant costing were desired for any of the above mentioned reasons, would any difficulties arise that would effectively prevent it from being made operational, such as:

a) Difficulty of getting accurate predictions of future sales or expected changes in the cost of variable factors of production.

b) Difficulties of estimating capacity due to frequently changing product specifications or extensive sub-contracting practices.

c) Other

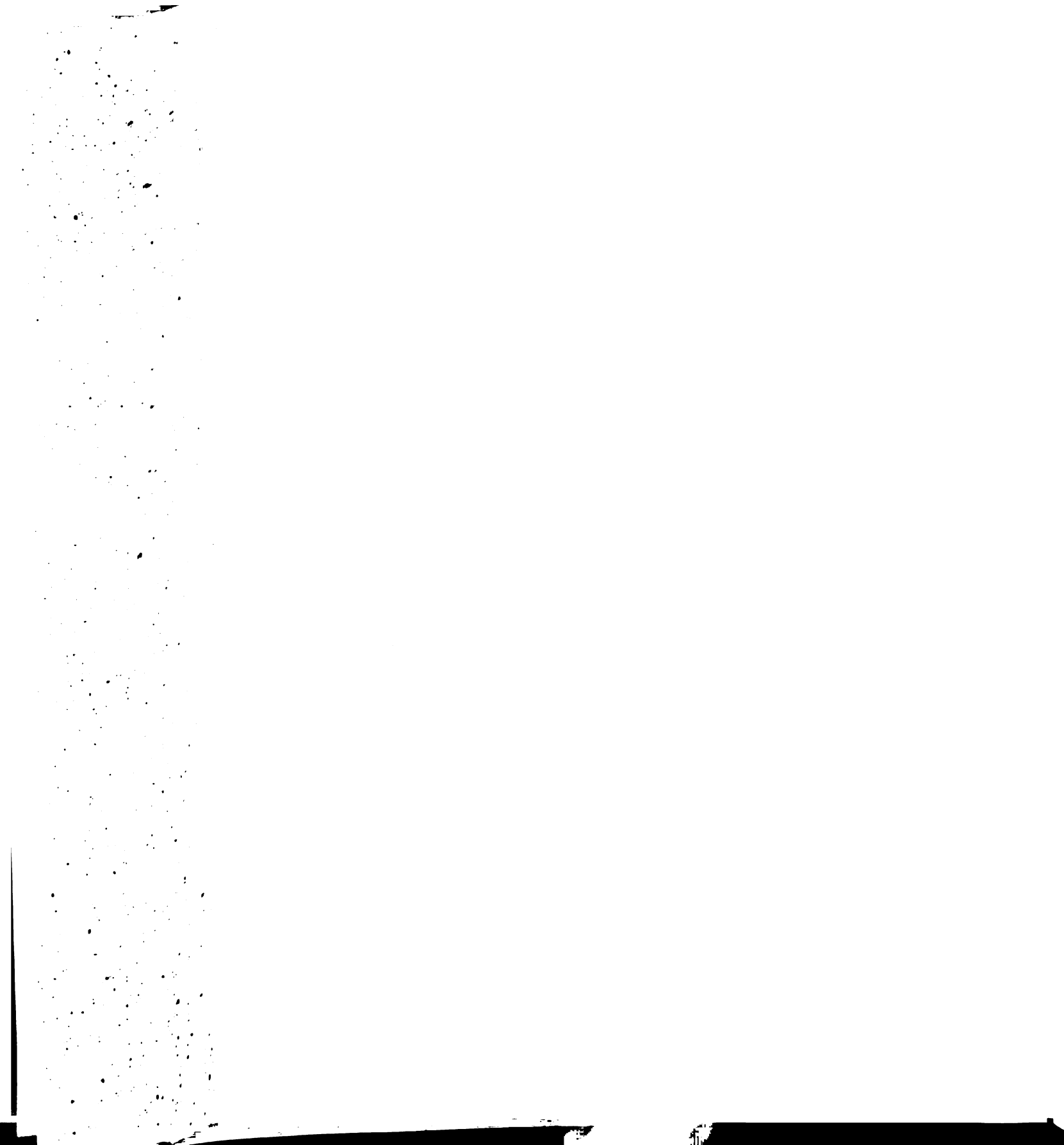
5. Other questions, observations or comments.



APPENDIX B
SURVEY FOLLOW-UP

1. What particular industry (ies) would you classify your firm or division as a member of?
2. What is the reason for your firm's potential annual fluctuation of inventories?
 - a. Cyclical nature of the industry
 - b. Capacity shortages
 - c. Expected variable cost increases
 - d. Other
3. What percentage of total costs are the costs of capacity for your various product lines or the firm as a whole?
4. Can you estimate (within a range) the effect upon firm or division profits when either of the two specific relevant costing criteria become valid? (Contrast with a direct costing determined profit figure and don't hesitate to "guesstimate!")

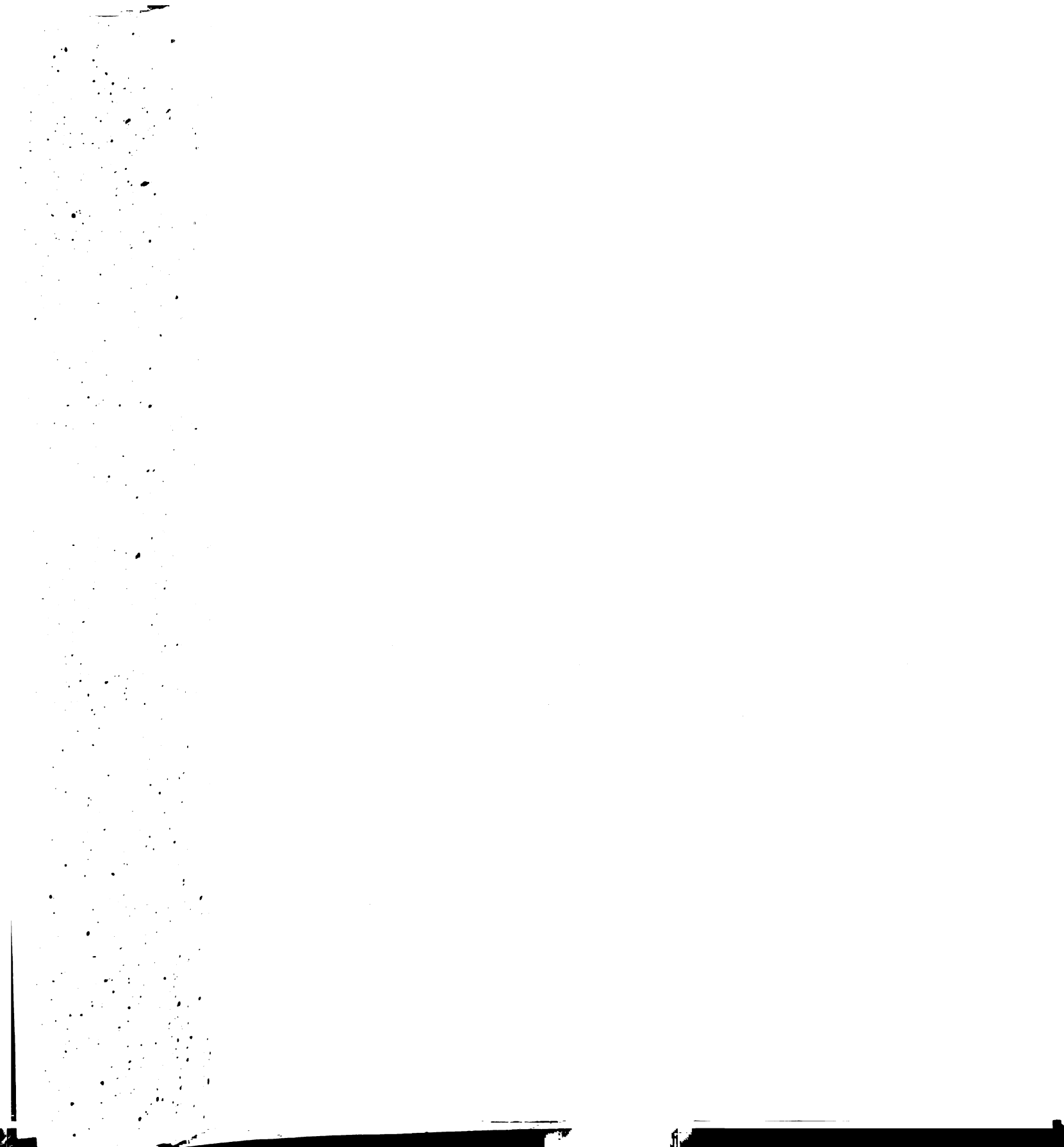
5. What are the approximate annual carrying charges on inventory? (Include insurance, taxes and obsolescence as well as cost of capital.)
6. Would you ever stockpile inventory items for periods longer than a year?
7. If your firm is characterized by chronic capacity shortages, why does this condition exist?
8. Are capacity shortages for particular product lines alleviated by the use of general purpose equipment?
9. Are chronic annual sales fluctuations a characteristic of your particular industry?



VI. SUMMARY AND CONCLUSIONS

The costs falling under the classification of fixed manufacturing overhead have traditionally provided the greatest problem to the cost accountant in terms of associating them with product for the purposes of income determination and inventory valuation. In attempting to assign these costs to product, he has looked for a basis of association called a burden factor which will presumably be a meaningful indicator of the benefits received by product from fixed manufacturing overhead.

However, many problems have arisen from this basic method. In a multi-product firm with several cost centers, the more important problems would be: (1) should plant-wide or separate cost center rates be used, (2) the type of burden factor to be selected for the plant or individual cost centers, (3) assignment of service department costs to cost centers, (4) level of capacity the burden factor is gauged for in arriving at overhead rates (level the plant or department could conceivably produce at, the level it is expected to produce at, or a level set in terms of expected long-run sales needs), (5) disposition of variances at the end of the year.



In addition to the above mentioned complexities, several other conditions led to the search for a more viable solution to the fixed overhead problem. Short-run management uses are questionably served, no matter which of the various absorption costing alternatives are selected because mixed in cost of goods sold figures are avoidable out-of-pocket costs along with unavoidable out-of-pocket costs and sunk cost allocations. In addition, two variables-- production as well as sales --affect income. This condition has led to circumstances where income of a second period exceeds that of the prior period despite the decline in sales due to increasing productivity.

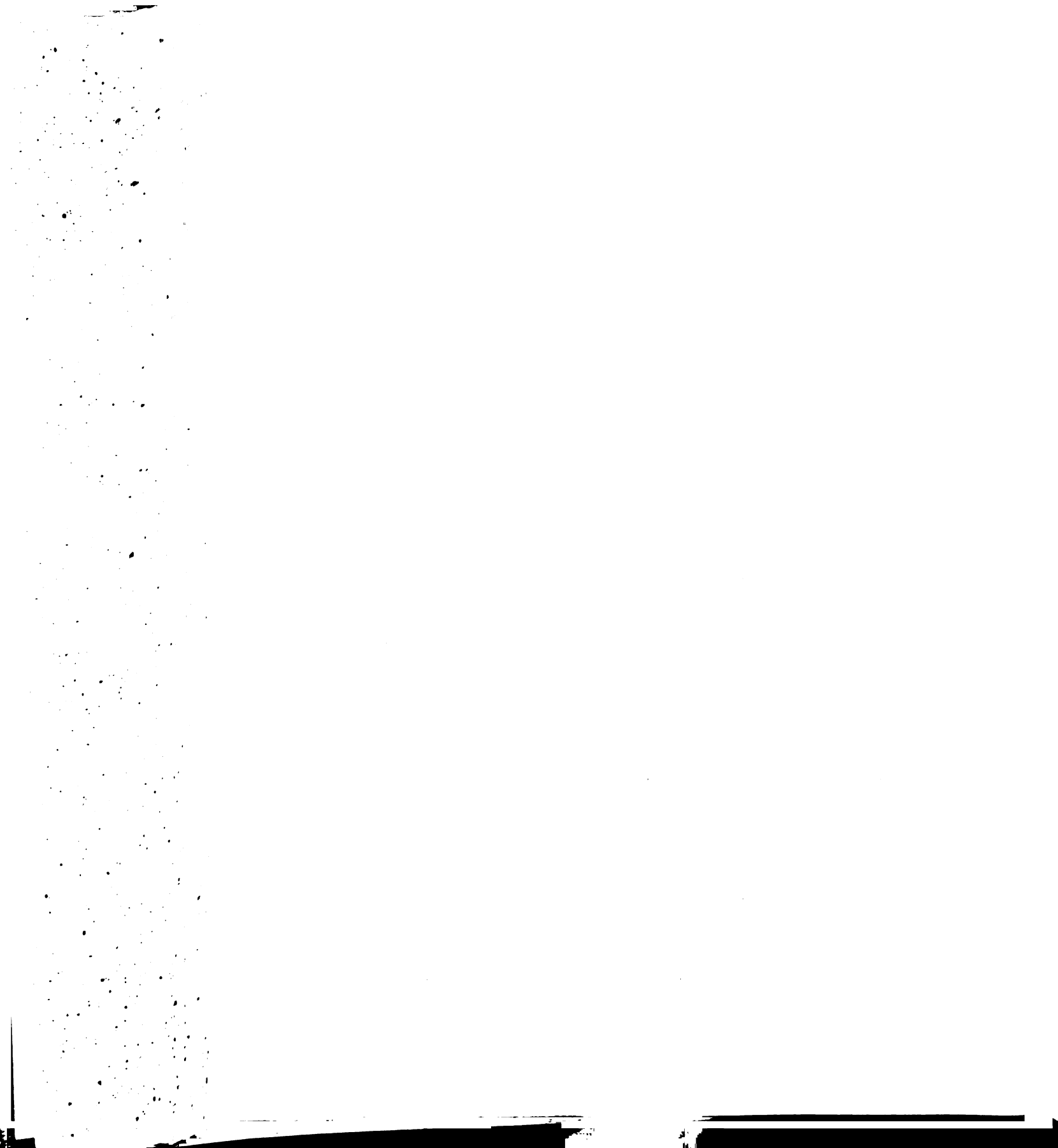
As a result, direct costing, a method advocating the separation of fixed and variable overhead costs with the former not being inventoried, was proposed in the literature in 1936.¹ Though originally advocated only for managerial purposes, the distinction between managerial uses and needs of outside parties was not clearly demarcated. After a dormant period during World War II, interest in the subject became very intense by the early 1950's. By

¹Jonathan Harris, "What Did We Earn Last Month?," op. cit.. Marple has observed that Harris' article may not have been the first in print on direct costing but that it deserves credit as the pioneering article on the subject. Marple, ed., op. cit., p. 8.

the mid part of that decade, direct costing had been recommended for published financial statements.

The relevant costing idea emerged in the early 1960's. Under this method, costs are inventoried if and only if their incurrence leads to future benefits in the form of increased revenues or decreased costs. With the variable costs of producing inventories, the above must be the case since these costs need not be incurred again for the amounts included in inventories. The same is not necessarily true of the fixed manufacturing costs, whether of the sunk or out-of-pocket variety because these costs are largely unavoidable in the short-run within various ranges of output. Therefore, when fixed costs are unavoidable in the short-run period, services of these types may not be scarce, economically speaking, to the firm even though they are necessary from the technical standpoint to the completion of product. Their necessity in the technical sense is sufficient justification for charging to product from the absorption costing viewpoint.

There are two circumstances where relevant costers would inventory fixed manufacturing costs: (1) sales for a future period are expected to exceed productive capacity, (2) future increases of the variable overhead factors are



anticipated.² In the first case, future revenues will be lost if inventories are not increased, and in the second, variable cost increases can be avoided to the extent of their inclusion in inventories prior to the anticipated cost increases. In both of these cases the fixed factors of production have a time utility that they do not have where these two particular conditions are not present. If these factor services were not available then inventories could not be increased and future profits would be decreased.

However, there may well be other benefits accruing to the firm from fixed factor services within the relevant costing context. Among the functions performed by inventories, Magee has noted the following: (1) short-term protection against stock-outs or extra uneconomical production runs arising from unforeseeable shifts in demand, (2) the necessity of keeping goods flowing or in transit between processes or places so that delays do not arise due to gaps in the firm's various pipelines, (3) minimizing set-up and carrying costs by means of optimum size production runs.³ Inventories at statement dates arising

² Horngren and Sorter, "Direct Costing," op. cit., 88.

³ John F. Magee, Production Planning and Inventory Control (New York: McGraw-Hill Book Company, Inc., 1958), pp. 17-20 and 55-59.



due to any of these functions are thus helping to minimize variable costs or provide protection against lost revenues. In these cases, as well as the two stated by Horngren and Sorter, it would appear that fixed costs should be inventoried.⁴

We contend that relevant costing is an offshoot of direct costing. The idea arose shortly after the 1958 recession. One of the authors of the idea was troubled by the thought that absorption costing might intensify recessions as a result of the expensing of large increments of overhead as inventories become depleted.⁵ In addition, the authors felt that the specific conditions leading to the inventorying of fixed overhead would be relatively infrequent hence the direct costing solution to inventory valuation and income measurement would result.⁶ Finally, since both authors had taken the position in their first joint article that direct costing should be used in published financial statements, we view relevant costing as a refine-

⁴Horngren and Sorter have alluded to the second of the functions noted above. Horngren and Sorter, "Direct Costing," op. cit., 90.

⁵George H. Sorter, "Reported Income and Inventory Change," op. cit.

⁶Horngren and Sorter, "Direct Costing," op. cit., 92.

ment of direct costing.⁷

One of the unpursued paths opened by the relevant costing controversy is its relationship to opportunity costs. Writers on both sides of the relevant costing question saw a kinship between the two but it was not clearly enunciated. We have defined opportunity costs as the current cost of factors expiring during the income period.

One of the disputes among income theorists involves the problem of whether expired services should be valued in terms of their costs by the most efficient means of production in contrast with their costs in terms of the firm's presently owned assets. Solomons has shown that in perfectly competitive markets, the appearance of more technologically efficient assets will tend to drive the price of older assets down to the point where cost per unit of service including depreciation will be the same.⁸ Solomons' analysis also ties in with an earlier proposal on obsolescence by Green and Sorter.⁹ Since relevant costing is

⁷Ibid.

⁸David Solomons, "The Determination of Asset Values," op. cit.

⁹David Green, Jr. and George H. Sorter, "Accounting for Obsolescence - A Proposal," op. cit.

admittedly an opportunity cost oriented figure, it should not be adopted without likewise implementing the Green-Sorter proposal. This would imply that when either of the two relevant costing conditions is present, signalling the inventorying of fixed overhead costs, depreciation costs of partially obsolete fixed assets could be significantly less than presently calculated amounts.

Though the relevant costing dialogue has revolved mainly around manufactured inventories, it has been presented as a general approach to asset valuation and cost expiration. We have therefore asked how the concept would affect asset valuation and expense determination outside of the manufactured inventories area.

The key to understanding the potential effect of relevant costing in other areas lies in understanding the benefits test implied in the statement that costs are carried forward as assets "if and only if they have a favorable economic effect on expected future costs or future revenues."¹⁰ Though the services stemming from fixed assets or attributable to unavoidable factors are necessary to complete product, because the factors behind these costs are either

¹⁰George H. Sorter and Charles T. Horngren, "The Relevant Costing Approach, op. cit., 393.

unavoidable in the short-run or the costs themselves expire largely as a result of time rather than usage, the services are not economically scarce. Hence the relevant costing criterion of when a charge should be carried forward as an asset pertains to incremental revenues and costs only.

How does the relevant costing test affect initially incurred costs, that is costs incurred at the beginning of factor life either for the acquisition of the factor itself or for other services necessary to ready the asset for usage. These costs meet both conventional tests for asset classification and the relevant costing test. One of the virtues of relevant costing is that it has focused some attention on intangibles such as research and development and advertising costs which have future benefits but due to difficulties of finding meaningful bases of write-off, conservatism has won out and these costs are usually immediately expensed. The fault, however, is not with conventional accounting but rather with the solution of expedience so widely adopted.

Relevant costing would imply different treatments than those presently accepted for after-costs, costs arising at the end of factor life such as bond redemption premiums and fixed asset removal costs. In both of these cases scarce

resources are expended in order to increase future revenues or decrease future costs. The fact that removal costs are foreseeable under the going concern assumption whereas bond redemptions are not does not lead to any meaningful distinctions between the two situations. Under relevant costing both of these costs should be inventoried and written off over future periods. This treatment of after costs could be avoided if the relevant costing rule were restated to also include a physical association test for carry-forward as well as the economic benefits test. Initially incurred costs and recombination costs would be unaffected by this consideration but it would abort the carry-forward of charges which arise in relation to assets or equities which are being terminated, despite the future benefits stemming from these costs.

The viewpoint has been put forth that one of the future benefits attributable to a fixed asset at the moment of acquisition is the tax shield provided by its depreciation.¹¹ If depreciation is defined as the decline in the present value of remaining future services, including its tax reduction potential, during the period, it has been shown

¹¹For example, Harold Bierman, Jr., "A Problem in Expense Recognition," op. cit.

that income tax allocation would become an obsolete procedure because it would, of necessity, break the equal annual return on investment criterion.¹² However, if we continue to define depreciation as a before tax charge rather than an after tax one, as defined above, then income tax allocation is not inconsistent with relevant costing, as a concept, on the assumption that additional charges to tax expense in earlier years of fixed asset life represent declines in remaining future benefits. However, whether income tax allocation will bring about a more closely equalized annual return on investment is dependent upon factors such as the "steepness" or slope of the pattern of net service values of affected assets. Moreover, whether these patterns can in fact be determined on an individual asset basis or whether there is any need to do so where multiple asset packages are used in firms or segments thereof are other questions making the equalized return on investment criterion for income tax allocation extremely tenuous.

The final question probed in this dissertation concerns

¹²David Drake, "The Service Potential Concept and Inter-Period Tax Allocation," op. cit.

the potential usefulness to management of relevant costing. Recent studies have begun to focus upon the effect of different accounting methods upon managerial decision making and changing from one method to another over time. A study of the latter type has posed the possibility that management users may adhere to previous interpretations of income despite changes in arriving at the measurement of income brought about by altered accounting methods.¹³ This lack of flexibility has been termed "functional fixation." The possibility of functional fixation by statement users should have great significance upon the potential adoption of relevant costing because it is essentially a hybrid between absorption costing and direct costing. We effectively go from direct costing to absorption costing when short capacity or rising variable factor costs are anticipated.

Because relevant costing has been viewed here as a refinement of direct costing, a survey was undertaken to determine whether relevant costing would significantly affect income determination as opposed to direct costing and also general attitudes toward the potential usefulness

¹³Yuji Ijiri, Robert K. Jaedicke, and Kenneth E. Knight, "The Effects of Accounting Alternatives on Management Decisions," op. cit.

of direct costing. The survey questionnaire was sent to all members of the Milwaukee Chapter of the National Association of Accountants presently employed in manufacturing firms. Four hundred and seventy-seven questionnaires were sent out with sixty-nine responses received or 14.5% of the total. Only twelve of these respondents indicated that relevant costing would lead to significantly different annual income figures for firms or segments thereof as opposed to direct costing. None of these respondents said that income would be affected by more than 5% though several hesitated even to guess. Moreover, these respondents all saw difficulties in terms of estimating sales or measuring capacity, conditions crucial to an accurate measurement of income in one of the relevant costing situations. This circumstance is one that could certainly be anticipated because those firms most likely to be affected by relevant costing would likewise be subject to relatively high sales volatility.

Though 46.3% of the respondents saw relevant costing as being potentially useful for management, further follow-ups revealed this to be a subjective type of feeling with no strong opinions being expressed.

For planning and control reports and techniques based upon accounting information, relevant costing appears to be

capable of playing only a minor role. In cost-volume-profit analysis, for example, difficulty would arise whenever short capacity or rising variable factor costs were anticipated because productivity as well as sales would affect income. Relevant costing might play a role in intra-firm transfer pricing systems where negotiated prices were in use. It might lead to higher prices being received from either outside firms or buying divisions within the given firm but sub-optimization might well occur in short capacity situations if central management does not referee. Its most logical use in addition to income determination, appears to be return on investment analysis if the view is taken that it gives a better matching of costs with revenues than direct costing, assuming that the latter, in turn, is preferred to absorption costing.

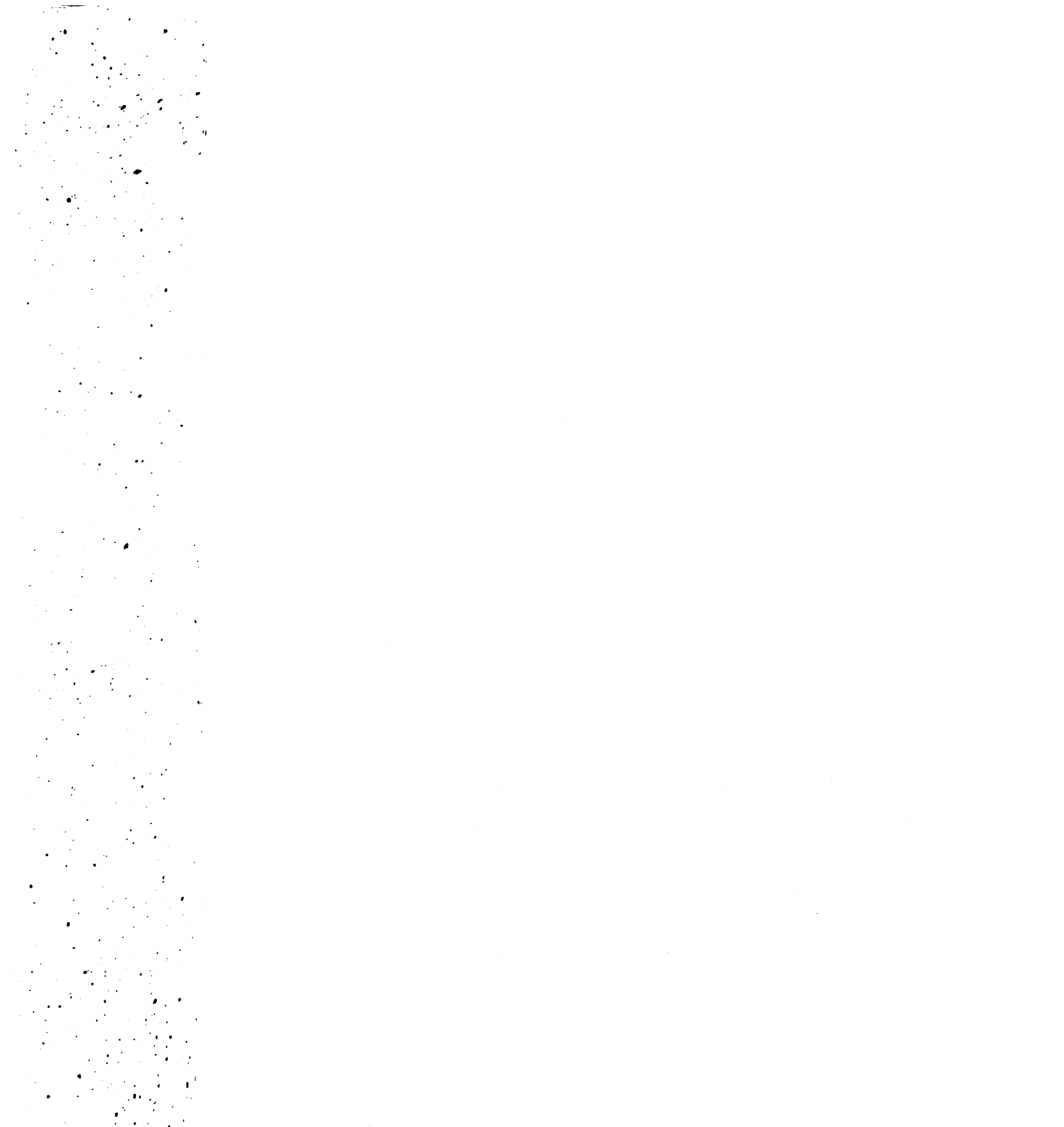
We conclude that relevant costing does not offer enough advantages to warrant its usage by external statement users. The crucial factor, in our opinion, is the time-run implied by the relevant costing test as opposed to absorption costing. The matching test of absorption costing makes no distinction between factor services that are deemed to be "fixed" in the short-run and those varying with productivity. As long as value is added at the time

factors perform services than costs are inventoried. It is our value judgment that outside statement readers are most benefitted by the longer-run matching test rather than the incremental shorter-run viewpoint.

Another circumstance which must carefully be considered concerns the question of objectivity of measurement because income determination under direct costing is partially a function of future events.¹⁴ The door to income manipulation and a decline of confidence in published income figures could be opened by relevant costing or other methods which evaluate the results of the past by peering into the future.

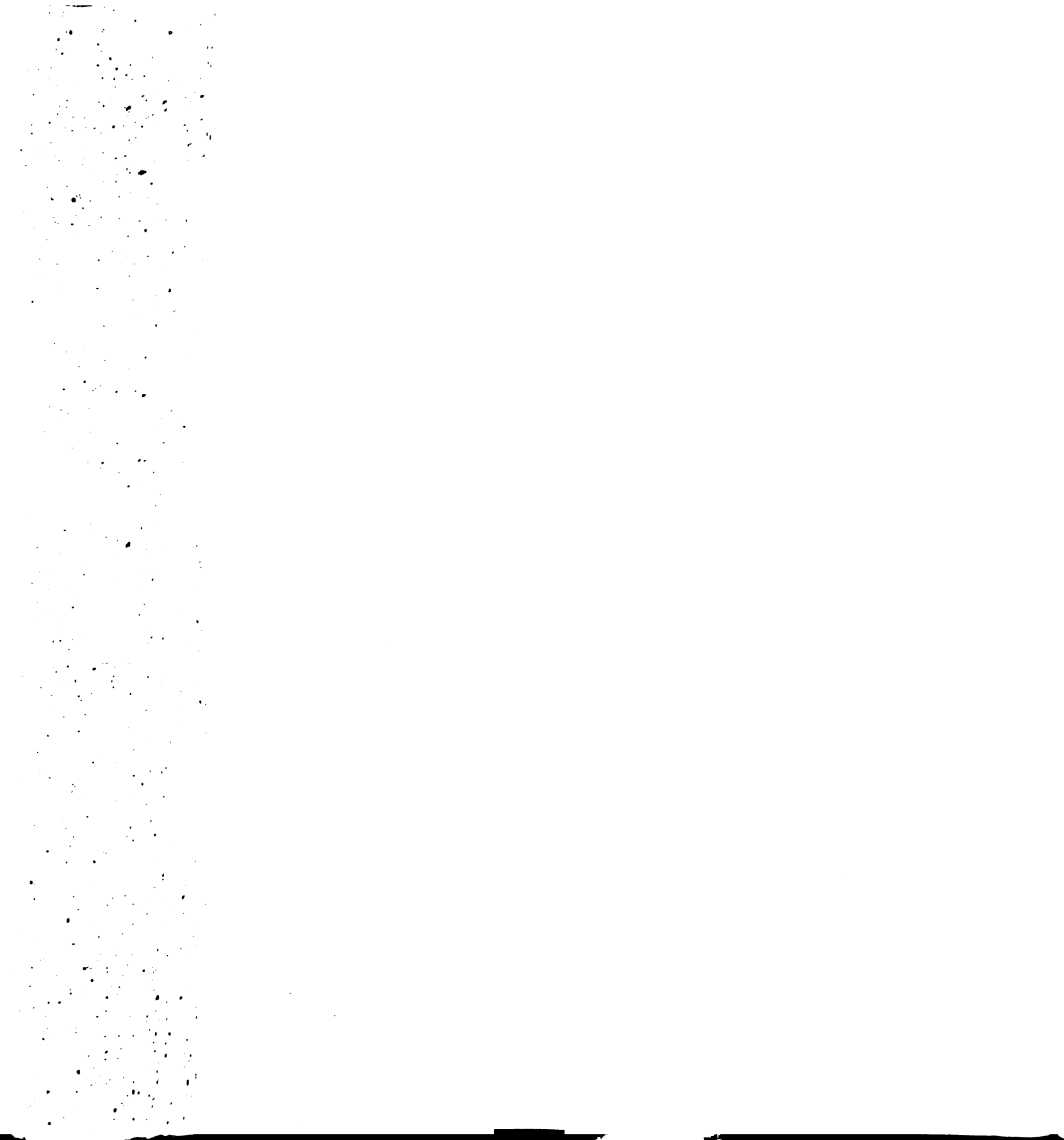
For management needs, the question is more of an individual one. Certainly the short-run considerations of expected short capacity and rising variable factor costs

¹⁴R. J. Chambers has taken a very strong stand against measuring past performance in terms of future events: ". . . it seems, at least to me, patently improper to judge past accomplishments on the basis of what some person (a manager, in particular) may think about the future. This is mixing two quite distinct things. One cannot assess how far he has travelled in the last hour by taking account of where he expects to be an hour hence. . . . progress to date and what lies ahead are in no sense the same; neither is part of the other." R. J. Chambers, Measures and Values, " The Accounting Review, XLIII (April, 1968), 240.



are of extreme importance to management. However, whether these circumstances should be incorporated as additional variables affecting income is another matter. In addition to the problem of "functional fixation" --inability to orient to changed measures of income-- several other aspects must also be considered. The functional fixation problem could be compounded when we consider that one of the circumstances leading to the inventorying of fixed costs--hence higher profits --is essentially a defensive action, the building of inventories in the face of rising variable factor costs. Finally, since present income is based upon future occurrences, questions of objectivity of measurement and possible attempts by affected management groups to manipulate income must also be strongly considered.

However, several questions brought up, in part at least, by the relevant costing controversy still remain to be answered. Certainly we would like to be able to determine, on a fairly broad scale, the proportions of inventories which serve the two functions delineated by Horngren and Sorter--hedges against rising variable factors and short capacity--as well as the three additional ones noted by Magee (see page 223). The smaller the proportions serving these functions, the smaller the distinction between rele-



vant costing and direct costing. Our survey, which covered only the functions mentioned by Horngren and Sorter, indicated that relevant costing would usually result in inventory valuations that would closely parallel direct costing determined figures. The question of inventory functions, of course, has great significance in terms of management's ability to maximize income as well as measuring it.

Another important problem concerns the question of what type of inventory valuation is most useful for the various readers of financial statements. Relevant costing stresses cost obviation or avoidance, those costs that need not be incurred again for inventory items including future costs saved and income not lost due to maintenance of stocks at appropriate levels. Some absorption costing adherents subordinate asset valuation to income measurement: though revenue is produced throughout the operating cycle, objectivity has ordinarily dictated that its recognition be delayed until the point of sale.¹⁵ Therefore, all costs which have added value to product should likewise be delayed in the inventory accounts until sale in order to get a better

¹⁵Philip E. Fess and William L. Ferrara, "The Period Cost Concept for Income Measurement - Can It Be Defended?," op. cit.



matching of costs and revenues. A different rationale for including all costs of production in inventories is that in the usual going concern situation, all costs, including fixed, will be recovered in the form of future cash inflows.¹⁶ Hence the balance sheet oriented idea of liquidity is the analogue to the previous reason stressing a better matching on the income statement. Chambers has stressed in his recent work a valuation based upon what could be obtained for assets if currently sold as a measure of the funds under management's jurisdiction.¹⁷ Other valuations stress the current costs (replacement costs) of factors tied up in assets as a measure of the economic sacrifice necessary to attain the firm's particular package of assets.

This discussion of asset valuations enumerating both cost bound measures and those based upon current values

¹⁶Staubus' most recent formulation in terms of asset valuation is called MATACAP (maximum time-adjusted cash potential) and is defined in terms of "the net contribution our assets will make to cash flows in their most likely future course." George J. Staubus, "Current Cash Equivalent for Assets: A Dissent," The Accounting Review, XLII (October, 1967), 660.

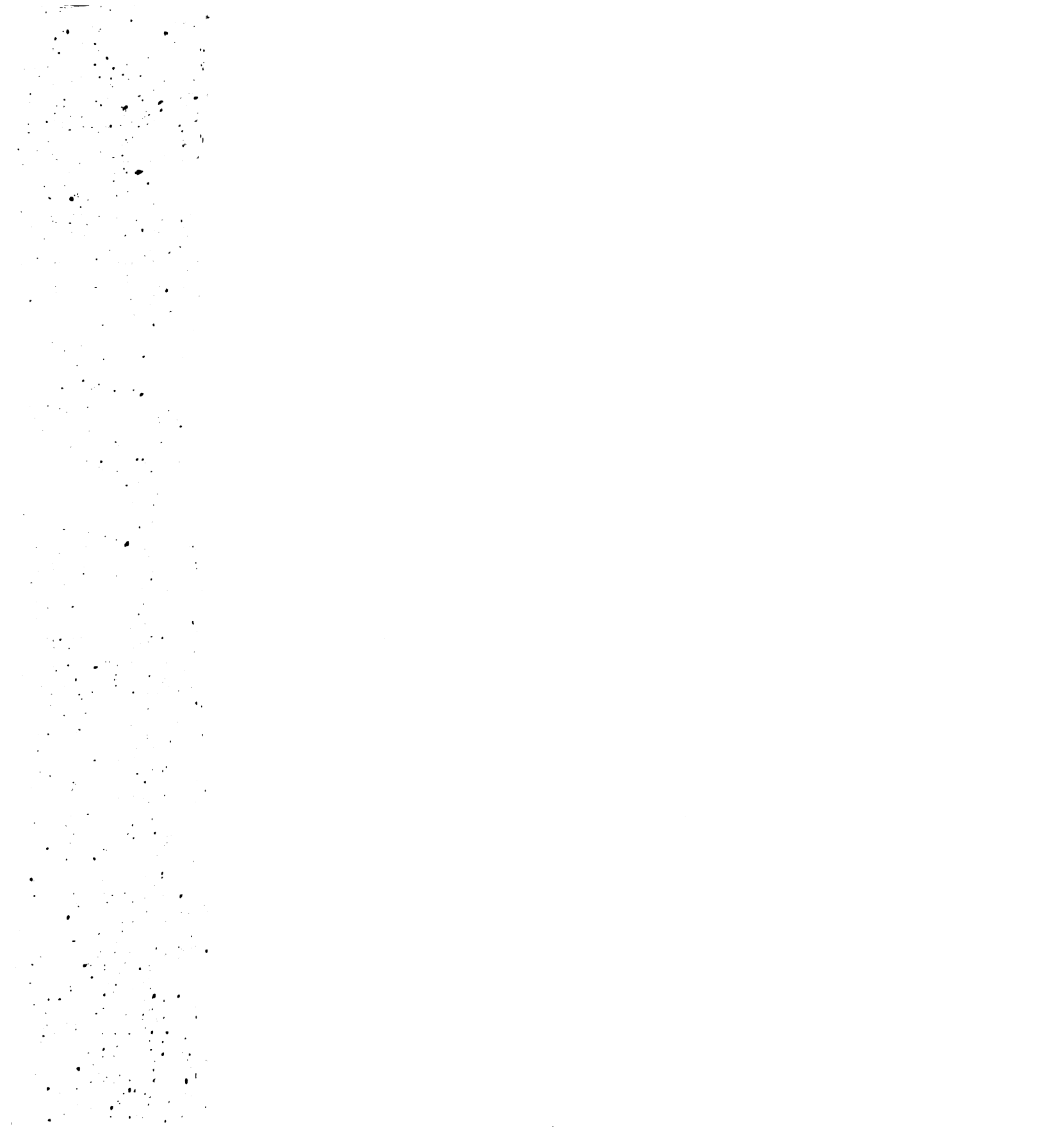
¹⁷Raymond J. Chambers, Accounting, Evaluation and Economic Behavior (Englewood Cliffs: Prentice-Hall, Inc., 1966), p. 92. For an excellent comparison between sales price and replacement cost as valuation bases see W.T. Baxter, "Accounting Values: Sale Price Versus Replacement Cost," Journal of Accounting Research, Vol.5 (Autumn, 1967), 208-14.

touches upon the presently existing divergence of views. Perhaps the increased attention focused upon the balance sheet in the relatively recent past may, in turn, eventually make both the balance sheet and the income statement more meaningful. If this is the road we are travelling, then relevant costing may well prove to be an important way-station.

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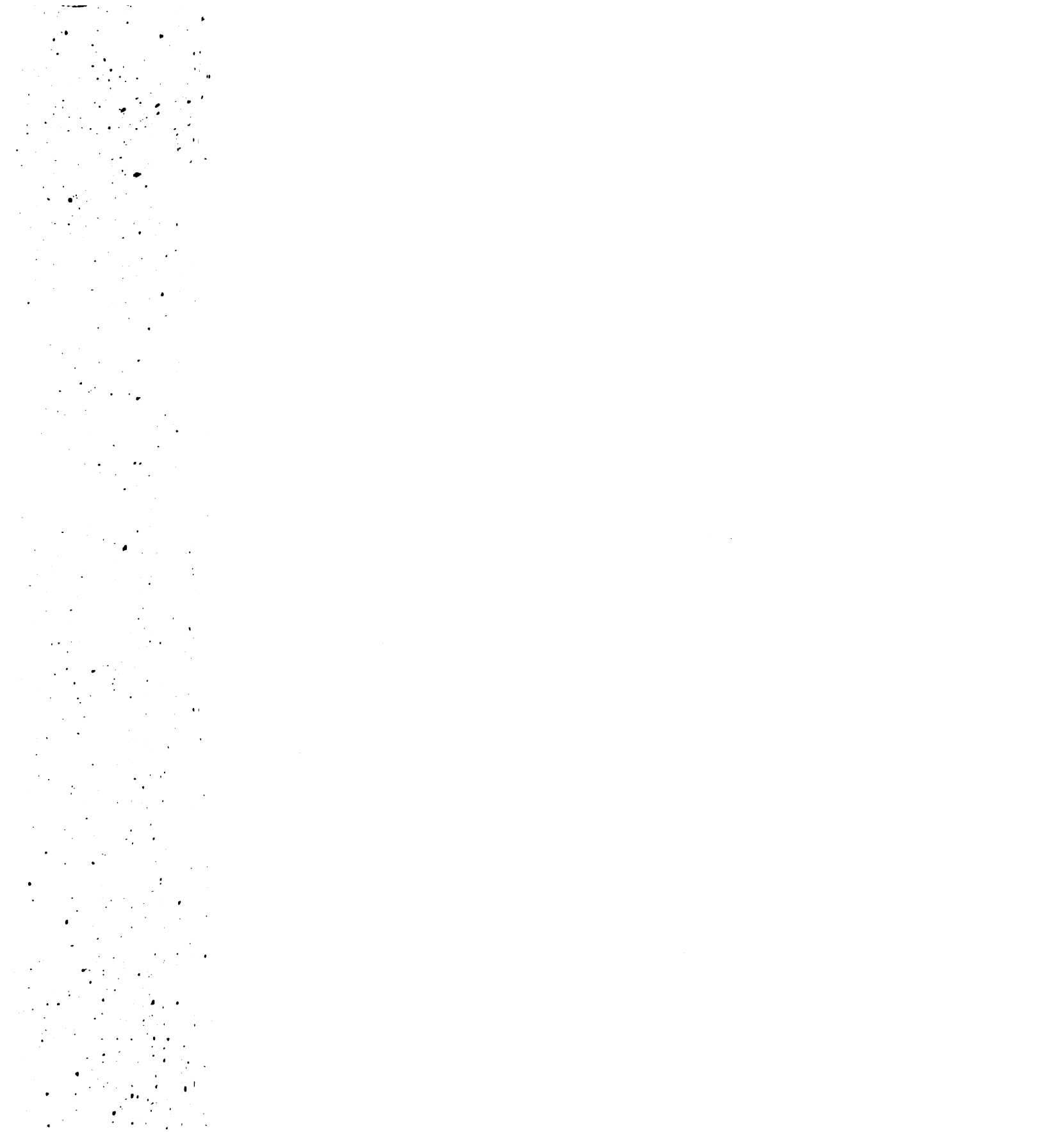
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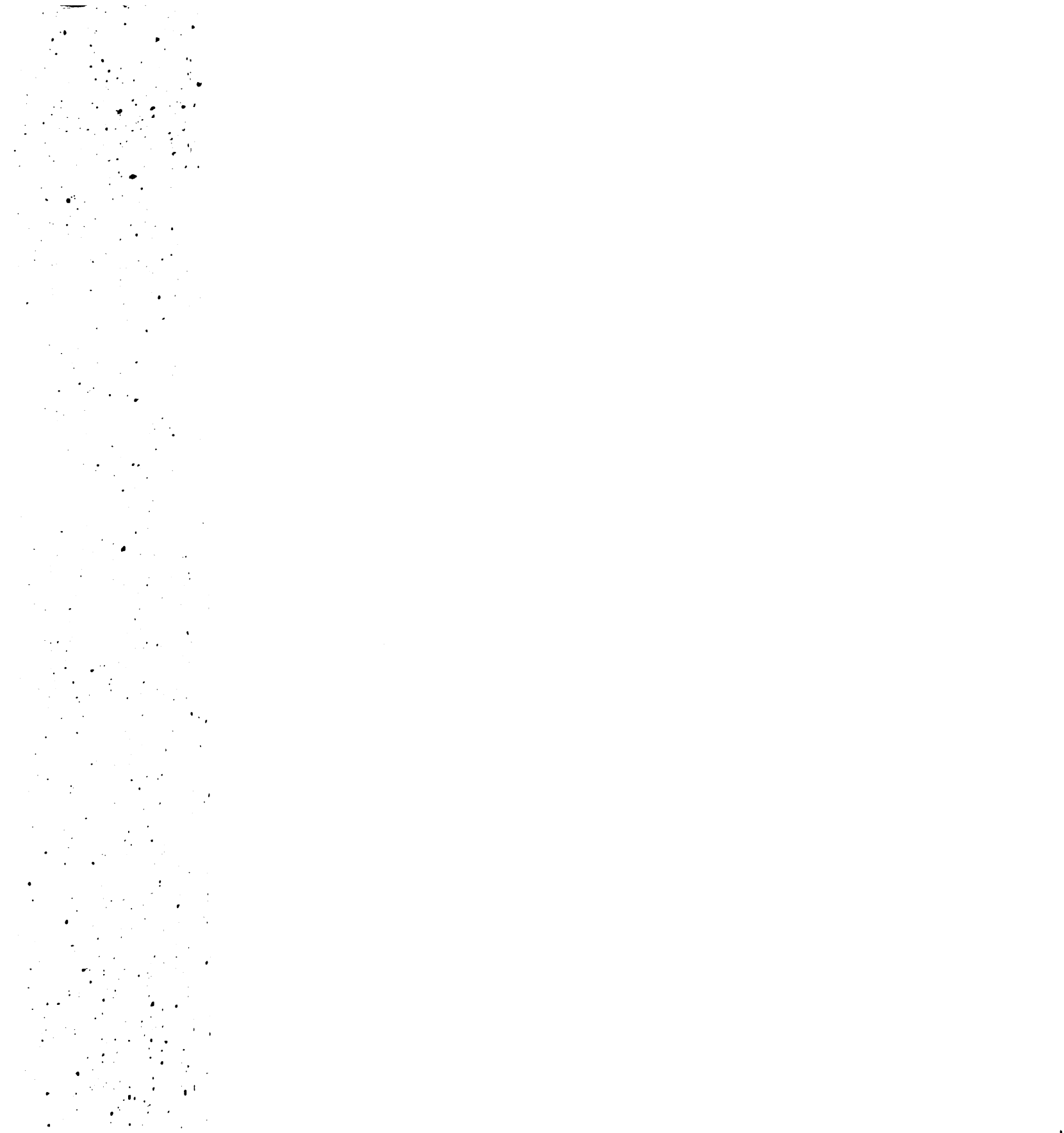
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