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Profit-sharing Problems and Their Solution

BY GABRIEL A. D. PREINREICH

Profit sharing is essentially an economic problem which, however, is of considerable interest to the accountant because he is frequently called upon to interpret its practical aspects, formulate its provisions or translate them into figures.

The origin of profit sharing in a modern sense may be traced to the gradual development of the means of production after the close of the Middle Ages. With the improvement of transportation facilities markets expanded and stimulated the growth of productive units. Tradesmen depending for a living chiefly upon their own handiwork found it profitable to hire help in far greater numbers than before and gradually assumed supervisory duties. Problems of management began to receive consideration and the discovery was made that voluntary coöperation based on fair play produces better results than slave driving.

The introduction of machinery created the modern factory with many thousands of workmen, whose performance could no longer be watched as closely as that of a few apprentices working under the master's eye. Inducements in the form of bonuses were devised as a means of reducing the cost of supervision and incidentally to increase efficiency beyond the degree obtainable by supervision alone. With the corporate form of ownership management emerges as a separate calling, and it is found that the higher the type of employee the more necessary it is to interest him directly in the result of his efforts, because only in that manner will he be induced to invest the utmost of his ability in the business, the success of which is dependent upon his wholehearted efforts and enthusiasm. In this way the field of profit sharing was gradually enlarged until it became an almost general practice to distribute a part of earnings among those whose efforts produced them.

Bonuses offered on a scientific plan are preferably based on units related to the beneficiaries' activities. Thus the extra compensation of workmen generally depends on their volume of production, salesmen receive a percentage of sales, the factory superintendent's income increases with decreasing manufacturing costs, branch managers share in the profit of their respective

branches and the bonuses of the general executives and their assistants are computed on the net earnings of the entire business.

Distributions not based upon the ultimate earnings of an enterprise or its quasi-independent subdivisions have become standardized in many lines of business and have gradually lost their essential characteristics as shares of the profit. Examples are salesmen's commissions or the various factory wage systems originated by Taylor, Halsey, Rowan, Gantt, Emerson and others. Their computation is comparatively simple and does not call for assistance on the part of the professional accountant. The scope of profit-sharing agreements based on net earnings, on the other hand, expanded more and more and now includes not only management in a broader sense of the word, but often all employees and even customers. It is this apportionment of net earnings between owners and others which still seems to be the source of considerable perplexity, causing more and lengthier discussions in many staff rooms, and even among executives, than perhaps any other single problem with which accountants are confronted in the course of an audit. Apart from lack of familiarity with the technique of solution, the difficulties are largely caused by a conflict of viewpoints as to what constitutes profits.

Under any conceivable profit-sharing plan the partners interested in net earnings are all or several of the following:

1. Owner
2. Management
3. Labor
4. Customers
5. Government

From the owner's point of view, the shares of 2, 3, 4 and 5 are expenses while the government allows only 2, 3 and 4. The status of management and labor depends upon the plan adopted, but the shares of 4 and 5, and frequently even 2, 3 and a part of 1, must be deducted before determining the adjusted profit on which their shares are based. The words "earnings," "profit" or "income" thus have a different meaning for each of the parties concerned, and it is therefore essential to reach an understanding regarding their use before the problem itself may be approached. In the following discussion the expression "net earnings of business" will mean the total amount distributable to partners 1, 2, 3, 4 and 5, after all expenses considered as such by standard auditing procedure, but none of the profit shares, have been deducted from

gross income. The owner's share alone will be referred to as "net profit", while "taxable net income" is defined as shares 1 plus 5, less non-taxable income plus unallowable deductions. Other phrases likely to occur, such as "net earnings after taxes", "after return on capital", "before depreciation" or "net profit after dividend on preferred stock", etc., should be interpreted in accordance with these main definitions.

Profit-sharing plans in actual operation vary as widely as human nature, but certain important elements are common to many. Distributive percentages are often expressed in terms of several bases, and the latter must be found by applying a series of deductions to the net earnings of the business. Some of the most frequent deductions are:

1. Normal rate of return on capital.
2. Profit shares, which are expenses to the owner.
3. Additions to expense reserves omitted from income account.
4. Additions to surplus reserves.

Opinions as to what constitutes a normal return are expressed in the following deductions from net earnings:

1. Stipulated dividends on preferred stocks.
2. Constant dividend rate on common stock.
3. Percentage of market value of common stock.
4. Percentage on value of common stock derived from formulæ based upon earnings.
5. Percentage on aggregate of accounts receivable, inventories and fixed assets.
6. Interest on investment (capital stock, surplus and undivided profits) at beginning of year.
7. Interest on average investment for year.
8. Constant percentage of net earnings.

The government, as partner *ex officio*, is, of course, in a privileged position, setting up its own rules for profit sharing. Management, labor and customers, however, are less independent and thus their shares are computed in many different ways. Whether the portion of arbitrarily adjusted earnings due the bonus fund is expressed in percentages of such earnings or in terms of what is left after deducting the bonus has long been a favorite subject of debates and should be decided beyond doubt by verifying the original intention of the parties, whenever ambiguous phraseology of the text fails to give enlightenment. Whichever may be the case, fractions expressed in terms of the gross base may readily be converted into terms of the net base, or vice versa, by

deducting the numerator from the denominator or adding it thereto. For instance $12/100$ of the gross amount equal $12/88$ of the remainder. Similarly $4/16$ plus $3/16$ of gross equal $4/9$ plus $3/9$ of a net of $9/9$.

Additions to expense reserves and surplus reserves are popular deductions, although from the point of view of accounting theory they are open to several objections which will be discussed in a subsequent paragraph.

A typical formula for determining the amount of the profit-sharing fund will read somewhat as follows:

1.	Net earnings before depreciation		\$
2.	Less: 8% dividend on preferred stock	\$	
3.	8% dividend on common stock		
4.	5% of "1" for calling first preferred		
5.	5% of "1" to reserve for depreciation		
6.	5% of "1" to dividend equalization fund		
7.	Adjusted net earnings		\$
8.	Less: Federal income tax	\$	
9.	Profit share of directors		
10.	Profit share of employees		
11.	Adjusted net profit		\$
	Profit share of directors 5% of adjusted net profit.		
	" " " employees 5% " " " " "		

It will be noticed that the first group of deductions is dependent on known amounts only, so that the adjusted net earnings may be obtained without difficulty. In the second group, on the contrary, all items are interdependent and unknown. The only clue as to their respective amounts is contained in rather roundabout hints, suggesting their ratios to each other as well as to adjusted net earnings. It is evident that under these conditions the formula in the form submitted is of no practical use, except as a proof sheet, after the unknown amounts have been determined by recourse to algebra. Equations may be set up and solved in many more or less complicated ways by persons familiar with that branch of mathematics, but it is rather difficult to find a standard method adaptable to all situations and yet simple enough to be acceptable to those members of the accounting profession who dislike the very sound of the word "algebra."

Before attempting to reach conclusions as to the simplest procedure to be followed, it is advisable to survey the field. Balderston's *Managerial Profit Sharing* contains a wealth of data concerning a wide variety of profit-sharing agreements in actual use

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by prominent commercial and industrial firms, from which the following representative samples have been selected and adapted for our purposes:

1. After 12% dividend on capital stock, $\frac{1}{3}$ to management.
2. After 6% on capital stock, surplus and undivided profits at beginning of year, 12% of remainder or \$400,000, whichever is less, to bonus fund.
3. After 5% on invested capital at beginning of year, $\frac{1}{3}$ of remainder up to 10% of capital and 15% of excess to profit-sharing fund.
4. After 10% on capital stock, 25% of remainder to employees, 25% of then remaining earnings to customers.
5. After 7% on preferred stock and \$5.00 per share on common stock, 5% of remainder to reserve for amortization of preferred stock and 10% of then remaining earnings to bonus fund.
6. After 10% on investment at beginning of year, $3\frac{1}{2}\%$ of earnings to pension fund and 20% of remainder to management.
7. After 8% on first preferred and 7% on second preferred, 5% of remainder to reserve for depreciation and 5% for calling first preferred. One half of new remainder to labor and management.
8. After $7\frac{1}{2}\%$ on market value of capital stock, 5% of remainder to each of reserves for dividend equalization, bad debts and contingencies. 10% of then remaining earnings to directors, 50% to labor and 40% to capital.
9. After 8% on preferred and 6% on present value of common (average net profit after preferred dividend for last five years capitalized at 6%), 40% of remainder to management.
10. After 7% on average investment for year, 5% to managers, 5% to employees.
11. After 10% on average capital, one third to management. One third of remainder to labor.
12. After 4% of earnings to sinking fund, 6% on average investment to surplus and 17% of remainder to management.
13. After 50% of earnings are paid to stockholders, a percentage on salaries is distributed, equal to percentage of dividend on capital stock.
14. After 7% preferred dividend, 1% on salaries given as bonus for each \$100,000 of net increase in surplus.

Federal income tax is deductible in all cases, before any other deduction may be made.

In order to make the problems definite and to avoid the use of symbols for known amounts, the following figures will be used in

all solutions as the values of the elements of computation set opposite them:

\$1,000,000	Common stock, capital stock, first preferred stock, second preferred stock, market value of capital stock, total investment in plants, inventories and accounts receivable.
	Invested capital at beginning of year.
\$ 500,000	Salaries.
	Total net profit (after preferred dividend) of the four years immediately preceding year under consideration.
\$ 300,000	Net earnings of business before such items of expense, if any, as are specifically mentioned.
\$ 1,000	Excess of unallowable deductions over non-taxable income.

As already shown in the formula on page 344, almost all problems require certain computations which may be performed readily as well as others for which a knowledge of the final result is necessary. It is obvious that, if we dismiss the first group (lines 2-6), by performing the computations indicated, our task will be greatly simplified. Upon examining the second group, we find that the items are interconnected like so many links of a chain and that the aggregate of deductions (lines 8-10) and remainder (line 11) equals the adjusted net earnings (line 7), the amount of which we already know. It is further noticeable that the owner's share of such adjusted net earnings seems to occupy a central position with respect to the other links, since the relationship of all links to each other may be stated only through the intermediary of this central link. The line of least resistance thus points to this undetermined portion of the owner's share as our most acceptable unit for further computation. This unit should not be confused with net profits or taxable net income; it is merely a remnant of earnings, after deduction of several more or less arbitrary amounts.

Using the symbol "C" (capital) for our unit we soon perceive that while we are unable to say how many "\$" the management's share will amount to, we may state readily, how many "C" it is going to be. As an example, in problem 1 the bonus will be one half of "C"; in problem 2, 12/88 of "C"; in problem 3, 15/85 C; and so on.

Slightly more complicated is the definition of the government's share; we know, however, that if the tax is 12/100 of taxable net income it must be 12/88 of the income after taxes. The latter income, in turn, is the aggregate of "C" plus all items of taxable income in the first group (lines 2, 3, 4 and 6), plus unallowable

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deductions less non-taxable income. The amount of the tax will thus be:

$$\begin{aligned} \text{In problem 1} & \dots\dots\dots \frac{12}{88}(C+120,000+1,000) \\ \text{" " 2} & \dots\dots\dots \frac{12}{88}(C+61,000) \end{aligned}$$

Adding all links of the chain we obtain the amount of the adjusted net earnings (line 7) in terms of our unit "C", which must equal the same amount in terms of the unit "\$". The rest of the work consists merely in finding the factor of "C" and dividing it into the factor of "\$" to obtain "C" in terms of dollars.

Problem 1 may, therefore, be solved as follows:

$$\begin{aligned} C + \frac{C}{2} + \frac{3}{22}(C+121,000) &= \$ 180,000.00 \\ 22C + 11C + 3C + 363,000 &= \$3,960,000.00 \\ 36C &= \$3,597,000.00 \\ C &= \$ 99,916.67 \\ \text{Management} &= 49,958.33 \\ \text{Federal income tax} &= 30,125.00 \\ & \underline{\hspace{10em}} \\ 12\% \text{ dividend} &= \$ 180,000.00 \\ & \underline{\hspace{10em}} \\ \text{Net earnings} &= \$ 300,000.00 \end{aligned}$$

The taxable net income is represented by:

12% dividend on capital stock	\$120,000.00
C	99,916.67
Federal income tax	30,125.00
Unallowable deductions (net)	1,000.00
Total	<u>\$251,041.67</u>
Tax 12% thereof	<u>\$ 30,125.00</u>

while the net profit consists of:

12% dividend on capital stock	\$120,000.00
C	99,916.67
Total	<u>\$219,916.67</u>

The equations of the other problems are built up in the same manner:

2. $C + \frac{3C}{22} + \frac{3}{22}(C+61,000) = 240,000$

3. $C + \frac{3C}{17} + \frac{3}{22}(C+117,666.\dot{6}\dot{6}) = 150,000$

4. After deducting 10% on the capital stock and the tax, employees, customers and owners share the remainder in the ratio 4/16, 3/16 and 9/16 respectively, or in terms of the last item (our unit C), in the ratio 4/9, 3/9 and 9/9. Therefore

$$C + \frac{4C}{9} + \frac{3C}{9} + \frac{3}{22}(C+101,000) = 200,000$$

5. If we disregard the tax, the three unknown items are the appropriation for amortization of preferred stock, the bonus and the final balance, all of which may be expressed in terms of a common base as $\frac{1}{19}$, $\frac{1}{10}$ and $\frac{9}{10}$ respectively, equivalent to $\frac{10}{190}$, $\frac{19}{190}$ and $\frac{171}{190}$. Since the first item increases surplus, the undetermined portion of the owner's share (C) is the sum of the first and last items or $\frac{181}{190}$ as against $\frac{19}{190}$ due the management, so that

$$C + \frac{19C}{181} + \frac{3}{22}(C + 121,000) = 180,000$$

6. Pension fund, management and owner share in the ratio $\frac{35}{965} : \frac{1}{5} : \frac{4}{5}$, or 35 : 193 : 772. Considering additions to pension fund an allowable deduction

$$C + \frac{C}{4} + \frac{35C}{772} + \frac{3}{22}(C + 101,000) = 200,000$$

7. If depreciation is an allowable deduction without adjustment and "5% for calling first preferred" a surplus appropriation, the ratio of unknown elements to each other being $\frac{1}{18} : \frac{1}{18} : \frac{1}{2} : \frac{1}{2}$, then the bonus must be $\frac{9C}{10}$ and the depreciation $\frac{C}{10}$ respectively, or in abbreviated form

$$2C + \frac{3}{22}(C + 151,000) = 150,000$$

8. The addition to reserve for bad debts is considered an allowable deduction and is therefore not included in C. The ratios are

$$\frac{1}{17} : \frac{1}{17} : \frac{1}{17} : \frac{1}{10} : \frac{5}{10} : \frac{4}{10}; \text{ or}$$

$$\left(\frac{2}{17} + \frac{4}{10}\right) : \frac{1}{17} : \frac{1}{10} : \frac{5}{10}; \text{ or}$$

88 : 10 : 17 : 85; and the equation

$$\frac{200C}{88} + \frac{12}{88}(C + 76,000) = 225,000$$

Up to this point, all problems presented were basically alike. The great majority of profit-sharing plans belongs to this group; more complicated provisions, such as the following, are comparatively rare:

9.
$$C + \frac{2}{3}\left(C - \frac{500,000 + C}{5}\right) + \frac{3}{22}(C + 81,000) = 220,000$$

In this case no bonus may be paid at all, unless the last year's results are more favorable than the average of the four preceding years, since otherwise the second expression of the equation becomes a negative quantity.

10. All elements of computation being unknown, C represents the net profit.

$$C + \frac{1}{9}\left\{C - \frac{7}{100}\left(1,000,000 + \frac{C}{2}\right)\right\} + \frac{3}{22}(C + 1,000) = 300,000$$

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$$11. \quad C + \left(\frac{3}{4} + \frac{1}{2}\right) \left\{ C - \frac{10}{100} \left(1,000,000 + \frac{C}{2} \right) \right\} + \frac{3}{22} (C + 1,000) = 300,000$$

12. If the word "earnings" is defined as the net earnings of the business after federal income tax, then

$$C + \frac{17}{83} \left\{ C - \frac{6}{100} \left(1,000,000 + \frac{C}{2} \right) - \frac{4}{100} \left\{ 300,000 - \frac{3}{22} (C + 1,000) \right\} \right\} + \frac{3}{22} (C + 1,000) = 300,000$$

$$13. \quad C + \frac{1}{2} \left\{ 300,000 - \frac{3}{22} (C + 1,000) \right\} \frac{500,000}{1,000,000} + \frac{3}{22} (C + 1,000) = 300,000$$

$$14. \quad C + \frac{500,000}{100} \times \frac{C}{100,000} + \frac{3}{22} (C + 71,000) = 230,000$$

Throughout the foregoing analysis of profit-sharing problems, the writer has been guided by the desire of stating all equations in the simplest form consistent with the clear segregation of constituent elements. Contractions obscuring the relationship of the various links of the chain to each other are really steps toward solution and must be avoided in the initial presentation, in order that the translation of words into figures may be followed without difficulty. Unfortunately, certain relationships can not be stated in their simplest form without complicating matters at the other end of the chain. In problems 5, 6, 7 and 8, for instance, it might be argued that the unit "C" is derived in a very complicated manner. If, however, we tried to simplify matters by not including undetermined surplus appropriations in "C," we would have to include their symbols in the formula of the tax, which would, in that event, become very complex, instead of remaining almost uniform for all problems. Difficulties of this kind may, perhaps, be reduced by the judicious use of several equations with several unknown elements in each, but such expressions require a higher degree of mathematical training and the saving in time, if any, is negligible for practical purposes.

The following rules may, therefore, be relied upon to produce a fairly simple and easily understood formula for ordinary profit-sharing agreements:

1. Express in dollars and cents all items that may be so expressed and adjust the net earnings by their aggregate.
2. Define the unit of further computation as the sum of all still undetermined items of taxable income (except the tax itself).
3. Express all other undetermined items in terms of this unit, using intermediate bases for gradual conversion, whenever necessary.

4. Add all expressions obtained by following rules 2 and 3 and place the result equal to the adjusted net earnings computed in accordance with rule 1.

By solving for "C" and substituting its dollar equivalent in the various links of the chain, the amounts of bonus, tax, etc., are readily determined.

Before starting work on an assignment of this nature, it is, of course, necessary to ascertain that there is no misunderstanding as to facts and intentions described in the text. In actual practice it is nearly always possible to ascertain just what treatment of the various expense or surplus reserves is acceptable to the commissioner of internal revenue or what the originator of a profit-sharing plan meant by the word "earnings" in a particular sentence. Theoretical problems are necessarily at a disadvantage in this respect, because doubts as to facts must be resolved by more or less arbitrary assumptions, with which the reader may agree or disagree. In either event, it is hoped that the careful study of the problems presented and a comparison of the respective phrases with their mathematical equivalents may be helpful to those who would like to practise the art of translating words into figures before approaching profit-sharing problems of their own.

Returning now to a general survey of the profit-sharing agreements as represented by the samples submitted, a regrettable lack of uniform principles and a certain disregard of sound accounting theory are apparent. It may be impossible to establish an ideal profit-sharing formula adaptable to all trades and conditions, but a few general rules could undoubtedly insure a more scientific approach toward the individual problem.

Omitting the details of bonus distribution and accepting the sometimes contested rule that federal income tax is an expense of the business and not of the owner alone, there are only two questions, which the originator of a profit-sharing plan must answer:

1. What is a normal return on capital?
2. What values should be placed on the respective contributions of capital, management and labor toward excess profits?

Normal return on capital is a fair wage for services rendered and should be deducted from the net earnings after taxes to place capital on an equal footing with management and labor, which have already received the market value of their services. It is necessary, however, to distinguish between the equities of the

preferred and common stockholders. The former are creditors rather than owners, so that dividends and redemption premiums on preferred stock are really a part of the cost of borrowed money. While this is an extreme view, not so generally accepted as to enable us to include such items of expenditure in the income account, we may adapt it for our purpose and say that a normal return on that portion of capital which is represented by preferred stocks may be defined as the stated dividend rate plus an addition to a reserve which will accumulate the redemption premium as, if and when needed. Expenses incidental to the floating of issues may be considered deferred charges to operations or be combined with the reserve for redemption premiums, depending upon the merits of the case.

Conclusions regarding the normal rate of return on the equity of the common stockholders may be reached in various ways. The present value of the assets representing that equity and a rate reflecting risks and conditions peculiar to the trade will give one result; the market value of the common stock, or its artificial equivalents for close corporations, coupled with the money rate for high-grade loans, will give another. The first method evaluates earning possibilities in terms of the rate, the second in terms of the capital. Theoretically, both should give the same answer, since only one amount may truthfully be described as a fair wage for the same services rendered during the same period. Book values based on cost do not give satisfactory results, because capital should be measured in terms of actual wealth and not in terms of money spent for its acquisition. If the appreciation of fixed assets, as determined by periodic appraisals, is credited to a special capital-surplus account, present value and book value will not differ materially.

Deducting, then, the adjustments mentioned, as the wages of capital, we arrive at excess profits, otherwise described by opposing schools of economic thought as "a mistake to be corrected" or as "the motive power of human endeavor."

From this fund, the partners are entitled to draw: in theory according to the value of their respective contributions, in practice according to their bargaining powers dependent upon the ratio of demand versus supply for each class. Capital, being the least abundant commodity, is in a position to dictate what the respective shares shall be. Our second question is, therefore, answered by the owner's conscience.

There is no reason why a profit-sharing contract should contain further provisions, and yet complications discussed in previous paragraphs are due entirely to this superfluous group.

Additions to expense reserves should have been deducted in the proper sections of the income account, before determining the net earnings of the business. Attempts to stabilize earnings, however, often take the form of omitting certain expense items from the income account and allocating to them a share of the income thus inflated in disregard of the fact that such expenses accrue independently from operating results. Depreciation and bad debts seem to be the favorite selections for this treatment, by means of which the good years help to carry the burden of the bad years, thereby insuring a steadier dividend and bonus rate.

As for surplus reserves, their only function is to give warning that certain assets had better be preserved for specific purposes. Admitting the need of protecting the owner against himself, it is difficult to see why management and labor should be made to pay for that necessity. If, for instance, a plant will have to be replaced by new construction, at twice the cost of its original acquisition, is it fair to deduct a certain percentage from earnings to build up a reserve for new construction? What is needed to build the new plant is cash, not a reserve; unless cash is accumulated, no reserve can help. And what happens when the construction is completed? Expenditures have been charged to new plant account, the old plant was absorbed by the reserve for depreciation, and the reserve for new construction is still intact, only to be returned to surplus. A melon is eventually cut for the stockholders out of the contributions of employees, who are thereby doubly jeopardized because increased depreciation charges on the larger investment will reduce future earnings. Reserves for the retirement of the principal amount of bonds or preferred stock are examples of the same fallacy. It is not necessary at all to set up a species of duplicate liability, but merely to allocate certain assets gradually to meet liabilities already on the books when they fall due. Those assets, it is true, must be earned first, but to pay liabilities deductions will have to be made from assets, not from earnings. Additions to surplus reserves are, therefore, not legitimate deductions from earnings and their introduction into profit-sharing plans merely increases the owner's share.

If profit shares of others, constituting expense to the owner, must be deducted before determining the base for those profit

shares, it similarly means that smaller portions of net earnings are actually distributed. It would be just as easy to say that the beneficiaries are to receive smaller shares of the net earnings.

As long as the bargaining powers of the parties to a profit-sharing plan are as unequal as under present conditions it may, perhaps, be idle to speculate upon what is a fair deduction and what is not. The owner is willing to part with just so much; what does it matter how large a percentage of what amount he may choose to call his figure? On the other hand, nothing promotes efficiency and enthusiastic coöperation more than the evidence of fair play. A multitude of deductions contrary to sound theory will inevitably engender the suspicion that they have been introduced only for the purpose of nullifying the effects of an unpremeditated impulse of generosity. Why does not the employer state in the simplest terms what he is willing to give? Incidentally the accountant's task would become simpler, too.