Volume Title: Taxable and Business Income

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Volume Publisher: UMI

Volume ISBN: 0-870-14118-X

Volume URL: http://www.nber.org/books/smit49-1

Publication Date: 1949

Chapter Title: Techniques

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Chapter URL: http://www.nber.org/chapters/c3249

Chapter pages in book: (p. 214 - 221)

Chapter 11

Techniques

Two basic ratios are used to summarize the analysis of Samples I and II: the Analysis X and the Analysis Y ratio. In the discussion of Sample III and some parts of Sample II, a variant of the Analysis X ratio, designated the Analysis Z ratio, is used.

A Analysis X Ratio

The Analysis X ratio measures the percentage difference between book and tax figures, such as for depreciation charges and net income. For depreciation charges, for instance, the Analysis X ratio expresses the difference between book and tax depreciation charges as a percentage of the arithmetic mean of the book and tax charges. For example, if a company reported a depreciation deduction of $105,000 to the Securities and Exchange Commission and a deduction of $95,000 on its federal corporation income tax return, the Analysis X ratio would be 10 percent [$10,000 divided by ½ ($105,000 plus $95,000)]. A positive ratio indicates that the book item is algebraically larger than the corresponding tax item; a negative ratio that the tax item is algebraically larger.

Why should the difference between the book and tax deductions be expressed as a ratio to the *mean* of these two deductions rather than as a percentage of one of them? Two considerations dictated the choice of the arithmetic mean as the denominator of the Analysis X ratio. First, it avoids unintended implications that the denominator of the Analysis X ratio is the correct figure. Secondly, it has certain mathematical advantages. It eliminates the possibility that values for the Analysis X ratio will be absurdly large and equalizes the upper and lower limits, thus making the frequency distributions more symmetrical than they would otherwise be.

If, for example, a very large book deduction and a very small tax deduction are taken by a company, the ratio of the difference between them to the tax deduction might be huge—say several thousand percent. Such a ratio would be difficult to interpret, since it would depend as much on the absolute size of the tax figure as on the difference between the tax and book figures. On the other hand, if the relationship were reversed, the lower limit on the negative ratio would be −100 percent. When the arithmetic mean is the denominator, the Analysis X ratio will always be less than 200 percent if a positive item of any size whatsoever is reported for both book and tax purposes. If a deduction is reported for one purpose but not for the other, the ratio will be 200 percent. Furthermore, it will be numerically the same but opposite in sign for any book item, A, and tax item, B, as for the reverse situation—a book item, B, and a tax item, A.[1]

These considerations are less important in determining the appropriate ratio to be used as a summary figure for a large industrial group than for an individual company. Eccentricities in the ratios of individual companies—if either the book or tax figure is used as a base—will largely balance out if group ratios are taken. But the group ratios, unsupplemented by an indication of the dispersion within the group, may be highly misleading. To indicate the degree of dispersion, frequency distributions of the Analysis X ratio computed for individual companies are presented in graphic form for selected indus-

[1] If, for example, the book item is 15 and the tax item 5, the Analysis X ratio will be 100 percent. If the book item, on the other hand, is 5 and the tax item 15, the Analysis X ratio will be −100 percent. If the sum of the book and tax items, rather than their mean, were the denominator, the limits of the ratio would be ±100 percent.

trial groups and years. The abscissae of these frequency charts represent the value of the Analysis X ratio, the ordinates the number of Analysis X ratios falling within specified numerical limits. Because of the nature of the data, charts indicate the degree of dispersion about the average better than mathematical measures of dispersion. It was not feasible to use uniform class intervals for the abscissae.

A special complication arises in interpreting the Analysis X ratio if the tax and book items have different algebraic signs, as can happen only in comparisons of book profit and statutory net income. Without the special adjustment described below, the Analysis X ratio would have the following properties: (1) whenever both the tax and book items have the same algebraic sign, the ratio would be numerically less than 200 percent; (2) whenever one item is zero and the other is either positive or negative, the ratio would be numerically 200 percent; and (3) whenever the items compared have different algebraic signs, the ratio would be numerically more than 200 percent.

To avoid meaninglessly large ratios, as might occur under this third contingency, algebraic signs were ignored in computing the *denominator*. With this adjustment the ratio is plus or minus 200 percent, as the case may be, whenever the tax and book items have different signs, regardless of their magnitude, as well as whenever one is zero. A simple illustration will clarify the method of computing the Analysis X ratio and the reason for making this adjustment. Suppose that a large corporation reports a book profit of $1,000 and a tax deficit of $500. The Analysis X ratio will be $1,000 minus a negative $500, or $1,500, divided by the arithmetic mean of $1,000 and $500, or $750. Expressed as a percentage, the ratio is 200. Were the components of the denominator not treated as if their algebraic signs were positive, the ratio in the illustration would be 600 percent: $1,500 divided by $250. This solution does not provide a completely satisfactory treatment, but none could; and it seems the best feasible approach.

B Analysis Y Ratio

The Analysis Y ratio is specifically designed to supplement the Analysis X ratio by indicating the relative importance of different sources of divergence between the two income concepts. Reliance on the Analysis X ratio alone might lead to false inferences; if small amounts are involved, a divergence, say in bad debt expenses, might be represented by a large Analysis X ratio but still cause merely a very minor difference between the two income figures.

Specific divergences must be expressed as percentages of some base figure so defined that the derived ratio will indicate their relative importance. Various figures from income statements or balance sheets—net income, sales, even asset and ownership items—were considered for this purpose. All have glaring defects when attempts are made to compare the same corporation for a series of years or different corporations in any one year or over a series of years.

After considerable experimentation the following procedure was adopted as most suitable. The dollar amount of each individual class of divergence was computed, without regard for algebraic sign, for each industrial group. Their sum (without regard for algebraic sign) gave the total divergence for each industrial group. Each class of divergence was then expressed as a percentage of the sum for the industrial group. For example, assume that for an hypothetical industrial group divergences between the two income concepts were reported in the aggregate amount of $1 million, distributed among the individual classes of divergence as follows: differences in depreciation accounting, $300,000; differences in capital gains and losses reported, $200,000; differences in inventory accounting, $100,000; all other classes of divergence, $400,000. The Analysis Y ratio would then be 30 percent for differences arising from depreciation accounting ($300,000 divided by $1 million, the sum of the individual classes of divergence), and 20, 10, and 40 percent, respectively, for the other groups.

In computing summary Analysis Y ratios for different classes of divergence, the direction of the divergence was disregarded. That is, the $300,000 divergence in depreciation accounting might have included $160,000 for companies with tax deductions larger than their book deductions and $140,000 for companies with book deductions larger than their tax depreciation charges. This procedure was followed in order to measure the total divergence arising from differences in depreciation accounting (or any other class of divergence) rather than simply the net difference between the two income figures for a given industrial group because of depreciation accounting. The difference between $160,000 and $140,000, $20,000, would understate the effect of different treatments of depreciation as a source of differences between book and tax figures.

The direction of the divergence is also significant. It is, for instance, important to know whether all differences in the treatment of depreciation tend to cause book profit to exceed statutory net income, or vice versa. To disclose this information the basic table for the Sample I analysis shows separately ratios for divergences that tend to make book profit exceed statutory net income and for divergences that tend to make statutory net income exceed book profit. The ratios indicate, for each industrial group, the percentage of the aggregate divergence for which each class and direction of divergence is responsible.

Consideration should be given to the reasons prompting the use of aggregate divergences as the denominator of the ratio in preference to net divergences, that is, the difference between book profit and statutory net income.

The former concept has two important advantages. First, it is likely to be much more stable over a period of years. The net divergence, i.e., the difference between book profit and statutory net income, would be subject to many of the disadvantages of net income as a base. Like net income, it would fluctuate widely, change algebraic sign, or it might even be zero; if it was zero, a ratio could not be computed. Changes in the derived ratio would frequently reflect changes in the denominator rather than in the numerator.

Secondly, if the aggregate divergence is the denominator, the sum of the component percentages for any given company or industrial group will be 100 percent. If some other base, such as the net divergence were employed, the results would have to be adjusted to add up to 100 percent before they would assume their full significance.

The Analysis Y ratio is a reasonably adequate crude numerical summary of the importance of each class of divergence. But it does not answer many pertinent questions. For example, it does not explain the size of a specific ratio; that is, it does not give a basis for distinguishing between ratios that are large because of a few individually large divergences and ratios that are large because of many individually small divergences.

No refined statistical measure for presenting this information is feasible with the available material. The most obvious procedure would be to construct a frequency distribution of ratios representing the relative importance, by individual companies, of each class of divergence. Such a distribution would supplement the Analysis X ratio in the analysis of Sample II. For many companies, however, book profit and statutory net income differ only in one or two minor respects. Consequently, a small divergence, such as a small donation unallowable as a deduction for tax purposes, might account for the major portion of the aggregate divergence of any one company. In a frequency distribution this small divergence would assume an apparent significance far beyond its actual significance. This plan of presentation was consequently abandoned.

To some extent, of course, even the summary ratios for industrial groups, especially when these groups are small, are subject to the same distortion. To supplement the summary ratios, therefore, data are shown from which the average size of the divergences in each class can be computed. Furthermore, the work sheets for individual companies were examined, and significant items are mentioned in the text.

C Analysis Z Ratio

The Analysis Z ratio expresses the divergence between book profit and statutory net income as a percentage of the latter rather than as a percentage of the arithmetic mean of the two.[2] This practice was followed in presenting the aggregate Sample III results because they can be compared more easily with national income estimates, which are based on tax data; i.e., the comparison is easier if the relationship of book profit to statutory net income is expressed as a direct percentage of statutory net income. This advantage was believed to outweigh the technical advantages of the Analysis X over the Analysis Z ratio, especially when the ratios are applied only to aggregate data and are usually small.

The treatment of algebraic signs in computing the Analysis Z ratio is similar to that described for Analysis X. Algebraic signs are taken into account in the numerator but the denominator is always regarded as positive, whether a statutory net income or deficit is reported. That is, with a book loss of $6,000 and a statutory deficit of $8,000, the Analysis Z ratio would be (–$6,000 minus –$8,000) divided by $8,000, or 25 percent. The Analysis Z ratios cannot, therefore, be applied to data in which deficits have been deducted from incomes. But since we present separate data for income and for deficit

[2] The decision to use the Analysis Z ratio in the aggregate compilations of Sample III data was made after the basic computations had been completed for Samples I and II. When Sample II aggregate data are compared directly with Sample III data, they were reprocessed so as to state the results in terms of the Analysis Z rather than the Analysis X ratio. The Analysis X ratio was, however, retained for the frequency distributions of both Sample II and III data, since it eliminates certain distortions characteristic of the Analysis Z ratio, especially when the divergences are relatively large.

In the aggregate presentations the general character of the numerical results is, in most instances, not greatly affected by the use of the Analysis Z rather than the Analysis X ratio. As long as the divergences are relatively small, as they are for the aggregate data in most instances, the differences between the two ratios are not large. When the divergences are relatively large, however, the Analysis Z ratio is always substantially larger, algebraically, than the corresponding Analysis X ratio.

companies algebraic signs can be taken into account if desired.

The data for individual companies were combined to obtain group ratios in the following steps. For a given cell—size class, industrial group, and year—the data were first classified into companies with statutory net incomes and companies with statutory deficits, and Analysis Z ratios were computed separately for each category. The numerator of the ratio for each category is the algebraic sum of the algebraic difference between the book and tax figures reported by each company. The denominator for the income category is simply the sum of statutory net incomes and for the deficit category the sum of statutory deficits. As the denominator is always regarded as positive, the Analysis Z ratio derives its algebraic sign from the numerator. In computing the ratio for the cell as a whole the numerators of the ratios for the income and deficit categories were added (again with regard to algebraic sign) and the denominators also (again with all figures considered positive in sign). Thus the Analysis Z ratio for the cell as a whole, being a ratio of aggregates, represents a weighted average of the individual company ratios included in it. The same general procedure was followed in combining size classes to obtain ratios for industrial groups, in consolidating industrial groups into broader groups, and in combining the data for individual years to obtain ratios for longer periods.