Journal of Accountancy

Volume 66 | Issue 1 Article 6

7-1938

Correspondence: Realization of Appreciation; Valuation and Depreciation

William H. Bell

Gabriel A. D. Preinreich

CORRESPONDENCE

REALIZATION OF APPRECIATION

Editor, THE JOURNAL OF ACCOUNTANCY:

DEAR SIR: I should like to comment upon some of the remarks appearing under the caption "Some General Observations on Surplus" on page 70 of THE JOURNAL for January, 1938. It seems to me that it is time that someone started a movement toward exposing the fallacy involved in the concept of "realization of appreciation through depreciation charges."

In the article in question it is stated: "In ordinary circumstances there is no justification for adjusting the books of account to reflect an unrealized increase in asset values occurring subsequent to acquisition. . . . But if, despite the lack of justification, an adjustment is actually recorded on the books, both accounting practice and the logic of the situation require that credit shall not pass to surplus immediately, but shall rest in a deferred account until the appreciation is realized through depreciation charges or actual sale. . . . Appreciation on land would never become an actual credit to surplus except upon sale at a price which included the appreciation. On the other hand, if buildings and machinery were depreciated through costs or income on the basis of appreciated values, then surplus or income would be entitled currently to an appropriate credit equivalent to that portion of the deferred profit then realized through the sale of goods or services, the cost of which included that profit."

The expression, "realization of appreciation through depreciation," seems to have originated some years ago in connection with income-tax practice, but I doubt that its implications have been sufficiently considered. The passage quoted brings out clearly the thought that appreciation is realized through depreciation charges in the same way as through actual sale of the property. This seems to me to be at least so doubtful as to discredit the principle of which it is the basis, which is that, since depreciation on appreciation is realized through the sale of goods or services, the amount thereof may be charged against the appreciation surplus and credited to earned surplus or income to offset the charge against operating expenses for such depreciation.

In order to protect the capital-asset position of the business, funds necessary to replace the property (up to the amount of its book value) must not only be recovered from the customers, but also retained in the business. If the charge against operations for depreciation on appreciation is offset by a credit to income or earned surplus, so that earned surplus remains charged with depreciation on cost only and in effect the only bookkeeping entry that is made is a transfer from appreciation surplus to the depreciation reserve, then there can be no assurance whatever that the entire amount of indicated earned surplus will not be paid out in dividends, in which case the funds necessary to replace the property (at its book value) will not be available when replacement becomes necessary.

The question may well be raised as to the real necessity for maintaining funds in the business for replacement of the property at its entire written-up book value. The answer, it seems to me, is that the business has made a representation to its security holders and creditors as to the value of its property, and therefore it has no right merely to whittle down piecemeal such valuation by charging the appreciation-surplus account and crediting the depreciation-reserve account, with the result that in a few years a considerable part of the property value has disappeared and very likely the other assets are insufficient to supply the deficiency. If, as happens in perhaps the majority of cases, the appreciation surplus is capitalized through the payment of stock dividends or otherwise, the entire amount of depreciation must be charged against operations and funds for replacement kept in the business.

Now let us consider whether the depreciation is in fact realized. One wonders what is the basis of determination of that fact. The question, it seems to me, is similar to one as to whether or not a business earns a fair rate on its indicated net worth, thereby justifying or not justifying a valuation for intangible capital assets. In order to settle that question it would be necessary to determine a fair rate of return on the net tangible assets. So in this case it would be necessary to determine a fair rate of return on the net tangible assets taking property at cost. Probably it could be said that if a business were able to earn an amount in excess of a fair return on the original cost of its tangible assets, such excess might be attributed to (1) an excess of the actual value of the property over its original cost, which excess has been recognized in writing up the property, and (2) the intangible capital assets, whether or not carried on the books. In any event, it will be seen that the question as to whether there is in fact a realization of depreciation on appreciation is at best a speculative consideration. I have no doubt that most of those who have employed the expression "realized appreciation" have used it regardless of the amount of profit or even if there was a loss. And, as previously stated, even if there has been realization, it has no practical significance unless there has also been retention in the business, and that is not accomplished by charging the depreciation against revaluation surplus.

Let us by all means discard the misleading expression, "realization of appreciation through depreciation," with all its implications.

Yours truly,

WILLIAM H. BELL

New York, N. Y.

VALUATION AND DEPRECIATION

Editor, THE JOURNAL OF ACCOUNTANCY:

DEAR SIR: May I submit some comments on Professor Saliers' recent review of the book, *The Science of Valuation and Depreciation*, by Professor Edwin B. Kurtz?

When an author speaks so highly of his work as Professor Kurtz does, not only in the preface and introduction, but throughout the text, I believe it is incumbent upon a reviewer to examine the sweeping claims made with more than ordinary care. I was quite surprised therefore to see Professor Saliers confine himself to a repetition of the author's statements either verbatim or in paraphrased form.

In particular, I object to the implications of the remark that "the shortcomings of the conventional straight-line method are discussed and scientific procedure explained" (THE JOURNAL OF ACCOUNTANCY, May, 1938, p. 452). The straight-line method appears at a disadvantage merely because Professor Kurtz is not immune to the temptation of comparing his own method at its best with the other method at its worst. Thus, he takes it for granted that accountants retain the cost of a discarded machine in the plant account after it has been scrapped—in short, that they depreciate a large number of machines in the same way as if the aggregate original cost had represented but a single machine. He ought to note that, if the original cost of the plant were posted to one account and that of its replacements to another, the successive balances of the former account would outline the mortality curve, because the cost of discarded items is removed at once.

When the books are so kept and when, in addition, the entire cost of a scrapped machine (barring any scrap value) is always charged to the reserve, regardless of whether the same amount has had a chance to accumulate in it, the straight-line method is a distinct improvement upon Professor Kurtz' "scientific" method for the case without interest. Depreciation can be charged annually at a straight or constant rate corresponding to the reciprocal of the average life on the balance of the plant account, regardless of the more than average age of any machine in it. That is exactly what he does, except that he deliberately uses the wrong ordinates of the mortality curve and therefore gets too small a premium. He hastens to explain on page 112 that "this, of course, is not due to any inaccuracy . . . but rather to the difference in the number of installments to be paid. In the straight-line plan the number of payments is fixed by the average life, namely 1,000 . . . units. In the replacement-insurance plan the number of units in service at the beginning of each age interval fixes the number of premiums to be

collected to make possible paying the 100 benefits. These totals are 1,050. . . . Thus the total money collected is the same in each case." In other words, "the only scientific approach" (p. 6) consists of charging too little on more life units than there are in 100 machines, while the straight-line method is unscientific enough to charge simply the right premium on the right number!

The case against the sinking-fund method is no more substantial. When costs are deleted in the same way, the correct premium calculated by recourse to interest should equal the sinking-fund contribution. That, however, is not the entire depreciation charge; the interest must be added. In this respect, Professor Kurtz reminds me of the once famous Doctor Price who, around 1770, tried to lift England by its bootstraps through the magic of compound interest. Depreciation methods do not affect the cash position; sums put into the sinking fund would have had to be employed in some manner anyway. The label does not create any income that could not have been obtained otherwise.

As far as I can see, Professor Kurtz's undoubted contributions to theory have all been made in his first book: *Life Expectancy of Physical Property* (1930), which is a valuable reference work. There is one idea in the new book though, which should have been followed up. I refer to chapters IV and VI, dealing with what he misleadingly calls "remainder service life." In figure 16, he divides the area of the mortality curve into horizontal rectangular layers and bisects each into triangles by diagonal lines drawn from the upper left to the lower right corners. If the layers were thin enough, the height of a lower triangle at a given point of time would furnish the remainder life of the machines represented by the layer, per cent, of their total useful life. For instance, if one machine has a useful life of five years, the triangle shows at the three-year point that 40 per cent of its life is still ahead. Similarly, if another machine will live up to the age of 20 years, it has 85 per cent of its total life left. These two figures are added together and counted as 1.25 per cent of the total life units originally contained in the 100 machines. As a calculation of life units, the procedure is wrong because, if the average life is ten years, the total life-service units number 1,000, of which the first machine has still to furnish 2 and the second 17. Therefore, the true proportion of remaining life units is 1.9 per cent of the total.

In his table VIII, Professor Kurtz performs the latter type of calculation, he multiplies each group of machines by its unexpired life and divides the sum of all products by all life units originally contained in all machines. That done, he proceeds to prove that table VIII and figure 16 are equivalent. The "proof" consists of inserting the results of table VIII into the chart, without bothering to see whether the rule of proportionality applied to the triangles would actually give the answers indicated at the point chosen. He never notices that table VIII considers all life units as equivalent, whereas figure 16 weights them by their variable cost on the ground that each machine was bought at the same price, regardless of the number of life units which it contains!

This basic misunderstanding is carried along to chapter VI entitled: "Composite Remainder Service Life," which pretends to furnish "convincing evidence of the soundness of the method . . . the logic . . . the accuracy . . . their correct joint use . . . a verification of the entire preceding analysis and a demonstration of the inherent unity of the whole body of principles presented" (pp. 5–6). Now, if "remainder service life" means remainder cost, it is clear enough from figure 16 that (since the area of a triangle is half that of a layer) the composite remainder cost must ultimately become 50 per cent for a plant currently maintained at a constant number of machines. On the other hand, if the actual life units remaining in a mature composite plant are compared with the units inherent in a new plant, the result must inevitably be more than 50 per cent.

How Professor Kurtz cuts this Gordian knot may be seen in table XX. To find the composite remainder service life, it is evidently necessary to average all products of the different age-groups of machines by their remainder service lives. The latter information is furnished by table VIII, per cent of the units originally contained in 100 machines; therefore, the original number of machines in each group and not only the survivors of each group are to be multiplied to get the correct composite. There is no warrant whatever in theory to multiply only the survivors (see p. 78), but Professor Kurtz must

somehow get 50 per cent as his answer and therefore that is just what he does!

Proof is thus furnished, not of the "soundness," etc., of the method, but merely of the correctness of an irrelevant elementary rule of integration somewhat analogous to $2 \times 2 = 4$. The oscillations of the *remainder cost* corresponding to figure 16 will also come to rest on the ultimate level of ½, but in the meantime the shapes of the true curves differ from those to which Professor Kurtz's empirical equations have been fitted in figures 24–30. Incidentally, these equations have no theoretical merit, even if fitted to the correct data, because the relationships are far more complex than he assumes (*Cf.* my article in *Econometrica*, July, 1938). A wave need not be a pure *sine* wave!

It is not clear why chapters IV and VI were written at all. Although it is stated on page 90 that the ultimate 50 per cent level "is further proof of the soundness of the per cent remainder service formula which is basic in this study," the formula (?) is abandoned then and there, no use being made of it for any purpose whatever. That is regrettable, because figure 16 really contains the germ of the true depreciation theory.

The utter lack of "inherent unity in the body of principles presented" (p. 6) becomes apparent in chapter VIII where the "normal" reserves calculated are found to be much smaller than the 50 per cent which was considered so basic. Table XXXII shows that for the case of zero interest the range is from 36.9 per cent to 46.7 per cent of original cost. These figures are of course affected by Professor Kurtz's way of apportioning the premium, but the discrepancies are not very great. Upon revising the apportionment so as to charge the right premium on the right number of units, the reserves obtained will be the exact complements of the book-value levels or true remainder-service life-levels which table XX and similar tables would have furnished, if the indefensible introduction of the mortality (survivor) curve into the multiplication had been omitted.

It is easy to demonstrate mathematically that, when interest is disregarded and when the plant always consists of the same number of machines, the absolute limits of ultimate book-value levels are ½ and ⅔ for the replacement-insurance method, i.e., for the straight-line method described. These levels refer only to the case without scrap value. Should the latter be 10 per cent of cost, the limits will be $1\frac{1}{20}$ and $2\frac{1}{20}$ respectively. The important thing to remember is that the level is independent of the average life, but is influenced considerably by the shape of the mortality curve. Professor Kurtz should also have mentioned that plant expansion and increasing replacement cost raise the book value considerably per centum of the total cost of the machines in service at any given time. The true remainder-cost method of figure 16 is independent of the shape of the mortality curve, but also leads to a level higher than 50 per cent when the plant expands and replacement costs increase.

The foregoing comments will suffice to show that Professor Kurtz's new book does not measure up either to its sanguine preface and introduction, or to Professor Saliers' benevolently neutral review. Nor, for that matter, to its title, since the germ of the true depreciation theory is mentioned only inadvertently and the problems of value are not touched upon at all. To take up the latter subject would entail a presentation of the changing net rental or service in terms of changing selling prices, rates of production, operating expenses, replacement costs and rates of interest, profit, and expansion. The value theory of scrapping would also have to be mentioned. Finally, the relationship between the rate of production and the productive capacity, and the even greater stumbling block of obsolescence, i.e. gradual improvement in the type of replacements, are also unavoidable topics in any extended discussion of the science of valuation and depreciation. If there is any such science! Professor Kurtz himself hints that there may not be, when he says that "in conclusion the author wishes to point out that although this treatment is scientific and analytic in nature, actual valuation and depreciation estimating must always be accompanied by the judgment of a competent appraiser" (p.7).

I have gone to such lengths to review this book unasked, because I fully agree with Professor Saliers that the subject of composite depreciation is highly important to accountants who are notoriously prone to look at a single machine only. Those who are interested in a good introduction to the subject will find more as well as more accurate information in Professor Kurtz's first book. Yours truly,

New York, N. Y.

GABRIEL A. D. PREINREICH