Journal of Accountancy

Volume 18 | Issue 5 Article 8

11-1914

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Recommended Citation

Thomas, E. S.; Jacobsson, G.; Gerhart, L.; Shorrock, E. G.; Heinke, L. H.; Lyman, G. V. W.; and Taylor, W. J. (1914) "Correspondence," *Journal of Accountancy*: Vol. 18: Iss. 5, Article 8.
Available at: https://egrove.olemiss.edu/jofa/vol18/iss5/8

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This article is available in Journal of Accountancy: https://egrove.olemiss.edu/jofa/vol18/iss5/8

Correspondence

Computation of Interest Rates

Editor, The Journal of Accountancy:

Sir: In your August number, under the caption *Computation of Interest Rates,* Mr. Skinner raised a question that is worthy of more than passing notice.

The question of the rate of interest charged by loan companies is seldom raised unless the matter gets into the courts, for the reason that the borrower is not in a position to quibble about terms. More flagrant cases than that mentioned in the article under consideration have come to my attention. I have known the borrower to repay the loan several times and still owe the principal.

The first solution offered by Mr. Skinner is so manifestly wrong that a refutation is hardly necessary. It is based on the assumption that the loan is repaid by six payments of $8.40 each, the last payment being seven months from the time of the loan. The average time therefore is three and one-half months, and this multiplied by fifty gives $175.00 as the average loan. But this method takes into account six payments only, leaving the next four payments to cover the interest on the loan; consequently the result obtained by Mr. Skinner's method is erroneous.

Mr. Baldwin's method, which accords with the general practice in such cases, is based on the assumption that interest and discount are the same thing. It is evident that the rate obtained from such assumption is less than the actual rate. When the rate is low the method of averages cuts little figure, but it is different when the rate is high.

A more accurate method is that of discounting each monthly payment. Taking the loan to be $50.00 to be repaid in ten monthly payments of $8.40 each, the rate would have to be 14.125%. But assuming this to be the correct rate and computing the amount of the loan and the several payments to the end of the term, we shall find that the results differ materially. Thus a loan of $50.00 at 14.125% per month for ten months will amount to $120.63, while the payments will amount to $137.39. On the other hand, assuming $137.39 to be the correct amount of the several payments and discounting this for ten months we get $56.95 as the present value of the loan.

It would seem not unreasonable to assume that the present value should equal the future value discounted for the whole time, and *vice versa.* If this assumption were true the rate would be 27.87% per month obtained by this formula; $i = (A - \frac{v}{n}) / V - A (\frac{n-1}{2})$ which is based on the theory that the sum of all payments, less the loan, $(An - V)$ divided by the difference between the amount of the loan for ten months and the amount of the several payments from time of payment to the end of the term, should give the rate. In illustration, $50.00 for ten months is equal to $500.00 for one month, and $84.00 for

four and one-half months (average time of payments) is equal to \$378.00 for one month. The difference is 122 months in favor of the lender. Dividing 34 (whole interest paid) by 122 gives 27.87 as the rate, and the only rate, that will conform to this assumption. Computing the amount of the principal at this rate for ten months we get \$189.35, and the several payments computed at the same rate will also amount to \$189.35. But each payment discounted at this rate would give a very small present value.

The different results obtained by different methods inevitably lead to the conclusion that what is called simple interest is not nearly so simple as is generally supposed. As a matter of fact simple interest is a misnomer. Interest paid monthly is really compounded.

In my opinion the only correct and scientific method is to compute the rate on the basis of compound interest, which gives results in every way satisfactory, at both ends and in the middle. But it has the disadvantage that people generally do not understand it, or cannot apply it readily when they do understand it.

The formula devised by Mr. Skinner for determining the rate based on compound interest requires the assumption of a trial rate and a repetition of the computation at another rate. It would be much simpler and fully as accurate to assume an approximate rate and then compute the present value of the monthly payment by the simple formula, $V = (\frac{a}{i} - \frac{a}{ir^n})$, where V is the present value of the annuity "a," "n" the number of terms, "i" the monthly rate and "r" the ratio, or 1 i. The resultant V will be more or less than the given loan, according as the assumed rate is higher or lower than the actual rate. Repeating this process with a rate either higher or lower than that previously used, as may be required, and interpolating between the two V's so as to obtain a V equal to the amount of the loan, we can obtain the required rate within a reasonable degree of accuracy.

But a better and much more direct method is to use what is known as Baily's formula, which gives the rate directly with great accuracy for less than 50 periods at usual rates and for 20 periods or less for high rates. For the information of those not acquainted with it, the formula is as follows: Let $q = (\frac{an}{V})^{\frac{2}{n+1}} - 1$, then $i = q \left(\frac{1 - \frac{n-1}{12} q}{1 - \frac{n-1}{12} 2q} \right)$

The rate obtained by this formula is always too great by a very small quantity. In the example given the rate obtained by this formula is 10.753%, while the actual rate is 10.7464%. The rate may, therefore, be taken as 10.75%.

Very truly yours,

E. S. Thomas.

Cincinnati, September, 1914.

Correspondence

Editor, The Journal of Accountancy:

Sir: In the August number of THE JOURNAL OF ACCOUNTANCY, there appeared an article by Mr. P. H. Skinner, *Computation of Interest Rates*, wherein the author says that he "was unable to find a formula for the operation."

And still, in computations of this character, we have the most remarkable formula invented, that is, Baily's formula, which gives the rate of interest with great accuracy, the solution of which consumes only a nominal amount of time and labor. The writer has been called upon time and time again to solve this interest rate problem, invariably using Baily's formula, which, strange to say, seems to be an unknown quantity even amongst accountants of prominence.

In order to demonstrate the remarkable accuracy of Baily's formula which is always too great, but producing a negligible error in periods from 1 to 50 years for ordinary rates, the appended comparative schedule is submitted, wherein the true rate is 5%.

Annuity for:	Rate per cent
3 years	5.00002
5 "	5.00006
11 "	5.00043
21 "	5.00195
31 "	5.00521
41 "	5.01093
51 "	5.01990
99 "	5.13604

In the problem, presented by Mr. P. H. Skinner, involving an extraordinary rate per cent, the application of Baily's formula works out 10.75375% per mo.

The true rate is in round figures 10.75000% " "

Leaving an error of 0.00375%

Yours truly,

G. JACOBSSON.

Chicago, September, 1914.

A Question of Inventory

Editor, The Journal of Accountancy:

Sir: The writer wishes to take advantage of the invitation often expressed in THE JOURNAL to make inquiries through your columns. I am desirous of inaugurating a system of inventory but am not able to perpetuate it with the regular method of perpetual inventory because our plant is divided—materials are kept at one or more or all buildings,

and facilities do not provide for stock room or clerk in charge to record receipts and usages.

We have a cost record showing exact cost of articles manufactured and complete make-up of every item used.

Can any of the readers give me their experience or suggestions whereby this record may be kept so that at any time it would show amount of raw materials on hand as an inventory?

Yours very truly,

L. GERHART.

Philadelphia, August, 1914.

Competitive Bidding

Editor, The Journal of Accountancy:

Sir: Mr. Cooper's remarks in his article in the August JOURNAL with reference to accountants bidding against each other for business are none too strong, and open up another subject which is as well worthy of discussion as the question—Should accountants advertise?

A few years ago two letters from me on the subject were published in the JOURNAL in the hope that they would provoke some debate, but they failed to do so. Mr. Cooper's remarks, coupled with a recent experience of an accountant friend of mine, have prompted me to make another attempt.

Along with a number of other accountants, my friend's firm was invited by the council of a certain city to submit a bid for auditing the city's books. The firm replied to the invitation in part as follows:

> "We have your circular letter asking quotations and terms for auditing the accounts of several city officials, as well as the financial records of your city.
>
> "We wish to call your attention to the fact that there are some things that cannot properly or profitably be placed upon a competitive basis.
>
> "If the city wished special counsel in some particularly important case, would the city officials ask prominent attorneys to submit bids; or, if medical assistance were needed in the schools, would the city ask physicians for competitive estimates. If spiritual consolation were needed for the sick and the afflicted in public institutions, would the council ask the pastors of the city for sealed proposals?
>
> "Asking competitive bids from professional accountants should result as unfortunately for you in this instance as it probably would in any of the other cases.
>
> "To request a competitive bid of a professional man is asking him to admit that his services are worth less than the fee ordinarily commanded by his profession.

> "We venture to express the opinion that in the long run the community would be better served, if your relation to public accountants were maintained upon a strictly professional basis.
>
> "Bidding is a violation of professional ethics among lawyers, physicians, and others, and should be so among accountants. If you require the services of a practitioner in any one of the other professions, we believe that your selection would be governed according to the qualifications and the reputation of the man or the firm selected, and that you would arrange terms for the service to be performed that would be mutually satisfactory.
>
> "We see no reason why you should not do likewise in this instance. We positively decline to enter a competition as bidders."

It must have been with some astonishment that the city council read the letter from which the foregoing is a quotation, as it is rarely that accountants have the courage of their convictions in such a case as this, and probably the letter in question was the only one of the kind that was received.

That city councils and the public have acquired the habit of asking for bids is something for which we accountants have only ourselves to thank. Further, the responsibility rests very largely upon the shoulders not of the small fry in the accounting world but on those of leading firms, who, if their practice were up to the standard of their ethical principles, would set a better example.

What are we going to do about it?

Yours very truly,

E. G. Shorrock.

Seattle, August, 1914.

Accounts of Holding Companies

Editor, The Journal of Accountancy:

Sir: I have read Mr. H. C. Freeman's excellent article in your September issue on *The Statement of Accounts of Holding Companies* with great interest. As the author invites discussion of some of the points involved I take the liberty of contributing to such discussion, and I would very much like to see the opinions of other accountants expressed through your columns, particularly on the second section of Mr. Freeman's article entitled "Interest of holding company in undivided earnings of subsidiaries."

In the case of the balance sheet of a holding company alone—not consolidated with the accounts of its subsidiaries—the question is considered of introducing "into the assets of the holding company an item representing the proportion of the increment in the net assets of the subsidiary company representing the undistributed earnings for the period, corresponding to the proportion of the stock of the subsidiary

company owned by the holding company," when such earnings have not been declared as dividends by the subsidiary.

I cannot see why this practice is not legitimate, provided, first, that the balance sheet of the holding company shows clearly what portion of the subsidiaries' profits taken into the accounts of the holding company have not actually been declared as dividends by the subsidiaries, and secondly, that no dividends be declared by the holding company in respect of subsidiaries' profits that have not been declared as dividends by the subsidiaries.

I contend that this is the safest method in cases where the balance sheet and profit and loss statement of the holding company alone are published, since instances are known where buyers of holding company securities have been misled and have suffered serious losses by reason of the undistributed earnings of subsidiary companies remaining as an undisclosed surplus, such security buyers having been in the dark as to whether the undisclosed surplus and current earnings were adequate to provide continuously for the dividend and interest requirements of the holding company securities outstanding.

In the case of a situation where minority interests in the subsidiaries are involved it is suggested that it is desirable to publish a consolidated profit and loss statement of the subsidiaries alone, followed by a profit and loss statement of the holding company, which includes the proportion of the profit earned by subsidiaries due the holding company.

Mr. Freeman quotes an argument in favor of the practice under discussion, namely, that the holding company is in a position to withdraw such undistributed profits at any time by causing a dividend to be declared, but raises the following objections thereto:

1. Where a holding company purchases the stock of a subsidiary company at a time when that company had a deficit, which at the time of acquisition by the holding company for one reason or another could not be eliminated, it would not be in a position to withdraw in the form of a dividend profits which might be earned after the acquisition of the subsidiary until the initial deficit had been absorbed and then only to the extent of the excess profit over the initial deficit.

Instances of the acquisition of subsidiaries in such circumstances may be said to be so rare as hardly to constitute a valid objection to the practice in question as a general rule.

2. Where a subsidiary company made substantial profits one year, which were brought into account by the holding company, but were not received by it in the form of dividends, and the following year the subsidiary company sustained a heavy loss, it might be impossible for the asset set up in the books of the holding company to be realized.

This is true. Entries should properly be made on the books of the holding company, however, to record the loss sustained by the subsidiary in any case, and the final effect on the surplus of the holding company would be the same whether the subsidiary profits for the prior year had been declared in dividends or not. If the subsidiary company's profits had not been paid over in dividends to the holding company, the

latter company would not be in a position to pay same out in dividends.

If the subsidiary profits for one year were paid out as dividends to the holding company and then paid out by the holding company as dividends, the holding company would be in a weaker position the following year, after the subsidiary had sustained losses, than if the subsidiary's first year profits had not been declared as dividends to the holding company, thus preventing the holding company from paying them out as dividends in turn.

3. Where the holding company brings the earnings of the subsidiary company into account in its own statement it could enjoy all the benefits of ownership of stock without ever distributing a dividend to the minority stockholders, by withdrawing the surplus funds of the subsidiary companies in the form of advances.

This abuse could be practised by a holding company irrespective of whether it brought the undeclared earnings of the subsidiary company into account in its own statements or not.

I cannot see that the arguments which Mr. Freeman advances against the plan of showing the profits of a subsidiary company as an asset on the balance sheet of a holding company have much force. He states that "there does not appear to be any method actually sustained by law by which the earnings can be so set up." Can he cite any legal decision against this practice? It seems to me that this is an accounting rather than a legal proposition.

Yours very truly,

L. H. HEINKE.

Grand Rapids, Mich, September, 1914.

Returnable Package in Accounts

Editor, The Journal of Accountancy:

Sir: Replying to the letter of Mr. A. Fischer in the August issue of THE JOURNAL, I would say that the column in the cash book for returnable packages covers the amount paid out for the return of those packages sold with cash sales, and for packages received from customers whose accounts have been closed in the customers' ledger; the returned package is paid for in cash.

Replying to the article of Mr. Wilhelm Jensen, also in the August issue of THE JOURNAL, I would say that he evidently fails to realize that in the cement business, perhaps, the cost value of the returnable package (the sack) is very close to the amount charged to the customer, whereas in the cracker business, and in many other lines, the actual cost of the new packages is only from 40 per cent to 60 per cent of the amount charged to the customer. While in the case of cement sacks the liability to customers for the redemption of the package very little exceeds the real worth thereof, in other lines the actual value of the returned package is only from 30 per cent to 40 per cent of the amount the company is obligated to pay.

The first question is the elimination of the account to cover the expense of maintaining the returnable package. This account is necessary, first, for the purpose of knowing whether or not it is better business to have these packages returned and put into condition or give them to the customer entirely with the goods and buy new ones. Should the cost of maintenance and repairs become excessive, it is evident that it would be policy to do away entirely with the returning of the package, and thereby save not only cost and bother of maintenance, but also time and expense in the office. Also, in many lines of commerce the value of the package exceeds the value of the contents, and therefore the maintenance and expense of the package forms a very important part of the operating expense, and like any other important item of expense, it should be segregated and kept easy of access to those conducting the affairs of the business.

The second question is the liability to customers. If Mr. Jensen had apprehended the use of the accounts suggested by me, he would have seen that the use of this liability account fully answers the question he raises later on: "Where would you keep track of packages outstanding an unusual time?" Not, as he suggests, for years, as there are very few packages which would be in returnable condition, if outstanding over a year.

As to the necessity for the liability account, I will use Mr. Jensen's own argument, that it was perhaps the straw that broke the back of the already overloaded camel, and thereby caused the failure. Certainly, had the company known of the extent of this liability, which, in this case, amounted to a net loss of 70 per cent of the cash paid out (owing to the fact that the second-hand package was worth not more than 30 per cent of the amount the company was compelled to pay for redemption), it would, in the usual course of business, have prepared for the trouble, and the burden would have been carried over the critical period. Business men seldom fail when they can look ahead and see what is before them, but it is the unseen, and therefore the unprepared-for, event, which generally causes their trouble; and it is the duty of the accountant to point out and keep before the business executive these possible dangers, in order that they may be provided for in advance.

The liability in the case of the returnable package is like bills receivable discounted—undoubtedly a contingent liability—it exists as truly in one case as it does in the other, and it is as important to keep account of it in one case as in the other.

The third point raised is as to the actual value of the package in the hands of the customer. Here again Mr. Jensen has gone astray for the reason that the separation of the merchandise and the package in the customers' ledgers has nothing to do with the asset consisting of the actual value of the returnable package in the hands of customers, which is ascertained by taking a percentage of the liability to customers' account, but is made entirely for the purpose of obtaining the real value of accounts receivable, in order that the firm itself, or its creditors, may not be misled by a false value placed thereon.

In other words, what I am doing by separating these items, as Mr. Jensen says, is to reduce to a certainty that which had been largely a matter of speculation and uncertainty with those concerns which use the returnable package.

Now as to the fourth question—profit on returnable packages. This, as I stated in my article, is ascertainable only on a percentage basis, and is impossible of accurate ascertainment, but can be closely approximated if it can be ascertained how many packages over the useful age limit are outstanding. The only profit on returnable packages exists on those packages which have been paid for and cannot or will not be returned.

I am glad to see that my article has provoked discussion on this question, and hope others will come back at me.

Yours truly,

G. V. W. LYMAN.

New Orleans, September, 1914.

Editor, The Journal of Accountancy:

Sir: In the June JOURNAL OF ACCOUNTANCY, there appears an article by G. V. W. Lyman, C. P. A., on the treatment of returnable packages.

The writer agrees with Mr. Lyman that this subject is one of very great importance and one which is often ignored in devising a system of accounts where such packages are employed.

A concern in the retail oil business was borrowing all the money possible on its accounts receivable. The company lending the money asked that an examination be made to determine the financial condition of the borrower, which examination disclosed the fact that the accounts receivable (which the loan company held as security) were overstated by the difference in the cost of the containers and the price at which they were charged to the customers—in this case about $2.00 per container. Several thousands of these containers were outstanding, and not only was the security of the loan company impaired but a false statement was being shown.

In view of the above situation, an accounting system was ordered installed, which would correct the faults disclosed. The system devised and installed was very similar to that described by Mr. Lyman, except that it was necessary to show monthly the profit and loss.

The problem then became one of keeping accounts on the books that would show at all times the correct inventory of returnable packages, the merchandise inventory being easily taken at the end of each month.

This was done by separating, as explained in Mr. Lyman's article, the merchandise charge from the charge for the package, and the entries to the controlling account at the end of the month were as follows:

Accounts receivable — merchandise
Accounts receivable — packages
    Merchandise sales
    Packages in transit

The "accounts receivable—packages" and "packages in transit" account were always equal and in making up the financial statement, both were eliminated, being nominal accounts. By eliminating these items from the balance sheet there was no danger of any misunderstanding as to the true assets or liabilities.

The inventory of packages was determined monthly in the following manner:

Beginning with the inventory of packages as determined by a physical inventory at depreciated values, all purchases were charged in the same manner as that in which an account for material might be handled. Packages returned for credit were charged at billed price to "packages in transit" account and credited to "accounts receivable—packages," thereby closing the transaction.

Packages retained and paid for by the customer were totaled through a column provided in the cash book at the end of the month and the following entries put upon the books:

(*a*) Cash
Accounts receivable—packages (at billed price)

(*b*) Packages in transit (at billed price)
Profit on package sales (profit on packages)
Inventory of packages (at average cost)

When the books were closed at the end of the month a reserve for depreciation was provided to offset wear and tear and obsolescence on packages, which depreciation reserve deducted from the book inventory, determined as above, gave the correct depreciated value of packages for the balance sheet.

If properly handled, the various accounts mentioned above would show on the trial balance at the end of the month as follows :

Debit—inventory of packages (average cost)
Credit—depreciation reserve
Debit—accounts receivable—packages (at billed price)
Credit—packages in transit—(at billed price)

The "accounts receivable—packages" and "packages in transit," being always equal, are eliminated from the balance sheet, as they are merely nominal accounts representing the value of packages in transit at billing price.

The inventory of packages can be proven by deducting the average profit from the "accounts receivable—packages" and adding the total of the packages in warehouse at average cost, and this proof can be made at any time that the inventory of packages in warehouse is lowest and need not necessarily be done at the end of the fiscal year.

Yours truly,

W. J. TAYLOR, C. P. A.

Cleveland, September, 1914.