# Another Look at the Evaluation of Investment in Accounts Receivable

**Edward A. Dyl**

*Edward A. Dyl is Associate Professor of Business Administration at the University of Wyoming.*

■ In a recent article in *Financial Management* (Summer 1976), John S. Oh advocates the use of the total change in accounts receivable as a measure of the incremental investment associated with a change in the firm's credit policies [7]. However, Oh fails to distinguish between two distinctly different types of credit policy decisions that affect the firm's investment in accounts receivable: the decision to change the firm's credit standards and the decision to change the credit period offered by the firm. His proposed approach is not applicable to the former type of decision, and it is only approximately correct for the latter type.

In fact, there appears to be widespread confusion about the measurement of the incremental investment in accounts receivable arising from a change in the firm's credit policies. For example, several authors (see [5] and [8]) indicate that the analyses for a change in credit standards and for a change in the credit period offered are essentially the same. They are not. In addition, most authors who explicitly discuss the credit period decision present a defective analysis (see [1], [2], [3], [4], [5], and [6]). Oh's approach [7], if restricted to the credit period decision, is an improvement upon the treatment in the finance texts cited; it too, however, has its defects. Although the decision to alter the credit period offered is the source of most of the disarray in the literature, for comparative purposes we will also discuss the credit standards decision.

## The Illustration

As an ongoing example, we shall consider various credit policy decisions faced by a firm with credit sales of $10 million per year, whose current combination of credit standards and credit terms has resulted in an average collection period of 30 days. At present, no cash discounts are offered, and bad debts are nil. Variable costs (including credit administration and inventory carrying costs) are equal to 60% of sales and are perfectly variable. The firm has substantial excess capacity, so fixed costs are irrelevant. Finally, the firm requires a 20% rate of return on new investments and has alternative investment opportunities that yield this rate.

## Changing Credit Standards

Credit standards may either be relaxed to attract new customers or tightened to eliminate unprofitable customers. In either case, the relevant considerations are the change in the firm's investment in accounts receivable and the change in the firm's profits. The incremental investment in accounts receivable ($I_S$) resulting from a change in credit standards is

$$I_S = V[C_N (S_N)/360] \qquad (1)$$

where V is the percentage variable cost of new sales, $C_N$ is the average collection period of the new customers (or, of the newly-eliminated customers in the case of greater stringency), and $S_N$ is the annual dollar sales attributable to the new customers (presumably negative in the case of more stringent standards). Thus, $C_N(S_N)/360$ is simply the total accounts receivable attributable to the new customers. For a change in credit standards, the relevant measure of investment is, of course, the dollar cost the firm has tied up in new accounts receivable, rather than total new accounts receivable. This point will be examined in greater detail presently.

The incremental annual profit ($P_S$) expected from a change in credit standards is simply

$$P_S = S_N(1 - V) - B_N(S_N) - R(I_S) \qquad (2)$$

where $B_N$ is the percentage bad debt expense associated with $S_N$, and R is the firm's required annual rate of return (or opportunity rate). Since the cost of carrying the investment in receivables is included in Equation (2), whenever $P_S$ is greater than zero the change in credit standards should be adopted.

Assume that our example firm is considering loosening their credit standards. It is estimated that the new customers would have an average collection period of 60 days and bad debt expense equal to 4% of sales. Annual sales to the new customers are expected to be $500,000. The resulting incremental investment in accounts receivable would be

$$I_S = 60(500{,}000)(.6)/360 = \$50{,}000$$

and the incremental profit would be

$$P_S = 500{,}000(.4) - .04(500{,}000) - .2(50{,}000) = \$170{,}000.$$

Clearly these marginal customers are profitable, and credit standards should be loosened to acquire their business.

This approach to credit standard decisions is generally well understood. What is not generally understood is that it is distinctly different from the analysis required for decisions to change the firm's credit terms (*i.e.*, the period for which credit is extended).

## Changing the Credit Period

A change in the credit period offered to customers is different from a change in credit standards because it will presumably affect the payment habits of the firm's existing customers in addition to changing the level of expected annual sales. Also, the analysis of a change to more generous credit terms differs slightly from that of more stringent terms. Initially, we consider the former.

The incremental investment ($I_P$) associated with a lengthening of the credit period offered by the firm is

$$I_P = (C_n - C)S/360 + V[C_n(S_n)/360] \qquad (3)$$

where $C_n$ is the new average collection period after the change, C is the current collection period on credit sales to existing customers, S is the level of sales to existing customers, and $S_n$ is the increase in annual sales expected to result from the change in the credit period. The difference between Equations (1) and (3) is evident. As current credit customers change their payment habits to take advantage of the more generous credit period, the accounts receivable attributable to these customers will increase. Because the firm will collect its profit, as well as its cost investment in the receivables attributable to new customers, more slowly, the proper measure of the firm's incremental investment is the aggregate change in existing receivables resulting from the change in credit period plus the cost investment in accounts receivable attributable to new customers. We have assumed that $C_n$ is the same for both old and new customers, but should this assumption prove inappropriate, Equation (3) can easily be modified.

The important difference between Equation (3) and the current textbook approach to measuring the incremental investment in accounts receivable for the credit period decision may be found in the first term on the right side of the equation. This term includes not only the firm's "cost investment" in S, but also the portion of S that represents profit. This treatment captures the opportunity cost associated with the

delay in the receipt of these profits. That is, due to the $C_n - C$ day delay in receiving the proceeds from S, the firm loses the opportunity to earn its required rate of return on both the profit and the "cost investment" in S for a period of $C_n - C$ days. Therefore, this foregone earning opportunity must be reflected as a cost of the credit period extension.

The computation of the reduction in accounts receivable investment ($I_P$) resulting from a shortening of the credit period differs slightly from Equation (3). It is computed as follows

$$I_P = (C_n - C)(S + S_n)/360 + V[C(S_n)/360] \quad (4)$$

where $(S + S_n)$ is the level of sales to remaining customers after the change in credit terms, and $S_n$ *(which is now negative)* remains the change in annual sales expected to result from the change in credit period. The first term on the right side of Equation (4) reflects the acceleration of collections as remaining customers pay more promptly in response to the reduced credit period, and the second term reflects the reduced investment because the firm has lost some customers. That is, *ceteris paribus*, presumably a reduced credit period will accelerate collections and, possibly, reduce sales. $I_P$ is negative, indicating that a shortened credit period will supply funds rather than absorb funds.

The incremental annual profit expected from a change in the credit period offered by the firm ($P_P$) is simply

$$P_P = S_n(1 - V) - B_n(S_n) - R(I_p \text{ or } I_P) \quad (5)$$

where $B_n$ is the percentage bad debt expense associated with either the new customers (*i.e.*, where $S_n > 0$) or the eliminated customers (*i.e.*, $S_n < 0$), and the other terms are as defined above. When $P_P$ is greater than zero, the change in credit period will benefit the firm.

As an illustration, assume that the firm described in our original example is considering a change in their credit period in an attempt to increase sales. If they offer terms of net 60 days, they estimate that their average collection period will increase to approximately 60 days and that sales will increase by $500,000. Bad debt expense on the new accounts is expected to average 1% of sales. The expected incremental investment of this credit policy change will be

$$I_P = (60 - 30)(10{,}000{,}000)/360 + 60(500{,}000)(.6)/360 = 833{,}333 + 50{,}000 = \$883{,}333.$$

Note that the bulk of the incremental investment results from the change in the payment habits of the firm's existing customers (who, presumably, have heard about "paying on the last day"). Given this incremental investment, the expected profit from this credit policy change is

$$P_P = 500{,}000(.4) - .01(500{,}000) - .2(883{,}333) = \$18{,}333.$$

Thus, the incremental profit indicates that the longer credit period should be offered. However, note that, despite the similarity in the examples, the incremental profit expected from the change in credit period is considerably lower than that expected from the change in credit standards considered in the preceding section. This difference results from the increased accounts receivable carrying costs attributable to the change in the payment period of the firm's "old" customers.

## A Critique of Oh's Approach

As we have noted, Oh's recent article [7] advocates the use of the total change in accounts receivable as a measure of the incremental investment associated with a change in credit policy. Thus, in analyzing a change in the firm's credit standards, presumably he would substitute the following for our Equation (1):

$$I_S = C_N(S_N)/360. \quad (6)$$

For our credit standards example, this would imply an incremental investment in receivables of $83,333, instead of the $50,000 computed from Equation (1). However, clearly there is no opportunity cost associated with the $33,333 difference between Oh's result and ours. That is, the $33,333 is simply uncollected profit and, more importantly, these "funds" would be nonexistent without the change in credit standards. Put another way, the $83,333 in total accounts receivable results because the firm's accountant records the profit at the time of the credit sale. He debits inventory by $50,000 (which is real investment that has an opportunity cost) and credits retained earnings with $33,333 to satisfy his fixation with balance sheets balancing. The $33,333 never represented usable funds to the firm and thus has no opportunity cost.

Professor Oh is closer to the mark if we apply his approach to the credit period decision. For example, his Equation (2") implies the following substitute for

our Equation (3):

$$I_P = (C_n - C)S/360 + C_n(S_n)/360. \qquad (7)$$

This expression is similar to Equation (3), except for the second term on the right side, which refers to the incremental investment arising from new sales. This term overstates the investment from new sales in the same manner explained in the preceding paragraph. Oh is correct, however, in noting that there is an opportunity cost associated with the change in accounts receivable arising from existing sales (*i.e.*, as measured by the first term on the right side of Equations (3) and (7) ). That is, the firm has less cash when the collection period for existing credit sales slows.

In summary, Oh's paper attempts to deal with opportunity costs in the credit period decision. He neglects to note, however, the difference between credit standards decisions and credit period decisions. In addition, he fails to distinguish between accounts receivable attributable to *new sales* and those attributable to a change in the collection period on *existing sales*. His opportunity cost approach only applies to the latter. Because Oh is one of the few to associate this important opportunity cost with a change in the credit period offered by the firm, his contribution, when put in the proper perspective, cannot be ignored.

## References


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