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AGRIBUSINESS MANAGEMENT

ACCOUNTS RECEIVABLE ANALYSIS AND THE ASSESSMENT OF CREDIT POLICY CHANGES

The combination of sagging sales and greatly reduced rates of interest has caused many agribusiness firms to reevaluate their current credit policies. As much as 20% of an agribusiness firm's assets may be invested in accounts receivables, generated as a result of their sales on credit. Their credit policies, therefore, would warrant careful review even when the economic conditions noted above do not provide an added incentive. In general, most firms would rather do business on a cash basis, but competition and the seasonal nature of their agricultural clients often require that credit terms be offered. While this granting of credit may have a positive influence to the extent that it stimulates sales, it also generates both direct and indirect costs for the firm. Herein lies the basic dilemma as agribusiness managers attempt to balance the added costs and benefits of providing credit.

Good accounts receivable management begins first with the decision concerning whether or not to grant credit. Second, much depends on the subsequent decision concerning whether or not to alter pre-existing credit policies. Much has already been written regarding the first of these two decisions. Managers and sales personnel are well indoctrinated regarding the firm's current credit policy, the expected credit standards of its customers and the need to regularly monitor and control their accounts receivables position. However, the second decision relating to credit policy alternatives and impacts is generally less well understood by agribusiness industry personnel. The objective of this paper is to explore more fully the basic relationships underlying the accumulation of receivables. Next, a means by which credit policy changes can be evaluated is reviewed. And finally, I shall demonstrate how an agribusiness manager can compute that break-even point where the added costs (e.g., bad debt) of a credit policy change are just offset by the benefits accruing from sales increases which the credit policy change may have directly stimulated.

Receivables Accumulation

The balance outstanding in your accounts receivable at a given point in time is largely a function of: (1) the volume of credit sales, and (2) the average length of time intervening between those credit sales and the collection of those accounts.

To create a simple scenario describing receivables accumulation, let's assume that you open a new retail store on January 1 and generate \$100 in credit sales per day and every business day thereafter. To further simplify matters, let's assume that customers are given 10 days within which to settle their unpaid accounts. At the end of the first day's business, your new firm will have \$100 in accounts receivable and this will reach \$1000 by the tenth day. Beginning on the eleventh day of business, the \$100 addition to receivables will be offset by the collection of \$100 from January 1 credit sales. In general, therefore, when a firm is experiencing stable sales the following will exist:

$$\text{Accounts Receivable} = \left(\begin{array}{c} \text{credit sales} \\ \text{per day} \end{array} \right) \times \left(\begin{array}{c} \text{length of} \\ \text{collection period} \end{array} \right)$$

$$\$1,000 = \$100 \times 10 \text{ days}$$

It's very easy now to see how a change in either sales or collection period will directly impact accounts receivable. Notice also that the \$1000 invested in accounts receivable is not a "free good." In fact, that

investment must be financed by someone. Suppose in our simple example that as the owner of your business you had provided \$100 in common stock to purchase the products sold during the first day of business. On January 1, as you open for business, your firm's balance sheet would be:

Inventories	<u>\$100</u>	Common Equity	<u>\$100</u>
Total Assets	<u>\$100</u>	Total Lib & Eqty.	<u>\$100</u>

By the close of business on January 1 the balance sheet would appear as:¹

Accounts Receivable	\$ 100	Owner Equity	<u>\$100</u>
Inventories	<u>0</u>	Total Lib. & Eqty.	<u>\$100</u>
Total Assets	<u>\$ 100</u>		

To remain in business, however, you must replenish inventories each and every business day. Assuming you borrow \$100 from the bank for this purpose, and assuming the bank is willing to lend you this money daily, by the eleventh day of business your balance sheet will appear as:

Accounts Receivable	\$1000	Notes Payable	\$1000
Inventories	<u>100</u>	Owner Equity	<u>\$ 100</u>
Total Assets	<u>\$1100</u>	Total Lib. & Eqty.	<u>\$1100</u>

Under stable conditions, this balance sheet will have reached a "steady state" condition as the \$100 in receivables collected every day can be used to finance the credit sales made that day. But consider now what would happen if after 10 business days, sales doubled to \$200 per day. After yet another 10-day transaction period, your notes payable to the bank would reach \$2100 before once again reaching a stable state. This example shows clearly that accounts receivable depend jointly on the magnitude of credit sales and the length of the collection period. It also demonstrates that any increase in receivables must be financed from some source other than product revenue.

You Should Change Your Credit Policy Components

Most agribusiness managers are aware that a general "easing" of credit policy components tends to stimulate sales. For example, a lengthening of the credit period, a relaxation of minimum customer credit standards, employing less rigorous and costly collection practices and/or offering cash discounts have all been used within the agribusiness industry as means for stimulating sales. But, it's not a simple world! As sales respond positively to such credit policy changes, some operating costs will also rise. To support the added sales, more labor and other resources will need to be employed. As outstanding receivables increase, the firm will confront greater carrying costs. And finally, bad debt and/or discount expenses can be expected to mirror those sales increases. The first critical question which management must ask, therefore, is whether sales revenues will rise more or less than the associated costs? Until this question can be answered in a credible manner, managers will not be prepared to consider changes in any credit policy components.

To better illustrate a procedure for analyzing proposed credit policy changes, the following income statements for a hypothetical agribusiness firm "Agriserve" is provided (see Table 1). Column 1 reflects the projected 1992 income for Agriserve under the assumption that the "current" credit policy is maintained throughout the year. We're assuming that Agriserve has excess capacity so sales can be increased without adding to the firm's general facilities or overhead expenses. Column 2 shows the "net income (item j) impact" of those credit policy changes on each statement element. We're also assuming that the "current" and "new" credit policy assumptions and components can be described as shown below in Table 2: Column 3 shows the projected 1992 income reflecting the expected effects of "easing" in a "new credit policy."

As described above and in Tables 1 and 2, the new policy is expected to increase sales and lower collection costs. However, discount expenses and other costs are expected to rise. We must next

¹ Abstracting that some small profit on sales should have been generated.

compute those amounts to better evaluate the costs and benefits associated with the proposed credit policy change.

Table 1
Agriserve, Inc.
Income Statement (Projected)
(Credit Policy Analysis Table)

	(1) Current Policy Projected 1992 Income (\$ million)	(2) Impact of Policy Change (\$ million)	(3) New Policy Projected 1992 Income (\$ million)
a. Gross Sales	300	+ 100	400
b. - Discounts	1.46	+ 3.05	4.512
c. Net Sales	298.540	+ 96.95	395.488
d. Prod. Expense/Overhead (60%)	180.00	60.000	240.000
<u>Credit Related Costs:</u>			
e. Cost of Carrying Receivables	1.575	+ 1.03	2.600
f. Credit Analysis/Collection	5.000	- 3.00	2.000
g. Bad Debt	7.500	+ 16.50	24.000
h. Profit Before Taxes	104.465	+ 22.42	126.888
i. Taxes (40%)	41.786	+ 8.97	50.755
j. Net Income	62.679	+ 13.45	76.133
Additional Opportunity Cost	---	---	.250

Table 2
Credit Policy Alternatives

<u>Current (1/10, net 30)</u>	<u>New (2/10, net 40)</u>
- \$5 million cost of collection	- \$2 million cost of collection
- \$300 million in annual sales	- \$400 million in annual sales
- Firm's cost of funds = 15%	- Firm's cost of funds = 15%
- 50% of customers who pay, do so on day 10 with discount	- 60% of customers who pay do so on day 10 with discount
- 40% of customers who pay do so on day 30	- half of remaining customers who pay do so on day 40
- 10% of customers who pay do so on day 40	- remaining other half of customers who pay, do so on day 60
- 2.5% of sales are never collected	- 6.0% of sales are never collected
- cash collections are reduced by discounts taken	- cash collections are reduced by discounts taken

Adjusted Computation

Management must first compute the average collection period (ACP) under both policies. Under the "current" policy, half (50%) of the customers paying do so on day 10, 40% pay on day 30 and 10% are delinquent but pay on day 40. Therefore, $ACP_C = (.50)(10) + (.40)(30) + (.10)(40) = 21 \text{ days}$. Under the "new" policy $ACP_N = (.60)(10) + (.20)(40) + (.20)(60) = 26 \text{ days}$.

While Agriserve expects to spend \$5 million in credit analysis and collection efforts under the current policy, 2.5 % of sales will never be collected. Bad debt losses, therefore amount to $(.025)(\$300 \text{ million}) = \7.5 million . Under the proposed new policy, credit analysis and collection costs would be reduced to \$2

million, but as a result of those reduced efforts, bad debts would rise to 6% of sales or (.60)(\$400 million) = \$24 million.

Note that Agriserve's net income is reduced by the amount of discounts taken. Under the current policy, 97.5% of all customers do pay, and of those 50% take the 1% cash discount by paying within 10 days. Under the current policy, discounts can be calculated as (\$300 million)(.975)(.01)(.50) = \$1.46 million. If those customers who pay under the new policy (94%), 60% of those pay within 10 days and enjoy the larger (2%) discount. Hence, new policy discounts are (\$400 million)(.94)(.02)(.60) = \$4.51 million. Under both policies, variable production expenses are expected to average 60% of gross sales, i.e. if a customer buys goods worth \$100, Agriserve will have to invest \$60 in labor and materials. Under current and new policies, this calculates to \$180 million and \$240 million, respectively. When products are sold but not yet paid for, Agriserve must, therefore, finance 60% of their sales value (sometimes called the variable cost ratio).

Agriserve's annual cost of carrying receivables, in turn, equals the average amount of receivables time the variable cost percentage times the cost of money used to finance those receivables, e.g.:

$$\left(\begin{array}{c} \text{Average Amt} \\ \text{of Receivables} \end{array} \right) \times \left(\begin{array}{c} \text{Variable Cost} \\ \text{Ratio} \end{array} \right) \times \left(\begin{array}{c} \text{Cost of} \\ \text{Funds} \end{array} \right) = \left(\begin{array}{c} \text{Cost of Carrying} \\ \text{Receivables} \end{array} \right)$$

The average amount of receivables for Agriserve is equal to the average collection period (ACP) times sales per day. Therefore, their cost of carrying receivables is:

$$\text{ACP} \left(\begin{array}{c} \text{Sales} \\ \text{per} \\ \text{Day} \end{array} \right) \left(\begin{array}{c} \text{Variable} \\ \text{Cost} \\ \text{Ratio} \end{array} \right) \left(\begin{array}{c} \text{Cost} \\ \text{of} \\ \text{Funds} \end{array} \right) = \text{Cost of Carrying Receivables}$$

OR

$$21 \left(\frac{\$300,000,000}{360} \right) (.60)(.15) = \$1.575 \text{ million for the current policy}$$

$$26 \left(\frac{\$400,000,000}{360} \right) (.60)(.15) = \$2.600 \text{ million for the new policy}$$

Finally, it should be noted that the new credit policy results in a longer ACP. Hence, Agriserve will have to wait longer (26 vs. 21 days) to actually receive the profits on the products it sells. Agriserve, therefore, will incur an opportunity cost due to not having this cash from profits available for investment. This "additional opportunity cost" is equal to the sales per day (current policy) times the change in ACP, times the contribution margin (1) minus the (variable cost ratio) times the cost of funds invested in receivables (k), or:

$$\begin{aligned} \text{Added Opportunity Cost} &= (\text{Sales, Old Policy}/360)(\Delta\text{ACP})(1-V)(k) \\ &= (\$300,000,000/360)(26 - 21)(1 - .60)(.15) \\ &= \$250,000 \end{aligned}$$

Computatorial Summary

As shown in Table 1, the combined effect of the new credit policy on Agriserve's operations is a \$13.45 million increase in net income. Of course this is just an estimate as there always exists some uncertainty regarding the numerous assumptions incorporated into the illustrative example. However, the procedure alone provides management with a valuable tool for evaluating the benefits/costs associated with a contemplated change in credit policy. Without such a tool, management is left with no means for evaluating the interrelationships between credit policies and cash flow decisions.

One added advantage of this computational procedure is that it provides a means by which management can judge the firm's net income sensitivity to credit policy changes and the "bad debt" response to such a change. For example, in the case of Agriserve, the easing of the credit policy, the relaxed efforts at collections, etc. were expected to result in an increase in bad debt from 2.5 to 6.0% of sales. Yet despite this added bad debt loss, the stimulus to sales and profits more than offset the impact. This may not always be the case, of course, and management often questions just how large the bad debt loss could grow before it would cause net income to decline. A "bad debt break-even analysis" can be linked to the computational procedure described above such that this question can be answered.

Bad Debt Break-Even

Let's refer again to the Agriserve assumptions and conditions described earlier in our example; except that the magnitude of the increase in bad debt is unknown. Agriserve's manager now wishes to know how large this bad debt loss could grow under the new credit policy before it would begin to adversely impact net income. Reviewing the computational arithmetic producing Table 1, Column 3 entries, we must simply ask ourselves how large an entry in row g (also impacting row b) could be before the net income under the new policy dropped to \$62,679,000 (or that net income under the current policy)?

The mathematical solutions which are shown in Table 3 show that under the new credit policy, bad debts could actually rise to 11.67% before net income would fall to that experienced under the current policy; i.e., you would be no worse off (break-even) with 11.67% bad debt under the new policy than you were with 2.5% bad debt under the current policy.

Table 3
New Credit Policy Specifications and Break-Even Computations

Row	Item	Amount
a.	1991 Gross Sales	A
b.	\$ Discounts	$A(1-B.D.)(\% \text{ Discount})(\% \text{ Paying} \leq 10 \text{ days})$ where: $B.D.$ = bad debt as a decimal percent $\% \text{ Discount} = .02$ $\% \text{ Paying} \leq 10 \text{ days} = .60$
c.	Net Sales	$A - (\$ \text{ Discounts})$
d.	Production Expense/Over.	$.60 A$
e.	Cost of Carrying Receivables	$ACP \left(\frac{A}{360} \right) (VCR)(CFF)$ where: $ACP = .6(10) + .2(40) + .2(60) = 26 \text{ days}$ $VCR = \text{variable cost ratio} = .60$ $C. \text{ off.} = \text{cost of funds} = .15$
f.	Credit An./Col.	cost of credit analysis and collection = \$2,000,000
g.	\$ Bad Debt	$(B.D.) A$
h.	PBT	profit before tax = Net Sales - (Prod. Exp./Over + Cost of Cor. Rec. + Crd. Ap./Col. + \$ Bad Debt
i.	Tax	$.40 (\text{PBT})$
j.	Net Income = N.I.	$\text{PBT} - \text{Tax} = \$62,679,000$ under current policy

Our computations show that:

N.I. = (1-.4) PBT, where:

$$PBT = (A - \$ \text{Discounts}) - (\text{Prod. Exp./Over} + \text{Cost of Car. Rec.} + \text{Cred. Ap./Col.} + \$ \text{Bad Debt})$$

$$A = \$400,000,000$$

$$\$ \text{Discounts} = A(1 - B.D.)(.02)(.60)$$

$$\text{Prod. Exp/Over} = .6 A$$

$$\text{Cost of Car. Rec.} = 26 \left(\frac{A}{360} \right) (.60)(.15)$$

$$\text{Cred. An/Col.} = \$2,000,000$$

$$\$ \text{Bad Debt} = (B.D.) A$$

$$\therefore \$62,679,000 = .6 \left\{ 400,000,000 - \left[400,000,000(1 - B.D.)(.02)(.6) \right] - .6(400,000,000) - 26 \left(\frac{400,000,000}{360} \right) \right.$$

$$\left. (.6)(.15) - 2,000,000 - 400,000,000B.D. \right\}$$

$$\text{Solving for B.D.} = .1167 \text{ or } 11.67\%$$

Conclusions

For most agribusiness firms, the creation of a credit policy and the granting of credit to their customers have become commonplace activities. Management recognizes that a credit policy can often be used to stimulate sales. Management also recognizes that sales on credit generate added costs in the form of uncollected accounts and collection fees, along with the firm's need to finance those sales generated on credit. The first challenge, therefore, is for management to accurately evaluate the costs and benefits associated with credit transaction. The second quest is for management to correctly evaluate the economic/financial impacts of changing credit policies. The final goal, therefore, is to accurately measure the trade-offs between bad debt losses emerging from a credit policy alteration and the benefits of added sales stimulated in large part by the credit policy adjustment.

This paper has attempted to address each of the goals or challenges posed above. It reviews a means of computing the costs and benefits of a hypothetical credit policy change. It demonstrates the computational procedures used to test the impact of such a credit policy change in the firm's net income. And finally, it outlines a breakeven procedure by which bad debt costs and sales increases can be equated.

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