Short-term Financial Planning and Management.

This topic discusses the fundamentals of short-term financial management; the analysis of decisions involving cash flows which occur within a year or less. These decisions affect current assets and/or current liabilities. We know that net working capital is the difference between current assets and current liabilities; since short-term finance is concerned with current assets and current liabilities, this topic is also referred to as working capital management. Some examples of short-term financial decisions are questions such as:

1) How much inventory should be kept on hand
2) How much cash should be kept on hand
3) Should goods be sold on credit
4) How should the firm borrow short-term

A) Cash and net working capital

Current assets are defined as cash and other assets that are expected to be converted to cash within one year. The four major categories of current assets are:

1) cash
2) marketable securities
3) accounts receivable
4) inventory.

Current liabilities are short-term obligations which require payment within one year. The three major categories are:

1) accounts payable
2) accrued wages and taxes, and other expenses payable
3) notes payable.

Defining cash in terms of other elements

The balance sheet identity can be written as:

Current assets + Fixed assets = Current liabilities + Long-term debt + Equity

Alternatively, by rearranging terms, this identity can be written:

(Cash + Other current assets) - Current liabilities + Fixed assets = Long-term debt + Equity

Solving this equation for Cash:
Cash = Long-term debt + Equity + Current liabilities - Current assets (excluding cash) - Fixed assets.

This equation clearly indicates those actions which increase cash and those which decrease cash:

**Activities which increase cash:**
1) Increase long-term debt (borrowing long-term)
2) Increase equity (sell common stock)
3) Increase current liabilities (borrow short-term)
4) Decrease current assets other than cash (sell inventory for cash)
5) Decrease fixed assets (sell fixed assets)

**Activities which decrease cash:**
1) Decrease long-term debt (repay long-term debt)
2) Decrease equity (repurchase common stock)
3) Decrease current liabilities (repay short-term debt)
4) Increase current assets other than cash (buy inventory for cash)
5) Increase fixed assets (buy fixed assets)

Activities that increase cash are called sources of cash; those decrease cash are called uses of cash. Sources of cash always involve increasing a liability or equity account and/or decreasing an asset account. Uses of cash are just the reverse. A use of cash involves increasing an asset account or decreasing a liability (equity) account.

**a) The Operating Cycle and the Cash Cycle**

A typical manufacturing firm’s short-run operating and financing activities might consist of the following events:

<table>
<thead>
<tr>
<th>Events</th>
<th>Decisions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Buying raw materials</td>
<td>How much inventory to order</td>
</tr>
<tr>
<td>2. Paying cash for purchases</td>
<td>To borrow, or draw down cash balance</td>
</tr>
<tr>
<td>3. Manufacturing the product</td>
<td>What choice of production technology</td>
</tr>
<tr>
<td>4. Selling the product</td>
<td>To offer cash terms or credit terms to customers</td>
</tr>
<tr>
<td>5. Collecting cash</td>
<td>How to collect cash</td>
</tr>
</tbody>
</table>

These activities create cash inflows and outflows that are both unsynchronized and uncertain. Cash inflows are unsynchronized because inflows from the sale of a product do not occur at the same time as
outflows to acquire raw materials. The uncertainty of cash flows arises from the fact that future sales and costs can not be predicted with certainty.

b) Defining the Operating and Cash Cycles

Short-term operating activities and cash flows can be represented by a cash-flow line. This line consists of an operating cycle and a cash cycle. The length of the operating cycle is equal to the sum of the inventory period and the accounts receivable period. The inventory period is the time required to order, produce, and sell a product. The accounts receivable period is the time required to collect cash from a sale.

The accounts payable period is the length of time the firm can delay payment on its purchases. The cash cycle is the difference between the operating cycle and the accounts payable period. A cash cycle of 30 days means that inflows occur 30 days after outflows. This mismatch suggests the need for short-term financing, which can be provided either by borrowing or by maintaining a liquid reserve of marketable securities. Alternatively, the cash cycle can be shortened by changing the inventory, accounts receivable or accounts payable period.

c) Calculating the Operating and Cash Cycles

The operating and cash cycle can be calculated from balance sheet and income statement information using financing ratios.

Example:

The following information for D. Drysdale & Co., Inc., represents balance sheet data for the beginning and end of 1995, and income statement data for the year 1995:

<table>
<thead>
<tr>
<th>Balance Sheet Item</th>
<th>Beginning</th>
<th>Ending</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inventory</td>
<td>$4,500</td>
<td>$5,000</td>
<td>$4,750</td>
</tr>
<tr>
<td>Accounts Receivable</td>
<td>3,500</td>
<td>4,500</td>
<td>4,000</td>
</tr>
<tr>
<td>Accounts Payable</td>
<td>2,250</td>
<td>2,500</td>
<td>2,375</td>
</tr>
</tbody>
</table>

Income Statement Item....................Annual

Net Sales (all credit)....................$18,000
Cost of Goods Sold.....................$13,300

3
Calculate the operating cycle and the cash cycle for Drysdale & Co.

The operating cycle is equal to the inventory period plus the accounts receivable period; we compute these from the inventory turnover ratio and the receivable turnover ratio, respectively.

Inventory turnover = Cost of goods sold / Average inventory = $13,300 / $4,750 = 2.80 times 
inventory is “turned over” 2.80 times per year. Therefore, the inventory period is determined as follows:

Inventory period = 365 / inventory turnover = 365 / 2.80 = 130.36 days

Assuming that all sales are credit sales, then:

Receivables turnover = Credit Sales / Average receivables = $18,000 / $4,000 = 4.50 times

Receivables period = 365 / Receivables turnover = 365 / 4.5 = 81.11 days

The operating cycle is:

Operating cycle = Inventory period + Accounts Receivables period
= 130.36 days + 81.11 days = 211.47 days = 211 days

In order to determine the cash cycle, we first compute the accounts payable turnover and then the accounts payable period:

Payable turnover = Cost of goods sold / Average payables = $13,300 / $2,375 = 5.60 times

Payables period = 365 / Payables turnover = 365 / 5.6 = 65.18 days

Therefore, the cash cycle is:

Cash cycle = Operating cycle - Accounts payable period = 211.47 - 65.18 days = 146.29 days = 146 days.

These calculations indicate that, on average, the time between Drysdale’s acquisition of inventory and collection of payment on sales is approximately 211 days, and the time between Drysdale’s payment for acquisitions and collection of payment on sales is approximately 146 days.

B) Some aspects of short-term financial policy

A firm’s short-term financial policy has two dimensions: the size of the investment in current assets, and the financing of current assets. A flexible current asset policy requires maintaining a relatively high ratio of current assets to sales, while a restrictive policy implies a relatively low ratio. A flexible financing policy employs relatively less short-term debt and more long-term debt; a restrictive financing policy requires that current assets are financed primarily by short-term debt.

The size of the firm’s investment in current assets

A flexible current asset policy implies that the firm maintains relatively high levels of cash, marketable securities and inventories, and grants liberal credit terms which result in relatively high levels of accounts receivable. Restrictive policies mean that the firm maintains relatively low levels of current assets. In
order to determine the optimal levels of current assets, the costs and benefits associated with each policy must be identified.

A flexible policy requires greater initial cash outflows in order to purchase inventory, finance credit sales, and maintain high levels of cash and marketable securities. Future cash inflows, however, should be higher for a flexible policy. Similarly, liberal credit policies also stimulate sales. In addition, the larger cash balances associated with a flexible policy ensure that bills can be paid promptly, thereby increasing discounts taken on accounts payable and reducing borrowing costs required in order to meet expenditures.

The costs associated with managing currents assets can be classified as follows: **Carrying costs** are costs that increase with increases in current assets, and **shortage costs** which decrease with increases in current assets. Carrying costs are the opportunity costs of investment in current assets. For example, if the firm holds idle cash, it forgoes the opportunity to earn interest on the investment of that cash. Similarly, investment in inventory implies an opportunity cost for the firm. The two kinds of shortage costs are trading costs, or order costs, and costs related to safety reserves. **Trading or order costs** arise when the firm runs out of cash or inventory and must consequently incur the cost of restocking. Costs related to safety reserves include loss of sales, customer goodwill, or production time when a stock out (or cash out) occurs.

The following figures demonstrates how combined costs reach a minimum at CA^*^.

The optimal investment in current assets is the level that minimizes the sum of the carrying costs and the shortage costs.
The Cash Budget

The **Cash budget** is a forecast of estimated cash inflows and outflows over a period of time; the cash budget is the primary tool of short-run planning. We illustrate the preparation of a cash budget with the following example.

**Example:** C. Erskine & Company has estimated sales for the next four quarters as follows:

<table>
<thead>
<tr>
<th></th>
<th>Qtr. 1</th>
<th>Qtr. 2</th>
<th>Qtr. 3</th>
<th>Qtr. 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales</td>
<td>$150</td>
<td>$200</td>
<td>$300</td>
<td>$250</td>
</tr>
</tbody>
</table>

Accounts receivable at the beginning of the year are $100. Erskine has a 54-day collection period. Cash outflows consist of: (1) payments to suppliers; (2) wages, taxes, and other expenses; (3) capital expenditures; and, (4) long-term financing payments. Erskine’s purchases from suppliers during a quarter are equal to 50% of next quarter’s forecast sales. Erskine’s payments to suppliers are equal to the previous period’s purchases. In the most recent quarter, Erskine’s purchases are \((0.50 \times $150) = $75\); which will be paid during the first quarter. Wages, taxes, and other expenses are 30% of sales. Interest and dividends are $20 per quarter. A capital expenditure of $100 is planned in the second quarter. Erskine maintains a $10 minimum cash balance to guard against foreseen contingencies and forecasting errors.

**Prepare a cash budget for C. Erskine & Co.**

a) **Sales and Cash Collections**

We begin by computing the cash collections for Erskine for each quarter. The 54-day collection period implies that \([90 - 54]/90 = 40%\) of the sales in a given quarter will be collected during the current quarter and \((54/90)=60\%\) during the following quarter; that is, sales made during the first \((90 - 54) = 36\) days of the quarter will be collected before the end of the quarter, while sales during the remaining 54 days will be collected during the following quarter. Therefore, ending receivables for a given quarter are 60% of sales during that quarter. In the first quarter, cash collections would be the beginning receivables of $100 plus 40% of sales, or:

\[
\text{Cash collections} = \text{Beginning accounts receivables} + (40\% \times \text{Sales})
\]

\[
= $100 + (0.4 \times $150) = $100 + $60 = $160.
\]

Erskine’s cash collections are thus:
The cash outflows for Erskine are:

<table>
<thead>
<tr>
<th></th>
<th>Qtr. 1</th>
<th>Qtr. 2</th>
<th>Qtr. 3</th>
<th>Qtr. 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Payment of Accounts</td>
<td>$75</td>
<td>$100</td>
<td>$150</td>
<td>$125</td>
</tr>
<tr>
<td>Wages, taxes, and other expenses</td>
<td>45</td>
<td>60</td>
<td>90</td>
<td>75</td>
</tr>
<tr>
<td>Capital Expenditures</td>
<td>0</td>
<td>100</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Long-term financing expenses*</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>$140</td>
<td>$280</td>
<td>$260</td>
<td>$220</td>
</tr>
</tbody>
</table>

* Include interest and dividends

b) The Cash Balance

The forecast net cash inflow is the difference between cash collections and cash outflows. The net cash inflow is determined as follows:

<table>
<thead>
<tr>
<th></th>
<th>Qtr. 1</th>
<th>Qtr. 2</th>
<th>Qtr. 3</th>
<th>Qtr. 4</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total cash collections</strong></td>
<td>$160</td>
<td>$160</td>
<td>$240</td>
<td>$280</td>
</tr>
<tr>
<td><strong>- Total cash disbursements</strong></td>
<td>140</td>
<td>280</td>
<td>260</td>
<td>220</td>
</tr>
<tr>
<td><strong>Net Cash inflow</strong></td>
<td>20</td>
<td>-120</td>
<td>-20</td>
<td>60</td>
</tr>
</tbody>
</table>

Erskine maintains a $10 minimum cash balance. Assuming that Erskine maintains this $10 balance at the beginning of the first quarter, we now compute the cumulative surplus, or deficit, for Erskine at the end of each quarter:

<table>
<thead>
<tr>
<th></th>
<th>Qtr. 1</th>
<th>Qtr. 2</th>
<th>Qtr. 3</th>
<th>Qtr. 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beginning cash balances</td>
<td>$10</td>
<td>$30</td>
<td>-$90</td>
<td>-$110</td>
</tr>
<tr>
<td>+ Net cash inflow</td>
<td>20</td>
<td>-120</td>
<td>-20</td>
<td>60</td>
</tr>
<tr>
<td><strong>Ending cash balances</strong></td>
<td>$30</td>
<td>-90</td>
<td>-110</td>
<td>-50</td>
</tr>
<tr>
<td>- Minimum cash balance</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td><strong>Cumulative surplus (deficit)</strong></td>
<td>$20</td>
<td>-$100</td>
<td>-$120</td>
<td>-$60</td>
</tr>
</tbody>
</table>
Beginning in the second quarter, Erskine has a cash shortfall. It occurs because of the seasonal pattern of sales, the delay in collections, and the planned capital expenditure.

Another example of the Cash Budget

The cash budget is a primary tool in short-run financial planning. It allows the financial manager to identify short-term financial needs and opportunities. Importantly, the cash budget helps the manager explore the need for short-term borrowing. It records estimates of cash receipts (cash in) and disbursements (cash out). The result is an estimate of the cash surplus or deficit.

We take the following example:

**Example:** ABC Company has estimated sales for the next four quarters as follows:

<table>
<thead>
<tr>
<th>Qtr. 1</th>
<th>Qtr. 2</th>
<th>Qtr. 3</th>
<th>Qtr. 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales</td>
<td>$200</td>
<td>$300</td>
<td>$250</td>
</tr>
</tbody>
</table>

ABC also started the year with accounts receivables equal to $120.

ABC has a 45-day receivables or average collection period. This means half of the sales in a given quarter are collected the following quarter. This happens because sales made during the first 45 days of a quarter are collected that quarter. Sales made in the second 45 days are collected in the next quarter.

Based on the sales forecasts, we need to estimate the ABC’s cash collections. First, any receivables that we have at the beginning of a quarter would be collected within 45 days, so all of them are collected sometime during the quarter. Second, any sales made in the first half of the quarter are collected, so total cash collections are:

\[
\text{Cash collections} = \text{Beginning accounts receivables} + (1/2 \times Sales)
\]

For example, in the first quarter, cash collections would be the beginning receivables of $120 plus half of sales, \(1/2 \times $200 = $100\), for a total of $220.

Since beginning receivables are all collected along with half of sales, ending receivables for a particular quarter would be the other half of sales. First-quarter sales are projected at $200, so ending receivables are $100. This would be the beginning receivables in the second quarter. Cash collections in the second quarter are thus $100 plus half of the projected $300 in sales, or $250 in total.

Continuing this process, we can summarize ABC’s projected cash collections.

<table>
<thead>
<tr>
<th></th>
<th>Qtr. 1</th>
<th>Qtr. 2</th>
<th>Qtr. 3</th>
<th>Qtr. 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beginning Receivables</td>
<td>$120</td>
<td>$100</td>
<td>$150</td>
<td>$125</td>
</tr>
<tr>
<td>Sales</td>
<td>200</td>
<td>300</td>
<td>250</td>
<td>400</td>
</tr>
<tr>
<td>Cash Collections</td>
<td>220</td>
<td>250</td>
<td>275</td>
<td>325</td>
</tr>
<tr>
<td>Ending Receivables</td>
<td>100</td>
<td>150</td>
<td>125</td>
<td>200</td>
</tr>
</tbody>
</table>

**Cash Outflows**
Now, consider the cash disbursements or payments. These come in the following forms:

- Payments of accounts payables. Generally, these payments are made sometimes after purchases.
- Wages, taxes, and other expenses.
- Capital expenditures: these are payments for cash for long-lived assets.
- Long-term financing expenses: it includes for example: interest payments on long-term outstanding debt and dividend payments to shareholders.

ABC’s purchases from suppliers (in dollars) in a quarter are equal to 60 percent of next quarter’s predicted sales. ABC’s payments to suppliers are equal to the previous quarter’s purchases, so the accounts payable period is 90 days. For example, in the quarter just ended, ABC ordered 0.60 \times $200 = $120 in suppliers. This would actually be paid in the first quarter of the coming year.

Wages, taxes, and other expenses are routinely 20 percent of sales; interest and dividends are currently $20 per quarter. In addition, ABC plans a major plant expansion (a capital expenditure) of $100 in the second quarter. If we put all these together, we get the cash disbursements:

<table>
<thead>
<tr>
<th></th>
<th>Qtr. 1</th>
<th>Qtr. 2</th>
<th>Qtr. 3</th>
<th>Qtr. 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Payment of Accounts</td>
<td>$120</td>
<td>$180</td>
<td>$150</td>
<td>$240</td>
</tr>
<tr>
<td>Wages, taxes, and other expenses</td>
<td>40</td>
<td>60</td>
<td>50</td>
<td>80</td>
</tr>
<tr>
<td>Capital Expenditures</td>
<td>0</td>
<td>100</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Long-term financing expenses*</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>$180</td>
<td>$360</td>
<td>$220</td>
<td>$340</td>
</tr>
</tbody>
</table>

The forecast net cash inflow is the difference between cash collections and cash outflows. The net cash inflow is determined as follows:

<table>
<thead>
<tr>
<th></th>
<th>Qtr. 1</th>
<th>Qtr. 2</th>
<th>Qtr. 3</th>
<th>Qtr. 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total cash collections</td>
<td>$220</td>
<td>$250</td>
<td>$275</td>
<td>$325</td>
</tr>
<tr>
<td>- Total cash disbursements</td>
<td>180</td>
<td>360</td>
<td>220</td>
<td>340</td>
</tr>
<tr>
<td><strong>Net Cash inflow</strong></td>
<td>40</td>
<td>-110</td>
<td>55</td>
<td>-15</td>
</tr>
</tbody>
</table>

So there is a cash surplus in the first and third quarter, and a cash deficit in the second and fourth.

We assume that ABC starts the year with a $20 cash balance. Furthermore, ABC maintains a $10 minimum cash balance to guard against unforeseen contingencies and forecasting errors. So we start the first quarter with $20 in cash. This increase by $40 during the quarter, and the ending balance is $60. Of this, a $10 is reserved as a minimum, so we subtract it out and find that the first-quarter surplus is $60 - $10 = $50.
ABC starts the second quarter with $60 in cash (the ending balance from the previous quarter). There is a net cash inflow of $-110, so the ending balance is $60 - $110 = -$50. We need another $10 as a buffer, so the total deficit is $-60. The calculations are summarized below:

<table>
<thead>
<tr>
<th>Qtr. 1</th>
<th>Qtr. 2</th>
<th>Qtr. 3</th>
<th>Qtr. 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Begining cash balances</td>
<td>$20</td>
<td>$60</td>
<td>-$50</td>
</tr>
<tr>
<td>+ Net cash inflow</td>
<td>40</td>
<td>-110</td>
<td>55</td>
</tr>
<tr>
<td>Ending cash balances</td>
<td>$60</td>
<td>-50</td>
<td>5</td>
</tr>
<tr>
<td>- Minimum cash balance</td>
<td>-10</td>
<td>-10</td>
<td>-10</td>
</tr>
<tr>
<td>Cumulative surplus (deficit)</td>
<td>$50</td>
<td>-$60</td>
<td>-$5</td>
</tr>
</tbody>
</table>

The situation is projected to improve to a $5 deficit in the third quarter, but, by the year’s end, ABC still has a $20 deficit.

**A short-Term Financial Plan**

We assume that ABC manages to borrow any needed funds on a short-term basis. The interest rate is 20 percent APR, and it is compounded on a quarterly basis. So, the rate is $20%/4 = 5% per quarter. We assume that ABC starts the year with no short-term debt.

We know from the previous table that ABC has a second-quarter deficit of $60 million. We have to borrow this amount. Net cash inflow in the following quarter is $55 million. We now have to pay $60 × 0.05 = $3 million in interest out of that, leaving $52 million to reduce the borrowing.

We still owe $60 - 52 = $8 million at the end of the third quarter. Interest in the last quarter is thus $8 × 0.05 = $0.4 million. In addition, net inflows in the last quarter are -$15 million, so we have to borrow $15.4 million, bringing out total borrowing up to $15.4 + 8 = $23.4 million. The following table extends the previous one to include these calculations:
<table>
<thead>
<tr>
<th></th>
<th>Qtr. 1</th>
<th>Qtr. 2</th>
<th>Qtr. 3</th>
<th>Qtr. 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beginning cash balances</td>
<td>$20</td>
<td>$60</td>
<td>$10</td>
<td>$10.0</td>
</tr>
<tr>
<td>Net cash inflow</td>
<td>40</td>
<td>-110</td>
<td>55</td>
<td>-15.0</td>
</tr>
<tr>
<td>Net short-term borrowing</td>
<td>—</td>
<td>60</td>
<td>—</td>
<td>15.4</td>
</tr>
<tr>
<td>Interest on short-term borrowing</td>
<td>—</td>
<td>—</td>
<td>-3</td>
<td>-0.4</td>
</tr>
<tr>
<td>Short-term borrowing repaid</td>
<td>—</td>
<td>—</td>
<td>-$52</td>
<td>—</td>
</tr>
<tr>
<td>Ending cash balance</td>
<td>$60</td>
<td>10</td>
<td>10</td>
<td>10.0</td>
</tr>
<tr>
<td>Minimum cash balance</td>
<td>-$10</td>
<td>-10</td>
<td>-10</td>
<td>-10.0</td>
</tr>
<tr>
<td>Cumulative surplus (deficit)</td>
<td>$50</td>
<td>0</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Beginning short-term borrowing</td>
<td>0</td>
<td>0</td>
<td>60</td>
<td>8.0</td>
</tr>
<tr>
<td>Change in short-term debt</td>
<td>0</td>
<td>60</td>
<td>-52</td>
<td>15.4</td>
</tr>
<tr>
<td>Ending short-term debt</td>
<td>0</td>
<td>60</td>
<td>8</td>
<td>23.4</td>
</tr>
</tbody>
</table>

Notice that the ending short-term debt is just equal to the cumulative deficit for the entire year, $20, plus the interest paid during the year, $3 + 0.4 = $3.4, for a total of $23.4.

The plan illustrates that in about 90 days, ABC would need to borrow $60 million or so on a short-term basis. It is time to start lining up the sources of funds.

Also, the firm’s short-term needs costs more than $3 million on interest (before taxes) for the year. This is a starting point for the ABC to being evaluating alternatives to reduce this expense. For example, can the $100 million planned expenditure be postponed or spread out. At 5 percent per quarter, short-term credit is expensive.

Also, if ABC’s sales are expected to keep growing, the $20 million plus deficit would probably also keep growing, and the need for additional financing is permanent. ABC may wish to think about raising money on a long-term basis to cover this need.
Credit And Inventory Management

Chapter 19

Credit policy is analyzed by computing the NPV of a credit decision.

A firm may require cash on or before delivery in payment for its products, or it may decide to extend credit to its customers. If credit is extended, then the firm must establish a credit policy, which involves three distinct components: the terms of sale, credit analysis, and collection policy.

The firm’s terms of sale consist of the following aspects of a credit sale: the credit period, the cash discount and discount period, and the type of credit instrument. Credit analysis is the process of attempting to distinguish between customers who are likely and not likely to make payment on an account. A firm’s collection policy is the set of procedures the firm uses to collect payment on accounts.

In this chapter, we discuss only the credit policy, leaving the other topics out.

A) Analyzing Credit Policy

Credit policy effects:
The decision regarding whether to grant credit depends on the following:

1) Revenue effects: Granting credit results in both a delay in revenue collections and an increase in total revenue.

2) Cost effects: Granting credit results in increased costs directly associated with the credit process and, if sales increase, increased variable costs.

3) The cost of debt: The cost of financing receivables must be considered in analyzing credit policy.

4) The probability of nonpayment: Some buyers will default.

5) The cash discount: Some customers will pay during the discount period to take advantage of the discount.

Evaluating a proposed credit policy

The relevant variables in analyzing credit policy are:

\[ P = \text{Price per unit} \]

\[ v = \text{Variable cost per unit} \]

\[ Q = \text{Current quantity sold per month} \]

\[ Q' = \text{Quantity sold under new policy} \]

\[ R = \text{Monthly required return} \]

Example: Suppose that a firm is considering granting credit terms of net 30 days. Consider the following information regarding the decision:
\[ P = \$11 \]
\[ v = \$5 \]
\[ Q = 100 \]
\[ Q' = 120 \]
\[ R = 1\% \]

Should the firm grant the credit terms of net 30 days to its customers.

**Solution:** If the firm does not extend credit, then the monthly sales are:
\[ P \times Q = (\$11 \times 100) = \$1100 \]
and monthly variable costs are:
\[ v \times Q = (\$5 \times 100) = \$500 \]
The cash flow is:
Cash flow (old policy) = \((P - v) \times Q = (\$11 - \$5) \times 100 = \$600\)
If credit is granted, then:
Cash flow (new policy) = \((P - v) \times Q' = (\$11 - \$5) \times 120 = \$720\)
The incremental cash flow is defined as follows:
Incremental cash flow = Cash flow (new policy) - Cash flow (old policy)
= \((P - v) \times Q - (P - v) \times Q = (P - v)(Q' - Q) = (\$11 - \$5) \times (20) = \$120\)
This incremental cash flow is in the form of a monthly annuity so that the present value of the annuity is:
\[ PV = \frac{((P - v)(Q' - Q))}{R} = \frac{\$120}{.01} = \$12000 \]
The cost of the change in credit policy is the sum of two components. First, the variable cost of producing the additional units:
\[ v(Q' - Q) = \$5 \times (120 - 100) = \$100 \]
Second, the first month’s sales which would be collected under the old policy are not collected until thirty days later under the new policy. Since collections are permanently delayed by thirty days, this cost is:
\[ PQ = \$11 \times 100 = \$1100 \]
The sum of these costs is:
\[ PQ + v(Q' - Q) = \$1100 + \$100 = \$1200 \]
The net present value of the change in credit policy is:
\[ NPV = \frac{PQ + v(Q' - Q) + ((P - v)(Q' - Q))}{R} = \frac{-\$1200 + \$12000}{\$12000} = \$10800 \]
Therefore, the change in credit policy to terms of net 30 days is beneficial in this example.

**B) Optimal Credit Policy**
Firms must also consider the optimal amount of credit to be granted. In performing this analysis, the firm must consider two categories of costs: the carrying costs associated with granting credit and investing in accounts receivables, and the opportunity costs which result from a refusal to grant credit. The carrying costs include the required return on the investment in receivables, losses from bad debts, and the costs of managing credit and credit collections. The opportunity costs are the foregone profits from the lost sales if the firm denies credit. The optimal amount of credit minimizes the sum of the carrying costs plus the opportunity costs which is the total credit cost curve. This is depicted in the figure.

In general, all other things being equal, it is likely that firms with (1) excess capacity, (2) low operating costs, and (3) repeat customers will extend credit more liberally than otherwise.
C) Further on Credit Analysis

Credit analysis is the process of estimating the probability that a customer will not pay, and then deciding whether to extend credit to that customer. The firm must first gather relevant information, and then determining the creditworthiness of the customer.

Consider a customer who purchases one unit on credit at a price of $P = 100 per unit. The variable cost is $70 per unit and the monthly required return is $r = 1\%$. Assume that this is a one-time sale. The probability of default is $\pi = 25\%$.

**Should the firm grant credit to the new customer.**

The net present value is the cost minus the present value of the cash flow:

$$NPV = -v + \frac{(1 - \pi) \times P}{(1 + r)^2} = -70 + \frac{75}{1.01} = 3.52$$

Since the present value is positive, the firm should extend credit to the customer.

In the preceding example, we assumed that the firm has no repeat business. In the next example, we analyze the credit decision under the following assumption about repeat business: a new customer who does not default on his first purchase will remain a customer indefinitely and will never default.

**Example:** Assume the following data from the previous example: $P = 100$ per unit, $v = 70$, and $\pi = 25\%$. Also, the firm’s required return for a two-month period is $2\%$. Assuming that a customer who does not default will purchase one unit every other month forever, should the firm extend credit to the new customer.

**Solution:** the cost to the firm is the variable costs $v = 70$. In two months, the customer will either default or he will pay $p = 100$ and purchase another unit. The probability that he will not default is $(1 - .25) = .75$ and the expected net cash inflow in two months is:

$$(1 - \pi) \times (P - v) = .75 \times 30 = 22.50$$

The net present value of the decision to grant credit is:

$$NPV = -v + \frac{((1 - \pi) \times (P - v))/r}{(1 - \pi) \times (P - v)) / r} = -70 + \frac{22.50}{.02} = 1.055$$

Since the net present value is positive, it is beneficial for the firm to extend credit to the new customer.

Notice, we are discounting by $r$, since it is considered as an annuity, with infinite life (a perpetuity).