Chapter 4

Long-Term Financial Planning and Growth

Overview of the Lecture

• What Is Financial Planning
• Financial Planning Models
• The Percentage of Sales Approach
• External Financing and Growth
What Is Financial Planning?

- Growth can be seen as one of financial management goal
- Dimensions of Financial Planning
  - Planning horizon
  - Aggregation
  - Scenario analysis

Scenario Analysis

Define a worst case, a normal case and a best case:

**Worst Case:** Sales are low (output prices are low), costs are high.

**Normal Case:** Sales are as expected (output prices are as expected), costs are as expected.

**Best Case:** Sales are high (output prices are high), costs are low.
Scenario Analysis

Even though the normal case is the most likely, management has to be prepared for the worst and best cases.

What Can Financial Planning Accomplish?

- Examining interactions
- Exploring options
- Avoiding surprises
- Ensuring feasibility and internal consistency
- Communication with investors and lenders
Principal Ingredients:

- Sales forecast (economic assumptions)
- Pro forma statements
- Asset requirements
- Financial requirements
- The plug

Preparing the pro forma statements requires the use of plug variables.

A plug variable varies to ensure that the balance sheet balances and to ensure that the pro forma balance sheet figures are consistent with the pro forma income statement figures.

That is, the growth assumptions cannot concern all items on the statements. How plug variables vary will determine the firm’s external financing required.
**Example 1**

Assumptions: Sales, costs, assets, debt and equity are all expected to increase by 20% in the coming year. “Dividends” is the plug variable:

<table>
<thead>
<tr>
<th>Computerfield Corporation</th>
<th>Pro Forma Financial Statements</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Income Statement</strong></td>
<td><strong>Balance Sheet</strong></td>
</tr>
<tr>
<td>Sales</td>
<td>Assets 600</td>
</tr>
<tr>
<td>Costs</td>
<td>Debt 300</td>
</tr>
<tr>
<td>Net income</td>
<td>Equity 300</td>
</tr>
<tr>
<td>Dividends</td>
<td>Total 600</td>
</tr>
<tr>
<td>Earnings retained</td>
<td>Total 600</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Example 1 (continued)

Equity is expected to increase by 50 while net income is expected to be 240.

For the pro forma income statement to be consistent with the pro forma balance sheet, dividends must be

\[ 240 - 50 = 190. \]

“Dividends” is used at the plug variable in the present example. The next example uses a different plug variable.

Example 2

Assumptions: Sales, costs, assets, are all expected to increase by 20% in the coming year. The dividend payout ratio will remain 50% of net income, so debt is the plug variable.

<table>
<thead>
<tr>
<th>Computerfield Corporation</th>
<th>Pro Forma Financial Statements</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Income Statement</strong></td>
<td><strong>Balance Sheet</strong></td>
</tr>
<tr>
<td>Sales</td>
<td>Assets 600</td>
</tr>
<tr>
<td>Costs (960)</td>
<td>Debt ?</td>
</tr>
<tr>
<td>Net income 240</td>
<td>Equity 370</td>
</tr>
<tr>
<td>Dividend 120</td>
<td>Total 600</td>
</tr>
<tr>
<td>Earnings retained 120</td>
<td>Total 600</td>
</tr>
</tbody>
</table>
Example 2 (continued)

Total liabilities and equity are expected to increase to 600 while equity is expected to be 370. For the pro forma balance sheet to balance, future debt has to be

\[ 600 - 370 = 230, \]

i.e. debt has to be reduced by 20.

In the last example, EFN is -20, i.e. the firm will be able to repay $20 of long-term debt if the projections are correct.

There are many ways to construct pro forma statements. The percent-of-sales approach is the most commonly used.
The percent-of-sales approach assumes that some items on the income statement and balance sheet always vary in proportions with sales.

For example, it may be reasonable to assume that current assets increase by 20% whenever sales increase by 20%.

There are some items, however, that do not have to vary in the same proportions as sales. These are debt, common stock, retained earnings, short-term debt and interest payments, among others. Other balance sheet items, such as accounts receivable, can also be relatively independent of sales.

Consider the following statements:

<table>
<thead>
<tr>
<th>Rosengarten Corporation</th>
<th>Current Financial Statements (in millions of $)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Income Statement</strong></td>
<td></td>
</tr>
<tr>
<td>Sales</td>
<td>1,000</td>
</tr>
<tr>
<td>Costs</td>
<td>(800)</td>
</tr>
<tr>
<td>Taxable income</td>
<td>200</td>
</tr>
<tr>
<td>Taxes (34%)</td>
<td>(68)</td>
</tr>
<tr>
<td>Net income</td>
<td>132</td>
</tr>
<tr>
<td>Dividend (33.33%)</td>
<td>44</td>
</tr>
<tr>
<td>Earnings retained</td>
<td>88</td>
</tr>
<tr>
<td><strong>Balance Sheet</strong></td>
<td></td>
</tr>
<tr>
<td>Cash</td>
<td>160</td>
</tr>
<tr>
<td>A/P</td>
<td>300</td>
</tr>
<tr>
<td>A/R</td>
<td>440</td>
</tr>
<tr>
<td>N/P</td>
<td>100</td>
</tr>
<tr>
<td>Inventory</td>
<td>600</td>
</tr>
<tr>
<td>C.L.</td>
<td>400</td>
</tr>
<tr>
<td>C.A.</td>
<td>1,200</td>
</tr>
<tr>
<td>LTD</td>
<td>800</td>
</tr>
<tr>
<td>NFA</td>
<td>1,800</td>
</tr>
<tr>
<td>C/S</td>
<td>800</td>
</tr>
<tr>
<td>R/E</td>
<td>1,000</td>
</tr>
<tr>
<td>Total</td>
<td>3,000</td>
</tr>
<tr>
<td>Total</td>
<td>3,000</td>
</tr>
</tbody>
</table>
Main assumption: Sales are expected to increase by 25%.

Assumptions concerning the income statement:

- Costs are a constant fraction of sales \( \frac{800}{1,000} = 80\% \).
- The tax rate is not expected to change (34\%).
- Dividend payout ratio will remain constant (33.33\%).

Assumptions concerning the balance sheet (assets):

- Each current asset is a constant fraction of sales:
  
  \[
  \frac{160}{1,000} = 16\% \quad \text{for Cash}, \\
  \frac{440}{1,000} = 44\% \quad \text{for A/R}, \\
  \frac{600}{1,000} = 60\% \quad \text{for inventory}.
  \]
Assumptions concerning the balance sheet (assets):

- The firm will keep operating at the same capacity level, measured by
  \[ \frac{\text{NFA}}{\text{Sales}} = \frac{1,800}{1,000} = 1.8. \]

That is, NFA in the pro forma balance sheet have to be equal to 1.8 times sales.

Assumptions concerning the balance sheet (liabilities):

- Accounts payable are a constant fraction of sales (30%).
- Notes payable and long-term debt are independent of sales (these are plug variables).
- Retained earnings increase depends on the “plowback ratio”, which is 66.66% in this example.
- Common stock is independent of sales (also a plug variable).
Percent-of-Sales Approach: An Illustration

Before adjusting the plug variables:

<table>
<thead>
<tr>
<th>Rosengarten Corporation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Partial Pro Forma Financial Statements (in millions of $)</td>
</tr>
</tbody>
</table>

### Income Statement
- Sales: 1,250
- Costs: (1,000)
- Taxable income: 250
- Taxes (34%): (85)
- Net income: 165
- Dividend (33.33%): 55
- Earnings retained: 110

### Balance Sheet
- Cash: 200
- A/R: 750
- Inventory: 750
- C.A.: 1,500
- NFA: 2,250
- Total: 3,750

This 25% growth has to be financed with debt and/or equity.

The **external financing needed** (EFN) is

\[
\text{EFN} = \text{Total} - \left( \frac{\text{Sales} - \text{Costs}}{\text{Sales}} \right) - \left( \frac{\text{Dividend} + \text{Earnings retained}}{\text{Sales}} \right) = 3,750 - 3,000 - \left( \frac{110 + 75}{1,250} \right) = $565 \text{ million.}
\]
The firm might follow some guidelines as to how funds can be raised.

These guidelines could be, for instance,

1. Use debt first (short-term then long-term);
2. Sell stocks only if necessary.

How much new debt to issue? This depends on the firm’s constraints.

Example of constraints:

- The current ratio must not be smaller than 3, say (the actual current ratio). This constraint limits short-term borrowing.
- The total debt ratio must not exceed 0.4, say (the actual total debt ratio). This constraint limits long-term borrowing once short-term borrowing has been exhausted.
- Raise the remaining funds through equity offering.
Percent-of-Sales Approach: An Illustration

Possible Financing Scenario

- Current ratio: 3
- Total debt ratio: 0.4

Short-Term Borrowing (Notes Payable)

\[
\text{Current Ratio} = \frac{\text{C.A.}}{\text{C.L.}} = \frac{1,500}{\text{C.L.}} = 3 \quad \Rightarrow \quad \text{C.L.} = \$500 \text{ million.}
\]

Actual current liabilities are $475 million, so they can be increased by $25 million.

Hence, Rosengarten can raise up to $25 million using N/P.

The firm has to find $565 million. If $25 million are obtained through N/P, $540 million have to be raised using long-term debt and common stock.
Percent-of-Sales Approach: An Illustration

Long-Term Debt

Total Debt Ratio = \frac{\text{Total debt}}{\text{Total assets}} = \frac{3,750}{\text{Total debt}} = 0.4,

which gives

\text{Total debt} = 1,500 \text{ million}.

Thus the firm can raise up to

\[ 1,500 - 500 - 800 = 200 \text{ million} \]

in long-term debt. We still need \( 540 - 200 = 340 \text{ million} \).

Percent-of-Sales Approach: An Illustration

The remaining $340 million will be raised through a common stock issue, which gives the following pro forma statements:

<table>
<thead>
<tr>
<th>Rosengarten Corporation</th>
<th>Pro Forma Financial Statements (in millions of $)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Income Statement</strong></td>
<td></td>
</tr>
<tr>
<td>Sales</td>
<td>1,250</td>
</tr>
<tr>
<td>Costs</td>
<td>(1,000)</td>
</tr>
<tr>
<td>Taxable income</td>
<td>250</td>
</tr>
<tr>
<td>Taxes (34%)</td>
<td>(85)</td>
</tr>
<tr>
<td>Net income</td>
<td>165</td>
</tr>
<tr>
<td>Dividend (33.33%)</td>
<td>55</td>
</tr>
<tr>
<td>Earnings retained</td>
<td>110</td>
</tr>
<tr>
<td><strong>Balance Sheet</strong></td>
<td></td>
</tr>
<tr>
<td>Cash</td>
<td>200</td>
</tr>
<tr>
<td>A/P</td>
<td>375</td>
</tr>
<tr>
<td>A/R</td>
<td>550</td>
</tr>
<tr>
<td>N/P</td>
<td>125</td>
</tr>
<tr>
<td>Inventory</td>
<td>750</td>
</tr>
<tr>
<td>C.L.</td>
<td>500</td>
</tr>
<tr>
<td>C.A.</td>
<td>1,500</td>
</tr>
<tr>
<td>LTD</td>
<td>1,000</td>
</tr>
<tr>
<td>NFA</td>
<td>2,250</td>
</tr>
<tr>
<td>C/S</td>
<td>1,140</td>
</tr>
<tr>
<td>R/E</td>
<td>1,110</td>
</tr>
<tr>
<td>Total</td>
<td>3,750</td>
</tr>
<tr>
<td>Total</td>
<td>3,750</td>
</tr>
</tbody>
</table>
An Alternative Scenario

Suppose that Rosengarten Corporation initially operates at 70% capacity.

That is, suppose that Rosengarten’s actual level of sales is achieved with the use of 70% of its net fixed assets only.

Full capacity sales (FCS) are then

$$1,000 = 0.7 \times \text{FCS} \implies \text{FCS} = \frac{1,000}{0.7} = 1,429.$$ 

An Alternative Scenario

Sales could increase to 1,429 without increasing net fixed assets. So if sales increase to 1,250, there is no need to increase fixed assets and thus the increase in total assets is, in this case,

$$0.25 \times \text{Current Assets} = 0.25 \times 1,200 = 300$$

and the external financing required is

$$\text{EFN} = 300 - (110 + 75) = 115.$$
An Alternative Scenario

What could be a possible financing plan in this case? Suppose we have the same requirements as before:

- The current ratio must be at least 3
- The total debt ratio must not exceed 0.4

Current Ratio $\Rightarrow$ Notes Payable

Since current assets increase as in the previous case, notes payable can go up 25 units to 125, which gives us a current ratio of exactly 3 and a value of 500 for current liabilities.
An Alternative Scenario

**Total Debt Ratio ⇒ Long-Term Debt**

In this case, projected total assets is 3,300 and thus the total debt ratio is given by

\[
\frac{\text{CL} + \text{LTD}}{3,300} = \frac{500 + \text{LTD}}{3,300}
\]

For this ratio to be less than or equal to 0.4, LTD must not exceed

\[
.4 \times 3,300 - 500 = 820.
\]

Notes payable can increase by \(125 - 100 = 25\) and LTD can increase by \(820 - 800 = 20\), so we still need to find

\[
115 - (25 + 20) = 70,
\]

which will be the increase in common stock.
An Alternative Scenario

The pro forma statements under this scenario are as follows:

<table>
<thead>
<tr>
<th>Rosengarten Corporation</th>
<th>Pro Forma Financial Statements (in millions of $)</th>
</tr>
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<tbody>
<tr>
<td><strong>Income Statement</strong></td>
<td><strong>Balance Sheet</strong></td>
</tr>
<tr>
<td>Sales</td>
<td>Cash 200 A/P 375</td>
</tr>
<tr>
<td>Costs (1,000)</td>
<td>A/R 550 N/P 125</td>
</tr>
<tr>
<td>Taxable income 250</td>
<td>Inventory 750 C.L. 500</td>
</tr>
<tr>
<td>Taxes (34%) (85)</td>
<td>C.A. 1,500</td>
</tr>
<tr>
<td>Net income 165</td>
<td>LTD 820</td>
</tr>
<tr>
<td>Dividend (33.33%) 55</td>
<td>NFA 1,800 C/S 870</td>
</tr>
<tr>
<td>Earnings retained 110</td>
<td>R/E 1,110 Total 3,300</td>
</tr>
<tr>
<td>Total 3,300</td>
<td>Total 3,300</td>
</tr>
</tbody>
</table>

A Third Scenario

Suppose that Rosengarten initially operates at 70% capacity and wants to be operating at 80% capacity in the coming year. What is then the increase in total assets and the external financing required?

If 1,429 is the full capacity sales level with 1,800 in net fixed assets, the ratio fixed assets/sales at full capacity is

\[
\frac{1,800}{1,429} = 1.26.
\]
A Third Scenario

If sales increase by 25% to 1,250 and Rosengarten operates at 80% capacity, full capacity sales are then

\[
\frac{1,250}{.8} = 1,563
\]

and thus net fixed assets are

\[
1.26 \times 1,563 = 1,969.
\]

A Third Scenario

As before, current assets increase with sales and thus the increase in total assets is

\[
.25 \times 1,200 + (1,969 - 1,800) = 469
\]

and the external financing needed is

\[
\text{EFN} = 469 - (75 + 110) = 284.
\]
**Weaknesses of the Percent-of-Sales Approach**

The percent-of-sales approach has three weaknesses:

1. It is unrealistic to assume that all expenses will remain exactly the same percent of sales from one fiscal year to the next.

2. With the percent-of-sales method, a company is essentially locked into a given profit margin.

3. The percent-of-sales approach assumes that all of the firm’s costs are variable. Fixed costs create “leverage”.

<table>
<thead>
<tr>
<th>Income Statement</th>
<th>Balance Sheet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales 1,250</td>
<td>Cash 200 A/P 375</td>
</tr>
<tr>
<td>Costs (1,000)</td>
<td>A/R 550 N/P ?</td>
</tr>
<tr>
<td>Taxable income 250</td>
<td>Inventory 750 C.L. ?</td>
</tr>
<tr>
<td>Taxes (34%) (85)</td>
<td>C.A. 1,500 LTD ?</td>
</tr>
<tr>
<td>Net income 165</td>
<td>NFA 1,969 C/S ?</td>
</tr>
<tr>
<td>Dividend (33.33%) 55</td>
<td>R/E 1,110</td>
</tr>
<tr>
<td>Earnings retained 110</td>
<td>Total 3,469 Total 3,469</td>
</tr>
</tbody>
</table>
An Alternative Approach

Note that some balance sheet items could be projected using target activity ratios.

In the Rosengarten example, for instance, the initial inventory turnover ratio is

\[
\frac{\text{COGS}}{\text{Inv}} = \frac{800}{600} = 1.33,
\]

for an average age of inventory (AAI) of

\[
\frac{365}{1.33} = 274 \text{ days}.
\]

If Rosengarten wants to reduce its AAI to 250 days and projected COGS is 1,000, then projected inventory is

\[
\frac{365}{1,000/\text{Inv}} = 250 \Rightarrow \text{Inv} = 685.
\]

This can be done with accounts receivable and accounts receivable. This way of producing pro forma statements is called the judgmental approach.
By how much can a firm grow without increasing its debt? This growth rate is called the **internal growth rate**.

By how much can a firm grow without selling stocks but by borrowing to leave the debt-equity ratio constant? This growth rate is called the **sustainable growth rate**.

---

**External Financing and Growth**

Let

\[
S \equiv \text{Sales} \quad A \equiv \text{Total assets} \quad D \equiv \text{Total debt} \\
E \equiv \text{Total equity} \\
p \equiv \text{Profit margin} \\
r \equiv \text{Retention ratio} \\
g \equiv \text{Growth rate in sales}
\]
Assume that all income statement items increase with sales. The profit margin remains constant as sales grow and thus projected net income when sales grow at the rate $g$ is

$$(1 + g)pS.$$  

Projected earnings retained are then

$$r(1 + g)pS.$$  

If all assets increase with sales and $D$ is independent of sales (accounts payable do not increase with sales),

$$\text{EFN} = gA - r(1 + g)pS.$$  

Rearranging, we obtain

$$\text{EFN} = -rpS + g(A - rpS).$$
Assuming that all income statement items and all assets increase in the same proportions as sales, the Hoffman company’s EFN, as a function of $g$, is given by

\[
\text{EFN} = -rpS + g(A - rpS) \\
= -\frac{2}{3} \times \frac{66}{800} \times 800 + g \left( 500 - \frac{2}{3} \times \frac{66}{800} \times 800 \right) \\
= -44 + 456g.
\]
**Internal Growth Rate**

The internal growth rate \( (g_i) \) is the maximum growth rate that can be achieved without increasing the firm’s debt and common stock. That is, \( g_i \) is such that

\[
\text{EFN} = 0 \Rightarrow (A - rpS)g_i = rpS.
\]

Isolating \( g_i \), we obtain

\[
g_i = \frac{rpS}{A - rpS} = \frac{r \times \frac{pS}{A}}{1 - r \times \frac{pS}{A}} = \frac{r \times \text{ROA}}{1 - r \times \text{ROA}}.
\]

---

**Sustainable Growth Rate**

The sustainable growth rate \( (g_s) \), on the other hand, is the maximum growth rate that can be achieved by the firm without issuing any new equity but by increasing debt such that the debt/equity ratio remains constant.

That is, since total equity increases by \( r(1 + g)pS \), the new level of debt \( D^* \) can be such that

\[
\frac{D^*}{E + r(1 + g)pS} = \frac{D}{E} \Rightarrow D^* = \frac{E + r(1 + g)pS}{E} \times D.
\]
Sustainable Growth Rate

The automatic increase in debt is then
\[
\frac{E + r(1+g)pS}{E} \times D - D = \frac{r(1+g)pS}{E} \times D,
\]
and thus, in this case, external financing needed (EFN\(^*\)) is given by
\[
EFN^* = gA - r(1+g)pS - \frac{r(1+g)pS}{E} \times D.
\]
Sustainable Growth Rate

\[ g_s = \frac{rpS \left(1 + \frac{D}{E}\right)}{A - rpS \left(1 + \frac{D}{E}\right)} = \frac{rpS \left(\frac{E+D}{E}\right)}{D+E - rpS \left(\frac{E+D}{E}\right)} \]

\[ = \frac{r \times \frac{pS}{E}}{1 - r \times \frac{pS}{E}} \]

\[ = \frac{r \times ROE}{1 - r \times ROE} \]

Determinants of Growth

Looking at the sustainable growth rate, what can we say about growth?

\[ g_s = \frac{rpS \left(1 + \frac{D}{E}\right)}{A - rpS \left(1 + \frac{D}{E}\right)} = \frac{rpS_x \left(1 + \frac{D}{E}\right)}{1 - rpS_x \left(1 + \frac{D}{E}\right)} \]
Determinants of Growth

The sustainable growth rate:

- Increases with the profit margin \( (p) \).
- Increases with the retention ratio \( (r) \).
- Increases with the debt/equity ratio \( (D/E) \).
- Increases with the total asset turnover \( (S/A) \).