# APPENDIX 17B

# FORECASTING FINANCIAL REQUIREMENTS WHEN THE BALANCE SHEET RATIOS ARE SUBJECT TO CHANGE

Both the AFN formula and the projected financial statement method as we initially used it assume that the ratios of assets and liabilities to sales ($A^*/S_0$ and $L^*/S_0$) remain constant over time. This, in turn, requires the assumption that each "spontaneous" asset and liability item increases at the same rate as sales. In graph form, this implies the type of relationship shown in Panel a of Figure 17B-1, a relationship that is (1) linear and (2) passes through the origin. Under those conditions, if the company's sales increase from $200 million to $400 million, or by 100 percent, inventory will also increase by 100 percent, from $100 million to $200 million.

The assumption of constant ratios and identical growth rates is appropriate at times, but there are times when it is incorrect. Three such conditions are described in the following sections.

## Economies of Scale

There are economies of scale in the use of many kinds of assets, and when economies occur, the ratios are likely to change over time as the size of the firm increases. For example, retailers often need to maintain base stocks of different inventory items, even if current sales are quite low. As sales expand, inventories may then grow less rapidly than sales, so the ratio of inventory to sales (I/S) declines. This situation is depicted in Panel b of Figure 17B-1. Here we see that the inventory/sales ratio is 1.5, or 150 percent, when sales are $200 million, but the ratio declines to 1.0 when sales climb to $400 million.

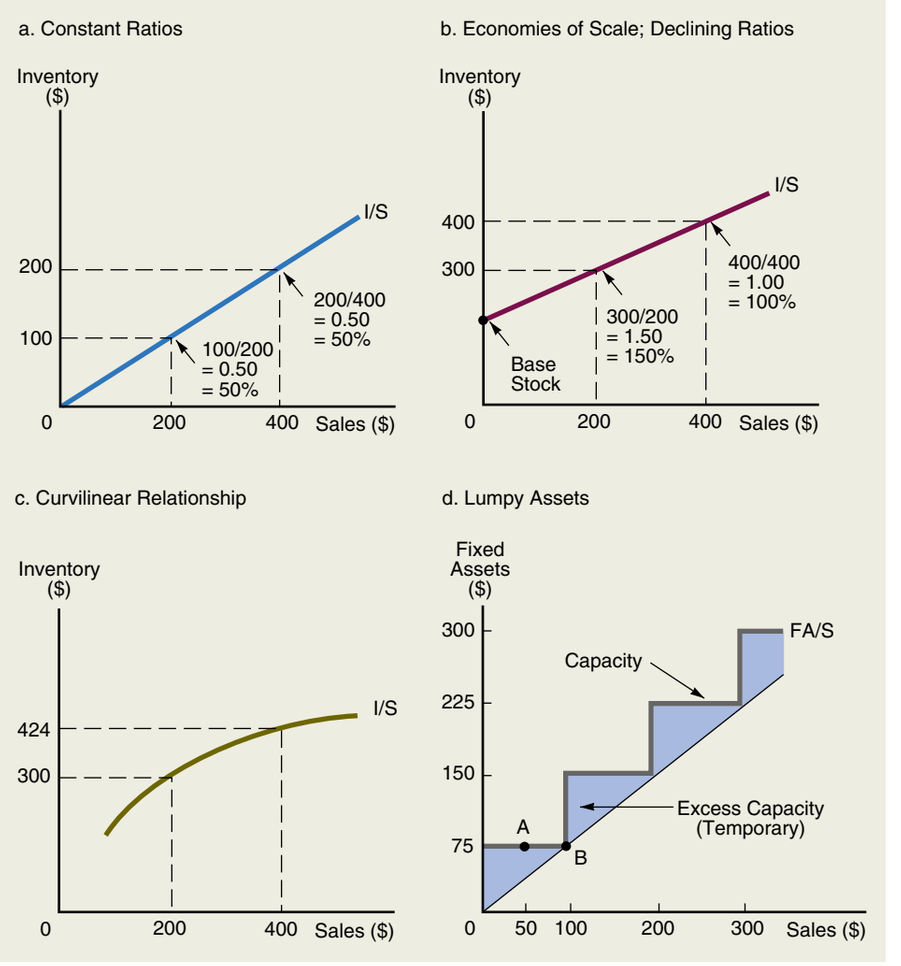
The relationship in Panel b is linear, but nonlinear relationships often exist. Indeed, if the firm uses one popular model for establishing inventory levels (the EOQ model), its inventories will rise with the square root of sales. This situation is shown in Panel c of Figure 17B-1, which shows a curved line whose slope decreases at higher sales levels. In this situation, very large increases in sales would require very little additional inventory.

## Lumpy Assets

**Lumpy Assets**
Assets that cannot be acquired in small increments but must be obtained in large, discrete units.

In many industries, technological considerations dictate that if a firm is to be competitive, it must add fixed assets in large, discrete units; such assets are often referred to as **lumpy assets.** In the paper industry, for example, there are strong economies of scale in basic paper mill equipment, so when a paper company expands capacity, it must do so in large, lumpy increments. This type of situation is depicted in Panel d of Figure 17B-1. Here we assume that the minimum economically efficient plant has a cost of $75 million, and that such a plant can produce enough output to reach a sales level of $100 million. If the firm is to be competitive, it simply must have at least $75 million of fixed assets.

**FIGURE 17B-1** **Four Possible Ratio Relationships (Millions of Dollars)**




Lumpy assets have a major effect on the fixed assets/sales (FA/S) ratio at different sales levels and, consequently, on financial requirements. At Point A in Panel d, which represents a sales level of $50 million, the fixed assets are $75 million, so the ratio FA/S = $75/$50 = 1.5. Sales can expand by $50 million, out to $100 million, with no additions to fixed assets. At that point, represented by Point B, the ratio FA/S = $75/$100 = 0.75. However, since the firm is operating at capacity (sales of $100 million), even a small increase in sales would require a doubling of plant capacity, so a small projected sales increase would bring with it a very large financial requirement.[1]

[1] Several other points should be noted about Panel d of Figure 17B-1. First, if the firm is operating at a sales level of $100 million or less, any expansion that calls for a sales increase above $100 million would require a *doubling* of the firm's fixed assets. A much smaller percentage increase would be involved if the

*(footnote continues)*

## EXCESS ASSETS DUE TO FORECASTING ERRORS

Panels a, b, c, and d of Figure 17B-1 all focus on target, or projected, relationships between sales and assets. Actual sales, however, are often different from projected sales, and the actual assets-to-sales ratio at a given time may be quite different from the planned ratio. To illustrate, the firm depicted in Panel b of Figure 17B-1 might, when its sales are at $200 million and its inventories at $300 million, project a sales expansion to $400 million and then increase its inventories to $400 million in anticipation of the higher sales. However, suppose an unforeseen economic downturn held sales to only $300 million. Actual inventories would then be $400 million, but inventories of only $350 million would be needed to support actual sales of $300 million. Thus, inventories would be $50 million larger than needed. Then, when the firm makes its forecast for the following year, it must recognize that sales could expand by $100 million with no increase whatever in inventories, but that any sales expansion beyond $100 million would require additional financing to increase inventories.

*(Footnote 1 continued)*

firm were large enough to be operating a number of plants. Second, firms generally go to multiple shifts and take other actions to minimize the need for new fixed asset capacity as they approach Point B. However, these efforts can only go so far, and eventually a fixed asset expansion will be required. Third, firms often make arrangements to share excess capacity with other firms in their industry. For example, the situation in the electric utility industry is very much like that depicted in Panel d. However, electric companies often build jointly owned plants, or else they "take turns" building plants, and then they buy power from or sell power to other utilities to avoid building new plants that would be underutilized.