**FINANCIAL AND OPERATING LEVERAGE**

1. OPERATING LEVERAGE

*Business risk*is the risk associated with operating cash flows. Operating cash flows are not certain because neither do the revenues nor the expenditures that comprise the cash flows.

* ***Revenues:*** depending on economic conditions and the actions of competitors, prices or quantity of sales (or both) may be different from what is expected. This is ***sales risk***.
* ***Expenditures:*** operating costs are comprised of fixed costs and variable costs. The greater the fixed component of operating costs, the less easily a company can adjust its operating costs to changes in sales.

The mixture of fixed and variable costs depends largely on the type of business. For example, fixed operating costs make up a large portion of an airline’s operating costs: No matter how many passengers are flying, the airline still needs to pay gate fees, pay a pilot, and buy fuel. The variable costs for an airline—the costs that change depending on the number of passengers—amount to a little bit of fuel and the cost of the meal.

Even within the same line of business, companies can vary their fixed and variable costs. For example, an airline could develop a system that allows it to vary the number of cabin stewards and baggage handlers according to passenger traffic, varying more of its operating costs as demand changes.

We refer to the risk that comes about from the mix of fixed and variable costs as ***operating risk***. The greater the fixed operating costs relative to variable operating costs, the greater the operating risk. Let’s take a look at how operating risk affects cash flow risk. The proportion fixed costs to total costs of a corporation is called **Operating leverage**. The higher the degree of operating leverage, the riskier is the firm.

Remember back in economics when you learned about elasticity? That’s a measure of the sensitivity of changes in one item to changes in another. We can look at how sensitive a firm’s operating cash flows are to changes in demand, as measured by unit sales. We’ll calculate the operating cash flow elasticity, which we call the ***degree of operating*** ***leverage (DOL)***. The degree of operating leverage is the ratio of the percentage change in operating cash flows to the percentage change in units sold.

Let’s simplify things and assume that we sell all that we produce in the same period. Then,

DOL=

**Example**

ABC Company LTD sells a unit of its product at Ksh. 30.00. if the variable costs per unit is Ksh. 20.00, and the total fixed cost is Ksh. 5000, calculate the DOL when units sold rise from 1000 units to 1500 units.

Solution

|  |  |  |
| --- | --- | --- |
|  | 1000 units sold | 1500 units sold |
| Sales | Ksh. 30,000.00 | 45,000.00 |
| Variable costs | (20,000.00) | (30,000.00) |
| **Contribution** | **10,000.00** | **15,000.00** |
| Less fixed cost | (5,000.00) | (5,000.00) |
| **Operating cash flow** | **5000.00** | **10,000.00** |
|  |  |  |

Percentage change in operating cash flows= 100% (CALCULATE)

Percentage change in units sold = 50% (CALCULATE)

DOL= 100%/50% = 2

Operating cash flows doubled when units sold increased by 50%.

What if the number of units decreases by 25%, from 1,000 to 750, what is the DOL?

We can represent the degree of operating leverage in terms of the basic elements of the price per unit, variable cost per unit, number of units sold, and fixed operating costs. How much do operating cash flows change when the number of units sold changes? It changes by the difference between the price per unit and the variable cost per unit—called the contribution margin—times the change in units sold. The percentage change in operating cash flows for a given change in units sold is:

Q is the units sold (1000 base in this case)

P is the price per unit

V is the variable costs per unit

F is the fixed cost.

Applying the formula for DOL using the data in the example above, we can figure out the sensitivity to change in units sold from 1,000 units:

= 2

A DOL of 2.0 means that a 1% change in units sold results in a 1% \* 2.0 = 2% change in operating cash flow. Why do we specify that the DOL is at a particular quantity sold (in this case 1,000 units)? Because the DOL will be different at different numbers of units sold. For example, at 10,000 units, what is the DOL? (Calculate, and you should get 1.5).

Note that at breakeven point, there are no operating profits and the DOL is undefined. Both sales risk and operating risk influence a firm’s operating cash flow risk. And both sales risk and operating risk are determined in large part by the type of business the firm is in. But management has more opportunity to manage and control operating risk than they do sales risk.

**FINANCIAL LEVERAGE**

***Financial risk*** is the risk associated with how a company finances its operations. If a company finances with debt, it is a legally obligated to pay the amounts comprising its debts when due. By taking on fixed obligations, such as debt and long-term leases, the company increases its financial risk. If a company finances its business with equity, either generated from operations (retained earnings) or from issuing new equity, it does not incur fixed obligations.

It is worthy noting that a company with a degree of debt (i.e., bonds) in its capital structure will be worth more than an all equity firm. Why? Remember the INTEREST TAX SHIELD that we studied in valuation- the reduction in taxes (and subsequent increased profitability) as a result of the tax allowability of interest on bonds. Beyond a certain point, however, debt results in FINANCIAL DISTRESS, especially when a firm is unable to honor fixed debt obligations. The proportion of debt to total capital in a corporation is called **Financial Leverage**. The higher the degree of financial leverage, the higher the probability of financial distress, and hence the riskier the firm.

The more fixed-cost obligations (i.e., debt) incurred by the firm beyond a certain point, the greater its financial risk. We can quantify this risk somewhat in the same way we did for operating risk, looking at the sensitivity of the cash flows available to owners when operating cash flows change. This sensitivity, which we refer to as the ***degree of financial leverage (DFL)***, is:

DFL=

The cash flows to owners are equal to operating cash flows, less interest and taxes. If operating cash flows change, how do cash flows to owners change? Suppose operating cash flows change from Ksh. 5,000 to Ksh. 6,000 and suppose the interest payments are Ksh. 1,000 and, for simplicity and wishful thinking, the tax rate is 0%:

|  |  |  |
| --- | --- | --- |
|  | **Operating Cash Flow of Ksh. 5,000** | **Operating Cash Flow of Ksh. 6,000** |
| Operating cash flow | 5000.00 | 6000.00 |
| Less interest | (1000.00) | (1000.00) |
| Less taxes | 0 | 0 |
| Cash flow to owners | 4000.00 | 4000.00 |

A change in operating cash flow from Ksh.5, 000 to Ksh. 6,000—a 20% increase—increased cash flows to owners by Ksh. 1,000—a 25% increase. Calculate the DFL.

What if, instead, our fixed financial costs (interest) are Ksh. 3,000? A 20% change in operating cash flows results in a 50% change in the cash flows available to owners:

|  |  |  |
| --- | --- | --- |
|  | **Operating Cash Flow of Ksh. 5,000** | **Operating Cash Flow of Ksh. 6,000** |
| Operating cash flow | 5000.00 | 6000.00 |
| Less interest | (3000.00) | (3000.00) |
| Less taxes | 0 | 0 |
| Cash flow to owners | 2000.00 | 3000.00 |

Using more debt financing increases the sensitivity of owners’ cash flows.

We can write the sensitivity of owners’ cash flows to a change in operating cash flows as:

Q is the units sold

P is the price per unit

V is the variable costs per unit

F is the fixed cost.

I is the fixed financing costs (interest on debt)

If

Number of units sold = 1,000

Price per unit = Ksh. 30

Variable cost per unit = Ksh.20

Fixed operating costs = Ksh.5, 000

Fixed financing costs = Ksh.1, 000

Then

= 1.25

Again, we need to qualify our degree of leverage by the level of production since DFL is different at different levels operating cash flows.

The firm must produce and sell a sufficient number of units to make a profit for owners. How many units are necessary? The break-even number of units considering both operating (Fixed costs) and financial costs (Interest), indicated as

Combining a firm’s degree of operating leverage with its degree of financial leverage results in the degree of total leverage (DTL), a measure of the sensitivity of the cash flows to owners to changes in unit sales:

DTL=

OR simply DTL= DOL x DFL

Suppose that;

Number of unit sold = 1,000

Price per unit = Ksh. 30

Variable cost per unit = Ksh. 20

Fixed operating cost = Ksh. 5,000

Fixed financing cost = Ksh. 1,000

Calculate the degree of total leverage at 1000 units.

1. DOL= 2 (Calculate)
2. DFL= 1.25 (calculate)
3. DTL= DOL x DFL= 2 x 1.25 = 2.50

OR

= 2.50.

In the case of operating leverage, the fixed operating costs act as a fulcrum: The greater the proportion of operating costs that are fixed, the more sensitive is operating cash flows to changes in sales. In the case of financial leverage, the fixed financial costs, such as interest, act as a fulcrum: The greater the proportion of financing with fixed cost sources, such as debt, the more sensitive cash flows available to owners are to changes in operating cash flows. Combining the effects of both types of leverage, we see that fixed operating and financial costs together act as a fulcrum that increases the sensitivity of cash flows available to owners to changes in the number of units sold.

**Exercises**

1. The Gearing Company has provided you with the following information regarding their operating and financing costs:

Price per unit = Ksh. 50

Variable cost per unit = Ksh. 30

Fixed operating cost = Ksh. 100,000

Fixed financing cost = Ksh. 50,000

a. Calculate its degree of operating leverage at 10,000 units sold.

b. Calculate its degree of financial leverage at 10,000 units sold.

c. Calculate its degree of total leverage at 10,000 units sold.

d. If there is a 1% increase in units sold, what do you expect to be the change in operating cash flows?

e. If there is a 3% decrease in units sold, what do you expect to be the change in cash flows to owners?

1. Suppose that the contribution margin is Ksh. 55 per unit. If fixed costs (operating and financing combined) are Ksh.10 million, what is the break-even number of units produced and sold?

3. The Jonhaux Company produces a product that has a contribution per unit of Ksh. 40. Fixed operating costs are Ksh. 140,000. The Jonhaux Company currently has Ksh. 10 million of bonds outstanding with a coupon rate of 5%.

a. What is the current break-even number of units for Jonhaux considering all fixed costs?

b. The board of Jonhaux is considering a proposal to issue Ksh.1 million additional bonds, with a coupon rate of 6%. How would this proposed financing affect the break-even point?

c. If 20,000 units are produced and sold, what is the degree of operating leverage, the degree of financial leverage, and the degree of total leverage under the current and proposed financial structures?

**Suggested further reading:**

* Fabozzi- Peterson, ***Financial management and analysis, second edition***, John Wiley & Sons, Inc., Hoboken, New Jersey (2003).
* Brealey−Meyers: ***Principles of Corporate Finance, Seventh Edition***, the McGraw−Hill Companies, 2003.