

Topics In Finance

Part III—Leverage

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ABSTRACT

This article investigates operating and financial leverage from the perspective of the financial manager, accenting the relationships to stockholder wealth maximization (SWM), risk and return, and potential agency problems. It also covers some of the pertinent literature related specifically to the implications of operating and financial risk and the associated measurement dilemmas.

Keywords: operating leverage, financial leverage, stockholder wealth maximization, agency theory

INTRODUCTION

While the concept of leverage is not new to most students of economics, the separation of leverage into its operating and financial components typically appears first in the financial management coverage of the topic. Furthermore, the attempt to bring those abstract concepts into a numbers-based setting highlights the power (and danger) of leverage in a new, more meaningful, way. The current article addresses the following questions:

- What is leverage (both operating and financial)?
- What are the advantages and disadvantages of leverage?
- What is the relationship of leverage to risk and return?
- How do financial managers influence the amount of leverage a firm adopts?
- How is leverage measured? Are these measurements sufficient to capture all dimensions of risk?
- How do external analysts judge managers' leverage choices? What are the implications for SWM?
- What temptations do managers face with regard to operating and financial leverage?
- What mechanisms can be employed to control the financial manager's behavior?

To address these issues, the theoretical section that follows offers the requisite definitional and conceptual background. Managerial behavior is then discussed, followed by a look at some of the conceptual and empirical literature devoted to the topic of leverage.

LEVERAGE—DEFINITIONS AND CONCEPTUAL ASPECTS

The introductory finance course defines operating leverage as the use of fixed-cost assets in the firm (or the capital-intensive versus labor-intensive plant mix for making and selling the product) and financial leverage as the use of fixed-cost debt in the capital structure (or the debt versus equity choice for raising funds for the firm). For operating leverage, the discussion typically centers on the “break-even point”—the level of sales at which total revenues and expenses are equal and operating income is zero. This concept makes it possible to compare scenarios with differing levels of operating leverage and highlights the risk-return aspect; at higher volume levels, leverage pays off in the form of higher operating income, but at lower levels of volume, losses can be magnified.

How do managers influence the level of operating leverage? If they are optimistic about future economic conditions and about the demand for the firm's product, they are more likely to select highly automated production facilities, buy buildings and equipment, and hire fewer workers, perhaps on a salaried basis, all decisions that increase the fixed costs of doing business. If, on the other hand, the future holds uncertainty, they might select less automation, rent their facilities and equipment, and hire more workers, perhaps paid by hourly wages. This high

variable-cost, more labor-intensive stance permits flexibility should demand not materialize, because workers can be laid off. Similarly, a rental agreement or short-term lease is less binding than ownership. The competitive nature of the industry also plays a role. If the firm seeks to become a leader within its industry, perhaps a more highly levered posture will be required—assumption of higher risk in pursuit of higher returns.

In the textbook setting, measuring operating leverage is simple: Categorize both variable and fixed costs; generate an income statement using a contribution margin format (Sales – Variable Costs – Fixed Costs = Operating Income, or Earnings Before Interest and Taxes); divide the contribution margin (Sales less Variable Costs) by Operating Income (also the contribution margin less fixed costs), and you produce the “degree of operating leverage” (DOL), a number greater than (or equal to) 1.00. Because managers have access to all costs and their behavior patterns (given the aid of their cost accountants!), this is a fairly routine matter. External financial reporting, however, does not categorize cost information in this manner, so it is quite a different matter for external analysts to gauge the degree of operating leverage (a problem covered in more depth in the literature review of this article). The interpretation of a DOL of, say, 1.60 is, “for every 1.00 percentage change in unit volume, the operating income will increase by 1.60 percent”; higher leverage offers higher potential return. One complicating factor is that this measure will differ in magnitude depending on how close a firm is operating to its break-even point. For external users attempting to compare firms, this poses additional problems.

As with any risk-related posture, financial managers attempt to generate the highest return for a given level of risk, and doing so should be rewarded in the marketplace. Associated decisions would include: Shall we invest in an advertising campaign (a fixed cost) to increase sales (driving up the total contribution margin, a return)? Should we replace a semi-automatic with an automatic machine? Should we move from hourly wages to commissions or to a salary plus bonus plan (thereby changing the cost structure in hopes of motivating our sales force, again increasing units sold)? Should we invest in a training program for our line workers (a fixed cost) to increase efficiency and drive down variable costs (by reducing labor hours and material waste)? While this is far from an exhaustive list, it gives a taste of the variety of ways a manager can influence operating leverage and create an impact on both leverage (risk) and operating income (return). As the previous article on financial analysis suggested, external analysts will look to ratios such as sales to total assets (or sales to fixed assets) and operating income to sales in an effort to judge performance. In general, managers can maximize stockholder wealth and the value of the firm by:

- Matching capacity (a function of operating leverage) with demand;
- Balancing risk and return in alignment with expressed stockholder preferences (subordinating managers’ personal attitudes towards risk);
- Maximizing operating efficiency (returns per unit of risk) without accounting “games”;
- Sharing information (disclosure) about operations, without jeopardizing competitive advantages.

This, of course, is a tall order for financial managers.

Financial leverage surfaces in the lower half of the income statement, beginning with operating income (also called Earnings Before Interest and Taxes, EBIT). Managers influence the interest expense incurred by deciding to fund projects by using more or less fixed-cost debt (typically, bonds) rather than issuing equity (stock). The advantages of debt are highlighted in the following example. Assume a company needs \$10 million in assets and can earn a 10% return, or \$1,000,000 in EBIT. It is considering two financing plans, one that is more debt-oriented and a second that is more equity-oriented. The first plan issues 200,000 common shares at \$20 per share (raising \$4 million) and issuing \$6 million in 8% bonds, and the second plan issues 400,000 common shares and \$2 million in debt, resulting in an equivalent asset base. The lower half of the respective income statements would read as follows:

	<u>Plan 1 (Debt)</u>	<u>Plan 2 (Equity)</u>
Earnings Before Interest & Taxes	\$1,000,000	\$1,000,000
Interest Expense (@ 8%)	<u>480,000</u>	<u>160,000</u>
Earnings Before Taxes	520,000	840,000
Income Taxes Expense (@ 40%)	<u>208,000</u>	<u>336,000</u>
Net Income	\$ 312,000	\$ 504,000
Common Shares Outstanding	200,000	400,000
Earnings Per Share	\$1.56	\$1.26

Note that, while net income is higher under the equity-oriented plan (under which less interest expense is incurred), because the income must be spread over more common shares outstanding, the effect is to lower earnings per share. When the return on assets exceeds the after-tax cost of debt, the common stockholders reap the benefits in the form of higher earnings per share. Of course, that is the upside of financial leverage; the downside is that, should earnings (return on assets) fall short, the bondholders' interest must be paid, and the stockholders stand to lose through depressed (or even negative) earnings per share. Once again, the risk-return trade-off manifests itself. As with operating leverage, one can also generate a measure of financial leverage, referred to as the degree of financial leverage (DFL), calculated as $EBIT / (EBIT - \text{Interest})$. If the measure is, say, 2.3, for every 1.0 percent increase in earnings before interest and taxes, earnings per share will increase 2.3 percent.

Managers must be cognizant of the magnification of risk when both operating and financial leverage are present. The degree of combined leverage (DCL) can be calculated as $DOL \times DFL$, so that for a hypothetical firm with a DOL of 1.6 and a DFL of 2.3, the DCL would equal 3.68, meaning that, for every 1.00 percent increase in sales volume, earnings per share would increase by 3.68 percent. High return and high risk co-exist, as a decrease in sales will reduce earnings per share by this magnified percentage. The following section discusses some of the types of managerial behaviors that might accompany decisions linked to operating and financial leverage. Sometimes these behaviors, while understandably human, do not advance the interests of stockholders.

MANAGERIAL BEHAVIORS RELATED TO LEVERAGE

Always aware that their performance is being monitored, managers adopt certain behaviors intended to enhance the resulting assessment, and sometimes these actions fail to help maximize stockholder wealth [See Laux, (a) and Laux (b) for a discussion of this concept and the associated leverage ratios.]. Some of the areas in which the agency problem raises its ugly head are linked to operating leverage. For example, consider the case where financial managers underestimate demand and purchase a semi-automatic machine (with lower fixed costs but higher variable costs than the automatic counterpart). As the higher-than-expected demand materializes, a move to an automatic machine might be warranted, but if the semi-automatic machine is not fully depreciated and the exchange would result in a loss on disposal in this year's income statement, management might be tempted to live with the (bad) choice. This really results in two mistakes—the initial bad choice of the semi-automatic machine and the new mistake of not replacing it with the automatic machine. However, it is a hard scenario for people external to the firm to police. One mechanism that might prevent such suboptimal decision making is to put in place a broadly participative capital budgeting approval program, one in which several managers (perhaps from different divisions) jointly review all investment decisions, outcomes, and proposals.

End-of-year incentive programs for the sales force can represent another opportunity for managerial misbehavior, if the goal is to increase sales volume simply to assure that managerial bonuses linked directly to sales are granted. The existence of a board-approved compensation committee that sets managerial compensation can help prevent such indiscretions. Discretionary expenses represent a third operating leverage aspect that can find managers acting in opposition to long-run wealth maximization. Certain "fixed" costs such as research and development, training programs, and maintenance, can be passed up in an attempt to lower the break-even point and minimize short-term losses, but delaying these expenditures can impair future efficiency and income-generating potential. This is perhaps the hardest to monitor and control, since managers are permitted much leeway in these types of decisions.

In addition to actions related to operations, a number of questionable managerial behaviors fall under the category of financial leverage. While these are described here briefly, they will be discussed in much more detail in a later article on capital structure. Included among these potential indiscretions would be a financial manager's reticence to take on debt (risk aversion) for fear of possible intervention by debt holders, including restrictions on dividends, control over future asset purchases, minimum working capital requirements, and the like. In addition, managers will keep some debt capacity in reserve to avoid going to the equity markets should more capital be required, because equity issuance is typically viewed negatively in the marketplace (depresses stock prices).

At the other end of the spectrum is the financial manager who levers up the firm unduly, taking on more debt to finance risky projects in hopes of driving up returns and stock prices. Sometimes managers will even accept projects that, due to the higher risk, would drive up the cost of capital for the firm, making the projects' ultimate

returns fall short of the weighted average cost of capital, a damaging scenario for long-run wealth creation. These types of behaviors highlight the problem of information asymmetry, a situation in which managers have more information (about projects, expected returns, and inherent risks) than do the investors and creditors who provide capital to the firm.

One number looked at by external financial statement users to detect the possibility of bad behavior is free cash flow (operating cash flow less capital expenditures less dividends), a measure of the level of cash produced by operating activities that remains after maintaining the productive capacity of the firm and covering common and preferred dividends. Managers prefer high free cash flow, because this gives them a cushion to avoid having to access the credit and equity markets. The existence of excess free cash flow, however, signals that managers have not found sufficiently good investment opportunities and, thus, should return these funds to stockholders in the form of dividends. A good deal of literature is devoted to these non-value-adding behaviors, and this series will present that research in a later article. The literature covered in the following section concentrates on operating leverage and financial leverage, with particular emphasis on general findings/relationships and measurement problems.

LEVERAGE IN THE LITERATURE

Much of the literature devoted to leverage concentrates on financial leverage and its relationship to the risk of common stocks. Perhaps the seminal article on the use of (financial) leverage is Hamada's 1972 work, "The Effect of the Firm's Capital Structure on the Systematic Risk of Common Stocks." The author finds that financial leverage explains 21 to 24 percent of the cross-sectional variation in beta, the commonly cited measure of a stock's volatility in relation to that of the market. A later article by Mandelker and Rhee [1984] incorporates operating leverage, with both types of leverage accounting for 38 to 48 percent of the variation. Many subsequent articles use a variety of leverage-related measures to explain the variations in common stock returns. Bhandari [1988] finds that expected returns are positively related to the ratio of debt to equity (DER), but recognizes the existence and importance of operating risk, commenting that "...it does not follow that, cross-sectionally, the common equity of a higher DER firm always has higher risk since the firm-level risk may vary..." (p. 507). In a 1989 article, Chung attempts to develop "a model which specifies the theoretical relationship between beta and the various firm variables, including cyclicality and the degrees of financial and operating leverage of the firm" (p. 345). He finds that beta variation "can be explained by the cross-sectional difference in the demand beta which represents the intrinsic business risk of the firm...and the degrees of financial and operating leverage... [with] a large portion of the...variation...explained by systematic business risk alone which represents the joint effect of the output market uncertainty (the demand beta) and operating risk of the firm (the degree of operating leverage)" (p. 357). In Chung's study, "...it appears that the effect of financial leverage on beta is relatively weak" (p. 357). Thus, researchers have yet to agree on how to answer the question of how much leverage represents the appropriate tradeoff between risk and return. The idea of an "optimal capital structure" (the best combination of debt and equity to finance the assets employed) is explored in Hull [1999] who finds that stock returns are more negative for firms moving "away from" industry norms than for firms moving "closer to" the norm (p. 32). He references Bowen et al. [1982] who find that "industry average leverage ratios are stable over time and firms gravitate toward such ratios as if these ratios are optimal" (as interpreted by Hull, p. 33; see also Bowen et al., p. 16). Opinions on leverage measures vary, however.

As the number of studies investigating the possible effects of leverage grows, more and more problems with measurements and model specifications also appear. Kim et al. [1992] use seven different ratios as surrogates for financial leverage and find similar results for all (that stock prices do not increase with leverage but instead "the direction of [the] reaction seems to depend on the position of a corporation's financial leverage relative to its optimal level," p. 144). Yet, in a comment on this study, Park [1994] discounts the findings because Kim et al. use market reactions to leverage changes to determine whether a firm was moving toward or away from the optimal leverage level. Penman et al. [2007] decompose the book-to-price ratio into operating and financing components, finding that operating risk is positively related to subsequent stock returns but that financing risk is negatively related. Piotroski [2007] finds several problems with both the measurements and conclusions of Penman et al. Similarly, Dimitrov and Jain's 2008 findings ("that changes in financial leverage predict future earnings, operating cash flows, accruals, and growth in assets," p. 195) are immediately challenged by Gu [2008] based both on the measure used for financial leverage and the "effects of firms with extreme changes in leverage...on the...results and inferences" (p. 226). In short, measurement and methodological choices are challenged frequently.

Several studies argue that there is no single accepted measure for leverage (either operating or financial) and that researchers end up with conflicting results for that reason. The works of Richard A. Lord [1995, 1996, and 1998] offer a number of examples suggesting that the textbooks lie; one can actually increase fixed costs and lower both the break-even level and the degree of operating leverage, depending on the proportional relationship with variable costs (and changes in them). The debate goes on.

In a 1997 survey of research relating accounting numbers to the risk of common stocks, Ryan offers three general conclusions about leverage:

- “earnings variability has historically been the accounting variable most strongly related to systematic equity risk”;
- “systematic equity risk is positively associated with sources of operating risk (price and quantity variability), operating leverage and financial leverage”;
- “firms with greater operating risk tend to choose a lower level of financial leverage to yield an acceptable level of systematic equity risk” (p. 82).

On the last point, the “trade-off” between the use of operating and financial leverage, Mandelker and Rhee [1984] find “evidence that firms with low levels of DFL [tend] to have higher levels of DOL and vice-versa” (as summarized in Lord, 1996, p. 29). Lord [1996], however, finds no evidence “of an interaction between the degree of operating leverage and the degree of financial leverage” (p. 27). For his sample, the degree of operating leverage, ratio of net profits to the market price of the firm, and the variability of unit output are all positively correlated with systematic (non-diversifiable) risk, unsystematic risk, and total risk, but the DFL is unrelated to systematic risk. In the final analysis, when a firm increases fixed costs (either in operations or in its financing structure), both net income and risk should increase. This aligns well with the theoretical base provided in the introductory course.

THIS SERIES CONTINUES

As previous articles [Laux (a) and Laux (b)] have shown, stockholder wealth maximization, risk and return, and the market’s response to financial information, here with regard to operating and financial leverage, influence the behavior of the financial manager. The next article on valuation presents models for investigating how market participants price the debt and equity securities of firms. Once again the financial manager must recognize the connections to stockholder welfare, risk and return, and his or her own behavior.

AUTHOR INFORMATION

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