AN INNOVATIVE APPROACH TO COMPREHENSIVE RISK CONCEPTS IN AN INTRODUCTORY UNDERGRADUATE FINANCE COURSE

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ABSTRACT

This paper will address the critical topic of risk in an introductory undergraduate finance course and propose a suggested sequence to present this in the classroom. The concepts covered will be taught at various points in an introductory undergraduate finance course, but the author suggests that a portion of the course should be dedicated to integrating risk concepts as an important topic in the course and as an additional tool in strategic management. The successful finance student is well-versed in statistics, accounting and economics, and this would be a unique opportunity to demonstrate how other academic disciplines are integrated into strategic decision-making. The student will then understand that a unified, holistic comprehension of financial risk is a critical tool of the effective manager.

INTRODUCTION

Risk is a critical concept in financial economics and should be an important parameter in financial decision making specifically and strategic management in general. There are many tools that deal with risk, but unfortunately, these tools usually are not taught in conjunction with each other in an introductory undergraduate finance course and students are left to deal with risk in an undisciplined manner. This paper will not introduce new concepts but will demonstrate that dealing with risk concepts in an introductory undergraduate finance course in a unified approach will help the student to better deal with risk in their managerial careers and to successfully implement risk mitigation techniques, an important part of strategic management. It will also demonstrate how concepts in descriptive statistics, financial accounting and microeconomics are critical components of financial economics, which itself is a crucial element of strategic planning. This paper suggests an innovative sequence to present fundamental risk topics.

DEFINITION OF RISK

A main responsibility of managers is to create wealth for the shareholders of a company and this implies that the wealth should be neither destroyed nor lost. The investment that shareholders have in the company is defined as "value at risk" (VAR) and is a parameter that many shareholders monitor closely. It is imperative then that strategies and tactics be implemented that increase the value of the investment while simultaneously reducing the risk to the lowest levels possible. The most common assumption is that shareholders are risk averse.
The annual return on the shareholders' equity is defined as:

$$\text{return} = [(P_1 - P_0) \div P_0] + [D_1 \div P_0]$$

where P_1 is the stock price at the end of a year, P_0 is the stock price at the beginning of the year and D_1 are total dividends paid during that one year time span. This can easily be substituted for bonds that an investor purchases from a company, where the interest revenues the investor receives replaces the dividend component in the return equation. The first part of the equation, $[(P_1 - P_0) \div P_0]$, is the capital

gains portion while the second part, $[D_1 \div P_0]$, is the dividend yield. Intuitively, this says that shareholders invest in a company to receive dividends, to have the stock price grow, or a combination of these two.

Risk is defined as the variability in the annual return equation, which is the sum of the variability in the capital gains and the variability in the dividend yield, since variances are additive [Walpole, Myers, Myers, Ye, 2002].

RISK IDENTIFICATION & MEASUREMENT

The first part of the sequence is to identify the level of risk present in the annual return on the shareholders' equity. The most common representation is the variance in the annual return on the shareholders' equity so both the continuous and discrete formulae are shown next:

$$\sigma^2 = \int (x - \mu)^2 f(x)\, dx \text{ [continuous]}$$
$$\sigma^2 = \Sigma (x - \mu)^2 f(x) \text{ [discrete]}$$

where x is the annual return on the shareholders' equity for a given year and μ is the mean of the annual return on the shareholders' equity over the entire time period examined [Walpole, Myers, Myers, Ye, 2002]. The standard deviation σ is the square root of either of the variance equations above, $\sigma \in R^n$. If the standard normal distribution is assumed to be the underlying probability distribution and if a sample of the annual return on the shareholders' equity is taken, the sample variance can be calculated as:

$$s^2 = [\Sigma (x - \mu)^2] \div [n - 1] = E(x^2) - \mu^2$$

[Adams, Booth, Bowie, Freeth, 2003]. The sample standard deviation s is the square root of s^2, where $s \in R^n$.

The second risk identification and measurement tool is financial statement analysis where particular emphasis should be placed on cash flows from operating activities from the statement of cash flows. Another set of ratios to examine are the liquidity ratios and the leverage ratios, which apply to short-term liabilities and long-term liabilities, respectively.

Ratio analysis and its corresponding risk indicators should be measured in two ways. First, the trend should be analyzed over a relevant time period to determine if the appropriate ratios are either improving or deteriorating. Second, the company's ratios should be compared to industry averages provided by investment analysts from Dun and Bradstreet, Value Line and the Risk Management Associates (formerly the Robert Morris Associates).

UNDERSTANDING SOURCES OF RISK

The second part of the sequence is to identify some of the sources of risk. Operating leverage and financial leverage are extensions of cost-volume-profit analysis covered extensively in a managerial accounting course and are direct applications of elasticities covered in a microeconomics course. Elasticities are an important concept in microeconomics which have many useful applications in real-life and which have been adopted in financial economics. In its purest form, the equation for an elasticity is:

$$\varepsilon = [\partial f(x) \div \partial x] \div [\partial f(y) \div \partial y]$$

where f(x) and f(y) are functions based on x and y respectively [Varian, 1984].
The equation for the degree of operating leverage is:

$$DOL = [\% \ \Delta \text{ EBIT}] \div [\% \ \Delta \text{ Sales}]$$

which is the percent change in EBIT divided by the percentage change in sales [Weston, Besley, Brigham, 1996]. The risk depicted by the degree of operating leverage is generated by the amount of fixed operating costs incurred by the company.
The equation for the degree of financial leverage is:

$$DFL = [\% \ \Delta \text{ EPS}] \div [\% \ \Delta \text{ EBIT}]$$

which is the percent change in EPS divided by the percentage change in EBIT [Weston, Besley, Brigham, 1996]. The interpretation for the degree of financial leverage is the same as it is for the degree of operating leverage.

The degree of financial leverage is a risk metric that increases as the company adds long-term debt to the permanent sources of financing or its capital structure. The equation for the degree of combined leverage is:

$$DCL = [\% \ \Delta \text{ EPS}] \div [\% \ \Delta \text{ sales}] = DOL * DFL$$

which is the percent change in EPS divided by the percentage change in sales [Weston, Besley, Brigham, 1996].

It is also important to mention bond duration, which is a direct measure of the interest rate sensitivity based on the company's level of debt. The formula for the bond price sensitivity based on yield λ is:

$$\partial P \div \partial \lambda = - D_M P$$
$$\text{where } D_M = \text{modified duration} = D \div [1 + (\lambda \ \div m)]$$

THE EFFECTS OF RISK

The third part of the sequence is to understand the effects generated by the various sources of risk. The mean-variance paradigm states that the required rate of return will increase as the level of risk increases. The Capital Asset Pricing Model (CAPM) developed by Sharpe, Lintner and Mossin is an important tool in financial economics because this model is a linear relationship between risk and the required rate of return. The equation for the CAPM is:

$$\text{return on retained earnings} = r_f + \beta(r_m - r_f)$$

where r_f is the risk-free rate of return
r_m is the return on the market portfolio
β is the firm specific risk factor