Short Communication

Financial leverage and systematic risk

Kheder Alaghi

Department of Accounting, Armenia State Agrarian University, Armenia. E-mail: khederalaghi@gmail.com.

The aim of this study is the effect of financial leverage in the systematic risk of listed companies in Tehran Stock Exchange. In this study, financial leverage (FL) as independent variables and systematic risk (β) as the dependent variable is considered. While significant at $\leq 0/05$ H_0 hypothesis, is rejected. Otherwise, there is no other adequate reason for rejecting H_0 hypothesis. For testing the hypothesis of this study, linear regression technique has been used. According to the results obtained, H_0 is rejected because significant $= 0.00 < 0.05$. Thus, financial leverage has effect on the systematic risk of listed companies in Tehran Stock Exchange.

Key words: Financial leverage, capital structure, systematic risk, operating leverage, earnings per share (EPS), earnings before interest and taxes (EBIT).

INTRODUCTION

Work that relates accounting numbers to market measures of systematic equity risk was largely undertaken in the 1970s (Ryan, 1997). A major contribution of the Mandelker and Rhee (1984) model over Hamada and Rubinstein type models is that it utilizes leverage values based on accounting flow numbers (degree of operating and financial leverage) rather than market stock numbers (level of operating and financial leverage). More recent proposals on changes in accounting disclosure of risk (Scholes, 1996) mean that a theoretically sound model of the relationship between accounting measures and market measures of risk is timely. Identification of this relationship is helpful on a number of fronts.

Firstly, the instability of market betas over time means that ex post measures of market risk are not good predictors of future risk. Identification of an appropriate relationship between accounting variables and market risk could lead to improved predictive models of future market risk. Secondly, financial models of risk (for example CAPM) do not identify the operational factors and environmental contingencies which influence risk. An accounting model gets closer to the identification of economic fundamentals which drive such relationships. Finally, interest in this relationship is further fuelled by being of practical use in situations where market estimates of risk are unavailable. Theoretical models that generate a value premium generally rely on the "operating leverage hypothesis," introduced to the real options literature by Carlson et al. (2004). This hypothesis states

that variable (that is flow) production costs play much the same role as debt servicing in levering the exposure of a firm's assets to underlying economic risks. Models generate a value premium, because absent operating leverage growth options are riskier than deployed capital. While operating leverage plays a critical role in these theories, there exists little supporting empirical evidence. The aim of this study is the effect of financial leverage in the systematic risk of listed companies in Tehran stock exchange.

MATERIALS AND METHODS

Systematic risk per share by establishing linear relationship between the market portfolio returns as independent variables and share returns as the dependent variable is derived. Systematic risk and financial leverage of 58 companies (2006 to 2009) from Tehran stock exchange is calculated within a 12 month financial period by using the statistic software programs of SPSS and Excel. In this study, financial leverage (FL) is considered as an independent variable, and systematic risk (β) is considered as a dependent variable. Research hypothesis is as follows:

H_0: Financial leverage has no effect on the systematic risk of listed companies in Tehran stock exchange.
H_1: Financial leverage has effect on the systematic risk of listed companies in Tehran stock exchange.

While SIG $\leq 0/05$ is, H_0 hypothesis is rejected. Otherwise there's no adequate reason for rejecting H_0 hypothesis.

DISCUSSION

Several previous studies have analyzed the association between a firm's operating and financial leverages and its beta. Recently, Mandelker and Rhee (1984) examine, using a correlation-based analysis, the effect of a firm's degree of operating leverage (DOL) and degree of financial leverage (DFL) on its beta and conclude that the impacts of DOL and DFL on beta are positive and statistically significant. Their theoretical model and its empirical testing implicitly assume that DOL and DFL are independent of each other, and strictly multiplicative. Such traditional assumption of independence, however, has been questioned by Huffman (1983) and others who argues that a firm's capacity decision may lead to important interactions between its DOL and DFL. Studies by Hamada (1972), Rubenstein (1973), Lev (1974) and Mandelker and Rhee (1984) test the impact of operating and/or financial leverages on beta based on some theoretical priors. They then empirically examine the relationship between these variables in three selected industries and finds. Financial leverage offers many advantages for a firm to move forward. But like most things, there are some limitations that come with financial leverage as well. For example, when a company uses financial leverage they are technically borrowing funds. Borrowing money is always going to develop a cloud whether it is one that just creates a little shade or one that causes a thunderstorm. When a company borrows constantly, they are creating an image that they might be of high risk. As a result, there might be an increase in interest rates and some restrictions could be given to the borrowing organization. Another area that could be affected by the use of financial leverage is the value of the stock. It could drop substantially if the stockholders become concerned. It seems that financial leverage is a good idea for a company when interest rates are low. But it is important to use financial leverage in moderation to avoid some of these limitations. The more debt in the capital structure of the firm, the greater the financial risk to the lender. This results in higher average interest rates to be paid and restrictions on the corporation. Common stockholders may become concerned and drive down the price of the stock. The degree of financial leverage (DFL) is defined as the percentage change in earnings per share that results from a given percentage change in earnings before interest and taxes (EBIT), and it is calculated as follows:

$$DFL = \frac{Percentage \quad change \quad in \quad EPS}{Percentage \quad change \quad in \quad EBIT}$$

$$DFL = \frac{EBIT}{EBIT - I}$$

$$EPS = \left[(EBIT - I)(1 - T) \right] / N \text{ , } EBIT = Q(P - V) - FC$$

I = Interest paid, T = the corporate tax rate, N= the number of shares outstanding, Q = Quantity produced or sold, V = Variable cost per unit, P = Sales price, FC = Fixed operating costs.

If the common stocks value is to be determined according to the systematic risk, beta (β) coefficient should be used. Barth et al. (2007) show that firms with higher financial statement transparency, as measured by the covariance between earnings and returns, have lower expected returns and systematic risk.

Accounting measures of firm-level risk have predictive power for firm's betas with market-wide cash flows, and this predictive power arises from the behavior of firm's cash flows. The systematic risks of stocks with similar accounting characteristics are primarily driven by the systematic risks of their fundamentals. Asset pricing theory suggests that the former should have a higher price of risk; thus beta, like cholesterol, comes in bad' and good' varieties. Empirically, we find that value stocks and small stocks have considerably higher cash-flow betas than growth stocks and large stocks, and this can explain their higher average returns. The poor performance of the CAPM since 1963 is explained by the fact that growth stocks and high-past-beta stocks have predominantly good betas with low risk prices. The formula for the beta of an asset within a portfolio is:

$$\beta_a = \frac{Cov \ (r_a, r_p)}{Var \ (r_p)}$$

where r_a measures the rate of return of the asset, r_p measures the rate of return of the portfolio, and $Cov(r_a, r_p)$ is the covariance between the rates of return.

The portfolio of interest in the CAPM formulation is the market portfolio that contains all risky assets, and so the r_p terms in the formula are replaced by r_m, the rate of return of the market.

Conclusion

Given all other factors that affect a firm's risk, higher financial leverage increases the firm's risk profile. Thus, higher financial leverage increases the beta of the equity of the firm, the reason is that, other things equal, higher leverage increases the variability of a firm's income. A company's asset beta is different from its equity beta. Asset beta reflects the business risk in the markets where the company operates. Equity beta reflects the combined effects of business and financial risk that the shareholders of a company are faced with. The study and understanding of risk is of paramount importance to any discussion of the value of a particular firm or enterprise. Most of basic financial management addresses risk from

Table 1. Regression results.

Variable	Coefficient	Standard error	T-stat	Significance
C	-1.538	0.667	-2.303	0.025
FL	2.599	0.582	4.464	0.000

$\beta = -1.54 + 2.6FL$. LS // dependent variable is beta, SMPL range: 1 to 58; number of observations: 58.

the perspective of a portfolio or the financial and operating characteristics of the firm. The beta coefficient is a key parameter in the Capital Asset Pricing Model (CAPM). It measures the part of the asset's statistical variance that cannot be mitigated by the diversification provided by the portfolio of many risky assets, because it is correlated with the return of the other assets that are in the portfolio. For testing the hypothesis of this study, linear regression technique has been used and the results of regression are presented in Table 1. According to Table 1, H_0 is rejected because significant = 0.00<0.05. Thus financial leverage has effect on the systematic risk of listed companies in Tehran Stock Exchange.

REFERENCES

Barth ME, Konchitchki Y, Landsman WR (2007). Cost of Capital and Financial Statements Transparency. Working Paper. Stanford University.

Campbell J, Polk C, Vuolteenaho T (2007). Growth or Glamour? Fundamentals and Systematic Risk in Stock Returns. NBER Working Paper. No. 11389.

Campbell JY, Tuomo V (2004). Bad beta, good beta. Am. Econ. Rev., 94: 1249-1275.

Carlson M, Adlai F, Ron G (2004). Corporate Investment and Asset Price Dynamics: Implications for the Cross Section of Return. J. Financ, 2577-2603.

Hamada R (1972). The Effect of Firm's Capital Structure on the Systematic Risk of Common Stocks. J. Financ., 435-452.

Huffman (1983). Inter-industry differences and the impact of operating and financial leverages on equity risk. Rev. Financ. Econ., 4(2): 141-155.

Mandelker G, Rhee S (1984). The Impact of Degrees of Operating and Financial Leverage on Systematic Risk of Common Stock. J. Financ. Quant. Anal., 45-57.

Ryan S (1997). A Survey of Research Relating Accounting Numbers to Systematic Equity Risk, with Implications for Risk Disclosure Policy and Future Research. Account. Horiz., 11(2): 82-95.

Rubinstein M (1973). A Mean-Variance Synthesis of Corporate Financial Theory. J. Financ, 167-181.

Sagi S, Francois G (2005). Operating Leverage, Stock Market Cyclicality and the Cross-Section of Returns. Society for Economic Dynamics.

Scholes M (1996). Global Financial Markets, Derivative Securities, and Systematic Risks. J. Risk Uncertain., 271-286.