

Problem Sheet 1: Review of Multiple Regression

Excel file EQUITY.XLS contains data on N=309 firms who sold new shares in the year 1996 in the US. Some of these are SEOs and some are IPOs. Data on the following variables is provided. All variables except SEO are measured in millions of US dollars.

- VALUE = the total value of all shares (new and old) outstanding just after the firm issued the new shares. This is calculated as the price per share times the number of shares outstanding.
- DEBT = the amount of long-term debt held by the firm.
- SALES = total sales of the firm.
- INCOME = net income of the firm.
- ASSETS = book value of the assets of the firm (i.e. what an accountant would judge the firm's assets to be worth).
- SEO = a dummy variable that equals 1 if the new share issue is an SEO and equals 0 if it is an IPO.

Motivation:

Investors and financial economists are interested in understanding how the stock market values a firm's equity (i.e. shares). In a fundamental sense, the value of a firm's shares should reflect investors' expectations of the firm's future profitability. However, data on expected future profitability is non-existent. Instead, empirical financial studies must use measures such as current income, sales, assets and debt of the firm as explanatory variables.

In addition to the general question of how stock markets value firms, a second question is also receiving considerable attention by financial economists in recent years. By way of motivating this problem, note that most of the shares traded on the stock market are old shares in existing firms. However, many old firms will issue some new shares in addition to those already trading -- what are referred to as "seasoned equity offerings" or SEOs. Furthermore, some firms that have not traded shares on the stock market in the past may decide to now issue such shares (e.g. a computer software firm owned by one individual may decide to "go public" and sell shares in order to raise money for future investment or expansion). Such shares are called "initial public offerings" or IPOs. Some researchers have argued on the basis of empirical evidence that IPOs are undervalued relative to SEOs.

Exercise: Use the data set above and estimate (and justify using OLS methods and associated testing procedures such as t-tests) a multiple regression model using VALUE as the dependent variable. Interpret your results. Test the hypothesis that IPOs are undervalued.