**Project: The Equity Underpricing Puzzle**

**Background**

Investors and financial economists are interested in understanding how the stock market values a firm’s equity. 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 (although very recent work has suggested the opposite).

In this exercise, you are asked to empirically investigate these questions using the following data set.

**Data**

EQUITY data are from Koop, *Analysis of Financial Data* 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.

**Question:**

Run the following regression:

**VALUE=a+b1\*DEBT+b2\*SALES+b3\*INCOME+b4\*ASSETS+b5\*SEO+b6\*DEBT\*SEO+b7\*SALES\*SEO+b8\*INCOME\*SEO+b9\*ASSETS\*SEO**

In the above regression I included a dummy variable SEO and four additional explanatory variables which interact the SEO dummy with each of the four other explanatory variables. Begin by running regression with all explanatory variables and drop insignificant variables. Explain results whether you found IPO underpricing puzzle.

Please do exercise again with correction for heteroscedasticity using White standard errors. Discuss how the results are different compared to the regression without correction for heteroscedasticity.