SIMULATING THE IMPACT OF MONETARY AND FISCAL POLICY ACTIVITIES ON THE RESULTS OF CORPORATE FINANCIAL DECISIONS

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ABSTRACT

This paper discusses a simulation model designed for use in graduate finance courses. The model illustrates that changes in the financial and economic environment of the firm will affect the results of the firm's financial decisions. The first part of the model determines the financial and economic environment of the firm, using monetary and fiscal policy variables as inputs. The second part of the model combines environment variables from the first part of the model with financial decision inputs. The environment variables and the financial decision variables interrrelate to provide the output of the model - the firm's earnings, the price of the firm's common stock, and the firm's incremental weighted average cost of capital. Through the use of this model, students can better understand the interrelationships between the firm's financial and economic envirnment and the firm's financial decisions; this undertanding should lead to better, and more timely, financial decisions.

INTRODUCTION

There are numerous texts written describing the financial system and the parts of our economy that are closely related to the financial system. In general, these texts are designed to describe the financial and economic environment of the buiness firm. Corporate financial managers' decisions are made within the context of this fiancial and economic environment. Unfortunately, these texts rarely discuss the role that this environment plays in the determination of corporate fiancial decisions.

On the other hand, there are also numerous texts written concerning the concepts, tools, and techniques involved in all areas of corporate financial decisions. It is the general objective of these texts to provide the reader with the basic foundations concerning investment, financing, and dividend decisions. However, these texts rarely discuss the impact of changes in the firm's financial and economic environment on the corporate financial decisions.

Thus, there is an obvious void in financial texts and literature. The link between the firm's financial and economic environment and its financial decisions has not been developed in financial texts and literature. The purpose of the creation of this simulation model was to develop this link. Specifically, this simulation model was designed for and has been used as a teaching tool in graduate finance courses. Through the use of this model, students can recognize that changes in the firm's financial and economic environment, due to monetary and fiscal policy activities, will affect the results of the firm's financial decisions. In addition, predictions of changes in monetary and fiscal policy activities must be included and the possible impacts taken into account when managers make new financial decisions. An understanding of the interrelationships between the firm's financial and economic environment and the firm's financial decisions should enable financial managers to make better, and more timely, decisions.

THE MODEL

The model consists of two major parts. The first part determines the financial and economic environment of the firm, using monetary and fiscal policy variables as inputs. The second part of the model combines environment variables from the first part of the model with financial decision inputs. The environment variables and the financial decision varibles interrelate to provide the output of the model, two measures of firm performance and a measure of the firm's incremental capital costs. The two parts of the model are discussed in more detail below.

A basic macroeconomic model is used to create the firm's financial and economic environment. A student (or group of students) representing the Federal Reserve Board determine the value for the money supply variable which represents monetary policy activity. In a similar manner, a student (or group of students) representing the President and Congress determine values for government spending, transfer payments, and the tax rate. The values for the money supply, government expenditures, and transfer payments which are actually used in the model are determined by a three period moving average to reflect thetime lags associated with these policy decisions. Given the values for these exogenous variables, and IS-LM model is used to calculate the level of nominal national income and

interest rates for the economy. This level of national income implies an aggregate demand curve, which when combined with a stipulated aggregate supply curve, provides the price level and the level of real output for the economy. A Phillips curve model provides an inflation rate and an unemployment rate. Thus, the first part of the simulation model determines six variables that depict the financial and economic environment of the firm; these six variables are the level of nominal national income, the level of interest rates, the price level, the level of real output, the rate of inflation, and the rate of unemployment. Subsequent changes in the monetary and fiscal policy variables will change these six variables and therefore change the financial and economic environment of the firm. In addition, this environment can also be altered by changing the values of parameters within the model to reflect the fact that not all environmental changes are predictable and that not all environmental changes are due to monetary and fiscal policy activities.

The second part of the model calculates a value for the firm's common stock price; these variables are the two variables that serve as performance measures for the firm. In addition, a value is calculated for the incremental weighted average cost of capital. These three variables are defined to be functions of both environmental variables and the firm's financial decision variables. Students in the class (firms) make decisions that determine the value each period for the firm's investment and the firm's dividends, as well as determining the method of financing the investment - - new debt, new common stock, and/or retained earnings. The values for the firm's earnings, the common stock price and the incremental weighted average cost of capital are determined from a series of step functions depending upon the values for and changes in the environmental variables and the firm's financial decision variables.

The functional effects of the environmental variables and the firm's financial decision variables on the firm's earnings, common stock price, and incremental weighted average cost of capital are ill-defined in the financial literature and theory. Thus, it is necessary to hypothesize these functional relationships in algebraic terms in order to derive equations that can be used to calculate values in this model. The following explanations detail the logic employed to translate these funtional links to algebraic relationships.

EARNINGS

It is postulated that the earnings for the period are a function of the earnings for the previous period, the change in investment during the present period, the change in national income, the incremental weighted average, cost of capital, and the rate of inflation for the period.

If national income, the firm's incremental weighted cost of capital, and the rate of inflation are compared to the previous period, and if each of these variables is viewed as having gone either up or down, eight different combinations of the three variables are possible; e.g., national income up, incremental cost of capital up, and infaltion up; national income up, incremental cost of capital up, and infaltion down; etc. One earnings equation based on the previous period's earnings and the change in investment during the period is formulated for each of these eight possible situations.

In each of the four cases where national income is rising, earnings for the period are based on the previous period's earnings, and a fraction of the present period's change in investment is added to get the present period's earnings. Thus, the firm's earnings will always rise if it has increased its investment during the period, will always fall if it has decreased its investment, and will always remain the same if its investment has remained the same. The amount of the increase or the decrease is dependent on the firm's incremental cost of capital and the rate of inflation; e.g., if both the incremental cost of capital and inflation have declined in a period, a firm will be richly rewarded for investing and heavily penalized for decreasing its investment. On the other hand, if the incremental cost of capital and inflation are rising, a firm will be rewarded only moderately for investing and will be penalized only slightly for decreasing its investment.

In each of the four cases where national income is falling, earnings for the period are based on 90 percent of the previous period's earnings, and a fraction of the present period's change in investment is either added or subtracted to get the present period's earnings. Thus, earnings for the period may either increase or decrease, depending on whether investment has been increased or decreased and by what amount, and whether the cost of capital is cheap and inflation is declining it may increase its earnings, even though the increase will not be as great as it would be if national income were rising. On the other hand, if the incremental cost of capital and inflation are rising while national income is falling, a firm will be penalized for investing further and rewarded slightly for decreasing its investment.

PRICE OF STOCK

The price of stock for the period is postulated to be a function of the change in national income for the period, the general level of interest rates for the period, the firm's earnings for the previous period, the price of the stock in the previous period, and the amount of the previous period's earnings distributed as dividends.

Once again, eight combinations of changes in national income, general level of interest rates, and earnings were considered; and for each, an equation to determine the stock price based on the previous stock price and the percentage of the previous period's earnings distributed as dividends

was formulated. These equations are, of necessity, highly speculative, but certain principles which guided their formualtion and discussed below:

1. Distributing dividends may help a firm's stock price, however;
2. When a firm distributes earnings as dividends, it necessarily does not retain them for investment;
3. When investment declines, earnings usually decline.
4. When earnings decline, the stock price is based on a fraction of the previous period's price and the multiplier based on the amount of earnings distributed as dividends is small, whereas;
5. When earnings increase, the stock price is based on a multiple of the previous period's price and the multiplier based on the amount of earnings distributed as dividends is large.

Thus, although a firm's stock price is apparently increased when it distributes more earnings as dividends, this increase may be negated if the lower investment caused by distributing earning from the previous period results in lower earnings in the present period.

Finally, it may be said that common stock is the most attractive to investors, as by a large multiple of the previous period's price and a large multiplier based on the amount of the previous period's earnings distributed as dividends, when national income is rising, interest rates on interest-bearing assets are falling, and the firm's earnings are rising; the common stock is the least attractive, as reflected by a small fraction of the previous period's price and a small multiplier based on the amount of the previous period's earnings distributed as dividends, when the firm's earnings are falling even while national income is rising and when interest rates on interest-bearing assets are rising.

COST OF DEBT

The cost of debt for the period is postulated to be a function of the changes in the general level of interest rates and the rate of inflation for the period, the ratio of the firm's debt to its total capital for the period, and the firm's cost of debt in the previous period.

Of the various ways in which the firm's use of debt could be measured, the ratio of long-term debt to the sum of long-term debt plus common stock plus retained earnings was chosen. Thus, a debt-to-total capital ratio of greater than 0.5 means that more than half of a firm's long-term funds were supplied through long-term borrowing.

Twelve combinations of the change in the general level of interest rates and the change in the rate of inflation and of ranges for the debt-to-total capital ratio were formed; and for each of the twelve cases, a multiplier for the previous cost of debt was chosen. Thus, the cost of debt for the period is a fraction of, or a multiple of, the previous period's cost of debt. The multiplier for each combination of the change in the general level of interest rates and the change in the rate of inflation logically increases as the debt-to-total capital ratio increases.

COST OF STOCK

It is postulated that the cost of stock for the period is a function of the general level of interest rates for the period, the expected rate of inflation for the period, the amount of dividends distributed in the previous period, and the cost of debt for the period.

The relationship between the cost of stock and the general level of interest rates, the expected rate of inflation, and last period's dividends is direct; the relationship between the cost of stock and the last period's price of the stock is inverse. Sixteen possible combinations of changes in the general level of interest rates, the expected rate of inflation, dividends paid, and stock price were considered, and the new effect on cost of equity was determined. For example, if interest rates are increasing, expected inflation is increasing, dividends decreased last period, and the stock price decreased last period, there would be a "net effect" of +2; i.e., there are three factors which would tend to increase the cost of stock and one which would tend to decrease it. The greater the net positive effect, the greater the cost of stock; the greater the negative effect, the lower the cost of stock.

It is axiomatic that equity funds are more expensive than debt funds, since shareholders require a greater reurn to compensate them for the fact that their claim on income involves greater risk than the claim of the bondholders.

Thus, the cost of stock for the period is a fraction of, or a multiple of, the previous period's cost of stock, plus fifteen percent of the period's cost of debt. The fifteen percent of the period's cost of debt is an arbitrarily chosen amount for the risk differential between stock and debt. The multiple will be the largest when interest rates, expected inflation, and last period's dividends have all increased and last period's stock price decreased. In a like manner, the fraction will be the smallest when interest rates, expected inflation and last period's dividends have decreased, but last period's stock price increased.

COST OF RETAINED EARNINGS

It is postulated that the cost of retained earnings is determined by function of the same variables as the cost of stock with the same functional relationships. However, since there are no floatation costs when earnings are retained, the cost of retained earnings for the period is simply postulated to be 90 percent of the cost of stock for the period.

INCREMENTAL WEIGHTED AVERAGE COST OF CAPITAL

The incremental weighted average cost of capital is then claculated as the sum of the cost of debt, csot of stock, and cost of retained earnings, with

each component cost weighted by the fraction of the change in investment financed by that particular source of capital.

DISCUSSION

The numerical values included in the algebraic relationships discussed above are indeed arbitrary. Unlike some other simulation models, there is no empirical data to test the validity of the second part of this model. The void in both financial literature and data prevent the empirical estimation of the functional relationships. However, this is not a critical problem. This model is designed as a teaching tool; it is not meant to be an accurate prediction model, but it is meant to introduce students to the concept that these interrelationships exist and must be considered. Indeed, it is not beyond belief that the numerical values for these functional relationships may be different for each individual firm! In addition, the instructor can change these relationships to simulate different variable sensitivites.

The benefits to the students from the use of this simulation model are derived from their recognition that when determining the firm's financial decisions predictions concerning future monetary and fiscal policy effects on the firm's financial and economic environment. Students come to recognize, for example, that a monetary policy designed to curb inflation could conceivably reduce the firm's investment and dividend decisions are "theoretically" correct! By recognizing the interrelationships and incorporating the impact of the financial and economic environment into the financial decision making, students will begin to understand and appreciate the link that traditional financial literature has ignored.

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