THE ARGUMENT

HOW EARNINGS EARN THEIR PLACE IN PICKING STOCKS

Peter Easton demonstrates by means of an example and a theoretical model how forecasts of accounting earnings may be used in stock valuation. The example shows the equivalence of valuation based on traditional discounted cashflow analysis and valuation based on aggregate future accounting earnings. The theoretical model is a simple extension of the original Miller and Modigliani (1961) theory of discounted cashflow.

The conventional wisdom is that cashflow, rather than earnings, is the fundamental variable of interest to equity investors. Several arguments support this wisdom, including:
• it is difficult to compare earnings across firms because of the variety of methods used to calculate accrual items;
• managers can manipulate accruals to alter reported earnings; and
• accounting earnings can result in bad investment decisions because analysts frequently select projects based on earnings rather than discounted cashflows.
These views have been pervasive in the press for decades.
Despite the apparent concern about the validity of earnings, cashflow forecasts are rare while earnings forecasts are often readily available. For example, BARCEP forecasts of earnings of Australia’s largest companies have been published monthly since November 1985.
The fact that management has discretion over the recognition of accruals is a two-edged sword. The discretion may be used by management to signal its private information or to opportunistically manipulate earnings. Signalling is expected to improve the ability of earnings to measure firm performance since management presumably has superior information about the firm’s cash-generating ability.
However, to the extent that management uses its discretion to opportunistically manipulate accruals, earnings will become a less reliable measure of firm performance and cashflows could be preferable.
Therefore, whether the net effect of accruals improves or reduces the ability of earnings to measure firm performance is an empirical question. Further, I will argue that the timing issues associated with recording in the accounting accrual process will not affect the relevance of earnings in valuation provided that forecasts of earnings are made for a sufficiently long time horizon.

THE EMPIRICAL EVIDENCE
Dechow (1994) determined that for a sample of more than 27,000 US observations, the $R^2$ from a regression of returns on earnings is always substantially higher than the $R^2$ from a regression of returns on cashflows for return intervals of between one and four years.
The key results are shown in Table 1. Cotter (1995), using a much smaller sample of Australian data (107 firms over a 10-year period), found similar results. She reported the Spearman Rank correlations shown in Table 2 (the Spearman Rank correlation is used rather than $R^2$ because of the excessive influence of a small number of observations in the calculation of $R^2$).
These results suggest that investors have historically reacted to earnings, not cashflows. Earnings over both short and long terms explain more of return realisations than are explained by cashflows. These research studies are based on realisation of earnings and cashflow. That is, they use perfect forecasts. Nevertheless, the results suggest that forecasts of earnings may be more useful than forecasts of cashflow and it is the relation between forecasts of earnings and expected returns which is of interest to equity analysts. The following model focuses on using forecasts of earnings as an indication of expected returns.
FOR EARNINGS

Table 1: Comparison Of Returns

| Return interval | Independent variable |
|----------------|--|------------------|
|                | Earnings from operations | Cashflow | Net cashflow |
| 1 year         | $R_1^2 = 3.24\%$ | $R_2^2 = 0.01\%$ | $R_3^2 = 0.01\%$ |
| 2 years        | $R_1^2 = 16.2\%$ | $R_2^2 = 3.18\%$ | $R_3^2 = 2.47\%$ |
| 4 years        | $R_1^2 = 40.26\%$ | $R_2^2 = 10.88\%$ | $R_3^2 = 6.12\%$ |

Table 2: Comparison Of Returns

| Return interval | Independent variable |
|----------------|--|------------------|
|                | Earnings | Cashflow from operations |
| 1 year         | 0.456    | 0.166 |
| 2 years        | 0.504    | 0.302 |
| 5 years        | 0.721    | 0.424 |
| 10 years       | 0.836    | 0.603 |

USING FORECASTS OF EARNINGS

The following example begins with the familiar case of calculation of internal rate of return (IRR) from a known investment yielding a finite stream of cashflows and having a non-zero terminal value. Accounting earnings are then derived from these cashflows and an IRR is calculated from these earnings. Advantages of using forecasts rather than forecasts of cashflows are demonstrated. Finally, the example is modified to show the use of forecasts of earnings per share (EPS) in valuing stock.

Consider a project with an initial investment of $100 million, projected net cash inflows of $20 million for each of the next five years and a terminal value of $50 million. This is shown in Figure 1 (see over).

The IRR from this project is the interest rate (I) at which the present value of the future cashflows is equal to the initial investment. That is, the internal rate of return is 12.15 per cent or the solution to:

$$100m - \frac{10m}{(1+I)} - \frac{10m}{(1+I)^2} - \frac{10m}{(1+I)^3} - \frac{10m}{(1+I)^4} - \frac{50}{(1+I)^5} = 0$$

Suppose the accountant chooses to depreciate the assets associated with the project by $10 million each year. This schedule will reduce the book value of the assets to $50 million at the end of the five-year period. Accounting earnings associated with the cashflows will be $20 million minus the $10 million depreciation; that is, $10 million (see Figure 2).

For simplicity I have chosen a depreciation schedule in which book value and liquidating value will be the same at the end of the project’s life. If this were not the case, accounting earnings of the last period would be adjusted by the gain or loss on sale of the assets.

A critical assumption in the calculation of IRR is that cashflows from the project may be reinvested at the IRR. That is, the $20 million net cash inflows in each year may be invested over the remaining life of the asset at 12.15 per cent. The interest on this investment is, of course, earnings. Hence, total earnings are as in Figure 3.

To illustrate the calculation of the earnings from reinvestment consider year 3 where $20 million has been re-invested for years 2 and 3 and a further $20 million has been reinvested for year 3 only. That is, earnings from reinvestment is $20m ((1.125)^2 -1) + $20m (1.125-1) = $5.155m.

IRR may be determined from the aggregate future accounting earnings (AFAE) stream. It is the interest (I) such that:

$$100 - (10m + 10m + 2.43m + 10m + 5.155m + 10m + 8.212m + 10m + 11.639m)/ ((1 + I)^5 - 1) = 0$$

Notice that DCF and AFAE yield the same IRR of 12.15 per cent. This equivalence will be demonstrated later by way of a theoretical model.

Forecasts of cashflows from equity shares are rare while forecasts of earnings are common. The above example shows that it is not necessary to transform earnings forecasts into cashflow projections in order to determine expected return on equity investment. Rather, the earnings forecasts can be used directly to evaluate the stock.

Suppose (modifying the above example) analysts provided three pieces of information:

- earnings of $1 per share for the current year;
- earnings of $1.243 per share for next year; and
EPS growth over years 3 to 5 of 21 per cent per year.

Suppose there are one million shares outstanding. (See Figure 4.)

The expected rate of return using the procedure above is 12.15 per cent. This expected rate of return may then be used to guide decisions regarding investment in the stock.

THEORETICAL FOUNDATION

Development of the well-known dividend capitalisation formula requires only the no-arbitrage assumption that:

\[ P_t = (1 + \rho)^{-1} \left( P_{t+1} + d_{t+1} \right) \]  

where

\[ P_t \quad \text{price of the asset at time } t \]
\[ d_t \quad \text{dividend paid to the owner of the asset at time } t \]
\[ \rho \quad \text{the expected rate of return} \]

It follows that

\[ P_t = (1 + \rho)^{-1} \left( (1 + \rho)^{-1} (P_{t+2} + d_{t+2}) + d_{t+1} \right) \]  

and, by recursive substitution of (1) into (2)

\[ P_t = \sum_{\tau=1}^{T} (1 + \rho)^{-\tau} d_{\tau} \]  

where \( d_{\tau} \) includes a liquidating terminal dividend (that is, in the last year of the investment \( d_{\tau} \) includes both the dividend for the period and the price for which the share is expected to be sold).

The discounted cashflow model frequently used in investment appraisal was derived from the dividend capitalisation model by Miller and Modigliani (1961).

The logic of their approach is that, if lending and borrowing may be undertaken at interest rate \( \rho \) then an infinite array of sequences of cashflows may be generated with each sequence having a present value of \( P_t \). Of course, one of these sequences will correspond to the sequence of cashflows obtained from investment in the asset. That is,

\[ P_t = \sum_{\tau=1}^{T} (1 + \rho)^{-\tau} CF_{\tau} \]  

Miller and Modigliani [1961] also define an earnings variable \( x_t \) having the property:

\[ x_{t+1} = (\rho) P_t \]  

That is, earnings of period \( t+1 \) are equal to the interest rate \( \rho \) multiplied by the initial investment. Since earnings may be summed over time, it follows (see Easton, Harris and Ohlson 1992 for a detailed discussion of this point) that the sum of earnings in periods \( t+1 \) and \( t+2 \) is the return from investing the initial sum at interest rate \( \rho \) for two years. This implies:

\[ x_{t+1} + x_{t+2} = ((1 + \rho)^2 - 1) P_t \]  

that is, the sum of earnings for two periods may be discounted by the rate of return for two periods. And, in general

\[ \sum_{\tau=1}^{T} x_{t} = ((1 + \rho)^T - 1) P_t \]  

That is,

\[ P_t = ((1 + \rho)^T - 1) \sum_{\tau=1}^{T} x_{\tau} \]  

The intuition behind equations (5) to (8) may be seen via a simple example of a savings account yielding 10 per cent.
interest (ie, \( \rho = 10 \) per cent). If \$100 is invested in such an account the interest (earnings, \( x_1 \)) is \$10 in the first year, \$11 (ie, \( x_2 \)) in the second year and \$12.10 (ie, \( x_3 \)) in the third year. It follows that earnings for the three-year period is \((1.1)^3 -1\) \$100 or \((10 + 11 + 12.10) = \$33.10\).

Of course, accounting earnings does not behave in the same way as \( x_t \). The accounting earnings of a firm in each period are not a constant portion (\( \rho \)) of price at the beginning of the period. For example, new projects may require some years of negative earnings during the start-up period – positive earnings will not be achieved until sales occur.

Further, accrual accounting procedures such as depreciation and amortisation follow arbitrary rules that may not reflect economic reality. However, since the formula for discounting earnings (equation (8)) discounts the sum of earnings rather than applying a different discount rate to the earnings of each year, these differences between accounting earnings and economic earnings (\( x_t \)) will not matter so long as

\[
\sum_{t=1}^{T} x_t = \sum_{t=1}^{T} AE_t
\]

where \( AE_t \) is the accounting earnings (operating profit) for time period \( t \). Substituting (9) into (8) yields

\[
P_t = ((1 + \rho)^T -1)^{-1} \sum_{t=1}^{T} AE_t
\]

Note that the expected rate of return \( \rho \) in (4) and (10) is the same in both of these relations. Thus, the critical assumption in the use of AFAE in project appraisal is the equivalence of the sum of accounting earnings (\( AE_t \)) and the sum of economic earnings (\( x_t \)) over the investment horizon.

Equation (9) will generally hold, although there are some notable exceptions. An example of an accounting accrual for which (9) will hold is depreciation. The choice of depreciation method, although arbitrary, will not affect the equality in (9) because at the end of the period any difference between accounting depreciation and economic (or true) depreciation will be accounted for by a “gain (or loss) on sale” adjustment to accounting earnings.

Tax savings and costs will be reflected in both \( CF_t \) and \( AE_t \). An increase or decrease in accounts receivable amounts to a redistribution of income across periods. This will not affect the sum of accounting earnings as long as there are no changes in receivables over the investment horizon under consideration. This appears to be a reasonable ex ante assumption in general.

REFERENCES

