THE VALUATION OF A SAVINGS ACCOUNT

(With Seven Insights)

A savings account is a simple investment that we all understand. We shall use it as a prototype for equity valuation. We shall use it to test ideas about how to value equities. Here is your ***first insight*** into equity analysis:

A valuation method that works for equities must work for a savings account

Here is a pro forma for a savings account where $100 is invested at the beginning of 2000 (the end of 1999) to earn at 5% per year. The present date is the end of 2000. The pro forma forecasts earnings, book values and dividends for this account for years 2001-2005, though the account is to be held indefinitely.

			Forecast Year				
	1999	2000	2001	2002	2003	2004	2005
Earnings withdrawn each year (full payout)							
Earnings		5	5	5	5	5	5
Dividends		5	5	5	5	5	5
Book value	100	100	100	100	100	100	100
Book rate of return		5%	5%	5%	5%	5%	5%
Earnings growth rate		0%	0%	0%	0%	0%	0%

The analyst wishes to value the account at the end of 2000. The value, you say, is clear: it's $100, because that is the amount the one could withdraw from the account. Put in accounting terms, the investment is worth its book value – the amount recorded as the balance in the passbook or on the bank statement. But we have to be careful. The $100

that can be withdrawn from the account is the *liquidation value* of the asset. Its *going-concern value* is based on the future value the investor expects to receive from holding the asset. The going-concern value is also the price at which the asset would trade in an efficient market for savings accounts. How do we calculate this value? This, of course, is the fundamental (!) question in equity analysis.

If going-concern value is based on the future value one expects to get from holding the asset, what exactly represents that value? Well, for the savings account, it is the cash (dividends) that we expect to withdraw from the account. All dividends would have to be included, including the liquidating dividend when the account is finally closed. But that introduces a problem, because a going concern (like a business firm) continues indefinitely; there is no liquidating dividend.

As it turns out, the savings account here can be valued by forecasting dividends. You'll notice from the pro forma that the account pays out $5 each year, the amount of the annual earnings, leaving $100 in the account to earn at 5%. If this $5 were paid as a perpetuity (the going-concern account is never liquidated), then the value is the dividend to be received in 2001, capitalized as a perpetuity:

$$V_{2000} = \frac{dividend_{2001}}{\text{Required Return}} = \frac{\$5}{0.05} = \$100$$

The *required return* for a savings account, like any asset, is the opportunity cost of the investment, the return one could get on an asset with the same risk – from the savings account at the bank across the street. The required return is thus sometimes referred to as the *cost of capital*: one has to incur a cost to give up the alternative investment.

The valuation of $100 makes sense: is we were to sell this asset in the market, we would sell it for $100. It makes sense from a conceptual point of view: the value of an asset should be the present value of the cash flow it is expected to pay the holder. (For a savings account, the going-concern value is the same as the liquidation value, but not so for equities.)

The model employed here is the *dividend discount model* that calculates value as the present value of dividend. Writing out the model in full, rather than a perpetuity,

$$V_{2000} = \frac{d_{2001}}{\rho} + \frac{d_{2002}}{\rho^2} + \frac{d_{2003}}{\rho^3} + \frac{d_{2004}}{\rho^4} + \longrightarrow \qquad \text{(Dividend Discount Model)}$$

Here the discount rate, ρ is one plus the required rate of return.

This is a good model for this savings account. Is it a good model for equities? Indeed, does it always work for a savings account?

Look at the pro forma for the savings account below:

		Forecast Year					
	1999	2000	2001	2002	2003	2004	2005
Earnings withdrawn each year (full payout)							
Earnings		5	5	5.25	5.51	5.79	6.08
Dividends		5	0	0	0	0	0
Book value	100	100	105	110.25	115.76	121.55	127.63
Book rate of return		5%	5%	5%	5%	5%	5%
Earnings growth rate		5%	5%	5%	5%	5%	5%

This account is the same as before, except that the investor does not make any withdrawals after 2000, and does not intend to make a withdrawal for 20 years. The

dividend discount model will not work – dividends are expected to be zero for many years to come. Here is a ***second insight*** for equity analysis:

Forecasting dividends does not yield a valuation

Think of a firm that "never pays dividends" – like Microsoft. Forecasting dividends is almost a ridiculous idea. Microsoft will ultimately pay a dividend, but in the very long run, and in the long run, "we are all dead."

There is an economic reason as well as a practical reason for not forecasting dividends. Dividends have to do with the distribution of value, not the generation of value. Economists refer to this principle as the *dividend irrelevance* principle – sometimes as the Miller and Modigliani principle after the professors who received the Nobel prize for the idea. Value is generated by earnings. Earnings can be distributed or retained, but the amount of the distribution (before liquidation) is not necessarily related to the amount of value generated by the asset. You can see this principle at work with the savings account. The two accounts here have different dividend forecasts, but the same $100 value in 2000. The principle also works for Microsoft: the fact that Microsoft pays no dividends has nothing to do with ability to generate value.

The savings account will pay out eventually. The amount is hard to comprehend unless we do some accounting. To forecast the amount that the savings account could pay out at some future date, we would have to forecast the balance of the account – the book value -- at that date. And so for Microsoft. A ***third insight***:

To value equities the analyst has to do some accounting

For the savings account, the accounting would go as follows. The book value will grow at 5% per year, as in the pro forma above, so after 20 years the book value (and the dividend

that can be paid from the book value) will be \$100 x 1.05^{20} = \$265.33. The present value of this amount is \$265.33/1.05^{20} = \$100. The accounting for Microsoft is going to be a bit more complicated, because we don't expect it to earn at a steady rate on book value, but something similar has to be done: dividends are paid out of book value, so forecasting future book values gives as indication of expected dividends.

Book Value and Valuation

But hold it! \$100 is the value and \$100 is also the current book value. So current book value gives us the value:

Value = book value

We don't have to do any accounting for future book value because the current accounting in the passbook is perfect. The accounting has been done for us. A ***fourth insight***:

Book value is a starting point for valuation

Accountants also report a book value for the equity of Microsoft -- \$47.3 billion in 2001. But it is not a perfect measure of value – Microsoft's market value was \$347 billion in 2001; the price-to-book ratio (P/B) was 7.3. But book value is a starting point. Indeed we can think of valuing a firm as follows:

Value = book value + extra value

The analyst recognizes the value already measured in book value, then adds "extra value." With that extra value, he calculates the intrinsic price-to-book ratio (P/B) at which the stock should trade.

The methods to add extra value will be introduced during the course, but here it a clue. Notice in the pro formas for the savings accounts that the rate of return on book value is equal to the required rate of return, 5%. Here is a ***fifth insight***:

If an asset is expected to earn at a rate equal to its required rate of return, it must be worth its book value

In other words, if an asset cannot earn a rate of return on its book value that is greater than the required return, it cannot add value – there is no extra value. There is no extra value for the savings account because it is expected to earn on its book value at the required rate of return. The account has a P/B ratio of 1.0. Correspondingly, if an asset is expected to earn at a rate that is greater than its book value, it must be worth a premium over book value; its P/B ratio must be greater than 1.0. For Microsoft to trade at 7.3 times book value, investors must forecast a rate of return of book value well in excess of the required rate (say 10%).

Earnings and Valuation

The savings account can also be valued from its earnings. In 2000, we forecast $5 in earnings for one year ahead (in 2001), referred to as *forward earnings*. The value of the asset can be calculated by capitalizing forward earnings:

$$V_{2000} = \frac{ForwardEarnings}{\text{Re}quired\,\text{Re}turn} = \frac{\$5}{0.05} = \$100$$

We can also calculate the value by capitalizing current earnings (for 2000):

$$V_{2000} = \frac{CurrentEarnings}{\text{Re}quired\,\text{Re}turn} = \frac{\$5}{0.05} = \$100$$

This leads to the ***sixth insight*:**

Capitalized earnings are a starting point for valuation

So we can also think of equity value as follows:

Value = capitalized earnings + extra value

The analyst recognizes the value in capitalized earnings, then adds "extra value." With this extra value, he calculates the P/E ratio. In 2001, analysts' consensus estimate for Microsoft's 2002 earnings were $1.83 per share. Capitalized at a required return of 10% (say), the value of these forward earnings is $18.30. Microsoft's shares traded at $65 at the time, so the market attributed considerable extra value to Microsoft. The analyst understands that capitalized earnings is a starting point for valuation, then develops methods to calculate extra value.

The methods will be introduced in this course, but here is a clue. Notice that, for the second savings account, earnings are expected to grow at 5%, the required rate of return. Here is the ***seventh insight*:**

If earnings are expected to grow at a rate equal to the require rate of return, value must equal capitalized earnings

In other words, if an asset cannot grow earnings more than the required rate, it does not add value – it has no extra value. For Microsoft to be worth $65, a large spread over capitalized earnings of $18.3, we must forecast earnings growth at a rate considerably higher than the required rate.

Looking at the first savings account, there appears to be a violation of this principle. Earnings there are not growing at all – less than the required return -- yet its value is equal to capitalized earnings. Therein lies a mystery that we leave you to ponder.

Anchoring Valuations in the Financial Statements

The equity analyst wants to follow procedures that make him feel secure about a valuation. There are many *ad hoc* methods that can lead him astray. Speculation – and speculative theories – can be rife, especially during bubbles. The analyst needs to be

protected against "irrational exuberance," against being carried away by the whims of the day. He needs to be anchored.

Accounting-based valuation anchors valuation in the financial statements. Both the book value and earnings capitalization approaches have this feature:

Value = anchor + extra value

Either book value or earnings (in the financial statements) serve as an anchor. The analyst then adds extra value. Disciplines procedures to calculate extra value provide more security.

The P/E Ratio

The savings account is a special case where there is no extra value over capitalized earnings. In this special case, the P/E ratio is simply given by the required return. There are two P/E ratios. The *forward P/E* and the *trailing P/E*.

The Forward P/E

The forward P/E is price to forward earnings. For the savings account, the forward P/E is \$100/\$5, or 20. The forward P/E for a savings account is a special case, for it is given by the required return. It is a case of a *normal forward P/E ratio*:

$$NormalForward\ \frac{P}{E} = \frac{1}{\text{Re}\,quired\ \text{Re}\,turn} = \frac{1}{0.05} = 20$$

A normal P/E is appropriate when value can be calculated by capitalizing earnings, with no "extra value." All one needs is a forecast of forward earnings and the required return.

The Trailing P/E

The trailing P/E multiplies current earnings rather than forward earnings. For the savings account, earnings for 2000 are \$5 and the value of the account at the end of 2000 is \$100. So it would appear that the trailing P/E is \$100/\$5 = 20, the same as the forward

P/E. However, this is incorrect. How can the value of one year more of earnings be the same? Suppose the $5 of 2000 earnings were not paid out so that the value in the account were $105. The P/E ratio then is $105/$5 = 21. The latter is the correct trailing P/E.

The amount that a dollar of earnings it worth – the P/E multiple – should not depend on dividends. The $5 of earnings for a savings account produces $105 in value for the owner of the account, the $100 at the beginning of the period that produced the earnings, plus the $5 of earnings. It she leaves the earnings in the account, she has $105; it she withdraws the earnings, she still has $105, with $100 in the account and $5 in her wallet. The trailing P/E is 21.

Thus the trailing P/E must always be based on cum-dividend prices:

$$Trailing\ \frac{P}{E} = \frac{\text{Pr}\,ice + dividend}{CurrentEarnings}$$

The dividend adjustment to price is necessary because dividends reduce the price (in the numerator) but do not affect earnings (in the denominator). The adjustment is not necessary for the forward P/E because both prices and forward earnings are reduced by the current dividend.

P/E ratios published in the financial press do not make this adjustment. If the dividend is small, it matters little, but for high payout firms, published P/E ratios depend on dividends as well as the ability of the firm to grow earnings.

The savings account has a special trailing P/E, a *normal trailing P/E*, because value can be calculated by capitalizing current earnings. Whereas the forward P/E is 1/required return, the normal trailing P/E is:

$$NormalTrailing\ \frac{P}{E} = \frac{1 + \text{Re}\,quired\ \text{Re}\,turn}{\text{Re}\,quired\ \text{Re}\,turn}$$

For the savings account, the normal trailing P/E is 1.05/0.05 = 21 (compared with 20 for the forward P/E). For a required return of 10 percent, the normal trailing P/E is 1.10/0.10 = 11 (compared with 10 for the forward P/E), and for a required return of 12 percent, it is 1.12/0.12 = 9.33 (compared with 8.33 for the forward P/E). The normal forward P/E and the normal trailing P/E always differ by 1.0, representing one current dollar earning at the required return during the forward year.
