

Cash Flows, Asset Values, and Investment Returns

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Is your model of expected return dependent on your point of view?

- If you estimate expected return from earnings, you should get the same answer as if you estimate it from cash flow
- Even in the simplest case, the two points of view may not be consistent
- I'll try to show you how to make it all come out right, at least in a simplified world

A simple balance sheet

- Consider the hypothetical company Offshore Widget
- It's a mature company, growing at a steady rate

Figure 1.

Offshore Widget Company balance sheet at time T (as reported)

Short term assets	1000.00
Plant at cost	8000.00
Accumulated depreciation	4000.00
Net plant	4000.00
Total gross assets	9000.00
Total assets	5000.00
Short term liabilities	500.00
Long term debt	2000.00
Total liabilities	2500.00
Shareholders equity	2500.00

We'll model its operations for a year

- Sales are a fixed percentage of gross plant
- The company will retain enough earnings to grow at 10%
- In fact, everything will grow at 10%!

Figure 2.

Governing parameters for model of Offshore Widget operations

Sales/gross plant	0.625
Interest on debt	8%
Life of plant	15
Tax rate	40%
Gross margin	30%
g	10.0%

Here's the income statement

- Gross margins are 30%
- Depreciation is based on declining balance, 15-year life

Figure 3.

Offshore Widget Company income statement for year Y

Year begins at time T, ends at time T+1 (scenario 1)

Revenues	5000.00
Cost of goods	3500.00
EBITDA	1500.00
Interest	160.00
Depreciation	266.67
Pre-tax income	1073.33
Tax	429.33
Net income	644.00
ROE	25.76%

Sources of funds

Debt and short-term liabilities grow at 10%

Figure 4.

Offshore Widget Company sources of funds year Y (scenario 1)

Cash flow	910.67
Borrowing (i.e. additions to long-term debt)	200.00
Change in short-term liabilities	50.00
Total sources of funds	1160.67

Uses of funds

- Funds are invested so that net plant grows at 10%
- The company pays out everything over what's required for 10% growth
- That left 100 to put in short-term assets, which is exactly 10%

Figure 5.

Offshore Widget Company disposition of funds year Y (scenario 1)

Change in gross plant	666.67
Distributions to shareholders	394.00
Change in short-term assets	100.00
Total disposition of funds	1160.67

Something didn't come out right!

- Most of the balance sheet items grew at 10%...
..but not all
- Why not?

Figure 6.

Offshore Widget Company balance sheet at time T+1 (scenario 1)

		Growth
Short-term assets	1100.00	10.0%
Plant at cost	8666.67	8.3%
Accumulated depreciation	4266.67	6.7%
Net plant	4400.00	10.0%
Total gross assets	9766.67	8.5%
Total assets	5500.00	10.0%
Short-term liabilities	550.00	10.0%
Long-term debt	2200.00	10.0%
Total liabilities	2750.00	10.0%
Shareholders equity	2750.00	10.0%

The accumulated depreciation account was inconsistent with our other assumptions

If gross and net plant are growing at the same rate, and we use declining-balance depreciation, THEN...

$$gGP = gNP + \frac{NP}{L}$$

$$AD = \frac{GP}{gL + 1}$$

Let's adjust the starting balance sheet

We'll restate the accumulated depreciation account

$$AD = \frac{GP}{gL + 1} = \frac{8000}{.1 \times 15 + 1} = 3200$$

Now the balance sheet looks like this

The change in accumulated depreciation also affects shareholders equity

Figure 7.

Offshore Widget Company balance sheet at time T (as adjusted)

Short-term assets	1000.00
Plant at cost	8000.00
Accumulated depreciation	3200.00
Net plant	4800.00
Total gross assets	9000.00
Total assets	5800.00
Short-term liabilities	500.00
Long-term debt	2000.00
Total liabilities	2500.00
Shareholders equity	3300.00

And here's the new income statement

The accumulated depreciation adjustment changes depreciation, which changes the income statement

Figure 8.

Offshore Widget Company income statement for Year Y

Year begins at time T, ends at time T+1 (scenario 2) year 1

Revenues	5000.00
Cost of goods	3500.00
EBITDA	1500.00
Interest	160.00
Depreciation	320.00
Pre-tax income	1020.00
Tax	408.00
Net income	612.00
ROE	18.55%

Sources of funds

Now we get a new number
for cash flow

Figure 9.

Offshore Widget Company sources of
funds year Y (scenario 2)

Cash flow	932.00
Borrowing	200.00
Change in short-term liabilities	50.00
Total sources of funds	1182.00

Uses of funds

- To make net plant grow at 10%, we need to invest \$800
- This leaves only \$282 to distribute

Figure 10.

Offshore Widget Company disposition of funds year Y (scenario2)

Change in gross plant	800.00
Distributions to shareholders	282.00
Change in short-term assets	100.00
Total disposition of funds	1182.00

Now it all works

- Everything is growing at 10%
- Our steady-state assumption is justified

Figure 11.

Offshore Widget Company balance sheet at time T+1 (scenario 2)

	Time 1	Growth
Short-term assets	1100.00	10.0%
Plant at cost	8800.00	10.0%
Accumulated depreciation	3520.00	10.0%
Net plant	5280.00	10.0%
Total gross assets	9900.00	10.0%
Total assets	6380.00	10.0%
Short-term liabilities	550.00	10.0%
Long-term debt	2200.00	10.0%
Total liabilities	2750.00	10.0%
Shareholders equity	3630.00	10.0%



How does all this relate to forecasting stock returns?

We'll start with the definition of total return

$$T = \frac{D}{P} + \frac{\Delta P}{P}$$

Let's rewrite the price-change part

Price changes because of growth, and because of changes in valuation

$$\frac{\Delta P}{P} = g + \frac{\Delta PB}{PB} (1 + g)$$



How much can the company distribute to shareholders?

If it still has money after
dividends and reinvestment,
that's "excess cash flow"

$$XCF = E - D - gB$$

It can use excess cash flow to repurchase shares

- So in effect the shareholders get not only the dividends, but the XCF
- So $DIST = (E - gB) / P$

$$DIST = \frac{D}{P} + \frac{XCF}{P} = \frac{D}{P} + \frac{E - D - gB}{P} = \frac{E - gB}{P}$$



So we can write return to shareholders as shown


- The T-Model
- States return in terms of ROE, g , price/book, and valuation change

$$T = g + \frac{ROE - g}{PB} + \frac{\Delta PB}{PB} (1 + g)$$

Can we rely on cash flow instead of earnings?

Money paid as dividends, or used to repurchase stock, shows up on the sources & uses statement

$$DIST = NI + DA + \Delta L - \Delta A$$



This leads to the following...

Restating the T-Model in terms
of sources & uses...

$$T = g + \frac{CF - \Delta GA + \Delta LTD + \Delta STL}{P} + \frac{\Delta PB}{PB} (1 + g)$$

Which works out to this

The cash-flow T-Model

$$T = \frac{CF + g(P - GA + TL)}{P} + \frac{\Delta PB}{PB}(1 + g)$$

Here's a convenient way to look at it

- We find that the cash-flow version is a better forecaster of returns
- It gives a quick picture of the source of a company's investment payoff

$$\Phi = \frac{P - GA + TL}{P}$$

Φ is the fraction of growth that ends up as return to shareholders

$$T = \frac{CF}{P} + \Phi g + \frac{\Delta PB}{PB} (1 + g)$$

The two T-Models should give the same result

- They do in the simple steady-state case
- Where the simplifying assumptions are violated, the cash-flow version gives a better estimate

Figure 12.

Comparison of expected return calculations forecast made for year Y at time T

Scenario 1 (Figures 1, 3-6)

Market value of firm	9900.00
Price/book	3.96
$g + (\text{ROE} - g) / \text{PB}$	13.98%
$(\text{CF} + g(\text{P} - \text{GA} + \text{TL})) / \text{P}$	12.63%

Scenario 2 (figures 7-11)

Market value of firm	9900.00
Price/book	3.00
$g + (\text{ROE} - g) / \text{PB}$	12.85%
$(\text{CF} + g(\text{P} - \text{GA} + \text{TL})) / \text{P}$	12.85%

A few examples from 2002 year-end financials

- Sometimes a company is better off not to grow (AA)
- If CF/ P is high enough, the stock can deliver a good return even if the company shrinks (MO)

	MSFT	MO	MRK	AA
CF/ P	3.4%	13.1%	6.0%	10.1%
Phi	0.79	0.75	0.79	-0.09
g for T+10%	8.3%	-4.2%	5.0%	0.8%