Lecture 8

Valuation Models for Stock Prices

- Cash Flow Models of Equity Valuation.
- Dividend Discount Models
- Accrual Discount Models
- Determining the Value Drivers
- Cases in Valuation Model Analysis

- Reading: SAIS, sec. 8.1, 8.2 and 8.3 and *Case Downloads from the Class Webpage (see last slides in this lecture)*

Jump to first page

Connection to Final Exam Question

ii) "The search for the 'correct' way to value common stocks, or even one that works, has occupied a huge amount of effort over a long period of time....the implementation of a system to selectively value or select common stocks is a difficult task. This is a task that a valuation model purports to accomplish."
Describe the **discounted dividend** cash flow valuation models conventionally used to analyse common stocks. How do these models differ from valuation models that discount cash flows other than dividends? What are some important limitations of using accounting data to implement discounted cash flow valuation?

It is commonplace to hear that discounted cash flow (DCF) models are the appropriate way to value common stocks – in the context of value investing, DCF has been proposed as the way to estimate 'intrinsic value'. This lecture covers these models and the connection to using accounting data for stock valuation.

It is doubtful that such models can do any more than provide some structure to a stock valuation. As the quote recognizes, stock valuation is 'a difficult task' – too difficult in many cases for a formula to capture.

Jump to first page

Basics of Discounted Cash Flow Valuation

- The basic models can be specified as:

$$DCF_0 = \frac{CF_1}{1 + k} + \frac{CF_2}{(1 + k)^2} + \frac{CF_3}{(1 + k)^3} + \ldots = \sum_{t=1}^{T} \frac{CF_t}{(1 + k)^t}$$

where CF_t is the cash flow at time t ; k is the discount rate ; T is the termination date of the investment, possibly infinity.

Key issues:

What is the relevant cash flow variable?

What is the terminal cash flow?

How to get the discount rate?

NOTE: For an equity security all of the rhs variables are unknown on the valuation date $t = 0$.

Jump to first page

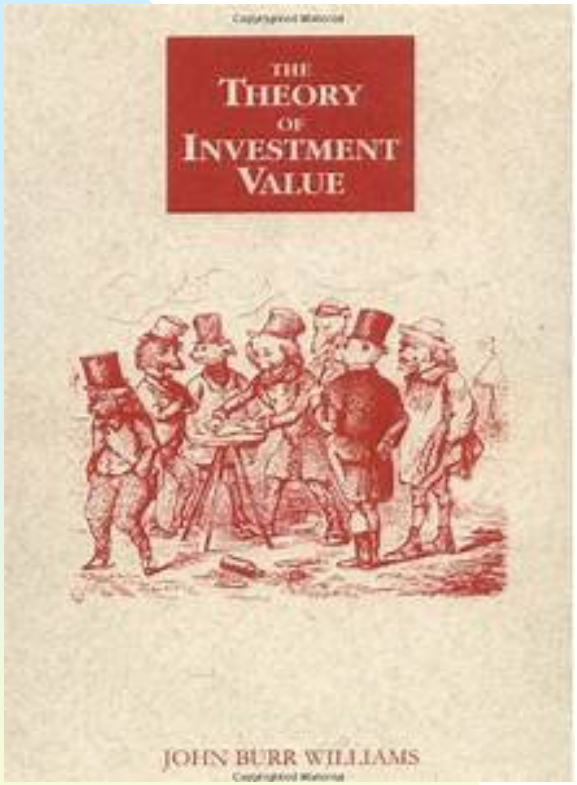
History of Discounted Cash Flow (*DCF*) Models

- Origins of *DCF* models for security valuation can be found in John Burr Williams The Theory of Investment Value (1938).
  - The present value for a business or a security, such as a stock or bond, can be determined by discounting the future stream of expected cash inflows minus expected cash outflows at the appropriate rate of interest.

- The basic *DCF* model was adapted and expanded in the *DDM* of Gordon (1962)
  - valuation of companies in regulated industries was a central concern.
  - the constant growth version of the discounted dividend model is often referred to as the 'Gordon growth model'

Jump to first page

Who was John Burr Williams (1900-1989)?



- Williams is credited with being an early proponent of using discounted cash flow to estimate the '**intrinsic value**' of a stock.
- This represented a more theoretical and mathematical approach to 'intrinsic value' than the relatively heuristic notions previously available.
- Williams was a long time student at Harvard and the Theory of Investment Value was his Harvard PhD thesis in Economics
- Williams worked as a securities analyst and sometime professor.

Jump to first page

J.B. Williams DCF model was not new. Previous writers such as Macaulay (1938) questioned the application of *DCF* to value common stocks

The 'assumption of payment', which must be made before the promised or 'hypothetical' yield of a bond can be calculated ... may, as we have seen, be a mere mathematical fiction for all except the highest grade of bonds. But, for common stocks it is not only a mathematical fiction but also an **economic absurdity**. Even if the chance that the promises contained in a bond will be kept is negligibly small that the promises are little more than mere words, they are at least *definite* words and, as such, can stand the strain of mathematical manipulation.

Jump to first page

Macaulay (1938) The Movement of Interest Rates, Bonds, Yields and Stock Prices in the United States since 1865 was a monumental NBER study. On $k = g$ in the Gordon *DDM* model, Macaulay observed:

- If … the dividend payments were to increase in geometric progression … **One of the strangest rationalizations** of unending price rise that appeared in the months immediately preceding the stock market culmination of 1929 was evolved by a Wall Street economist. He presented to the directors of the investment trust … statistical evidence that the wealth of the country increased in the long run about 3 per cent per annum. He then argued that corporations as a class should be expected to share in this growth at this rate and hence that their **dividends should be expected, over the long run, to increase at least 3 per cent per annum**; that is to say in such a series as \$4.12, \$4.24, \$4.37, etc., or $\$4(1.03)$, $\$4(1.03)^2$, $\$4(1.03)^3$, etc. He then suggested that … **these future dividends would eventually be discounted at a rate that would not exceed 3 per cent per annum**. But, he continued, if distant enough payments were assumed, **discounting them at this rate would give very high prices for the stocks**. The suggestion was even made that, as there seemed to be no necessary time limit to the 3 per cent rate of growth in wealth, there should logically be no 'ceiling' whatever for stock prices. **The phantasy was strangely reminiscent of the Petersburg Paradox in the mathematical theory of probability.**

Jump to first page

Narrow vs. Broad Dividends

- Initial conception of the dividend *DCF* models were developed for high cash payout securities
  - Gordon focused on US utility stocks where the cash payout was determined by state/federal rate setting bodies that set utility rates for private companies
- More recently, share buyback programs have been replacing high cash payout
  - *narrow dividends* are just cash dividend payout while *broad dividends* include both buybacks and cash dividends
- See three files in 417_lecture8.zip on growth of share repurchases

Jump to first page

Narrow and Broad Dividends for Pfizer (from 10-K)

Consolidated Statements of Cash Flows
Pfizer Inc. and Subsidiary Companies

(MILLIONS)	Year Ended December 31, 2017	2016	2015
Operating Activities			
Net income before allocation to noncontrolling interests	**$ 21,355**	$ 7,246	$ 6,986
Net cash provided by operating activities	**16,470**	15,901	14,688
Financing Activities			
Proceeds from short-term borrowings	**8,464**	7,472	5,557
Principal payments on short-term borrowings	**(9,990)**	(5,102)	(3,965)
Net proceeds from/(payments on) short-term borrowings with original maturities of three months or less	**1,401**	(3,084)	2,717
Proceeds from issuance of long-term debt	**5,274**	10,976	—
Principal payments on long-term debt	**(6,154)**	(7,689)	(2,990)
Purchases of common stock	**(5,000)**	(5,000)	(6,160)
Cash dividends paid	**(7,659)**	(7,317)	(6,940)
Proceeds from exercise of stock options	**862**	1,019	1,263
Other financing activities, net	**(233)**	(196)	109
Net cash used in financing activities	**(13,035)**	(8,921)	(10,409)

Jump to first page

Figure 4.1.c Prices, Narrow and Broad Dividends

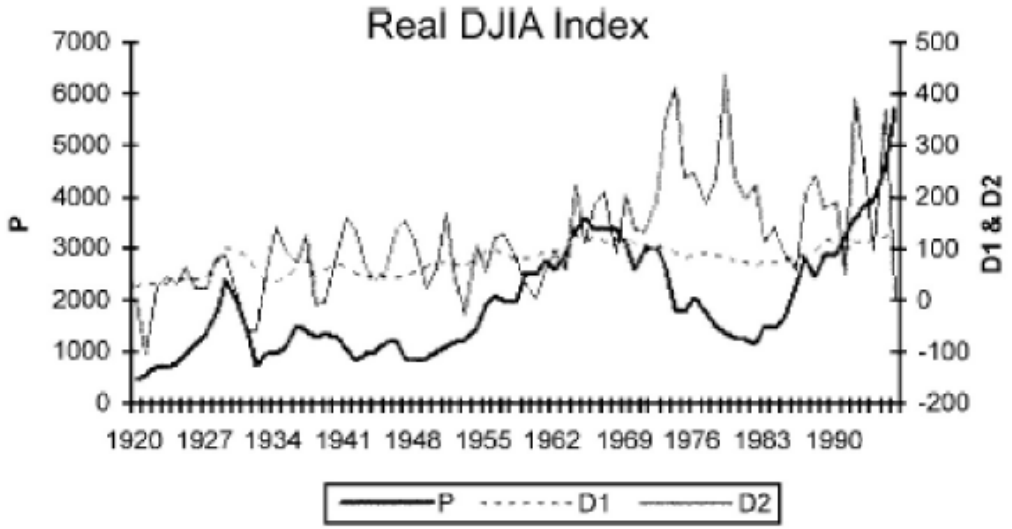


FIG. 1.—Price, narrow dividend (D1), and broad dividend (D2) series for real DJIA index and real S&P industrial index, respectively.

np to first page

Figure 4.2.a US Dividend Payers, 1926-1999

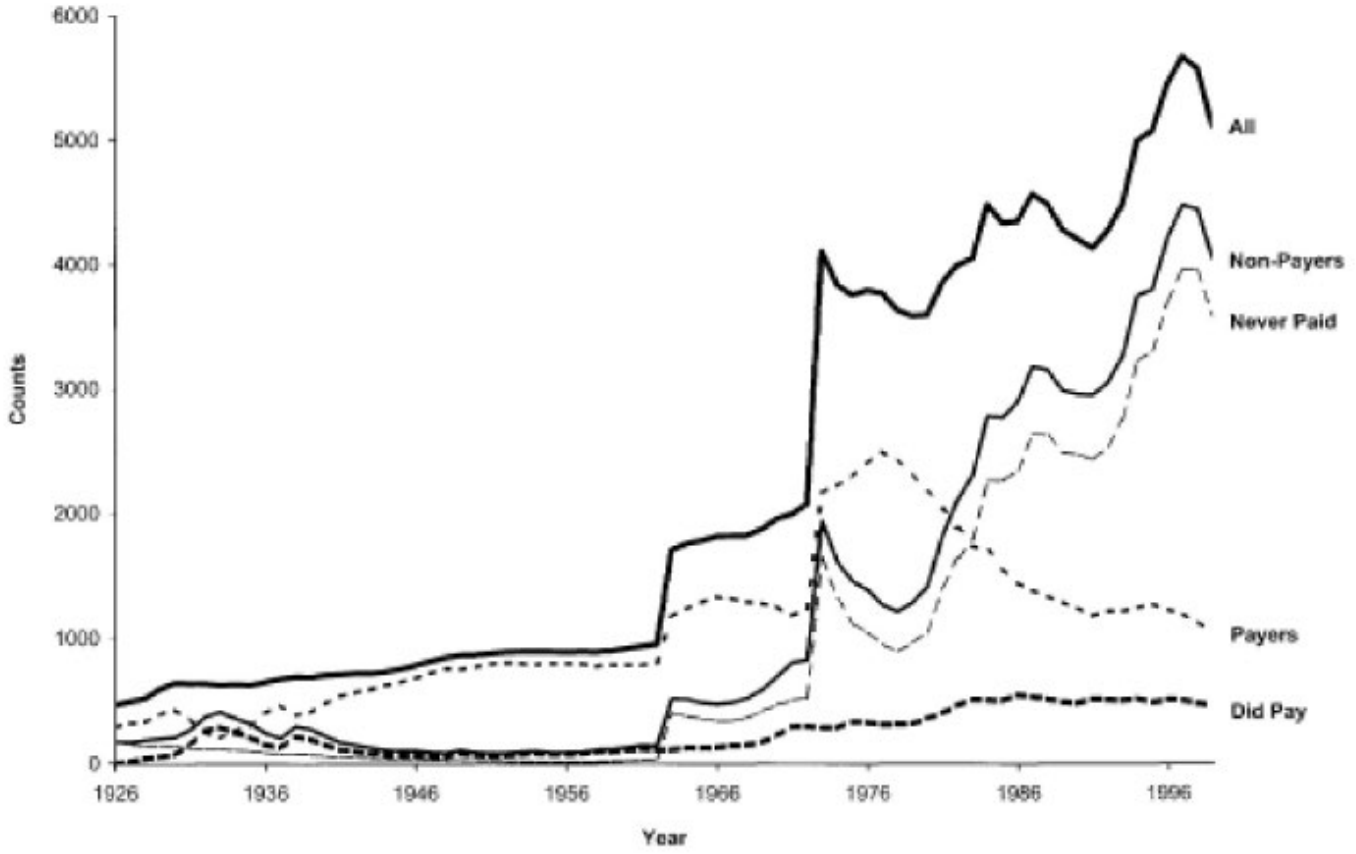


Fig. 1. The number of CRSP firms in different dividend groups. The CRSP sample includes NYSE, AMEX, and NASDAQ securities with share codes of 10 or 11. A firm must have market equity data (price and shares outstanding) for December of year t to be in the sample for that year. We exclude utilities (SIC codes 4900–4949) and financial firms (SIC codes 6000–6999). Payers pay dividends in year t; non-payers do not. The two subgroups of non-payers are firms that have never paid and former payers (firms that do not pay in year t but did pay in a previous year).

Title: Dividend payers and non-payers, 33 countries and 17,106 listed firms, 1985-2006

Summary Statistics: Annual number of dividend payers and non-payers, never payers and former payers, means and medians of payout ratios, numbers (and percentages) of payers and non-payers: 1985–2006 for all countries. Payers pay dividends in year t; non-payers do not. The two subgroups of non-payers are firms that have never paid and former payers (firms that do not pay in year t but did in a previous year).

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
All firms	1434	1623	2059	2433	2697	3052	3556	3855	4105	4823	5519	6459	6997	8047	9128	10837	12407	13388	13895	14928	15714	17106
Mean of dividend payout ratio of payers	38%	38%	37%	33%	34%	35%	37%	38%	38%	36%	35%	35%	34%	35%	34%	33%	35%	37%	36%	34%	34%	34%
Median of dividend payout ratio of payers	34%	34%	33%	30%	30%	31%	32%	34%	34%	31%	31%	30%	29%	30%	29%	28%	30%	32%	31%	29%	29%	29%
Payers	1246	1393	1707	2020	2236	2529	2883	3048	3157	3418	3867	4425	4642	4951	5282	5882	6427	6843	7208	7809	8367	9121
	87%	86%	83%	83%	83%	83%	81%	79%	77%	71%	70%	69%	66%	62%	58%	54%	52%	51%	52%	52%	53%	53%
Non-payers	188	230	352	413	461	523	673	807	948	1405	1652	2034	2355	3096	3846	4955	5980	6545	6687	7119	7347	7985
	13%	14%	17%	17%	17%	17%	19%	21%	23%	29%	30%	32%	34%	39%	42%	46%	48%	49%	48%	48%	47%	47%
Never payers	0	169	202	284	343	387	444	571	674	805	1201	1469	1773	2061	2635	3246	4200	5106	5453	5662	5907	6201
	0%	10%	10%	12%	13%	13%	13%	15%	16%	17%	22%	23%	25%	26%	29%	30%	34%	38%	39%	38%	38%	36%
Former payers	0	14	25	21	28	49	76	100	122	142	108	150	203	329	354	392	468	617	514	413	367	485
	0%	1%	1%	1%	1%	2%	2%	3%	3%	3%	2%	2%	3%	4%	4%	4%	4%	5%	4%	3%	2%	3%

Jump to first page

Basic DCF model: The DDM

- Dividend Discount Model (*DDM):* Assume that the future is known with certainty and that perfect market assumptions apply.
  - No taxes and the term structure of discount rates is flat.
  - Assumes dividends are source of security cash flow

- Assume that the stock to be valued is purchased at price *P(0)* and held for one period and then sold, the dividend to be received in the next period is *Div(1)*) and the price received from selling the stock is *P(1)*

$$P(0) = \frac{Div(1) + P(1)}{1 + k} \rightarrow k = \frac{P(1) - P(0)}{P(0)} + \frac{Div(1)}{P(0)}$$

Jump to first page

Solving for the Infinite Horizon DDM

- Notice the essential role of a simplified firm with 'clean surplus' – no share repurchases, only dividends
- Accounting for randomness in the future cash flows by taking expectations conditional on information available at *t=0*, the infinite horizon *DDM* is derived by making a progressive substitution for prices:

$$E[P(1)] = \frac{E[P(2)] + E[Div(2)]}{1 + k} \rightarrow P(0) = \frac{E[Div(1)]}{(1 + k)} + \frac{E[P(2) + Div(2)]}{(1 + k)^2}$$

$$P(0) = \sum_{t=1}^{T} \frac{E[Div(t)]}{(1 + k)^t} + \frac{E[P(T)]}{(1 + k)^T} \rightarrow P(0) = \sum_{t=1}^{\infty} \frac{E[Div(t)]}{(1 + k)^t}$$

Jump to first page

Applying the *DDM:* Preferred Stock Valuation

- Preferred Stocks
  - Rationales for preferred stock issuance
    - Role of Basel III for banks
    - Debt surrogates for corporations
      - Low credits and non-bank financials
- Assume that *Div(t)* is fixed at *Div** (*g = 0*)
  - Apply the perpetual pricing model
    - *P(t) = Div* / k*
  - Valuation for preferred shares involves comparison of the dividend yield (similar to traditional yield spread analysis)

Jump to first page

Preferred Share Features

- Fixed rate vs. Rate Reset
  - The reset rate can vary according to the length of time between reset dates and the reference rate used for the reset
    - See Enbridge Examples → see CIBC 'Canadian preferred shares' report in link to CIBC report on class webpage
    - www.prefinfo.com (Hymas Investments) also has details of Cdn. Pref. shares
- Retractable vs. Redeemable
  - Redeemable preferred shares, also known as callable preferred shares, allows the issuer to buy back the (perpetual) preferred stock at a fixed (call) price
    - Terms and conditions depend on the prospectus
  - Retractable preferred shares are issued with a maturity date when the company can force the shareholders to redeem shares for a fixed payment
    - Terms and conditions depend on the prospectus, the retraction may be an exchange for common shares (not necessarily a cash price).

Jump to first page

The Gordon Growth Model

The ***Gordon growth model*** (growing perpetuity)

- Assume the dividend changes over time according to the assumption: $D(t+1) = D(t)(1 + g)$, where g is the assumed constant growth rate in dividends.

$$P(0) = \sum_{t=1}^{\infty} \frac{Div(t)}{(1+k)^t} = \sum_{t=1}^{\infty} \frac{D(0)(1+g)^t}{(1+k)^t}$$

$$= \frac{D(0)(1+g)}{(1+k)} \left[1 + \frac{1+g}{1+k} + \frac{(1+g)^2}{(1+k)^2} + \frac{(1+g)^3}{(1+k)^3} + \ldots \right]$$

$$= \frac{D(0)(1+g)}{(1+k)} \left[\frac{1}{1 - \frac{1+g}{1+k}} \right] = \frac{D(1)}{k-g}$$

Jump to first page

Examples of Applying the Formula

- SAIS, p.428-33, examines examples from Damodaran (1994)
  - How is *k* estimated?
  - How is *g* estimated?
  - How is *D(1)* estimated?
  - What types of companies are examined?
- Exercise: use Gordon model to value BUD, GE and BCE

Jump to first page

From Dividends to Earnings

- Dividends are problematic as a model for determining stock prices as the limited variation in dividend payout does not correspond to the substantial variation in stock prices → transition to an earnings model
  - Assume constant dividend payout $E(t) = b\ Div(t)$
  - It follows that the constant dividend payout of the Gordon model translates to earnings
    - $E(t+1) = b\ Div(t+1) = b\ Div(t)\ (1+g) = E(t)\ (1+g)$
    - Constant dividend growth with constant dividend payout translates the substitution of earnings (which has more substantial variation than dividends) in the Gordon Growth model → $P(0) = (b\ E(1)) / (k - g)$
  - Damodaran estimates *k* using CAPM and *g* from past growth rates

Jump to first page

Damodaran on Simplified DDM Valuation: Substituting Earnings *g* for Dividends *g*

Southwestern Bell has earnings per share of $4.33 in 1992 and paid out 63% of its earnings as dividends. Its earnings and dividends had grown at 6% a year between 1988 and 1992 and were expected to grow at the same rate in the long term. The beta for the stock was 0.95. The T-bond rate at the time of the analysis was 7% ...

Cost of equity = 7% + 0.95 x 5.5% = 12.23%

Value of equity = $2.73 x 1.06 / (0.1223 - 0.06) = $46.45

SW Bell was selling for $78.00 on the day of this analysis (May 1993).

Damodaran (1994, p.103) then uses the $78.00 stock price to solve for *g* in the Gordon model as 8.43%. This is interpreted as the expected growth rate embedded in the current price which is 2.43% higher than the estimated historical growth rate.

Jump to first page

Calculating the *g* and *k*

- Estimating *g* by converting the problematic dividend growth assumption to earnings growth requires assuming a constant dividend payout ratio (*b*)
  - Damodaran estimates the *g* from the previous 5 years of earnings → more realistic to take use the observed stock price and use the formula to provide an implied growth rate estimate → this can be used to interpret *P/E*
  - Earnings are an accrual measure that might not represent the underlying cash flows → possible to interpret *b* as a broad dividend
  - *How to interpret g*?
- Estimating *k* using the *CAPM* requires R_F as the long term bond rate, Damodaran estimates *β (somehow?)* with geometric equity risk premium ($E[R_M] - R_F$) estimated from 1925 to 1992
  - *Is this the best way to get k?*

Jump to first page

Two more Damodaran Examples: Exxon, Dresdner

Exxon has earnings per share of $3.82 in 1992 and paid out 74% of its earnings as dividends that year. The expected growth rate in earnings and dividends, in the long term, was expected to be 6%. The beta for Exxon was 0.75 and the T-Bond rate was 7% ... Cost of equity = 7% + 0.75 x 5.5% = 11.13% ... Value of equity per share = 2.83 x 1.06 / (0.1113 - 0.06) = $58.47. Exxon was selling for $65.00 on the day of this analysis (May 1993).

Bank. It is estimated that Dresdner "maintained a growth rate of 5% in earnings and dividends between 1983 and 1992, and was expected to grow at this rate in the long term". The analysis continues that Dresdner:

was also expected to have earnings per share of 34.05 DM in 1993 and to pay out 47.62% of its earnings as dividends. It had a beta of 0.87 in 1993, measured relative to the Frankfurt DAX. The ten-year bond rate in Germany at the end of July 1993 was 6.42% and the risk premium for stocks over bonds was assumed to be 3.5% ... Cost of equity = 6.42% + (0.87 x 3.5%) = 9.45%

Jump to first page

Using Accruals for the Cash Flow: The Residual Income Model

- This model exploits the **clean surplus** relationship:
  - *BV(t) = BV(t-1) + E(t) - D(t)*
    - *D(t) = E(t) - ΔBV*
  - Clean surplus does not apply with share repurchases or other manipulations of the equity account
- The clean surplus equation is substituted into the general DCF model to obtain *(AE* is 'abnormal earnings', i.e., return on equity in excess of cost of capital*):*

$$P(0) = \sum_{t=1}^{\infty} \frac{D(t)}{(1+k)^t} = \sum_{t=1}^{\infty} \frac{E(t) - \Delta BV(t)}{(1+k)^t}$$

$$= BV(0) + \sum_{t=1}^{\infty} \frac{(ROE(t) - k)\, BV(t-1)}{(1+k)^t} = BV(0) + \sum_{t=1}^{\infty} \frac{AE(t)}{(1+k)^t}$$

Some Basic Residual Income Calculations

- $ROE(t) = E(t) / BV(t-1)$
  - *ROE* (return on equity) is an accrual measure
    - This is not a cash measure
- $k = \Delta BV / BV(t-1)$
  - This is an interpretation for *k* that differs from the *CAPM* interpretation of the Gordon *DDM*
- 'Return on equity in excess of cost of capital' interpretation of the residual income model needs to be in an accounting, not economic, sense

Jump to first page

Interpreting Return on Equity

- Examine the numerator of the residual income model
  - *(ROE(t) – k) BV(t-1)*
    - *This variable depends on the accrual relationship between earnings and the change in book value → importance of clean surplus*

- The *ROE* can be expressed in value driver format (Table 8.10, p.467):

$$ROE = \frac{\text{Net Income}}{\text{Book Value of Equity}}$$

$$= \left(\frac{\text{Net Income}}{\text{Sales}} \right) \left(\frac{\text{Sales}}{\text{Total Assets}} \right) \left(\frac{\text{Total Assets}}{\text{Book Value of Equity}} \right)$$

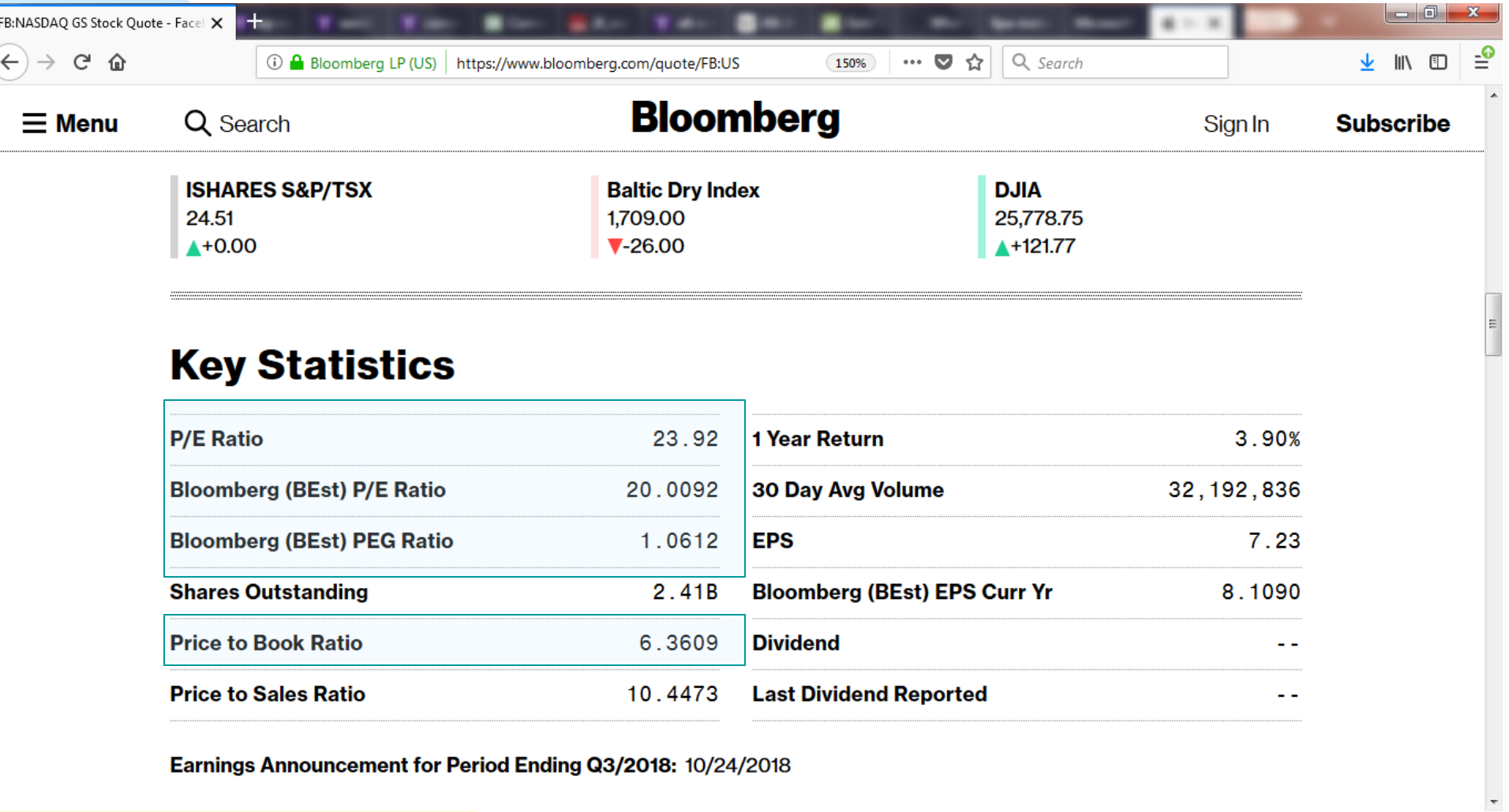
Jump to first page

P / BV, ROE and *P / E*

- Conventional measures of relative valuation are Price to Book Value (*P/BV*), Price to Earnings (*P/E*) and Return on Equity (*ROE*)
  - Given any two the other is given
- Assume Net Income and Earnings are the same:
  - *ROE = E / BV*
  - *P/E = (P / BV) ÷ (E / BV)*
    - This holds for aggregate and per share values

Jump to first page

Key Statistics from Bloomberg for Facebook (24/8/18)



Jump to first page

Different Forms of the P/E Ratio

- The *P/E* ratio is a key valuation measure for practicing security analysts
- Letting *b* represent the dividend payout ratio (*Div(t) / E(t)*), i.e., *b E(t) = Div(t),* in the Gordon model the *P/E* ratio can be solved as:

$$P(0) = \frac{b\,E(1)}{k - g} = \frac{b\,E(0)(1 + g)}{k - g} \quad \rightarrow \quad \frac{P(0)}{E(0)} = \frac{b\,(1 + g)}{k - g}$$

- Observe what the *P/E* is when *g* = 0 (no growth) and *b* = 1 (full earnings payout to dividends)

Jump to first page

Interpreting the *P/E* ratio

- For a preferred stock $E = Div.$, $b = 1$, $g = 0$
  - It follows that $P/E = 1/k^*$ → this k^* provides a low bound for the k associated with common stock
- Consider a stock that may or may not pay narrow dividends (*ND*) and needs to allocate a constant fraction of cash flow to sustain the growth of earnings (or alternatively, cash from operations) at g and returns the remainder (*BD*) to shareholders (as share buybacks, dividends, debt paydown, increased asset purchases to fund increased future g)
  - To make sense of this *BDDM* version, i.e., $k > g$, the observed *P/E* implies k from the CAPM imposes an implied estimate about the $E[R_i]$ and β for that stock
  - *E.g.,* $b = .8$ $P/E = 35$ $g = 10\%$ → $k = 12.5\%$
  - Increasing $g = 25\%$ $k = 27.5\%$

Jump to first page

Scenarios for *k* in *BDDM* given *g* & *b* & *P/E* *

P/E		5	20	50
b .8	*g* = .25	*k* = 45%	*k* = 30%	*k* = 27%
	g = .05	*k* = 22%	*k* = 9.2%	*k* = 6.7%
	g = -.05	*k* = 10%	*k* = -1.2%	*k* = -3.5%
b .5	*g* = .25	*k* = 37.5%	*k* = 28%	*k* = 26%
	g = .05	*k* = 15.5%	*k* = 7.6%	*k* = 6.1%
	g = -.05	*k* = 4.5%	*k* = -2.6%	*k* = -4%
b .2	*g* = .25	*k* = 30%	*k* = 26.3%	*k* = 25.5%
	g = .05	*k* = 9.2%	*k* = 6.1%	*k* = 5.4%
	g = -.05	*k* = -1.2%	*k* = -4%	*k* = -4.6%
b -.05	*g* = .25	*k* = 23.8%	*k* = 24.7%	*k* = 24.9%
	g = .05	*k* = 4%	*k* = 4.7%	*k* = 4.9%
	g = -.05	*k* = -5.9%	*k* = -5.2%	*k* = -5.1%

** What happens as b → 0? (k → g why?)*

Jump to first page

P/E Ratio for the AE Model

- The Residual Income Model can also be solved for a *P/E* ratio (after some manipulation)
- Recalling that the definition for *AE(t)* requires, *k BV(t-1)* = *E(t) - AE(t):*

$$\frac{P(0)}{E(0)} = \frac{1 + g}{k}\left\{1 + \left(\frac{AE(1)}{E(1)}\right)\left[\frac{g}{k - g}\right]\right\}$$

Jump to first page

The *PEG* Ratio

The ***"PEG" ratio***, or *P/E* to growth rate ratio:

- sometimes used as a crude rule of thumb to determine under/over valuation for a common stock.
  - For example, if the PEG ratio is less than one then the stock is undervalued because the 'cost of growth' as measured by the *P/E* is less than the actual growth.
  - Problems with the PEG → based on accrual # (earnings) and does not investigate sources of and future prospects for growth

In terms of the *AE* model:

$$\frac{P(0)}{100g\ E(0)} = \frac{PEG}{100} = \frac{1}{100}\left[\frac{1+g}{kg} + \frac{1+g}{k}\frac{AE(1)}{E(1)}\frac{1}{k-g}\right]$$

Jump to first page

S&P Indices
S&P 500 EARNINGS AND ESTIMATE REPORT
10/15/2010

Below is an initial look into the current reporting, the only sure item is that the numbers will change
(Lines 8-38 are new, comments are always appreciated - I have thick skin)

	DATA BASED ON COMPATIBLE DATA REPORTED TO DATE:			DATA BASED ON ALL 500 ISSUES:			
SECTOR	ISSUES USED	OPER MARGIN	AS RPT MARGIN	OP P/E ON 12 MONTH SEP,'10	OPER P/E ON 2010 EST	OPER P/E ON 2011 EST	S&P 500 YIELD
Consumer Discretionary	19	6.91%	6.39%	15.7	15.5	13.8	1.51%
Consumer Staples	10	6.55%	4.60%	15.3	15.2	13.8	3.06%
Energy	3	16.36%	16.36%	13.3	12.3	10.6	2.12%
Financials	14	10.81%	1.35%	15.3	12.8	10.8	1.14%
Health Care	7	13.44%	13.44%	12.8	12.4	11.0	2.21%
Industrials	9	7.69%	7.43%	16.2	15.7	14.0	2.22%
Information Technology	18	17.17%	16.87%	15.8	15.2	13.5	0.95%
Materials	2	0.00%	-1.23%	18.4	17.4	13.7	1.89%
Telecommunication Services	0	#DIV/0!	#DIV/0!	15.9	14.9	14.4	5.46%
Utilities	1	13.03%	13.03%	13.1	12.9	12.4	4.29%
S&P 500	**83**	**10.58%**	**7.78%**	**14.9**	**14.1**	**12.4**	**1.98%**
Estimate	500	8.64%	6.87%				

	S&P 600 2017 EST OPER P/E	S&P 600 5YR PROJ ANNUAL GROWTH %	S&P 600 PEG	MIDCAP 2017 EST OPER P/E	MIDCAP 5YR PROJ ANNUAL GROWTH %	MIDCAP PEG	SMALLCAP 2017 EST OPER P/E	S
Index	18.08	12.21	1.48	20.14	9.70	2.08	20.95	
Consumer Discretionary	19.74	17.92	1.10	16.44	12.21	1.35	17.73	
Consumer Staples	20.81	8.90	2.34	21.47	12.95	1.66	18.34	
Energy	29.27	24.50	1.19	-66.43	-34.92	1.90	-72.49	
Financials	14.11	9.18	1.54	16.44	10.46	1.57	16.95	
Health Care	16.12	10.62	1.52	19.28	13.27	1.45	29.58	
Industrials	18.43	10.01	1.84	19.33	12.48	1.55	19.40	
Information Technology	18.01	13.45	1.34	19.55	12.72	1.54	19.77	
Materials	18.42	11.43	1.61	17.64	9.59	1.84	19.40	
Real Estate	38.78	8.21	4.73	33.20	5.27	6.30	34.20	
Telecommunication Services	13.70	4.13	3.32	-22.56	-0.22	101.24	38.67	
Utilities	18.59	5.16	3.61	20.72	5.82	3.56	21.52	

Jump to first page

Earnings, Free Cash Flow and EVA

- ***What is the appropriate 'cash flow' to discount in the DCF model?***
  - '***economic free cash flow***' (Buffett)
  - ***net cash flow***
  - ***free cash flow***
  - ***EVA***

- Higgins (1998, p.19) observes:
  - "So many conflicting definitions of cash flow exist today that the term has almost lost meaning"

Jump to first page

Free Cash Flow to Equity Model

- The free cash flow to equity model (*FCFE*) aims to measure the return to equity above the amount required to: maintain existing production levels; or, alternatively, to keep the firm on a particular growth path.
  - Adjustments for payment to debt can create conceptual problems
  - As with PEG, *FCFE* is an accrual number; Difficult to estimate future values of *FCFE*
- Much the same manipulations as for the models using dividends can be applied to this model (see sec. 8.3):

$$P(0) = \sum_{t=1}^{\infty} \frac{FCFE^*(t)}{(1+k)^t}$$

Jump to first page

Free Cash Flow (*FCF*), A Non-GAAP measure

- Various methods are suggested for *FCF*
  - Free Cash Flow to the Firm (*FCFF*)
  - Free Cash Flow to Equity (*FCFE*)
  - Could be calculated from Income Statement or Cash Flow Statement
- Basic Idea is to provide a measure of Economic 'Profit'
- 'Simple *FCFF*', determined from the Cash Flow Statement: *FCFF = CFO – Cap. Ex.*
- 'Adjusted Simple *FCFF': Simple FCFF – Div.*

Jump to first page

Inter Pipeline, Annual Report 2017

Consolidated Statements of Cash Flows

(millions of Canadian dollars)	Years Ended December 31 2017	2016
OPERATING ACTIVITIES		
Net income	$ 526.7	$ 477.6
Items not involving cash:		
Depreciation and amortization	255.7	229.7
Loss on disposal of assets	9.5	6.5
Non-cash expense	4.1	20.0
Deferred income tax expense	188.3	100.4
Proceeds from long-term deferred revenue	6.3	-
Proceeds from long-term lease inducements	-	14.6
Funds from operations	990.6	848.8
Net change in non-cash operating working capital (note 21)	37.8	(42.9)
Cash provided by operating activities	1,028.4	805.9
INVESTING ACTIVITIES		
Expenditures on property, plant and equipment	(378.8)	(186.1)
Proceeds on disposal of assets	0.3	1.1
Acquisition of offgas processing (note 24)	-	(1,383.0)
Assumption of cash on acquisition of offgas processing (note 24)	-	46.9
Acquisition of Cold Lake non-controlling interest (note 25)	-	(355.1)
Net change in non-cash investing working capital (note 21)	29.0	7.0
Cash used in investing activities	(349.5)	(1,869.2)
FINANCING ACTIVITIES		
Cash dividends paid to shareholders of Inter Pipeline Ltd. (note 8)	(302.5)	(470.4)
Cash distributions paid by Cold Lake to non-controlling interest	-	(31.7)
Cash contributions received from Cold Lake non-controlling interest	-	0.6
(Decrease) increase in debt	(371.6)	979.2

Jump to first page

Other Suggestions for *FCF*

- *FCFF = EBIT(1 - Tax rate) + Depreciation - Capital Expenditures ± Δ Net Working Capital*
  - *Mix of Income Statement and Cash Flow Statement and Balance Sheet*
- *FCFE = Net Income + Depreciation - Capital expenditures - Δ Net Working Capital - Debt principal repayments + Proceeds of New Debt Issues*
  - Calculations from Cash Flow Statement
- *Note the potentially important impact of adjustments to Debt on FCFE*

Jump to first page

What is working capital?

- Working Capital (WC) is a Balance Sheet Item

Working Capital = Current Assets – Current Liabilities

WC is often interpreted as a liquidity measure

Key Current Assets usually are

- Cash and Marketable Securities
- Inventories
- Accounts Receivable

Key Current Liabilities usually are

- Accounts payable
- Short Term Borrowing
- Accrued Liabilities

Jump to first page

The Boeing Company and Subsidiaries
Condensed Consolidated Statements of Operations
(Unaudited)

(Dollars in millions, except per share data)	**March 31 2024**	December 31 2023
Assets		
Cash and cash equivalents	**$6,914**	$12,691
Short-term and other investments	**615**	3,274
Accounts receivable, net	**2,959**	2,649
Unbilled receivables, net	**9,673**	8,317
Current portion of financing receivables, net	**57**	99
Inventories	**83,471**	79,741
Other current assets, net	**2,843**	2,504
Total current assets	**106,532**	109,275
Liabilities and equity		
Accounts payable	**$11,616**	$11,964
Accrued liabilities	**21,607**	22,331
Advances and progress billings	**58,972**	56,328
Short-term debt and current portion of long-term debt	**1,063**	5,204
Total current liabilities	**93,258**	95,827

Jump to first page

The Boeing Company and Subsidiaries
Condensed Consolidated Statements of Cash Flows

	Three months ended March 31	
	2024	2023
Cash flows – operating activities:		
Net loss	**($355)**	($425)
Adjustments to reconcile net loss to net cash provided by operating activities:		
Non-cash items –		
Share-based plans expense	**119**	222
Treasury shares issued for 401(k) contribution	**606**	553
Depreciation and amortization	**442**	457
Investment/asset impairment charges, net	**21**	11
Other charges and credits, net	**10**	33
Changes in assets and liabilities –		
Accounts receivable	**(328)**	(341)
Unbilled receivables	**(1,357)**	(1,055)
Advances and progress billings	**2,718**	1,417
Inventories	**(3,778)**	(390)
Other current assets	**(249)**	82
Accounts payable	**(264)**	231
Accrued liabilities	**(666)**	(769)
Income taxes receivable, payable and deferred	**(59)**	(122)
Other long-term liabilities	**(83)**	(117)
Pension and other postretirement plans	**(261)**	(244)
Financing receivables and operating lease equipment, net	**79**	101
Other	**43**	38
Net cash used by operating activities	**(3,362)**	(318)

Jump to first page

What is a Value Driver?

- For equity securities, the key part of the *DCF* valuation is the determining the numerator
- A ***value driver*** is a factor that has a significant impact on the level and change of the cash flow that drives equity security value.
  - Value drivers are essential items that need to be identified in constructing the ‘story’ about a company, e.g., Apple and iPhone demand
- Two key dimensions to value drivers:
  - profitability
  - growth

Jump to first page

The Story: COS Syncrude Valuation

- Canadian Oil Sands (COS.UN) was a ***unit trust*** with ownership in Syncrude as the sole income producing asset. The company was formed in 2001 by the merger of two previous entities resulting in a non-operating entity with 21.7% ownership of the Syncrude oil sands project.
- The Syncrude oil sands project involves surface mining of oil with an alternative technology
- In Feb. 2003 COS announced the intention to buy 10% of Syncrude from Encana
  - Problem to assess whether fair value was paid for the purchase
- COS was purchased by Suncor in 2016
  - Suncor was one of the partners in the Syncrude project

Jump to first page

What is a ‘unit trust’?

- Common stocks arising from limited liability corporations (LLC) are one of a number of different methods of creating tradeable equity claims
  - Other methods include limited liability partnerships (LLP) and limited corporations (LC)
  - Key point: Different forms of organization have different tax implications
  - In the LLC taxes on profits are paid the firm level with dividend payments receiving favorable personal income tax treatment
- A unit trust has a ‘flow through’ tax structure where the payment to unit holders are treated like debt payments, deductible at the firm level, with tax implications passing to unit holders at full personal income tax rates
    - Unit trusts have theoretical unlimited liability
    - Tax treatment is similar to limited partners in LLP

Jump to first page

Problems? A *DCF* for Canadian Oil Sands

- The DCF was conducted by a professional engineering firm to value the initial COS unit trust issue. A number were required: SSB prices off WTI (US$), gas is used to heat the slurry

In the escalated price assumption evaluation, the Gilbert Laustsen Jung April 1, 2001 price forecast was used:

Year	Inflation	Exchange Rate	West Texas Intermediate at Cushing	Light Sweet Crude Oil at Edmonton	Alberta Average Natural Gas Price
		$US/$Cdn	US$/bbl	$Cdn/bbl	$Cdn/MMbtu
2001	1.5%	0.645	27.25	41.25	7.90
2002	1.5%	0.066	24.00	35.25	5.90
2003	1.5%	0.670	22.00	31.75	5.15
2004	1.5%	0.680	21.00	29.75	4.30
2005	1.5%	0.690	21.25	29.75	4.20
2006	1.5%	0.700	21.75	29.75	4.10
2007	1.5%	0.710	22.00	29.75	4.05
2008	1.5%	0.720	22.25	29.75	4.05
2009	1.5%	0.720	22.50	30.25	4.10
2010	1.5%	0.720	23.00	30.75	4.20
2011	1.5%	0.720	23.25	31.25	4.25
Thereafter	1.5%	0.720	+1.5%	+1.5%	+1.5%

Jump to first page

Result of the DCF with escalating costs and prices

Combined Working Interest

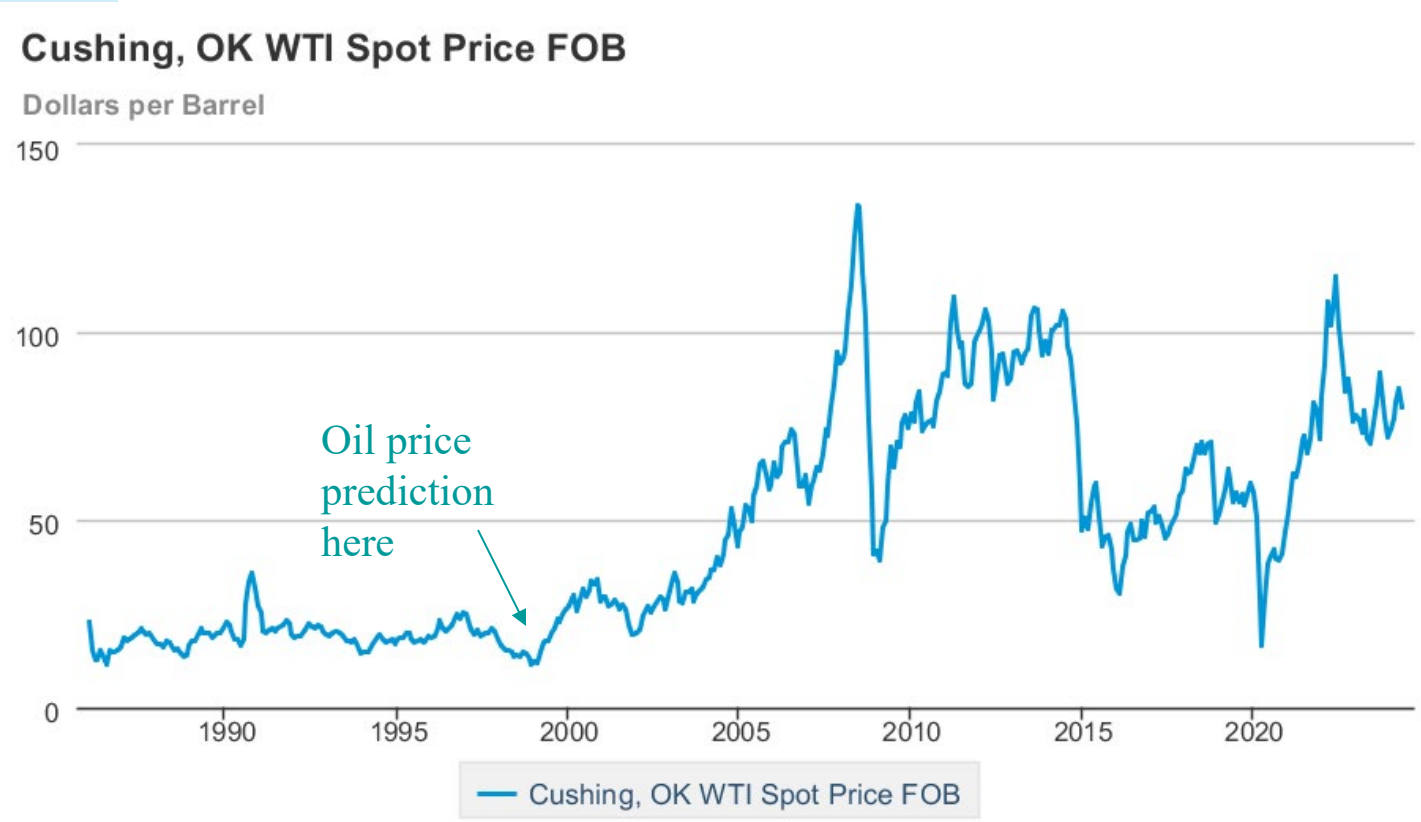
Proved Plus Probable Reserves
Estimated Future Net Cash Flow

Escalated Prices and Costs

	Volumes	Gross Revenue	Crown Royalty	Operating Costs	Operating Income	Capital Costs	Cash Flow Before Income Taxes
	(Mbbls)			($ millions)			
2001	19,566	807	143	318	346	213	133
2002	20,110	709	114	295	300	363	(63)
2003	20,436	649	103	284	263	340	(77)
2004	24,892	728	97	316	315	173	142
2005	27,718	797	108	338	351	251	100
2006	27,718	797	109	336	352	266	86
2007	31,523	906	128	358	421	111	310
2008	34,784	1,000	149	365	486	39	447
2009	34,784	1,017	153	366	498	40	458
2010	34,784	1,035	157	368	510	40	469
2011	34,784	1,052	161	369	522	41	481
2012	34,784	1,069	165	370	534	42	492
Remainder	800,035	29,688	4,916	8,938	15,834	1,643	14,192
Total	1,145,915	40,254	6,502	13,020	20,732	3,561	17,171

Jump to first page

Compare the predictions with actual future price performance



Jump to first page

Calculating the DCF for the Combined entities

- Even a relatively simple valuation scenario associated with the non-operating COS, the validity of the results is problematic, e.g., in 2012 the Canadian dollar was near par and the WTI price was close to $100 → breakeven market value of COS based on this DCF was consistent with a 12% discount rate

Summary of Reserves and Present Value of Estimated Future Net Cash Flows

Escalated Prices and Costs

	Gross Project Reserves	Combined Working Interest		Present Value of Estimated Future Net Cash Flow Before Income Taxes				
		Gross Reserves	Net After Crown Royalty					
	(Mmbbls)	(Mmbbls)	(Mmbbls)	Undiscounted	10%	12%	15%	20%
				($ millions)				
Proved	3,280	713	611	$10,368	$2,470	$2,063	$1,647	$1,233
Proved Plus 50% Probable	4,276	929	787	13,769	2,756	2,208	1,657	1,130
Proved Plus Probable	5,271	1,146	962	17,171	3,043	2,353	1,668	1,027

Jump to first page

Possible DDM: *Anheuser-Busch* (BUD)

- GDC (p.437) observe: “in practice, we find that the more a company’s results are subject to fluctuation, the less predictable becomes the future average. Thus the best industries for valuation are those which do not show large profit declines in periods of recession.”
  - Beer industry provides an excellent of a company with stable cash flows
  - Not all brewers have this characteristic
  - Important breweries are owned by companies that produce many beers in different countries, AB InBev + SABMiller
- The key element in any security valuation is the price.

Jump to first page

Story of the Beer Industry

- Beer Industry has changed dramatically since the Belgian brewery Interbrew acquired Labatts in 1995
  - What followed was a global acquisition of breweries in many countries
- Key Acquisitions
  - Beck's (German) 2001
  - 2004 major Latin American brewer Ambev merges with Interbrew to form Inbev
  - 2008 InBev acquires the largest US brewer Anheuser-Busch (Budweiser) to form AB Inbev
  - 2015 acquires second largest global brewer SABMiller
- Going back to Ambev, AB Inbev has dedicated considerable effort to non-brew liquids expansion

Jump to first page

Problems? Delta Airlines (DAL)

- Airlines are a favorite example used by Buffett to describe ‘growth without profits’
  - After years of critiquing airlines, B-H did invest in Delta and Southwest
- Valuation of major US airlines after 9/11 are an excellent example of companies on the fast track to bankruptcy → American vs. United price history
- Prior to 9/11Delta was the strongest of the hub-airline majors.
  - Need to assess the competition with Southwest in conjunction with the 9/11 shock

Jump to first page

DELTA AIR LINES, INC.
Consolidated Statements of Cash Flows

(in millions)	Year Ended December 31, 2023	2022	2021
Cash Flows From Operating Activities:			
Net income	$ 4,609	$ 1,318	$ 280
Adjustments to reconcile net income to net cash provided by operating activities:			
Depreciation and amortization	2,341	2,107	1,998
Deferred income taxes	980	591	115
(Gain)/loss on fair value investments	(1,283)	874	(38)
Pension, postretirement and postemployment payments greater than expense	(121)	(453)	(2,038)
Changes in certain assets and liabilities:			
Receivables	(7)	(728)	(981)
Fuel inventory	121	(158)	(318)
Prepaids and other current assets	17	(867)	(58)
Air traffic liability	(1,216)	1,902	1,814
Loyalty program deferred revenue	538	324	376
Profit sharing	821	455	108
Other payables, deferred revenue and accrued liabilities	(285)	1,226	1,986
Noncurrent liabilities	(18)	(348)	(399)
Other, net	(33)	120	419
Net cash provided by operating activities	6,464	6,363	3,264

Jump to first page

Mainline aircraft information by fleet type

Fleet Type	Current Fleet[1]					Commitments	
	Owned	Finance Lease	Operating Lease	Total	Average Age (Years)	Purchase	Options
A220-100	41	4	—	45	4.0	—	—
A220-300	23	—	—	23	1.6	77	—
A319-100	57	—	—	57	21.8	—	—
A320-200	60	—	—	60	28.2	—	—
A321-200	63	22	42	127	5.0	—	—
A321-200neo	48	—	—	48	0.8	107	70
A330-200	11	—	—	11	18.8	—	—
A330-300	28	—	3	31	14.9	—	—
A330-900neo	19	3	5	27	2.0	12	—
A350-900	17	—	11	28	5.1	16	—
B-717-200	10	70	—	80	22.3	—	—
B-737-800	73	4	—	77	22.3	—	—
B-737-900ER	114	—	49	163	8.0	—	—
B-737-10	—	—	—	—	—	100	30
B-757-200	100	—	—	100	26.4	—	—
B-757-300	16	—	—	16	20.9	—	—
B-767-300ER	44	—	—	44	27.7	—	—
B-767-400ER	21	—	—	21	23.0	—	—
Total	745	103	110	958	14.8	312	100

(1)

Jump to first page