

Introduction to Financial Engineering

ENMG 602

Using the Accounting Framework: AOL Case Overview
[Voice over Slides Video]
(Chapter 5, Antle)

AOL's Business Environment

- America Online was the leader in providing internet connections in 1997 with 8.6 million subscribers.
- AOL had two sources of revenue,
 - Online service revenue generated from customer subscription to online service
 - Other revenues from e-commerce and advertising.
- Rapid changes occurred in the manner in which subscription revenue was generated which shifted strategy to focusing on non-subscription revenues.

AOL's Business Environment

- Non-subscription revenues are difficult to estimate. Revenue uncertainty was combined with fierce competition.
- However, AOL's revenue was growing rapidly (from \$39 million in 1992 to \$1.6 billion in 1997).
- Looking at AOL's balance sheets on June 30 1996 and 1997, total assets **declined** by around \$112 million over the period.
- This can be serious for a growing internet company.

Balance Sheet

America Online, Inc. Consolidated Balance Sheets (amounts in thousands, except share data)					
ASSETS	JUNE 30,		LIABILITIES AND STOCKHOLDERS' EQUITY	JUNE 30,	
	1997	1996		1997	1996
Current assets:			Current liabilities:		
Cash and cash equivalents	\$124,340	\$118,421	Trade accounts payable	\$ 69,703	\$105,904
Short-term investments	268	10,712	Other accrued expenses and liabilities	297,298	127,876
Trade accounts receivable	65,306	49,342	Deferred revenue	166,007	37,950
Other receivables	26,093	23,271	Accrued personnel costs	20,008	15,719
Prepaid expenses and other current assets	107,466	65,290	Current portion of long-term debt	1,454	2,435
Total current assets	<u>\$323,473</u>	<u>\$267,036</u>	Total current liabilities	<u>\$ 554,470</u>	<u>\$289,884</u>
Property and equipment at cost, net	\$233,129	\$111,090	Long-term liabilities:		
Other assets:			Notes payable	\$ 50,000	\$ 19,306
Restricted cash	\$ 50,000	\$ —	Deferred income taxes	24,410	135,872
Product development costs, net	72,498	44,330	Deferred revenue	86,040	—
Deferred subscriber acquisition costs, net	—	314,181	Minority interests	2,674	22
License rights, net	16,777	4,947	Other liabilities	1,060	1,168
Other assets	84,618	29,607	total liabilities	\$ 718,654	\$446,252
Deferred income taxes	24,410	135,872	Stockholders' equity:		
Goodwill, net	41,783	51,691	Preferred stock, \$0.01 par value; 5,000,000 shares authorized, 1,000 shares issued and outstanding at June 30, 1997, and 1996, respectively	\$ 1	\$ 1
total assets	<u>\$846,688</u>	<u>\$958,754</u>	Common stock, \$0.01 par value; 300,000,000 shares authorized, 100,188,971 and 92,626,000 shares issued and outstanding at June 30, 1997, and 1996, respectively	1,002	926
			Unrealized gain on available-for-sale securities	16,924	—
			Additional paid-in capital	617,221	519,342
			Accumulated deficit	(507,114)	(7,767)
			total stockholders' equity	\$ 128,034	\$512,502
			Total liabilities and stockholders' equity	\$ 846,688	\$958,754

See accompanying notes.

AOL's Balance Sheet

➤ **What led to the \$112 million decrease in asset value?**

- AOL may have incurred heavy losses due to competition.
- AOL may have distributed assets to shareholders.
- AOL may have used assets to pay debt.

AOL's Balance Sheet – Asset Decrease Analysis

- Since liabilities increased by \$273 million, **we can rule out that AOL used assets to pay off debt.**
- The accounting identity tells us that stockholder's equity should have declined. It did decrease by \$385 million.
- The decrease in equity came from a decrease in accumulated deficit (retained earnings) of \$499 million, from (\$8) to (\$507) million.
- This indicates that **no dividend was paid** in 1997.
- **Could it be that competition led to big losses?**

AOL's Income Statement – Asset Decrease Analysis

- Looking at AOL's income statement for the period June 30 1996 – June 30, 1997, the revenues are around \$1.7 billion (up from \$1.1 billion in 1996).

America Online, Inc.
Consolidated Statement of Operations for the Year Ended June 30, 1997
 (amounts in thousands, except share data)

Revenues:	
Online service revenues	\$1,429,445
Other revenues	255,783
Total revenues	\$1,685,228
Costs and expenses:	
Cost of revenues	\$1,040,762
Marketing	
Marketing	409,260
Write-off of deferred subscriber acquisition costs	385,221
Product development	58,208
General and administrative	193,537
Amortization of goodwill	6,549
Restructuring charge	48,627
Contract termination charge	24,506
Settlement charge	24,204
Total costs and expenses	\$2,190,874
Income (loss) from operations	\$ (505,646)
Other income (expense), net	6,299
Income (loss) before provision for income taxes	\$ (499,347)
Provision for income taxes	—
Net income (loss)	\$ (499,347)

AOL's Income Statement – Asset Decrease Analysis

- **The increase in revenue indicates that competition didn't hurt AOL too badly in 1997.**
- **What happened then?**
- **It must be that expenses increased significantly in 1997.**



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Using the Accounting Framework: AOL Case Analysis
[Voice over Slides Video]
(Chapter 5, Antle)

Deferred Subscriber Acquisition Costs

- Looking at expenses, all of these are normal expenses (cost of revenues, marketing, etc.) except for the \$385 million **write-off of deferred subscriber acquisition costs**.
- Footnote 2 explains that these costs are attributed to marketing programs that result in subscriber registrations.
- E.g., the cost of identifying target customers, preparing free-trial disks, and mailing disks to target customers.
- Prior to October 1, 1996, these expenditures were recorded as an asset and amortized monthly over a period < 24 months.

Deferred Subscriber Acquisition Costs

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(amounts in thousands, except share data)

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Deferred Subscriber Acquisition Costs

- Footnote 3 explains that AOL changed to a flat-rate pricing and reduced reliance on online subscriber revenues.
- This created uncertainty as to whether these expenditures created an asset (i.e., produced a future benefit).
- As a result, after October 1, 1996, started expensing these costs as incurred (i.e., as usual advertising costs).

Deferred Subscriber Acquisition Costs

- The corresponding asset was **written-off** as follows.

Deferred subscriber acquisition expense 385,221,000

Deferred subscriber acquisition cost 385,221,000

Deferred Subscriber Acquisition Costs	
Starting balance (06/30/96) → 314,181	56,189 → Amortization in period
Period additional costs → 130,229	
Ending balance (06/30/97) → 385,221 <u>before write-off</u>	
	385,221 → Write-off
Ending balance (06/30/97) → 0 <u>after write-off</u>	

AOL's Statement of Cash Flow

- Cash flow from operations was a positive \$123 million.
- Cash flow from financing activities provided cash of \$79 million (by issuing stocks).
- Investing activities used cash of \$197 million. This is expected from a growing company.
- The overall increase in cash, \$6 million.

America Online, Inc. Consolidated Statement of Cash Flows for the Year Ended June 30, 1997 (amounts in thousands)	
CASH FLOWS FROM OPERATING ACTIVITIES	
Net income (loss)	\$(499,347)
Adjustments to reconcile net income to net cash provided by (used in) operating activities:	
Write-off of deferred subscriber acquisition costs	\$ 385,221
Noncash restructuring charges	22,478
Depreciation and amortization	64,572
Amortization of subscriber acquisition costs	59,189
Changes in assets and liabilities:	
Trade accounts receivable	(16,418)
Other receivables	2,083
Prepaid expenses and other current assets	(44,394)
Deferred subscriber acquisition costs	(130,229)
Other assets	(38,902)
Trade accounts payable	(36,944)
Accrued personnel costs	2,979
Other accrued expenses and liabilities	139,134
Deferred revenue	214,097
Other liabilities	(470)
Total adjustments	\$ 622,396
NET CASH PROVIDED BY (USED IN) OPERATING ACTIVITIES	\$ 123,049
CASH FLOWS FROM INVESTING ACTIVITIES	
Short-term investments	\$ 10,444
Purchase of property and equipment	(149,768)
Product development costs	(56,795)
Purchase costs of acquired businesses	(475)
NET CASH USED IN INVESTING ACTIVITIES	\$(196,594)
CASH FLOWS FROM FINANCING ACTIVITIES	
Proceeds from issuance of preferred stock of subsidiary	\$ 15,000
Proceeds from issuance of common stock, net	84,506
Principal and accrued interest payments on line of credit and long-term debt	(19,811)
Proceeds from line of credit and issuance of long-term debt	50,000
Restricted cash	(50,000)
Principal payments under capital lease obligations	(231)
NET CASH PROVIDED BY FINANCING ACTIVITIES	\$ 79,464
Net increase in cash and cash equivalents	\$ 5,919
Cash and cash equivalents at beginning of year	118,421
Cash and cash equivalents at end of year	<u>\$ 124,340</u>
SUPPLEMENTAL CASH FLOW INFORMATION	
Cash paid during the year for:	
Interest	\$ 1,567
Income taxes	—

AOL's Statement of Cash Flow

- How could AOL's income statement show such a large loss, yet have a positive cash flow?
- The write-off (expense) of the \$385 million in deferred subscriber acquisition costs is a **non-cash expense** which is added back to net income in calculating net cash.

AOL Case Take-Home Lesson

- It is very risky to take accounting numbers at their face value without understanding the underlying institutional context and accounting convention.
- For example, looking at net income and total asset historical trends on June, 30 1997 could suggest that AOL is heading to bankruptcy, which is not the case.
- In fact, AOL stock price was **not affected** by the decline in net income in 1997 because it was justified by an investor awareness complain.

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Economic Concepts: Asset Valuation - Cash Flows Timing
[Voice over Slides Video]
(Chapter 6, Antle)

GAAP and Asset Valuation

- GAAP are increasingly framed on requiring value estimation for assets first and then deriving income implications.
- Valuation is a complex combination of **art** and **science**.
- The value of an asset is tied to cash flows that it generates.
- Two important properties of cash flows that affect valuation are **timing** and **uncertainty**.

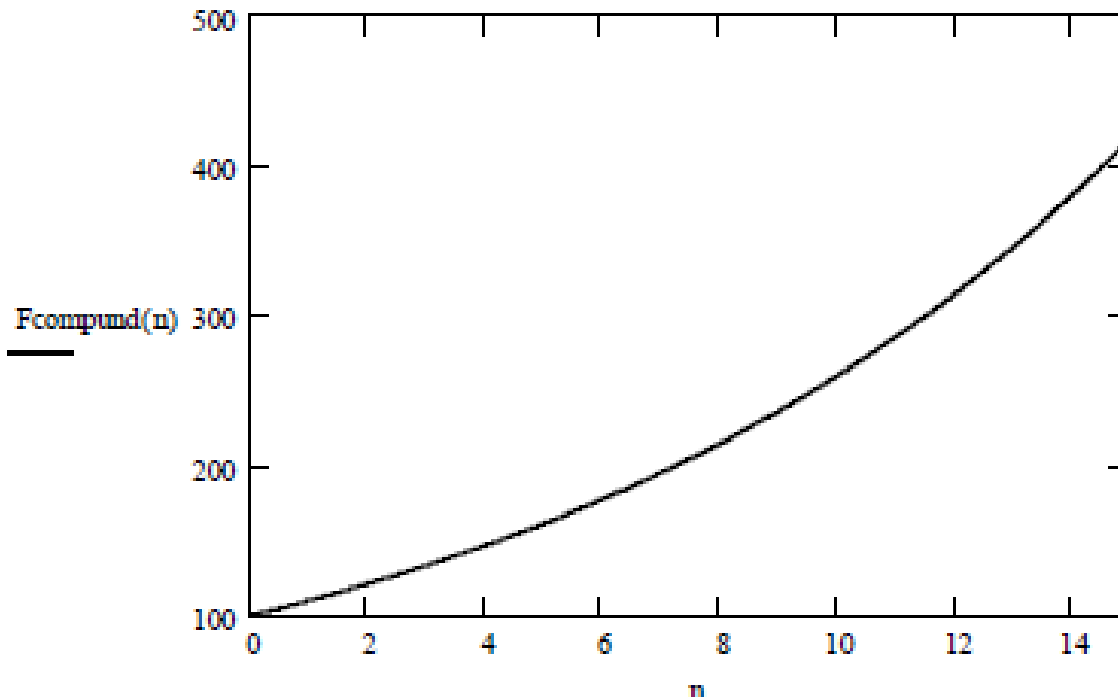
Effect of Cash Flow Timing - Principal and Interest

- If you invest P dollars for one year at an interest rate of r per year, then one year later your fortune is $F = P + Pr = P(1 + r)$.
- The amount P is the **principal** and the amount Pr is the **interest**.
- Under a **compound interest** rule, an investment earns **interest on interest**.
- Specifically, P dollars invested for n years (periods) at an interest rate of r per year will have a value of

$$F = P(1 + r)(1 + r)\dots(1 + r) = P(1 + r)^n.$$

Example of Compound Interest

- Consider \$100 invested at an interest rate of 10%. Notice that the amount grows **geometrically**.



Equivalence, Present Value and Time Value of Money

- Consider two situations
 1. Having \$110 a year from now.
 2. Receiving a \$100 today and depositing it in a bank account at 10% annual interest rate for 1 year.
- These two situations are “**equivalent.**”
- The \$100 today is **equivalent** to \$110 after one year.
- The **present value** of the \$110 future amount is \$100.
- That is, \$100 today are worth more than \$100 tomorrow. This is the principle of **time value of money.**

Present Value and Discounting

- In general, an amount F received n years from now is equivalent to having

$$P = F/(1+r)^n$$

- The process of evaluating future amount(s) F as an equivalent present value P is called **discounting**.
- We say that P is the **discounted value** of F .
- The term $d_n = 1/(1+r)^n$ is the **discounting factor**.

Present Value of a Stream of Cash Flows

- A stream of cash flows is a series of payments or receipts.
- It is assumed that payment/receipts occur at end of periods.
- E.g., when the period is 1 year, the stream (– \$10, \$5, \$5, \$5) indicates a payment of \$10 now (end of Year zero) and the receipt of \$5 at end of Years 1-3.
- The present value of a cash flow stream $\mathbf{x} = (x_0, x_1, \dots, x_n)$ at an interest rate of r per period is

$$PV = x_0 + \frac{x_1}{1+r} + \frac{x_2}{(1+r)^2} + \dots + \frac{x_n}{(1+r)^n} = \sum_{j=0}^n \frac{x_j}{(1+r)^j}.$$

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Economic Concepts: Asset Valuation - Cash Flows Uncertainty
[Voice over Slides Video]
(Chapter 6, Antle)

Uncertain Cash Flows: Expected Value

- Suppose that a future cash flow has an uncertain value F .
- E.g., amounts generated from sales or from accounts receivable, amounts paid for warranty or a health care plan.
- Suppose that F takes on the value f_j with probability p_j , $j = 1, \dots, m$.
- The **expected value** of F is a “weighted average:” Values from different outcomes with weights being the probabilities,

$$E[F] = \sum_{j=1}^m p_j f_j .$$

Uncertain Cash Flows: Expected Value

- How to estimate f_j and p_j ?
- No straightforward approach.
- Function of information. Looking at **history** (if any) and current economic indicators usually help.
- **Subjective estimates** are often needed.

Example of Expected Value and Effect of Information

- It's Dec 1, you own an asset that will pay an amount F on Dec 31 which is equally likely (i.e., $p_1 = p_2 = 0.5$) to be $f_1 = \$1,000$ or $f_2 = \$1,500$.
- The **expected cash flow** from the asset is

$$E[F] = \sum_{j=1}^2 p_j f_j = 0.5 \times 1000 + 0.5 \times 1500 = \$1,250.$$

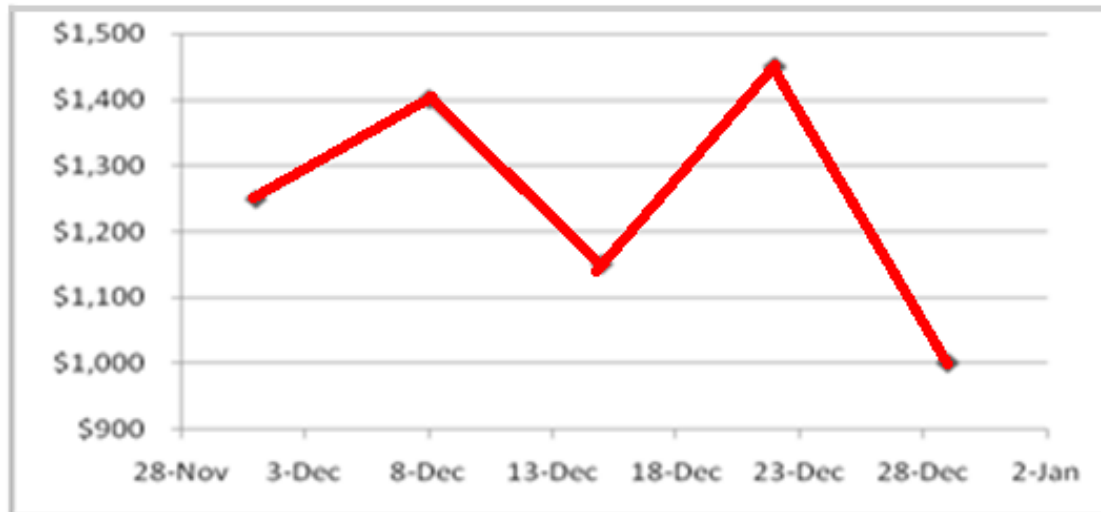
Example of Expected Value and Effect of Information

- Suppose that throughout the month, you obtain new information.
- You revise your estimate of the probabilities, while not changing the estimates of payoffs.

Date	p_1	p_2	f_1	f_2	$E[F]$
1-Dec	0.5	0.5	\$ 1,000	\$ 1,500	\$ 1,250
8-Dec	0.2	0.8	\$ 1,000	\$ 1,500	\$ 1,400
15-Dec	0.7	0.3	\$ 1,000	\$ 1,500	\$ 1,150
22-Dec	0.1	0.9	\$ 1,000	\$ 1,500	\$ 1,450
29-Dec	1	0	\$ 1,000	\$ 1,500	\$ 1,000

Example of Expected Value and Effect of Information

➤ The expected value of the asset fluctuates as follows.



Example of Expected Value and Effect of Information

- As you can see, values affected by uncertainty do not follow a smooth trajectory.
- This is perhaps what happens to stock prices. (E.g. **S&P 500 index**).



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Economic Concepts: DECF Asset Valuation
[Voice over Slides Video]
(Chapter 6, Antle)

Discounted Expected Cash Flow (DECF)

- If we combine the concepts of **PV** and **EV** we can determine a company's discounted expected cash flows from an investment (asset).
- This is called **DECF valuation**.
- The change in discounted expected value is a function of two components
 - **Normal Economic Earnings** due to timing (changes due to time value of money; i.e., due to interest).
 - **Abnormal Economic Earnings** due to uncertainty (changes in expected value from investment).

Example of DECF Valuation

- Suppose the payoff from an asset will occur on Dec 31, 2008.
- On Dec 31, 2004, it is estimated that the asset is equally likely to pay \$1,000 or \$1,500 on Dec 31, 2008.
- This leads to an expected payoff of \$1,250 on Dec 31, 2008.
- The discounting rate is 6%. Then the DECF asset valuation, on Dec 31, 2004, is

$$\text{\$1,250} / 1.06^4 = \text{\$990.12}.$$

DECF Valuation and Economic Earnings

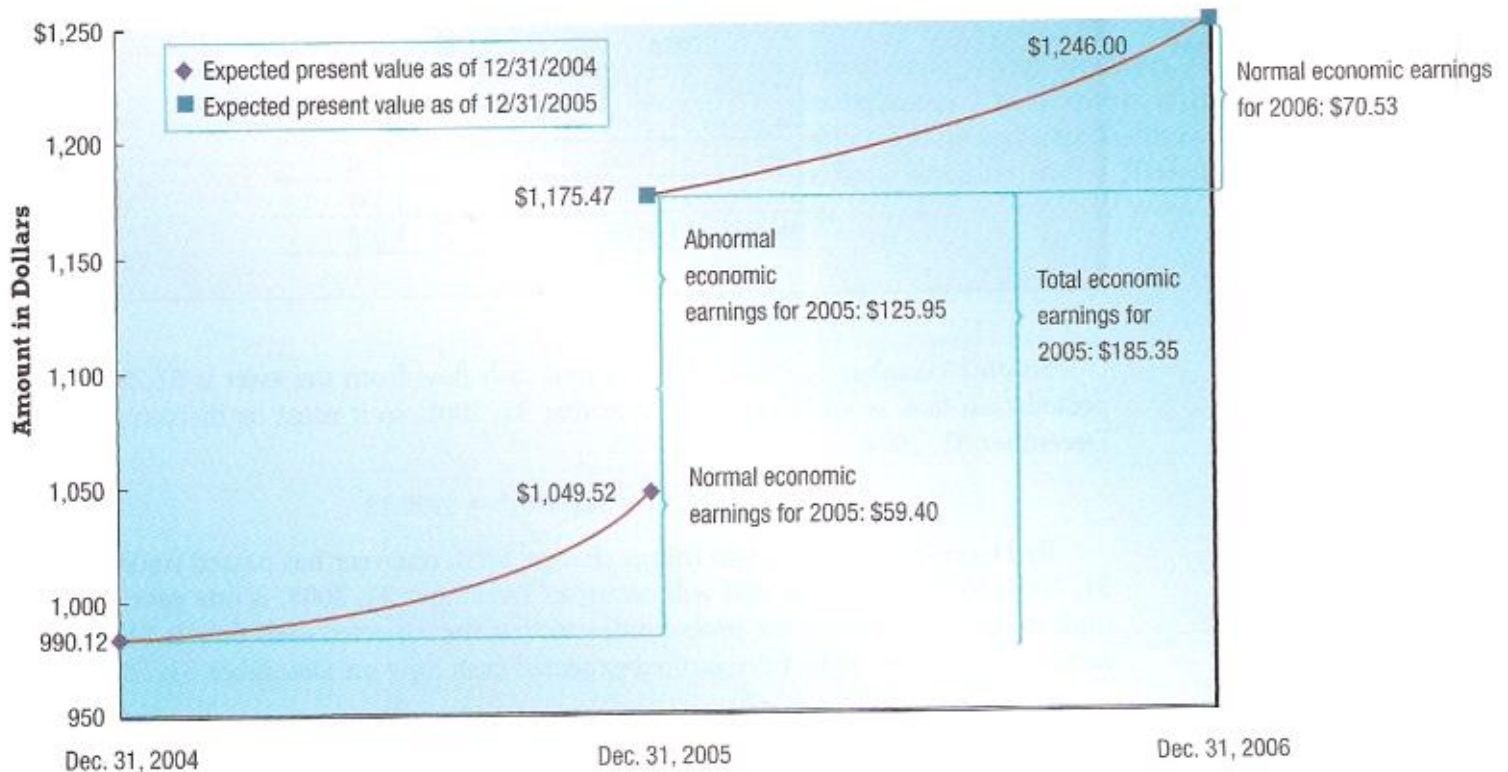
- On Dec 31, 2005, new information is available and it is estimated that the asset will pay \$1,000 with probability (w.p.) 0.2 and \$1,500 otherwise (w.p. 0.8).
- This leads to an expected payoff of \$1,400 on Dec 31, 2008.
- Then, the **DECF** asset valuation on Dec 31, 2005 is
$$\$1,400 / 1.06^3 = \$1,175.47.$$
- The **total earnings** as a result of the new information in 2005 is
$$\$1,175.47 - \$990.12 = \$185.35.$$

DECF Valuation and Economic Earnings

- These can be divided into **normal** and **abnormal earnings** as follows.
- Suppose the probability estimates did not change, then the DECF on Dec 31, 2005 is
$$\$1250 / 1.06^3 = \$1,049.52.$$
- Therefore, the **normal economic earnings** (due to time value of money) on Dec 31, 2005 are
$$\$1049.52 - \$990.12 = \$59.40.$$
- This leaves $\$185.35 - \$59.4 = \$125.95$ to **abnormal economic earnings** (due to uncertainty).

DECF Valuation and Economic Earnings

➤ The following figure illustrates what's happening.





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Financial Statement Analysis: Economic Vs. GAAP Valuation
[Voice over Slides Video]
(Chapter 7, Antle)

Basics of Financial Analysis

- Financial analysis aims to build a bridge from financial reports to economics.
- Financial statements are **filtered** by accounting conventions and institutional context.
- When book values closely reflect economic values, the filter gives a **“clear picture.”**
- Otherwise, the filter gives a **“cloudy picture”**.
- The key to understanding a set of financial statements is knowing whether it presents a “clear” or a “cloudy” picture.

The Value of a Firm in the Stock Market

- The stock market estimates the **economic value** of publically traded companies as
Market Capitalization = # of Shares Outstanding × Share Price.
- Stock market valuation is based on processing information about future cash flows and forming an expectation.
- Stock market prices are measures of the aggregate economic value of a company which may include assets and liabilities not recognized by GAAP.

GAAP Valuation Vs. Economic Valuation

- One difference between GAAP and economic valuation is **restrictive recognition**.
- Income is only reported when a service takes place or an expense is incurred.
- E.g., a promising employment contract does not affect GAAP valuation. (*Other examples?*)
- Another difference relates to the **difference between book and market values** of some assets.

Strengths and Weaknesses of GAAP Valuation

- The main **strengths** of GAAP valuation are
 - **Objectivity and verifiability.** Accounts are compiled based on clear convention and can be replicated easily.
 - **Conservative bias.** GAAP disclose effects of “bad events” immediately and waits until “good events” occur.
- The main **weaknesses** of GAAP valuation are
 - **Focus on historical and current events.** GAAP do not look into the future when decisions are made.
 - **Rigidity.** GAAP do not always capture the precise economic structure and status of firms.

Conceptual Framework for Financial Statement Analysis

- This framework is based on identifying the assets and liabilities with economic valuation close to GAAP valuation and others with the two valuations different.

Accounting Balance Sheet (book values)			Economic Balance Sheet (economic values)	
Book Value of Assets	BvA ₁ Recognized assets with valuations close to their economic values	A ₁ Examples include cash, accounts receivable, and marketable securities	EvA ₁ Assets with economic value equal to their book value	Economic Value of Assets
	BvA ₂ Recognized assets with known economic values different from the accounting values	A ₂ Examples include some inventories and automobiles	EvA ₂ Assets with economic value likely greater than their book value	
	BvA ₃ Recognized assets for which it is difficult to obtain economic values	A ₃ Examples include specially constructed manufacturing facilities and some plots of land	EvA ₃ Assets with economic value likely greater than their book value	
		A ₄ Examples include some types of intellectual property, human capital, and valuable relationships	EvA ₄ Unrecognized assets (i.e., assets with economic value but not listed in the balance sheet)	

By definition, these economic assets have zero book value.

Conceptual Framework for Financial Statement Analysis

Book Value of Liabilities	BvL ₁ Recognized liabilities with valuations close to their economic values	L ₁ Examples include accounts payable and short-term debt	Economic Value of Liabilities
	BvL ₂ Recognized liabilities with known economic values different from the accounting values	L ₂ Examples include some types of long-term debt	
	BvL ₃ Recognized liabilities for which it is difficult to obtain economic values	L ₃ Examples include estimated warranty liabilities	
	By definition, these economic obligations have zero book value.		
		EvL ₁ Obligations with economic value equal to their book value	Economic Value of Liabilities
		EvL ₂ Obligations with economic value likely greater or less than their book value	
		EvL ₃ Obligations with economic value likely less than their book value	
		EvL ₄ Unrecognized liabilities (i.e., economic obligations not listed in the balance sheet)	

Book Value of Equity	BvE The total of all the shareholders' equity accounts on the GAAP balance sheet	
		EvE The economic value of the equity can be estimated by the stock market value of the common stock. Usually, this valuation will be more than the book value of the equity, implying that the understatement of the book value of assets is greater than any understatement of the book value of liabilities.
		Economic Value of Equity

Measuring the Closeness of GAAP and Economic Valuations

- Three ratios are used to gauge the closeness of GAAP and economic valuation.

1. Market-to-Book Ratio,

Market Capitalization / Stockholder's Equity

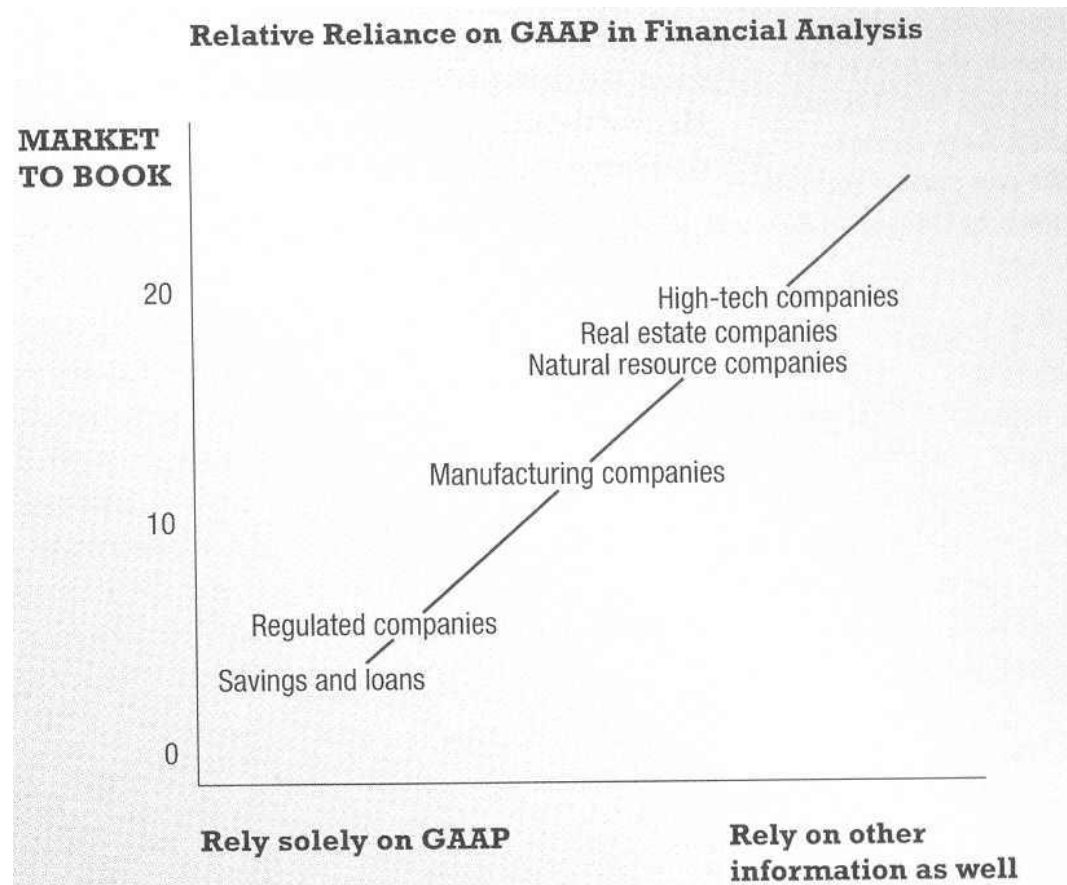
2. Economic Return On Equity,

$$\frac{(\text{Ending market price} + \text{dividends}) - \text{Beginning market price}}{\text{Beginning market price}}$$

3. Accounting Return On Equity,

Net Income / Stockholder's Equity.

Reliance On GAAP Vs. Market-to-book Ratio By Industry





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Introduction to Financial Engineering

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Financial Statement Analysis: Harrodsburg Case
[Voice over Slides Video]
(Chapter 7, Antle)

Harrodsburg Case

- **Harrodsburg First Financial Bankcorp, Inc., is a small savings and loan (i.e. commercial bank) in Kentucky.**
- **Harrodsburg's Form 10K indicates that its main income is based on the difference of interest between interest-earning assets (loans) and interest-bearing liabilities (deposits).**
- **This is typical in the saving and loan business**

Harrodsburg Balance Sheet Analysis (Sep 30, 1998)

ASSETS	GAAP	ECONOMIC	DIFFERENCE
Cash and due from banks (A ₁)	\$ 739.8	\$ 739.8	\$ 0
Interest-bearing deposits (A ₁)	7,334.3	7,334.3	0
Securities available-for-sale at fair value (A ₁)	3,825.5	3,825.5	0
Securities held-to-maturity, fair value of \$11,226,762 (A ₂)	11,140.8	11,226.8	85.0
Loans receivable, net (A ₁)	85,271.9	85,271.9	0
Accrued interest receivable (A ₁)	660.8	660.8	0
Premises and equipment, net (A ₃)	852.1	?	?
Other assets (A ₃)	94.1	?	?
Assets not recognized by GAAP (A ₄)	0.0	?	?
TOTAL ASSETS	\$109,919.3	?	?
LIABILITIES AND STOCKHOLDERS' EQUITY			
Deposits (L ₁)	\$ 78,995.7	\$78,995.7	\$ 0
Advance payments by borrowers for taxes and insurance (L ₁)	71.8	71.8	0
Deferred federal income tax (L ₃)	1,398.2	?	?
Dividends payable (L ₁)	354.5	354.5	0
Other liabilities (L ₁)	117.5	117.5	0
Liabilities not recognized by GAAP (L ₄)	0.0	?	?
TOTAL LIABILITIES	\$ 80,937.7	?	?
STOCKHOLDERS' EQUITY			
Common stock, \$0.10 par value, 5,000,000 shares authorized; 2,182,125 shares issued and outstanding	\$ 218.2		
Additional paid-in capital	21,154.1		
Retained earnings, substantially restricted	11,003.2		
Accumulated other comprehensive income	2,475.0		
Treasury stock, 258,607 shares, at cost	(4,477.5)		
Unallocated employee stock ownership plan (ESOP) shares	(1,391.4)		
Total stockholders' equity	\$ 28,981.6	\$29,093.2	\$111.6
TOTAL LIABILITIES AND STOCKHOLDERS' EQUITY	\$109,919.3	?	\$ 26.6

Harrodsburg Market-to-Book ratio

- The stock price of Harrodsburg on Sep 30, 1998 was \$15.125.
- Harrodsburg has 2,182,125 stocks outstanding and 258,607 treasury stocks.

- Then, the net number of outstanding stocks is

$$2,182,125 - 258,607 = 1,923,518$$

- Harrodsburg's market capitalization is

$$1,923,518 \times \$15.125 = \$29,093,210$$

- Therefore, Harrodsburg's market-to-book ratio is

$$\$29,093,210 / \$28,981,600 = 1.004$$

- This indicates that financial statements provide a **very clear picture** of Harrodsburg's economic situation on Sep 30, 1998.

Harrodsburg Return on Equity

- Next, we look at return on equity for the period between Sep 30, 1998 and Sep 30, 1999.
- Note that Harrodsburg's net income for this period is \$1,508.6 K and that its stock price on Sep 30, 1999 was \$13.25.
- In addition, the stock paid a dividend of \$0.85/stock.
- Therefore, Harrodsburg's accounting return on equity is

$$1,508.6 / 28,981.6 = 0.052$$
- Its economic return on equity is

$$[(13.25 + 0.85) - 15.125] / 15.125 = - 0.0678$$
- This difference in accounting and economic ROE indicates that the image got a **bit cloudy** in 1999.



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Financial Statement Analysis: Microsoft Case
[Voice over Slides Video]
(Chapter 7, Antle)

Microsoft Case

- As you may know, software giant **Microsoft** develops a wide assortment of software and provides online services and workforce training.
- On June 30, 1998 the closing price of MS common stock was \$108.375/share.
- MS balance sheet indicates that 2.47 billion shares of common stock are outstanding at this date.
- Therefore, MS market capitalization on June 30, 1998 is

$$2.47 \times 108.375 = \$267.686 \text{ billion}$$

Microsoft Market-to-Book Ratio

- MS book value (Exhibit 7.4) needs adjustment because of issues related to preferred stocks.
- MS preferred stocks carry cumulative dividends (paid in arrears) and are convertible into cash at pre-defined values.
- Therefore, preferred stocks are treated as a **liability**.
- Their \$980 million worth is subtracted from total equity leading to an equity (book value) of

$$16.627 - 0.980 = \$15.647 \text{ billion.}$$

- Therefore, MS market-to-book ratio is

$$267.686 / 15.647 = 17.1!$$

- Financial statements provide a **very cloudy picture** of MS economic situation on Jun 30, 1998.

Microsoft Balance Sheet Analysis (Jun 30, 1998)

ASSETS	GAAP	ECONOMIC	DIFFERENCE
Cash and short-term investments (A ₁)	\$13,927	\$ 13,927	\$ 0
Accounts receivable (A ₁)	1,460	1,460	0
Other current assets (A ₃)	502	?	?
Property and equipment, net (A ₃)	1,505	?	?
Equity and other investments (A ₃)	4,703	?	?
Other assets (A ₃)	260	?	?
Assets not recognized by GAAP (A ₄)	0	?	?
TOTAL ASSETS	\$22,357	>\$312,931	>\$290,574
LIABILITIES AND STOCKHOLDERS' EQUITY			
Accounts payable (L ₁)	\$ 759	\$ 759	\$ 0
Accrued compensation (L ₁)	359	359	0
Income taxes payable (L ₃)	915	?	?
Unearned revenue (L ₁)	2,888	2,888	0
Other liabilities (L ₃)	809	>809	?
Liabilities not recognized by GAAP (L ₄)	0	>39,380	>39,380
TOTAL LIABILITIES	\$ 5,730	>\$ 44,195	>\$ 38,465
STOCKHOLDERS' EQUITY			
Convertible preferred stock—shares authorized 100; shares issued and outstanding 13	\$ 980	\$ 1,050	\$ 70
total liabilities plus preferred stock	\$ 6,710		
Common stock and paid-in-capital—shares authorized 8,000; shares issued and outstanding 2,470	\$ 8,025		
Retained earnings, including other comprehensive income of \$666	7,622		
total common stockholders' equity	\$15,647	\$267,686	\$252,039
TOTAL LIABILITIES AND STOCKHOLDERS' EQUITY	\$22,357	>\$312,931	>\$290,574

Microsoft Balance Sheet Analysis (Jun 30, 1998)

- To understand the reason for the high market-to-book ratio, let's look first at MS liabilities.
- E.g., **employee stock option** is a liability not recognized by GAAP.
- On June 30, 1998, when MS stock price was \$108.375, there were outstanding stock options on 466 million shares with an average **exercise price** of \$23.87.
- This liability is worth

$$(\$108.375 - \$23.87) \times 466 = \$39.38 \text{ billion}$$

Microsoft Balance Sheet Analysis (Jun 30, 1998)

- Other liabilities are close to their book values except for income tax payable and other liabilities which may include litigation liability.
- This leads to a **total economic value of liabilities** at least equal to **\$44.195 billion**.
- Turning now into the stockholder equity section, the economic value of preferred stock (treated as a liability) is estimated as \$1,050 million.
- Therefore, the total **economic value of liabilities and stock holder equity** is at least
$$44.195 + 1.05 + 267.686 = \$312.931 \text{ billion.}$$
- The **economic value of MS assets** > **\$312.931 billion**, compared to \$22.357 book value.

Microsoft Return on Equity

- Finally, looking into return on equity between June 30, 1998 and June 30, 1999.
- The net income for MS in this period was \$7.785 billion, and \$28 million were paid to preferred stock holders in dividends.
- Therefore, the **accounting return on equity** is
$$(7.785 - 0.028) / 15.647 = 50\%$$
- Accounting ROE is **high** because net income captures the benefits of **economic assets not recognized by GAAP** and net equity is under-estimated.

Microsoft Return on Equity

- In terms of economic return on equity, MS common share increased from \$108.375 on June 30 1998 to \$180.375 on June 30 1999, with no dividends paid.

- Therefore, MS economic return on equity is

$$(180.375 - 108.375) / 108.375 = 66.4\%$$

- This means that the **market has high future expectations for MS** on June 30, 1999, which are not captured by GAAP.

Final Thought - Financial Statements and Bikinis?

