

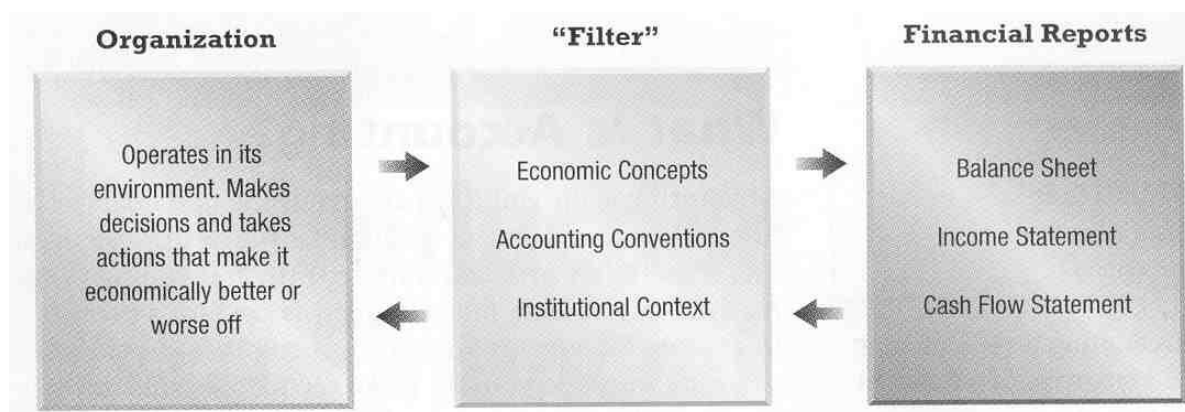
Introduction to Accounting and Setting the MARR¹

- **What is accounting?**

- Accounting is the act of gathering and reporting the financial history of an organization (company).
- This requires a continuous process of
 - Capturing financial data,
 - Organizing it,
 - Producing financial reports.

- **Framework for understanding accounting information**

- Information in accounting reports are determined by
 - *Economic concepts*. Determine what is being actually reported? E.g., financial value, wealth, income.
 - *Accounting conventions*. Dictate how to report financial transactions to measure the desired economic criteria.
 - *Institutional context*. This reflects the effect of human judgment in adopting accounting conventions.



¹ Compiled mostly from Antle and Gartska (2004), *Financial Accounting*, and Chapter 10, text.

- **Financial statements: Balance Sheet**

- An organization's balance sheet is a list of resources available (*assets*), resources committed (*liabilities*), and their difference (*equity*) at a point in time.

Union Plaza Hotel and Casino, Inc. and Subsidiaries			
Consolidated Balance Sheet as of December 31, 2001			
(dollars in thousands)			
ASSETS		LIABILITIES	
Cash and cash equivalents	\$ 3,552	Accounts payable	\$ 2,441
Accounts receivable, net	786	Accrued liabilities	2,353
Inventories of food, beverage, etc.	423	Other current liabilities	609
Prepaid expenses	793	Total current liabilities	<u>\$ 5,403</u>
Total current assets	<u>\$ 5,554</u>	Long-term debt	32,900
Property and equipment:		Obligations under capital leases	1,582
Land	\$ 7,012	TOTAL LIABILITIES	<u>\$39,885</u>
Buildings	48,040		
Leasehold improvements	3,564	STOCKHOLDERS' EQUITY	
Furniture and equipment	31,659	Common stock	\$ 750
	<u>\$90,275</u>	Additional paid-in capital	\$ 5,462
Less accumulated depreciation and amortization	(55,903)	Retained earnings	\$14,525
Net property and equipment	\$34,372	Less treasury stock	<u>(13,897)</u>
Other assets	587	TOTAL STOCKHOLDERS' EQUITY	\$ 628
		TOTAL LIABILITIES AND STOCKHOLDERS' EQUITY	
TOTAL ASSETS	<u><u>\$40,513</u></u>		<u><u>\$40,513</u></u>

- The numbers on the balance sheet add up. Assets and liabilities and stockholders' equity must balance.
- This is the fundamental accounting identity,

$$\text{ASSETS} = \text{LIABILITIES} + \text{EQUITY} .$$

- Equivalently,

$$\text{ASSETS} - \text{LIABILITIES} = \text{EQUITY} .$$

- **Financial statements: Income statement**

- An organization's income statement lists the economic resources acquired (*revenues*) and consumed (*expenses*) through operations over a period of time.

Union Plaza Hotel and Casino, Inc. and Subsidiaries
Income Statement for the Year Ended December 31, 2001
(dollars in thousands)

REVENUES	
Casino	\$37,807
Food and beverage	10,351
Rooms	11,110
Other	2,524
GROSS REVENUES	<u>61,792</u>
Less promotional allowances	<u>(6,922)</u>
NET REVENUES	<u>54,870</u>
OPERATING EXPENSES	
Casino	\$22,865
Food and beverage	8,997
Rooms	4,294
General and administrative	5,155
Entertainment	591
Advertising and promotion	1,329
Utilities and maintenance	6,712
Depreciation and amortization	4,130
Provision for doubtful accounts	44
Other costs and expenses	1,246
TOTAL OPERATING EXPENSES	<u>\$55,363</u>
OPERATING INCOME (LOSS)	<u>\$ (493)</u>
OTHER INCOME (EXPENSE)	
Interest income	3
Loss on sale of assets	(159)
Interest expense	<u>(2,265)</u>
TOTAL OTHER INCOME (EXPENSE)	<u>(2,421)</u>
NET LOSS	<u><u>\$ (2,914)</u></u>

- The income statement reports success or failure of company's operations during the period.
- Relative to the balance sheet, the income statement explains the *change in retained earnings* between the beginning and end of the period.

- **Financial statements: Cash flow statement**

- An organization’s cash flow statement describes flow of cash into and out of organization during a period.
- The cash flows are classified as one of three types
 - *Operating activities*. Intended to generate net income.
 - *Investing activities*. Resulting from acquiring or disposing of productive company assets.
 - *Financing activities*. Payments to or receipts from suppliers of money (e.g., shareholders or debt holders).

Union Plaza Hotel and Casino, Inc. and Subsidiaries
Consolidated Statements of Cash Flows for the Year Ended December 31, 2001
 (dollars in thousands)

CASH FLOWS FROM OPERATING ACTIVITIES	
Cash received from customers	\$54,761
Cash paid to suppliers and employees	(51,314)
Interest received	3
Interest paid	(2,384)
NET CASH PROVIDED BY (USED IN)	
OPERATING ACTIVITIES	\$ 1,066
CASH FLOWS FROM INVESTING ACTIVITIES	
Proceeds from sale of property and equipment	\$ 42
Purchase of property and equipment	(1,173)
NET CASH USED IN INVESTING ACTIVITIES	\$ (1,131)
CASH FLOWS FROM FINANCING ACTIVITIES	
Principal payments on short-term contracts	\$ (158)
Proceeds from long-term debt	2,000
Principal payments on long-term debt	(641)
Principal payments on capital leases	(919)
NET CASH PROVIDED BY FINANCING ACTIVITIES	\$ 282
NET INCREASE (DECREASE) IN	
CASH AND CASH EQUIVALENTS	\$ 217
CASH AND CASH EQUIVALENTS, at beginning of the year	3,335
CASH AND CASH EQUIVALENTS, at end of the year	\$ 3,552

- Relative to the balance sheet, the income statement explains the *change in cash* between the beginning and end of period.

- **Annual report**

- The balance sheet, the income statement and the cash flow statement are part of a comprehensive financial report called annual report.
- The annual report contains other elements such as the retained earnings statement, management discussion and analysis, notes to financial statements and auditor's report.

- **Balance sheet contents**

- A balance sheet generally contains the following:
 - Current assets
 - Noncurrent assets
 - Current Liabilities
 - Noncurrent (long-term) liabilities
 - Stockholders' equity

- **Assets**

- An asset (i) generates economic benefit, (ii) is owned or controlled, (iii) is the result of a past transaction.
- *Current assets* are converted to cash or used in business within one year. E.g., cash, short-term investments, accounts receivable, and inventories.

- *Noncurrent assets* are converted to cash or used in business after more than one year. E.g., property, plant and equipment, long-term investments, and rights.
- An asset *market value* is the value the market assigns to an asset.
- *Book value* is the value accounting assigns to an asset.
- Market value and book value are often different.
- *Depreciation* is the deduction of the book value over time.

- **Liabilities**

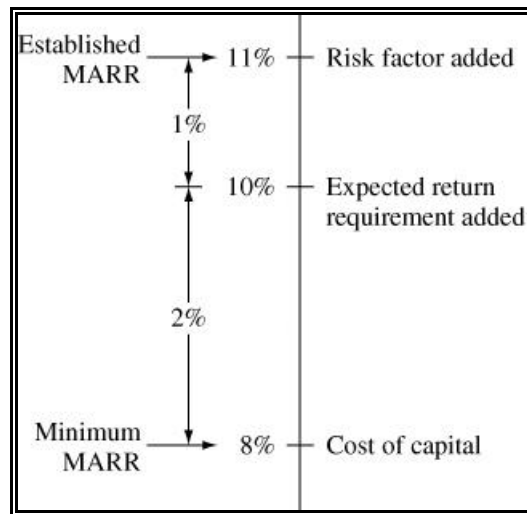
- A liability (i) requires a future sacrifice, (ii) is an obligation, and (iii) is the result of a past transaction.
- *Current liabilities* are expected to be paid within one year. E.g., accounts payable, accrued liabilities, short-term borrowings, dividends payable, unearned revenues.
- Dividends are the part of earnings that a company shares with its shareholders (owners).
- *Noncurrent liabilities* are debts expected to be paid after more than one year. E.g., warranties, employee benefits, lease, bonds payable, long-term borrowings.

- **Stockholders' equity**

- This is the difference between total assets and total liabilities, which arises from the contributions of owners and economic income.
- Examples include
 - *Common Stock*. Shareholders' investment in entity through acquisition of stock. Entitles holder to vote on major decisions and claim assets in case of liquidation.
 - *Preferred stock*. Similar to common stock. Owners are typically not allowed to vote on major decisions. They however have priority in dividend and claim on assets in case of liquidation.
 - *Retained Earnings*. Net income generated from operations less what has been returned to shareholders in dividends.

- **Setting the MARR**

- As you have seen, the minimum attractive rate of return (MARR) is essential in engineering economic analysis.
- As mentioned in Chapter 1, the MARR is set above the company's *cost of capital*.
- The cost of capital is a weighted average of the cost of debt and equity financing.
- In establishing the MARR, the company's management adds increments for (i) additional return and (ii) risk factor.

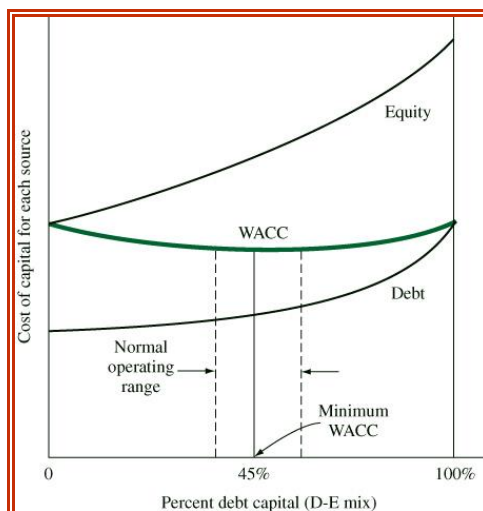


➤ The MARR may vary from one project to another and over time because of factors such as risk, investment opportunity, tax, capital limitation, competition.

- **Weighted Average Cost of Capital (WACC)**

- Financing of a project comes from equity and debt sources.
- WACC is estimated as follows

$$\text{WACC} = (\text{equity fraction})(\text{cost of equity capital}) + (\text{debt fraction})(\text{cost of debt capital})$$



- Costs of equity and debt capitals are divided into several categories as reflected in the company's balance sheet.
 - Debt financing is considered risky as it entails strict payment obligations to the company.
 - *Debt-to-equity-ratio* = liabilities/equities is used to assess the risk of debt financing. (Text refers to this ratio as *D-E mix*.)
- **Determining the cost of debt capital**
 - Debt financing is obtained mainly through loans and bonds.
 - Bond and loans interest payments are *tax-deductible*.
 - (For bonds, “interest” includes coupon payment and price discounts relative to the face value.)
 - Tax deductible means that the interest payments will be considered “expenses” on the company's income statement leading to a lower net income.
 - This leads to tax saving as taxes apply to net income.
 - This is an advantage of debt financing. (Do not forget that debt financing is risky though.)
 - The cost of debt capital is then found as the ROR (yield) of the bond or loan after adjusting down the interest expenses at the appropriate tax rate.
 - E.g., let T_e be the tax rate, and suppose a company receives P now and pays C_t in interest in periods $t = 1, \dots, n$ and then pays P back at time n . (This is like a bond *at par*.)

- Then, the cost of debt capital is i_d^* that satisfies

$$P - \sum_{t=1}^n \frac{(1-T_e)C_t}{(1+i_d^*)^t} - \frac{P}{(1+i_d^*)^n} = 0.$$

- For bonds not at par, the analysis should include tax deduction from interest in terms of discount on face value, which is more involved.

- **Determining the cost of equity capital**

- Equity financing comes from issuing preferred stock, and common stock, and from retained earnings.
- Tax considerations do not affect equity cost of capital since stock dividends are *not* tax-deductible.
- Preferred stocks typically guarantee a stated dividend annually, quoted as a percentage of the par (issuance) value.²
- This percentage can be used as the cost of capital for the preferred stock.
- E.g. a 10% dividend preferred stock with a par value of \$100, will pay an annual dividend of \$10.
- The cost of capital in this case is 10% .
- For common stock, no stated rate of return is guaranteed.
- One approach is to estimate the dividend growth rate, g .

² Preferred stock may not generate dividends every year. However, when dividends are paid in a year, they are *cumulative* for preferred stock, meaning that unpaid previous years dividends are paid, in addition to the current year dividend.

- Letting DV_1 be the first year dividend (in dollars) and P the price of the stock, the cost of equity is

$$R_e = DV_1 / P + g .$$

- E.g., if a stock issued at \$20 per share pays \$1 dividend in the first year, and an appreciation rate of 4% per year is anticipated for future dividends.

- Then, the corresponding cost of capital is

$$R_e = 1 / 20 + 0.04 = 0.09 = 9% .$$

- **CAPM**

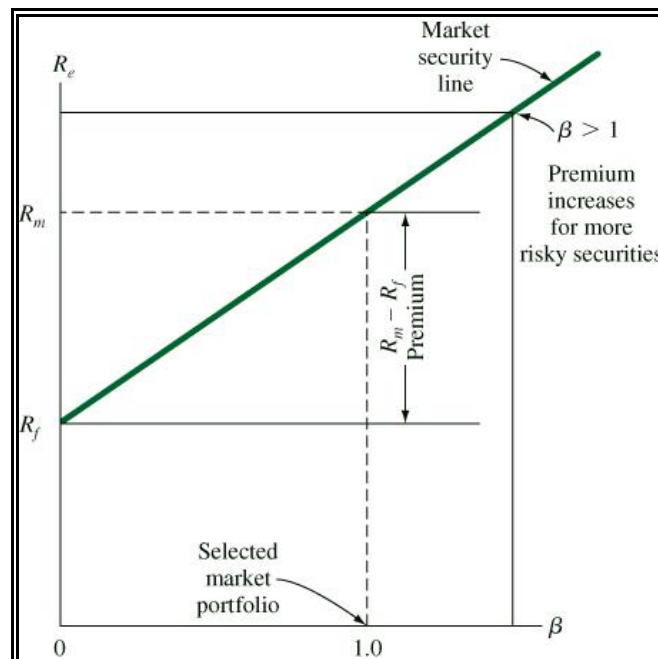
- Another model to estimate the common stock return is the capital asset pricing model (CAPM).
- CAPM is a financial stock valuation model based on an strategy that involves investing in the whole stock market (market portfolio) and the risk-free (bond) asset.
- This investment strategy can be shown to be optimal under certain assumptions.³
- Investing in the market portfolio typically translates in investing in an *index fund* that captures most of the market. E.g., the S&P 500 index.
- CAPM gives the expected stock return as a function of the risk-free (bond) rate, R_f , the average market (index) rate of return, R_m , and β of the stock.

³ The most important assumption is *market efficiency*, which states that past stock values cannot be used to predict future ones.

- β is a measure of correlation between the stock price and the market portfolio value.
- Specifically, letting σ_M^2 be the variance of market ROR and σ_{sM} the covariance between the stock and the market portfolio RORs $\beta = \sigma_{sM} / \sigma_M^2$.
- β is estimated from historical data and published.
- A high β reflects a highly volatile stock with a price that fluctuates a lot.
- Based on CAPM, the cost of capital for a common stock is estimates as follows.

$$R_e = R_f + \beta(R_m - R_f).$$

- That is, the cost of capital of a common stock is equal to the risk-free rate plus a risk premium.
- The *security market line* gives R_e as a function of β .



- Stocks with high β admit high return. This is akin to “high risk, high reward” but the risk is measured via β , i.e. correlation with the market.
- Specific or own risk, as for example measured by the standard deviation of return, σ_s , is not included in CAPM.
- The rationale is that in a “well-diversifies” portfolio, specific risk is diversified away, while marker risk remains.