DBF
FINANCE

Financial Reporting and Analysis: Financial Analysis Techniques

Francisco Parga, CFA

Y la respuesta a la pregunta es…. SÍ!! Pero sin aprendértelas de memoria.

Hay que:

- entender la lógica de la fórmula
- entender qué mide (**actividad, liquidez, solvencia, rentabilidad**, etc…)
- entender qué es mejor, si un ratio alto o un ratio bajo
- **hacer mil ejercicio**s esta semana para aprender a utilizarlos, y de tanto utilizarlos aprendértelos, para hacer bien el examen del fin de semana.
- Asumir que de aquí a unos meses, se te van a olvidar muchas fórmulas. No hay problema. Para ello están las 8 semanas de repaso, recuperación y exámenes prácticos antes del examen incluidas en el plan de viaje que estás siguiendo, y que explicamos en detalle en el aquí (link a carta 2).

Dicho lo cual, en este tema será crítico que sepáis diferenciar entre ratios de liquidez, solvencia, actividad y rentabilidad, así como entender los usos y limitaciones de un análisis a través de ratios.

Ratios

Uses

1. Project future earnings and cash flows
2. Evaluate a company´s capacity to meet its obligation even after the occurrence of unexpected events.
3. Assess the performance of the management team
4. Evaluate changes in the industry / sector / firm over time
5. Compare a Company with its competitors

Limitations

1. Not useful when viewed in isolation
2. Differences in different accounting methods made comparisons more difficult
3. Difficult to find comparable companies for firms that operate in multiple industries. (e.g. Berkshire)
4. Conclusions cannot be made by calculating a single ratio. Ratio analysis has to be performed relative to one another and not in isolation
5. Determining the “benchmark” value for a ratio is difficult, requiring the use of ranges.

Common-Size Analysis

Normalize income statements and balance sheets for the purpose of more easily comparing performance across firms or a single firm over time

Vertical common-size income statement → All income statement items shown as a percentage of sales

Vertical common-size balance sheet → All balance sheet items shown as a percentage of total assets

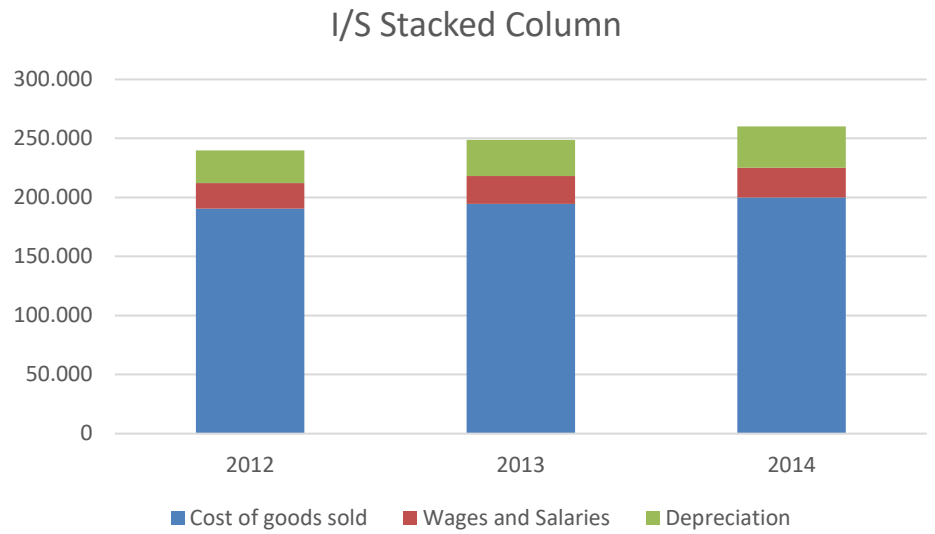
Income Statement	2012	2013	2014
Sales	100%	100%	100%
Cost of goods sold	46%	42%	40%
Wages and Salaries	5%	5%	5%
Depreciation	7%	7%	7%
Interest expense	0%	0%	1%
Income from continuing operations	**42%**	**46%**	**48%**
Gain from sale of equipment	0%	0%	3%
Earnings before taxes	**42%**	**46%**	**50%**
Income tax	15%	16%	18%
Net Income	**27%**	**30%**	**33%**

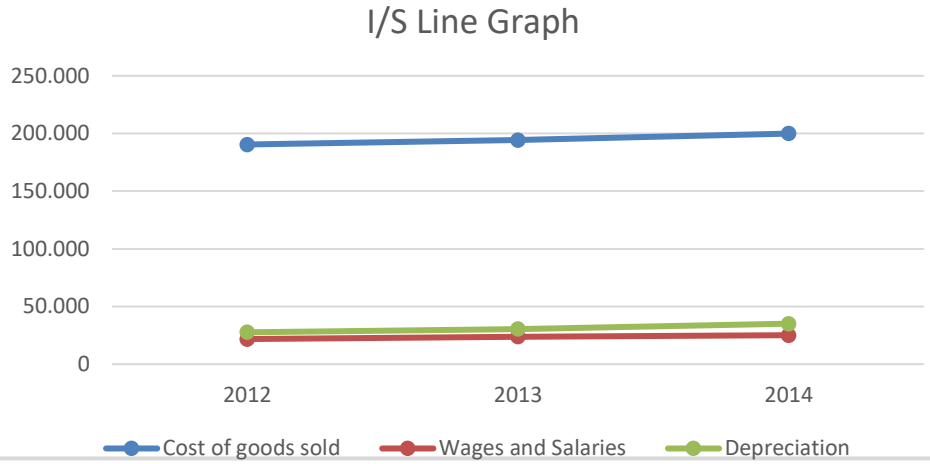
Balance Sheet		
	2013	**2014**
Current Assets		
Cash	7%	32%
Accounts receivable	3%	7%
Inventory	2%	1%
Non current Assets		
Land	34%	24%
Gross plant and equipment	68%	53%
Accumulated depreciation	-17%	-21%
Net plant and equipment	51%	33%
Goodwill	**3%**	**2%**
Total Assets	**100%**	**100%**
Current Liabilities		
Accounts payable	34%	12%
Wages payable	23%	11%
Interest payable	2%	2%
Taxes payable	1%	8%
Dividends payable	1%	9%
Noncurrent Liabilities		
Bonds	5%	5%
Deferred taxes	7%	5%
Stockholders´ equity		
Common stock	10%	6%
Retained earnings	17%	43%
Total liabilities and Stockholders equity	**100%**	**100%**

Horizontal common size income statement

Income Statement			
	2012	**2013**	**2014**
Sales	1	1.10	1.21
Cost of goods sold	1	1.00	1.05
Wages and Salaries	1	1.10	1.16
Depreciation	1	1.10	1.27
Interest expense	1	1.15	1.38
Income from continuing operations	**1**	**1.21**	**1.38**
Gain from sale of equipment			
Earnings before taxes	**1**	**1.22**	**1.47**
Income tax	1	1.22	1.47
Net Income	**1**	**1.22**	**1.47**

Graphical Analysis





Regression Analysis

Identify relationships between variables, and use the relationship to forecast

SHOW EXCEL EMRP CFA-DAMODARAN

b) classify, calculate, and interpret activity, liquidity, solvency, profitability, and valuation ratios;

① Activity Ratios

- Asset utilization
- Turnover ratios

May indicate the efficiency in the use of assets(i.e. inventory and fixed assets)

② Liquidity ratios

- ABILITY to pay Short Term Obligations

③ Solvency Ratios

- ABILITY to pay Longer Term Obligations

④ Profitability Ratios

- Capacity to generate operating profits and net profits

⑤ Valuation Ratios → Sales per share, EPS, or CF per share

COLLECTION PERIOD

$$\text{Receivables turnover} = \frac{\text{Annual sales}}{\text{Average receivables}}$$

$$\text{DSO} = \frac{365}{\text{Receivables Turnover}}$$

$$\text{DSO} = \frac{\text{Average receivables}}{\text{Annual sales}} \times 365$$

DESIRABLE to have an average collection period similar to the industry average.

The credit terms of the firm must be analysed as a benchmark.

- A very high collection period can be an indicator of customers are too slow in paying their bills, hence tying too much invested capital.
- A very low collection period can be an indicator of a too rigorous credit policy that may lead to the loss of sales.

INVENTORY TURNOVER

$$\text{Inventory turnover} = \frac{\text{Annual COGS}}{\text{Average inventory}}$$

$$\text{Days of inventory on hand} = \frac{365}{\text{Inventory Turnover}}$$

$$\text{Days of inventory on hand} = \frac{\text{Average inventory}}{\text{Annual COGS}} \times 365$$

DESIRABLE to have an average inventory turnover similar to the industry average.

The credit terms of the fimr must be analysed as a benchmark.

- A very high processing period can be an indicator that too much capital is tied up in stock and could lead to risks of obsolescence.
- A very low processing period can be an indicator of a too low level of inventory available and hence can lead to the loss of sales.

PAYABLES TURNOVER

$$\text{Payables turnover} = \frac{\text{Purchases}}{\text{Average payables}}$$

$$\text{DPO} = \frac{365}{\text{PAYABLES TURNOVER}}$$

$$\text{DPO} = \frac{\text{Average payables}}{\text{Purchases}} \times 365$$

the inventory equation CAN BE USE to calculate purchases

$$\text{Purchases} = \text{COGS} - \text{Beginning inventory} + \text{Ending inventory}$$

OTHER METRICS

$$\text{Total Asset Turnover} = \frac{\text{Revenue}}{\text{Average total Assets}}$$

This ratio tries to measure how effective is a company in its use of its total assets to generate revenue

$$\text{Fixed Asset Turnover} = \frac{\text{Revenue}}{\text{Average Net Fixed Assets}}$$

This ratio tries to measure how effective is a company in its use of its net fixed assets to generate revenue

- Different industries and sector have significant differences in their turnover ratios (retailers with ratios that can approach 10 and more capital intensive industries such as manufacturers with ratios close to 1).
- It is desirable to have a ratio as close to the industry benchmark as possible.
- Low ratios can be an indicator of a company that is tying up too much capital. However, a too high ratio might indicate an outdated asset base or underinvestment.

OTHER METRICS

$$\text{Working Capital Turnover} = \frac{\text{Revenue}}{\text{Average Working Capital}}$$

- Working capital defined as current assets minus current liabilities. (Beware of this. Cash and short term debt?).
- The working capital turnover ratio gives us information about the utilization of working capital in terms of dollars of sales per dollar of working capital.
- Some firms may have very low working capital if DPO is larger than DSO and DIH (hence payables equalling or exceeding inventory and receivables). In this instance the working capital turnover ratio will is large, and can fluctuate significantly from period to period, and is less informative about the operating efficiency of the firm (according to CFAI)

Liquidity Ratios

$$\text{Current Ratio} = \frac{\text{Current Assets}}{\text{Current Liabilities}}$$

The higher the current ratio, the more likely the Company will be able to pay its short-term obligations

A current ratio of less than 1 means a negative working capital and a is probably facing a liquidity crisis….

$$\text{Quick Ratio} = \frac{\text{Cash} + \text{Marketable securities} + \text{Receivables}}{\text{Current Liabilities}}$$

Quick ratio is a more strick measure of liquidity since it excludes inventory and other current assets

The higher the quick ratio, the more likely the Company will be able to pay its short term obligations

Liquidity Ratios

$$\text{Cash Ratio} = \frac{\text{Cash} + \text{Marketable securities}}{\text{Current Liabilities}}$$

The higher the cash ratio, the more likely the Company will be able to pay its short term obligations

$$\text{Defensive interval} = \frac{\text{Cash} + \text{Marketable securities} + \text{Receivables}}{\text{Average Daily Expenditures}}$$

This ratio measures the number of days of average expenditures the firm can pay with the liquid assets currently possesed

Average expenditures comprise cash expenses for costs of goods, R&D, and SG&A.

$$\text{Cash Conversion Cycle} = \text{Days sales outstanding} + \text{Days of inventory on hand} - \text{Days of payables}$$

Length of time it takes the firm to turn investments in inventory into cash

High cash conversion cycles are bad since it means that too much capital must be used by the firm to generate sales

Solvency Ratios

$$\text{Debt-to-equity} = \frac{\text{Total Debt}}{\text{Total Shareholders´ Equity}}$$

An increase in this ratio suggests a greater reliance on debt as source of financing

Debt= Long term debt+ interest bearing short term obligations

Some analysts include operating leases as debt

$$\text{Debt-to-capital} = \frac{\text{Total Debt}}{\text{Total Debt} + \text{Total Shareholders´ Equity}}$$

An increase in this ratio suggests a greater reliance on debt as source of financing

$$\text{Debt-to-assets} = \frac{\text{Total Debt}}{\text{Total Assets}}$$

An increase in this ratio suggests a greater reliance on debt as source of financing

$$\text{Financial leverage} = \frac{\text{Average Total Assets}}{\text{Average Total Equity}}$$

An increase in the use of debt financing grows financial leverage and hence may pose a risk to equity holders and bondholders.

DEBT-TO-EQUITY EXPLANATION

$$\text{Debt-to-equity} = \frac{\text{Total Debt}}{\text{Total Shareholders´ Equity}}$$

FINANCIAL LEVERAGE EXPLANATION

$$\text{Financial leverage} = \frac{\text{Average Total Assets}}{\text{Average Total Equity}}$$

Solvency Ratios

$$\text{Interest Coverage} = \frac{\text{EBIT}}{\text{Interest Payments}}$$

The lower the ratio, the more likely it is that the firm will have problems for meeting its debt obligations

$$\text{Fixed charge coverage} = \frac{\text{EBIT} + \text{Lease payments}}{\text{Interest Payments} + \text{Lease payments}}$$

The lower the ratio, the more likely it is that the firm will have problems for meeting its debt obligations

$$\text{Debt-to-EBITDA} = \frac{Total\ Debt}{EBITDA}$$

Because depreciation and amortization (¿?!!) are not cash expenses, the debt-to-EBITDA ratio reflects the firms capacity to meet its debt obligation.

Profitability Ratios (1 of 5)

IMPORTANT TERMS

Gross Profit $= Sales\ - COGS$

OPERATING PROFIT $= EBIT$

NET INCOME $= EARNINGS\ AFTER\ TAXES\ BUT\ BEFORE\ DIVIDENDS$

Total Capital $= Long\ term\ debt + short\ term\ debt + common\ and\ preferred\ Equity$

Total Capital $= Total\ Assets$

Profitability Ratios (2 of 5)

$$\text{Net profit margin} = \frac{\text{Net Income}}{\text{Revenue}}$$

- Analysts should be bothered when this ratio is too low.
- However, net profit margin should be based on net income from continuing operations (analysts must be thinking about future prospects of the business and therefore, discontinued operations will not affect the company in the future.

$$\text{Gross profit margin} = \frac{\text{Gross Profit}}{\text{Revenue}}$$

- Analysts should be bothered when this ratio is too low.
- This ratio can be increased by rising prices or reducing costs. The ability to raise prices usually is limited by the presence of competition

$$\text{Operating profit margin} = \frac{\text{EBIT}}{\text{Revenue}}$$

- EBIT may include several non operating costs (gains on investments)
- Analysts should be bothered if the ratio is too low and be consistent in the way they calculate the ratio
- Some analyst prefer to add back depreciation and amortization to the numerator

$$\text{Pretax margin} = \frac{\text{EBT}}{\text{Revenue}}$$

Profitability Ratios (3 of 5)

$$\text{ROA} = \frac{\text{Net Income}}{\text{Average Total Assets}}$$

- This measure is misleading since interest is deducted from Net Income but total Assets include both debt and Equity holders
- Hence, the interest expense should be added back

$$\text{Adjusted ROA} = \frac{\text{Net Income} + \text{Interest expense x (1 – tax rate)}}{\text{Average Total Assets}}$$

$$\text{Operating ROA} = \frac{\text{EBIT}}{\text{Average Total Assets}}$$

$$\text{ROTC} = \frac{\text{EBIT}}{\text{Average Total Capital}}$$

- Total capital includes short- and long-term debt, preferred equity, and common equity
- Analysts should be bothered if the ratio is too low

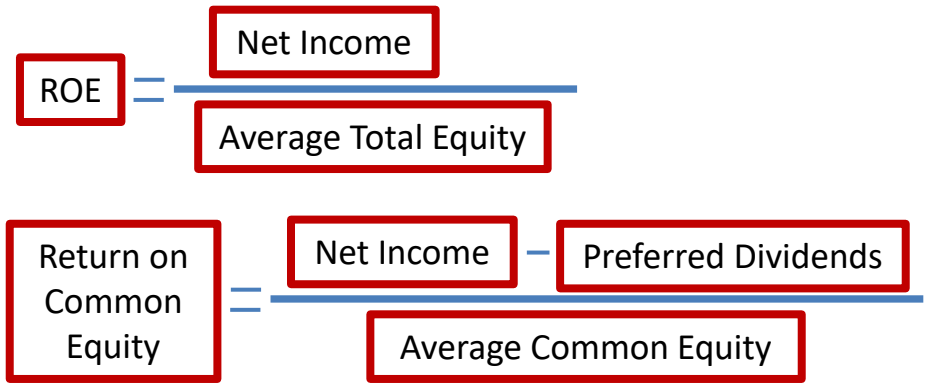
- An alternative way for calculationg ROTC is to include the present value of operating leases on the balance sheet as a fixed asset and as a long-term liability. This adjustment is very important for companies that depend upon operating leases for financing

ROA AND ADJUSTED ROA EXPLANATION

$$\text{ROA} = \frac{\text{Net Income}}{\text{Average Total Assets}}$$

$$\text{Adjusted ROA} = \frac{\text{Net Income} + \text{Interest expense x (1 – tax rate)}}{\text{Average Total Assets}}$$

Profitability Ratios (5 of 5)



- The return on common equity is better analyzed using the DuPont decomposition (see later in the reading)

Calculate the ratios in the template below

Ratios	202X
Current Ratio	
Quick Ratio	
Days of sales outstanding	
Inventory turnover	
Total Asset Turnover	
Working Capital Turnover	
Gross profit Margin	
Net Profit Margin	
Return on Total Capital	
Return on Common Equity	
Debt-to-Equity	
Interest Coverage	

Income Statement	202X
Sales	250,000
Cost of goods sold	-200,000
Gross Profit	**50,000**
Operating expenses	-10,000
Operating profit	**40,000**
Interest expense	-10,000
Earnings before taxes	**30,000**
Income tax	-10,000
Net Income	**20,000**
Common dividends	**6,000**

Balance Sheet	202X-1	202X
Current Assets		
Cash and marketable securities	9,500	11,000
Accounts receivable	200,000	220,000
Inventory	100,000	300,000
Non current Assets		
Gross plant and equipment	1,500,000	1,650,000
Accumulated depreciation	-400,000	-600,000
Net plant and equipment	1,100,000	1,050,000
Total Assets	**1,409,500**	**1,581,000**
Current Liabilities		
Accounts payable	85,000	120,000
Short term debt	150,000	180,000
Current portion of long term debt	30,000	50,000
Noncurrent Liabilities		
Long term debt	700,000	849,500
Deferred taxes	80,000	10,000
Stockholders´ equity		
Common stock	250,000	250,000
Additional paid in capital	100,000	100,000
Retained earnings	14,500	28,500
Total liabilities and Stockholders equity	**1,409,500**	**1,588,000**

D) demonstrate the application of DuPont analysis of return on equity and calculate and interpret effects of changes in its components;

DuPont system → Used to decompose ROE, to better analyze and understand what changes are driving the changes in ROE

Calculate the ROE and use the Dupont Analysis to decompose and better analyze the ROE evolution

$$ROE = \frac{\text{Net Income}}{\text{Average Total Equity}}$$

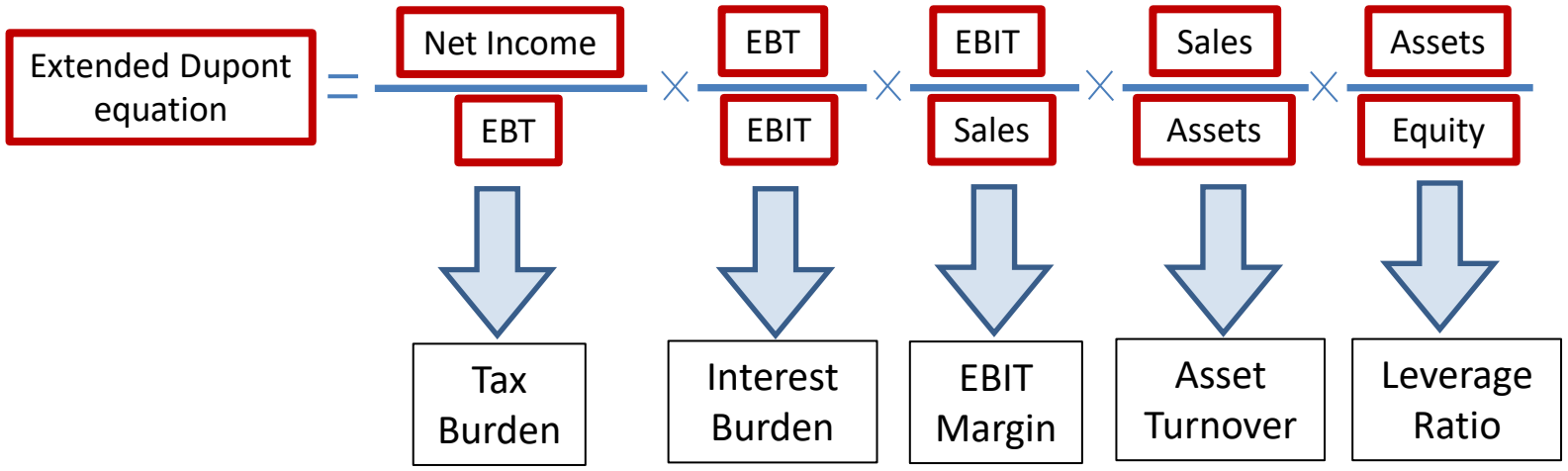
$$\text{Original Dupont equation} = \frac{\text{Net Income}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Assets}} \times \frac{\text{Assets}}{\text{Equity}}$$

Net Profit Margin | Asset Turnover | Leverage Ratio

	20x3	20X4	20X5
Net Income	200	300	**400**
Sales	1,000	1,200	1,300
Equity	1,000	1,400	1,800
Assets	230	276	299

	20x3	20X4	20X5
ROE	20.0%	21.4%	22.2%
Net profit margin	20.0%	25.0%	30.8%
Asset Turnover	4.35	4.35	4.35
Financial leverage	0.23	0.20	0.17

D) demonstrate the application of DuPont analysis of return on equity and calculate and interpret effects of changes in its components;



The most common ratio in a valuation context is the ***price-to-earnings*** **(P/E) ratio**

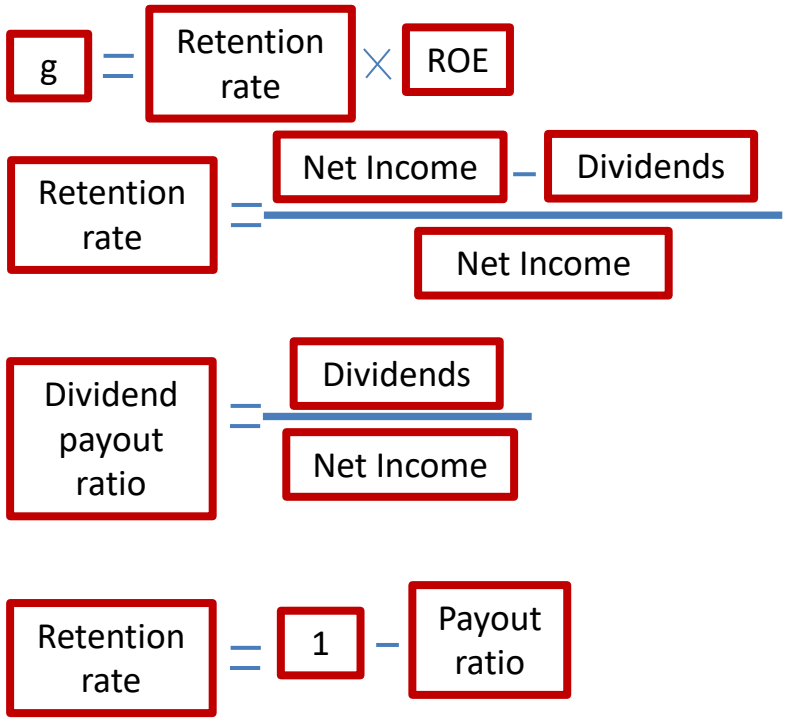
$$\frac{P}{E} = \frac{Market\ Price\ of\ Stock}{Earnings\ per\ Share}$$

Other ratios are price-to-cash flow, price-to-sales, and price-to-book value

USE OF EPS.
Taking into account the dilutive effect of convertible securities and stock options, dilutive EPS (FRA)

Dividends

- EPS and net income are not reduced by the payment of common stock dividends.
- Net income minus dividends declared = retained earnings
- Retained earnings that are used to finance growth
- The weight of total net income that is not paid to shareholders as dividends is a key determinant of ***sustainable growth rate***.


g
=
Retention rate
×
ROE
Retention rate
=
Net Income
–
Dividends
Net Income
Dividend payout ratio
=
Dividends
Net Income
Retention rate
=
1
–
Payout ratio

Company	A	B	C
Earnings per Share	5	4	5
Dividends per Share	3.0	1.0	0.5
ROE	25.0%	15.0%	5.0%

	A	B	C
RR	40%	75%	90%
ROE	25.0%	15.0%	5.0%
SGR	10.00%	11.25%	4.50%

OTHER RATIOS

Dividends

- Sales per employee.
- Net Income per employee.
- Growth in same-store sales. → Retail & Restaurants. Excludes the growth from new openings
- Sales per square foot.

BUSINESS RISK

The standard deviation of

- revenue,
- operating income, and
- net income

BUSINESS RISK (cont.)

The standard deviation of

- revenue,
- operating income, and
- net income

Indicate the degree of variation and hence risk in the firm's performance.

They all depend on the size. Thus, analysts employ a size-adjusted measure of variation (The **coefficient of variation)**

$$\text{CV Sales} = \frac{\text{standard deviation of sales}}{\text{Mean Sales}}$$

$$\text{CV Operating Income} = \frac{\text{standard deviation of Operating Income}}{\text{Mean } \textit{Operating Income}}$$

$$\text{CV Net Income} = \frac{\text{standard deviation of Net Income}}{\text{Mean } \textit{Net Income}}$$

BUSINESS RISK (cont.)

Intricacies of financial institutions (Banks, insurance companies) make common ratios useless frequently.

- **Capital Ratios:** Capital adequacy measured as unit of dollar generation over the firms equity capital (RoRWA, Core Tier I, etc…)**.**
- **Value-at-risk:** Estimate of a dollar loss that the firm may exceed only a % of the time over a specific time period.
- **Reserve Requirements** and Liquid Asset Requirements.
- **Net Interest Margin→** Measures the performance of the bank in their lending activity.

$$\text{Net Interest Margin} = \frac{\text{interest income}}{\textit{Interest earning assets}}$$

CREDIT ANALYSIS

Based upon ratios that we have already analysed but with an emphasis on liquidity and solvency:

- **Ability to service its debt:**
  - Interest coverage ratios based on EBITDA or EBIT
  - Return on Capital
  - Debt-to-assets
  - Cash flow-to-Total Debt
- **Ratios to predict firm bankruptcies:**
  - Altman Z score (Low score means high probability of default). Based on:
    - Working Capital to Assets
    - Retained earnings to Assets
    - EBIT to Assets
    - Market to Book Value ratio of a share of stock
    - Revenues to assets

Business Segment = A portion of a larger company that represents more than 10% of total revenues, assets or income, and it is distinguishable from the other LOBs in terms of risk and return.

Geographic segments must also be reported when the abovementioned criteria is met.

BOEING Example, 5 segments

- **Commercial Airplanes:**
- **Defense, Space and Security:**
  - Boeing Military Aircraft
  - Network & Space Systems
  - Global Services and Support
- **Boeing Capital**

Segment reporting is very useful for analysts as a source of information for projection revenues and cash flow.
Project each segment separately is a must when risks and growth prospects differ significantly.

Use of ratios to prepare pro-forma financial statements→ Inclussion of estimates for t+1 and t+2

- **Begin with an estimate of next period sales**
- Use of average **COGS %** or most recent COGS from common size to project COGS
- **Analyst may infer** that certain ratios may remain unchanged will others may change
- In order to assess how potential changes in estimates may impact the model:
  - Sensitivity Analysis -> What if I increase growth rate to 5%?
  - Scenario Analysis
  - Simulation→ Probability distributions for key variables. Montecarlo with the assistance of computers