Study Notes: 15.535 Business Analysis Using Financial Statements

MIT Sloan School of Management

Spring 2022 - 2024 Quizzes

1 Accruals and Earnings Quality

1.1 Calculating Accruals

- **Total Accruals**:

$$\text{Total Accruals} = \text{Net Income (NI)} - \text{Cash Flow from Operations (CFO)}$$

- **Split Components**:
    - *Working Capital Accruals*: Related to changes in current assets/liabilities (e.g., accounts receivable, inventory, prepaid expenses).
    - *Non-Working Capital Accruals*: Related to long-term items (e.g., depreciation, amortization, deferred taxes).

- **Economic Rationale**: Working capital accruals are volatile and short-term, while non-working capital accruals are stable but larger (e.g., depreciation).

1.2 Days Metrics

- **Days Inventory**:

$$\text{Days Inventory} = \frac{365}{\text{Inventory Turnover}} = \frac{365}{\text{COGS/Average Inventory}}$$

- **Days Receivables**:

$$\text{Days Receivables} = \frac{365}{\text{Receivables Turnover}} = \frac{365}{\text{Net Sales/Average Accounts Receivable}}$$

- **Interpretation**: Declining days inventory/receivables may indicate efficiency or demand-driven sales growth.

1.3 Earnings Quality Concerns

- Positive total accruals suggest lower earnings quality.

- Analyze trends in days metrics:
    - Declining days receivables with booming sales = healthy growth.
    - Rising days inventory with high backlog = production ramp-up (not necessarily negative).

2 Valuation Multiples

2.1 Key Ratios

- **Trailing P/E**:
$$\text{Trailing P/E} = \frac{\text{Stock Price (P)}}{\text{Trailing Twelve Months (TTM) EPS}}$$

- **Forward P/E**:
$$\text{Forward P/E} = \frac{\text{Stock Price (P)}}{\text{Next Twelve Months (NTM) EPS Forecast}}$$

- **PEG Ratio**:
$$\text{PEG} = \frac{\text{P/E Ratio}}{\text{Long-Term EPS Growth Rate}}$$

2.2 Special Items Impact

- Special items (e.g., impairments, restructuring) distort P/E ratios.

- Over-/Under-valuation depends on whether special items are transitory or recurring.

3 Bankruptcy Risk & Altman Z"-Score

3.1 Calculation

$$Z'' = 6.56 \times \frac{\text{Working Capital}}{\text{Total Assets}} + 3.26 \times \frac{\text{Retained Earnings}}{\text{Total Assets}} + 6.72 \times \frac{\text{EBIT}}{\text{Total Assets}} + 1.05 \times \frac{\text{Book Value Equity}}{\text{Total Liabilities}}$$

- **Interpretation**:
    - $Z'' > 2.60$: Low bankruptcy risk (AAA rating).
    - $Z'' < 1.10$: High bankruptcy risk (CCC rating).

- **IPO Impact**: Reduces current assets, total assets, and equity, lowering Z'' significantly (e.g., Rivian's post-IPO Z'' dropped from 13.23 to 2.03).

4 Special Items & Cash Flow Analysis

4.1 Categorization

- **Core Items**: SG&A, R&D, amortization (recurring).

- **Special Items**: Impairments, restructuring, litigation (non-recurring).

- **Gray Areas**: Contingent consideration (depends on acquisition strategy).

4.2 Cash Flow vs. Net Income

- Asset-light companies (e.g., Skechers) have less depreciation, so CFO often exceeds NI.

- High D&A in asset-heavy firms reduces NI but not CFO.

5 Cookie Jar Accounting

5.1 Depreciable Life

$$\text{Depreciable Life} = \frac{\text{Gross PPE}}{\text{Depreciation Expense}}$$

- **Manipulation**: Shortening life increases depreciation expense, reducing earnings (but negligible impact during extreme losses, e.g., NCL's \$4B losses).

6 Beneish M-Score & Dechow F-Score

6.1 Beneish M-Score

$$M = -4.84 + 0.92 \times \text{DSRI} + 0.528 \times \text{GMI} + 0.404 \times \text{AQI} + 0.892 \times \text{SGI} + 0.115 \times \text{DEPI} - 0.172 \times \text{SGAI} + 4.679 \times \text{TATA} - 0.327 \times \text{LVGI}$$

- **Limitations**: Fails to detect intersegment manipulation (e.g., ADM's nutrition segment) as transactions net to zero in consolidated statements.

6.2 Dechow F-Score

- Variables include accruals, receivables/inventory changes, and soft assets.
- **Interpretation**:
  - F-Score ≈ 1: Normal risk (e.g., Skechers' 1.07 implies low manipulation risk).

7 Days Unearned Revenue

$$\text{Days Unearned Revenue} = \frac{365}{\text{Net Sales/Average Unearned Revenue}}$$

- **Trend Analysis**: Stable days unearned revenue (e.g., Apple's 11–13 days) suggests new services offsetting commission revenue recognition.

8 Case Studies

8.1 Nvidia (2024)

- **Accrual Ratio**:

$$\frac{\text{NI} - \text{CFO} - \text{CFI}}{\text{Avg. Total Assets}} = \frac{29,760 - 28,090 - (-10,566)}{53,455} = 3.12\%$$

- **Inventory Accrual**: +98 (small accrual implies meeting demand without inventory drawdown).

8.2 ADM (2023)

- **Beneish M-Score Errors**: Misclassification of AQI (net PPE vs. buildings), DEPI (D&A vs. depreciation), LVGI (excluding liabilities), TATA (using wrong denominators).
- **SEC Inquiry**: Intersegment transactions not detectable in consolidated scores.