Forecasting Earnings

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Outline

- Earnings measures
- Time-series behavior of EPS
- Return on Equity (ROE)
- Decomposition of ROE
- Earnings quality
- Growth
- Non-accounting earnings predictors
- Macroeconomic predictors
- Price-based forecasts
Earnings Measures

- Residual income
- Earnings per share
- Net income
- Net Operating Profit After Tax (NOPAT)
- Revenue
Time-series Behavior of Annual EPS

• When information is restricted to past and current EPS, EPS forecasts assuming a random walk with drift is almost as good as it gets

$$\text{EPS}_t = d + \text{EPS}_{t-1} + e_t$$
Time-series Behavior of Quarterly EPS

• When information is restricted to past and current quarterly EPS, the following model provides a reasonable approximation

\[ EPS_t = c_1 + EPS_{t-4} + c_2 (EPS_{t-1} - EPS_{t-5}) + c_3 e_{t-4} + e_t \]
Time-series Behavior of Quarterly EPS: Accounting Implications

• Strong earnings correlation for quarters that belong to the same fiscal year
  – This is due to the integral approach (APB 28)

• Earnings in the third and, particularly, fourth quarters are “noisy”
  – Correction of estimation error from prior quarters
  – Recognition of one-time or special items
Profitability

- Freeman, Ohlson and Penman (JAR 1982) showed that ROE predicts earnings changes
  - High ROE implies future earnings decreases and low ROE implies earnings increases

- This follows because ROE is mean-reverting
  - High ROE is followed by lower ROE and low ROE is followed by higher ROE
ROE and Future Earnings Changes

\[ \text{ROE}_0 = \frac{\text{EPS}_0}{\text{BVPS}_{-1}} \implies \text{EPS}_0 = \text{ROE}_0 \times \text{BVPS}_{-1} \]

\[ \text{ROE}_1 = \frac{\text{EPS}_1}{\text{BVPS}_0} \implies \text{EPS}_1 = \text{ROE}_1 \times \text{BVPS}_0 \]

\[ \text{EPS}_1 - \text{EPS}_0 = (\text{ROE}_1 - \text{ROE}_0) \times \text{BVPS}_{-1} \]
\[ + \text{ROE}_1 \times (\text{BVPS}_0 - \text{BVPS}_{-1}) \]

ROE is mean-reverting:

\[ \text{Correlation}(\text{ROE}_0, \text{ROE}_1 - \text{ROE}_0) < 0 \]
Reasons for Mean-Reversion in ROE

- **Competition** among firms and *entry and exit of firms* drive abnormal levels of profitability toward the mean.

- Abnormal levels of ROE are likely to reflect *transitory economic shocks* or *fair value adjustments*.

- When profitability is abnormal, *reinvested earnings and new capital investments* are likely to earn more normal levels of profitability compared to existing capital, driving future ROE toward the mean.

- *Abandonment options* and other real options allow firms to discontinue or revise low profitability projects.

- Low levels of ROE are often due to *conservatism* (e.g., recognition of impairment losses) or “big bath” charges. These items:
  - Are less likely to recur compared to other earnings items.
  - Increase subsequent earnings (e.g., lower future depreciation, subsequent reversal of restructuring liabilities).
  - Reduce equity, the denominator for future ROE calculations.
Further Analysis of Profitability

• Time-series behavior of profitability
  – “Normal” level of ROE
  – Trends (linear, geometric, quadratic …)
  – Persistence of changes

• Decomposition of profitability
  – “Core” vs. “one-time” profitability
  – Operating profitability vs. leverage effect
  – Analyses of operating profitability and leverage
Core vs. One-time Profitability

ROE = Core ROE + One-time ROE

Core ROE = Core Income / Common Equity

One-time ROE = One-time income / Common Equity

Net income = Core income + One-time income

One-time income:
  – Impairment, asset write-downs and restructuring charges
  – Gains and losses
  – In-process R&D
  – ...
Core vs. One-time Profitability

- One-time items are often not easily discernable in reported income statements
- Seemingly one-time items may actually recur
- There is a contemporaneous correlation between Core ROE and One-time ROE (e.g., due to earnings smoothing)
- Past One-time ROE affects future Core ROE
  - One-time ROE changes the denominator for future Core ROE
  - Impairment, asset write-downs and other one-time items affect future core expenses (e.g., impairment reduces future depreciation)
Operating Profitability vs. Leverage Effect

ROE = RNOA + Leverage Effect

RNOA = NOPAT / Net Operating Assets

Leverage Effect = ROE – RNOA

• RNOA is more persistent than the leverage effect
Analysis of RNOA

• Profit margin vs. asset turnover
• Profitability of operating assets (ROOA) vs. operating liability (OL) leverage effect
Profit Margin vs. Asset Turnover

\[ \text{RNOA} = \text{Profit Margin} \times \text{Asset Turnover} \]

\[ \text{Profit Margin} = \frac{\text{NOPAT}}{\text{Revenue}} \]

\[ \text{Asset Turnover} = \frac{\text{Revenue}}{\text{Net Operating Assets}} \]

• Profit margin and asset turnover measure different aspects of profitability and are therefore likely to have different persistence
Analysis of Profit Margin

• Time-series analysis
  – Trends
  – Persistence of changes

• Common-size income statement
  – Line-items vary in persistence and “stickiness”

• Operating leverage analysis
  – High operating leverage implies high sensitivity of profit margin to sales growth in the near to intermediate term
Analysis of Asset Turnover

• Time-series analysis
  – Trends
  – Persistence of changes

• Individual asset turnover ratios
  – Assets differ in the strength of their relation to sales and accordingly in the persistence of their turnover
**ROOA vs. OL Leverage Effect**

RNOA = ROOA + OL Leverage Effect

ROOA = \( \frac{(NOPAT + \text{Implicit Interest on OL})}{\text{Operating Assets}} \)

OL Leverage Effect = RNOE – ROOA

- ROOA is more persistent than the OL leverage effect
- ROOA may serve as a substitute for RNOA when NOA is negative
OL Leverage Effect

OL Leverage Effect = RNOA – ROOA = 
(OL / NOA) × (ROOA – Implicit Interest on OL)

• OL leverage is more persistent than OL spread
• OL leverage is positively related to future profitability
  – Contractual operating liabilities
  – Estimated liabilities
  – Denominator effect of operating assets
Leverage Effect

Leverage Effect = ROE – RNOA =
(Debt / Equity) \times (RNOA – Cost of Borrowing)

• Financial leverage is more persistent than financial spread
• Financial leverage (spread) is negatively (positively) related to RNOA

Leverage Effect = ROE / RNOA =
(NOA / Equity) \times (NI / NOPAT)
Earnings Quality

- Accruals vs. cash flow
- Taxable income vs. book income
- Fundamental signals
- Disclosed assumptions (e.g., pension)
Accruals vs. Cash Flow

• Accruals-to-assets is negatively related to future earnings
  – Refinements: CFS instead of BS measurement; discretionary or selected accruals instead of total accruals; deflation by net income instead of assets

• Cash flow-to-price is positively related to future earnings
  – Related, but not the same information as accruals
Five-Year Earnings Growth for Portfolios of Firms Sorted by the Cash Flow-to-earnings Ratio
Taxable Income vs. Book Income

• The ratio of taxable income-to-earnings predicts future earnings changes
  – Some forms of earnings management do not affect taxable income
  – Taxable income excludes some transitory items
  – Taxable income is often “smoothed” over time, hence informing on management expectations of future taxable income and, by inference, future earnings
Five-Year Earnings Growth for Portfolios of Firms Sorted by the Taxable Income-to-earnings Ratio
Fundamental Signals

• Abnormal increases in receivables
  – Revenue overstatement
  – Negative demand shocks
  – Expected write-offs
Fundamental Signals

• Abnormal increases in inventories
  – Negative demand shocks
  – Expected price concessions
  – Expected write-downs
  – Overproduction
  – Excess capitalization
Fundamental Signals

• Abnormal levels of Capex
  – Overinvestment
  – Excess capitalization
  – Insufficient depreciation (when capex is compared to depreciation)
Fundamental Signals

• Changes in R&D and advertising
  – R&D and advertising are economic investments accounted for as period expenses
  – When firms cut these expenses they increase current earnings and reduce future earnings
  – Abnormal changes in R&D or advertising are positively related to future earnings changes
Fundamental Signals

• Changes in the gross margin
  – Sales and COGS are more persistent than other earnings items
  – An earnings decrease due to a gross profit decline is likely to be more persistent than other earnings decreases
Fundamental Signals

• Changes in the effective tax rate
  – Changes in the effective tax rate are relatively transitory
  – An unusual decrease in the effective tax rate predicts an increase in next year’s income tax expense and so a decrease in next year’s earnings
Fundamental Signals

• Changes in the bad debt expense
  – This expense is highly discretionary
  – When firms cut the bad debt expense they increase current earnings but reduce future earnings
  – Abnormal changes in the bad debt expense are positively related to future earnings changes
Fundamental Signals

• Changes in the LIFO reserve
  – These are due to timing of inventory acquisitions, which have little implications for performance but are still included in COGS
  – Changes in the LIFO reserve are positively related to future earnings changes
Fundamental Signals

• Unusual items, gains and losses
  – These items are both discretionary and transitory
  – There is a strong negative auto-correlation in changes in unusual items
  – There is a weak negative correlation between current changes in unusual items and future changes in “core” earnings
  – Unusual items are negatively associated with future earnings changes
Disclosed Assumptions

• Assumptions underlying the calculation of the pension and OPEB expenses
  – Discount rates
  – Expected return on pension plan assets
  – Trend in employee compensation
  – Trend in health care cost

• Assumptions underlying the calculation of the ESO expense
  – Stock volatility
  – Expected option lives
  – Expected dividend yield
  – Risk free interest rate
  – The proportion of options expected to vest
Growth Analysis

• *Past growth rates* in earnings, revenues, assets and equity may predict future earnings growth

• *Investment intensity* ratios
  – Capex, business acquisition, R&D, advertisement, investments in working capital

• *Sustainable growth ratio*
  – ROE × Plowback ratio
Growth and Profitability

• Growth in net assets predicts a decline in profitability
  
  – *New investments* are on average less profitable than existing investments
    
    • Capital constraints induce firms to first invest in the most profitable projects and then, as funds become available, invest in less profitable projects
  
  – *Conservative accounting* principles and the *realization principle* prevent firms from recognizing anticipated profits from new investments and require immediate expensing of some investments (e.g., R&D)
  
  – *Growth in net assets increases with accruals*, which are relatively easy to manipulate and so are less persistent than the cash component of earnings
Non-accounting earnings predictors

• Indicators of demand
  – Product market size (e.g., service area population in the wireless industry)
  – Product market share (e.g., population penetration in the wireless industry)
  – Customer satisfaction data
  – Volume (e.g., passenger miles, web traffic)
  – Order backlog

• Indicators of capital (including human capital) and its productivity
  – Patent counts
  – Labor productivity (e.g., sales per employee)

• Corporate finance events
  – Dividend changes
  – Equity and debt offerings
  – Investments
Macroeconomic Predictors

• Interest rates
  – Expected inflation
  – Real interest rates

• Realized inflation

• Measures of economic activity
  – Economy-wide
  – Industry-specific
Price-based Forecasts

- **Stock returns** and **price-earnings ratios** predict subsequent earnings changes.

- The **market-to-book ratio** predicts future profitability and growth.

- **Dividend yield**
  - Negative association with future earnings growth.
  - Positive association with earnings sustainability.
Conclusion

• Research has provided many relevant insights regarding the prediction of future earnings using F/S information
  – Many of the insights are preliminary and require further research
  – Current research does not fully utilize prior findings