

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

$$\begin{aligned} \text{EPS}_t &= c_1 + \text{EPS}_{t-4} \\ &\quad + c_2 (\text{EPS}_{t-1} - \text{EPS}_{t-5}) \\ &\quad + c_3 e_{t-4} + e_t \end{aligned}$$

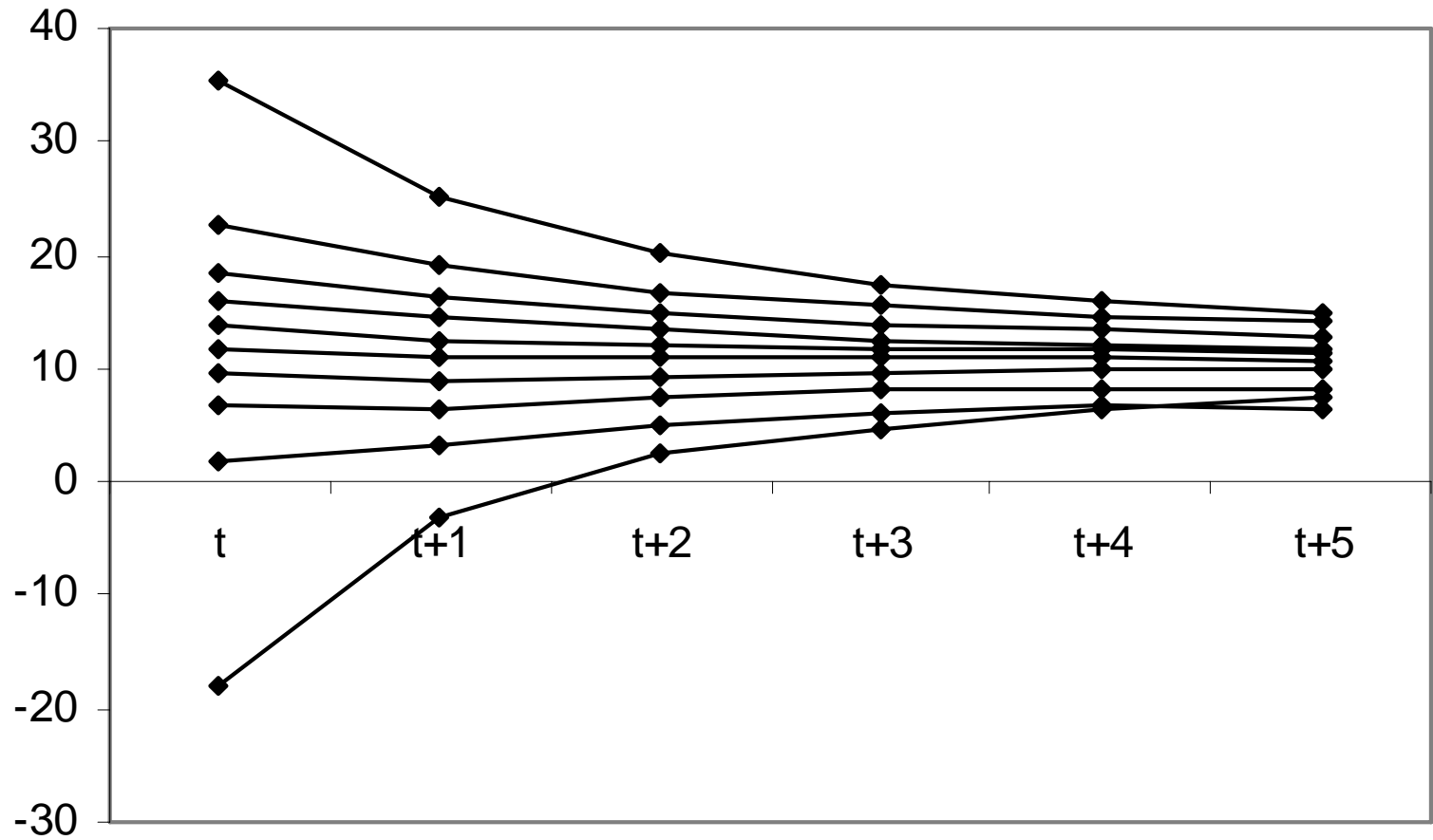
Time-series Behavior of Quarterly EPS: Accounting Implications

- 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 Over Time



ROE and Future Earnings Changes

$$ROE_0 = EPS_0 / BVPS_{-1} \Rightarrow EPS_0 = ROE_0 \times BVPS_{-1}$$

$$ROE_1 = EPS_1 / BVPS_0 \Rightarrow EPS_1 = ROE_1 \times BVPS_0$$

$$EPS_1 - EPS_0 = (ROE_1 - ROE_0) \times BVPS_{-1} \\ + ROE_1 \times (BVPS_0 - BVPS_{-1})$$

ROE is mean-reverting:

$$\text{Correlation}(ROE_0, ROE_1 - ROE_0) < 0$$

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

$ROE = \text{Core ROE} + \text{One-time ROE}$

$\text{Core ROE} = \text{Core Income} / \text{Common Equity}$

$\text{One-time ROE} = \text{One-time income} / \text{Common Equity}$

$\text{Net income} = \text{Core income} + \text{One-time income}$

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

$ROE = RNOA + \text{Leverage Effect}$

$RNOA = NOPAT / \text{Net Operating Assets}$

$\text{Leverage Effect} = ROE - RNOA$

- 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

$RNOA = \text{Profit Margin} \times \text{Asset Turnover}$

$\text{Profit Margin} = \text{NOPAT} / \text{Revenue}$

$\text{Asset Turnover} = \text{Revenue} / \text{Net Operating Assets}$

- 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

$RNOA = ROOA + \text{OL Leverage Effect}$

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

$\text{OL Leverage Effect} = RNOE - ROOA$

- 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 = $RNOA - ROOA =$
 $(OL / NOA) \times (ROOA - \text{Implicit Interest on OL})$

- 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

$$\text{Leverage Effect} = \text{ROE} - \text{RNOA} = \\ (\text{Debt} / \text{Equity}) \times (\text{RNOA} - \text{Cost of Borrowing})$$

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

$$\text{Leverage Effect} = \text{ROE} / \text{RNOA} = \\ (\text{NOA} / \text{Equity}) \times (\text{NI} / \text{NOPAT})$$

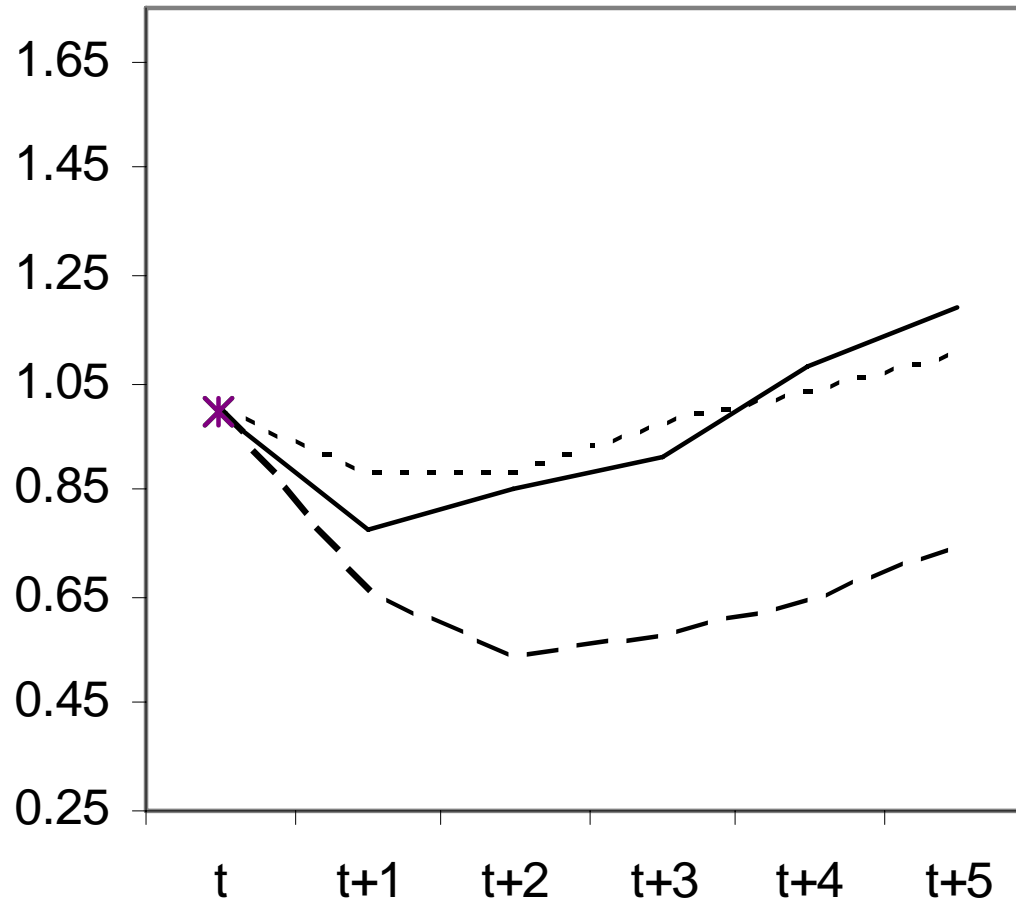
Earnings Quality

- 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

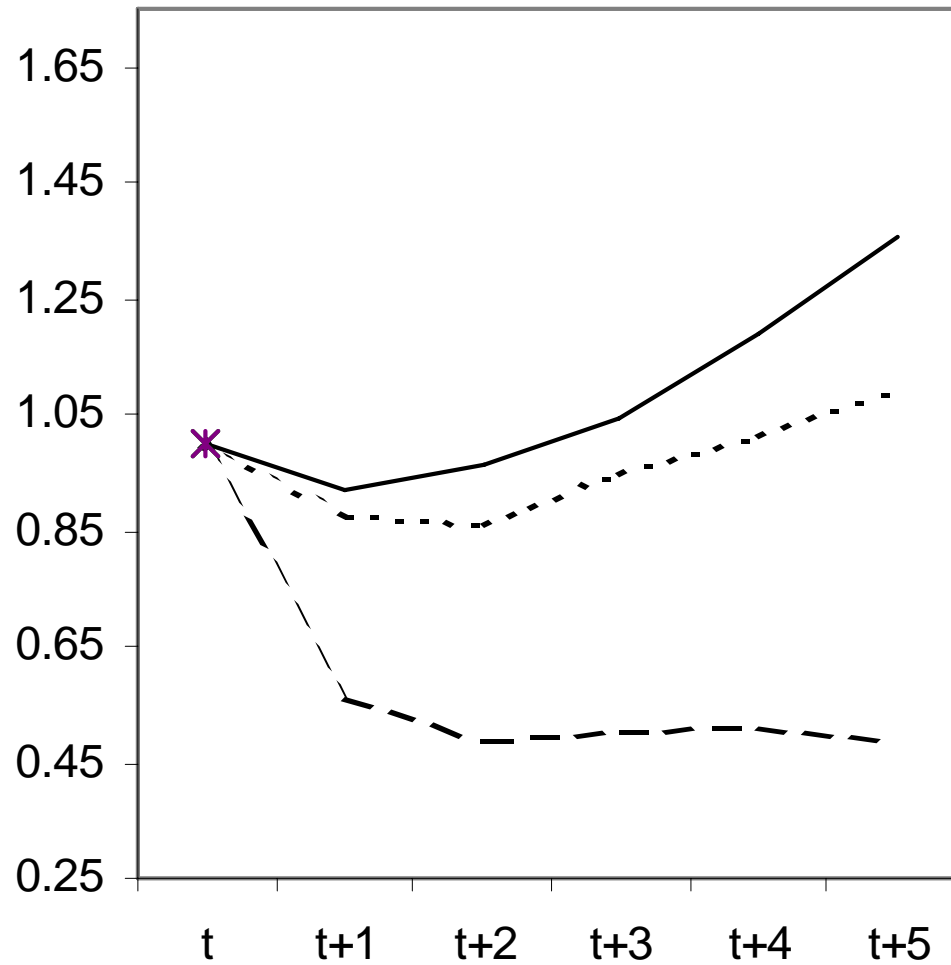
Five-Year Earnings Growth for Portfolios of Firms Sorted by the Cash Flow-to-earnings Ratio



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