ACCOUNTING AND STOCK SELECTION: A SURVEY

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Introduction

- Accounting and stock selection is a current hot topic
- Research motivated by post-earnings announcement drift studies
  - showing that market doesn't fully reflect implications of earnings surprises in a timely manner
  - abnormal returns occur mostly around future earnings announcement dates
    - investors/analysts underestimate persistence of earnings
    - returns unexplainable by risk considerations

Introduction (cont.)

- If market is inefficient with respect to reported earnings
  - it might be inefficient with respect to other accounting information
    - documenting these inefficiencies is a goal of current research

Introduction (cont.)

- This survey discusses stock selection related to:
  - reported accruals
  - accounting conservatism
  - residual income model
  - accounting signals
  - pro forma earnings

Introduction (cont.)

- Studies generally characterized by:
  - sample period extending from 1960's - 1990's
  - abnormal returns measured by
    - market-adjusted returns,
    - size-adjusted returns,
    - intercept from Fama-French 3-factor model and/or
    - intercept from 4-characteristic model
  - returns robust to risk adjustments
    - returns often clustered around future earnings announcements

Accrual Anomaly

- Documented by Sloan
  - *Accounting Review*, July 1996
- Earnings are made up of
  - cash flow
  - accruals
- Investors don't fully understand differing implications of cash flows, accruals

Accrual Anomaly (cont.)

- Cash flow component is more persistent than accrual component
- Investors fixate on reported earnings
  - rather than on separate cash flow, accrual components
- Therefore:
  - firms with high (low) accruals earn negative (positive) abnormal returns

Accrual Anomaly (cont.)

- Sloan's study
  - sample period: 1962-1991
  - earnings defined as income from continuing operations
    - excludes non-recurring items

Accrual Anomaly (cont.)

- Accruals = (_CA – _Cash) – (_CL – _STD – _TP) - Dep
  - _CA = change in current assets
  - _Cash = change in cash
  - _CL = change in current liabilities
  - _STD = change in short-term debt
  - _TP = change in taxes payable
  - Dep = depreciation and amortization expense
- Cash flow component of earnings:
  - earnings minus accruals
- Variables standardized by average total assets

Accrual Anomaly (cont.)

- Firms partitioned each year into deciles
  - according to magnitude of accruals
- Return period begins four months after fiscal year-end

Accrual Anomaly (cont.)

- Size-adjusted returns:
  - lowest accrual portfolio
    - 4.9% 1st year (significant)
    - 1.6% 2nd year
  - highest accrual portfolio
    - -5.5% 1st year (significant)
    - -3.2% 2nd year (significant)
  - hedge portfolio
    - 10.4% 1st year (significant)
    - 4.8% 2nd year (significant)

Accrual Anomaly (cont.)

- 1st year size-adjusted hedge returns are positive in 28 of 30 years
- Size-adjusted returns are clustered around earnings announcements
  - 4.5% at earnings announcement
  - 6.0% outside announcement window

Accrual Anomaly: Growth in Net Operating Assets

- Accruals measures growth in short-term net operating assets
- Does the accrual anomaly extend to growth in long-term net operating assets?
  - Fairfield, Whisenant, and Yohn (*Accounting Review*, January 2003)

Growth in Net Operating Assets (cont.)

- $GrNOA_t = NOA_t – NOA_{t-1}$
  - $GrNOA_t$ = growth in net operating assets, year *t*
  - NOA_t = net operating assets, end of year *t*
- $GrLTNOA_t = GrNOA_t – ACC_t$
  - $GrLTNOA_t$ = growth in long-term net operating assets
  - ACC_t = accruals, end of year *t*

Growth in Net Operating Assets (cont.)

- Sample period: 1964 – 1993
- Firms partitioned each year into deciles
  - according to magnitude of accruals
  - and magnitude of growth in long-term net operating assets
- Abnormal returns calculated using FF 3-factor model

Growth in Net Operating Assets (cont.)

- One-year abnormal returns (all significant):
  - lowest accrual portfolio: 6.5%
  - highest accrual portfolio: -3.1%
  - lowest growth in long-term net operating asset portfolio: 5.5%
  - highest growth in long-term net operating asset portfolio: -1.9%
- No significant different between accrual and long-term net operating asset portfolio returns

Accrual Anomaly: Current Net Operating Assets

- Investors do not fully appreciate earnings implications of net operating assets
  - Hirshleifer, Hou, Teoh, and Zhang (working paper, Ohio State University, September 2003)
- High (low) NOA is associated with high (low) past earnings growth
  - but slower (faster) future earnings growth

Current Net Operating Assets (cont)

- Sample period: 1964 – 2002
- Abnormal returns calculated using characteristic benchmark approach
  - Daniel, Grinblatt, Titman, and Wermers (*Journal of Finance*, July 1997)

Current Net Operating Assets (cont.)

- Annualized abnormal returns (all significant):
  - lowest NOA portfolio:
    - 6.0% 1st year
    - 3.2% 2nd year
    - 3.0% 3rd year
  - highest NOA portfolio:
    - -8.7% 1st year
    - -6.2% 2nd year
    - -3.5% 3rd year
  - hedge NOA portfolio:
    - 14.8% 1st year
    - 9.6% 2nd year
    - 6.4% 3rd year

Current Net Operating Assets (cont.)

- Comparison to accrual anomaly returns:
  - 1st year hedge return 78% larger than for accruals
    - increasing to 152% in year 3
  - Asymmetry between returns to highest and lowest NOA portfolios less than for accruals
    - relatively more attractive for an investor precluded from taking short positions

Current Net Operating Assets (cont.)

- Firms sorted into quintiles based on NOA
  - and then into quintiles based on accruals
  - return spread between top and bottom accrual quintiles is significant in only three NOA quintiles (marginal in two of them)
- Firms sorted into quintiles based on accruals
  - and then into quintiles based on NOA
  - return spread between top and bottom NOA quintiles is significant in all accrual quintiles
    - and much larger in magnitude than accrual spread

Accrual Anomaly: Accrual Components

- Which accrual components have the greatest ability to predict returns?
  - Thomas and Zhang (*Review of Accounting Studies*, June/September 2002)
- Sample period: 1970 – 1997
- Size-adjusted abnormal returns are highest for change in inventories
  - lowest decile: 4.5%
  - highest decile: -6.89%
  - hedge portfolio return: 11.39%
    - positive hedge return in 27 of 28 years

Accrual Components (cont.)

- No explanation for finding that is consistent with data
- Empirical regularity:
  - firms with inventory increases (decreases) have higher (lower) levels of profitability, growth, and abnormal returns over prior 5 years
    - which reverse immediately after inventory change

Accrual Components (cont.)

- Investors do not recognize that less reliable accruals have lower persistence
  - Richardson, Sloan, Soliman, and Tuna (working paper, University of Pennsylvania, July 2003)
- Accruals = change in non-cash assets – change in liabilities
  - more comprehensive definition of accruals than Sloan (1996)

Accrual Components (cont.)

- Accruals = _WC + _NCO + _FIN
  - WC = working capital (medium reliability)
  - NCO = net non-current operating assets (low/medium reliability)
  - FIN = net financial assets (high reliability)

Accrual Components (cont.)

- Sample period: 1962 – 2001
- ROA_{t+1} regressed on:
  - ROA_t
  - $\_WC_t$
  - $\_NCO_t$
  - $\_FIN_t$
  - coefficients on accruals with lower reliability are more negative than those with higher reliability

Accrual Components (cont.)

- One-year size-adjusted abnormal returns:
  - hedge accrual portfolio: 13.3% (significant)
- Hedge portfolio abnormal return is significantly larger than the 10% abnormal return on operating accrual hedge portfolio

Accrual Components (cont.)

- One-year size-adjusted abnormal returns (all significant):
  - hedge _WC portfolio: 12.9%
  - hedge _NCO portfolio: 16.5%
  - hedge _NCA (sum of _WC and _NCO) portfolio: 18.0%
  - hedge _FIN portfolio: -8.2%
- Highest returns for accruals of lowest reliability

Accrual Anomaly: Value-Glamour Anomaly

- What is the relation between value-glamour and accrual anomalies?
  - Desai, Rajgopal, and Venkatachalam (*Accounting Review*, April 2004)
- Similarities
  - discretionary accruals positively related to forecasted growth
  - future returns related to current accounting data
    - firms with high sales growth (glamour firms) have positive accruals
    - firms with low sales growth (value firms) have negative accruals
  - both associated with reversal of prior returns
  - future abnormal returns concentrated around earnings announcements

Value-Glamour Anomaly (cont.)

- Sample period: 1973 – 1997
- Traditional proxies for value-glamour dichotomy:
  - SG: past sales growth
  - B/M
  - E/P
  - C/P: C is “cash flow” as measured by earnings plus depreciation
    - this is not cash flow from operations, as no adjustment is made for accruals
- Additional variable examined: CFO/P
  - CFO is earnings plus depreciation minus change in working capital

Value-Glamour Anomaly (cont.)

- Firms assigned to deciles on each value-glamour proxy
- Regress abnormal return on scaled decile rank for various combinations of proxies, and size
  - coefficient on each proxy interpreted as abnormal return to hedge portfolio

Value-Glamour Anomaly (cont.)

- Accruals (ACC) and SG
  - coefficient on ACC is a significant -7.0%
  - SG coefficient is insignificant
- ACC and B/M
  - coefficient on ACC is a significant -7.1%
  - B/M coefficient is insignificant
- ACC and E/P
  - coefficient on ACC is a significant -9.2%
  - coefficient on E/P is a significant 10.2%
- ACC and C/P
  - coefficient on ACC is a significant -7.6%
  - coefficient on C/P is a significant 10.0%

- Conclusion:
  - accrual and value-glamour anomalies appear to be distinct

Value-Glamour Anomaly (cont.)

- Compare CFO/P with traditional value-glamour proxies
- Regress one-year abnormal returns on size and:
  - SG
  - B/M
  - E/P
  - CFO/P
  - coefficient on CFO/P is 10.9% (significant)
    - only other significant coefficient is that of SG (-3.2%)
- Conclusion: CFO/P parsimoniously reflects value-glamour anomaly

Value-Glamour Anomaly (cont.)

- Regress one-year size-adjusted abnormal returns on size and:
  - CFO/P and ACC
    - coefficient on CFO/P is a significant 12.9%
    - ACC coefficient is insignificant
- CFO/P appears to capture predictive power of accruals for future returns

Accounting Conservatism

- Accounting rules are conservative
  - costs incurred in developing intangibles are generally expensed immediately
    - rather than capitalized on the balance sheet
  - losses are generally recognized sooner than gains

Accounting Conservatism (cont.)

- Do investors and analysts appreciate the impact of conservatism on earnings?
  - Penman and Zhang (*Accounting Review*, April 2002)
- Conservatism measured by C-score:
  - $C_t = (INV_t + RD_t + ADV_t)/NOA_t$
    - INV_t = LIFO reserve
    - RD_t = estimated R&D assets
    - ADV_t = estimated advertising brand assets

Accounting Conservatism (cont.)

- Earnings Quality Indicator (Q-score) measures whether C-score is unusually high or low
  - benchmarked against C_{t-1} and industry median:
    - $Q_t^A = C_t - C_{t-1}$
    - $Q_t^B = C_t$ – Industry median C_t
    - $Q = (Q_t^A + Q_t^B)/2$
- Q-score measures temporary effects of conservatism on earnings
  - high (low) Q-score indicates current profitability is lower (higher) than expected in the future

Accounting Conservatism (cont.)

- Sample period: 1975 – 1997
- Q-score predicts future return on net operating assets (RNOA)
  - Future RNOA for high Q-score firms remains stable or trends up
  - Future RNOA for low Q-score firms deteriorates

Accounting Conservatism (cont.)

- One-year size-adjusted abnormal returns (all significant):
  - lowest Q decile portfolio: -3.17
  - highest Q decile portfolio: 5.78%
  - hedge portfolio: 8.95%
    - hedge portfolio earns positive returns in every year but one
- Size-adjusted hedge returns are negative during prior 2 years
  - while RNOA increases (decreases) for low-Q (high-Q) firms
    - implying that investors misinterpret firms' reported earnings during those years

Residual Income Model

- Residual income, or abnormal earnings, is given by:
  - $x_t^a = x_t - r \cdot b_{t-1}$
    - x_t is reported earnings in period t
    - r is the discount rate
    - b_{t-1} is the book value at the end of period t-1
- Firm value can be expressed as:
  - $V_t = b_t + \sum E_t[x_{t+\_}]/(1+r)_{-}$
- This is equivalent to dividend discount model

Residual Income Model (cont.)

- Assume that:
  - $x_{t+1}^a = \_x_t^a + \_t+1$
    - Dechow, Hutton, and Sloan (*Journal of Accounting and Economics*, January 1999)
- Then:
  - $V_t = b_t + \_ \cdot x_t^a/(1+r- \_)$
- To estimate V_t
  - 12% discount rate is assumed
  - a number of different values of _ are used

Residual Income Model (cont.)

- Sample period: 1976 – 1995
- Form deciles according to V/P ratio
- One-year returns (all significant):
  - lowest V/P decile
    - 13.6% - 15.9% (depending on value of _ used)
  - highest V/P decile
    - 21.5% - 23.5%
  - hedge portfolio
    - 7.2% - 9.9%

Residual Income Model (cont.)

- Operationalize residual income model using analysts' earnings forecasts
  - Frankel and Lee (*Journal of Accounting and Economics*, June 1998)

$$V_t = B_t + \sum_{i=1}^{\infty} \frac{E[(ROE_{t+i} - r_e)B_{t+i-1}]}{(1+r_e)^i}$$

  - B_t = book value at time t
  - ROE_{t+i} = after-tax return on equity for period t+i
  - r_e = cost of equity capital

Residual Income Model (cont.)

- Required inputs:
  - r_e
    - estimated using an industry-based discount rate
  - dividend payout rate, k
    - estimated by dividing dividends in most recent 12 months by net income before extraordinary items
      - or by dividends divided by 6% of net assets, for firms with negative earnings
    - which allows for the computation of book value:
    - $B_{t+1} = [1 + (1-k)ROE_{t+1}]B_t$

Residual Income Model (cont.)

- future ROE's
  - calculated based on analysts' earnings forecasts
- forecast horizon and terminal value
  - specific earnings forecasts for two years are used
  - terminal value is a zero-growth perpetuity

- Sample period: 1975 – 1993

Residual Income Model (cont.)

- Returns:
  - low V/P quintile:
    - 13.8% for 12 months
    - 21.7% for 24 months
    - 33.1% for 36 months
  - high V/P quintile:
    - 15.9% for 12 months
    - 31.1% for 24 months
    - 49.3% for 36 months
  - hedge portfolio (all significant):
    - 3.1% for 12 months
    - 15.2% for 24 months
    - 30.6% for 36 months

Residual Income Model (cont.)

- Partition firms into quintiles based on B/M
  - return differences between top and bottom V/P quintiles are significant in each B/M quintile
    - range between 15.0% and 46.9%
- Partition firms into quintiles based on V/P
  - return differences between top and bottom B/M quintiles are only significant in one V/P quintile
- Similar results are found for size-partitioning
- Conclusion: predictive power of V/P is not explained by either B/M or size

Accounting Signals

- High B/M firms outperform low B/M firms
- Strategy's success relies on strong performance of a minority of firms
  - majority of firms underperform
- B/M strategy could be improved by discriminating, ex-ante, between strong and weak companies
    - Piotroski (*Journal of Accounting Research*, Supplement 2000)

Accounting Signals (cont.)

- Average high B/M firm is financially distressed
  - declining and/or low margins, profits, cash flows, liquidity
  - rising and/or high levels of financial leverage
- Variables reflecting changes in these conditions should help predict firm performance

Accounting Signals (cont.)

- Nine fundamental signals used to measure financial condition
  - each signal characterized as either good (1) or bad (0)
- F-score is the sum of these signals

Accounting Signals (cont.)

- Profitability
  - ROA
    - signal = 1 (0) if ROA is positive (negative)
  - CFO
    - signal = 1 (0) if CFO is positive (negative)
  - _ROA
    - signal = 1 (0) if _ROA is positive (negative)
  - ACCRUALS
    - signal = 1 (0) if ACCRUALS is negative (positive)

Accounting Signals (cont.)

- Leverage, liquidity, and sources of funds
  - _LEVER: change in LTD/TA
    - signal = 1 (0) if _LEVER is negative (positive)
  - _LIQUID: change in current ratio
    - signal = 1 (0) if _LIQUID is positive (negative)
  - EQ_OFFER:
    - signal = 1 (0) if the firm did not (did) issue common equity during year

Accounting Signals (cont.)

- Operating efficiency
  - _MARGIN: change in gross margin ratio
    - signal = 1 (0) if _MARGIN is positive (negative)
  - _TURN: change in asset turnover ratio
    - signal = 1 (0) if _TURN is positive (negative)
- F-score expected to be positively associated with
  - future firm performance
  - future stock returns

Accounting Signals (cont.)

- Sample period: 1976 – 1996
- Sample consists of firms in the highest B/M quintile
- Positive relation between F-score and next year's ROA
  - spread between ROA of high and low F-score deciles is 10.6%

Accounting Signals (cont.)

- One-year market-adjusted returns:
  - all high B/M firms: 5.9%
  - high F-score firms (deciles 8 and 9) : 13.4%
  - low F-score firms (deciles 0 and 1): -9.6%
  - high-low F-score firms: 23.0% (significant)
  - high-all high B/M firms: 7.5% (significant)

Accounting Signals (cont.)

- Two-year market-adjusted returns:
  - all high B/M firms: 12.7%
  - high F-score firms: 28.7%
  - low F-score firms: -14.5%
  - high-low F-score firms: 43.2% (significant)
  - high-all high B/M firms: 16.0% (significant)

Accounting Signals (cont.)

- A similar analysis is performed for the lowest B/M quintile firms
  - Mohanram (working paper, NYU, April 2003)
- Uses same nine fundamental signals

Accounting Signals (cont.)

- Adds six growth signals
  - stability of earnings
    - measured by variance of ROA over last five years
      - signal = 1 if ROA variability is less than that of industry, 0 otherwise
  - stability of growth
    - measured by variance of sales growth over last five years
      - signal = 1 if sales growth variability is less than that of industry, 0 otherwise

Accounting Signals (cont.)

- earnings vs. revenue growth
  - signal = 1 if earnings growth rate is at least equal to sales growth rate, 0 otherwise
- R&D, advertising, and capital expenditures
  - signal = 1 if R&D/TA is greater than median for industry, 0 otherwise
  - signal = 1 if advertising/TA is greater than industry median, 0 otherwise
  - signal = 1 if capital expenditures/TA is greater than industry median, 0 otherwise

Accounting Signals (cont.)

- Sample period: 1979 – 1999
- Four lowest F-score deciles are the “low” group
- Highest three F-score deciles are the “high” group

Accounting Signals (cont.)

- One-year size-adjusted returns:
  - low F-score firms: -8.4%
  - high F-score firms: 0.2%
  - high-low F-score firms: 8.6% (significant)

Accounting Signals (cont.)

- Lowest G-score decile is the “low” group
- Highest 3 G-score deciles are the “high” group
- One year size-adjusted returns:
  - low G-score firms: -16.2%
  - high G-score firms: 1.9%
  - high-low G-score firms: 18.1% (significant)
- Second year size-adjusted returns:
  - low G-score firms: -10.3%
  - high G-score firms: 0.9%
  - high-low G-score firms: 11.2% (significant)

Pro Forma Earnings

- Many companies report pro forma earnings
  - which exclude certain expenses
- Implicitly conveys that excluded expenses do not have predictive value for future earnings
- Do investors understand predictive value of excluded expenses?
  - Doyle, Lundholm, and Soliman (*Review of Accounting Studies*, June/September 2003)

Pro Forma Earnings (cont.)

- I/B/E/S earnings is proxy for pro forma earnings
- Decompose difference between earnings and pro forma earnings into two parts
  - special items
    - e.g., restructuring charges
  - other exclusions
    - e.g., goodwill amortization

Pro Forma Earnings (cont.)

- $1 of excluded expenses predicts $3.328 less in cash flow over next three years
  - more than 40% of the predictive value of pro forma earnings
- Special items are generally unrelated to future cash flows
- $1 of other exclusions predicts $6.422 less in cash flow over next three years
  - almost as large as the predictive value of pro forma earnings

Pro Forma Earnings (cont.)

- Regress market-adjusted returns over next 3 years on:
  - earnings surprise, scaled by total assets
  - total exclusions, scaled by total assets
  - B/M
  - size
  - beta
  - accruals
  - momentum
- All variables expressed as a scaled rank
  - between 0 and 1
    - variable coefficient represents hedge portfolio return, controlling for the other variables

Pro Forma Earnings (cont.)

- Sample period: 1988 – 1999
- Coefficient on total exclusions (all significant):
  - -5.7% one year
  - -9.8% two years
  - -11.3% three years
- Coefficient on total exclusions for subsample of non-zero total exclusions (all significant):
  - -7.7% one year
  - -14.5% two years
  - -24.7% three years

Pro Forma Earnings (cont.)

- Dividing the total exclusions into special items and other exclusions:
  - only coefficient on other exclusions is significant
    - and greater than that on total exclusions

Pro Forma Earnings (cont.)

- Coefficient on other exclusions (all significant):
  - -6.2% one year
  - -10.8% two years
  - -16.1% three years
- Coefficient on other exclusions for subsample of non-zero total exclusions (all significant):
  - -8.3% one year
  - -14.9% two years
  - -31.2% three years
- Abnormal returns exist for a long time because there is no future reversal for investors to identify

Summary

- Abnormal returns can apparently be earned on strategies related to:
  - accruals
  - degree of accounting conservatism
  - fundamental firm value
  - accounting signals
  - pro forma earnings

Summary (cont.)

- Abnormal returns not explainable by risk
  - many risk factors are controlled for
  - bulk of return around earnings announcements
- Analysts and investors do not fully and correctly react to accounting information when disclosed

Summary (cont.)

- Unresolved questions:
  - why isn't readily available accounting information quickly and fully reflected in prices?
    - why does it take years, in some instances?
  - why do sophisticated investors (such as analysts) make biased inferences about the implications of accounting information?