

Psychology
and
Financial Statement Analysis:
*How can analysts avoid the pitfalls?**

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* I thank Hanna Lee and Helen Wang for research assistance.

* This article began as a lecture note for the author's MBA financial statement analysis elective at Columbia Business School. Columbia MBA students from 2002 to 2007 contributed class discussion ideas to this article.

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ABSTRACT

What are the psychological pitfalls that analysts should avoid when evaluating financial statements? This article describes a list of ten major pitfalls and proposes that disciplined processes be installed to mitigate them. Checklists, scorecards, and pre-articulated procedures add value by disciplining the analyst to resist pitfalls like over-confidence, narrow framing, and anchoring bias and to assess based on the agreed-upon criteria. Such discipline improves the chances of achieving consistent, reproducible, and scalable results across trades and over time.

Keywords: financial statement analysis, equity screening, behavioral finance

Much has been written about how psychology impacts stock prices (e.g., Thaler 1999; Hirschleifer 2001), investment advice (Kahneman and Riepe 1998), performance evaluation (Statman and Scheid 2002; Kahn 2004), the interpretation of accounting numbers (Hirschleifer and Teoh 2003), sell-side analysts' earnings forecasts (Richardson, Teoh, and Wysocki 2004), and asset allocation (Statman 2004). In stark contrast, the literature has been strangely silent about how psychology can affect financial statement analysis ("FSA"), the bottoms-up process of collecting, interpreting, and using fundamental information – the first step in evaluating and selecting stocks. The purpose of this article is to alert financial analysts to the potential psychological pitfalls in FSA and to recommend that analysts and asset managers mitigate them by instituting disciplined decision-making processes.

A Talent, Not a Craft

Financial statement analysis is the process of transforming accounting information from quarterly and annual financial statements into projections of future cash flow and returns. A detail-oriented firm-level activity, its goal is to evaluate a business and its prospects, and to arrive at a buy/sell recommendation or fair value estimate for a proposed investment or M&A transaction.

FSA is a talent, not a craft. This is because the purpose of FSA is not only to forecast the future – a task of skill – but to forecast the future better than the stiff competition – a task requiring more than mere competency. Numerous MBA textbooks such as Copeland, Koller, and Murrin (2000), White, Sondhi, and Fried (2003), and Penman (2004) describe its mechanical aspects. But, despite elaborate numerical analysis and number crunching, implementing FSA requires that analysts make crucial judgment calls. FSA is not a purely quantitative activity like derivatives pricing or Markowitz portfolio optimization. Absent sound judgment, FSA is a Cheshire Cat – an enticing grin with no body.

Because FSA is a talent and not a craft, successful practitioners differentiate themselves by cultivating "styles" for making the necessary judgment calls (CEASA

2006). Unfortunately, no matter how practitioners make their judgment calls, the calls are subjective. Thus, FSA is unavoidably susceptible to psychological biases. First, FSA requires an analyst to select firms and input data characterizing the chosen firms for analysis. This invites several dimensions of potential selection bias. Which firms and industries should be in the pool of candidates for investment consideration? Which of the hundreds of accounting numbers in a set of financial statements should the analyst focus on? If the analyst wants to study firm-level trends, how many years of historical time series data should she keep? If the analyst wants to compare profitability ratios across firms, what peer firms should she use for comparison?

A second area of subjectivity stems from how selected data is interpreted. What is the best measure of profitability for a given firm: operating income, EBITDA, or net income? Should the analyst place more weight on projected revenue growth or profit margins? Should she try to correct for earnings management or low “earnings quality” as indicated by the growing body of evidence documenting accounting-based pricing anomalies (e.g., Bernard and Thomas 1989; Ou and Penman 1989; Sloan 1996; Abarbanell and Bushee 1998; and Lee 2001)? How should the analyst handle unrealized foreign currency translation gains and losses and pension liability estimates?

A third and probably the most discretionary aspect of financial statement analysis concerns how raw accounting information is combined to make cash flow and earnings forecasts, value and target price estimates (Copeland, Koller, and Murrin 2000; Penman 2004), and “alpha” scores (Treynor and Black 1973; Black and Litterman 1992; Piotroski 2000; Alford, Jones, Lim, and Litterman 2004). Different analysts use different models and different models often yield inconsistent answers (Yee 2004). Even techniques as basic as ratio screening or the method of comparables require subjective input. What set of screening ratios should she work with?¹ How should these ratios be adjusted to correct

¹ There are two ways that academic studies have tried to identify the most useful set of screening ratios: statistical search (Ou and Penman 1989) and guided search (Lev and Thiagarajan 1993; Piotroski 2000). Statistical search lets the data speak for itself (subject to *ad hoc* restrictions on the search space) but, depending on implementation details, is subject to the pitfall of data snooping. In contrast, guided search relies on *ex ante* theoretical hypotheses to motivate the search space and the construction of prediction variables. Both are vulnerable to selection bias in the search space.

for leverage, unusual market conditions, or accounting biases? If the analyst chooses to use a more sophisticated forecasting model, how should she estimate input parameters like betas, growth rates, and variances that valuation and portfolio selection models demand? These estimation exercises are fraught with subjectivity.

Is Analyst Psychology Important?

Numerous studies, some on the pages of FAJ, have documented evidence of psychology or non-rational behavior by capital market participants. While there is little doubt as to the existence of some non-rational behavior at the individual level, the importance of analyst psychology at the aggregate market level is open to debate. Hundreds of accounting rules have been enacted or altered in the last several decades without causing gigantic swings in stock prices. Lifting mandatory goodwill amortization did not cause prices to systematically inflate. The imposition of stock option expensing in 2006 did not cause the shares of tech firms to systematically collapse. Does this imply that analysts and investors override accounting foibles and rationally process substance over form so that behavioral pitfalls do not matter?

For the following reason, I think not. Since behavioral biases infect *individual* analyses and trades, behavioral biases could significantly reallocate trading gains and losses across traders without causing swings in stock prices, which reflect “average” beliefs. Accordingly, the great danger of behavioral phenomena is that they cause stand-alone investors to behave sub optimally in their portfolio selection and trading activities and, thus, open themselves up to exploitation by more rational or quantitative investors. For example, Odean (1998) finds that small investors incur lower returns because they hold on to losers too long. The lesson is clear: even if the market is efficient on average, *an investor who falls into behavioral traps is unable to rely naively on market efficiency for a fair shake.*²

² Beyond this, I believe FSA is not a zero-sum game. FSA is but one stage in the market’s capital allocation process, which involves everything from capital formation, auditing, and FSA to financial planning and portfolio management. How FSA is implemented trickles through to impact other stages of the capital allocation process.

Whether analyst psychology plays an important role at the aggregate level is an open question. It is tempting to conjecture that anomalies like post-earnings-announcement drift (Bernard and Thomas 1989), value stocks (LaPorta, Lakonishok, Shleifer, and Vishny 1997), and the accruals anomaly (Sloan 1996) are market-wide aggregate implications of individual analyst psychology. Indeed, sixteen years ago Zeckhauser, Patel, and Hendricks (1991) offer a thought-provoking essay advocating that micro-economists and psychologists build models of pricing anomalies by mathematically aggregating the irrational behavioral traits of market participants. This program has since been pursued by, among many other academics, Daniel, Hirshleifer, and Subrahmanyam (2001), Hirshleifer and Teoh (2003), and Shefrin (2005). Mauboussin (2006) offers a masterful popular account of interdisciplinary thinking on this topic and Yee (2005) considers behavioral aggregation in a non-market setting.

10 Behaviors That Impact FSA

This section introduces the behaviors that are potentially most relevant to financial statement analysis and the next section describes how they impact FSA. While Kahneman and Riepe (1998), Thaler (1999), Hirshleifer (2001), and Shefrin (2005, Chapter 27) provide more comprehensive lists of behaviors, I have reduced their ideas down to ten behaviors that apply specifically to financial statement analysis.

The first set of non-rational behaviors is what Kahneman and Riepe and Hirshleifer refer to as “biases of judgment”. Of these, analyst overconfidence, over optimism, and overreaction, even if not made inevitable, are at least exacerbated by self-selection.³ Analysts self-select not only into the profession but also the stocks they cover and the ones they ignore. Thus, overconfidence, over optimism, and overreaction are lurking pitfalls.

³ Although I believe that enthusiastic and emotional people are more likely to self-select into the analyst profession than into, say, the legal or teaching professions, I decided to leave mood swings and other emotional pathologies off my list of judgmental biases. Granted, one cannot rule in or rule out that mood and sunlight could affect the outcome of financial statement analysis without empirical evidence.

1. *Overconfidence*: An analyst is overconfident if she mistakenly believes a realization distribution is narrower or more favorable than it really is. In controlled experiments, 15%-20% of outcomes fall outside subjects' expressed 95% confidence intervals (Odean 1998).
2. *Over optimism*: More than 50% of kids in Lake Woebegone believe they are above average. In addition to over-estimating means, optimists may also under-estimate the role of chance in determining outcomes and misperceive games of chance as games of skill, which means optimists believe they are in more control than they really are.
3. *Overreaction to recent events and hot-hand fallacy*: Investors extrapolate real or imagined trends into the future. This promotes the hot-hand fallacy (zeal that a hot hand will persist) and causes investors to "ride the winners" too much, which in turn generates real stock-price momentum (Zeckhauser, Patel, and Hendricks 1991).

LaPorta, Lakonishok, Shleifer, and Vishny (1997), Piotroski (2000), Griffin and Lemmon (2002), Mohanram (2004) and others report statistical evidence consistent with the hypothesis that investors systematically under react to both contrarian *good* news about beaten-down value stocks and contrarian *bad* news about over-hyped growth stocks. Consequently, value stocks remain undervalued too long while growth stocks remain overvalued too long, which causes the famous value-growth anomaly.

While self-selection exacerbates biases of judgment, business schools reinforce the next set of biases by virtue of how they train analysts.

4. *Hindsight bias*: Unanticipated events appear inevitable after the fact. Hindsight bias promotes overconfidence that pet anecdotal scenarios (such as famous business school discussion cases) will recur. Ironically, an analyst that is more inclined to accept "practical commonsense" is more susceptible to hindsight bias since she will selectively identify anecdote-reproducing patterns in a sequence of events. Hindsight bias is the FSA equivalent of data snooping bias in statistical analysis.
5. *Regret for act of commission*: People focus too much on outcomes as opposed to the decision-making process and, moreover, hate to be proven right. Accordingly, an analyst prefers to issue high probability recommendations over higher expected-benefit (but lower probability) ones. Therefore, an analyst might be slow or fail altogether to make a rational call in order to avoid the risk of being proven wrong.
6. *Herding*: People conform to the observed behavior of others even when that behavior is without identifiable justification.⁴ Herding improves market efficiency when, by

⁴ Causal observation suggests that herding is relevant to Wall Street, where institutional practices provide career and pecuniary incentives for analysts to meet benchmarks and follow "normal" practices. I thank the editor for calling to my attention the distinctions between herding, collective wisdom and collective miscalculation.

virtue of centralizing group information and diversifying away irrational idiosyncratic behavior, herd behavior leads to “collective wisdom” that is superior to any individual acting independently. Unfortunately, herd behavior could also lead to “collective miscalculation” by spreading individual error to other herd members. Collective miscalculation could be responsible for perpetuating anomalies such as price momentum, market bubbles, or over-reliance on naive valuation heuristics.

My final set of non-rational behaviors refers to deviations from standard mean-value preferences or Bayesian rationality with respect to the use of probability distributions.⁵

7. *Non-Bayesian handling of probabilities*: People do not intuitively process probability assessments in a Bayesian rational way. For example, people often over-estimate the likelihood of a long shot so they over-pay for lottery tickets and insurance. In laboratory experiments, subjects value a 1% chance of winning \$1000 more than a \$10 gift.
8. *Fixation on recent changes, myopia*: Investors have a penchant to fixate on recent changes in a handful of familiar metrics (e.g., price, EPS, revenues) and pay insufficient attention to the long-run picture. Moreover, since US GAAP financials are conveniently stated in nominal U.S. dollars, analysts may not duly appreciate the implications of exchange rate fluctuations on revenues from overseas subsidiaries.
9. *Narrow framing, heuristic simplification*: Investors have a penchant to fixate too much on familiar metrics and unpleasant outcomes like P/E ratios or the possibility of slowing near-term growth. In laboratory experiments, individuals avoid buying insurance (locking in a sure expense) and opt instead to gamble on a probability of no loss even if buying insurance is mathematically the rational course of action.
10. *Mental accounting, anchoring bias*: Mental accountants put gains and losses into separate mental accounts and treat them as distinct accounts, overlooking the fact that a dollar is a dollar whether it is received from account A or account B. An undue emphasis is placed on tracking individual accounts and not enough on looking at the overall results of the portfolio. Similarly, anchorors cling too much to some peripheral piece of information. In experiments, Tversky and Kahneman (1974) find that when people are shown a number (like a social security number) they are told up front is irrelevant, the number nonetheless influences their decisions.

⁵ One can alternatively re-interpret behaviors 8-10 from the perspective of prospect theory, where rational investors have utilities that depend on (irrational) reference points relative to which gains and losses are valued asymmetrically. Specifically, Kahneman and Tversky (1979) find that investors are risk-averse to gains and risk-preferring with respect to losses. In this sense, prospect-theory investors fixate on recent changes and suffer from mental accounting and anchoring bias that places gains and losses in separate buckets. An implication of prospect theory is the disposition effect, according to which investors sell winners more quickly than losers (Odean 1998).

Training analysts in advanced probability and statistics would not inoculate analysts against Bayesian irrationality because a smart analyst can easily rationalize biased assessments by suitably adjusting her prior belief assumptions. In the context of financial statement analysis, Bayesian analysis requires subjectively estimated belief assumptions.

Implications for Financial Statement Analysis

This section elaborates on the first two columns of Table 1. The first column lists the ten behavioral phenomena identified above. The second column itemizes each phenomenon's implication for FSA. The next section discusses the third column of Table 1, which suggests a possible course of action that an analyst might take to mitigate the likelihood of FSA bias associated with each behavior.

INSERT TABLE 1 NEAR HERE.

As indicated in Table 1, behavioral biases affect information collection (how an analyst chooses information to incorporate and which to ignore); information processing (how frequently an analyst revises her forecasts and with what level of confidence); and the conclusions she draws from financial statement analysis. In particular, herding, myopia, narrow framing, and anchoring bias distort information collection. Overconfidence, over optimism, hindsight bias, non-Bayesian handling of probabilities, fixation, and anchoring bias distort information processing. Regret, herding, and mental accounting influence the valuation estimates, revisions, and recommendations the analyst is willing to recognize and articulate.

Hindsight bias, non-Bayesian handling of probabilities, fixation, narrow framing, and mental accounting also stimulate financial statement data snooping. An analyst might rationalize a past mistake by pointing to calls that she should have made were it not for an "avoidable" mistake. Even worse, an analyst might compound her mistake by constructing a quasi-scientific heuristic that will enable her to make the right call next time. If she had ignored an impairment charge, which *ex post* proved to coincide with subsequent disappointing returns, she may over react to impairment charges next time. Analogously, economic theorists are not unknown to offer ingenious *ex post*

modifications to rescue their failed predictive models. “The reality is too painful to bear, so you just distort it until it’s bearable.” (Munger 1995)

Mitigation of the Behavioral Pitfalls

Being aware of the pitfalls and when they might occur in financial statement analysis is the first step towards mitigating them. Beyond this, I believe that investment managers should commit to processes – formal procedures and schedules for collecting information (perhaps using checklists and scorecards), updating forecasts, and deriving valuation estimates or buy/sell recommendations. The emphasis should be on the investment decision-making *process*: performing Bayesian-consistent, reproducible FSA that lead to sound investment decisions. Fortuitous outcomes arising from *ex ante* unsound decisions must not be celebrated since good luck is not consistently reproducible.

I recommend that investment managers put in place decision-making processes that

1. apply their chosen FSA style evenly to every candidate investment in their investment universe;
2. aim to diversify away potential idiosyncratic FSA errors caused by analyst-specific psychological biases; and
3. command enough institutional commitment to survive inevitable periods of disappointing performance.

Managers should whittle a chosen process down to its essential elements to avoid loopholes where human psychology can creep in unnecessarily. The goal is a disciplined process, not an onerously bureaucratic or black-box one.

Unfortunately, financial statement analysis is a complex activity subject to many unknowns that may change with time (Yee 2007). As a result, the applicability of any given process, even quantitative ones built upon so-called rigorous theory, is not infinite in domain. Businesses are not stationary entities; their operations and personnel change over time. The investment environment and the macro-economic states of the world also change over time. Because such changes may cause a given investment approach to become ill-advised, human judgment is always necessary to assess when to suspend a

process. As such, the need for human intervention is an unavoidable component of any process, including quantitative ones.

For this reason, I also recommend that decision-making processes discipline fundamental analysts to pay attention to the forest and the forest in the long run as well as the trees. Having a vast array of ingenious analytical tools can create an illusion of false security. Tools do not substitute for rationality. Analysts need to understand both the virtues and limitations of these tools, and to make allowances for their inadequacies. Mitigating fixation and framing biases born of naïveté requires that analysts expand their intellectual competency beyond traditional FSA methods. Managers should avoid cultivating over-specialization of labor based on the notion that stunting analysts in other directions stimulates them to grow faster within their narrow specialties. In FSA, “it is better to be roughly right than precisely wrong”⁶ and narrow thinking increases dangerously the odds of the latter.⁷

The last column of Table 1 itemizes my recommendations for counteracting each listed behavioral bias. In Table 1, “pre-set procedures” refer to checklists and scorecards that itemize questions analysts must answer when evaluating a firm. These checklists and scorecards should be tailored to the investment manager’s investment style and applied to every potential investment.

The use of pre-set procedures yields several benefits. It encourages consistent and reproducible results. It discourages narrow framing and draws the analyst’s attention away from irrelevant (or strategically disfavored) information that might trigger mental accounting or anchoring bias. Simultaneously, checklists and scorecards direct the analyst’s attention to the factors that management has deemed important as a matter of investment style and policy.

⁶ Economists commonly attribute this adage to J. M. Keynes (Davidson 1984 at 574) although I have not been able to find it in Keynes’s published works.

⁷ FSA should be taught in coordination with complementary topics in financial economics, such as modern portfolio theory, risk management, and decision analysis. Teaching FSA to aspiring analysts who have insufficient grasp of these complementary frameworks would be like giving driving lessons to students who don’t know how to brake.

In Table 1, “quantitative methods” refer to the use of theory-guided financial statement analysis techniques. These include, but are not limited to, DuPont ratio decomposition, discounted cash flow analysis, residual income valuation (e.g., Penman 2004), rule-based equity screening and alpha scoring, and other quantifiable asset allocation frameworks (Treynor and Black 1973; Black and Litterman 1992).

Process Adds Value but is Not a Panacea.

Beyond the number crunching, FSA is a subjective activity – a talent, not a craft. Like any human activity, it is subject to behavioral pitfalls associated with analyst psychology. This article offers my attempt to identify warning signs for FSA practitioners from the growing field of behavioral finance. There are numerous ways for a fundamental analyst to go wrong, from narrow framing to hindsight bias and identifying imagined patterns in financial time series. These psychological pitfalls always lurk even if an analyst is free of incentive-driven biases or other sinister intentions; behavioral potholes await even honest analysts attempting to make fair evaluations.

While the purpose of this article is not to advocate any particular FSA framework, one way to counteract behavioral biases is to emphasize discipline and process over near-term outcomes. A disciplined process adds value by removing in-the-moment psychology and emotions from the picture and disciplining the analyst to make emotionally detached assessments based on pre-agreed attributes like scores and screens. A disciplined process achieves consistent, reproducible, and scalable results across trades and over time. Behavioral finance research such as Odean’s (1998) result suggests that process and discipline just might be the main sources of value-added by the quantitative asset managers whose FSA style is “shallow dive” or arms length.

Nonetheless, process is not a panacea. Some degree of human intervention and discretion is unavoidable in financial statement analysis because the applicability of any given process is not infinite in domain. Unanticipated regime shocks – such as the subprime mortgage overhang at the time of this writing – require human judgment to assess whether an existing FSA process requires intervention. Accordingly, a degree of human intervention is an unavoidable component of any FSA process – even if human

judgment is limited to deciding when/if to pull the plug on that process.

In a speech at Harvard, Charlie Munger (1995) said “To a man with a hammer, every problem tends to look pretty much like a nail.” Success with a process potentially breeds a new behavioral pitfall: hammer bias. An asset manager who enjoys success with a certain FSA process is naturally tempted to apply her hammer to more nails. The pitfall is that all nails are not suited to the same type of hammer, even one with a stellar track record.

Conclusion

As behavioral finance is documenting, psychology lurks in the shadows ready to strike in every economic activity that requires a degree of subjective judgment. Financial statement analysis is no exception. Accordingly, fundamental investment managers and analysts must be alert to the instances where subjective behavioral biases may lead to bad decisions. Fundamentalists can improve their performance by supplementing their bottoms-up analyses with quantitative processes and frameworks that instill discipline and prevent errors caused by psychological tendencies to misinterpret details.

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Table 1: Psychological implications and how to mitigate them.

Behavioral Bias	Possible FSA Implications	Possible Remedy
Overconfidence	Under-recognition of uncertainty inherent in financial projections.	Estimate confidence intervals using quantitative statistical procedures whenever possible.
Over optimism	Extrapolation of temporary good performance to over-optimistic growth projections. Under-projection of risks and expenses.	Rely on quantitative methods. Do not extrapolate based on intuition or limited data. Be skeptical. Avoid temptation to override quantitative methods when they yield answers that differ from personal preferences.
Overreaction to recent events, hot-hand fallacy	Undue belief that current performance, whether good or bad, will persist into the future. Promotes “ride the winners” tendencies.	
Hindsight bias	Over-reliance on anecdotal evidence. Firm-level data snooping.	Disregard anecdotal evidence that lack statistical support.
Regret for acts of commission	Foregoing an optimal decision to avoid chance of a bad outcome. Withholding a rational recommendation due to risk of being wrong.	Revise forecasts according to pre-set quantitative formulas and schedules. Avoid temptation to override when the formulas yield answers that differ from personal preferences.
Herding	Hesitating to draw conclusions that deviate from consensus or pre-existing opinion. “If EBITDA is the fashionable metric, I must also use it.”	Avoid actions without first identifying a clear rationale. Make an independent forecast before comparing to the consensus opinion.
Non-Bayesian handling of probabilities	Mis-weighting of information to form forecasts. Mis-understanding of risk profiles.	Use Bayesian framework when working with probabilities.
Fixation on recent changes, myopia	Paying undue attention to extraordinary gains or losses, earnings near-misses, or other transitory one-time events.	Develop quantitative procedures, not only to interpret the medium and longer-term implications of changes, but also to select and organize the input data. Proactively learn about and consistently incorporate information from less familiar accounting numbers.
Narrow framing, heuristic simplification	Fixating on familiar numbers and overlooking complex charges or arcane but hazardous footnote information.	
Mental accounting, anchoring bias	Allowing irrelevant information like earnings momentum to unduly affect analyses. Lowering analytical standards for glamorous stocks. Valuing gains and losses differently.	