The Moneyball of Quality Investing

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Factor investing has rightfully gained adherents among investors seeking superior risk-adjusted returns. Our research reveals that quality is not a factor that reliably commands a premium in its own right. Nonetheless, value investing conditioned upon certain indicators of company quality is a promising strategy.

In 2000, Mike Hampton, a star pitcher, signed the largest contract in sports history up to the time. The compensation was $121 million over eight years. As it turned out, however, Hampton had only one truly successful year out of the eight. He was a great ballplayer, but he was not worth the negotiated amount. In baseball—and in soccer, too[1]—hiring great players at high salaries is a bad business decision.

Billy Beane, the general manager of the Oakland Athletics, was one of the first major league baseball executives to understand that traditional scouting methods lead to overpaying for skills that don't reliably contribute to success. Beane's objective was to make the best possible use of the A's limited salary budget by winning games as cheaply as possible. (His European counterpart would be Sir Alex Ferguson, who managed Manchester United from 1986 to 2013.)[2] Beane was playing what came to be known as "moneyball." He and his staff learned to focus on players' statistics, rather than appearances, and, in time, they isolated the metrics that count.

In the investment field, the factor framework has migrated from academia to the real world of investment decision-making. Investors are seeking higher returns at low costs, and factor investing seems to offer the solution. But factors may not offer the returns that many believe are linked to them. Quality is one such factor.

The meaning of quality as an investment practitioner's term of art is unclear. It is tempting to believe that good companies—quality companies—are good investments, but the evidence does not support this thesis. Our research shows that quality is not a factor that reliably commands a premium in its own right. Nonetheless, value investing conditional on certain indicators of company quality is a promising strategy.

What Is Quality?

Given the focus on factor investing as well as the allure of quality to many investors, we decided to test whether there is a reliable premium associated with a quality factor. Unlike more established factors such as market, value, or momentum, there is no precise, generally accepted definition of investment quality. In academic circles, the most commonly used definition is profitability as measured by the gross-profits-to-assets ratio.[3] The presumably homogeneous inputs make it an apt choice for identifying profitable companies, but it is not the only financial measure of a quality company. Scanning academic publications and investment managers' approaches, we identified 10 different factors:[4]

1. Profitability
2. Margins
3. Growth in profitability
4. Growth in margins
5. Leverage
6. Financial constraints and distress
7. Earnings stability
8. Net payout/issuance
9. Growth activities (R&D, advertising expenses, etc.)
10. Accounting quality

The list is long but not exhaustive. Knowledgeable readers could surely enumerate a few more items. Nonetheless, these categories suggest a number of variables that might serve as quality metrics. We chose three to five metrics within each category and report performance results for the long–short strategies based on these measures in **Table 1**. The measures associated with published studies are highlighted in grey.

Table 1. Performance by Quality Measure (U.S. Stocks, July 1965–January 2014)

Name	Mean	Vol	t-stat	Name	Mean	Vol	t-stat
Accounting Quality				**Financing/Capital Structure**			
Accruals	2.2%	9.7%	1.58	Equity Issuance	4.5%	9.7%	3.25**
Net Operating Assets	4.1%	9.8%	2.95**	Debt Issuance	3.2%	7.3%	3.06**
Accruals (Sloan 1996)	2.9%	11.4%	1.77	Change in L.T. Leverage	1.8%	6.5%	1.87
Accruals Decline/Growth	1.5%	8.9%	1.16	Market Leverage	−3.8%	13.9%	−1.88
Earnings Smoothness	0.8%	10.1%	0.58	Book Leverage	−1.5%	10.7%	−0.96
Growth in Margins				**Growth Activities**			
L.T. Change in Margin	0.0%	8.8%	−0.03	R&D Expense	0.4%	19.1%	0.14
S.T. Change in Asset Turnover	2.2%	9.4%	1.66	Capital Expense	−2.8%	9.3%	−2.07
S.T. Change in Margin	0.6%	8.5%	0.46	Advertising Expense	−0.1%	16.2%	−0.06
Growth in Profitability				**Earnings Stability**			
L.T. Change in ROA	−1.1%	11.7%	−0.64	S.T. Change in Inventory	4.3%	9.9%	3.01**
L.T. Change in ROE	−1.0%	10.3%	−0.65	Stability of Gross Profitability	0.7%	13.0%	0.36
L.T. Change in Cash Flow Profitability	4.2%	9.9%	2.91**	Stability of Cash Flow Profitability	0.0%	17.0%	0.02
L.T. Change in Gross Profitability	2.3%	12.2%	1.33	Stability of Margins	0.0%	9.1%	0.00
Margins				**Payout**			
ROR	1.2%	18.3%	0.47	Net Payout Ratio	2.2%	12.0%	1.26
Margins	−0.8%	10.2%	−0.55	Total Payout Ratio	0.9%	15.8%	0.39
Operating Margins	1.8%	18.6%	0.68	Dividend Payout Ratio	−0.9%	12.2%	−0.51
Financial Constraint/Distress				**Profitability**			
Kaplan Zingales Index	−1.0%	12.6%	−0.53	Gross profitability	3.2%	10.7%	2.09**
Debt Coverage Ratio	3.6%	15.4%	1.62	ROA	−0.7%	18.5%	−0.25
S.T. Change in Asset Liquidity	−2.2%	8.2%	−1.82	ROE	−1.6%	15.0%	−0.73
Net Cash Outflow	2.6%	16.0%	1.13	Net ROE	2.1%	15.4%	0.96
Interest Coverage Ratio	−0.4%	16.7%	−0.15	Cash Flow profitability	4.1%	18.8%	1.51

Source: Research Affiliates using data from CRSP and Compustat.

Of the 40 measures we examined, 25 have positive performance, including 6 whose results are statistically different from zero. Of the 9 reported in the literature, 8 had positive returns, and 5 of these were statistically significant. Of the 31 unpublished factors, 18 had positive performance, and only 1 was statistically significant. These results are indistinguishable from random occurrences. However, we did observe that measures that have a positive return are more likely to get published. For example, in the profitability category, only the gross-profits-to-assets ratio (proposed by Novy–Marx) has a statistically significant positive return.[5] Two out of five measures of profitability produced negative, albeit statistically insignificant, returns. With statistical instability like this, one catches a whiff of data-snooping.

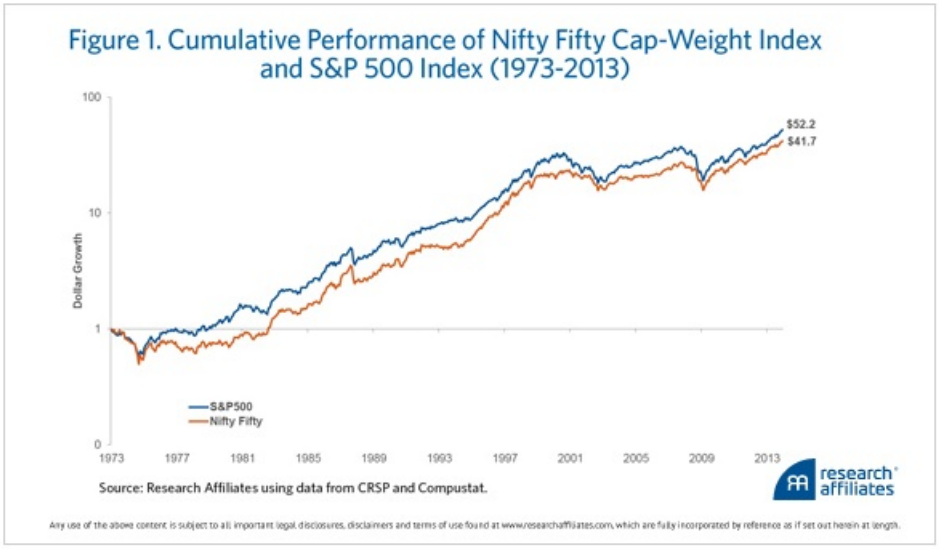
The obvious incentives pushing academics to ferret out investment strategies with anomalous returns lead to what John Cochrane (2011) memorably characterized as a zoo of factors. We are not alone in questioning the reliability of many of the long–short factors investigated in the literature. Papers by Chordia, Subrahmanyam, and Tong (2014), McLean and Pontiff (2013), and Harvey, Liu, and Zhu (2014) explore the multitude of biases in the publication process. Levi and Welch (2014) examine the literature and report that, among 600 factors that worked in-sample, 51% work after publication and 49% fail.

The long list of quality variables facilitates data-mining and impedes independent verification of factor effects. In addition, each product offering captures the supposed factor in its own unique way. One product's implementation of a quality investment strategy may have little to do with the methodology employed by others claiming to harvest the quality premium. Moreover, much like academic results, practitioner-supplied returns for quality strategies tend to be inflated due to data mining and survivorship bias. When the conversation turns to quality, we recommend a healthy degree of skepticism.

The Nifty Fifty

In the late 1960s and early 1970s, institutional investors became enamored of 50 large, stable, fast-growing companies including such household names as General Electric, Xerox, Polaroid, and IBM. They were popularly called the *nifty fifty*. Because of their strong record of growth, valuation ratios seemed irrelevant; investors found them attractive at 50, 80, and even 100 times earnings. At the end of 1972, when the S&P 500 Index traded at a P/E of 20, the nifty fifty were trading at a P/E of 40. The popularity of the nifty fifty spurred a shift from value investing to a "growth at any price" paradigm. Sadly for many investors, company popularity did not translate into investment performance.

The late 1960s and early 1970s were a period of remarkable growth in the U.S. economy. In 1973–1974, however, the S&P 500 fell by 39%, and the basket of nifty fifty stocks fell by 47%. The broad market regained confidence; around the end of 1976, the S&P 500 investors broke even with their initial 1973 investment. It took the nifty fifty investors nearly a decade to recoup their losses, and they never caught up with the broad market. Forty-one years later, the S&P 500 investors of 1973 would have earned about 23% more than the nifty fifty investors. **Figure 1**displays the growth of a dollar invested in a hypothetical capitalization-weighted nifty fifty index relative to a dollar invested in the S&P 500 for the period 1973–2013.



The nifty fifty were great companies. But buying quality companies does not expose investors to a systematic factor which commands a risk premium. Just as hiring great ballplayers at rocket-high salaries may be bad business decisions, buying quality stocks at high prices are likely to be bad investment decisions.

Information That Counts

Beane's staff concluded that a ballplayer's on-base percentage and slugging percentage are better predictors of offensive success than conventional box-score statistics.[6] They also discovered players with moderate salary expectations who scored high on these overlooked metrics. Using these selection criteria allowed the Oakland A's to increase their wins significantly, even in competition with richer teams. Lewis (2003, p. 292) explained that the goal was not to have the highest on-base percentage but to win games as cheaply as possible. "And the way to win games cheaply is to buy the qualities in a baseball player that the market undervalues, and sell the ones that the market overvalues."

Are there statistical measures that can do for quality investing what the on-base and slugging percentages did for the Oakland Athletics' performance?

In one of the past decade's finest research papers, John Cochrane asks whether aggregate equity returns can be predicted by the aggregate market dividend yield.[7] He observes that a high dividend yield has to predict either high dividend growth or high returns. Given that dividend growth is extremely hard to forecast, Cochrane concludes that the market's current dividend yield should be indicative of future long-term equity returns.

Analogous reasoning applies to individual stocks. The price-to-cash-flows ratio must predict either high growth in cash flows or high returns. The predictability of growth in cash flows is demonstrably low;[8] therefore price-to-cash-flows ratios—and other price-to-fundamentals ratios—should be strong predictors of future returns. Indeed, a stock's value characteristic as measured by price-to-fundamentals ratios is strongly predictive of the long-term return.[9] Given this, we hypothesize that the following three pieces of information can help investors make better use of a value signal:[10]

1. Likelihood of default;
2. Company profitability and growth; and
3. Degree to which the reported accounting variables of the company can be trusted.

Considering the nifty fifty, we do not expect any long-term premium from low chances of bankruptcy, high profitability, high growth, or trustworthy financial accounting. Research corroborates this view by asserting there are no long-term fundamental risks associated with these factors for which the market would require a premium.[11] Nonetheless, a company whose stock price relative to fundamentals is low may be a particularly good investment if it also scores well on these variables.

We used three measures to capture the pertinent information: return on equity (ROE) to reflect growth and profitability; the debt coverage ratio to represent the likelihood of default; and the accruals-to-average-total-assets measure defined by Sloan (1996) to quantify possible accounting red flags.[12] To arrive at company-specific quality measures, we used the simple arithmetic average of each stock's percentile rank for these three variables.

The first line of **Table 2** shows the performance of a simple long–short strategy based on this quality measure. On average the strategy produces a small negative return. It has some alpha after we control for factor exposure and negative exposure to the value factor.

Table 2. Long-Short Performance on Quality and Value Plus Quality. (U.S. Stocks, July 1963–January 2014)

Strategy	Average Ret (ann.)	Vol. (ann.)	t-stat	S.R.	Alpha (ann.)	t-stat	Market Exposure	Size Exposure	Value Exposure	Momentum Exposure
Simple Long Short	−0.4%	14.0%	0.29	−0.03	3.9%	2.52	−0.17	−0.77	−0.19	0.11
Diagonal Long Short	11.2%	24.6%	3.96	0.46	9.3%	3.10	−0.13	−0.40	1.15	0.16

Source: Research Affiliates using data from CRSP and Compustat.

When we use quality in conjunction with value, the results are much better. The second line of Table 2 shows the results of a portfolio where we go long value stocks with high quality and short growth stocks with low quality. This long–short strategy has annual alpha of 11.2% per annum. A substantial portion of this statistically significant alpha comes from conditioning on quality information. The annualized alpha, controlling for the Fama–French–Asness–Carhart four factor model, is 9.3% per annum.

Leverage-constrained investors might be more interested in how a long-only implementation of this approach could benefit their retirement account. To illustrate the potential benefit, we started by using companies' combined book-, dividends-, earnings-, and sales-to-price ratios to select 400 value stocks from the largest 1,000 stocks by market capitalization in our universe. We then sorted them into two groups: low quality stocks and high quality stocks. **Table 3** displays the simulated average returns, volatilities, and Sharpe ratios for these two portfolios.

Table 3. Quality Value Portfolio Statistics (U.S. Stocks, July 1963–January 2014)

	Value, Low Quality	Value, High Quality	Difference (High minus Low)
Average Return	15.7%	16.3%	0.6%
Volatility	21.4%	18.5%	−2.9%
Sharpe Ratio	0.49	0.60	0.11

Source: Research Affiliates using data from CRSP and Compustat.

The high quality value portfolio has fewer distressed, slow growing, unprofitable companies with potentially questionable accounting practices. As a result, the high-quality value portfolio has a better risk-adjusted return. Quality is not, in itself, a factor that generates a premium; but value investing conditioned on a properly specified concept of quality is a powerful investment strategy.

In Closing

The approach we advocate is not new. Graham and Dodd formulated the principles of value investing in the 1930s: find high quality stocks and buy them at low prices. Active value managers have been using these principles for generations. Of course, statistical sophistication has advanced, and research in corporate finance and accounting has identified statistically valid predictors of company fundamentals.[13] In academia, the interaction of value and quality has recently been studied,[14] and quantitative active managers use quality measures together with value to make better portfolios.[15] But the core of the approach is the same.

What is new is the healthy degree of skepticism toward the proposition that a quality factor is a good investment approach on its own. What is also new, or at least renewed, is a certain willingness to challenge traditional thinking on the basis of solid empirical research. In Lewis's (2003, p. 292) opinion, Billy Beane's contribution to baseball was not genius but intellectual courage. In this way, too, moneyball is a fine model for investing.

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Endnotes

[1] For example, in 2003 Roman Abramovich purchased Chelsea Football Club and started managing it with a simple strategy: if you want a player, get him at any cost. The 2006 transfer of star striker Andriy Shevchenko from AC Milan to Chelsea for 30.8 million pounds was an English club record at the time. But Shevchenko was already 29 years old, and, frequently injured, he scored only 9 goals in two seasons with Chelsea.

[2] *The Economist* (2011) wrote, “Manchester United has become one of the world’s most valuable sports businesses on [Ferguson’s] watch, and…one of the secrets of his success has been knowing the value of money.” The same article describes him as “notably meritocratic” in his hiring decisions. Anita Elberse and Tom Dye note in a Harvard case study that, ove the course of his career, he adapted to meaningful changes in the world of soccer: “Ferguson had massively expanded his backroom staff, and had appointed a team of sports scientists to support the coaching staff.”

[3] Novy–Marx (2013). Gross profit is the difference between sales and the costs of goods sold.

[4] We did not include quality measures related to the quality of corporate governance or practitioner-oriented measures of investment quality, e.g., earnings-to-price ratios or low volatility.

[5] The gross profitability measure has been critically examined by Ball, Gerakos, Linnainmaa and Nikolaev (2014).

[6] A player’s on-base percentage is the proportion of at-bats for which he walked or got a hit. A player’s slugging percentage is the number of bases he ran in proportion to the number available (four bases per at-bat).

[7] Cochrane (2008).

[8] Chan, Karceski, and Lakonishok (2003).

[9] If the market were adept at predicting cash flow growth, and if price-to-fundamentals ratios reflected the market’s forecast, then the value effect would disappear. Companies whose growth is predictable and correctly reflected in the valuation ratios would not generate any value premium.

[10] By introducing the three types of information mentioned above, we are not trying to lengthen the list of quality indicators. On the contrary, we are trying to set apart the reasonably predictable information about company fundamentals that may prove useful in appraising value signals.

[11] It has been argued that bankruptcy risk may be associated with a premium. However, Dichew (1998) showed that companies in distress historically did not pay a premium.

[12] Sloan (1996) defines the measure as the change in non-cash current assets, less the change in current liabilities (exclusive of short-term debt and taxes payable), less depreciation expense, all divided by average total assets.

[13] Piotroski (2000).

[14] Piotroski and So (2013).

[15] Fama and French (2013); Asness, Frazzini, and Pedersen (2014).