Launch of Lehman Brothers Large-Capitalization Quantitative Stock Selection Model

Framework for Disciplined Stock Picking

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The Lehman Brothers Large-Capitalization Quantitative Stock Selection Model provides a rigorous framework for understanding and forecasting future stock returns.

- In back-testing, the performance of the model is strong, generating average out-of-sample *excess* long/short returns of 10.3% with a 12-month holding period, with positive performance in 80% of the months (1998-2006). Our long-only stock portfolio produced out-of-sample average annual returns in *excess* of the Russell 1000 of 5.1%. This performance, net an assumed management fee of 1%, would have placed us in the top 3% (10^{th}/520) of all mutual funds in our category over this time period.
- The Lehman Brothers Large-Cap Stock Selection Model is composed of 10 separate sector models, where each model is a refinement of a general model of factors that are important for stock picking. This approach allows us to hone in on the key characteristics of a sector, preserving fundamental investor intuition while retaining a disciplined approach to quantitative modeling.
- Each sector model has three thematic components: a valuation component; a quality component; and a market dynamics component. By drawing alphas from across a wide range of sources, investment styles and factors, we are able to diversify the basis of the model's outperformance, generating success in all past macroeconomic environments and regimes.
- Our proprietary and unique factors include measures on i) earnings quality metrics based on the discretionary component of accruals; ii) detailed analyst stock recommendations; iii) detailed analyst forecasts; iv) abnormal stock volume; v) earnings surprises based on market reactions to the news; vi) price momentum adjusted for smoothness; and vii) changes in employee utilization.
- Our initial model portfolio overweights Energy and Technology and underweights Health Care, Industrials and Consumer Staples. Large active stock positions include: NKE, JCP, MO, XOM, CVX, COP, VLO, MRO, JPM, AIG, MS, WM, MRK, SGP, BA, HON, AAPL, HPQ, AMAT, NVDA, MA, NUE, S, and AT.

Analyst Certification

I, Matthew S. Rothman, Ph.D., hereby certify (1) that the views expressed in this research Report accurately reflect my personal views about any or all of the subject securities or issuers referred to in this Report and (2) no part of my compensation was, is or will be directly or indirectly related to the specific recommendations or views expressed in this Report.

To the extent that any of the conclusions are based on a quantitative model, Lehman Brothers hereby certifies (1) that the views expressed in this research report accurately reflect the firm's quantitative research model (2) no part of the firm's compensation was, is or will be directly or indirectly related to the specific recommendations or views expressed in this research report.

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July 20, 2007

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Executive Summary[1]

Ours is a straightforward task: to predict which stocks will go up, which will go down, and which will stay relatively unchanged over the next nine to 12 months. And we seek not to just identify, say, the 10 best and 10 worst stocks but to have a forecast for each and every stock in the Russell 1000.

It is a straightforward task but not a simple one. For investing is a difficult affair that preys upon the worst aspects of a person's decision-making capabilities. Frequently, investors are called upon to discern when the newest data point is a temporary setback in a trend of ever increasing growth as opposed to when the incremental information foreshadows an imminent reversion to the mean. They must be adept at cutting their losses despite the inevitable pain this entails—considerably more pain than the innate gratification that gains provide. They must resist the inclination to see patterns in charts and graphs where none exists, where the data is truly random. In short, the successful investor enjoys far fewer of the cognitive biases and psychological flaws than normal human beings possess.

Quantitative models are the key to reconciling conflicting signals and avoiding counting the same information multiple times, assuming, of course, the past has any relevance for the future.

Quantitative models are the tools by which average investors may become better stock pickers. A well-designed quantitative model hones in on the characteristics of stocks that are empirically verified to correlate highly with future returns. Too often investors believe they know what those qualities are; too often, they are wrong. When the information is disparate and conflicting—that is, when a stock is expensive but has strong price momentum, or when a firm's balance sheet is strong but the stock has been subject to recent heavy shorting—quantitative tools can help fill the gap. Conversely, when the information is not unique but a repackaging of the same facts under a different label—for example, when a company's free cash flow generation is high and has a strong EBITDA-to-enterprise valuation ratio—a quantitative model is the discipline that stops you from overweighting those pieces of information.

For us, quantitative model building is an empirical exercise, replete with judgment grounded in economic, financial, and behavioral theory. Not every measure that backtests well is a good factor for inclusion in our model. To be a successful factor it must have a firm economic rationale or capitalize on a foible in human decision-making that has been well-documented in the academic psychology literature.

On the flip side, a strong economic rationale for a quantitative factor or a plethora of anecdotal information that a measure matters is also insufficient. It must be shown to correlate with future stock returns over a long period of time. What distinguishes quantitative investing from other forms of investing is belief in the power of empirical backtesting. But part of what distinguishes a good quantitative model from a poorly devised one is the use of economically derived and well thought-out factors that are, hopefully, largely uncorrelated.

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[1] We would like to thank Mary M. Margiotta for her insights and perspective on a wide range of accounting issues .

Ultimately, the power of quantitative models rests in the performance numbers. Over the past five years, quantitative investment managers have handily outperformed both the index and fundamental managers and as a result have grabbed the bulk of new fund flows. On the other hand, fundamentally based managers have underperformed the general market. According to published industry reports[2], for the three years ending in 2004, the median quantitative product generated an additional 110 basis points of returns relative to all other institutional products while at the same taking significantly less risk. Hence, the median quantitative product achieved an Information Ratio of 0.37 while all other products obtained an Information Ratio of only 0.06

Distinguishing Features of the Lehman Brothers Model

The Lehman Brothers Large-Cap Core Model has a number of distinguishing characteristics that we believe make it a unique product offering.

Our proprietary factors include signals that are useful in gauging a stock's misvaluation, a company's quality of management as well as the market's enthusiasm for a specific firm.

First and foremost, we have a significant number of proprietary factors in our model. These include:

1. Earnings quality measures that explicitly capture the portion of earnings that are subject to managerial discretion and hence not likely to be repeatable;

2. Price momentum signals that explicitly adjust for the smoothness of price increases/decreases, as we find the path matters as well as the end point;

3. Earnings revision signals that correct for each individual fundamental analyst biases and for the timeliness/staleness of the forecast;

4. Analyst recommendation signals based off of each individual analyst's recommendations adjusted for the timeliness/staleness of each forecast;

5. Forward earnings-to-price ratios that are adjusted at the individual analyst level, again, to correct for bias and timeliness/staleness of the forecast;

6. Earnings surprises based on the market reaction to the news as opposed to using the consensus recommendations as a proxy for market expectations;

7. Employee utilization and changes in productivity that measure the efficiency of labor in the production process;

8. Abnormal trading volume as an indicator of hype and/or neglect.

[2] See Casey, Quirk & Associates report, "The Geeks Shall Inherit the Earth? Quantitative Managers' Recent Edge", November 2005

Second, we believe our data is comprehensive, clean, and free of forward look-ahead bias and compares favorably with the data used by any other sell-side or buy-side firm that we are aware of. For example, our accounting data does not contain restatements from mergers and acquisitions or corrections/amendments for fraud or other issues. Moreover, we have hand-corrected and re-matched the links between our return data and our accounting data far beyond what is available from commercial vendors. Consequently, we place greater confidence in achievability of back-tested numbers on a going-forward basis.

Third, as a brand-new product free of "legacy" issues, our model represents current best practices. Products with a longer history inevitably have a certain degree of inertia built in to them—any new changes must be expected to be sufficiently beneficial to justify the effort, time, and expense of re-educating clients along with the potential risks of alienating or losing some of these clients. Because we are starting our product with a clean slate, we have been able to take a fresh look at all modeling techniques and approaches and settle on what we believe today represents best practices.

Fourth, we are quants and aim to be quants for quants. We do not aim to have opinions about the importance of China or India, or ethanol–based fuels in the decade ahead. We do not want to take a stand on whether earnings margins in oil refiners are going to shrink or expand over the next 18 months. To us, these matters are best left in the hands of a general equity strategist and/or fundamental analyst. Rather, our models are based on highly rigorous backtesting of what has been known to work for decades, in and out of numerous macroeconomic cycles, sector expansions and contractions, the rise of the Internet bubble and its subsequent bursting. We seek to find the constants and believe that what has worked in the past will work again. Or, to quote the songwriter Paul Simon, we believe that "after changes upon changes, [things] are more or less the same, after changes [they] are more or less the same".

Fifth, we have explicitly modeled each of the 10 GICS sectors separately and individually, in essence having10 separate models all under the banner of the Lehman Large Cap Stock Selection Model. Each of these models, though, is a refinement of a general model of factors that we find are useful for stock picking. This methodology allows us to focus on those variables that are most useful within that sector, thereby preserving much of intuition fundamental investors have for what matters in a sector, while still retaining a disciplined approach to quantitative modeling. This procedure was significantly more arduous than traditional approach of building a "one size fits all" model. We happily embrace this pain, however, as we believe the benefits as measured through the model's performance were well served.

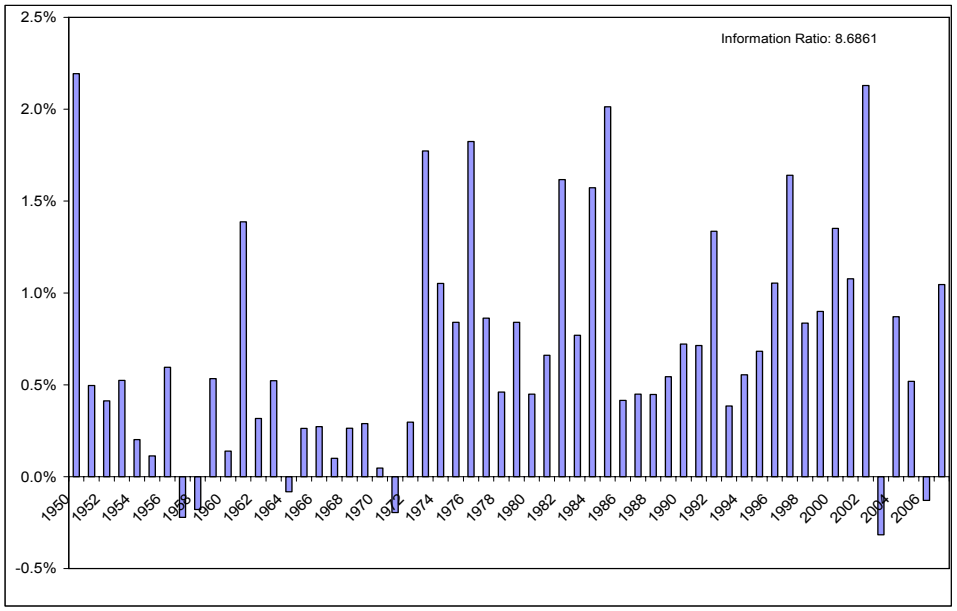
Sixth, many on our team have been on the buy-side. Our group is set up to run like a buy-side shop. Our production systems are capable of generating fresh trade lists every day and communicating them to clients and the trading desk. And our models conform to the way most of our clients are set-up to run: universes, sector definitions and constraints are set to mirror common constraints given by consultants and plan sponsors.

Overall Model Performance

Returns

As shown in Figure 1 and Figure 2, the performance of our model in back-testing is strong, generating long/short annual average returns of 9.8% in excess of the Russell 1000 index, over the period 1962 through 2006. The consistency of the model is impressive with 51 out of 57 calendar years producing positive return spread. The power of the model is almost evenly split between the long side and the short side with the long-only portfolio obtaining 4.6% average annual excess returns, again with positive performance in 51 out of 57 calendar years.

Figure 1: Performance of Lehman Large-Cap Core Model: Long/Short Excess Returns, Average Monthly Returns, Reported on a Calendar Year Basis, 1950-2006



Past performance is not a guarantee of future results.
Large Cap Universe is Russell 1000 after 1978; pre-1978 it is defined via analogous market capitalization break-points
Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Specifically, these returns are obtained by going long the top-ranked stocks by the model (Quintile 1) and shorting the bottom ranked stocks (Quintile 5) and holding these stocks for one year. It is as if each month you invested 1/12th of your assets in the Q1 and Q5 stocks and then held that portfolio for a year. After the initial 12 months, you would have 12 different portfolios, or "slices", on at any given time, each with a different level of "seasoning", or aging. Whenever we discuss our long/short strategy we are referring to this process of going long the Quintile 1 stocks and shorting the Quintile 5 stocks, and whenever we talk about our *N*-month holding period return, we are referring to this process of holding *N* number of slices each being held for *N* months.

Figure 2: Performance of Lehman Brothers Large-Cap Core Model, Excess Average Stock Returns Relative to Large-Cap Universe

	Relative Return										
Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-200612											
Quintile 1	0.4%	0.8%	1.2%	2.6%	3.7%	4.6%	5.4%	6.4%	7.8%	9.0%	10.4%
Quintile 2	0.2%	0.4%	0.6%	1.2%	1.6%	2.0%	2.4%	2.6%	3.0%	3.5%	4.1%
Quintile 3	0.0%	0.0%	0.1%	0.2%	0.3%	0.5%	0.7%	0.8%	1.0%	1.2%	1.3%
Quintile 4	-0.1%	-0.3%	-0.4%	-1.0%	-1.3%	-1.7%	-2.0%	-2.4%	-3.0%	-3.4%	-4.2%
Quintile 5	-0.4%	-0.9%	-1.4%	-2.9%	-4.1%	-5.2%	-6.1%	-7.0%	-8.3%	-9.7%	-11.1%
Long / Short Spread	0.8%	1.7%	2.7%	5.4%	7.9%	9.8%	11.5%	13.3%	16.1%	18.7%	21.5%
198701-200612											
Quintile 1	0.5%	1.0%	1.5%	3.0%	4.3%	5.3%	6.1%	7.2%	8.5%	9.5%	11.1%
Quintile 2	0.2%	0.4%	0.7%	1.3%	1.9%	2.3%	2.6%	2.8%	3.0%	3.8%	4.5%
Quintile 3	0.0%	0.0%	0.0%	0.3%	0.4%	0.5%	0.5%	0.6%	0.8%	0.9%	0.9%
Quintile 4	-0.1%	-0.3%	-0.5%	-1.1%	-1.6%	-2.1%	-2.4%	-2.6%	-3.0%	-3.3%	-4.1%
Quintile 5	-0.6%	-1.1%	-1.7%	-3.5%	-5.0%	-6.0%	-6.8%	-7.9%	-9.3%	-10.8%	-12.4%
Long / Short Spread	1.1%	2.1%	3.2%	6.5%	9.3%	11.3%	13.0%	15.1%	17.8%	20.3%	23.5%
199801-200612											
Quintile 1	0.5%	1.1%	1.7%	3.2%	4.3%	5.1%	5.8%	6.4%	6.8%	7.7%	9.6%
Quintile 2	0.2%	0.4%	0.7%	1.2%	1.6%	1.8%	2.1%	2.3%	2.3%	3.8%	5.1%
Quintile 3	0.0%	0.0%	0.0%	0.3%	0.2%	0.1%	0.0%	0.2%	0.8%	1.3%	1.4%
Quintile 4	-0.1%	-0.3%	-0.5%	-1.1%	-1.5%	-1.8%	-2.1%	-2.4%	-2.3%	-2.4%	-2.8%
Quintile 5	-0.7%	-1.2%	-1.9%	-3.6%	-4.5%	-5.2%	-5.7%	-6.6%	-7.7%	-10.4%	-13.2%
Long / Short Spread	1.2%	2.3%	3.5%	6.9%	8.8%	10.3%	11.5%	13.0%	14.5%	18.1%	22.8%
197301-199712											
Quintile 1	0.5%	1.0%	1.5%	3.2%	4.8%	6.0%	7.1%	8.5%	10.7%	12.7%	14.7%
Quintile 2	0.2%	0.5%	0.8%	1.6%	2.2%	2.9%	3.3%	3.6%	4.4%	5.0%	5.8%
Quintile 3	0.0%	0.0%	0.1%	0.3%	0.4%	0.7%	1.0%	1.2%	1.3%	1.2%	1.2%
Quintile 4	-0.2%	-0.4%	-0.5%	-1.2%	-1.7%	-2.3%	-2.6%	-3.1%	-4.0%	-4.9%	-6.1%
Quintile 5	-0.5%	-1.1%	-1.8%	-3.6%	-5.4%	-6.9%	-8.2%	-9.4%	-11.4%	-13.1%	-14.8%
Long / Short Spread	1.1%	2.2%	3.3%	6.8%	10.3%	12.9%	15.3%	17.9%	22.1%	25.7%	29.5%

Past performance is not a guarantee of future results.
Large cap universe is Russell 1000 after 1978; pre-1978 it is defined via analogous market capitalization break-points.
Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

When building a model, it is critical to hold back a portion of the data that is distinct from the data that is used to build and fit the model. This held back data is referred to as the "out-of-sample" data. Little confidence should be placed in a model without a backtesting period and an out-of-sample period over which the model's validity is then tested. Out-of-sample testing is crucial to verifying a model's soundness, for without it one cannot be sure that the results are not just the product of over-fitting data (situations) that have little prospect of repeating anytime in the near future.

Our in-sample period for developing the weights for the model is 1973 through 1997. This period was chosen for several reasons. First, data for Nasdaq stocks becomes available starting in January 1973; prior to that our universe is limited to NYSE and AMEX stocks which are in general larger and more liquid than the average Nasdaq security. Second, this time period represents a long horizon with a number of market and macroeconomic cycles over which to calibrate our model but does not contain the Internet bubble period. And third, this period is relatively recent enough so that all of our data sources are available for the majority of time.

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1998 to 2006 was our out-of-sample period and the results here represent our "one shot" at that data.

The period 1998 to 2006 represents our out-of-sample period. We were uncompromising in our use of the out-of-sample data, never letting it influence our choosing of factors and/or the weights of the factors in the model. We truly held ourselves to a "one shot" approach to the out-of-sample data: developing our models in-sample, adjusting and refining as we saw fit, but only giving ourselves "one shot" at the out-of-sample period. The numbers reported here are those results. This process allows us to be cautiously optimistic about the repeatability of these numbers going forward.

The out-of-sample performance is better than we had hoped for. Long/Short excess returns average 10.3% with a 12-month holding period, with the performance being monotonic and nearly perfectly symmetrical across quintiles. The model was optimized for a 12- month holding period, but the performance is actually stronger at shorter holding periods of six and nine months. Performance remains positive out to a holding period of 36 months, but clearly the rate of the portfolio's appreciation has slowed.

According to publicly available data on Morningstar, the out-of-sample performance of the top quintile (long only) would have placed it in the upper echelons of mutual funds. Specifically, for the period 1998–2006, the top quintile of the model returned 5.1%, on average, in excess of the Russell 1000. Within the fund category "Large Cap Blend", there are only nine funds out of a universe of 520 funds that have better performance. For this calculation, we assume an annual expense ratio for our portfolio of 1% so as to not unduly bias the results in our favor.

Overall Model Performance: Stock Selection Results

Picking stocks is harder than it looks due to the skewness in stock returns; only 46% of stocks outperformed the market over a 12-month period from 1962 to 2006.

One of the principal missions of our model is to be able to select stocks on a broad scale, as opposed to picking a few winners. Figure 3 highlights our success on this front. Due to skewness in stock returns, significantly less than 50% of stocks outperform the market on average each month. From 1962 to 2006, on average, only 46% of stocks outperformed, assuming a12-month holding period. For our model, however, 52% of stocks in top-ranked quintile outperformed the market, while 61% of the stocks in the bottom quintile underperformed the market.

Figure 3: Stock Selection Performance of the Lehman Brothers Large-Cap Core Model, Average Percent of Stocks Outperforming Each Month

	Percent of Companies Outperforming										
Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-200612											
Quintile 1	50%	51%	51%	52%	52%	52%	51%	51%	50%	50%	49%
Quintile 2	49%	49%	50%	50%	49%	48%	48%	47%	47%	46%	46%
Quintile 3	49%	48%	48%	48%	47%	46%	46%	45%	45%	44%	43%
Quintile 4	48%	47%	47%	45%	44%	43%	42%	42%	41%	40%	39%
Quintile 5	46%	46%	44%	42%	40%	39%	38%	37%	36%	35%	35%
Universe Average	48%	48%	48%	47%	47%	46%	45%	44%	44%	43%	42%
198701-200612											
Quintile 1	51%	51%	52%	52%	53%	52%	51%	51%	50%	49%	48%
Quintile 2	50%	50%	50%	50%	50%	49%	49%	48%	47%	46%	46%
Quintile 3	49%	49%	48%	48%	47%	47%	46%	45%	44%	43%	43%
Quintile 4	48%	48%	47%	45%	44%	43%	42%	42%	41%	40%	39%
Quintile 5	46%	46%	44%	41%	40%	39%	37%	36%	35%	34%	33%
Universe Average	49%	49%	48%	47%	47%	46%	45%	44%	43%	42%	42%
199801-200612											
Quintile 1	51%	52%	52%	52%	51%	50%	50%	50%	49%	50%	50%
Quintile 2	50%	49%	49%	49%	48%	48%	47%	47%	46%	48%	49%
Quintile 3	49%	49%	48%	48%	46%	45%	44%	45%	45%	45%	46%
Quintile 4	49%	48%	47%	46%	44%	43%	42%	41%	41%	41%	42%
Quintile 5	47%	46%	45%	42%	41%	39%	38%	37%	35%	35%	35%
Universe Average	49%	49%	48%	47%	46%	45%	44%	44%	43%	44%	44%
197301-199712											
Quintile 1	51%	52%	53%	54%	55%	55%	54%	54%	53%	52%	51%
Quintile 2	50%	50%	51%	51%	51%	50%	50%	49%	49%	48%	47%
Quintile 3	49%	49%	48%	48%	48%	47%	46%	46%	45%	44%	43%
Quintile 4	47%	47%	47%	45%	44%	43%	42%	42%	41%	39%	39%
Quintile 5	46%	44%	43%	40%	38%	37%	36%	36%	35%	34%	33%
Universe Average	48%	48%	48%	47%	47%	46%	46%	45%	44%	43%	42%

Past performance is not a guarantee of future results.
Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

The out-of-sample stock selection of the model is equally impressive. In the period 1998 through 2006, while 45% of stocks outperformed the market, 50% of the stocks in Quintile 1 outperformed and 61% of the stocks in Quintile 5 underperformed. We are pleasantly surprised by these hit-rates for as anyone with active experience in the markets is well aware, these are difficult numbers to achieve.

Overall Model Performance: Consistency

For a portfolio manager, consistency of performance is arguably more important than the exact level of returns yielded. Most managers would gladly sacrifice a notable portion of their returns if it would ensure them a higher level of ability to repeatedly outperform, month-in and month-out. Superior consistency in performance brings in assets; inferior consistency in performance gets a portfolio manager fired.

We hold our own model to the same standard. As seen in Figure 4, in the out-of-sample period of 1998 to 2006, our top quintile outperforms 86% of the time, while our bottom

quintile underperforms 79% of the time. Overall, our long/short portfolio generated positive returns 80% of the time, out-of-sample.

Figure 4: Consistency of Performance of the Lehman Brothers Large-Cap Core Model: Percent of Months Quintiles Outperform

Portofolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-200612											
Quintile 1	66%	72%	75%	81%	87%	87%	86%	87%	86%	83%	81%
Quintile 2	59%	63%	66%	74%	75%	72%	72%	73%	72%	71%	72%
Quintile 3	54%	53%	54%	57%	59%	60%	60%	61%	59%	60%	60%
Quintile 4	42%	37%	36%	30%	28%	27%	28%	26%	28%	32%	31%
Quintile 5	36%	31%	27%	20%	17%	16%	14%	13%	14%	13%	15%
spread	65%	71%	74%	82%	87%	87%	88%	90%	90%	88%	87%
198701-200612											
Quintile 1	68%	75%	79%	84%	93%	92%	90%	91%	89%	88%	86%
Quintile 2	59%	67%	69%	78%	81%	77%	75%	76%	74%	77%	78%
Quintile 3	56%	53%	51%	57%	58%	60%	56%	58%	56%	58%	59%
Quintile 4	42%	34%	34%	29%	24%	23%	25%	23%	29%	33%	32%
Quintile 5	34%	29%	23%	15%	11%	10%	9%	9%	8%	9%	10%
spread	68%	75%	79%	86%	93%	90%	93%	92%	94%	93%	92%
199801-200612											
Quintile 1	66%	70%	77%	78%	84%	86%	82%	82%	77%	81%	82%
Quintile 2	58%	58%	63%	71%	70%	65%	67%	73%	72%	75%	82%
Quintile 3	55%	50%	47%	55%	54%	51%	52%	51%	60%	68%	65%
Quintile 4	45%	38%	37%	29%	28%	27%	26%	22%	30%	31%	32%
Quintile 5	40%	34%	31%	23%	23%	21%	17%	20%	15%	10%	11%
spread	60%	69%	71%	78%	84%	80%	85%	84%	88%	93%	93%
197301-199712											
Quintile 1	72%	80%	83%	91%	98%	97%	97%	97%	95%	93%	91%
Quintile 2	61%	71%	73%	81%	83%	84%	83%	80%	78%	78%	77%
Quintile 3	55%	54%	58%	59%	60%	66%	63%	66%	59%	58%	59%
Quintile 4	38%	33%	32%	26%	21%	20%	22%	21%	23%	27%	25%
Quintile 5	29%	24%	18%	9%	5%	5%	4%	2%	4%	6%	6%
spread	74%	79%	83%	93%	98%	97%	97%	98%	98%	95%	94%

Past performance is not a guarantee of future results.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Overall Model Performance: Turnover

Model turnover is a double-edged sword. On one side, too much turnover in a model may lead to high transactions costs. If the transactions costs are too high, the model may not be feasible in practice. Trading costs will eat up all of the potential alpha. On the other side, if the model has too little turnover, then the portfolio becomes stale. Good new ideas are not reflected in the portfolio; new signal exposures are not incorporated into the holdings. Finally, the ideal level of turnover cannot be separated from investment strategy but must fit hand-in-glove with one's investment style. To paraphrase John Selden, turnover is a roguish thing.

Figure 5, Figure 6, Figure 7, and Figure 8 show the average transition of stocks across quintiles at six-, nine-, 12-, and 15- month horizons. For example, Figure 7 illustrates that, on average, 35% of the stocks currently ranked in the top quintile will continue to be in the top quintile 12 months from now, while 33% of the stocks currently ranked in the bottom quintile will continue to be there in one year's time.

Figure 5: Lehman Brothers Large-Cap Core Model, Historical Transition Matrix of Stocks Across Quintiles, Six-Month Time Frame

Current Quintile Rank	Quintile Rank in 6 Months				
	1	2	3	4	5
1	49%	24%	13%	7%	3%
2	23%	29%	23%	14%	6%
3	12%	22%	26%	22%	12%
4	6%	14%	22%	29%	23%
5	3%	6%	11%	23%	49%

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 6: Lehman Brothers Large-Cap Core Model, Historical Transition Matrix of Stocks Across Quintiles, Nine-Month Time Frame

Current Quintile Rank	Quintile Rank in 9 Months				
	1	2	3	4	5
1	40%	23%	15%	10%	6%
2	22%	25%	21%	16%	10%
3	14%	21%	23%	21%	14%
4	9%	15%	20%	25%	22%
5	6%	9%	14%	22%	40%

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 7: Lehman Brothers Large-Cap Core Model, Historical Transition Matrix of Stocks Across Quintiles, 12-Month Time Frame

Current Quintile Rank	Quintile Rank in 12 Months				
	1	2	3	4	5
1	35%	22%	16%	12%	8%
2	20%	22%	20%	17%	12%
3	15%	20%	21%	20%	15%
4	11%	16%	19%	22%	21%
5	8%	11%	15%	21%	33%

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 8: Lehman Brothers Large-Cap Core Model, Historical Transition Matrix of Stocks Across Quintiles, 15-Month Time Frame

Current Quintile Rank	Quintile Rank in 15 Months				
	1	2	3	4	5
1	33%	21%	16%	12%	9%
2	20%	22%	20%	17%	12%
3	15%	19%	20%	20%	15%
4	12%	16%	19%	22%	20%
5	8%	11%	15%	20%	31%

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

We believe that annual unconstrained turnover rates of 65% and 67% for Q1 and Q5 stocks, respectively, are reasonable levels of turnover for a Large-Cap Core model, especially considering the level of excess returns produced by the model.

Sector Performance

We believe that one of the key drivers of the model's overall performance and consistency comes from our detailed modeling of each sector. As seen in Figure 9, we are able to capture return outperformance well at the individual sector level. Notable sectors where the model is able to achieve particular success include Health Care, Energy, Technology, Consumer Discretionary, and Financials.

Figure 9: Individual Sector Performance for Lehman Brothers Large-Cap Core Model, Excess Average Stock Returns

	196201-200612										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
Energy	0.7%	1.6%	2.6%	5.7%	8.1%	10.6%	13.1%	15.1%	18.8%	21.3%	24.6%
Materials	0.6%	1.0%	1.6%	3.0%	4.3%	5.9%	7.3%	9.0%	11.9%	16.4%	19.9%
Industrials	0.9%	1.9%	2.9%	6.0%	8.8%	11.2%	13.6%	16.5%	21.4%	24.9%	28.7%
Consumer Discretionary	1.0%	2.1%	3.1%	6.4%	9.4%	11.9%	13.8%	15.7%	18.7%	20.6%	21.6%
Consumer Staples	0.6%	1.3%	2.1%	4.5%	6.6%	8.3%	9.8%	11.8%	15.3%	19.9%	25.3%
Health Care	1.3%	2.6%	3.9%	8.4%	12.4%	15.4%	17.9%	20.8%	24.0%	25.2%	26.5%
Financials	0.4%	1.2%	2.0%	4.6%	6.8%	9.0%	11.0%	13.3%	16.8%	19.6%	22.8%
Information Technology	1.3%	2.6%	4.1%	8.5%	12.0%	14.2%	15.8%	16.7%	19.9%	23.1%	25.9%
Telecommunication Services	-0.3%	-0.3%	-0.2%	-0.1%	0.8%	2.7%	4.8%	6.1%	7.0%	8.2%	8.2%
Utilities	0.3%	0.8%	1.2%	3.0%	4.7%	6.2%	7.5%	8.9%	12.1%	16.2%	19.6%
	197301-199712										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
Energy	1.0%	2.0%	3.4%	6.6%	9.1%	11.5%	14.3%	16.7%	20.9%	23.8%	26.7%
Materials	0.8%	1.7%	2.5%	4.8%	7.2%	9.8%	12.5%	15.3%	20.6%	26.9%	32.7%
Industrials	1.0%	2.1%	3.3%	7.1%	10.5%	13.3%	15.9%	18.8%	24.6%	29.5%	34.1%
Consumer Discretionary	1.2%	2.3%	3.4%	7.1%	10.3%	13.4%	15.5%	18.0%	22.7%	26.4%	27.9%
Consumer Staples	1.0%	2.2%	3.3%	6.5%	9.5%	12.4%	14.9%	18.1%	24.1%	30.3%	37.2%
Health Care	1.7%	3.5%	5.2%	10.9%	16.4%	20.6%	23.8%	27.7%	34.0%	37.3%	40.7%
Financials	0.5%	1.3%	2.3%	5.4%	8.4%	10.8%	12.9%	15.4%	19.9%	24.5%	28.8%
Information Technology	1.4%	2.8%	4.4%	9.2%	13.2%	16.3%	19.3%	21.8%	27.6%	30.7%	32.4%
Telecommunication Services	0.2%	0.7%	1.1%	1.2%	2.8%	4.4%	5.8%	6.6%	9.1%	13.2%	13.7%
Utilities	0.7%	1.5%	2.3%	4.7%	7.2%	9.2%	11.1%	12.7%	15.6%	19.2%	22.7%
	199801-200612										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
Energy	1.2%	2.4%	3.6%	8.3%	12.2%	16.5%	21.6%	25.2%	30.6%	37.3%	51.4%
Materials	0.6%	0.6%	1.1%	1.8%	1.4%	2.4%	1.9%	3.2%	3.4%	4.9%	2.4%
Industrials	1.0%	1.8%	2.4%	4.6%	6.0%	7.5%	10.7%	14.6%	20.0%	26.0%	35.0%
Consumer Discretionary	1.0%	2.2%	3.4%	7.2%	10.8%	13.3%	16.2%	19.4%	24.8%	27.1%	32.4%
Consumer Staples	0.3%	0.9%	1.5%	4.0%	6.2%	6.5%	7.2%	8.5%	9.8%	15.3%	23.0%
Health Care	1.4%	2.8%	4.4%	9.9%	12.6%	15.5%	17.2%	18.3%	16.6%	15.3%	17.6%
Financials	0.4%	1.1%	1.7%	3.7%	6.3%	8.7%	10.6%	12.2%	14.3%	16.8%	19.9%
Information Technology	1.7%	2.4%	3.6%	7.5%	7.8%	5.3%	3.6%	1.0%	-1.9%	4.5%	6.9%
Telecommunication Services	-0.9%	-1.4%	-1.2%	1.5%	3.5%	7.7%	14.2%	18.8%	15.4%	5.4%	-2.2%
Utilities	0.6%	1.1%	1.5%	3.7%	6.0%	7.8%	10.1%	12.5%	20.2%	31.5%	41.3%

Past performance is not a guarantee of future results.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

The sectors where the model struggles are Materials and Telecoms. The Telecom sector has undergone radical transformation over the past 30 years. Prior to 1984, telecommunication companies were effectively a regulated utility. With the break-up of AT&T and the creation of the RBOCs, competition was introduced into this sector. In the years of the Internet Bubble, telecommunication stocks traded like technology companies. The fraud years of WorldCom had a pernicious and long-lasting impact on the sector. It was not merely that a company was overstating revenues; rather it was that the market leader was materially overstating the size of the market, thereby signaling to all market participants that the revenue opportunities were far greater than anyone had previously imagined. Consequently, companies throughout the industry massively over invested in capacity. When the fraud was discovered, the returns to these companies plummeted and still remain depressed, as the industry continues to work through the excess capacity. It should surprise no one that a quantitative process has great difficulty here, given the numerous structural regime changes that have occurred in this sector.

Theme Component Weights

The individual factors that make up the sector models are grouped into three thematic components:

- Valuation Component
- Quality Component
- Market Dynamics & Temperament Component

By drawing alphas from across a wide range of sources, investment styles and factors, we are able to diversify the basis for the model's outperformance. We believe this is critical for ensuring its success in all macroeconomic environments and market regimes.

As seen in Figure 10, the weights of the themes vary considerably across sectors. We do not artificially seek to impose a limit or band on what these weights should be. Instead, we let the data speak to us. That said, the two more fundamental variable-based themes on a combined basis overwhelmingly fall between 65% and 75% of the weight of the model, while the more market sentiment-based theme hovers around 25% and 35% of the model weight.

Figure 10: Thematic Weights for Lehman Brothers Large-Cap Core Model

GICs Sector	Valuation	Quality of Management / Capital Deployment	Market Dynamics & Temperament
Financials	25%	40%	35%
Materials	33%	30%	37%
Industrials	18%	55%	27%
Health Care	20%	53%	27%
Technology	18%	47%	35%
Telecommunications	15%	70%	15%
Consumer Discretionary	23%	40%	37%
Consumer Staples	33%	42%	25%
Energy	53%	25%	22%
Utilities	45%	30%	25%

Source: Lehman Brothers Quantitative Equities Strategies Research

Thematic Component Performance

Valuation Component

The valuation theme is composed of a number of factors that seek to capture misvaluations in the pricing of stocks. Identifying misvaluations early and then holding them to until the market recognizes the situation is the key to successful investing. How to identify misvaluations *ex-ante* is the tricky part. Are they best seen by looking at normalized values (e.g., normalized cash flows or normalized multiples) or forecasted variables, or past performance? Is it better to look at accounting measures, which are subject to substantial managerial discretion, or to look at cash flow-based metrics? How much of valuation

should be done at the sector (or even industry) level versus how much should be done at the market wide level?

Of course, none of these questions has a single right answer. Our approach is that valuation should be done within a sector, by a combination of factors, each with a long established track-record of success. There is no single factor or set of factors that works well across all sectors—the diversity of business within the U.S. economy is simply too large. Different sectors require different factors. Moreover, even within a sector, it would be foolhardy to rely on a single factor to capture valuation across all market regimes and macro cycles. We believe this is the only prudent approach.

As evidenced by Figure 11, we believe there is merit to our methodology. In the period 1962 through 2006, the top quintile of our Valuation Theme outperforms, on average, by 280 basis points. More impressive to us, though, is the 560 long/short performance in the period 1998 to 2006 since this represents the peak of the Internet Bubble and its aftermath. Additionally, the data from this period is free of all restatements, both from M&A activity and fraud. As such, we maintain a cautious optimism that these results may be repeatable in the future.

Figure 11: Valuation Theme Performance for Lehman Brothers Large-Cap Core Model, Average Excess Returns Relative to Large-Cap Universe

	Relative Return										
Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-200612											
Quintile 1	0.3%	0.5%	0.7%	1.3%	2.0%	2.8%	3.7%	4.6%	6.1%	7.8%	9.5%
Quintile 2	0.2%	0.3%	0.4%	0.8%	1.1%	1.6%	2.2%	2.7%	3.9%	4.7%	5.4%
Quintile 3	-0.1%	-0.1%	-0.2%	-0.4%	-0.7%	-0.8%	-1.1%	-1.4%	-1.8%	-1.9%	-2.3%
Quintile 4	-0.2%	-0.2%	-0.3%	-0.6%	-0.8%	-1.1%	-1.4%	-1.6%	-2.3%	-3.2%	-4.0%
Quintile 5	-0.2%	-0.3%	-0.4%	-0.7%	-1.2%	-1.8%	-2.4%	-3.1%	-4.2%	-5.6%	-6.9%
Long/Short spread	0.5%	0.8%	1.1%	2.1%	3.2%	4.6%	6.1%	7.6%	10.3%	13.5%	16.4%
199801-200612											
Quintile 1	0.5%	0.8%	1.0%	1.8%	2.6%	3.8%	5.1%	6.5%	9.2%	13.1%	17.2%
Quintile 2	0.1%	0.2%	0.3%	0.4%	0.7%	0.9%	1.4%	2.1%	3.4%	4.2%	5.1%
Quintile 3	-0.1%	-0.2%	-0.4%	-0.9%	-1.1%	-1.2%	-1.7%	-2.3%	-2.5%	-2.6%	-3.5%
Quintile 4	-0.3%	-0.4%	-0.5%	-0.6%	-1.1%	-1.7%	-2.2%	-2.7%	-4.6%	-8.1%	-10.5%
Quintile 5	-0.2%	-0.3%	-0.5%	-0.7%	-1.1%	-1.8%	-2.6%	-3.7%	-5.5%	-6.5%	-8.2%
Long/Short spread	0.7%	1.1%	1.5%	2.4%	3.7%	5.6%	7.7%	10.2%	14.7%	19.6%	25.4%
197301-199712											
Quintile 1	0.4%	0.7%	1.0%	1.8%	2.8%	3.7%	4.8%	5.8%	7.5%	9.4%	11.2%
Quintile 2	0.2%	0.4%	0.6%	1.0%	1.4%	1.9%	2.5%	3.1%	4.5%	5.7%	6.5%
Quintile 3	0.0%	0.0%	-0.1%	-0.1%	-0.2%	-0.2%	-0.3%	-0.4%	-0.6%	-0.7%	-0.9%
Quintile 4	-0.2%	-0.3%	-0.4%	-0.9%	-1.1%	-1.4%	-1.9%	-2.3%	-3.3%	-4.3%	-5.3%
Quintile 5	-0.4%	-0.6%	-0.9%	-1.6%	-2.5%	-3.5%	-4.5%	-5.6%	-7.4%	-9.5%	-11.1%
Long/Short spread	0.8%	1.3%	1.8%	3.4%	5.2%	7.2%	9.3%	11.4%	14.9%	18.9%	22.3%

Past performance is not a guarantee of future results.
Large cap universe is Russell 1000 after 1978; pre-1978 it is defined via analogous market capitalization break-points
Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Quality Component

Quantifying the quality of a company is an onerous assignment. How can one objectively ascertain whether a CEO, CFO, or other corporate officer is behaving in ways that will benefit the share price in the years ahead? For us, the answer is simple: follow the cash, or perhaps more accurately, the capital. By watching how management deploys its most

scarce and precious resource—shareholder capital—we gain great insight into the future path of returns.

Our research shows that companies with management that is cautious with shareholder capital and have a track record of using it wisely in the past earn high excess returns in the future. A high level of capital spending is a clear negative signal for it often occurs at peaks in business cycles, when trends are unsustainable. Conversely, positive signals all include capital being returned to shareholders in the form of share purchases, low levels of inventory build and other accruals on the balance sheet, and the jettisoning of non-productive assets and employees.

The performance of this thematic component is strong and naturally complements the Valuation Theme. In the out-of-sample period, the top quintile returns 220 bps per annum in excess returns with annual rebalancing. Again, the data for this period contains true "as was" data, free of all look-ahead biases from restatements, M&A activity and the like.

Figure 12: Quality Theme Performance for Lehman Brothers Large-Cap Core Model, Average Excess Returns Relative to Large-Cap Universe

	Relative Return										
Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-200612											
Quintile 1	0.2%	0.4%	0.6%	1.3%	1.9%	2.5%	3.0%	3.5%	4.4%	5.3%	6.3%
Quintile 2	0.1%	0.2%	0.2%	0.5%	0.7%	0.8%	1.1%	1.3%	1.6%	2.1%	2.8%
Quintile 3	0.1%	0.2%	0.2%	0.4%	0.4%	0.6%	0.6%	0.7%	0.8%	0.5%	0.1%
Quintile 4	-0.1%	-0.1%	-0.1%	-0.3%	-0.4%	-0.5%	-0.6%	-0.9%	-1.2%	-1.7%	-2.2%
Quintile 5	-0.3%	-0.6%	-0.8%	-1.7%	-2.4%	-3.2%	-3.8%	-4.3%	-5.1%	-5.8%	-6.8%
Long / Short spread	0.5%	0.9%	1.4%	2.9%	4.4%	5.7%	6.8%	7.7%	9.5%	11.2%	13.2%
199801-200612											
Quintile 1	0.3%	0.5%	0.8%	1.6%	2.1%	2.2%	2.5%	2.9%	3.0%	3.2%	4.0%
Quintile 2	0.0%	0.1%	0.1%	0.3%	0.6%	0.5%	0.6%	0.8%	1.3%	2.6%	3.7%
Quintile 3	0.1%	0.2%	0.2%	0.2%	0.1%	0.2%	0.2%	0.6%	1.0%	1.9%	3.1%
Quintile 4	0.0%	0.1%	0.1%	0.1%	0.0%	0.2%	0.3%	0.0%	-0.4%	-0.5%	-1.2%
Quintile 5	-0.5%	-0.8%	-1.2%	-2.2%	-2.8%	-3.1%	-3.7%	-4.3%	-4.9%	-7.2%	-9.7%
Long / Short spread	0.7%	1.4%	2.0%	3.9%	4.9%	5.3%	6.2%	7.1%	7.9%	10.4%	13.7%
197301-199712											
Quintile 1	0.2%	0.4%	0.6%	1.4%	2.3%	3.0%	3.6%	4.3%	5.7%	7.1%	8.4%
Quintile 2	0.2%	0.3%	0.5%	0.9%	1.2%	1.5%	1.9%	2.2%	2.8%	3.5%	4.3%
Quintile 3	0.0%	0.1%	0.1%	0.2%	0.3%	0.5%	0.6%	0.5%	0.6%	-0.1%	-0.8%
Quintile 4	-0.1%	-0.1%	-0.1%	-0.4%	-0.6%	-0.7%	-1.1%	-1.5%	-2.3%	-3.2%	-4.1%
Quintile 5	-0.3%	-0.6%	-1.0%	-1.9%	-2.8%	-3.7%	-4.3%	-4.9%	-6.1%	-6.7%	-7.6%
Long / Short spread	0.5%	1.0%	1.6%	3.3%	5.1%	6.7%	7.9%	9.2%	11.9%	13.8%	16.0%

Past performance is not a guarantee of future results.
Large cap universe is Russell 1000 after 1978; pre-1978 it is defined via analogous market capitalization break-points
Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Market Dynamics and Temperament Component

Gauging the dynamics and mood of the market and fellow investors is a crucial part to successful investing for, as the saying goes, the market can remain irrational longer than any individual investor can remain solvent. Hence, he (or she) who ignores the temperament of the market does so at his (or her) own peril.

Quantifying the mood of the market is not as difficult as one might first imagine. Sell-side analysts provide a handy gauge through both their earnings forecast and stock recommendations. Following the pattern of past stock returns (e.g., price momentum) is fruitful, even if much maligned in some academic circles. Earnings surprises, when properly measured, continue to foreshadow the movement in prices in the quarters to come. And finally, we believe a stock's abnormal volume is an indicator of the hype and over-attention surrounding it and thus is a valuable indicator of companies with unsustainable share prices.

Figure 13 highlights the returns to using this component in one's investment process. The top quintile earned 3.3% average excess returns per annum with a 12-month holding period in the period 1998 to 2006. This level of return was remarkably steady over a variety of time periods and investment horizons.

Figure 13: Market Dynamics and Temperament Theme Performance for Lehman Brothers Large-Cap Core Model, Average Excess Returns Relative to Large-Cap Universe

	Relative Return										
Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-200612											
Quintile 1	0.3%	0.7%	1.1%	2.3%	3.1%	3.5%	3.7%	3.9%	3.6%	3.0%	2.6%
Quintile 2	0.0%	0.2%	0.3%	0.8%	1.1%	1.3%	1.2%	1.2%	1.2%	1.1%	1.0%
Quintile 3	0.0%	-0.1%	0.0%	0.0%	-0.1%	-0.2%	-0.3%	-0.4%	-0.4%	0.0%	0.2%
Quintile 4	-0.1%	-0.3%	-0.4%	-0.8%	-1.1%	-1.2%	-1.2%	-1.2%	-1.3%	-1.4%	-1.2%
Quintile 5	-0.2%	-0.5%	-0.9%	-2.1%	-2.9%	-3.2%	-3.1%	-3.1%	-2.8%	-2.3%	-2.5%
Long / Short spread	0.4%	1.2%	2.1%	4.4%	6.0%	6.7%	6.8%	7.0%	6.4%	5.3%	5.1%
199801-200612											
Quintile 1	0.4%	0.9%	1.5%	2.7%	3.1%	3.3%	3.1%	2.9%	1.3%	0.2%	-0.1%
Quintile 2	0.0%	0.3%	0.4%	0.9%	1.0%	0.9%	0.2%	-0.2%	-0.7%	-1.1%	-1.7%
Quintile 3	0.0%	-0.1%	0.0%	0.1%	-0.1%	-0.4%	-0.6%	-0.9%	-1.4%	-1.0%	-0.6%
Quintile 4	-0.2%	-0.4%	-0.4%	-0.8%	-0.7%	-0.7%	-0.3%	0.0%	0.5%	0.9%	1.4%
Quintile 5	-0.3%	-0.7%	-1.4%	-2.9%	-3.3%	-3.2%	-2.4%	-1.8%	0.4%	0.9%	1.0%
Long / Short spread	0.7%	1.6%	2.9%	5.6%	6.4%	6.5%	5.5%	4.7%	0.9%	-0.8%	-1.1%
197301-199712											
Quintile 1	0.3%	0.7%	1.2%	2.6%	3.7%	4.3%	4.6%	5.0%	4.9%	4.4%	4.2%
Quintile 2	0.1%	0.2%	0.4%	1.0%	1.5%	1.7%	1.7%	1.7%	1.7%	1.5%	1.5%
Quintile 3	0.0%	0.0%	0.1%	0.1%	0.1%	0.1%	0.1%	-0.1%	0.2%	0.3%	0.6%
Quintile 4	-0.1%	-0.3%	-0.5%	-1.0%	-1.4%	-1.6%	-1.7%	-1.8%	-1.8%	-1.9%	-1.8%
Quintile 5	-0.2%	-0.6%	-1.0%	-2.4%	-3.6%	-4.0%	-4.1%	-4.2%	-4.2%	-3.7%	-4.2%
Long / Short spread	0.5%	1.3%	2.2%	5.0%	7.3%	8.3%	8.6%	9.2%	9.1%	8.1%	8.4%

Past performance is not a guarantee of future results.

Large cap universe is Russell 1000 after 1978; pre-1978 it is defined via analogous market capitalization break-points

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Risk-Adjusted, Optimized Portfolio Returns

To fully understand the behavior of our model, we run a series of computer simulated optimizations. Through this process, we are able to gain additional insight into how the model is generating its excess returns by constraining its behavior on a number of dimensions. For example, in this framework, we are able to keep the model from taking large sector bets by specifying the degree to which the model portfolio's sector weights can differ from the benchmark's sector weights. By doing this, we hope to gain further insight as to where "alpha" is being produced by the model and to eliminate risks and unintended behavior of the model which ultimately turns out to be value destroying.

Our optimization had the following parameters:

Constraints	Values
Tracking Error	4%
Number of Securities	80 - 120
Active Sector Weight	+/- 7%
Active Sector Exposure	+/- 0.30
Active Stock Weight	+/-2%
Turnover (Monthly)*	10%
Trade Size**	< 15% of ADV
Universe:	Russell 1000
Initial Portfolio Size	$2 billion

*This constraint is relaxed in June of each due to once-per-year annual universe rebalance

**This constraint is relaxed for initial set-up trade to "< 50% of ADV" under assumption that the portfolio will be traded over multiple days

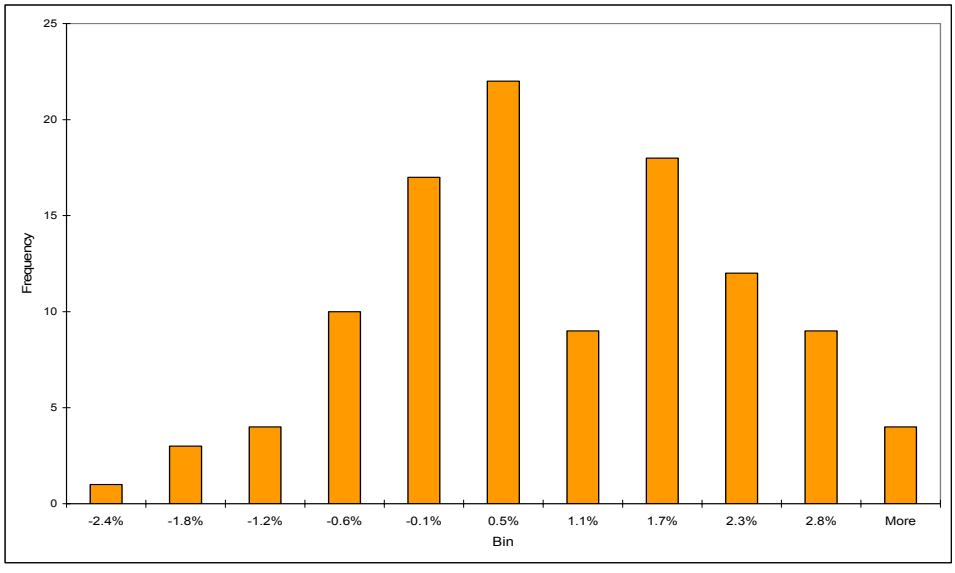
Our enhanced (optimal) model portfolio outperformed the benchmark by 7.1% on an average annualized basis from January 1995 through February 2007. The portfolio achieved a realized tracking error of 4.2% and an Information Ratio of 1.68 (see Figure 14). The consistency of the portfolio is high as only 6.7% of the months does the model underperform — that is, does it experience a rolling 12-month track record inferior to the benchmark. Finally, our model is equally proficient in both up-markets and down-markets. In months, when the market as a whole is up, our model outperforms 67% of the time; similarly, in months when the market as a whole is down, our model outperforms 61% of the time. The distribution of returns is generally symmetric but does naturally exhibit some left skewness (see Figure 15).

Figure 14: Enhanced (Optimized) Portfolio Results, Lehman Brothers Large-Cap Core Model, January 1998 through February 2007

Annualized Average Absolute Returns	14.3%
Annualized Average Portfolio Return in Excess of Benchmark	7.7%
Annualized Tracking Error	4.5%
Information Ratio (Monthly Rebalance)	1.72
Information Ratio (No Rebalancing)	2.51
Percent of Months Model Outperforms	63%
Percent of Months with Positive 12 Month Track Record	97%
Percent of Times Model Outperforms when Benchmark Down	63%
Percent of Times Model Outperforms when Benchmark Up	64%
Percent of Stocks Outperforming Benchmark	52%
Annualized Portfolio Turnover	130%

Past performance is not a guarantee of future results.
Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services; Axioma

Figure 15: Distribution of Enhanced (Optimized) Portfolio Excess Monthly Returns, Large-Cap Core Model, January 1998 Through February 2007



Past performance is not a guarantee of future results.
Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services; Axioma

Admittedly, the use of an optimizer remains controversial, with the process having its share of visceral critics. Today, most (but not all) quantitative portfolio managers use an optimizer (such as the one we utilize here at Lehman Brothers) to create stock portfolios. The majority of managers find it helpful in understanding and controlling for the risks in their portfolios while simultaneously maximizing expected returns. However, to the extent that risk is mismeasured, or that individual stock alphas are miscomputed and represent random noise as opposed to actual signal, it is certainly possible that an optimizer may do more harm than good in the portfolio construction process.

Our belief is that optimizers are a mathematical tool, just like regressions or Monte-Carlo simulations, and are neither inherently good nor bad. Instead, it depends upon the skill of the end-user to implement them wisely, understanding their pitfalls as well as their promise.

Model Portfolio

The exhibit that follows shows our initial quantitatively derived model portfolio. The current set of constraints that led to the selection of this portfolio is available from us upon request.

Figure 16: Lehman Brothers Quantitative Equities Strategies Research Large- Cap Core Model

As of Close on July 6, 2007

Ticker	Company Name	Price	Portfolio Weight	Benchmark Weight	Active Weight	Overall Model Rank	Valuation Rank	Quality Rank	Market Dynamics Rank
Consumer Discretionary			9.84%	10.99%	-1.15%				
NKE	NIKE INC	$ 59.67	1.56%	0.14%	1.42%	1	2	1	1
JCP	PENNEY J C INC	$ 72.55	1.51%	0.10%	1.40%	1	1	2	1
MHP	MCGRAW HILL COS INC	$ 67.67	0.87%	0.15%	0.73%	1	4	1	2
AZO	AUTOZONE INC	$ 139.92	0.63%	0.04%	0.59%	1	2	1	2
JCI	JOHNSON CTLS INC	$ 116.60	0.69%	0.15%	0.55%	1	2	4	1
WHR	WHIRLPOOL CORP	$ 113.92	0.58%	0.06%	0.52%	1	1	2	2
BDK	BLACK & DECKER CORP	$ 88.93	0.55%	0.04%	0.51%	1	1	1	2
RL	POLO RALPH LAUREN CORP	$ 102.30	0.52%	0.04%	0.48%	1	2	1	3
DISH	ECHOSTAR COMMUNICATIONS NEW	$ 44.56	0.47%	0.06%	0.41%	1	1	3	1
NVR	NVR INC	$ 691.50	0.43%	0.02%	0.41%	1	1	1	3
ESI	ITT EDUCATIONAL SERVICES INC	$ 119.83	0.40%	0.03%	0.37%	1	5	1	1
HAS	HASBRO INC	$ 32.49	0.35%	0.03%	0.31%	1	3	1	2
NWL	NEWELL RUBBERMAID INC	$ 29.52	0.32%	0.05%	0.27%	1	3	1	1
MHK	MOHAWK INDS INC	$ 103.00	0.29%	0.04%	0.26%	1	1	2	2
VFC	V F CORP	$ 93.66	0.28%	0.05%	0.23%	1	3	2	1
BC	BRUNSWICK CORP	$ 32.78	0.18%	0.02%	0.16%	1	1	1	2
WTW	WEIGHT WATCHERS INTL INC NEW	$ 51.15	0.10%	0.01%	0.09%	1	3	1	3
IAR	IDEARC INC	$ 36.31	0.10%	0.03%	0.07%	1	3	3	1
Consumer Staples			5.24%	8.47%	-3.24%				
MO	ALTRIA GROUP INC	$ 71.60	2.96%	0.96%	2.00%	1	1	1	2
KR	KROGER CO	$ 28.23	1.26%	0.13%	1.13%	1	1	2	1
DF	DEAN FOODS CO NEW	$ 31.42	0.36%	0.03%	0.33%	1	1	3	3
EL	LAUDER ESTEE COS INC	$ 46.08	0.30%	0.03%	0.27%	1	1	1	2
BARE	BARE ESCENTUALS INC	$ 35.54	0.27%	0.01%	0.26%	1	2	1	1
ACV	ALBERTO CULVER CO NEW	$ 24.36	0.10%	0.01%	0.09%	1	1	1	1
Energy			16.06%	10.69%	5.37%				
COP	CONOCOPHILLIPS	$ 81.04	2.84%	0.84%	2.00%	1	1	3	2
VLO	VALERO ENERGY CORP NEW	$ 75.49	2.26%	0.26%	2.00%	1	1	1	2
XOM	EXXON MOBIL CORP	$ 86.46	5.10%	3.10%	2.00%	1	3	1	1
MRO	MARATHON OIL CORP	$ 63.59	2.28%	0.28%	2.00%	1	2	1	2
CVX	CHEVRON CORP NEW	$ 87.68	3.20%	1.20%	2.00%	1	2	2	2
OSG	OVERSEAS SHIPHOLDING GROUP INC	$ 88.57	0.38%	0.02%	0.36%	1	1	1	5
Financials			24.38%	20.55%	3.83%				
JPM	JP MORGAN CHASE & CO	$ 48.97	3.06%	1.06%	2.00%	1	2	2	2
MS	MORGAN STANLEY	$ 73.09	2.49%	0.49%	2.00%	1	3	1	1
AIG	AMERICAN INTL GROUP INC	$ 70.08	3.00%	1.00%	2.00%	1	2	1	2
GS	GOLDMAN SACHS GROUP INC	$ 223.64	2.53%	0.58%	1.95%	2	4	1	2
WM	WASHINGTON MUT INC	$ 43.52	1.60%	0.24%	1.35%	1	2	1	3
PRU	PRUDENTIAL FINL INC	$ 97.87	1.41%	0.29%	1.12%	1	3	4	1
MET	METLIFE INC	$ 64.88	1.29%	0.19%	1.10%	1	2	1	1
XL	XL CAP LTD	$ 83.44	1.02%	0.10%	0.92%	1	1	4	1
STI	SUNTRUST BKS INC	$ 87.52	1.04%	0.20%	0.84%	1	3	2	1
MBI	MBIA INC	$ 62.66	0.89%	0.05%	0.84%	1	1	1	3
HIG	HARTFORD FINL SVCS GROUP INC	$ 99.33	0.81%	0.20%	0.61%	1	1	4	1
TRV	TRAVELERS COMPANIES INC	$ 54.52	0.82%	0.23%	0.58%	1	1	4	2
CB	CHUBB CORP	$ 54.55	0.66%	0.14%	0.52%	1	1	1	2
LTR	LOEWS CORP	$ 52.06	0.62%	0.14%	0.48%	1	2	1	1
AMP	AMERIPRISE FINL INC	$ 65.67	0.43%	0.10%	0.33%	1	3	3	1
CMA	COMERICA INC	$ 60.83	0.38%	0.06%	0.32%	1	2	2	1
RDN	RADIAN GROUP INC	$ 55.13	0.29%	0.03%	0.26%	1	1	1	4
AOC	AON CORP	$ 42.68	0.34%	0.08%	0.26%	1	2	1	1
AXS	AXIS CAPITAL HOLDINGS	$ 40.79	0.28%	0.04%	0.24%	1	1	3	2
PRE	PARTNERRE LTD	$ 78.72	0.26%	0.03%	0.23%	1	1	3	1
SAF	SAFECO CORP	$ 63.99	0.25%	0.04%	0.21%	1	1	1	3
UNM	UNUM GROUP	$ 26.23	0.25%	0.06%	0.19%	1	1	4	1
FNF	FIDELITY NATIONAL FINANCIAL	$ 23.89	0.22%	0.03%	0.18%	1	1	4	1
CNA	CNA FINL CORP	$ 49.08	0.14%	0.01%	0.13%	1	1	4	1
NFS	NATIONWIDE FINL SVCS INC	$ 62.51	0.13%	0.02%	0.11%	1	1	4	1
AFG	AMERICAN FINL GROUP INC OHIO	$ 34.10	0.09%	0.02%	0.07%	1	1	1	3
DFS	DISCOVER FINL SVCS	$ 25.64	0.09%	0.09%	0.00%	NA	NA	NA	NA

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services; Axioma
Note 1=Most Attractive; 5=Least Attractive; NA=Not Available

Figure 16 (continued): Lehman Brothers Quantitative Equities Strategies Research Large-Cap Core Model Portfolio

As of Close on July 6, 2007

Ticker	Company Name	Price	Portfolio Weight	Benchmark Weight	Active Weight	Overall Model Rank	Valuation Rank	Quality Rank	Market Dynamics Rank
Health Care			7.37%	11.47%	-4.10%				
MRK	MERCK & CO INC	$ 49.46	2.68%	0.68%	2.00%	1	3	1	1
SGP	SCHERING PLOUGH CORP	$ 30.53	1.41%	0.29%	1.12%	1	4	1	2
AET	AETNA INC NEW	$ 51.08	0.88%	0.17%	0.71%	1	1	3	1
CI	CIGNA CORP	$ 54.28	0.71%	0.10%	0.61%	1	1	3	1
HUM	HUMANA INC	$ 63.18	0.58%	0.07%	0.51%	1	1	1	4
WCG	WELLCARE HEALTH PLANS INC	$ 94.00	0.34%	0.02%	0.31%	1	1	1	4
KG	KING PHARMACEUTICALS INC	$ 20.85	0.27%	0.03%	0.23%	1	1	2	2
KCI	KINETIC CONCEPTS INC	$ 54.28	0.22%	0.02%	0.20%	1	2	1	3
HLTH	HLTH CORPORATION STOCK	$ 13.96	0.15%	0.02%	0.14%	1	1	1	5
COV	COVIDIEN LTD	$ 42.31	0.13%	0.13%	0.00%	NA	NA	NA	NA
Industrials			7.09%	11.38%	-4.29%				
BA	BOEING CO	$ 98.88	2.50%	0.50%	2.00%	1	5	1	2
HON	HONEYWELL INTL INC	$ 59.08	1.65%	0.29%	1.36%	1	4	2	1
GWW	GRAINGER W W INC	$ 94.21	0.42%	0.04%	0.38%	1	3	1	1
CHRW	C H ROBINSON WORLDWIDE INC	$ 52.00	0.38%	0.06%	0.32%	1	5	1	3
MAN	MANPOWER INC	$ 94.26	0.28%	0.05%	0.23%	1	3	1	1
SPW	SPX CORP	$ 91.13	0.23%	0.03%	0.20%	1	2	3	1
DNB	DUN & BRADSTREET CORP DEL NEW	$ 104.93	0.23%	0.04%	0.19%	1	5	1	1
RHI	ROBERT HALF INTL INC	$ 37.15	0.20%	0.03%	0.17%	1	4	1	5
LSTR	LANDSTAR SYS INC	$ 48.56	0.17%	0.02%	0.15%	1	5	1	3
EXPD	EXPEDITORS INTL WASH INC	$ 41.76	0.15%	0.06%	0.09%	1	5	1	4
TFX	TELEFLEX INC	$ 83.25	0.10%	0.02%	0.08%	1	1	1	1
TTC	TORO CO	$ 59.85	0.09%	0.02%	0.07%	1	4	1	1
TYC	TYCO INTL LTD NEW	$ 53.17	0.17%	0.17%	0.00%	NA	NA	NA	NA
GE	GENERAL ELECTRIC CO	$ 38.48	0.52%	2.52%	-2.00%	5	2	5	4
Information Technology			20.21%	15.46%	4.75%				
AAPL	APPLE INC	$ 132.30	2.73%	0.73%	2.00%	1	5	1	1
AMAT	APPLIED MATLS INC	$ 19.99	2.18%	0.18%	2.00%	1	1	1	3
NVDA	NVIDIA CORP	$ 43.77	2.10%	0.10%	2.00%	1	4	1	1
HPQ	HEWLETT PACKARD CO	$ 45.98	2.78%	0.78%	2.00%	1	1	2	1
MA	MASTERCARD INC	$ 161.90	2.08%	0.08%	2.00%	1	3	1	2
KLAC	KLA-TENCOR CORP	$ 56.42	1.36%	0.07%	1.30%	1	1	1	2
ADSK	AUTODESK INC	$ 45.20	1.13%	0.07%	1.06%	1	4	1	3
ALTR	ALTERA CORP	$ 23.52	0.94%	0.05%	0.88%	1	4	1	1
LRCX	LAM RESEARCH CORP	$ 51.95	0.86%	0.04%	0.81%	1	1	1	2
CDNS	CADENCE DESIGN SYSTEM INC	$ 22.05	0.61%	0.04%	0.57%	1	1	2	1
CSC	COMPUTER SCIENCES CORP	$ 59.67	0.61%	0.07%	0.55%	1	1	1	2
VSEA	VARIAN SEMICONDUCTOR EQUIPMNT	$ 39.28	0.54%	0.02%	0.52%	1	2	1	1
AVT	AVNET INC	$ 41.20	0.47%	0.04%	0.43%	1	1	3	1
EDS	ELECTRONIC DATA SYS NEW	$ 28.30	0.50%	0.09%	0.41%	1	2	1	2
BMC	BMC SOFTWARE INC	$ 30.32	0.42%	0.04%	0.38%	1	2	1	3
CPWR	COMPUWARE CORP	$ 12.15	0.27%	0.02%	0.25%	1	2	2	1
DST	DST SYS INC DEL	$ 83.29	0.28%	0.03%	0.25%	1	2	1	1
FDS	FACTSET RESH SYS INC	$ 68.43	0.15%	0.02%	0.13%	1	4	1	1
TSS	TOTAL SYS SVCS INC	$ 30.00	0.07%	0.01%	0.06%	1	3	1	1
TEL	TYCO ELECTRONICS LTD	$ 39.82	0.13%	0.13%	0.00%	NA	NA	NA	NA
Materials			4.57%	3.57%	1.00%				
NUE	NUCOR CORP	$ 61.00	1.62%	0.12%	1.51%	1	1	2	2
DOW	DOW CHEM CO	$ 45.82	0.89%	0.28%	0.61%	1	1	3	1
IP	INTL PAPER CO	$ 39.33	0.70%	0.11%	0.59%	1	1	2	4
STLD	STEEL DYNAMICS INC	$ 46.29	0.57%	0.03%	0.54%	1	1	1	2
CE	CELANESE CORP DEL	$ 40.96	0.51%	0.04%	0.48%	1	1	1	1
CMC	COMMERCIAL METALS CO	$ 34.79	0.28%	0.03%	0.25%	1	1	1	1
Telecommunication Services			2.64%	3.64%	-1.00%				
S	SPRINT NEXTEL CORP	$ 21.87	1.58%	0.39%	1.18%	1	1	2	4
NIHD	NII HLDGS INC	$ 87.00	0.79%	0.09%	0.70%	1	4	1	3
VZ	VERIZON COMMUNICATIONS	$ 41.55	0.27%	0.77%	-0.50%	3	2	3	2
Utilities			2.61%	3.78%	-1.18%				
EIX	EDISON INTL	$ 56.50	0.74%	0.12%	0.63%	1	1	1	1
PCG	PG&E CORP	$ 44.62	0.70%	0.10%	0.60%	1	1	3	1
SRE	SEMPRA ENERGY	$ 59.30	0.60%	0.10%	0.50%	1	2	3	1
XEL	XCEL ENERGY INC	$ 20.47	0.42%	0.05%	0.37%	1	1	2	2
LNT	ALLIANT ENERGY CORP	$ 38.96	0.14%	0.03%	0.12%	1	1	1	4

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services; Axioma
Note 1=Most Attractive; 5=Least Attractive; NA=Not Available

Model Details

Model Details

Data

The crucial input for all quantitative models is the data. We believe the raw data we are using is the best available and that our data cleaning and quality assurance procedures are among the best in the industry.

Our source of return data is the C.R.S.P. database, which contains daily stock returns back to 1926 for all stocks which have ever traded on the NYSE, Amex, or Nasdaq stock exchanges. It is completely free of survivorship bias. This allows us to test any of the market sentiment return based factors back over 80 years, across a wide-range of market and economic regimes.

The fundamental data that almost all buy-side and sell-side shops use and that all academic studies are based upon is deeply flawed. The traditional Compustat data is full of restatements announced by companies. For example, whenever a company announces a merger, it will go back and restate its financials for up to five years, as if the merged companies had existed during that time period. This is the information that Compustat will report in its database going forward. It throws out the old data that was actually known at the moment in time and overwrites it with this new data.

Other examples of restatements include restating the financial reports for outright fraud (e.g., WorldCom, Enron, AOL Time Warner, Xerox, etc.), restating the financial reports for discontinued operations and other charges, restating revenue recognition, and restatements due to accounting for reserves.

Ultimately, regardless of the reason for the restatements, Compustat replaces the data that was actually known on the date with the restated data that is often not known until many months or years later. Consequently, investors who naively use this restated data will have significant forward look-ahead bias in their return predictions, and will appear to be prescient in their ability to avoid such fiascos as Enron, WorldCom, and other notable blow-ups.

We have purchased (at considerable expense) the actual fundamental data that was known at each point in time. Consequently, our data is both time-stamped with the exact moment when the data was known to the market and it is free of restatements. As such, it is considerably cleaner, and we believe our model is much more representative of the returns that investors would actually be able to achieve.

Our source for earnings estimate and recommendations is the I/B/E/S detail files. Our source for volume data is C.R.S.P. Our sector definitions are based on S&P GICS data, which we discuss in greater detail in proceeding sections.

Integration of Data Sets

One of the critical challenges facing a quantitative modeling effort is the integration of all the different data sources. Unfortunately, none of the data sources uses the same identifier for all stocks. For example, C.R.S.P. uses its own identifier referred to as a PERMNO (permanent number) while Compustat uses a GVKEY. One needs to create a mapping table between GVKEYs and PERMNOs.

Unfortunately, it is worse than it sounds for GVKEYs are at the company level and PERMNOs are at the security level. Additionally, each company may treat mergers, divestitures, and acquisitions differently. Did AOL buy Time Warner? Did Time Warner buy AOL? Or is it a new company altogether with its own new identification key called AOL Time Warner? In order to do proper linking and follow the returns of companies over time, one has to be a detective hunting these companies back through time.

We have found that while there are commercial products and vendors who purport to do this linking across data vendors and data sets, the quality of the products is often quite poor. Numerous and egregious errors are commonplace once you start to do the slightest poking.

Hence, we have undertaken considerable efforts on our own to remap and link the various datasets to each other. At this point, we are convinced that we have one of the most extensive and accurate linkages across datasets and vendors that exists on either the buy-side or the sell-side.

Sector Definitions and Proprietary Historical Mapping System

The choice of sector classification system is a key decision in the construction of the model, the significance and importance of which should not be overlooked or minimized. A good sector classification system is one that captures the similarities across companies in both fundamental capital and market based trading activities.

We have chosen to use the Global Industry Classification Standards (GICS) code as our principal sector and industry classification system. We have done so primarily for two reasons. First and foremost, it is the standard that our clients have overwhelmingly adopted. As a client service–driven group, we believe it is of primary importance to be aligned with our clients on matters such as this. Second, according to a recent academic paper, GICS dominates other commonly available classification systems in its ability to capture stock return co-movements as well as cross-sectional dispersion in accounting variables.[3]

Unfortunately, GICS, a joint-venture between Morgan Stanley Capital International Inc. (MSCI) and Standard & Poor's, provides historical company classification only from 1985 to present day. We are on our own when it comes to filling in the prior time periods. For this task, we relied on SIC (Standard Industry Classification) codes, the system developed and maintained by U.S. Department of Labor. We were able obtain the full history of SIC codes on a company-by-company basis, including changes in a company's SIC code mapping, from C.R.S.P. S&P and Compustat do not have this data as they save and present only the company's current classification.

SIC codes are not a perfect solution, however, as they are historically inconsistent with major changes in methodology occurring at several distinct times. Additionally, they do not match well with the GICS system which raises issues when we transition from one methodology to another. Consequently, we have taken on the great burden of manually mapping SIC codes into GICS code, so that our sector or industry classification of each company maintains a high level of consistency.

To achieve this goal, we followed the process outlined below. We first carefully reviewed the descriptions of SIC codes as provided by the Labor Department and the descriptions of GICS code from S&P/MSCI, then mapped the SIC codes to GICS codes according to the descriptions. There are four levels in the SIC schema, which correspond to four digits in SIC code. The four levels are: division; major group; industry group; and industry. There are also four levels in the GICS system: sector; industry group; industry; and sub-industry. These four levels are presented in an eight-digit number, with two-digit groupings corresponding to each level. We mapped the first three levels of SIC code to the first three levels of

[3] Sanjeev Bhojraj,Charles M. C. Lee, and Derek K. Oler, 2003. "What's My Line? A Comparison of Industry Classification Schemes for Capital Market Research", Journal of Accounting Research, volume 41(5): pages 745-774

GICS—that is, we mapped the first three digits of SIC codes to the first six digits of GICS codes. We feel we lack sufficient expertise and company-specific knowledge to map the fourth level of SIC code to the fourth level of GICS, nor do we believe this level of granularity in classification will ever be utilized in our models.

Often, however, the descriptions alone are not enough to ascertain the proper mapping. By design SIC codes are production-oriented as opposed to the GICS's focus on principal business activity gleaned from annual reports and financial statements. This distinction results in numerous ambiguous mappings, where the SIC code would include companies only marginally related to an industry.

As a second step, we looked at the SIC code and GICS code a company is assigned after 1985. From this we counted the number of times that a given SIC code is matched to one of the various GICS codes and calculated a hit rate. Specifically, we calculated the hit-ratio as the percentage of companies with a given SIC code that were mapped to a given GICS code in the post 1985 period. We examined those three GICS sectors with the highest hit ratios and then used our judgment as to which one would be most appropriate.

In addition, we also relied on return correlations to verify and augment our mappings. For a variety of different time periods—specifically from 1987 to 1991, 1992 to 1996, 1997 to 2001, and 2002 to 2006—we regressed the returns of companies within a given two-digit SIC code on the returns of companies with given four-digit GICS codes. For each SIC code, we then selected the GICS sector with the greatest explanatory power as the appropriate mapping sector. We then used this as an additional check against the methodologies outlined above.

Through all of these different methodologies, along with our judgment, we believe that we were able to devise a highly robust and historically consistent sector and industry classification system.

Sector Models and Factor Weights

As discussed previously, we have explicitly modeled each of the 10 GICS sectors. We have not tried to force a single version model on every sector, either in terms of factors used or theme and factor weights, as we do not believe that most sectors behave identically.

As seen below, we believe there is a core set of factors which work across almost all sectors. But equally important, there are some factors that only work in one or two sectors and the relative importance of factors changes across sectors. By allowing ourselves this flexibility, we believe we are able to preserve much of investors' intuition into what characteristics and signals matter within a sector, while also maintaining a rigorous and disciplined approach to quantitative stock selection.

This approach does come at cost: it is considerably more painful and more work to create 10 models than it is to create one model. We embrace this pain, however, not only because we are masochists but because we believe this approach is the right one and because we believe it results in a more robust and powerful model.

Throughout our model, we use a total of 27 different signals: nine different Valuation factors; 12 different Quality factors; and six different Market Dynamics and Temperament factors. As discussed previously, not all of these factors are used in each of the sector models. This would be sub-optimal due to the high correlation of some of the factors. On average, for each sector model we use between two and three valuation factors, four to five quality factors, and three to four market dynamics factors, for a total of between nine and 11 factors overall.

The Valuation factors are: 1) Book-to-Price 2) Trailing Earnings-to-Price; 3) EBITDA-to-EV; 4) Sales-to-Price; 5) Total Yield; 6) Net Free Cash Flow-to-Price; 7) Gross Free Cash Flow-to-Price; 8) Net Income-to-Operating Cash Flow; and 9) Sharpened Forward Earnings-to-Price.

The Quality factors are: 1) Return on Equity; 2) Return on Invested Capital; 3) Change in Shares Outstanding; 4) Change in Employees; 5) Changes in Managerial Discretionary Accruals; 6) Taxes Paid to Pre-tax Income; 7) Incremental Net Margins; 8) Intangibles to Assets; 9) Changes in Debt to Assets; 10) Sales Growth; 11) Net Income Growth; and 12) Asset Turnover.

The Market Dynamics and Temperament factors are: 1) Residualized Price Momentum; 2) Sharpened Analyst Recommendations; 3) Sharpened Earnings Revisions; 4) Abnormal Volume; and 5) Market Estimated Earnings Surprise Signal (MEeSS).

Detailed in Figure 17 are the exact factors we use in each sector along with their weight in the model.

Figure 17: Factors and Factor Weights for Lehman Brothers Large-Cap Core Model

Signals Used in Large Cap Core Model	Financials	Materials	Industrials	HealthCare	Technology	Telecomms	Consumer Discretionary	Consumer Staples	Energy	Utilities
EBITDA to EV	10%	20%		10%						15%
Trailing Earnings to Price							15%	10%		
Book to Price	15%		10%			15%			20%	20%
Sales to Price							7.5%	12.5%		
Total Yield		7.5%						10%		
Net Free Cash Flow to Price		5%	5%	10%					10%	
Net Income to Operating Cash flow									12.5%	
Gross Free Cash Flow to Price					10%					
Sharpened Forecast Earnings to Price			2.5%		7.5%				10%	10%
VALUATION	**25%**	**32.5%**	**17.5%**	**20%**	**17.5%**	**15%**	**22.5%**	**32.5%**	**52.5%**	**45%**
ROE	10%			10%						
ROIC			15%		15%	15%	7.5%	12.5%		
Change in Shares Outstanding	5%	5%	5%		5%		12.5%	12.5%	7.5%	15%
Change in Employees	10%		7.5%		5%	17.5%	5%	5%	5%	
Taxes Paid to Pre-tax Income	15%									
Change in Managerial Discretionary Accruals		17.5%	7.5%	12.5%	12.5%	15.0%	15%	12.5%	12.5%	10%
Incremental Net Margins		7.5%		5%						5%
Net Income Growth				12.5%	5%					
Intangibles to Assets				12.5%		5%				
Change in Debt to Assets			10%		5%					
Sales Growth						17.5%				
Asset Turnover			10%							
QUALITY	**40%**	**30%**	**55%**	**52.5%**	**47.5%**	**70.0%**	**40%**	**42.5%**	**25%**	**30%**
Price Momentum, Residualized	15%	15%	12.5%	10%	15%	10%	15%	10%	15%	15%
Sharpened Analyst Recommendations	5%							7.5%		5%
Sharpened Earnings Revisions Model	5%	10%	5%		10%		7.5%	7.5%	7.5%	
Earnings Revisions Ratio				10%						5%
Stock Liquidity	5%	5.0%	2.5%	7.5%	2.5%		7.5%			
Market Estimated Earnings Surprise Signal	5%	7.5%	7.5%		7.5%	5%	7.5%			
MARKET DYNAMICS & TEMPERAMENT	**35%**	**37.5%**	**27.5%**	**27.5%**	**35%**	**15.0%**	**37.5%**	**25%**	**22.5%**	**25%**

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Putting It All Together: Selecting the Factors and Picking Their Weights

Selecting Among Factors

Our first step was the selection of the economically derived and well-thought out factors that are significant in stock picking through rigorous univariate backtesting. Most of the factors we tested are listed in the next section ("Individual Factors Employed and Their Performance") as well as the third major section of this report.

After selecting the candidate factors on a univariate basis, it was necessary that we carefully screen these factors again so that only those that are largely uncorrelated make it into our quantitative model. If the factors were highly correlated, the estimates of the coefficients would become unreliable and we would not be able to accurately determine the contribution of each individual factor.

While the use of screening tools have proliferated lately, we believe they are misguided as they cannot account for the correlation across signals, thereby overweighting common information and underweighting proprietary signals.

For us, this is the heart of the entire matter of model building. We believe this is the big difference between good models, bad models, and the plethora of screening tools that have become so widespread. Screening tools just choose the companies that rank highly on each of a number of different metrics, with no consideration of the correlation of the signals, no worries about double counting the information. Models explicitly tackle this situation and ascertain the unique information of each signal. If one fails to take into consideration the correlation among the factors, then one inevitably winds up overweighting the same common pieces of information while underweighting the more unique information from proprietary signals.

We have seen models in the marketplace with 45 to 70 factors. These models frighten us, as they are surely misspecified due to the large correlation of most of the factors. Investors who use such models are at best getting multiple sources of exposure to the same factor in ways they are not aware of. At worst (and more likely), in one part of the model they are going long a factor and in another part of the model shorting a different factor that is highly correlated with the first factor. Obviously, this is far from an ideal situation but it is the inevitable outcome of using a highly non-parsimonious model.

The good news is that it is not overly difficult to avoid this situation if one is careful in the factor selection and factor weighting process.

The way we determine if a factor should be included in our model is through cross-sectional regressions. Why regressions? Regressions provide us with a nice way of combining several factors into a single score for each stock and have some very nice properties which make the results easy to understand.

We started by comparing the t-statistics of each of the factors and adjusted R^2's from two regression scenarios: one is *without* the additional factor in question; the second is *with* the additional factor in question. By examining the t-statistics from the "additional variable" regression, we can determine if the factor contains supplementary information (or

explanatory power) given the presence of other factors in the model. Furthermore, we examine the difference in adjusted R^2 measures, which tells us how much additional explanation power the model has by including the new factor.

To be statistically rigorous, we tested if the adjusted R^2s from the two scenarios are significantly different or their difference is purely by chance. To do this, we utilized three different statistical approaches to compare the two scenarios.

As described below, these approaches complement each other, giving us greater confidence in our decision. Our philosophy is that if a factor is truly helpful in predicting future stock returns, it should perform well no matter how we test it. We tried our best to eliminate any biases brought upon by any particular statistical method.

First, we ran a series of Fama-Macbeth cross-sectional regressions, where we regressed different holding period future stock returns on various factors each month.[4] To gain insight on how the factor predicts future returns for different holding periods, we used future returns for three, six, nine, 12, 15, and 18 months ahead periods, individually as dependent variable. From each of the cross-sectional regressions, we obtained a single coefficient, which we refer to as our "gamma". These gammas can be interpreted as the return of the factor (or factor premium) for that three-, six-, nine-, 12-, 15-, or 18-month period.

The question we are most interested in is whether these gammas are, on average, statistically and economically different from zero. To test this we calculate the time series t-statistics of the coefficient and the time series average of adjusted R^2s. Since we do this for each month and the holding periods are longer than one month, there are overlapping periods when we move from one month to another. For example, if we use a three-month holding period, there will be two months overlapping in calculating future returns when we move from one month to the next. If we use a 12-month holding periods then there will be overlapping periods of 11 months. This will artificially inflate the t-statistics due to positive serial correlation that a traditional t-test does not correct for. To overcome this problem, we used Newey-West method, which allows us to correct for the serial autocorrelation in gammas.

The Fama-Macbeth regressions gave us a time series of coefficients which correspond to the returns of fully invested portfolios. This allows us to see how the efficacy of the factors change over time. However, it also has a downside. Namely, for some periods, we may not have enough observations, making the estimates less reliable. For our second methodology, we used panel regressions to further validate our model.

Panel regressions offer a good alternative. The main difference between the Fama-Macbeth regressions and panel regressions is that, in Fama-Macbeth methodology a single regression is run each month and then a time series average of coefficients is taken at the

[4] It is crucial to ensure that all of the information in the factor is known at the beginning of the period over which returns are being calculated otherwise the investment strategy is not feasible to implement in practice.

end. In a panel regression, we pool all the observations together and run one regression to estimate the coefficient. In this way, we have many more observations. The problem with this methodology is that any non-stationarity in a factor's performance will be hidden by pooling all the different time periods together into one big regression.

For our third methodology, we ran a series of simulations. For each month, we took the time series of Fama-Macbeth coefficients and calculated the average excluding that month. Using the coefficients we obtained from this process and the factor values we observed at this month, we forecasted the future stock return for this month from the model for different holding periods, including three-, six-, nine-, 12, 15 and 18 months. Then we calculated out-of- sample R^2, which is defined as one minus the variance of forecast error divided by the variance of dependent variables.

Choosing Factor Weights

To determine the weights of each factor we relied overwhelmingly on the results of the regressions and simulations. The coefficients from the Fama-McBeth regressions can be interpreted as the optimal weights for each factor in a given time period. The time averages of these weights can then be thought of as the optimal average weights, weighting each month equally. Of course, there is no reason why each period must be given the same weight—for example, more recent periods can be given a higher weight if one believes that these periods are more representative of the investment environment in the months ahead. We chose not to pursue factor timing strategies (or dynamic weighting as it is often called) for in our experience, the periods of great success are followed by the times of great disaster and the periods of poor performance are followed by times of triumph. Placing greater emphasis on what has been working recently ensures that when a factor fails (and all factors eventually fail or get arbitraged away) the portfolio will be heavily invested in that factor and fail too.

In picking the weights of the factors, we also relied on our own judgment and common sense. If the results of the regressions recommended a weight for a single factor of, say, 35%, we simply ignored it. Placing a third of the weight of the model in one factor is simply not prudent; we have little confidence that the result will repeat. Of course, the factor would still be weighed disproportionately high, just not that high.

Using our in sample data only, if we noticed a factor starting to fail, we would also take down its weight from what the regressions recommended. We would not and did not, however, down-weight a factor because of some belief or opinions we may have, be it about the direction of the economy in the coming months or years ahead, the emergence of China and India, or some emerging trend in an industry. Those judgments are the realm of a strategist. We are quants and follow our models and the data. We do not think we are soothsayers who can divine future trends or market psychologists who can anticipate the market's mood. We are just quants and are quite happy to have it that way.

Individual Factors Employed and Their Performance

On the proceeding pages we detail the performance of all the factors employed in our model.

All of these variables produced positive long/short spreads with a 9-, 12-, and 15-month holding periods over the time frame 1962 to 2006 (or using a later starting date if that is when the data first become available). We also examined the performance over subsets of periods and found it to be relatively consistent. Finally, it was also important that the factors were helpful in stock selection as opposed to simply picking selected winners.

Valuation Factors

Book-to-Price

Book-to-price captures the historical value of the price the company paid for the assets in place relative to the price for the assets in the market today. Companies with low book-to-price ratios are believed to be "expensive," while those with high book-to-price ratios are thought to be "cheap." So, obviously, the strategy is to buy the high book-to-price companies and sell the low book-to-price.

We argue this dynamic occurs because investors do not fully appreciate the power of mean reversion. Companies that have been doing well will have seen their stock price run up in the mistaken belief that good times will continue indefinitely. Thus, the denominator of the ratio becomes inflated, leading to a low relative book-to-price ratio. As investors see the folly of their ways, prices will fall, reverting to a lower level. For high book-to-price firms, the story is inverted, with ultimately prices reverting back to their high previous level.

This is often why valuation factors are called "mean reversion" factors. Alternatively, this type of story is called an "over-reaction" story, as investors over-react to recent news.

As seen in Figure 18, during the period 1962 through 2006, investing according to book-to-price was a profitable strategy, with average long/short returns of 3.4% per annum with a 12-month holding period for both sides of the trade. As the holding period increases, the profitability of the strategy increases as well, with average long/short returns of 9.6% and 15.4% with 24-month and 36-month holding periods, respectively.

Figure 18: Performance of Book-to-Price, Average Excess Returns, Relative to Large-Cap Universe

	Relative Return										
Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-200612											
Quintile 1	0.3%	0.6%	0.8%	1.3%	2.0%	2.9%	4.0%	5.0%	6.3%	7.6%	8.6%
Quintile 2	0.2%	0.2%	0.4%	0.8%	1.2%	1.6%	2.3%	2.9%	4.1%	5.2%	6.2%
Quintile 3	-0.1%	-0.1%	-0.1%	-0.2%	-0.2%	0.0%	0.3%	0.4%	0.8%	1.4%	2.1%
Quintile 4	-0.1%	-0.2%	-0.3%	-0.5%	-0.7%	-0.6%	-0.6%	-0.6%	-0.5%	-0.9%	-1.5%
Quintile 5	-0.1%	-0.2%	-0.3%	-0.3%	-0.3%	-0.5%	-1.1%	-1.8%	-3.3%	-5.0%	-6.7%
Long/Short Spread	0.5%	0.8%	1.1%	1.5%	2.4%	3.4%	5.0%	6.7%	9.6%	12.6%	15.4%
198701-200612											
Quintile 1	0.3%	0.5%	0.6%	1.0%	1.6%	2.4%	3.4%	4.0%	4.8%	5.8%	6.9%
Quintile 2	0.1%	0.1%	0.2%	0.5%	0.9%	1.2%	1.5%	2.0%	3.1%	3.9%	4.5%
Quintile 3	-0.1%	-0.2%	-0.2%	-0.4%	-0.7%	-1.0%	-1.2%	-1.3%	-1.7%	-2.0%	-2.1%
Quintile 4	-0.1%	-0.3%	-0.4%	-0.8%	-1.2%	-1.5%	-2.0%	-2.5%	-3.0%	-3.6%	-4.1%
Quintile 5	-0.1%	-0.2%	-0.2%	-0.2%	-0.6%	-1.0%	-1.6%	-2.1%	-2.9%	-4.0%	-5.0%
Long/Short Spread	0.4%	0.7%	0.8%	1.2%	2.2%	3.4%	5.0%	6.1%	7.7%	9.8%	11.9%
196201-198612											
Quintile 1	0.4%	0.7%	0.9%	1.6%	2.4%	3.4%	4.5%	5.8%	7.8%	9.2%	10.2%
Quintile 2	0.2%	0.3%	0.5%	1.0%	1.5%	2.1%	2.9%	3.6%	5.0%	6.2%	7.6%
Quintile 3	-0.1%	-0.1%	-0.1%	-0.1%	0.1%	0.8%	1.5%	1.9%	2.9%	4.1%	5.3%
Quintile 4	0.0%	-0.2%	-0.2%	-0.2%	-0.2%	0.2%	0.7%	1.1%	1.7%	1.4%	0.7%
Quintile 5	-0.1%	-0.2%	-0.5%	-0.3%	-0.1%	0.0%	-0.6%	-1.5%	-3.7%	-5.9%	-8.2%
Long/Short Spread	0.5%	0.9%	1.4%	1.9%	2.6%	3.4%	5.1%	7.4%	11.5%	15.1%	18.4%

Past performance is not a guarantee of future returns,
Large cap universe is Russell 1000 after 1978; pre-1978 it is defined via analogous market capitalization break-points
Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Book-to-price is helpful in selecting stocks over a range of time periods, noting that the percentage of stocks in Q1 that outperform is significantly higher than the median in all time periods (see Figure 19). Furthermore, book-to-price is effective with the exceptions of Technology, Consumer Discretionary, and Health Care (see Figure 20).

Figure 19: Performance of Book-to-Price, Stock Selection Percentage

	Percent of Companies Outperforming										
Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-200612											
Quintile 1	50%	51%	51%	51%	51%	52%	52%	52%	53%	52%	51%
Quintile 2	49%	49%	49%	50%	50%	50%	50%	51%	51%	51%	51%
Quintile 3	48%	48%	48%	46%	47%	47%	46%	46%	46%	46%	46%
Quintile 4	48%	47%	47%	47%	46%	46%	44%	45%	44%	43%	43%
Quintile 5	48%	47%	48%	47%	45%	44%	43%	43%	41%	40%	39%
198701-200612											
Quintile 1	50%	50%	50%	49%	50%	49%	49%	49%	48%	47%	47%
Quintile 2	49%	49%	49%	48%	49%	48%	48%	48%	48%	47%	47%
Quintile 3	48%	48%	48%	47%	46%	45%	44%	43%	42%	42%	41%
Quintile 4	48%	48%	48%	46%	45%	44%	42%	42%	40%	38%	38%
Quintile 5	49%	48%	48%	46%	45%	43%	42%	41%	39%	38%	36%
196201-198612											
Quintile 1	51%	52%	52%	53%	53%	54%	55%	56%	58%	56%	55%
Quintile 2	49%	49%	50%	51%	51%	51%	52%	54%	54%	54%	53%
Quintile 3	47%	47%	48%	46%	48%	50%	48%	49%	50%	49%	50%
Quintile 4	49%	47%	46%	48%	47%	48%	46%	48%	47%	47%	46%
Quintile 5	48%	47%	48%	47%	45%	45%	45%	45%	44%	43%	40%

Past performance is nit a guarantee of future results.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 20: Performance of Book-to-Price Across GICS Sectors, Excess Returns Relative to Sector

	196201-198612										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
Energy	1.0%	1.6%	2.5%	5.0%	7.6%	9.5%	10.5%	12.0%	14.7%	16.7%	20.6%
Materials	0.4%	0.7%	0.8%	1.7%	2.8%	4.5%	6.9%	9.2%	12.7%	16.8%	21.5%
Industrials	0.9%	1.8%	2.6%	4.9%	6.6%	8.9%	11.4%	14.4%	19.3%	25.3%	32.3%
Consumer Discretionary	0.5%	0.8%	1.1%	1.8%	2.9%	4.0%	5.2%	6.5%	8.5%	11.0%	14.4%
Consumer Staples	0.4%	0.8%	1.1%	2.3%	3.4%	4.6%	5.7%	7.5%	12.5%	19.9%	28.0%
Health Care	0.4%	0.8%	1.1%	2.6%	3.9%	5.8%	8.2%	11.5%	18.7%	26.4%	34.0%
Financials	0.5%	0.9%	1.3%	2.2%	3.3%	5.2%	8.1%	10.9%	16.2%	21.4%	24.9%
Information Technology	-0.1%	0.1%	0.4%	1.0%	2.4%	4.6%	7.8%	11.3%	20.7%	32.9%	43.9%
Telecommunication Services	0.5%	0.6%	0.6%	1.0%	1.4%	3.5%	5.4%	7.8%	10.3%	14.8%	24.9%
Utilities	0.4%	0.8%	1.1%	2.2%	3.5%	4.4%	5.1%	5.2%	6.4%	7.7%	10.2%
	198701-200612										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
Energy	1.3%	2.4%	3.4%	5.8%	7.1%	8.9%	12.5%	14.7%	18.4%	21.4%	24.3%
Materials	0.6%	0.9%	1.2%	1.2%	1.9%	3.4%	5.3%	7.0%	10.8%	13.6%	19.0%
Industrials	0.5%	0.8%	1.1%	1.6%	2.1%	2.4%	2.5%	3.0%	5.0%	9.2%	14.3%
Consumer Discretionary	0.2%	0.2%	0.1%	-0.4%	-0.7%	-0.2%	0.8%	0.9%	1.6%	3.5%	6.2%
Consumer Staples	0.2%	0.2%	0.2%	0.0%	-0.1%	0.5%	0.6%	0.5%	-0.9%	-2.1%	-4.1%
Health Care	0.5%	0.6%	0.6%	0.0%	1.2%	0.9%	1.9%	2.7%	3.7%	5.5%	9.2%
Financials	0.2%	0.3%	0.3%	0.6%	1.2%	2.4%	3.9%	5.1%	7.5%	9.1%	11.3%
Information Technology	0.0%	-0.2%	-0.7%	-0.8%	-0.4%	0.4%	0.0%	-1.0%	-2.5%	-0.9%	-1.2%
Telecommunication Services	0.0%	0.2%	0.4%	0.4%	0.2%	1.7%	3.4%	6.7%	7.1%	11.7%	10.3%
Utilities	0.3%	0.4%	0.7%	2.1%	3.9%	5.8%	7.9%	9.6%	13.7%	18.0%	21.6%

Past performance is not a guarantee of future results.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Trailing Earnings-to-Price

A trailing earnings-to-price ratio is a common indicator to determine how expensive, or cheap, a stock is relative to its peers. It is also often referred to as an earnings yield multiple, as it measures what fraction of a dollar one receives for a dollar of cost (price). In other words, a trailing earnings-to-price ratio of 0.10 would mean that the investors received 10¢ per dollar cost of the stock. Intuitively, we would expect the cheaper stocks (high trailing e/p) to outperform the relatively more expensive stocks (low trailing e/p), as investors will want to buy low and sell them when they are overpriced, forcing the prices up and down, respectively.

This variable was relatively reliable as a predictor of future stock returns generating, on average, 330 bps of outperformance, on a long/short basis over the years 1962 to 2006, assuming a 12-month holding period (see Figure 21). The factor's ability to discriminate across winners and loser is, perhaps, more impressive still, with 51% of Q1 stocks outperforming and 44% of Q5 stocks underperforming during the same time period (see Figure 22). Its performance is consistent across a range of sectors, with notable performance in Energy, Utilities, Consumer Staples and Industrials (see Figure 23).

Figure 21: Trailing Earnings to Price, Average Excess Returns, Relative to Large-Cap Universe

	Relative Return										
Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-200612											
Quintile 1	0.4%	0.6%	0.8%	1.3%	1.7%	2.3%	3.1%	3.8%	5.0%	6.1%	7.2%
Quintile 2	0.1%	0.1%	0.1%	0.2%	0.3%	0.5%	0.7%	1.0%	1.9%	2.5%	3.0%
Quintile 3	-0.1%	-0.1%	-0.2%	-0.2%	-0.3%	-0.3%	-0.4%	-0.6%	-0.9%	-1.2%	-1.7%
Quintile 4	-0.1%	-0.2%	-0.2%	-0.4%	-0.6%	-1.0%	-1.5%	-2.0%	-2.9%	-3.7%	-4.4%
Quintile 5	-0.1%	-0.2%	-0.3%	-0.4%	-0.6%	-1.0%	-1.4%	-1.8%	-2.6%	-3.4%	-4.3%
Long/Short Spread	0.5%	0.8%	1.1%	1.7%	2.4%	3.3%	4.5%	5.6%	7.7%	9.5%	11.5%
198701-200612											
Quintile 1	0.3%	0.4%	0.6%	0.9%	1.1%	1.5%	2.0%	2.4%	3.0%	3.5%	4.3%
Quintile 2	0.0%	0.0%	0.0%	0.0%	0.2%	0.2%	0.3%	0.7%	1.4%	1.9%	2.2%
Quintile 3	0.0%	0.0%	0.1%	0.2%	0.3%	0.3%	0.2%	0.1%	-0.3%	-0.7%	-1.6%
Quintile 4	-0.2%	-0.3%	-0.3%	-0.5%	-0.8%	-1.2%	-1.7%	-2.0%	-2.5%	-2.8%	-3.1%
Quintile 5	-0.1%	-0.1%	-0.2%	-0.4%	-0.7%	-0.7%	-0.7%	-1.1%	-1.5%	-1.8%	-2.0%
Long/Short Spread	0.4%	0.6%	0.8%	1.3%	1.7%	2.1%	2.7%	3.5%	4.5%	5.3%	6.3%
196201-198612											
Quintile 1	0.5%	0.7%	1.0%	1.6%	2.2%	3.0%	4.0%	4.9%	6.6%	8.1%	9.3%
Quintile 2	0.1%	0.1%	0.1%	0.3%	0.4%	0.7%	1.0%	1.3%	2.2%	3.0%	3.6%
Quintile 3	-0.2%	-0.3%	-0.4%	-0.6%	-0.7%	-0.8%	-1.0%	-1.0%	-1.3%	-1.5%	-1.8%
Quintile 4	-0.1%	-0.1%	-0.1%	-0.3%	-0.4%	-0.8%	-1.4%	-2.0%	-3.2%	-4.4%	-5.4%
Quintile 5	-0.2%	-0.3%	-0.3%	-0.4%	-0.6%	-1.3%	-1.9%	-2.4%	-3.5%	-4.6%	-6.0%
Long/Short Spread	0.7%	1.0%	1.3%	2.0%	2.9%	4.2%	5.8%	7.3%	10.2%	12.6%	15.3%

Past performance is not a guarantee of future results.

Large-cap universe is Russell 1000 after 1978; pre-1978 it is defined via analogous market capitalization break-points
Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 22: Performance of Trailing Earnings-to-Price, Stock Selection Percentage

	Percent of Companies Outperforming										
Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-200612											
Quintile 1	51%	51%	51%	51%	51%	51%	51%	51%	51%	50%	50%
Quintile 2	49%	49%	49%	49%	48%	48%	47%	47%	47%	46%	46%
Quintile 3	48%	48%	47%	46%	45%	45%	44%	43%	43%	42%	41%
Quintile 4	48%	48%	48%	47%	46%	45%	44%	43%	42%	41%	40%
Quintile 5	47%	47%	47%	46%	45%	44%	43%	42%	41%	40%	38%
198701-200612											
Quintile 1	50%	50%	50%	49%	49%	48%	48%	47%	47%	47%	47%
Quintile 2	49%	49%	49%	48%	48%	48%	47%	47%	47%	46%	46%
Quintile 3	49%	49%	49%	47%	47%	46%	45%	45%	44%	44%	43%
Quintile 4	48%	48%	47%	47%	46%	45%	44%	43%	43%	42%	42%
Quintile 5	48%	48%	48%	47%	46%	45%	44%	44%	43%	41%	41%
196201-198612											
Quintile 1	51%	52%	52%	52%	52%	53%	54%	54%	54%	53%	53%
Quintile 2	49%	49%	49%	49%	48%	48%	48%	47%	47%	46%	46%
Quintile 3	47%	47%	46%	45%	44%	44%	43%	42%	41%	40%	40%
Quintile 4	48%	48%	48%	47%	46%	45%	44%	43%	41%	40%	38%
Quintile 5	47%	47%	47%	46%	45%	43%	42%	41%	40%	38%	37%

Past performance is not a guarantee of future results.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 23: Performance of Trailing Earnings to Price Across GICS Sectors, Excess Returns Relative to Sector

	196201-198612										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
Energy	1.0%	1.6%	1.9%	2.7%	3.3%	4.6%	6.8%	9.4%	12.4%	14.1%	16.1%
Materials	0.7%	1.0%	1.3%	1.7%	2.4%	4.1%	6.2%	8.9%	12.8%	16.3%	20.1%
Industrials	0.5%	1.0%	1.3%	2.7%	4.2%	6.6%	9.1%	10.4%	12.2%	14.9%	19.1%
Consumer Discretionary	0.6%	1.0%	1.2%	2.2%	3.7%	5.5%	7.4%	9.1%	11.9%	14.2%	16.8%
Consumer Staples	1.1%	1.7%	2.4%	4.2%	5.4%	7.2%	9.1%	11.5%	16.1%	22.7%	28.6%
Health Care	0.5%	0.6%	0.9%	2.1%	3.9%	6.0%	8.3%	10.7%	16.4%	21.9%	29.8%
Financials	0.6%	0.9%	1.2%	1.5%	1.5%	2.0%	3.2%	4.5%	7.9%	9.4%	10.2%
Information Technology	0.1%	-0.1%	-0.2%	-0.9%	0.2%	3.0%	3.7%	7.0%	16.5%	24.1%	32.8%
Telecommunication Services	0.5%	0.9%	1.0%	2.2%	2.7%	4.0%	5.7%	7.3%	8.5%	11.0%	19.0%
Utilities	1.0%	1.5%	1.9%	3.0%	4.4%	6.7%	9.3%	11.6%	16.5%	21.1%	24.5%
	198701-200612										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
Energy	0.5%	1.2%	1.7%	4.4%	7.6%	10.3%	12.6%	15.4%	17.7%	19.3%	23.6%
Materials	0.3%	0.5%	0.7%	1.0%	1.5%	2.2%	2.3%	2.4%	-0.5%	-2.2%	-4.2%
Industrials	0.7%	1.0%	1.4%	2.6%	3.9%	5.0%	5.7%	6.4%	7.6%	9.3%	11.0%
Consumer Discretionary	0.2%	0.2%	0.3%	0.0%	0.5%	0.9%	1.6%	2.4%	2.9%	3.2%	3.1%
Consumer Staples	0.6%	1.1%	1.5%	2.6%	3.2%	3.1%	3.0%	3.0%	2.4%	3.2%	5.2%
Health Care	0.7%	1.2%	1.7%	2.7%	2.9%	4.6%	5.3%	6.6%	7.4%	5.5%	1.8%
Financials	0.5%	0.7%	1.0%	1.8%	2.4%	3.4%	4.4%	5.3%	7.7%	9.4%	11.3%
Information Technology	0.4%	0.6%	0.8%	1.9%	2.3%	1.3%	1.5%	2.6%	2.4%	4.8%	5.7%
Telecommunication Services	-0.2%	-0.2%	-0.3%	-1.5%	-4.1%	-7.8%	-10.9%	-14.1%	-11.2%	-7.9%	-7.0%
Utilities	-0.2%	-0.5%	-0.9%	-0.9%	-0.3%	-0.2%	1.4%	2.3%	4.6%	7.3%	8.4%

Past performance is not a guarantee of future results.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Sharpened Forward Earnings-to-Price

A forward earnings-to-price ratio has the same logic and motivation as the trailing earnings-to-price ratio; however, here earnings are based on sell-side analyst forecasts of earnings instead of actual reported earnings. For our signal, we are not working off a consensus earnings forecast but instead adjust each individual analyst's forecast for known sources of bias including recency and prior forecast error. The individual forecasts are then aggregated to form our Sharpened Forward Earnings-to-Price signal. Again, we expect those firms with high signals to outperform and those with low signals to underperform.

As shown in Figure 24, the returns to this proprietary factor are strong, notably in the post 2001 period, where most earnings forecast variables have failed. During this later period, the signal generated excess long/short of 11.1% per annum, on average, assuming a 12-month holding period. The stock selection ability of the factor is strong with 56% and 39% of Q1 and Q5 stocks, respectively, outperforming at a one-year horizon (see Figure 25). As shown in Figure 26 and Figure 27, the decay rate of the signal is fairly slow. It is able to generate statistically significant returns for more than five months after initial implementation and positive returns up to 16 months out.

Figure 24: Sharpened Forward Earnings-to-Price, Average Excess Returns, Relative to Large-Cap Universe

	Relative Return										
Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
198401-200612											
Quintile 1	0.4%	0.6%	1.0%	1.7%	2.5%	3.3%	4.4%	5.4%	7.0%	8.9%	10.8%
Quintile 2	0.1%	0.3%	0.4%	0.7%	0.8%	0.9%	1.0%	1.3%	2.0%	2.7%	3.2%
Quintile 3	-0.1%	-0.1%	-0.1%	-0.2%	-0.2%	-0.2%	-0.1%	0.0%	0.3%	0.6%	0.8%
Quintile 4	-0.1%	-0.2%	-0.3%	-0.6%	-0.8%	-1.1%	-1.4%	-1.7%	-2.1%	-2.9%	-3.6%
Quintile 5	-0.3%	-0.6%	-0.9%	-1.5%	-2.3%	-2.9%	-3.9%	-5.0%	-7.2%	-9.3%	-11.1%
Long/Short Spread	0.7%	1.2%	1.8%	3.2%	4.7%	6.2%	8.3%	10.4%	14.3%	18.2%	21.9%
199701-200612											
Quintile 1	0.4%	0.7%	1.0%	1.5%	2.3%	3.0%	3.9%	4.7%	6.1%	7.5%	9.5%
Quintile 2	0.1%	0.3%	0.3%	0.6%	0.7%	0.4%	0.2%	0.3%	0.8%	1.7%	3.1%
Quintile 3	-0.1%	-0.2%	-0.2%	-0.3%	-0.7%	-0.8%	-0.8%	-0.6%	0.2%	1.0%	1.7%
Quintile 4	-0.1%	-0.2%	-0.4%	-0.8%	-1.0%	-1.2%	-1.3%	-1.3%	-1.6%	-2.4%	-3.5%
Quintile 5	-0.3%	-0.6%	-0.8%	-0.9%	-1.3%	-1.4%	-2.0%	-3.0%	-5.4%	-7.9%	-10.8%
Long/Short Spread	0.7%	1.2%	1.7%	2.4%	3.5%	4.4%	5.8%	7.7%	11.4%	15.4%	20.3%
200101-200612											
Quintile 1	0.6%	1.1%	1.6%	3.1%	4.5%	6.1%	7.4%	8.4%	11.3%	15.2%	18.6%
Quintile 2	0.4%	0.7%	0.9%	1.6%	1.8%	1.9%	1.9%	1.8%	2.2%	3.1%	5.1%
Quintile 3	0.1%	0.2%	0.3%	0.4%	0.3%	0.3%	0.2%	-0.1%	0.5%	1.2%	2.0%
Quintile 4	-0.3%	-0.5%	-0.8%	-1.6%	-2.5%	-3.4%	-3.8%	-3.9%	-4.7%	-6.2%	-8.4%
Quintile 5	-0.8%	-1.4%	-2.0%	-3.5%	-4.1%	-4.9%	-5.7%	-6.3%	-9.3%	-13.5%	-17.6%
Long/Short Spread	1.4%	2.5%	3.6%	6.6%	8.6%	11.1%	13.1%	14.7%	20.6%	28.7%	36.2%

Past performance is not a guarantee of future results.

Large cap universe is Russell 1000 after 1978; pre-1978 it is defined via analogous market capitalization break-points
Source: Lehman Brothers Quantitative Equity Strategies Research; Center for Research in Securities Prices; Thompson Financial Services

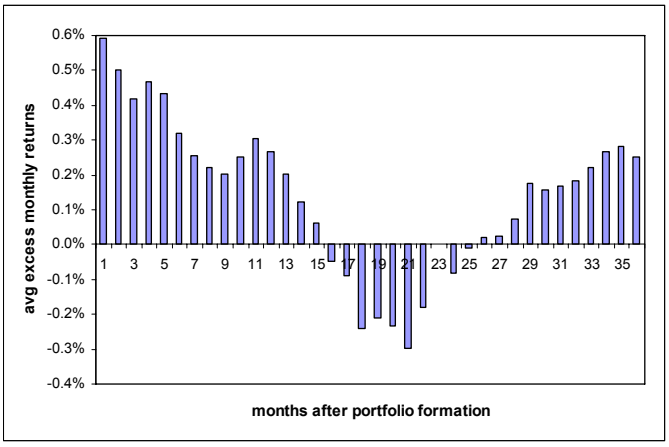
Figure 25: Performance of Sharpened Forward Earnings-to-Price, Stock Selection Percentage

	Percent of Companies Outperforming										
Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
198401-200612											
Quintile 1	51%	52%	52%	52%	52%	52%	52%	52%	52%	52%	52%
Quintile 2	50%	49%	49%	49%	49%	48%	47%	47%	46%	45%	45%
Quintile 3	48%	48%	48%	47%	47%	46%	45%	45%	44%	43%	43%
Quintile 4	48%	48%	47%	46%	46%	44%	43%	42%	41%	40%	39%
Quintile 5	47%	47%	46%	44%	42%	41%	39%	38%	36%	34%	33%
199701-200612											
Quintile 1	51%	52%	52%	51%	51%	51%	51%	51%	50%	51%	52%
Quintile 2	50%	49%	49%	49%	48%	47%	46%	46%	45%	46%	47%
Quintile 3	48%	48%	48%	47%	47%	46%	45%	44%	44%	44%	45%
Quintile 4	48%	48%	47%	45%	44%	42%	41%	40%	38%	38%	37%
Quintile 5	48%	47%	46%	44%	42%	40%	38%	37%	34%	32%	31%
200101-200612											
Quintile 1	54%	54%	55%	55%	55%	56%	55%	55%	55%	56%	56%
Quintile 2	51%	51%	51%	51%	50%	49%	48%	47%	46%	47%	47%
Quintile 3	50%	49%	50%	49%	49%	48%	46%	46%	45%	45%	46%
Quintile 4	48%	47%	46%	45%	43%	42%	40%	40%	39%	37%	35%
Quintile 5	47%	46%	45%	43%	41%	39%	38%	37%	34%	31%	28%

Past performance is not a guarantee of future results.

Source: Lehman Brothers Quantitative Equity Strategies Research; Center for Research in Securities Prices; Thompson Financial Services

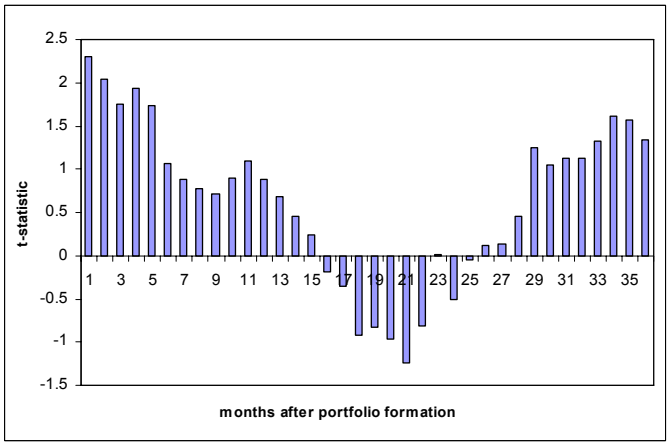
Figure 26: Sharpened Forward E/P: Relative Average Excess Returns per Month After Portfolio Implementation, 2001 through 2006



Past performance is not a guarantee of future results.

Source: Lehman Brothers Quantitative Equity Strategies Research; Center for Research in Securities Prices; Thompson Financial Services

Figure 27: Sharpened Forward E/P: t-statistics of Relative Average Excess Returns per Month After Portfolio Implementation, 2001 through 2006



Past performance is not a guarantee of future results.

Source: Lehman Brothers Quantitative Equity Strategies Research; Center for Research in Securities Prices; Thompson Financial Services

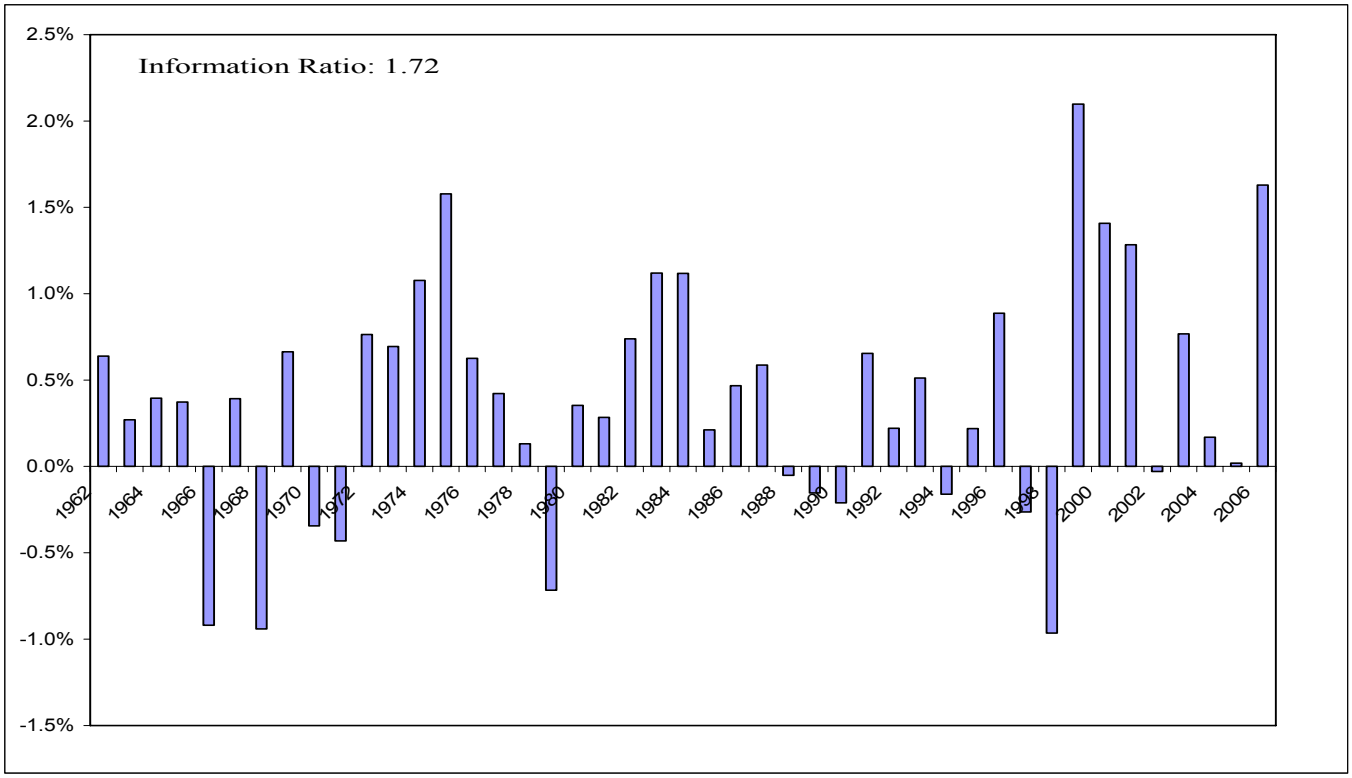
EBITDA-to-Enterprise Value

EBITDA-to-enterprise value is another measure of earnings yield just like trailing earnings-to-price. The key difference between the two measures is the composition of the denominator. Enterprise value is the sum of the market value of equity, including preferred equity, plus the market value of debt minus cash holdings. The "price" in the trailing earnings-to-price is market value of common equity.

When using enterprise value as the denominator, earnings yield reflects the pre-tax yield on the purchase price of buying into the whole company, not just an equity stake in the company. By doing this, we are able to put companies with very different capital structures and tax rates on a level playing field when comparing earnings yields. Trailing earnings-to-price is a poor signal when making these types of relative comparisons.

EBITDA-to-EV is one of our stronger valuation variables, on a stand-alone (univariate) basis. It is able to produce consistent results over a long time period (see Figure 26) and generate relatively large quintile spread returns consistently over time for a wide range of holding periods (see Figure 27). Additionally, it works well in all sectors except Telecoms and Financials (see Figure 28).

Figure 28: Performance of EBITDA-to-EV: Long/Short Excess Returns, Average Monthly Returns, Reported on a Calendar Year Basis, 1962–2006



Past performance is not a guarantee of future results.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 29: EBITDA-to-EV, Average Excess Returns, Relative to Large-Cap Universe

	Relative Return										
Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-198612											
Quintile 1	0.3%	0.4%	0.6%	1.1%	1.8%	2.5%	3.3%	4.2%	6.2%	8.2%	9.6%
Quintile 2	0.1%	0.1%	0.1%	0.4%	0.6%	1.1%	1.4%	1.9%	3.0%	3.7%	4.4%
Quintile 3	0.0%	-0.1%	-0.2%	-0.3%	-0.4%	-0.5%	-0.5%	-0.5%	-0.3%	-0.5%	-0.2%
Quintile 4	-0.2%	-0.3%	-0.4%	-0.7%	-1.0%	-1.4%	-1.7%	-2.1%	-3.0%	-3.8%	-4.8%
Quintile 5	-0.1%	-0.2%	-0.3%	-0.4%	-0.7%	-1.2%	-1.9%	-2.7%	-4.0%	-5.7%	-7.6%
Long/Short Spread	0.4%	0.6%	0.9%	1.6%	2.5%	3.7%	5.3%	6.9%	10.2%	13.9%	17.2%
198701-200612											
Quintile 1	0.4%	0.7%	0.9%	1.4%	2.0%	2.5%	3.1%	3.6%	4.3%	4.9%	5.8%
Quintile 2	0.1%	0.2%	0.3%	0.6%	0.9%	1.3%	1.5%	1.6%	2.2%	3.0%	4.1%
Quintile 3	0.0%	-0.1%	-0.1%	-0.2%	-0.2%	-0.3%	-0.2%	0.0%	0.2%	0.3%	-0.2%
Quintile 4	-0.2%	-0.4%	-0.5%	-0.9%	-1.2%	-1.7%	-2.2%	-2.6%	-3.3%	-4.2%	-5.5%
Quintile 5	-0.3%	-0.4%	-0.5%	-0.9%	-1.4%	-1.9%	-2.0%	-2.6%	-3.8%	-4.3%	-4.9%
Long/Short Spread	0.7%	1.1%	1.4%	2.4%	3.4%	4.3%	5.1%	6.2%	8.1%	9.2%	10.6%
199801-200612											
Quintile 1	0.6%	0.9%	1.1%	1.7%	2.3%	2.9%	3.9%	4.8%	6.4%	8.2%	10.3%
Quintile 2	0.1%	0.3%	0.4%	0.9%	1.1%	1.6%	1.8%	1.7%	2.6%	3.7%	5.0%
Quintile 3	0.0%	-0.1%	-0.2%	-0.4%	-0.4%	-0.8%	-0.8%	-0.6%	-0.6%	-0.4%	-0.9%
Quintile 4	-0.2%	-0.4%	-0.4%	-0.8%	-1.3%	-1.8%	-3.0%	-3.9%	-5.2%	-6.3%	-7.6%
Quintile 5	-0.5%	-0.7%	-1.0%	-1.7%	-2.1%	-2.8%	-2.9%	-3.7%	-5.9%	-8.1%	-10.4%
Long/Short Spread	1.0%	1.6%	2.2%	3.4%	4.5%	5.7%	6.8%	8.5%	12.4%	16.3%	20.7%

Past performance is not a guarantee of future results.

Large cap universe is Russell 1000 after 1978; pre-1978 it is defined via analogous market capitalization break-points
Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 30: Performance of EBITDA-to-EV Across GICS Sectors, Excess Returns Relative to Sector

	196201-198612										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
Energy	0.9%	1.6%	2.3%	3.7%	5.5%	7.3%	9.2%	11.1%	15.1%	18.9%	25.4%
Materials	0.4%	0.4%	0.6%	1.0%	1.6%	2.7%	4.1%	5.9%	9.7%	14.8%	19.7%
Industrials	0.7%	1.3%	1.8%	4.0%	6.4%	9.6%	13.6%	17.3%	23.8%	29.7%	32.7%
Consumer Discretionary	0.3%	0.2%	0.2%	0.3%	0.9%	1.8%	2.8%	3.3%	4.1%	4.3%	6.6%
Consumer Staples	0.8%	1.3%	1.7%	3.0%	3.9%	5.1%	6.4%	7.6%	10.7%	14.4%	17.8%
Health Care	0.2%	0.3%	0.3%	1.1%	2.0%	3.0%	4.5%	6.1%	9.2%	11.8%	15.9%
Financials	-0.1%	-0.2%	-0.2%	-0.4%	-0.4%	-0.4%	-0.2%	0.0%	-0.4%	-0.2%	-2.4%
Information Technology	0.5%	1.0%	1.7%	4.2%	7.5%	10.6%	13.6%	17.5%	27.7%	38.4%	45.1%
Telecommunication Services	0.6%	0.7%	0.8%	2.1%	2.0%	-0.1%	-3.2%	-4.7%	-10.5%	-13.6%	-10.8%
Utilities	0.5%	0.7%	0.8%	1.7%	3.6%	5.7%	9.4%	13.2%	19.4%	31.2%	42.7%

	198701-200612										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
Energy	0.8%	1.4%	1.9%	3.6%	5.1%	7.2%	9.9%	11.9%	15.2%	15.7%	19.5%
Materials	0.9%	1.5%	1.8%	2.6%	4.1%	7.1%	9.2%	11.6%	14.8%	17.5%	21.4%
Industrials	0.8%	1.6%	2.3%	3.5%	4.3%	5.5%	6.6%	7.7%	9.9%	11.9%	14.5%
Consumer Discretionary	0.7%	1.0%	1.1%	1.8%	3.3%	4.9%	6.1%	7.3%	8.9%	9.3%	9.0%
Consumer Staples	0.7%	1.4%	2.0%	3.5%	4.6%	5.3%	6.0%	7.0%	8.6%	11.6%	14.6%
Health Care	0.9%	1.2%	1.6%	2.5%	2.2%	4.1%	4.6%	5.3%	3.6%	-2.1%	-5.5%
Financials	0.3%	0.6%	0.7%	1.1%	1.5%	1.9%	2.0%	2.0%	2.7%	3.2%	3.5%
Information Technology	0.6%	0.9%	1.0%	1.9%	2.3%	1.8%	0.8%	0.7%	1.6%	1.4%	3.5%
Telecommunication Services	0.3%	0.4%	0.3%	-1.4%	-3.8%	-5.9%	-8.9%	-10.8%	-9.9%	-6.7%	-6.3%
Utilities	0.1%	0.3%	0.4%	1.6%	3.3%	5.0%	7.6%	9.7%	14.6%	19.1%	21.9%

Past performance is not a guarantee of future results.

Source: Lehman Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Sales-to-Price

Sales-to-price is another factor that sheds light into the relative valuation of a company by comparing the revenues of a company relative to its equity price. Companies with high ratios here are generating a lot of revenue for a dollar equity investment stake in the firm. The opposite is true for companies with a low sales-to-price ratio. Again, investors usually prefer cheap stocks to expensive stocks, all else being equal. Hence, we would expect stocks with low sales-to-price ratios to underperform those with high sales-to-price ratios.

It is important to remember that comparing sales-to-price ratios across industries or disparate companies is tricky, as profitability is affected by many variables aside from revenues. Companies with high sales-to-price ratios may, in fact, be unprofitable. Because of these limitations, we generally find sales-to-price to be more useful in those situations where earnings yield variables are inappropriate, namely industries where a number of companies may be losing money.

The track record of sales-to-price as a predictor of future stock returns is impressive. It produces large long/short spreads over a variety of holding periods across different time periods. For example, the average Long/Short return is 5.8% for the period 1962 through 2006, making it one of the better-performing valuation measures (see Figure 31). Additionally, the signal has strong power to discriminate against winning and losing stocks (see Figure 32). In sectors, it works best in Energy, Health Care, Technology and Utilities and is least effective in Materials and Industrials (see Figure 33).

Figure 31: Performance of Sales-to-Price, Average Excess Returns, Relative to Large-Cap Universe

	Relative Return										
Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-200612											
Quintile 1	0.3%	0.6%	0.8%	1.4%	2.1%	2.9%	3.8%	4.7%	6.1%	7.7%	9.4%
Quintile 2	0.1%	0.3%	0.3%	0.7%	1.0%	1.2%	1.5%	1.8%	2.5%	3.2%	3.5%
Quintile 3	0.0%	-0.1%	-0.1%	-0.1%	-0.2%	-0.3%	-0.4%	-0.5%	-0.4%	-0.3%	-0.3%
Quintile 4	-0.2%	-0.4%	-0.6%	-1.3%	-1.8%	-2.3%	-2.9%	-3.4%	-4.3%	-5.5%	-7.0%
Quintile 5	-0.3%	-0.5%	-0.7%	-1.4%	-2.1%	-2.9%	-3.8%	-4.9%	-6.9%	-9.0%	-10.8%
Long/Short Spread	0.6%	1.1%	1.5%	2.8%	4.3%	5.8%	7.6%	9.6%	13.0%	16.7%	20.2%
198701-200612											
Quintile 1	0.3%	0.6%	0.8%	1.1%	1.5%	2.0%	2.5%	2.8%	2.8%	3.1%	3.8%
Quintile 2	0.2%	0.3%	0.4%	0.6%	0.5%	0.4%	0.1%	-0.1%	-0.2%	-0.2%	-0.7%
Quintile 3	-0.1%	-0.1%	-0.2%	-0.3%	-0.5%	-0.6%	-0.7%	-1.0%	-1.2%	-1.7%	-2.3%
Quintile 4	-0.2%	-0.4%	-0.6%	-1.2%	-1.4%	-1.8%	-2.2%	-2.5%	-3.1%	-4.2%	-6.2%
Quintile 5	-0.4%	-0.6%	-0.9%	-1.7%	-2.6%	-3.3%	-4.2%	-5.1%	-7.1%	-9.5%	-11.1%
Long/Short Spread	0.7%	1.2%	1.7%	2.8%	4.0%	5.3%	6.7%	7.9%	9.9%	12.6%	14.9%
196201-198612											
Quintile 1	0.3%	0.5%	0.8%	1.7%	2.7%	3.6%	4.8%	6.1%	8.6%	11.0%	13.4%
Quintile 2	0.1%	0.2%	0.3%	0.7%	1.3%	1.9%	2.6%	3.3%	4.6%	5.7%	6.6%
Quintile 3	0.0%	-0.1%	0.0%	0.0%	0.0%	0.0%	-0.2%	-0.1%	0.1%	0.6%	1.1%
Quintile 4	-0.2%	-0.4%	-0.7%	-1.4%	-2.1%	-2.7%	-3.5%	-4.1%	-5.1%	-6.5%	-7.6%
Quintile 5	-0.2%	-0.4%	-0.6%	-1.2%	-1.8%	-2.6%	-3.5%	-4.7%	-6.6%	-8.7%	-10.7%
Long/Short Spread	0.5%	0.9%	1.4%	2.9%	4.5%	6.2%	8.3%	10.8%	15.3%	19.7%	24.0%

Past performance is not a guarantee of future results.

Large cap universe is Russell 1000 after 1978; pre-1978 it is defined via analogous market capitalization break-points

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 32: Performance of Sales-to-Price, Stock Selection Percentages

	Percent of Companies Outperforming										
Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-200612											
Quintile 1	49%	50%	50%	49%	50%	50%	50%	50%	49%	49%	48%
Quintile 2	49%	49%	49%	48%	48%	47%	47%	47%	47%	46%	45%
Quintile 3	48%	48%	48%	47%	46%	45%	45%	44%	43%	43%	42%
Quintile 4	48%	47%	46%	45%	44%	42%	41%	40%	39%	38%	37%
Quintile 5	48%	47%	46%	44%	42%	40%	39%	37%	36%	34%	33%
198701-200612											
Quintile 1	50%	50%	50%	48%	48%	48%	47%	47%	46%	44%	44%
Quintile 2	49%	49%	49%	48%	48%	47%	46%	45%	44%	44%	43%
Quintile 3	48%	48%	47%	47%	46%	45%	44%	43%	42%	41%	40%
Quintile 4	47%	47%	47%	45%	45%	43%	41%	41%	39%	38%	37%
Quintile 5	48%	47%	46%	43%	41%	39%	38%	37%	35%	33%	32%
196201-198612											
Quintile 1	49%	50%	50%	50%	51%	51%	52%	52%	52%	52%	51%
Quintile 2	49%	48%	48%	48%	48%	48%	48%	48%	49%	48%	47%
Quintile 3	48%	48%	48%	47%	46%	46%	45%	45%	44%	45%	44%
Quintile 4	48%	47%	46%	45%	43%	41%	40%	40%	39%	38%	37%
Quintile 5	48%	47%	46%	44%	43%	41%	39%	38%	36%	35%	34%

Past performance is not a guarantee of future results.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 33: Performance of Sales-to-Price Across GICS Sectors, Excess Returns Relative to Sector

	196201-198612										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
Energy	1.0%	1.9%	3.1%	5.6%	8.6%	10.7%	12.6%	14.5%	16.7%	17.8%	20.2%
Materials	0.2%	0.3%	0.2%	0.1%	0.3%	0.6%	1.3%	2.4%	3.9%	6.6%	9.6%
Industrials	0.6%	1.0%	1.5%	3.3%	5.2%	7.1%	9.3%	12.0%	16.9%	20.8%	22.8%
Consumer Discretionary	-0.2%	-0.3%	-0.5%	-0.7%	-0.5%	0.0%	0.2%	0.4%	0.9%	1.4%	3.1%
Consumer Staples	0.4%	0.7%	1.0%	1.9%	2.7%	3.7%	4.4%	5.4%	7.6%	9.7%	12.5%
Health Care	0.5%	0.9%	1.2%	2.9%	4.7%	6.8%	8.5%	11.0%	16.2%	21.2%	27.1%
Information Technology	0.7%	1.2%	1.6%	3.2%	6.1%	8.6%	12.3%	17.0%	25.9%	36.6%	45.8%
Telecommunication Services	0.0%	0.0%	-0.4%	-0.7%	-0.4%	0.9%	2.8%	5.0%	6.0%	8.8%	15.8%
Utilities	0.7%	1.2%	1.7%	3.2%	4.9%	6.7%	8.9%	10.9%	15.0%	19.6%	24.2%
	198701-200612										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
Energy	0.8%	1.6%	2.1%	3.6%	5.3%	7.0%	8.9%	11.3%	15.9%	21.6%	30.5%
Materials	0.6%	0.9%	1.1%	0.8%	1.2%	2.3%	3.5%	4.9%	7.2%	9.1%	12.9%
Industrials	0.3%	0.6%	0.9%	1.2%	1.5%	1.5%	1.4%	0.7%	0.3%	1.0%	2.8%
Consumer Discretionary	0.8%	1.4%	1.9%	3.3%	5.0%	7.2%	9.2%	10.9%	14.7%	19.7%	25.0%
Consumer Staples	0.4%	0.7%	1.0%	1.3%	1.2%	1.4%	1.5%	1.2%	0.4%	-0.3%	-0.9%
Health Care	1.0%	1.6%	2.3%	4.0%	5.3%	7.4%	9.0%	9.9%	11.7%	12.6%	15.2%
Information Technology	0.7%	1.2%	1.7%	2.5%	3.6%	5.3%	6.3%	6.1%	8.6%	15.1%	22.9%
Telecommunication Services	0.4%	0.6%	0.5%	0.7%	1.4%	3.6%	5.1%	7.2%	11.3%	14.8%	16.5%
Utilities	0.3%	0.6%	0.9%	1.9%	3.5%	5.3%	7.5%	9.1%	13.6%	16.9%	18.0%

Past performance is not a guarantee of future results.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Total Yield

Total yield is the sum of repurchase yield and current dividend yield, and thus represents the total aggregate cash flow going to equity holders. Academics find that even though the firms have substituted repurchases for dividend payments over the recent years, total yield remained constant.[5] Consequently, despite the widespread popularity of the dividend yield factor as a predictor of future returns, the total yield is a more accurate measure of firms' payouts. High value of the current total yield implies that a company expects to have extra cash to repurchase its shares and/or pay dividends. Therefore, higher current total yield is associated with larger returns in the future.

We find some evidence in support of the hypothesis. As Figure 34 shows, while the factor performance used to be relatively strong it has deteriorated over time, with the long/short strategy producing an average of 20 bps in 1998 through 2006 period on a 12-month holding period basis. Moreover, the return pattern is not monotonic: the quintile returns are U-shaped. The factor is not particularly helpful in stock selection as detailed in Figure 35. Total yield has some usefulness as an indicator in specific sectors, however, caution is required for as Figure 36 shows the best-performing sectors in the earlier period produced some of the lowest returns in the most recent period and vice versa.

Figure 34: Performance of Total Yield, Average Excess Returns, Relative to Large-Cap Universe

	Relative Return										
Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
198701-200612											
Quintile 1	0.1%	0.2%	0.3%	0.6%	0.7%	0.7%	0.9%	0.8%	0.8%	1.1%	1.3%
Quintile 2	0.1%	0.2%	0.3%	0.7%	1.1%	1.2%	1.3%	1.8%	2.8%	3.7%	4.6%
Quintile 3	0.0%	0.0%	0.2%	0.4%	0.6%	0.7%	0.7%	0.9%	1.3%	1.3%	1.1%
Quintile 4	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.2%	-0.3%	-0.6%	-1.0%	-0.9%
Quintile 5	0.0%	0.0%	0.0%	0.0%	-0.1%	-0.2%	-0.2%	-0.3%	-0.7%	-1.3%	-2.5%
Long/Short Spread	0.1%	0.2%	0.3%	0.6%	0.8%	0.9%	1.1%	1.1%	1.4%	2.3%	3.8%
199801-200612											
Quintile 1	0.3%	0.6%	0.8%	1.4%	1.6%	1.7%	2.0%	2.1%	3.5%	7.5%	12.3%
Quintile 2	0.1%	0.2%	0.3%	0.5%	0.6%	0.0%	-0.4%	-0.3%	0.3%	2.5%	4.6%
Quintile 3	-0.1%	-0.1%	0.1%	0.1%	-0.2%	-0.3%	-0.6%	-0.8%	0.1%	1.7%	3.8%
Quintile 4	-0.1%	-0.1%	-0.2%	-0.2%	-0.3%	-0.4%	-0.3%	0.0%	0.5%	2.8%	5.5%
Quintile 5	0.1%	0.2%	0.4%	0.7%	1.1%	1.5%	2.1%	2.9%	4.9%	6.7%	7.5%
Long/Short Spread	0.2%	0.3%	0.5%	0.6%	0.5%	0.2%	-0.1%	-0.8%	-1.4%	0.8%	4.8%
196201-198612											
Quintile 1	0.2%	0.3%	0.4%	0.6%	0.9%	1.3%	1.7%	2.1%	3.0%	3.7%	4.4%
Quintile 2	0.1%	0.2%	0.3%	0.5%	0.7%	1.1%	1.6%	2.1%	3.2%	4.4%	5.8%
Quintile 3	-0.1%	-0.1%	-0.1%	-0.3%	-0.3%	-0.3%	-0.3%	-0.4%	-0.5%	0.0%	0.2%
Quintile 4	-0.1%	-0.1%	-0.1%	-0.2%	-0.2%	-0.3%	-0.4%	-0.5%	-1.1%	-1.8%	-2.7%
Quintile 5	-0.1%	-0.1%	-0.1%	-0.1%	-0.2%	-0.5%	-0.9%	-1.2%	-1.8%	-2.8%	-3.5%
Long/Short Spread	0.3%	0.4%	0.5%	0.7%	1.1%	1.8%	2.6%	3.2%	4.8%	6.5%	7.9%

Past performance is not a guarantee of future results.

Large cap universe is Russell 1000 after 1978; pre-1978 it is defined via analogous market capitalization break-points

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

[5] For example, see Jacob Boudoukh, Roni Michaely, Matthew Richardson, Michael Roberts M. "On the Importance of Measuring Payout Yield: Implications for Empirical Asset Pricing," NBER Working Paper #10651, July 2004.

Figure 35: Performance of Total Yield, Stock Selection Percentages

Portfolio	Percent of Companies Outperforming										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
198701-200612											
Quintile 1	50%	49%	49%	49%	49%	48%	47%	47%	45%	44%	44%
Quintile 2	49%	49%	50%	50%	50%	49%	49%	49%	48%	48%	48%
Quintile 3	49%	48%	49%	49%	49%	48%	47%	47%	46%	46%	45%
Quintile 4	48%	48%	48%	47%	47%	46%	45%	45%	44%	43%	42%
Quintile 5	49%	49%	48%	47%	46%	46%	45%	44%	43%	41%	41%
199801-200612											
Quintile 1	51%	51%	51%	51%	50%	50%	50%	49%	49%	51%	53%
Quintile 2	49%	49%	50%	50%	49%	47%	46%	46%	47%	49%	50%
Quintile 3	49%	48%	48%	48%	47%	46%	45%	45%	45%	47%	49%
Quintile 4	49%	48%	48%	47%	47%	46%	46%	46%	46%	47%	49%
Quintile 5	50%	50%	50%	49%	48%	48%	48%	49%	48%	48%	49%
196201-198612											
Quintile 1	50%	50%	50%	50%	50%	49%	49%	49%	50%	49%	48%
Quintile 2	48%	48%	48%	48%	47%	47%	47%	46%	46%	47%	47%
Quintile 3	47%	47%	47%	46%	45%	45%	44%	44%	42%	42%	41%
Quintile 4	49%	48%	48%	47%	46%	45%	45%	44%	42%	41%	40%
Quintile 5	48%	48%	48%	47%	46%	44%	43%	43%	41%	40%	39%

Past performance is not a guarantee of future results.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 36: Performance of Total Yield Across GICS Sectors, Excess Returns Relative to Sector

	196201-198612										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
Energy	0.4%	0.5%	0.9%	1.0%	1.2%	1.7%	2.3%	2.0%	1.5%	1.9%	4.2%
Materials	0.3%	0.4%	0.6%	1.0%	1.6%	3.0%	4.8%	6.7%	10.3%	14.6%	18.3%
Industrials	0.5%	1.0%	1.3%	2.7%	4.1%	5.3%	6.4%	7.2%	8.7%	10.8%	13.5%
Consumer Discretionary	0.1%	0.0%	-0.2%	-0.2%	0.2%	0.5%	1.1%	1.8%	2.5%	2.1%	1.5%
Consumer Staples	0.7%	1.0%	1.5%	2.6%	3.2%	4.2%	5.3%	6.6%	11.7%	17.3%	23.9%
Health Care	0.2%	0.1%	-0.1%	-0.3%	-0.3%	0.0%	0.3%	0.6%	3.0%	6.0%	8.0%
Financials	0.5%	0.7%	0.7%	1.7%	2.9%	4.4%	6.2%	7.7%	12.2%	16.1%	20.2%
Information Technology	0.0%	-0.1%	-0.2%	-0.7%	-0.3%	-0.2%	0.4%	1.3%	7.0%	13.2%	15.8%
Telecommunication Services	1.0%	1.9%	2.9%	5.8%	8.4%	10.8%	13.5%	15.4%	17.6%	19.3%	21.6%
Utilities	0.5%	0.6%	0.5%	0.8%	1.0%	1.2%	1.4%	1.7%	2.3%	2.9%	4.2%
	198701-200612										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
Energy	-0.2%	-0.3%	-0.3%	0.1%	0.8%	0.8%	0.6%	0.5%	0.6%	3.2%	8.2%
Materials	0.3%	0.4%	0.5%	0.0%	-0.1%	-0.2%	-0.3%	0.2%	2.1%	4.4%	9.5%
Industrials	0.2%	0.4%	0.6%	0.8%	1.3%	2.1%	2.7%	3.2%	4.6%	5.3%	7.5%
Consumer Discretionary	0.0%	0.0%	0.0%	-0.3%	-1.0%	-2.2%	-2.4%	-2.7%	-1.5%	0.0%	-0.9%
Consumer Staples	0.5%	1.0%	1.5%	3.1%	4.3%	5.5%	7.3%	9.2%	13.7%	18.3%	22.7%
Health Care	0.5%	1.1%	1.6%	2.6%	3.7%	3.6%	3.7%	3.5%	4.6%	9.6%	15.9%
Financials	0.2%	0.3%	0.3%	0.1%	0.1%	0.3%	0.9%	1.3%	1.3%	1.2%	0.2%
Information Technology	0.4%	1.2%	1.6%	3.0%	3.5%	2.8%	0.9%	-1.8%	-7.9%	-17.6%	-20.7%
Telecommunication Services	-0.2%	-1.5%	-2.6%	-4.0%	-4.6%	-4.9%	-4.9%	-4.8%	-4.7%	-2.8%	0.4%
Utilities	-0.1%	-0.3%	-0.5%	-0.9%	-0.5%	-0.4%	-0.5%	-0.8%	-1.4%	-1.7%	-0.9%

Past performance is not a guarantee of future results.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

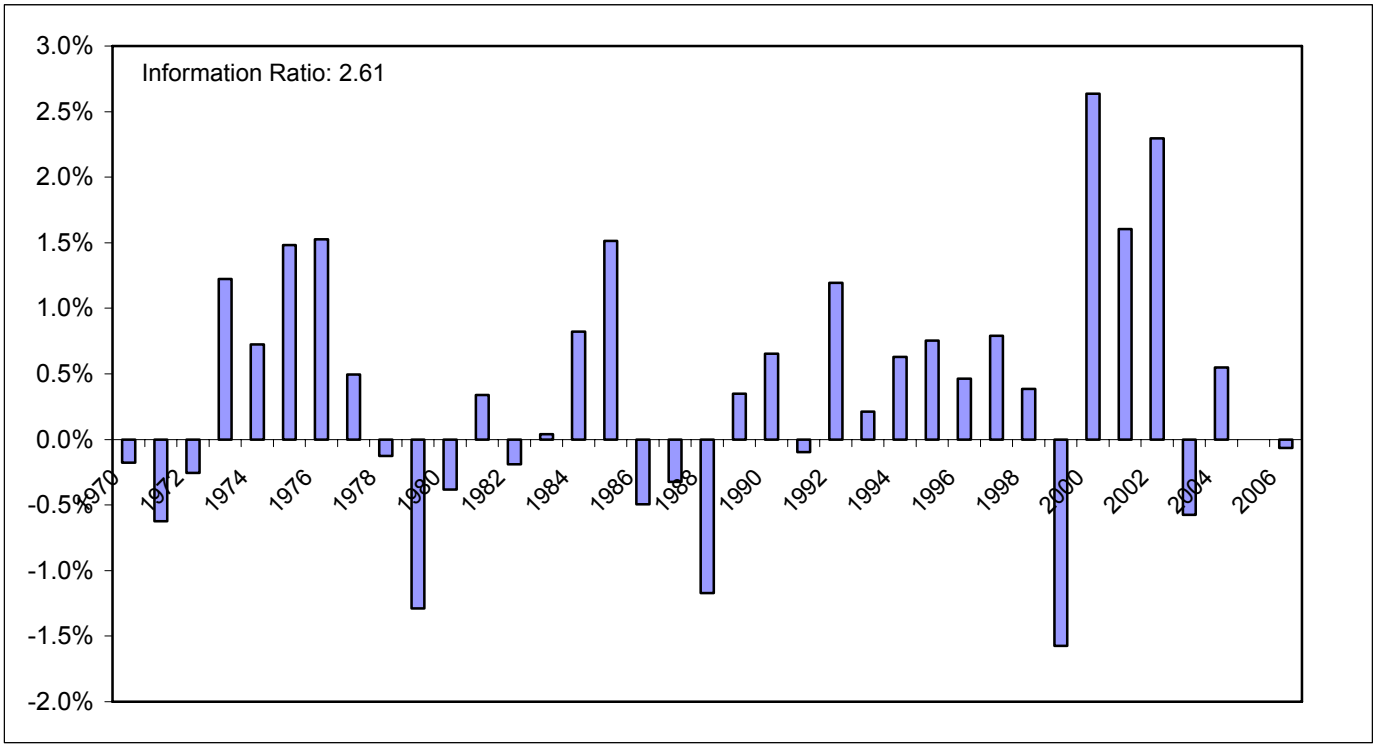
Net Free Cash Flow to Price and Gross Free Cash Flow to Price

Free cash flow–based measures capture the money companies have on hand to spend after accounting for the firm's obligations for taxes, interest expenses, and preferred dividends. Controversy exists on whether reinvestment "needs" and non-legally binding obligations, such as common dividends, should be netted out.

Net free cash flow and gross free cash flow are not the same construct as Michael Jensen's free cash flow, as these measures represent cash left in the company after any perquisites have (potentially) been consumed.[6] Instead, these signals quantify the capacity firms have to self-finance growth and to redistribute cash to shareholders. Consequently, we would expect companies with high levels of free cash flow to outperform and those with low levels to underperform.

As seen in Figure 37 and Figure 38, these measures have a strong positive track record of predicting returns and the long/short quintiles spreads are large (Figure 39 and Figure 40). Additionally, they work well in a variety of sectors, particularly the ones mentioned earlier.

Figure 37: Performance of Net Free Cash Flow-to-Price: Long/Short Excess Returns, Average Monthly Returns, Reported on a Calendar Year Basis, 1967–2006

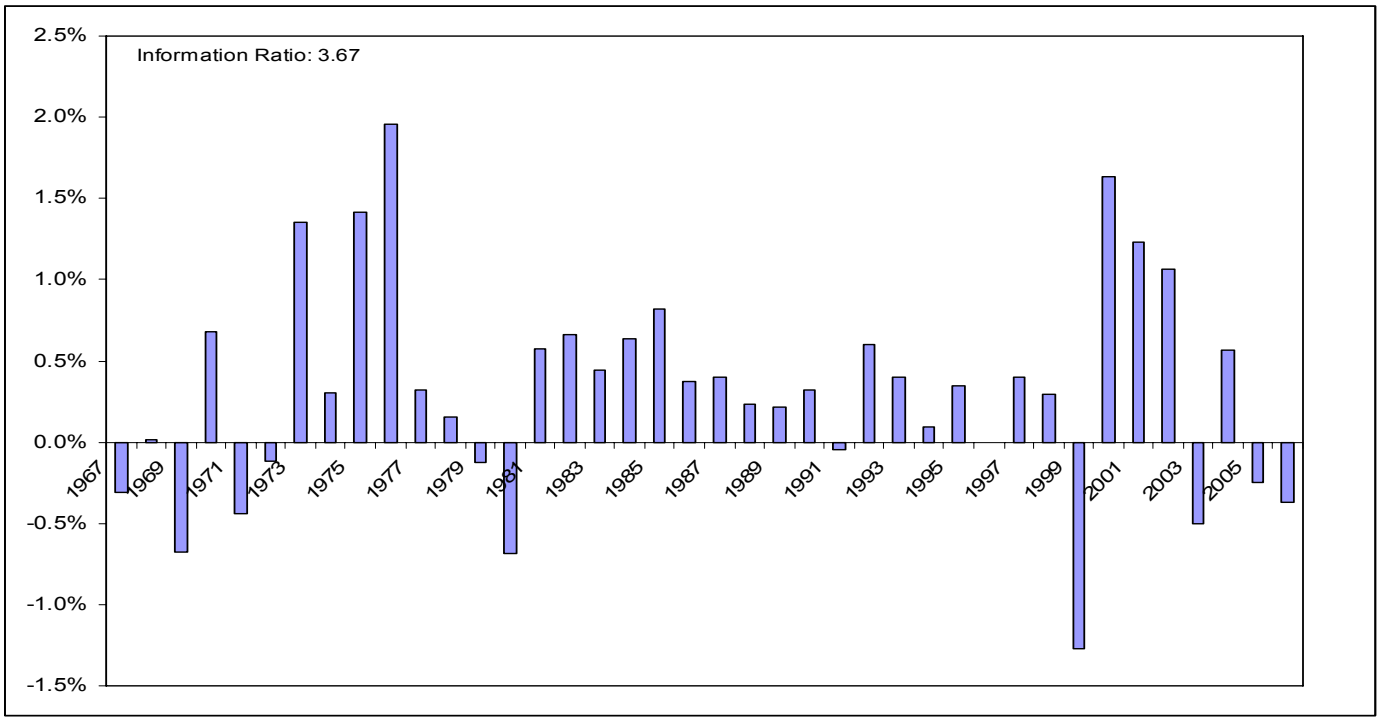


Past performance is not a guarantee of future results.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

[6] See Michael Jensen, "Agency costs of free cash flow, corporate finance and takeovers", 1986, American Economic Review, 76, pp 323-329

Figure 38: Performance of Gross Free Cash Flow-to-Price: Long/Short Excess Returns, Average Monthly Returns, Reported on a Calendar Year Basis, 1967–2006



Past performance is not a guarantee of future performance.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 39: Performance of Net Free Cash Flow-to-Price, Average Excess Returns, Relative to Large-Cap Universe

	Relative Return										
Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-200612											
Quintile 1	0.4%	0.7%	1.0%	1.9%	2.9%	4.3%	5.5%	6.8%	10.1%	14.0%	18.3%
Quintile 2	0.2%	0.4%	0.6%	1.1%	1.4%	1.6%	2.2%	3.0%	4.4%	5.8%	6.7%
Quintile 3	0.0%	0.0%	-0.1%	-0.1%	-0.1%	-0.1%	-0.3%	-0.4%	-0.3%	-0.8%	-1.6%
Quintile 4	-0.2%	-0.5%	-0.6%	-1.2%	-1.8%	-2.2%	-2.7%	-3.4%	-4.9%	-6.6%	-8.3%
Quintile 5	-0.2%	-0.4%	-0.6%	-1.2%	-1.7%	-2.2%	-2.8%	-3.6%	-4.9%	-6.0%	-6.8%
Long/Short Spread	0.6%	1.1%	1.6%	3.1%	4.6%	6.5%	8.4%	10.3%	15.0%	20.0%	25.1%
198701-200612											
Quintile 1	0.4%	0.8%	1.1%	1.9%	2.6%	3.1%	3.6%	4.2%	5.2%	6.3%	7.7%
Quintile 2	0.2%	0.3%	0.4%	0.6%	0.9%	0.9%	1.2%	1.6%	2.3%	2.9%	2.9%
Quintile 3	-0.2%	-0.3%	-0.4%	-0.6%	-1.0%	-1.5%	-2.1%	-2.6%	-3.6%	-5.2%	-7.5%
Quintile 4	-0.3%	-0.6%	-0.8%	-1.7%	-2.7%	-3.4%	-4.3%	-5.5%	-7.9%	-10.3%	-12.5%
Quintile 5	-0.3%	-0.5%	-0.8%	-1.7%	-2.2%	-2.6%	-3.0%	-3.5%	-4.7%	-5.7%	-6.4%
Long/Short Spread	0.7%	1.3%	1.9%	3.6%	4.7%	5.7%	6.6%	7.8%	9.9%	12.0%	14.1%
196201-198612											
Quintile 1	0.3%	0.5%	0.8%	1.8%	3.2%	5.4%	7.2%	8.9%	14.2%	20.4%	26.6%
Quintile 2	0.3%	0.6%	0.9%	1.6%	1.9%	2.4%	3.2%	4.5%	6.6%	8.7%	10.4%
Quintile 3	0.1%	0.2%	0.2%	0.4%	0.8%	1.1%	1.2%	1.4%	2.2%	2.6%	2.7%
Quintile 4	-0.2%	-0.3%	-0.4%	-0.6%	-0.7%	-0.9%	-1.0%	-1.2%	-1.9%	-3.0%	-4.1%
Quintile 5	-0.1%	-0.3%	-0.4%	-0.7%	-1.1%	-1.8%	-2.7%	-3.6%	-5.2%	-6.3%	-7.1%
Long/Short Spread	0.4%	0.8%	1.2%	2.5%	4.3%	7.2%	9.9%	12.5%	19.4%	26.7%	33.8%

Past performance is not a guarantee of future results.

Large cap universe is Russell 1000 after 1978; pre-1978 it is defined via analogous market capitalization break-points

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 40: Performance of Gross Free Cash Flow-to-Price, Average Excess Returns, Relative to Large-Cap Universe

	Relative Return										
Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-198612											
Quintile 1	0.2%	0.4%	0.5%	1.0%	1.6%	2.2%	2.8%	3.5%	4.9%	6.2%	7.5%
Quintile 2	0.1%	0.2%	0.2%	0.5%	0.8%	1.0%	1.3%	1.7%	2.6%	3.3%	4.0%
Quintile 3	-0.1%	-0.1%	-0.1%	-0.3%	-0.4%	-0.4%	-0.4%	-0.5%	-0.8%	-1.1%	-1.5%
Quintile 4	-0.1%	-0.2%	-0.3%	-0.5%	-0.6%	-0.9%	-1.3%	-1.8%	-2.7%	-3.4%	-4.2%
Quintile 5	-0.1%	-0.3%	-0.4%	-0.8%	-1.3%	-1.9%	-2.5%	-2.9%	-4.0%	-5.0%	-5.9%
Long/Short Spread	0.3%	0.6%	0.9%	1.8%	2.9%	4.0%	5.2%	6.4%	8.9%	11.2%	13.4%
198701-200612											
Quintile 1	0.3%	0.5%	0.7%	1.2%	1.7%	2.2%	2.7%	3.1%	4.0%	4.9%	5.8%
Quintile 2	0.1%	0.2%	0.2%	0.3%	0.3%	0.2%	0.1%	0.3%	0.6%	0.7%	0.7%
Quintile 3	-0.1%	-0.1%	-0.1%	-0.3%	-0.5%	-0.5%	-0.5%	-0.5%	-0.7%	-1.3%	-1.8%
Quintile 4	-0.2%	-0.3%	-0.5%	-0.8%	-0.8%	-1.2%	-1.6%	-2.1%	-2.6%	-3.2%	-4.1%
Quintile 5	-0.1%	-0.2%	-0.3%	-0.4%	-0.7%	-0.7%	-0.6%	-0.9%	-1.2%	-1.1%	-0.6%
Long/Short Spread	0.5%	0.7%	1.0%	1.6%	2.4%	2.8%	3.3%	4.0%	5.2%	6.0%	6.4%
199801-200612											
Quintile 1	0.3%	0.5%	0.7%	0.8%	1.1%	1.4%	2.0%	2.5%	4.6%	7.8%	10.5%
Quintile 2	0.2%	0.2%	0.2%	0.4%	0.3%	0.1%	0.0%	0.4%	1.2%	1.9%	2.4%
Quintile 3	-0.2%	-0.1%	0.1%	-0.1%	-0.4%	-0.4%	-0.7%	-0.9%	-1.9%	-3.3%	-4.2%
Quintile 4	-0.2%	-0.3%	-0.6%	-0.7%	-0.4%	-0.9%	-1.5%	-2.0%	-3.4%	-4.6%	-6.2%
Quintile 5	-0.2%	-0.3%	-0.4%	-0.4%	-0.6%	-0.1%	0.3%	0.0%	-0.6%	-1.7%	-2.4%
Long/Short Spread	0.5%	0.8%	1.0%	1.2%	1.6%	1.5%	1.8%	2.4%	5.2%	9.5%	12.9%

Past performance is not a guarantee of future results.

Large cap universe is Russell 1000 after 1978; pre-1978 it is defined via analogous market capitalization break-points
Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 41: Performance of Net Free Cash Flow-to-Price Across GICS Sectors, Excess Returns Relative to Sector

	196201-198612						
	1 month	3 months	6 months	9 months	12 months	24 months	36 months
Energy	0.6%	1.9%	2.6%	3.1%	3.7%	4.6%	0.9%
Materials	0.2%	0.8%	1.3%	2.0%	3.4%	10.2%	17.0%
Industrials	0.3%	0.6%	2.0%	4.2%	6.5%	12.8%	14.9%
Consumer Discretionary	0.1%	0.0%	0.2%	0.5%	0.7%	3.2%	8.0%
Consumer Staples	0.8%	1.9%	3.7%	5.5%	7.0%	12.8%	20.7%
Health Care	1.0%	2.5%	5.1%	7.7%	10.7%	22.1%	32.1%
Information Technology	0.0%	0.1%	-0.4%	-1.0%	-0.1%	8.5%	19.6%
Telecommunication Services	0.3%	1.1%	3.5%	5.2%	6.9%	20.0%	33.4%
Utilities	0.6%	1.2%	1.9%	2.0%	2.9%	11.9%	29.0%

	198701-200612						
	1 month	3 months	6 months	9 months	12 months	24 months	36 months
Energy	0.3%	0.8%	2.5%	4.8%	6.9%	14.8%	22.9%
Materials	0.5%	1.0%	1.5%	2.0%	3.0%	10.4%	15.6%
Industrials	0.9%	2.3%	4.4%	5.9%	7.7%	15.7%	25.9%
Consumer Discretionary	0.5%	1.1%	1.9%	2.4%	2.7%	3.5%	1.9%
Consumer Staples	0.8%	2.1%	3.4%	4.1%	4.0%	4.8%	10.3%
Health Care	1.3%	3.6%	7.0%	10.9%	14.9%	27.5%	28.9%
Information Technology	1.3%	3.0%	5.0%	6.2%	6.3%	16.4%	35.9%
Telecommunication Services	0.3%	1.6%	1.7%	0.7%	-2.4%	-6.1%	-7.1%
Utilities	-0.1%	-0.4%	0.0%	0.6%	1.3%	5.0%	4.1%

Past performance is not a guarantee of future results.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 42: Performance of Gross Free Cash Flow-to-Price Across GICS Sectors, Excess Returns Relative to Sector

	196201-198612						
	1 month	3 months	6 months	9 months	12 months	24 months	36 months
Energy	1.1%	2.7%	4.7%	6.2%	7.6%	14.2%	22.2%
Materials	0.3%	0.7%	1.4%	2.5%	3.5%	7.2%	10.3%
Industrials	0.2%	0.8%	2.0%	3.5%	5.4%	11.8%	18.7%
Consumer Discretionary	0.3%	0.6%	1.4%	2.5%	3.5%	6.8%	9.5%
Consumer Staples	0.5%	0.8%	1.4%	1.8%	2.6%	6.3%	10.1%
Health Care	0.4%	0.8%	1.9%	3.8%	5.8%	11.7%	18.3%
Information Technology	0.3%	1.5%	2.4%	3.8%	6.0%	22.2%	42.4%
Telecommunication Services	0.0%	0.4%	1.6%	2.9%	4.5%	12.6%	15.6%
Utilities	0.4%	1.1%	2.4%	3.5%	4.9%	12.8%	20.0%

	198701-200612						
	1 month	3 months	6 months	9 months	12 months	24 months	36 months
Energy	0.5%	1.3%	2.8%	5.0%	6.9%	14.4%	22.8%
Materials	0.6%	0.9%	0.7%	0.6%	1.3%	6.1%	9.4%
Industrials	0.6%	1.8%	3.2%	4.5%	5.5%	10.9%	14.1%
Consumer Discretionary	0.4%	0.9%	1.4%	2.0%	2.0%	2.1%	-2.7%
Consumer Staples	0.6%	1.7%	2.5%	3.2%	4.0%	6.5%	8.4%
Health Care	0.8%	1.5%	2.5%	4.0%	5.6%	3.7%	-1.6%
Information Technology	0.6%	1.1%	1.6%	2.5%	2.8%	5.5%	14.6%
Telecommunication Services	0.1%	0.5%	0.0%	-1.5%	-5.0%	-8.5%	-8.1%
Utilities	-0.2%	-0.7%	-1.1%	-0.4%	0.2%	6.1%	8.1%

Past performance is not a guarantee of future results.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Quality

Return on Invested Capital

Return on invested capital (ROIC) is defined as net operating profits after taxes (NOPAT) divided by invested capital (IC). NOPAT is the after-tax profits to the firm as a whole before any payments to debt or equity stakeholders. IC is the total book value of the firm invested in operating activities of the firm, including all intangibles, notably goodwill. Consequently, ROIC captures the firm's skill in maximizing its capital to enhance profitability, regardless of the capital structure of the firm. Assuming that skill is persistent, we would expect companies with past high (low) ROICs to continue to have high (low) ROICs in the future and, as such, we would expect historical ROICs to be positively associated with future stock returns.

As seen in Figure 43, ROIC is positively correlated with future stock returns with the magnitude of the returns being economically and statistically significant in the later half of the sample period. Moreover, the factor's ability to screen winner and loser stocks with 63% of Quintile 1 stocks outperforming in the 1987 through 2006 period (see Figure 44). Additionally, ROIC is a positive discriminator of returns in all sectors except for Materials and Telecommunications, our two problem sectors in many other regards as well (see Figure 45).

Figure 43: Performance of Return on Invested Capital, Average Excess Returns, Relative to Large-Cap Universe

	Relative Return										
Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-200612											
Quintile 1	0.0%	0.1%	0.2%	0.4%	0.6%	0.5%	0.3%	-0.2%	-1.0%	-1.8%	-2.3%
Quintile 2	0.1%	0.2%	0.2%	0.3%	0.4%	0.5%	0.4%	0.2%	-0.1%	-0.6%	-1.1%
Quintile 3	0.0%	0.1%	0.1%	0.2%	0.3%	0.5%	0.6%	0.9%	1.0%	0.9%	0.8%
Quintile 4	-0.1%	-0.3%	-0.4%	-0.6%	-0.6%	-0.7%	-0.9%	-1.1%	-1.6%	-1.7%	-1.3%
Quintile 5	-0.2%	-0.3%	-0.4%	-1.0%	-1.4%	-1.8%	-2.0%	-2.3%	-3.1%	-3.3%	-3.8%
Long/Short Spread	0.2%	0.4%	0.6%	1.4%	1.9%	2.2%	2.2%	2.1%	2.1%	1.5%	1.4%
198701-200612											
Quintile 1	0.1%	0.3%	0.5%	0.9%	1.4%	1.5%	1.7%	1.8%	2.1%	2.3%	2.5%
Quintile 2	0.1%	0.2%	0.3%	0.4%	0.4%	0.6%	0.6%	0.5%	0.6%	0.5%	0.4%
Quintile 3	0.0%	0.0%	0.0%	0.2%	0.1%	0.3%	0.3%	0.5%	0.8%	0.5%	0.3%
Quintile 4	-0.2%	-0.4%	-0.7%	-1.2%	-1.5%	-1.8%	-2.1%	-2.5%	-3.3%	-3.5%	-3.2%
Quintile 5	-0.3%	-0.5%	-0.8%	-1.6%	-2.1%	-2.8%	-3.2%	-3.9%	-5.5%	-5.8%	-6.2%
Long/Short Spread	0.4%	0.8%	1.2%	2.5%	3.5%	4.3%	4.9%	5.7%	7.5%	8.2%	8.7%
199801-200612											
Quintile 1	0.2%	0.4%	0.8%	1.5%	2.5%	2.7%	2.8%	3.1%	4.2%	5.3%	6.2%
Quintile 2	0.3%	0.5%	0.6%	0.7%	0.9%	1.1%	1.2%	1.0%	0.3%	-0.4%	-1.0%
Quintile 3	0.1%	0.1%	0.0%	0.3%	0.2%	0.2%	0.4%	0.6%	0.9%	0.1%	-0.8%
Quintile 4	-0.3%	-0.6%	-0.8%	-1.6%	-2.1%	-2.6%	-3.2%	-3.8%	-4.6%	-4.3%	-3.9%
Quintile 5	-0.4%	-0.8%	-1.2%	-2.2%	-2.9%	-3.7%	-3.9%	-4.6%	-6.2%	-6.4%	-6.4%
Long/Short Spread	0.6%	1.2%	2.0%	3.7%	5.4%	6.3%	6.8%	7.6%	10.5%	11.8%	12.7%

Past performance is not a guarantee of future results.

Large-cap universe is Russell 1000 after 1978; pre-1978 it is defined via analogous market capitalization break-points

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 44: Performance of Return on Invested Capital, Stock Selection Percentages

	Percent of Months Outperforming										
Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-200612											
Quintile 1	51%	51%	53%	53%	58%	55%	50%	51%	48%	41%	42%
Quintile 2	50%	48%	54%	55%	54%	54%	51%	50%	53%	47%	44%
Quintile 3	51%	50%	48%	52%	54%	53%	55%	54%	59%	57%	56%
Quintile 4	42%	39%	37%	38%	37%	41%	40%	44%	42%	44%	48%
Quintile 5	44%	43%	43%	40%	36%	36%	37%	38%	37%	34%	34%
Long/Short Spread	52%	55%	55%	56%	58%	58%	58%	59%	59%	57%	56%
198701-200612											
Quintile 1	55%	54%	60%	61%	68%	63%	60%	63%	66%	58%	58%
Quintile 2	50%	48%	56%	54%	53%	54%	52%	54%	56%	53%	50%
Quintile 3	52%	53%	46%	49%	53%	53%	57%	57%	57%	54%	52%
Quintile 4	40%	33%	31%	31%	27%	33%	33%	34%	32%	32%	37%
Quintile 5	43%	38%	39%	33%	31%	28%	30%	29%	27%	20%	27%
Long/Short Spread	54%	60%	59%	66%	69%	69%	67%	69%	73%	73%	70%
199801-200612											
Quintile 1	57%	59%	68%	71%	84%	78%	73%	77%	86%	79%	84%
Quintile 2	53%	51%	54%	53%	55%	57%	56%	55%	55%	55%	50%
Quintile 3	55%	55%	48%	49%	51%	45%	49%	52%	53%	54%	49%
Quintile 4	40%	32%	30%	30%	26%	35%	33%	26%	27%	35%	39%
Quintile 5	45%	42%	37%	32%	29%	29%	31%	32%	24%	14%	22%
Long/Short Spread	57%	60%	66%	75%	81%	77%	75%	78%	84%	88%	85%

Past performance is not a guarantee of future results.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 45: Performance of Return to Invested Capital across GICS Sectors, Excess Returns Relative to Sector

	196201-200612										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
Energy		0.4%	0.8%	1.5%	1.8%	3.7%	5.3%	6.5%	9.5%	8.4%	7.4%
Materials		-0.3%	-0.7%	-1.7%	-2.2%	-2.4%	-3.0%	-3.2%	-5.4%	-8.8%	-13.2%
Industrials	0.2%	0.4%	0.5%	0.8%	1.1%	1.4%	2.2%	2.9%	3.3%	2.5%	2.5%
Consumer Discretionary	0.2%	0.4%	0.7%	1.4%	1.8%	1.5%	1.1%	0.1%	-1.8%	-5.1%	-7.8%
Consumer Staples	0.1%	0.2%	0.3%	0.7%	1.3%	1.9%	3.1%	4.5%	6.8%	8.6%	10.9%
Health Care	0.1%	0.2%	0.5%	1.8%	1.4%	0.2%	-2.4%	-4.5%	-12.3%	-19.0%	-22.8%
Information Technology	1.2%	1.7%	2.3%	3.5%	5.6%	8.1%	9.1%	10.1%	11.8%	14.6%	16.2%
Telecommunication Services	0.8%	1.6%	2.1%	2.8%	3.3%	2.0%	0.2%	-4.8%	-7.3%	-13.9%	-22.6%
Utilities	0.4%	0.9%	1.4%	2.2%	2.9%	3.3%	3.5%	5.0%	7.3%	6.8%	7.5%
	198701-200612										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
Energy	0.4%	0.9%	1.5%	3.7%	5.4%	8.5%	11.0%	13.2%	15.6%	13.3%	13.3%
Materials	0.0%	-0.3%	-0.7%	-1.5%	-1.7%	-1.3%	-1.6%	-1.0%	-3.7%	-8.6%	-15.8%
Industrials	0.4%	1.0%	1.3%	2.1%	3.1%	4.2%	5.5%	7.5%	9.9%	10.7%	11.0%
Consumer Discretionary	0.3%	0.5%	0.8%	1.7%	2.8%	2.6%	2.6%	2.5%	2.6%	-0.7%	-3.5%
Consumer Staples	0.3%	0.5%	0.7%	1.4%	1.8%	2.1%	3.2%	4.4%	6.2%	7.9%	8.8%
Health Care	0.2%	0.3%	0.7%	2.7%	2.5%	2.3%	-0.2%	-2.2%	-11.5%	-19.3%	-24.6%
Information Technology	1.9%	3.0%	4.5%	8.4%	12.7%	17.3%	21.7%	26.4%	30.7%	34.1%	37.7%
Telecommunication Services	0.1%	0.6%	1.1%	0.5%	-0.8%	-3.9%	-7.1%	-11.1%	-6.8%	-8.9%	-15.4%
Utilities	0.0%	0.2%	0.4%	0.9%	1.1%	1.3%	1.7%	2.7%	4.9%	6.1%	7.7%

Past performance is not a guarantee of future results.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Return on Equity

Return on equity (ROE) is calculated as the after-tax earnings of the firm, after it pays all operating expenses, taxes and interest payments, divided by the book value of common equity. In short, it measures the return on shareholders' equity of existing assets and, as such, a high ratio means that past management decisions have paid off handsomely, while a low ratio means that managers have made poor investment decisions in the past. Assuming that managerial decision making is not a random walk, we would expect companies with past high ROEs to continue to have high ROEs in the future and, as such, we would expect historical ROEs to be positively associated with future stock returns.

While the results are generally consistent with the hypothesized outcomes, they are not quite as strong as we would have hoped. As seen in Figure 46, the quintile spreads average 2.4% over the in-sample period of 1973 through 1997. Additionally, the stock-picking power of the model as shown in Figure 47 is not particularly strong. However, in the Financial sector, where it is inappropriate to use ROIC, we find that ROE does work well (see Figure 48). Consequently, we're comfortable using this signal in that space.

Figure 46: Performance of Return on Equity, Average Excess Returns, Relative to Large-Cap Universe

	Relative Return										
Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
197301-199712											
Quintile 1	0.1%	0.2%	0.3%	0.6%	1.1%	1.6%	1.9%	2.2%	2.3%	2.7%	3.7%
Quintile 2	0.0%	0.1%	0.1%	0.3%	0.5%	0.7%	0.6%	0.9%	0.8%	0.0%	-0.3%
Quintile 3	-0.1%	-0.2%	-0.3%	-0.3%	-0.5%	-0.9%	-1.0%	-1.3%	-1.6%	-3.1%	-4.6%
Quintile 4	-0.1%	-0.2%	-0.4%	-0.7%	-0.7%	-1.3%	-1.8%	-2.3%	-3.0%	-3.1%	-3.7%
Quintile 5	-0.1%	-0.2%	-0.3%	-0.4%	-0.6%	-0.8%	-0.9%	-1.0%	-0.5%	-0.2%	0.9%
Long/Short Spread	0.2%	0.3%	0.5%	1.0%	1.7%	2.4%	2.8%	3.2%	2.9%	2.9%	2.9%
198701-200612											
Quintile 1	0.1%	0.2%	0.4%	0.7%	0.8%	1.1%	1.1%	1.1%	1.3%	1.9%	2.6%
Quintile 2	0.1%	0.3%	0.4%	0.7%	1.1%	1.4%	1.6%	1.8%	2.1%	1.8%	1.6%
Quintile 3	0.0%	0.0%	0.0%	0.2%	0.3%	0.1%	-0.1%	-0.1%	-0.2%	-0.9%	-2.1%
Quintile 4	-0.1%	-0.3%	-0.4%	-0.9%	-1.4%	-2.0%	-2.1%	-2.3%	-2.9%	-2.7%	-2.9%
Quintile 5	-0.1%	-0.2%	-0.3%	-0.6%	-0.7%	-0.4%	-0.2%	-0.4%	-0.1%	-0.1%	0.4%
Long/Short Spread	0.2%	0.4%	0.7%	1.3%	1.5%	1.5%	1.3%	1.5%	1.4%	2.0%	2.2%
199801-200612											
Quintile 1	0.1%	0.3%	0.5%	0.8%	0.5%	0.5%	0.1%	-0.4%	-0.7%	-0.8%	-1.3%
Quintile 2	0.3%	0.6%	0.8%	1.5%	2.1%	2.7%	3.1%	3.5%	3.9%	4.1%	3.6%
Quintile 3	0.1%	0.1%	0.3%	0.8%	1.3%	1.3%	1.1%	1.7%	2.1%	2.3%	2.0%
Quintile 4	-0.1%	-0.3%	-0.5%	-0.9%	-1.4%	-2.0%	-1.7%	-1.4%	-1.4%	-0.5%	0.6%
Quintile 5	-0.3%	-0.5%	-0.8%	-1.6%	-1.7%	-1.0%	-0.6%	-1.2%	-0.9%	-1.5%	-1.4%
Long/Short Spread	0.4%	0.8%	1.3%	2.4%	2.2%	1.4%	0.8%	0.8%	0.2%	0.7%	0.1%

Past performance is not a guarantee of future results.

Large cap universe is Russell 1000 after 1978; pre-1978 it is defined via analogous market capitalization break-points
Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 47: Performance of Return on Equity, Stock Selection Percentages

	Percent of Companies Outperforming										
Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
197301-199712											
Quintile 1	50%	50%	49%	49%	48%	48%	47%	46%	46%	45%	44%
Quintile 2	49%	49%	50%	49%	49%	48%	47%	46%	44%	44%	43%
Quintile 3	48%	48%	48%	47%	47%	46%	45%	44%	43%	42%	41%
Quintile 4	48%	47%	46%	46%	45%	44%	43%	43%	42%	41%	41%
Quintile 5	47%	48%	47%	46%	46%	45%	45%	44%	43%	42%	42%
198701-200612											
Quintile 1	50%	50%	49%	48%	48%	47%	46%	46%	45%	44%	44%
Quintile 2	49%	50%	50%	49%	49%	48%	47%	47%	46%	45%	44%
Quintile 3	49%	49%	49%	48%	48%	47%	46%	45%	44%	43%	42%
Quintile 4	48%	48%	47%	46%	45%	44%	44%	44%	43%	43%	42%
Quintile 5	48%	48%	48%	46%	45%	45%	44%	43%	43%	41%	41%
199801-200612											
Quintile 1	49%	49%	49%	48%	47%	46%	45%	45%	43%	43%	43%
Quintile 2	50%	50%	50%	50%	49%	49%	48%	47%	47%	46%	45%
Quintile 3	49%	49%	49%	49%	49%	48%	47%	47%	46%	46%	45%
Quintile 4	49%	48%	48%	47%	45%	45%	46%	45%	45%	45%	45%
Quintile 5	48%	48%	47%	45%	44%	43%	42%	42%	42%	40%	40%

Past performance is not a guarantee of future results.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 48: Performance of Return on Equity Across GICS Sectors, Excess Returns Relative to Sector

	196201-200612										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
Energy	0.1%	0.3%	0.4%	2.0%	4.0%	6.7%	8.9%	10.8%	14.1%	13.2%	15.7%
Materials	-0.1%	-0.1%	0.0%	0.1%	0.1%	0.1%	0.1%	-0.7%	-5.9%	-10.1%	-14.1%
Industrials	0.3%	0.6%	0.9%	1.6%	2.5%	3.5%	4.1%	4.9%	4.7%	3.2%	2.0%
Consumer Discretionary	0.0%	0.0%	-0.1%	0.0%	0.3%	-0.1%	-0.7%	-1.1%	-1.7%	-2.5%	-5.8%
Consumer Staples	0.2%	0.4%	0.7%	1.7%	2.5%	2.5%	3.0%	2.8%	1.6%	2.9%	5.6%
Health Care	0.8%	1.5%	2.2%	4.8%	6.7%	7.0%	7.7%	7.5%	7.9%	1.5%	-3.2%
Financials	0.7%	1.4%	2.1%	4.4%	6.5%	8.7%	10.7%	12.5%	17.3%	22.4%	27.9%
Information Technology	0.6%	1.3%	2.2%	4.6%	6.9%	8.9%	10.0%	12.1%	17.7%	21.3%	26.7%
Telecommunication Services	-0.1%	0.0%	-0.3%	-0.1%	-1.4%	-4.6%	-5.5%	-9.8%	-18.0%	-22.9%	-22.7%
Utilities	-0.4%	-1.5%	-3.0%	-5.9%	-5.7%	-5.9%	-5.6%	-3.5%	-1.0%	-10.5%	-12.7%

	197301-199712										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
Energy	-0.1%	-0.1%	-0.1%	0.5%	1.5%	3.7%	5.7%	7.6%	12.9%	14.5%	15.7%
Materials	-0.3%	-0.4%	-0.5%	-1.2%	-1.4%	-1.1%	-0.8%	-0.7%	-1.9%	-2.8%	-1.4%
Industrials	0.3%	0.6%	0.8%	0.9%	1.7%	2.8%	3.4%	4.2%	3.9%	3.6%	4.5%
Consumer Discretionary	-0.2%	-0.5%	-0.8%	-1.6%	-2.5%	-4.1%	-6.0%	-7.6%	-11.1%	-14.4%	-20.2%
Consumer Staples	0.4%	0.4%	0.4%	1.6%	2.2%	2.5%	3.9%	4.5%	4.9%	6.5%	9.3%
Health Care	0.9%	1.7%	2.6%	5.5%	8.5%	9.3%	11.6%	12.6%	18.6%	13.8%	8.0%
Financials	0.8%	1.6%	2.5%	6.3%	9.9%	13.6%	16.8%	20.1%	27.7%	35.4%	43.9%
Information Technology	0.6%	1.4%	2.6%	6.6%	11.9%	17.7%	20.7%	23.2%	27.1%	28.0%	35.2%
Telecommunication Services	-0.8%	-1.4%	-1.7%	-2.4%	-4.4%	-8.8%	-10.6%	-13.3%	-20.7%	-27.9%	-30.3%
Utilities	0.8%	0.3%	-0.1%	-2.3%	-1.4%	1.1%	2.2%	4.5%	6.5%	6.6%	19.3%

	199801-200612										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
Energy	0.4%	0.8%	1.2%	4.2%	7.7%	11.4%	14.1%	16.2%	16.4%	10.6%	15.5%
Materials	0.1%	0.4%	0.8%	2.2%	2.4%	2.1%	1.5%	-0.8%	-13.3%	-24.4%	-41.1%
Industrials	0.3%	0.6%	1.0%	2.5%	3.6%	4.8%	5.4%	6.1%	6.1%	2.5%	-3.3%
Consumer Discretionary	0.3%	0.7%	1.0%	2.5%	4.6%	6.4%	8.1%	10.1%	15.5%	21.0%	24.7%
Consumer Staples	0.0%	0.4%	1.0%	2.0%	3.0%	2.4%	1.5%	-0.2%	-4.6%	-4.0%	-2.3%
Health Care	0.7%	1.1%	1.7%	3.9%	3.9%	3.3%	1.3%	-1.3%	-11.6%	-22.2%	-26.5%
Financials	0.5%	1.0%	1.4%	1.7%	1.4%	1.3%	0.9%	0.1%	-1.0%	-2.2%	-4.8%
Information Technology	0.7%	1.2%	1.7%	1.6%	-0.8%	-5.2%	-7.7%	-6.9%	0.5%	8.0%	8.8%
Telecommunication Services	0.9%	1.9%	1.7%	3.4%	3.3%	1.9%	2.6%	-3.9%	-13.4%	-13.4%	-7.2%
Utilities	-2.6%	-4.9%	-8.5%	-12.7%	-13.8%	-19.2%	-20.3%	-18.9%	-15.2%	-43.1%	-76.2%

Past performance is not a guarantee of future results.

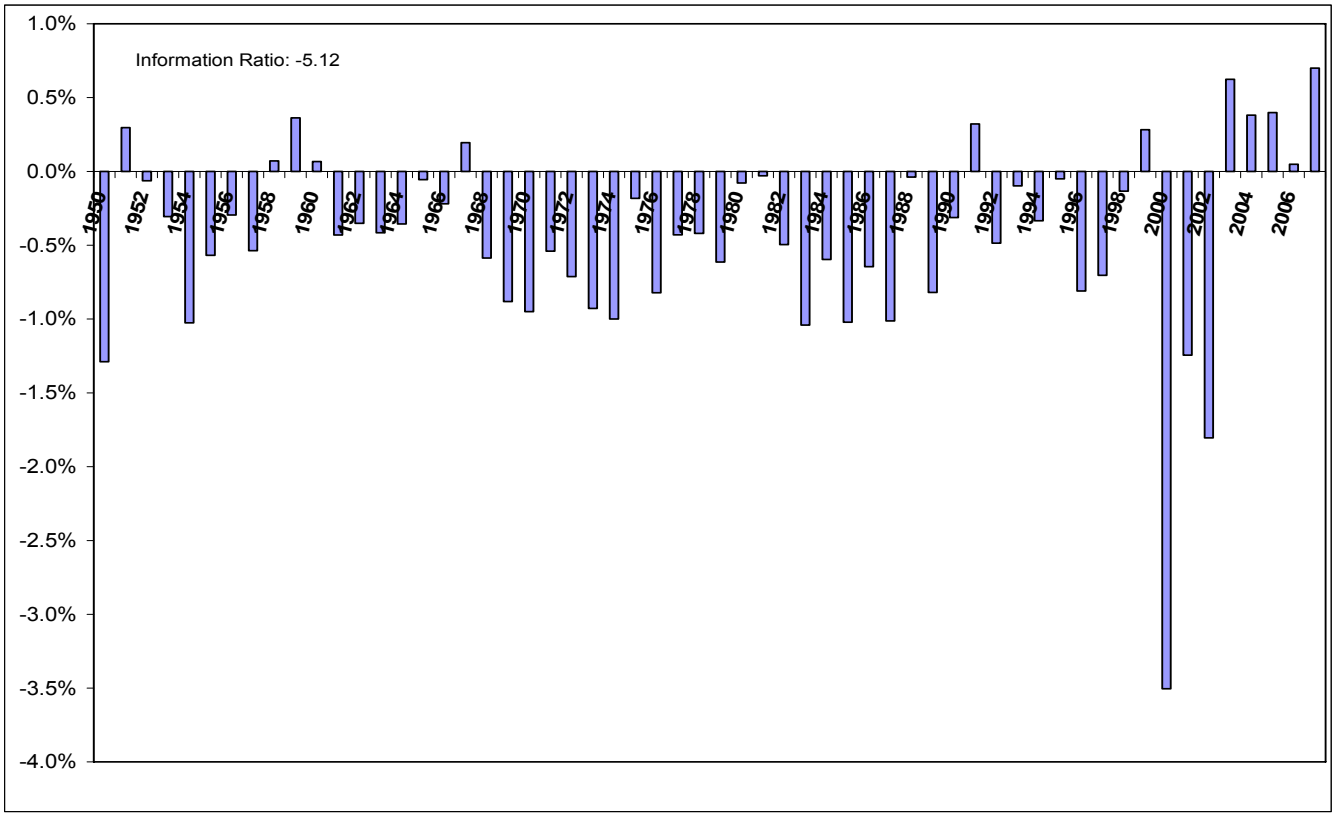
Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Net Change in Shares Outstanding

Investors are always looking to managers of companies for indications about the true value of the company, as managers clearly have better information than what is available to the average outsider. One of the key signals investors look at is whether companies are net buyers or sellers of their own shares. If companies are buying back their own shares, it is a good guess that they believe their own shares are underpriced. Conversely, if companies are net sellers (or issuers) of their own shares, one can surmise that firms believe their shares are overpriced. Consequently, we would expect the stocks of net issuers (Q1 stocks) to underpeform while those of net buyers (Q5 stocks) to outperform.

The performance of this factor is exactly as we hypothesized and is quite consistent and strong. As seen in Figure 49, the performance was very steady, producing an Information Ratio of 5.12, though, the adverse performance in the past five years does raise concerns for us. Despite this, Q1-Q5 spreads in the period 1998 to 2006 remain attractive, with an average excess return of 5.3% with a 12-month holding period (see Figure 50). The performance in almost all sectors is good with the notable exceptions of Telecoms and Materials in the later half of the sample (see Figure 51).

Figure 49: Performance of Net Change in Shares Outstanding: Long/Short Excess Returns, Average Monthly Returns, Reported on a Calendar Year Basis, 1950–2006



Past performance is not a guarantee of future results.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 50: Performance of Net Change in Shares Outstanding, Average Excess Returns, Relative to Large-Cap Universe

Portofolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-198612											
Quintile 1	-0.2%	-0.4%	-0.6%	-1.4%	-2.3%	-3.1%	-3.8%	-4.4%	-5.6%	-7.3%	-9.1%
Quintile 2	0.0%	0.1%	0.1%	0.3%	0.5%	0.6%	0.5%	0.5%	0.7%	1.0%	1.1%
Quintile 3	0.0%	-0.1%	-0.1%	-0.3%	-0.2%	-0.2%	0.0%	0.1%	0.3%	0.7%	1.2%
Quintile 4	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	0.0%	0.1%	0.2%	0.2%	0.2%	0.0%
Quintile 5	0.3%	0.6%	0.9%	2.0%	2.9%	3.9%	4.9%	5.9%	8.1%	11.0%	13.5%
Long / Short Spread	-0.5%	-1.0%	-1.6%	-3.4%	-5.2%	-6.9%	-8.7%	-10.2%	-13.7%	-18.3%	-22.6%
198701-200612											
Quintile 1	-0.3%	-0.5%	-0.8%	-1.4%	-2.2%	-2.8%	-3.4%	-4.0%	-5.0%	-5.0%	-5.0%
Quintile 2	0.0%	0.0%	0.0%	-0.1%	0.0%	0.4%	0.8%	1.0%	1.5%	1.8%	2.2%
Quintile 3	0.0%	0.0%	0.0%	0.2%	0.3%	0.5%	0.6%	0.8%	0.9%	0.3%	-0.5%
Quintile 4	0.0%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.0%	-0.1%	-0.6%	-1.2%
Quintile 5	0.2%	0.4%	0.7%	1.3%	1.8%	2.0%	2.3%	2.5%	3.1%	3.8%	4.7%
Long / Short Spread	-0.5%	-1.0%	-1.5%	-2.8%	-4.0%	-4.8%	-5.7%	-6.6%	-8.1%	-8.8%	-9.7%
199801-200612											
Quintile 1	-0.4%	-0.9%	-1.2%	-2.0%	-2.9%	-3.4%	-3.8%	-4.3%	-5.1%	-6.6%	-10.0%
Quintile 2	0.0%	0.0%	-0.1%	-0.4%	-0.2%	0.3%	0.5%	0.4%	-0.1%	-1.9%	-3.4%
Quintile 3	0.1%	0.2%	0.2%	0.6%	0.9%	1.4%	2.0%	2.9%	4.1%	4.6%	5.0%
Quintile 4	0.1%	0.1%	0.2%	0.3%	0.4%	0.3%	0.4%	0.5%	0.9%	1.9%	3.3%
Quintile 5	0.3%	0.5%	0.9%	1.6%	2.0%	1.9%	1.9%	1.9%	2.2%	4.4%	7.5%
Long / Short Spread	-0.7%	-1.4%	-2.1%	-3.6%	-4.9%	-5.3%	-5.7%	-6.1%	-7.3%	-11.0%	-17.6%

Past performance is not a guarantee of future results.

Large cap universe is Russell 1000 after 1978; pre-1978 it is defined via analogous market capitalization break-points

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 51: Performance of Net Change in Shares Outstanding Across GICS Sectors, Excess Returns Relative to Sector

	196201-198612										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
Energy	-0.3%	-0.8%	-1.3%	-3.7%	-5.9%	-8.6%	-10.5%	-11.9%	-13.8%	-15.8%	-18.9%
Materials	-0.7%	-1.3%	-1.9%	-3.3%	-5.0%	-6.3%	-7.6%	-8.7%	-10.4%	-13.7%	-16.1%
Industrials	-0.2%	-0.4%	-0.8%	-1.7%	-2.4%	-3.5%	-5.5%	-7.9%	-13.2%	-18.0%	-19.6%
Consumer Discretionary	-0.8%	-1.5%	-2.3%	-5.0%	-7.9%	-10.6%	-13.2%	-15.7%	-19.9%	-25.1%	-30.5%
Consumer Staples	-0.1%	-0.2%	-0.3%	-1.2%	-2.3%	-3.8%	-5.6%	-6.7%	-8.1%	-9.5%	-10.9%
Health Care	0.1%	0.0%	0.0%	-0.2%	-1.3%	-1.9%	-2.3%	-3.0%	-6.1%	-9.0%	-11.4%
Financials	-0.7%	-1.4%	-2.1%	-4.7%	-7.3%	-9.9%	-12.4%	-15.7%	-21.2%	-27.2%	-34.4%
Information Technology	-0.2%	-0.1%	-0.2%	-2.1%	-3.9%	-5.4%	-7.8%	-9.1%	-11.4%	-14.6%	-18.4%
Telecommunication Services	-0.6%	-1.2%	-1.3%	-2.6%	-0.8%	-0.1%	-3.4%	-5.5%	-6.9%	-7.6%	-18.6%
Utilities	-0.1%	-0.3%	-0.4%	-0.9%	-1.4%	-2.4%	-3.6%	-4.1%	-4.9%	-6.0%	-7.7%
	198701-200612										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
Energy	-0.3%	-0.6%	-0.8%	-1.5%	-1.9%	-2.4%	-2.9%	-3.4%	-3.5%	-2.5%	-4.7%
Materials	0.1%	0.3%	0.4%	0.7%	0.9%	1.0%	1.3%	1.2%	0.8%	0.8%	-1.9%
Industrials	-0.4%	-0.8%	-1.2%	-2.2%	-3.3%	-4.0%	-5.0%	-5.8%	-8.9%	-12.8%	-14.2%
Consumer Discretionary	-0.5%	-0.8%	-1.1%	-2.0%	-3.2%	-3.5%	-3.9%	-4.2%	-4.8%	-5.1%	-5.1%
Consumer Staples	0.0%	-0.1%	-0.2%	-0.7%	-1.2%	-2.1%	-2.8%	-2.8%	-4.8%	-6.7%	-6.4%
Health Care	-0.9%	-1.9%	-2.6%	-6.2%	-9.6%	-13.1%	-16.8%	-21.1%	-27.9%	-33.6%	-39.9%
Financials	-0.2%	-0.4%	-0.6%	-1.7%	-2.6%	-3.3%	-3.7%	-3.7%	-3.7%	-3.4%	-3.2%
Information Technology	-0.3%	-0.4%	-0.5%	-1.0%	-1.4%	-1.7%	-2.0%	-3.8%	-7.5%	-6.5%	-4.9%
Telecommunication Services	0.1%	0.3%	0.2%	0.7%	0.6%	0.6%	0.9%	1.2%	1.3%	7.7%	12.1%
Utilities	-0.5%	-1.0%	-1.5%	-3.0%	-4.4%	-5.4%	-6.4%	-7.9%	-10.0%	-11.1%	-12.8%

Past performance is not a guarantee of future results.

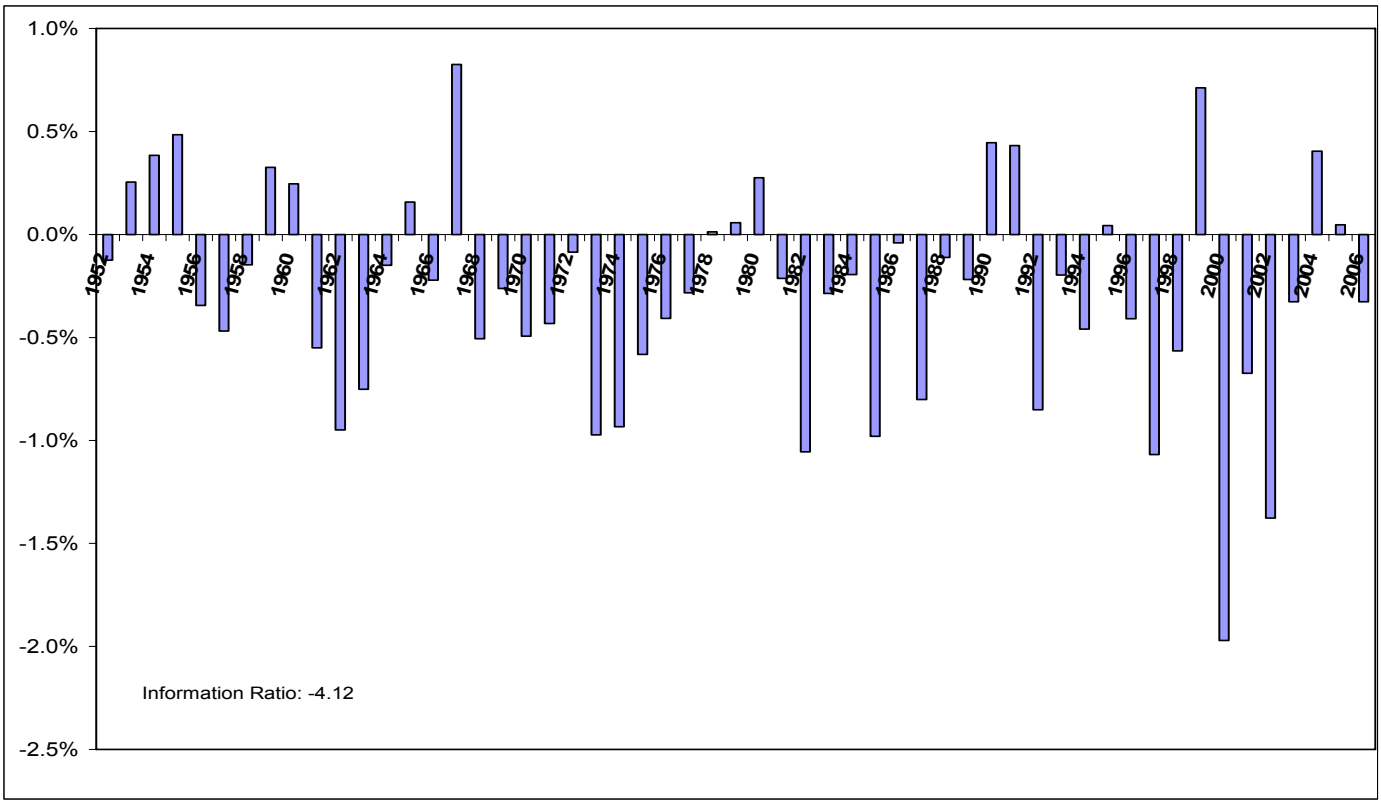
Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Percentage Change in Total Employees

The percent change in employees reflects how a main input into the production process—labor—is growing. Companies that are rapidly growing their employee base are expanding rapidly and, like most other major investments companies make, this investment is apt to be mistimed too. Major expansions overwhelmingly occur at tops in the business cycle, at the moment when management is most optimistic. Furthermore, companies that experience rapid employee growth are most likely companies which have grown through acquisitions; the empirical evidence is overwhelming that, on average, acquisitions are value destructive. On the other hand, companies that are shrinking their employees, are companies that strive for efficiency. Consequently, we expect changes in total employees to be negatively correlated with future stock returns.

Figure 52 and Figure 53 illustrate that our intuition is correct with the factor generating an information ratio of 4.12, outperforming in 39 of 55 years, and generating average long/short excess returns of 4.5% with a 12-month holding period. The factor is largely consistent across sectors, with the exception of the Energy and Utilities (see Figure 54)

Figure 52: Performance of Percent Change in Total Employees: Long/Short Excess Returns, Average Monthly Returns, Reported on a Calendar Year Basis, 1952–2006



Past performance is not a guarantee of future results.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 53: Performance of Percent Change in Total Employees, Average Excess Returns, Relative to Large-Cap Universe

	Relative Return										
Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-200612											
Quintile 1	-0.2%	-0.4%	-0.7%	-1.3%	-1.9%	-2.4%	-2.7%	-3.0%	-3.6%	-3.8%	-4.2%
Quintile 2	0.0%	-0.1%	-0.1%	-0.2%	-0.2%	-0.2%	-0.3%	-0.4%	-0.4%	-0.8%	-1.2%
Quintile 3	0.0%	0.0%	0.0%	0.1%	0.2%	0.3%	0.3%	0.3%	0.3%	0.2%	0.5%
Quintile 4	0.1%	0.1%	0.2%	0.2%	0.4%	0.5%	0.6%	0.7%	0.6%	0.8%	0.9%
Quintile 5	0.1%	0.2%	0.3%	0.8%	1.1%	1.4%	1.6%	1.8%	2.3%	2.8%	3.2%
Long/Short Spread	-0.3%	-0.6%	-1.0%	-2.0%	-3.0%	-3.8%	-4.3%	-4.8%	-5.9%	-6.6%	-7.4%
197301-199712											
Quintile 1	-0.3%	-0.5%	-0.7%	-1.3%	-2.0%	-2.6%	-3.1%	-3.8%	-4.7%	-4.8%	-4.9%
Quintile 2	0.0%	0.0%	-0.1%	-0.1%	-0.1%	0.0%	0.0%	0.1%	0.0%	-0.8%	-1.4%
Quintile 3	0.0%	0.0%	0.0%	0.1%	0.2%	0.2%	0.3%	0.4%	0.7%	0.7%	1.0%
Quintile 4	0.1%	0.1%	0.2%	0.3%	0.5%	0.7%	0.9%	1.1%	1.2%	1.8%	2.0%
Quintile 5	0.1%	0.2%	0.3%	0.7%	1.1%	1.4%	1.6%	1.9%	2.7%	3.0%	3.4%
Long/Short Spread	-0.4%	-0.7%	-1.0%	-2.1%	-3.1%	-4.0%	-4.8%	-5.7%	-7.3%	-7.8%	-8.3%
199801-200612											
Quintile 1	-0.3%	-0.7%	-1.1%	-2.1%	-2.9%	-3.1%	-2.5%	-2.0%	-2.5%	-4.2%	-6.5%
Quintile 2	0.0%	0.0%	0.1%	0.1%	0.2%	0.3%	-0.2%	-0.7%	-0.2%	0.1%	0.0%
Quintile 3	0.0%	0.0%	0.0%	0.2%	0.3%	0.2%	0.1%	-0.2%	-1.3%	-1.1%	-0.8%
Quintile 4	0.1%	0.2%	0.2%	0.4%	0.8%	0.8%	0.6%	0.7%	0.7%	0.8%	1.7%
Quintile 5	0.2%	0.4%	0.7%	1.3%	1.4%	1.5%	1.3%	1.2%	1.7%	2.8%	3.8%
Long/Short Spread	-0.5%	-1.0%	-1.7%	-3.3%	-4.3%	-4.5%	-3.8%	-3.2%	-4.1%	-7.0%	-10.4%

Past performance is not a guarantee of future results.

Large Cap Universe is Russell 1000 after 1978; pre-1978 it is defined via analogous market capitalization break-points

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 54: Performance of Percent in Change in Total Employees Across GICS Sectors, Excess Returns Relative to Sector

	196201-200612										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
Energy	-0.2%	-0.2%	-0.3%	-0.1%	0.0%	0.4%	0.6%	0.6%	-0.4%	-2.4%	-4.2%
Materials	0.0%	-0.1%	-0.1%	-0.3%	-0.8%	-1.1%	-1.6%	-2.2%	-3.5%	-5.2%	-7.5%
Industrials	-0.5%	-1.2%	-1.9%	-4.3%	-6.4%	-8.4%	-10.0%	-11.5%	-13.3%	-14.5%	-17.2%
Consumer Discretionary	-0.2%	-0.4%	-0.6%	-1.2%	-2.2%	-3.5%	-4.3%	-4.7%	-5.1%	-4.1%	-3.6%
Consumer Staples	-0.3%	-0.6%	-0.9%	-2.1%	-3.0%	-3.6%	-3.8%	-4.2%	-5.3%	-5.6%	-5.5%
Health Care	-0.6%	-1.0%	-1.6%	-3.3%	-4.7%	-5.4%	-6.4%	-7.6%	-9.0%	-10.3%	-11.5%
Financials	-0.1%	-0.3%	-0.4%	-0.8%	-1.6%	-2.4%	-3.0%	-3.6%	-3.7%	-3.6%	-4.5%
Information Technology	-0.2%	-0.4%	-0.9%	-1.7%	-2.3%	-3.0%	-3.1%	-3.6%	-6.6%	-10.7%	-10.2%
Telecommunication Services	-0.6%	-1.1%	-1.5%	-2.1%	-2.7%	-2.5%	-2.0%	-2.2%	-1.0%	3.3%	6.8%
Utilities	0.0%	-0.1%	-0.2%	-0.6%	-0.9%	-1.1%	-1.4%	-1.8%	-2.7%	-4.1%	-5.7%
	197301-199712										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
Energy	-0.2%	-0.3%	-0.3%	-0.5%	-0.8%	-0.3%	-0.4%	-0.4%	-1.3%	-2.7%	-4.4%
Materials	-0.4%	-0.7%	-1.1%	-2.2%	-3.3%	-4.1%	-4.8%	-5.8%	-7.0%	-8.3%	-9.6%
Industrials	-0.6%	-1.3%	-1.9%	-4.0%	-5.8%	-7.3%	-8.9%	-10.7%	-13.1%	-15.6%	-19.9%
Consumer Discretionary	-0.4%	-0.7%	-1.1%	-2.2%	-3.5%	-4.8%	-5.4%	-5.8%	-7.2%	-7.3%	-6.8%
Consumer Staples	-0.4%	-0.7%	-1.1%	-2.3%	-3.4%	-4.3%	-4.8%	-5.9%	-7.4%	-8.2%	-9.1%
Health Care	-0.5%	-0.7%	-1.0%	-2.1%	-3.5%	-4.5%	-5.7%	-7.2%	-10.6%	-12.8%	-15.6%
Financials	-0.2%	-0.5%	-0.7%	-1.2%	-2.2%	-2.5%	-2.7%	-3.0%	-3.0%	-3.5%	-4.5%
Information Technology	-0.1%	-0.3%	-0.7%	-1.0%	-0.9%	-1.5%	-2.8%	-4.5%	-5.8%	-4.6%	2.3%
Telecommunication Services	-0.2%	-0.3%	-0.4%	-1.2%	-1.7%	-1.9%	-1.8%	-2.4%	0.0%	5.7%	9.9%
Utilities	-0.2%	-0.3%	-0.4%	-0.5%	-0.7%	-0.8%	-1.2%	-1.7%	-2.9%	-3.8%	-4.7%
	199801-200612										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
Energy	-0.3%	-0.3%	-0.2%	1.0%	1.7%	1.8%	1.6%	1.0%	-1.8%	-2.7%	-0.1%
Materials	0.6%	1.1%	1.6%	2.9%	4.0%	5.4%	6.5%	6.6%	4.4%	-0.4%	-11.1%
Industrials	-0.4%	-1.1%	-1.9%	-5.2%	-8.3%	-10.5%	-12.7%	-14.3%	-17.4%	-21.6%	-25.0%
Consumer Discretionary	-0.2%	-0.2%	-0.2%	0.3%	0.1%	0.7%	1.9%	2.0%	2.5%	3.2%	2.0%
Consumer Staples	-0.4%	-0.7%	-1.1%	-3.4%	-4.2%	-4.4%	-4.4%	-3.9%	-2.7%	-0.6%	0.1%
Health Care	-1.2%	-2.4%	-4.2%	-9.4%	-13.1%	-15.0%	-16.6%	-18.3%	-19.5%	-21.8%	-21.8%
Financials	-0.2%	-0.4%	-0.8%	-2.0%	-3.0%	-4.0%	-4.6%	-5.1%	-6.2%	-7.3%	-9.7%
Information Technology	-0.5%	-0.7%	-0.8%	-0.7%	-0.2%	2.0%	9.4%	15.6%	13.3%	-1.5%	-14.7%
Telecommunication Services	-1.9%	-3.7%	-5.1%	-6.2%	-7.7%	-5.6%	-3.2%	-1.1%	-2.1%	-0.8%	-3.1%
Utilities	0.4%	0.5%	0.3%	-0.7%	-1.5%	-2.0%	-1.8%	-2.1%	-3.9%	-8.3%	-14.6%

Past performance is not a guarantee of future results.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Changes in Managerial Discretionary Accruals

The power of accounting accruals to forecast future stock returns was brought to most people's attention with the publication of Richard Sloan's seminal 1996 article in *The Accounting Review*.[7] Sloan showed that investors fail to understand the difference in persistence of cash–based earnings versus accrual–based earnings. Cash is highly likely to persist, whereas accruals are highly unlikely to persist. Since investors mistakenly assign the same level of persistence to both components of earnings, companies where a large percentage of last quarter's earnings came from accruals will have lower earnings this period than is expected by the market and, hence, experience negative stock returns. On the other hand, companies where a large percentage of last quarter's earnings came from cash will have higher earnings this quarter than is anticipated by the market and, hence, experience positive stock returns. Sloan's paper showed that a strategy of simply sorting companies on the basis of the ratio of accruals-to-total earnings produces statistically and economically significant abnormal returns.

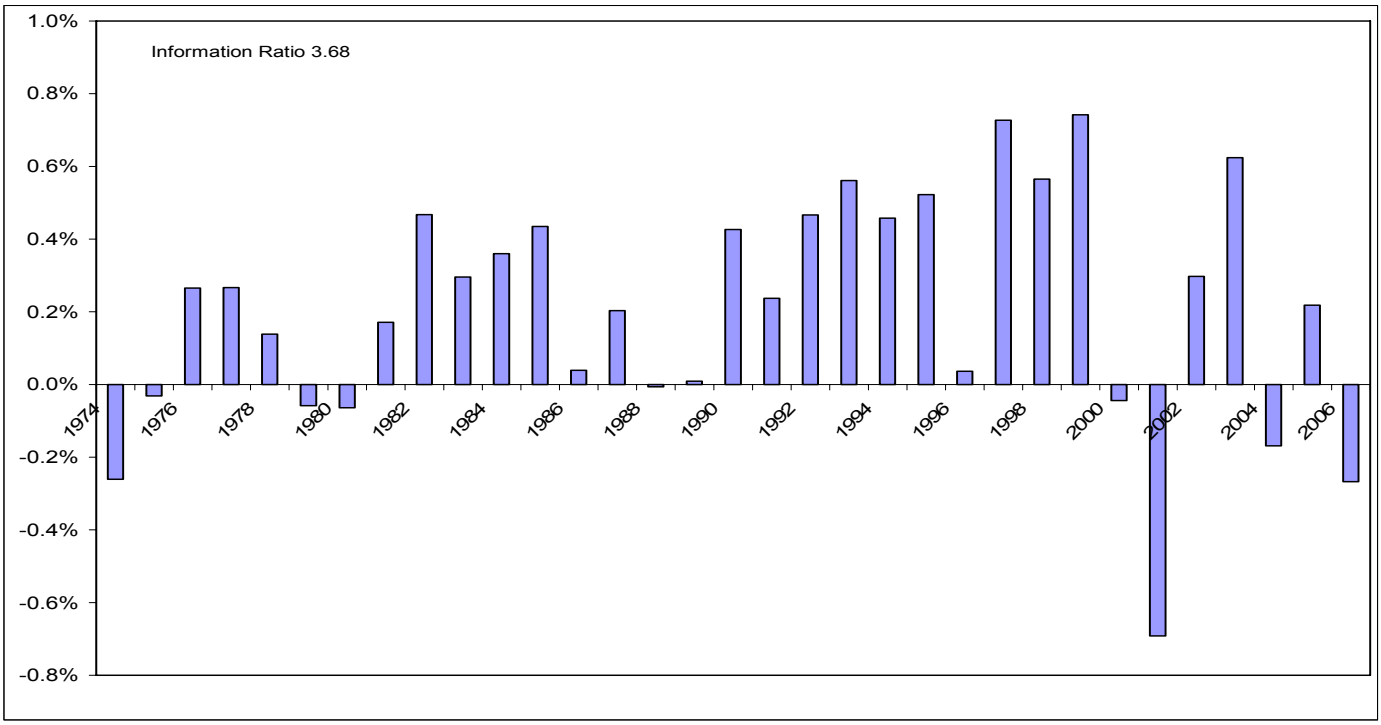
We have improved on Sloan's work by focusing on the components of earnings that are directly subject to managerial discretion. Drawing on the academic accounting literature, we use a modified version of a model of non-discretionary accounting accruals, which can be observed and estimated both cross-sectionally and in time-series. The portion of accruals that are not explained by our model is what we label managerial discretionary accruals. Like Sloan, we then sort companies on the basis of managerial discretionary accruals to total earnings in the hope that this measure, too, will produce significant abnormal returns.

One of our most surprising results is that we did not find that Sloan's original measure was able to produce statistically and economically significant excess returns when we used the non-restated fundamental data. We tried several additional versions of the measure and were not able to achieve success.

As presented in Figure 55, our managerial discretionary accruals variable was, however, able to produce positive abnormal returns. Over the time period 1974-2006, the strategy generated average excess calendar year returns of 2.4% with an Information Ratio of 3.68. As seen in Figure 56, the quintile spreads are generally consistent over time, with some slight degradation in the recent period (which was not included in our testing period) The consistency of the quintiles out- or under- performing are high (see Figure 57). Across sectors, the measure performs well with occasional issues in Materials, Telecoms and Information Technology during the post Internet Bubble period.

[7] See Richard Sloan, "Do Stock Prices Fully Reflect Information in Accruals and Cash Flows About Future Earnings?", The Accounting Review, 1996, Volume 71, pp 289-316.

Figure 55: Performance of Change in Managerial Discretionary Accruals: Long/Short Excess Returns, Average Monthly Returns, Reported on a Calendar Year Basis, 1974–2006



Past performance is not a guarantee of future results.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 56: Performance of Change in Managerial Discretionary Accruals, Average Excess Returns, Relative to Large-Cap Universe

	Relative Return										
Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
197401-199712											
Quintile 1	0.2%	0.3%	0.4%	0.8%	1.1%	1.2%	1.3%	1.5%	2.2%	2.9%	3.2%
Quintile 2	0.1%	0.2%	0.3%	0.5%	0.7%	0.9%	1.0%	1.2%	1.8%	2.4%	3.2%
Quintile 3	0.0%	0.1%	0.1%	0.2%	0.4%	0.7%	0.8%	0.9%	1.1%	1.0%	0.9%
Quintile 4	-0.1%	-0.2%	-0.3%	-0.5%	-0.6%	-0.8%	-1.0%	-1.1%	-1.8%	-2.3%	-2.7%
Quintile 5	-0.3%	-0.5%	-0.7%	-1.3%	-1.8%	-2.2%	-2.4%	-2.9%	-4.0%	-4.7%	-5.8%
Long/Short Spread	0.4%	0.8%	1.2%	2.1%	2.9%	3.4%	3.8%	4.4%	6.1%	7.6%	9.0%
198701-200612											
Quintile 1	0.2%	0.4%	0.6%	1.1%	1.4%	1.6%	1.9%	2.4%	3.0%	3.4%	3.8%
Quintile 2	0.1%	0.3%	0.4%	0.7%	0.9%	1.0%	1.2%	1.5%	1.8%	2.2%	2.9%
Quintile 3	0.0%	0.0%	0.0%	-0.1%	-0.1%	-0.2%	-0.3%	-0.2%	-0.2%	-0.1%	-0.2%
Quintile 4	-0.1%	-0.2%	-0.4%	-0.6%	-0.8%	-1.1%	-1.1%	-1.4%	-2.0%	-2.0%	-2.0%
Quintile 5	-0.3%	-0.5%	-0.7%	-1.3%	-1.6%	-1.7%	-2.1%	-2.8%	-3.5%	-4.3%	-5.4%
Long/Short Spread	0.5%	0.9%	1.2%	2.4%	3.0%	3.3%	4.0%	5.2%	6.5%	7.7%	9.2%
199801-200612											
Quintile 1	0.2%	0.3%	0.4%	0.9%	1.0%	1.2%	1.7%	2.3%	1.8%	0.9%	0.3%
Quintile 2	0.1%	0.2%	0.4%	0.6%	0.8%	0.7%	0.7%	1.0%	0.5%	0.0%	-0.2%
Quintile 3	0.0%	-0.1%	-0.2%	-0.6%	-0.9%	-1.3%	-1.6%	-1.8%	-1.8%	-1.2%	-0.9%
Quintile 4	0.0%	-0.2%	-0.3%	-0.5%	-0.8%	-1.1%	-1.0%	-1.3%	-1.6%	-0.9%	-0.5%
Quintile 5	-0.2%	-0.2%	-0.2%	-0.6%	-0.5%	0.0%	-0.2%	-0.6%	0.4%	0.9%	0.8%
Long/Short Spread	0.4%	0.5%	0.6%	1.5%	1.5%	1.2%	1.9%	2.9%	1.4%	0.1%	-0.5%

Past performance is not a guarantee of future results.

Large Cap Universe is Russell 1000 after 1978; pre-1978 it is defined via analogous market capitalization break-points

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 57: Performance of Change in Managerial Discretionary Accruals, Months Outperforming Percentage

	Percent of Months Outperforming										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
197301-199712											
Quintile 1	56%	59%	60%	63%	66%	69%	63%	60%	62%	61%	61%
Quintile 2	60%	60%	62%	68%	63%	62%	62%	63%	62%	67%	68%
Quintile 3	52%	52%	55%	54%	60%	61%	60%	58%	62%	58%	56%
Quintile 4	44%	38%	42%	39%	37%	36%	37%	37%	33%	30%	29%
Quintile 5	38%	34%	32%	26%	25%	23%	26%	24%	23%	21%	21%
Long/Short Spread	62%	64%	69%	72%	77%	78%	75%	76%	78%	76%	77%
198701-200612											
Quintile 1	59%	61%	64%	65%	67%	73%	68%	67%	63%	64%	61%
Quintile 2	62%	60%	65%	71%	67%	66%	61%	65%	61%	66%	63%
Quintile 3	45%	53%	51%	52%	51%	50%	47%	47%	47%	48%	47%
Quintile 4	43%	38%	40%	38%	34%	36%	36%	36%	33%	32%	33%
Quintile 5	39%	35%	34%	30%	33%	37%	35%	33%	30%	28%	26%
Long/Short Spread	63%	63%	66%	69%	70%	69%	70%	70%	68%	67%	74%
199801-200612											
Quintile 1	55%	57%	60%	62%	66%	69%	69%	71%	55%	49%	43%
Quintile 2	61%	55%	60%	63%	65%	64%	56%	62%	57%	51%	51%
Quintile 3	38%	51%	42%	43%	35%	35%	32%	30%	30%	40%	43%
Quintile 4	48%	43%	41%	40%	39%	38%	36%	37%	42%	43%	45%
Quintile 5	45%	44%	50%	45%	51%	65%	57%	55%	58%	56%	55%
Long/Short Spread	57%	56%	53%	57%	56%	54%	58%	59%	44%	40%	45%

Past performance is not a guarantee of future results.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 58: Performance of Change in Managerial Discretionary Accruals Across GICS Sectors, Excess Returns Relative to Sector

	197401-199712										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
Energy	0.1%	0.4%	0.9%	1.8%	2.5%	3.4%	3.3%	3.7%	5.7%	6.9%	8.6%
Materials	0.1%	0.0%	-0.1%	0.0%	-0.2%	-0.1%	-0.3%	-0.2%	-0.1%	0.5%	1.0%
Industrials	0.3%	0.6%	1.0%	2.0%	2.8%	3.0%	2.9%	2.7%	3.0%	5.1%	6.3%
Consumer Discretionary	0.5%	1.0%	1.4%	2.8%	3.6%	4.5%	5.9%	7.3%	11.5%	14.7%	16.3%
Consumer Staples	0.4%	0.6%	1.1%	2.5%	3.2%	3.7%	4.0%	4.6%	5.7%	7.4%	10.1%
Health Care	0.8%	1.5%	2.3%	4.8%	6.7%	7.1%	7.8%	8.6%	10.6%	14.6%	19.5%
Information Technology	0.8%	1.6%	2.7%	5.1%	8.1%	11.2%	13.9%	16.9%	20.5%	17.6%	17.2%
Telecommunication Services	0.0%	0.2%	0.7%	0.6%	0.0%	-0.2%	-0.5%	-0.7%	-0.5%	-0.1%	4.7%
Utilities	0.3%	0.6%	1.0%	1.9%	2.9%	3.1%	3.0%	3.2%	4.9%	7.3%	8.8%

	198701-200612										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
Energy	0.1%	0.4%	0.7%	1.2%	1.5%	1.7%	2.3%	2.4%	2.0%	3.0%	3.5%
Materials	0.2%	0.2%	0.3%	0.7%	1.0%	1.2%	1.0%	1.1%	1.7%	2.3%	5.0%
Industrials	0.5%	0.9%	1.1%	1.4%	1.4%	1.4%	2.3%	3.2%	4.9%	7.4%	10.1%
Consumer Discretionary	0.7%	1.4%	2.1%	4.3%	5.0%	5.9%	7.1%	8.3%	11.6%	14.3%	16.3%
Consumer Staples	0.3%	0.7%	1.0%	3.1%	3.8%	3.8%	4.2%	4.9%	5.1%	7.8%	11.5%
Health Care	0.8%	1.5%	1.9%	3.3%	4.2%	4.0%	4.8%	6.0%	8.4%	15.3%	20.6%
Information Technology	1.3%	2.1%	3.0%	5.0%	6.9%	7.9%	9.4%	12.0%	15.1%	13.4%	14.7%
Telecommunication Services	0.4%	0.7%	1.2%	1.7%	2.4%	4.6%	8.4%	12.2%	12.8%	8.6%	2.6%
Utilities	0.2%	0.3%	0.7%	1.9%	3.0%	4.1%	4.5%	4.1%	2.8%	1.6%	0.4%

Past performance is not a guarantee of future results.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Taxes Paid to Pre-tax Income

Taxes Paid-to-Pre-tax Income is our poor man's version of accruals for financial firms. GAAP accounting standards are generally significantly weaker than U.S. income tax reporting standards with regards to what constitutes "income." Additionally, there are probably few (if any) companies that are willing to overstate cash earnings for the purpose of income tax reporting standards, as this results in having to pay higher taxes, a cash expense. Consequently, for companies within the same industry, we believe it is fair to interpret the ratio of taxes paid-to-pre-tax income as proportional to the amount of cash earnings each company had as a fraction of total earnings. Consistent with Richard Sloan's finding that cash earnings are highly persistent and the investors underestimate this persistence, we expect firms with higher values of taxes paid-to-pre-tax income to have higher future returns.

The returns to the signal across the entire universe of stocks is not particularly strong, as seen in Figure 59 below. However, within the Financial sector, the returns are notably stronger, producing average long/short spreads of 9.6% with a 12-month holding period over the period 1989–2006 (the period for which the data is available). Additionally, the returns are from both the long side of the portfolio and the short side as well, with average excess returns of 4.0% and -5.6%, respectively.

Figure 59: Performance of Taxes Paid to Pre-tax Income, Average Excess Returns, Relative to Large-Cap Universe

	Relative Return							
Portfolio	1 month	3 months	6 months	9 months	12 months	18 months	24 months	36 months
198901-200612								
Quintile 1	0.1%	0.5%	0.7%	0.9%	0.8%	1.6%	3.0%	6.0%
Quintile 2	0.1%	0.3%	0.2%	0.6%	0.7%	2.2%	4.6%	7.7%
Quintile 3	0.1%	0.3%	0.8%	1.2%	1.0%	0.8%	0.9%	0.2%
Quintile 4	0.0%	0.1%	0.1%	0.1%	0.1%	-0.3%	-0.5%	-3.1%
Quintile 5	-0.1%	-0.5%	-1.4%	-2.0%	-1.9%	-1.9%	-2.0%	-1.3%
Long / Short Spread	0.2%	1.0%	2.1%	2.8%	2.7%	3.5%	5.0%	7.2%

Past performance is not a guarantee of future results.

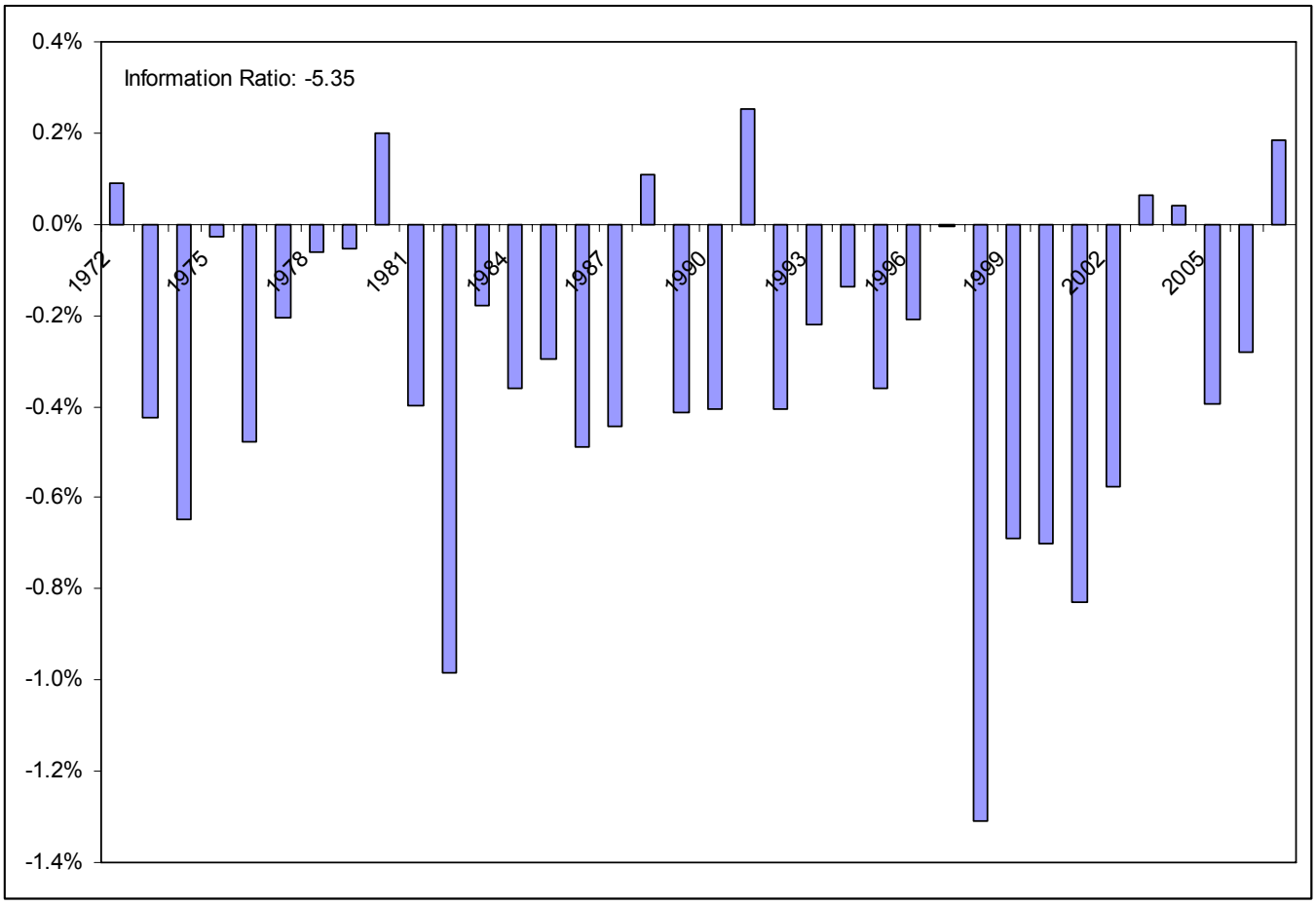
Large cap universe is Russell 1000 after 1978; pre-1978 it is defined via analogous market capitalization break-points
Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Changes in Debt to Assets

Significant changes in debt relative to asset base are usually associated with major acquisitions and/or mergers. As has been well documented in the academic finance literature, major acquisitions are highly destructive to shareholder wealth, as managers tend to significantly overpay and synergies have a way of failing to materialize. Additionally, significant increases in debt levels rise the probability of default (or even bankruptcy) for the firm.

Figure 60 confirms that companies with significant increases in debt relative to assets underperform on a broad scale, in a highly consistent manner. The strategy of shorting companies with higher debt-to-assets and buying companies with reduced debt-to-assets generates an Information Ratio of 5.35 and positive returns in 28 out of 35 of the most recent years. The magnitude of the long/short return in our out-of-sample period (1998-2006) averages 4.4% per year, assuming a 12-month holding period (see Figure 61). Moreover, the long/short portfolio outperformed in 78% of the months during 1998 through 2006 period (see Figure 62).

Figure 60: Performance of Changes in Debt-to-Assets: Long/Short Excess Returns, Average Monthly Returns, Reported on a Calendar Year Basis, 1972–2006



Past performance is not a guarantee of future results.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 61: Performance of Changes in Debt-to-Assets, Average Excess Returns, Relative to Large-Cap Universe

	Relative Return										
Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-198612											
Quintile 1	-0.2%	-0.4%	-0.6%	-1.1%	-1.4%	-2.0%	-2.4%	-2.8%	-3.7%	-4.8%	-5.3%
Quintile 2	-0.1%	-0.1%	-0.1%	-0.4%	-0.3%	-0.5%	-0.5%	-0.7%	-0.8%	-0.5%	-0.6%
Quintile 3	0.1%	0.1%	0.0%	0.1%	0.0%	-0.1%	0.0%	0.3%	0.7%	0.8%	1.2%
Quintile 4	0.1%	0.1%	0.1%	0.2%	0.4%	0.7%	0.7%	0.6%	0.5%	0.6%	1.4%
Quintile 5	0.0%	0.2%	0.3%	0.5%	0.9%	1.1%	1.2%	1.3%	2.0%	2.8%	3.0%
Long/Short Spread	-0.2%	-0.6%	-0.9%	-1.6%	-2.3%	-3.1%	-3.6%	-4.0%	-5.7%	-7.6%	-8.3%
198701-200612											
Quintile 1	-0.3%	-0.5%	-0.8%	-1.4%	-1.9%	-2.2%	-2.7%	-3.2%	-3.9%	-4.3%	-4.5%
Quintile 2	-0.1%	-0.1%	-0.2%	-0.4%	-0.5%	-0.6%	-0.6%	-0.7%	-0.8%	-0.2%	0.4%
Quintile 3	0.1%	0.2%	0.2%	0.4%	0.6%	0.5%	0.7%	0.9%	1.2%	1.0%	1.2%
Quintile 4	0.1%	0.2%	0.3%	0.5%	0.6%	0.8%	1.0%	1.3%	1.8%	2.4%	2.2%
Quintile 5	0.1%	0.2%	0.4%	0.7%	1.0%	1.2%	1.2%	1.2%	1.0%	0.5%	-0.1%
Long/Short Spread	-0.4%	-0.8%	-1.1%	-2.1%	-3.0%	-3.5%	-3.9%	-4.4%	-4.9%	-4.8%	-4.3%
199801-200612											
Quintile 1	-0.4%	-0.7%	-1.1%	-1.8%	-2.3%	-2.4%	-2.6%	-3.3%	-4.1%	-5.0%	-5.6%
Quintile 2	-0.1%	-0.2%	-0.2%	-0.6%	-0.7%	-0.9%	-0.9%	-1.6%	-2.5%	-1.5%	-0.8%
Quintile 3	0.1%	0.2%	0.2%	0.2%	0.0%	-0.3%	-0.2%	0.6%	0.8%	0.4%	-0.1%
Quintile 4	0.1%	0.2%	0.3%	0.8%	1.0%	1.1%	1.5%	1.8%	2.3%	2.8%	2.8%
Quintile 5	0.2%	0.4%	0.6%	1.1%	1.6%	2.1%	2.0%	2.3%	3.1%	3.4%	3.6%
Long/Short Spread	-0.6%	-1.1%	-1.6%	-2.9%	-4.0%	-4.4%	-4.7%	-5.6%	-7.2%	-8.5%	-9.2%

Past performance is not a guarantee of future returns.

Large cap universe is Russell 1000 after 1978; pre-1978 it is defined via analogous market capitalization break-points

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 62: Performance of Change in Debt-to-Assets, Months Outperforming Percentage

Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-198612											
Quintile 1	40%	37%	33%	33%	29%	27%	23%	20%	24%	27%	29%
Quintile 2	48%	46%	44%	44%	40%	39%	38%	39%	36%	43%	42%
Quintile 3	55%	57%	60%	59%	60%	58%	59%	60%	59%	57%	54%
Quintile 4	58%	59%	58%	63%	65%	65%	62%	63%	59%	55%	58%
Quintile 5	55%	61%	64%	68%	71%	75%	71%	69%	67%	70%	69%
Long/Short Spread	40%	34%	30%	31%	28%	22%	21%	20%	16%	19%	25%
198701-200612											
Quintile 1	35%	33%	30%	25%	23%	19%	18%	20%	20%	20%	18%
Quintile 2	44%	43%	42%	40%	40%	41%	45%	45%	51%	50%	50%
Quintile 3	56%	56%	58%	61%	65%	67%	63%	61%	58%	57%	59%
Quintile 4	59%	58%	61%	62%	58%	58%	62%	63%	68%	68%	67%
Quintile 5	58%	59%	59%	69%	68%	68%	67%	66%	58%	53%	54%
Long/Short Spread	38%	32%	31%	26%	19%	18%	19%	17%	22%	28%	27%
199801-200612											
Quintile 1	35%	28%	28%	27%	24%	26%	22%	22%	24%	18%	14%
Quintile 2	41%	42%	42%	39%	38%	33%	40%	40%	40%	43%	46%
Quintile 3	59%	55%	54%	49%	50%	47%	48%	50%	45%	48%	51%
Quintile 4	60%	56%	62%	64%	56%	57%	64%	71%	77%	75%	74%
Quintile 5	62%	66%	65%	77%	78%	81%	76%	78%	78%	76%	76%
Long/Short Spread	34%	29%	29%	20%	12%	16%	16%	17%	14%	15%	15%

Past performance is not a guarantee of future results.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Net Income Growth

Net income growth is the year-over-year growth in income before extraordinary items. This measure captures those companies that are able not only to maintain strong income growth but those that are actually able to accelerate that growth. As such, this measure is an indicator of a growing company. We expect this measure to be associated with positive future stock returns and to be most effective in growth sectors of the market.

As seen in Figure 63, there is limited support for this factor's efficacy across the entire large-cap universe of stocks, with Q1-Q5 spreads not being particularly economically significant in any time period. However, upon examining the sector-specific results, a different story emerges. As seen in Figure 64, net income growth is particularly helpful in growth sectors such as Healthcare and Technology, as well as Energy and Consumer Discretionary in recent years.

Figure 63: Performance of Net Income Growth, Average Excess Returns, Relative to Large-Cap Universe

	Relative Return										
Portofolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-198612											
Quintile 1	0.1%	0.1%	0.1%	0.0%	-0.1%	-0.1%	-0.2%	0.0%	0.4%	-0.6%	-1.4%
Quintile 2	0.0%	-0.1%	-0.1%	0.0%	0.0%	0.2%	0.1%	0.1%	0.3%	0.3%	-0.2%
Quintile 3	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.2%	0.2%	0.3%	0.7%	0.7%
Quintile 4	0.0%	0.0%	0.0%	0.1%	0.2%	0.2%	0.3%	0.3%	0.6%	0.6%	0.9%
Quintile 5	-0.1%	-0.2%	-0.2%	-0.2%	-0.1%	-0.1%	0.0%	0.0%	-0.2%	0.1%	1.2%
spread	0.2%	0.3%	0.3%	0.1%	-0.1%	0.0%	-0.2%	0.0%	0.6%	-0.6%	-2.6%
198701-200612											
Quintile 1	0.1%	0.1%	0.2%	0.5%	0.7%	1.0%	1.1%	1.4%	0.9%	0.3%	0.6%
Quintile 2	0.1%	0.1%	0.1%	0.1%	0.2%	0.2%	0.2%	0.0%	-0.1%	-0.4%	-0.4%
Quintile 3	0.0%	0.0%	0.0%	0.0%	0.0%	-0.3%	-0.5%	-0.6%	-0.5%	-0.3%	-0.6%
Quintile 4	0.0%	0.1%	0.1%	0.0%	-0.1%	-0.1%	-0.2%	-0.4%	-0.2%	0.1%	-0.1%
Quintile 5	-0.1%	-0.3%	-0.4%	-0.6%	-0.7%	-0.7%	-0.7%	-0.5%	-0.2%	0.0%	0.3%
spread	0.2%	0.4%	0.6%	1.0%	1.4%	1.6%	1.8%	1.8%	1.0%	0.3%	0.3%
199801-200612											
Quintile 1	0.1%	0.2%	0.4%	0.5%	0.6%	0.7%	1.0%	1.5%	1.1%	-0.7%	-1.1%
Quintile 2	0.1%	0.1%	0.1%	0.1%	0.1%	0.2%	0.3%	0.0%	0.0%	0.5%	0.4%
Quintile 3	0.0%	0.1%	0.1%	0.1%	0.1%	-0.2%	-0.3%	-0.1%	0.2%	0.7%	0.5%
Quintile 4	0.0%	0.1%	0.1%	0.3%	0.3%	0.7%	0.5%	0.5%	1.0%	2.0%	2.7%
Quintile 5	-0.3%	-0.5%	-0.6%	-1.0%	-1.2%	-1.2%	-1.5%	-1.8%	-2.2%	-2.4%	-2.4%
spread	0.4%	0.7%	1.0%	1.5%	1.8%	2.0%	2.5%	3.3%	3.3%	1.7%	1.3%

Past performance is not a guarantee of future results.

Large cap universe is Russell 1000 after 1978; pre-1978 it is defined via analogous market capitalization break-points

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 64: Performance of Net Income Growth Across GICS Sectors, Excess Returns Relative to Sector

	196201-198612										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
Energy	0.2%	0.4%	0.4%	-0.7%	-1.8%	-1.8%	-0.6%	0.9%	3.0%	3.5%	1.6%
Materials	0.5%	0.9%	1.2%	1.5%	1.2%	0.6%	-0.2%	0.0%	-1.2%	-2.8%	-4.6%
Industrials	-0.1%	-0.3%	-0.5%	-0.9%	-1.3%	-1.2%	-1.1%	-0.7%	-0.4%	-2.2%	-5.9%
Consumer Discretionary	0.2%	0.4%	0.6%	1.0%	1.6%	2.0%	2.3%	2.9%	3.6%	3.1%	1.0%
Consumer Staples	0.5%	0.9%	1.3%	1.8%	1.8%	2.0%	1.9%	1.5%	0.2%	-0.6%	-1.3%
Health Care	0.4%	0.6%	0.7%	0.9%	2.2%	3.8%	4.9%	4.9%	2.6%	0.4%	-3.6%
Financials	-0.3%	-0.4%	-0.4%	-0.8%	-1.3%	-1.2%	-1.3%	-1.1%	1.7%	1.9%	-2.0%
Information Technology	0.7%	1.4%	1.7%	2.6%	3.1%	3.1%	2.7%	1.3%	-2.2%	-6.4%	-10.1%
Telecommunication Services	0.2%	0.3%	0.9%	2.5%	3.1%	3.7%	5.2%	5.2%	4.7%	1.6%	-5.1%
Utilities	0.0%	-0.1%	-0.3%	-1.2%	-2.2%	-3.0%	-3.4%	-3.7%	-4.1%	-4.2%	-3.7%

	198701-200612										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
Energy	0.2%	0.5%	0.5%	1.2%	3.0%	6.2%	8.3%	10.0%	9.4%	7.8%	8.7%
Materials	-0.2%	-0.2%	-0.1%	0.5%	0.8%	1.1%	1.7%	1.3%	-2.1%	-3.5%	-6.2%
Industrials	0.0%	0.0%	0.2%	0.7%	1.4%	2.2%	3.0%	3.5%	2.5%	2.0%	3.3%
Consumer Discretionary	0.2%	0.4%	0.6%	1.5%	2.8%	3.5%	4.0%	4.1%	2.8%	0.4%	-0.3%
Consumer Staples	0.2%	0.5%	1.0%	1.8%	2.7%	2.7%	2.4%	1.8%	0.2%	-1.2%	0.4%
Health Care	0.7%	1.2%	2.1%	4.3%	5.1%	5.3%	5.3%	6.4%	4.5%	0.8%	-1.8%
Financials	0.1%	0.1%	0.1%	0.1%	-0.3%	-0.8%	-1.1%	-1.4%	-0.9%	0.1%	2.1%
Information Technology	0.5%	0.9%	1.7%	4.1%	6.4%	7.6%	8.9%	10.5%	8.8%	10.3%	11.9%
Telecommunication Services	0.4%	0.9%	0.8%	2.1%	3.2%	2.0%	-0.3%	-4.2%	-6.5%	-4.1%	0.5%
Utilities	-0.3%	-0.8%	-1.4%	-3.1%	-3.6%	-4.5%	-5.0%	-5.4%	-6.8%	-7.8%	-9.8%

	199801-200612										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
Energy	0.4%	0.9%	1.2%	2.8%	5.9%	10.9%	14.4%	17.9%	15.1%	10.9%	15.3%
Materials	-0.3%	-0.2%	0.2%	1.8%	1.9%	1.8%	2.6%	2.6%	-3.2%	-7.5%	-15.5%
Industrials	-0.1%	0.0%	0.1%	0.5%	1.2%	2.5%	3.7%	4.7%	3.2%	2.7%	2.4%
Consumer Discretionary	0.0%	0.1%	0.2%	0.9%	2.7%	4.0%	5.6%	7.9%	8.7%	7.1%	9.5%
Consumer Staples	0.2%	0.5%	0.8%	0.8%	1.6%	2.2%	1.9%	0.8%	-3.6%	-9.1%	-6.7%
Health Care	1.0%	1.6%	2.5%	5.7%	6.0%	5.5%	6.6%	8.1%	5.0%	-0.3%	0.7%
Financials	0.2%	0.4%	0.5%	0.8%	0.5%	-0.3%	-0.6%	-1.6%	-1.3%	-1.2%	-0.5%
Information Technology	0.3%	0.6%	1.4%	2.9%	2.6%	2.2%	5.6%	12.5%	16.7%	14.6%	12.9%
Telecommunication Services	1.0%	1.5%	1.5%	3.3%	5.0%	2.8%	-1.6%	-5.7%	-2.3%	2.6%	7.0%
Utilities	-0.6%	-1.6%	-2.7%	-6.5%	-8.3%	-10.6%	-12.4%	-13.9%	-18.4%	-25.2%	-33.0%

Past performance is not a guarantee of future results.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Asset Turnover

Asset turnover captures the amount of sales that are generated from each dollar value of assets—that is, a company's efficiency in using its asset base. On a relative basis for companies within the same sector or other relative peer grouping, a high asset turnover ratio is better than a low one. Hence, we would expect companies with high asset turnover ratios to have higher future stock returns relative to companies with low asset turnover ratios.

On average, we find that the above hypothesis, in fact, holds true. Figure 65 shows that in the periods 1962-1986 and 1986-2006, high asset turnover stocks outperformed low asset turnover stocks by 140 bps and 310 bps, respectively, per year, for a 12-month holding period. The stock-picking ability of the factor was mildly helpful in most periods (Figure 66). The sector results show little stability over time. The strategy worked well within Energy, Industrials, Consumer Staples, Technology and Utilities sectors in the 1962-1986 time period but this reversed to a large degree in 1987-2006 era, with Industrials, Consumer Staples, Utilities and Materials all generating negative returns (Figure 67).

Figure 65: Performance of Asset Turnover, Average Excess Returns, Relative to Large-Cap Universe

	Relative Return										
Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-198612											
Quintile 1	0.1%	0.2%	0.3%	0.7%	0.8%	1.2%	1.7%	2.1%	3.0%	4.0%	5.5%
Quintile 2	0.1%	0.2%	0.3%	0.3%	0.4%	0.5%	0.9%	1.3%	2.0%	2.2%	2.6%
Quintile 3	0.0%	-0.1%	-0.3%	-0.3%	-0.5%	-0.3%	-0.2%	0.0%	-0.1%	-1.2%	-1.8%
Quintile 4	-0.1%	-0.1%	-0.1%	-0.1%	0.2%	0.3%	0.4%	0.6%	0.0%	-0.6%	-1.1%
Quintile 5	-0.1%	-0.3%	-0.4%	-1.0%	-1.6%	-2.0%	-2.2%	-2.5%	-3.1%	-3.3%	-3.6%
Long/Short Spread	0.2%	0.5%	0.8%	1.7%	2.4%	3.2%	3.9%	4.6%	6.1%	7.3%	9.1%
198701-200612											
Quintile 1	0.2%	0.3%	0.5%	0.7%	0.9%	1.0%	1.2%	1.5%	2.3%	2.8%	3.2%
Quintile 2	0.0%	0.1%	0.2%	0.3%	0.4%	0.5%	0.4%	0.2%	-0.6%	-1.0%	-1.5%
Quintile 3	0.0%	-0.1%	-0.2%	-0.5%	-0.8%	-1.2%	-1.8%	-2.3%	-3.3%	-4.7%	-5.8%
Quintile 4	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.3%	0.4%	-0.2%	-1.1%	-2.4%
Quintile 5	-0.4%	-0.7%	-1.1%	-2.0%	-2.8%	-3.8%	-4.7%	-5.6%	-7.0%	-8.3%	-9.9%
Long/Short Spread	0.5%	1.0%	1.6%	2.7%	3.7%	4.8%	5.9%	7.0%	9.3%	11.2%	13.2%
199801-200612											
Quintile 1	0.2%	0.4%	0.6%	1.0%	1.3%	1.5%	1.7%	2.0%	3.2%	4.7%	6.1%
Quintile 2	0.1%	0.3%	0.4%	0.8%	1.5%	1.9%	2.2%	2.2%	1.5%	1.4%	1.2%
Quintile 3	0.0%	-0.1%	0.0%	0.0%	-0.1%	-0.2%	-0.8%	-1.1%	-1.7%	-3.9%	-5.1%
Quintile 4	0.1%	0.3%	0.4%	0.7%	1.4%	2.0%	3.1%	3.8%	3.3%	0.2%	-2.0%
Quintile 5	-0.6%	-1.1%	-1.7%	-3.3%	-4.8%	-6.2%	-7.4%	-8.8%	-10.8%	-12.1%	-14.5%
Long/Short Spread	0.8%	1.5%	2.3%	4.3%	6.1%	7.7%	9.1%	10.8%	13.9%	16.7%	20.6%

Past performance is not a guarantee of future results.

Large-cap universe is Russell 1000 after 1978; pre-1978 it is defined via analogous market capitalization break-points

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 66: Performance of Asset Turnover, Stock Selection Percentages

	Percent of Companies Outperforming										
Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-198612											
Quintile 1	49%	49%	49%	48%	46%	46%	46%	46%	46%	45%	44%
Quintile 2	49%	48%	49%	47%	45%	45%	45%	46%	46%	44%	44%
Quintile 3	48%	47%	46%	46%	44%	44%	44%	44%	45%	43%	41%
Quintile 4	48%	48%	47%	46%	46%	45%	46%	46%	44%	43%	42%
Quintile 5	48%	49%	48%	48%	46%	44%	45%	45%	45%	45%	44%
198701-200612											
Quintile 1	50%	50%	50%	48%	47%	47%	46%	45%	44%	42%	41%
Quintile 2	49%	49%	49%	47%	46%	45%	45%	44%	42%	42%	41%
Quintile 3	48%	48%	47%	46%	45%	43%	42%	41%	40%	39%	38%
Quintile 4	48%	48%	48%	47%	46%	44%	43%	43%	42%	40%	39%
Quintile 5	47%	46%	46%	44%	44%	42%	41%	40%	38%	37%	36%
199801-200612											
Quintile 1	50%	50%	50%	49%	48%	47%	47%	47%	46%	47%	47%
Quintile 2	50%	50%	49%	48%	48%	46%	46%	45%	44%	45%	45%
Quintile 3	48%	48%	47%	46%	44%	43%	41%	40%	39%	40%	40%
Quintile 4	48%	48%	48%	47%	45%	44%	43%	42%	41%	40%	40%
Quintile 5	47%	46%	45%	43%	41%	39%	38%	38%	36%	36%	35%

Past performance is not a guarantee of future results.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 67: Performance of Asset Turnover Across GICS Sectors, Excess Returns Relative to Sector

	196201-198612										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
Energy	0.4%	0.8%	1.3%	2.4%	3.0%	3.4%	3.6%	3.3%	2.9%	1.5%	-1.5%
Materials	-0.2%	-0.3%	-0.6%	-1.4%	-2.4%	-3.0%	-3.6%	-3.5%	-1.7%	-0.5%	0.4%
Industrials	0.3%	0.8%	1.3%	2.6%	3.5%	5.5%	7.4%	8.1%	11.5%	13.5%	14.8%
Consumer Discretionary	-0.2%	-0.4%	-0.7%	-1.0%	-1.5%	-1.6%	-2.4%	-3.4%	-4.6%	-6.9%	-10.8%
Consumer Staples	0.0%	0.2%	0.4%	1.4%	1.8%	2.7%	3.2%	3.4%	5.3%	6.4%	6.2%
Health Care	0.1%	0.3%	0.5%	-0.1%	-0.9%	-1.2%	-1.8%	-2.9%	-3.5%	-4.5%	-5.3%
Information Technology	1.6%	3.6%	5.3%	10.3%	14.9%	19.2%	24.3%	30.7%	38.1%	43.6%	51.5%
Telecommunication Services	0.1%	0.0%	0.0%	0.4%	0.8%	0.9%	-0.8%	-1.6%	-3.2%	-4.7%	-9.7%
Utilities	0.4%	0.8%	1.1%	2.5%	3.8%	4.9%	6.2%	7.5%	10.1%	13.1%	16.0%
	198701-200612										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
Energy	0.4%	0.6%	1.0%	2.2%	3.7%	5.4%	6.7%	8.9%	12.4%	17.5%	25.7%
Materials	-0.1%	-0.3%	-0.3%	-0.3%	0.0%	-0.3%	-0.7%	-1.1%	-2.8%	-4.3%	-4.6%
Industrials	0.2%	0.2%	0.2%	0.4%	0.6%	0.6%	0.4%	0.1%	-1.7%	-3.9%	-5.9%
Consumer Discretionary	0.3%	0.7%	1.0%	1.7%	2.9%	3.6%	3.9%	4.4%	6.0%	7.5%	8.5%
Consumer Staples	0.0%	0.0%	-0.1%	-0.3%	-0.6%	-1.5%	-2.9%	-4.2%	-6.2%	-7.4%	-8.8%
Health Care	0.7%	1.4%	2.1%	5.0%	7.0%	9.5%	10.4%	12.5%	14.7%	15.1%	14.1%
Information Technology	0.3%	0.4%	0.6%	1.4%	3.0%	4.0%	5.3%	7.0%	15.9%	20.8%	29.2%
Telecommunication Services	0.0%	0.8%	1.1%	1.8%	1.9%	3.8%	5.3%	6.3%	10.7%	9.1%	3.1%
Utilities	-0.4%	-0.8%	-1.0%	-1.9%	-2.6%	-3.3%	-4.2%	-4.8%	-6.1%	-8.3%	-11.6%

Past performance is not a guarantee of future results.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Market Dynamics and Temperament Factors

Residualized Price Momentum

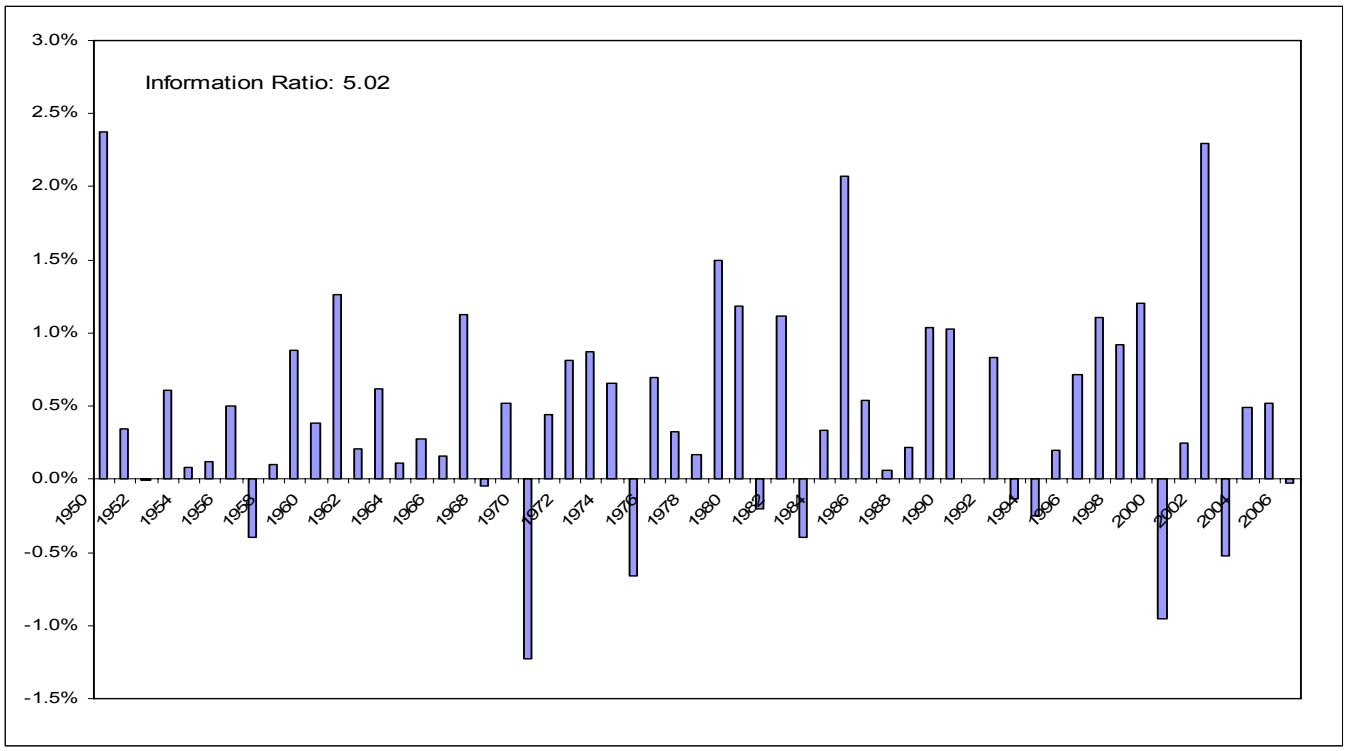
Price momentum is a vexing signal. It is the hardest of all variables to understand why it works and why it continues to work. By simply ranking stocks on their past nine-month cumulative returns and buying a portfolio of the winners and selling a portfolio of the losers, investors can earn outsized excess returns. One does not need to be a hard core believer in efficient market doctrine to find this result difficult to understand—signals don't get easier to compute or easier to implement than this.

Like it or not, though, price momentum works and the investor who ignores it does so at his own peril. Going against momentum is foolhardy and not using it to your advantage is leaving money on the table. Researchers have found the strategy to be profitable in nearly every market around the globe, in the data in the U.S. market stretching back into the 1880s, and a variety of asset classes. And despite its widespread fame in recent years, the strategy continues to work.

We have devised our own modified version of price momentum. This version not only considers the magnitude of the return but the path of the return. A return path that is highly choppy is worse than a path that approximates a straight line. Consequently, we estimate what an idealized version of the price path would be for the company and then calculate the difference between the idealized and actual path (e.g., the residual path). Our score is then a combination of the magnitude of the return and the "roughness" of the stock's price path. We expect this measure to be positively correlated with future returns.

As seen in Figure 68, our residualized price momentum variable earned positive returns in 45 out of the past 57 years, generating an Information Ratio of 5.02. In terms of quintile spreads, the factor generated remarkably consistent returns over all time periods. In all three sample periods, the top quintile and bottom quintile returns are each nearly symmetrical, producing 3.1% and -2.9% excess returns, on average, over a 12-month holding period (see Figure 69). The stock selection ability of the factor was relatively strong (see Figure 70) and it worked well in all sectors except for Utilities (see Figure 71).

Figure 68: Performance of Residualized Price Momentum: Long/Short Excess Returns, Average Monthly Returns, Reported on a Calendar Year Basis, 1950–2006



Past performance is not a guarantee of future results.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 69: Performance of Residualized Price Momentum, Average Excess Returns, Relative to Large-Cap Universe

	Relative Return										
Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-198612											
Quintile 1	0.2%	0.6%	1.0%	2.1%	2.8%	3.2%	3.3%	3.6%	3.5%	2.9%	2.3%
Quintile 2	0.0%	0.1%	0.3%	0.8%	1.0%	1.2%	1.4%	1.7%	1.8%	2.0%	2.0%
Quintile 3	-0.1%	-0.2%	-0.2%	-0.2%	-0.2%	-0.3%	-0.4%	-0.6%	-0.4%	-0.1%	0.2%
Quintile 4	-0.1%	-0.2%	-0.4%	-0.9%	-1.1%	-1.1%	-1.2%	-1.3%	-1.2%	-1.0%	-0.7%
Quintile 5	0.0%	-0.3%	-0.7%	-1.7%	-2.4%	-2.9%	-3.0%	-3.2%	-3.6%	-3.6%	-3.5%
Long/Short Spread	0.2%	0.9%	1.7%	3.8%	5.3%	6.1%	6.4%	6.8%	7.1%	6.5%	5.8%
198701-200612											
Quintile 1	0.1%	0.5%	1.0%	2.3%	3.1%	3.1%	2.8%	2.4%	1.1%	0.3%	-0.6%
Quintile 2	0.1%	0.3%	0.5%	0.8%	0.9%	0.7%	0.5%	0.2%	-0.5%	-1.1%	-1.3%
Quintile 3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-0.2%	-0.1%	0.3%	0.2%	0.9%
Quintile 4	-0.1%	-0.3%	-0.5%	-0.9%	-1.0%	-0.9%	-0.8%	-0.6%	-0.2%	0.5%	0.9%
Quintile 5	-0.2%	-0.5%	-1.1%	-2.3%	-3.1%	-3.0%	-2.4%	-2.0%	-0.9%	0.0%	-0.1%
Long/Short Spread	0.3%	1.1%	2.1%	4.7%	6.2%	6.1%	5.1%	4.4%	2.0%	0.3%	-0.5%
199801-200612											
Quintile 1	0.3%	1.0%	1.7%	3.2%	3.2%	3.0%	2.3%	1.2%	-1.5%	-2.1%	-3.0%
Quintile 2	0.1%	0.5%	0.7%	0.9%	0.5%	0.2%	-0.3%	-0.7%	-2.2%	-2.4%	-2.3%
Quintile 3	0.0%	-0.2%	-0.1%	0.0%	0.1%	-0.1%	-0.4%	-0.5%	-0.2%	-0.3%	0.2%
Quintile 4	-0.2%	-0.5%	-0.8%	-1.3%	-0.9%	-0.7%	-0.2%	0.3%	1.7%	2.6%	3.6%
Quintile 5	-0.3%	-0.8%	-1.6%	-2.9%	-3.2%	-2.7%	-1.6%	-0.5%	2.1%	2.3%	1.5%
Long/Short Spread	0.6%	1.7%	3.3%	6.1%	6.4%	5.8%	3.9%	1.7%	-3.6%	-4.5%	-4.5%

Past performance is not a guarantee of future results.

Large cap universe is Russell 1000 after 1978; pre-1978 it is defined via analogous market capitalization break-points

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 70: Performance of Residualized Price Momentum, Stock Selection Percentages

	Percent of Companies Outperforming										
Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-198612											
Quintile 1	50%	51%	52%	53%	53%	52%	51%	50%	48%	47%	45%
Quintile 2	49%	49%	49%	49%	49%	48%	47%	47%	46%	46%	45%
Quintile 3	48%	48%	47%	47%	46%	45%	45%	45%	44%	44%	43%
Quintile 4	47%	47%	47%	45%	45%	44%	44%	43%	43%	43%	43%
Quintile 5	48%	47%	46%	44%	43%	42%	42%	42%	41%	41%	41%
198701-200612											
Quintile 1	49%	50%	51%	52%	52%	50%	49%	48%	46%	45%	43%
Quintile 2	49%	50%	50%	49%	49%	48%	47%	46%	45%	44%	43%
Quintile 3	49%	49%	49%	48%	47%	46%	45%	45%	45%	44%	44%
Quintile 4	49%	48%	48%	46%	46%	45%	45%	44%	44%	44%	44%
Quintile 5	48%	48%	46%	44%	43%	43%	44%	43%	43%	43%	43%
199801-200612											
Quintile 1	51%	51%	52%	53%	51%	49%	48%	47%	45%	45%	44%
Quintile 2	50%	50%	50%	50%	48%	47%	45%	45%	44%	44%	44%
Quintile 3	49%	49%	48%	47%	47%	46%	44%	45%	44%	45%	46%
Quintile 4	48%	48%	47%	46%	45%	45%	45%	44%	45%	47%	48%
Quintile 5	48%	47%	46%	44%	43%	43%	44%	44%	44%	45%	46%

Past performance is not a guarantee of future results.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 71: Performance of Residualized Price Momentum Across GICS Sectors, Excess Returns Relative to Sector

	196201-198612										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
Energy	-0.5%	-0.3%	0.0%	0.4%	1.4%	2.2%	1.9%	2.2%	4.7%	6.8%	6.1%
Materials	0.3%	1.2%	2.1%	4.2%	4.8%	5.6%	5.9%	6.3%	6.4%	6.1%	6.1%
Industrials	0.2%	0.9%	1.7%	3.6%	5.1%	6.0%	6.8%	7.9%	10.2%	10.5%	11.2%
Consumer Discretionary	0.5%	1.4%	2.5%	5.5%	7.3%	7.9%	7.9%	8.5%	10.9%	12.8%	13.3%
Consumer Staples	-0.5%	-0.2%	0.3%	1.2%	2.6%	3.8%	4.4%	5.5%	5.6%	5.4%	3.5%
Health Care	0.2%	0.9%	2.0%	5.1%	7.9%	9.6%	10.5%	11.6%	12.2%	11.0%	10.0%
Financials	-0.2%	0.4%	1.1%	3.0%	4.3%	4.7%	4.9%	5.4%	5.1%	5.0%	6.1%
Information Technology	0.6%	1.8%	3.1%	6.8%	11.1%	13.2%	12.8%	11.8%	6.8%	6.2%	2.2%
Telecommunication Services	-1.1%	-1.3%	-1.1%	0.6%	2.7%	3.3%	2.7%	1.6%	-0.3%	-0.7%	-2.1%
Utilities	-0.6%	-0.4%	0.0%	0.2%	0.2%	-0.2%	-0.7%	-1.6%	-3.3%	-4.1%	-5.0%
	198701-200612										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
Energy	-0.3%	-0.3%	-0.1%	0.7%	1.1%	0.5%	-0.9%	-1.4%	-1.6%	0.0%	3.5%
Materials	-0.5%	-0.5%	-0.3%	1.1%	1.1%	1.5%	2.6%	3.1%	3.8%	4.0%	0.8%
Industrials	-0.1%	0.5%	1.2%	2.6%	3.2%	3.4%	3.7%	4.7%	5.9%	7.1%	7.7%
Consumer Discretionary	0.6%	1.6%	2.9%	6.2%	8.2%	9.1%	9.8%	11.0%	10.4%	8.0%	6.3%
Consumer Staples	-0.6%	-0.8%	-0.7%	0.1%	1.5%	2.0%	3.0%	4.4%	6.2%	8.9%	10.9%
Health Care	0.3%	1.1%	2.1%	5.4%	7.3%	8.8%	10.0%	10.2%	8.5%	8.0%	7.6%
Financials	-0.2%	0.2%	0.7%	2.0%	3.2%	3.4%	3.3%	3.6%	3.6%	2.0%	1.0%
Information Technology	0.6%	1.4%	2.7%	5.1%	6.0%	4.7%	2.5%	1.4%	-0.4%	-1.3%	-1.4%
Telecommunication Services	0.5%	1.4%	2.2%	3.6%	3.8%	2.1%	-1.5%	-4.7%	-9.6%	-12.1%	-13.5%
Utilities	0.2%	0.7%	1.3%	2.1%	2.0%	0.7%	-1.4%	-2.4%	-5.6%	-7.8%	-9.5%

Past performance is not a guarantee of future results.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Sharpened Analyst Recommendations

Fundamental analysts are key players in the capital markets, serving as interpreters of complex financial information to investors. Additionally, they serve the investment community in many other critical ways such as: providing access to management; sharing their detailed industry knowledge; and building complex models of company financials. One of the other outputs produced by fundamental analysts' are stock recommendations. While acknowledging that this task has diminished in importance in recent years, we investigated whether or not these recommendations were useful in predicting future stock returns.

Our data for this was the publicly available data sold by Thompson Financial Services; all Lehman Brothers analysts were excluded from the analysis. Because a number of analyst recommendations go stale and have not been affirmed in some time, we adjusted each analyst's recommendation for its degree of timeliness.

We found that analyst recommendations were a contra-indicator of returns. Stocks that were, on average, most highly recommended by analysts performed the worst (Quintile 5) and those that were the least highly recommended by analysts performed the best (Quintile 1). This should *not* be interpreted that all "buys", according to the I/B/E/S scale, underperform and that all "sells" outperform. Our rankings are *relative rankings* and, importantly, they are adjusted for timeliness.

The intuition for this result is relatively straight-forward. The psychology literature documents that people are prone to placing too much weight on current information, extrapolating current trends far out into the future. Analysts tend to do this too. When things are going well for a company, they believe that things will continue to go well, discounting the alternatives as unlikely. These appear to be the times when they are most likely to raise or affirm their stock recommendation on a stock. On the other hand, when things are going poorly for a company, analysts appear to have a hard time considering the turnaround and see the current situation continuing onwards unabated. Consequently, they tend to either reaffirm their negative outlook on the stock or downgrade it. In either case, analysts, like all other people, appear to extrapolate current information too far into the future and, hence, the reversal in the company's prospects catches them by surprise. Notice, this is the exact same logic for why valuation variables behave as they do and, perhaps, the behavior of analysts here can even help explain part of the reason for the book-to-price phenomena.

As for our specific results, the performance of the factor is good and has strengthened in recent years. During the out-of-sample period (1998-2006), the long/short portfolio generated returns in excess of the Russell 1000 of 4.4%, on average, with a 12-month holding period (see Figure 72). Unfortunately, during that same time frame, the long/short portfolio was not as consistent as we might have hoped, only outperforming 57% of the time (see Figure 73). Nonetheless, we included the factor in the model due to its relatively low correlation with other factors.

Figure 72: Performance of Sharpened Analyst Recommendations, Average Excess Returns, Relative to Large-Cap Universe

	Relative Return										
Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
198401-200612											
Quintile 1	0.2%	0.3%	0.3%	0.7%	1.0%	1.3%	1.8%	1.8%	1.7%	1.7%	1.8%
Quintile 2	0.0%	0.1%	0.2%	0.3%	0.5%	1.4%	1.6%	2.0%	2.5%	2.8%	2.4%
Quintile 3	0.0%	0.0%	0.1%	0.1%	0.2%	0.4%	0.7%	1.2%	2.7%	3.4%	4.6%
Quintile 4	-0.2%	-0.2%	-0.2%	-0.1%	-0.3%	-0.8%	-1.0%	-1.2%	-1.3%	-1.3%	-1.3%
Quintile 5	0.0%	-0.2%	-0.5%	-1.0%	-1.6%	-2.2%	-2.9%	-3.4%	-4.5%	-4.9%	-5.7%
Long/Short Spread	0.1%	0.5%	0.8%	1.7%	2.6%	3.6%	4.7%	5.2%	6.2%	6.6%	7.5%
198401-199712											
Quintile 1	-0.1%	-0.2%	-0.2%	-0.4%	0.0%	0.2%	0.3%	-0.2%	-1.2%	-3.1%	-5.8%
Quintile 2	-0.1%	0.0%	0.1%	0.2%	0.4%	0.7%	0.7%	0.6%	1.0%	0.6%	-0.5%
Quintile 3	0.1%	0.2%	0.2%	0.4%	0.9%	1.9%	2.6%	3.6%	5.9%	8.7%	12.1%
Quintile 4	0.0%	0.0%	0.1%	0.5%	0.2%	-0.6%	-0.7%	-0.6%	0.6%	1.7%	3.8%
Quintile 5	0.1%	0.0%	-0.3%	-0.7%	-1.3%	-1.8%	-2.0%	-2.5%	-4.0%	-4.4%	-4.8%
Long/Short Spread	-0.2%	-0.2%	0.1%	0.3%	1.3%	2.0%	2.3%	2.3%	2.8%	1.3%	-1.0%
199801-200612											
Quintile 1	0.3%	0.5%	0.6%	1.2%	1.5%	1.9%	2.6%	2.9%	3.4%	4.5%	6.7%
Quintile 2	0.1%	0.1%	0.3%	0.3%	0.5%	1.7%	2.1%	2.8%	3.4%	4.1%	4.3%
Quintile 3	-0.1%	0.0%	0.0%	0.0%	-0.2%	-0.4%	-0.2%	-0.1%	0.9%	0.2%	-0.2%
Quintile 4	-0.2%	-0.3%	-0.4%	-0.3%	-0.5%	-0.9%	-1.2%	-1.5%	-2.3%	-3.1%	-4.6%
Quintile 5	0.0%	-0.2%	-0.6%	-1.2%	-1.7%	-2.4%	-3.3%	-3.8%	-4.7%	-5.3%	-6.3%
Long/Short Spread	0.3%	0.7%	1.1%	2.3%	3.2%	4.4%	5.9%	6.7%	8.1%	9.8%	13.0%

Past performance is not a guarantee of future results.

Large-cap universe is Russell 1000 after 1978; pre-1978 it is defined via analogous market capitalization break-points

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 73: Performance of Sharpened Analyst Recommendations, Months Outperforming Percentage

	Percent of Months Outperforming										
Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
198401-200612											
Quintile 1	49%	49%	50%	53%	54%	51%	58%	59%	59%	54%	52%
Quintile 2	48%	47%	52%	57%	56%	65%	60%	64%	68%	69%	67%
Quintile 3	46%	49%	50%	50%	52%	54%	55%	63%	66%	65%	65%
Quintile 4	46%	44%	42%	50%	43%	39%	39%	36%	39%	37%	36%
Quintile 5	52%	49%	43%	43%	39%	32%	31%	27%	25%	21%	25%
Long/Short Spread	51%	51%	54%	56%	58%	60%	63%	64%	65%	70%	65%
198401-199712											
Quintile 1	38%	50%	40%	44%	50%	46%	54%	52%	46%	27%	19%
Quintile 2	46%	48%	46%	52%	48%	54%	48%	50%	52%	50%	46%
Quintile 3	56%	52%	60%	60%	69%	81%	85%	85%	90%	88%	92%
Quintile 4	50%	48%	46%	67%	52%	40%	44%	35%	48%	52%	60%
Quintile 5	58%	50%	33%	42%	35%	23%	23%	17%	19%	23%	29%
Long/Short Spread	46%	50%	50%	52%	63%	67%	67%	67%	63%	56%	42%
199801-200612											
Quintile 1	54%	48%	54%	58%	56%	54%	60%	62%	66%	70%	74%
Quintile 2	49%	47%	55%	60%	60%	70%	66%	72%	77%	80%	81%
Quintile 3	42%	47%	46%	45%	45%	41%	40%	51%	52%	51%	47%
Quintile 4	44%	42%	40%	42%	39%	39%	37%	37%	34%	28%	20%
Quintile 5	49%	48%	47%	44%	41%	37%	36%	33%	28%	20%	23%
Long/Short Spread	53%	52%	55%	58%	55%	57%	61%	63%	66%	78%	80%

Past performance is not a guarantee of future results.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Sharpened Earnings Forecast Revisions

Analyst forecast revisions is one of the most storied quantitative signals. It was the first signal in a majority of quant models and performed admirably over a large number of years. Its run, however, came to an inglorious end in the late 1990s. Much has been written and there are many hypotheses floating around as to the causes. Instead of adding voice to this debate, we have taken a different tack and tried to fix the variable.

Like our sharpened E/P variable, for this signal we are not working off of consensus earnings forecasts but instead adjust each individual analyst's forecast for known sources of bias including recency and prior forecast error. All of the "sharpened" individual forecasts are then aggregated to form our sharpened consensus forecast. We then take the difference between this month's and last month's sharpened consensus forecast to calculate our sharpened earnings revisions signal. We expect those firms with high positive sharpened forecast revisions to outperform and those with low sharpened forecast revisions to underperform.

The performance of the factor is relatively good. During the period 2001 thru 2006, the Q1 – Q5 spread was positive, albeit, not monotonic (see Figure 74). The percentage of months that Q1-Q5 spread outperformed is respectable at 66% of the time during this same period (see Figure 75). Furthermore, the performance was strong in a number of key sectors where we feel comfortable applying the signal (see Figure 76).

Figure 74: Performance of Sharpened Earnings Revisions, Average Excess Returns, Relative to Large-Cap Universe

	Relative Return										
Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
199701-200612											
Quintile 1	-0.1%	-0.1%	-0.1%	0.6%	1.3%	2.0%	2.3%	2.4%	2.4%	3.1%	4.1%
Quintile 2	0.1%	0.2%	0.4%	0.6%	0.8%	0.8%	1.1%	1.6%	1.6%	1.2%	0.7%
Quintile 3	-0.1%	-0.1%	-0.2%	-0.6%	-0.8%	-1.0%	-0.9%	-1.1%	-0.5%	-1.0%	-2.1%
Quintile 4	-0.1%	-0.4%	-0.6%	-1.2%	-1.7%	-1.8%	-2.4%	-2.5%	-2.6%	-2.4%	-2.2%
Quintile 5	0.0%	0.0%	0.0%	-0.5%	-0.6%	-0.8%	-1.2%	-1.5%	-2.1%	-2.2%	-2.3%
Long/Short Spread	0.0%	-0.1%	-0.1%	1.1%	2.0%	2.8%	3.4%	3.9%	4.5%	5.3%	6.4%
198401-200012											
Quintile 1	0.0%	-0.1%	0.0%	0.4%	0.9%	1.5%	1.6%	1.7%	1.2%	1.0%	1.0%
Quintile 2	0.1%	0.2%	0.3%	0.4%	0.6%	0.6%	0.6%	0.8%	1.0%	0.9%	1.2%
Quintile 3	-0.1%	-0.1%	-0.1%	-0.2%	-0.1%	-0.1%	0.2%	0.4%	1.1%	1.3%	1.3%
Quintile 4	-0.1%	-0.4%	-0.5%	-1.0%	-1.5%	-1.7%	-2.2%	-2.3%	-2.0%	-2.1%	-2.3%
Quintile 5	-0.2%	-0.2%	-0.4%	-0.9%	-1.3%	-1.8%	-2.3%	-2.8%	-3.3%	-3.9%	-5.1%
Long/Short Spread	0.1%	0.2%	0.3%	1.2%	2.2%	3.3%	3.9%	4.6%	4.5%	4.8%	6.1%
200101-200612											
Quintile 1	0.0%	0.1%	0.2%	1.1%	1.9%	2.3%	2.8%	3.4%	4.3%	5.3%	7.1%
Quintile 2	0.2%	0.2%	0.3%	0.2%	0.2%	0.5%	1.0%	1.3%	1.1%	0.6%	-1.9%
Quintile 3	-0.1%	-0.2%	-0.4%	-1.0%	-1.5%	-2.2%	-2.8%	-3.8%	-4.3%	-5.5%	-6.7%
Quintile 4	-0.1%	-0.3%	-0.4%	-0.8%	-1.1%	-1.5%	-2.2%	-2.7%	-4.1%	-4.5%	-4.8%
Quintile 5	0.1%	0.1%	0.1%	0.0%	0.0%	0.3%	0.4%	0.6%	0.9%	1.2%	2.1%
Long/Short Spread	-0.1%	0.0%	0.1%	1.1%	1.9%	2.0%	2.4%	2.8%	3.4%	4.2%	5.0%

Past performance is not a guarantee of future results.

Large cap universe is Russell 1000 after 1978; pre-1978 it is defined via analogous market capitalization break-points

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 75: Performance of Sharpened Earnings Revisions, Months Outperforming Percentage

Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
198401-200012											
Quintile 1	47%	48%	49%	56%	62%	61%	62%	60%	58%	54%	51%
Quintile 2	61%	56%	55%	58%	56%	55%	56%	56%	52%	53%	50%
Quintile 3	45%	47%	46%	45%	48%	50%	50%	49%	52%	54%	55%
Quintile 4	37%	35%	32%	34%	28%	31%	31%	31%	34%	36%	40%
Quintile 5	44%	40%	37%	31%	31%	32%	35%	35%	35%	35%	29%
Long/Short Spread	54%	54%	56%	64%	69%	72%	69%	69%	63%	66%	66%
199701-200612											
Quintile 1	45%	49%	43%	59%	67%	62%	70%	68%	74%	72%	71%
Quintile 2	57%	55%	57%	60%	58%	61%	65%	65%	63%	60%	45%
Quintile 3	34%	49%	45%	34%	35%	35%	34%	33%	38%	37%	35%
Quintile 4	42%	36%	32%	33%	29%	33%	30%	30%	30%	35%	35%
Quintile 5	53%	51%	45%	42%	42%	46%	50%	47%	45%	45%	43%
Long/Short Spread	47%	49%	56%	63%	65%	65%	66%	64%	69%	72%	76%
200101-200612											
Quintile 1	50%	51%	51%	66%	75%	71%	83%	82%	90%	91%	89%
Quintile 2	54%	53%	56%	53%	51%	60%	64%	66%	66%	61%	32%
Quintile 3	28%	47%	38%	29%	23%	21%	15%	13%	20%	16%	11%
Quintile 4	44%	36%	35%	28%	28%	26%	22%	20%	14%	20%	16%
Quintile 5	54%	56%	51%	50%	48%	47%	54%	57%	60%	61%	63%
Long/Short Spread	49%	49%	59%	66%	68%	66%	66%	64%	74%	68%	68%

Past performance is not a guarantee of future results.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 76: Performance of Sharpened Earnings Revisions across GICS Sectors, Excess Return Relative to Sector

	198401-200012										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
Energy	0.4%	1.0%	1.6%	3.1%	3.2%	3.5%	4.5%	4.0%	3.9%	3.1%	1.6%
Materials	0.1%	0.1%	0.3%	1.0%	2.4%	3.7%	4.6%	5.0%	3.6%	1.9%	0.3%
Industrials	0.0%	-0.2%	0.1%	1.0%	1.6%	2.8%	3.8%	5.7%	7.8%	9.6%	10.9%
Consumer Discretionary	0.1%	0.0%	-0.1%	-0.2%	0.1%	0.6%	0.1%	-0.1%	-1.8%	-2.8%	-3.5%
Consumer Staples	-0.1%	0.1%	0.2%	1.4%	2.1%	2.8%	3.8%	5.1%	5.2%	7.9%	8.5%
Health Care	0.6%	1.1%	1.8%	4.1%	7.1%	9.1%	10.7%	12.2%	11.3%	10.6%	11.7%
Financials	0.3%	0.4%	0.7%	1.3%	2.2%	3.2%	4.0%	4.9%	6.1%	6.6%	7.2%
Information Technology	0.3%	0.6%	1.1%	3.6%	6.0%	9.3%	10.9%	11.5%	7.8%	8.1%	11.0%
Telecommunication Services	0.4%	-0.1%	0.0%	1.0%	1.5%	0.7%	1.1%	1.4%	3.8%	5.6%	7.8%
Utilities	0.4%	0.3%	0.3%	0.3%	0.6%	1.1%	1.7%	2.3%	2.7%	1.8%	1.0%
	199701-200612										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
Energy	0.1%	0.7%	1.2%	4.4%	6.2%	8.1%	9.4%	9.2%	11.8%	15.5%	20.4%
Materials	-0.2%	-0.6%	-0.8%	-0.7%	-0.6%	0.4%	-0.2%	0.0%	3.0%	10.4%	11.0%
Industrials	-0.1%	-0.2%	-0.3%	0.1%	0.8%	2.0%	3.1%	5.2%	7.0%	8.7%	11.2%
Consumer Discretionary	-0.1%	-0.2%	-0.5%	-0.1%	0.8%	1.5%	2.3%	2.7%	5.6%	6.2%	7.3%
Consumer Staples	0.4%	1.1%	1.9%	3.6%	4.7%	5.1%	6.1%	7.4%	8.6%	9.7%	9.3%
Health Care	0.8%	0.9%	1.8%	6.1%	10.2%	13.2%	14.9%	14.9%	9.6%	6.1%	6.5%
Financials	0.1%	0.1%	0.2%	0.6%	1.5%	2.8%	4.1%	5.5%	7.6%	9.7%	12.3%
Information Technology	0.5%	1.1%	1.8%	4.2%	5.7%	8.6%	9.0%	8.9%	6.5%	8.4%	5.6%
Telecommunication Services	-1.0%	-2.4%	-3.1%	-3.3%	-5.5%	-8.3%	-11.1%	-12.4%	-9.3%	-7.9%	-4.7%
Utilities	0.0%	-0.1%	-0.3%	0.1%	0.1%	0.1%	0.1%	-0.1%	-1.1%	-4.8%	-8.6%

Past performance is not a guarantee of future results.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Abnormal Share Volume

Conventional wisdom holds that stocks that rise on high volume continue to outperform and stocks that rise on low volumes will soon give up their gains. We find a strikingly different result: stocks with high share turnover generate relatively low returns and stocks with low share turnover generate relatively high returns over investment horizons of one to three years.

Part of the difference between the conventional wisdom and our results is that we are looking at very different measures of turnover. Our measure of share turnover is based on *monthly* volume and we are interested in the component of turnover that is abnormal for the stock, different from its usual behavior.

We find a negative relation between abnormal turnover and future stock returns. We interpret this as consistent with both the "winner's curse" and an over-attention/neglect story. Stocks that have experienced significant abnormal volume are undoubtedly stocks where there has been significant hype and media attention focused on them. This interest causes the company's share price to rise to an unsustainable level from which, as the attention inevitably fades, the shares retreat. Stocks with abnormally low turnover are experiencing the opposite phenomena: neglect. Consequently, they find their share prices languishing. In due time, as these stocks rotate back into favor, their shares prices rebound and they outperform.

As seen in Figure 77 below, the empirical results confirm this story. Stocks in Quintile 1 have abnormally high share turnover and over the period 1979–2004, these stocks underperformed by 170 bps, on average, assuming a 12-month holding period. Conversely, Quintile 5 stocks have abnormally low turnover and outperformed, on average, by 140 bps. These returns are generally consistent across time periods and quintiles. As seen in Figure 78, the performance of the quintiles is consistent across time and months, with the long/short portfolio outperforming between 64% and 70% of the months. This signal worked in all sectors with the exception of Energy, Materials and Telecomm (see Figure 79).

Figure 77: Performance of Abnormal Share Volume, Average Excess Returns, Relative to Large-Cap Universe

	Relative Return										
Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-198612											
Quintile 1	0.0%	-0.1%	-0.2%	-0.4%	-0.5%	-0.5%	-0.5%	-0.4%	-0.1%	0.1%	0.4%
Quintile 2	0.1%	0.2%	0.2%	0.0%	-0.4%	-0.7%	-1.1%	-1.3%	-1.5%	-1.9%	-2.3%
Quintile 3	0.0%	-0.1%	-0.1%	-0.1%	-0.3%	-0.5%	-0.7%	-1.0%	-1.4%	-1.1%	-1.4%
Quintile 4	0.0%	0.0%	0.0%	0.2%	0.5%	0.7%	0.9%	1.1%	1.3%	1.3%	1.3%
Quintile 5	0.1%	0.2%	0.4%	0.9%	1.5%	2.2%	2.9%	3.7%	4.4%	4.8%	5.5%
Long/Short Spread	-0.1%	-0.4%	-0.6%	-1.2%	-2.0%	-2.7%	-3.4%	-4.1%	-4.4%	-4.7%	-5.1%
197901-200412											
Quintile 1	-0.2%	-0.4%	-0.6%	-1.2%	-1.5%	-1.7%	-1.8%	-2.0%	-2.3%	-2.6%	-3.0%
Quintile 2	0.0%	0.1%	0.1%	0.2%	0.1%	-0.1%	-0.4%	-0.5%	-0.9%	-1.7%	-2.3%
Quintile 3	0.0%	0.0%	0.0%	0.1%	0.1%	0.1%	0.0%	0.0%	0.2%	0.4%	0.5%
Quintile 4	0.0%	0.1%	0.1%	0.2%	0.4%	0.4%	0.6%	0.7%	1.1%	1.7%	2.2%
Quintile 5	0.1%	0.3%	0.4%	0.7%	1.0%	1.4%	1.7%	2.1%	2.7%	3.3%	3.8%
Long/Short Spread	-0.3%	-0.7%	-1.0%	-1.9%	-2.4%	-3.1%	-3.6%	-4.1%	-5.0%	-5.9%	-6.8%
199801-200612											
Quintile 1	-0.3%	-0.6%	-1.0%	-1.5%	-1.3%	-1.1%	-0.9%	-0.8%	-0.9%	-3.3%	-5.2%
Quintile 2	0.0%	0.1%	0.3%	0.6%	0.6%	0.4%	0.5%	0.5%	0.5%	0.8%	0.8%
Quintile 3	0.0%	0.0%	0.1%	0.1%	-0.2%	-0.3%	-0.5%	-0.3%	-0.1%	1.0%	2.1%
Quintile 4	0.0%	0.1%	0.1%	-0.1%	-0.2%	-0.6%	-0.8%	-1.0%	-1.0%	0.8%	2.3%
Quintile 5	0.3%	0.5%	0.6%	0.9%	1.1%	1.6%	1.5%	1.4%	1.5%	1.3%	1.0%
Long/Short Spread	-0.6%	-1.1%	-1.6%	-2.5%	-2.5%	-2.7%	-2.5%	-2.2%	-2.4%	-4.6%	-6.2%

Past performance is not a guarantee of future results.

Large-cap universe is Russell 1000 after 1978; pre-1978 it is defined via analogous market capitalization break-points

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 78: Performance of Abnormal Share Volume, Months Outperforming Percentage

Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-198612											
Quintile 1	45%	42%	38%	40%	40%	42%	44%	44%	44%	47%	41%
Quintile 2	53%	53%	54%	51%	45%	43%	38%	39%	37%	38%	37%
Quintile 3	49%	49%	53%	53%	49%	48%	45%	44%	44%	52%	51%
Quintile 4	52%	50%	56%	58%	60%	61%	62%	63%	64%	64%	63%
Quintile 5	52%	59%	59%	59%	61%	63%	64%	67%	67%	65%	61%
Long/Short Spread	47%	40%	39%	37%	37%	32%	35%	35%	39%	35%	29%
197901-200412											
Quintile 1	46%	43%	40%	34%	33%	33%	34%	37%	33%	34%	32%
Quintile 2	51%	51%	54%	54%	52%	47%	45%	44%	44%	38%	38%
Quintile 3	53%	52%	52%	53%	54%	56%	55%	53%	51%	55%	55%
Quintile 4	53%	54%	55%	58%	60%	61%	63%	62%	63%	65%	65%
Quintile 5	51%	55%	58%	59%	59%	58%	61%	66%	65%	70%	63%
Long/Short Spread	44%	39%	35%	33%	32%	30%	32%	30%	30%	28%	25%
199801-200612											
Quintile 1	50%	51%	48%	44%	42%	45%	46%	51%	42%	34%	28%
Quintile 2	51%	52%	57%	60%	62%	57%	57%	60%	64%	66%	61%
Quintile 3	47%	45%	48%	49%	52%	53%	51%	47%	49%	56%	61%
Quintile 4	47%	48%	46%	48%	47%	48%	48%	47%	49%	56%	58%
Quintile 5	53%	57%	58%	56%	56%	48%	47%	51%	50%	58%	53%
Long/Short Spread	42%	37%	32%	35%	33%	36%	40%	38%	36%	30%	23%

Past performance is not a guarantee of future results.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 79: Performance of Abnormal Share Volume Across GICS Sectors, Excess Return Relative to Sector

	196201-198612										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
Energy	0.0%	0.0%	-0.2%	-1.5%	-3.2%	-3.8%	-5.1%	-5.9%	-6.1%	-6.0%	-6.0%
Materials	0.1%	0.0%	-0.1%	0.1%	0.3%	0.6%	0.5%	0.1%	0.4%	-0.9%	-1.2%
Industrials	0.0%	-0.2%	-0.4%	-0.7%	-1.8%	-3.1%	-3.9%	-4.4%	-5.7%	-6.2%	-5.7%
Consumer Discretionary	-0.1%	-0.5%	-0.7%	-1.4%	-2.0%	-2.6%	-3.1%	-2.5%	-0.8%	1.2%	2.5%
Consumer Staples	-0.4%	-0.7%	-1.2%	-2.8%	-3.3%	-3.4%	-3.2%	-2.6%	-2.6%	-1.8%	-2.7%
Health Care	-0.2%	-0.5%	-1.0%	-2.9%	-4.4%	-5.0%	-4.9%	-5.7%	-7.4%	-9.8%	-12.1%
Financials	-0.4%	-0.7%	-1.1%	-1.8%	-2.0%	-2.9%	-3.7%	-4.0%	-6.2%	-6.9%	-6.5%
Information Technology	-0.5%	-0.9%	-1.2%	-3.8%	-6.3%	-8.2%	-9.5%	-9.5%	-8.8%	-9.4%	-6.9%
Telecommunication Services	-0.1%	-0.1%	-0.5%	-0.4%	-1.2%	-2.9%	-5.3%	-6.5%	-4.4%	-6.4%	-10.2%
Utilities	0.1%	0.0%	0.0%	-0.3%	-0.7%	-1.0%	-1.4%	-2.6%	-4.2%	-5.3%	-5.1%

	197901-200412										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
Energy	0.2%	0.5%	0.8%	1.1%	1.1%	0.9%	0.4%	-0.1%	1.3%	1.0%	-2.0%
Materials	0.4%	0.7%	0.9%	1.7%	2.2%	2.6%	2.5%	2.5%	3.4%	3.0%	2.1%
Industrials	-0.1%	-0.4%	-0.6%	-1.0%	-1.1%	-1.3%	-1.0%	-0.4%	0.2%	0.9%	1.9%
Consumer Discretionary	-0.3%	-0.8%	-1.1%	-2.0%	-2.6%	-3.4%	-3.8%	-4.3%	-5.7%	-5.2%	-5.6%
Consumer Staples	-0.4%	-0.8%	-1.1%	-2.3%	-3.3%	-3.4%	-3.3%	-3.1%	-3.4%	-3.5%	-2.0%
Health Care	-0.4%	-0.9%	-1.6%	-3.4%	-5.3%	-6.2%	-7.1%	-8.8%	-11.7%	-14.6%	-18.0%
Financials	-0.1%	-0.3%	-0.6%	-1.5%	-2.4%	-3.2%	-3.7%	-3.9%	-4.3%	-3.4%	-1.6%
Information Technology	-1.0%	-1.7%	-2.4%	-4.1%	-5.4%	-7.2%	-10.1%	-12.3%	-15.3%	-17.8%	-19.1%
Telecommunication Services	0.4%	1.1%	1.4%	2.4%	2.8%	2.1%	0.8%	-1.1%	-2.8%	-8.2%	-12.9%
Utilities	-0.3%	-0.6%	-0.8%	-1.3%	-2.0%	-2.6%	-3.3%	-4.0%	-4.9%	-5.9%	-6.2%

	198212-200701										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
Energy	0.2%	0.6%	1.1%	2.1%	2.6%	3.0%	2.9%	2.4%	2.8%	1.1%	-3.4%
Materials	0.4%	0.9%	1.3%	2.6%	3.7%	4.7%	5.1%	4.9%	4.5%	3.9%	2.6%
Industrials	-0.1%	-0.2%	-0.3%	-0.7%	-0.7%	-0.9%	-0.9%	-0.8%	-0.8%	-0.3%	0.9%
Consumer Discretionary	-0.3%	-0.8%	-1.1%	-1.9%	-2.4%	-2.9%	-3.0%	-3.4%	-4.9%	-4.2%	-3.7%
Consumer Staples	-0.3%	-0.7%	-1.0%	-1.8%	-2.6%	-2.6%	-2.5%	-2.3%	-2.1%	-1.0%	0.6%
Health Care	-0.4%	-0.9%	-1.5%	-3.0%	-4.6%	-5.2%	-5.9%	-7.2%	-9.3%	-12.0%	-13.9%
Financials	-0.2%	-0.4%	-0.6%	-1.5%	-2.3%	-2.9%	-3.3%	-3.5%	-3.8%	-2.9%	-1.2%
Information Technology	-0.9%	-1.4%	-2.1%	-3.3%	-3.8%	-4.3%	-6.4%	-8.3%	-12.7%	-15.9%	-16.9%
Telecommunication Services	0.3%	0.9%	1.1%	2.1%	2.5%	2.5%	1.4%	0.1%	-0.6%	-4.3%	-6.3%
Utilities	-0.5%	-0.9%	-1.4%	-2.3%	-3.0%	-3.3%	-3.7%	-3.9%	-4.2%	-4.7%	-4.4%

Past performance is not a guarantee of future results.

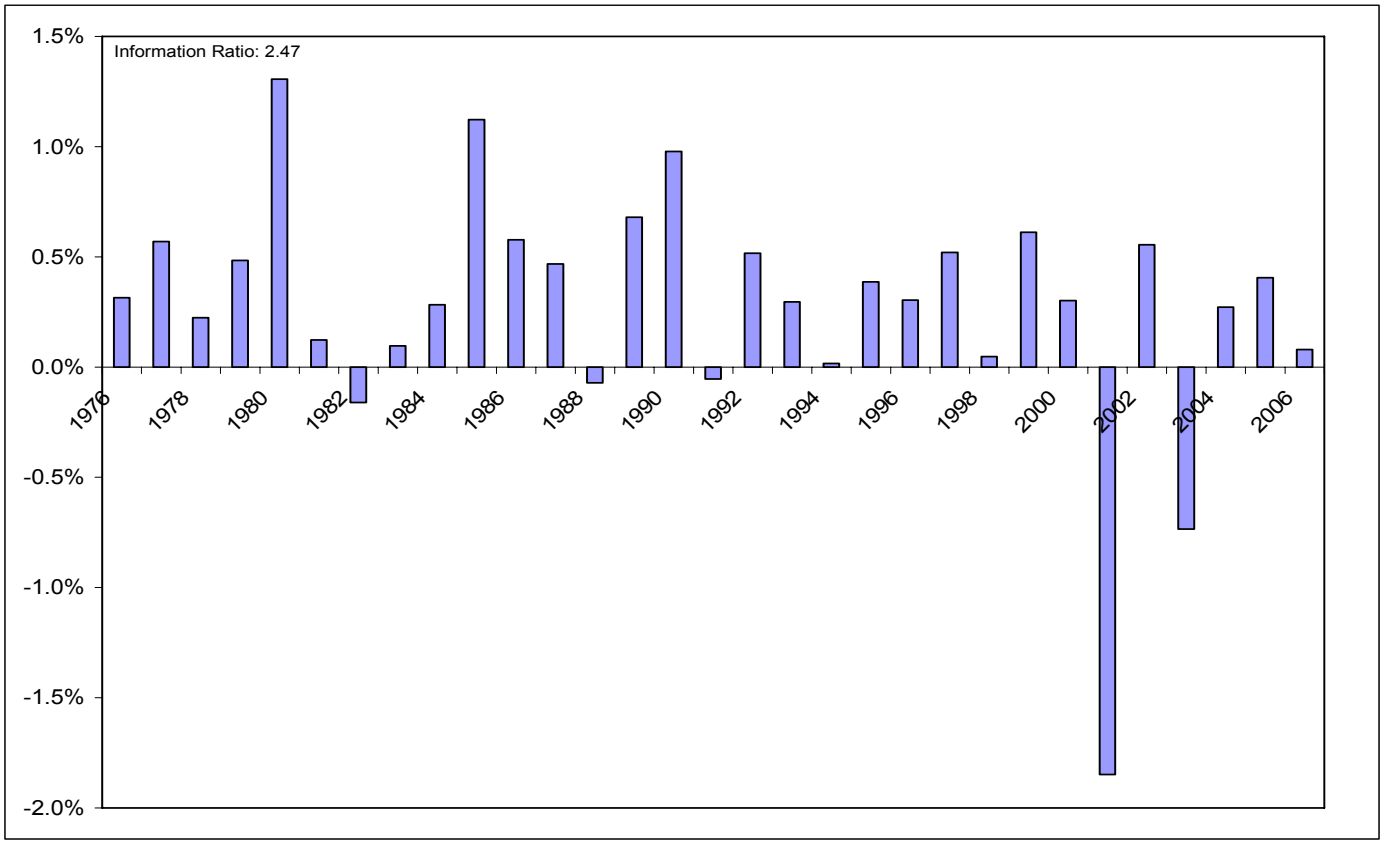
Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Earnings Revisions Ratio

The Earnings Revision Ratio is computed simply as the number of analysts raising their earnings estimates minus the number lowering their estimates divided by the total number of analysts who are actively covering the stock. The measure seeks to capture the broad analyst sentiment on a name. Due to the fact that not all analysts revise their forecast each month, we include the previous months of the signal as well, with more recent observations getting disproportionately more weight.

As seen in Figure 80 below, the performance of the factor was strong until 2001, generating an Information Ratio of over 2.47 but since then its performance has been choppy. Still, as seen in Figure 81, the average performance since 1998 has been positive and as shown in Figure 82, the top quintile has outperformed 60% of the time during this period. We include this factor in our model only in those occasional sectors where sharpened earnings revisions is not effective and, even then, the weight we put on this factor is relatively small.

Figure 80: Performance of Earnings Revisions Ratio: Long/Short Excess Returns, Average Monthly Returns, Reported on a Calendar Year Basis, 1976–2006



Past performance is not a guarantee of future results.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 81: Performance of Earnings Revisions Ratio, Average Excess Returns, Relative to Large-Cap Universe

	Relative Return										
Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
198401-200612											
Quintile 1	0.2%	0.5%	0.7%	1.5%	2.3%	2.6%	2.6%	2.8%	3.1%	2.4%	2.5%
Quintile 2	0.1%	0.0%	0.0%	0.2%	0.4%	0.5%	0.3%	0.2%	0.3%	0.1%	0.1%
Quintile 3	0.0%	0.1%	0.0%	-0.1%	-0.2%	-0.1%	-0.2%	-0.3%	-0.7%	-1.3%	-1.8%
Quintile 4	-0.1%	-0.2%	-0.3%	-0.8%	-1.1%	-1.3%	-1.2%	-1.2%	-1.3%	-0.5%	-0.2%
Quintile 5	-0.3%	-0.5%	-0.5%	-0.9%	-1.5%	-1.8%	-1.6%	-1.5%	-1.6%	-0.6%	-0.5%
Long/Short Spread	0.6%	1.0%	1.1%	2.5%	3.9%	4.4%	4.3%	4.3%	4.7%	2.9%	3.1%
198401-200012											
Quintile 1	0.4%	0.7%	0.9%	2.0%	2.8%	3.1%	2.9%	2.9%	2.9%	2.1%	2.6%
Quintile 2	0.2%	0.2%	0.3%	0.4%	0.7%	0.9%	0.7%	0.5%	0.6%	0.3%	0.5%
Quintile 3	0.0%	0.0%	-0.1%	-0.2%	-0.3%	-0.3%	-0.4%	-0.6%	-1.0%	-1.6%	-2.1%
Quintile 4	-0.1%	-0.2%	-0.3%	-0.8%	-1.2%	-1.4%	-1.3%	-1.3%	-1.0%	-0.1%	0.0%
Quintile 5	-0.4%	-0.7%	-0.7%	-1.3%	-1.8%	-2.1%	-1.8%	-1.4%	-1.4%	-0.6%	-0.7%
Long/Short Spread	0.8%	1.4%	1.7%	3.2%	4.7%	5.2%	4.7%	4.3%	4.3%	2.7%	3.3%
200101-200612											
Quintile 1	-0.1%	0.0%	-0.1%	0.3%	0.8%	1.1%	1.7%	2.6%	3.9%	3.4%	2.2%
Quintile 2	-0.2%	-0.4%	-0.6%	-0.4%	-0.3%	-0.5%	-1.0%	-0.9%	-0.7%	-1.2%	-2.2%
Quintile 3	0.0%	0.2%	0.1%	0.2%	0.2%	0.7%	0.6%	0.9%	0.7%	0.1%	-0.3%
Quintile 4	0.0%	0.0%	-0.1%	-0.5%	-0.7%	-1.0%	-1.0%	-1.0%	-2.4%	-2.5%	-1.3%
Quintile 5	0.0%	0.0%	0.3%	0.0%	-0.5%	-0.8%	-0.9%	-1.7%	-2.3%	-0.6%	0.5%
Long/Short Spread	-0.1%	0.0%	-0.5%	0.2%	1.3%	1.9%	2.7%	4.3%	6.2%	4.0%	1.7%

Past performance is not a guarantee of future results.

Large Cap Universe is Russell 1000 after 1978; pre-1978 it is defined via analogous market capitalization break-points

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 82: Performance of Earnings Revisions Ratio, Months Outperforming Percentage

Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
198401-200012											
Quintile 1	63%	66%	71%	75%	83%	82%	75%	75%	70%	65%	66%
Quintile 2	65%	59%	62%	61%	66%	60%	59%	57%	57%	54%	51%
Quintile 3	47%	52%	48%	47%	46%	46%	46%	38%	40%	37%	37%
Quintile 4	43%	41%	37%	32%	29%	29%	33%	31%	39%	48%	50%
Quintile 5	34%	29%	31%	30%	25%	24%	30%	31%	35%	36%	37%
Long/Short Spread	68%	73%	72%	77%	82%	83%	77%	75%	72%	67%	65%
198401-200612											
Quintile 1	59%	64%	66%	71%	78%	76%	74%	75%	71%	65%	65%
Quintile 2	61%	54%	57%	58%	61%	56%	54%	54%	55%	52%	50%
Quintile 3	49%	53%	50%	50%	48%	48%	46%	40%	41%	39%	38%
Quintile 4	45%	43%	40%	34%	32%	30%	34%	32%	37%	45%	48%
Quintile 5	37%	34%	36%	34%	29%	28%	33%	32%	35%	37%	38%
Long/Short Spread	63%	68%	67%	72%	76%	77%	74%	74%	72%	67%	64%
199701-200612											
Quintile 1	48%	58%	55%	61%	66%	60%	64%	67%	56%	46%	49%
Quintile 2	55%	48%	53%	54%	51%	49%	44%	42%	46%	37%	37%
Quintile 3	52%	53%	47%	47%	49%	49%	45%	42%	46%	41%	41%
Quintile 4	53%	48%	47%	40%	41%	38%	45%	36%	38%	48%	56%
Quintile 5	43%	43%	46%	43%	42%	41%	45%	42%	47%	60%	59%
Long/Short Spread	53%	58%	57%	62%	63%	62%	60%	63%	54%	45%	43%

Past performance is not a guarantee of future results.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Market Estimated Earnings Surprise Signal (MEeSS)

Earnings surprises is one of the oldest known anomalies, dating back to Ray Ball and Philip Brown's seminal1968 article[8]. What Ball and Brown found (and others have repeatedly confirmed over the subsequent decades) is that companies that experience large positive earnings surprises continue to outperform the market over the subsequent quarters while those companies that experience negative surprises continue to underperform.

The tricky part with earnings surprises is to estimate exactly what the market was expecting in earnings for the company. Traditionally, most investors use analyst consensus forecast or some time-series forecast of earnings. How good a job either of these measures actually does is open to debate.

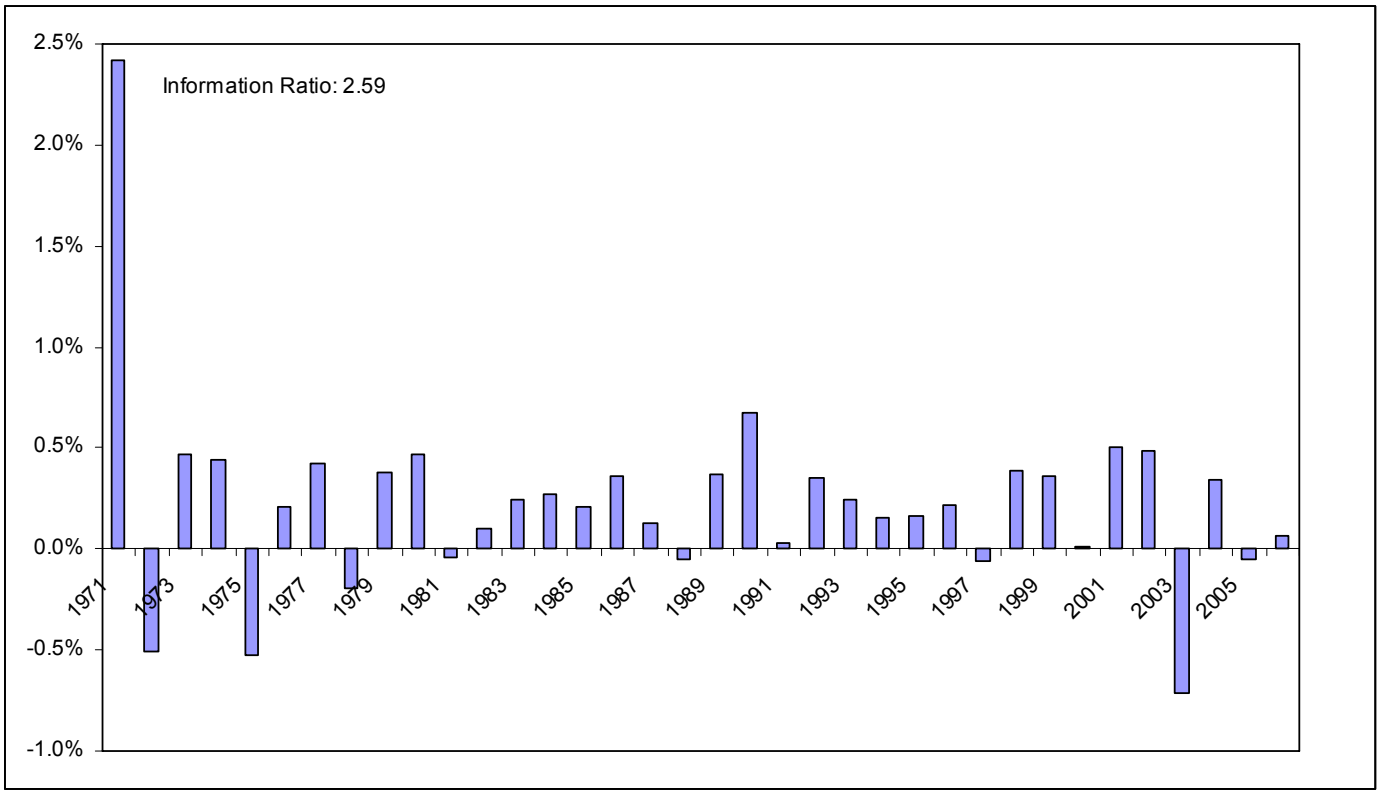
We side-step these issues by calculating surprise through observing the market's reaction to the earnings announcement. Specifically, we calculate the surprise by looking at the stock's return in excess of the market (positive or negative) on the day of the earnings announcement, as well as the day before and the day after to make sure we have captured all of the possible news associated with the event.

In short, we are asserting that if the company's stock had a big positive return in excess of the market on the day of, before, and day after the earnings announcement then the market was positively surprised by the earnings news. Conversely, if the stock had a big negative return on the earnings announcement day, plus the day prior and after it, well, then we aver that the market was negatively surprised.

The results in Figure 83 show the profitability of trading on earnings surprises as defined in this manner. Quite simply, the returns are strong, generating an Information Ratio of 2.59, on a calendar year basis over the time period 1971-2006, with only nine down years out of 36. As seen in Figure 84, the returns to the trading strategy do not all accrue in the month directly proceeding the earnings announcement but continue to grow for between nine and 12 months out, depending on the period. Regarding the strategy's efficacy across different sectors, as illustrated in Figure 85, it performed well in most sectors with the potential exception in recent years of Materials, Utilities, and Health Care.

[8] Ray Ball and Philip Brown, "An Empirical Evaluation of Accounting Income Number", Journal of Accounting Research, Autumn 1968, pp. 159-178.

Figure 83: Performance of Market Estimated Earnings Surprise Signal: Long/Short Excess Returns, Average Monthly Returns, Reported on a Calendar Year Basis, 1971– 2006



Past performance is not a guarantee of future results.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 84: Performance of Market Estimated Earnings Surprise Signal, Average Excess Returns, Relative to Large-Cap Universe

	Relative Return										
Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-198612											
Quintile 1	0.2%	0.4%	0.6%	0.9%	1.0%	0.9%	0.7%	0.2%	-0.4%	-0.5%	-0.6%
Quintile 2	0.1%	0.2%	0.2%	0.3%	0.3%	0.4%	0.3%	0.4%	0.9%	1.1%	1.3%
Quintile 3	0.0%	0.1%	0.1%	0.2%	0.4%	0.4%	0.5%	0.5%	0.9%	1.1%	1.3%
Quintile 4	0.0%	0.0%	-0.1%	-0.1%	0.0%	0.0%	0.1%	0.3%	0.3%	0.1%	0.1%
Quintile 5	-0.3%	-0.6%	-0.8%	-1.2%	-1.7%	-1.7%	-1.5%	-1.4%	-1.7%	-1.8%	-2.3%
Long/Short Spread	0.6%	1.0%	1.4%	2.1%	2.7%	2.6%	2.2%	1.7%	1.4%	1.2%	1.6%
198701-200612											
Quintile 1	0.2%	0.2%	0.2%	0.5%	0.8%	1.3%	1.6%	2.0%	2.8%	2.7%	3.7%
Quintile 2	0.0%	0.1%	0.1%	0.3%	0.5%	0.6%	0.5%	0.6%	0.1%	-0.9%	-1.3%
Quintile 3	0.0%	-0.1%	-0.1%	-0.1%	-0.1%	-0.2%	-0.5%	-0.7%	-0.9%	-1.2%	-2.0%
Quintile 4	0.0%	0.0%	0.1%	0.1%	0.0%	-0.3%	-0.4%	-0.4%	-0.5%	-0.7%	-1.0%
Quintile 5	-0.2%	-0.3%	-0.3%	-0.7%	-1.1%	-1.4%	-1.2%	-1.5%	-1.4%	0.1%	0.6%
Long/Short Spread	0.5%	0.5%	0.4%	1.1%	1.9%	2.6%	2.9%	3.5%	4.2%	2.5%	3.0%
199801-200612											
Quintile 1	0.2%	0.1%	0.1%	0.4%	0.9%	1.4%	1.8%	2.3%	2.4%	0.2%	-1.3%
Quintile 2	0.0%	0.0%	0.0%	0.3%	0.2%	0.2%	-0.1%	0.3%	-0.5%	-1.1%	-0.3%
Quintile 3	0.0%	0.0%	0.0%	-0.1%	-0.2%	-0.4%	-0.5%	-0.6%	-0.1%	1.6%	3.2%
Quintile 4	0.0%	0.1%	0.2%	0.2%	0.1%	-0.2%	-0.6%	-0.6%	0.3%	1.6%	2.2%
Quintile 5	-0.3%	-0.3%	-0.3%	-0.8%	-1.0%	-0.9%	-0.6%	-1.4%	-2.1%	-2.2%	-3.8%
Long/Short Spread	0.4%	0.4%	0.4%	1.2%	1.9%	2.3%	2.5%	3.6%	4.5%	2.4%	2.5%

Past performance is not a guarantee of future results.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 85: Performance of Market Estimated Earnings Surprise Signal Across GICS Sectors, Excess Return Relative to Sector

	196201-198612										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
Energy	0.2%	0.7%	1.3%	1.7%	1.7%	0.0%	0.2%	-0.1%	-1.1%	-0.2%	1.0%
Materials	0.7%	1.2%	1.3%	1.7%	1.7%	3.2%	4.1%	3.1%	2.9%	3.2%	3.3%
Industrials	1.0%	2.0%	2.8%	4.1%	4.2%	4.5%	4.1%	4.4%	5.6%	6.2%	6.8%
Consumer Discretionary	0.3%	0.5%	0.5%	0.7%	1.3%	2.0%	1.7%	1.9%	2.4%	1.2%	0.3%
Consumer Staples	0.4%	1.0%	1.2%	1.4%	1.3%	1.1%	0.3%	0.1%	0.1%	-1.5%	-3.4%
Health Care	0.3%	0.6%	0.7%	2.4%	4.3%	5.6%	6.1%	7.0%	7.2%	6.8%	6.0%
Financials	0.3%	0.7%	1.3%	3.1%	4.5%	5.7%	6.1%	6.5%	7.9%	8.4%	10.2%
Information Technology	1.0%	1.8%	2.8%	5.6%	7.0%	8.0%	8.5%	6.5%	6.4%	10.6%	9.6%
Telecommunication Services	0.5%	0.9%	1.4%	1.3%	0.7%	0.5%	0.5%	1.9%	-7.6%	-10.1%	-9.5%
Utilities	0.0%	0.3%	1.0%	1.6%	1.7%	0.8%	0.9%	0.6%	2.5%	1.2%	3.0%
	199801-200612										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
Energy	0.0%	-0.1%	-0.1%	-0.2%	1.5%	2.5%	5.2%	4.5%	3.2%	0.7%	0.4%
Materials	0.1%	-0.2%	-0.5%	-0.6%	-2.5%	-3.7%	-3.9%	-3.4%	-6.9%	-11.0%	-18.3%
Industrials	0.8%	1.3%	1.9%	2.4%	2.7%	1.6%	2.7%	3.9%	2.5%	0.0%	-1.5%
Consumer Discretionary	0.4%	0.9%	1.2%	2.3%	3.5%	4.1%	4.4%	4.9%	7.0%	8.2%	9.3%
Consumer Staples	0.5%	0.8%	1.2%	1.5%	1.7%	2.3%	1.9%	1.6%	4.2%	5.7%	8.3%
Health Care	0.0%	-0.2%	-0.9%	-0.8%	-1.4%	-1.4%	-1.1%	-1.1%	1.0%	2.7%	5.7%
Financials	-0.1%	-0.4%	-0.3%	0.6%	1.2%	1.5%	1.2%	0.8%	0.3%	-1.2%	-2.9%
Information Technology	0.9%	0.6%	0.3%	3.8%	5.8%	7.3%	8.6%	12.2%	13.5%	4.6%	4.1%
Telecommunication Services	0.6%	-0.6%	-1.2%	2.2%	2.8%	5.8%	7.1%	9.4%	9.6%	5.7%	8.9%
Utilities	-0.1%	-0.4%	-0.6%	-1.1%	-1.9%	-3.6%	-3.6%	-2.5%	-2.5%	-3.0%	-3.7%

Past performance is not a guarantee of future results.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

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Stand-Alone Factor Analyses: Signals We Tested But Are Not Using

Overview

In the course of developing our model, we tested a large number of signals that ended up having limited or no ability to determine future stock returns. A priori, we believed all of these signals held promise and a large number of them were suggested to us by fundamental analysts. We did not test whether or not these factors are useful for estimating earnings, multiple expansion, cash flows or any other fundamental or accounting variables. As quantitative analysts, we are solely concerned with a factor's ability to predict stock returns.

The signals can be grouped into the following categories:

- Valuation
- Growth Prospects
- Profitability and Efficiency
- Market Sentiment

We measured factor efficacy over holding periods ranging from one month to three years but placed the greatest emphasis on the nine-month and 12-month results. Efficacy for us is not represented in a single metric but rather is a myriad of measures. It is manifested in relative returns, information ratios, percentage of months the long/short quintile returns overperformed, percent of stocks in the long (short) quintile that out- (under-) perform and the speed of decay of the factor.

We also examined the robustness of the factors' performance across a wide range of sectors and over different time periods. Consistency here was a key variable in helping us decide whether or not to use a factor.

Valuation Factors

Earnings-to-Sales

The earnings-to-sales ratio is a measure of company profitability. A high value implies that each dollar generated in sales translates into more earnings to shareholders. Therefore, we expect a higher earnings-to-sales ratio to be positively correlated with higher future stock returns.

Even though the long/short strategy based on the earnings-to-sales ratio returned 360 bps over a 12-month holding period in the most recent period of 1998-2006, its return was inconsistent over time as can be seen from Figure 86. Similarly, we have mixed stock selection hit-rates over different time periods and the spreads of the outperforming companies are small across the quintiles (see Figure 87). Analyzing the strategy returns within different sectors (Figure 88), we find that the signs often flip over time. For example, stocks in the Information Technology sector produce the lowest returns at the beginning of the sample and become the best investments in the later sample. Overall, the time inconsistency of the earnings-to-sales ratio convinced us not to include this factor in the model.

Figure 86: Performance of Earnings-to-Sales, Average Excess Returns, Relative to Large-Cap Universe

	Relative Return										
Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
198701-200612											
Quintile 1	0.0%	0.0%	0.0%	0.1%	0.3%	0.4%	0.6%	0.9%	0.3%	-0.7%	-1.6%
Quintile 2	0.1%	0.1%	0.1%	0.1%	0.0%	-0.1%	-0.3%	-0.3%	-0.2%	-0.3%	-0.7%
Quintile 3	0.0%	0.0%	0.0%	0.2%	0.3%	0.4%	0.1%	-0.2%	-0.5%	-0.7%	-0.7%
Quintile 4	0.0%	0.0%	0.0%	0.2%	0.1%	0.0%	0.0%	0.3%	0.4%	0.1%	0.0%
Quintile 5	-0.1%	-0.1%	-0.2%	-0.5%	-0.7%	-0.7%	-0.5%	-0.7%	-0.1%	1.3%	2.4%
Long/Short Spread	0.1%	0.1%	0.2%	0.6%	1.0%	1.1%	1.2%	1.6%	0.5%	-2.0%	-3.9%
199801-200612											
Quintile 1	0.2%	0.3%	0.4%	0.7%	1.0%	1.2%	1.7%	2.5%	3.0%	2.6%	1.5%
Quintile 2	0.2%	0.3%	0.4%	0.6%	0.5%	0.6%	0.7%	1.2%	2.0%	2.6%	2.9%
Quintile 3	0.1%	0.2%	0.2%	0.4%	0.8%	1.2%	1.2%	0.9%	1.1%	1.7%	2.7%
Quintile 4	0.0%	0.0%	0.0%	0.0%	-0.2%	-0.7%	-0.7%	-0.4%	-0.3%	-0.1%	0.4%
Quintile 5	-0.3%	-0.6%	-0.9%	-1.8%	-2.1%	-2.4%	-3.0%	-4.3%	-5.8%	-6.7%	-7.5%
Long/Short Spread	0.5%	0.8%	1.3%	2.5%	3.1%	3.6%	4.8%	6.9%	8.8%	9.3%	8.9%
196201-198612											
Quintile 1	0.0%	-0.1%	-0.2%	-0.5%	-0.9%	-1.3%	-1.7%	-2.2%	-2.9%	-3.5%	-4.2%
Quintile 2	0.0%	0.0%	0.0%	-0.1%	-0.3%	-0.5%	-0.7%	-0.8%	-1.0%	-1.5%	-1.9%
Quintile 3	0.0%	0.0%	0.0%	0.1%	0.3%	0.5%	0.6%	0.6%	0.7%	0.5%	0.6%
Quintile 4	0.0%	0.1%	0.1%	0.3%	0.6%	0.9%	1.2%	1.4%	1.9%	2.4%	2.6%
Quintile 5	0.0%	0.0%	0.1%	0.2%	0.4%	0.4%	0.5%	0.6%	0.9%	1.4%	1.7%
Long/Short Spread	0.0%	-0.2%	-0.3%	-0.7%	-1.3%	-1.7%	-2.2%	-2.7%	-3.8%	-5.0%	-5.9%

Past performance is not a guarantee of future results.

Large-cap universe is Russell 1000 after 1978; pre-1978 it is defined via analogous market capitalization break-points

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 87: Performance of Earnings-to-Sales, Stock Selection Percentages

	Percent of Companies Outperforming										
Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
198701-200612											
Quintile 1	49%	49%	48%	48%	47%	47%	46%	46%	45%	43%	42%
Quintile 2	49%	49%	49%	48%	47%	46%	46%	45%	44%	44%	43%
Quintile 3	49%	49%	49%	48%	47%	47%	46%	45%	45%	45%	45%
Quintile 4	49%	48%	48%	47%	47%	46%	45%	45%	45%	44%	43%
Quintile 5	48%	48%	48%	46%	45%	45%	44%	43%	43%	42%	41%
199801-200612											
Quintile 1	49%	49%	49%	48%	47%	47%	46%	47%	45%	44%	43%
Quintile 2	50%	49%	49%	47%	47%	46%	45%	45%	44%	44%	44%
Quintile 3	49%	49%	49%	48%	47%	46%	46%	46%	45%	45%	46%
Quintile 4	49%	48%	48%	47%	46%	45%	45%	44%	44%	44%	45%
Quintile 5	47%	47%	46%	43%	43%	42%	41%	40%	38%	37%	37%
196201-198612											
Quintile 1	48%	48%	48%	46%	45%	44%	43%	43%	41%	40%	39%
Quintile 2	49%	49%	49%	48%	47%	46%	45%	44%	43%	41%	40%
Quintile 3	49%	48%	48%	49%	48%	48%	47%	47%	45%	44%	42%
Quintile 4	49%	49%	48%	48%	47%	47%	47%	46%	45%	45%	44%
Quintile 5	48%	48%	48%	47%	47%	46%	46%	46%	47%	46%	46%

Past performance is not a guarantee of future results.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 88: Performance of Earnings-to-Sales Across GICS Sectors, Excess Return Relative to Sector

	196201-198612										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
Energy	-0.4%	-0.7%	-1.0%	-2.7%	-3.8%	-4.1%	-3.5%	-2.9%	-1.4%	-0.6%	-2.5%
Materials	0.3%	0.3%	0.4%	0.1%	-0.5%	-0.8%	-1.4%	-1.7%	-1.9%	-3.1%	-3.7%
Industrials	0.1%	0.0%	0.1%	0.1%	0.3%	1.0%	1.7%	1.6%	0.9%	-0.7%	-1.6%
Consumer Discretionary	0.1%	0.1%	0.2%	0.4%	0.0%	0.0%	-0.1%	-0.6%	-1.3%	-2.0%	-3.8%
Consumer Staples	-0.3%	-0.6%	-0.9%	-1.9%	-3.0%	-3.6%	-4.4%	-4.7%	-5.9%	-6.9%	-7.1%
Health Care	-0.2%	-0.4%	-0.5%	-1.0%	-1.3%	-1.8%	-2.4%	-2.9%	-4.0%	-4.9%	-5.7%
Information Technology	-0.3%	-0.9%	-1.5%	-3.6%	-5.6%	-7.1%	-10.2%	-12.2%	-18.9%	-26.2%	-32.3%
Telecommunication Services	-0.1%	-0.4%	-0.9%	-2.1%	-3.9%	-6.8%	-11.2%	-14.9%	-22.9%	-26.6%	-26.9%
Utilities	-0.4%	-0.8%	-1.1%	-2.4%	-3.8%	-5.0%	-6.1%	-7.5%	-10.2%	-13.1%	-16.1%
	198701-200612										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
Energy	-0.1%	0.0%	0.1%	1.2%	2.7%	4.3%	5.3%	6.7%	6.9%	3.9%	2.0%
Materials	0.0%	0.1%	0.1%	0.1%	0.3%	0.3%	0.0%	-0.3%	-3.2%	-5.7%	-10.0%
Industrials	0.1%	0.2%	0.3%	0.6%	1.1%	2.1%	2.8%	3.8%	5.2%	4.9%	4.4%
Consumer Discretionary	-0.4%	-1.0%	-1.5%	-2.8%	-3.8%	-5.2%	-6.7%	-7.4%	-9.4%	-12.5%	-17.2%
Consumer Staples	0.0%	0.0%	0.1%	0.1%	0.1%	-0.4%	-0.5%	-0.2%	0.6%	0.8%	2.5%
Health Care	0.1%	0.2%	0.4%	0.4%	-1.1%	-1.1%	-1.9%	-2.7%	-6.8%	-14.1%	-20.5%
Information Technology	0.6%	1.0%	1.6%	4.2%	6.8%	8.2%	9.8%	11.7%	10.7%	6.5%	-0.6%
Telecommunication Services	-0.6%	-1.0%	-1.5%	-4.1%	-6.5%	-10.1%	-14.7%	-19.3%	-19.6%	-17.5%	-12.2%
Utilities	0.0%	-0.2%	-0.4%	-1.2%	-1.8%	-2.6%	-2.7%	-3.2%	-4.5%	-4.2%	-3.3%

Past performance is not a guarantee of future results.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Dividend Yield

Traditionally, dividends played a key role in stock valuation models, and dividend yield was considered to be a good predictor of expected future cash flow and returns. When a company decides on a dividend policy, it makes that commitment anticipating profitable prospects in the long run. It is very uncommon for a dividend-paying firm to reduce or halt dividend payments. Consequently, a high dividend yield signals favorable long-term opportunities, and it should be positively correlated with future stock returns.[9]

Today, the forecasting power of the dividend yield is a debatable issue. On one hand, recent academic literature documents that the dividend payout rates dropped dramatically in the 1990s as companies altered their cash flow redistribution practices.[10] On the other hand, dividend tax cuts, adopted by the Bush Administration in 2003, spurred dividend payments. Therefore, ex-ante, we do not have a clear hypothesis on the relationship between the current dividend yield and future stock returns.

We find some evidence of a positive correlation between the dividend yield and future stock returns. The returns to the long/short strategy were higher in 1962-1986, and produced 270 bps per year on average, assuming 12-month holding period (Figure 89). However, in the recent period from 1998-2006 the strategy spread shrank to a mere 160 bps, and the quintile returns were non-monotonic. Figure 90 and Figure 91 reveal that the dividend yield had mixed success in stock selection and through time.

[9] There has been recent work challenging the permanent dividend hypothesis and the signaling hypothesis associated with dividends. For a good summary see: Gustavo Grullon, Roni Michaely, Shlomo Benartzi and Richard Thaler, "Dividend Changes Do Not Signal Changes in Future Profitability", Journal of Business, Volume 78, Number 5, pp 1659-1682.

[10] On decline in dividend payouts see: Eugene Fama and Ken French "Disappearing dividends: Changing firm characteristics or lower propensity to pay?", Journal of Financial Economics 60(1), 2001.

On effect of dividend tax cuts see: Raj Chetty and Emmanuel Saez, "Dividend Taxes and Corporate Behavior: Evidence from the 2003 Dividend Tax Cut", Quarterly Journal of Economics, 2005, Volume 120, Number 3, pp 791-834.

Figure 89: Performance of Dividend Yield, Average Excess Returns, Relative to Large-Cap Universe

	Relative Return										
Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
198701-200612											
Quintile 1	0.2%	0.3%	0.3%	0.6%	0.9%	1.3%	1.8%	2.2%	3.3%	4.4%	5.6%
Quintile 2	0.0%	0.0%	0.1%	0.1%	0.0%	-0.1%	-0.3%	-0.3%	0.0%	0.2%	0.4%
Quintile 3	0.0%	0.0%	0.0%	0.0%	-0.1%	-0.2%	-0.5%	-0.7%	-1.1%	-1.7%	-2.4%
Quintile 4	-0.1%	-0.1%	-0.2%	-0.1%	0.0%	0.0%	-0.1%	0.0%	0.1%	0.3%	0.7%
Quintile 5	-0.1%	-0.1%	-0.2%	-0.4%	-0.4%	-0.5%	-0.7%	-0.8%	-1.0%	-1.3%	-1.9%
Long/Short Spread	0.2%	0.4%	0.5%	1.0%	1.4%	1.9%	2.5%	3.0%	4.3%	5.7%	7.4%
199801-200612											
Quintile 1	0.2%	0.4%	0.5%	1.0%	1.5%	1.8%	2.2%	2.5%	4.5%	7.0%	11.0%
Quintile 2	-0.1%	-0.2%	-0.3%	-0.5%	-1.0%	-1.6%	-2.1%	-2.6%	-2.8%	-1.9%	-1.5%
Quintile 3	0.0%	0.0%	-0.1%	-0.3%	-0.6%	-1.0%	-1.3%	-1.5%	-2.4%	-2.7%	-3.1%
Quintile 4	-0.1%	-0.2%	-0.3%	-0.3%	-0.4%	-0.5%	-0.7%	-0.8%	-0.6%	-0.5%	-0.1%
Quintile 5	0.0%	0.0%	0.0%	0.0%	0.0%	0.2%	0.2%	0.4%	0.4%	0.0%	-1.6%
Long/Short Spread	0.3%	0.4%	0.5%	1.1%	1.4%	1.6%	2.0%	2.1%	4.1%	7.0%	12.6%
196201-198612											
Quintile 1	0.3%	0.4%	0.5%	0.9%	1.3%	1.9%	2.6%	3.2%	4.4%	5.8%	7.2%
Quintile 2	0.1%	0.2%	0.3%	0.5%	0.7%	1.0%	1.2%	1.5%	2.0%	2.7%	3.5%
Quintile 3	-0.1%	-0.1%	-0.2%	-0.3%	-0.4%	-0.5%	-0.5%	-0.6%	-0.4%	-0.2%	-0.2%
Quintile 4	-0.1%	-0.1%	-0.2%	-0.3%	-0.4%	-0.4%	-0.6%	-0.9%	-1.5%	-2.2%	-2.8%
Quintile 5	-0.1%	-0.1%	-0.1%	-0.3%	-0.5%	-0.9%	-1.3%	-1.7%	-2.6%	-3.8%	-5.1%
Long/Short Spread	0.4%	0.5%	0.7%	1.1%	1.8%	2.7%	3.9%	4.9%	7.0%	9.6%	12.3%

Past performance is not a guarantee of future results.

Large cap universe is Russell 1000 after 1978; pre-1978 it is defined via analogous market capitalization break-points

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 90: Performance of Dividend Yield, Stock Selection Percentages

	Percent of Companies Outperforming										
Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
198701-200612											
Quintile 1	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%
Quintile 2	49%	49%	49%	48%	48%	48%	47%	47%	46%	46%	46%
Quintile 3	48%	48%	48%	48%	47%	47%	46%	45%	45%	44%	44%
Quintile 4	48%	48%	48%	47%	47%	46%	45%	45%	44%	44%	43%
Quintile 5	49%	48%	48%	46%	46%	45%	44%	44%	43%	42%	42%
199801-200612											
Quintile 1	50%	51%	51%	52%	52%	51%	51%	51%	51%	52%	54%
Quintile 2	49%	48%	48%	47%	46%	45%	45%	44%	43%	44%	45%
Quintile 3	49%	49%	48%	47%	46%	45%	44%	44%	44%	43%	43%
Quintile 4	49%	47%	47%	46%	45%	44%	44%	43%	43%	42%	42%
Quintile 5	49%	49%	49%	47%	46%	45%	45%	46%	44%	44%	43%
196201-198612											
Quintile 1	50%	51%	51%	51%	51%	51%	52%	52%	52%	52%	52%
Quintile 2	49%	49%	49%	49%	48%	48%	48%	48%	47%	47%	47%
Quintile 3	48%	48%	47%	46%	46%	45%	44%	44%	44%	43%	43%
Quintile 4	48%	48%	48%	47%	46%	46%	45%	44%	43%	41%	40%
Quintile 5	48%	47%	48%	47%	45%	44%	43%	42%	41%	40%	39%

Past performance is not a guarantee of future results.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 91: Performance of Dividend Yield, Months Outperforming Percentage

Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-198612											
Quintile 1	59%	57%	59%	58%	60%	63%	67%	66%	69%	67%	71%
Quintile 2	52%	56%	57%	57%	58%	58%	55%	59%	61%	63%	63%
Quintile 3	48%	49%	48%	51%	51%	49%	52%	52%	54%	52%	52%
Quintile 4	48%	46%	45%	45%	45%	45%	45%	42%	35%	29%	28%
Quintile 5	50%	46%	47%	47%	47%	45%	45%	45%	41%	39%	39%
Long/Short Spread	54%	54%	54%	56%	58%	58%	59%	61%	63%	64%	64%
198701-200612											
Quintile 1	53%	54%	56%	60%	61%	63%	62%	62%	63%	63%	66%
Quintile 2	48%	50%	53%	54%	57%	60%	55%	53%	56%	57%	59%
Quintile 3	45%	48%	48%	47%	51%	50%	47%	44%	42%	35%	34%
Quintile 4	52%	50%	48%	47%	48%	51%	51%	51%	48%	53%	57%
Quintile 5	49%	46%	41%	42%	43%	40%	41%	42%	38%	37%	36%
Long/Short Spread	54%	59%	56%	58%	59%	60%	59%	57%	62%	65%	64%
199801-200612											
Quintile 1	53%	51%	56%	64%	60%	62%	60%	62%	64%	66%	89%
Quintile 2	43%	40%	45%	44%	45%	46%	38%	30%	31%	41%	43%
Quintile 3	49%	51%	49%	46%	44%	39%	37%	33%	29%	33%	32%
Quintile 4	57%	49%	45%	40%	43%	45%	44%	45%	40%	48%	53%
Quintile 5	50%	50%	44%	49%	51%	50%	55%	58%	53%	51%	45%
Long/Short Spread	51%	54%	59%	58%	55%	52%	51%	52%	56%	64%	72%

Past performance is not a guarantee of future results.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Repurchase Yield

A high repurchase yield identifies profitable companies with extra cash. Contrary to dividend yield, when a company decides to repurchase its shares, it does not make any commitment to do so in the future. When free cash is used to repurchase shares, it increases the stake in the firm for the remaining shareholders. Additionally, because of the flexibility to time share repurchases and tax considerations, more firms have substituted recently from the dividend payouts to repurchases. Therefore, we hypothesize that the repurchase yield factor should be positively correlated with future returns.

Figure 92 and Figure 93 illustrate the relative success of the long/short strategy prior to 1987. However, in the period 1998 through 2006, the strategy produced non-monotonic quintile spreads and smaller variations in the stock selection hit rates. Even though repurchse yield predicts higher future returns for firms in Consumer Discretionary, Health Care, Financials and Utilities sectors, the relative returns in other sectors flip sign across different time periods (Figure 94).

Figure 92: Performance of Repurchase Yield, Average Excess Returns, Relative to Large-Cap Universe

	Relative Return										
Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-198612											
Quintile 1	0.3%	0.6%	0.8%	1.5%	2.1%	3.0%	3.8%	4.7%	6.5%	8.4%	10.8%
Quintile 2	0.0%	0.1%	0.2%	0.5%	0.8%	0.9%	1.0%	1.0%	1.3%	1.4%	0.9%
Quintile 3	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	-0.1%	-0.3%	-0.7%
Quintile 4	0.0%	-0.1%	-0.2%	-0.5%	-0.8%	-1.2%	-1.4%	-1.7%	-2.4%	-2.9%	-3.2%
Quintile 5	-0.3%	-0.5%	-0.8%	-1.5%	-2.2%	-2.8%	-3.5%	-4.2%	-5.4%	-6.5%	-7.6%
Long/Short Spread	0.5%	1.1%	1.6%	3.0%	4.3%	5.8%	7.3%	8.9%	11.9%	14.9%	18.4%
198701-200612											
Quintile 1	0.2%	0.3%	0.4%	0.8%	1.1%	1.3%	1.4%	1.7%	2.5%	2.8%	3.0%
Quintile 2	0.0%	0.0%	0.0%	0.0%	-0.2%	-0.5%	-0.6%	-0.6%	-0.4%	-0.2%	-0.2%
Quintile 3	-0.1%	0.0%	0.0%	0.1%	0.4%	0.6%	0.7%	0.5%	0.5%	0.5%	1.1%
Quintile 4	0.0%	0.0%	0.0%	0.0%	-0.1%	0.0%	0.0%	0.1%	0.2%	0.0%	-0.5%
Quintile 5	-0.1%	-0.3%	-0.5%	-0.9%	-1.3%	-1.4%	-1.5%	-1.8%	-2.7%	-3.2%	-3.4%
Long/Short Spread	0.3%	0.5%	0.9%	1.7%	2.3%	2.6%	2.9%	3.5%	5.2%	6.0%	6.3%
199801-200612											
Quintile 1	0.2%	0.4%	0.6%	0.8%	1.0%	1.1%	1.2%	1.4%	2.2%	2.9%	3.6%
Quintile 2	-0.1%	-0.2%	-0.2%	-0.5%	-1.0%	-1.9%	-2.4%	-2.5%	-3.1%	-2.2%	-1.7%
Quintile 3	-0.1%	-0.1%	-0.1%	0.1%	0.5%	0.8%	0.6%	-0.3%	-0.8%	-1.2%	-1.0%
Quintile 4	0.0%	0.0%	0.1%	0.2%	0.2%	0.2%	0.4%	0.7%	0.9%	0.1%	-1.0%
Quintile 5	-0.1%	-0.2%	-0.4%	-0.7%	-0.6%	-0.3%	0.1%	0.7%	0.8%	0.4%	0.3%
Long/Short Spread	0.3%	0.6%	0.9%	1.5%	1.6%	1.4%	1.1%	0.7%	1.4%	2.5%	3.3%

Past performance is not a guarantee of future results.

Large-cap universe is Russell 1000 after 1978; pre-1978 it is defined via analogous market capitalization break-points

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 93: Performance of Repurchase Yield, Stock Selection Percentages

	Percent of Companies Outperforming										
Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-198612											
Quintile 1	50%	51%	51%	51%	51%	51%	51%	51%	51%	51%	51%
Quintile 2	49%	49%	48%	49%	48%	48%	48%	47%	47%	46%	46%
Quintile 3	48%	48%	48%	48%	47%	46%	46%	45%	45%	44%	43%
Quintile 4	48%	47%	47%	46%	45%	44%	44%	43%	42%	41%	41%
Quintile 5	47%	47%	46%	45%	43%	43%	42%	42%	41%	40%	39%
198701-200612											
Quintile 1	49%	50%	49%	49%	49%	48%	48%	47%	47%	47%	46%
Quintile 2	49%	49%	49%	47%	47%	46%	45%	45%	44%	44%	44%
Quintile 3	49%	48%	49%	48%	48%	47%	47%	46%	45%	44%	44%
Quintile 4	49%	49%	48%	47%	46%	46%	45%	45%	44%	43%	43%
Quintile 5	48%	48%	47%	46%	45%	44%	44%	43%	43%	42%	41%
199801-200612											
Quintile 1	50%	50%	50%	49%	48%	48%	47%	47%	47%	47%	47%
Quintile 2	48%	48%	47%	46%	44%	42%	41%	41%	40%	41%	42%
Quintile 3	48%	48%	48%	47%	47%	46%	46%	45%	43%	42%	42%
Quintile 4	49%	49%	48%	47%	46%	45%	45%	45%	44%	44%	43%
Quintile 5	49%	49%	48%	47%	46%	46%	45%	45%	45%	44%	43%

Past performance is not a guarantee of future results.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 94: Performance of Repurchase Yield Across GICS Sectors, Excess Return Relative to Sector

	196201-198612										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
Energy	0.3%	0.6%	1.0%	1.1%	1.7%	2.1%	1.9%	2.9%	5.4%	5.2%	5.8%
Materials	0.7%	1.3%	2.1%	4.1%	5.7%	7.6%	9.1%	10.7%	14.3%	16.6%	19.6%
Industrials	0.6%	1.2%	1.7%	3.5%	5.6%	7.8%	9.9%	12.1%	18.1%	24.3%	28.8%
Consumer Discretionary	0.9%	1.8%	2.7%	5.0%	7.3%	10.0%	12.2%	14.0%	19.2%	24.6%	29.7%
Consumer Staples	0.3%	0.7%	0.8%	1.8%	3.2%	4.2%	4.8%	6.0%	9.7%	13.4%	18.3%
Health Care	0.3%	0.2%	-0.1%	0.1%	0.8%	1.4%	2.1%	2.2%	1.3%	1.0%	1.6%
Financials	-0.3%	-0.6%	-0.6%	-0.3%	0.4%	2.1%	4.0%	6.7%	10.7%	15.6%	16.2%
Information Technology	0.9%	1.7%	2.7%	5.8%	9.0%	10.6%	13.4%	16.7%	21.5%	34.0%	48.4%
Telecommunication Services	0.8%	1.3%	2.0%	4.3%	4.3%	2.3%	-0.6%	-3.0%	-10.6%	-18.9%	-26.3%
Utilities	0.3%	0.6%	0.8%	1.6%	2.3%	3.0%	4.2%	5.7%	8.0%	9.1%	12.6%
	198701-200612										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
Energy	0.1%	0.4%	0.8%	2.2%	3.5%	4.7%	5.5%	6.4%	7.2%	8.6%	11.8%
Materials	0.0%	0.1%	0.1%	-0.7%	-1.4%	-1.9%	-2.8%	-3.2%	-3.5%	-4.9%	-5.8%
Industrials	0.3%	0.6%	1.0%	1.7%	2.1%	2.5%	2.7%	3.0%	4.9%	5.4%	5.5%
Consumer Discretionary	0.4%	0.7%	1.2%	2.2%	2.9%	3.0%	3.3%	4.5%	6.8%	7.3%	7.2%
Consumer Staples	0.3%	0.6%	0.8%	1.5%	2.0%	2.2%	2.6%	3.2%	5.5%	7.2%	8.5%
Health Care	0.5%	1.0%	1.7%	4.2%	6.6%	8.6%	10.4%	12.2%	13.3%	15.8%	18.8%
Financials	0.2%	0.4%	0.6%	1.4%	2.4%	3.1%	3.4%	3.6%	3.5%	4.4%	4.4%
Information Technology	0.1%	0.3%	0.5%	1.5%	2.5%	1.2%	1.3%	2.7%	6.4%	7.5%	8.3%
Telecommunication Services	-0.1%	-0.4%	-0.7%	-2.4%	-3.6%	-4.8%	-5.3%	-5.8%	-1.2%	-1.9%	-4.0%
Utilities	0.4%	0.7%	1.0%	1.7%	1.6%	1.5%	1.6%	1.7%	2.4%	3.1%	3.2%

Past performance is not a guarantee of future results.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Assets-to-Enterprise Value Plus Cash

Assets-to-enterprise value plus cash can effectively be thought of as the market return per dollar invested in the company. If a firm exhibits high assets-to-enterprise value relative to its peers, it can be considered as undervalued by the market. A firm with a low ratio is expensive as its market value exceeds its book value. Consequently, we expect firms with a high assets-to-enterprise value to outperform firms with a low measure.

We find some empirical support for this factor. As Figure 95 illustrates, the long/short strategy consistently produced positive returns over various holding periods and different time periods. The strategy yielded 7.0% per year, on average, prior to 1987, assuming a 12-month holding period. Since then, however, the relative returns have dropped to 3.4% annually, on average. Similarly, the ability of the factor to distinguish among the best and worst stocks diminished over the recent period (Figure 96). As for sector performance (Figure 97), the returns to the strategy were good in Energy, Materials, Consumer Staples, Health Care and Utilities. Nevertheless, due to deteriorating power of the factor in the recent years, we do not include assets-to-enterprise value plus cash measure as a candidate for the stock selection model.

Figure 95: Performance of Assets-to-Enterprise Value Plus Cash, Average Excess Returns, Relative to Large-Cap Universe

	Relative Return										
Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-198612											
Quintile 1	0.5%	0.9%	1.2%	2.2%	3.3%	4.3%	5.7%	7.3%	10.5%	14.3%	18.0%
Quintile 2	0.1%	0.2%	0.3%	0.8%	1.3%	2.1%	2.8%	3.4%	4.8%	6.3%	7.9%
Quintile 3	0.0%	0.1%	0.1%	-0.1%	-0.1%	0.0%	-0.3%	-0.2%	-0.5%	-0.5%	-0.6%
Quintile 4	-0.2%	-0.5%	-0.7%	-1.4%	-2.0%	-2.9%	-3.8%	-4.8%	-6.4%	-8.3%	-10.5%
Quintile 5	-0.2%	-0.3%	-0.5%	-1.0%	-1.7%	-2.7%	-4.2%	-5.9%	-9.1%	-12.2%	-15.1%
Long/Short Spread	0.7%	1.2%	1.7%	3.1%	5.0%	7.0%	9.9%	13.2%	19.7%	26.4%	33.1%
198701-200612											
Quintile 1	0.3%	0.6%	0.7%	1.0%	1.4%	1.9%	2.3%	2.6%	2.9%	4.0%	6.0%
Quintile 2	0.1%	0.1%	0.1%	0.2%	0.5%	0.9%	1.5%	2.2%	3.1%	4.4%	4.8%
Quintile 3	-0.1%	-0.1%	-0.1%	-0.2%	-0.3%	-0.5%	-0.5%	-0.6%	0.0%	0.8%	1.5%
Quintile 4	-0.1%	-0.1%	-0.1%	-0.2%	-0.6%	-1.0%	-1.6%	-2.0%	-3.0%	-4.4%	-6.1%
Quintile 5	-0.3%	-0.4%	-0.6%	-0.8%	-1.1%	-1.5%	-2.0%	-2.4%	-3.4%	-5.2%	-6.7%
Long/Short Spread	0.6%	1.0%	1.3%	1.9%	2.5%	3.4%	4.3%	4.9%	6.3%	9.1%	12.7%
199801-200612											
Quintile 1	0.3%	0.5%	0.5%	0.6%	1.0%	1.6%	2.0%	2.2%	2.7%	4.2%	7.5%
Quintile 2	0.1%	0.0%	-0.1%	-0.1%	0.2%	0.8%	1.7%	2.4%	3.4%	5.0%	6.3%
Quintile 3	-0.1%	0.0%	-0.1%	-0.5%	-0.7%	-1.1%	-1.0%	-1.0%	-0.2%	0.5%	0.7%
Quintile 4	0.0%	0.0%	0.2%	0.4%	0.1%	-0.3%	-1.3%	-1.9%	-2.8%	-4.3%	-6.5%
Quintile 5	-0.3%	-0.4%	-0.5%	-0.5%	-0.8%	-1.1%	-1.5%	-1.8%	-3.5%	-6.0%	-8.5%
Long/Short Spread	0.5%	0.9%	1.0%	1.1%	1.8%	2.8%	3.5%	4.0%	6.2%	10.1%	16.0%

Past performance is not a guarantee of future results.

Large cap universe is Russell 1000 after 1978; pre-1978 it is defined via analogous market capitalization break-points
Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 96: Performance of Assets-to-Enterprise Value Plus Cash, Stock Selection Percentages

	Percent of Companies Outperforming										
Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-198612											
Quintile 1	51%	52%	52%	52%	53%	53%	54%	55%	56%	57%	56%
Quintile 2	49%	49%	49%	50%	50%	50%	50%	50%	51%	51%	51%
Quintile 3	49%	49%	49%	47%	47%	46%	45%	45%	44%	44%	43%
Quintile 4	48%	46%	46%	44%	42%	41%	40%	39%	37%	36%	34%
Quintile 5	48%	47%	47%	46%	43%	42%	40%	38%	36%	34%	32%
198701-200612											
Quintile 1	50%	50%	50%	49%	48%	48%	48%	47%	47%	47%	47%
Quintile 2	49%	49%	49%	48%	48%	48%	48%	48%	48%	48%	47%
Quintile 3	48%	48%	48%	47%	47%	46%	46%	45%	45%	45%	45%
Quintile 4	48%	48%	48%	47%	45%	44%	43%	42%	41%	40%	39%
Quintile 5	48%	48%	47%	46%	45%	43%	42%	41%	40%	38%	37%
199801-200612											
Quintile 1	50%	50%	49%	48%	48%	47%	47%	47%	47%	47%	47%
Quintile 2	49%	48%	48%	47%	47%	47%	47%	47%	47%	48%	48%
Quintile 3	49%	48%	48%	47%	46%	44%	44%	44%	44%	44%	45%
Quintile 4	48%	48%	48%	46%	45%	44%	42%	42%	40%	39%	38%
Quintile 5	48%	48%	47%	45%	44%	42%	41%	40%	38%	37%	35%

Past performance is not a guarantee of future results.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 97: Performance of Assets-to-Enterprise Value Plus Cash Across GICS Sectors, Excess Return Relative to Sector

	196201-198612										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
Energy	1.5%	2.5%	3.7%	7.6%	11.0%	14.0%	17.5%	20.4%	24.8%	30.0%	38.5%
Materials	0.7%	1.3%	1.9%	3.5%	5.4%	7.6%	10.1%	13.0%	18.2%	24.1%	29.5%
Industrials	1.1%	2.2%	3.0%	5.5%	7.7%	10.0%	12.6%	16.3%	23.9%	32.7%	40.9%
Consumer Discretionary	0.7%	1.1%	1.4%	2.4%	3.7%	5.5%	8.1%	10.8%	16.2%	20.1%	23.4%
Consumer Staples	1.0%	1.7%	2.5%	4.6%	6.5%	8.4%	10.6%	13.3%	20.0%	28.0%	36.9%
Health Care	0.7%	1.3%	2.0%	3.8%	6.6%	10.5%	14.0%	18.4%	28.6%	39.3%	50.0%
Information Technology	-0.1%	-0.2%	0.0%	0.4%	1.6%	4.7%	9.0%	13.6%	27.8%	45.8%	60.4%
Telecommunication Services	0.9%	1.3%	1.5%	2.3%	3.6%	4.9%	5.1%	6.9%	7.1%	10.0%	21.4%
Utilities	0.6%	1.2%	1.8%	4.5%	7.6%	11.5%	16.0%	20.2%	30.1%	42.9%	57.8%
	199801-200612										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
Energy	1.5%	3.1%	4.1%	7.2%	9.8%	12.7%	17.1%	21.8%	33.4%	48.5%	63.2%
Materials	0.8%	1.3%	1.3%	0.5%	2.6%	6.6%	11.5%	16.2%	27.3%	39.7%	58.6%
Industrials	0.0%	-0.1%	-0.3%	-1.1%	-2.0%	-3.3%	-4.2%	-6.1%	-7.3%	-7.0%	-4.6%
Consumer Discretionary	0.0%	-0.4%	-0.7%	-1.6%	-1.9%	-1.7%	-1.5%	-2.1%	-3.3%	-4.5%	-5.3%
Consumer Staples	0.9%	1.6%	2.2%	3.8%	4.9%	5.7%	6.0%	7.2%	9.3%	14.1%	18.9%
Health Care	0.8%	1.5%	2.0%	2.1%	4.6%	7.5%	10.5%	13.2%	20.1%	29.2%	37.8%
Information Technology	0.6%	0.8%	0.4%	-0.6%	0.0%	1.0%	1.7%	2.7%	9.3%	18.1%	28.9%
Telecommunication Services	0.0%	-0.6%	-1.3%	-4.0%	-4.1%	-1.8%	-0.2%	1.2%	-8.3%	-7.7%	-6.4%
Utilities	0.4%	0.7%	1.1%	3.1%	5.2%	8.0%	10.7%	13.1%	22.3%	33.0%	42.0%

Past performance is not a guarantee of future results.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Growth Prospects Factors

Order Backlog-to-Current Sales

By looking at order backlog-to-current sales we can get a glimpse into future revenues as a percentage of current revenues. If the market is not paying attention to the announced order backlog, then we should find that order backlog will be a useful predictor of future returns. Fundamental analysts in industries such as Oil Service and Drilling, Engineering and Construction, Aerospace and Defense, and Machinery state that these variables are helpful in providing guidance for the direction of the stock returns.

There appears to be limited support for the hypothesis of order backlog predicting future stock returns. Over the long horizon and, in particular, in the periods where order backlog data is harder to obtain, there is scant evidence of return predictability. Whatever evidence there is in support of the premise, it is concentrated in the 1998 to 2006 period (see Figure 98). Upon closer examination, we are led to believe that this measure is working well in a few companies and failing the majority of stocks as the stock level hit-rates remain quite low (see Figure 99). Additionally, in the sectors where we would expect the measure to be highly efficacious (e.g., energy and industrials), we find slim evidence of its usefulness (see Figure 100).

Figure 98: Performance of Order Backlog-to-Current Sales, Average Excess Returns, Relative to Large-Cap Universe

	Relative Return										
Portofolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-200612											
Quintile 1	0.1%	0.3%	0.4%	0.9%	1.1%	1.2%	1.1%	1.0%	1.2%	1.2%	0.7%
Quintile 2	0.0%	0.1%	0.1%	-0.1%	-0.2%	-0.6%	-1.3%	-1.9%	-3.6%	-5.1%	-6.3%
Quintile 3	-0.1%	-0.2%	-0.3%	-0.6%	-0.8%	-0.7%	-0.3%	-0.2%	0.1%	0.3%	1.0%
Quintile 4	0.1%	0.2%	0.4%	0.6%	0.9%	1.3%	1.6%	1.8%	2.4%	3.3%	4.9%
Quintile 5	-0.1%	0.0%	0.0%	0.1%	0.1%	0.2%	0.6%	1.1%	2.2%	3.1%	3.7%
Long/Short Spread	0.2%	0.3%	0.4%	0.8%	1.0%	0.9%	0.5%	-0.1%	-1.0%	-1.8%	-2.9%
196201-198612											
Quintile 1	0.1%	0.3%	0.6%	0.9%	1.0%	0.7%	0.2%	-0.2%	-0.5%	-1.5%	-2.3%
Quintile 2	0.0%	0.0%	0.0%	0.2%	0.3%	-0.2%	-0.9%	-1.3%	-2.6%	-3.5%	-5.1%
Quintile 3	-0.2%	-0.4%	-0.8%	-1.6%	-2.4%	-3.1%	-3.8%	-4.7%	-6.9%	-9.0%	-11.5%
Quintile 4	0.2%	0.5%	0.7%	1.3%	2.2%	3.2%	4.1%	4.7%	6.5%	8.6%	12.0%
Quintile 5	-0.1%	0.0%	0.1%	0.5%	1.0%	1.6%	2.7%	3.9%	5.5%	6.0%	6.1%
Long/Short Spread	0.2%	0.4%	0.5%	0.5%	0.0%	-0.9%	-2.5%	-4.1%	-6.0%	-7.4%	-8.4%
198701-200612											
Quintile 1	0.1%	0.2%	0.3%	0.8%	1.2%	1.6%	2.0%	2.1%	2.7%	3.7%	3.6%
Quintile 2	0.1%	0.2%	0.2%	-0.3%	-0.5%	-1.0%	-1.7%	-2.4%	-4.4%	-6.6%	-7.4%
Quintile 3	0.0%	0.0%	0.1%	0.2%	0.4%	1.4%	2.6%	3.7%	6.4%	8.8%	12.9%
Quintile 4	0.0%	0.0%	0.1%	0.0%	-0.2%	-0.4%	-0.5%	-0.8%	-1.4%	-1.8%	-2.0%
Quintile 5	0.0%	0.0%	0.0%	-0.2%	-0.6%	-0.9%	-1.1%	-1.3%	-0.9%	0.3%	1.3%
Long/Short Spread	0.1%	0.2%	0.3%	1.1%	1.8%	2.5%	3.1%	3.4%	3.6%	3.4%	2.3%
199801-200612											
Quintile 1	0.2%	0.4%	0.7%	2.1%	3.7%	5.2%	7.0%	8.0%	8.7%	7.2%	4.1%
Quintile 2	0.3%	0.6%	0.9%	1.6%	2.9%	3.2%	3.2%	3.8%	1.4%	-5.9%	-10.1%
Quintile 3	-0.2%	-0.2%	-0.3%	-0.5%	-0.4%	0.5%	1.3%	1.6%	1.5%	-1.7%	-4.7%
Quintile 4	0.1%	0.3%	0.5%	0.8%	0.9%	0.7%	0.7%	0.8%	1.8%	4.7%	8.3%
Quintile 5	0.0%	-0.1%	-0.1%	-0.6%	-1.4%	-2.4%	-3.6%	-4.6%	-5.9%	-6.1%	-8.0%
Long/Short Spread	0.3%	0.5%	0.8%	2.8%	5.1%	7.6%	10.6%	12.6%	14.7%	13.3%	12.1%

Past performance is not a guarantee of future results.

Large Cap Universe is Russell 1000 after 1978; pre-1978 it is defined via analogous market capitalization break-points

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 99: Performance of Order Backlog-to-Current Sales, Stock Selection Percentages

	Percent of Companies Outperforming										
Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-198612											
Quintile 1	49%	49%	48%	46%	46%	45%	44%	43%	42%	41%	41%
Quintile 2	49%	48%	49%	47%	47%	45%	44%	44%	42%	42%	40%
Quintile 3	49%	47%	46%	43%	42%	41%	40%	40%	38%	37%	35%
Quintile 4	49%	50%	49%	49%	49%	48%	49%	49%	49%	49%	50%
Quintile 5	48%	49%	48%	48%	48%	47%	48%	48%	49%	49%	48%
198701-200612											
Quintile 1	48%	48%	48%	46%	45%	44%	43%	41%	39%	38%	36%
Quintile 2	48%	48%	47%	44%	42%	39%	37%	36%	33%	31%	30%
Quintile 3	48%	48%	47%	45%	43%	42%	41%	40%	38%	36%	35%
Quintile 4	49%	49%	48%	46%	44%	43%	42%	41%	38%	36%	35%
Quintile 5	48%	48%	48%	45%	43%	42%	40%	39%	37%	36%	34%
199801-200612											
Quintile 1	49%	48%	48%	46%	44%	43%	40%	38%	34%	32%	29%
Quintile 2	48%	48%	47%	44%	41%	37%	35%	32%	27%	25%	22%
Quintile 3	48%	47%	46%	41%	39%	37%	36%	34%	32%	30%	28%
Quintile 4	50%	49%	48%	45%	44%	42%	40%	39%	36%	34%	32%
Quintile 5	47%	47%	46%	42%	39%	37%	34%	31%	29%	28%	25%

Past performance is not a guarantee of future returns.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 100: Performance of Order Backlog to Current Sales Across GICS Sectors, Excess Return Relative to Sector

	196201-198612										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
Energy	-1.2%	-2.2%	-3.2%	-5.2%	-7.0%	-10.9%	-14.2%	-17.6%	-26.2%	-29.4%	-30.7%
Materials	0.4%	0.8%	1.1%	2.2%	3.4%	3.9%	3.1%	2.8%	1.8%	1.4%	0.2%
Industrials	0.4%	0.7%	1.1%	2.9%	4.3%	5.5%	6.0%	7.7%	13.1%	17.1%	21.6%
Consumer Discretionary	0.2%	0.3%	0.5%	1.3%	2.2%	2.4%	1.9%	1.2%	-1.1%	-1.0%	-0.1%
Consumer Staples	-1.1%	-1.2%	-1.8%	-4.9%	-4.0%	0.6%	11.8%	17.4%	9.1%	6.2%	0.0%
Health Care	-0.8%	-1.6%	-2.3%	-4.4%	-8.0%	-11.0%	-15.1%	-18.1%	-22.6%	-27.3%	-34.4%
Information Technology	-0.3%	-0.4%	-0.8%	-2.0%	-2.7%	-3.7%	-4.2%	-3.9%	1.1%	7.2%	13.4%
	198701-200612										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
Energy	-0.7%	-1.0%	-1.1%	-0.9%	-1.7%	1.0%	4.0%	7.5%	8.7%	9.6%	12.2%
Materials	-0.1%	-0.4%	-0.3%	-0.9%	-1.7%	-3.3%	-4.9%	-5.9%	-6.5%	-8.2%	-0.1%
Industrials	0.0%	0.2%	0.3%	0.3%	0.4%	0.3%	0.1%	-0.2%	-0.9%	-1.4%	-0.8%
Consumer Discretionary	0.3%	0.5%	0.7%	1.5%	2.6%	3.9%	4.8%	5.4%	5.7%	3.4%	-2.5%
Consumer Staples	0.0%	0.0%	0.0%	-0.2%	-1.0%	-1.1%	-0.6%	-0.9%	-0.2%	-0.3%	1.3%
Health Care	-0.2%	-1.1%	-2.0%	-4.7%	-6.7%	-8.9%	-10.5%	-10.8%	-14.0%	-15.1%	-15.4%
Information Technology	-0.2%	0.0%	0.1%	1.1%	2.3%	2.8%	3.0%	0.7%	-10.0%	-24.5%	-51.4%

Past performance is not a guarantee of future returns.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Depreciation Margin

Depreciation margin measures the cost of sales in terms of the asset base that is being consumed. A low depreciation margin ratio is equivalent to high asset turnover ratio—that is, the amount of the asset base being consumed to generate a dollar of revenue is small. Consequently, we expect companies with low depreciation margins to outperform companies with high depreciation margins.

As depicted in Figure 101, the empirical results are generally consistent with the story, with the lowest-ranked stocks outperforming the highest-ranked stocks. However, as depicted in Figure 102 and Figure 103, neither the consistency of the performance nor the power of the measure to discriminate among stocks is particularly high.

Figure 101: Performance of Depreciation Margin, Average Excess Returns, Relative to Large-Cap Universe

	Relative Return										
Portofolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-198612											
Quintile 1	-0.1%	-0.4%	-0.6%	-1.2%	-1.6%	-1.8%	-2.3%	-3.0%	-4.1%	-5.2%	-6.0%
Quintile 2	-0.1%	-0.1%	-0.2%	-0.2%	-0.1%	-0.2%	-0.3%	-0.4%	-0.2%	0.2%	0.9%
Quintile 3	0.1%	0.2%	0.2%	0.3%	0.3%	0.4%	0.3%	0.3%	0.4%	0.7%	0.8%
Quintile 4	0.0%	0.1%	0.2%	0.4%	0.8%	1.1%	1.6%	2.3%	3.5%	4.3%	4.4%
Quintile 5	0.0%	0.1%	0.1%	0.4%	0.6%	0.8%	1.0%	1.4%	2.0%	2.2%	2.5%
Long/Short Spread	-0.1%	-0.4%	-0.7%	-1.5%	-2.2%	-2.6%	-3.3%	-4.4%	-6.1%	-7.3%	-8.4%
198701-200612											
Quintile 1	-0.2%	-0.4%	-0.6%	-1.0%	-1.3%	-1.7%	-2.1%	-2.6%	-4.3%	-5.8%	-7.6%
Quintile 2	0.0%	0.0%	0.0%	-0.1%	-0.1%	-0.3%	-0.7%	-1.0%	-1.4%	-2.2%	-3.2%
Quintile 3	0.0%	0.0%	-0.1%	-0.2%	-0.3%	-0.4%	-0.4%	-0.6%	-1.6%	-3.1%	-4.8%
Quintile 4	0.0%	0.0%	0.0%	-0.2%	-0.5%	-0.8%	-1.0%	-1.6%	-2.1%	-2.6%	-3.2%
Quintile 5	0.1%	0.1%	0.1%	0.1%	0.0%	0.0%	0.0%	0.0%	0.3%	1.4%	2.1%
Long/Short Spread	-0.2%	-0.5%	-0.7%	-1.1%	-1.3%	-1.8%	-2.1%	-2.6%	-4.6%	-7.1%	-9.7%
199801-200612											
Quintile 1	-0.3%	-0.6%	-1.0%	-1.6%	-1.6%	-1.9%	-2.0%	-2.5%	-5.2%	-7.6%	-10.1%
Quintile 2	0.2%	0.4%	0.5%	0.8%	1.2%	1.3%	1.1%	0.8%	0.7%	-0.1%	-1.5%
Quintile 3	0.0%	0.0%	0.0%	0.2%	0.4%	0.9%	1.6%	2.0%	1.4%	0.0%	-0.8%
Quintile 4	0.0%	0.0%	0.0%	-0.3%	-0.8%	-1.4%	-1.8%	-2.8%	-3.1%	-3.8%	-4.7%
Quintile 5	0.1%	0.1%	0.2%	0.2%	0.4%	0.3%	0.0%	-0.1%	0.4%	1.7%	2.7%
Long/Short Spread	-0.4%	-0.8%	-1.2%	-1.7%	-2.0%	-2.2%	-2.0%	-2.4%	-5.5%	-9.3%	-12.9%

Past performance is not a guarantee of future results.

Large-cap universe is Russell 1000 after 1978; pre-1978 it is defined via analogous market capitalization break-points
Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 102: Performance of Depreciation Margin, Stock Selection Percentages

	Percent of Companies Outperforming										
Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
198701-200612											
Quintile 1	47%	47%	47%	46%	45%	43%	42%	41%	40%	38%	36%
Quintile 2	48%	48%	47%	46%	46%	44%	43%	42%	41%	40%	39%
Quintile 3	48%	48%	48%	46%	45%	44%	43%	42%	41%	40%	40%
Quintile 4	48%	49%	48%	47%	46%	44%	44%	43%	42%	41%	40%
Quintile 5	50%	49%	49%	47%	46%	45%	45%	44%	43%	42%	41%
199801-200612											
Quintile 1	47%	47%	46%	46%	45%	43%	41%	41%	39%	39%	37%
Quintile 2	49%	48%	48%	47%	46%	45%	43%	43%	42%	42%	42%
Quintile 3	48%	48%	48%	47%	46%	44%	43%	43%	42%	43%	44%
Quintile 4	49%	49%	48%	46%	45%	43%	42%	41%	40%	40%	40%
Quintile 5	50%	50%	49%	48%	47%	46%	45%	45%	44%	45%	44%
196201-198612											
Quintile 1	48%	47%	46%	45%	44%	42%	41%	40%	39%	38%	37%
Quintile 2	48%	47%	47%	46%	46%	45%	43%	43%	42%	42%	42%
Quintile 3	49%	48%	48%	47%	46%	45%	45%	45%	44%	43%	43%
Quintile 4	49%	49%	49%	48%	48%	47%	48%	47%	48%	47%	46%
Quintile 5	48%	49%	48%	49%	48%	47%	47%	47%	47%	46%	45%

Past performance is not a guarantee of future returns.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 103: Performance of Depreciation Margin, Months Outperforming Percentage

Portofolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-198612											
Quintile 1	45%	49%	49%	46%	43%	44%	38%	35%	36%	36%	40%
Quintile 2	44%	47%	45%	44%	45%	46%	46%	49%	48%	46%	51%
Quintile 3	56%	54%	55%	51%	52%	51%	47%	49%	52%	53%	56%
Quintile 4	51%	53%	55%	52%	57%	59%	62%	68%	73%	74%	70%
Quintile 5	51%	54%	51%	53%	52%	52%	57%	58%	61%	60%	59%
Long/Short Spread	44%	46%	47%	48%	47%	45%	42%	34%	36%	40%	41%
198701-200612											
Quintile 1	50%	50%	48%	52%	49%	45%	45%	47%	46%	40%	37%
Quintile 2	49%	46%	44%	44%	47%	43%	42%	40%	38%	31%	37%
Quintile 3	44%	47%	46%	45%	42%	40%	43%	40%	36%	39%	38%
Quintile 4	53%	51%	51%	47%	45%	41%	45%	40%	38%	34%	33%
Quintile 5	49%	55%	54%	53%	52%	49%	52%	55%	52%	55%	62%
Long/Short Spread	52%	50%	46%	50%	51%	50%	48%	48%	47%	44%	38%
199801-200612											
Quintile 1	50%	51%	49%	62%	57%	56%	58%	58%	52%	49%	38%
Quintile 2	55%	53%	49%	49%	50%	50%	51%	49%	43%	31%	34%
Quintile 3	45%	45%	48%	43%	49%	47%	51%	50%	45%	50%	49%
Quintile 4	53%	53%	49%	47%	40%	37%	38%	34%	36%	25%	15%
Quintile 5	48%	57%	56%	51%	50%	47%	49%	55%	62%	68%	76%
Long/Short Spread	49%	49%	48%	52%	55%	54%	54%	54%	49%	48%	32%

Past performance is not a guarantee of future returns.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Change in Receivables-to-Change in Sales

Change in receivables-to-change in sales measures increases in uncollected revenue as sales grow. A large ratio may indicate that a company is experiencing problems with payment collection if account receivables are not subsequently converted into cash. Sometimes, a company with a high ratio of change in receivables-to-changes in sales is involved in "channel stuffing": a company that forces more products to its distributors and intentionally inflates the revenue figures in order to meet the quarterly sales goals. Consequently, we expect a negative relationship between change in receivables-to-change in sales and future returns.

We find mixed evidence of the factor performance. In the sample prior to 1987, the stocks in the top quintile outperformed the stocks in the bottom quintile by 300 bps, assuming a 12-month holding period (Figure 104). However, after 1987 the long/short return spread flips sign, and the stock selection spreads become negligible (Figure 105). In addition, the quintile returns exhibit no particular pattern at any time. Figure 106 reveals that the strategy works well approximately half of the time. Therefore, change in receivables-to-change in sales is not a useful factor for investment strategy.

Figure 104: Performance of Change in Receivables-to-Change in Sales, Average Excess Returns, Relative to Large-Cap Universe

	Relative Return										
Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-198612											
Quintile 1	0.5%	0.7%	1.0%	2.0%	2.8%	3.5%	3.8%	4.3%	4.9%	5.4%	6.0%
Quintile 2	-0.1%	0.0%	0.0%	0.0%	0.3%	0.6%	0.9%	0.6%	1.1%	2.0%	2.9%
Quintile 3	0.2%	0.3%	0.4%	0.6%	1.2%	1.1%	1.2%	1.2%	1.7%	1.8%	2.7%
Quintile 4	-0.1%	-0.2%	-0.2%	-0.2%	-0.4%	-0.5%	-0.7%	-0.7%	-0.8%	-1.3%	-0.8%
Quintile 5	0.0%	-0.1%	0.0%	0.1%	0.1%	0.5%	0.6%	1.1%	1.6%	1.9%	1.8%
Long/Short Spread	0.4%	0.8%	1.0%	1.9%	2.6%	3.0%	3.3%	3.1%	3.3%	3.6%	4.2%
198701-200612											
Quintile 1	-0.1%	-0.2%	-0.2%	-0.2%	-0.3%	-0.4%	-0.5%	-0.4%	-0.4%	-0.7%	-0.8%
Quintile 2	0.0%	0.0%	0.0%	-0.2%	-0.4%	-0.5%	-0.5%	-0.7%	-1.1%	-1.2%	-1.3%
Quintile 3	0.1%	0.0%	-0.1%	0.0%	0.2%	0.4%	0.2%	0.2%	0.3%	0.6%	1.4%
Quintile 4	0.1%	0.3%	0.4%	0.5%	0.6%	0.7%	0.9%	0.9%	1.2%	1.2%	1.1%
Quintile 5	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.2%	0.1%	0.3%	0.5%	0.1%
Long/Short Spread	0.0%	-0.1%	-0.2%	-0.2%	-0.3%	-0.5%	-0.6%	-0.5%	-0.7%	-1.2%	-0.9%
199801-200612											
Quintile 1	-0.1%	-0.1%	-0.1%	0.1%	0.0%	-0.1%	-0.1%	0.1%	0.1%	0.0%	0.6%
Quintile 2	-0.1%	0.0%	0.0%	-0.2%	-0.3%	-0.7%	-0.8%	-1.0%	-0.9%	-0.8%	-0.4%
Quintile 3	0.1%	0.0%	0.0%	0.1%	0.5%	0.8%	0.4%	0.2%	-0.1%	0.1%	0.5%
Quintile 4	0.2%	0.3%	0.4%	0.4%	0.5%	0.8%	1.1%	1.3%	1.4%	1.3%	0.7%
Quintile 5	0.0%	0.0%	0.0%	-0.1%	-0.6%	-0.6%	-0.5%	-0.7%	-0.6%	0.0%	0.1%
Long/Short Spread	-0.1%	-0.1%	0.0%	0.2%	0.6%	0.5%	0.4%	0.9%	0.7%	0.0%	0.5%

Past performance is not a guarantee of future returns.

Large-cap universe is Russell 1000 after 1978; pre-1978 it is defined via analogous market capitalization break-points
Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 105: Performance of Change in Receivables-to-Change in Sales, Stock Selection Percentages

	Percent of Companies Outperforming										
Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-198612											
Quintile 1	51%	52%	52%	53%	54%	55%	55%	55%	54%	52%	52%
Quintile 2	49%	50%	49%	48%	49%	51%	52%	51%	52%	52%	50%
Quintile 3	50%	51%	51%	51%	52%	50%	51%	51%	50%	49%	48%
Quintile 4	50%	47%	48%	48%	48%	48%	45%	46%	44%	44%	44%
Quintile 5	49%	50%	50%	48%	48%	49%	48%	48%	47%	47%	46%
198701-200612											
Quintile 1	48%	48%	48%	47%	47%	46%	45%	45%	45%	44%	43%
Quintile 2	49%	49%	49%	47%	46%	46%	45%	45%	44%	43%	42%
Quintile 3	49%	49%	48%	47%	47%	46%	45%	45%	44%	43%	42%
Quintile 4	49%	49%	49%	48%	47%	47%	46%	45%	44%	44%	43%
Quintile 5	48%	48%	48%	48%	47%	47%	46%	46%	46%	45%	45%
199801-200612											
Quintile 1	49%	48%	48%	47%	47%	46%	45%	45%	44%	44%	44%
Quintile 2	48%	49%	48%	46%	46%	45%	45%	44%	44%	43%	42%
Quintile 3	50%	49%	48%	46%	47%	46%	45%	45%	44%	43%	43%
Quintile 4	49%	49%	49%	48%	46%	46%	45%	45%	43%	44%	44%
Quintile 5	48%	48%	48%	47%	45%	45%	45%	44%	44%	44%	44%

Past performance is not a guarantee of future returns.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 106: Performance of Change in Receivables to Change in Sales, Months Outperforming Percentage

Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-198612											
Quintile 1	54%	51%	55%	60%	64%	65%	59%	62%	67%	69%	62%
Quintile 2	50%	54%	54%	58%	57%	53%	54%	52%	52%	56%	56%
Quintile 3	54%	53%	51%	46%	51%	54%	55%	53%	50%	51%	51%
Quintile 4	50%	46%	54%	49%	50%	52%	51%	53%	53%	50%	49%
Quintile 5	47%	47%	50%	54%	62%	57%	60%	60%	62%	66%	65%
Long/Short Spread	57%	56%	52%	52%	50%	53%	52%	48%	51%	52%	47%
198701-200612											
Quintile 1	46%	44%	45%	47%	45%	45%	48%	50%	45%	44%	43%
Quintile 2	46%	48%	49%	44%	40%	39%	42%	44%	37%	38%	39%
Quintile 3	53%	50%	47%	47%	54%	53%	53%	50%	49%	51%	52%
Quintile 4	58%	63%	63%	59%	59%	56%	59%	58%	60%	62%	58%
Quintile 5	50%	51%	53%	54%	55%	57%	54%	54%	53%	55%	54%
Long/Short Spread	49%	43%	43%	46%	45%	44%	46%	46%	46%	46%	46%
199801-200612											
Quintile 1	44%	45%	50%	57%	51%	50%	55%	59%	55%	54%	57%
Quintile 2	44%	47%	49%	45%	40%	40%	43%	46%	42%	40%	38%
Quintile 3	56%	53%	46%	48%	60%	61%	58%	54%	53%	55%	57%
Quintile 4	59%	58%	62%	53%	57%	57%	61%	63%	62%	69%	64%
Quintile 5	49%	47%	52%	57%	48%	51%	46%	47%	43%	49%	55%
Long/Short Spread	51%	43%	41%	53%	54%	55%	56%	55%	55%	55%	55%

Past performance is not a guarantee of future returns.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Return on Assets (ROA)

Return on assets is a measure of company profitability: the amount of earnings a company has generated per unit of assets. Since the denominator in the ratio includes the book value of both debt and equity, return on assets represents the profitability of the firm as a whole and not just the profitability of the equity holder's investment. Logically, ROA should be positively correlated with future stock returns. The ratio is a more accurate indicator of profitability for the industries where the book value of assets is closer to its market value.

We find some evidence in support of the positive relation between return on assets and future stock returns. As seen in Figure 107, the long/short strategy earns, on average, 160 bps before 1987 and 150 bps afterwards, assuming a 12-month holding period. The factor helps minimally to distinguish between winners and losers as apparent from the small stock picking spreads in Figure 108. As for sectors, return on assets predicted higher expected returns for firms in Energy, Industrial and Health Care, while returns in the other sectors flipped signs over different time periods (Figure 109).

Figure 107: Performance of Return on Assets, Average Excess Returns, Relative to Large-Cap Universe

	Relative Return										
Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-198612											
Quintile 1	0.0%	-0.1%	-0.3%	-0.3%	-0.6%	-0.9%	-0.5%	1.0%	0.9%	-4.0%	-7.6%
Quintile 2	-0.2%	-0.3%	-0.3%	0.6%	2.0%	2.1%	1.3%	0.8%	0.3%	-2.7%	-5.4%
Quintile 3	0.1%	0.1%	0.0%	0.9%	1.7%	1.8%	2.0%	2.1%	0.2%	0.4%	0.8%
Quintile 4	-0.4%	-0.8%	-1.0%	-1.3%	-0.2%	-1.2%	-3.2%	-3.9%	-5.7%	-6.5%	-5.0%
Quintile 5	-0.5%	-0.8%	-1.0%	-1.1%	-1.5%	-2.5%	-2.6%	-3.3%	1.3%	3.3%	7.2%
Long/Short Spread	0.6%	0.7%	0.8%	0.8%	0.9%	1.6%	2.1%	4.3%	-0.3%	-7.3%	-14.7%
198701-200612											
Quintile 1	0.1%	0.2%	0.3%	0.4%	0.6%	0.6%	0.7%	0.7%	0.8%	0.5%	-0.1%
Quintile 2	0.0%	0.0%	0.0%	0.1%	0.3%	0.4%	0.5%	0.6%	0.7%	0.6%	0.8%
Quintile 3	0.0%	0.0%	0.1%	0.4%	0.6%	0.7%	0.4%	0.2%	-0.4%	-0.9%	-1.1%
Quintile 4	0.0%	0.1%	0.0%	0.1%	0.0%	0.0%	0.2%	0.4%	0.9%	1.1%	1.1%
Quintile 5	-0.1%	-0.2%	-0.3%	-0.6%	-1.0%	-0.9%	-0.7%	-0.9%	-0.5%	0.7%	1.7%
Long/Short Spread	0.2%	0.4%	0.6%	1.0%	1.6%	1.5%	1.4%	1.6%	1.3%	-0.1%	-1.8%
199801-200612											
Quintile 1	0.2%	0.4%	0.7%	0.9%	1.0%	0.9%	0.9%	1.2%	2.0%	2.2%	1.2%
Quintile 2	0.1%	0.1%	0.1%	0.5%	0.8%	0.9%	1.1%	1.5%	1.8%	2.0%	1.7%
Quintile 3	0.1%	0.2%	0.3%	0.7%	1.2%	1.6%	1.2%	1.1%	0.6%	1.0%	2.7%
Quintile 4	0.0%	0.0%	0.0%	-0.2%	-0.5%	-0.6%	0.3%	0.9%	1.8%	2.7%	2.7%
Quintile 5	-0.4%	-0.6%	-0.9%	-1.6%	-2.0%	-1.9%	-2.3%	-3.3%	-4.5%	-5.4%	-5.7%
Long/Short Spread	0.6%	1.1%	1.6%	2.5%	3.0%	2.8%	3.2%	4.5%	6.5%	7.6%	6.9%

Past performance is not a guarantee of future returns.

Large-cap universe is Russell 1000 after 1978; pre-1978 it is defined via analogous market capitalization break-points

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 108: Performance of Return on Assets, Stock Selection Percentages

	Percent of Companies Outperforming										
Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-198612											
Quintile 1	51%	49%	46%	46%	44%	44%	43%	42%	40%	36%	37%
Quintile 2	46%	48%	48%	50%	52%	50%	47%	47%	43%	40%	38%
Quintile 3	49%	50%	48%	50%	49%	47%	47%	45%	41%	42%	43%
Quintile 4	46%	46%	46%	45%	44%	42%	40%	39%	41%	40%	40%
Quintile 5	47%	46%	45%	45%	44%	44%	44%	45%	47%	49%	50%
198701-200612											
Quintile 1	50%	49%	49%	48%	47%	46%	46%	45%	43%	42%	41%
Quintile 2	49%	49%	49%	48%	48%	47%	47%	46%	45%	45%	44%
Quintile 3	49%	49%	49%	48%	48%	47%	46%	46%	46%	45%	45%
Quintile 4	49%	49%	48%	48%	46%	46%	46%	45%	44%	44%	43%
Quintile 5	48%	48%	47%	46%	44%	44%	44%	43%	42%	41%	40%
199801-200612											
Quintile 1	50%	50%	50%	48%	47%	46%	45%	45%	44%	43%	43%
Quintile 2	50%	49%	49%	48%	48%	47%	47%	46%	46%	46%	45%
Quintile 3	49%	49%	49%	48%	48%	47%	47%	46%	46%	46%	46%
Quintile 4	49%	49%	48%	47%	46%	45%	45%	45%	44%	44%	44%
Quintile 5	48%	47%	46%	44%	42%	41%	41%	40%	39%	38%	37%

Past performance is not a guarantee of future returns.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 109: Performance of Return on Assets across GICS Sectors, Excess Return Relative to Sector

	196201-198612										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
Energy	1.8%	2.9%	3.5%	3.8%	2.9%	7.0%	12.0%	19.0%	34.3%	32.0%	24.9%
Materials	-0.4%	0.0%	1.1%	-0.2%	-6.6%	-10.2%	-11.4%	-12.0%	-15.7%	-24.9%	-21.7%
Industrials	0.6%	0.6%	0.0%	-1.4%	2.9%	8.8%	14.1%	16.1%	9.5%	7.3%	8.5%
Consumer Discretionary	0.1%	-0.5%	-1.1%	-3.1%	-3.9%	-8.2%	-15.1%	-17.9%	-35.4%	-55.3%	-81.1%
Consumer Staples	1.2%	1.6%	1.7%	4.8%	5.1%	3.2%	4.9%	6.6%	-6.7%	-18.1%	-31.0%
Health Care	0.5%	1.4%	2.1%	10.1%	15.0%	20.0%	36.1%	43.0%	59.6%	62.0%	43.8%
Information Technology	0.8%	1.1%	0.5%	-0.4%	-3.4%	0.0%	2.0%	5.9%	18.2%	-1.2%	-0.9%
Telecommunication Services	0.4%	2.2%	4.8%	11.8%	10.3%	9.4%	7.7%	6.2%	-29.8%	-55.7%	-83.6%
Utilities	1.5%	3.9%	6.0%	14.2%	16.2%	10.3%	9.4%	-1.4%	-2.1%	-19.1%	-41.3%
	198701-200612										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
Energy	0.2%	0.5%	0.9%	2.9%	5.0%	7.5%	9.4%	11.1%	12.5%	11.7%	13.8%
Materials	0.1%	0.1%	0.2%	0.7%	1.5%	2.0%	2.0%	1.9%	-1.1%	-3.6%	-9.7%
Industrials	0.2%	0.4%	0.6%	1.5%	2.6%	3.2%	3.4%	3.7%	4.0%	2.7%	1.3%
Consumer Discretionary	-0.3%	-0.7%	-1.0%	-2.1%	-2.5%	-3.7%	-4.9%	-5.6%	-7.3%	-9.8%	-13.4%
Consumer Staples	-0.2%	-0.3%	-0.3%	-0.6%	-0.5%	-1.2%	-1.8%	-2.8%	-3.9%	-3.8%	-4.0%
Health Care	0.4%	1.1%	1.5%	2.6%	3.3%	3.5%	3.0%	2.7%	-0.3%	-8.1%	-15.6%
Information Technology	0.9%	1.4%	2.1%	4.2%	6.0%	6.5%	6.7%	8.0%	11.0%	12.6%	11.9%
Telecommunication Services	-0.4%	-0.6%	-0.8%	-2.4%	-3.6%	-6.7%	-9.8%	-12.4%	-11.5%	-12.7%	-10.8%
Utilities	-0.1%	0.3%	0.5%	0.2%	1.6%	-1.2%	-3.1%	-2.7%	-6.5%	-11.9%	-15.0%

Past performance is not a guarantee of future returns.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Working Capital to Sales

Working capital-to-sales is the ratio of the difference between the current non-cash receivables and payables accounts-to-net revenues. Large values occur when a company starts to pile up inventories, has problems with payment collections or its sales slow. Therefore, a higher measure indicates either a firm is experiencing a reduction in demand for its products or it is manipulating its accruals to potentially generate favorable revenue numbers. Hence, we predict that a higher ratio of working capital-to-sales foreshadows lower future stock returns.

According to the empirical results, working capital-to-sales is negatively related to future stock returns, as we expected. As Figure 110 suggests, the long/short spreads to the strategy consistently produce negative returns in different sub-samples and holding periods. Unfortunately, even though the stocks in the top quintile do underperform the stocks in the bottom quintile, the relation does not change monotonically for the stocks in the middle. The factor provides little help to discriminate among stocks, as evident from Figure 111. Finally, Figure 112 illustrates that the strategy outperformed the benchmark in 70% of the cases before 1986, assuming a nine-or 12-month holding period; however, in the most recent sample, the strategy was equally likely to generate positive and negative returns. Because of the inconsistency in quintile relative returns and the detereorating performance of the strategy during later years, we do not include working capital-to-sales in the stock selection model.

Figure 110: Performance of Working Capital-to-Sales, Average Excess Returns, Relative to Large-Cap Universe

	Relative Return										
Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-198612											
Quintile 1	0.1%	-0.1%	-0.3%	-1.0%	-1.6%	-1.4%	-1.6%	-1.4%	-3.1%	-4.3%	-2.3%
Quintile 2	-0.1%	-0.2%	-0.3%	-0.6%	-0.5%	-1.1%	-1.3%	-1.3%	-1.3%	-0.5%	2.0%
Quintile 3	-0.3%	-0.5%	-0.7%	-0.9%	-1.4%	-2.1%	-3.0%	-4.0%	-4.9%	-5.3%	-4.8%
Quintile 4	0.0%	0.0%	0.0%	0.0%	0.1%	0.1%	0.5%	0.7%	0.5%	0.9%	3.1%
Quintile 5	0.0%	0.0%	0.0%	0.0%	0.6%	1.4%	1.7%	1.8%	3.4%	4.2%	6.4%
Long/Short Spread	0.1%	-0.2%	-0.4%	-1.0%	-2.2%	-2.8%	-3.3%	-3.2%	-6.5%	-8.5%	-8.7%
198701-200612											
Quintile 1	0.0%	-0.1%	-0.2%	-0.6%	-1.0%	-1.3%	-1.7%	-2.1%	-2.8%	-4.3%	-5.4%
Quintile 2	0.0%	0.0%	0.0%	0.1%	0.4%	0.4%	0.2%	0.2%	0.4%	0.9%	1.7%
Quintile 3	0.1%	0.1%	0.2%	0.3%	0.4%	0.5%	0.6%	0.5%	0.6%	0.9%	1.0%
Quintile 4	0.1%	0.2%	0.3%	0.5%	0.7%	0.9%	1.0%	1.2%	1.7%	2.8%	3.2%
Quintile 5	0.0%	-0.2%	-0.3%	-0.3%	-0.3%	-0.3%	0.1%	0.3%	0.1%	-0.1%	-0.2%
Long/Short Spread	0.0%	0.1%	0.1%	-0.2%	-0.7%	-1.0%	-1.7%	-2.4%	-2.9%	-4.2%	-5.2%
199801-200612											
Quintile 1	0.0%	0.0%	0.1%	-0.2%	-0.9%	-1.2%	-1.7%	-2.2%	-2.4%	-3.5%	-4.3%
Quintile 2	0.0%	0.0%	0.1%	0.2%	0.4%	0.4%	0.0%	-0.1%	0.4%	0.7%	2.1%
Quintile 3	0.1%	0.2%	0.3%	0.5%	0.6%	0.6%	0.4%	0.0%	0.3%	0.9%	1.5%
Quintile 4	0.1%	0.2%	0.3%	0.3%	0.2%	0.5%	0.6%	0.8%	1.2%	2.4%	2.5%
Quintile 5	-0.1%	-0.3%	-0.5%	-0.5%	-0.2%	0.0%	0.8%	1.5%	0.7%	0.4%	-0.7%
Long/Short Spread	0.1%	0.3%	0.6%	0.3%	-0.8%	-1.2%	-2.5%	-3.6%	-3.1%	-3.9%	-3.6%

Past performance is not a guarantee of future returns.

Large-cap universe is Russell 1000 after 1978; pre-1978 it is defined via analogous market capitalization break-points

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 111: Performance of Working Capital-to-Sales, Stock Selection Percentages

	Percent of Companies Outperforming										
Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-198612											
Quintile 1	49%	48%	47%	44%	44%	44%	43%	43%	42%	42%	43%
Quintile 2	47%	48%	47%	47%	46%	45%	45%	44%	44%	43%	45%
Quintile 3	48%	46%	43%	44%	41%	39%	40%	39%	38%	37%	38%
Quintile 4	49%	48%	47%	48%	46%	46%	46%	46%	45%	44%	46%
Quintile 5	49%	50%	49%	48%	47%	48%	47%	48%	48%	48%	47%
198701-200612											
Quintile 1	49%	48%	48%	46%	45%	44%	44%	43%	42%	40%	40%
Quintile 2	49%	49%	48%	47%	47%	47%	46%	45%	45%	44%	45%
Quintile 3	49%	49%	49%	48%	47%	47%	47%	46%	45%	45%	45%
Quintile 4	49%	49%	49%	49%	48%	47%	47%	47%	46%	46%	45%
Quintile 5	48%	48%	48%	47%	46%	45%	45%	44%	44%	43%	42%
199801-200612											
Quintile 1	49%	48%	48%	46%	45%	43%	42%	42%	41%	40%	39%
Quintile 2	49%	49%	48%	47%	47%	46%	45%	45%	44%	44%	45%
Quintile 3	50%	49%	49%	48%	47%	46%	46%	45%	45%	45%	45%
Quintile 4	50%	49%	49%	48%	47%	47%	47%	47%	46%	46%	46%
Quintile 5	48%	47%	47%	46%	45%	44%	44%	43%	43%	42%	41%

Past performance is not a guarantee of future returns.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 112: Performance of Working Capital-to-Sales, Months Outperforming Percentage

Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-198612											
Quintile 1	52%	43%	42%	38%	35%	36%	36%	40%	36%	33%	36%
Quintile 2	53%	57%	56%	50%	53%	49%	46%	43%	48%	54%	57%
Quintile 3	52%	49%	47%	49%	48%	47%	44%	45%	46%	45%	44%
Quintile 4	50%	51%	58%	60%	56%	57%	63%	62%	60%	58%	64%
Quintile 5	56%	51%	54%	57%	59%	59%	57%	57%	64%	64%	60%
Long/Short Spread	47%	41%	40%	36%	30%	29%	34%	36%	30%	24%	32%
198701-200612											
Quintile 1	49%	49%	47%	42%	36%	38%	34%	33%	29%	28%	23%
Quintile 2	48%	46%	47%	53%	55%	56%	50%	53%	50%	54%	55%
Quintile 3	54%	58%	62%	57%	53%	56%	62%	59%	58%	56%	59%
Quintile 4	53%	55%	56%	66%	62%	63%	63%	62%	61%	67%	66%
Quintile 5	50%	50%	44%	40%	38%	40%	41%	45%	50%	44%	46%
Long/Short Spread	48%	48%	49%	46%	46%	47%	41%	42%	40%	35%	34%
199801-200612											
Quintile 1	52%	55%	54%	53%	41%	42%	36%	36%	30%	33%	23%
Quintile 2	51%	49%	51%	53%	57%	57%	51%	53%	53%	53%	59%
Quintile 3	56%	62%	61%	65%	58%	57%	66%	61%	62%	60%	68%
Quintile 4	50%	55%	52%	62%	51%	53%	52%	50%	58%	70%	66%
Quintile 5	44%	44%	37%	35%	36%	37%	43%	49%	49%	48%	47%
Long/Short Spread	54%	52%	55%	53%	52%	51%	49%	48%	45%	41%	41%

Past performance is not a guarantee of future returns.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

R&D Expenses-to-Market Capitalization; R&D Expenses-to-Sales; Change in R&D Expenses-to-Change in Sales; Elasticity of R&D Expenses-to-Elasticity of Sales

R&D expenses-to-market capitalization and R&D expenses-to-sales represent the ratios of research and development expenses-to-market value of equity and net revenues, respectively. Comparisons of companies based on these measures are more relevant within the same sector as capital intensity varies widely across industries. If a company possesses optimistic future prospects for a new product, it is likely to allocate a larger share of capital to R&D expenses. Therefore, a firm with a high level of R&D expenses per unit of equity, or dollar of revenues, is expecting to grow and generate higher returns in the future. On the contrary, if a company experiences a drop in the ratio relative to its peers, then the company's management considers future opportunities to be limited.

To properly assess the returns to the strategy based on R&D expenses, we look at several relative measures: R&D expenses-to-market capitalization (Figure 113), R&D expenses-to-sales (Figure 114), change in R&D expenses-to-change in sales (Figure 115), and elasticity of R&D expenses-to-elasticity of sales (Figure 116). Figure 113 and Figure 114 reveal that investing into the strategy yields significant positive spreads over nine- and 12-month holding periods, especially in the most recent sample. The long/short abnormal returns based on R&D expenses-to-market capitalization is above 10% per year, and the abnormal returns based on R&D expenses-to-sales constitutes 7.5% per year, assuming a 12-month holding period. However, we cannot explain either the negative spreads for the other two measures or the reason why the third and fourth quintiles underperformed the stocks in the bottom quintile. Figure 117 suggests that the factor has limited ability to distinguish between winners and losers. Nor does the strategy generate time consistent returns (Figure 118). As for performance of the factors across sectors, the only sector where this strategy seems to work in different periods is Energy (Figure 119). Even though certain R&D multiples produce significant returns to the long/short strategy, we would not invest on the basis of this factor due to the lack of monotonicity over stock quintiles, small spreads, time incosistent performance, and litlle help across sectors.

Figure 113: Performance of R&D Expenses-to-Market Capitalization, Average Excess Returns, Relative to Large-Cap Universe

	Relative Return										
Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-198612											
Quintile 1	0.3%	0.5%	0.8%	1.9%	3.0%	4.1%	5.2%	6.7%	9.7%	12.6%	15.1%
Quintile 2	0.1%	0.1%	0.2%	0.4%	0.7%	1.1%	1.5%	1.7%	1.5%	1.2%	1.0%
Quintile 3	-0.1%	-0.1%	-0.2%	-0.2%	-0.1%	-0.2%	-0.1%	-0.2%	-0.2%	-0.8%	-1.5%
Quintile 4	0.0%	0.0%	0.0%	0.0%	0.1%	0.3%	0.6%	0.7%	0.6%	0.4%	0.4%
Quintile 5	-0.1%	-0.1%	-0.1%	-0.1%	-0.2%	-0.4%	-0.5%	-0.4%	-0.1%	-0.4%	-0.3%
Long/Short Spread	0.3%	0.6%	0.9%	1.9%	3.2%	4.4%	5.6%	7.1%	9.9%	13.1%	15.4%
198701-200612											
Quintile 1	0.4%	0.8%	1.1%	1.9%	3.1%	4.7%	6.6%	8.1%	10.4%	13.1%	16.8%
Quintile 2	0.0%	0.0%	0.0%	-0.1%	-0.1%	0.2%	0.3%	0.3%	0.2%	1.3%	3.1%
Quintile 3	-0.1%	-0.2%	-0.3%	-0.6%	-1.0%	-1.1%	-1.3%	-1.2%	-1.4%	-2.5%	-3.0%
Quintile 4	-0.2%	-0.4%	-0.6%	-1.2%	-2.1%	-3.4%	-4.9%	-6.5%	-8.6%	-10.4%	-12.7%
Quintile 5	-0.1%	-0.1%	-0.2%	-0.5%	-1.0%	-1.4%	-1.9%	-2.5%	-3.2%	-4.2%	-5.5%
Long/Short Spread	0.5%	0.9%	1.3%	2.5%	4.1%	6.1%	8.5%	10.6%	13.6%	17.3%	22.3%
199801-200612											
Quintile 1	0.6%	1.1%	1.5%	3.0%	5.7%	8.6%	11.8%	14.2%	15.0%	8.9%	5.4%
Quintile 2	0.0%	0.0%	-0.1%	-0.2%	0.4%	0.9%	1.1%	0.5%	-2.3%	-6.2%	-9.6%
Quintile 3	-0.2%	-0.4%	-0.5%	-0.9%	-1.6%	-2.3%	-2.9%	-3.5%	-5.5%	-9.1%	-12.5%
Quintile 4	-0.3%	-0.5%	-0.7%	-1.4%	-3.0%	-4.9%	-7.4%	-9.4%	-12.0%	-12.2%	-12.5%
Quintile 5	-0.1%	-0.1%	-0.2%	-0.6%	-1.0%	-1.5%	-2.0%	-2.6%	-1.8%	0.3%	2.5%
Long/Short Spread	0.7%	1.2%	1.7%	3.5%	6.7%	10.1%	13.9%	16.8%	16.8%	8.5%	2.9%

Past performance is not a guarantee of future returns.

Large-cap universe is Russell 1000 after 1978; pre-1978 it is defined via analogous market capitalization break-points

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 114: Performance of R&D Expenses-to-Sales, Average Excess Returns, Relative to Large-Cap Universe

	Relative Return										
Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-198612											
Quintile 1	0.2%	0.4%	0.6%	1.3%	2.1%	2.7%	3.1%	3.5%	3.7%	3.3%	3.1%
Quintile 2	0.0%	-0.1%	-0.1%	-0.1%	0.0%	0.0%	0.1%	0.4%	0.6%	0.5%	0.2%
Quintile 3	0.0%	0.0%	0.0%	0.0%	0.1%	0.4%	0.7%	1.0%	1.2%	1.1%	0.6%
Quintile 4	0.0%	0.0%	0.0%	0.2%	0.3%	0.4%	0.5%	0.8%	1.4%	2.5%	3.7%
Quintile 5	0.1%	0.1%	0.3%	0.7%	1.1%	1.6%	2.2%	2.9%	4.6%	5.7%	7.2%
Long/Short Spread	0.1%	0.2%	0.3%	0.6%	1.0%	1.1%	0.9%	0.6%	-0.9%	-2.4%	-4.1%
198701-200612											
Quintile 1	0.1%	0.3%	0.5%	1.1%	2.2%	3.7%	5.4%	6.9%	9.0%	10.7%	14.7%
Quintile 2	0.1%	0.1%	0.1%	0.1%	0.0%	0.1%	-0.1%	-0.3%	-0.1%	0.3%	0.4%
Quintile 3	-0.1%	-0.3%	-0.4%	-1.1%	-1.8%	-2.4%	-2.9%	-3.4%	-3.8%	-3.5%	-2.7%
Quintile 4	-0.1%	-0.1%	-0.2%	-0.6%	-1.1%	-1.7%	-2.4%	-3.3%	-4.9%	-6.4%	-8.5%
Quintile 5	0.0%	0.0%	0.1%	-0.1%	-0.4%	-0.8%	-1.2%	-1.8%	-2.6%	-3.8%	-5.1%
Long/Short Spread	0.1%	0.2%	0.4%	1.2%	2.7%	4.5%	6.6%	8.7%	11.6%	14.6%	19.8%
199801-200612											
Quintile 1	0.1%	0.3%	0.6%	2.0%	4.6%	7.3%	9.8%	11.7%	8.2%	-5.9%	-16.8%
Quintile 2	0.0%	0.0%	-0.1%	-0.4%	-1.1%	-1.8%	-3.1%	-4.6%	-6.5%	-9.0%	-12.7%
Quintile 3	-0.2%	-0.4%	-0.7%	-1.7%	-2.4%	-3.3%	-4.1%	-5.1%	-5.9%	-5.2%	-4.4%
Quintile 4	-0.1%	-0.1%	-0.1%	-0.4%	-0.8%	-1.3%	-1.5%	-1.8%	-2.0%	0.2%	3.1%
Quintile 5	0.1%	0.2%	0.3%	0.3%	0.1%	-0.2%	-0.6%	-1.0%	-0.3%	1.8%	4.2%
Long/Short Spread	0.0%	0.2%	0.4%	1.7%	4.5%	7.5%	10.4%	12.8%	8.5%	-7.7%	-21.0%

Past performance is not a guarantee of future returns.

Large-cap universe is Russell 1000 after 1978; pre-1978 it is defined via analogous market capitalization break-points

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 115: Performance of Change in R&D Expenses to Change in Sales, Average Excess Returns, Relative to Large-Cap Universe

	Relative Return										
Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-198612											
Quintile 1	0.2%	0.5%	0.7%	1.3%	2.0%	2.7%	3.4%	3.8%	4.6%	4.8%	4.7%
Quintile 2	0.0%	0.0%	0.0%	0.1%	0.3%	0.2%	0.2%	0.3%	-0.5%	-1.7%	-1.6%
Quintile 3	-0.1%	-0.3%	-0.4%	-0.5%	-0.5%	-0.4%	-0.5%	-0.5%	-1.0%	-1.6%	-2.4%
Quintile 4	0.0%	0.0%	0.1%	0.1%	0.2%	0.3%	0.7%	1.5%	2.9%	3.6%	4.2%
Quintile 5	0.2%	0.3%	0.5%	1.3%	2.1%	2.9%	3.5%	4.1%	5.8%	7.8%	9.5%
Long/Short Spread	0.1%	0.1%	0.2%	0.0%	-0.1%	-0.2%	-0.1%	-0.3%	-1.3%	-2.9%	-4.8%
198701-200612											
Quintile 1	0.0%	0.0%	0.1%	0.4%	0.9%	1.8%	2.8%	3.5%	5.5%	6.7%	9.6%
Quintile 2	0.0%	0.0%	0.0%	0.0%	-0.3%	-0.3%	-0.8%	-1.4%	-1.5%	-0.7%	0.5%
Quintile 3	-0.1%	-0.2%	-0.4%	-1.0%	-1.6%	-2.1%	-2.3%	-2.5%	-3.0%	-3.1%	-4.1%
Quintile 4	0.0%	0.0%	0.0%	-0.4%	-0.8%	-1.2%	-1.7%	-2.2%	-3.1%	-3.8%	-4.3%
Quintile 5	0.2%	0.3%	0.4%	0.7%	1.0%	1.3%	1.4%	1.5%	0.7%	0.2%	0.0%
Long/Short Spread	-0.2%	-0.2%	-0.3%	-0.3%	-0.1%	0.6%	1.4%	2.0%	4.8%	6.5%	9.6%
199801-200612											
Quintile 1	-0.1%	-0.1%	0.0%	0.5%	1.2%	2.6%	3.8%	4.6%	3.5%	-6.5%	-13.6%
Quintile 2	-0.1%	-0.2%	-0.4%	-0.8%	-1.4%	-1.6%	-2.4%	-3.6%	-5.4%	-8.0%	-11.8%
Quintile 3	-0.1%	-0.2%	-0.5%	-1.4%	-2.2%	-3.0%	-3.6%	-4.1%	-4.2%	-2.9%	-3.7%
Quintile 4	0.1%	0.1%	0.2%	0.1%	0.0%	-0.1%	-0.5%	-0.8%	-0.2%	1.8%	5.5%
Quintile 5	0.4%	0.6%	1.0%	1.8%	3.1%	3.8%	4.1%	4.2%	1.0%	-1.7%	-2.3%
Long/Short Spread	-0.5%	-0.8%	-1.0%	-1.3%	-1.8%	-1.2%	-0.4%	0.5%	2.5%	-4.8%	-11.3%

Past performance is not a guarantee of future returns.

Large-cap universe is Russell 1000 after 1978; pre-1978 it is defined via analogous market capitalization break-points

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 116: Performance of Percentage Change in R&D Expenses to Percentage Change in Sales, Average Excess Returns, Relative to Large-Cap Universe

	Relative Return										
Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-198612											
Quintile 1	0.0%	0.0%	0.1%	0.4%	0.7%	0.9%	1.2%	1.3%	1.7%	1.4%	1.2%
Quintile 2	-0.1%	-0.2%	-0.2%	-0.2%	0.1%	0.4%	0.8%	1.0%	0.7%	0.8%	1.0%
Quintile 3	0.1%	0.1%	0.2%	0.2%	0.4%	0.6%	0.8%	1.1%	0.9%	0.3%	0.2%
Quintile 4	0.1%	0.1%	0.2%	0.5%	0.7%	0.7%	0.8%	0.9%	1.1%	0.9%	0.5%
Quintile 5	0.1%	0.3%	0.4%	0.9%	1.4%	1.8%	2.3%	3.0%	4.8%	6.2%	7.4%
Long/Short Spread	-0.1%	-0.2%	-0.3%	-0.5%	-0.7%	-0.9%	-1.0%	-1.8%	-3.1%	-4.8%	-6.2%
198701-200612											
Quintile 1	-0.1%	-0.1%	-0.1%	-0.2%	-0.3%	0.0%	-0.1%	-0.3%	-0.2%	0.4%	1.2%
Quintile 2	0.0%	0.1%	0.1%	0.3%	0.6%	1.0%	1.6%	1.9%	2.9%	3.3%	5.4%
Quintile 3	0.1%	0.3%	0.4%	0.7%	0.9%	1.3%	1.4%	1.7%	1.9%	2.9%	4.4%
Quintile 4	-0.1%	-0.2%	-0.2%	-0.8%	-1.2%	-1.7%	-1.8%	-2.3%	-2.2%	-2.1%	-1.9%
Quintile 5	0.1%	0.2%	0.3%	0.6%	0.7%	1.1%	1.3%	1.7%	0.8%	-0.2%	-0.9%
Long/Short Spread	-0.2%	-0.2%	-0.4%	-0.8%	-1.0%	-1.1%	-1.3%	-2.0%	-1.0%	0.5%	2.2%
199801-200612											
Quintile 1	-0.1%	-0.2%	-0.4%	-0.7%	-0.7%	0.0%	0.2%	-0.3%	-1.1%	-2.9%	-3.5%
Quintile 2	-0.1%	0.0%	0.0%	0.6%	1.3%	2.2%	3.1%	3.4%	3.8%	-2.4%	-6.9%
Quintile 3	0.2%	0.3%	0.4%	0.6%	0.7%	1.3%	1.5%	1.7%	-2.0%	-7.4%	-14.0%
Quintile 4	-0.1%	-0.1%	-0.1%	-0.9%	-1.0%	-2.1%	-3.2%	-4.9%	-6.5%	-9.1%	-11.6%
Quintile 5	0.2%	0.3%	0.5%	1.3%	2.2%	3.0%	3.6%	4.6%	2.2%	-0.3%	0.4%
Long/Short Spread	-0.3%	-0.5%	-0.8%	-2.0%	-2.9%	-3.0%	-3.5%	-4.9%	-3.3%	-2.7%	-3.8%

Past performance is not a guarantee of future returns.

Large-cap universe is Russell 1000 after 1978; pre-1978 it is defined via analogous market capitalization break-points

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 117: Performance of R&D Expenses-to-Market Capitalization, Stock Selection Percentages

	Percent of Companies Outperforming										
Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-198612											
Quintile 1	49%	50%	49%	50%	51%	50%	51%	51%	51%	52%	51%
Quintile 2	48%	49%	48%	48%	48%	47%	46%	46%	45%	44%	42%
Quintile 3	48%	48%	48%	47%	47%	46%	46%	45%	45%	44%	42%
Quintile 4	48%	48%	48%	47%	47%	46%	46%	46%	46%	45%	45%
Quintile 5	48%	48%	48%	47%	46%	45%	44%	44%	44%	42%	41%
198701-200612											
Quintile 1	48%	49%	49%	48%	47%	46%	46%	45%	44%	44%	44%
Quintile 2	49%	49%	48%	46%	45%	44%	43%	42%	41%	40%	40%
Quintile 3	49%	48%	48%	46%	45%	44%	42%	42%	40%	39%	38%
Quintile 4	48%	48%	47%	46%	44%	42%	40%	39%	37%	36%	35%
Quintile 5	49%	49%	48%	47%	46%	45%	44%	43%	42%	41%	40%
199801-200612											
Quintile 1	49%	49%	49%	48%	47%	46%	46%	45%	43%	42%	42%
Quintile 2	48%	48%	48%	45%	44%	42%	40%	39%	36%	36%	36%
Quintile 3	48%	48%	47%	44%	43%	41%	40%	38%	37%	37%	36%
Quintile 4	48%	47%	46%	45%	43%	41%	39%	38%	35%	36%	37%
Quintile 5	50%	49%	49%	47%	46%	45%	45%	45%	46%	46%	47%

Past performance is not a guarantee of future returns.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 118: Performance of R&D Expenses-to-Sales, Months Outperforming Percentage

Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-198612											
Quintile 1	54%	51%	54%	52%	55%	55%	58%	59%	55%	52%	50%
Quintile 2	49%	48%	46%	42%	47%	49%	47%	48%	52%	48%	44%
Quintile 3	48%	49%	47%	46%	47%	44%	47%	47%	47%	46%	50%
Quintile 4	48%	47%	47%	45%	48%	53%	54%	54%	54%	53%	51%
Quintile 5	52%	56%	55%	60%	64%	67%	69%	71%	78%	80%	84%
Long/Short Spread	51%	51%	51%	48%	49%	51%	48%	52%	49%	43%	38%
198701-200612											
Quintile 1	52%	52%	52%	46%	45%	45%	49%	49%	47%	51%	62%
Quintile 2	54%	53%	53%	48%	49%	49%	50%	53%	56%	57%	53%
Quintile 3	45%	45%	44%	42%	42%	32%	32%	31%	36%	39%	45%
Quintile 4	48%	45%	43%	44%	42%	40%	39%	38%	39%	42%	39%
Quintile 5	54%	53%	51%	47%	49%	47%	49%	51%	44%	45%	43%
Long/Short Spread	53%	51%	48%	49%	44%	48%	50%	51%	49%	55%	62%

Past performance is not a guarantee of future returns.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 119: Performance of R&D Expenses-to-Sales Across GICS Sectors, Excess Return Relative to Sector

	196201-198612										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
Energy	0.0%	0.1%	0.2%	1.0%	3.1%	5.5%	8.0%	10.4%	15.2%	21.6%	28.7%
Materials	0.5%	0.8%	1.2%	2.3%	3.4%	4.2%	5.1%	6.2%	7.4%	8.5%	8.9%
Industrials	-0.1%	-0.1%	-0.1%	0.3%	0.2%	-0.3%	-0.5%	-1.4%	-5.4%	-9.5%	-13.1%
Consumer Discretionary	-0.2%	-0.2%	-0.1%	-0.5%	-1.1%	-2.3%	-4.2%	-5.9%	-10.3%	-16.4%	-23.3%
Consumer Staples	0.2%	0.4%	0.4%	0.3%	0.2%	-0.2%	-0.1%	0.1%	0.8%	3.2%	3.9%
Health Care	0.6%	1.0%	1.4%	2.1%	3.1%	4.4%	6.3%	7.8%	10.1%	13.1%	15.3%
Information Technology	0.7%	1.2%	1.7%	3.4%	3.5%	2.8%	1.1%	-0.5%	-6.7%	-15.2%	-24.9%
Telecommunication Services	1.4%	4.7%	8.6%	20.3%	32.7%	41.4%	47.8%	57.3%	63.8%	47.6%	26.3%
Utilities	0.4%	1.1%	1.6%	1.9%	3.0%	3.6%	2.5%	4.9%	18.4%	32.4%	45.2%

	198701-200612										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
Energy	0.5%	1.1%	1.6%	2.5%	3.2%	3.7%	4.0%	4.4%	4.0%	4.8%	3.1%
Materials	0.0%	0.1%	0.3%	1.2%	1.9%	3.0%	4.4%	5.6%	9.6%	14.2%	18.4%
Industrials	0.3%	0.6%	0.8%	1.6%	2.3%	3.5%	4.6%	5.8%	8.6%	10.9%	14.3%
Consumer Discretionary	-0.9%	0.4%	6.6%	1.3%	-3.9%	-3.7%	-12.1%	-18.9%	-27.5%	-46.2%	-55.0%
Consumer Staples	0.2%	0.4%	0.6%	1.3%	2.3%	3.5%	4.9%	6.6%	10.1%	12.6%	16.1%
Health Care	0.3%	0.7%	1.1%	1.5%	1.6%	0.3%	1.0%	1.9%	5.6%	10.2%	13.5%
Information Technology	0.0%	0.1%	0.4%	1.3%	0.6%	0.0%	-1.3%	-3.3%	-9.1%	-19.7%	-28.3%
Telecommunication Services	-1.8%	-3.0%	-3.1%	-3.1%	-5.8%	-11.8%	-14.6%	-16.1%	-20.3%	-25.2%	-32.6%

	199801-200612										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
Energy	0.3%	0.7%	1.3%	2.7%	4.2%	4.3%	4.4%	4.2%	1.9%	1.2%	-7.2%
Materials	-0.4%	-0.9%	-1.1%	-1.5%	-2.2%	-2.4%	-2.2%	-2.0%	1.1%	4.0%	4.7%
Industrials	0.5%	0.8%	1.3%	2.7%	3.0%	3.7%	4.0%	4.0%	4.4%	0.9%	-4.6%
Consumer Staples	0.0%	0.1%	0.3%	0.2%	0.6%	1.6%	3.5%	5.1%	6.4%	6.5%	8.6%
Health Care	0.4%	0.9%	1.4%	2.3%	4.1%	1.9%	1.3%	1.5%	3.0%	0.7%	0.1%
Information Technology	0.4%	0.9%	1.6%	4.8%	8.1%	11.8%	14.7%	16.5%	12.9%	-2.7%	-11.7%
Telecommunication Services	-4.1%	-6.5%	-6.7%	-3.8%	-6.2%	-13.4%	-11.6%	-6.9%	1.2%	-0.7%	-11.9%

Past performance is not a guarantee of future returns.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Accruals to Assets

The power of accounting accruals to forecast future stock returns was brought to most people's attention with the publication of Richard Sloan's seminal 1996 article in *The Accounting Review*.[11] Sloan showed that investors fail to understand the difference in persistence of cash-based earnings versus accrual-based earnings. Cash is highly likely to persist, whereas accruals are highly unlikely to persist. Since investors mistakenly assign the same level of persistence to both of these components of earnings, companies where a large percentage of last quarter's earnings came from accruals would have lower earnings this period than is expected by the market and, hence, experience negative stocks returns. On the other hand, companies where a large percentage of last quarter's earnings came from cash would have higher earnings this quarter than is anticipated by the market and, hence, experience positive stock returns. Sloan's paper shows that a strategy of simply sorting companies on the basis of the ratio of accruals-to-total earnings produces statistically and economically significant abnormal returns.

One of our most surprising results is that we do not find that Sloan's original measure is able to produce statistically and economically significant excess returns when we use the non-restated fundamental data.

As seen in Figure 120, the returns to investing according to accruals-to-assets strategy are diminishing, with average one-year holding period returns of 140 bps pre 1987 and perverse returns in the most recent period. The stock selection results are weak (Figure 121), with only 2% to 3% spreads across quintiles, depending upon the period. While the results for certain sectors may appear reasonable at first glance, upon closer inspection careful readers will notice that signs flip for nearly all sectors, with the notable exception of Health Care (Figure 122). Finally, while the decay seems fairly stretched out in the pre 1987 period, in the post 1997 period, the investment opportunity window for the strategy is one month (Figure 123, Figure 124, Figure 125, Figure 126).

[11] See Richard Sloan, "Do Stock Prices Fully Reflect Information in Accruals and Cash Flows About Future Earnings?", The Accounting Review, 1996, Volume 71, pp 289-316.

Figure 120: Performance of Accrual-to-Assets, Average Excess Returns, Relative to Large-Cap Universe

	Relative Return										
Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-198612											
Quintile 1	0.0%	-0.1%	-0.1%	-0.2%	-0.4%	-0.3%	-0.2%	0.0%	0.1%	-0.7%	-1.0%
Quintile 2	-0.1%	-0.1%	-0.2%	-0.1%	-0.2%	-0.1%	0.1%	0.2%	0.9%	1.2%	0.9%
Quintile 3	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.3%	0.3%	0.3%	0.0%	0.0%
Quintile 4	0.1%	0.1%	0.3%	0.5%	0.6%	0.5%	0.5%	0.6%	0.5%	1.1%	1.1%
Quintile 5	0.1%	0.3%	0.4%	0.6%	0.9%	1.1%	1.2%	1.1%	1.8%	2.9%	3.0%
Long/Short Spread	-0.2%	-0.4%	-0.5%	-0.8%	-1.3%	-1.4%	-1.4%	-1.1%	-1.7%	-3.6%	-4.0%
198701-200612											
Quintile 1	-0.1%	-0.2%	-0.2%	-0.2%	-0.2%	-0.1%	-0.4%	-0.8%	-1.4%	-1.4%	-1.3%
Quintile 2	0.0%	0.0%	0.0%	0.1%	0.0%	0.1%	0.0%	-0.2%	-0.6%	-0.9%	-0.8%
Quintile 3	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.3%	-0.4%	-0.5%	-0.8%	-1.2%	-1.3%
Quintile 4	0.0%	0.1%	0.0%	-0.2%	-0.2%	-0.3%	-0.2%	-0.1%	0.1%	0.0%	-0.5%
Quintile 5	0.1%	0.2%	0.3%	0.5%	0.5%	0.7%	1.0%	1.6%	2.5%	3.3%	3.7%
Long/Short Spread	-0.3%	-0.4%	-0.5%	-0.7%	-0.8%	-0.8%	-1.4%	-2.4%	-3.9%	-4.7%	-5.0%
199801-200612											
Quintile 1	-0.1%	0.0%	0.1%	0.4%	0.9%	1.2%	0.9%	0.2%	-0.5%	-0.3%	-0.3%
Quintile 2	0.1%	0.0%	0.0%	0.2%	0.3%	0.7%	0.5%	-0.2%	-0.6%	-0.7%	0.4%
Quintile 3	-0.2%	-0.2%	-0.1%	0.0%	0.1%	0.0%	0.0%	0.4%	0.3%	0.1%	0.2%
Quintile 4	0.0%	-0.1%	-0.2%	-0.9%	-1.1%	-1.6%	-1.5%	-1.2%	-0.9%	-1.0%	-1.2%
Quintile 5	0.2%	0.2%	0.2%	0.2%	-0.1%	-0.2%	0.1%	0.8%	1.8%	1.9%	1.0%
Long/Short Spread	-0.2%	-0.2%	-0.1%	0.2%	1.0%	1.4%	0.7%	-0.7%	-2.3%	-2.1%	-1.3%

Past performance is not a guarantee of future returns.

Large-cap universe is Russell 1000 after 1978; pre-1978 it is defined via analogous market capitalization break-points

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 121: Performance of Accrual-to-Assets, Stock Selection Percentages

	Percent of Companies Outperforming										
Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-198612											
Quintile 1	48%	49%	49%	47%	47%	47%	47%	47%	47%	46%	45%
Quintile 2	48%	48%	47%	47%	46%	46%	47%	46%	46%	45%	45%
Quintile 3	49%	48%	48%	47%	46%	46%	46%	47%	47%	46%	45%
Quintile 4	49%	48%	49%	48%	47%	46%	46%	45%	45%	44%	44%
Quintile 5	50%	50%	50%	49%	49%	50%	49%	48%	48%	48%	47%
198701-200612											
Quintile 1	48%	48%	48%	47%	46%	45%	45%	44%	43%	42%	41%
Quintile 2	49%	49%	48%	48%	47%	46%	46%	46%	45%	45%	44%
Quintile 3	48%	48%	48%	47%	46%	46%	45%	45%	44%	43%	43%
Quintile 4	49%	49%	48%	47%	46%	46%	45%	45%	44%	44%	43%
Quintile 5	49%	49%	49%	48%	48%	47%	46%	46%	45%	44%	44%
199801-200612											
Quintile 1	49%	48%	48%	47%	47%	47%	46%	45%	44%	44%	43%
Quintile 2	49%	49%	48%	47%	46%	45%	46%	45%	45%	44%	44%
Quintile 3	48%	48%	48%	47%	45%	44%	44%	44%	43%	43%	42%
Quintile 4	49%	48%	47%	46%	44%	43%	43%	42%	42%	41%	41%
Quintile 5	49%	49%	49%	47%	47%	45%	45%	45%	44%	44%	44%

Past performance is not a guarantee of future returns.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 122: Performance of Accrual-to-Assets Across GICS Sectors, Excess Return Relative to Sector

	196201-198612										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
Energy	-0.1%	-0.3%	-0.9%	-2.6%	-3.3%	-3.3%	-1.6%	0.7%	1.9%	-0.3%	-4.5%
Materials	-0.3%	-0.5%	-0.8%	-1.7%	-2.1%	-2.5%	-3.6%	-4.5%	-5.9%	-5.8%	-6.9%
Industrials	-0.2%	-0.7%	-1.4%	-3.2%	-4.5%	-4.9%	-4.9%	-4.5%	-4.5%	-6.2%	-7.7%
Consumer Discretionary	-0.4%	-1.1%	-1.4%	-2.2%	-2.5%	-2.2%	-2.9%	-3.0%	-3.7%	-5.9%	-7.6%
Consumer Staples	-0.4%	-0.6%	-1.1%	-0.6%	-1.0%	0.2%	0.6%	0.5%	-0.6%	-2.3%	-5.8%
Health Care	-0.2%	-0.7%	-1.1%	-3.2%	-4.9%	-6.2%	-6.6%	-8.2%	-11.5%	-14.2%	-14.7%
Information Technology	-0.2%	-0.3%	-0.2%	-0.1%	0.8%	-1.1%	-3.6%	-7.2%	-13.2%	-15.5%	-11.7%
Telecommunication Services	-0.4%	-0.3%	-0.7%	-1.7%	1.8%	3.6%	8.7%	14.8%	21.9%	13.1%	-2.0%
Utilities	-0.5%	-1.2%	-1.9%	-3.3%	-3.4%	-3.2%	-2.3%	-0.8%	-1.2%	-3.1%	-1.1%

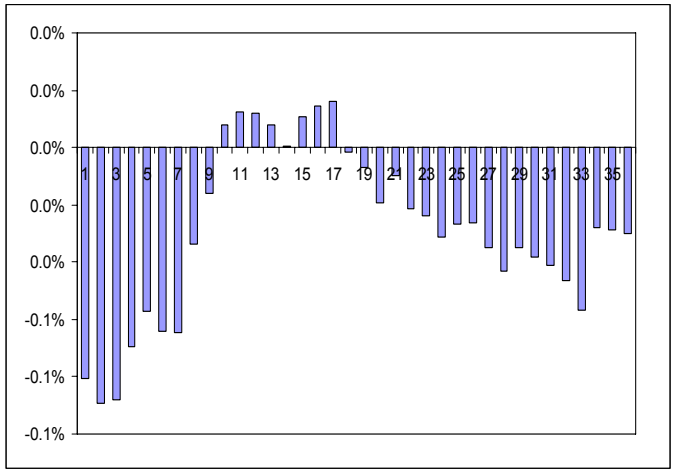
	198701-200612										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
Energy	-0.2%	-0.5%	-0.8%	-1.1%	-1.1%	-0.4%	0.3%	0.5%	0.4%	-0.5%	-1.1%
Materials	-0.3%	-0.4%	-0.4%	0.1%	0.3%	0.2%	0.2%	-0.5%	-3.4%	-5.5%	-4.6%
Industrials	-0.3%	-0.4%	-0.5%	-0.7%	-0.5%	-0.1%	-0.4%	-0.2%	0.5%	0.2%	-1.5%
Consumer Discretionary	-0.3%	-0.4%	-0.6%	-1.3%	-1.4%	-1.8%	-1.7%	-2.0%	-2.8%	-3.5%	-5.4%
Consumer Staples	-0.4%	-0.7%	-0.9%	-1.8%	-2.4%	-2.5%	-3.3%	-3.1%	-3.4%	-4.4%	-6.4%
Health Care	-0.5%	-0.9%	-1.4%	-2.0%	-1.9%	-2.5%	-3.8%	-5.8%	-9.9%	-16.1%	-18.1%
Information Technology	-0.3%	-0.2%	0.1%	0.3%	0.2%	0.0%	-1.9%	-5.6%	-10.3%	-5.2%	-1.6%
Telecommunication Services	-0.4%	-0.5%	-0.4%	-0.2%	0.4%	1.5%	0.6%	-0.2%	1.3%	-0.2%	-1.4%
Utilities	0.1%	0.2%	0.2%	0.7%	0.4%	0.0%	-0.9%	-1.6%	-1.5%	-2.6%	-2.5%

	199801-200612										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
Energy	0.0%	-0.2%	-0.3%	-1.2%	-2.0%	-2.2%	-2.1%	-1.9%	0.3%	-1.1%	-6.2%
Materials	-0.4%	-0.5%	-0.2%	1.2%	3.1%	3.8%	4.6%	2.9%	-5.4%	-10.1%	-5.1%
Industrials	-0.3%	-0.1%	0.0%	0.0%	1.2%	2.7%	3.1%	3.7%	5.5%	7.3%	6.3%
Consumer Discretionary	-0.5%	-0.5%	-0.3%	-0.7%	0.3%	0.9%	1.5%	2.2%	4.3%	7.6%	9.0%
Consumer Staples	-0.5%	-1.0%	-1.4%	-3.1%	-4.6%	-3.8%	-3.8%	-3.1%	-2.9%	-5.1%	-9.0%
Health Care	-0.2%	-0.4%	-1.0%	-1.0%	-0.4%	-1.5%	-3.9%	-7.3%	-14.3%	-20.5%	-21.8%
Information Technology	0.0%	0.3%	0.7%	2.9%	2.8%	2.6%	-1.5%	-7.4%	-13.0%	-9.5%	-7.1%
Telecommunication Services	-0.5%	-0.3%	0.6%	1.5%	3.0%	2.6%	-0.7%	-5.1%	-5.9%	-10.5%	-9.3%
Utilities	0.1%	0.3%	0.2%	0.7%	0.1%	-0.5%	-2.3%	-3.6%	-3.9%	-5.3%	-2.6%

Past performance is not a guarantee of future returns.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

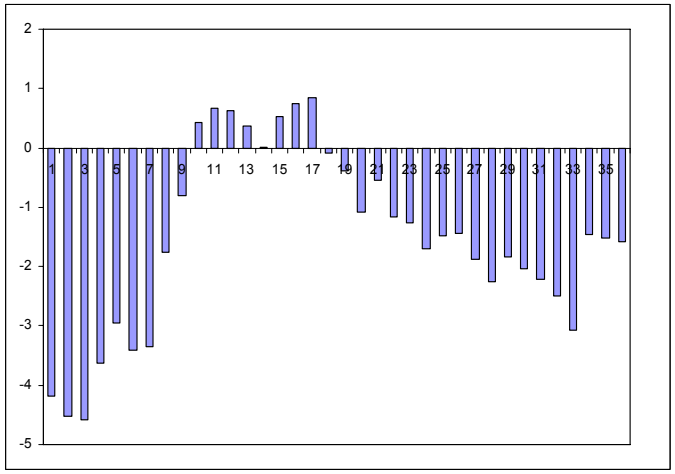
Figure 123: Accrual-to-Assets: 1962/01-1996/12
Gamma Coefficients (normalized; equal weights)



Past performance is not a guarantee of future returns.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

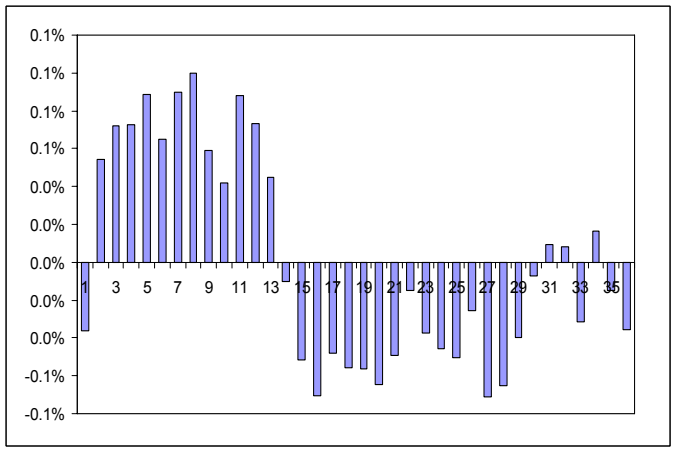
Figure 124: Accrual-to-Assets: 1962/01-1996/12
T-Statistics (normalized; equal weights)



Past performance is not a guarantee of future returns.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

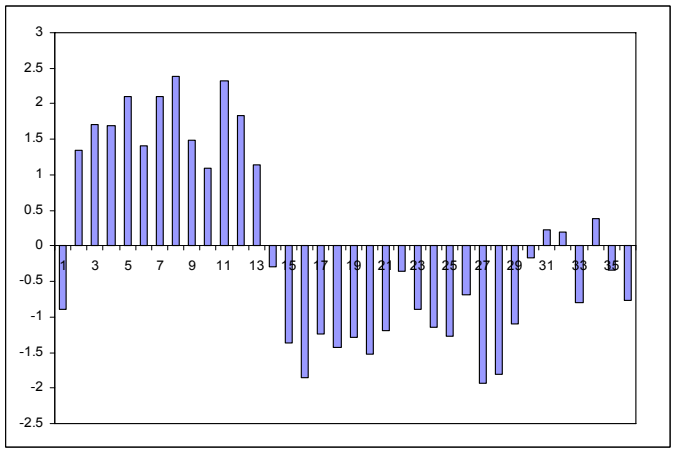
Figure 125: Accrual-to-Assets: 1997/01-2006/12
Gamma Coefficients (normalized; equal weights)



Past performance is not a guarantee of future returns.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 126: Accrual-to-Assets: 1997/01-2006/12
T-Statistics (normalized; equal weights)



Past performance is not a guarantee of future returns.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

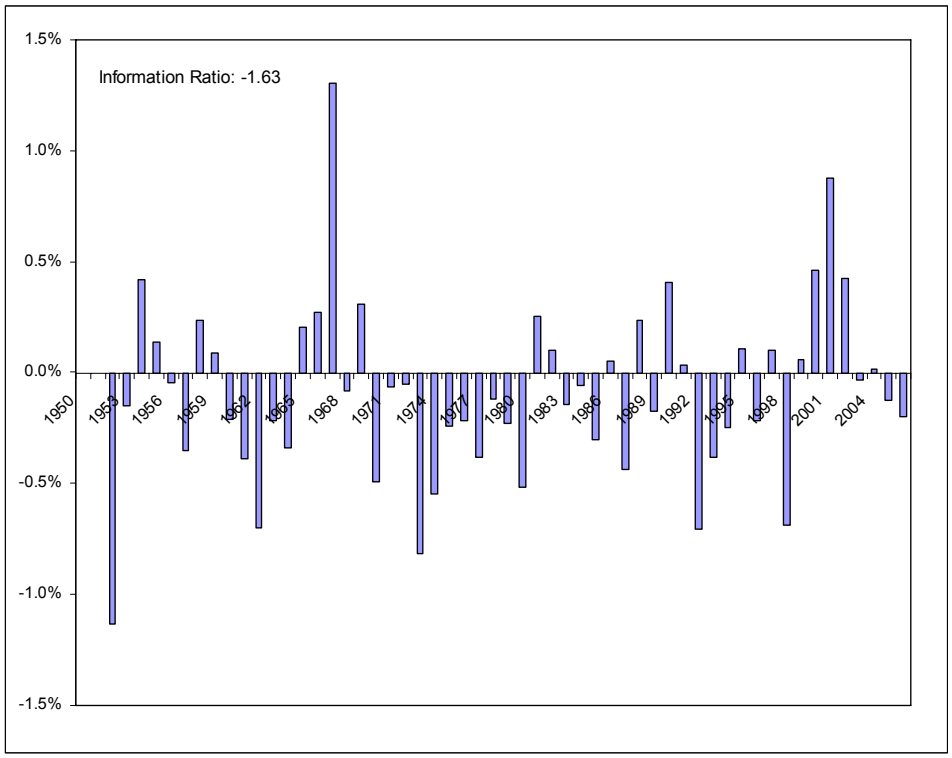
Profitability and Efficiency Factors

Change in Employees-to-Change in Net Operating Income

Change in employees-to-change in net operating income measures how much incremental net income results from adding or subtracting employees— in short, how profitable the firm's hiring or firing of its employees turns out to be.

As seen in the relatively small quintile spreads and inconsistency of these spreads over different time periods, the inability of this factor to discriminate across stocks, and the lack of reliable outperformance from the long/short portfolio, we chose not to include this measure as a potential factor in our model (see Figure 127, Figure 128 and Figure 130). Additionally, we are concerned by lack of monotonicity in the quintile returns (the U-shaped patterns of the returns). Similar inconsistency is observed when we look at the relative return spreads based on percentage change in employees-to-percentage change in net operating income (Figure 129). We could not think of a reasonable explanation for this effect.

Figure 127: Performance of Change in Employees-to-Change in Net Operating Income: Long/Short Excess Returns, Average Monthly Returns, Reported on a Calendar Year Basis, 1952–2006



Past performance is not a guarantee of future returns.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 128: Performance of Change in Employees-to-Change in Net Operating Income, Average Excess Returns, Relative to Large-Cap Universe

	Relative Return										
Portofolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-200612											
Quintile 1	-0.1%	-0.1%	-0.1%	-0.2%	-0.2%	-0.2%	-0.2%	-0.1%	0.7%	1.6%	2.2%
Quintile 2	0.0%	0.0%	0.0%	-0.1%	-0.1%	-0.3%	-0.4%	-0.6%	-1.0%	-1.1%	-1.4%
Quintile 3	0.0%	0.0%	-0.1%	-0.2%	-0.1%	-0.1%	-0.1%	-0.2%	-0.3%	-0.5%	-0.9%
Quintile 4	0.0%	-0.1%	-0.1%	-0.2%	-0.3%	-0.3%	-0.4%	-0.6%	-1.2%	-1.8%	-1.8%
Quintile 5	0.0%	0.1%	0.1%	0.3%	0.5%	0.7%	1.0%	1.3%	1.6%	1.7%	1.9%
Long/Short Spread	-0.1%	-0.2%	-0.2%	-0.5%	-0.7%	-0.9%	-1.1%	-1.4%	-0.9%	-0.1%	0.3%
198701-200612											
Quintile 1	-0.1%	-0.2%	-0.3%	-0.7%	-1.0%	-1.3%	-1.6%	-1.9%	-1.6%	-1.4%	-1.5%
Quintile 2	0.0%	-0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-0.1%	0.2%	0.2%
Quintile 3	0.1%	0.1%	0.2%	0.6%	1.2%	1.8%	2.1%	2.4%	2.9%	3.9%	4.7%
Quintile 4	0.0%	0.0%	0.0%	0.1%	0.2%	0.2%	0.2%	0.2%	-0.4%	-1.2%	-1.3%
Quintile 5	-0.1%	-0.1%	-0.1%	-0.2%	-0.5%	-0.7%	-0.7%	-0.7%	-1.2%	-2.3%	-3.2%
Long/Short Spread	0.0%	-0.1%	-0.2%	-0.5%	-0.5%	-0.6%	-0.9%	-1.2%	-0.4%	0.9%	1.7%
199801-200612											
Quintile 1	0.0%	0.0%	-0.1%	-0.3%	-0.5%	-0.6%	-0.6%	-0.7%	0.4%	1.2%	1.9%
Quintile 2	-0.1%	-0.2%	-0.2%	-0.3%	-0.5%	-0.5%	-0.4%	-0.1%	0.0%	0.6%	-1.0%
Quintile 3	0.1%	0.2%	0.4%	0.9%	1.7%	2.4%	2.4%	2.1%	1.5%	2.2%	2.7%
Quintile 4	0.0%	0.1%	0.2%	0.6%	0.9%	1.1%	1.4%	1.6%	1.2%	1.1%	2.1%
Quintile 5	-0.1%	-0.2%	-0.2%	-0.4%	-1.0%	-1.4%	-1.5%	-1.4%	-2.0%	-3.9%	-4.5%
Long/Short Spread	0.1%	0.2%	0.1%	0.0%	0.6%	0.8%	0.9%	0.7%	2.4%	5.1%	6.4%

Past performance is not a guarantee of future returns.

Large-cap universe is Russell 1000 after 1978; pre-1978 it is defined via analogous market capitalization break-points

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 129: Performance of Percentage Change in Employees-to-Percentage Change in Net Operating Income, Average Excess Returns, Relative to Large-Cap Universe

	Relative Return										
Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-200612											
Quintile 1	-0.1%	-0.1%	-0.2%	-0.4%	-0.6%	-0.6%	-0.6%	-0.6%	-0.4%	-0.4%	-0.4%
Quintile 2	0.0%	-0.1%	-0.2%	-0.4%	-0.4%	-0.6%	-0.8%	-0.9%	-1.0%	-0.9%	-1.4%
Quintile 3	0.0%	0.0%	0.0%	0.1%	0.1%	0.1%	0.1%	-0.1%	-0.1%	0.0%	0.4%
Quintile 4	0.0%	0.1%	0.2%	0.4%	0.5%	0.8%	0.9%	1.0%	0.8%	0.6%	0.7%
Quintile 5	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.2%	0.2%	0.2%	0.2%
Long/Short Spread	-0.1%	-0.1%	-0.2%	-0.4%	-0.6%	-0.6%	-0.7%	-0.7%	-0.6%	-0.6%	-0.5%
198701-200612											
Quintile 1	-0.1%	-0.2%	-0.3%	-0.6%	-0.8%	-0.8%	-0.8%	-0.8%	-0.6%	-0.7%	-0.8%
Quintile 2	0.0%	-0.1%	-0.1%	-0.2%	-0.1%	-0.1%	-0.3%	-0.2%	-0.2%	0.1%	0.1%
Quintile 3	0.0%	0.1%	0.1%	0.4%	0.6%	0.5%	0.7%	0.5%	0.7%	1.0%	1.5%
Quintile 4	0.0%	0.1%	0.2%	0.4%	0.5%	0.7%	0.6%	0.6%	0.0%	-0.4%	-0.3%
Quintile 5	-0.1%	-0.1%	-0.2%	-0.3%	-0.4%	-0.6%	-0.5%	-0.5%	-0.6%	-1.0%	-1.6%
Long/Short Spread	0.0%	0.0%	-0.1%	-0.3%	-0.4%	-0.3%	-0.2%	-0.3%	0.1%	0.3%	0.8%
199801-200612											
Quintile 1	0.0%	0.0%	0.0%	-0.2%	-0.4%	-0.1%	0.3%	0.7%	1.5%	1.4%	1.7%
Quintile 2	0.0%	-0.1%	-0.1%	-0.4%	-0.4%	-0.7%	-1.2%	-1.5%	-1.6%	-0.6%	-1.6%
Quintile 3	0.0%	-0.1%	-0.1%	0.1%	0.3%	0.0%	0.1%	-0.4%	-0.8%	-1.2%	-1.2%
Quintile 4	0.1%	0.2%	0.4%	0.6%	0.6%	1.0%	0.8%	0.8%	0.3%	0.1%	0.8%
Quintile 5	0.0%	-0.1%	-0.2%	-0.1%	-0.3%	-0.5%	-0.4%	-0.4%	-0.6%	-1.0%	-1.1%
Long/Short Spread	0.1%	0.1%	0.2%	-0.1%	-0.1%	0.4%	0.7%	1.0%	2.1%	2.4%	2.8%

Past performance is not a guarantee of future returns.

Large-cap universe is Russell 1000 after 1978; pre-1978 it is defined via analogous market capitalization break-points

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 130: Performance of Change in Employees-to-Change in Net Operating Income Across GICS Sectors, Excess Return Relative to Sector

	196201-200612										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
Energy	-0.1%	-0.2%	-0.4%	-1.3%	-1.8%	-1.8%	-1.6%	-1.3%	-1.5%	-2.8%	-4.9%
Materials	-0.2%	-0.4%	-0.5%	-0.9%	-1.1%	-1.6%	-1.9%	-1.8%	-1.4%	-0.6%	-0.9%
Industrials	-0.1%	-0.3%	-0.5%	-1.1%	-1.8%	-2.4%	-3.1%	-4.1%	-4.9%	-3.4%	-1.7%
Consumer Discretionary	0.0%	0.0%	-0.1%	-0.2%	-0.3%	-0.6%	-1.0%	-1.1%	0.0%	1.0%	0.6%
Consumer Staples	-0.1%	-0.1%	-0.2%	-0.4%	-0.6%	-0.8%	-1.0%	-1.4%	-2.3%	-2.9%	-3.5%
Health Care	-0.3%	-0.5%	-0.8%	-0.9%	-0.5%	-0.1%	0.2%	0.4%	1.9%	5.3%	8.7%
Financials	-0.2%	-0.2%	-0.3%	-0.3%	0.0%	0.3%	0.7%	1.2%	2.5%	3.0%	3.9%
Information Technology	-0.1%	-0.3%	-0.6%	-1.2%	-1.0%	-0.4%	0.4%	0.8%	3.1%	4.9%	7.6%
Telecommunication Services	0.0%	0.0%	0.2%	0.0%	-0.6%	-0.7%	-1.1%	-2.0%	1.4%	8.1%	9.9%
Utilities	0.0%	0.0%	0.0%	0.1%	0.2%	0.5%	0.8%	1.1%	1.5%	1.1%	0.0%
	198701-200612										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
Energy	-0.2%	-0.3%	-0.5%	-1.5%	-2.5%	-2.5%	-2.3%	-1.7%	-1.4%	0.4%	0.7%
Materials	0.0%	-0.1%	0.2%	0.8%	1.5%	2.0%	2.8%	3.6%	6.1%	8.1%	8.9%
Industrials	-0.2%	-0.6%	-1.0%	-2.3%	-3.4%	-4.4%	-5.7%	-6.9%	-7.8%	-6.1%	-3.8%
Consumer Discretionary	0.1%	0.0%	-0.2%	-0.6%	-0.7%	-0.6%	-0.2%	0.3%	1.8%	3.2%	5.0%
Consumer Staples	0.2%	0.5%	0.7%	1.4%	2.1%	2.5%	2.7%	3.0%	4.0%	4.7%	5.2%
Health Care	-0.4%	-0.6%	-0.7%	-0.4%	0.2%	0.4%	0.5%	0.1%	1.5%	6.6%	11.2%
Financials	0.0%	0.0%	-0.1%	0.1%	0.1%	0.0%	-0.1%	-0.3%	-1.1%	-1.5%	-0.8%
Information Technology	-0.1%	-0.3%	-0.6%	-1.4%	-0.8%	-1.2%	-1.0%	-2.6%	-3.0%	-1.8%	-2.5%
Telecommunication Services	0.0%	-0.1%	-0.1%	-1.0%	-2.1%	-3.3%	-4.1%	-7.0%	-3.5%	4.8%	5.4%
Utilities	0.0%	0.0%	0.2%	0.5%	0.7%	1.0%	1.3%	2.0%	3.3%	4.3%	3.9%

Past performance is not a guarantee of future returns.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

EBITDA Margins

EBITDA margins capture the profitability of the firm before financing and investing expenses. A declining figure indicates that a firm is facing greater competition than before or is operating with significant cost inefficiencies. Companies with low levels of firm profitability are in highly competitive markets, and, in general, investors seek out high profitability companies in less competitive markets.

Unfortunately, this measure has little consistency in its ability to predict future stock returns. As shown in Figure 131 for EBITDA Margins and Figure 133 for Change in EBITDA Margins, the quintile spreads flip signs across periods. In the period from 1962 to 1986, investors would have wanted to short companies with *high* levels of EBITDA margins and go long companies with *low* levels of EBITDA margins. In the period from 1987 to the end of the 2006, investors would have wanted to do exactly the opposite, particularly from 1998 through 2006. At no time were EBITDA margins particularly helpful in distinguishing between winners and losers (see Figure 132), and there is little consistency in sector performance across time periods (see Figure 134).

Figure 131: Performance of EBITDA Margins, Average Excess Returns, Relative to Large-Cap Universe

	Relative Return										
Portofolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-200612											
Quintile 1	0.0%	-0.1%	-0.2%	-0.5%	-0.6%	-0.9%	-1.3%	-1.6%	-1.6%	-1.8%	-1.9%
Quintile 2	0.1%	0.1%	0.1%	0.1%	0.2%	0.3%	0.2%	0.4%	0.2%	-0.1%	-0.3%
Quintile 3	0.0%	0.0%	0.0%	0.1%	0.2%	0.2%	0.2%	-0.1%	-0.5%	-1.0%	-1.4%
Quintile 4	0.0%	0.1%	0.2%	0.3%	0.3%	0.4%	0.4%	0.7%	0.9%	0.8%	0.3%
Quintile 5	0.0%	0.0%	0.0%	0.0%	0.1%	0.3%	0.5%	0.9%	1.8%	2.9%	3.9%
Long/Short Spread	0.0%	-0.1%	-0.2%	-0.4%	-0.7%	-1.2%	-1.8%	-2.4%	-3.4%	-4.7%	-5.7%
198701-200612											
Quintile 1	-0.1%	-0.2%	-0.2%	-0.5%	-0.6%	-1.0%	-1.4%	-1.8%	-2.9%	-4.1%	-5.8%
Quintile 2	0.0%	0.0%	0.1%	0.1%	0.1%	0.2%	0.3%	0.4%	-0.3%	-1.5%	-2.1%
Quintile 3	0.0%	-0.1%	-0.2%	-0.4%	-0.7%	-1.1%	-1.6%	-2.2%	-3.1%	-4.2%	-5.5%
Quintile 4	0.0%	0.0%	0.1%	0.0%	-0.2%	-0.4%	-0.7%	-0.9%	-1.6%	-2.6%	-3.9%
Quintile 5	-0.1%	-0.2%	-0.3%	-0.7%	-1.0%	-1.2%	-1.3%	-1.5%	-1.3%	-0.3%	0.6%
Long/Short Spread	0.1%	0.0%	0.1%	0.3%	0.4%	0.2%	-0.1%	-0.3%	-1.5%	-3.8%	-6.4%
199801-200612											
Quintile 1	0.1%	0.2%	0.2%	0.2%	-0.1%	-0.3%	-0.5%	-0.7%	-1.6%	-2.8%	-5.3%
Quintile 2	0.1%	0.2%	0.4%	0.8%	1.2%	1.7%	2.4%	3.3%	2.6%	0.0%	-1.8%
Quintile 3	-0.1%	-0.1%	-0.2%	-0.3%	-0.5%	-0.6%	-0.6%	-1.1%	-1.2%	-2.0%	-2.2%
Quintile 4	0.1%	0.1%	0.2%	0.4%	0.7%	0.9%	1.1%	1.3%	1.6%	2.3%	3.0%
Quintile 5	-0.3%	-0.6%	-1.0%	-1.7%	-2.2%	-2.6%	-3.7%	-4.6%	-6.3%	-7.6%	-8.6%
Long/Short Spread	0.5%	0.8%	1.2%	1.9%	2.1%	2.3%	3.2%	3.8%	4.6%	4.7%	3.3%

Past performance is not a guarantee of future returns.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 132: Performance of EBITDA Margins, Stock Selection Percentages

	Percent of Companies Outperforming										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-200612											
Quintile 1	48%	48%	47%	46%	45%	44%	42%	42%	40%	39%	38%
Quintile 2	49%	48%	48%	47%	46%	45%	44%	43%	42%	41%	40%
Quintile 3	48%	48%	48%	47%	46%	45%	44%	43%	42%	41%	39%
Quintile 4	48%	48%	48%	47%	45%	44%	44%	43%	42%	41%	39%
Quintile 5	48%	48%	48%	46%	46%	45%	44%	44%	43%	42%	40%
198701-200612											
Quintile 1	48%	47%	47%	45%	44%	42%	40%	39%	36%	34%	32%
Quintile 2	48%	48%	47%	46%	44%	42%	41%	39%	37%	35%	33%
Quintile 3	48%	48%	47%	46%	44%	42%	41%	40%	37%	35%	34%
Quintile 4	48%	48%	48%	46%	44%	42%	41%	40%	38%	36%	34%
Quintile 5	48%	48%	47%	44%	43%	41%	40%	39%	36%	34%	32%
199801-200612											
Quintile 1	48%	47%	46%	44%	41%	38%	35%	34%	30%	28%	25%
Quintile 2	48%	48%	47%	45%	42%	40%	37%	36%	32%	30%	28%
Quintile 3	48%	47%	46%	44%	42%	40%	38%	36%	33%	31%	29%
Quintile 4	49%	48%	47%	45%	42%	40%	38%	37%	34%	32%	30%
Quintile 5	48%	46%	45%	41%	39%	36%	34%	33%	29%	26%	24%

Past performance is not a guarantee of future returns.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 133: Performance of Change in EBITDA Margins, Average Excess Returns, Relative to Large-Cap Universe

	Relative Return										
Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-198612											
Quintile 1	0.2%	0.1%	-0.1%	-0.3%	-0.6%	-0.7%	-0.7%	-0.5%	0.4%	-0.5%	-1.7%
Quintile 2	0.1%	0.1%	0.2%	0.5%	0.7%	1.0%	1.2%	1.4%	1.8%	1.7%	1.8%
Quintile 3	0.1%	0.2%	0.3%	0.7%	1.1%	1.5%	1.8%	2.2%	3.0%	3.9%	5.1%
Quintile 4	0.0%	0.0%	0.2%	0.5%	0.9%	1.4%	1.8%	2.4%	3.7%	5.0%	6.1%
Quintile 5	-0.2%	-0.4%	-0.5%	-0.3%	0.0%	0.3%	0.6%	0.4%	0.3%	0.7%	1.7%
Long/Short Spread	0.4%	0.5%	0.4%	0.0%	-0.6%	-1.0%	-1.2%	-0.9%	0.1%	-1.2%	-3.4%
198701-200612											
Quintile 1	0.0%	0.0%	0.0%	-0.2%	-0.2%	-0.2%	-0.4%	-1.0%	-2.7%	-5.0%	-6.9%
Quintile 2	-0.1%	-0.1%	-0.2%	-0.3%	-0.4%	-0.7%	-1.0%	-1.3%	-1.8%	-2.2%	-2.8%
Quintile 3	0.0%	-0.1%	-0.1%	-0.2%	-0.4%	-0.9%	-1.3%	-1.6%	-2.4%	-3.3%	-3.7%
Quintile 4	0.0%	0.1%	0.0%	-0.2%	-0.3%	-0.5%	-0.5%	-0.6%	-1.0%	-1.3%	-2.4%
Quintile 5	-0.1%	-0.2%	-0.4%	-0.8%	-1.2%	-1.5%	-1.7%	-1.9%	-2.0%	-1.8%	-2.2%
Long/Short Spread	0.2%	0.2%	0.4%	0.7%	1.0%	1.3%	1.3%	0.9%	-0.7%	-3.2%	-4.8%
199801-200612											
Quintile 1	0.2%	0.3%	0.4%	0.9%	1.4%	2.0%	2.5%	2.5%	0.7%	-4.6%	-10.7%
Quintile 2	0.0%	-0.1%	-0.3%	-0.6%	-0.9%	-1.4%	-2.2%	-3.0%	-3.8%	-4.3%	-5.1%
Quintile 3	0.0%	-0.1%	-0.1%	-0.3%	-0.7%	-1.5%	-1.9%	-2.2%	-2.2%	-2.0%	-1.1%
Quintile 4	0.1%	0.2%	0.2%	0.1%	0.0%	-0.1%	-0.1%	0.1%	0.5%	2.4%	4.1%
Quintile 5	-0.3%	-0.4%	-0.7%	-0.9%	-0.6%	-0.1%	0.4%	0.3%	-0.3%	-0.5%	-0.4%
Long/Short Spread	0.4%	0.7%	1.1%	1.8%	2.0%	2.1%	2.1%	2.3%	1.0%	-4.1%	-10.3%

Past performance is not a guarantee of future returns.

Large-cap universe is Russell 1000 after 1978; pre-1978 it is defined via analogous market capitalization break-points

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 134: Performance of EBITDA Margins Across GICS Sectors, Excess Return Relative to Sector

	196201-198612										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
Energy	-0.6%	-1.2%	-1.8%	-3.2%	-4.4%	-5.8%	-6.9%	-8.1%	-10.0%	-11.2%	-12.1%
Materials	0.1%	0.0%	0.1%	-0.2%	-0.8%	-1.2%	-2.1%	-3.1%	-5.2%	-7.7%	-10.1%
Industrials	-0.1%	-0.2%	-0.3%	-0.8%	-1.2%	-1.5%	-1.9%	-2.7%	-5.3%	-7.1%	-5.4%
Consumer Discretionary	0.3%	0.5%	0.7%	1.0%	1.7%	2.3%	2.9%	3.4%	4.3%	4.6%	4.4%
Consumer Staples	-0.1%	-0.5%	-0.6%	-1.1%	-1.3%	-1.3%	-1.1%	-0.8%	-0.3%	0.2%	1.1%
Health Care	-0.2%	-0.6%	-1.0%	-1.5%	-2.3%	-3.9%	-5.9%	-7.8%	-11.4%	-15.4%	-20.0%
Information Technology	-0.4%	-0.7%	-1.3%	-2.6%	-3.9%	-5.1%	-7.6%	-11.3%	-17.3%	-23.9%	-30.7%
Telecommunication Services	0.8%	1.7%	2.5%	4.1%	5.5%	6.0%	7.0%	7.9%	9.1%	11.1%	13.0%
Utilities	-0.3%	-0.5%	-0.8%	-1.6%	-3.2%	-4.3%	-6.2%	-7.3%	-9.7%	-12.4%	-15.6%

	198701-200612										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
Energy	-0.2%	-0.4%	-0.8%	-1.2%	-1.4%	-1.7%	-2.5%	-3.3%	-6.2%	-11.2%	-14.7%
Materials	-0.1%	-0.2%	-0.3%	-0.5%	-1.0%	-1.0%	-1.0%	-1.6%	-2.1%	-2.6%	-4.6%
Industrials	0.2%	0.4%	0.6%	1.1%	1.7%	2.8%	3.8%	5.4%	7.3%	7.5%	7.2%
Consumer Discretionary	-0.2%	-0.4%	-0.6%	-0.9%	-1.4%	-2.0%	-2.8%	-3.5%	-6.4%	-11.0%	-16.0%
Consumer Staples	0.1%	0.1%	0.2%	0.3%	0.2%	0.0%	0.2%	0.6%	1.3%	2.0%	3.7%
Health Care	-0.1%	-0.3%	-0.3%	-0.5%	-1.4%	-1.0%	-1.0%	-2.5%	-8.1%	-17.0%	-23.4%
Information Technology	0.5%	0.8%	1.2%	2.6%	4.0%	5.1%	6.5%	7.6%	5.3%	-0.5%	-7.2%
Telecommunication Services	0.1%	0.6%	1.0%	0.8%	0.3%	-1.9%	-4.8%	-7.2%	-10.1%	-9.7%	-9.8%
Utilities	0.1%	0.1%	0.0%	0.4%	0.7%	1.0%	1.3%	1.0%	0.3%	0.5%	3.0%

	199801-200612										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
Energy	0.0%	0.0%	0.0%	1.1%	2.1%	3.7%	3.8%	4.1%	2.3%	-5.4%	-12.3%
Materials	0.3%	0.7%	1.3%	2.7%	2.9%	4.1%	5.6%	5.7%	6.6%	7.5%	1.8%
Industrials	0.2%	0.5%	0.8%	1.3%	1.4%	2.3%	3.4%	5.6%	8.1%	7.4%	2.8%
Consumer Discretionary	-0.2%	-0.4%	-0.6%	-0.7%	-1.3%	-1.7%	-2.0%	-2.0%	-3.6%	-5.7%	-6.7%
Consumer Staples	0.2%	0.6%	0.8%	1.1%	1.2%	1.2%	1.9%	2.4%	4.5%	4.9%	3.8%
Health Care	0.0%	0.0%	0.1%	-0.4%	-4.1%	-4.1%	-5.3%	-7.6%	-19.2%	-32.2%	-36.9%
Information Technology	1.0%	1.6%	2.5%	4.0%	5.3%	5.3%	9.4%	12.9%	19.5%	18.8%	16.4%
Telecommunication Services	1.1%	3.0%	4.5%	5.6%	4.9%	1.0%	-2.3%	-5.1%	0.5%	12.1%	17.2%
Utilities	0.3%	0.7%	0.7%	1.7%	2.1%	2.6%	2.9%	2.2%	1.6%	4.6%	11.0%

Past performance is not a guarantee of future returns.

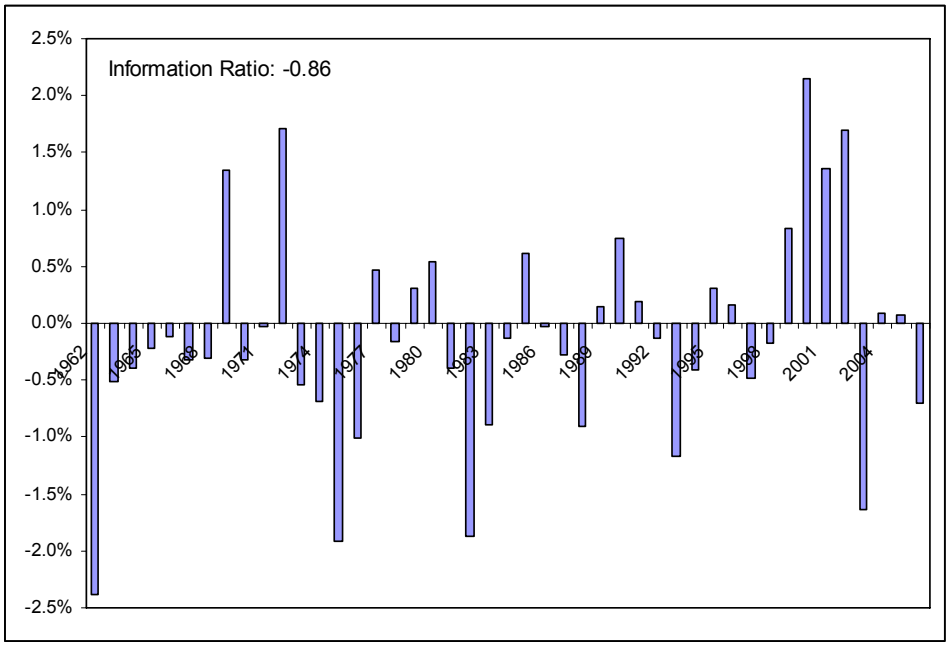
Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Pre-Tax Margins

Pre-tax margins capture the profitability of the firm after accounting for financing and investing expenses. As with EBITDA margins, both the level and change in pre-tax margins reflect the efficiency of operations and the competitiveness of the markets for the firm's goods.

The ability of pre-tax margins to predict future returns is limited. Over the period 1962 through 2006, there is weak evidence that firms with *low* pre-tax margins underperform those with *high* pre-tax margins—the Q1-Q5 spread is -1.3% at the 12-month horizon—which is counter-intuitive. However, the result is not stable but indeed flip-flops in different periods. In the 1962 to 1986 timeframe Q1 *underperforms* Q5 by 280 bps, while in the years 1998 to 2006 Q1 *outperforms* Q5 by 340 bps (see Figure 135, Figure 136, Figure 137, Figure 138). It is exactly this lack of consistency in factor performance which leads us not to consider pre-tax margins as a signal in our model.

Figure 135: Performance of Pre-Tax Margins: Long/Short Excess Returns, Average Monthly Returns, Reported on a Calendar Year Basis, 1962 to 2006



Past performance is not a guarantee of future returns.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 136: Performance of Pre-Tax Margins, Average Excess Returns, Relative to Large-Cap Universe

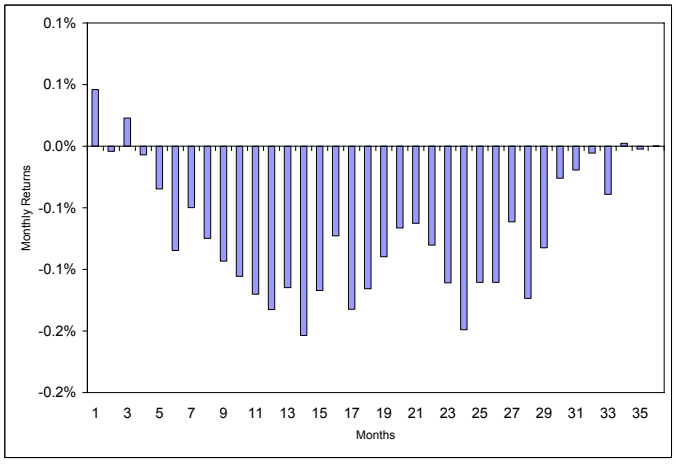
	Relative Return										
Portofolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-200612											
Quintile 1	0.0%	-0.1%	-0.1%	-0.4%	-0.6%	-0.9%	-1.3%	-1.6%	-1.9%	-2.4%	-2.6%
Quintile 2	0.0%	-0.1%	-0.1%	-0.2%	-0.3%	-0.5%	-0.7%	-0.8%	-1.2%	-1.8%	-2.3%
Quintile 3	0.0%	0.0%	0.0%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.2%	-0.4%	-0.6%
Quintile 4	0.1%	0.2%	0.3%	0.6%	0.9%	1.0%	1.2%	1.5%	2.2%	2.6%	3.1%
Quintile 5	0.0%	-0.1%	-0.1%	0.0%	0.1%	0.4%	0.6%	0.8%	1.2%	1.9%	2.1%
Long/Short Spread	0.0%	0.0%	0.0%	-0.3%	-0.7%	-1.3%	-2.0%	-2.3%	-3.1%	-4.3%	-4.7%
198701-200612											
Quintile 1	0.0%	-0.1%	-0.2%	-0.3%	-0.4%	-0.6%	-0.9%	-0.9%	-1.7%	-2.8%	-3.5%
Quintile 2	0.0%	-0.1%	-0.2%	-0.4%	-0.6%	-1.0%	-1.5%	-1.9%	-3.0%	-4.5%	-6.2%
Quintile 3	-0.1%	-0.1%	-0.2%	-0.3%	-0.5%	-0.7%	-1.0%	-1.4%	-2.3%	-3.0%	-3.9%
Quintile 4	0.1%	0.2%	0.3%	0.4%	0.3%	0.1%	0.0%	0.0%	0.4%	0.4%	0.1%
Quintile 5	-0.1%	-0.2%	-0.4%	-0.9%	-1.2%	-1.2%	-1.3%	-1.9%	-2.6%	-2.8%	-3.3%
Long/Short Spread	0.1%	0.1%	0.2%	0.5%	0.8%	0.6%	0.5%	0.9%	0.9%	0.0%	-0.1%
199801-200612											
Quintile 1	0.1%	0.2%	0.2%	0.3%	0.3%	0.4%	0.3%	0.9%	0.2%	-2.7%	-6.1%
Quintile 2	0.1%	0.1%	0.2%	0.3%	0.2%	-0.1%	-0.4%	-0.5%	-0.6%	-0.8%	-0.9%
Quintile 3	0.0%	0.0%	0.1%	0.2%	0.3%	0.6%	1.1%	1.2%	1.2%	1.9%	3.4%
Quintile 4	0.2%	0.3%	0.5%	0.9%	1.2%	1.3%	1.7%	2.2%	3.7%	4.3%	4.6%
Quintile 5	-0.5%	-0.9%	-1.4%	-2.5%	-2.8%	-3.1%	-3.9%	-5.7%	-9.5%	-12.9%	-16.0%
Long/Short Spread	0.6%	1.1%	1.6%	2.8%	3.2%	3.4%	4.3%	6.6%	9.7%	10.2%	9.9%
196201-198612											
Quintile 1	0.1%	0.0%	-0.1%	-0.4%	-0.8%	-1.1%	-1.7%	-2.0%	-2.0%	-2.1%	-2.0%
Quintile 2	0.0%	0.0%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	0.0%	0.1%	0.1%	0.4%
Quintile 3	0.0%	0.0%	0.1%	0.1%	0.3%	0.4%	0.5%	0.8%	1.3%	1.5%	1.6%
Quintile 4	0.1%	0.2%	0.3%	0.8%	1.3%	1.7%	2.2%	2.7%	3.5%	4.3%	5.1%
Quintile 5	0.1%	0.1%	0.1%	0.6%	1.2%	1.7%	2.1%	2.7%	4.0%	5.2%	5.9%
Long/Short Spread	0.0%	-0.1%	-0.2%	-1.0%	-2.0%	-2.8%	-3.8%	-4.8%	-6.0%	-7.3%	-7.9%

Past performance is not a guarantee of future returns.

Large-cap universe is Russell 1000 after 1978; pre-1978 it is defined via analogous market capitalization break-points

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

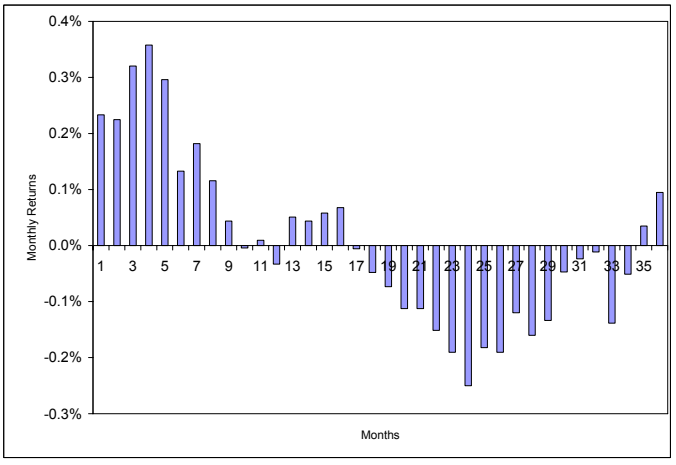
Figure 137: Pre-tax Margins: Q1-Q5 Relative Returns per Month after Portfolio Implementation, 1962 thru 2006



Past performance is not a guarantee of future returns.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 138: Pre-tax Margins: Q1-Q5 Relative Returns per Month After Portfolio Implementation, 1990 thru 2006



Past performance is not a guarantee of future returns.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

COGS Margins and Changes in COGS Margins

COGS (cost of goods sold) margins capture the cost of procuring or manufacturing goods and services for sale as a fraction of revenues earned. We view COGS margins as a measure of a company's pricing power and its efficiency of production. A marked decrease in COGS margins could be a sign of inflated earnings. An increase in the ratio could be indicating increased competition or cost inefficiencies. Hence, it is also a measure of the sustainability of profitability.

The empirical evidence for changes in COGS margins as a predictor of future stock returns is weak. There is little consistency over time in the returns to the factor as seen in the quintile spreads. Also, the returns are U-shaped, with Q3 often out-performing Q1 for which we have no obvious explanation and certainly would not have predicted ex-ante (see Figure 139). Additionally, the signal is not particularly helpful in stock selection (see Figure 140), nor are there any indications of the factor being reliable within sectors (see Figure 141). For completeness, we also test COGS margins by itself. As shown in Figure 142 and Figure 143, this incarnation of the variable is even less profitable.

Figure 139: Performance of Change in COGS Margins, Average Excess Returns, Relative to Large-Cap Universe

	Relative Return										
Portofolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-198612											
Quintile 1	-0.2%	-0.4%	-0.5%	-0.4%	-0.1%	-0.1%	0.3%	0.3%	0.6%	0.0%	1.1%
Quintile 2	-0.2%	-0.2%	-0.2%	-0.3%	-0.1%	0.3%	0.5%	0.6%	1.8%	2.3%	2.2%
Quintile 3	0.2%	0.4%	0.5%	1.2%	2.3%	3.3%	4.8%	6.3%	8.9%	11.7%	13.9%
Quintile 4	0.2%	0.2%	0.4%	0.5%	0.9%	1.4%	1.3%	1.1%	0.8%	0.7%	0.4%
Quintile 5	0.3%	0.5%	0.7%	1.0%	1.5%	1.6%	1.6%	1.6%	1.8%	2.1%	2.6%
Long/Short Spread	-0.5%	-0.9%	-1.2%	-1.4%	-1.6%	-1.7%	-1.3%	-1.3%	-1.2%	-2.1%	-1.5%
198701-200612											
Quintile 1	-0.1%	-0.1%	-0.1%	-0.2%	-0.1%	0.0%	0.1%	0.0%	0.7%	1.6%	2.7%
Quintile 2	0.0%	0.0%	-0.1%	-0.1%	-0.2%	-0.5%	-0.7%	-0.7%	-0.8%	-1.1%	-1.2%
Quintile 3	0.0%	0.0%	0.0%	0.0%	0.0%	-0.1%	-0.1%	-0.3%	-0.4%	-0.1%	-0.4%
Quintile 4	0.1%	0.1%	0.2%	0.1%	-0.1%	-0.3%	-0.5%	-0.5%	-0.7%	-1.1%	-1.6%
Quintile 5	0.0%	-0.1%	0.0%	0.1%	0.4%	0.9%	1.1%	1.1%	0.8%	0.2%	0.0%
Long/Short Spread	-0.1%	0.0%	-0.1%	-0.4%	-0.5%	-0.9%	-1.1%	-1.0%	0.0%	1.4%	2.7%
199801-200612											
Quintile 1	0.0%	-0.1%	-0.1%	0.1%	0.7%	1.2%	1.2%	1.1%	1.3%	0.8%	1.7%
Quintile 2	0.0%	0.1%	0.0%	0.0%	-0.1%	-0.5%	-0.7%	-0.6%	-0.5%	-0.4%	-0.5%
Quintile 3	0.0%	0.0%	0.0%	-0.1%	-0.5%	-0.7%	-1.0%	-1.5%	-1.7%	-0.8%	-1.0%
Quintile 4	0.1%	0.2%	0.3%	0.2%	-0.2%	-0.6%	-0.7%	-0.5%	-0.4%	-0.2%	0.0%
Quintile 5	-0.2%	-0.2%	-0.2%	-0.1%	0.2%	0.9%	1.4%	1.7%	1.6%	0.9%	0.4%
Long/Short Spread	0.1%	0.2%	0.2%	0.2%	0.5%	0.2%	-0.2%	-0.6%	-0.3%	-0.2%	1.3%

Past performance is not a guarantee of future returns.

Large-cap universe is Russell 1000 after 1978; pre-1978 it is defined via analogous market capitalization break-points

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 140: Performance of Changes in COGS Margins, Stock Selection Percentages

	Percent of Companies Outperforming										
Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-198612											
Quintile 1	47%	48%	46%	47%	48%	47%	47%	46%	46%	46%	45%
Quintile 2	48%	47%	48%	45%	45%	44%	44%	44%	45%	44%	43%
Quintile 3	51%	51%	50%	51%	51%	52%	51%	52%	52%	52%	49%
Quintile 4	51%	50%	50%	51%	51%	50%	50%	50%	49%	48%	47%
Quintile 5	51%	52%	52%	51%	51%	50%	50%	48%	48%	47%	46%
198701-200612											
Quintile 1	47%	47%	46%	44%	42%	40%	39%	37%	35%	34%	32%
Quintile 2	48%	47%	47%	45%	44%	42%	41%	40%	38%	36%	35%
Quintile 3	49%	49%	49%	46%	46%	44%	43%	42%	39%	37%	34%
Quintile 4	48%	48%	47%	45%	44%	42%	40%	39%	37%	34%	33%
Quintile 5	48%	48%	47%	45%	43%	41%	39%	38%	35%	33%	31%
199801-200612											
Quintile 1	47%	47%	45%	43%	40%	38%	36%	35%	31%	29%	27%
Quintile 2	48%	48%	46%	44%	42%	39%	37%	36%	33%	31%	29%
Quintile 3	49%	48%	47%	44%	42%	39%	38%	36%	33%	31%	29%
Quintile 4	49%	48%	47%	44%	42%	40%	38%	36%	32%	30%	27%
Quintile 5	48%	47%	46%	44%	41%	38%	35%	33%	30%	27%	24%

Past performance is not a guarantee of future returns.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 141: Performance of Change in COGS Margins Across GICS Sectors, Excess Return Relative to Sector

	196201-198612										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
Energy	0.1%	0.2%	0.2%	2.1%	4.5%	5.9%	6.9%	7.7%	10.5%	12.1%	13.4%
Materials	-0.4%	-0.5%	-0.8%	-1.1%	-0.7%	-0.8%	-0.8%	-2.3%	-4.3%	-8.9%	-10.9%
Industrials	0.2%	0.4%	0.5%	-0.5%	-1.3%	-2.9%	-4.6%	-4.6%	-2.8%	-1.7%	0.3%
Consumer Discretionary	-0.2%	-0.2%	-0.4%	-1.4%	-2.7%	-3.4%	-4.3%	-5.9%	-8.1%	-11.1%	-10.9%
Consumer Staples	-0.1%	0.0%	-0.1%	0.7%	1.3%	1.8%	2.0%	1.6%	-0.7%	-1.6%	-1.3%
Health Care	-0.5%	-0.6%	-0.5%	-0.4%	-0.9%	-2.3%	-3.0%	-4.4%	-6.6%	-10.5%	-9.5%
Information Technology	-0.9%	-1.4%	-2.2%	-3.9%	-6.7%	-8.1%	-7.6%	-6.5%	-3.0%	-1.0%	1.5%
Telecommunication Services	-0.3%	-0.4%	0.3%	1.8%	3.6%	5.7%	7.9%	11.7%	13.8%	18.6%	13.8%
Utilities	-0.6%	-0.6%	-0.5%	-0.4%	0.3%	0.3%	2.2%	3.3%	1.2%	2.1%	5.2%
	198701-200612										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
Energy	0.1%	0.4%	0.5%	-0.8%	-2.0%	-5.0%	-7.2%	-9.2%	-9.1%	-5.7%	-2.6%
Materials	-0.2%	-0.3%	-0.5%	-0.8%	-0.2%	0.6%	1.5%	2.1%	5.4%	7.6%	9.5%
Industrials	0.0%	-0.2%	-0.3%	-0.8%	-1.1%	-2.0%	-2.9%	-3.4%	-3.7%	-4.9%	-6.2%
Consumer Discretionary	-0.4%	-0.7%	-1.0%	-1.8%	-2.7%	-4.0%	-4.8%	-5.1%	-3.2%	0.5%	3.2%
Consumer Staples	0.0%	-0.2%	-0.3%	0.1%	0.1%	-0.2%	-0.2%	-0.5%	-2.4%	-3.0%	-2.8%
Health Care	-0.4%	-0.5%	-1.0%	-1.9%	-3.5%	-4.5%	-5.6%	-7.2%	-8.5%	-5.3%	0.2%
Information Technology	-0.5%	-0.6%	-0.7%	-1.3%	-1.2%	-0.9%	-0.9%	0.4%	1.5%	3.0%	7.9%
Telecommunication Services	-1.3%	-2.7%	-4.1%	-6.4%	-7.1%	-6.7%	-6.3%	-4.4%	-0.9%	2.2%	5.5%
Utilities	-0.1%	-0.1%	-0.1%	-0.2%	0.2%	0.1%	0.1%	0.7%	2.5%	5.9%	6.6%

Past performance is not a guarantee of future returns.

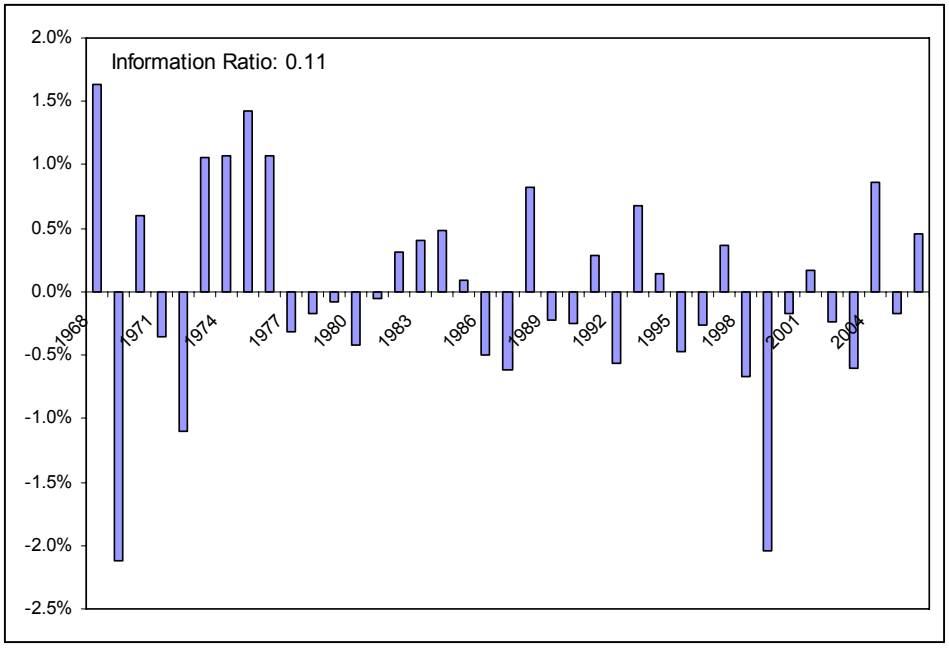
Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 142: Performance of COGS Margins Across GICS Sectors, Excess Return Relative to Sector

	196201-198612										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
Energy	0.2%	0.6%	0.8%	1.7%	2.1%	2.6%	3.2%	4.0%	5.4%	7.5%	8.0%
Materials	-0.5%	-0.8%	-1.1%	-1.8%	-1.7%	-1.7%	-1.2%	-0.8%	-0.4%	-1.4%	-1.9%
Industrials	0.3%	0.9%	1.3%	2.7%	3.8%	4.7%	5.7%	7.6%	10.5%	12.0%	14.1%
Consumer Discretionary	0.3%	0.2%	0.2%	0.1%	0.0%	0.7%	0.9%	1.2%	2.2%	3.2%	4.9%
Consumer Staples	0.2%	0.3%	0.4%	0.6%	0.6%	0.7%	0.4%	-0.4%	-2.8%	-6.1%	-11.0%
Health Care	-0.2%	-0.2%	-0.1%	-0.7%	-1.1%	-2.2%	-4.3%	-5.9%	-9.6%	-12.3%	-12.5%
Information Technology	0.4%	1.0%	1.6%	2.3%	4.1%	5.8%	8.4%	10.8%	20.0%	30.8%	41.3%
Telecommunication Services	0.1%	-0.2%	0.1%	1.0%	1.5%	2.4%	3.6%	6.2%	9.2%	9.4%	10.5%
Utilities	0.1%	0.0%	0.2%	0.4%	1.1%	1.7%	2.6%	3.6%	5.7%	6.5%	10.0%
	198701-200612										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
Energy	0.2%	0.5%	0.7%	1.3%	1.8%	1.9%	2.4%	3.3%	6.3%	11.5%	16.6%
Materials	-0.1%	-0.3%	-0.6%	-1.1%	-1.2%	-1.3%	-0.8%	-0.4%	-0.2%	-0.7%	-0.5%
Industrials	-0.1%	-0.1%	-0.1%	-0.2%	-0.5%	-1.0%	-1.7%	-2.6%	-4.5%	-5.3%	-5.6%
Consumer Discretionary	0.1%	0.2%	0.5%	1.0%	1.5%	2.3%	2.9%	3.8%	6.9%	11.0%	15.3%
Consumer Staples	-0.1%	-0.3%	-0.6%	-1.0%	-1.9%	-2.9%	-4.3%	-5.7%	-9.0%	-12.0%	-15.3%
Health Care	-0.3%	-0.7%	-1.2%	-3.0%	-4.7%	-5.9%	-7.1%	-8.0%	-9.3%	-8.7%	-10.1%
Information Technology	-0.3%	-0.5%	-0.7%	-0.3%	0.3%	0.5%	-1.1%	-3.1%	-3.4%	0.7%	7.8%
Telecommunication Services	-0.6%	-0.9%	-1.2%	-1.3%	-0.8%	0.0%	0.7%	1.5%	2.4%	5.8%	7.0%
Utilities	-0.4%	-0.7%	-0.9%	-1.8%	-2.8%	-4.0%	-5.0%	-5.5%	-5.2%	-6.2%	-11.8%

Past performance is not a guarantee of future returns.
Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 143: Performance of COGS Margins: Long/Short Excess Returns, Average Monthly Returns, Reported on a Calendar Year Basis, 1968-2006



Past performance is not a guarantee of future returns.
Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Net PP&E Margins

Net PP&E margins quantifies the utilization efficiency of a firm's fixed asset base to produce revenues. A higher ratio corresponds to greater revenue production ability for a fixed amount of assets. A low ratio may indicate either overinvestment in PP&E, low asset productivity, or aggressive accounting practices (e.g., depreciation policies). In short, we would expect a high number here to forecast positive future returns and a low number to harbinger negative future returns.

There is no evidence to support this claim. As seen in Figure 144, the quintile spreads between companies with low PP&E margins and companies with high PP&E margins are rather small. Moreover, in many of the periods, the Q5 returns are positive and outperform the Q1 returns. Additionally, Q5 is no better at picking loser stocks than is Q1 (Figure 145). The story remains unchanged at the individual sector level (Figure 146).

Figure 144: Performance of Net PP&E Margins, Average Excess Returns, Relative to Large-Cap Universe

	Relative Return										
Portofolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-198612											
Quintile 1	0.1%	0.1%	0.2%	0.3%	0.4%	0.7%	0.9%	1.0%	1.6%	2.1%	2.6%
Quintile 2	0.0%	-0.1%	0.0%	-0.1%	-0.2%	-0.4%	-0.4%	-0.6%	-0.7%	-0.6%	-0.8%
Quintile 3	-0.1%	-0.2%	-0.2%	-0.5%	-0.8%	-0.9%	-1.2%	-1.2%	-1.7%	-2.6%	-3.4%
Quintile 4	0.0%	-0.1%	-0.2%	-0.5%	-0.9%	-1.3%	-1.6%	-2.4%	-3.3%	-3.8%	-4.1%
Quintile 5	0.0%	-0.1%	-0.2%	-0.4%	-0.3%	-0.6%	-1.0%	-1.2%	-1.4%	-1.5%	-1.4%
Long/Short Spread	0.1%	0.2%	0.4%	0.7%	0.8%	1.3%	1.8%	2.2%	3.1%	3.6%	3.9%
198701-200612											
Quintile 1	0.1%	0.1%	0.1%	0.2%	0.3%	0.4%	0.5%	0.5%	0.5%	0.7%	1.2%
Quintile 2	0.1%	0.0%	0.1%	0.3%	0.3%	0.5%	0.4%	0.2%	0.4%	0.5%	0.6%
Quintile 3	-0.2%	-0.2%	-0.4%	-0.7%	-0.9%	-1.0%	-0.9%	-0.8%	-1.0%	-1.1%	-1.2%
Quintile 4	0.0%	0.0%	0.0%	0.0%	-0.1%	-0.3%	-0.6%	-0.8%	-1.0%	-0.9%	-1.2%
Quintile 5	0.0%	0.1%	0.1%	0.1%	0.2%	0.3%	0.4%	0.6%	0.7%	0.5%	0.2%
Long/Short Spread	0.0%	0.0%	0.0%	0.0%	0.1%	0.2%	0.1%	-0.1%	-0.3%	0.2%	1.0%
199801-200612											
Quintile 1	0.1%	0.3%	0.3%	0.4%	0.5%	0.8%	1.1%	1.2%	0.9%	1.7%	2.9%
Quintile 2	0.0%	0.0%	0.1%	0.3%	0.3%	0.6%	0.3%	-0.3%	-0.3%	-0.4%	0.0%
Quintile 3	-0.2%	-0.2%	-0.5%	-0.8%	-1.0%	-1.2%	-1.2%	-1.3%	-1.9%	-2.1%	-2.7%
Quintile 4	0.0%	0.0%	0.1%	0.1%	0.2%	-0.1%	-0.5%	-0.5%	-0.2%	-0.4%	-1.3%
Quintile 5	0.0%	0.0%	0.0%	-0.2%	-0.3%	-0.4%	-0.1%	0.3%	0.8%	1.0%	1.0%
Long/Short Spread	0.1%	0.3%	0.4%	0.6%	0.9%	1.2%	1.3%	0.9%	0.2%	0.7%	1.8%

Past performance is not a guarantee of future returns.

Large-cap universe is Russell 1000 after 1978; pre-1978 it is defined via analogous market capitalization break-points
Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 145: Performance of Net PP&E Margins, Stock Selection Percentages

	Percent of Companies Outperforming										
Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-198612											
Quintile 1	50%	49%	49%	48%	47%	48%	48%	48%	49%	49%	48%
Quintile 2	49%	48%	48%	47%	46%	45%	46%	44%	43%	42%	41%
Quintile 3	48%	48%	48%	45%	44%	44%	41%	42%	40%	38%	37%
Quintile 4	49%	49%	48%	46%	43%	42%	41%	39%	37%	37%	36%
Quintile 5	48%	47%	47%	47%	47%	45%	45%	45%	43%	42%	41%
198701-200612											
Quintile 1	48%	48%	48%	47%	46%	44%	43%	42%	40%	39%	37%
Quintile 2	49%	48%	48%	46%	45%	44%	43%	42%	40%	38%	37%
Quintile 3	48%	48%	47%	45%	44%	42%	41%	40%	39%	37%	36%
Quintile 4	49%	48%	48%	46%	45%	43%	42%	41%	39%	37%	36%
Quintile 5	49%	49%	48%	47%	45%	45%	44%	43%	41%	39%	37%
199801-200612											
Quintile 1	49%	48%	48%	46%	44%	42%	40%	38%	35%	32%	30%
Quintile 2	49%	48%	47%	44%	42%	40%	38%	36%	33%	31%	28%
Quintile 3	48%	47%	45%	43%	40%	38%	36%	35%	32%	29%	27%
Quintile 4	48%	47%	46%	43%	41%	39%	37%	35%	32%	30%	27%
Quintile 5	48%	48%	47%	45%	42%	40%	39%	38%	35%	31%	29%

Past performance is not a guarantee of future returns.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 146: Performance of Net PP&E Margins Across GICS Sectors, Excess Return Relative to Sector

	196201-198612										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
Energy	0.3%	0.7%	1.0%	1.4%	1.1%	0.4%	-0.1%	0.5%	1.1%	0.7%	-2.3%
Materials	0.4%	0.4%	0.4%	0.1%	-1.0%	-2.6%	-2.8%	-3.0%	-3.7%	-5.4%	-6.4%
Industrials	0.0%	-0.2%	0.0%	0.9%	1.8%	2.7%	3.7%	4.1%	5.9%	8.3%	9.2%
Consumer Discretionary	-0.1%	-0.2%	-0.2%	0.1%	0.9%	2.1%	3.4%	4.3%	7.5%	7.1%	5.5%
Consumer Staples	0.5%	0.8%	1.5%	3.8%	5.0%	5.5%	5.4%	6.7%	8.5%	10.8%	11.4%
Health Care	-0.7%	-1.3%	-1.9%	-2.7%	-4.0%	-4.1%	-3.5%	-2.5%	-1.5%	-1.7%	-2.6%
Information Technology	0.0%	0.0%	-0.2%	0.0%	0.9%	2.9%	5.7%	7.6%	9.3%	8.2%	2.3%
Telecommunication Services	0.2%	0.1%	-0.4%	-0.1%	-2.5%	-5.4%	-7.6%	-10.9%	-22.1%	-25.6%	-19.3%
Utilities	0.3%	0.5%	0.8%	1.4%	1.9%	2.8%	3.4%	4.1%	6.6%	9.2%	11.4%
	198701-200612										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
Energy	0.3%	0.2%	0.3%	1.1%	1.5%	2.3%	2.4%	2.0%	-0.6%	-3.3%	-3.5%
Materials	-0.2%	-0.2%	-0.1%	0.4%	0.2%	0.5%	0.3%	0.8%	1.5%	4.0%	5.2%
Industrials	-0.2%	-0.4%	-0.7%	-1.2%	-1.5%	-1.3%	-1.0%	-1.4%	-3.4%	-6.0%	-8.3%
Consumer Discretionary	0.1%	0.0%	0.0%	-0.3%	0.0%	0.2%	0.2%	0.4%	0.5%	0.8%	1.1%
Consumer Staples	-0.1%	-0.4%	-0.7%	-0.7%	0.0%	0.4%	0.2%	0.1%	1.2%	4.6%	6.4%
Health Care	0.0%	0.1%	0.1%	-0.4%	-0.6%	-0.9%	-1.8%	-2.7%	-4.5%	-6.0%	-4.3%
Information Technology	0.2%	0.3%	-0.1%	0.3%	0.1%	-0.1%	0.2%	1.0%	3.7%	7.5%	12.8%
Telecommunication Services	0.1%	0.2%	0.4%	0.5%	0.6%	0.2%	-0.5%	-0.6%	1.4%	2.6%	9.0%
Utilities	-0.1%	-0.3%	-0.6%	-0.9%	-1.7%	-2.2%	-2.3%	-2.4%	-3.8%	-5.9%	-5.8%

Past performance is not a guarantee of future returns.

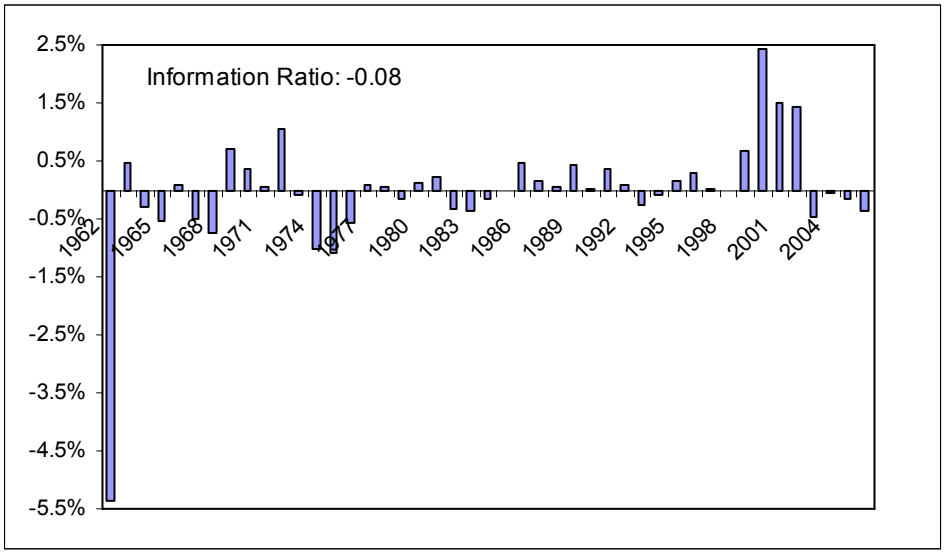
Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

NOPAT Margins

Net operating profit after taxes (NOPAT) margins is a measure of after-tax profitability of the firm on an ongoing basis. Firms with higher profitability are likely to have higher future stock returns and firms with lower profitability are likely to have lower future returns. Alternatively, one might reasonably believe that NOPAT is mean-reverting due to either business cycle conditions or the inevitable pouring in of competition that follows high levels of firm profitability. In this scenario, high levels of NOPAT would correlate with lower future stock returns and low levels of firm profitability would correspond with higher future stock returns.

The empirical results do not support either hypothesis on the relation between NOPAT Margins and future stock returns. The information ratio for the measure is very close to zero, implying that the returns from the Q1-Q5 spread measured over the entire sample period are almost random (Figure 147). The long/short strategy on a 12-month holding period has a negative return of 130 bps over the period 1962 thru 1986, and a positive return of 390 bps after 1987 (Figure 148). Figure 149 and Figure 150 reveal that the stock hit rates and sector returns also flip-flop over different time periods. Because of the time inconsistent performance, we do not include NOPAT Margins in the model.

Figure 147: Performance of NOPAT Margins: Long/Short Excess Returns, Average Monthly Returns, Reported on a Calendar Year Basis, 1962—2006



Past performance is not a guarantee of future returns.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 148: Performance of NOPAT Margins, Average Excess Returns, Relative to Large-Cap Universe

	Relative Return										
Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-198612											
Quintile 1	0.0%	-0.1%	-0.2%	-0.4%	-0.4%	-0.4%	-0.7%	-0.8%	-0.8%	-1.0%	-0.8%
Quintile 2	-0.1%	-0.1%	-0.1%	-0.2%	-0.2%	-0.3%	-0.3%	-0.3%	-0.6%	-1.1%	-1.4%
Quintile 3	0.0%	0.0%	0.0%	0.0%	0.1%	0.1%	0.1%	0.3%	0.8%	0.9%	1.0%
Quintile 4	0.0%	0.0%	0.0%	0.0%	0.1%	0.3%	0.4%	0.6%	0.7%	1.0%	1.4%
Quintile 5	0.1%	0.1%	0.2%	0.5%	0.7%	0.9%	1.0%	1.3%	1.8%	2.1%	1.7%
Long/Short Spread	-0.1%	-0.2%	-0.4%	-0.8%	-1.1%	-1.3%	-1.6%	-2.1%	-2.6%	-3.1%	-2.4%
198701-200612											
Quintile 1	0.1%	0.2%	0.3%	0.6%	1.1%	1.5%	1.8%	1.9%	2.0%	1.6%	1.5%
Quintile 2	0.0%	0.0%	0.0%	0.1%	-0.2%	-0.3%	-0.2%	-0.2%	-0.9%	-1.3%	-1.8%
Quintile 3	0.1%	0.1%	0.2%	0.3%	0.6%	0.7%	0.6%	0.6%	0.4%	0.1%	-0.4%
Quintile 4	0.0%	0.1%	0.1%	0.2%	0.2%	0.3%	0.4%	0.4%	0.4%	0.0%	-0.3%
Quintile 5	-0.2%	-0.4%	-0.7%	-1.2%	-1.8%	-2.4%	-2.8%	-3.1%	-2.7%	-1.1%	0.2%
Long/Short Spread	0.3%	0.7%	1.0%	1.8%	2.9%	3.9%	4.5%	5.0%	4.6%	2.7%	1.2%
199801-200612											
Quintile 1	0.3%	0.4%	0.7%	1.2%	2.1%	2.5%	2.9%	3.1%	2.8%	2.3%	2.3%
Quintile 2	0.1%	0.1%	0.2%	0.5%	0.2%	0.4%	0.7%	1.0%	1.0%	0.7%	0.3%
Quintile 3	0.2%	0.3%	0.4%	0.5%	0.8%	0.9%	1.0%	1.2%	1.5%	2.3%	2.6%
Quintile 4	-0.1%	-0.1%	-0.2%	-0.5%	-0.7%	-0.9%	-1.2%	-1.7%	-1.4%	-1.4%	-1.8%
Quintile 5	-0.4%	-0.8%	-1.2%	-2.1%	-2.6%	-3.5%	-4.2%	-4.8%	-5.2%	-4.8%	-4.0%
Long/Short Spread	0.6%	1.2%	1.8%	3.3%	4.7%	6.0%	7.1%	8.0%	8.1%	7.1%	6.3%

Past performance is not a guarantee of future returns.

Large-cap universe is Russell 1000 after 1978; pre-1978 it is defined via analogous market capitalization break-points

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 149: Performance of NOPAT Margins, Stock Selection Percentages

	Percent of Companies Outperforming										
Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-198612											
Quintile 1	49%	48%	48%	47%	46%	46%	45%	44%	44%	43%	43%
Quintile 2	48%	48%	48%	47%	46%	46%	46%	46%	45%	44%	43%
Quintile 3	48%	48%	48%	47%	47%	46%	46%	46%	46%	45%	44%
Quintile 4	49%	48%	48%	48%	47%	46%	46%	46%	45%	44%	44%
Quintile 5	48%	49%	48%	48%	48%	48%	48%	47%	46%	45%	44%
198701-200612											
Quintile 1	49%	49%	49%	49%	48%	48%	47%	47%	46%	45%	44%
Quintile 2	49%	49%	49%	48%	46%	46%	45%	44%	44%	43%	43%
Quintile 3	49%	49%	49%	48%	47%	47%	46%	46%	45%	44%	44%
Quintile 4	49%	49%	49%	48%	47%	47%	47%	46%	46%	45%	44%
Quintile 5	48%	47%	47%	45%	44%	43%	42%	42%	41%	41%	41%
199801-200612											
Quintile 1	49%	50%	50%	49%	49%	48%	47%	47%	45%	44%	43%
Quintile 2	50%	49%	49%	48%	47%	46%	45%	45%	44%	44%	44%
Quintile 3	49%	49%	49%	48%	47%	46%	47%	47%	46%	46%	46%
Quintile 4	48%	48%	47%	46%	45%	44%	44%	44%	44%	43%	43%
Quintile 5	47%	46%	46%	43%	42%	41%	40%	39%	38%	38%	39%

Past performance is not a guarantee of future returns.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 150: Performance of NOPAT Margins Across GICS Sectors, Excess Return Relative to Sector

	196201-198612										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
Energy	-0.5%	-0.9%	-1.2%	-2.3%	-3.4%	-4.0%	-4.5%	-4.3%	-4.5%	-5.3%	-4.9%
Materials	0.1%	0.2%	0.3%	0.5%	0.6%	1.0%	1.3%	1.4%	2.4%	2.3%	3.3%
Industrials	-0.1%	-0.1%	-0.2%	-1.0%	-1.1%	-0.9%	-0.9%	-1.3%	-3.2%	-4.0%	-2.2%
Consumer Discretionary	0.2%	0.2%	0.3%	0.9%	1.4%	2.0%	2.6%	3.4%	5.3%	6.8%	8.5%
Consumer Staples	0.1%	0.0%	0.0%	0.1%	0.1%	0.4%	0.8%	1.4%	2.8%	4.0%	6.0%
Health Care	-0.5%	-1.0%	-1.6%	-2.3%	-2.8%	-4.3%	-6.0%	-7.3%	-9.5%	-13.9%	-16.7%
Information Technology	-0.7%	-1.7%	-2.9%	-7.0%	-10.8%	-12.9%	-16.8%	-21.8%	-29.7%	-34.9%	-40.9%
Telecommunication Services	1.0%	2.2%	3.0%	5.4%	8.3%	11.0%	14.5%	16.9%	21.8%	23.8%	22.6%
Utilities	-0.2%	-0.2%	-0.3%	-0.6%	-1.9%	-2.5%	-2.9%	-3.5%	-7.3%	-13.4%	-17.4%

	198701-200612										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
Energy	0.1%	0.0%	-0.1%	-0.1%	-0.1%	0.6%	0.3%	-0.4%	-3.0%	-7.8%	-11.9%
Materials	0.0%	0.0%	-0.1%	-0.8%	-1.3%	-0.9%	-0.7%	-0.3%	-1.2%	-2.6%	-6.1%
Industrials	0.1%	0.2%	0.2%	0.2%	0.6%	1.6%	2.9%	4.7%	8.1%	9.8%	10.3%
Consumer Discretionary	-0.1%	-0.2%	-0.2%	-0.4%	-0.1%	-0.3%	-0.6%	-1.0%	-3.0%	-5.9%	-10.5%
Consumer Staples	0.2%	0.3%	0.3%	0.8%	1.5%	2.6%	4.1%	5.8%	9.3%	12.6%	15.9%
Health Care	-0.1%	-0.3%	-0.1%	0.6%	0.8%	2.6%	2.8%	2.0%	-3.5%	-9.6%	-12.3%
Information Technology	0.7%	1.1%	1.8%	4.1%	7.6%	10.6%	14.2%	16.9%	12.9%	3.0%	-5.1%
Telecommunication Services	0.3%	0.7%	1.3%	0.8%	-1.1%	-5.7%	-9.7%	-13.8%	-13.6%	-16.4%	-19.6%
Utilities	0.4%	0.6%	0.8%	1.5%	2.3%	2.9%	4.0%	5.0%	6.7%	8.9%	11.2%

	199801-200612										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
Energy	0.1%	0.0%	-0.2%	0.8%	1.5%	2.4%	2.4%	1.4%	-3.0%	-11.5%	-18.1%
Materials	0.3%	0.6%	0.7%	0.3%	-1.0%	-0.6%	-0.1%	0.9%	-0.5%	-3.1%	-15.8%
Industrials	0.2%	0.2%	0.1%	0.2%	0.2%	1.3%	3.2%	6.2%	11.8%	13.3%	11.3%
Consumer Discretionary	-0.3%	-0.5%	-0.6%	-1.0%	-0.7%	-0.9%	-0.6%	-0.3%	-1.1%	-1.2%	-0.3%
Consumer Staples	-0.3%	-0.6%	-0.9%	-1.1%	-0.5%	0.4%	2.0%	3.6%	6.4%	8.7%	9.7%
Health Care	0.0%	-0.4%	-0.3%	0.0%	-3.3%	-2.4%	-5.2%	-7.4%	-19.4%	-29.3%	-34.8%
Information Technology	0.7%	1.4%	2.7%	5.8%	10.6%	14.8%	20.6%	24.5%	24.2%	17.6%	12.2%
Telecommunication Services	1.1%	2.5%	4.7%	6.2%	4.6%	-2.5%	-9.3%	-16.5%	-13.5%	-7.1%	-9.7%
Utilities	0.6%	1.1%	1.5%	2.6%	3.8%	4.9%	6.8%	8.5%	12.7%	19.3%	24.3%

Past performance is not a guarantee of future returns.

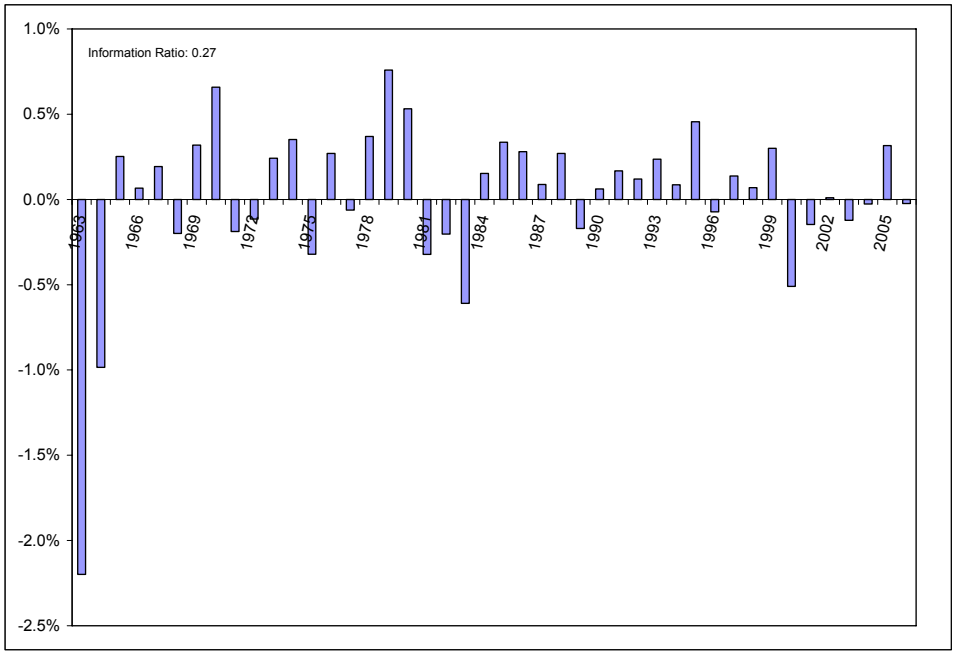
Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Changes in Gross Margins

Gross margins reveal how much a company earns in gross income relative to the revenues it is able to generate. At a base level, gross margins are a rough measure of company profitability and, hence, also a measure of the competitiveness of the industry. Changes in gross margins capture changes in company profitability. As such, one might reasonably believe that changes in profitability are positively associated with future stock returns.

The empirical support for changes in gross margins as a predictor of future stock returns is limited. Figure 151 and Figure 152 show wide swings in the consistency of the factor returns over time, with the factor generating a low Information Ratio. Additionally, there is no monotonicity in returns across quintiles and the stock selection power of the factor is relatively poor (Figure 153). Finally, the lack of consistency in factor returns is also exhibited at the sector level, with the best-performing sectors in one period often becoming the worst-performing in the next period, and vice versa (Figure 154).

Figure 151: Performance of Changes in Gross Margins: Long/Short Excess Returns, Avg Monthly Returns, Reported on a Calendar Year Basis, 1963 to 2006



Past performance is not a guarantee of future returns.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 152: Performance of Changes in Gross Margins, Average Excess Returns, Relative to Large-Cap Universe

	Relative Return										
Portofolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-198612											
Quintile 1	0.1%	0.1%	0.1%	0.1%	0.0%	0.1%	0.1%	0.2%	0.7%	0.2%	-0.5%
Quintile 2	0.0%	0.1%	0.1%	0.2%	0.2%	0.3%	0.3%	0.4%	0.3%	0.5%	0.3%
Quintile 3	0.0%	0.1%	0.2%	0.5%	0.6%	0.7%	0.7%	0.8%	0.9%	0.8%	1.1%
Quintile 4	-0.1%	-0.1%	-0.2%	-0.1%	0.1%	0.1%	0.2%	0.2%	0.4%	0.4%	0.5%
Quintile 5	-0.2%	-0.4%	-0.5%	-0.8%	-0.9%	-1.0%	-1.1%	-1.2%	-1.3%	-1.2%	-0.5%
Long/Short Spread	0.3%	0.5%	0.6%	0.9%	0.9%	1.1%	1.2%	1.4%	2.0%	1.5%	0.1%
198701-200612											
Quintile 1	0.0%	0.0%	0.0%	0.3%	0.6%	1.0%	1.4%	1.5%	1.1%	0.2%	-0.2%
Quintile 2	0.1%	0.2%	0.2%	0.1%	-0.1%	-0.3%	-0.7%	-0.9%	-1.0%	-1.0%	-1.2%
Quintile 3	0.0%	0.0%	0.1%	0.1%	0.1%	-0.1%	-0.2%	-0.4%	-0.5%	-0.3%	-0.4%
Quintile 4	-0.1%	-0.1%	-0.2%	-0.1%	-0.3%	-0.3%	-0.5%	-0.4%	-0.1%	0.0%	-0.2%
Quintile 5	-0.1%	-0.1%	-0.2%	-0.3%	-0.4%	-0.2%	0.0%	0.0%	0.2%	0.6%	1.3%
Long/Short Spread	0.0%	0.1%	0.2%	0.7%	1.0%	1.3%	1.4%	1.5%	0.9%	-0.3%	-1.5%
199801-200612											
Quintile 1	-0.1%	-0.2%	-0.1%	0.2%	0.4%	1.0%	1.8%	2.4%	1.9%	0.6%	-0.1%
Quintile 2	0.3%	0.5%	0.5%	0.2%	-0.2%	-0.8%	-1.7%	-2.0%	-2.0%	-0.7%	-0.7%
Quintile 3	0.0%	0.1%	0.2%	0.2%	0.0%	-0.3%	-0.6%	-1.0%	-0.7%	0.0%	0.5%
Quintile 4	-0.1%	-0.2%	-0.4%	-0.2%	-0.3%	-0.4%	-0.5%	-0.6%	-0.4%	-0.2%	0.0%
Quintile 5	0.0%	-0.1%	-0.3%	-0.4%	0.1%	0.7%	1.1%	1.3%	1.5%	0.5%	0.5%
Long/Short Spread	-0.1%	0.0%	0.2%	0.5%	0.3%	0.3%	0.7%	1.1%	0.4%	0.1%	-0.7%

Past performance is not a guarantee of future returns.

Large-cap universe is Russell 1000 after 1978; pre-1978 it is defined via analogous market capitalization break-points

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 153: Performance of Changes in Gross Margins, Stock Selection Percentages

	Percent of Companies Outperforming										
Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
198701-200612											
Quintile 1	49%	49%	48%	48%	47%	47%	46%	46%	44%	43%	43%
Quintile 2	49%	49%	49%	48%	47%	46%	46%	45%	44%	43%	43%
Quintile 3	49%	49%	49%	48%	47%	46%	46%	45%	44%	44%	43%
Quintile 4	49%	48%	48%	47%	47%	46%	45%	45%	44%	44%	43%
Quintile 5	48%	48%	48%	46%	45%	45%	44%	44%	44%	43%	43%
199801-200612											
Quintile 1	49%	48%	48%	47%	46%	46%	45%	45%	43%	42%	41%
Quintile 2	50%	50%	49%	47%	46%	45%	44%	44%	43%	44%	44%
Quintile 3	49%	49%	49%	48%	47%	45%	45%	44%	44%	44%	44%
Quintile 4	49%	48%	47%	47%	46%	45%	45%	44%	44%	43%	42%
Quintile 5	48%	48%	47%	46%	45%	45%	44%	44%	43%	43%	42%
196201-198612											
Quintile 1	49%	48%	48%	48%	46%	45%	45%	44%	45%	43%	42%
Quintile 2	49%	49%	49%	49%	48%	47%	46%	46%	45%	44%	43%
Quintile 3	49%	49%	49%	49%	48%	48%	47%	47%	46%	45%	44%
Quintile 4	48%	48%	47%	47%	47%	46%	46%	46%	46%	44%	43%
Quintile 5	48%	47%	47%	45%	44%	44%	43%	43%	43%	43%	43%

Past performance is not a guarantee of future returns.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 154: Performance of Changes in Gross Margins Across GICS Sectors, Excess Return Relative to Sector

	196201-198612										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
Energy	0.2%	0.4%	0.5%	0.2%	-0.1%	-0.2%	0.1%	1.3%	3.7%	5.1%	4.6%
Materials	0.3%	0.6%	0.8%	1.0%	0.4%	-0.3%	-0.8%	-0.3%	0.6%	1.6%	1.1%
Industrials	-0.1%	-0.2%	-0.2%	0.0%	0.2%	1.0%	1.5%	1.5%	1.2%	0.2%	-1.0%
Consumer Discretionary	0.2%	0.3%	0.5%	1.2%	1.8%	2.2%	2.6%	3.2%	4.6%	5.3%	5.0%
Consumer Staples	0.1%	0.1%	0.2%	-0.3%	-0.4%	-0.3%	0.0%	0.1%	0.8%	1.9%	1.4%
Health Care	0.7%	1.2%	1.9%	3.7%	5.9%	8.1%	9.7%	11.0%	11.8%	12.6%	11.5%
Information Technology	0.8%	1.2%	1.3%	2.4%	3.9%	4.7%	4.8%	5.0%	0.8%	-2.5%	-6.6%
Telecommunication Services	0.1%	0.4%	0.4%	0.0%	0.0%	-1.2%	-5.0%	-7.5%	-9.2%	-10.9%	-11.5%
Utilities	0.3%	0.5%	0.7%	1.0%	0.6%	0.3%	-0.2%	-0.8%	-0.6%	0.1%	-0.2%

	198701-200612										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
Energy	-0.2%	-0.5%	-0.7%	-0.2%	1.1%	3.9%	6.3%	8.7%	8.1%	4.6%	2.7%
Materials	0.1%	0.2%	0.3%	1.1%	1.4%	1.5%	0.9%	0.4%	-2.7%	-3.4%	-6.9%
Industrials	0.1%	0.1%	0.2%	0.8%	1.5%	2.3%	3.1%	3.2%	2.3%	2.1%	3.9%
Consumer Discretionary	0.5%	0.9%	1.4%	2.7%	3.7%	4.2%	4.3%	4.3%	3.2%	-0.3%	-4.1%
Consumer Staples	-0.1%	-0.1%	-0.1%	-0.3%	-0.1%	0.1%	0.0%	-0.5%	0.5%	1.0%	1.5%
Health Care	0.2%	0.5%	1.0%	2.0%	3.4%	4.0%	4.7%	6.1%	6.0%	2.2%	-1.3%
Information Technology	0.3%	0.6%	0.8%	1.5%	1.9%	2.0%	0.2%	-1.5%	-3.0%	-5.2%	-11.2%
Telecommunication Services	0.9%	1.9%	2.7%	5.4%	6.8%	6.9%	6.9%	6.2%	3.5%	0.5%	-1.7%
Utilities	-0.1%	-0.1%	-0.2%	-0.4%	-1.0%	-1.6%	-1.3%	-1.6%	-1.8%	-1.6%	-2.2%

Past performance is not a guarantee of future returns.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Tax Burden

Tax burden potentially measures two competing constructs. The first hypothesis is that a company's tax burden quantifies the extent to which a company runs in a tax efficient manner. Under this interpretation, having a low tax burden is good as it is an indicator of competent company management seeking to maximize after-tax profits for the company. An alternative view of tax burden is that it is a proxy for the degree of earnings management being undertaken by the company. Due to the differences in revenue recognition under GAAP and federal taxation laws, companies with low relative tax burdens are most likely companies with lower cash earnings relative to the other companies in the same industry. Under this view, a high tax burden is a positive sign for future returns as it indicates a low probability of company managers engaging in earnings management.

The empirical evidence is consistent with the "tax efficiency" story, although, the potential returns to investing according to this strategy are not large. As shown in Figure 155, in the time periods 1962-1986 and 1987-2006, companies with high tax burdens underperform their sector peers by 90 bps and 50 bps per year, on average. Conversely, during these same periods, companies with low tax burdens outperformed their sector peers by 100 bps and 80 bps per year, on average. While these returns are statistically significant, the feasibility of implementing this strategy is dubious. Additionally, the stock selection ability of the factor is mediocre (see Figure 156), though the factor's consistency across sectors does remain relatively high (see Figure 157).

Figure 155: Performance of Tax Burden, Average Excess Returns, Relative to Large-Cap Universe

	Relative Return										
Portofolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-198612											
Quintile 1	-0.1%	-0.1%	-0.2%	-0.4%	-0.6%	-0.9%	-1.1%	-1.2%	-1.5%	-1.9%	-2.2%
Quintile 2	-0.1%	-0.1%	-0.3%	-0.3%	-0.5%	-0.6%	-0.8%	-0.8%	-0.9%	-1.0%	-1.3%
Quintile 3	0.0%	0.0%	0.1%	0.1%	0.2%	0.3%	0.3%	0.3%	0.2%	-0.2%	-0.2%
Quintile 4	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.2%	0.3%	0.8%	1.0%	0.9%
Quintile 5	0.1%	0.2%	0.3%	0.5%	0.7%	1.0%	1.1%	1.4%	2.1%	2.5%	3.0%
Long/Short Spread	-0.2%	-0.3%	-0.5%	-0.9%	-1.3%	-1.9%	-2.2%	-2.6%	-3.5%	-4.3%	-5.3%
198701-200612											
Quintile 1	0.0%	-0.1%	-0.1%	-0.1%	-0.3%	-0.5%	-0.5%	-0.7%	-1.0%	-1.7%	-2.4%
Quintile 2	0.0%	0.0%	-0.1%	-0.1%	0.1%	0.2%	0.1%	0.3%	0.1%	-0.1%	0.1%
Quintile 3	0.0%	-0.1%	-0.1%	-0.1%	-0.2%	-0.1%	0.0%	0.3%	0.0%	0.1%	0.3%
Quintile 4	0.0%	-0.1%	0.0%	0.0%	-0.1%	-0.3%	-0.4%	-0.3%	-0.1%	0.1%	-0.1%
Quintile 5	0.1%	0.2%	0.3%	0.4%	0.6%	0.8%	0.9%	0.7%	1.1%	1.7%	2.3%
Long/Short Spread	-0.1%	-0.3%	-0.4%	-0.6%	-1.0%	-1.3%	-1.3%	-1.4%	-2.2%	-3.5%	-4.7%
199801-200612											
Quintile 1	-0.1%	-0.2%	-0.2%	-0.3%	-0.5%	-0.6%	-0.6%	-1.1%	-1.9%	-2.4%	-3.5%
Quintile 2	0.0%	0.1%	0.1%	0.0%	0.1%	0.3%	0.2%	0.4%	0.4%	-0.8%	-1.0%
Quintile 3	0.0%	-0.1%	-0.1%	-0.2%	-0.3%	0.0%	0.0%	0.6%	0.5%	0.3%	0.7%
Quintile 4	0.0%	-0.1%	-0.1%	-0.1%	-0.4%	-1.0%	-1.0%	-1.1%	-1.0%	-0.4%	-0.3%
Quintile 5	0.2%	0.4%	0.4%	0.7%	1.1%	1.4%	1.5%	1.3%	2.2%	3.3%	3.9%
Long/Short Spread	-0.3%	-0.6%	-0.6%	-0.9%	-1.5%	-1.9%	-2.1%	-2.5%	-4.1%	-5.8%	-7.4%

Past performance is not a guarantee of future returns.

Large-cap universe is Russell 1000 after 1978; pre-1978 it is defined via analogous market capitalization break-points

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 156: Performance of Tax Burden, Stock Selection Percentages

	Percent of Companies Outperforming										
Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
198701-200612											
Quintile 1	49%	49%	48%	47%	46%	45%	45%	44%	43%	42%	41%
Quintile 2	49%	49%	49%	47%	47%	46%	46%	45%	45%	44%	43%
Quintile 3	48%	49%	49%	48%	47%	47%	46%	46%	45%	44%	44%
Quintile 4	49%	49%	49%	48%	47%	46%	46%	45%	45%	44%	44%
Quintile 5	49%	49%	49%	48%	48%	47%	47%	46%	46%	45%	45%
199801-200612											
Quintile 1	49%	49%	48%	47%	46%	45%	44%	43%	42%	42%	41%
Quintile 2	49%	49%	49%	47%	46%	45%	44%	44%	44%	43%	42%
Quintile 3	49%	48%	48%	47%	47%	47%	46%	46%	45%	45%	45%
Quintile 4	49%	48%	48%	47%	45%	44%	44%	44%	43%	43%	43%
Quintile 5	49%	49%	49%	48%	47%	46%	46%	46%	45%	45%	45%
196201-198612											
Quintile 1	47%	47%	46%	46%	46%	45%	45%	44%	43%	43%	43%
Quintile 2	48%	48%	47%	47%	46%	46%	45%	45%	44%	44%	43%
Quintile 3	49%	48%	48%	48%	47%	47%	46%	46%	45%	44%	43%
Quintile 4	48%	49%	49%	48%	47%	46%	46%	46%	46%	45%	44%
Quintile 5	49%	49%	49%	48%	48%	48%	48%	47%	47%	45%	45%

Past performance is not a guarantee of future returns.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 157: Performance of Tax Burden Across GICS Sectors, Excess Return Relative to Sector

	196201-200612										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
Energy	-0.1%	-0.1%	-0.3%	-0.9%	-1.9%	-2.3%	-2.8%	-3.2%	-4.4%	-7.0%	-12.6%
Materials	0.2%	0.3%	0.5%	0.9%	1.0%	0.8%	0.9%	0.6%	-0.7%	-2.2%	-2.9%
Industrials	-0.3%	-0.4%	-0.6%	-1.0%	-1.7%	-2.6%	-3.3%	-4.5%	-6.9%	-9.9%	-11.8%
Consumer Discretionary	-0.3%	-0.6%	-0.9%	-1.7%	-2.4%	-3.2%	-4.0%	-4.8%	-6.8%	-8.3%	-9.8%
Consumer Staples	0.1%	0.1%	0.2%	-0.1%	-0.4%	-1.0%	-1.5%	-2.0%	-3.1%	-3.9%	-5.6%
Health Care	-0.1%	-0.1%	0.0%	-0.3%	-1.0%	-1.7%	-1.6%	-1.0%	0.1%	0.6%	1.9%
Financials	-0.3%	-0.4%	-0.7%	-1.2%	-1.5%	-1.8%	-2.4%	-2.9%	-3.3%	-5.1%	-6.3%
Information Technology	0.2%	0.4%	0.5%	0.9%	1.2%	-0.1%	-1.3%	-2.2%	-6.7%	-10.5%	-13.3%
Telecommunication Services	0.0%	-0.2%	-0.6%	-1.2%	-0.7%	0.2%	2.4%	3.1%	1.6%	-0.2%	-3.2%
Utilities	-0.2%	-0.2%	-0.4%	-1.7%	-3.4%	-5.0%	-7.2%	-8.3%	-9.9%	-12.9%	-16.5%
	198701-200612										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
Energy	0.1%	0.4%	0.5%	0.2%	-1.0%	-0.9%	-1.0%	-1.1%	-0.5%	-1.5%	-4.5%
Materials	0.1%	0.1%	0.4%	0.5%	0.2%	-0.7%	-0.9%	-1.9%	-5.9%	-9.1%	-10.8%
Industrials	0.1%	0.1%	0.2%	0.4%	0.2%	0.2%	-0.1%	-1.1%	-3.5%	-7.4%	-10.6%
Consumer Discretionary	-0.2%	-0.4%	-0.5%	-0.9%	-1.6%	-1.9%	-2.2%	-2.4%	-3.3%	-4.5%	-6.3%
Consumer Staples	0.3%	0.5%	0.7%	1.4%	1.9%	1.6%	1.2%	0.5%	0.0%	0.4%	-0.7%
Health Care	-0.3%	-0.3%	-0.3%	-0.6%	-1.9%	-2.9%	-2.7%	-1.0%	1.4%	4.1%	8.4%
Financials	-0.1%	-0.3%	-0.4%	-0.4%	-0.5%	-1.2%	-1.7%	-2.2%	-3.5%	-6.3%	-9.5%
Information Technology	0.3%	0.7%	0.9%	1.4%	1.3%	1.7%	2.7%	2.6%	0.3%	-1.4%	1.0%
Telecommunication Services	0.3%	0.3%	0.0%	0.4%	2.2%	4.5%	8.1%	7.8%	0.3%	-3.2%	-4.8%
Utilities	-0.2%	-0.3%	-0.5%	-1.6%	-2.7%	-3.7%	-4.9%	-5.5%	-7.1%	-10.4%	-13.2%

Past performance is not a guarantee of future returns.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Gross Margins

Gross margins reveal how much a company earns in gross income relative to the revenues it is able to generate. At a base level, gross margins are a rough measure of company profitability and, hence, also a measure of the competitiveness of the industry. Companies with high levels of gross margins relative to their peers experience high levels of profitability. Eventually, when the industry becomes more competitive, these high profitability firms will have more slack and wherewithal to survive the storm. Hence, we predict that companies with high gross margins will have high future returns.

The data is weakly consistent with our intuition but the economic returns to this investment strategy are paltry. As seen in Figure 158, in the period 1987-2006, the average returns to buying the top 20% of stocks ranked according to their gross margins and shorting the bottom 20% of stocks are 100 bps per year, on average, assuming a 12-month holding period. Unfortunately, however, in the period 1962–1986, this strategy would have lost 70 bps per year on average. Figure 159 illustrates that the consistency of the returns to the various quintiles is relatively low and for the long/short portfolio the outcome is no different from what one would expect from blind luck. Returns from the strategy at the sector level appear no different (Figure 160).

Figure 158: Performance of Gross Margins, Average Excess Returns, Relative to Large-Cap Universe

	Relative Return										
Portofolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-198612											
Quintile 1	0.0%	0.0%	-0.1%	-0.2%	-0.4%	-0.6%	-0.8%	-0.9%	-1.1%	-1.4%	-1.9%
Quintile 2	-0.1%	-0.1%	-0.2%	-0.2%	-0.4%	-0.4%	-0.3%	-0.1%	0.0%	-0.5%	-1.1%
Quintile 3	0.0%	0.0%	0.1%	0.1%	0.1%	0.0%	-0.1%	-0.1%	0.1%	0.4%	0.6%
Quintile 4	-0.1%	-0.1%	-0.1%	-0.1%	0.0%	0.0%	0.0%	-0.2%	-0.3%	-0.4%	-0.2%
Quintile 5	0.0%	0.0%	0.0%	-0.1%	0.0%	0.2%	0.2%	0.2%	0.7%	1.0%	1.5%
Long/Short Spread	0.0%	-0.1%	-0.1%	-0.2%	-0.4%	-0.7%	-1.0%	-1.1%	-1.8%	-2.5%	-3.4%
198701-200612											
Quintile 1	0.1%	0.2%	0.3%	0.5%	0.7%	0.9%	1.3%	1.5%	2.2%	2.5%	2.8%
Quintile 2	0.1%	0.1%	0.2%	0.2%	0.2%	0.2%	0.1%	0.2%	-0.2%	-1.3%	-2.3%
Quintile 3	0.0%	0.0%	0.0%	-0.1%	-0.1%	-0.2%	-0.3%	-0.5%	-0.8%	-1.3%	-1.7%
Quintile 4	-0.1%	-0.1%	-0.2%	-0.4%	-0.6%	-0.9%	-1.1%	-1.1%	-1.5%	-1.7%	-1.8%
Quintile 5	-0.1%	-0.1%	-0.2%	-0.2%	-0.2%	-0.1%	-0.1%	-0.3%	0.1%	1.4%	2.4%
Long/Short Spread	0.2%	0.3%	0.4%	0.7%	0.9%	1.0%	1.4%	1.9%	2.1%	1.0%	0.4%
199801-200612											
Quintile 1	0.2%	0.4%	0.7%	1.2%	1.4%	1.8%	2.2%	2.6%	3.2%	2.8%	2.9%
Quintile 2	0.3%	0.4%	0.5%	0.9%	1.2%	1.5%	1.8%	2.6%	3.0%	2.2%	1.4%
Quintile 3	0.0%	0.0%	-0.1%	-0.2%	-0.3%	-0.5%	-0.5%	-0.7%	-0.8%	-0.8%	-1.3%
Quintile 4	-0.1%	-0.2%	-0.3%	-0.8%	-1.2%	-1.8%	-2.2%	-2.6%	-3.3%	-3.2%	-2.1%
Quintile 5	-0.3%	-0.5%	-0.8%	-1.1%	-1.0%	-1.0%	-1.4%	-2.2%	-2.1%	-1.0%	-0.9%
Long/Short Spread	0.5%	0.9%	1.4%	2.4%	2.4%	2.8%	3.6%	4.8%	5.3%	3.8%	3.9%

Past performance is not a guarantee of future returns.

Large cap universe is Russell 1000 after 1978; pre-1978 it is defined via analogous market capitalization break-points

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 159: Performance of Gross Margins, Stock Selection Percentages

	Percent of Companies Outperforming										
Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
198701-200612											
Quintile 1	49%	49%	49%	48%	48%	47%	46%	46%	45%	44%	44%
Quintile 2	49%	49%	48%	48%	47%	47%	46%	46%	45%	44%	44%
Quintile 3	49%	49%	48%	47%	47%	46%	45%	44%	44%	43%	43%
Quintile 4	49%	48%	48%	47%	46%	45%	45%	45%	44%	43%	43%
Quintile 5	48%	48%	48%	47%	46%	45%	45%	44%	43%	43%	42%
199801-200612											
Quintile 1	49%	50%	50%	49%	48%	47%	46%	45%	44%	44%	43%
Quintile 2	49%	49%	48%	48%	47%	45%	45%	45%	45%	44%	43%
Quintile 3	48%	49%	48%	46%	45%	44%	44%	44%	43%	43%	43%
Quintile 4	49%	48%	47%	46%	45%	44%	44%	44%	43%	43%	43%
Quintile 5	48%	48%	47%	45%	45%	44%	44%	43%	42%	42%	42%
196201-198612											
Quintile 1	49%	48%	48%	47%	46%	46%	46%	45%	44%	43%	42%
Quintile 2	48%	48%	48%	48%	46%	45%	45%	45%	44%	43%	42%
Quintile 3	49%	49%	48%	48%	47%	47%	46%	46%	45%	45%	44%
Quintile 4	47%	48%	47%	46%	46%	45%	45%	45%	44%	43%	42%
Quintile 5	48%	48%	47%	46%	46%	46%	46%	45%	44%	44%	43%

Past performance is not a guarantee of future returns.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 160: Performance of Gross Margins Across GICS Sectors, Excess Return Relative to Sector

	196201-198612										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
Energy	0.2%	0.4%	0.6%	0.8%	1.5%	2.5%	3.5%	4.9%	8.5%	10.1%	11.3%
Materials	0.2%	0.4%	0.6%	1.2%	1.3%	1.8%	1.8%	1.6%	1.8%	1.3%	0.6%
Industrials	-0.2%	-0.4%	-0.6%	-0.9%	-1.5%	-1.7%	-1.8%	-2.0%	-2.7%	-3.5%	-6.5%
Consumer Discretionary	-0.4%	-0.6%	-0.9%	-1.7%	-2.3%	-3.1%	-3.8%	-4.7%	-6.8%	-8.8%	-11.1%
Consumer Staples	-0.1%	-0.2%	-0.2%	-0.6%	-0.8%	-0.6%	0.2%	0.7%	1.7%	2.8%	3.7%
Health Care	0.4%	0.8%	1.4%	3.0%	4.8%	6.2%	8.2%	9.8%	11.5%	14.4%	15.9%
Information Technology	-0.2%	-0.5%	-0.9%	-2.1%	-4.0%	-6.3%	-7.8%	-8.6%	-16.2%	-27.4%	-36.1%
Telecommunication Services	-0.2%	-0.3%	-0.4%	-0.8%	-1.0%	-1.0%	-2.3%	-4.5%	-4.8%	-3.8%	-2.8%
Utilities	-0.1%	-0.1%	-0.2%	-0.4%	-0.7%	-0.9%	-0.9%	-0.8%	-0.5%	0.2%	1.1%
	198701-200612										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
Energy	-0.2%	-0.5%	-0.8%	-0.8%	-0.9%	-0.9%	-1.1%	-2.2%	-5.1%	-10.8%	-16.6%
Materials	0.1%	0.1%	0.2%	0.2%	0.3%	-0.1%	-1.6%	-2.1%	-3.2%	-4.4%	-8.4%
Industrials	0.0%	0.0%	0.0%	0.1%	0.5%	1.0%	1.3%	2.2%	4.2%	5.8%	6.6%
Consumer Discretionary	-0.1%	-0.3%	-0.6%	-1.3%	-2.0%	-3.1%	-4.0%	-4.8%	-7.4%	-11.4%	-15.8%
Consumer Staples	0.1%	0.2%	0.5%	1.1%	1.9%	2.8%	4.3%	6.0%	9.3%	12.4%	16.0%
Health Care	0.2%	0.5%	0.8%	2.1%	2.3%	3.1%	2.8%	2.7%	-0.6%	-6.2%	-9.3%
Information Technology	0.2%	0.4%	0.5%	1.0%	0.9%	0.7%	2.1%	3.3%	3.3%	-2.9%	-11.4%
Telecommunication Services	0.4%	0.8%	1.2%	1.5%	0.8%	0.1%	-0.6%	-1.3%	0.8%	0.8%	0.8%
Utilities	0.3%	0.5%	0.7%	1.8%	2.8%	3.2%	3.8%	4.4%	5.2%	7.4%	10.6%

Past performance is not a guarantee of future returns.

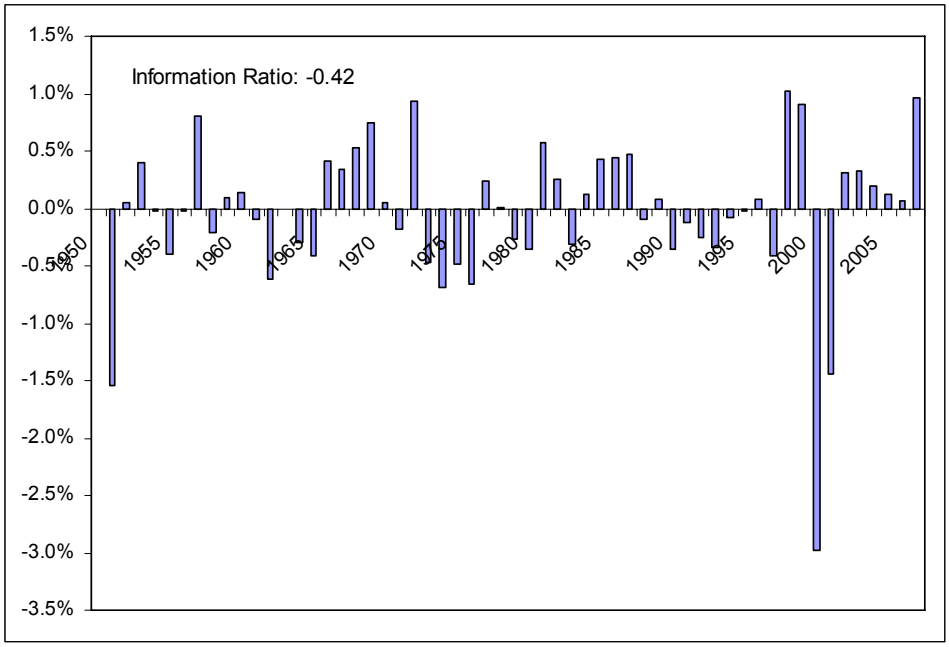
Source: Lehman brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

SG&A to Net Sales

We look at the usefulness of selling, general and administrative costs as a fraction of net revenues as a predictor for future stock returns. Our hypothesis is that when these costs are high as a percentage of net revenues relative to other companies within the sector, it is an indicator of an inefficiently run company. Consequently, we would expect this measure to correlate negatively with future stock returns—that is, high SG&A-to-net sales would correspond with poor future stock returns.

We find little empirical support for this hypothesis. Figure 161 shows the average monthly returns to the strategy on a calendar year basis. The information ratio here is quite low, meaning that the returns are close to random. Furthermore, as seen in Figure 162 and Figure 163, the magnitude of the returns to various quintiles seems to be nearly random, as does the consistency of the performance of quintiles.

Figure 161: Performance of SG&A to Net Sales: Long/Short Excess Returns, Average Monthly Returns, Reported on a Calendar Year Basis, 1950 to 2006



Past performance is not a guarantee of future returns.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 162: Performance of SG&A-to-Net Sales, Average Excess Returns, Relative to Large-Cap Universe

	Relative Return										
Portofolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-198612											
Quintile 1	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.1%	0.2%	0.4%	0.9%
Quintile 2	0.0%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	0.0%	0.1%	0.4%	0.7%	0.8%
Quintile 3	0.0%	0.1%	0.1%	0.3%	0.5%	0.7%	0.7%	0.7%	0.9%	1.3%	1.5%
Quintile 4	0.0%	0.0%	0.0%	-0.1%	-0.2%	-0.4%	-0.4%	-0.4%	-0.5%	-1.1%	-1.1%
Quintile 5	-0.1%	-0.1%	-0.1%	-0.3%	-0.5%	-0.8%	-1.1%	-1.4%	-2.1%	-2.8%	-3.6%
Long/Short Spread	0.1%	0.1%	0.1%	0.3%	0.4%	0.8%	1.2%	1.5%	2.3%	3.2%	4.5%
198701-200612											
Quintile 1	-0.1%	-0.3%	-0.4%	-0.8%	-1.1%	-1.3%	-1.2%	-0.8%	-0.4%	-0.3%	-0.3%
Quintile 2	0.0%	0.1%	0.1%	0.4%	0.5%	0.5%	0.4%	0.3%	0.6%	0.6%	0.4%
Quintile 3	0.0%	0.1%	0.1%	0.1%	-0.1%	-0.1%	-0.3%	-0.5%	-1.2%	-1.8%	-2.8%
Quintile 4	0.0%	0.0%	0.0%	0.1%	0.3%	0.7%	0.7%	0.6%	0.5%	0.1%	0.3%
Quintile 5	0.1%	0.1%	0.1%	0.2%	0.3%	0.2%	0.2%	0.2%	-0.2%	0.1%	0.7%
Long/Short Spread	-0.2%	-0.4%	-0.6%	-0.9%	-1.4%	-1.5%	-1.4%	-1.0%	-0.2%	-0.4%	-1.0%
199801-200612											
Quintile 1	-0.2%	-0.4%	-0.6%	-0.9%	-1.4%	-1.6%	-1.3%	-0.6%	-0.2%	0.0%	0.1%
Quintile 2	0.0%	0.0%	0.0%	0.1%	-0.1%	-0.4%	-0.8%	-1.1%	-0.9%	-0.6%	-0.5%
Quintile 3	0.0%	0.1%	0.2%	0.4%	0.4%	0.4%	0.4%	0.2%	-0.8%	-1.6%	-2.2%
Quintile 4	0.1%	0.1%	0.2%	0.6%	1.3%	2.4%	2.9%	3.2%	4.7%	5.4%	6.5%
Quintile 5	0.1%	0.2%	0.3%	0.4%	0.6%	0.3%	0.2%	0.0%	-1.4%	-2.3%	-2.8%
Long/Short Spread	-0.3%	-0.5%	-0.8%	-1.3%	-2.1%	-1.9%	-1.5%	-0.6%	1.2%	2.3%	2.9%

Past performance is not a guarantee of future returns.

Large-cap universe is Russell 1000 after 1978; pre-1978 it is defined via analogous market capitalization break-points

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 163: Performance of SG&A-to-Net Sales, Months Outperforming Percentage

Portofolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-198612											
Quintile 1	49%	47%	51%	54%	53%	52%	51%	52%	51%	49%	53%
Quintile 2	47%	47%	46%	45%	47%	55%	55%	57%	56%	59%	60%
Quintile 3	52%	53%	53%	51%	53%	54%	52%	52%	54%	56%	57%
Quintile 4	48%	45%	47%	44%	45%	43%	41%	44%	45%	44%	40%
Quintile 5	47%	48%	49%	44%	43%	43%	44%	43%	38%	35%	37%
Long/Short Spread	50%	51%	53%	54%	54%	56%	55%	51%	57%	59%	57%
198701-200612											
Quintile 1	47%	43%	45%	46%	45%	40%	38%	42%	41%	42%	43%
Quintile 2	48%	51%	51%	58%	56%	52%	52%	49%	53%	51%	49%
Quintile 3	53%	56%	53%	54%	49%	50%	50%	44%	39%	33%	32%
Quintile 4	50%	49%	50%	48%	51%	53%	49%	46%	42%	47%	46%
Quintile 5	50%	48%	47%	45%	47%	50%	47%	48%	52%	54%	52%
Long/Short Spread	50%	48%	49%	48%	45%	45%	47%	44%	47%	48%	48%
199801-200612											
Quintile 1	51%	47%	49%	49%	45%	41%	48%	52%	47%	43%	39%
Quintile 2	45%	45%	43%	45%	45%	41%	44%	38%	47%	44%	43%
Quintile 3	53%	60%	59%	53%	54%	60%	59%	53%	43%	30%	27%
Quintile 4	52%	53%	58%	58%	61%	67%	66%	67%	74%	90%	91%
Quintile 5	50%	45%	44%	37%	45%	44%	37%	40%	41%	44%	34%
Long/Short Spread	57%	50%	51%	57%	48%	51%	57%	53%	57%	51%	54%

Past performance is not a guarantee of future returns.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Coverage Ratio

The coverage ratio is the number of times cash flow from operations can cover interest payments. Companies with lower coverage ratios relative to their peers will have higher probabilities of default, all else being equal. Similar to low free cash flow being a indicator for negative future returns, we would expect a low coverage ratio to be a negative signal as well.

While we find this to be the case, the economic payoff to this signal is small, and the return is statistically indistinguishable from zero. As seen in Figure 164, the returns for going long companies with high coverage ratios and shorting companies with low coverage ratios is nearly identical, and over the past 44 years the strategy has produced returns of 40 bps on average. Additionally, the quintile returns are indistinguishable from each other and nearly random (Figure 165). No clear pattern emerges across sectors, with most sectors flip-flopping regarding the sign and magnitude of the returns (Figure 166).

Figure 164: Performance of Coverage Ratio, Average Excess Returns, Relative to Large-Cap Universe

	Relative Return										
Portofolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-200612											
Quintile 1	0.0%	0.0%	0.0%	-0.1%	-0.2%	-0.2%	-0.2%	-0.2%	-0.2%	-0.1%	0.1%
Quintile 2	0.1%	0.2%	0.2%	0.3%	0.5%	0.9%	1.2%	1.4%	1.9%	2.2%	3.4%
Quintile 3	0.2%	0.3%	0.5%	1.1%	1.8%	2.7%	3.5%	4.3%	6.8%	9.6%	12.1%
Quintile 4	0.0%	0.0%	0.1%	0.2%	0.3%	0.6%	0.5%	0.6%	1.2%	1.7%	1.7%
Quintile 5	-0.1%	-0.2%	-0.3%	-0.5%	-0.6%	-0.6%	-0.7%	-0.6%	-0.4%	-0.1%	0.3%
Long/Short Spread	0.1%	0.2%	0.3%	0.4%	0.5%	0.4%	0.5%	0.4%	0.3%	0.0%	-0.2%
196201-198612											
Quintile 1	0.0%	0.1%	0.1%	0.2%	0.0%	0.0%	0.2%	0.5%	1.3%	1.6%	2.1%
Quintile 2	0.1%	0.1%	0.2%	0.3%	0.8%	1.4%	1.9%	2.3%	3.0%	3.9%	6.4%
Quintile 3	0.3%	0.6%	0.9%	2.1%	3.5%	5.2%	6.5%	7.9%	12.3%	17.3%	21.4%
Quintile 4	-0.1%	-0.2%	-0.2%	-0.3%	-0.3%	0.1%	0.0%	0.2%	1.1%	1.4%	1.6%
Quintile 5	-0.2%	-0.3%	-0.4%	-0.6%	-0.8%	-0.8%	-0.9%	-0.7%	-0.4%	-0.2%	0.3%
Long/Short Spread	0.2%	0.4%	0.5%	0.7%	0.8%	0.9%	1.2%	1.3%	1.6%	1.9%	1.9%
198701-200612											
Quintile 1	0.0%	-0.1%	-0.1%	-0.3%	-0.3%	-0.5%	-0.7%	-1.0%	-1.7%	-2.0%	-2.1%
Quintile 2	0.1%	0.2%	0.3%	0.3%	0.3%	0.4%	0.4%	0.5%	0.6%	0.3%	0.0%
Quintile 3	-0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.2%	0.3%	0.1%	0.3%
Quintile 4	0.1%	0.2%	0.3%	0.7%	0.9%	1.0%	1.0%	1.0%	1.3%	1.9%	1.8%
Quintile 5	-0.1%	-0.1%	-0.2%	-0.3%	-0.5%	-0.5%	-0.5%	-0.5%	-0.5%	0.0%	0.3%
Long/Short Spread	0.0%	0.0%	0.1%	0.0%	0.2%	0.0%	-0.3%	-0.4%	-1.2%	-2.0%	-2.4%

Past performance is not a guarantee of future returns.

Large-cap universe is Russell 1000 after 1978; pre-1978 it is defined via analogous market capitalization break-points

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 165: Performance of Coverage Ratio, Months Outperforming Percentage

Portofolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-198612											
Quintile 1	48%	50%	48%	49%	48%	51%	47%	45%	50%	52%	48%
Quintile 2	55%	56%	53%	57%	55%	58%	58%	57%	68%	66%	70%
Quintile 3	58%	56%	55%	62%	66%	65%	62%	63%	67%	66%	64%
Quintile 4	47%	51%	52%	50%	49%	55%	50%	56%	61%	61%	65%
Quintile 5	42%	38%	38%	40%	42%	40%	41%	43%	42%	41%	48%
Long/Short Spread	57%	58%	56%	52%	55%	55%	54%	55%	54%	56%	53%
198701-200612											
Quintile 1	50%	44%	48%	45%	46%	46%	41%	38%	36%	37%	43%
Quintile 2	56%	57%	58%	55%	57%	60%	58%	58%	60%	55%	48%
Quintile 3	47%	52%	53%	53%	50%	51%	48%	49%	52%	47%	47%
Quintile 4	58%	57%	56%	60%	63%	60%	61%	58%	55%	59%	58%
Quintile 5	47%	45%	46%	43%	43%	47%	47%	46%	47%	44%	48%
Long/Short Spread	49%	51%	52%	51%	52%	48%	49%	46%	44%	43%	42%
199801-200612											
Quintile 1	54%	47%	52%	47%	45%	49%	43%	41%	41%	41%	49%
Quintile 2	57%	60%	66%	59%	57%	61%	60%	60%	57%	51%	35%
Quintile 3	43%	49%	51%	50%	46%	53%	46%	47%	55%	49%	49%
Quintile 4	57%	51%	49%	53%	50%	47%	47%	42%	44%	46%	41%
Quintile 5	40%	38%	39%	39%	44%	43%	43%	45%	42%	35%	38%
Long/Short Spread	56%	61%	61%	57%	56%	51%	56%	52%	53%	51%	49%

Past performance is not a guarantee of future returns.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 166: Performance of Coverage Ratio Across GICS Sectors, Excess Return Relative to Sector

	196201-198612										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
Energy	0.4%	0.4%	0.4%	0.2%	0.6%	1.5%	2.9%	3.7%	5.9%	8.9%	11.3%
Materials	0.5%	0.9%	1.2%	1.9%	1.7%	1.3%	0.8%	0.5%	0.7%	1.6%	2.9%
Industrials	0.4%	0.7%	1.0%	2.0%	2.9%	4.2%	5.4%	6.1%	6.2%	7.1%	8.2%
Consumer Discretionary	0.5%	0.9%	1.3%	2.0%	2.1%	2.3%	2.6%	2.9%	3.6%	5.0%	5.4%
Consumer Staples	-0.2%	-0.3%	-0.5%	-0.8%	-1.6%	-1.9%	-1.8%	-2.2%	-3.8%	-4.2%	-4.7%
Health Care	-0.2%	-0.6%	-1.0%	-2.8%	-4.5%	-5.6%	-6.7%	-8.7%	-12.4%	-16.0%	-17.5%
Information Technology	-0.1%	-0.3%	-1.0%	-2.7%	-3.5%	-4.5%	-6.0%	-6.9%	-9.0%	-10.8%	-11.3%
Telecommunication Services	-0.7%	-1.5%	-2.2%	-4.1%	-6.7%	-11.3%	-17.5%	-21.5%	-33.7%	-44.9%	-50.7%
Utilities	0.1%	0.1%	0.2%	0.5%	0.6%	0.4%	-0.2%	-1.4%	-2.5%	-4.1%	-8.0%
	198701-200612										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
Energy	0.0%	-0.2%	-0.3%	-0.1%	0.5%	0.9%	0.9%	0.5%	-0.4%	-3.3%	-2.6%
Materials	0.1%	0.3%	0.6%	1.5%	2.5%	3.8%	4.1%	4.6%	5.1%	6.9%	5.9%
Industrials	0.2%	0.4%	0.5%	1.0%	1.5%	2.0%	2.1%	2.3%	2.7%	3.1%	1.9%
Consumer Discretionary	-0.1%	-0.3%	-0.7%	-1.9%	-2.4%	-3.3%	-4.4%	-5.5%	-7.8%	-10.6%	-12.2%
Consumer Staples	0.1%	0.3%	0.6%	1.3%	2.2%	2.4%	2.5%	2.0%	0.9%	1.0%	0.3%
Health Care	0.4%	0.9%	1.4%	2.7%	3.7%	3.8%	4.7%	4.5%	1.6%	-1.8%	-0.8%
Information Technology	0.3%	0.2%	0.0%	-0.4%	-0.4%	-1.7%	-3.2%	-3.5%	-6.4%	-6.5%	-7.3%
Telecommunication Services	-0.7%	-1.4%	-2.1%	-4.7%	-7.3%	-10.9%	-13.9%	-15.7%	-13.5%	-9.0%	-4.6%
Utilities	-0.4%	-0.7%	-1.1%	-2.0%	-3.1%	-4.3%	-4.7%	-5.2%	-6.1%	-5.9%	-6.3%

Past performance is not a guarantee of future returns.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Cash to Assets and Cash to Price

The cash-to-assets ratio is a measure of the firm's cash on the balance sheet to its total assets (including corporate debt). The cash-to-price ratio is a measure of the firm's cash on the balance sheet to its market capitalization. In times of financial distress, firms with a cash shortage have a higher probability of insolvency or even bankruptcy. Therefore, the cash-to-assets or cash-to-price ratio can be thought of as a solvency indicator. Sound stable companies keep sufficient cash funds on hand, and, consequently, we would expect the stocks of such companies to yield higher returns going forward.

From 1962 through 2006 the long/short strategy produced an unimpressive 40 bps return on a 12-month holding period investment, and the strategy returns were both positive and negative in different sub-samples (Figure 167 and Figure 168). In addition, the relative returns do not change monotonically across the quintiles for either version of the factor (see Figure 168). Figure 169 and Figure 170 reveal almost identical percentages of outperforming stocks for different quintiles, implying that the model does not differentiate successfully between winners and losers. In line with the inconsistent relative returns over different time periods, we find that a 12-month holding period return strategy outperformed only in 48% of the months in the total sample and 60% of the months after 1998 (Figure 171).

Figure 167: Performance of Cash to Assets, Average Excess Returns, Relative to Large-Cap Universe

	Relative Return										
Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-200612											
Quintile 1	0.1%	0.1%	0.2%	0.3%	0.2%	0.0%	-0.2%	-0.4%	-1.2%	-2.5%	-3.7%
Quintile 2	0.1%	0.1%	0.1%	0.2%	0.2%	0.3%	0.5%	0.6%	1.0%	1.4%	1.9%
Quintile 3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.3%	0.4%	0.6%
Quintile 4	0.0%	0.0%	0.1%	0.2%	0.3%	0.4%	0.3%	0.4%	0.4%	0.5%	0.6%
Quintile 5	-0.1%	-0.2%	-0.3%	-0.5%	-0.4%	-0.4%	-0.4%	-0.4%	-0.3%	0.3%	0.6%
Long/Short Spread	0.2%	0.3%	0.5%	0.7%	0.5%	0.4%	0.2%	-0.1%	-0.8%	-2.8%	-4.3%
199801-200612											
Quintile 1	0.2%	0.5%	0.8%	1.5%	2.2%	3.0%	4.1%	5.1%	5.8%	4.1%	2.7%
Quintile 2	0.1%	0.1%	0.1%	0.2%	-0.1%	0.2%	0.4%	0.7%	1.2%	1.3%	1.4%
Quintile 3	0.0%	0.0%	0.0%	-0.1%	-0.2%	-0.4%	-0.8%	-1.0%	-1.0%	-0.7%	-0.5%
Quintile 4	-0.1%	-0.1%	-0.1%	-0.3%	-0.5%	-1.0%	-1.4%	-1.9%	-2.8%	-3.4%	-3.9%
Quintile 5	-0.2%	-0.5%	-0.8%	-1.3%	-1.4%	-1.7%	-2.2%	-2.9%	-3.3%	-1.3%	0.2%
Long/Short Spread	0.5%	1.0%	1.5%	2.8%	3.6%	4.7%	6.3%	8.0%	9.1%	5.4%	2.5%
196201-198612											
Quintile 1	0.1%	0.0%	0.1%	0.0%	-0.4%	-0.8%	-1.7%	-2.5%	-4.1%	-5.5%	-6.3%
Quintile 2	0.1%	0.1%	0.2%	0.3%	0.3%	0.3%	0.5%	0.7%	1.1%	1.1%	1.0%
Quintile 3	0.0%	0.0%	0.0%	0.1%	0.1%	0.3%	0.4%	0.7%	0.9%	0.6%	0.4%
Quintile 4	0.0%	0.1%	0.1%	0.3%	0.6%	0.7%	0.7%	0.7%	1.0%	1.5%	2.1%
Quintile 5	0.0%	0.0%	-0.1%	-0.2%	0.1%	0.3%	0.6%	1.0%	1.4%	2.4%	2.9%
Long/Short Spread	0.1%	0.1%	0.1%	0.1%	-0.4%	-1.1%	-2.3%	-3.5%	-5.5%	-7.9%	-9.2%

Past performance is not a guarantee of future returns.

Large-cap universe is Russell 1000 after 1978; pre-1978 it is defined via analogous market capitalization break-points
Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 168: Performance of Cash-to-Price, Average Excess Returns, Relative to Large-Cap Universe

	Relative Return										
Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-200612											
Quintile 1	0.2%	0.3%	0.4%	0.6%	0.9%	1.4%	1.9%	2.4%	3.4%	4.7%	6.2%
Quintile 2	0.1%	0.2%	0.2%	0.4%	0.5%	0.8%	1.2%	1.4%	1.7%	1.9%	2.3%
Quintile 3	0.0%	-0.1%	-0.1%	-0.1%	-0.2%	-0.2%	-0.4%	-0.4%	-0.6%	-0.8%	-1.0%
Quintile 4	-0.2%	-0.3%	-0.4%	-0.7%	-1.0%	-1.5%	-2.0%	-2.5%	-3.2%	-3.6%	-4.7%
Quintile 5	-0.1%	-0.2%	-0.3%	-0.4%	-0.6%	-1.0%	-1.3%	-1.7%	-2.3%	-3.2%	-4.0%
Long/Short Spread	0.3%	0.5%	0.6%	1.0%	1.5%	2.3%	3.2%	4.1%	5.7%	7.9%	10.2%
198701-200612											
Quintile 1	0.3%	0.5%	0.6%	1.2%	1.7%	2.5%	3.4%	4.2%	5.6%	7.1%	9.0%
Quintile 2	0.1%	0.2%	0.2%	0.3%	0.5%	0.8%	1.2%	1.4%	1.7%	1.7%	2.1%
Quintile 3	0.0%	0.0%	-0.1%	-0.2%	-0.2%	-0.3%	-0.5%	-0.5%	-0.8%	-1.0%	-1.1%
Quintile 4	-0.2%	-0.3%	-0.4%	-0.8%	-1.1%	-1.6%	-2.2%	-2.6%	-3.0%	-3.2%	-4.3%
Quintile 5	-0.1%	-0.2%	-0.3%	-0.5%	-0.8%	-1.3%	-1.9%	-2.5%	-3.5%	-4.6%	-5.6%
Long/Short Spread	0.4%	0.7%	0.9%	1.7%	2.5%	3.8%	5.2%	6.7%	9.0%	11.6%	14.5%
196201-198612											
Quintile 1	0.1%	0.2%	0.2%	0.1%	0.1%	0.4%	0.6%	0.9%	1.5%	2.8%	4.0%
Quintile 2	0.1%	0.2%	0.2%	0.4%	0.6%	0.9%	1.2%	1.5%	1.8%	2.0%	2.5%
Quintile 3	0.0%	-0.1%	-0.1%	-0.1%	-0.1%	-0.2%	-0.3%	-0.4%	-0.4%	-0.6%	-0.9%
Quintile 4	-0.2%	-0.3%	-0.4%	-0.7%	-1.0%	-1.3%	-1.8%	-2.3%	-3.4%	-4.1%	-5.1%
Quintile 5	-0.1%	-0.1%	-0.2%	-0.3%	-0.5%	-0.7%	-0.8%	-1.0%	-1.4%	-2.1%	-2.7%
Long/Short Spread	0.2%	0.3%	0.4%	0.5%	0.6%	1.0%	1.4%	1.9%	3.0%	4.9%	6.7%

Past performance is not a guarantee of future returns.

Large-cap universe is Russell 1000 after 1978; pre-1978 it is defined via analogous market capitalization break-points

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 169: Performance of Cash-to-Assets, Stock Selection Percentages

	Percent of Companies Outperforming										
Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-200612											
Quintile 1	49%	49%	49%	47%	46%	45%	44%	43%	41%	40%	39%
Quintile 2	49%	49%	49%	48%	47%	47%	47%	46%	46%	45%	45%
Quintile 3	49%	48%	48%	48%	46%	46%	46%	47%	47%	46%	45%
Quintile 4	49%	49%	48%	48%	47%	46%	46%	46%	45%	45%	44%
Quintile 5	48%	48%	48%	47%	47%	46%	46%	45%	45%	44%	43%
199801-200612											
Quintile 1	49%	49%	49%	47%	46%	45%	45%	44%	43%	42%	40%
Quintile 2	49%	49%	48%	47%	45%	44%	44%	44%	44%	43%	43%
Quintile 3	48%	48%	48%	47%	46%	45%	44%	44%	44%	44%	44%
Quintile 4	49%	49%	49%	47%	47%	46%	45%	45%	44%	43%	43%
Quintile 5	48%	48%	47%	46%	45%	45%	44%	44%	43%	43%	44%
196201-198612											
Quintile 1	49%	49%	49%	47%	46%	45%	44%	42%	40%	39%	38%
Quintile 2	50%	49%	49%	48%	47%	47%	47%	46%	46%	45%	45%
Quintile 3	48%	48%	48%	48%	46%	47%	48%	48%	48%	46%	45%
Quintile 4	48%	49%	48%	48%	47%	46%	46%	46%	45%	45%	44%
Quintile 5	48%	48%	48%	47%	47%	47%	47%	47%	47%	46%	45%

Past performance is not a guarantee of future returns.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 170: Performance of Cash-to-Price, Stock Selection Percentages

	Percent of Companies Outperforming										
Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-200612											
Quintile 1	49%	49%	49%	48%	48%	48%	47%	47%	47%	47%	46%
Quintile 2	49%	49%	49%	48%	48%	47%	47%	47%	46%	46%	46%
Quintile 3	48%	48%	48%	47%	46%	46%	45%	45%	44%	43%	42%
Quintile 4	48%	48%	47%	46%	45%	44%	43%	43%	42%	41%	40%
Quintile 5	48%	48%	48%	47%	46%	46%	45%	44%	43%	42%	42%
198701-200612											
Quintile 1	49%	49%	49%	49%	48%	48%	48%	48%	48%	47%	47%
Quintile 2	49%	49%	49%	48%	48%	47%	47%	46%	46%	46%	46%
Quintile 3	49%	49%	48%	48%	47%	46%	45%	45%	44%	43%	43%
Quintile 4	48%	48%	47%	46%	45%	45%	44%	43%	42%	42%	41%
Quintile 5	48%	48%	48%	47%	47%	46%	45%	44%	43%	42%	42%
196201-198612											
Quintile 1	50%	49%	48%	47%	47%	47%	46%	46%	46%	46%	46%
Quintile 2	49%	49%	49%	48%	47%	47%	47%	47%	46%	46%	46%
Quintile 3	48%	48%	48%	47%	46%	45%	45%	44%	44%	43%	42%
Quintile 4	48%	47%	47%	46%	45%	44%	43%	43%	42%	41%	40%
Quintile 5	48%	47%	47%	47%	46%	46%	45%	45%	44%	43%	43%

Past performance is not a guarantee of future returns.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 171: Performance of Cash-to-Assets, Months Outperforming Percentage

Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-198612											
Quintile 1	55%	51%	49%	49%	44%	38%	33%	28%	23%	14%	16%
Quintile 2	55%	55%	57%	53%	49%	50%	51%	52%	58%	56%	53%
Quintile 3	51%	50%	53%	48%	50%	51%	50%	55%	58%	54%	56%
Quintile 4	46%	48%	49%	54%	56%	57%	55%	55%	60%	66%	69%
Quintile 5	46%	48%	49%	45%	46%	51%	53%	57%	58%	67%	69%
Long/Short Spread	52%	52%	50%	51%	46%	43%	38%	28%	27%	22%	20%
198701-200612											
Quintile 1	52%	55%	54%	48%	48%	47%	49%	53%	52%	52%	49%
Quintile 2	50%	51%	54%	53%	54%	58%	61%	56%	52%	61%	62%
Quintile 3	49%	53%	55%	49%	44%	48%	45%	47%	51%	55%	57%
Quintile 4	53%	52%	51%	53%	57%	55%	53%	53%	49%	47%	39%
Quintile 5	45%	39%	40%	43%	42%	43%	43%	46%	46%	50%	46%
Long/Short Spread	57%	58%	54%	52%	53%	52%	54%	54%	55%	52%	50%
199801-200612											
Quintile 1	56%	60%	60%	56%	61%	61%	61%	65%	63%	64%	62%
Quintile 2	56%	56%	61%	55%	53%	58%	60%	54%	50%	56%	50%
Quintile 3	46%	47%	48%	47%	43%	40%	38%	40%	45%	50%	47%
Quintile 4	50%	47%	49%	44%	45%	40%	33%	34%	27%	25%	18%
Quintile 5	42%	37%	35%	41%	39%	38%	38%	39%	42%	48%	54%
Long/Short Spread	62%	62%	61%	57%	62%	60%	65%	64%	64%	61%	61%

Past performance is not a guarantee of future returns.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Employees to Assets

The number of employees to total assets describes how many people a company employs per unit of capital — that is, how labor-intensive a company is relative to its fixed capital base. Compared to the other companies in the same industry, a company with a larger number of employees to assets is less efficient than its peers. Relatively fewer employees per unit of assets may indicate more efficient production, a growing company, or a company cutting back on operations and laying off its workers. In terms of efficiency, a lower ratio should be positively correlated with future stock returns.

Figure 172 shows that even though the stocks in the upper quintile outperform the stocks in the bottom quintile, during the recent years 1987-2006 both tails yield consistently negative returns across different holding periods. We have no reasonable explanation for this pattern. The stock selection hit rates are virtually identical across quintiles (Figure 173), and ths strategy loses money after 1998 (Figure 174). According to the sector results in Figure 175, the Q1-Q5 spread flips signs over different time periods. Overall, the factor provides little help in picking stocks.

Figure 172: Performance of Employees to Assets, Average Excess Returns, Relative to Large-Cap Universe

	Relative Return										
Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-198612											
Quintile 1	0.2%	0.4%	0.6%	1.3%	1.8%	2.8%	3.8%	4.7%	6.4%	8.2%	10.8%
Quintile 2	-0.1%	-0.2%	-0.3%	-0.7%	-1.0%	-1.4%	-1.6%	-1.7%	-1.8%	-2.4%	-3.1%
Quintile 3	-0.1%	-0.2%	-0.4%	-0.5%	-0.8%	-0.9%	-0.9%	-0.8%	-1.4%	-2.4%	-3.3%
Quintile 4	-0.1%	-0.2%	-0.2%	-0.3%	-0.1%	0.0%	0.3%	0.4%	0.1%	-0.4%	-0.7%
Quintile 5	0.0%	-0.2%	-0.3%	-0.7%	-1.3%	-1.5%	-1.6%	-1.8%	-2.2%	-2.3%	-2.4%
Long/Short Spread	0.2%	0.6%	1.0%	2.0%	3.1%	4.3%	5.4%	6.5%	8.6%	10.5%	13.1%
198701-200612											
Quintile 1	0.0%	0.0%	0.0%	-0.4%	-0.9%	-1.3%	-2.1%	-2.8%	-3.9%	-5.1%	-6.5%
Quintile 2	0.0%	0.0%	0.0%	0.0%	-0.2%	-0.4%	-0.6%	-0.9%	-1.5%	-2.0%	-2.8%
Quintile 3	0.0%	0.0%	-0.1%	-0.2%	-0.3%	0.0%	0.0%	-0.1%	-0.8%	-1.9%	-1.7%
Quintile 4	0.0%	0.0%	0.0%	0.1%	0.0%	0.1%	0.2%	0.4%	0.5%	0.8%	0.0%
Quintile 5	-0.3%	-0.7%	-1.0%	-1.7%	-2.1%	-2.8%	-3.3%	-3.8%	-4.7%	-6.0%	-7.6%
Long/Short Spread	0.3%	0.7%	0.9%	1.3%	1.2%	1.4%	1.2%	0.9%	0.8%	0.9%	1.1%
199801-200612											
Quintile 1	0.0%	0.0%	0.0%	-0.4%	-1.1%	-1.8%	-3.0%	-3.9%	-4.6%	-3.5%	-1.8%
Quintile 2	0.0%	0.0%	0.1%	0.3%	0.4%	0.2%	-0.2%	-0.9%	-1.5%	-1.8%	-2.2%
Quintile 3	0.1%	0.1%	0.2%	0.4%	1.0%	1.9%	2.6%	2.8%	1.7%	-1.9%	-3.6%
Quintile 4	0.0%	0.1%	0.0%	0.1%	0.1%	0.3%	0.8%	1.6%	0.9%	-1.4%	-3.9%
Quintile 5	-0.5%	-0.8%	-1.1%	-1.8%	-2.3%	-2.8%	-2.8%	-2.9%	-2.8%	-3.4%	-5.3%
Long/Short Spread	0.5%	0.9%	1.1%	1.4%	1.2%	1.0%	-0.1%	-1.0%	-1.8%	-0.1%	3.5%

Past performance is not a guarantee of future returns.

Large-cap universe is Russell 1000 after 1978; pre-1978 it is defined via analogous market capitalization break-points
Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 173: Performance of Employees-to-Assets, Stock Selection Percentages

	Percent of Companies Outperforming										
Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-198612											
Quintile 1	50%	50%	50%	49%	48%	47%	48%	48%	48%	47%	47%
Quintile 2	48%	48%	47%	45%	44%	42%	42%	42%	43%	41%	40%
Quintile 3	48%	47%	46%	45%	44%	43%	43%	44%	43%	42%	41%
Quintile 4	48%	47%	47%	46%	46%	46%	46%	47%	45%	44%	43%
Quintile 5	49%	49%	49%	48%	46%	45%	45%	45%	45%	45%	45%
198701-200612											
Quintile 1	49%	49%	48%	46%	45%	45%	44%	43%	41%	40%	39%
Quintile 2	49%	49%	48%	47%	46%	45%	44%	43%	42%	41%	40%
Quintile 3	48%	48%	48%	46%	45%	44%	43%	42%	40%	39%	39%
Quintile 4	48%	48%	48%	46%	45%	44%	43%	43%	41%	39%	38%
Quintile 5	47%	46%	46%	45%	45%	43%	42%	41%	40%	38%	37%
199801-200612											
Quintile 1	50%	49%	49%	46%	45%	44%	44%	43%	42%	43%	44%
Quintile 2	49%	49%	49%	47%	46%	45%	44%	42%	42%	43%	43%
Quintile 3	48%	48%	47%	46%	45%	44%	43%	42%	41%	41%	41%
Quintile 4	48%	48%	47%	45%	43%	42%	41%	40%	38%	37%	36%
Quintile 5	48%	47%	46%	46%	45%	43%	42%	43%	42%	42%	41%

Past performance is not a guarantee of future results.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 174: Performance of Employees-to-Assets, Months Outperforming Percentage

Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-198612											
Quintile 1	54%	53%	54%	54%	58%	62%	63%	66%	70%	76%	69%
Quintile 2	50%	45%	42%	36%	36%	40%	37%	37%	42%	41%	38%
Quintile 3	47%	47%	46%	42%	41%	41%	45%	44%	38%	34%	39%
Quintile 4	44%	48%	46%	41%	42%	42%	43%	44%	47%	45%	47%
Quintile 5	51%	52%	53%	50%	48%	50%	48%	40%	42%	42%	46%
Long/Short Spread	50%	53%	53%	54%	54%	58%	60%	62%	67%	66%	68%
198701-200612											
Quintile 1	48%	48%	45%	42%	38%	39%	37%	32%	35%	32%	30%
Quintile 2	51%	52%	47%	45%	46%	50%	49%	48%	40%	38%	39%
Quintile 3	51%	48%	46%	41%	43%	37%	35%	33%	30%	29%	40%
Quintile 4	50%	48%	52%	53%	49%	48%	50%	51%	57%	56%	52%
Quintile 5	47%	46%	46%	47%	48%	45%	43%	45%	45%	40%	37%
Long/Short Spread	51%	49%	52%	48%	45%	47%	49%	50%	52%	57%	52%
199801-200612											
Quintile 1	53%	51%	49%	39%	34%	32%	28%	30%	35%	40%	47%
Quintile 2	52%	52%	49%	44%	49%	57%	55%	48%	38%	40%	38%
Quintile 3	51%	48%	49%	50%	51%	46%	42%	37%	33%	25%	30%
Quintile 4	51%	48%	53%	55%	50%	49%	49%	51%	59%	51%	47%
Quintile 5	48%	49%	51%	57%	56%	54%	56%	60%	60%	55%	49%
Long/Short Spread	51%	49%	51%	40%	38%	35%	35%	35%	40%	43%	47%

Past performance is not a guarantee of future results.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 175: Performance of Employees-to-Assets Across GICS Sectors, Excess Return Relative to Sector

	196201-198612										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
Energy	0.4%	0.9%	1.1%	2.4%	3.4%	3.8%	3.1%	2.4%	-0.7%	-4.3%	-7.6%
Materials	-0.2%	-0.3%	-0.4%	-0.9%	-2.1%	-2.9%	-3.8%	-4.5%	-4.6%	-4.0%	-3.3%
Industrials	0.5%	1.0%	1.7%	2.9%	4.6%	6.9%	9.3%	10.4%	15.1%	18.2%	21.0%
Consumer Discretionary	-0.1%	-0.3%	-0.6%	-1.6%	-2.7%	-3.3%	-4.0%	-4.9%	-5.6%	-7.1%	-8.6%
Consumer Staples	0.1%	0.3%	0.6%	1.5%	1.9%	2.5%	2.8%	3.3%	4.4%	6.7%	7.0%
Health Care	0.5%	1.2%	1.9%	4.0%	6.4%	8.7%	10.4%	11.7%	13.5%	16.9%	21.5%
Information Technology	0.8%	1.7%	2.6%	4.9%	6.6%	8.6%	11.4%	14.9%	22.2%	28.6%	35.1%
Telecommunication Services	-0.3%	-0.8%	-1.7%	-3.3%	-5.7%	-7.6%	-9.4%	-11.0%	-15.2%	-15.7%	-10.6%
Utilities	0.3%	0.7%	1.1%	2.3%	3.6%	4.7%	5.6%	7.0%	9.5%	11.9%	14.1%

	198701-200612										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
Energy	0.1%	0.3%	0.6%	1.2%	1.8%	2.7%	3.0%	3.3%	4.1%	5.8%	8.2%
Materials	0.2%	0.4%	0.7%	1.9%	3.4%	4.3%	5.1%	6.3%	8.2%	10.4%	14.2%
Industrials	0.0%	-0.1%	-0.1%	-0.5%	-0.8%	-1.4%	-2.5%	-3.5%	-5.3%	-6.5%	-8.6%
Consumer Discretionary	0.1%	0.2%	0.1%	0.0%	0.0%	-0.7%	-1.0%	-1.1%	-1.9%	-3.3%	-4.3%
Consumer Staples	0.0%	0.1%	0.1%	0.0%	0.0%	-0.5%	-1.1%	-1.8%	-3.7%	-5.1%	-6.4%
Health Care	0.0%	0.0%	-0.1%	0.0%	-0.1%	0.0%	-1.4%	-3.2%	-8.0%	-13.2%	-20.4%
Information Technology	0.2%	0.3%	0.2%	0.3%	0.5%	0.3%	-1.3%	-2.7%	-1.5%	-2.1%	-3.4%
Telecommunication Services	-0.5%	-0.6%	-0.9%	-2.4%	-3.3%	-4.5%	-5.4%	-8.4%	-12.9%	-21.0%	-29.1%
Utilities	0.1%	0.0%	0.0%	-0.2%	-0.3%	-0.3%	-0.8%	-0.8%	-0.3%	0.1%	-1.1%

	199801-200612										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
Energy	-0.5%	-0.7%	-0.8%	-0.8%	-0.5%	-0.4%	-0.3%	0.1%	-1.7%	-4.1%	-5.6%
Materials	-0.1%	-0.4%	-0.6%	-1.0%	-1.2%	-3.2%	-5.7%	-7.6%	-11.8%	-15.6%	-14.5%
Industrials	0.3%	0.5%	0.6%	0.6%	0.8%	0.6%	0.0%	0.0%	0.1%	1.6%	4.3%
Consumer Discretionary	0.4%	0.9%	1.2%	1.9%	3.5%	3.6%	4.2%	5.0%	8.1%	10.8%	16.1%
Consumer Staples	-0.3%	-0.7%	-1.1%	-2.4%	-3.6%	-5.4%	-7.6%	-9.4%	-12.9%	-15.8%	-19.2%
Health Care	0.2%	0.1%	0.2%	1.0%	1.2%	4.9%	6.9%	8.7%	10.5%	11.2%	10.7%
Information Technology	0.5%	0.9%	0.9%	1.1%	-0.2%	-3.1%	-8.9%	-14.8%	-16.5%	-2.6%	8.5%
Telecommunication Services	0.0%	0.4%	0.5%	-0.8%	-2.2%	-4.2%	-5.9%	-12.1%	-13.9%	-17.1%	-20.4%
Utilities	0.1%	-0.1%	-0.3%	-0.9%	-1.2%	-1.7%	-2.9%	-2.9%	-3.1%	-2.9%	-4.4%

Past performance is not a guarantee of future results.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Invested Capital to Enterprise Value

Invested capital-to-enterprise value is the ratio of a company's book value of invested capital to the market value of its equity plus debt. In other words, it shows how much a company actually invests in the business to achieve its current market value. Therefore, this measure represents the markup on invested capital earned by the firm. A lower ratio signifies a higher return on invested capital, so we expect this factor to be negatively associated with higher future stock returns.

We find little evidence in support of the above hypothesis. Opposite to our expectations, from 1962 through 1987 the stocks in the top quintile with the highest ratio of invested capital-to-enterprise value outperform the stocks in the lowest quintile by 690 bps, assuming a 12-month holding period (Figure 176). In the most recent sample after 1998, the long/short spread is negative as we would have predicted, however, the quintile returns possess a U-shape. We cannot intuitively explain the patterns of stock hit rates and the performance of the strategy in time, as implied by Figure 177 and Figure 178. In summary, since the empirical findings go directly against our prior hypothesis, we do not include this factor among our candidate signals.

Figure 176: Performance of Invested Capital-to-Enterprise Value, Average Excess Returns, Relative to Large-Cap Universe

	Relative Return										
Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-198612											
Quintile 1	0.5%	0.9%	1.2%	2.1%	2.7%	3.5%	4.6%	5.6%	7.5%	9.8%	13.0%
Quintile 2	0.0%	0.0%	0.1%	0.3%	0.4%	0.8%	1.4%	2.0%	3.1%	5.0%	6.4%
Quintile 3	-0.1%	-0.1%	-0.1%	0.0%	0.4%	1.0%	1.4%	2.2%	2.5%	2.0%	1.1%
Quintile 4	-0.1%	-0.1%	-0.1%	-0.3%	-0.3%	-0.4%	-0.7%	-0.9%	-2.0%	-3.8%	-6.0%
Quintile 5	-0.2%	-0.4%	-0.6%	-1.0%	-1.8%	-3.3%	-5.8%	-8.9%	-14.6%	-19.5%	-23.7%
Long/Short Spread	0.7%	1.3%	1.7%	3.1%	4.5%	6.9%	10.4%	14.5%	22.1%	29.3%	36.7%
198701-200612											
Quintile 1	0.1%	0.2%	0.2%	0.1%	0.3%	0.4%	0.6%	0.4%	-0.2%	-0.5%	-0.7%
Quintile 2	0.0%	-0.1%	-0.2%	-0.7%	-0.9%	-1.2%	-1.6%	-1.9%	-2.9%	-3.7%	-4.8%
Quintile 3	-0.2%	-0.5%	-0.7%	-1.3%	-2.2%	-2.7%	-3.4%	-4.1%	-5.7%	-7.7%	-9.6%
Quintile 4	-0.3%	-0.5%	-0.8%	-1.5%	-2.2%	-3.3%	-4.4%	-5.5%	-7.1%	-8.0%	-9.1%
Quintile 5	-0.1%	0.0%	0.0%	0.2%	0.0%	0.2%	0.2%	0.4%	0.8%	0.7%	1.0%
Long/Short Spread	0.2%	0.2%	0.1%	-0.1%	0.3%	0.1%	0.4%	0.1%	-1.0%	-1.1%	-1.8%
199801-200612											
Quintile 1	0.2%	0.3%	0.3%	0.4%	1.0%	1.4%	2.2%	2.5%	2.9%	4.9%	7.2%
Quintile 2	0.0%	-0.1%	-0.4%	-0.9%	-0.9%	-1.0%	-0.9%	-0.7%	-0.2%	1.1%	3.1%
Quintile 3	-0.4%	-0.7%	-0.9%	-1.6%	-2.6%	-3.2%	-3.8%	-4.4%	-5.7%	-6.6%	-7.0%
Quintile 4	-0.2%	-0.5%	-0.7%	-1.8%	-2.6%	-4.2%	-5.7%	-7.3%	-9.7%	-12.6%	-15.2%
Quintile 5	0.0%	0.1%	0.3%	1.3%	1.6%	2.3%	2.2%	2.6%	0.8%	-6.0%	-13.8%
Long/Short Spread	0.3%	0.3%	0.0%	-0.9%	-0.7%	-0.9%	0.0%	-0.1%	2.1%	10.9%	21.0%

Past performance is not a guarantee of future results.

Large-cap universe is Russell 1000 after 1978; pre-1978 it is defined via analogous market capitalization break-points

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 177: Performance of Invested Capital-to-Enterprise Value, Stock Selection Percentages

	Percent of Companies Outperforming										
Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-198612											
Quintile 1	51%	52%	51%	52%	52%	52%	52%	54%	54%	55%	54%
Quintile 2	48%	48%	48%	47%	47%	46%	46%	46%	47%	48%	47%
Quintile 3	49%	48%	48%	47%	46%	46%	46%	46%	45%	44%	42%
Quintile 4	49%	49%	48%	47%	45%	44%	43%	42%	41%	39%	38%
Quintile 5	49%	47%	47%	44%	43%	40%	38%	35%	32%	30%	28%
198701-200612											
Quintile 1	49%	48%	48%	47%	48%	47%	47%	46%	45%	43%	42%
Quintile 2	48%	48%	48%	46%	45%	44%	43%	43%	42%	41%	40%
Quintile 3	48%	47%	47%	45%	43%	42%	41%	40%	38%	37%	37%
Quintile 4	48%	47%	47%	45%	43%	42%	40%	39%	37%	36%	35%
Quintile 5	49%	49%	48%	46%	44%	42%	41%	40%	39%	37%	36%
199801-200612											
Quintile 1	49%	49%	49%	48%	48%	48%	48%	47%	47%	48%	49%
Quintile 2	49%	48%	48%	47%	45%	45%	44%	44%	45%	46%	47%
Quintile 3	48%	47%	47%	45%	43%	42%	41%	40%	39%	40%	41%
Quintile 4	48%	47%	46%	44%	42%	40%	38%	36%	34%	33%	33%
Quintile 5	48%	48%	47%	45%	43%	41%	39%	38%	35%	33%	31%

Past performance is not a guarantee of future results.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 178: Performance of Invested Capital-to-Enterprise Value, Months Outperforming Percentage

Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-198612											
Quintile 1	59%	58%	61%	67%	68%	69%	68%	74%	74%	74%	78%
Quintile 2	54%	51%	46%	49%	49%	50%	51%	53%	60%	61%	63%
Quintile 3	48%	45%	42%	43%	45%	48%	49%	50%	55%	58%	51%
Quintile 4	45%	47%	46%	44%	41%	40%	40%	42%	38%	40%	40%
Quintile 5	45%	43%	41%	37%	38%	36%	31%	28%	16%	8%	8%
Long/Short Spread	56%	59%	61%	63%	66%	68%	72%	77%	85%	87%	89%
198701-200612											
Quintile 1	50%	49%	51%	49%	50%	48%	45%	48%	51%	50%	48%
Quintile 2	48%	48%	47%	51%	51%	45%	46%	44%	44%	42%	42%
Quintile 3	42%	38%	36%	33%	27%	27%	23%	19%	16%	18%	14%
Quintile 4	40%	42%	37%	34%	29%	24%	23%	21%	19%	18%	21%
Quintile 5	48%	52%	49%	46%	43%	43%	42%	42%	44%	43%	42%
Long/Short Spread	50%	49%	49%	55%	55%	56%	54%	54%	54%	50%	50%
199801-200612											
Quintile 1	53%	46%	56%	57%	53%	51%	47%	57%	63%	61%	62%
Quintile 2	45%	46%	45%	54%	54%	51%	55%	54%	65%	59%	70%
Quintile 3	35%	31%	32%	33%	25%	28%	18%	14%	8%	11%	12%
Quintile 4	44%	40%	41%	33%	32%	24%	18%	15%	12%	4%	5%
Quintile 5	49%	50%	47%	43%	45%	41%	44%	39%	35%	26%	22%
Long/Short Spread	54%	49%	55%	61%	59%	60%	58%	62%	66%	70%	76%

Past performance is not a guarantee of future results.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Debt-to-Total Assets and Debt-to-Market Capitalization

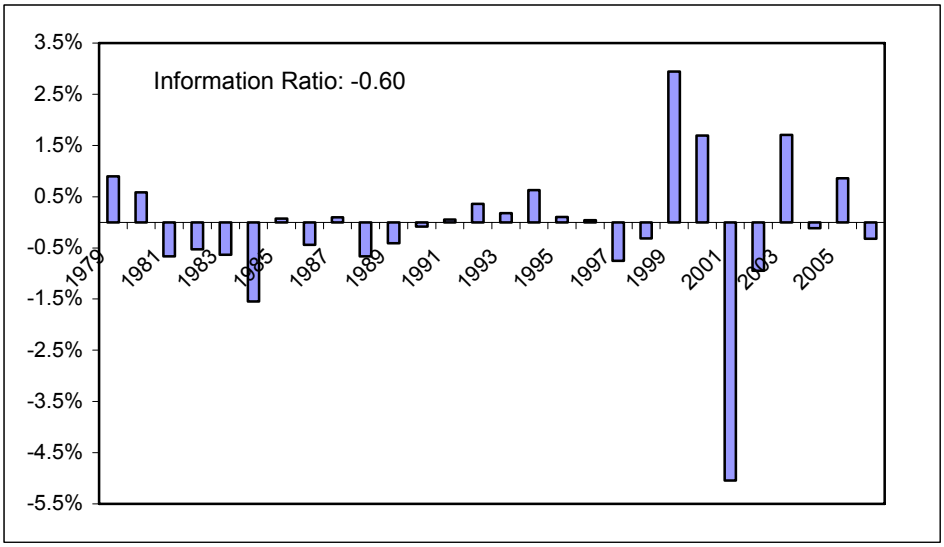
Debt-to-total assets is a ratio of the book value of debt to the book value of the firm's assets. This signal describes the amount of debt that a firm services with its physical assets (*actual* leverage). Debt to market capitalization is the ratio of the market value of debt to the market value of equity representing the *financial* leverage of the company.

Leverage magnifies business outcomes whether positive or negative. When a firm decides to employ outside financing, it is hoping that the larger earnings generated due to debt will outweigh the interest costs. If the outcome is favorable, a levered firm usually outperforms an equity-financed firm. However, a firm with a higher leverage ratio faces a larger risk of default, especially when its earnings are volatile. Because larger leverage implies a riskier earnings stream, for us to use this as the basis of an investment strategy we would want to see firms with higher debt levels earning lower stock returns in the future.

Our empirical results suggest that the strategy based on debt-to-total assets measure has limited ability to predict future returns. While the negative Information Ratio and the negative Q1 - Q5 return spreads support our prior expectations, both the information ratio and the magnitude of the spreads are small (see Figure 179 and Figure 180). Figure 182 reveals that our stock selection hit rates are virtually indistinguishable across quintiles. Finally, the factor has little consistency in different time periods (Figure 183), losing money approximately half of the time over the past 40 years.

The debt-to-market capitalization measure earns positive returns in a long/short strategy (see Figure 181). We speculate that this result is driven by a risk-based story: firms with high financial leverage are more likely to go bankrupt, as such their stocks are considered riskier. According to the basic rules of finance, riskier investments should be rewarded with higher returns, and this is exactly what we observe in Figure 181. There is no anomaly here for us to take advantage of, so we do not include the factor in our list of candidates for inclusion in the model.

Figure 179: Performance of Debt-to-Total Assets: Long/Short Excess Returns, Average Monthly Returns, Reported on a Calendar Year Basis, 1971-2006



Past performance is not a guarantee of future results.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 180: Performance of Debt-to-Total Assets, Average Excess Returns, Relative to Large-Cap Universe

	Relative Return										
Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-198612											
Quintile 1	-0.1%	-0.2%	-0.3%	-0.4%	-0.5%	-0.6%	-0.6%	-0.6%	-0.5%	-0.3%	-0.3%
Quintile 2	0.1%	0.2%	0.2%	0.2%	0.5%	0.8%	1.1%	1.4%	1.9%	2.1%	2.5%
Quintile 3	0.0%	0.1%	0.2%	0.5%	0.6%	0.8%	0.9%	1.1%	1.5%	1.4%	1.5%
Quintile 4	0.1%	0.1%	0.1%	0.1%	0.1%	0.0%	0.0%	0.0%	-0.3%	-0.6%	-0.9%
Quintile 5	0.0%	0.0%	0.0%	-0.2%	-0.6%	-0.9%	-1.4%	-2.0%	-2.5%	-3.0%	-3.4%
Long/Short Spread	-0.1%	-0.2%	-0.2%	-0.2%	0.1%	0.3%	0.8%	1.4%	2.0%	2.7%	3.1%
198701-200612											
Quintile 1	-0.1%	-0.1%	-0.1%	-0.1%	-0.2%	0.0%	0.0%	-0.2%	-0.8%	-1.3%	-1.4%
Quintile 2	0.0%	-0.1%	-0.1%	-0.1%	-0.1%	-0.2%	-0.3%	-0.3%	-0.2%	-0.2%	-0.9%
Quintile 3	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.1%	0.2%	0.4%	1.3%	2.5%
Quintile 4	0.0%	0.0%	0.0%	0.0%	-0.1%	-0.2%	-0.3%	-0.2%	0.3%	0.0%	-0.5%
Quintile 5	0.1%	0.1%	0.2%	0.2%	0.3%	0.2%	0.3%	0.4%	0.2%	0.1%	0.0%
Long/Short Spread	-0.1%	-0.2%	-0.3%	-0.3%	-0.4%	-0.3%	-0.4%	-0.6%	-1.0%	-1.5%	-1.5%
199801-200612											
Quintile 1	-0.1%	-0.1%	-0.2%	-0.2%	-0.1%	0.4%	0.6%	0.4%	-0.6%	-1.5%	-1.5%
Quintile 2	-0.1%	-0.2%	-0.3%	-0.4%	-0.4%	-0.4%	-0.5%	-0.6%	-0.3%	0.4%	0.6%
Quintile 3	0.0%	-0.1%	-0.1%	-0.4%	-0.9%	-1.3%	-1.8%	-2.2%	-3.0%	-3.3%	-3.4%
Quintile 4	0.0%	0.1%	0.1%	-0.1%	-0.2%	-0.4%	-0.8%	-0.8%	0.2%	0.2%	-0.2%
Quintile 5	0.2%	0.4%	0.5%	1.0%	1.5%	1.7%	2.4%	3.2%	3.6%	4.1%	4.3%
Long/Short Spread	-0.3%	-0.5%	-0.7%	-1.2%	-1.5%	-1.3%	-1.7%	-2.8%	-4.2%	-5.6%	-5.8%

Past performance is not a guarantee of future results.

Large Cap Universe is Russell 1000 after 1978; pre-1978 it is defined via analogous market capitalization break-points

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 181: Performance of Debt-to-Market Capitalization, Average Excess Returns, Relative to Large-Cap Universe

	Relative Return										
Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-198612											
Quintile 1	0.1%	0.2%	0.1%	0.2%	0.2%	0.7%	1.2%	1.5%	2.2%	3.5%	5.1%
Quintile 2	0.1%	0.2%	0.3%	0.6%	1.0%	1.4%	2.0%	2.7%	3.9%	5.3%	6.5%
Quintile 3	0.0%	0.0%	0.0%	0.1%	0.1%	0.1%	0.2%	0.3%	0.5%	0.4%	0.4%
Quintile 4	-0.1%	-0.1%	-0.1%	-0.3%	-0.5%	-0.7%	-1.0%	-1.5%	-2.2%	-3.1%	-4.2%
Quintile 5	-0.1%	-0.2%	-0.3%	-0.6%	-1.0%	-1.4%	-1.9%	-2.6%	-3.8%	-4.9%	-5.9%
Long/Short Spread	0.2%	0.3%	0.4%	0.7%	1.2%	2.1%	3.1%	4.1%	6.0%	8.4%	11.0%
198701-200612											
Quintile 1	0.1%	0.2%	0.3%	0.7%	0.9%	1.5%	2.0%	2.5%	3.3%	4.7%	6.5%
Quintile 2	0.1%	0.1%	0.1%	0.1%	0.3%	0.5%	0.6%	0.7%	0.7%	0.7%	0.8%
Quintile 3	-0.1%	-0.1%	-0.1%	0.0%	0.1%	0.0%	-0.1%	0.1%	0.7%	1.6%	1.9%
Quintile 4	0.0%	0.0%	0.0%	-0.2%	-0.5%	-0.6%	-0.8%	-1.0%	-1.7%	-2.9%	-4.0%
Quintile 5	-0.1%	-0.2%	-0.3%	-0.6%	-0.8%	-1.3%	-1.8%	-2.2%	-3.0%	-4.1%	-5.3%
Long/Short Spread	0.2%	0.5%	0.7%	1.2%	1.8%	2.8%	3.8%	4.7%	6.3%	8.8%	11.9%
199801-200612											
Quintile 1	0.1%	0.1%	0.1%	0.2%	0.5%	1.1%	1.6%	1.8%	2.8%	4.5%	7.3%
Quintile 2	0.1%	0.0%	0.0%	0.1%	0.5%	0.8%	1.3%	1.5%	1.8%	2.4%	3.3%
Quintile 3	-0.1%	-0.1%	-0.1%	-0.1%	-0.2%	-0.5%	-1.0%	-1.0%	-0.7%	-0.2%	-1.5%
Quintile 4	0.0%	0.1%	0.1%	-0.2%	-0.6%	-0.8%	-0.9%	-1.1%	-2.2%	-4.0%	-4.9%
Quintile 5	-0.1%	-0.1%	-0.1%	-0.1%	-0.2%	-0.7%	-1.0%	-1.2%	-1.6%	-2.6%	-4.1%
Long/Short Spread	0.1%	0.2%	0.2%	0.3%	0.7%	1.8%	2.6%	3.0%	4.4%	7.1%	11.3%

Past performance is not a guarantee of future results.

Large-cap universe is Russell 1000 after 1978; pre-1978 it is defined via analogous market capitalization break-points

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 182: Performance of Debt-to-Total Assets, Stock Selection Percentages

	Percent of Companies Outperforming										
Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-198612											
Quintile 1	48%	48%	47%	47%	46%	45%	45%	45%	45%	45%	43%
Quintile 2	49%	49%	49%	48%	47%	47%	47%	47%	46%	46%	44%
Quintile 3	49%	48%	48%	48%	46%	47%	48%	48%	48%	46%	46%
Quintile 4	49%	49%	49%	48%	47%	46%	45%	46%	45%	44%	43%
Quintile 5	50%	49%	49%	47%	46%	45%	45%	44%	43%	41%	40%
198701-200612											
Quintile 1	48%	48%	48%	46%	46%	45%	45%	44%	43%	42%	42%
Quintile 2	49%	49%	49%	48%	47%	47%	46%	46%	46%	45%	44%
Quintile 3	49%	48%	49%	48%	48%	47%	46%	46%	45%	45%	45%
Quintile 4	49%	49%	48%	47%	46%	45%	45%	44%	44%	43%	43%
Quintile 5	49%	49%	49%	48%	47%	46%	45%	45%	43%	42%	42%
199801-200612											
Quintile 1	48%	48%	47%	46%	45%	45%	45%	45%	43%	42%	42%
Quintile 2	49%	49%	48%	48%	47%	46%	45%	45%	45%	45%	44%
Quintile 3	49%	48%	48%	46%	46%	44%	43%	43%	42%	42%	43%
Quintile 4	48%	48%	47%	45%	44%	43%	42%	42%	41%	41%	41%
Quintile 5	50%	50%	50%	49%	48%	47%	47%	46%	46%	45%	44%

Past performance is not a guarantee of future results.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 183: Performance of Debt-to-Total Assets, Months Outperforming Percentage

Portfolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-198612											
Quintile 1	43%	41%	42%	42%	45%	44%	49%	49%	52%	55%	53%
Quintile 2	54%	59%	58%	56%	58%	58%	60%	61%	69%	64%	67%
Quintile 3	54%	57%	54%	62%	60%	60%	60%	63%	67%	68%	66%
Quintile 4	55%	56%	54%	55%	50%	51%	47%	48%	40%	43%	42%
Quintile 5	50%	53%	52%	48%	48%	44%	40%	35%	39%	42%	45%
Long/Short Spread	46%	47%	43%	46%	49%	52%	54%	54%	53%	57%	59%
198701-200612											
Quintile 1	49%	47%	47%	49%	45%	46%	51%	49%	48%	42%	38%
Quintile 2	52%	49%	49%	47%	49%	49%	52%	51%	54%	53%	51%
Quintile 3	51%	48%	46%	51%	50%	55%	59%	58%	56%	56%	55%
Quintile 4	49%	50%	50%	47%	50%	47%	46%	46%	48%	50%	52%
Quintile 5	54%	56%	54%	54%	52%	46%	49%	47%	43%	43%	40%
Long/Short Spread	50%	50%	51%	49%	46%	51%	53%	55%	51%	48%	53%
199801-200612											
Quintile 1	45%	42%	41%	48%	43%	43%	54%	47%	48%	35%	32%
Quintile 2	44%	42%	43%	39%	46%	47%	52%	47%	51%	50%	53%
Quintile 3	48%	44%	41%	43%	39%	37%	44%	39%	30%	30%	27%
Quintile 4	48%	49%	50%	42%	48%	49%	44%	46%	51%	53%	53%
Quintile 5	59%	67%	64%	68%	69%	66%	68%	70%	64%	64%	57%
Long/Short Spread	44%	41%	46%	45%	39%	39%	45%	41%	33%	26%	34%

Past performance is not a guarantee of future results.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Market Sentiment Factors

One-Month Reversal

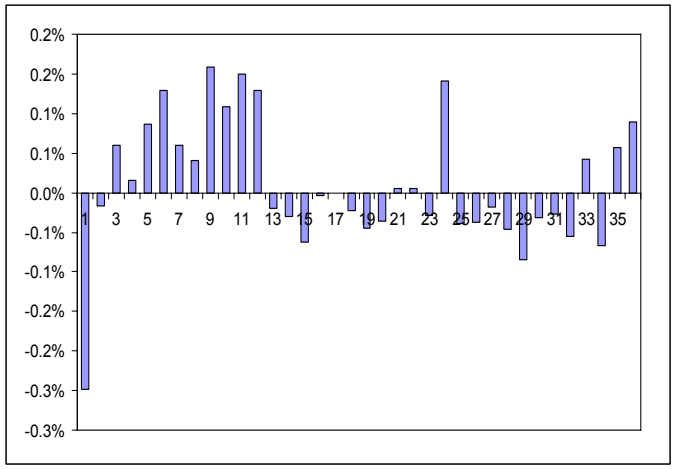
The one-month reversal factor is based on the idea that the stock market initially overreacts in response to new information. As time goes by, equity prices gradually adjust back to their fundamental values. Investors who invest according to contrarian strategies buy current losers and sell current winners, anticipating the eventual mean-reversion of mispriced stocks. Therefore, we expect a negative relation between the one-month reversal and future stock returns.

Empirical evidence suggests that the one-month reversal effect disappeared from the large-cap universe in the 1990s. We define the large-cap as the Russell 1000 after 1978 (when Russell 1000 was implemented) and the top 85%—90% of market capitalization prior to 1978. The small-cap universe covers all the stocks in Russell 2000 after 1978, and the stocks between the 85th and 97th percentiles of the total market size before 1978.

Figure 184 through Figure 187 illustrate the returns to Q1-Q5 spread in the large-cap universe. As can be seen from Figure 184 and Figure 185, for the last 40 years the strategy yielded significant returns on a one-month holding period investment. However, the returns to the strategy greatly diminished in 1990s, as implied by the insignificant t-statistic of -1.0 for a one-month holding period portfolio (Figure 186 and Figure 187).

Similar to large companies, the factor possessed significant predictive power for short-term investment in the small-cap universe over the last 40 years (Figure 188 and Figure 189). Starting from 1990 though, the returns to the one-month reversal strategy are, at best, marginally significant (Figure 190 and Figure 191). In summary, since the returns to a one-month reversal strategy ceased to exist over the last decade, we would not include this factor in the stock selection model.

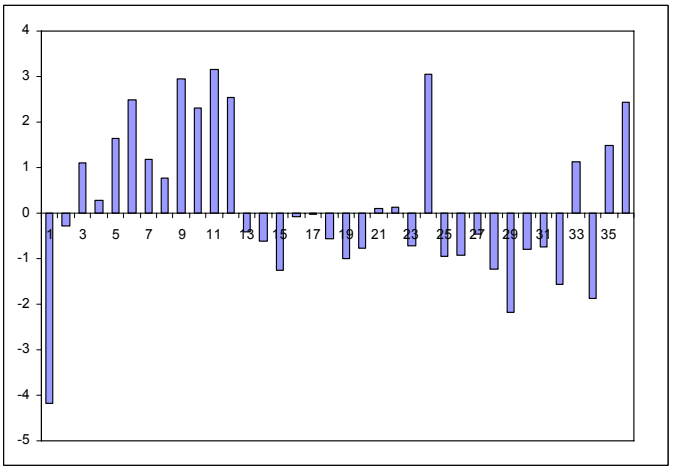
Figure 184: One-month Reversal: Q1-Q5 Relative Returns per month After Portfolio Implementation, 1962 Through 2006



Past performance is not a guarantee of future results.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

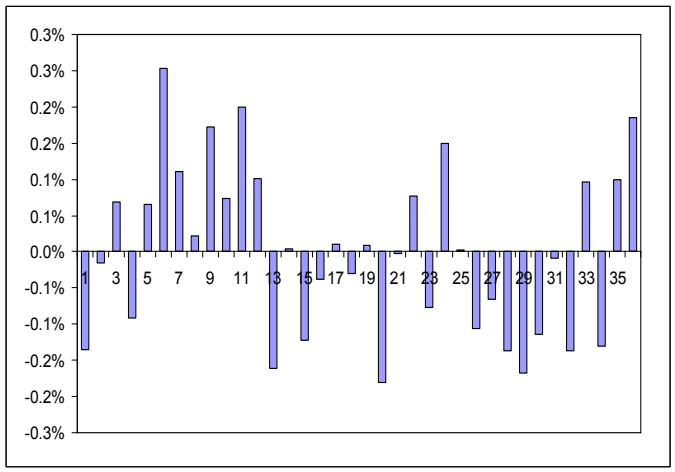
Figure 185: One-Month Reversal: T-statistics for Q1-Q5 Relative Returns per Month After Portfolio Implementation, 1962 Through 2006



Past performance is not a guarantee of future results.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

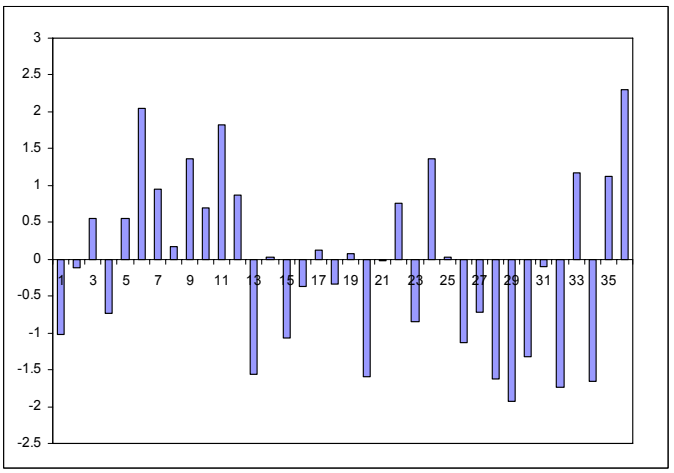
Figure 186: One-Month Reversal: Q1-Q5 Relative Returns per Month After Portfolio Implementation, 1990 Through 2006



Past performance is not a guarantee of future results.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

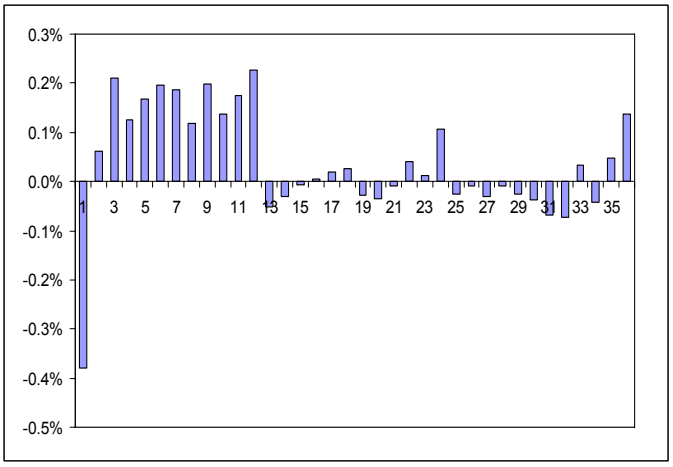
Figure 187: One-month Reversal: T-statistics for Q1-Q5 Relative Returns per Month After Portfolio Implementation, 1990 Through 2006



Past performance is not a guarantee of future results.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

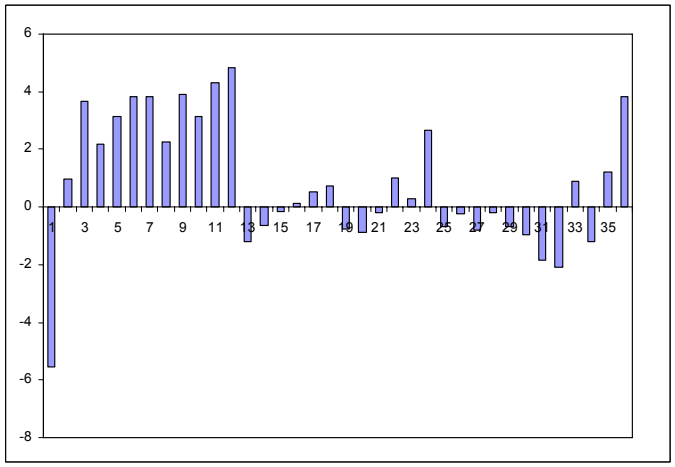
Figure 188: One-Month Reversal: Q1-Q5 Relative Returns per Month After Portfolio Implementation, 1962 Through 2006



Past performance is not a guarantee of future results.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

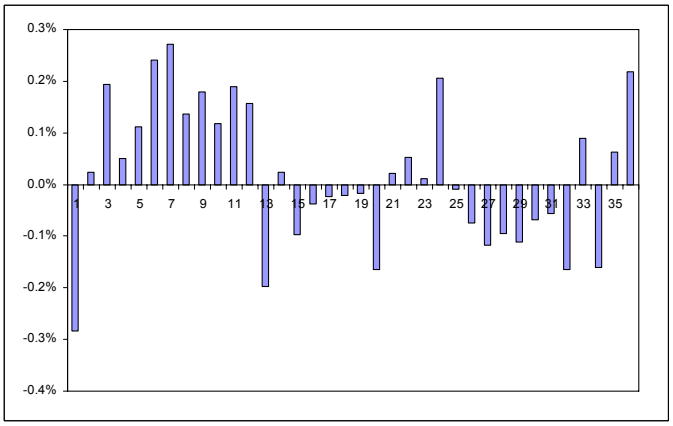
Figure 189: One-month Reversal: T-statistics for Q1-Q5 Relative Returns per Month After Portfolio Implementation, 1962 through 2006



Past performance is not a guarantee of future results.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

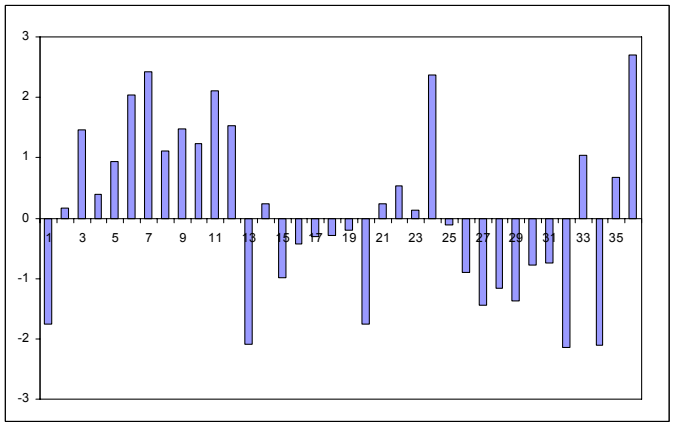
Figure 190: One-Month Reversal: Q1-Q5 Relative Returns per Month After Portfolio Implementation, 1990 Through 2006



Past performance is not a guarantee of future results.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 191: One-Month Reversal: T-statistics for Q1-Q5 Relative Returns per Month After Portfolio Implementation, 1990 Through 2006



Past performance is not a guarantee of future results.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Volume

Our volume factor measures a stock's relative liquidity versus the liquidity at its respective stock exchange. We would expect more liquid stocks, as measured by the relative trading volume, to be negatively correlated with future stock returns.

We find some evidence in support of the above hypothesis. Volume works well in the earlier sample, producing returns to the long/short strategy of 7.2% annually, assuming a 12-month holding period (Figure 192). However, the performance of the volume factor drops significantly after 1987, generating, on average, 60 bps annually. The factor has some ability to distinguish between the best and the worst stocks, as apparent from Figure 193. Finally, Figure 194 shows that the strategy was making money in 81% of the months before 1987, but the success rate deteriorated to only 59% post 1998.

Figure 192: Performance of Volume, Average Excess Returns, Relative to Large -Cap Universe

	Relative Return										
Portofolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-198612											
Quintile 1	-0.3%	-0.8%	-1.3%	-2.4%	-3.6%	-4.8%	-6.0%	-7.1%	-9.4%	-11.5%	-13.9%
Quintile 2	-0.1%	-0.1%	-0.1%	-0.7%	-1.2%	-1.8%	-2.4%	-3.2%	-4.7%	-7.0%	-8.8%
Quintile 3	0.2%	0.3%	0.5%	0.9%	1.1%	1.4%	1.6%	1.7%	2.1%	2.4%	2.7%
Quintile 4	0.1%	0.3%	0.4%	1.1%	1.9%	2.5%	3.0%	3.8%	5.2%	6.7%	7.8%
Quintile 5	0.1%	0.3%	0.5%	1.0%	1.6%	2.4%	3.6%	4.7%	7.0%	9.6%	12.0%
Long/Short Spread	-0.4%	-1.1%	-1.7%	-3.4%	-5.2%	-7.2%	-9.6%	-11.9%	-16.4%	-21.2%	-25.8%
198701-200612											
Quintile 1	-0.2%	-0.3%	-0.5%	-0.8%	-0.8%	-0.4%	0.2%	0.7%	2.0%	3.6%	5.7%
Quintile 2	0.1%	0.2%	0.3%	0.5%	0.5%	0.7%	0.8%	0.6%	-0.1%	-0.9%	-1.9%
Quintile 3	0.0%	0.1%	0.1%	0.2%	0.2%	0.1%	0.0%	-0.2%	-0.2%	-0.5%	-0.5%
Quintile 4	0.0%	0.0%	0.0%	-0.1%	-0.2%	-0.6%	-1.0%	-1.2%	-1.4%	-1.4%	-1.8%
Quintile 5	0.0%	0.1%	0.1%	0.2%	0.3%	0.2%	0.1%	0.0%	-0.3%	-0.8%	-1.4%
Long/Short Spread	-0.2%	-0.4%	-0.6%	-1.1%	-1.1%	-0.6%	0.1%	0.6%	2.3%	4.4%	7.1%
199801-200612											
Quintile 1	-0.3%	-0.5%	-0.8%	-1.4%	-1.6%	-1.6%	-1.7%	-2.2%	-5.0%	-11.1%	-17.3%
Quintile 2	0.1%	0.2%	0.3%	0.7%	1.0%	1.3%	1.4%	1.3%	0.2%	-1.6%	-3.3%
Quintile 3	0.1%	0.1%	0.0%	0.1%	0.0%	-0.2%	-0.4%	-0.5%	0.4%	1.8%	3.3%
Quintile 4	0.0%	0.0%	0.0%	-0.2%	-0.4%	-0.9%	-1.2%	-1.3%	-0.4%	2.5%	4.9%
Quintile 5	0.1%	0.2%	0.4%	0.8%	1.1%	1.4%	2.0%	2.8%	4.8%	8.4%	12.4%
Long/Short Spread	-0.4%	-0.8%	-1.2%	-2.2%	-2.7%	-2.9%	-3.7%	-5.0%	-9.8%	-19.5%	-29.7%

Past performance is not a guarantee of future results.

Large-cap universe is Russell 1000 after 1978; pre-1978 it is defined via analogous market capitalization break-points

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 193: Performance of Volume, Stock Selection Percentages

	Percent of Companies Outperforming										
Portofolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-198612											
Quintile 1	47%	46%	45%	43%	42%	41%	41%	40%	40%	40%	39%
Quintile 2	48%	48%	47%	46%	45%	44%	43%	43%	43%	42%	41%
Quintile 3	49%	49%	49%	49%	48%	47%	47%	47%	47%	47%	46%
Quintile 4	49%	49%	49%	49%	49%	49%	49%	49%	50%	50%	49%
Quintile 5	49%	49%	49%	49%	49%	49%	50%	51%	52%	52%	52%
198701-200612											
Quintile 1	48%	48%	47%	45%	44%	43%	42%	42%	41%	40%	40%
Quintile 2	49%	49%	49%	48%	47%	46%	45%	45%	43%	42%	41%
Quintile 3	49%	49%	49%	48%	48%	47%	46%	45%	44%	43%	43%
Quintile 4	49%	48%	48%	47%	47%	46%	45%	45%	44%	43%	43%
Quintile 5	49%	49%	48%	48%	48%	47%	46%	46%	45%	44%	43%
199801-200612											
Quintile 1	48%	47%	46%	43%	41%	39%	37%	36%	33%	31%	30%
Quintile 2	49%	49%	48%	47%	46%	45%	44%	43%	42%	42%	41%
Quintile 3	49%	49%	49%	48%	47%	46%	45%	45%	44%	45%	46%
Quintile 4	49%	49%	49%	47%	47%	46%	45%	45%	46%	47%	49%
Quintile 5	50%	50%	50%	50%	50%	49%	49%	50%	51%	54%	55%

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 194: Performance of Volume, Months Outperforming Percentage

Portofolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-198612											
Quintile 1	34%	27%	23%	15%	13%	13%	8%	4%	2%	3%	6%
Quintile 2	44%	42%	39%	33%	31%	26%	22%	21%	18%	10%	10%
Quintile 3	65%	60%	63%	64%	65%	63%	63%	65%	68%	67%	62%
Quintile 4	59%	62%	65%	76%	80%	82%	88%	92%	96%	96%	92%
Quintile 5	59%	64%	60%	64%	69%	73%	82%	84%	87%	90%	93%
Long/Short Spread	37%	25%	23%	16%	19%	19%	15%	8%	2%	1%	5%
199801-200612											
Quintile 1	47%	54%	48%	40%	40%	41%	41%	39%	26%	23%	22%
Quintile 2	51%	56%	58%	56%	56%	54%	60%	62%	55%	49%	36%
Quintile 3	47%	57%	50%	56%	58%	56%	61%	58%	71%	74%	78%
Quintile 4	45%	42%	44%	46%	47%	48%	43%	47%	55%	61%	68%
Quintile 5	48%	51%	52%	57%	60%	58%	64%	65%	73%	76%	80%
Long/Short Spread	47%	49%	47%	40%	42%	41%	40%	37%	26%	21%	24%

Past performance is not a guarantee of future results.

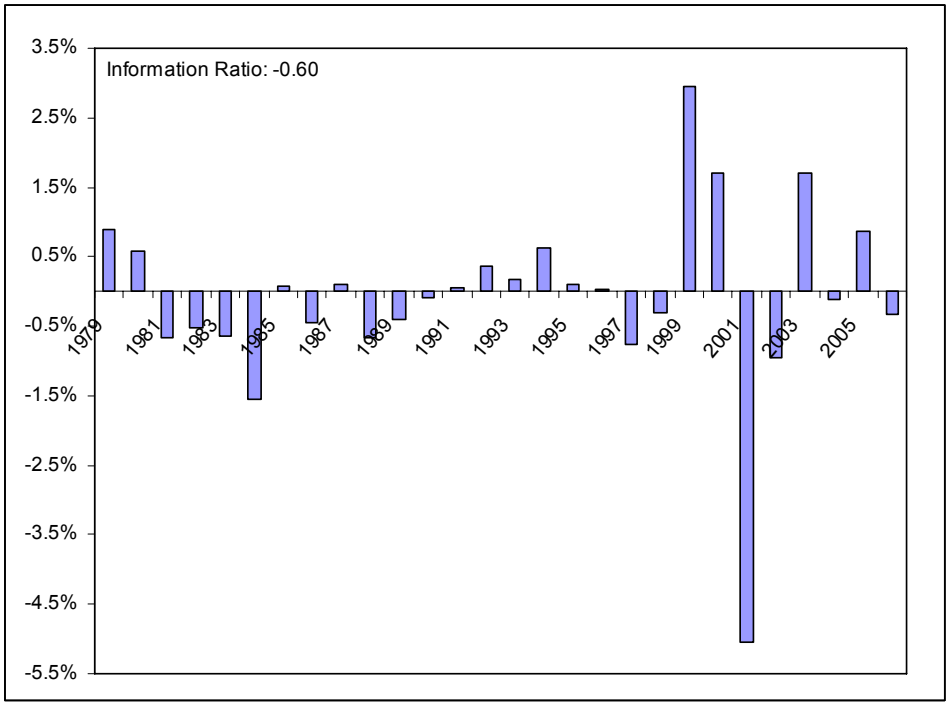
Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Turnover

Analogous to the volume factor, the turnover measure captures a stock's liquidity relative to the average liquidity at the stock exchange. However, the turnover factor is not contaminated by stock splits and other corporate actions where our volume measure may be. We expect the stocks with the highest turnover (Q1) to underperform the stocks with the lowest turnover (Q5).

The turnover factor has an information ratio of -0.6, suggesting a small negative correlation between the factor and future stock returns (Figure 195). Surprisingly, the sign of Q1-Q5 spreads flips in the period after 1987, with stocks in the top quintile outperforming the stocks in the bottom quintile by 170 bps on average, assuming a 12-month holding period (Figure 196). Figure 197 reveals very limited stock-picking success for the turnover factor.

Figure 195: Performance of Turnover: Long/Short Excess Returns, Average Monthly Returns, Reported on a Calendar Year Basis, 1979 to 2006



Past performance is not a guarantee of future results.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 196: Performance of Turnover, Average Excess Returns, Relative to Large-Cap Universe Turnover

	Relative Return										
Portofolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-198612											
Quintile 1	-0.1%	-0.4%	-0.5%	-1.1%	-1.7%	-2.5%	-3.7%	-4.5%	-7.8%	-11.7%	-15.5%
Quintile 2	0.2%	0.3%	0.3%	0.4%	0.5%	0.4%	0.3%	0.3%	-0.2%	-0.8%	-1.0%
Quintile 3	0.0%	0.1%	0.1%	0.1%	0.1%	0.1%	0.4%	0.5%	1.9%	2.9%	3.8%
Quintile 4	0.0%	0.0%	0.0%	0.5%	0.6%	1.2%	1.7%	2.0%	3.1%	4.5%	5.7%
Quintile 5	-0.1%	0.0%	0.0%	0.0%	0.2%	0.6%	1.1%	1.7%	3.3%	5.2%	6.8%
Long/Short Spread	-0.1%	-0.4%	-0.5%	-1.0%	-1.9%	-3.0%	-4.8%	-6.1%	-11.0%	-16.8%	-22.3%
198701-200612											
Quintile 1	0.0%	0.0%	0.0%	-0.1%	0.0%	0.7%	1.3%	1.5%	1.8%	2.3%	3.4%
Quintile 2	0.0%	0.0%	-0.1%	-0.2%	-0.3%	-0.4%	-0.4%	-0.4%	0.0%	0.3%	0.0%
Quintile 3	0.1%	0.2%	0.2%	0.4%	0.4%	0.4%	0.3%	0.3%	0.5%	0.5%	0.3%
Quintile 4	0.0%	0.0%	0.1%	0.2%	0.3%	0.3%	0.2%	0.1%	0.1%	-0.4%	-0.7%
Quintile 5	-0.1%	-0.2%	-0.2%	-0.3%	-0.5%	-1.0%	-1.3%	-1.6%	-2.4%	-2.7%	-3.0%
Long/Short Spread	0.1%	0.2%	0.2%	0.1%	0.5%	1.7%	2.6%	3.1%	4.2%	5.0%	6.3%
199801-200612											
Quintile 1	0.0%	0.0%	0.1%	0.3%	1.3%	2.8%	4.1%	4.5%	2.4%	-5.1%	-11.6%
Quintile 2	0.0%	0.0%	-0.3%	-0.5%	-0.6%	-0.8%	-0.9%	-1.0%	-0.3%	0.9%	0.7%
Quintile 3	0.1%	0.2%	0.2%	0.3%	0.1%	-0.2%	-0.8%	-0.8%	-0.1%	1.5%	3.1%
Quintile 4	0.0%	0.0%	0.1%	0.1%	0.0%	-0.3%	-0.3%	-0.4%	0.4%	2.5%	4.6%
Quintile 5	-0.1%	-0.2%	-0.2%	-0.2%	-0.8%	-1.6%	-2.0%	-2.3%	-2.4%	0.2%	3.2%
Long/Short Spread	0.1%	0.2%	0.2%	0.5%	2.1%	4.4%	6.1%	6.8%	4.8%	-5.2%	-14.7%

Past performance is not a guarantee of future results.

Large-cap universe is Russell 1000 after 1978; pre-1978 it is defined via analogous market capitalization break-points

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 197: Performance of Turnover, Stock Selection Percentages

	Percent of Companies Outperforming										
Portofolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-198612											
Quintile 1	47%	47%	46%	44%	43%	41%	41%	41%	39%	38%	37%
Quintile 2	49%	50%	49%	48%	47%	46%	46%	46%	46%	45%	45%
Quintile 3	49%	49%	48%	48%	48%	47%	47%	47%	48%	48%	47%
Quintile 4	48%	49%	48%	49%	48%	48%	48%	48%	49%	50%	49%
Quintile 5	48%	48%	48%	48%	47%	47%	47%	48%	50%	50%	49%
198701-200612											
Quintile 1	49%	48%	48%	45%	44%	43%	42%	41%	40%	39%	38%
Quintile 2	49%	49%	49%	47%	47%	46%	45%	45%	43%	42%	42%
Quintile 3	49%	50%	49%	49%	48%	47%	47%	46%	45%	44%	44%
Quintile 4	49%	49%	49%	48%	49%	48%	47%	47%	46%	44%	44%
Quintile 5	48%	47%	47%	47%	47%	45%	44%	44%	43%	42%	43%
199801-200612											
Quintile 1	48%	48%	47%	45%	43%	42%	41%	40%	37%	36%	34%
Quintile 2	49%	49%	49%	47%	46%	45%	44%	44%	43%	43%	43%
Quintile 3	50%	50%	50%	48%	47%	47%	46%	46%	46%	46%	47%
Quintile 4	49%	49%	49%	49%	48%	47%	47%	47%	47%	48%	49%
Quintile 5	48%	48%	48%	47%	46%	44%	43%	43%	43%	46%	48%

Past performance is not a guarantee of future results.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Amihud Illiquidity Measure and Modified Amihud Illiquidity Measure

Our Amihud illiquidity factor is the illiquidity measure developed by Amihud[12], whereas the modified version of the illiquidity measure takes into account its performance over time. These factors represent the price impact of the stock trading volume. A larger impact implies that the stock is less liquid because even small changes in the trading activity are likely to affect its market price. Thus, stocks with a high Amihud illiquidity value should be positively compensated in terms of future returns.

From Figure 198 we can see that the long/short strategy yielded a 5.1% average return on a 12-month holding period basis from 1962-1986. However, the sign of the strategy returns flipped in the second half of our sample. Moreover, it is not obvious to us why the stocks in the 4th quintile significantly underperform the other quintiles post 1998. We have no reasonable explanation for the positive spread returns to the modified illiquidity measure in Figure 199. In addition, Figure 200 illustrates that the stock hit rates are virtually identical across different quintiles. According to sector results in Figure 201, the Amihud illiquidity factor consistently generates positive returns in Consumer Staples, Health Care, and Utilities. Overall, due to lack of monotonicity in relative returns across the quintiles and limited stock picking ability of the factor, we see little potential to an strategy investment based on Amihud illiquidity measure.

Figure 198: Performance of Amihud Illiquidity Measure, Average Excess Returns, Relative to Large-Cap Universe

	Relative Return										
Portofolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-198612											
Quintile 1	0.0%	0.1%	0.2%	0.4%	0.8%	1.1%	1.6%	2.6%	4.1%	5.9%	7.6%
Quintile 2	0.1%	0.3%	0.4%	0.8%	1.3%	2.0%	2.6%	3.2%	4.8%	6.2%	7.0%
Quintile 3	0.1%	0.1%	0.1%	0.2%	0.2%	0.2%	0.3%	0.3%	0.7%	1.0%	1.8%
Quintile 4	0.0%	0.0%	0.1%	0.1%	0.2%	0.4%	0.7%	0.8%	1.1%	0.9%	0.6%
Quintile 5	-0.3%	-0.5%	-0.8%	-1.7%	-2.8%	-4.0%	-5.5%	-7.0%	-10.4%	-13.8%	-17.3%
Long/Short Spread	0.3%	0.6%	1.0%	2.1%	3.5%	5.1%	7.1%	9.5%	14.4%	19.7%	24.8%
198701-200612											
Quintile 1	0.1%	0.2%	0.3%	0.3%	0.2%	0.1%	0.2%	0.0%	-0.1%	-0.6%	-1.0%
Quintile 2	0.1%	0.2%	0.3%	0.6%	0.8%	0.8%	0.9%	1.0%	0.8%	0.6%	0.2%
Quintile 3	0.0%	-0.1%	-0.1%	0.0%	0.1%	0.1%	0.0%	0.1%	0.2%	-0.1%	-0.5%
Quintile 4	-0.1%	-0.3%	-0.5%	-0.8%	-1.2%	-1.5%	-1.9%	-2.0%	-2.0%	-1.8%	-2.3%
Quintile 5	0.0%	0.0%	0.0%	0.0%	0.1%	0.5%	0.8%	0.9%	1.2%	1.9%	3.6%
Long/Short Spread	0.1%	0.2%	0.3%	0.2%	0.1%	-0.3%	-0.6%	-0.9%	-1.3%	-2.5%	-4.6%
199801-200612											
Quintile 1	0.2%	0.4%	0.7%	1.1%	1.8%	2.3%	3.1%	3.9%	6.6%	9.6%	14.0%
Quintile 2	0.2%	0.4%	0.6%	1.2%	1.6%	2.0%	2.6%	3.3%	4.5%	7.1%	9.4%
Quintile 3	0.0%	-0.1%	-0.1%	-0.1%	0.0%	0.1%	0.3%	0.6%	1.9%	3.9%	5.2%
Quintile 4	-0.3%	-0.6%	-1.0%	-2.1%	-3.3%	-4.6%	-6.4%	-7.9%	-10.1%	-11.4%	-13.7%
Quintile 5	-0.1%	-0.2%	-0.2%	-0.2%	-0.1%	0.3%	0.3%	0.1%	-2.9%	-9.3%	-15.0%
Long/Short Spread	0.3%	0.6%	0.9%	1.3%	1.9%	2.0%	2.7%	3.8%	9.5%	18.9%	29.0%

Past performance is not a guarantee of future results.

Large-cap universe is Russell 1000 after 1978; pre-1978 it is defined via analogous market capitalization break-points

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

[12] See Yakov Amihud, "Illiquidity and Stock Returns: Cross-section and Time-series Effects", Journal of Financial Markets, 2002, Volume 5, Number 1.

Figure 199: Performance of Modified Amihud Illiquidity Measure, Average Excess Returns, Relative to Large-Cap Universe

	Relative Return										
Portofolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-198612											
Quintile 1	-0.1%	-0.3%	-0.4%	-0.6%	-0.4%	-0.2%	-0.5%	-1.1%	-2.9%	-4.0%	-5.6%
Quintile 2	0.0%	-0.1%	-0.2%	-0.3%	-0.1%	0.1%	0.1%	0.2%	0.4%	0.2%	0.2%
Quintile 3	-0.1%	-0.1%	-0.1%	-0.5%	-1.0%	-1.3%	-1.2%	-1.0%	0.5%	1.5%	2.2%
Quintile 4	0.2%	0.3%	0.5%	0.8%	0.9%	1.0%	1.3%	1.9%	2.8%	3.6%	4.3%
Quintile 5	0.1%	0.2%	0.2%	0.4%	0.3%	0.2%	0.0%	0.0%	-0.5%	-1.1%	-1.4%
Long/Short Spread	-0.2%	-0.4%	-0.7%	-1.0%	-0.7%	-0.4%	-0.5%	-1.1%	-2.3%	-2.9%	-4.3%
198701-200612											
Quintile 1	-0.1%	-0.1%	0.0%	0.0%	0.1%	0.2%	0.7%	1.3%	3.1%	5.1%	7.3%
Quintile 2	0.0%	0.0%	0.1%	0.1%	0.0%	-0.5%	-0.9%	-1.1%	-0.9%	-1.2%	-0.9%
Quintile 3	0.0%	0.0%	0.0%	0.0%	-0.2%	-0.3%	-0.5%	-0.7%	-1.2%	-1.5%	-2.4%
Quintile 4	0.1%	0.1%	0.1%	0.2%	0.2%	0.2%	0.3%	0.2%	-0.6%	-1.0%	-2.0%
Quintile 5	0.0%	-0.1%	-0.2%	-0.3%	-0.1%	0.3%	0.6%	0.4%	-0.3%	-1.3%	-2.0%
Long/Short Spread	-0.1%	0.0%	0.1%	0.3%	0.2%	-0.1%	0.1%	0.8%	3.4%	6.5%	9.4%
199801-200612											
Quintile 1	-0.1%	0.0%	0.1%	0.4%	0.7%	0.7%	1.0%	1.7%	2.9%	2.9%	3.8%
Quintile 2	0.0%	0.1%	0.1%	0.0%	-0.8%	-2.3%	-3.6%	-4.8%	-6.1%	-6.7%	-6.7%
Quintile 3	0.1%	0.1%	0.1%	0.2%	0.1%	0.1%	0.0%	0.0%	0.4%	1.5%	2.2%
Quintile 4	0.1%	0.2%	0.3%	0.4%	0.8%	1.4%	1.8%	2.3%	3.0%	5.1%	6.0%
Quintile 5	-0.1%	-0.3%	-0.6%	-1.0%	-0.8%	0.0%	0.7%	0.8%	-0.2%	-2.8%	-5.2%
Long/Short Spread	0.1%	0.3%	0.7%	1.4%	1.6%	0.7%	0.3%	1.0%	3.1%	5.7%	9.0%

Past performance is not a guarantee of future results.

Large-cap universe is Russell 1000 after 1978; pre-1978 it is defined via analogous market capitalization break-points

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 200: Performance of Amihud Illiquidity Measure, Stock Selection Percentages

	Percent of Companies Outperforming										
Portofolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-198612											
Quintile 1	48%	48%	48%	48%	48%	48%	48%	49%	50%	50%	49%
Quintile 2	49%	49%	49%	49%	48%	48%	48%	48%	49%	49%	49%
Quintile 3	48%	49%	48%	48%	47%	47%	47%	46%	47%	47%	46%
Quintile 4	49%	49%	48%	48%	47%	48%	48%	48%	48%	48%	47%
Quintile 5	47%	46%	46%	44%	43%	41%	40%	39%	38%	37%	35%
198701-200612											
Quintile 1	49%	49%	48%	48%	47%	46%	46%	45%	44%	43%	43%
Quintile 2	49%	50%	49%	49%	48%	47%	47%	46%	45%	44%	44%
Quintile 3	49%	48%	49%	48%	48%	47%	46%	46%	45%	44%	43%
Quintile 4	48%	48%	47%	46%	46%	45%	44%	43%	42%	41%	41%
Quintile 5	49%	48%	48%	46%	45%	44%	42%	42%	40%	40%	39%
199801-200612											
Quintile 1	50%	50%	50%	50%	49%	49%	49%	50%	51%	53%	54%
Quintile 2	51%	50%	50%	50%	50%	49%	49%	49%	50%	51%	53%
Quintile 3	49%	49%	49%	48%	48%	47%	47%	47%	47%	48%	48%
Quintile 4	48%	47%	46%	44%	42%	40%	38%	36%	34%	34%	34%
Quintile 5	48%	47%	47%	44%	42%	40%	38%	37%	34%	33%	32%

Past performance is not a guarantee of future results.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 201: Performance of Amihud Illiquidity Measure Across GICS Sectors, Excess Return Relative to Sector

	196201-198612										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
Energy	0.2%	0.3%	0.3%	1.7%	2.5%	3.6%	4.6%	6.0%	5.9%	1.3%	-3.2%
Materials	0.0%	-0.1%	-0.3%	-0.8%	-1.1%	-2.0%	-2.0%	-1.4%	-0.7%	0.7%	2.3%
Industrials	0.2%	0.5%	0.7%	1.6%	2.9%	4.7%	6.1%	7.2%	9.5%	12.0%	14.7%
Consumer Discretionary	0.4%	0.9%	1.4%	2.4%	3.4%	4.6%	6.0%	7.9%	11.1%	14.7%	18.2%
Consumer Staples	0.3%	0.5%	0.8%	1.7%	3.0%	3.8%	4.6%	5.2%	3.6%	4.5%	8.7%
Health Care	1.0%	1.6%	2.4%	5.2%	8.9%	13.0%	16.9%	21.8%	31.6%	41.0%	50.8%
Financials	0.2%	0.1%	0.1%	0.1%	0.3%	0.8%	1.2%	2.0%	2.1%	2.2%	2.1%
Information Technology	0.8%	1.7%	2.0%	3.3%	4.7%	7.6%	8.7%	9.4%	9.9%	15.3%	18.4%
Telecommunication Services	1.0%	2.7%	3.6%	7.9%	11.7%	15.3%	19.0%	22.8%	30.6%	38.5%	50.0%
Utilities	0.2%	0.5%	0.8%	1.8%	2.7%	3.7%	5.1%	7.0%	9.2%	11.5%	12.9%

	198701-200612										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
Energy	0.1%	0.2%	0.3%	-0.3%	-0.9%	-1.3%	-1.3%	-1.0%	-1.3%	-2.5%	-2.5%
Materials	0.1%	0.0%	0.1%	-0.7%	-0.3%	0.1%	0.9%	2.4%	5.2%	7.7%	12.0%
Industrials	-0.1%	0.0%	0.2%	0.1%	0.6%	0.9%	1.2%	1.3%	0.5%	1.1%	2.3%
Consumer Discretionary	-0.1%	-0.1%	-0.2%	-0.8%	-1.1%	-1.8%	-2.4%	-2.7%	-3.3%	-5.3%	-8.2%
Consumer Staples	0.3%	0.6%	1.1%	2.3%	2.7%	2.9%	3.1%	3.7%	4.9%	6.0%	5.7%
Health Care	0.4%	0.7%	0.8%	1.0%	2.6%	2.2%	2.0%	1.7%	1.6%	0.8%	-1.1%
Financials	0.0%	0.0%	0.1%	0.0%	-0.5%	-0.7%	-0.9%	-1.5%	-2.7%	-4.0%	-5.2%
Information Technology	0.1%	0.1%	-0.1%	-0.7%	-1.8%	-2.3%	-4.2%	-6.4%	-12.9%	-21.5%	-32.4%
Telecommunication Services	-0.1%	-0.7%	-1.0%	-2.6%	-4.0%	-4.4%	-5.2%	-5.4%	-5.3%	-7.9%	-13.0%
Utilities	0.6%	1.0%	1.4%	2.8%	4.2%	5.5%	6.6%	7.3%	9.1%	11.3%	13.8%

Past performance is not a guarantee of future results.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Flow and Abnormal Flow

We construct a stock flow measure as an aggregated daily turnover signed by daily returns. Abnormal flow corrects for the time trends in the flow measure. If during a day there are more buy orders than sell orders, at the end of the day the stock return is positive. Therefore, a positively signed flow represents higher interest in a particular stock, which presumably indicates higher short-term returns in the future. Thus, these measures exemplify a crude "buy" or "sell" recommendation, and, as such, should be positively correlated with future stock returns.

Both flow measures produce a small but time-consistent return of about 2% per year, assuming a 12-month holding period (Figure 202 and Figure 203). However, the flow factor is not particularly useful in stock picking, as is evident from similar stock hit rates across different quintiles in Figure 204. As for sector performance, the measure possesses some predictive ability for stocks in Consumer Discretionary, Financial, Information Technology and Utilities (Figure 205). The returns for firms in the other sectors flip their signs depending on the time period. We conclude that the flow factors have some predictive power for future stock returns, however, the potential returns to the long/short strategy are economically too small.

Figure 202: Performance of Flow, Average Excess Returns, Relative to Large-Cap Universe

	Relative Return										
Portofolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-198612											
Quintile 1	-0.2%	-0.3%	-0.2%	-0.1%	0.1%	0.3%	0.2%	0.2%	-1.1%	-2.8%	-4.4%
Quintile 2	-0.1%	-0.1%	0.0%	0.2%	0.8%	1.1%	1.6%	1.7%	2.5%	2.9%	2.8%
Quintile 3	0.0%	-0.1%	-0.1%	0.1%	0.0%	0.2%	0.4%	0.4%	1.2%	1.7%	2.7%
Quintile 4	0.1%	0.2%	0.2%	0.0%	0.0%	0.0%	0.0%	0.2%	1.0%	2.1%	2.6%
Quintile 5	0.2%	0.2%	0.0%	-0.4%	-1.1%	-1.8%	-2.4%	-2.6%	-3.3%	-3.8%	-4.0%
Long/Short Spread	-0.4%	-0.5%	-0.2%	0.2%	1.2%	2.0%	2.6%	2.7%	2.2%	1.1%	-0.4%
198701-200612											
Quintile 1	-0.1%	-0.2%	-0.1%	0.0%	0.5%	1.3%	1.1%	1.0%	1.3%	0.9%	1.4%
Quintile 2	-0.1%	-0.2%	-0.1%	-0.3%	-0.1%	0.0%	-0.2%	-0.3%	-0.3%	-0.7%	-0.8%
Quintile 3	0.0%	0.0%	0.0%	0.1%	-0.1%	-0.2%	-0.3%	-0.5%	-0.8%	-1.1%	-1.7%
Quintile 4	0.2%	0.3%	0.4%	0.5%	0.4%	0.0%	0.0%	0.1%	0.0%	-0.2%	-0.6%
Quintile 5	0.1%	0.1%	-0.1%	-0.3%	-0.8%	-1.0%	-0.6%	-0.2%	-0.2%	1.1%	1.7%
Long/Short Spread	-0.2%	-0.2%	0.0%	0.3%	1.2%	2.3%	1.7%	1.2%	1.5%	-0.2%	-0.4%
199801-200612											
Quintile 1	-0.2%	-0.5%	-0.3%	0.4%	0.8%	1.6%	1.5%	1.3%	0.5%	-2.4%	-5.1%
Quintile 2	-0.1%	-0.2%	-0.1%	-0.2%	0.0%	-0.2%	-0.3%	-0.4%	0.3%	1.7%	3.0%
Quintile 3	0.0%	0.1%	0.1%	0.2%	-0.2%	-0.4%	-0.7%	-0.8%	-0.3%	0.9%	2.6%
Quintile 4	0.3%	0.4%	0.5%	0.3%	0.2%	-0.2%	-0.3%	-0.4%	0.0%	1.1%	2.3%
Quintile 5	0.1%	0.2%	-0.2%	-0.7%	-0.8%	-0.8%	-0.2%	0.3%	-0.5%	-1.3%	-2.9%
Long/Short Spread	-0.3%	-0.6%	-0.1%	1.2%	1.7%	2.4%	1.6%	1.0%	1.0%	-1.1%	-2.2%

Past performance is not a guarantee of future results.

Large-cap universe is Russell 1000 after 1978; pre-1978 it is defined via analogous market capitalization break-points

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 203: Performance of Abnormal Flow, Average Excess Returns, Relative to Large-Cap Universe

	Relative Return										
Portofolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-198612											
Quintile 1	-0.2%	-0.3%	-0.2%	-0.1%	0.2%	0.4%	0.5%	0.5%	-0.1%	-1.0%	-2.1%
Quintile 2	-0.2%	-0.3%	-0.2%	-0.2%	0.1%	0.6%	1.0%	1.3%	2.1%	2.6%	2.9%
Quintile 3	0.0%	0.1%	0.0%	0.3%	0.3%	0.5%	0.9%	0.8%	1.7%	2.6%	3.5%
Quintile 4	0.1%	0.2%	0.2%	0.1%	0.0%	-0.2%	-0.2%	0.0%	0.7%	1.5%	2.0%
Quintile 5	0.2%	0.3%	0.2%	-0.2%	-1.0%	-1.6%	-2.4%	-2.7%	-4.2%	-5.6%	-6.6%
Long/Short Spread	-0.4%	-0.6%	-0.4%	0.1%	1.2%	2.0%	2.9%	3.2%	4.1%	4.6%	4.5%
198701-200612											
Quintile 1	-0.2%	-0.2%	-0.2%	-0.2%	0.4%	1.2%	1.1%	1.0%	1.5%	1.2%	1.7%
Quintile 2	-0.1%	-0.1%	-0.1%	-0.2%	-0.1%	-0.1%	-0.3%	-0.3%	-0.3%	-0.7%	-0.9%
Quintile 3	-0.1%	-0.1%	0.0%	0.2%	0.3%	0.1%	-0.1%	-0.2%	-0.5%	-1.0%	-1.5%
Quintile 4	0.2%	0.3%	0.4%	0.5%	0.3%	0.0%	0.0%	-0.1%	-0.4%	-0.5%	-1.0%
Quintile 5	0.1%	0.1%	0.0%	-0.2%	-0.8%	-1.2%	-0.7%	-0.5%	-0.4%	0.9%	1.7%
Long/Short Spread	-0.3%	-0.3%	-0.2%	0.0%	1.2%	2.3%	1.8%	1.4%	1.9%	0.3%	0.0%
199801-200612											
Quintile 1	-0.3%	-0.5%	-0.4%	0.2%	0.8%	1.6%	1.6%	1.4%	1.0%	-1.3%	-3.8%
Quintile 2	-0.1%	-0.2%	-0.1%	-0.3%	-0.3%	-0.4%	-0.6%	-0.6%	0.0%	1.2%	2.6%
Quintile 3	0.0%	0.0%	0.1%	0.3%	0.4%	0.0%	-0.4%	-0.5%	-0.2%	1.0%	2.8%
Quintile 4	0.3%	0.5%	0.5%	0.4%	0.3%	0.0%	-0.2%	-0.3%	0.1%	1.4%	2.6%
Quintile 5	0.1%	0.2%	-0.1%	-0.7%	-1.1%	-1.1%	-0.4%	0.0%	-1.0%	-2.3%	-4.2%
Long/Short Spread	-0.3%	-0.7%	-0.2%	0.9%	1.9%	2.7%	2.1%	1.5%	2.0%	1.0%	0.4%

Past performance is not a guarantee of future results.

Large-cap universe is Russell 1000 after 1978; pre-1978 it is defined via analogous market capitalization break-points

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 204: Performance of Flow, Stock Selection Percentages

	Percent of Companies Outperforming										
Portofolio	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
196201-198612											
Quintile 1	47%	47%	47%	47%	46%	46%	46%	45%	45%	44%	43%
Quintile 2	48%	47%	48%	48%	48%	48%	48%	47%	48%	48%	47%
Quintile 3	48%	48%	48%	48%	47%	47%	47%	47%	47%	47%	47%
Quintile 4	49%	49%	48%	48%	46%	46%	46%	47%	48%	48%	47%
Quintile 5	49%	49%	48%	46%	45%	44%	44%	44%	44%	44%	43%
198701-200612											
Quintile 1	48%	48%	48%	46%	46%	46%	45%	44%	43%	41%	41%
Quintile 2	48%	48%	48%	47%	47%	47%	46%	45%	44%	43%	43%
Quintile 3	49%	48%	48%	48%	47%	46%	45%	45%	44%	43%	42%
Quintile 4	49%	50%	49%	49%	48%	47%	46%	45%	44%	43%	43%
Quintile 5	49%	49%	48%	47%	46%	44%	43%	43%	42%	41%	41%
199801-200612											
Quintile 1	48%	47%	47%	47%	46%	45%	43%	43%	42%	41%	40%
Quintile 2	49%	48%	48%	47%	47%	46%	46%	45%	45%	46%	47%
Quintile 3	49%	49%	49%	48%	47%	46%	45%	45%	44%	46%	47%
Quintile 4	50%	50%	50%	48%	47%	46%	45%	45%	44%	45%	46%
Quintile 5	50%	49%	48%	45%	44%	43%	42%	42%	40%	41%	41%

Past performance is not a guarantee of future results.

Large-cap universe is Russell 1000 after 1978; pre-1978 it is defined via analogous market capitalization break-points

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

Figure 205: Performance of Flow across GICS Sectors, Excess Return Relative to Sector

	196201-198612										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
Energy	-1.3%	-1.0%	-0.4%	0.6%	1.1%	2.5%	4.4%	4.4%	5.4%	6.5%	5.9%
Materials	-0.1%	-0.3%	-0.2%	-0.1%	0.7%	1.3%	2.2%	2.0%	1.7%	1.0%	-0.1%
Industrials	-0.2%	-0.5%	0.0%	-0.3%	0.3%	0.5%	1.4%	1.7%	2.5%	1.8%	1.5%
Consumer Discretionary	-0.6%	-0.9%	-0.7%	-0.5%	1.0%	2.3%	2.6%	1.9%	1.1%	0.3%	-0.2%
Consumer Staples	-0.8%	-0.9%	-0.9%	-1.0%	-0.1%	0.7%	0.2%	0.8%	0.8%	0.3%	0.6%
Health Care	-0.8%	-0.9%	-1.0%	-0.6%	-1.0%	0.2%	0.6%	1.7%	1.4%	0.4%	-0.3%
Financials	-0.9%	-0.5%	-0.4%	-0.2%	0.9%	1.5%	-0.2%	0.2%	-0.3%	-1.1%	-0.7%
Information Technology	-0.5%	-0.5%	0.1%	1.1%	1.7%	2.9%	5.2%	6.2%	3.7%	0.1%	-2.3%
Telecommunication Services	-0.7%	-1.3%	-1.2%	-1.5%	-0.8%	-1.2%	-3.3%	-2.6%	-7.0%	-8.5%	-10.8%
Utilities	-0.1%	0.0%	0.4%	0.7%	1.7%	2.5%	2.4%	1.7%	1.0%	-1.0%	-3.1%

	198701-200612										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
Energy	-0.1%	-0.5%	-0.5%	-0.3%	-0.7%	0.9%	0.7%	-0.1%	-0.5%	-2.5%	-1.2%
Materials	-1.1%	-1.6%	-1.7%	-1.3%	-1.1%	-0.9%	-1.1%	-0.4%	-0.2%	0.0%	-1.7%
Industrials	-0.4%	-0.4%	-0.5%	-0.6%	-0.3%	0.0%	-0.5%	-0.6%	0.6%	0.8%	0.4%
Consumer Discretionary	-0.3%	-0.3%	-0.3%	1.0%	2.3%	3.4%	3.2%	3.2%	3.8%	2.9%	3.2%
Consumer Staples	-0.4%	-0.6%	-0.8%	-1.5%	-1.5%	-0.1%	0.8%	1.0%	2.1%	1.5%	3.7%
Health Care	-0.6%	-0.4%	-1.2%	-1.0%	-0.7%	1.6%	2.1%	1.8%	3.3%	0.4%	-2.2%
Financials	-0.6%	-0.7%	-0.4%	0.1%	1.5%	2.3%	2.2%	2.6%	3.1%	3.0%	3.0%
Information Technology	0.4%	0.7%	1.2%	1.1%	2.8%	4.5%	3.4%	3.9%	4.8%	2.1%	5.0%
Telecommunication Services	-0.6%	-0.1%	0.0%	0.8%	2.1%	4.8%	3.9%	2.2%	-0.8%	-4.0%	-7.3%
Utilities	0.0%	-0.2%	0.1%	1.1%	1.7%	1.6%	1.2%	1.6%	0.2%	0.4%	0.1%

	199801-200612										
	1 month	2 months	3 months	6 months	9 months	12 months	15 months	18 months	24 months	30 months	36 months
Energy	0.3%	-0.6%	-0.9%	0.2%	-1.4%	0.4%	0.1%	-0.8%	-1.6%	-3.9%	-2.6%
Materials	-1.3%	-1.9%	-1.8%	-0.7%	-0.1%	0.0%	0.0%	0.8%	1.1%	1.5%	-4.4%
Industrials	-0.2%	-0.1%	0.1%	0.5%	0.6%	0.4%	-0.2%	-0.5%	0.5%	0.3%	2.1%
Consumer Discretionary	-0.1%	-0.6%	-0.9%	0.6%	1.3%	1.9%	1.3%	0.9%	1.6%	0.8%	0.0%
Consumer Staples	-0.7%	-1.5%	-2.1%	-2.9%	-3.0%	-1.9%	-2.3%	-1.5%	-1.5%	-2.9%	-1.6%
Health Care	-0.8%	-0.6%	-1.6%	-1.0%	-2.4%	-0.3%	0.1%	-1.1%	-0.9%	-1.9%	-0.9%
Financials	-0.5%	-0.7%	-0.2%	0.3%	1.4%	2.0%	2.0%	3.8%	4.5%	4.0%	3.9%
Information Technology	0.0%	-0.6%	0.6%	0.3%	2.9%	4.6%	3.4%	4.4%	2.3%	-2.6%	-6.5%
Telecommunication Services	-1.4%	-0.6%	-0.1%	2.9%	3.5%	7.6%	6.0%	3.7%	3.4%	1.3%	-1.8%
Utilities	0.2%	-0.1%	0.5%	2.4%	3.2%	2.7%	2.7%	3.5%	1.4%	2.0%	0.3%

Past performance is not a guarantee of future results.

Source: Lehman Brothers Quantitative Equity Strategies Research; Compustat; Center for Research in Securities Prices; Thompson Financial Services

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