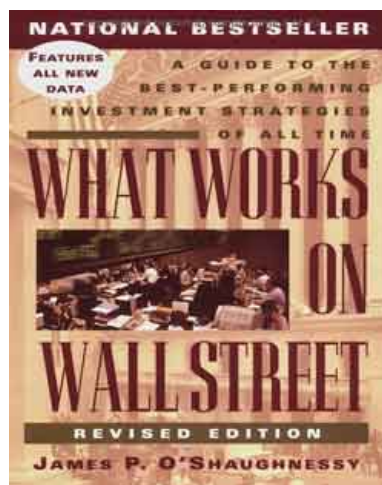


What Works on Wall Street

A Guide to the Best-Performing Investment Strategies of All Time



By

James O'Shaughnessy

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The Big Idea

It is amazing to reflect how little systematic knowledge Wall Street has to draw upon as regards the historical behavior of securities with defined characteristics. We do, of course, have charts showing the long-term price movements of stock groups and individual stocks. But there is no real classification here, except by type of business. Where is the continuous, ever growing body of knowledge and technique handed down by the analysts of the past to those of the present and future? When we contrast the annals of medicine with those of finance, the paucity of our recorded and digested experience becomes a reproach. We lack the codified experience which will tell us whether codified experience is valuable or valueless. In the years to come we analysts must go to school to learn the older established disciplines. We must study their ways of amassing and scrutinizing facts and from this study develop methods of research suited to the peculiarities of our own field of work. - Ben Graham, 1946

What Works on Wall Street, by James P. O'Shaughnessy has been around only since 1998, but has already been hailed as one of the great classics of investment. O'Shaughnessy was the first person not an employee of Standard and Poors to gain access to the S&P Compustat Database, the most important and complete repository of fundamental and technical stock data in the world. The project that inspired this book was to computer backtest the data using various fundamental formula searches in order to find out what styles of investment have actually made profits in the last 50 years or so. It is a huge book, 366 pages long, so this little summary here hardly does it justice. This book is not just good, it is downright momentous, an amazing book that cuts through a century of Wall Street lore to show exactly what techniques pay off, you absolutely must get a copy and read it!!! In very brief form, this is what O'Shaughnessy found.

Small capitalization strategies owe their superior returns to microcap stocks with market capitalization below \$25 million. These stocks are too small for virtually any investor to buy.

Buying stocks with low PERs is most profitable when you stick to larger, better known issues.

Price-to-Sales ratio is the best value ratio to use for buying market-beating stocks.

Last year's biggest losers are the worst stocks to buy this year.

Last year's earnings gains alone are worthless in determining what the stock will do this year.

Using several factors dramatically improves investment performance.

You can beat the S&P 500 by four times if you concentrate on large, well-known stocks with high dividend yields.

Relative strength is the only growth variable that consistently beats the market.

Buying the most popular issues with the highest PERs is one of the worst approaches.

Risk is one of the most important elements to consider in a strategy.

Combining growth and value strategies is the best way to improve your investment performance.

Index funds

Indexing is a great way to achieve very good investment results because it sidesteps flawed decision making and psychological traps. The S&P beats 80% of managed funds in long term returns. Indexing is a disciplined bet on large capitalization stocks. As these are the stocks that attract the lion's share of investment attention and investment funds, it is perfectly logical that they provide returns that are on average equal to the returns of the stock market. Portfolios made up of large capitalization stocks tend to have similar returns to an index fund overall, even if these large capitalization stocks are not formally part of a popular index.

A superior variation on indexing is to buy the highest yielding large capitalization stocks, this is very well known in the form of the "Dogs of the Dow" strategy, where you buy the 10 cheapest Dow stocks with the best dividend yields. In every decade since 1928, when the Dow Jones index was expanded to 30 stocks, this strategy has beaten the market average.

Discipline is the key

One of the reasons why academics adopted the flawed "random walk" hypothesis of stock movements is because of inconsistent methodology used by fund managers themselves. Fund managers do not adopt a well defined strategy and stick to it, they tend to go with flavor of the month stocks, to adopt new paradigms when they see fit, to rebalance portfolios constantly and generally move about in a random manner. By analyzing the returns of fund managers academics were unable to find any managers who had consistently been able to get far above average results in a statistically significant manner. They erroneously concluded that it is the market that is random. In reality the market does reward certain approaches over time, but none of the market professionals studied ever stuck to any of these approaches. Rather than random stocks, it is clear that it is the investors who are random.

The *one* factor that unites all of the great investors is that they have a simple formula that is applied consistently over time and can be easily stated in a book. As complicated as Warren Buffett's methods are, you could write a book about him and state with great precision how he goes to work analyzing stocks, in fact many books about him have indeed been produced. The 80% of managed funds that fail to beat the market do so because of complicated and ever changing strategies, or lack of strategies as may be the case. To paraphrase O'Shaughnessy, if you can't write down your technique on a piece of paper, you don't have a technique.

But there are approaches that consistently beat indexing!

The key is to adopt an approach that works, and stick to it. The reason most investors fail is that they go chasing better results elsewhere and tend to move out of sectors just when they are about ready to start making big gains. An approach of buying the 50 stocks with the lowest price-to-sales ratios would have beaten the market by 400% since 1950! This approach is as consistent as buying all the large capitalization stocks, and is

not something that you need really to do much portfolio management with. The gains made from such an approach have been as consistent as the approach itself, and is one of the most lucrative stock picking methods available.

The problem comes from us being human

Studies in medicine, psychology, accounting, science and even investment have repeatedly found that the weakest link is the human. When experts are asked what factors they believe affect the outcome, a model can usually be prepared. It has been found that an expert is usually substantially outperformed by his own model in terms of predictive ability. The problem lies in the nature of a human, no matter what level of information we are provided with, no matter what level of experience, human perception and psychology is anathema to accuracy. Doctors who provided all the criteria for designing a model to predict the lifetime of a cancer patient, for example, are almost universally outperformed by their own model. This isn't a ringing endorsement of black box software though, you have to get the parameters right in the first place. The evidence is that when a phenomenon is well understood and can be expressed as a series of rules, rigid following of those rules is better than regularly breaking them to try to beat the model with intuitive adjustments.

Base rates

The most boring thing in the world for most people is statistics. Models deal effectively based on reams of statistical data, following on from information given on population averages. Unless there truly is some kind of genuine insight about a company to be made that is truly not reflected in its statistics, there is very little gain to be made in tilting a model in order to conform with our own prejudices. What this means is that market averages on individual indicators, like dividend yields and price-to-research ratios can give us a very clear picture of what to expect based on the results of thousands of companies. There is a strong tendency in humans, however, to ignore what this picture really says. Although a vast repository of data suggests that it is a stupid idea to buy stocks on very high price-earnings ratios, these remain necessarily the most popular stocks on the market. It is a case of the *story* clouding the message of the *statistics*. If the story is compelling enough, we are always willing to ignore what the base rate is telling us, even though by definition the base rate is the most reliable indicator of what usually happens when numbers like this occur.

In social science terms, analysts overweight the vivid and exciting, and underweight pallid statistics.

Simple versus Complex

We also prefer the complex and artificial to the simple and unadorned. We are convinced that investment requires sophisticated strategies, the juggling of dozens of variables and complicated portfolio management.

William of Ockham, a fourteenth-century Franciscan monk from the village of Ockham in Surrey, England, developed the "principle of parsimony," now called Ockham's Razor. For centuries this has been a guiding principle in science, through this principle we have eradicated much of what we formerly held true, discarded the increasingly sophisticated system of nested golden spheres to explain the increasingly precise measurements of

heavenly bodies, have defeated pseudoscience once and for all (except in the minds of those who don't believe in Ockham's Razor!) and is the standard test of a new theory: if the new work does not do any better than the old at explaining experimental observation, and is not simpler than the old theory, discard the new work.

Ockham's Razor is also the key to successful investing. This is, however, contrary to human nature, and for that reason there will always be a burgeoning market for the difficult and exotic in the sale of "systems" and new generations of trading software with ever-more indicators and features, without anyone stopping to ask, "is it really necessary?"

When making decisions, we view everything in the present tense. We time-weight information - meaning that the newest thing always carries the greatest import. Think of the last time you really screwed up. When the mistake was made you had to contend with emotion. The mistake becomes obvious when, drained of emotion and feeling, you take a historical perspective.

Institutional investors claim to do their work professionally, free of emotion, yet the authors of the book *Fortune and Folly* found that despite analysts desks being cluttered with the very best information available, the majority of fund management executives choose outside managers using gut feelings and keep managers with consistently poor track records simply because they have good personal relationships with them. In addition they are notorious for investing heavily at the start of bear markets and for firing managers right at the bottom of the cycle.

Problems with previous studies

There have been many studies to test returns before now, but none have been particularly satisfactory for many reasons.

Most studies do not work on data over a long enough time period. Five year studies are virtually useless, as in fact are studies anything less than about 25 years. If you studied returns in the 60s the answer would have been "growth" investing, in the 80s the ideal answer was "value" investing. Some strategies have shone out over time, yet there has not been much proof. It was not until powerful computers came along and databases such as Compustat became available that long term academic study even became particularly feasible.

Another problem with databases is that they tend to upwardly bias results because they don't include dead companies. Most data providers do not bother providing information on stocks that have ceased trading, eliminating the weakest companies from research. As the study is trying to find information on which strategies work really well, it is fairly important to know which ones really don't work, in particular the ones that led to buying stocks that went out of business or were taken over.

Another problem is that some studies have been rather idealistic on data being publicly known. It is not necessarily right to assume that all investors knew what was appearing in the July report back on January first, so O'Shaughnessy lagged the fundamental data by up to 11 months to ensure this didn't happen, and only used the information published in the annual report. If the premise that techniques that have worked in the last 50 years will continue to work, then this means that you could use these techniques

by doing nothing more than studying 6-month old annual reports, available free of charge. I can see a few \$5000 a year data services not being too happy with these findings!

The study also cut out microcapitalized stocks. It is virtually impossible for you to put serious money into companies under \$25 million, in particular if you are an investment fund. The liquidity of them is so poor that a large order sends the price in a spin; even most retail traders won't touch them because liquidity is practically zero and the gap between bid and ask can be over 100%! Previous studies have happily included these, in spite of the fact that in practice it is virtually impossible to invest in them.

Also the author had to be very careful to avoid "data mining", this is the generation of spurious statistics through taking small samples and making inappropriate extrapolations to larger populations. This is like looking around a train and noticing a lot of blondes seem to be taking the train today, and generalizing this to the whole population assuming there must be a causal link between being blonde and taking a train. As statisticians know, if you torture the data for long enough, it will confess to anything.

Testing strategies

Large stocks vs all stocks

To test the idea that large stocks outperform the general market, a comparative test was done on a portfolio that represented "large" stocks, i.e. stocks in the top 16% of market capitalizations (similar in makeup to the S&P 500) versus a portfolio of "all" stocks with a market capitalization of at least \$150 million (in today's money). The reason for choosing the minimum cutoff will become clear soon.

Unsurprisingly, the "large" portfolio performed very similarly to the S&P 500, in fact the majority of stocks in this portfolio were S&P 500 stocks, in the main part the weighting of each stock was different to the real index. At any rate, returns were essentially the same.

The "all" portfolio outperformed the "large" portfolio substantially: \$10,000 invested in this portfolio in 1951 grew to almost \$2.7 million, compared to \$1.6 million for the "large" portfolio. It was not entirely a clean sweep though, "all" outperformed "large" 73 percent of the time in rolling 5 year periods and 75 percent of rolling 10 year periods.

The conclusion? Large stocks are not necessarily the best stocks, so widen your view.

Looking closer though, the author looked to find out which stocks in the "all" portfolio were giving this great growth. Many past academic studies have ranked groups of stocks by capitalization and found that the smallest stocks do the best. The great flaw in this idea though is that the very stocks that provide this growth are the uninvestibles with no liquidity. Penny stock traders will be happy, but for most investors this is not usable information. Small Cap funds base their investment philosophy on these academic studies extolling the virtues of small stocks, without realizing that the ones which grow the best are too small even for small-cap funds. In fact it is not until you get to the top 40% of stocks by capitalization that you reach the threshold of \$150 million, which is the practical minimum market capitalization that the majority of investors will have some interest in investing in.

With high trading costs, appalling liquidity, a record of either going to the moon or going broke and the paucity of data available, O'Shaughnessy recommends finding other approaches to investment, rather than buying large portfolios containing these types of stocks.

The Morningstar Mutual Fund database proves that this is in fact the case for "small cap" funds, the median capitalization of stocks in these funds being \$860 million, which puts them in the top 20 to 30% of all stocks, hardly the same thing as these microcap stocks, where you are talking about capitalizations of below \$25 million.

The only way to emulate the gains of the microcap portfolio would be to create portfolio containing over 2000 stocks worth several million dollars, hardly a feat likely to be attempted by many. However the results would have been spectacular, with a \$10,000 investment turning into \$806 million over the next 45 years, albeit with a staggering 47.53% annual standard deviation of return. Even so, the volatility would have been long forgotten with this amazing result. In practice you would need a computer to automatically purchase these shares and to rebalance the portfolio every year, as done here. Tax returns would probably be pretty labor intensive as well, with thousands of capital gains events occurring each year.

This return is a chimera though, you simply could not do this. The companies that made the gains tended to be very tightly held, you could not buy the stocks at a reasonable price even if you did program a SEATS terminal to buy them for you. The stocks are sold after 12 months, the smallest stocks on the market bought again. The massive compounding does not come through holding these stocks for a long time, it comes through holding them for a year and then getting into something else. This means they can only be traded, not held. The liquidity and huge spreads between bid and ask make this strategy unworkable. It simply can't be done outside of the computer simulation, so forget it.

So what is the best cap range to invest in, that actually can be invested in? Once again it was the small cap stocks, ones between \$25 million and \$100 million. The gains were not anywhere near those of the microcap stocks, on page 43 (of the revised edition) the bar chart comparing microcap with all other sizes shows a towering return for microcap with all of the others being little lines darkening the x-axis. Removing the microcaps allows the others to be compared, and page 46 has the returns of the others, very small stocks return about double what the other ones do, but interestingly overall the small stocks did not hugely outperform "market leaders", a category that could be loosely reworded as "blue chips". Both of these classes nicely outperformed the "all stocks", "large stocks" and "mid-cap" ranges, disproving the oft-repeated claim that median companies are actually the best to invest in.

If you want to invest in stocks using a formula based only on capitalization, go either with very small stocks or very large ones that have a lot going for them.

Price-to-Earnings Ratios

PERs are probably the most popular measure for a stock. The PER is calculated by dividing the company's earnings-per-share by the share price, the number given, which

typically runs between 5 and 30 under most circumstances indicates how many dollars you pay to buy a dollar of earnings.

A high PER means that a share is expensive compared to current earnings. You can't directly compare PERs for different companies because a swiftly growing company can more easily justify a high PER than one that is standing still. Either way, most investors will prefer a company with a very low PER, all else being equal.

Low PERs

Comparing the effect of PER on subsequent appreciation, the author found that there was a big difference between the behavior of big stocks and small stocks. The "large" portfolio quite strongly reacted to a low PER, buying a large stock with a low PER was a good way to improve on index averages. The tendency was somewhat different with smaller stocks though, in fact the low PER stocks in the "all stocks" portfolio underperformed their average. It seems that for small stocks, a low PER is not necessarily a good thing. In addition, the volatility of low PER small stocks was greater than the average for small stocks.

Low PER stocks of both the large and small variety had a significantly greater volatility than the average of their portfolios, though in the case of large stocks this was well compensated by the increased gains.

Looking at deciles (top 10%, next 10% ... lowest 10% etc) it can be seen that the very bottom decile of PERs, the 10% of stocks with the lowest PERs was not as good as the next 40%. Perhaps these stocks truly are the losers that deserve a low PER. The best range of PERs for "all stocks" were those stocks in the second, third and fourth deciles. Avoid the top 50% of PERs, and the bottom 10%. The best was the stocks in the 10%-20% range. For large stocks the bottom three deciles were the best.

High PERs

Buying the most expensive large and small stocks is not a good idea either. In both cases the returns from the highest PER stocks were clearly inferior to averages. This is a way of saying that you should avoid the flavor of the month, various technology issues and anything with an attractive and exciting story that attracts a very high PER is likely to suffer greatly when the real earnings potential starts to be realized down the track. Returns were lower, volatility was higher. In all this was a very bad strategy.

The story is the same with large and small stocks. Large companies with the highest PERs suffered just the same as small companies.

This confirms Graham and Dodd, who said this in their famous book *Security Analysis: Principles and Technique*. They said, "*People who habitually purchase common stocks at more than about 20 times their average earnings are likely to lose considerable money in the long run.*"

Price-to-Book Ratios

The price-to-book ratio is found by dividing the price of the stock by the book value per share. In this study the common equity liquidating value per share was used as a proxy for book value. This ratio shows you how much you are paying over and above the money you could get by tearing a company apart and selling its components. A company with a vault full of cash, valuable machinery and real estate and other saleable assets will fetch a good price, its book value, if it should cease operating and be picked apart by corporate vultures.

Low PBRs

Over the long term, buying stocks with the lowest price to book ratios pays off very well compared to the market average (more than double), both in the "large stocks" universe and with "all stocks". Volatility was higher, which in risk adjusted terms made the strategy less desirable for small stocks compared with large.

High PBRs

Stocks with very high PBRs did very poorly, both in terms of returns and volatility. The top 50 PBR stocks actually lost money most years over this long time period, and as a group, high PBR stocks have a 28.43% volatility, a wild ride by anyone's standards. There were long periods though, spanning decades, where high PBR stocks actually outperformed their indexes. This is one strategy that you don't want to be trying to use based on recent history; it flips to the opposite trend frequently, but in an unpredictable manner.

PBR deciles

Ranking deciles, the bottom decile was always the best to invest in, and the bar chart slopes down fairly evenly through the higher deciles. The evidence is clear that the lower the PBR, the better in nearly all cases. The strategy leads to a higher volatility of returns for smaller stocks, but the results are still pleasing. Unfortunately the strategy is proven wrong for fairly extended periods, where the market actually rewards a high PBR; however in the longer term low PBR stocks dominate convincingly.

Price-to-Cashflow Ratios

You find the cashflow of a company by adding income (before extraordinary items) to depreciation and amortization. The PCR is a way of looking at how much you pay for the company's cashflow. Some value investors like this ratio because it is very much harder to fudge than earnings. In this study utility stocks were excluded because of certain unique factors that affect those.

Low PCRs

The market rewarded low PBRs, but such stocks showed a higher volatility. On a risk adjusted basis possibly the gains were not worthwhile, though after 45 years of pursuing this strategy \$10,000 grew to \$4.5 million with low PCRs, compared to \$2.7 million in the "all stocks" universe. For large stocks, the returns were also very much better with low PBRs, though volatility was only slightly higher, more than compensated by returns

some three times higher than the "large" portfolio. In terms of returns, large stocks with low PCRs do better than small stocks with low PCRs.

High PCRs

Over some short periods, high PCR stocks did very well, but over the medium term, and especially the long term they were a disaster. Examples of high PCR stocks that Australian's should be familiar with include Bondcorp and Quintex, typical high flying 80s stocks that invested huge amounts of money in ventures in the hope of realizing speculative capital gains. For a while those companies did well, but fell hard when boom times ended. This is confirmed by the overall trends of high PCR companies.

PCR deciles

Heading through the deciles from lowest PCR to highest PCR, a linear trend shows diminishing returns, the lowest three deciles do much better than higher ones, and the highest PCR stocks have a very poor return, and the volatility is simply staggering, both for "large" and "all" stocks.

Price-to-Sales Ratios

Price-to-Sales ratios (PSR) measure the price of a stock, versus the annual sales figures. This is another figure that is hard to manipulate, and in the opinion of Ken Fisher (son of Phil), author of *Super Stocks*, the PSR is "an almost perfect measure of popularity".

Low PSRs

The PSR really is the greatest value indicator, correlations between a low PSR and high stock gains are unmistakable, with very low volatility. An investment in the lowest PSR stocks in the 50s grew from \$10,000 to \$8.2 million at the end of 1996, compared to the "all stocks" gain of \$2.7 million. Volatility was very low in low PSR stocks, compared to the average. The indicator works well with large stocks as well, though the strategy yields its greatest gains with small stocks.

High PSRs

One word: carnage! High PSR stocks are toxic to your health, the gains were minimal and volatility went through the roof. They drastically underperformed T-bills as far as returns went, and to attain this infamous result you would have been in for a white-knuckle ride of ups and downs (and downs). They faired marginally better with large stocks, but although there were years when these sexy-story stocks did very well, they always failed in the end, more than compensating for any price gains in their good times.

PSR deciles

With each rising decile the PSR hurt performance. There was no better PSR than the very lowest one, in all cases the lower the PSR the better. The only time high PSR stocks beat the benchmarks was in the late 60s, when spellbound growth investors

chased after stocks with stories. These returns were severely reversed in the next decade. Note that during this time, however, low PSR stocks also did well (everything did well in the 60s!). A strategy that only worked once, during a time when speculators seemed intent on buying every single stock they could get their hands on up to absurd prices, is definitely one for the bin.

Dividend yields

Again in this particular study, utility stocks are excluded, for they are typically high yield and any survey of high yield stocks would simply be a survey of utilities. It turns out that the effect of dividend yield depends very much on the size of the company you buy.

High yields

Surprisingly, over the years high yielding stocks have largely failed to keep up with their benchmarks. Taking the top 50 yielding stocks from the "all stocks" portfolio resulted in very disappointing results very much below the "all stocks" return. The top 50 in the "large stocks" portfolio performed much better, in fact buying high yielding large stocks gave a return almost double the "large" result, with virtually identical volatility.

Yield by Decile

In fact the bar chart on page 155 of dividend yield by decile vs. appreciation in large stocks is not particularly convincing, good results occur for the higher 40% of yields, but also for the yields in the 7th and 8th decile (bottom 20 to 40% of yields). The correlation is not a powerful one, this is not the strongest of the indicators, though as will be seen later it does provide a strong synergy with other indicators, improving "systems" in a way not expected just by the impact of yield taken alone.

With the "all stocks" portfolio, the absolute highest top 50 dividend yield stocks are often companies in trouble, a high dividend yield is a good thing, as seen by the generally higher profits made from higher dividend yields on the decile chart: just avoid the absolute highest dividend yield stocks, the top few % of dividend yielding companies look like they are in trouble.

Interesting implication for Capital Asset Pricing Model

One of the central tenets of the CAPM is that risk (defined as volatility) and reward are directly and inextricably linked. The assumption is that the market, being efficient, rationally prices stocks to provide a nice, clean tradeoff between volatility and return, it is impossible to get better returns than the market index without massively increasing volatility. It also assumes that by taking on higher risk, you can expect higher rewards. In other words, volatility is proportional to expected returns. An interesting and very obvious conclusion from this work is that exposing yourself to higher risk does not mean you can expect higher return. In fact some of the strategies with the very poorest returns had very high volatility. Hardly a rational pricing away of risk, and definitely not something you would expect if CAPM was true and the market completely efficient. This study has shown that certain strategies, which cannot be explained away as blind luck, produced results of much lower volatility and higher return than the market. This is unthinkable to a CAPM true believer. In addition the differentiation between large stocks and small stocks

has absolutely no place in the CAPM dogma. Many of the strategies found by O'Shaughnessy lie well above where most analysts have always drawn efficient frontiers, the model breaks down.

One year Earnings per Share percentage changes

Investors commonly rush in to shares that had a spectacular growth last year in their earnings. It seems that a company has just found a new magic formula, it is time to ride that bandwagon to certain riches.

The 50 stocks with the biggest increase in EPS last year

Actually, this is like closing the barn door after the horse has bolted. These stocks, which made such impressive earnings gains last year, are now likely to be very overpriced, as bullish speculators rush in to the latest greatest of the growth stocks. It is very hard to continue very high gains for long, so what usually happens is those speculators who were seduced by the big win last year end up leaving in disgust when their overpriced stock fails to continue such a performance.

The strategy did have some good runs, not surprisingly this included most of the 60s, when speculation did that to all the growth stocks. The rest of the time it was just high volatility and low gains.

Large stocks did much worse than small stocks in this particular technique.

The 50 stocks with the worst earnings changes

The requirement was that companies still be making money, but the profit should fall from spectacular to pitiful. The results were better than buying the best gainers, but volatility was higher than the index, with lower returns for small stocks. Large stocks did better than small stocks, marginally beating the large stocks index, but with higher volatility.

One year EPS Changes by Decile

The decile plots were unenlightening. There is no clear pattern that emerges. Clearly one year gains in EPS are not a worthwhile parameter to base investment decisions on.

Five year EPS percentage changes

Perhaps if you take a five year gain in EPS it would be better than only one year? Actually, no. The results were pretty similar, top and bottom 50 stock portfolios underperformed the averages, decile plots showed that for "all stocks" you can do marginally better sticking to just above the median EPS percentage change, but the "large stocks" portfolio was pretty flat, though it might be an idea to avoid the highest decile.

The conclusion from EPS studies is that investors pay too much for stocks with great EPS gains, both one year and five-year averages. Forget about using EPS gains as a research method, except to avoid extremes.

Profit margins

Net profit margins are found by dividing income before extraordinary items by net sales, and then multiply by 100 to get a percentage. The theory is that companies with high profit margins are highly efficient, and can survive tough business environments and make better profits.

50 Stocks with highest profit margins

Interestingly, the "all stocks" portfolio outperformed the 50 "all" stocks with the highest profit margins. Volatility was about the same. The results were better with "large" stocks, but not as good as the "large" index. Volatility was lower though.

Profit margins by decile

The results were quite unexpected. A look at the results by deciles shows that apart from the 10% of stocks with the very lowest profit margins, the stocks that did best were the ones in the lower profit margin end of the scale, quite distinctly so for both large and small stocks.

The implications are that you should avoid stocks with the highest profit margins, if you wish to use this method as a determinant. O'Shaughnessy doesn't make the link, but if you'll permit me to insert my own theory, I wonder could this mean that the market favors those companies that like to do large amounts of sales and make only a little bit of money from each. Companies that overprice their product don't get the volume to compensate, and won't do as well. When writing this I am specifically thinking of Woolworths and stocks of that ilk. They do well because they don't make a large profit margin, they just sell a lot. If Woolworths increased their prices by 50% to get a huge profit margin, I doubt many people would shop there any more.

Return on Equity

High ROE is the hallmark of a growth stock. You calculate it by dividing common stock equity into income before extraordinary items then multiply by 100 to get a percentage. This is another factor people believe will provide a good gauge of how well the company invests shareholder's money, so presumably it means they should manage your money well too.

50 stocks with highest ROE

Another disappointment, volatility was way up but the top 50 "all" stocks did much worse than their index. The same was seen for "large" stocks, they did a bit worse, with volatility also worse than the index.

Decile analysis for ROE

Decile analysis for "all" stocks looked a bit random, but if you concentrated in the second decile of ROE you would have done well. Concentrate on high ROE stocks, but not the highest 10%. Same thing was observed for "large" stocks, though the bias toward the second and third deciles of ROE were more obvious. Buy large stocks in the top 30% of ROE, but not the top 10%.

As well as the decile analysis, you can look at the time analysis. High ROE stocks have done well only 50% of the time. It did well in the 50s and 60s, but earlier studies from the 30s and 40s showed it did worse, and it hasn't performed well lately either. The second and third deciles seem to be the best, but the strategy lacks consistency.

Relative Price Strength (momentum)

This particular measure isn't fundamental analysis at all, it is decidedly technical in nature. To efficient market theorists it is the most hated of measures, price momentum. It shows that stock prices have memories, the idea that buying the stock that did the best may continue to do well is just trend following. Surely this couldn't work?

Alternatively, why not buy the stocks that have done the worst over the last year? Surely they are ready for a bounce? Here's hoping...

Last year's biggest winners (50 stocks with highest RPS)

These are the stocks that did the best last year. Now I know you've heard all about markets as a whole having regression to the mean, the worst time to buy is when the market has gained the most, but for individual stocks it doesn't seem to be the case.

\$10,000 invested in 1951 in the "all" stocks that did the best the previous year, with the portfolio rebalanced every year so as to always be in on last year's big winners grew to \$4.1 million in 1996, compared with the "all stocks" portfolio which gave back \$2.7 million. This is an excellent return, but volatility was very high, at 29.8%. Clearly it is a wild ride, risk adjusted (Sharpe ratio = (avg return - risk free interest)/volatility) the strategy actually came out worse than the index, the volatility was too high for those that believe in this kind of risk analysis. It is a good strategy if you have the stomach, but it isn't something you'd tell your mother to do.

If you invested in "large" stocks, you did even better. The return of \$4.4 million was even better than "all stocks", but enormously better than the regular "large stocks" return of \$1.6 million. Volatility wasn't as bad as smaller stocks, so the risk adjusted return is superior to the market average, though volatility still is higher than the "large" portfolio.

Price momentum is not the same as picking the stocks with highest gains in EPS, and it doesn't mean buying stocks with the highest PERs either. Often these stocks are enjoying a bounce from unfair lows or just starting their upward gains. PERs are higher than average, but rarely the highest, and not hugely higher than average anyway. This is a reflection of how much esteem the market places on the stock, and is a factor of a great many things, not just an earnings spike.

Last year's biggest losers

I remember watching episodes of the Adams Family as Gomez watched the ticker tape with glee as his stocks lost money. Here is a method Gomez Adams would be proud of. By buying last year's worst stocks, \$10,000 grew in 45 years to \$43,040, a return of 3.3 percent a year. In addition volatility was higher. Never a better argument against "bottom fishing" has been made.

For the "large" portfolio the results were bad, but not that bad. \$10,000 grew to \$603,645, a return of 9.55% a year. Nothing spectacular, especially compared to the \$1.6 million you would get from buying a "large" index.

Decile analysis

Looking at the deciles, you can see that the top 10% did even better than the top 50 stocks. Buying a portfolio of the top 10% of "all" stocks yielded over \$11 million. This confirms the idea of buying the top growers, but avoid the elite few right up the top of the list and you can do even better, and volatility was lower too. (Though I wonder is it fair to compare the volatility of a 50 stock portfolio with the thousands of stocks that must make up the top decile, of course volatility is lower if you go to a much larger portfolio).

The decile chart of both "all stocks" and "large stocks" clearly slopes quite evenly, returns declining linearly as last year's momentum drops, though the lowest decile lies well below the trend line. For large stocks the line wasn't as neat, the 8th percentile actually did better than the "large" portfolio (though not as well as the highest momentum). Past the 8th percentile returns dropped again, the 9th and 10th percentiles being pretty bad.

Adding value factors to improve performance of RPS

The last third of the book deals with combining factors to improve performance. By using a few factors you can greatly enhance returns, or diminish volatility, depending on your goals.

Low PER and high relative strength

By removing all stocks with a negative PER or a PER over 20, and taking the 50 highest performing stocks from that universe the results were highly impressive. The proverbial 10 grand grew to \$22.7 million. What's more the volatility was down from the highest RPS portfolio, 24.61%. Very impressive!

Price-to-book and relative strength

All stocks with PBR below 1 and top 50 RPS grew to \$18.6 million with volatility of 23.95%.

Price-to-Sales Ratio and top 50 RPS

Top 50 RPS stocks with a PSR under one grew to \$23.4 million with volatility 25.51%. The strategy beat the index in 34 out of 45 years, and won over every 5 and 10 year period. Very very consistent gains.

Multifactor models with large stocks

The performance gains aren't as spectacular with "large" stocks, but impressive nonetheless. Low PER plus high relative strength returned \$5.7 million with quite a low volatility of 19.05%. No test for PBR was run, you don't get large stocks with a PBR below 1 very often. The best 50 RPS "large" stocks with a PSR below 1 returned \$5.1 million.

Adding more growth factors

Using top relative strength and PER below 20, you actually hurt your performance by adding the condition that earnings gain is positive.

High EPS gains and high relative strength

Although good gains in EPS didn't provide a very good return by themselves, combined with relative strength they did ok. If EPS gains exceeded 25% and the top 50 stocks for RPS were bought, the returns were \$9.2 million, though the 29.18% volatility is higher than the "all stocks" volatility of 19.7%.

Return on equity plus relative strength

Stocks with a ROE above 15% and the best 50 RPS returned \$14.3 million. Still not as good as combining RPS with value factors.

"Large" stocks did well also, returns of the portfolio were double the "large" index, but only gave back \$3.9 million, with 22.42% volatility, slightly higher than the index.

The Cornerstone Value Strategy

This is a blue-chip strategy. It uses "leading" stocks. These stocks, as defined in this book: 1) come from the "large" stocks universe, 2) have more common shares outstanding than the average stock in the Compustat database, 3) have cashflows per share exceeding the Compustat mean 4) have sales 1.5 times (or better) the Compustat mean 5) they aren't utility stocks.

This definition excluded all but 570 of the 9889 stocks in Compustat, only 6% of the whole.

Low PERs are a good thing with leaders, returns were superior to the "leader" index.

High yield worked very well with leaders. Buying the leading stocks with the highest dividend yields did four times better than the "large stocks" index, returning \$6.4 million. Volatility was very good, a standard deviation of 16.95%, only very slightly above the "large stocks" volatility of 16.01%.

Downside protection was very good, the largest fall this strategy ever experienced was a 15% drop in one year. Over 5 year periods it never lost money. This is extraordinary!

Not only is the strategy fantastic in bear markets, it also shines on bulls. It did extremely well in bull markets, nicely beating the "large" index.

This strategy not only had good returns, but it is one of the simplest to implement. Paraphrased, it means you should buy a portfolio of blue chip stocks with the highest yields. That's all there is to it.

The Cornerstone Growth Strategy

Looking for a growth strategy that would complement the cornerstone value strategy, O'Shaughnessy developed this one. Tests of combinations of variables failed to turn up anything worthwhile using 5-year compound earnings growth rates and profit margins as factors. Uniting increased earnings with low price-to-sales ratios gives a strategy that performs virtually the same as low PSR alone, though with lower volatility. This strategy involves buying stocks from the "all stocks" universe, insisting on EPS being higher than the previous year and having a PSR below 1.5 and buying the 50 stocks from that list with the highest one-year previous performance. The increase of PSR to 1.5 is to make the strategy less rigorous, allowing more stocks to be included in the rankings of top growth.

Returns are approximately equal to the PSR \leq 1, top 50 growth strategy, but with very slightly lower volatility, and better base rates (this means it works more consistently, making money more often than the simpler method).

Growth strategies work better with small stocks. The returns on growth-type strategies were always superior using the "all" stocks universe, they simply didn't pay very well on large stocks.

This strategy is the one to use for those with a slightly higher risk tolerance than one who would use the Cornerstone Value Strategy. The higher volatility of the growth version is very well compensated for by the extra gains. What is so great about it is that it includes value and growth filters in one. It gets you in on popular, fast moving growth issues, but the PSR filter keeps you out of anything overpriced. The common feature of every one of the top growth strategies found in this book is that some sort of value factor was used.

Optimal strategies that achieve the highest gains with lowest volatility

A reminder of what is termed the Sharpe Ratio. The Sharpe Ratio is used in risk analysis to rank strategies. The highest Sharpe Ratios are the best. The way to calculate them is to take the average return from the strategy, subtract the risk-free rate of interest (90 day T-bills rate) and divide by the standard deviation of returns. To get a really high Sharpe Ratio you need high returns and low volatility.

By using a 50-50 approach, allocating half the portfolio to the Cornerstone Growth strategy and half to the Cornerstone Value strategy, the results were only marginally inferior to the results of the Cornerstone Growth strategy, but with a similar volatility to the "all stocks" index, only 19.99%, compared to "all stocks" 19.70%. This is extraordinary, accounting for an exceptional Sharpe Ratio of 68, one of the highest found.

This combined strategy blows previous ideas about efficient frontiers out of the water. For the same volatility as the market, you can design a portfolio with gains vastly superior to the market index.

The author recommends this strategy for all investors except those very near to retirement. Those who are approaching retirement can reduce their growth portfolio and increase the value portion to make the returns even more secure.

The figures tell the whole story, the first is the return, the numbers in the brackets are the standard deviation of return (volatility) and the Sharpe Ratio. Over the period tested (Dec 31 1952 - Dec 31 1996), "large stocks" (read: S&P 500) grew a compound 13.19% (16.18%, 45) a year. The Cornerstone Value approach returned 16.73% (17.14%, 64), the Cornerstone Growth strategy gave 21.72% (25.59%, 63) and the United Strategy gave 19.23% (19.99%, 68).

Top Strategies by absolute return

The book actually rates almost 70 different systems, I'll put the top 15 here. If you want to see the rest, including which strategies gave the worst returns, go get the book!

The \$10,000 becomes figures are a bit different to those quoted above because some of the ranked strategies used five years of previous EPS data. Because of that all strategies start running on Dec 31, 1954 instead of 1951.

Strategy	\$10,000 becomes	Compound Return	Standard Deviation	Sharpe Ratio
PSR < 1, high rel str, all stocks	\$13M	18.62%	25.64%	61
Earnings yield > 5, high rel str, all stocks	\$12.6M	18.52%	24.48%	61
Cornerstone Growth, all stocks	\$12.5M	18.52%	25.41%	61
PBR < 1, high rel str, all stocks	\$10.3M	17.95%	23.36%	60
United Cornerstone	\$7.6M	17.1%	19.5%	66
ROE > 15, high rel str, all stocks	7.6M	17.10%	26.59%	54
EPS higher than last year, best rel str, all stocks	\$6.9M	16.84%	28.19%	52
5-year EPS change > mean, profit margin > mean, EPS higher this year. best rel str, all stocks	\$6M	16.46%	22.23%	57
yield > mean, positive rel str, lowest PSR, all stocks	\$5.7M	16.34%	21.98%	52
1-year EPS change > 25%, high rel str, all stocks	\$5.6M	16.25%	28.56%	49
PBR < 1.5, yield > mean, PER < mean, lowest price to cashflow	\$4.6M	15.73%	22.85%	52
Lowest PSR, all stocks	\$4.3M	15.54%	25.66%	49

\$25M < capitalization < \$100M	\$4.2M	15.45%	30.44%	44
market leaders, low price-to-cashflow	\$4.1M	15.39%	19.00%	57
Cornerstone Value	\$3.6M	15.06%	16.47%	62

The top 10 lowest risk (volatility) strategies

Strategy	\$10,000 becomes	Compound return	Standard deviation	Sharpe Ratio
90-day T-bills	\$99,854	5.63%	2.71%	0
Intermediate term bonds	\$152,806	6.71%	6.70%	17
Large Stocks	\$981,782	11.54%	15.72%	41
Capitalization > \$1 billion	\$985,177	11.55%	15.77%	41
High profit margin, large stocks	\$716,131	10.90%	15.81%	36
S&P 500	\$971,901	11.51%	15.96%	39
Cornerstone value	\$3.6M	15.06%	16.47%	62
Market leaders	\$1.9M	13.34%	16.59%	50
High yield, large stocks	\$1.7M	13.06%	16.63%	50
Market leaders, high PER	\$599,558	10.24%	16.69%	34

And the ten best strategies by Sharpe Ratio (risk adjusted returns)

Strategy	\$10,000 becomes	Compound return	Standard deviation	Sharpe ratio
United Cornerstone strategies	\$7.5M	17.10%	19.50%	66
Cornerstone value	\$3.6M	15.06%	16.47%	62
PSR < 1, high rel str, all stocks	\$13.0M	18.62%	25.64%	61
Cornerstone growth, all stocks	\$12.6M	18.52%	25.41%	61
Earnings yield > 5, high rel str, all stocks	\$12.6M	18.52%	24.48%	61
Price-book < 1, high rel str, all stocks	\$10.3M	17.95%	23.36%	60
Cornerstone growth, large stocks	\$3.2M	14.71%	17.5%	58
5-yr EPS change > mean, profit margin > mean, EPS higher than last year, best rel str, all stocks	\$6.0M	16.46%	22.23%	57
Market leaders, low price to cashflow	\$4.1M	15.39%	19.00%	57

You'll have to get the book in order to see all of the other strategies, the lists are quite extensive and the whole book contains an enormous amount of statistical data to back up the points made. If you have any queries about research methods, it is all in there, including the specific formula he used to approximate each factor.

The investment strategy used was to update the portfolio every 12 months with the stocks that best reflect the trading style. Taxes and dealing costs are ignored. Prices used are "at market" averages for the day of purchase and all methods were applied mechanically by the computer based on publicly knowable data that was as much as 12 months old. Dividends were not reinvested, merely added to capital returns.

The only question is, can you depend on the next 50 years to behave very much in the same way as the last 50? I look forward to reading the 2050 edition to find out! If these techniques should fail, then it should mean there will be something very wrong with the idea of buying high flying stocks that are still quite cheap. Somehow this scenario doesn't seem so likely, as long as the herd wants to try to beat the system, buying glamour stocks and following up all the gossip, such techniques will remain underutilized, and hence will work.