

THE GRAIL ANOMALY©

BY JOHN HENRY SMITH, MBA, FCFI
GRAIL SECURITIES (SWITZERLAND)

WITH REFERENCE TO THE RESEARCH PAPER PUBLISHED IN MARCH 2010

BENCHMARKS AS LIMITS TO ARBITRAGE:

UNDERSTANDING THE LOW VOLATILITY ANOMALY

BY MALCOM BAKER
HARVARD BUSINESS SCHOOL AND NBER

BRENDEN BRADLY
ACADIAN ASSET MANAGEMENT

JEFFREY WURGLER
NYU STERN SCHOOL OF BUSINESS AND NBER

SUMMARY

The authors of the above-mentioned research paper, covering 41 years of data from 1969 to 2008, validated that excess returns over the market risk premium can be generated by low beta portfolios. Their empirical evidence of a Low Volatility Anomaly directly contradicts the conventional tenet of the Capital Asset Pricing Model (CAPM), which demands that an excess return can only be achieved when the model's beta¹ component is more than 1. In other words, a return higher than that of the market can only be achieved by taking on correspondingly higher beta stocks, meaning more risk.

The Capital Asset Pricing Model (CAPM)

$$E(E) = E_E + E(E(E_E) - E_E)$$

E (R) = Expected Return

R_f = Risk Free Rate

β = Beta

R_m = Market Return/ Market Risk Premium

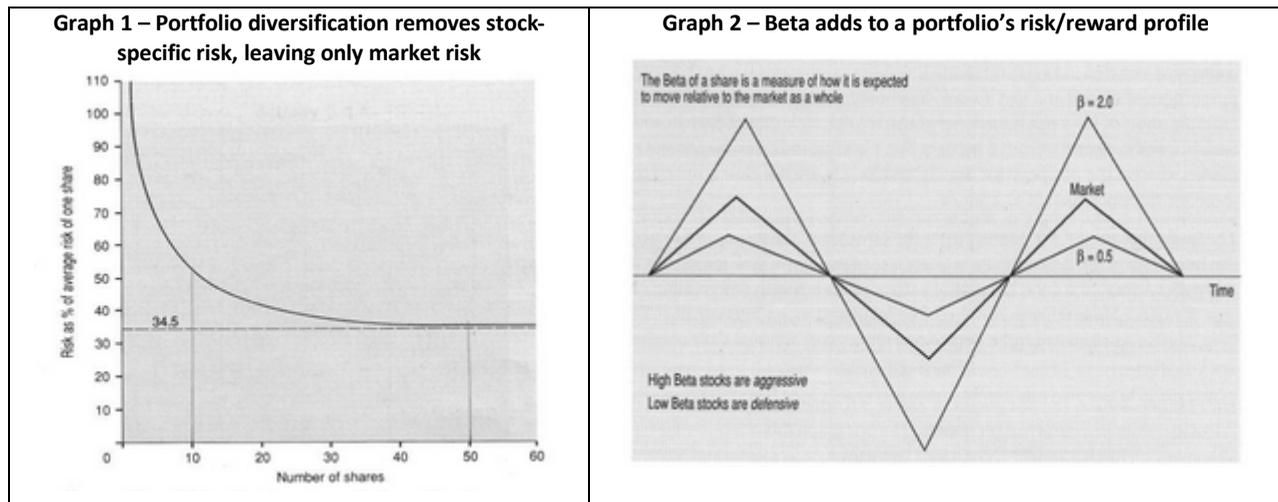
¹ Beta measures the sensitivity of a portfolio's systemic risk to the movements of the market as a whole

Grail Securities (Switzerland) since 2010 has unreservedly argued the existence of a Low Volatility Anomaly without knowing of Baker et al's research, whereby this paper clarifies how this dichotomy is resolved.

THE BETA PUZZLE

Since CAPM assumes a positive correlation between risk and return, its primary function is to calculate the portfolio's expected market risk premium using beta, which measures the investment's volatility against the market volatility² in the expression $\beta (E(R_E) - R_f)$. In Graph 1, it is this element that CAPM rewards, because in an efficient portfolio, holding no more than 36 stocks, 34.5% of all risk is market-specific and cannot be diversified away. Conversely, the remaining 65.5%, being stock-specific risk, is not rewarded, because it is diversified away through co-variance³.

Consequently, the second graph shows beta's systemic behaviour in both bull and bear markets. The extent by which a portfolio out- or underperforms the market risk premium is the portfolio's alpha.

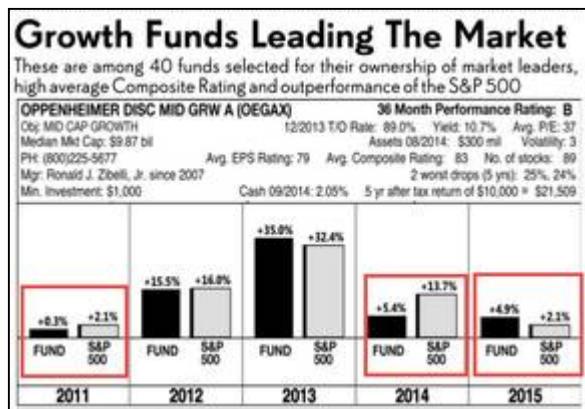


The CAPM has gained ascendancy and credence for focusing on market risk and the minimum return expected for taking it on. Consequently, risk-averse investors tend to choose index funds in the belief that they are less risky than other styled investments. However the paradox is that such funds and portfolios, with their limited constraints, harbour far more risk than ones offering higher returns generated by the unsystematic attributes of shares.

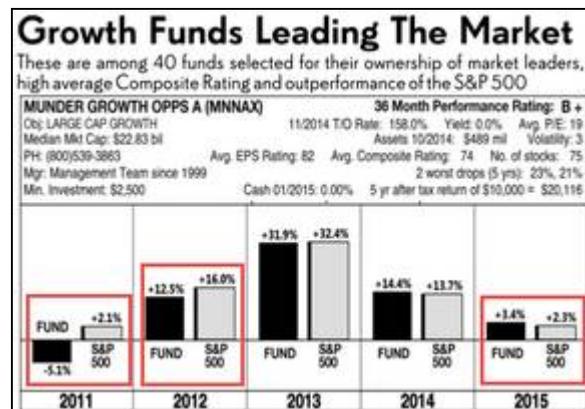
² In the U.S.A. the S&P 500 index is used as the market's proxy

³ In Probability Theory and Statistics the co-variance of variables tend to cancel each other out

The two funds below showed the risks of pursuing such a market return strategy in that their margins of safety were depended on the market's performance. The Oppenheimer Disc Mid Grw A Fund, containing 89 stocks, underperformed market risk in years 2011 and 2014, whereas the Munder Growth Opps A Fund, containing 75 stocks, was even negative in 2011 and in 2015 underperformed the S&P500.



Investors Business Daily, 18 February 2015, page A8



Investors Business Daily, 29 February 2015, page A11

This explains, at least in part, why risk-inclined investors take on higher risk stocks in a process of randomized naïve selection, e.g. without undertaking thorough fundamental analysis⁴ in the expectation of higher returns. Such an over-confident approach, based on epistemic arrogance⁵, in all probability does not deliver the anticipated results in the longer term, and takes on the characteristics of a lottery⁶. Mitton and Vorkink⁷ argue that volatile individual stocks can be positively skewed as there is some small chance of doubling or tripling in value in the short term, but have a much larger probability of declining in value.

However, it must be reminded that because of the pre-conditioning of biases formed by the CAPM and fuelled by market attitudes, low volatility portfolios offering abnormal returns⁸ are out of naïve ignorance hardly an option even today, because conventional market attitudes and practices consider them suspect, and are thus in scarce supply.

⁴ Baker, Bradley and Wurgler, "Benchmarks as Limits to Arbitrage: Understanding the Low Volatility Anomaly." Financial Analysts Journal (2011), Vol. 67, No. 1, pp. 40-54

⁵ Nassim Nicholas Taleb, in "The Black Swan". Penguin Books, page 140, Taleb claims that epistemic has a double effect: "we overestimate what we know, and underestimate uncertainty."

⁶ Kahneman and Tversky, "Prospect Theory: An Analysis of Decision under Risk." Econometrica 47 (1979), pp 263-291

⁷ Mitton and Vorkink, "Equilibrium Under-diversification and the Preference for Skewness." Review of Financial Studies 20 (2007), pp. 1255-1288

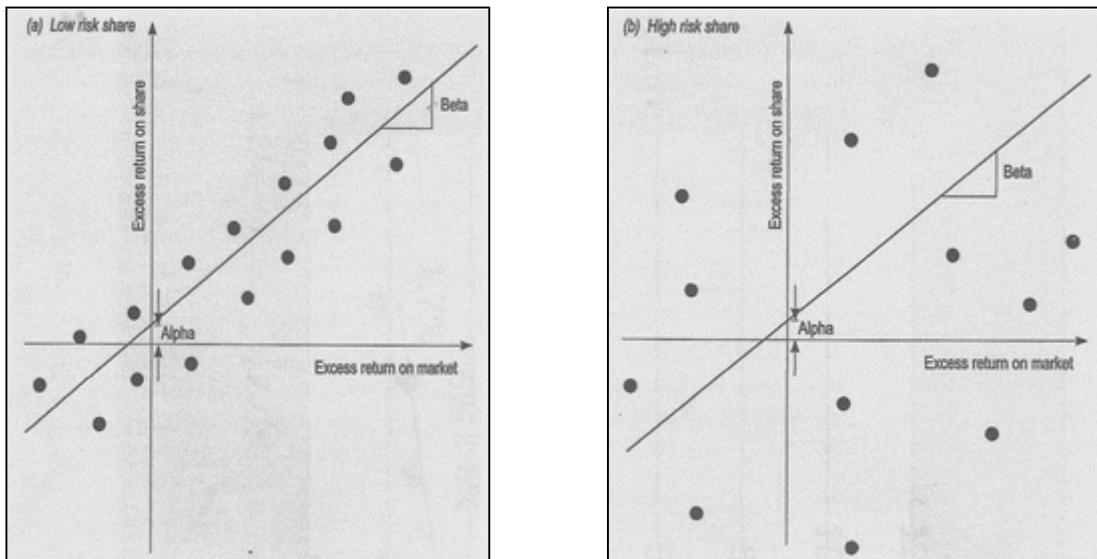
⁸ An abnormal return is the difference between the Market Risk Premium and the actual portfolio return, and is also called a portfolio's alpha

The measurement of risk is best understood by the use of a scatter graph. A variable is plotted against the two axes y and x, in our example, stock prices and a market index. For any given two prices the intercept of the two axes on the regression line is the stock's beta.

In example (a), there is a greater the concentration of prices around the beta line, indicating their closer correlation to the portfolio's beta. Such an investment set can be constructed to return the market risk premium value of 1, with its concomitant near absence of unsystematic components to generate any alpha.

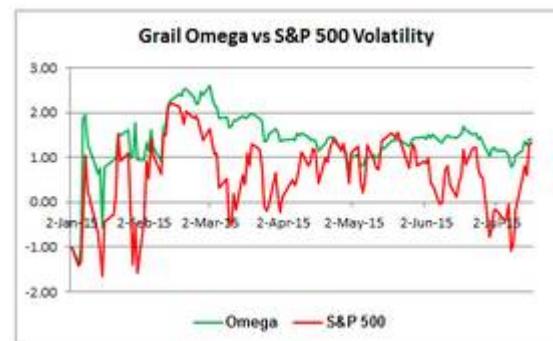
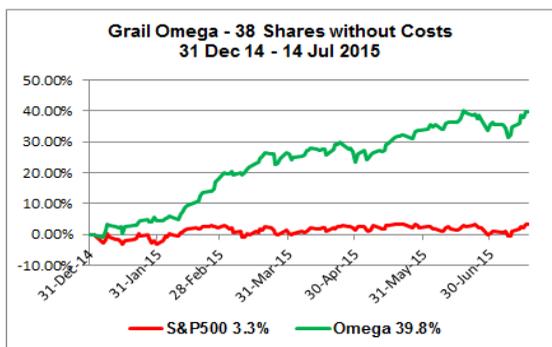
In example (b), the portfolio prices are well dispersed, so that the regression equation or beta is less reliable at explaining the overall risk of the portfolio. The aggregate of the data points may nevertheless confirm that there is a greater correlation to the beta of a low risk, high return portfolio when the portfolio possesses strong unsystematic components to generate a high alpha value.

To establish how reliable the portfolio's beta is the statistical measure R-Squared is used, which calculates the percentage a portfolio's movements that can be explained by the movements in a benchmark index. A high R-Squared value of between 80 and 100 will indicate a more reliable beta figure. An R-Squared of 70 or less means the beta value should be ignored.



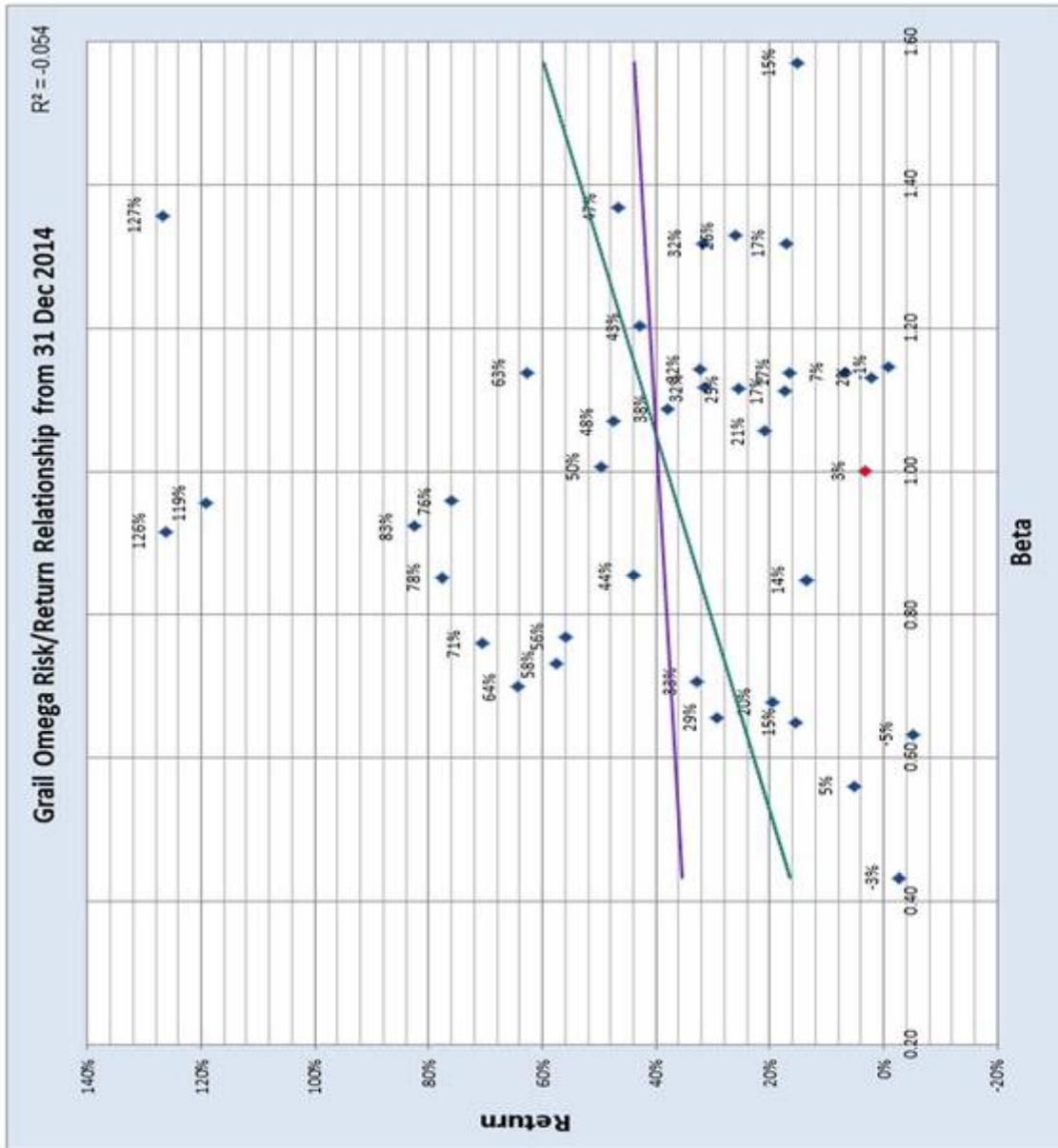
The Grail Omega Portfolio (GOP) confirms the findings of Baker et al as a low risk, high return portfolio even though the scatter graph on the next page highlights anomalies, which identify significant inconsistencies in the Capital Asset Pricing Model.

- The GOP's beta is 0.91, and is only nine basis points under the market beta of 1.00. However, the S&P 500's performance is only 3.3%, and GOP has a performance of 39.8%! This is confirmed in the scatter graph below by the beta regression line's intercept point.
- As the GOP holds 38 stocks, the diversification process, cited in Graph 1 on Page 2, confirms the portfolio's beta of 0.91, meaning that it has characteristics as being a classical CAPM portfolio that should generate similar returns as the S&P 500, but does not.
- The Volatility graph, based on sigma calculations, shows that the S&P 500 is significantly more volatile over time and generates a much lower return than the GOP, as shown in the second graph:



- The dispersion of the portfolio's individual stock returns range from 127% to -5%. The CAPM only calculates the co-movement of the S&P500 and the GOP on the hypothesis that stock-specific risk is diversified away. The GOP's aggregate return is however achieved from unsystematic or stock-specific sources, such as consistently high earnings growth, new products, superior balance sheet management, etc., which have little or no influence on the broad market.
- The R^2 value of -0.054 signals that the portfolio's beta as a measure of risk is unusable. This is also confirmed by the GOP's correlation of 0.28 with the S&P 500. The underlying rationale points to the incapacity of the CAPM to calculate the market risk premium when unsystematic forces dominate returns.
- The two tables accompanying the scatter graph reveal glaring inconsistencies in that similar betas produce dissimilar returns. This anomaly alone certainly raises the issue of whether the CAPM is sufficiently consistent to fulfil its utility function for portfolios, which deliver high returns stemming from unsystematic sources.

Stock	Beta	Return
CBM	1.57	15%
ISLE	1.37	47%
	1.36	127%
	1.33	26%
	1.32	32%
	1.32	17%
	1.20	43%
	1.15	-1%
	1.14	32%
	1.14	7%
	1.14	17%
	1.14	63%
	1.13	2%
	1.12	32%
	1.11	25%
	1.11	17%
	1.09	38%
	1.07	48%
	1.06	21%
	1.01	50%
	1.00	3%
	0.96	76%
	0.95	119%
	0.92	83%
	0.92	126%
	0.85	44%
	0.85	78%
	0.85	14%
	0.77	56%
	0.76	71%
	0.73	58%
	0.71	33%
	0.70	64%
	0.68	20%
	0.66	29%
	0.65	15%
	0.63	-5%
	0.56	5%
	0.43	-3%



Stock	Beta	Return
CBM	1.36	127%
ISLE	0.92	126%
	0.95	119%
	0.92	83%
	0.85	78%
	0.96	76%
	0.76	71%
	0.70	64%
	1.14	63%
	0.73	58%
PANW	0.77	56%
	1.01	50%
	1.07	48%
	1.37	47%
	0.85	44%
	1.20	43%
	1.09	38%
	0.71	33%
	1.14	32%
MTRI	1.32	32%
	1.12	32%
	0.66	29%
	1.33	26%
	1.11	25%
	1.06	21%
	0.68	20%
AAPL	1.11	17%
	1.32	17%
	1.14	17%
	0.65	15%
	1.57	15%
	0.85	14%
	1.14	7%
	0.56	5%
S&P 500	1.00	3%
UAM	1.13	2%
TSRA	1.15	-1%
DOC	0.43	-3%
LOCO	0.63	-5%

Beta Return
0.91 39.8%

Less than 1 18
Greater than 1 20
Total Stocks 38

CONCLUSIONS THAT ARE INCONCLUSIVE

Many researchers, among them Black, Jensen and Scholes⁹, have published results over the years that have led to the expression that “beta is dead”, claiming that the relationship between risk and return is much flatter than predicted by the CAPM. Also Baker et al expressed their own doubts with: “These patterns are hard to explain with traditional, rational theories of asset prices. In principle, beta might simply be the wrong measure of risk, too”¹⁰.

The information extracted from the scatter graph throws up shortcomings that call into question the use of the CAPM as a vigorous prognosticator of a portfolio’s residual risk and return post-diversification¹¹ by calculating simply the market risk premium, and ignoring alpha’s contribution. Worst still in the GOP’s case R-Squared showed that because of stock-specific factors the resulting portfolio’s beta could not be relied upon to arrive at a premium. Furthermore, the inconsistency of similar stock prices generating dissimilar betas revealed another endemic weakness. Notwithstanding these flaws, the most important issue beta has is its removal of 65.5% of risk arising from unsystematic sources, although its function is dual in nature: not only to forecast losses in declining markets, but also the equal and opposite function to quantify expected returns in rising markets, as shown in Graph 2 on page 2. The scatter graph shows that unsystematic returns are very considerable, compared to the market risk premium of only 6.87%.

All in all, these issues render the Capital Asset Pricing Model unusable in portfolios dominated by stock-specific growth, which in GOP’s case returns an alpha of 31.63%, based on the following equation:

$$E = E_E - (E_E + EE_E - E_E EE)$$

Where:

R_p = Realized Return of the Portfolio

R_m = Market Return

R_f = Risk-Free Rate

⁹ Black, Fischer, Jensen & Scholes, “The Capital Asset Pricing Model: Some Empirical Tests.” In M.C. Jensen, ed., *Studies in the Theory of Capital Markets*. New York: Praeger, 1972, pp. 79-121.

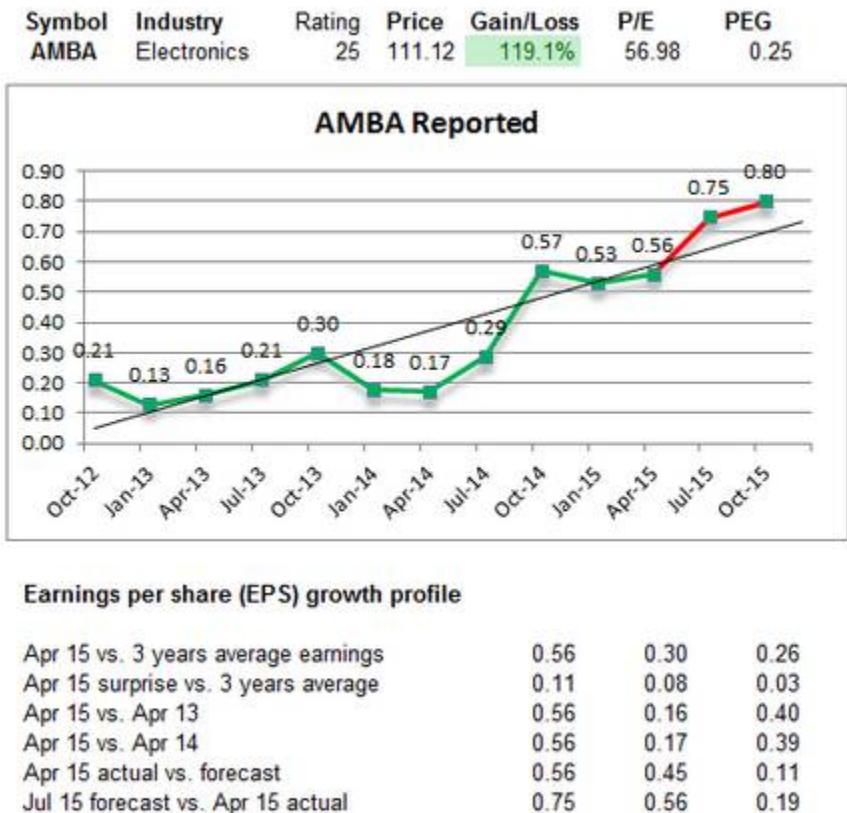
¹⁰ Baker, Bradley and Wurgler, “Benchmarks as Limits to Arbitrage: Understanding the Low Volatility Anomaly.” *Financial Analysts Journal* (2011), Vol. 67, No. 1, pp 43-44.

¹¹ It is the diversification effect which reduces both risk and return by averaging out a portfolio’s constituent beta values and returns.

As such, the portfolio's low risk of a beta of 0.91 and its high return of 39.8% qualify it as a Low Volatility Anomaly.

This absence of a truer representation of returns has been instrumental in forming biases, which on the one hand postulate that index funds are the safest, and that growth stocks are the riskiest, when the reverse is true, since the margin of safety of index funds are much smaller than a portfolio of growth stocks over time. However, the prerequisite is that stock selections are not to be made naïvely but are based on thorough fundamental analysis, whereby the Grail Equity Management System (GEMS) conducts 26 tests, of which the analysis of a stock's earnings pedigree is over-weighted in its analysis.

Here is an example of how thoroughly GEMS evaluates a stock's earnings profile. The earnings projections for the next two quarters are indicated in red.



Stocks like Ambarella, Inc. (AMBA) with outstanding EPS profiles have the propensity to generate strong price accumulation over the medium-term and longer. Since 31 December 2014 with a beta of only 0.95 this stock's price is up 119.01% against the S&P 500's return of only 3.3%.



As you can see in the following table the average earnings growth of the GOP's 38 stocks for the 2nd and 3rd quarter 2015 is 64% and indicates that pari parssu individual stocks' earnings profiles tend to drive stock prices.

Grail Omega Portfolio Forecasts

	EPS Q2	EPS Q3	Average	P/E	PEG
Average	229%	135%	182%	21	0.41

Therefore, the higher the unsystematic or alpha returns are, the lower is the risk of loss of principal. Thus unsystematic components are by far the major contributors to the portfolio's profit, and not the systematic occurrences, or lack of them. Of course systematic risks happen, but only seldom. The last deep bear market was in 2007/8 when the S&P 500 fell 57.57% in the period 5 November 2007 to 9 March 2009. Under normal bullish conditions the most sensitive risk points are:

- On initial purchase of a stock
- On a major event that damages a company's business model and which causes a key reversal of its stock price. For example, the conviction by a Chinese court caused Nu Skin Enterprises (NUS) share price to fall 60.00% from 9 January 2014 to 20 February 2015.
- Market risk, which is triggered by a direct threat of macro-economic and political proportions with uncertain outcomes.

Karl Popper, a philosopher of science, pointed out that even if a particular theory were 'right', you could never actually prove it. All that you could ever hope to prove is that it is wrong. He concluded that a good theory is generally reckoned to be one that works quite well for most of the time!

My own conclusion is that the CAPM is flawed mainly because it does not include an alpha return component, although, for example, the market's intercept on beta's regression line at 0.91 is a 39.8% return and provides a sliding scale of risk and return along its slope. Unfortunately for investors the preoccupation with only the market risk premium dominates all product offerings, because they have given rise to the plethora of index funds and EFTS in the mistaken belief that they are safer than market premium plus alpha portfolios, which are equally of low risk, but generate higher returns.

That said, Baker et al's research on the Low Volatility Anomaly does appear to be gaining wider recognition. However even the authors doubt whether there is sufficient momentum to alter the common practices of the major market players to change their offering mix. Nor is there any evidence to shift the ingrained biases of investors nurtured on a false hypothesis. Consequently this self-fulfilling prophecy is perpetuated by the market's pervasive misinformation concerning the very nature of expected or actual risks and returns.

Nevertheless the anomaly of low risk equalling high return exists, as the 41-year study has proven, and unequivocally confirms the Grail Equity Management System (GEMS) as a progenitor of this phenomenon. Because this paper has been inspired by the Baker, Bradley and Wurgler research, I would like to join the authors in the sentiment they expressed:

“We believe the long-term outperformance of low risk portfolios is perhaps the greatest anomaly in finance. It is large in economic magnitude and practical relevance and challenges the basic notion of a risk-return trade off.”

John Henry Smith, MBA, FMCI
Grail Securities (Switzerland)
6331 Hünenberg
Switzerland
www.grailsecurities.com

My Linked In profile:

https://www.linkedin.com/profile/preview?locale=en_US&trk=prof-0-sb-preview-primary-button