Alpha and Beta

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Abstract

The main problem in portfolio management is the question How an investor should distribute his wealth to gain the best possible expected return for the amount of risk, he is willing to suffer from. To solve this problem, Alpha is a measure of the performance of an investment as compared to a suitable benchmark index, such as the S&P 500. An alpha of one (the baseline value is zero) shows that the return on the investment during a specified time frame outperformance the overall market average by 1%. A negative alpha number reflects an investment that is underperforming as compared to the market average. Beta, on the other hand, is a measure of a stock's systematic risk or volatility.

1 - Introduction

Markowitz (1952) [1] *serves as the theoretical basis on which several capital market models were developed. The Capital Asset Pricing Model (CAPM) developed by Sharpe (1964)*[2] *Lintner (1965)* [3] *and Mossin (1966)* [4] *is the most established of these models. Although it has suffered from many critical remarks throughout the years, it remains a standard model until today. Besides its extensive presence in theoretical research, it is also widely employed in practice. This is due to the main advantage of the CAPM compared to subsequently developed and more sophisticated models; its convenient applicability combined with comparatively little data requirements. The most promising successor of the CAPM is the Fama-French three –Factor model, which was introduced by Fama & French (1993)* [5] *This model is already widespread in research, however, it is only rarely used in practice. Consequently, the CAPM remains the dominant model in practical applications and it doesn't seem to lose this position in the near future.*

The essential factor of a stock in the equilibrium equation of the CAPM is the beta factor, which states the systematic risk contribution of this stock to the overall risk of a portfolio. The beta factor in particular can for example be used to assess listed companies, calculate market oriented capital costs or optimize portfolio structure without estimating the whole variance-covariance-matrix (1) [6]. *For all these applications the accuracy of the beta factor is of special interest. Because the market portfolio isn't observable and the true beta is unknown, knowledge about deviations between beta factors due to different input parameters for their estimation gets essential. This is also true for the Fama-French model as it is an extension of the CAPM and the beta factor remains an important parameter. However, the Fama-French Model additionally consider two further factors related to size and book-to- market influencing the return of a stock.*

2 - What is Alpha?

Alpha is a measure of the performance of an investment as compared to a suitable benchmark index, such as the S&P 500. An Alpha of one (the baseline value is zero) shows

that the return on the investment during a specified time frame outperformed the overall market average by 1%. A negative alpha number reflects an investment that is underperforming as compared to the market average.

Alpha is one of five standard performance ratios that are commonly used to evaluate individual stocks or an investment portfolio, with the other four being beta, standard deviation, R-squared, and the Sharpe ratio. Alpha is usually a single number (e.g., 1 or 4) representing a percentage that reflects how an investment performed relative to a benchmark index.

A positive alpha of 5 (+5) means that the portfolio's return exceeded the benchmark index performance by 5%. An alpha of negative -5 (-5) indicates that the portfolio underperformed the benchmark index by 5%. An alpha zero means that the investment earned a return that matched the overall market return, as reflected by the selected benchmark index.

The alpha ratio is often used along with the beta coefficient, which is a measure of the volatility of an investment. The two ratios are both used in the Capital Asset Pricing Model (CAPM) to analysis a portfolio of investments and assess its theoretical performance.

3 - Origin of alpha

The concept of alpha originated from the introduction of weighted index funds, which attempt to replicate the performance of the entire market and assign an equivalent weight to each area of investment. Basically, investors began to require portfolio managers of actively traded funds to produce returns that exceeded what investors could expect to make by investing in a passive index fund. Alpha was created as a metric to compare active investments with index investing.

4 - What is Beta?

The beta coefficient, or beta is a measure of a stock's volatility or relative risk in comparison to the performance of the entire market. This measure of volatility can tell an investor whether a specific investment is risk or safe than the benchmark.

The volatility of an asset or portfolio in respect to the general market is measured by beta, which can help investors assess how much risk they are willing to take in exchange for a certain return. The default value for beta is one, indicating that the security's price moves in lockstep with the market.

A stock with a positive beta value travels in the same direction as the index. A negative value implies the stock is moving in the opposite direction of the market, the stock is rising when the market is falling and vice versa. A beta rating greater than one also indicates that the stock is more volatile than the market. If the beta value is 1.1, for example, the share price is likely to fluctuate by 10% more than the index. A value less than 1 indicates that the stock price fluctuates less.

5 - What is Beta Testing?

Beta testing is an opportunity for real users to use a product in a production environment to uncover any bugs or issues before a general release. Beta testing is the final round of testing before releasing a product to a wide audience. The objective is to uncover as many bugs or usability issues as possible in this controlled setting.

Beta tests can either be open or closed. In an open test, anyone can use the product and is usually presented with some messaging that the product is in beta and given a method for submitting feedback. In closed beta, the testing is limited to a specific set of testers, which may be composed of current customers, early adopters, and /or paid beta testers. Sometimes

they are conducted by diverting a certain percentage of users to the beta site instead of the current release.

Testing can either last for a set period or run until new issues stop being reported and all important ones have been addressed.

6 - What is the Objective?

Beta testing is the best chance to find bugs or issues before a product id fully released. While internal testing can uncover many problems, nothing can truly simulate real users trying to complete real tasks.
Additionally, beta testing is the first opportunity to test software in an actual production environment versus a lab or stage setting. This ensures the software can perform under real workloads and that speed, storage, and scalability all work as expected.
In addition to finding problems, testing is an opportunity to validate hypotheses about how users will use new functionality and ensure the product meets requirements and expectations. While beta testing isn't typically a period when new features or functionality is introduced, it can inform any fast follows required to satisfy users' needs fully.
Beta testing is also a chance to refine the positioning, marketing, and communication about the product, as these can be tested out against people who are now using it.

7 - How Do Product Managers Use Beta Testing?

Product managers can tap into the feedback flood of beta testing to collect a host of ideas and suggestions to consider for future releases. In addition, because testers are encouraged and sometimes incentivized to provide feedback, they are far more likely to make requests and comments than typical users proactivity.

Beta testing is also a chance to begin looking at usage behavior and analytics to confirm that users interact with the product as expected or discover unexpected usage patterns. Gathering these learnings before a general release can inform priorities about user education, onboarding, user help, and documentation to make it a smoother experience for the general user base.

8 - How to Use the Beta Test Feedback?

If product development was resistant to address something, the input from beta testers can help product management make a stronger case that it should be resolved. Product managers can also run experiments during beta tests, seeing which different prompts, notifications, messaging, and featured content move the needle and drive the desired behavior.

Looking at the performance of the production environment during testing can also contribute to how aggressively the product should be rolled out. For example, if scalability appears to be an issue during the beta test, the rollout can be slowed down to avoid a major outage or performance issues. At the same time, the infrastructure is ramped up for a more significant load.

9 - Capital Asset Pricing Model (CAPM)

The CAPM is used to calculate the amount of return that investors need to realize to compensate for a particular level of risk. It subtracts the risk-free rate from the expected rate and weight it with a factor-beta-to get the risk premium. It then adds the risk premium to the risk-free rate of return to get the rate of return an investor expects as compensation for the risk. The CAPM formula is expressed as follows;

$r = R_f + beta\ (R_m - R_f) + Alpha$

therefore,

$$Alpha = R - R_f - beta\ (R_m - R_f)$$

Where:

R represents the portfolio return

R_f *represents the risk−free rate of return*

Beta represents the systematic risk of a portfolio

R_m *represents the market return per a benchmark*

For example, assuming that the actual return of the fund is 30, the risk-free rate is 8%, beta is 1.1, and the benchmark index return is 20%, alpha is calculated as

$$Alpha = (0.30 - 0.08) – 1.1\ (0.20 – 0.08)$$

$$= 0.088\ or\ 8.8\%$$

The result shows that the investment in this example outperformed the benchmark index by 8.8%.

The CAPM is an idealized depiction of how financial markets price securities and thereby determine expected returns on capital investments. The model provides a methodology for quantifying risk and translating that risk into estimates of expected return on equity.

A principal advantage of CAPM is the objective nature of the estimated costs of equity that the model can yield. The capital asset pricing model cannot be used in isolation because it necessarily simplifies the world of financial markets. But financial managers can use it to supplement other techniques and their own judgment in their attempts to develop realistic and useful cost of equity calculations.

Although its application continues to spark vigorous debate, modern financial theory is now applied as a matter of course to investment management. And increasingly, problems in corporate finance are also benefiting from the same techniques. The CAPM embodies the theory. And then raises these questions; what is CAPM? How can they use the model? Most important, does it work?

Capital Asset Pricing Model, a theoretical representation of the behavior of financial markets, can be employed in estimating a company's cost of equity capital. Despite limitations, the model can be a useful addition to the financial manager's analytical tool kit.

10 - What is CAPM?

Modern financial theory rests on two assumptions;

1 – securities markets are very competitive and efficient (that is, relevant information about the companies is quickly and universally distributed and absorbed;

2 – these markets are dominated by rational, risk-averse investors, who seek to maximize satisfaction from returns on their investments.
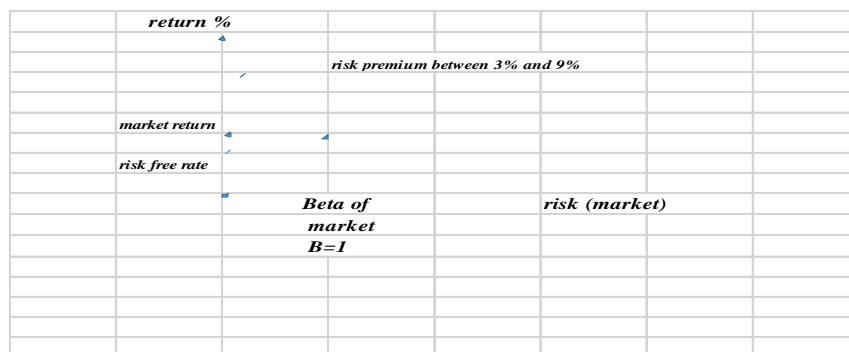
The first assumption presumes a financial market populated by highly sophisticated, well, informed buyers and sellers. The second assumption describes investors who care about wealth and prefer more to less.

In addition, the hypothetical investors of modern financial theory demand a premium in the form of higher expected returns for the risks they assume. Although, these two assumptions constitute the cornerstones of modern financial theory, the formal development of CAPM

involves other, more specialized limiting assumptions. These include frictionless markets without imperfections like transaction costs, taxes, and restrictions on borrowing and short selling. The model also requires limiting assumptions concerning preferences. Finally, investors are assumed to agree on the likely performance and risk of securities, based on a common time horizon.

Figure , (1)

CAPM

		return %					
				risk premium between 3% and 9%			
market return							
risk free rate							
			Beta of market B=1		risk (market)		

Although CAPM's assumptions are obviously unrealistic, such simplification of reality is often necessary to develop useful models. The true test of a model lies not just in the reasonableness of its underlying assumptions but also in the validity and usefulness of the model's prescription. Tolerance of CAPM's assumptions, however fanciful, allows the derivation of a specific, though idealized, model of the manner in which financial markets measure risk and transform it into expected return.

11 - Portfolio diversification

Capital Asset Pricing Model deals with the risks and returns on financial securities and defines them exactly, if arbitrarily. The rate of return an investor receives from buying a common stock and holding it for a given period of time is equal to the cash dividends received plus the capital gain (or minus the capital loss) during the holding period divided by the purchase price of the security.

Although investors may expect a particular return when they buy a particular stock, they may be disappointed or pleasantly surprised, because fluctuations in stock prices result in fluctuating returns. Therefore, common stocks are considered risky securities. (in contrast, because the returns on some securities, such as Treasury bills, don't differ from their expected returns, they are considered riskless securities.) financial theory defines risk as the possibility that actual returns will deviate from expected returns, and the degree of potential fluctuation determines the degree of risk.

An underpinning of CAPM is the observation that risky stocks can be combined so that the combination (the portfolio) is less risky than any of its components. Although such diversification is a familiar notion, it may be worthwhile to review the manner in which diversification reduces risk.

12 - Cost of equity

This difficulty is unfortunate in view of the role of equity costs in vital tasks such as capital budgeting evaluation and the valuation of possible acquisitions. The cost of equity is one component of the weighted average cost of capital,

Which corporate executives often use as a hurdle rate in evaluating investments. Financial managers can employ CAPM to obtain an estimate of the cost of equity capital.

If CAPM correctly describes market behavior, the security market line gives the expected return on a stock. Because this expected return, R_s is by definition the company's cost of

$$K_e \; = \; R_s \; = \; R_f \; + \; \beta_s \; (R_m \; - \; R_f$$

Arriving at a cost of equity for evaluating cash flows in the future requires estimates of the future values of the risk-free rate, R_f, the expected return on the market, R_m, and beta, β_s

Assumptions: Rf = 10%, Rm = 19%.

$$K_e \; = \; R_s \; = \; R_f \; + \; \beta_s \; (R_m \; - \; R_f$$

$$= 10\% + \beta_s \; (19\% - 10\%)$$

$$= 10\% + \beta_s \; (9\%)$$

Electric Utility

$$\beta_u \quad = .75$$

Ru = 10% + Bu (9%)

$$= 10\% + .75(9\%)$$

$$= 16.75\%$$

Ku = 17%

Chemical company

$$\beta_c \quad = 1.10$$

Rc = 10% + Bc (9%)

$$= 10\% + 1.10 \; (9\%)$$

$$= 19.9\%$$

Kc = 20%

Airline

$$\beta_A = 1.55$$

Ra = 10% + Ba (9%)

$$= 10\% + 1.15 \; (9\%)$$

$$= 23.95\%$$

Ka = 24%

The betas in above exhibit are consistent with those of companies in the three industries represented. Many Electric Utilities have low levels of systematic risk and low betas because of relatively modest swings in their earnings and stock returns.

Airline revenues are closely tied to passenger miles' flows, a yardstick very sensitive to changes in economic activity. Amplifying this systematic variability in revenues is high operating and financial leverage. The results are earnings and returns that very widely and produce high betas in these stock.

Major Chemical companies exhibit an intermediate degree of methodical risk.

13 - Does CAPM work?

As an idealized theory of financial markets, the model's assumptions are clearly unrealistic. But the true test of CAPM, naturally, is how well it works. There has been numerous empirical test of CAPM. Most of these have examined the past to determine the extent to which stock returns and betas have corresponded in the manner predicted by the security market line. With few exceptions the major empirical studies in this field have concluded that;

1 – as a measure of risk, beta appears to be related to past returns. Because of the close relationship between total methodical risk, it is difficult to distinguish their effects empirically. Nonetheless, inclusion of a factor representing unmethodical risk appears to add little explanatory power to the risk or return relationship.

2 – the relationship between past return and beta is linear-that is, reality conforms to what the model predicts. The relationship is also positively sloped-that is, there is a positive trade-off between the two (high risk equals high return, low risk equals low return).

3 – the empirical SML appears less steeply sloped than the theoretical SML. As illustrated in above Exhibit, low-beta securities earn a return somewhat higher than CAPM would predict, and high -beta stocks earn less than predicted. A variety of deficiencies in CAPM and or in the statistical methodologies employed have been advanced to explain this phenomenon. Figure (2).

Theoretical and estimated security market lines
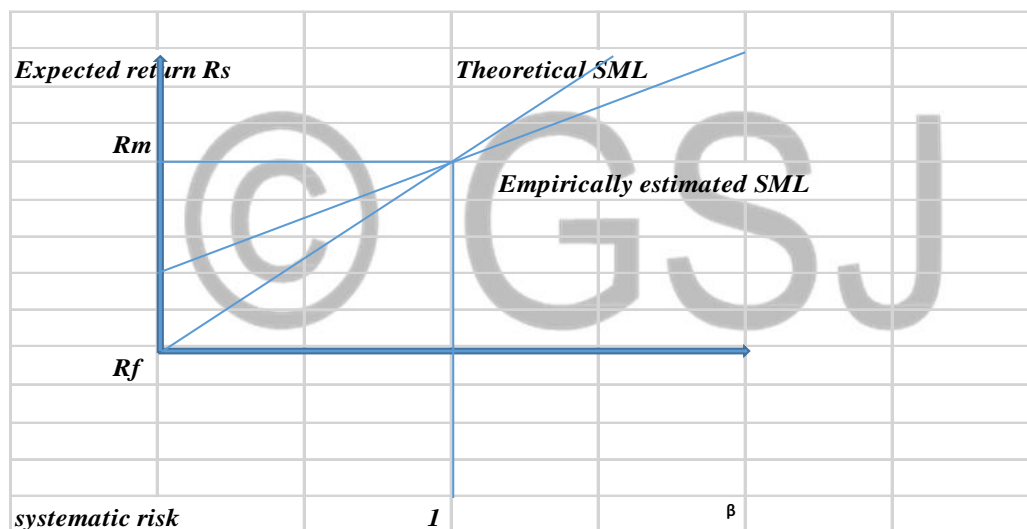
Although these empirical tests don't unequivocally validate CAPM, they do support its main implications. The systematic risk measure, beta, does appear to be related to past returns; a positive risk / return trade-off does exist; and this risk / return relationship does appear to be linear. Contradictory finding concerning the slope of the SML is a subject of continuing research. Some researchers suggest using a more gradually sloped "empirical market line" based on these findings instead of the theoretical SML.

Recent work in the investment management field has challenged the proposition that only systematic risk matters, in a complex world it would be unlikely to find only one relevant type of risk-market risk

Much progress has been made in the development of richer asset pricing models. As of yet, however, none of these more sophisticated models has proved clearly superior to CAPM, this continues to be a fertile area of research, focused primarily on investment management applications.

14 - What are alpha and beta in mutual funds?

The relationship between risk and return is a foundational concept in investments. You cannot get higher returns without taking risks. A good understanding of risk and risk adjusted returns is required when you evaluate mutual fund performance. For example, if a mutual fund gives high returns you should try to understand if it is due to higher risk taken by the fund manager. In this article, we will discuss different measures of risk and returns, what is alpha and beta in mutual fund? So, that you can understand various performance parameters of a mutual fund scheme and make informed investment decisions.

14. 1 - How is risk measured?

In layman terms, risk is the deviation from expected or average returns. A common measures of risk is standard deviation. Standard deviation is a statistical metric which measures the dispersion of returns from the average returns. Higher the standard deviation higher is the volatility. Standard deviation is an absolute measure of risk. For example, standard deviation of returns on equity fund is likely to be higher than a debt fund. Similarly, standard deviation of returns of large cap funds is likely to be lower than midcap funds.

14. 2- What is beta in mutual fund?

A more useful understanding of risk is in relation to the market or rather the relevant market benchmark. Beta of a mutual fund scheme is the volatility of the scheme relative to its market benchmark. If beta of a scheme is more than 1, then scheme is more volatile than its benchmark. If beta is less than 1, then the scheme is less volatile than the benchmark. If a scheme outperformance its benchmark you should try to understand, whether the beta of the scheme was high or the fund manager was able to deliver superior risk adjusted returns.

14.3- How is risk adjusted returns measured?

Risk adjusted return factors in the risk taken by the scheme. You should always try to invest in schemes with good track record of superior risk adjusted returns to ensure that you get superior performance without taking more risks than what is required according to your risk appetite.

A common measures of risk adjusted returns is the Sharpe Ratio. Sharpe Ratio is the ratio of the excess returns of the scheme over risk free rate to the standard deviation of the scheme. Higher the Sharpe Ratio, higher is the risk adjusted returns.

The limitations of Sharpe Ratio are as binary. 1- Sharpe Ration doesn't distinguish between good and bad volatility. When a scheme gives high returns, its standard deviation will also be high, but this is good volatility. When a scheme gives low returns, its standard deviation will be high but this is bad volatility. This limitation of Sharpe Ratio is solved by using a ratio called Sortino ratio. The calculation of Sharpe and Sortino ratio is almost the same with one major difference- Sortino ratio only shows downside volatility. Volatility in down markets. 2- Sharpe Ratio as well as the Sortino ratio, is that it doesn't distinguish between market risk and excess risk over market.

What is alpha in mutual funds, both the limitations of Sharpe Ratio are addressed by suing a metric known as alpha. Alpha is the excess returns relative to market benchmark for a given amount of risk taken by the scheme. Alpha in mutual funds is probably the most important performance measures of a mutual fund scheme. If a scheme outperformed the benchmark, then alpha will tell you whether the outperformance was due to higher risk or the fund manager's skill of delivering superior risk adjusted returns.

14.4 - Calculation of alpha and beta in mutual funds

To understand alpha and beta, one needs a basic understanding of Capital Asset Pricing Model (CAPM). CAPM is the mathematical relationship of fund returns and market risk. The mathematical equation of CAPM is as follows;

$$fund\ return = risk\ free\ rate + beta \times (benchmark\ return - risk\ free\ rate)$$

If you rearrange the above equation then, you get the formula for beta:

$$beta = (fund\ ret$$

Beta is calculated statistically by fitting a line through a plot of excess monthly returns of the fund over risk free rate (on Y-axis) versus excess monthly returns of market benchmark over risk free rate – the slope or gradient of the best fit line through this plot is the beta of the fund. Beta is calculated in Excel using Regression tool in the Data tab. You may need to install data analysis pack in Excel unless it is already installed.

From the point of view of investors, the calculation of beta isn't important as the understanding of beta. Beta of a scheme is disclosed on a monthly basis in the scheme factsheet.

Let us assume that;

Assume risk free rate is 4%
Scheme's beta is 1.5, and its benchmark is Nifty – 100 rises by 10% in a year, then according to CAPM,

the fund return will be
$$4\% + 1 \cdot 5 \times (10\% - 4\% = 13\%$$

However, if Nifty – 100 falls by 5%, the fund return will be

$$4\% + 1 \cdot 5 \times (-5\% - 4\%) = -9 \cdot 5\%$$

Clearly higher the beta, higher is the risk. You should check the beta of a fund and invest according to your risk appetite.

In the above example, we saw that CAPM predicted the fund to outperform the benchmark when market was up. The actual returns of a fund may be different from what is predicted by CAPM. The difference in actual returns versus what is predicted by CAPM is known as alpha in mutual funds. The mathematical equation for alpha is;

$$fund\ return = r$$
$$+ \alpha$$

Continuing with the previous example, CAPM predicted that the fund will give 13% when Nifty – 100 rises by 10%, but the actual return of the fund was 15%. Where did this extra 2% come from? This extra 2% return is the value added by the fund manager of the scheme through superior stock selection. This 2% is the Alpha of the fund. If the fund manager is able to maintain this alpha in down-market also, then if Nifty – 100 falls by 5%, then,

Fund return will be

$$4\% + 1 \cdot 5 \times (-5\%$$

you can see that alpha isn't just about giving high return in bull markets, but also limiting downside when market is down.

15 - What is Alpha in Stock Market?

The success of your investment is measured by its alpha. It determines How far a stock or mutual fund has outpaced the market. This is based on the idea that as the market rises, most stocks gain value. The market return is What it's called, and it's often adjusted for risk. Many stocks, on the other hand, outperform the market, usually due to stronger earnings. Their profit margin exceeds the market. By comparing your stock or fund to a benchmark index, Alpha determines this difference, as a result, it shows the amount of value that has been added or withdraw from total returns.

In stocks, alpha is represented by a single number that can be positive or negative based on the stock's performance. The proportion by which the stock's performance differed from the benchmark is represented by the alpha's exact value, if a stock outperforms its benchmark, its alpha is expressed in the positive with a figure it's a represents the percentage by which it outperforms the market, a negative alpha, on the other hand, reflects How much the stock underperformed.

16 - What is Beta in Stock Market?

The beta degree, or beta, is a measure of a stock's volatility or relative risk in comparison to the performance of the entire market. This measure of volatility can tell an investor whether a specific investment is riskier or safer than the benchmark.

The volatility of an asset or portfolio in respect to the general market is measured by beta, which can help investors assess How much risk they are willing to take in exchange for a certain return. The default value for beta is one, indicating that the security's price moves in lockstep with the market.

A stock with a positive beta value travels in the same direction as the index. A negative value implies the stock is moving in the opposite direction of the market, the stock is rising when the market is falling and opposite, a beta rating greater than one also indicates that the stock is more volatile than the market. If the beta value 1.1, for example, the share price is likely to fluctuate by 10% more than the index. A value less than 1 indicates that the stock price fluctuates less.

17 - Difference Between Alpha and Beta in Stock Market

You have probably come across the phrases "alpha" and "beta" during your stock market research, in finance, alpha and beta are two of the most often used metrics for determining how well a portfolio manager performs in comparison to their peers. Common deviation, R-squared, and the Sharp ratio are all standard technical risk calculations that investment managers use to determine and compare an investment's returns.

Alpha / Beta Separation

All investment returns can be seen as the culmination of the market return (Beta) and excess returns (Alpha). The rise of index funds has shown that achieving Beta market exposure is inexpensive and easily achievable through index mutual funds and exchange-traded funds (ETFs).

Institutional investors have recognized that in order to maximize returns, minimize costs and manage the risks of their portfolios, manager performance (Alpha) can be separated from Beta using straightforward tools and analytical techniques. The academic rigor associated with this process has helped uncover an entire new set of asset classes; Alternative Beta.

Alternative Alpha and Beta separation have proven to be tremendous tools in the hands of the world's largest institutions, but implementing these strategies on a smaller scale presents substantial analytical and implementation challenges.

Understanding Returns: Alpha opposite Beta

There are moments in history when the science of investing takes a major step forward. The birth of the Capital Asset Pricing Model (CAPM) was one of them; the dawn of index funds was another, today, another investing revolution is afoot; Alpha / Beta separation. Perhaps the most critical of these concepts is that of Alpha and Beta. Simply put, Beta is the risk / reward of your portfolio that is explained just by being in a particular market. Alpha is excess return.

For most investors, Alpha and Beta are inseparable. When you buy an active mutual fund, for instance, you are buying a lot of Beta and a little bit of Alpha.

But the most experience investors are now separating the two, decoupling their decisions about Alpha from their decisions about Beta. This new investing technique allows investors to gain increased control over their asset allocation strategies, control costs and most importantly maximize returns.

Beta: The Market

For many investors, the most important investment decision they will ever make is simply to invest in the market. The learn after the learn shows that our most basic asset allocation decisions determine the size of our portfolios' return. The most important thing from a returns perspective is making sure that we are in the market – getting market – level returns for market – level risks, preferably at low cost.

Market return – also known as Beta – are both widely available and wonderfully cheap. Mass – market retail products such as index mutual funds and exchange – traded funds reliably deliver market returns in many traditional asset classes at extremely low costs. State Street Global Advisors' S&P 500 SPDR ETF (NYSE Area: SPY), for example, trades millions of shares a day.

Derivatives offer another efficient tool for accessing index – level returns. Both futures and options allow investors to gain exposure to most of the world's markets with minimal cost and tremendous flexibility.

Alpha pollution

It's fine to pay a high price for true excess returns; after all, alpha is hard to find. The problem is, investors aren't always sure what they are paying for.

Alpha must always be explained relative to some benchmark, and defining that benchmark properly is critical. Suppose that an investment manager chooses the S&P 500 as its benchmark, but holds a portfolio whose default position is 50 percent Treasuries and 50% stocks. If the stock market falls, that manager will outperform, as the steady fixed – income position will offset the falling stock prices. But has the manager really captured Alpha? Not really. Its default portfolio simply captured a different market than the index. If investors paid Alpha – level fees for this static 50% bond / 50% stock portfolio, they were misled. They could have achieved the same exposure for less.

Figure; (3).
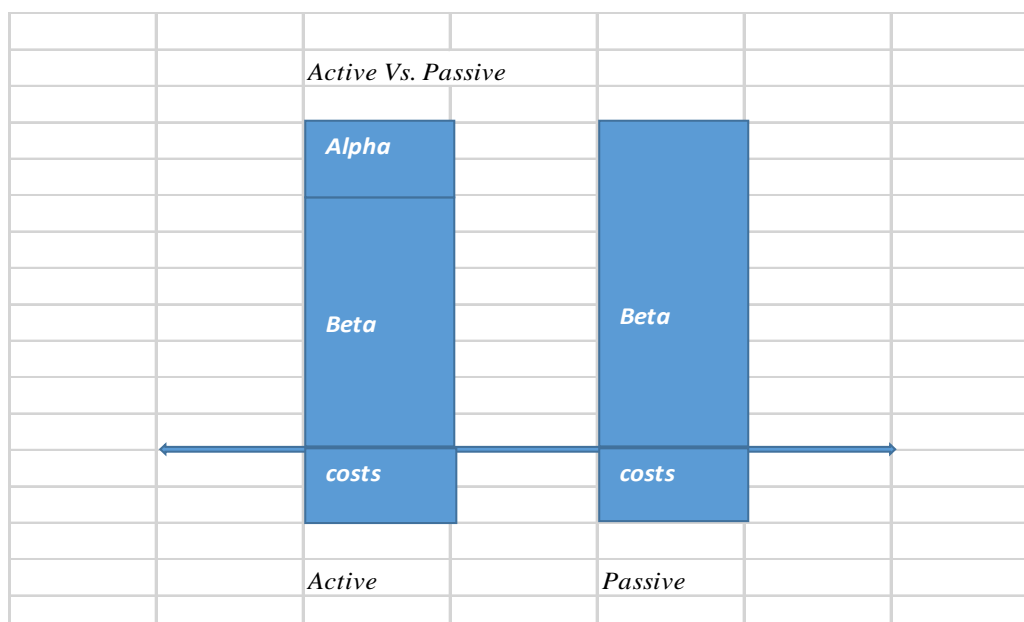
Every investment decision has an implication in Alpha and Beta terms. The decision to invest in a passive index is also a decision to abandon any attempt at gaining Alpha. Investing with an active manager is a decision to pay a premium for a blend of Alpha and Beta. An active mutual fund, is going to produce returns that are the culmination not only of that manager's skill, but also of the underlying market itself. In both cases, total return is degraded by the costs of implementing the strategies in question. Worse, you are paying active – management – level fees for the entire portfolio, not just the portion of the portfolio actually generating Alpha.

The first goal of Alpha / Beta separation is to understand exactly what you are buying and exactly what you are paying for it. That way, you can make sure you aren't paying Alpha – level fees for Beta – level results.

18 - Hedge Fund Replication

This exploration of alternative Beta underlies a new breed of investment strategies; synthetic hedge fund products. Hedge funds-a simple name for a range of private investment funds that may or may not use hedging or any other particular strategy have been used for decade by institutional investors seeking diversification from the traditional asset classes like stocks and bonds, or seeking strategies typically unavailable in other forms, like leverage and shorting. Some of the most successful investors in the world; such as the Harvard and Yale endowments- make sizeable allocation to hedge funds and other alternative investments because they are able to deliver steady returns that aren't correlated to other asset classes. In fact, the most sophisticated investors diversify their alternatives exposure across multiple strategies and platforms to take advantage of the favorable risk / return trade-offs. In 2007, the Yale University Endowment allocated over 23% of its assets to absolute return strategies, and over 69% of its portfolio was allocated to alternative investment (1), as it sought out steadier return during a period of market trouble.

But even the most complicated hedge fund can still be understood both in terms of its core market exposure (the real Beta of the strategy) and the manager's skill (the Alpha, positive or negative). One way of teasing out the real Beta of the hedge fund markets is to look into a very shiny rearview mirror. In many cases hedge fund strategies can be successfully replicated using easily tradable asset classes. Quantitative analysis can identify the factor bets made by a given hedge fund strategy, and then produce similar returns and risk profiles using a synthetic approach involving options, exchange trade funds or other related instruments. These synthetic hedge fund indexes can then be considered the true

Beta for a particular hedge fund strategy, and the manager's deviation from that Beta will be determined by his skill.

This continues the primary trend of Alpha / Beta separation.

Investors are able to access what they were seeking all along the hedge fund market; alternative Beta, or the low-correlation returns that can boost the performance of the portfolio overall. And they can do so without paying something that may not really have existed in the first place: Alpha.

Implementation: controlling costs, improving returns

How do you implement this understanding of Alpha and Beta into a portfolio?

The most common portfolio strategy for institutions and high net worth investors is one that blends both traditional active management and the benefits of indexing.

Let's take the example of a large pension fund. Suppose that the investment manager sets the overall target asset allocation for the fund across four different asset classes;

Figure, (4)
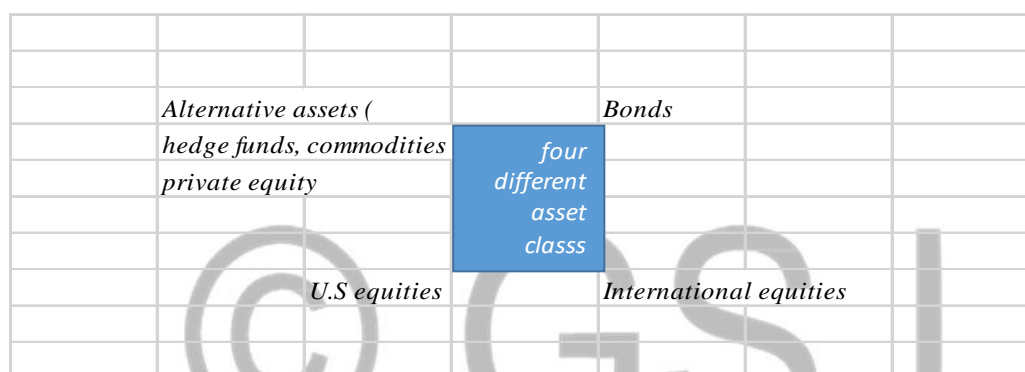
Inside each asset class, it employs a core-end satellite approach. First, it selects the core managers-passive managers that provide beta exposure at extremely low costs that make up the bulk of the pension fund's returns. Then it takes a portion of its assets and applies them to specific managers whom it believes have the potential for excess returns; perhaps a large-cap manager, or a hedge fund with a good track record in long/short strategies.

In each case, the decision about each manager is made in the context of the markets in which it invests, and its appropriate benchmark. The large-cap manager isn't hired simply because he is a good stock-picker; he is hired because he is a good large-cap stock-picker. The benefit of this approach is that the core portfolio can be left relatively stable, subject to occasional rebalancing and renegotiation. The downside is that the global of potential Alpha managers is limited, and each Alpha manager is being paid to produce both Alpha and Beta.

In an Alpha / Beta separation strategy, these decisions about asset allocation and manager selection are decoupled. Fundamental asset allocation decisions are made using clear, essence vehicles, but the Alpha managers are selected purely for their skill. These Alpha managers are evaluated based on the risk and return only of their active management. Without regard to what they invest in, be it fine wines, small-cap stocks or Liberian bonds (see figures 3).

The core asset allocation decisions are implemented entirely with passive vehicles. Managers that are believed to have the potential for pure Alpha are then layered on top of this core portfolio, without affecting the core asset allocation strategy.

In theory, such a methodology has significant appeal;

a – cost control. In an Alpha/Beta separation strategy, a larger % of overall portfolio assets are in Beta-centric, passive investment vehicles. Regardless of whether these vehicles are ETFs, separate accounts or derivatives, these passive vehicles generally carry low management fees and or minimal transaction costs. If those dollars were with an active manager, the investor would be incurring active management fees-almost certainly higher. In the Swedish pension system, for example, the costs of switching managers were reduced from 100 basis points on average, to 5 basis points (Angstrom).

b – reduced tracking Error. Because Beta generation is now entirely segregated, investors can be extremely selective choice of investment managers. For the largest institutional investors, this means having increased buying power when negotiating with index managers or swap counterparties.

c – flexibility. Because the core asset allocation is now handled entirely with low-cost, highly liquid passive vehicles, shifts in asset allocation can be achieved with minimal friction. This means that portfolio rebalancing, adjusting for a change in risk profile, tax management or even the termination of one manager in favor of another can be done quickly and easily.

Figure, (5).
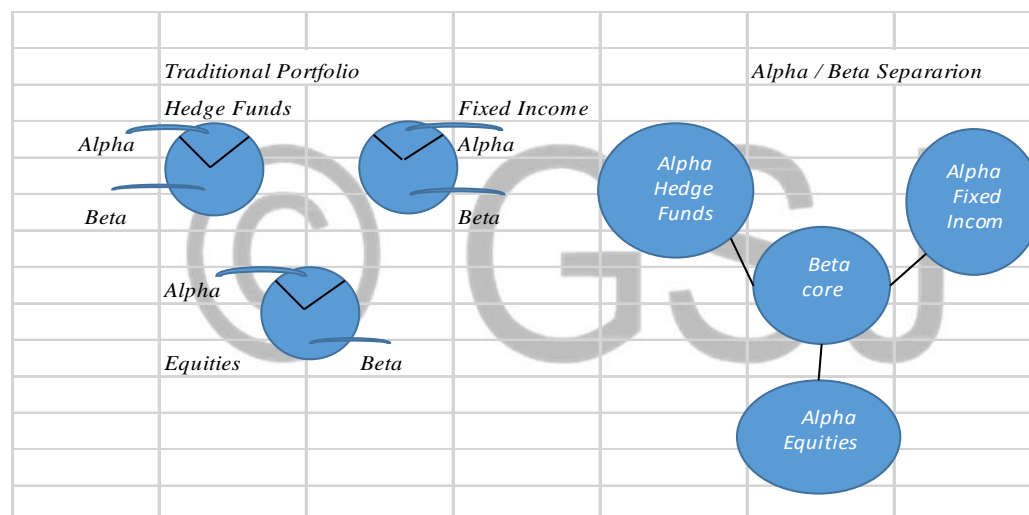
d – better beta. By segregating the beta decision from manager selection, investors can more cleanly analyze their expected portfolio returns. This makes finding uncorrelated asset classes more straightforward, as unclear of active management return is removed from the analysis.

e – better alpha. By selecting alpha managers solely on their ability to generate alpha within certain risk parameters, investors have a wider net to deal with, looking at any and every asset class, including asset classes that are highly illiquid (which is where alpha is most likely to be found). In the ideal case, the returns of the alpha managers are entirely uncorrelated with any of the other asset classes in the portfolio – yet another boon to the asset allocation process.

f – alternative beta. The combination of alpha / beta separation and modern investment techniques yields an entirely new asset class; alternative beta – the low – correlated beta returns available in alternative asset classes like hedge funds, these alternative betas can be captured in synthetic hedge fund products without the high costs traditionally associated with hedge fund strategies. Since the single biggest impact on portfolio returns in asset allocation, the ability to create an uncorrelated asset class – alternative beta – is tremendously powerful.

These factors combine to create a compelling case. The combination of lower costs, more – predictable outcomes and increased flexibility would seem to be a sure winner. But despite these theoretical advantages, the alpha / bets separation portfolio has unique warning.

First and foremost, managing a complete alpha / beta separation portfolio isn't for the casual investor. The combined the portfolio can be complex, and requires attention and analyses. While any asset allocation strategy needs fine – tuning, when alpha is essentially an asset class in itself, paying attention to correlation and absolute performance becomes critical.

But perhaps more importantly, finding alpha managers is nontrivial. Very few managers consistently beat their benchmarks. Indeed, there are many in academic finance who believe that in most markets, alpha seeking is a zero-sum game, where by definition, every active manager's win is another's loss. In fact, even the very definitions of alpha and beta undergo continuous academic debate.

Despite the debate, Alpha / Beta separation is far more than academic. The world's largest and most sophisticated institutional investors are adopting the approach. In August of 2008, the Massachusetts Pension Reserves Investment Management Board announced that it was firing its active managers and shifting its $50 billion portfolio toward an index / portable alpha structure (Appell). In 2005, the Swedish pension system transitioned $14 billion to a strict Alpha / Beta separation system. And credits the shift with reducing costs and increasing true uncorrelated Alpha in its portfolio (Angstrom). It has since shifted an additional $32 billion to the strategy.

19 – implementation challenges

Imagine you are a financial advisor running a modest separate account for a high net worth individual – around $1 million in assets. After a thorough analysis of the investor's other holdings, her risk tolerance and her financial situation, you construct a diversified portfolio using ETFs and low – cost mutual funds with a blended expense ratio of under 30 basis point (.30%). You have even used a hedge fund replication product to add in additional low – correlated returns to the portfolio. If you have done your job, your asset allocation of Beta vehicles will generate solid results.

But your client isn't satisfied. She wants to beat the market. She wants Alpha. How do you go about getting it? After careful due diligence, you stumble across a mutual fund from manager ABC.

Manager ABC has a consistently outperforming large – cap strategy, making effective and profitable tilt-and-timing decisions. If you were to add this fund to the client's portfolio, it would increase the asset allocation to large-cap stocks, and create rebalancing challenges at the end of the month. What do you do?

The answer is to separate the Alpha from the Beta. You balance your client's mutual fund investment in ABC with a corresponding short position in the S&P 500. Theoretically, you have now created pure, uncorrelated Alpha from ABC, and can manage your equity exposure independent of your analysis of the mutual fund's performance.

Figure, (6)
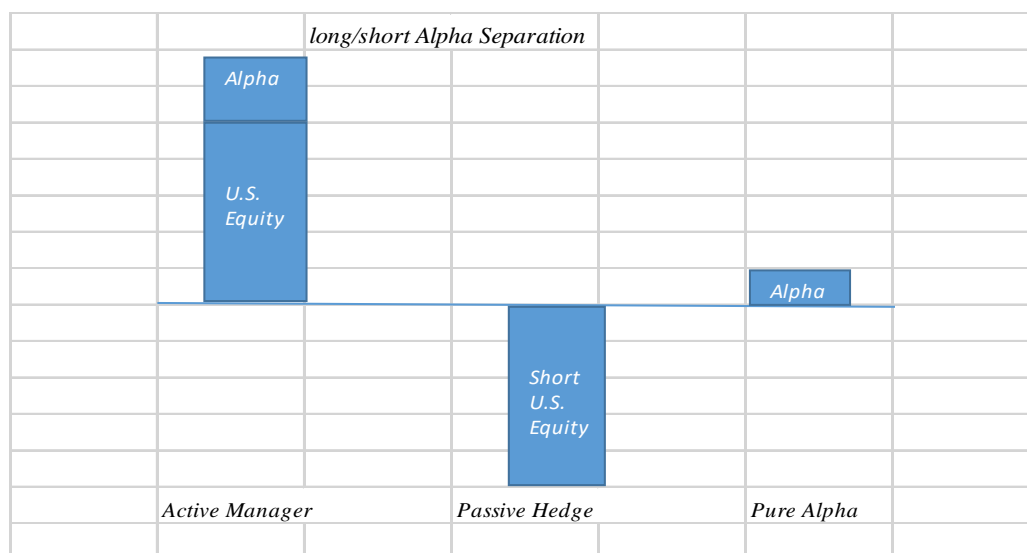
While simplistic and hypothetical, the example is useful for several reasons. Long/short and market-neutral equity strategies were the first to offer this kind of pure Alpha to investors, and are among the easiest to implement. But there are several things working against our hypothetical advisor;

A – hedging isn't free, whether implemented through shorting equities, swaps, futures or options, there are financing and transaction costs that degrade the separated Alpha. In many markets, successful active management is measured in basis points. Separation only makes sense when the cost of stripping out the Beta is substantially less than the expected Alpha of the manager.
B – matching execution and liquidity is critical. To put on or unwind an Alpha separation strategy, multiple transaction in different markets must be made. Swaps, equities and future all have different settlement and cash management requirements that need to be monitored and managed.

For these reasons, many investors don't construct Pure-Alpha exposure on their own, or even through a managed separate account. Instead they rely on asset managers to either package their own expertise in Pure-Alpha form, or on fund-of-funds managers who seek to collect High-Alpha managers and package their returns in a portfolio format.

Package approaches are fine, as long as the underlying principle remains clear; pay Alpha fees only for True-Alpha returns. And don't think you have to pay Alpha fees for all asset classes, since even alternative asset classes can be captured using alternative Beta.

20 - Understanding Strategic Beta

Strategic Beta – along with alternative beta, multifactor investing, smart beta, fundamental indexing, and a few other related phrases – broadly refers to a diverse and growing category of rules – based approaches to investing in various markets. Often, the methodologies behind strategic beta portfolios are designed to screen an investment universe for securities with certain specified characteristics that are believed to often the opportunity for better returns, less "or sometimes more" risk, or some other desired attribute, such as income generation. So far, universal consensus on the most appropriate term, not to mention its precise definition, has proved elusive. For the purposes of this discussion, we define strategic beta as a rules – based index approach that deviates from market capitalization weights.

The benefits of strategic beta include outperformance potential at a lower cost.

Leveraging goals of both active and passive management, strategic beta   may offer complementary portfolio exposure for investors seeking inexpensive, diversified equity approaches with market-beating potential.

Figure, (7).

Strategic Beta- Seeking to Build a Better Index				
	Passive		Active	
1. low cost		Strategic Beta	1. Active risk management	
2. transparent			2. potential for out-	
3. excessive risk -		1. lower cost 2. combines active management insight with the discipline of rules-based approach in the construction of a passive index	performance	
concentrations			3. High cost	
4. embedded large-cap bias			4. difficult to identify	
			sustainable alpha	
source: John Hancock investment management for illustrative purpose only.				

Traditional cap-weighted index-tracking funds have provided investors with expedient and low-cost access to broad market exposure for more than 40 years. While their virtues are significant, these passive funds aren't as intrinsically neutral as they might seem on the surface.

By definition, market cap weighting, the methodology used by the S&P 500 index and many other traditional benchmarks, places greater emphases on shares of larger, more expensive companies, which can produce unintended risk concentrations at particularly inopportune time. These indexes inherently neglect the equity of smaller, potentially more promising firms in favor of large-cap companies that have already experienced significant growth. Moreover, as they are instruments designed to imitative the market rather than to beat it, investors in passive cap-weighted index-tracking funds forfeit the potential of realizing relative outperformance.

Active management, on the other hand, does allow for outperformance potential, but it's generally costlier to implement than passive exposure, and not all active managers have provided investors with benefits commensurate with the price.

By attempting to sidestep the drawbacks of cap-weighted indexing and active management, strategic beta aspires to offer investors the best of both approaches-the potential for outperformance by emphasizing specific segments of the market, on the one hand, and the low cost and transparency of a rules-based indexing approach, on the other hand.

According to Morningstar, $710 billion was invested in strategic Beta ETFs as of December 31, 2017. With over 700 strategic Beta ETFs on offer today. They now account for 21% of all ETF assets, up from 14% in 2010. A 2019 ETF.com and Brown Brothers Harriman survey of financial advisors revealed that 83% of respondents plan to maintain or increase their exposure to strategic Beta in the next year. More advisors and investors are coming to appreciate the value of incorporating strategic Beta into investment portfolios. ETFs, well suited to systematic and transparent approaches, represent the primary vehicle for strategic Beta implementation.

Strategic Beta is gaining share in the ETF market

Strategic Beta as a percentage of the ETF market, 2010 and 2018 (%)
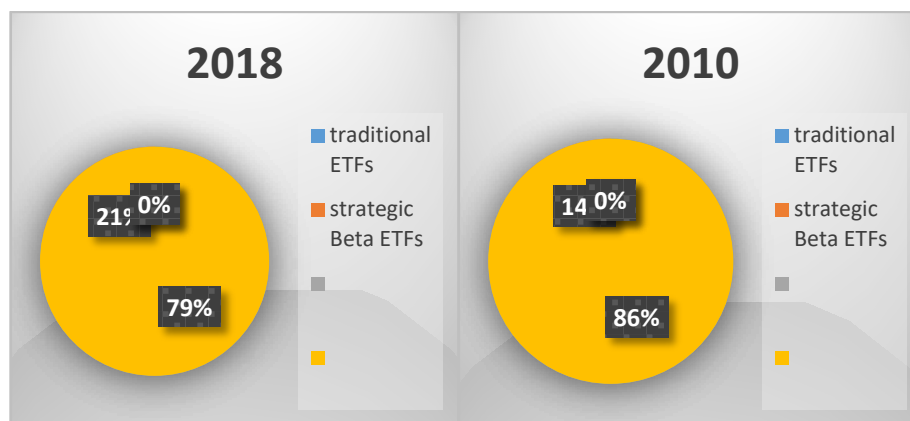
Source: Morningstar Direct. 2018.

From single factor to multifactor approaches, variants abound

By any definition, strategic Beta is a broad category that allows room for many variations on the alternative indexing theme, and investors seem to be using them to pursue a variety of investment objectives.

According to a recent FTSE Russell survey, U.S. advisors who use strategic Beta appear equally likely to employ these strategies to provide Alpha, improve diversification, or provide downside protection. Reasons for using strategic Beta very by country, as well as, the study revealed that U.K. and Canadian advisors most frequently use strategic Beta to improve diversification and increase yield (1).

To bring greater order to the study and evaluation of these approaches, Morningstar group strategic Beta investment into three major categories;

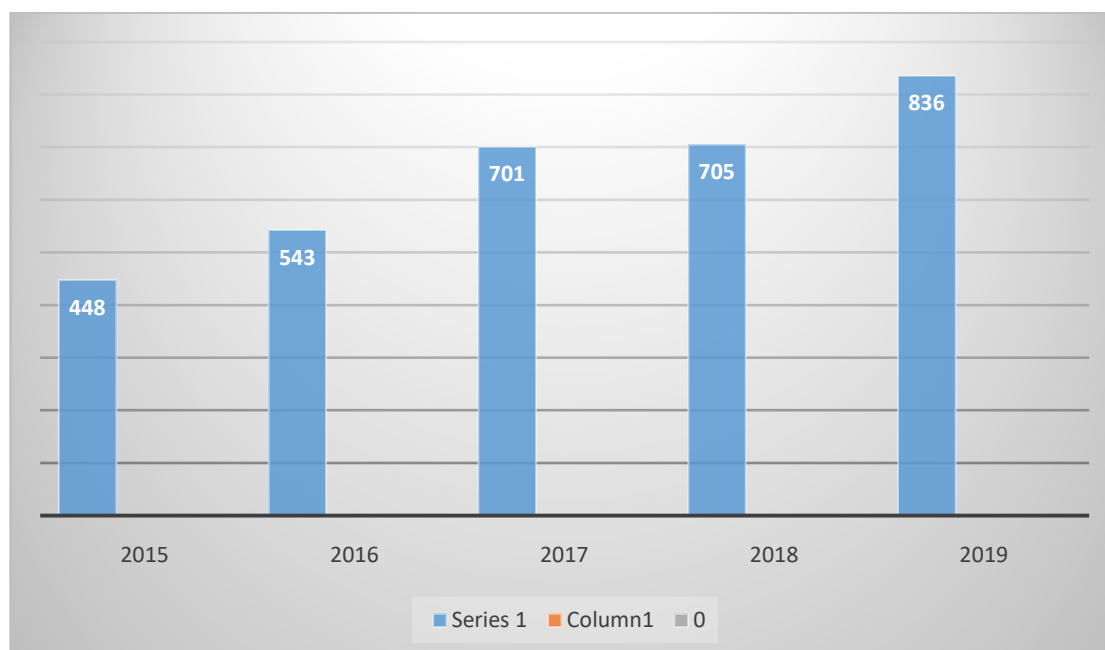**A – return oriented;**

B – risk oriented; and

C – other; with a range of secondary attributes falling under each.

A – Return- oriented strategies

Morningstar defines return oriented strategic Beta investments as those that seek to improve returns relative to standard core benchmarks, and includes value and growth based indexes in this category. Strategies following dividend-weighted methodologies also fall into this group. In essence, a return-oriented strategy aims to capture a specific factor or source of expected return by emphasizing securities with a particular trait. There are also return-oriented variations known as multifactor approaches that, at the portfolio level, pursue more than one type of premium- a concept well explore in further detail.

Strategic Beta ETF assets have more than tripled in the last five years

Strategic Beta ETF asset growth, 2015-2019 ($billions)

A – 1. fundamental weighting, an example of a return-oriented strategy

Fundamentally weighted strategies, which fall under the return-oriented strategies banner, seek to weight securities by a company's economic influence, measured through variables such as book equity, sales, cash flows, and dividends.

Fundamental indexers break the link between a stock's market capitalization and its weight in a portfolio. The pioneers of this methodology pursued it out of "concern that market capitalization is a particularly volatile way to measure a company's size or its true fair value", and results of their published research found fundamental indexing delivered "consistent, significant benefits relative to standard cap weighted indexes" (2).

Fundamental weighting enthusiasts argue that a portfolio that uses fundamental variables rather than market prices to weight securities has the potential for higher average returns.

B – Risk-oriented strategies

Continuing with Morningstar's strategic Beta classifications, risk-oriented strategies aim to alter the level of portfolio risk relative to a standard benchmark. Two of the most common example pursue opposite objectives:

low volatility strategies aim to pare back a portfolio's level of market risk and high Beta strategies deliberately seek to dial the risk level up.

B – 1. Low volatility, an example of a risk-oriented strategy

Low volatility strategies select and weight their holdings based upon historical volatility, endeavoring to generate better risk-adjusted returns than the market. Stock that have demonstrated more price stability in the past are favored over those that have experienced greater fluctuations.

These types of approaches can be beneficial in dialing the level of equity risk in a portfolio up or down, and for that reason have an obvious appeal. But like any other investment approach, there are unknowns involved. For example, tactical over-or underweights to Beta are essentially market calls, with lower volatility being preferable in down markets and higher exposure to risk being desirable during markets rallies. As history shows, anticipating inflection point in the equity markets is virtually impossible.

As for employing these types of investments as long-term strategic allocations, other challenges remain. One example can be found in the relatively high valuations of many dividend-paying stocks today. This segment of the market has traditionally been viewed as defensive, and therefore less volatile than the market as a whole. And while that may continue to be true over long stretches of time, investors need to be way of how a passively constructed low Beta strategy invests. An overweight allocation to an overpriced sector is unlikely to produce the kind of results investors are looking for.

C – other strategies

Following the return-oriented strategy and risk-oriented strategy categories, Morningstar's final strategic Beta attribute group encompasses a variety of approaches, ranging from nontraditional commodity benchmarks to multi-asset indexes and equal-weighted strategies.

C – 1. Equal weighted, an example of other strategies

Incorporating perhaps the simplest of strategic Beta methodologies, an equal-weighted approach assigns a uniform weight to its constituent holdings without regard to price, underlying fundamentals, or anything else, no one security is emphasized more than another.

Its advocates argue that, by breaking the connection between price and position size, equal-weighted approaches avoid a structural overvalued security. Supporters of equal-weighted indexing also point out that, because the approach requires frequent rebalancing, there is a buy-low-and-sell-high discipline embedded in the methodology.

The drawbacks of equal-weighted strategies can include unintended factor concentrations, arbitrarily driven by the number of securities that happen to be listed under a particular sector, industry, or country. Moreover, in assigning the smallest stock the same position size as the largest stock, an equal-weighted portfolio's risk profile is radically different from the broader market. Another consideration for potential investors is that the frequent rebalancing needed to maintain an equally weighted portfolio drives up its transaction costs.

21 – Conclusion

An important assistance in organizing an investment portfolio is distinguishing between alpha and beta risks. The trends described earlier lead to an important new development. There is a hope to bring alpha and beta risks together in one common framework to be able to coordinate and direct all sources of risk and return in the portfolio.

Beta risk

Starting point for thinking about beta risk is a world in which investment markets are completely in equilibrium. All relevant information has been accounted for in the prices and everybody agrees on this. In this world is still a reward for investing. Investing in government bonds is rewarded with the corresponding market rate. Investing in credits comes with an additional reward because of the credit risk one takes and investing in equities is expected to be rewarded with a risk premium compared to bonds. In this equilibrium world all markets mentioned are priced such that the expected risk rewards will be included. These expected returns are beta returns, the returns that, at that moment, from the price for different

systematic risks in the world. The corresponding risks are beta risks. The expectations for the reward for these sources of risk may vary in the course of time, but even if everybody trades in them and believes in them they continue to exist. This is because there are suppliers of these risks who want to place them in the market against a reward. The government has to finance its debits; the entrepreneur has to finance his company. Because these suppliers exist, the supply of bets risk is in principle large.

Beta risks typically found in a widely diversified index. And this total return index will rise in the long term; the efficient frontier consists completely of beta risks.

One doesn't have to be smart or work hard to be rewarded for beta risk in the long term. The only thing to be done is to participate in the respective market. And that is simple. This is why beta risk is a commodity.

Alpha risk

An alpha is an extra return compared to the strategic benchmark. This can only be acquired by a temporary deviation from this benchmark. That can be one in many ways; tactical asset allocation, geographical asset-mix, equity selection, credit selection.

Deviating from the benchmark is only useful in a world that is temporarily or partly not in balance. By taking advantage of these disequilibria one buys what is undervalued and sells what is overvalued. This will restore the balance.

In the alpha world one winner means one loser; the total amount of available return is defined by the available return on the 'market value weighed' benchmark. So, if one person has taken an underweight position per definition someone else has a taken an overweight position. If one wins, the other loses.

Therefore, the world of alpha is a Darwinist one. Rational investors only play the alpha game if they think they have a competitive advantage to harvest alpha; you have to be smarter or work harder than others. Or you have to be able to operate cheaper. And if you are successful, in general others are quick to join the feast. With the result that every unbalanced situation is in principle temporary.

In a world that is reasonably efficient, like most investors assume, the supply of potential alpha isn't infinite. In addition, it is often expensive to harvest the available alpha; equity selection within small caps often has added value, but one has to work hard to discover this by visiting companies. Therefore, an important part of the gross alpha is lost on costs.

In contrast to beta, alpha is definitely not a commodity. Hard work and scarce talent is needed to harvest. This has to be paid for. For expected alpha a high price has to be paid.

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