

Measuring Alpha Based Performance. Implications for Alpha Focused, Structured Products.

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1. Introduction

Do you remember a time, not that long ago, when phones were simple, uniform, and well understood? Clearly, it's no longer straightforward to define what the term "phone" means. Consider a modern Blackberry, Treo, or iPhone. These devices are part computer, music player, camera, voice recorder, video player, *and* part phone. The phone — or what used to be considered a phone — is now commonly bundled with various other devices. The same state of confusion and path of evolution — from a standalone measure of return to a bundled measure of return — prevails in the investment idea known as alpha.

Ad-hoc definitions and disparate interpretations of alpha are wide-ranging and ubiquitous.² This has contributed to the current state of affairs in which even active investment professionals and their clients rarely specify (or ask) *exactly* what alpha is (and/or is not). It's not uncommon for a somewhat loose definition of alpha to be proposed, accepted, and then set aside as more operational and legal issues take precedent. However, with many products being marketed around the objective of "earning alpha" (e.g., Portable Alpha), it is critical to understand exactly what alpha is and is not. Perpetuating the confusion associated with alpha is likely to have an adverse effect on demand for structured investment products with an alpha focus.

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² For example, a document available at www.allaboutalpha.com lists 20 different definitions of what alpha is (gathered from diverse sources). Significant conflicts and diversions amongst the definitions exist.

2. Defining and Estimating Alpha

Our purposes will be well-served by defining alpha in its most general form early in our discussion.³ An asset's total return is comprised of its alpha-return component plus its beta-return component. Any discussion of alpha implies a discussion of beta. Therefore, in order to address the issue of "what is the return associated with alpha?", this paper will also pose the complementary question "what is the return associated with beta?" as the remaining return is, by definition, alpha.

The confusion surrounding alpha is twofold. First, there is confusion regarding what alpha means, even in as simple a depiction as the Capital Asset Pricing Model (CAPM). This probably stems from a lack of understanding regarding the assumptions used to derive the CAPM, its subsequent implications and predictions, and the empirical estimation of alpha and beta. This is an easy problem to address, and is not especially widespread. Second, and more to the point of this paper, there is a lack of understanding regarding the definition of "beta return." This is understandable, since the accepted definition of beta return has undergone significant changes in the last fifteen years. The focus of this paper is to chronicle the evolution of "beta return" since the advent of the CAPM. It is the opinion of the authors that an increased understanding of the evolution of beta will lead to increased demand for structured products that produce (properly-defined, and well-understood) alpha.

2.1 Estimation of Alpha:

Generally speaking, alpha (for asset i) is estimated empirically via a statistical linear regression as follows.

$$R_i - r_f = \alpha + \beta_1 \cdot (R_{F1} - r_f) + \beta_2 \cdot (R_{F2} - r_f) + \dots + \beta_k \cdot (R_{Fk} - r_f) + \varepsilon \quad [1]$$

where

R_i is a vector (column of data) representing the last T periods of returns for asset i. (A common choice is to set T equal to 60 months of data, although daily data is often used when focusing on 6-, 12-, or 18-month periods).

r_f is a vector of returns on the risk free asset (typically the short term T-Bill rate, or LIBOR) for the last T periods.

R_{Fk} is a vector of returns on factor-x for the last T periods. Depending upon the model of risk employed (CAPM or otherwise), there may be only one factor, or there may be several factors. Risk factors are thought to be systematic in nature. That is, it is assumed that virtually all assets are exposed to a relatively small number (= k) of common risks, and these are referred to as factors. Equation [1] is written in general form to include these k factors. The CAPM has only one factor, a maximally-diversified global portfolio of risky assets. Hence in the CAPM, the factor R_{F1} is typically written as R_{Mkt} . Most models post-dating the CAPM typically employ multiple risk factors.

³ This paper contains an attached appendix, in which commonly-used terminology is defined.

β_x is the beta (estimated statistically) associated with the return vector of factor-x. It measures how sensitive the assets' returns are to movements (returns) in factor-x. The CAPM models one beta, whereas for multi-factor models, there are multiple definitions of beta.⁴

ε is the residual vector, indicating deviations between the linear regression line (or response surface for multifactor models) and the actual returns of asset i. There are T ε 's estimated in each regression, and they have a mean of exactly zero.

α is the alpha of asset i for the period measured. It represents the return of asset i beyond what would be expected, given the asset's exposure to the risk factors. It is the "money shot" number in investment analysis. A positive value of α indicates that the asset or portfolio (and most importantly, the manager(s) of the portfolio) performed abnormally well based upon the risk exposure to the various systematic factors. Alpha is also referred to as abnormal return, and is interpreted as a direct measure of investment manager skill.

The return due to exposure to the various risk factors is also known as the beta component of the return. Rearranging equation [1] gives

$$R_i - (\alpha + \varepsilon) = r_f + \beta_1 \cdot (R_{F1} - r_f) + \beta_2 \cdot (R_{F2} - r_f) + \dots + \beta_k \cdot (R_{Fk} - r_f) \quad [2]$$

The right side of the expression is the beta return component. In this depiction ($\alpha + \varepsilon$) constitute the non-beta return component. Since the mean of ε is always exactly equal to zero the non-beta returns are therefore equal to α .

Equation [1] is a completely general form for the estimation of alpha. It employs several factors and their associated betas (up to k of them). That is, equation [1] provides estimates of α and $\beta_1, \beta_2, \dots, \beta_k$. For the CAPM (a one factor model), only α and β_1 are estimated. Regardless of the number of specified factors, the estimate of α is used as a measure of abnormal risk adjusted performance of the asset, portfolio, or manager(s).

3. Models of Risk and Expected Return — General Results

All modern models of risk relate risk to expected (different from realized) return. The key feature of these models is that all risk is viewed as belonging to one of two categories: either (i) systematic risk or (ii) non-systematic risk.⁵ Within these models, systematic risk is "rewarded" and non-systematic risk is not. By reward we mean an increase in expected return. Hence, an increase in systematic risk implies an increase in expected return, and an increase in non-systematic risk implies no increase in expected return. Said differently, the expected return for holding non-systematic risk is zero. Beyond these commonalities, models differ in what types of risks are considered to be systematic. Some models employ only one systematic risk factor (CAPM), while other models employ 2, 3, 4 or more.

⁴ Beta is *not* volatility relative to the market, as is so often claimed. It is a scaled measure of the correlation of returns between the asset and the factor(s). For the CAPM, the scaling factor is the ratio of volatility of asset i to the volatility of the market. That is, for the CAPM, $\beta_i = [\sigma_i / \sigma_{Mkt}] \cdot \text{correlation}(i, \text{Mkt})$.

⁵ Both systematic and non-systematic risk are commonly referred to using other terminology. Systematic risk is also known as beta risk, or factor risk. Non-systematic risk is also known as idiosyncratic risk, diversifiable risk, or asset specific risk.

No matter how many risk factors are specified, the interpretation of risk versus expected return is always the same. Specifically, an increase in systematic risk results in an increase in expected return, and non-systematic risk is expected to provide a return of zero. However, actual returns and expected returns are rarely equal after-the-fact.

Once the actual returns to the factors are known (from the historical period of measure, e.g. 60 months), it is possible to compute what the return on the asset *should have been*, given its exposure to the factors, as measured by the respective betas and the actual return performance of the factors. This is also a measure of what the asset would have earned in the period under study if non-systematic risk was not rewarded.⁶

Hence, if for the last 60 months, we have estimates of the k betas and the actual returns on the k factors, then the reward for systematic risk can be computed as:

$$\text{Actual beta return} = \overline{r_f} + \beta_1 \cdot (\overline{R_{F1}} - \overline{r_f}) + \beta_2 \cdot (\overline{R_{F2}} - \overline{r_f}) + \dots + \beta_k \cdot (\overline{R_{Fk}} - \overline{r_f}) \quad [3]$$

where the β 's are estimated via the linear regression of Equation [1], and are multiplied by the respective *means* of the actual factor returns above the risk free rate for the period of measure. The terms systematic return and beta return are synonymous.

For the non-systematic component, the *expected* return is zero, but the *actual* return is rarely zero. The actual return to non-systematic risk is, by definition, alpha. It is the primary measure of investment skill.⁷ It is computed as:

$$\text{Actual non-systematic return} = (\text{actual total return}) - (\text{actual beta return})$$

$$\alpha = (\text{actual total return}) - (\text{actual beta return})$$

Hence, alpha (the actual reward for holding non-systematic risk) is computed as:

$$\alpha = \overline{R_i} - [\overline{r_f} + \beta_1 \cdot (\overline{R_{F1}} - \overline{r_f}) + \beta_2 \cdot (\overline{R_{F2}} - \overline{r_f}) + \dots + \beta_k \cdot (\overline{R_{Fk}} - \overline{r_f})] \quad [4]$$

This computation is, for the purpose of obtaining alpha, equivalent to that of Equation [1]. All returns (including alpha) at this stage are measured in per period terms (say, per month) — and can be annualized later.

To summarize the empirical estimation process:

Step 1. Using historical data (say the 5 years of monthly returns of the asset under study, the risk free rate, and the specified factors), estimate the linear regression equation [1]. This provides estimates of alpha (per month) and k-estimates of beta.

⁶ It is especially important to subtract the risk free return in each period from both R_i and all factor returns. Failure to do so will result in a statistical bias in alpha equal to $r_f \cdot (1 - \sum \beta_k)$.

⁷ If an investor has no skill in individual asset selection, but is able to time the market, this ability will manifest itself as positive alpha.

If the sole purpose is to estimate alpha only, you can stop at this step.

Step 2. If you desire to compute the return on an asset or portfolio due solely to the risk exposures associated with the k factors (i.e. the beta component of return), then compute equation [3]. This is what you would expect the asset to have earned if non-systematic risk was not rewarded. The difference between the asset's total return and the beta component of the return will equal the value of alpha computed in step (1).

4. Specific Models of Risk and Return

The prior section outlined general issues associated with all models of risk and return. In this section we turn to the evolution of these models and discuss specific models. We will relate these specific models to the general statements made in the prior section.

Based on the pioneering work of Sharpe (1964), Litner (1965), and Mossin (1966), the Capital Asset Pricing Model (CAPM) our conceptualization of risk and return was changed forever. In any model of risk, CAPM or otherwise, total risk (defined as the variance of returns) is comprised of systematic risk plus non-systematic risk. In the CAPM, systematic risk is related to only one factor — the global market portfolio. Increases in an asset's exposure to this systematic risk, as measured by beta, are associated with increases in expected (different from actual) returns. Alternatively, increases in non-systematic risk are *not* associated with increases in expected return.

The CAPM is stated formally as:

$$E[R_i] = r_f + \beta \cdot (E[R_{Mkt}] - r_f) \quad [5]$$

Where $E[\cdot]$ implies an expected value.

If the CAPM is the model employed, then alpha and beta are estimated via a linear regression (per equation [1]) as follows:⁸

$$R_i - r_f = \alpha + \beta_1 \cdot (R_{Mkt} - r_f) + \varepsilon \quad [6]$$

If we have obtained an estimate of beta (via equation [6]) and we also have the actual returns for the market and the risk free rate (say, in the last 60 months) then the reward for systematic risk can be computed (per equation [3]) as:

$$Actual\ beta\ return = \overline{r_f} + \beta_1 \cdot \overline{(R_{Mkt} - r_f)} \quad [7]$$

Notice that equation [7] is essentially the empirical version of the CAPM [5]. This is not surprising since equation [7] measures actual return associated with market risk only, and the CAPM implies that only market risk should be rewarded.

⁸ Equation [6] is commonly known as the market model regression.

From the advent of the CAPM in 1964 to the mid-1970s, there was relatively little controversy regarding the CAPM. For the most part, statistical tests of the CAPM were supportive of the CAPM's prediction that non-systematic risk should not be rewarded, which is the same as saying that, on average, alpha was not statistically different from zero. The predominant view at the time was that markets were highly efficient, and hence it was quite unlikely for any individual to earn alpha consistently over time. Randomness or luck was the common explanation assigned to any organization or individual who demonstrated consistent ability to earn alpha over time.⁹

However, Sanjoy Basu published a paper in 1977 showing that, after controlling for systematic risk, low P/E stocks outperformed high P/E stocks. This finding ran contrary to the predictions of the CAPM. It now seemed possible that alpha could be earned consistently via skill, and not luck. Another anomaly appeared in 1981 when two doctoral students, Rolf Banz and Mark Reinganum, working independently at the University of Chicago, discovered that small capitalization stocks outperformed large capitalization stocks after controlling for their exposure to market risk factors.¹⁰ This, like Basu's P/E discovery, were anomalies — at least from the viewpoint of the CAPM.

In the decade to follow, much research was aimed at better understanding these two anomalies. It was a time of transition, but throughout this period, although the CAPM was repeatedly challenged, it was largely left unchanged.¹¹ That is, from 1964 to the early 1990s, systematic risk was considered to be based on only one factor, the market, while the P/E and market capitalization anomalies were largely viewed as puzzles yet to be solved.

In 1993 (more than ten years after the discoveries of Basu, Banz, and Reinganum) Eugene Fama and Ken French published a paper claiming to refute the one factor structure of the CAPM in favor of a three factor structure of systematic risk. The new factors (in addition to the market) were a value factor (similar in spirit to P/E, but based instead on the ratio of the accounting-based book value of equity per share to the stock market price per share)¹² and a size (market capitalization) factor. The new model came to be known as the Fama-French Three-Factor Model.

Initially the inclusion of these two additional factors was controversial, but with time and a large amount of scrutinizing research, the academic and practitioner community accepted the legitimacy of the two new factors.

Expressed in expectation form, the Fama-French Three Factor model is

$$E[R_i] = r_f + \beta_1 \cdot (E[R_{Mkt}] - r_f) + \beta_2 \cdot (E[R_{SMB}]) + \beta_3 \cdot (E[R_{HML}]) \quad [8]$$

⁹ As a very simple example, if 1024 people flip a coin once a year, (and flipping heads is associated with earning positive alpha), then after ten years you would expect one person to have flipped heads ten times in a row. If only one person in a thousand beats the market ten years in a row, then this is supportive of luck, not skill. This one in a thousand ratio is similar to the performance of mutual fund managers. (Peter Lynch's Magellan fund earned positive alpha in 11 of 13 years).

¹⁰ The finding has since come to be known as the size effect.

¹¹ During this period, Eugene Fama commented "It takes a model to beat a model".

¹² The ratio is commonly referred to as the book to market ratio.

where R_{SMB} is the return to a portfolio of small cap stocks minus the return to a portfolio of big cap stocks (Small Minus Big), and R_{HML} is the return to a portfolio of high book to market stocks minus low book to market stocks (High Minus Low).¹³

The Fama-French alpha and its three betas are empirically estimated via a linear regression as¹⁴

$$R_i - r_f = \alpha + \beta_1 \cdot (R_{Mkt} - r_f) + \beta_2 \cdot (R_{SMB}) + \beta_3 \cdot (R_{HML}) + \varepsilon \quad [9]$$

As the one-factor CAPM declined from favor and the Fama-French Three Factor Model gained acceptance, the definition of systematic risk also changed. This spawned an evolution in the definition of assets' expected returns — and alpha. As the way we conceptualize assets' expected returns evolved, so too has the way we define alpha changed. The three factor model of Fama and French is the most widely-accepted definition of systematic risk in use today.¹⁵

5. Bias in Alpha Estimations

Next consider the measurement of alpha under both the CAPM and the Fama-French structures. Following equation [4], under the CAPM, alpha is estimated as

$$\alpha^{CAPM} = \bar{R}_i - [\bar{r}_f + \beta_1^{CAPM} \cdot \overline{(R_{Mkt} - r_f)}] \quad [10]$$

whereas under the Fama-French Three Factor model, alpha is estimated via equation [9] as

$$\alpha^{FF3} = \bar{R}_i - [\bar{r}_f + \beta_1^{FF3} \cdot \overline{(R_{Mkt} - r_f)} + \beta_2^{FF3} \cdot \overline{(R_{SMB})} + \beta_3^{FF3} \cdot \overline{(R_{HML})}] \quad [11]$$

If there are truly three systematic risk factors that drive returns, but the measurement of alpha is conducted assuming the one-factor CAPM, then there is a bias inherent in the estimation of alpha. The bias is equal to:

$$\begin{aligned} \text{Alpha Bias} &= \text{False Alpha} - \text{True Alpha} = \alpha^{CAPM} - \alpha^{FF3} \\ \text{Alpha Bias} &= (\beta_1^{FF3} - \beta_1^{CAPM}) \cdot \overline{(R_{Mkt} - r_f)} + \beta_2^{FF3} \cdot \overline{(R_{SMB})} + \beta_3^{FF3} \cdot \overline{(R_{HML})} \end{aligned} \quad [12]$$

¹³ There is no risk free rate subtracted from the SMB or HML portfolios because the factor returns are constructed from the difference between two portfolios (each with a risk free rate subtracted) and in the differencing process, the risk free rates cancel out.

¹⁴ Historic returns for all three factors are available at Ken French's web site: <http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/index.html>

¹⁵ In 1997, Mark Carhart published a paper implying that a fourth factor (price momentum) should be considered as a factor. This model, known as the Fama-French, Carhart Four Factor model, remains somewhat controversial. The focus of this paper is limited to the Fama French Three Factor model. Risk consulting firms such as Barra and Axioma employ numerous risk factors (including SMB, HML, and momentum). The additional risk factors are employed not necessarily for their systematic characteristics, but rather because some industries are exposed to specific risks, and asset managers are interested in measuring these risks.

Note that the direction of the bias can be positive or negative. For small-cap stocks, a CAPM-based alpha will likely have a positive bias (the CAPM alpha will be too large), whereas for large-cap stocks, the bias will tend to be negative. For value stocks (high book to market ratio) the CAPM alpha will likely have a positive bias, whereas for growth stocks (low book to market ratios) the bias will tend to be negative. Smaller value stocks will be especially susceptible to positive bias, while larger growth stocks will be especially susceptible to negative bias.

Intuitively, the CAPM alpha bias arises from beta (systematic) returns being falsely assigned to (or denied from) CAPM alpha. This phenomenon (of incorrectly measuring beta returns, and hence incorrectly measuring alpha returns) is sometimes referred to as "dirty alpha", or "alpha contamination." In short, this alpha contamination distorts the true measure of a manager's skill.

For example, if an *unskilled* asset manager tilts his/her assets toward small market cap value stocks, they will register as a skilled manager if their performance is measured against the CAPM — remember, their CAPM-based alpha would be positively biased. More accurately, their Fama-French alpha would be insignificantly different from zero, indicating a lack of skill (no significant positive or negative performance). In this scenario, benchmarking a manager's performance via the CAPM makes an unskilled manager appear skillful.

6. The Cost of Obtaining Alpha and Beta Returns

Alpha (properly measured) is in low supply and in high demand. It therefore follows that the price associated with obtaining alpha is relatively high. Alternatively, systematic returns associated with each of the three Fama French factors are easy and relatively cheap to obtain. Stock index futures, total return swaps (TRSs) and exchange-traded funds (ETFs) are traded on numerous market indices in highly-liquid markets, making access to the market factor easy to obtain at low cost. Exposure to the small minus big (SMB) market cap factor can be synthetically created by taking a long position in the Russell 2000 and a short position in the Russell 1000, as futures, TRSs and ETFs are available on both of these indices. Exposure to the high minus low (HML) book to market factor (value versus growth) can be obtained via taking a long position in the Russell 1000 Value index and a short position in the Russell 1000 Growth index. These indices also trade in the form of futures, TRSs and ETFs.

With access to systematic (beta) returns being relatively easy to obtain at low cost, there is no reason to pay anything but the most nominal of fees for exposure to the beta component of returns. Alternatively, paying a relatively large fee for access to alpha-based returns makes sense (provided the fee is less than the alpha). With a two-tier pricing structure between alpha and beta returns, a contaminated alpha (with a potentially unknown direction of bias) is likely to be mispriced compared to what an investor can obtain their own.¹⁶ This potential mispricing is not in the best interest of the money management industry (at least overall), as it is likely to reduce (total) investor demand for any product purporting to supply alpha (especially when the alpha is measured against the CAPM). In short, demand for alpha-

¹⁶ In the context of the phone analogy, a CAPM-based alpha is an assorted bundle of different returns with widely-differing inherent values. It's comprised of the high value (Fama-French based) alpha and low value HML and SMB beta returns.

focused structured products, such as Portable Alpha, with alpha measured against Fama-French factors, will almost certainly exceed that of products where alpha is measured against the CAPM.

7. Application to Benchmarked Portfolios

There are many funds and investment products that — for various reasons — are benchmarked against a specific index. For example, a long-only equity manager may be judged on whether they outperform the Russell 3000, an active extension (i.e. 130/30) manager may be compared against the performance of the Standard and Poor's 500, and a hedge fund manager, choosing to invest via more exotic strategies, may select (possibly with an intent to "game" his performance) a specific benchmark for comparison. If a fund has a mandate (imposed by upper management, investors, or self imposed by the actual asset managers) to benchmark itself against, say, the Standard and Poor's 500, then what measure of the market should be employed in the estimation of alpha in equation [9]? The S&P 500, or the broad market comprised of all available assets?

From the investor's point of view (contemplating investment in a benchmarking fund) the proper market measure for performance assessment is the universe of all assets available *to the investor*. However, from the viewpoint of assessing the skill of the manager of the portfolio (constrained to invest only in assets contained in the benchmark) the measure of the market in equation [9] should be assets available *to the manager* - that is, the benchmark.¹⁷ Hence, the choice of the definition of the market return factor used in equation [9] depends upon whose perspective the assessment is being made from: the manager's or the investor's. For *assessment from the investor's view* (assuming they have broad latitude in the types of assets they can invest in), then equation [9] should employ the broadly defined market return, no matter what the benchmark constraints are on a fund under consideration. For *assessment of manager skill*, equation [9] should employ the benchmark.¹⁸

8. Extending Portable Alpha Measures of Performance

Typically, products with a formally assigned benchmark - often referred to as relative return products, are judged on the basis of a scaled version of alpha, commonly known as the information ratio. The information ratio is defined as the estimated alpha divided by the tracking error.¹⁹ Tracking error (TE) can be computed in various (and equivalent) ways. For

¹⁷ For a manager who is benchmarked to an index, but has latitude to invest outside the index, then for the purpose of measuring the skill of the manager, the measure of the market return in equation [9] should be expanded beyond that of the index to reflect the set of all assets from which they *could* choose.

¹⁸ It could be argued that for purposes of measuring manager skill, only one factor should be employed - the index (i.e. use equation [6] with the market defined as the index). However, consider a manager benchmarked to the S&P 500 who tilts the portfolio toward small cap value stocks. The manager will likely earn positive alpha via (CAPM style) equation [6], and zero alpha via (Fama-French style) equation [9]. The alpha of equation [6] is spurious because (i) the manager tilted their holdings toward systematic risk, and (ii) equation [6] is mis-specified from a systematic risk perspective. This contaminates the alpha measure of equation [6], by moving systematic (beta) return (mis-specified in equation [6]) into the alpha return measure. Since the Fama-French measure of alpha was zero, the manager demonstrated no skill in employing this tilt.

¹⁹ See Grinold (1989).

our purposes, in order to keep the focus on equation [9], we compute tracking error as the volatility (standard deviation) of the residual ϵ 's in equation [9]. That is

$$\text{Information Ratio} = \alpha / \text{TE} = \alpha / \sigma_{\epsilon} \quad [13]$$

The volatility of the residuals in equation [9] is a measure of idiosyncratic (non-systematic) risk.²⁰ Since alpha measures the return earned for taking on idiosyncratic risk, *the information ratio measures of the amount of idiosyncratic return earned per unit of idiosyncratic risk exposure*. For this reason, the information ratio is often interpreted as a measure of investment efficiency.

Products that lack a direct link to a specific benchmark are referred to as absolute return products. Portable Alpha products are one such example, since they can draw their alpha from virtually any set of assets. Due to the lack of a formal benchmark, measuring the performance of these products via the information ratio is potentially problematic. Instead, performance measures for absolute return products are typically focused on metrics such as alpha, value at risk, the Sharpe Ratio and others. An inability to use the information ratio as a performance measure of absolute return products is unfortunate, as it provides an insightful measure of investment performance.

However, relative return products, like absolute return products, *can* be analyzed with the information ratio. In this case, the (implicit) benchmark is the universe of assets available to an investor. Using this definition for a benchmark, the computation of the information ratio for an absolute return product follows directly from equations [9] and [13]. The traditional avoidance of the information ratio as a performance measure of Portable Alpha and other absolute return products is unfortunate, since just as with relative return products, the information ratio provides an insightful measure of investment performance.

Further support for the legitimate use of the information ratio as a valid measure of performance for Portable Alpha products can be seen in the construction of tests for the statistical significance of alpha. When testing if the estimated alpha of a Portable Alpha product is significantly different from zero, both alpha and σ_{ϵ} (typically obtained using a broad measure of the market - not a subset index) are used in constructing the test statistic.²¹ In this process, standard statistical tests divide alpha by a scaled measure of σ_{ϵ} in order to determine if alpha is significant. Similarly, the information ratio divides alpha by σ_{ϵ} in order to gage investment efficiency. Therefore it seems irrational to avoid the use of the information ratio when analyzing absolute return products such as Portable Alpha.

All investors in either absolute or relative return products benefit from access to consistently measured return metrics.²² For relative return products, although the focus is usually on the information ratio, it is typically measured from the perspective of the manager rather than the investor (by using the manager's universe as the measure of the market instead of the

²⁰ Technically, idiosyncratic (non-systematic) risk equals the variance of the ϵ 's (i.e. σ_{ϵ}^2). Therefore, tracking error ($= \sigma_{\epsilon}$) measures the square root of idiosyncratic risk.

²¹ The t-statistic for this test is constructed by dividing alpha by its standard error. The standard error of alpha is computed from the excess returns of the factors, and a (degrees of freedom corrected) measure of tracking error (σ_{ϵ}) in a simple matrix algebra computation.

²² For instance, in November 2007 Standard & Poor's announced it would begin publishing a 130/30 Strategy Index with the explicit intention of making it easier to benchmark manager performance.

investor's accessible universe of investable assets). For absolute return products, the focus is rarely, if ever, on the information ratio. This situation of a biased information ratio in one hand, and no measure at all in the other, creates a difficult environment for an investor seeking to make well-informed decisions. By measuring each of these products with a consistently-measured, investor-focused information ratio, direct comparisons between the two products would be possible, and aggregate demand for professional money management services would likely increase.

9. Conclusions

Recently, Portable Alpha, an alpha-focused absolute return product with tremendous potential, has met with somewhat muted demand. There are several reasons for the lack of robust demand including complexity of implementation, various legal issues, the ability to identify consistent alpha generating sources, and competing products such as active extension (e.g., 130/30) products. Beyond these commonly-mentioned reasons, skepticism, a general lack of understanding, and overt confusion have also contributed to the ambiguous demand for Portable Alpha products. Much of the confusion arises from a lack of clear consensus regarding a strict definition of alpha. Inquiries are too often met with off the cuff, vague, and inconsistent explanations. Obviously, this diminishes demand for all alpha-focused products, with Portable Alpha products possibly affected more than others.

One partial remedy, but probably a necessary one, is to improve the clarity of exactly what alpha is, why it is best measured against three sources of systematic risk rather than one, and why, when properly measured, it is worth paying for. These ideas should be broadly disseminated. Specifically, investors and other interested parties should be educated to understand that

- (i) there is overwhelming evidence that asset returns are driven by two (or more) systematic factors beyond those expressed in the CAPM,
- (ii) returns associated with systematic factors are easy and cheap to obtain in liquid markets;
- (iii) because of the misrepresentation of systematic risk in the CAPM, measures of alpha obtained from the CAPM are mis-measured (biased) via the false assignment of systematic (beta) returns to alpha;
- (iv) a Fama-French-based alpha corrects for this bias (by measuring only returns based on skill in asset selection and/or market timing), and
- (v) since the Fama-French alpha measure does not contain low-value systematic (beta) returns, the Fama-French alpha is composed *entirely* of high value non-systematic returns, and is therefore worth purchasing as a portfolio enhancement.

Relative return products such as active portfolio extensions (130/30 funds) pose an additional challenge for Portable Alpha, as they serve as substitute goods. Direct comparisons between Portable Alpha and active extension products have traditionally been difficult to obtain, in large part due to asymmetric performance methodologies in which the information ratio is only computed for active extension products. This makes comparison of absolute and relative return products challenging for the investor. Another unfortunate asymmetry occurs because the information ratio has only been employed from the viewpoint of assessing fund manager

skill, and not from the viewpoint of assessing portfolio enhancement to the investor. Reconciling these performance measurement issues, and moving to a common assessment methodology in which both absolute and relative return products are assessed via an *investor focused* information ratio would do much to improve investor demand for both products.

If investors are educated to understand that Fama-French factors properly measure alpha, and that the information ratio (when measured from the investor's perspective) provides a method for direct comparison of absolute and relative return products, then the current state of confusion surrounding alpha and interpretation of investment performance metrics will likely attenuate, leading to an improved understanding and acceptance of alpha-focused products. The result will likely be a significant increase in collective demand for all professionally managed alpha-focused products.

References:

Banz, R. 1981. The Relationship Between Return and Market Value of Common Stock. *Journal of Financial Economics* 9: 3-18.

Basu, S. 1977 Investment performance of common stocks in relation top their price earnings ratios: A test of market efficiency, *Journal of Finance* 32, June, 663-682.

Fama, Eugene F. and Kenneth R. French, 1993, "Common Risk Factors in the Returns on Stocks and Bonds," *Journal of Financial Economics* 33 (1), 3-56.

Grinold, Richard. (1989) The Fundamental Law of Asset Management. *Journal of Portfolio Management*. (Spring) 30:37.

Lintner, John. 1965. "The Valuation of Risk Assets and the Selection of Risky Investments in Stock Portfolios and Capital Budgets." *Review of Economics and Statistics*. 47:1, 13-37.

Mossin, Jan. 1966, "Equilibrium in a Capital Asset Market", *Econometrica*, 34, 768-783.

Reinganum, Marc R. 1981, "Abnormal Returns in Small Firm Portfolios." *Financial Analysts Journal*, 37 pp. 52-56, 71.

Sharpe, William F. 1964. "Capital Asset Prices: A Theory of Market Equilibrium under Conditions of Risk". *Journal of Finance*. 19:3, pp. 425-442.

Terminology Appendix

130/30 Portfolio - a portfolio constructed by shorting 30% of total assets and going long 130% of total assets. The proceeds from the short sale are fully employed in the long position, effectively employing 160% of total assets.

Abnormal Return – another term for alpha. See definition for Alpha. Not to be confused with excess returns.

Alpha – the return associated with an asset for exposure to non-systematic (idiosyncratic) risks. Alpha equals: [the asset's total return] minus [the return associated with common risk factors plus the risk free return]. Also known as abnormal return. Alpha is a measure of whether or not an asset beat the market on a risk adjusted basis.

Active Extension Portfolio - a portfolio in which the proceeds from shorting are used to invest additional wealth in long positions. See 130/30 Portfolio for an example with a 30% short position.

Asset Specific Risk - another term for non-systematic risk.

Beating the Market - to earn a positive alpha. Properly measured, it adjusts for systematic risk, and hence the phrase commonly heard is “to beat the market *on a risk adjusted basis*.”

Beta – a statistical coefficient, estimated via linear regression, that describes how a particular asset's returns are influenced by the returns associated with a systematic risk factor. Contrary to popular belief, beta is *not* a measure of volatility relative to the market (see footnote 4).

Beta Risk – another term for systematic risk.

Diversifiable Risk - another term for non-systematic risk.

Excess Returns – returns measured above the risk free rate, not to be confused with abnormal returns (alpha).

Factor – a systematic variable that has been theorized to be associated (either directly, or as a proxy for other more difficult to measure variables) with economy wide risks that virtually every asset is exposed to.

Factor Risk – another term for systematic risk, or beta risk. Referred to as market risk in the CAPM. See systematic risk.

Idiosyncratic Return - the reward (return) for taking on idiosyncratic risk, as measured by alpha.

Idiosyncratic Risk – another term for non-systematic risk.

Information Ratio - a performance metric measuring the amount of idiosyncratic return earned per unit of tracking error exposure. Commonly interpreted as idiosyncratic return per unit of idiosyncratic risk exposure, and hence considered a measure of investment efficiency. (Tracking error (TE) is a measure of idiosyncratic risk). Computed as: Info. Ratio = α / TE = $\alpha / \sigma_{\epsilon}$.

Market Risk – another term for systematic risk tied to the market factor. Commonly used when the risk model employed is the CAPM.

Non-Systematic Risk – the portion of total risk that is not related to systematic risk. Also known as diversifiable risk, idiosyncratic risk, asset specific risk. It equals the variance of the residuals estimated in equation [1].

Portable Alpha - a structured product in which an "alpha engine" (often a hedge fund with low systematic returns) is used to produce alpha. The alpha engine is then combined with (ported to) another asset possessing solely systematic returns (often a futures contract, or a total return swap) forming a two asset portfolio. The portfolio is structured so that systematic returns associated with the alpha engine are supplemented by the systematic returns of the futures or swap. The result is a product that earns both systematic (beta) returns and non-systematic (alpha) returns.

Return – the internal rate of return (IRR) on an asset over a period of time. For stocks this requires information on price changes, dividend payments, and stock splits.

Risk Free Rate – typically taken to be the rate of return on a short term government bond, or LIBOR.

Systematic Risk – broad based (economy wide) risks that affect virtually every asset. In the CAPM there is only one such risk (the broad market). Other models of risk have more than one systematic risk component. Also known as beta risk, and factor risk, and within the context of the CAPM, market risk. Systematic risk plus non-systematic risk equals total risk.

Total Risk – the variance of an asset's returns, often symbolized as σ_i^2 . Total risk equals systematic risk plus non-systematic risk.

Tracking error - the standard deviation of the epsilons in equation [1]. It is the square root of idiosyncratic (non-systematic) risk.

Variance - a measure of dispersion, symbolized as σ^2 . When applied to returns, it is defined to be the total risk of an asset. That is, the total risk of asset $i = \sigma_i^2$.

Volatility – a measure of dispersion, symbolized as σ . Also known as standard deviation (the square root of variance). When applied to returns it is considered a measure of total risk. Technically, when applied to returns it is the square root of total risk. When applied to the regression residuals, it measures tracking error.