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SEPARATING ALPHA AND BETA | AUGUST 2010

WHY FOCUSING ON ALPHA ISN'T AS SIMPLE AS IT SEEMS

IDEAS ON THE SEPARATION, TRANSPORT, AND MANAGEMENT OF AGGREGATE PORTFOLIO ALPHA AND BETA

There is no question the financial crisis of 2007-2009 has accelerated change in the asset management industry.¹ In the experience and minds of many market participants, the crisis revealed a failure or flaw in financial engineering in general and the concept of portable alpha in particular. The purpose of this note is to examine the philosophy and practice of separating alpha and beta. As with many issues on which people seem adamantly at odds with strongly divergent opinions, it may help to clarify what portable alpha is and what it is not. It may also help to clarify who is making decisions about portable alpha and to what end. Ultimately, we should ask, do we even pursue this investment strategy at all?

WHAT IS PORTABLE ALPHA?

The basic idea of portable alpha is to extract the alpha from an active strategy and drop it onto a passive exposure deemed to be more consistent with the risk appetite of the investor. To do this, one must construct a set of trades which effectively reduce the systematic

risks of an actively managed portfolio to zero. A second set of trades add other presumed to be more desirable systematic risks. The first set of trades *separate* any available extra market performance or alpha from associated systematic risks. Once the alpha has been *separated*, it can be *transported* to another portfolio whose systematic risks are different. In short, one can have the active performance and active risk of one portfolio with the systematic risks of another portfolio.

Although the historical path to thinking about separating alpha and beta, and indeed even the terms themselves, have flowed from the Capital Asset Pricing Model (CAPM), the necessary conditions for alpha-beta separation are considerably weaker.² This is an important point because a discussion about alpha-beta separation can get caught up in acceptance or rejection of the CAPM as a positive model of stock prices.³ Indeed in the forgoing, the term “systematic risks” was used rather than “beta” to help make this point. Let’s take an

¹ The National Bureau of Economic Research has not finalized the end date for the Great Recession of 2007. On April 8, 2010, the Business Cycle Dating Committee determined that “although most indicators have turned up, ... the determination of the trough date on the basis of current data would be premature.” <http://www.nber.org/cycles/april2010.html>

² Sharpe, William F. (1964). “Capital asset prices: A theory of market equilibrium under conditions of risk”, *Journal of Finance*, 19 (3), 425-442. 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, 4, 768-783.

³ This distinction between positive and normative models is meant in Friedman’s sense: Friedman, Milton. (1966). “Essays in Positive Economics: Part I - The Methodology of Positive Economics” In *Essays In Positive Economics* (Chicago: Univ. of Chicago Press, 1953): 3-43.

absurdly simple example to illustrate the idea of alpha separation from an underlying portfolio.

Let's suppose an active manager is buying and selling US Treasuries. The active manager believes it has acquired superior information on Treasuries and selectively bets on particular issues through a *physical portfolio* of Treasury issues. But, the manager also believes it has no particular skill calling the direction of rates, changes in the slope of the yield curve, or changes in the convexity of the yield curve.⁴ As a consequence, the manager tries hard to match the holdings of the broad market in maturity and coupon as well as in exposure to the three factors mentioned above. Let's suppose, for all practical purposes, the physical portfolio shows the same volatility patterns as the broad Treasury market. But, it earns just a few ticks more than the broad market everyday by virtue of the superior information. Without loss of generality or reliance on the CAPM, we can call this small extra-market performance the *alpha* of the portfolio.

If there are a set of forward or futures contracts on US Treasuries (which in this case there are), they could be used to create a *synthetic portfolio* which produces the same returns as owning the broad Treasury market. Let's suppose that works well enough for all practical purposes.⁵ Our suppositions at this point aren't especially heroic. We're assuming only that there's a physical portfolio on which we might be able to earn extra-market returns and that the salient characteristics of that portfolio can be matched at a practically acceptable level by another (synthetic) portfolio which can be shorted.

One need not have any particular model of market equilibrium or theory of capital markets in mind for this to work. Clearly, in this case, the active manager could hold the physical portfolio long while shorting a synthetic portfolio of forward or futures contracts to neutralize it's exposure to interest rate shift, twist, and convexity. The result would be a pure stream of alpha that would vary based on the time-varying superiority of the active manager's special information. In short, the alpha was *separated* from the underlying active portfolio of Treasuries.

This pedantry reveals three simple truths about alpha separation. First, there is no alpha to separate unless an active management process can consistently produce it. This may seem obvious but alpha transportation is as much about (and perhaps more about) the selection of a successful active strategy as it is about neutralizing systematic risk. Active processes are inherently volatile and notoriously hard to identify *ex ante*. While active process risk can be diversified, it can't be eliminated without eliminating the alpha.

Second, separating the alpha from any active management process relies on a practically acceptable matching of volatilities through synthetic portfolios. How close a matching of volatilities is possible in any situation may vary. How close a matching of volatilities is required may depend on the circumstances and intended tactical or strategic goal of the investor. This matching of volatilities must occur both against the active portfolio generating the alpha and against the new target exposure to which the alpha will be transported.

And third, a breakdown in either the active manager's process or the matching of volatilities will cause a breakdown in the whole separation and transportation strategy. In short, trying to separate alpha from any portfolio introduces a new set of risks that volatility is poorly or even perversely matched. Thus, an alpha transportation strategy also adds additional risk and can obviously be riskier in the aggregate than a simple active long investment.

THE BIG IF

Alpha separation, or alpha capture as it is sometimes called, depends on the ability to form volatility or return mimicking portfolios at a practically acceptable level. *If* an active manager's process is narrowly confined to an easily identifiable domain of securities and *if* there is a sufficient breadth of derivative instruments available, alpha separation may be as simple as shorting a futures contract or a basket of futures against the physical portfolio. *If not*, alpha separation may require taking less

⁴ Or out to as many moments as one likes or using whatever model one believes best represents interest rate movements.

⁵ This seems simple but gets to the heart of the matter. The real issue is whether the market is complete and the state space can be spanned so that the portfolio position can be replicated. A full discussion of this issue is far outside the scope of this paper. See for example: Ross, Stephen A. (1976) "Options and Efficiency". *The Quarterly Journal of Economics*, 90, 1: 75-89. Or, Baptista, Alexandre M. (2005). "Options and Efficiency in Multidate Security Markets", *Mathematical Finance*, 15, 4: 569-587.

sure bets on the ability to match returns. Understanding the nature of those bets is crucial to understanding whether the results of an alpha separation strategy are likely to be acceptable.

The systematic risks of complex active strategies may not be easily mimicked by simple futures baskets. For example, a complex active small stock strategy may not have the same fundamental systematic risks as the Russell 2000. In attempting to separate alpha from the small stock strategy, one is faced with a choice – to live with systematic risk differences between the strategy and the Russell 2000 or to attempt to more closely match the strategy with a more complex set of derivatives based on a particular returns generating model.⁶ Choosing the more complex hedging route brings with it a whole new set of risks. One's success may turn on whether the returns generating model and the derivatives pricing models are robust enough to capture the ensuing market environments. If the target portfolio for the separated alpha is also complex, porting the alpha may create yet another set of model-related risks.⁷

In mathematical principle, this is all simple. One can suppose and estimate a returns generating (factor) model that describes the set of return possibilities of all relevant assets including the active portfolio. Given those (factor) risks, the risks of likely derivatives used in the separation and transportation of the alpha can be priced by arbitrage models. Mimicking the active portfolio's risks is a familiar optimization problem given the factor exposures of the active portfolio and the synthetic instruments. The past success of the returns generating models and the arbitrage models can be measured and extrapolated forward. This gives a sense of likely variation and error in the separation process *assuming historical relationships stay intact*. And, therein lies another problem.

THE PROBLEM WITH COMPLEXITY

Over time, the capital markets seem to have evolved in response to new information but perhaps without a very long memory. The markets seem to have exhibited both complexity,^{8,9} and chaos.¹⁰ In a sense, it should be inevitable that we have problems trying to model capital market prices and returns. The world has grown and changed in both complexity and diversity. The markets themselves are the result of human interactions. And, it is impossible for market participants or regulators to control every situation with which they are faced. Market participants may adapt to changing circumstances but may do so with simple heuristics which aren't necessarily value maximizing.¹¹

In the face of a dynamically changing environment coupled with human behavior, the assumption of constant historical relationships should be viewed with some skepticism. And the more complex our pricing models are, the more we should be skeptical that we understand how they will fail. While we might be willing to extrapolate historical risk relationships through tomorrow's close, we should be less sanguine about extrapolating them for a year. Moreover, the models themselves may have a tendency to break down because there are limits to arbitrage.¹²

The forgoing shouldn't be taken as a nihilistic or Luddite rejection of modeling, return prediction, forecasting, modern risk management or active management. Rather, it is an open-eyed warning that complexity opens the door for mistakes and outcomes that were never anticipated. Even the use of simple derivatives carry with them extra risks which may not be fully anticipated. Prior to the Great Recession of 2007, few would have thought that venerable institutions such as Bear Stearns and Lehman Brothers could have failed or

6. Or, one could choose a dynamic replication strategy of physicals to match the systematic risks. Dynamic replication has its own risks. See for example: Derman, Emanuel and Nassim Nicholas Taleb, (2005) "The illusions of dynamic replication" *Quantitative Finance*, 5, 4: 323–326.

7. See for example, Knight, Will. (2008), "Quantifying the Meltdown: The complexity of quantitative analysis is accelerating financial turmoil", *Technology Review*, Thursday, September 18, <http://www.technologyreview.com/blog/editors/22132/>. Or, Urstadt, Bryant (2007). "The Blow-Up", *Technology Review*, November/December <http://www.technologyreview.com/business/19529/>.

8. "Complexity is characterized by: a) a large number of similar but independent elements or agents; b) persistent movement and responses by these elements to other agents; c) adaptiveness so that the system adjusts to new situations to ensure survival; d) self-organization, in which order in the system forms spontaneously; e) local rules that apply to each agent; and f) progression in complexity so that over time the system becomes larger and more sophisticated." Vicente Valle. (2000). *Chaos, Complexity, and Deterrence*. National War College manuscript.

9. "A complex system is one in which numerous independent elements continuously interact and spontaneously organize and reorganize themselves into more and more elaborate structures over time." Garnett P. Williams. (1997) *Chaos Theory Tamed*, Joseph Henry Press: Washington, D.C..

10. "Chaos theory is the qualitative study of unstable aperiodic behavior in deterministic nonlinear dynamical systems." Stephen Kellert. (1993) *In the Wake of Chaos: Unpredictable Order in Dynamical Systems*, University of Chicago Press.

11. Andrew Lo. (2004). "The Adaptive Markets Hypothesis: Market Efficiency from an Evolutionary Perspective", *Journal of Portfolio Management* 30: 15-29.

12. For example see, Gabaix, Xavier, Arvind Krishnamurthy and Olivier Vigneron. (2007). "Limits of Arbitrage: Theory and Evidence from the Mortgage Backed Securities Market". *Journal of Finance*. 62, 2: 557-595.

that AIG would require a massive federal bail-out. Prior to 2007, those institutions' participation in any over-the-counter market was believed to be safe for their counterparties. Few market participants in 2004 would have ex-ante warned about Lehman defaulting on its paper.

This suggests that any alpha separation and transportation strategy is inherently more risky, in terms of alpha delivery, than a simple long investment in an active strategy. The more complex the separation and transportation strategy, the more likely it is that small and unforeseen changes may dramatically affect the success of the strategy. Consistent with chaos and complexity theory, one may experience completely acceptable performance for long periods until an unusual confluence of conditions cause the strategy to fail.¹³

Moreover, any alpha separation strategy itself is not consistent with market clearing and may be divergent with respect to market equilibrium. Obviously, in order for markets to clear, all assets have to be held. In portable alpha strategies, investors hold more of some physical assets and less of others than would otherwise be consistent with market clearing. They then place side bets either through organized futures markets or OTC markets to mitigate their risks.

At the micro level, it is sensible to believe one's actions do not move market prices. But when many are starting portable alpha strategies and it seems everyone is talking about it, does there not seem to be an inconsistency between micro behavior and macro consequences? In fact, we've seen the consequences of ignoring the macro impacts of apparent hedging activity before with portfolio insurance in 1987.¹⁴ And in the recent market meltdown, it appears some of the consequences can be ascribed to a repetition of that style of behavior. When it seems every pension plan in the world is raising their allocation to alternatives and private equity, we shouldn't be surprised when we see failures and poor market performance in those parts of the market. Deploying those raised allocations through

portable alpha seems like raising the stakes even further. Users should proceed eyes-wide-open in their use of alpha separation and transportation.

THE BIGGER WHO

The "big if" in pursuing an alpha separation strategy is whether or not alpha can be produced and be practically replicated by a synthetic portfolio. In many simple cases, this is likely to be the case. In many cases, the mismatch risks will seem acceptable. For some other active strategies, the synthetic portfolio will either be a gross approximation or a guess. For example, trying to separate private equity alpha from its underlying market exposure and porting it to a bond portfolio might be seen as both technically challenging and extreme.

Portable alpha strategies have been sold into the institutional asset management market for several years. The buyers are mainly pension funds, both public and private, as well as foundation and endowments. The funds' rationale for porting alpha is that a set of active strategies may have superior returns but it would be too risky to have the asset allocation implied by long investments in those strategies. Consequently, the physical investment is made in the presumed high alpha strategies. Their effective asset allocation is modified by a synthetic portfolio to be in congruence with a strategic asset allocation deemed reasonable.

The bigger question is: who should be engaging in a portable alpha strategy? Paraphrasing and quoting Ian Malcolm, the mathematician in the film *Jurassic Park*, financial engineers and plan sponsors have been so preoccupied with whether or not they could port alpha, "they didn't stop to think if they should."¹⁵ It's an important question with perhaps a surprising answer.

Stretching back over nearly eighty years, financial economics has bifurcated along two related but distinct lines – corporate finance decisions and individual consumption-investment choices. Individuals choose between consumption and investment on the basis of

¹³ This is one of the key points made by Lowenstein in : Lowenstein, Roger. (2000) *When Genius Failed: The Rise and Fall of Long-Term Capital Management*. Random House: New York.

¹⁴ See for example: Gennotte, G. and H. Leland (1990), "Market Liquidity, Hedging and Crashes", *American Economic Review* 80: 999-1021. Or, Grossman, S. (1988). "An Analysis of the Implications for Stock and Futures Price Volatility of Program Trading and Dynamic Hedging Strategies," *Journal of Business*, 61: 275-298 and Grossman, S., and M. Miller, 1988, "Liquidity and Market Structure," *Journal of Finance*, 38: 617-633.

¹⁵ Scene 30, *Jurassic Park*, Ian Malcolm speaking: "Your scientists were so preoccupied with whether or not they could that they didn't stop to think if they should. Science can create pesticides, but it can't tell us not to use them. Science can make a nuclear reactor, but it can't tell us not to build it!"

their consumption and risk preferences. In contrast, corporations, passing value through to individuals, should make decisions on the basis of economic value-added and have no legitimate risk preferences of their own.¹⁶

This fundamental feature of corporate finance dates back to Irving Fisher. It has been repeatedly reaffirmed, materially uncontested as a principle, by many scholars including several Nobel prize winners.¹⁷ Briefly, as long as markets are sufficiently competitive and complete, corporations should maximize economic value-added. Stockholders can always trade on their own account to take more or less risk or achieve more or less current consumption.

In the world of pensions, this style of thinking should lead private (corporate) plans to invest in liability matching assets – probably mostly bonds.¹⁸ The Black-Tepper arbitrage arguments which demonstrate this have been extended and remain virtually uncontested.¹⁹ In recent parlance, this might take the form of a Liability Driven Investment (LDI) strategy focused on liability matching investments as a base around which other strategies are layered. The LDI approach has however not seemed to be tightly congruent with the Black-Tepper argument for full matching of liabilities. Instead, it has seemed mostly to come from a recognition that non-matching assets have more risk (the individual choice point of view) rather than that non-matching assets add no value (the corporate decision point of view).²⁰

It is tempting to regard portable alpha as potentially value-adding and hence useful with an LDI strategy or the full Black-Tepper solution. One might argue that pension fund managers may be able to pick assets, strategies, and managers who provide extra-market returns which are then ported on top of an LDI strategy. And indeed

they might be. Value-added would, of course, have to be measured against the full cost of pension management activity.²¹ As has been pointed out repeatedly by Charlie Ellis, Keith Ambachtscheer and others, the long-term reality has been that few pension funds, pension consultants, or funds of funds have documented an ability to actually add economic value adjusted for systematic risks.

The inconvenient truth of pension fund management is that the overwhelming majority of both private and public pension funds should be passively invested in fully funded, liability matching portfolios. Corporations should fund as they create liabilities and match them as closely as practically possible. This preserves maximum value for both pension beneficiaries and stockholders (or taxpayers in the case of public funds). A distinct minority of plans should be actively investing if for no other reason than most are unwilling to commit the necessary ongoing resources. David Swensen of Yale notes the same issue for endowments.²² Moreover, that more than half who try to add value will fail is simply the arithmetic of active management as Bill Sharpe demonstrated in 1991.²³

For endowments and foundations, the proper use of portable alpha is less clear because the precise nature of the stakeholders is somewhat less clear. Many university charters place the faculty in substantive control of the university but their compensation doesn't rise and fall with university bottom-line success. Similarly for other foundations or endowments, there is no obvious way to determine how residual risk should be borne or shared. Moreover, there is no obvious liability to match. This is clearly an area that deserves some sharper thinking and analysis.

¹⁶ Unfortunately, agency costs may intrude on this relationship. See for example: Jensen, Michael C.; Meckling, William H. (1976). "Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure". *Journal of Financial Economics*, 3, 4: 305–360.

¹⁷ The classic references are: Fisher, Irving (1930). *The Theory of Interest*. New York: Macmillan wherein Fisher establishes a separation theorem between production plans and stockholder consumption preferences. And Modigliani, Franco and Merton H. Miller. (1958). "The Cost of Capital, Corporation Finance and the Theory of the Firm". *American Economic Review*, 48, 3: 261–97. There is a large literature on unanimity of stockholder preferences over production plans – far too large to cite here.

¹⁸ Black, Fischer. 1980. "The Tax Consequences of Long-Run Pension Policy," *Financial Analysts Journal*, 36, 4: 21-28. Tepper, Irwin. (1981). "Taxation and Corporate Pension Policy". *Journal of Finance* 36, 1: 1-13.

¹⁹ Gold, Jeremy (2007). "The Intersection of Pensions and Enterprise Risk Management" *Pension Finance Institute* <http://www.pensionfinance.org/papers/TheIntersectionofPensionsandEnterpriseRiskManagement.pdf>

²⁰ Gold, Jeremy (2005) "Accounting/Actuarial Bias Enables Equity Investment By Defined Benefit Pension Plans" *North American Actuarial Journal*, 9, 3: 1-21. <http://www.soa.org/library/journals/north-american-actuarial-journal/2005/july/naaj0903-1.pdf>

²¹ Ambachtsheer, Keith. (2007). *Pension Revolution: A Solution to the Pensions Crisis*. John Wiley & Sons, Hoboken, NJ.

²² <http://www.propublica.org/article/yales-financial-wizard-david-swensen-says-most-endowments-shouldnt-try-to-b>

²³ William F. Sharpe. (1991) "The Arithmetic of Active Management." *The Financial Analysts' Journal* 47, 1, January/February: 7-9.

Public pension plans face a conundrum in many ways similar to private plans. In the case of public plans, tax-payers are the bearers of residual risk. The essence of the Black-Tepper argument is that no value is added by a strategy at the plan level when the residual risk bearers could undertake the same strategy on their own accounts at similar terms. In the case of private plans, the tax deductibility of corporate borrowing and the more favorable personal tax treatment of equities imply that corporate pensions should invest in bonds and stockholders should hold equities in their personal accounts. A similar result should hold for public plans and indeed it does.²⁴ Since more than half of all plans fail to add economic value, there is hardly a general argument that pension plans public or private can invest on better terms than individuals.

HOW AND WHEN TO IMPLEMENT A PORTABLE ALPHA PROGRAM

For public and private pension plans, undertaking a portable alpha program should spring from a documented, cost-effective and robust capability to add value through manager selection. Like asking for a show of hands in a crowded room of all those who are above average drivers, many plans will say they are above average in selection skill. The bar should be higher. Not only must there be a demonstrated track record of manager selection, but that selection has to have been cost effective considering the incremental costs of the activity including senior management bandwidth to monitor the process.

A clearly structured measurement process should go along with the program. Those responsible for the program have to be measured and compensated on the success of manager selection and implementation to align incentives with the economic value added which is created or lost. The efficacy of the entire program should be measured on the basis of whether value was added or not. It is questionable whether many public pension plans have the stomach for such measures. It

may well mean compensating the investment staffs, and perhaps quite handily so, at politically inconvenient times. But without such measures, policies and controls, public funds are simply gambling with taxpayers' money without any real expectation of success.

In considering whether to undertake a portable alpha program, due account must be given to the unpredictable nature of such programs because of their complexity. Active investment management is, at very best, a secondary activity of corporations, governmental organizations, foundations, and/or endowments. Their core competencies typically lie elsewhere. Because of the ability of complex strategies to sometimes generate large unexpected losses, any fiduciary should ask whether the acceptance of such a non-core risk is consistent with the objectives of the organization. In the wake of the Great Recession of 2007, many organizations are asking just such questions.

There have been news reports of plans abandoning portable alpha strategies because they are perceived to have failed. Without knowing how many portable alpha strategies were out there, it's hard to assess what the total impact on portable alpha AUM has been. Without examining the strategies in detail it is impossible to assess whether or not the strategies really failed. It may be after all that the strategies may have technically worked but the plans' expectations were not met and may have been unrealistic in the first place. If the portfolio insurance debacle was any guide, many plans didn't truly understand what they had bought.

Some portable alpha programs may have failed because the separation and transportation strategies failed in extreme markets. This would rightly be a failure of financial engineering. But some of the portable alpha strategies may have failed because of a failure of active management in this extreme environment. That would not be a failing of portable alpha per se but rather a demonstration that it may be harder than it looks to pick high-quality active managers over the long run.

²⁴ Bader, Lawrence N. and Jeremy Gold (2007). "The Case against Stock in Public Pension Funds", *Financial Analysts Journal*, 63, 1: 55–62.

Almost every pension in America, and indeed around the world, uses multiple managers with diverse strategies, to greater and lesser extents of course, to implement their asset allocation. Any of these pension portfolios can also be decomposed into two portfolios: a portfolio which matches the liabilities as closely as possible and a zero net investment hedge fund wherein all the extra return potential and extra risks reside.²⁵ The question that fiduciaries and residual risk bearers should ask is: on what proven basis are the plan managers judged to be capable of successfully running a multi-asset, multi-strategy hedge fund? And, are the incentives and controls aligned to facilitate success?

If one can get past these philosophical issues, the rest is just financial engineering and a consistent practice of measuring results and consistently rewarding results.

SUMMARY

The separation of alpha and beta is a theoretically simple idea. The practical problems of implementation are either solvable or understandable. The real questions aren't the technical questions of whether we can or how we can separate alpha and beta. The real question is whether, and on what basis, we should try.

²⁵ Asness, Clifford S, Robert J Krail, and John M Liew. (2001). "Do Hedge Funds Hedge?", *Journal of Portfolio Management*, 28, 1: 6-19.

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