

Alpha as a Net Zero-Sum Game

How serious a constraint?

Joanne M. Hill

The term *alpha* has become a catchword for favorable outcomes from investment decisions and processes. Today's investors seek *alpha* returns from taking idiosyncratic risk. They are engaged in *alpha transport* or *alpha-beta separation*, and they debate whether alpha is *pure* or *tainted* by hidden systematic risk factors, embedded short options, or liquidity premiums. The desire to increase exposure to alpha and active risk is growing, despite many skeptics.

I address a common caveat cited by those speaking about their ability to earn or generate alpha—that it is a zero-sum game. This would imply that the aggregate alpha gains by one set of investors must equal those lost by another set (after deducting trading and research costs). This is one of the cornerstones of the arguments against the “alpha quest.” How relevant is this warning about the decisions investors face in the short and intermediate term, that the size of the alpha pie is not fixed, and that not all investors draw from the same benchmark or have the same constraints and access costs?

To state this differently, the *alpha game* in practice (rather than theory) is not a closed system, where there are a set of identical and finite chips available at the start and end, so that the returns delivered by winners must come at the expense of losers.

Rather, financial markets and the associated capital allocation process in a global economy are part of a highly complex system, where participants vary in terms of degree and form of access to investment choices, and their investment horizons, risk preferences, capital constraints, and tax regimes. They also come with behavioral biases, which could influence the judgment and decisions of investors with the same skills and information.

On a simpler level, one needs to look no further than the opening of new markets like China, new products like

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search engines (Google), and the difficulties of defining pure alpha (skill) as separate from common risk factors to begin to question what the zero-sum alpha game means in practice.

THE ORIGINS OF ALPHA

Some 45 years ago, William Sharpe, a graduate student working at the RAND Corporation at the time, expanded on the work of his colleague, Harry Markowitz [1952], to postulate that stock market returns were driven by their common participation in the economy and the broad equity market. The normative results of his dissertation were published by *Management Science* in 1963; this was followed soon after by a *Journal of Finance* [1964] article laying out the equilibrium theory implications for capital asset price determination.

"Beta," or sensitivity to a market portfolio, as represented by a broad-based index, was the most important driver of investment performance and differentiating prices of stocks. A significant implication of Sharpe's result was that an equity index fund managed very efficiently and cheaply is the most rational path to capturing the returns of equity exposure. Such funds became the core of institutional investment, the basis for exchange-traded fund products, and the largest component of pension fund equity assets. Indexes are the standard against which other industry products are judged, valued for their efficiency, simplicity, low fees, and tax efficiency.

But what about the *non-market* or *idiosyncratic* component of equity returns? The term *alpha* comes from the statistical term for the intercept in a simple regression of stock returns on a market or benchmark index. Since index sensitivity was *beta*, the average return not related to equity market movements was called *alpha*. The error terms of this simple regression represented *stock-specific* risk.

Sharpe [1966], Treynor [1966a, 1966b], and Jensen [1967] first suggested that manager skill, independent of market portfolio movements, could be represented by the alpha derived from a performance history of a fund. Strategy or stock returns minus beta multiplied by the benchmark were estimates of the value-added for taking on the *stock-specific* risk. The *information ratio* (alpha/tracking error) has come to be used as the term describing alpha per unit of stock-specific risk.

SPOTLIGHT ON ALPHA

Pages and pages of academic, consultant, and practitioner articles later, the performance measurement

business has flourished; indexes and benchmarks have multiplied. The purity and sustainability of alpha has been debated to the point where most investors now accept a multiple risk factor model as a credible framework for isolating alpha from common risk factors. In fact, enhanced index managers have refined and extended Sharpe's original single-factor beta risk approach using structured investment processes that rely on quantitative models to generate alpha. This extension relies on the work of Fama and French [1992, 1994] on multifactor models, as well as on event studies associated with a variety of anomalies including momentum and earnings surprise.

Enhanced index strategies have grown to capture some 25% of the equity fund management business. Also, strategies calling themselves market-neutral have been spawned that are constructed from long and short portfolios with offsetting betas (risk factors) so as to provide returns consisting almost entirely of alpha.

Since the end of the bear market in 2002, alpha's star has risen higher in the cosmos, in large part because beta has recently given investors a tough lesson in the magnitude of broadly diversified equity risk. The strong bull and bear markets of 1995–2003 have demonstrated that returns can vary in a wide range from –20% to +20% for an equity exposure with a beta of 1.0. The downside of this risk can be painful when global equity beta represents over 50% of an institution's assets. Moreover, lower interest rates, inflation, and risk expectations have combined to reduce the expectations for equity beta return to 10% or less. To add to investors' problems, the major alternative to equity beta, interest rate risk, is also perceived to offer poor prospects for generating rewards in the next three to five years.

THE QUEST FOR ACTIVE RISK AND ALPHA

Investors have turned to alpha to seek rewards from taking risk or applying some skill beyond that provided by common risk factor returns. Even though investor skill is costly to find and deliver, the recent track record for alpha seems to offer more promise for financial asset growth in the next decade than the prospects for taking equity beta and duration risk. Also, alpha risk is easier to diversify because of its low cross-strategy correlation properties, so active risk can be added to a portfolio with a potential to improve returns at a greater rate than it increases portfolio total risk.

Investors have found some equity management styles that appear to deliver persistent returns in excess of

benchmarks: in small- and mid-cap stocks, in hedge funds, in enhanced index strategies, in some global asset allocation strategies, and in emerging markets, as analyzed by Hill, Rattray, and Tierens [2004]. Traditional large-cap managers, especially value managers, have had difficulty in delivering consistently positive alphas, and have been subject to the most influence by significant style, size, and dispersion factors in their relative performance.

Recently, variations in long-only investment products that allow for some short exposure and more flexibility in portfolio construction have been motivated by the work of Clarke, de Silva, and Thorley [2002]. Their analysis shows that a transfer coefficient driven by constraints in the portfolio construction process limits the amount available in the opportunity set of active returns that can be delivered through an investment process.

The amount of potential alpha that is delivered via a specific investment process is influenced by constraints on the process from weights relative to benchmark, target risk factors, and trading costs. Clarke et al. [2002] show alpha capture can be increased by shifting from the constraints of long-only strategies to those that permit short positions or portfolio holdings with close to equal weights.

Skeptics, however, remain. One of the primary objections to an alpha-tilt approach is that investors are unlikely to be able to identify enough managers with skill, given that the quest for alpha is a zero-sum game. Moreover, the argument is that the best managers are close to capacity, especially for large-scale investors like pension funds and endowments, and are not willing to subject themselves to the scrutiny of short-term performance monitoring or the disclosure requirements typically required.

The average investor must in theory earn market (beta) returns minus transaction costs, since half the asset returns are above and half are below those of the market. So, say the skeptics, why shouldn't investors with sizable assets not just index from the beginning, and reduce the drag on performance by paying less for investment management services, trading costs, performance assessment, and risk analysis? The cost savings from efficiently run index portfolios could be considered a head start of perhaps as much as 100-200 basis points (bp) for avoiding the alpha quest.

As it turns out, we have Sharpe [1991] to also thank for the zero-sum alpha concept along with the notion of the superiority of market cap-weighted benchmarks. In a single-period world, where there are active and passive investors, simple mathematics can be used to prove

that market returns will be a cap-weighted average of the securities in the market, and that active manager performance in aggregate must be poorer than the performance of passively managed funds by an amount equal to aggregate research and trading costs.

This *zero-sum alpha* hypothesis is a strong argument that has a great deal of further support in academic literature related to mutual fund and hedge fund performance. It also is regularly noted as a source of concern by thought leaders in the investment community as they address the challenge of greater allocations to alpha risk or skill. When results are adjusted for survivorship bias, non-linearity in returns, liquidity premiums, and embedded (non-beta) risk factor exposures, there appears to be strong evidence that median fund managers in many categories do not deliver a consistent advantage after fees relative to their benchmarks.

The interest in separating alpha and beta risk management shows that investors are becoming less willing to pay active manager fees for beta and are seeking index returns through low-fee fund products or tradable vehicles like exchange-traded funds (ETFs), index futures, and index swaps. The motivation for alpha-beta separation is a sound one because it aligns payment for investment skill with strategies focused on delivering relative or absolute returns. The question of whether the aggregate returns are positive after fees, however, remains.

THE ZERO-SUM ALPHA PIE ARGUMENT

Many argue that the quest for alpha is doomed to fail for half of the assets devoted to skill-based strategies. Of course, this does not mean that those who make this argument are not devoting their efforts to finding alpha. It just means that they think they will be part of those consuming the winning half of the alpha pie.

Exhibit 1 shows an estimated breakdown of the holders of U.S. equities based on Federal Reserve data (as of 2005Q1) and trade publications (as of 2005Q2). Broadly speaking, we divide U.S. equityholders into institutional assets (including hedge funds, investment manager/mutual funds, pension funds, and individual investors) and corporate-direct investors in stocks. The pie chart illustrates that each category of institutional and hedge fund investment style, as well as corporate and individual investors, has some winners and losers relative to the average stock market holder in the category.

Although the figure is drawn to show a proportional number of winners and losers in each slice of the pie

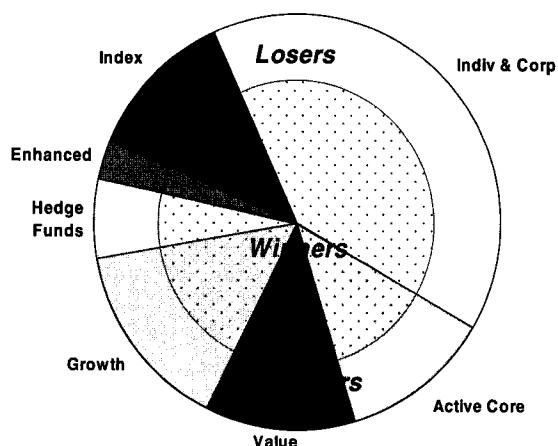
EXHIBIT 1

Zero-Sum Alpha Game Puzzle by Manager Type

Holders of U.S. Equities

	\$ bil	%
Institutions	\$8,600	
Active Core	1,700	12%
Active Value	1,700	12%
Active Growth	2,150	15%
Hedge Funds	900	6%
Enhanced	450	3%
Index	1,700	12%
Indiv & Corp	5,800	40%
	\$14,400	

U.S. Equity Alpha Pie



Source: Federal Reserve Bank bulletin (as of 2005Q1), *Pensions & Investments* (January 10, 2005), and Goldman Sachs estimates.

(except for the index portion), reality is typically different. Some slices may have more than their share of winners; median small-cap managers, for example, may outperform the Russell 2000 benchmark. It appears the same has been true in international enhanced strategies, as shown by Tierens [2004].

We could, however, still have an overall zero-sum game. The pie is not statistically divided, and in a multi-period investment world we would expect assets to shift to categories where more alpha is available.

Many would argue that this is the phenomenon we now see as cash moves out of large-cap growth and into small-cap value, U.S. equity strategies, hedge funds, and enhanced strategies. As time passes, more capital shifts to the slices with higher net alpha, straining the capacity of the investment opportunity set and skill of managers in that slice.

WHY THE ALPHA PIE IS NOT ZERO-SUM

The most constraining assumptions that underlie the idea of a zero-sum alpha pie are that all investors have the same single-period horizon and that they face the same information and opportunity set (and hence use the same benchmark). Moreover, for the zero-sum argument to be valid, capital allocated to the U.S. equity pie must

be assumed to be fixed, which is feasible only in a short single-period horizon world.

The single-period, single benchmark assumptions of the zero-sum alpha conclusion are the easiest to refute. In his original article, Sharpe [1991] identifies three reasons why we may find active managers beating the market in practice:

1. Passive managers do not hold all the securities in the market, but they sample subsets that themselves may represent active views on a macro level or risk preferences. (Certainly, this is the case in practice, as we see a wide variety of index strategies and benchmarks across all asset classes and few true passive investors across all financial assets.)
2. Active institutional manager performance may not represent the entire market of active security holders—for example, individual investors may have sufficiently negative aggregate alphas to provide a positive alpha to institutional investors after research and trading costs.
3. The argument for a zero-sum dollar alpha across active managers implicitly assumes weights for managers are based on funds under management at the start of the period. This is not typically the way statistics in active manager performance studies are

constructed, and may bias results as certain styles, e.g., small-cap, move in and out of favor.

The proliferation of benchmarks for equity management is probably one of the strongest arguments as to why alpha is elusive in aggregate. During the 1990s, owners of assets were focused on paying fees for investment skill and categorized investment managers by the choice set in which they purported to add value. Consequently, they were judged and rewarded on the basis of outperformance or alpha relative to these varied benchmarks. Therefore, a positive alpha could be present even if the benchmark had a negative return.

Behind the scenes is the implicit assumption that the securities market "clears" efficiently across the portfolio of benchmarks of all investors engaged in subsets of active or passive management. But then we are back to reason number 2 above, where there may be some omitted investors.

This problem is complicated further by the fact that we now have a greater focus on absolute return investing where the benchmark is a cash-equivalent yield (LIBOR) plus a premium reflecting the risk taken in the strategy. The investment choice set for absolute return managers may overlap with the choice set of active equity managers who have equity market benchmarks. The same investment opportunity can be viewed as having a positive or negative alpha, depending on whether it is judged against a LIBOR plus risk premium or an equity benchmark. With these complexities, a clearer direction is not to focus on alpha at all, but rather on aggregate return for total risk taken; this, however, makes the payment for skill versus risk factor investment returns more complicated.

Day in and day out, we see investors turn away trading opportunities or turn to them as attractive depending solely on the time frame of their investment horizon. The simplest example of how the horizon and risk preference might influence decisions may be seen in the different ways a short-term tactical trader versus a long-term growth equity manager might evaluate the prospects for a drug company.

The tactical trader may care about the return opportunity of a drug pending Food and Drug Administration (FDA) approval in the next month and base her opinion to buy or sell on the outcome of that ruling and the expected price action in the stock once the news is out. If she is anticipating a favorable ruling, she may be buying the stock today with an expectation of selling it as soon as the ruling is announced. She may choose to short an

ETF focused on health care or another drug company against this position. This trader may have no interest in investing in the company longer term, lacking the skill to assess the research agenda and the long-term prospects of the pharmaceutical product line.

The growth fund manager, however, has analyzed the growth prospects of the company's current drugs and new drugs under development, and has decided the company is worth owning because of its research and development to build on a successful portfolio of products. The fund manager views the imminent FDA ruling as a high-risk event that could move the stock against him in the short run, so he has decided to wait to buy until after the ruling.

Both the trader and the fund manager could be right or wrong in their evaluations and make or lose money, even though they may end up being on other sides of the trade once the ruling is complete. (The trader ultimately sells the stock to the growth fund manager.)

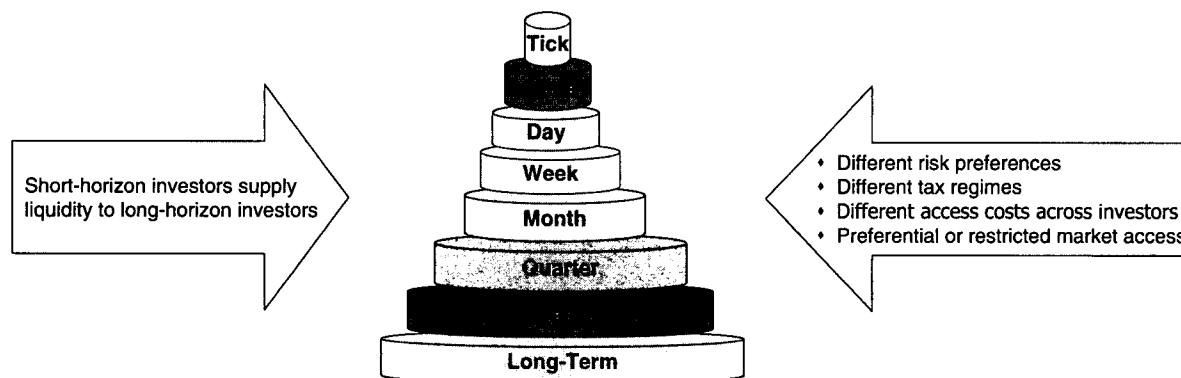
Another example of trading horizon differences would be a mutual fund with a one-year horizon looking to reduce exposure to a stock in a troubled industry by selling the stock position to a hedge fund that is using the stock as a hedge against a short position in another stock. Or, the hedge fund may be buying the stock to seek a large enough control position with the hope of taking the company private and then restructuring the business over three to five years. Added to this argument would be transactions in stocks for statistical arbitrage trading strategies where short-term horizons dominate. During the late 1990s, these short-term trading strategies earned unusually high returns, providing interim liquidity for mutual funds as they invested their massive equity inflows.

Exhibit 2 is a schematic of the multiple horizons of market participants on any given day, ranging from high-frequency arbitrageurs and market makers who evaluate tick-by-tick trading opportunities to investors with multiple-year horizons. Interacting with these horizons are the different market access costs of these participants that influence turnover decisions, as shown by Sofianos and Rodella [2005].

For example, high-frequency traders with smaller order sizes typically have very low trading costs and need only a small profit to justify a buy or sell to initiate a new trade. The close-out of a position may be based on a desire to carry very low risk and, thus, the target exit price is close to the entry level. Long-term investors may wish to accumulate a significant holding in a company—several percent of shares outstanding. Since trading costs are, in

EXHIBIT 2

Multiple Horizons and Different Access Costs



Source: Goldman Sachs.

effect, a negative alpha and dependent on the size of the trade relative to the execution horizon and volatility, the target price for a more strategic investor would be quite high relative to the entry price, and the time frame would be much longer. Tactically adjusting the size of the position based on short-term news or price movements would be unusual.

Consequently, even if we assume all long-only investors are operating in the same choice set, differences in market access costs and horizon can complicate the zero-sum alpha pie argument in practice. Would all short-term traders have negative alpha and long-term investors have positive alpha? Would one-half of each?

Since we cannot ascertain who is buying from whom or selling to whom, and often find a hedged market maker, options trader, or quantitatively-based electronic trading strategy on the other side of trades, the idea that there are clear and equal winners and losers does not hold water in practice.

Risk preferences and tolerance are also important factors in the equation of investment decisions. Investors may choose to exit a holding because of its marginal risk contribution to their total holdings, not necessarily its unique future return prospects. So even with a fixed horizon, a company that changes its product line or leverage to give it a riskier profile may be sold by one manager and bought by another manager as its risk characteristics change.¹

If the stock appreciates, does this mean those who sold it because of the higher risk are worse off? Not necessarily. It may

have been replaced by another lower-risk company that had a favorable return, consistent with its lower risk profile.

THE GAMES MULTIPLY— WHAT ASSETS GO INTO THE PIE?

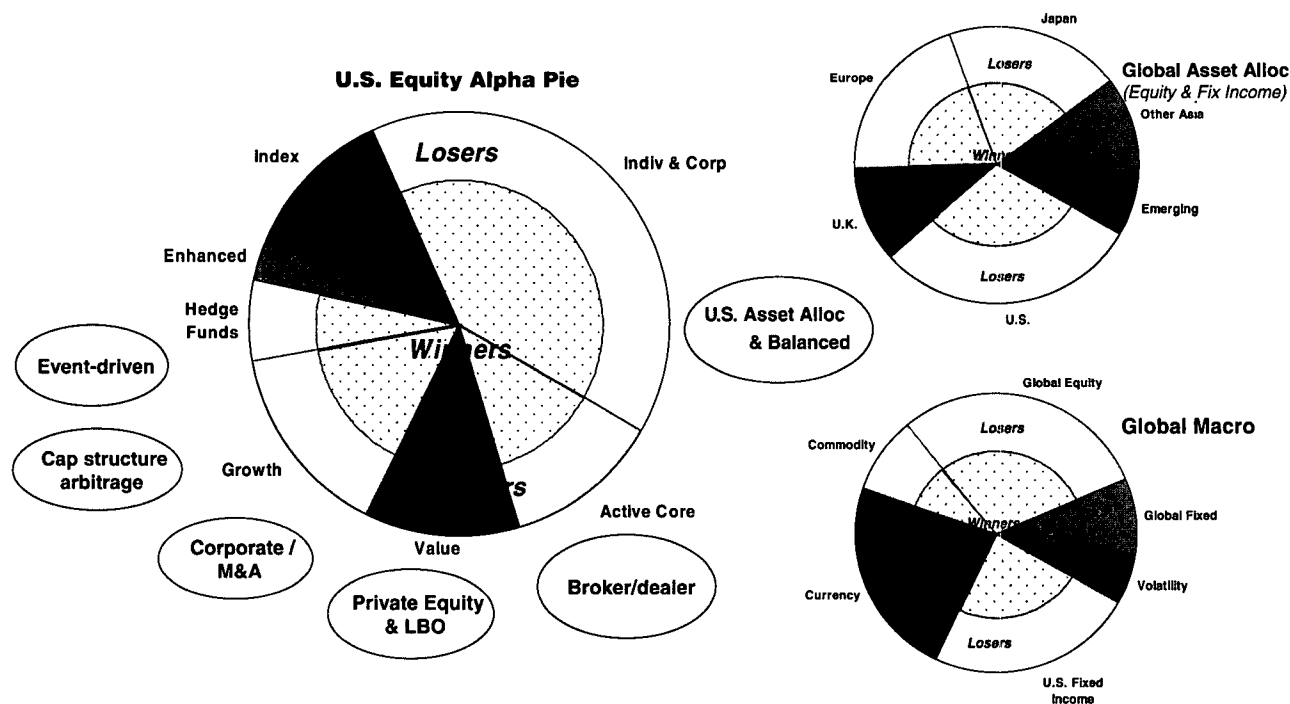
Financial markets are part of a complex, open system. Exhibit 3 shows several strategies beyond the pie of U.S. equity managers that can influence the equilibrium price of an individual stock at any given time. These strategies are each employed by investors with a range of horizons, access costs, tax regimes, and home markets. Regulatory constraints and risk tolerance also influence the appetite for the security.

If we take a stock like Exxon, the buyers or sellers on any given day could be motivated by the fundamentals or technicals specific to the company, but also by the fact that the stock is a component of a sector or a U.S. equity index, has commodity and currency sensitivity, could be involved in a takeover, has debt that looks cheap relative to the stock, or is a natural hedge to another energy company that is perceived as mispriced.

Global investors, such as pension funds, endowments, and central banks, and those pursuing strategies like global asset allocation, global balanced and global macro, scan for the global opportunity set. They assess which country, asset class, sector, and sometimes stock may offer the best value relative to risk contribution. They help capital flow across borders and asset categories to expand and contract the alpha pie that is a given country's stock market.

EXHIBIT 3

A Wide Variety of Investment Decision Processes



Source: Goldman Sachs.

A pension fund may have received a contribution to shore-up an underfunded pension plan, and have begun to put the money to work in a long-term holding in global equities. This shifts capital from the real economy where it might have been deployed for a new factory into a diversified set of financial assets. A hedge fund engaging in capital structure arbitrage may be selling a stock to hedge a long bond position from the same issuer. A corporation may be buying a stock as part of a takeover or corporate buy-back. A private equityholder may be engaged in an initial offering of a company in a public market.

This reinforces my point about the multitude of benchmarks employed in practice. The reference portfolios to which a given trade or position is added vary so greatly that the idea that there are alphas of a diversified set of investment strategies that must sum to zero is hard to comprehend in practice. These alphas could in aggregate be positive or negative for a given style of investors, e.g., enhanced index managers or capital structure arbitrage

managers. For the system as a whole, the participants and information set are too dynamic to be limited by the perception of a constrained aggregate opportunity set.

It must be true, however, that global economic growth will drive an ability to provide net positive alpha across the entire global capital system, since this growth influences aggregate wealth and capital creation. Negative economic growth probably means that the games are tougher, and there are fewer winners than losers, but certainly we can envision some strategies and types of investors that would succeed.

The following are a limited set of specific examples that illustrate how the games vary in participants and scope over time:

- Consider the analysis that has gone into the assessment of China moving from a Communist economic model to one driven by capital return opportunities. In just a few years, the global capital

(and commodity) markets have seen major changes to the supply of and demand for capital related to U.S. government debt from the privatization of the Chinese economy. Investors with a variety of horizons have altered their strategies to take advantage of the opportunity set changes that have occurred.

- An analogy explaining the challenges of distinguishing alpha from beta was noted by Boldt [2005], CIO of the University of Texas Investment Management Company, at a conference on asset and risk allocation. Suppose a new accessible planet is discovered, similar to earth, with a range of investment opportunities (or take the case of America's discovery and development in the 16th-18th centuries). These investment opportunities would represent a net positive alpha, but due to risk and access costs, not all investors would have an interest in or the ability to explore them. At some point, this new planet's (or new continent's) investment opportunities become more accessible and less risky and shift to the beta side, meriting a risk premium and inclusion in a universal market portfolio. Until that point, however, there are likely to be a host of alpha opportunities for companies and investors who can access them and are comfortable with the risk.
- In 1999, technology companies began using stock as currency and investing in non-public technology companies and non-technology public companies (AOL/Time Warner), issuing stock in unprecedented amounts as stock investors bid up technology stock prices. These were new investors in search of alpha, funding it by, in effect, shorting their own equity. Similarly, Google is issuing stock to raise billions in cash for future investment or product development opportunities. Will the ability to earn a return on these funds necessarily mean that others have lower returns, or will their creativity increase the economic growth pies?²

We can draw an analogy between the zero-sum alpha argument and the capital asset pricing model (CAPM) in terms of their relevance for the practice of investment management. The concept of the CAPM with its restrictive assumptions provides a useful framework for thinking about the basic risk drivers of investment returns on an ex ante basis. The concepts of CAPM, market portfolio, and zero-sum alpha, however, all have their roots in a positive equilibrium theory of capital markets with assumptions that we acknowledge are violated in the real world.

Similarly, real alphas (if we could measure them exactly) are not likely to sum to zero for the same reasons that all global investors do not, in practice, own the global, cap-weighted risky financial asset portfolio, and that return is not positively aligned with risk when measured empirically for subsets of the capital market for fixed periods of time. (In a single-horizon world, one particular set of alphas should in fact meet the zero-sum argument. These would be the alphas calculated relative to the global capitalization-weighted risky asset portfolio. These alphas, however, are not what most investors mean when they use alpha as a measure of investment skill.)

The bottom line is that we invest in a multiperiod world, with periodic limitations on the free flow of new capital or strategy development across market participants.

What is important to keep in mind and factor into decisions is that the total dollar amount of net investor total returns is constrained by the aggregate opportunity set for long-term economic growth opportunities against frictions that exist on these growth opportunities (rather than that alphas against a global capital asset benchmark need to sum to zero). It is also the presence of access frictions, choice constraints, and different horizons and risk preferences and tax efficiencies that tips the scale in favor of positive alphas to specific skill-based managers.

These factors suggest directions to look for the most fertile positive alpha ground—channels of investing that are less obvious, more constrained, higher-risk, and less crowded, including those that lie in the gray area between investment categories and clienteles.

ENDNOTES

¹An example is the evolution of companies like Verizon, BellSouth, and ATT from low-risk, steady cash flow, telephone companies to higher-risk telecom companies as the regulatory environment shifted to foster more competition and innovation.

²I was first confronted with a question related to zero-sum investing on a final exam in a graduate equity strategies finance course. *What if there were a move to 100% of pension and mutual funds assets passively managed against an equity index instead of the 10% thus managed at that time. How would this affect capital allocation?*

On the surface, one might say that this could lead to a massive *large-cap* outperformance, as money flowed to the stocks with the highest weight. The corporate sector, however, could ultimately see tremendous opportunity, since CFOs of large-cap companies could use their stocks as currency to purchase smaller companies with good earnings—spinning off lagging product lines. Thus, the mergers and acquisitions market would

take the place of the secondary financial market as the capital allocation mechanism. Similarly, upon seeing corporations move in this way, new investors could put money into long/short hedge funds that would short large-cap stocks that were beneficiaries of the index flows, and buy smaller companies that they would see as likely candidates for a takeover.

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