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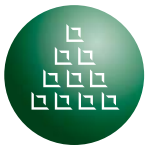
Philosophy, process, and performance.

EDWARD KUNG AND LARRY POHLMAN

PANAGORA



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Financial markets in the U.S. have been anything but normal. According to Ryan Labs, pension assets underperformed pension liability by about 67.83% for the past three years, the worst since the firm began tracking asset liability funding ratios in 1987.

Pension administrators have been forced to rethink and shift their focus on their ability to pay benefits, control risk, and smooth out volatility. At the same time, the quest for alpha has been hampered by adherence to the classic asset allocation process (Arnott [2002], Bernstein [2003], and Litterman [2003]). As a result, alpha has been reduced.

The idea of portable alpha is based on the notion that asset allocation and the search for alpha are separable. *Portable alpha enables investors to budget risk and enhance alpha (potentially) without dramatically changing asset allocation.* We explore the effects of implementing portable alphas in a variety of investment scenarios, and provide a discussion of the benefits and drawbacks.

WHAT IS PORTABLE ALPHA?

Active investment managers provide two types of return: the return generated from market exposure or *beta*, and the return that comes from selection skill or *alpha*. Active beta returns typically come from market timing—that is, increasing market exposure in up markets and reducing it in down markets. Passive beta returns come from index fund exposure.

Alpha comes from security selection within an asset class. The value-added from a true alpha strategy thus does

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EXHIBIT 1

Correlation Analysis—1994-4/2003

	SP500	EAFE	Lehman AgG	Non US Bond	RE	Cash
CSFB Hedge Fund Index	0.46	0.41	0.14	-0.20	0.24	0.10
CSFB Multi Strategy	0.04	0.09	0.02	0.09	0.11	0.09
CSFB Emerging Market	0.47	0.48	-0.13	-0.27	0.27	-0.07
CSFB Fixed-Income Arb Index	-0.01	0.00	0.07	-0.22	0.21	0.03
CSFB Global Macro	0.22	0.11	0.24	-0.22	0.17	0.08
CSFB Managed Futures	-0.26	-0.13	0.30	0.35	-0.09	-0.08
CSFB Short Bias	-0.76	-0.64	0.10	0.09	-0.27	0.05
CSFB Market-Neutral Index	0.40	0.34	0.06	0.03	0.24	0.25
CSFB Event-Driven	0.54	0.52	-0.05	-0.21	0.39	0.10
CSFB Convertible Arb Index	0.11	0.07	0.07	-0.21	0.20	0.14
CSFB Hedged Long/Short Index	0.57	0.57	0.05	-0.02	0.22	0.10

Source: CSFB/Tremont.

not depend on the direction of the market. A true stock-picker, for instance, would have a beta of 1.0 relative to the market benchmark, and all value-added would come from the active risk or stock-picking. Portable alpha refers to the process of separating the alpha from the beta and then applying it to other portfolios.

A portable alpha strategy takes the form of a beta-neutral portfolio that is implemented through an overlay or by strategic asset allocation. Within strategic asset allocation, a plan can have: 1) an outright allocation to portable alpha; and 2) a capital commitment to portable alpha strategies while using futures or swaps to maintain the established overall asset allocation (sometimes referred to as equitization).

Within these broad groupings, portable alpha can be generated many different ways. An alpha-generating portfolio consisting entirely of futures uses very little cash (due to margin requirement) and provides an alpha that can be applied over all or part of the portfolio. We will call strategies that use little or no cash *overlay* strategies or *leveraged* strategies.

Or, plan sponsors can invest in a portable alpha strategy calling for the investment manager to purchase securities and use derivatives to eliminate market exposure. For example, a manager of small-cap equities who generates 4% alpha each year can hedge the small-cap market exposure, or beta, by selling Russell 2000 index futures against the portfolio. This results in a pure alpha return that can be applied to the overall fund.

Implementing a portable alpha strategy requires careful consideration. In theory, most investment strategies can be converted into portable alpha, provided there is alpha to begin with. The first consideration is liquidity. A hedging vehicle is required in order to eliminate market exposure. There must be an available index future, swap contract, or exchange-traded fund (ETF) to be used for hedging. Some investment strategies, such as real estate or private equity, do not lend themselves to constructing portable alpha because there is no hedging instrument.

Second, we need to be aware of the amount of alpha that can be generated. Efficient asset classes will not lend themselves to generating enough alpha to be worthwhile.

SOURCES OF PORTABLE ALPHA

Institutional investors tend to source a portable alpha strategy from a hedge fund or fund of funds. Market-neutral and long-short strategies have been the primary sources for portable alpha due to their low correlations with major market indexes, but market-neutral strategies are not always beta-neutral. In fact, the CSFB Market-Neutral index shows positive correlation with the S&P 500 index.

Exhibit 1 shows the correlations of all CSFB Hedge Funds with major market indexes.[1]

While hedge funds have been the source of additional alpha, not every alpha-generating hedge fund is appropriate for porting alpha. Market risk or systematic risk can be difficult to isolate and to eliminate while preserving market neutrality. Alpha also can be difficult to obtain without the benefit of hedging market risk.

Research also shows that hedge fund managers exhibit extremely high correlation within hedge fund style categories. On average per investment style, hedge fund returns in excess of cash are at least 50% correlated with each other. These high correlations imply hedge fund managers are not that unique in identifying alpha opportunities.

Some hedge fund managers are simply repackaging

beta and selling it as a pure alpha strategy (see Jensen and Rotenberg [2003]). Fixed-income arbitrage, emerging markets, managed futures, and merger arbitrage indexes are 59%, 81%, 75%, and 52% correlated with naive strategies that consist of simple mortgages, short-term corporate debt, emerging market equity, debt, and various eurodollar instruments.

This is not to say one should ignore the hedge fund altogether. A carefully chosen hedge fund or portfolio of hedge funds may still provide the best return, risk, and diversification benefits investors seek.

An alternative for transporting alpha is to combine traditional *long-only* funds that produce consistent alpha with short positions in index derivatives. In fact, there are considerable benefits to hiring managers who run portable alpha strategies as a variation of an established long-only fund. First, these investment managers or firms are usually willing to disclose their investment philosophy and processes. Hedge funds with proprietary trading strategies are more reluctant to reveal their investment insight.

Second, these managers tend to have well-defined investment processes. Hedge funds, on the other hand, quite often rely upon the skill of one individual.

Third, traditional long-only products tend to have fairly long and reliable track records. Hedge funds in general have limited live track records (see Anson [2001]). As a result, hedge fund indexes and universes built based upon these hedge fund track records will inevitably experience survivorship bias, backfill bias, and self-selection bias. This is true even after index or universe creators try to minimize the biases (see Asness, Krail, and Liew [2001]).

In sourcing portable alpha, investors should explore alpha opportunities where managers have demonstrated their abilities to generate significant information coefficients in the strategy. Institutional investors are familiar with the alphas generated from traditional long-only strategies, and have already implemented these alphas in their plans, but inefficiently, given the fact that most products bundle the beta and the alpha.

Our focus here is to show how investors can obtain portable alphas via traditional long-only strategies and implement them in other strategies or asset classes.

PORTABLE ALPHA FUNDING AND ITS IMPACT

Determining the source for funding a portable alpha allocation is critical, as it has direct impacts on risk budgeting, asset allocation, and performance measurement. Investors can fund a portable alpha strategy by:

1. Reducing equity allocation and substituting a portable alpha strategy.
2. Reducing fixed-income allocations and substituting a portable alpha strategy.
3. Scaling down the overall allocation from each asset class proportionately and substituting a portable alpha strategy.[2]

Each of these scenarios generates distinct portfolio characteristics. To illustrate the effects of various funding allocation decisions and the impact of changes in investment markets, we construct a sample portfolio based on an actual large defined-benefit plan's asset mix consisting of 36% S&P 500, 23% non-U.S. equity, 21% Lehman Aggregate, 7% non-U.S. bonds, 8% real estate, and 5% cash. We refer to this throughout as the plan.

To study the impact of funding portable alpha in the plan, we construct 12 scenarios, each representing 5% incremental portable alpha allocations funded by equity, fixed-income, or both asset classes.

Exhibit 2 shows that the plan's portfolio risk is reduced in an almost linear fashion after funding a portable alpha strategy with equity allocation. The result is that a portion of the more volatile equity asset class is replaced with a low-volatility market-neutral strategy (the CSFB Market Neutral Index). In addition, since the portable alpha strategy is essentially uncorrelated with other asset classes, the overall risk of the portfolio is reduced.

The plan's return will improve significantly with little change in total risk once we fund the same portable alpha with fixed-income assets. This is because a market-neutral strategy exhibits risk characteristics similar to those of fixed-income assets. The result is that a market-neutral strategy can be used as a substitute for a fixed-income product.

Since in most plans there is a greater allocation to equities than to fixed-income investments, scaling down both asset classes proportionately to fund a market-neutral portable alpha can reduce a plan's overall risk accordingly.

Exhibit 2 also suggests that even with a 5% allocation to portable alpha, the plan can achieve meaningful risk reduction, alpha enhancement, or both.

OPTIMAL ALLOCATION

Because of the long and short nature of the investments, portable alpha strategies provide broader investment opportunities and should have better risk and return characteristics than a traditional long-only strategy. While in the-

EXHIBIT 2

Portable Alpha Allocation at the Plan Level—1994-4/2003

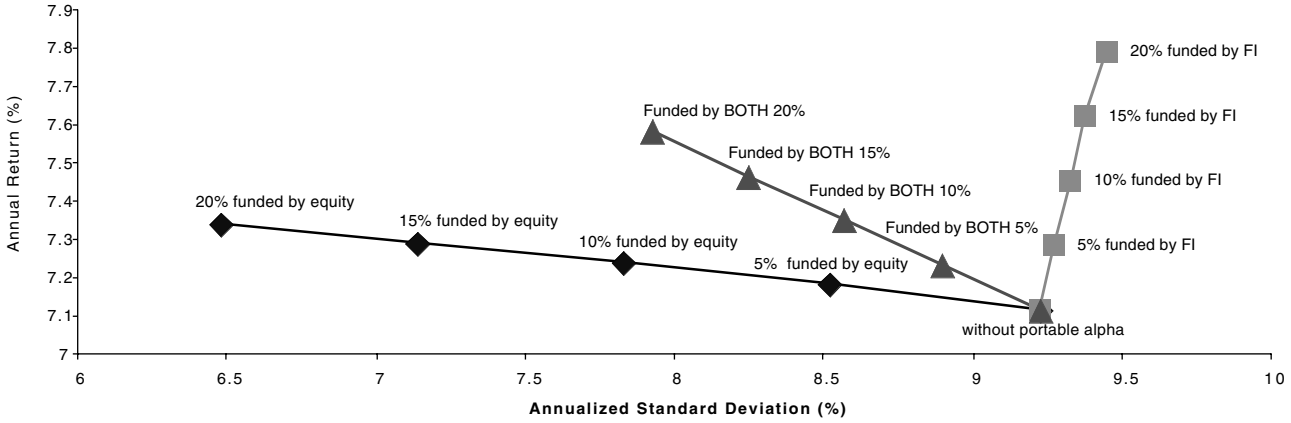
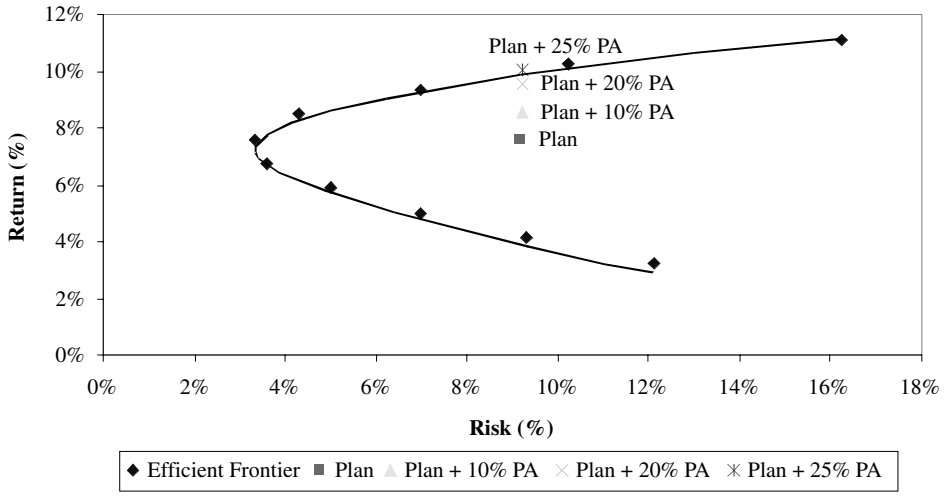


EXHIBIT 3

Adding Portable Alpha



ory a plan could use up to 100% portable alpha in lieu of traditional long-only products, this may not be feasible due to institutional plan guidelines and investment constraints.

To gauge the optimal portable alpha allocation for the plan, we construct an efficient frontier based on the monthly returns for the plan's asset mix. We plot the original plan and the plan with 10%, 20%, and 25% of portable alpha on the frontier.

Exhibit 3 shows that an inefficient portfolio based upon the plan strategic allocation can be moved to a more efficient portfolio by adding 20%-25% of a properly chosen portable alpha.[3] As a result, the plan could enhance its alpha by 20 basis points per month or 240 bp per year with virtually the same amount of risk.

NOT ALL PORTABLE ALPHAS ARE EQUAL

Portable alpha strategies come in many different styles. The correlation between the alpha and the target portfolio can have a significant impact on performance. Incorporation of portable alpha can significantly change the risk and return profile of a portfolio.

To illustrate this point, we create two hypothetical portable alphas. In the first case, we assume that a man-

EXHIBIT 4
Risk-Return and Correlations—1984-4/2003

	Return (%)	Std Dev (%)		S&P 500 Index	Lehman Aggregate Bond Index	Value / Growth Alpha	Treasury/ Credit Alpha
S&P 500 Index	12.26	15.85		1.00			
Lehman Aggregate Bond Index	9.61	4.6		0.20	1.00		
Value/Growth Alpha	**11.65**	**3.18**		0.27	**0.10**	1.00	
Treasury/Credit Alpha	**11.65**	**3.18**		**-0.10**	0.33	0.11	1.00

EXHIBIT 5
Information Ratio—1984-4/2003

	Return (%)	Std Dev (%)	Information Ratio
S&P + Value/Growth Alpha	25.26	15.98	1.58
S&P + Treasury/Credit Alpha	**25.30**	**15.84**	**1.60**
Lehman Agg + Treasury/Credit Alpha	22.26	5.92	3.76
Lehman Agg + Value/Growth Alpha	**22.26**	**5.85**	**3.81**

ager with perfect foresight moves between the S&P value and growth indexes. In the second case, we assume that a manager with perfect foresight moves between the Lehman Treasury and corporate bond indexes. Since we are interested in alpha and not beta, we remove all systematic risk and return from the alphas. Finally, since equity returns are higher and more volatile than fixed-income returns, we scale the two alphas to have the same means and standard deviations.

We then transport these two *true alphas* to two different portfolios. The first is 100% invested in the S&P 500 and the second 100% invested in the Lehman government/credit index. Exhibit 4 shows the return characteristics and correlations of the four securities.

As one would expect, the correlation between the S&P 500 portfolio and the fixed-income alpha is lower than the correlation of the S&P 500 with the equity alpha. Similarly, the correlation between the Lehman G/C portfolio with the equity alpha is lower than the correlation of the Lehman G/C and the fixed-income alpha.

The final step in the example is to compare the information ratios of portfolios created by transporting the alphas to the two different base portfolios. The results are shown in Exhibit 5.

Because of the lower correlation between asset classes, the S&P 500 portfolio plus the fixed-income alpha produces a higher information ratio than the S&P 500 plus the equity alpha. Similarly, the combination of the Lehman G/C portfolio and the equity alpha produces a higher information ratio than the Lehman G/C and the fixed-income alpha portfolio.

This example illustrates why synthetic enhanced equity portfolios created from a fixed-income alpha and equity futures can have higher information ratios than pure enhanced index equity portfolios. It is not because the return is higher, but rather that the risk is lower. With the latest introduction of fixed-income exchange-traded funds, it is also feasible to create synthetic fixed-income portfolios that combine equity alphas with fixed-income ETFs that could have higher information ratios than enhanced fixed-income portfolios.

As actual portfolios typically include a wide variety of asset classes for funding, the optimal portable alpha for a portfolio could possibly involve a combination of alpha sources rather than a single allocation.

IMPLEMENTATION

Institutional investors can implement a portable alpha strategy through a beta-neutral program that transports alpha to any desired asset class or strategy. Equitization refers to a process to combine a portable alpha with index futures, swaps, or ETFs. The cash remains invested in a portable alpha strategy that is then combined with a

long futures position, providing a total return close to the S&P 500 index plus portable alpha. The equitized portable alpha strategy can exhibit the risk and return characteristics of any equity market.

CASE STUDY 1—U.S. LARGE-CAP WITH SMALL-CAP PORTABLE ALPHA

There are many different sources of alpha. Exhibit 6 shows the median alpha (defined as excess return of the manager over beta times benchmark) for the traditional long-only strategies. In the past ten years, the median U.S. large-cap managers generated 0.58% alpha. This compares to a 3.78% median alpha for small-cap managers.[4]

Suppose our plan wants to maintain its strategic asset allocation to large-cap domestic equity but would like to enhance performance by adding small-cap alpha. Using the sample plan's asset mix, the small-cap portable alpha can be funded by reducing the large-cap allocation from 36% to 26%.

Assume the 10 percentage point reduction in the large-cap allocation is equal to $1 million. The basic investment process is as follows:

- Step 1: Investment manager deposits $50,000 to satisfy the margin account with a broker. This allows for the purchase of $1 million in equity index futures, leaving $950,000 to be used for investment.
- Step 2: Investment manager buys S&P 500 index futures to establish market exposure equal to $1 million (10%) to bring the large-cap asset class allocation back to the original 36%.
- Step 3: Investment manager purchases $950,000 in small-cap stocks. This long-only portfolio is designed to beat the Russell 2000 index, but it has a beta of 1.0 relative to the index. The securities are held in broker custody.
- Step 4: Investment manager shorts $950,000 worth of Russell 2000 index futures to eliminate market exposures or beta.

The result is that the plan sponsor is able to maintain the original 36% strategic domestic equity market exposure (original 26% + 10% S&P 500 index futures) plus the small-cap portable alpha, as shown in the bars in Exhibit 6.

Transporting alpha through equitization allows the investor to maintain large-cap asset class exposure, while benefiting from alpha generated from small-cap assets without changing the plan's asset allocation.

New generations of ETFs such as MSCI EAFE and emerging markets index funds have made it possible for institutional investors to transport alphas from international equity universes to any other asset class similar to the large-cap/small-cap example discussed. The MSCI EAFE ETF has delivered consistent index-like performance.

Portable Alpha in Up Markets

Exhibit 7 illustrates how portable alpha would work in an up market. For purposes of simplicity, we assume the small-cap manager can generate a 4% median alpha from stock selection. The large-cap and small-cap sectors represented by the S&P 500 and Russell 2000 indexes generated 27% and 18%, respectively, for the three years ending March 2000.

S&P 500 index futures would gain roughly $270,000, as the market went up 27% during this period. As the Russell 2000 index went up 18%, small-cap stocks would gain $209,000 from the combination of market impact and alpha. The portfolio would lose $171,000 from shorting the Russell 2000 index futures. The difference of $38,000 ($209,000 – $171,000) represents the 4% ($38,000/$950,000) of small-cap alpha the strategy would generate. Since the alpha for $38,000 is portable, it is applied to the original $1 million, resulting in a 3.8 percentage point return above what an index manager would provide.

Portable Alpha in Down Markets

Exhibit 8 illustrates how portable alpha would work in a down market. Once again, we assume that the small-cap manager can deliver 4% median alpha from stock selection. The S&P 500 and Russell 2000 indexes generated negative 17% and 11% returns, respectively, for the three years ending March 2003.

Large-cap index futures would generate a loss of $170,000 since the S&P 500 index went down 17%. The small-cap stock would have a loss of $66,500 (–11% market return + 4% alpha × initial investment $950,000). The short Russell 2000 index futures would generate a gain of $104,500, as the Russell 2000 index went down 11%. By incorporating the small-cap portable alpha, the plan would reduce the loss by 3.8 percentage points.

EXHIBIT 6

Median Manager Alpha and Active Risk—10 Years Ending March 2003

	Alpha	*Active Risk*
Large-Cap Core	**0.58**	**3.94**
Large-Cap Growth	**-0.03**	**7.25**
Large-Cap Value	**1.96**	**5.94**
Small-Cap Core	**3.78**	**7.87**
Small-Cap Value	**1.89**	**7.86**
Small-Cap Growth	**7.41**	**11.22**
Core Fixed-Income	**0.17**	**1.00**
High-Yield	**1.16**	**3.29**
Emerging Market	**2.93**	**9.92**
Non-US Equity	**3.18**	**7.99**
Non-US Fixed-Income	**1.11**	**4.08**
Real Estate	**1.83**	**3.48**
Source: PSN.		

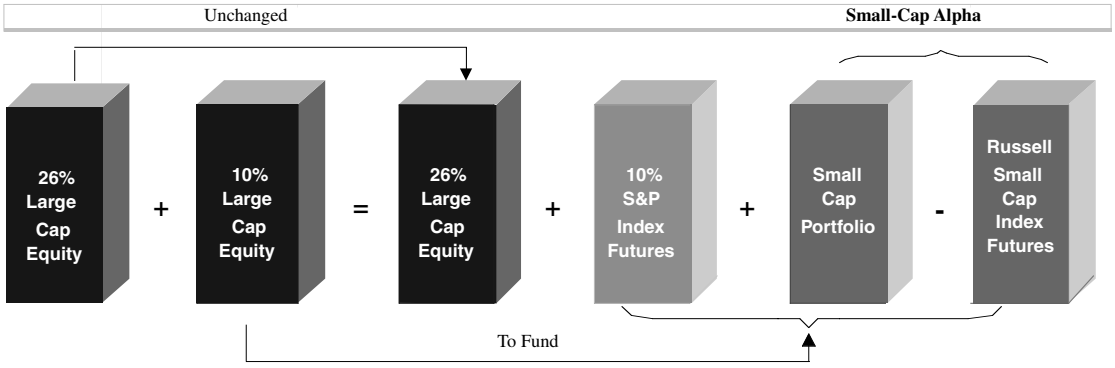
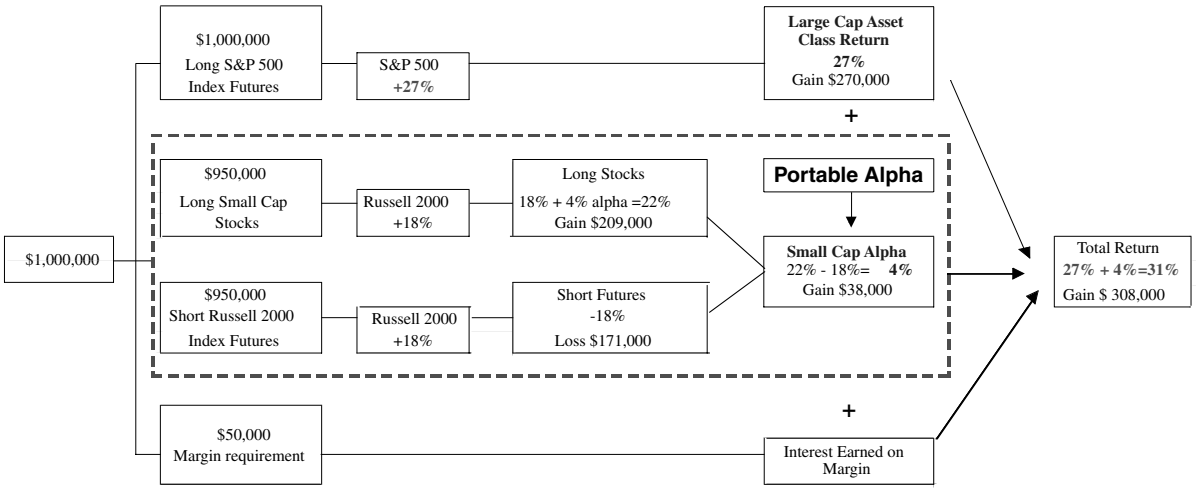


EXHIBIT 7

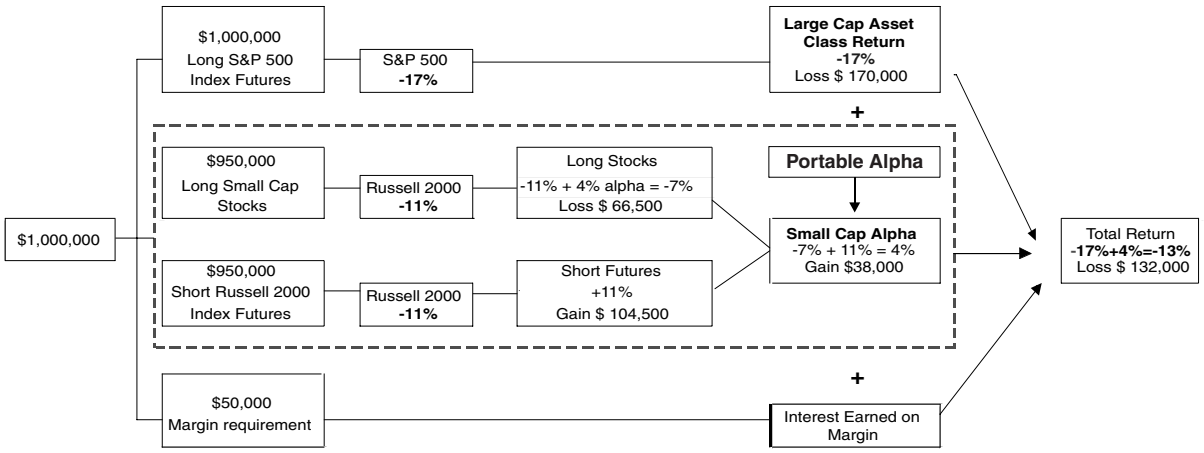
3 Years Bull Market—April 1997-March 2000



Note: Total return and dollar gain do not include interest rebate on the short or interest earned on margin.

EXHIBIT 8

3 Years Bear Market—April 2000–March 2003



Note: Total return and dollar gain do not include interest rebate on the short or interest earned on margin.

CASE STUDY 2—FIXED-INCOME FUTURES OVERLAY WITHOUT COMMITTING CAPITAL

Portable alpha strategies implemented through equitization can provide greater flexibility, but a scarcity of capital may constrain portable alpha allocation. Futures overlays enable investors to transport alphas that have zero correlation with major market indexes without committing capital other than margin deposits.

Here's an example of how we transport alpha via fixed-income futures overlay. The sample portable alpha strategy is an all futures-based portfolio engineered from the traditional core fixed-income product. It is assumed to deliver 1%-2% of pure alpha per year and is neutral to credit, duration, or convexity. For the same plan's asset mix, let's assume the 21% of fixed-income asset class represented by the Lehman Aggregate index is equal to $1 million. In practice, we need to satisfy only a 3% margin requirement to trade fixed-income futures. The investment process is as follows:

- Step 1: Investment manager deposits with a broker $3 million or 3% of $100 million to satisfy the margin account.
- Step 2: Investment manager uses the futures-based fixed-income portable alpha strategy on a Lehman Aggregate portfolio with market exposure equal to $100 million.

Exhibit 9 illustrates how portable alpha works through a fixed-income futures overlay. The index portfolio provides a market return. This is combined with T-bill returns and the return from the portable alpha. In this example, the plan will benefit by an *additional* $10,812,000 from portable alpha (assuming 2% compounded on $100 million for five years).

In this case, the portable alpha is used to overlay 100% of the fixed-income portion of the plan. Investors can tailor the overlay to cover *all* or *part* (50%, 150%) of the portfolio, depending on their investment objectives.

Exhibit 10 shows how investors can transport alpha with 50% futures overlay with virtually the same investment process. Portable alpha enables the investor to transport alpha to any asset class via fixed-income futures overlay that is supported by a margin account equal to 3% of the asset.

Successful portable alpha implementation depends on 1) an investment manager's ability to generate consistent alpha that has low correlation with major indexes; 2) an investor's ability to identify these alphas; and 3) an investor/manager's ability to execute a portable alpha program.

BENEFITS OF USING PORTABLE ALPHA

There are considerable benefits of transporting alpha within or across asset classes. Successful portable alpha programs enable institutional investors to:

- Budget risk according to a plan's investment policy and capital market forecast.
- Maintain strategic asset allocation as desired and

EXHIBIT 9

100% Fixed-Income Futures Overlay—October 1998–September 2003 (5 Yrs)

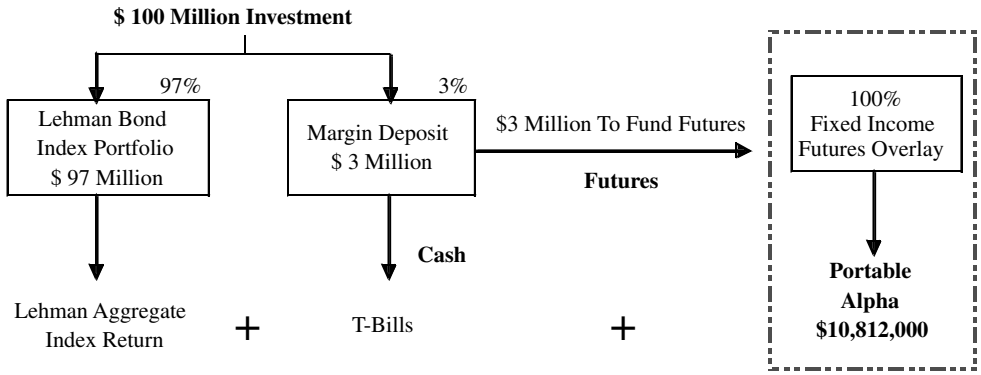
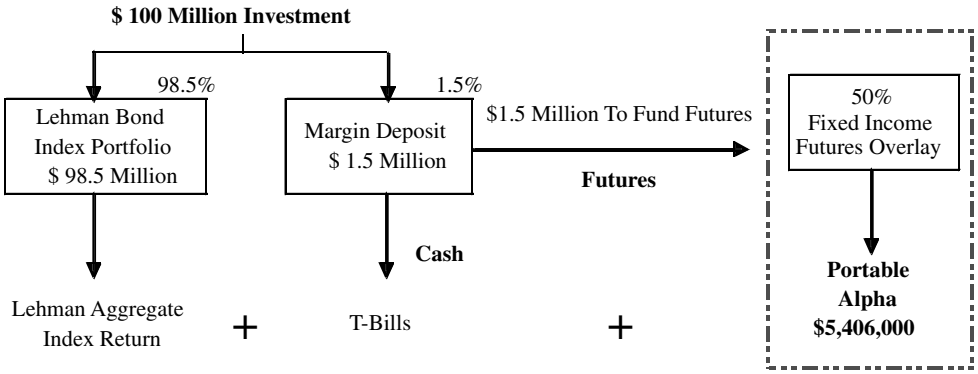


EXHIBIT 10

50% Fixed-Income Futures Overlay—October 1998–September 2003 (5 Yrs)



provide flexibility to rebalance portfolios with index futures. In the case of the large-cap/small-cap example, investors can adjust the 10% S&P 500 index futures to shift their asset allocation.

- Transport alpha via an overlay program that is supported by a small amount of cash in a margin account.
- Not make wholesale changes to an established manager structure.
- Clearly measure portable alpha performance. Through equitization, institutional investors can combine traditional asset classes with portable alpha (large-cap equity + S&P 500 index futures + small-cap portable alpha) and measure performance against an appropriate broad market index such as the S&P 500 index.

CHALLENGES

Transporting alpha is not without challenges. The key is to have a clear understanding of how these derivatives work within a portfolio context.

- Derivatives transactions are efficient, but are not free. Transaction costs will surely reduce alpha.
- From time to time, index futures may not track the benchmark perfectly. Investment managers and investors need to actively manage the futures position.
- Certain asset classes may not have liquid futures contracts available, and more expensive instruments such as ETFs or swaps contracts would increase costs.

- Investment guidelines—A portable alpha strategy typically involves derivatives and leverage to hedge market risk. While some institutional investors have a clear mandate permitting derivatives usage, many do not.
- Funding—Portable alpha funding has multiple impacts on a plan. Reducing any asset class to fund portable alpha may not be an easy decision either emotionally or intellectually.
- Lack of expertise—Institutions may not have the in-house expertise to build and execute a portable alpha strategy.

CONCLUSION

Portable alpha strategies employ some of the best financial engineering tools available to investment managers to shape returns and to control risk. Portable alpha is more than a concept. Conceptually, everyone is already invested in portable alpha, but inefficiently.

We believe portable alpha will have a profound impact on active alpha investing and asset allocation, and will be broadly applied in traditional portfolio management.

ENDNOTES

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[1]CSFB/Tremont Hedge Fund index data have been available since 1994. All our examples use this time period.

[2]It may be advantageous to use multiple portable alphas in a portfolio with multiple asset classes.

[3]We used the same CSFB market-neutral alpha in the plan's asset mix.

[4]To simplify the exposition of the examples, we assume that index futures have the same returns as the underlying indexes.

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