

August 2007

Implementing Portable Alpha: The Case of North Pole Public Employees' Retirement System

¹While this case describes a real world situation, all individual and institutional names have been changed, at the request of the participants. NPPERS, the "North Pole Public Employees' Retirement System", is a fictional public pension plan.

1. Introduction

The years 2002-04 were deeply transformative for NPPERS' investments. A 2002 asset-liability study had resulted in two dramatic changes in the investment policies and objectives of the then \$5 billion fund:

1. a push towards greater asset class diversification; and
2. a mandate to significantly increase the contribution of active management (i.e., "alpha") to overall performance.

To achieve the latter, the investment team decided to implement a portable alpha program, which eventually came to represent about 20% of total plan assets (over \$1 billion). This case study describes how the NPPERS portable alpha program was conceived, structured and implemented.

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2. Governance at NPPERS

Governance at NPPERS encompassed a set of policies and rules formulated over the years by the board of trustees, to direct the management of the system. One of the core concepts was “staff empowerment”, the idea that the system was best served if staff were given the latitude to implement board policy decisions and objectives. As a result, the NPPERS investment team was granted a high degree of flexibility relative to its public pension peers. However this “latitude” was earned gradually, through providing continuous investment education to the board and increased internal management of a significant portion of the portfolio’s investments (most of the straight indexing or enhanced indexing exposures within U.S. Equities, Core Fixed Income, and TIPS).

The move towards internal management produced good results almost immediately, thereby building the board’s confidence in the investment team. After a few years, flexibility was granted to allow the investment team the ability to hire and fire managers within asset classes (with the concurrence of the plan’s general asset consultant, Arctic Strategies), without seeking board approval. To support a strong policy focus on the investment outcome, an incentive compensation structure was implemented by NPPERS, whereby investment staff could earn bonuses based on generating portfolio returns, over rolling multi-year periods, in excess of the strategic policy benchmarks.

In the words of NPPERS general asset consultant (“GAC”), Rudolph Noel of Arctic Strategies: “Several years ago the NPPERS board stepped out from the security of the norm and put in place a structure of delegation that allows for nimble investing by investment professionals who are responsible for their actions and held accountable for the results. The fact that the board adopted this approach, continues to endorse it, and remains relatively free of political pressures, is the foundation of this program’s success.”

3. The 2002 Asset-Liability Study

NPPERS entered the new millennium with an aggressively positioned portfolio, about 75% allocated to equities. Consequently, 2000-02 were difficult years, as the bear market in equities resulted in negative fund returns. At the same time, state legislative changes had led to an increase in the investment portfolio’s target

real rate of return, from 4% to 5%. Concerned about the portfolio's higher return targets and market volatility, the NPPERS investment team conducted an asset/liability study in 2002. The main findings were concerning:

- The current asset allocation (over 70% equities) was excessively volatile, with the potential to impose, in the case of protracted bear markets, a significant future contribution burden on the state.
- Given current market valuations, the long-term (multi-decade) outlook for most asset class returns, particularly equities, was unattractive relative to history.
- In view of this negative long-term return outlook for asset classes, the increased real return target of 5%, which translated to 8.5% nominal returns, would be difficult to achieve without significant alpha².

The asset/liability study resulted in a series of recommendations to alter the investment policy. The key elements, which were all approved by the trustees, were:

1. Increased diversification across asset classes, including adding new exposures (such as timber and hedge funds), to reduce portfolio volatility without sacrificing too much in expected returns
2. Investing in "high expected return" alternative asset classes, such as private equity, venture capital and distressed debt
3. Increase in the proportion of "active management" in the portfolio, i.e., targeting more alpha from traditional asset allocations

The asset/liability study also increased flexibility, as the investment team was given latitude to tactically adjust the portfolio's asset allocation away from the policy allocation, within constraints (a "range" was assigned for each asset class – see Exhibit 1 below). The following exhibit also contrasts the previous asset allocation with the newly approved policy.

²Throughout this case study, we will use the term "alpha" in the typical practitioner sense, i.e., a return in excess of that which can be obtained simply by a passive exposure to a given asset class (or "beta"). It is often interpreted as the return to managers' investing "skill".

EXHIBIT 1 - ASSET ALLOCATION			
	Pre-2002	2002 Policy	
	Policy	Benchmark	Range
EQUITY	75.0%	50.0%	50.0%
Domestic Equity	50.0%	27.5%	15 - 40%
Intl & Emg Equity	25.0%	17.5%	5 - 30%
Long/Short Equity		5.0%	0 - 10%
FIXED INCOME	22.5%	30.0%	30.0%
Domestic Core Bonds	12.5%	10.0%	5 - 15%
TIPS	10.0%	10.0%	5 - 15%
High Yield Bonds		5.0%	0 - 10%
Market-Neutral Portfolio		5.0%	0 - 10%
ALTERNATIVES	2.5%	20.0%	20.0%
Commodities	2.5%	2.5%	0 - 5%
Real Estate		5.0%	0 - 7.5%
Distressed Debt		2.5%	0 - 5%
Private Equity		5.0%	2.5 - 7.5%
Timberland		5.0%	2.5 - 7.5%

In summary, by the end of 2002, the NPPERS investment staff had significant latitude and incentives to outperform the policy portfolio by: 1) implementing tactical tilts across asset classes; 2) hiring managers to deliver alpha.

The new policy introduced NPPERS to new asset classes and investing strategies, including hedge funds. Conceptually, hedge funds appealed to NPPERS due to their relatively stable investment returns and low correlation to broad stock and bond markets. Hedge funds were viewed as effective diversification strategies, thus reducing overall fund volatility, and had the potential to generate better risk-adjusted returns than traditional active managers.

For their initial hedge fund exposure, NPPERS' investment team chose to go through hedge fund of funds, rather than direct. The ability to source new managers and secure access in limited capacity funds were considered very important, "At the time, our investment consultant was not comfortable recommending hedge fund managers and there were no other consulting firms with the expertise to do it", says Nick Claus, the plan's CIO.

Initially NPPERS hired one fund of hedge funds manager, Glacier Alternative Asset Management, to run two portfolios with separate mandates. The portfolios were included in the overall asset allocation as follows:

1. a portfolio of long-short equity managers was included within the equities allocation,
2. a portfolio of market-neutral hedge fund managers was included within the fixed income allocation.³

4. Portable Alpha Program

4.1. *The Concept*

One outcome of the asset/liability study was a clear mandate to seek greater “alpha” within the portfolio. Among institutional investors, the conventional approach to achieving this had been to allow managers to become more active (i.e., to take “bigger bets”). Another common, though less conventional, tactic was to enter new, non-traditional asset classes that were perceived as better “alpha hunting grounds.” NPPERS sought to do both: 1) moved towards more active management in emerging markets and commodities, which had been passively indexed; 2) implement allocations to “alternative” assets, such as hedge funds, private equity and timber.

While these actions improved the expected risk-return characteristics of the portfolio, the NPPERS investment team recognized that they did not alter the alpha generation potential of the core equity and fixed income allocations, which together still accounted for nearly 70% of the pension fund. They knew that when it came to increasing the overall alpha contribution to the portfolio, the greatest impact would come from producing alpha within traditional equities and fixed income. However, those were the very asset classes the team believed had the least expected alpha. In particular, U.S. large cap equities and U.S. core fixed income were thought to be the most efficiently priced and liquid markets, and there was overwhelming empirical evidence from academics and practitioners supporting this view. Therefore, NPPERS needed to find a way to add alpha to asset classes that did not seem to have much alpha to begin with.⁴ The solution was to find other places to source alpha, and then somehow allocate or “transport” it to the core equity and fixed income allocations. The solution was portable alpha.

³The decision of where to allocate the hedge fund portfolios was driven largely by their expected risk and return. The long-short equity portfolio was expected to deliver returns in line with equities, but at lower risk, and also would have positive beta to equities, since the underlying hedge fund managers would typically be net long stocks. The market-neutral equity portfolio was expected to deliver returns in line with bonds, but at lower risk, and with no beta or correlation to equities.

⁴More precisely, NPPERS and Arctic Strategies, the plan’s GAC, formulated the issue in terms of information ratio (“IR” – see footnotes 6 and 7 for definitions). They believed that for US large cap equities and core fixed income, the expected information ratio was modest, and just as importantly, this IR was maximized at very low levels of tracking error (i.e., enhanced indexing), after which it dropped fairly quickly. As a result, an attempt to increase alpha by allowing managers in those asset classes to take higher tracking error would just degrade the reward/risk parameters of the portfolio, while adding little actual performance.

The basic goal underlying NPPERS' portable alpha concept was the separation of alpha and beta:

Beta: sourced through derivative instruments, which achieve asset class exposure with small cash commitments, freeing up funds to allocate to alpha managers

Alpha: sourced from purely "skill-focused" managers that were not bound by traditional asset classes (multi-strategy), or investment constraints (i.e., could employ shorting, leverage, derivatives, etc.)

The proposal was to assemble an "alpha pool", or portfolio of alpha products (funds, strategies), structured to be market-neutral or zero beta. This pool would then be "ported" or overlaid onto traditional asset class exposures, such as U.S. equities and bonds, the latter synthetically created through derivatives.⁵ The following outlines the basics of the "alpha pool" concept:

- Target pool size of up to \$1.5 billion, or 25% of the NPPERS portfolio.
- Overlay about \$1 billion on US equities and fixed income allocations.
- Remaining \$0.5 billion would remain as the "market-neutral" allocation within the NPPERS portfolio
- Source of funds would be some combination of existing equity and fixed income allocations (passive and active).

So long as the alpha pool produced a higher information ratio⁶ than the existing allocations it replaced, then the portfolio would be better off, either by taking less tracking error⁷ (risk reduction), delivering higher returns, or both. The investment team expected the alpha pool would generate alpha of 3-4% with a similar amount of tracking error, or an expected information ratio of 1.0.

⁵In addition to the alpha pool structure, which is a fairly complex and advanced way of implementing portable alpha, NPPERS also looked at instead using "bundled products," where individual alpha managers already provide a complete "alpha + beta" package. For example, an investor seeking to add alpha within a US large cap equities allocation, might approach a hedge fund of funds, who would agree to combine their product with an S&P500 replicating overlay. The main advantage is "one-stop shopping", ie, the investor does not have to worry about generating the betas, and how the two pieces fit together. NPPERS eventually abandoned the idea, because they found that most alpha managers would not agree to provide the beta bundled with their products. Therefore, to preserve their flexibility to choose the best alpha managers, they moved towards the alpha pool structure.

⁶The information ratio is a standard measure of reward-risk tradeoff in money management. It is defined as the ratio of : 1) the average return generated by a manager in excess of the relevant benchmark (i.e., "alpha" in this case study); and 2) a measure of the amount of active risk taken to generate these excess returns (also known as "tracking error" – see footnote 7). For example, an information ratio of 0.5 means a manager generated 0.5% of excess return for every 1% of active risk. Note that an information ratio can be zero or negative, if the manager has no skill, and thus cannot outperform its benchmark. Over the past 5 years, an information ratio of 0.6 or better would have placed a manager in the top quartile of U.S. equity or fixed income managers.

⁷Tracking error is a way to quantify the amount of active risk a manager takes, by measuring how much a portfolio's returns vary "around" a benchmark. For the statistically inclined reader, it is defined as the standard deviation of excess returns.

4.2. Pre-Implementation Steps

The next steps in implementing the portable alpha program were to source the alpha and beta, and eventually putting it all together. However, getting to that point required an extended period of education and planning, initially at the team level - staff and the GAC - and then eventually the board.

Relative to its public pension peers, NPPERS had features that gave it a unique advantage, in terms of developing comfort with the innovative approaches required by portable alpha:

- The NPPERS staff had many years of experience with internally managing the indexing and enhanced indexing strategies (S&P500, Core Fixed Income, TIPS),
- Staff had been implementing a “synthetic rebalancing” program⁸ through Northern Lights Investment Advisors (“NLIA”) for several years, so they were familiar with the concept and mechanics of using derivatives to create beta or adjust asset class exposures.
- The fund’s general asset consultant (or “GAC”), Arctic Strategies, was willing to step outside the traditional areas of asset management and build out their alternatives expertise

Getting board authorization to implement portable alpha was relatively straightforward, given the autonomy already granted to the investment team. Recall that NPPERS’ governance policies allowed the CIO broad tactical discretion (within pre-set asset class exposure ranges), and also hiring/firing authority over investment managers, with the concurrence of the GAC.⁹ Therefore, the portable alpha program’s implementation fell largely within the governance policy-defined scope of the investment team. In essence, because the portable alpha program did not materially alter the plan’s asset allocation, just the means by which the asset class exposures were obtained, it could be implemented directly by the CIO and his staff, upon the GAC’s approval.

⁸ A synthetic rebalancing program is a way to rebalance the asset class exposures of a portfolio without changing allocations to individual managers, by trading derivatives. For example, if a plan has a policy allocation of 60% US Equities / 40% US Fixed Income, but perhaps due to market moves, finds itself 65%/35%, rather than rebalancing by redeeming partially from the equity managers and adding to the fixed income managers, it can achieve almost the same result by simply “shorting” 5% of S&P500 index and “going long” 5% of Lehman Aggregate (or the relevant equity and fixed income benchmarks). In theory, this kind of program allows a plan to remain at policy weights continuously, by rebalancing daily, or even intra-day.

⁹ While no board approval is required, the asset consultant is required to sign off on these actions.

Notwithstanding, the investment team realized early on that a full fledged portable alpha program would be a new experience, requiring extensive research and knowledge acquisition. Implementation of the program would represent a significant departure from traditional public pension management, and therefore it was important to get the board of trustees educated and “on board”.

After nearly a year researching and refining their concept, in mid-2003 NPPERS investment team compiled a portable alpha report, which was sent to the trustees. Then, in the fall of 2003, staff held a portable alpha education session with the board, and described their intention to implement the program. As NPPERS CIO Claus explains, “I impressed on the trustees the fact that, on one hand, the portable alpha program would represent a very “non-conventional” investment approach relative to other public pension plans, which by itself created a risk of public scrutiny or criticism, i.e., ‘headline risk’. On the other hand, I strongly felt the program represented the best way, perhaps the only way, to achieve the plan’s long-term return objectives, without taking on excessive investment risk and exposing the pension fund to material downside.” His presentation was followed by the plan’s asset consultant, who told the trustees that they were comfortable with and approved the portable alpha proposal. The trustees ultimately expressed their support.

Now, the NPPERS investment team was ready to implement.

4.3. *Sourcing Alpha*

NPPERS decided early on to use hedge funds as the primary alpha source for the new program. “It was critical that we constructed an alpha portfolio that minimized equity and bond market exposures to the greatest extent possible,” stated CIO Claus. While many asset classes exhibited alpha potential, hedge funds were closest in structure and spirit to delivering “pure” alpha, (i.e., with little or no beta), given their focus on low correlation to traditional asset classes, in some cases actual market-neutrality.¹⁰ NPPERS considered multiple ways to obtain this exposure:

1. *Fund of Hedge Funds*: Provided instant diversification across managers, as well as access to extensive research, risk management and standardized reporting.

¹⁰We are not implying that all hedge funds, or even most hedge funds, deliver market-neutral, uncorrelated alpha. In fact, AQR has published extensively (see “Do Hedge Funds Hedge?” and “An Alternative Future Parts I and II”) on the fact that most hedge funds deliver non-trivial beta, along with the alpha. However, we do believe that sufficient exceptions to the above exist, such that the hedge fund industry remains the best hunting ground for sourcing alpha directly.

They allowed quick entry into hedge funds and in practice could act as an extension of internal staff. Having said that, there were some non-trivial disadvantages. First was cost, since hedge fund of funds charge significant management and (often) performance fees, over and above the fees charged by the underlying hedge fund managers. This additional layer of fees would result in less net alpha.¹¹ A second concern was the potential lack of tactical nimbleness, i.e., because they invest in underlying hedge funds that have lock ups and restricted liquidity (quarterly, sometimes semi-annual or annual), the fund of funds themselves are limited in how tactical they can be. Finally, there was concern that the fund of funds would be highly correlated among themselves. Work done by NPPERS staff, together with Arctic Strategies, suggested that while most fund of funds were diversified as stand alone investments, they tended to have similar allocations to various broad hedge fund strategy types (e.g., long-short equity, global macro, equity arbitrage, credit, CTAs, market-neutral, etc), and therefore exhibited high correlations to each other. As a result, there would be little diversification benefit from putting together a portfolio with several fund of funds, versus only a couple.¹²

2. *Direct Investing – Single Strategy Hedge Funds:* One key advantage relative to fund of funds would be avoiding the extra layer of fees. Additionally, building a portfolio of single strategy managers would also give NPPERS the ability to access specialists in each asset class, and the flexibility to tilt the alpha pool to strategies or market segments where staff had higher conviction. However for a small staff, or new entrant into the field of hedge fund investing, there were many perceived disadvantages. Most important was the hedge fund industry's sheer complexity and diversity. There were several different types of strategies, many with distinct sub-specialties, such that a well diversified portfolio would require dozens of separate allocations. Each of these allocations would have to result from extensive due diligence across a wide number of managers, and once implemented, would require intense monitoring. It would be difficult, if not impossible, to achieve this without significant investment by NPPERS in new personnel, and resources (travel budget, databases, risk systems, operational due diligence specialists).

¹¹Some institutional investors have adopted a "training wheels" model of hedge fund of funds investing. Under this setup, the first few investments in the asset class are made through fund of funds, who act not only as manager, but also help educate the plan's investment staff on hedge fund due diligence. Eventually, the institution starts making hedge fund investments directly, eliminating the extra fee layer of fund of funds. This option is likely only available to plans willing to commit significant assets to hedge funds (in dollar terms), so that it becomes a worthwhile business proposition for a small or medium-sized fund of funds to undertake the education and knowledge transfer.

¹²An exception to this high correlation across managers is when a fund of funds is hired to create a customized or "completion" portfolio, i.e., a selection of strategies/funds that complement the exposures already found in the other fund of funds portfolios (perhaps by, focusing on niche managers or market segments). NPPERS eventually hired a fund of funds manager to create just such a customized portfolio.

3. *Direct investing – Multi-strategy Hedge Funds*: For NPPERS, multi-strategy hedge funds delivered the key strength of fund of funds investing, namely strategy diversification (as the name implied, multi-strategy managers combined multiple sources of alpha – the bigger ones could resemble a fund of funds, except in the form of a “fund of strategies”), with one of the main advantages of going direct, i.e., potentially lower fees. But unlike fund of funds, multi-strategy funds would potentially be able to allocate tactically in real time, shifting towards more attractive opportunities and market segments.¹³ And unlike single strategy hedge fund managers, multi-strategy managers had more stable businesses, as they were less exposed to the ups and downs of any specific strategy or asset class.¹⁴ On the downside, relative to hedge fund of funds, investing in multi-strategy funds would require that NPPERS be able to evaluate and monitor the main features of each manager’s process, including investment philosophy, risk management and business strategy.

Given all these considerations, the investment team decided that during the first few years, the alpha pool would be built around a limited core of hedge fund of funds, along with a few multi-strategy managers. Single strategy hedge funds would not be considered at this stage. One of the components of the new alpha pool would be the existing Glacier market-neutral hedge fund of funds (in which NPPERS had already invested \$300 million). In addition, the stated goal was to add one more fund of funds (but likely no more than one, due to concerns about high correlations, which in the data approached 0.9), and as many multi-strategy firms as the team “could get comfortable with.” Recognizing the significant due diligence effort required, and also the need to evaluate the underlying investment processes and strategies of the multi-strategy firms, the CIO, his key staff and the GAC were all active participants in the alpha pool manager selection.¹⁵

An RFP was prepared in late 2003 and sent to nearly 20 hedge fund of funds and multi-strategy hedge fund managers. Generating the list was a crucial step, and the names were gathered from a variety of sources:

¹³Of course this is only valuable if the manager has skill in making tactical allocations, over and above the returns generated by the underlying strategies. As with traditional asset allocation, it can be difficult to evaluate the effectiveness of tactical tilts within multi-strategy funds, and perhaps a skeptical approach to begin with is warranted.

¹⁴For example, many single strategy (or “dedicated”) convertible arbitrage hedge fund managers were forced to shut down, in the face of massive client redemptions and staff departures, in 2005, a year when the convertible arbitrage strategy as a whole experienced a significant drawdown. Multi-strategy managers could potentially better weather these storms, by tactically shifting away from unattractive strategies during difficult times, and accessing other opportunities.

¹⁵Per the NPPERS governance policies, Arctic Strategies, as the general asset consultant to the plan, would be required to approve any hiring recommendations made by the staff.

- Staff's contacts gathered over years in the industry
- Asset consultants' relationships and contacts
- Consultation with "respected experts/peers" (e.g., CIO's that had significant hedge fund programs implemented)
- Leveraging of existing relationship with the Glacier hedge fund of funds group, specifically research and views on individual managers

In deciding which fund of funds would be included in the RFP list, the main criteria were fairly "typical": demonstrated experience and distinguished track record in managing large mandates, over multiple years, for institutional clients. For the multi-strategy firms invited to participate, along with the same criteria above, there was an important additional layer of scrutiny placed on more intangible factors, such as whether the firm had an "institutional setup" and focus (business model, reporting/transparency, compliance, risk management, systems), as well as strong reputation, "pedigree" and integrity. Finally, the search focused primarily on managers that had a market-neutral focus or profile, ie, those that built their products to deliver returns with little correlation to traditional asset classes (equities and bonds). This step, as we will see later, drastically simplified the process of "porting" the returns from the alpha pool managers onto the underlying beta exposures.

Based on the RFP responses, in early 2004 the list was narrowed to 8 managers, who were invited for presentations at the consultant's offices in the Arctic Circle. In mid-2004, an even smaller group of managers were then subject to detailed on-site due diligence meetings. In the fall of 2004, the final list of alpha pool managers was decided and approved jointly by both NPPERS staff and the general asset consultant.

Having chosen the alpha pool participants, the investment team still had to decide how much to allocate to each manager. For a traditional investment portfolio, such allocation decisions would typically be based on some optimization, taking as inputs the expected returns and risk of each manager, and their correlations. However, in the case of hedge funds, this was not a straightforward exercise, as the investment team discovered. The following were some of the obstacles to conducting the "standard" analysis:

- Short history of returns (most hedge funds have brief track records), which made risk and correlation estimates imprecise and unreliable
- Dynamic nature of fund of funds and multi-strategy portfolios, resulting in estimates of risk and correlation changed over time

- Limited capacity in some managers, such that one could not assume the full desired allocations¹⁶

So while an optimizer was used, the final allocation was driven heavily by some “common sense” and fairly conservative assumptions, as well as the imposition of a few exogenous constraints:

1. Fund of funds would make up at least half of the portfolio (a diversification and risk management constraint), and their correlations to each other were assumed very high (> 0.8)
2. Assumed that multi-strategy manager returns, or more exactly their information ratios, would be similar over the long-run
3. Assumed that multi-strategy manager correlations would be higher in the future than they had been historically

These assumptions and constraints lead to an effective “floor” on the total fund of funds allocation, and also had the effect of biasing the multi-strategy hedge fund allocations towards equal risk-weighting.¹⁷ The final alpha pool proposal is exhibited below:¹⁸

EXHIBIT 2 – PROPOSED ALPHA POOL COMPOSITION		
Firm	Type	Proposed Allocation
Glacier	Fund of Funds	\$300 million
FOF 2	Fund of Funds	\$300 million
FOF 3	Fund of Funds	\$150 million
Multi 1	Multistrategy	\$150 million
Multi 2	Multistrategy	\$300 million
Multi 3	Multistrategy	\$200 million

A final word on the allocation process above. Over the years, investors have been “indoctrinated” with heavily quantitative portfolio construction methods, so that the procedure adopted above by NPPERS could appear ad hoc and simplistic. But recall

¹⁶ The very real phenomenon of capacity constraints in the hedge fund industry has a couple of implications for investors considering portable alpha. Firstly, it limits the potential amount of portable alpha that can eventually be implemented, if access to institutional-quality hedge funds is constrained (e.g., a \$1 billion alpha pool is feasible, while a \$25 billion pool is probably not). Secondly, it creates an advantage to early adopters, who can secure capacity with institutional-quality managers before they close.

¹⁷ Although not necessarily equal dollar allocations, since there were differences in target risk and tracking error across the various managers, such that more “risky” products would get proportionately smaller investments.

¹⁸ Note that this proposal includes the pre-existing Glacier market-neutral hedge fund, which going forward would be allocated to the alpha pool. Also, despite originally intending to hire only one more fund of funds, NPPERS did eventually add two, although one of them was structured to allow the fund to capture capacity directly.

that this allocation decision was only attempted after an extensive due diligence and selection process, resulting in a pool of managers believed to have sustainable alpha, and differentiated processes. Having completed that stage, the adoption of an allocation rule that was biased towards equal allocations among these “quality” and mutually-differentiated managers (with some tilts due to capacity constraints), was in a sense quite natural, and more importantly, judged far more reasonable than what an optimizer would have produced, given the data available.¹⁹

4.4. Sourcing Beta

The NPPERS investment team now had to decide whether to outsource the beta management, or do it “in house.”²⁰ They chose to hire Northern Lights Investment Advisors for 3 main reasons:

1. Historical Relationship: NLIA had been managing several derivatives based mandates for NPPERS, including enhanced commodities indexing and core fixed income. Also NLIA ran the NPPERS “synthetic rebalancing” program, which made employed many of the basic beta management techniques that the portable alpha program would need.²¹
2. Staffing: NPPERS was not adequately staffed to handle beta management.
3. “Reputational” Risk Management: “We felt that the portable alpha concept would already represent a significant departure from peers in public pension management” explains Nick Claus, “and so for betas, we preferred to hire a well known and respected outside provider”.

The first reason was the most important. “Had it not been for the historical relationship with NLIA, we might have brought the beta management in house” says Claus, who also felt that the choice of whether to outsource would necessarily vary by institutional investor, depending on staffing, risk profile and trading savvy/experience.

¹⁹It is beyond the scope of this case study to delve into the subject, but the deficiencies of optimizers are at their maximum when analyzing hedge fund data, since optimizers tend to focus on extremes in the data, ie, lower volatility or high average return products, which in the case of hedge funds can be simply the result of bad data. One of the services an investor gets from the better fund of funds or asset consultants, is their expertise in dealing with these data limitations and lack of good hedge fund benchmarks, to build robust portfolios.

²⁰Bundled portable alpha products (see footnote 4) are already fully outsourced, by definition, so this section applies only to alpha pool types of structures.

²¹See footnote in section 4.2 for a discussion of synthetic rebalancing.

While the answer to “what’s the best way to get beta?” may be unclear, there was little doubt at NPPERS that “beta management is difficult”. As Bill Weinachten from NLIA put it, “discussions of portable alpha tend to focus on alpha sourcing, as most people think beta is the “easy part.” However, there are several issues involved which, if not carefully considered, can undermine an entire portable alpha program. “In beta management, operational issues drive everything” added Claus, “it’s the tedious but important stuff”. Specifically, operational issues include:

- document drafting and creation (e.g., ISDA’s),
- collateral management,
- counterparty credit analysis,
- security selection (futures vs swaps), and
- rebalancing.

With NLIA’s help, the NPPERS investment team made a plan on how to address these areas:

Collateral: This is an implementation issue that portable alpha discussions frequently overlook. What it means in practice is that for every \$100 of assets in a portable alpha structure, one does not actually have \$100 of exposure to the underlying alpha product (fund, strategy, etc), since part of the assets have to remain as margin or “cushion,” to deal with fluctuations in the market prices of the derivatives instruments used to create beta exposure. This cash drag dampens the alpha pool’s active risk that can be effectively “ported” on a benchmark. In discussions with NLIA, it was decided that the NPPERS alpha pool would keep a cash reserve of a little more than 20% of total exposures to use as cushion,²² funds which could be accessed daily to met any cash requirements. To offset the risk-diluting effects of this cash balance, effectively a form of “underinvestment”, NPPERS chose to build an alpha pool targeting higher active risk than had it been a stand alone product. This was possible because a few of the alpha pool managers offered more aggressive (i.e., higher tracking error), but otherwise identical, versions of their products. Thus NPPERS could invest fewer dollars in those managers

²²This buffer was far higher than what was actually required to meet regulatory margin, which would be approximately 5-7%. However, holding only those lower balances would be equivalent to assuming that the fund could raise cash daily to replenish the cash buffer, in a period of protracted beta drawdown. This would not be the case with the NPPERS alpha pool, or portable alpha in general. Broadly speaking, the liquidity of an alpha pool is driven by the liquidity terms of the underlying managers or funds, and in the case of hedge funds, monthly or quarterly liquidity are the norm. In addition, many managers also impose an up front “lock-up” period of a year or two, during which no funds can be withdrawn. In the case of NPPERS, because the beta exposures were generated through swaps that were reset only monthly, and because some of the alpha pool managers allowed monthly withdrawals, the investment team had to set aside a cash amount that would address any reasonably forecastable one-month drawdowns of a portfolio made up of S&P 500 (approx. 80%) and Lehman Aggregate (remaining 20%). In the absence of a precise rule or formula, the final size chosen for the cash balance was arrived subjectively, driven in large part by NLIA’s experience with the mechanics of derivatives trading and knowledge of market cycles.

while still gaining the desired risk exposures, thereby freeing up cash for collateral.²³

Beta Selection: Since the beta exposure in a portable alpha program is created through derivatives trading, the attractiveness of using a given index as benchmark is a function of the cost of replication, and/or the tracking error imposed.²⁴ The nature of these costs varies by which derivative instrument was chosen. For example, futures need to be “rolled” to preserve long-term beta exposure, however the roll imposes costs due to trading commissions, and also “basis risk.”²⁵ Also, futures don’t perfectly track underlying indices, i.e., they have tracking error. In the case of swaps, there is no tracking error, since the swap counterparties promise to deliver the exact return of the index, however there is an implicit financing cost, or spread, built in to the swap, which is the “premium” required by the swap providers to compensate for the cost of guaranteeing the exposure. Again supply/demand, as well as the underlying benchmark’s liquidity and how easy it is to hedge, would dictate the financing cost.²⁶ Bottom line, no index or benchmark can be perfectly replicated at zero cost. Whether due to tracking error, trading commissions, or various implicit costs (like rolling futures or swap financing), any derivatives-based exposure will deviate, usually lag, the index or benchmark it was designed to replicate. However, some benchmarks are easier and cheaper to replicate.²⁷ According to NLIA, who helped guide NPPERS’ benchmark selection, the “best” benchmarks to use are the S&P500, U.S. Treasuries, and Mortgage-backed securities. Next on the scale, but still fairly cheap and attractive, are MSCI EAFE and Russell 2000. Less attractive yet are the more illiquid and atypical

²³One manager offered a version of their product seeking 2x NPPERS’ target tracking error, while another offered a version 4x as aggressive. As a result, these managers only received half and a quarter of their budgeted allocations, in dollar terms.

²⁴Still in the spirit of the definition of tracking error we have used throughout this case study, in this particular situation, the term is used to refer to the discrepancy between the returns of the index and the derivative instrument used to replicate it.

²⁵Rolling involves selling out of the near-maturity contract and buying into a longer maturity contract, thus extending the beta exposure period beyond the term of any individual contract (which tend to be 12 months or less). However due to supply/demand forces in the futures markets, contracts tend to trade at a “premium” or “discount” to their underlying benchmark at any point in time. The basis risk in rolling futures arises from the fact that the contracts being sold and bought during a roll likely have slight differences in basis, due to different demand/supply across maturities. Note that while we refer to this as a cost, it can in theory be a “gain” at times, however historically many indices roll with a loss.

²⁶As was the case with futures, we use the term “cost” because most of the time this financing spread is a drag on the returns of the swap, however this does not have to be the case. For example, market practitioners report that in the Spring of 2006, one could effectively “get paid”, ie incur a negative spread, to put on a swap delivering the Russell 2000 index, the reason being that apparently there was so much demand by traders to short small cap stocks, that Wall Street desks were willing to pay hedgers to step up and buy small cap exposure, ie, Russell 2000, and thus help offset the desks’ short exposures elsewhere.

²⁷It is important to note that the issue is not simply due to derivatives implementation. In fact, every investor in traditional index funds, which tend to trade underlying stocks, is very familiar with the fact that they cannot exactly match the return of the underlying index, even before fees.

equity benchmarks, such as Russell 1000 or Russell 3000, or MSCI All Country (which includes emerging markets). Finally, on the other end of the spectrum are various exotic betas/indices, such as emerging markets, micro cap stocks, etc.

Taking the above into consideration, the team and NLIA chose a beta pool portfolio of S&P 500, Russell 2000 and, on the fixed income side, a combination of Treasury Bond and MBS exposures.²⁸

Instrument Selection: With benchmarks selected, the final decision was regarding type of instrument — a choice between futures or swaps. Futures had the edge in “user-friendliness”, since they were exchange-traded. Also, given the exchange’s heavy regulatory oversight over futures brokers, the need for individual investor’s counterparty credit monitoring was significantly mitigated. In addition, futures required far less work in terms of setting up documentation, and since all futures investors “face the exchange” and are subject to standard margin requirements, there would be no issue with NPPERS being an “unknown” vis-à-vis Wall Street.

Swaps were the opposite. Their over-the-counter and less regulated nature meant that compared to futures, swap transactions incurred a far greater, but still small, risk of default by the counterparties. Trading swaps therefore would require the ability to assess, and then monitor, creditworthiness of counterparties. Also swap contracts were ruled by standard, but still complex, documentation called ISDA agreements (International Swaps and Derivatives Association). These documents were negotiated with each counterparty, and dictated the terms that could make a swap attractive or not, such as collateral requirements (amount and type), thresholds for collecting accrued gains and losses, settlement periods, etc. An institution that was unknown to Wall Street, at least in terms of swap trading, would likely have limited bargaining power in setting up ISDA’s, and could be saddled with onerous terms.

Still, the team chose swaps.²⁹ NLIA believed futures were less optimal for generating long-term passive beta exposures, because of tracking error and

²⁸Technically, NPPERS’ domestic fixed income benchmark was the Lehman Aggregate. However, NLIA advised them it was a meaningfully inefficient and expensive benchmark to replicate synthetically (i.e., through derivatives), because the corporate bond exposure, which made up roughly 20% of the Lehman Aggregate, was inefficiently priced. Therefore, NPPERS decided to split the benchmark into its underlying exposures, Treasuries, MBS and Corporate, and only use the first two as part of the beta pool.

²⁹Specifically, these were “total return swaps”, with either monthly or quarterly settlement, as well as intra-month trigger points for settling in case of large market moves.

the costs of rolling the contracts and posting cash collateral. In all these respects, they felt swaps would be somewhat more cost-efficient in the long run. “While swaps have more operational risk due to their over-the-counter nature, we were extremely comfortable going down this path given our respect for the strong team assembled at NLIA,” said Claus. As the agent for NPPERS, NLIA would negotiate the ISDA’s and also perform the counterparty analysis and monitoring on behalf of NPPERS.

Sizing Beta Exposures: The question of “how much” beta to add to an alpha source seems fairly straightforward — “100%” seems the obvious answer. However that is generally not the case. In fact, the answer depends crucially on two other questions: 1) how much beta is already being delivered by the alpha sources used (e.g., a portfolio of hedge funds, or a hedge fund of funds), and 2) is it the “right” beta, in other words, how correlated to the desired beta exposure (e.g., large cap vs. small cap, equities vs. bonds, etc)?

To illustrate the first question, imagine the goal is to replace a traditional large cap manager with a portable alpha product benchmarked to the S&P 500, with alpha being provided by a portfolio of long-short equity hedge funds. In this case, how much S&P500 beta to “buy” (through futures or swaps) depends on how much large cap beta is currently in the long-short portfolio. As is well known,³⁰ most long-short equity managers display significant beta, as they typically do not target market neutrality, but rather tend to be net long stocks. Also, the amount of this net long exposure can vary over time. Therefore to know how much beta to add in this example, a beta manager would have to receive reasonably precise and timely data on the current net long equity exposure of the underlying alpha portfolio managers, whether individually, or perhaps, aggregated in the case of an alpha pool.³¹

As for the second question (“is it the “right” beta?”), let us use one of the most oft-cited portable alpha examples. Suppose a plan sponsor has invested with a skilled small cap manager, i.e., one that generates alpha, however the plan wants to reduce exposure to the small cap sector overall, and increase the exposure to core fixed income (perhaps to reduce overall portfolio risk). In this case, unlike the example above of the long-short equity managers, the

³⁰See “Do Hedge Funds Hedge”, and “An Alternative Future Parts I and II”.

³¹We are abusing terminology here, clearly. The term “alpha portfolio” or “alpha pool” in this case is not meant to indicate a pure alpha source, but rather the source from which the alpha will be obtained, although it might bring along some other less desirable things as well...

beta pool is not merely complementing the beta of the alpha portfolio, but rather it has to replace the existing beta, usually by shorting one index exposure (small cap stocks) and going long the desired exposure (core fixed income).

NPPERS was able to sidestep many of these considerations through the alpha pool's design. As previously mentioned, the alpha pool was the outcome of an RFP and due diligence process with a high focus on **market-neutrality** in the composite manager mix. Therefore, NPPERS and NLIA decided to proceed with the beta implementation assuming the alpha pool was long-term market-neutral (i.e., had no passive betas), so it could be directly overlaid on the beta pool. And more importantly, the beta pool itself would be sized to achieve 100% exposures to the desired benchmarks. This assumption effectively allowed NLIA to run the beta pool independently of the specific composition of the alpha pool. The only inputs needed were the target size of the portable alpha program, and the desired asset class/beta mix.³² To ensure the soundness of this market-neutral assumption, NPPERS still requires its alpha pool managers to report, on a weekly or monthly basis, their exposures to major systematic risks, such as equity markets, credit and interest rates. While this data is not used to manage the beta exposure of the portable alpha program, it is used to monitor that the hedge fund managers are sticking to their market-neutral discipline, and that any betas that appear are a result of tactical bets, not some systematic bias creeping into the investment process.

5. Putting It All Together and Lessons Learned

Once the pieces were in place, the transition was quick. During the last week of September, 2004, NPPERS redeemed two active U.S. equity products, which generated proceeds of \$500 million. An additional \$400 million was sourced from the existing in-house S&P500 indexing program (about \$300 million), and proceeds from a reduction in the TIPS allocation (about \$100 million). This resulting \$900 million was used to fund four alpha pool managers on October 1, 2004, as well as to provide

³²NLIA is involved in other portable alpha implementations where the alpha pool is not built market-neutral. In those cases, the clients do gather data on "beta" exposures from the underlying hedge fund managers, and convey the information to NLIA, who takes it into account when sizing the beta portfolio. However, even in such instances, NLIA urge clients to only measure the long-term or "permanent" component of beta present in the alpha portfolio, not short-term fluctuations. The reason being that many short-term beta changes are difficult to estimate and act upon in real time, and more importantly, might be the result of alpha manager market timing bets, which should not necessarily be offset by the beta manager.

the approximately \$200 million cash collateral for the beta pool run by NLIA (as explained previously, see section 4.4).³³

Early results have been promising, with the program generating positive alpha during the first two years (net of the costs of financing the beta positions).³⁴ But, beyond the impact on performance, Claus feels that the greatest revolution brought about by the portable alpha program has been a change in mentality at the staff and board level, towards “flexibility”, in portfolio construction and alpha sourcing, and towards “risk/return disaggregation”, releasing the ties between asset allocation and alpha generation. “Ideally, the whole portfolio would be portable alpha”, he says, “that’s the power of looking at investments this way.” His remark is quickly followed by the observation that in his view, NPPERS’ biggest obstacle to expanding the portable alpha program is identifying and gaining access to “institutional quality” alpha managers. It is therefore probably no coincidence that as this case study was being finalized, NPPERS had announced the hiring of a Manager of Hedge Funds and further build-out of internal resources dedicated to overseeing its hedge fund effort.

³³A fifth alpha pool manager, Glacier, was already part of the fund’s market neutral allocation at the time of the program’s implementation, while the sixth and final alpha manager, another fund of hedge funds, was added a few months later, with proceeds from an existing core fixed income allocation (which was then synthetically replicated in the beta pool).

³⁴One unexpected obstacle that arose early on was reporting, which like collateral management, is another example of a practical implementation issue overlooked in most conceptual discussions of portable alpha. The cause of the difficulty has to do with subtle issues surrounding the nature of the investments in the program. The portable alpha program consists of two types of investments: 1) beta exposures achieved synthetically through derivatives, and 2) the alpha pool. As those who are familiar with derivatives already know, the returns generated by derivatives are not equal to the underlying benchmark return, but rather the benchmark returns net of implicit financing costs (usually libor plus some premium or spread). On the other hand, the market-neutral managers in the alpha pool in theory should deliver a return that is greater than some relevant short rate (e.g., libor), since that is the expected return of a zero beta asset, ie, the true benchmark for market-neutral managers. When you add it all up, total portable alpha returns are still of the type “beta+alpha”, ie, the beta pool delivers “beta – cash” returns and the alpha pool delivers “cash + alpha” returns, but to see that requires that the custodian and back office systems “adjust” the reported returns of the alpha and beta pool constituents, so that they’re expressed as “benchmark” and “excess of benchmark”. Because of the non-standard nature of this accounting and reporting, setting it up took up significant time from staff, consultants, NLIA and the custodian, during the early months of the program.

Disclosure:

All return targets presented herein are net of fees.

There is a risk of substantial loss associated with trading commodities, futures, options and other financial instruments. Before investing or trading, investors and trading counterparties should carefully consider their financial position and risk tolerance to determine if the proposed trading style is appropriate. Investors and trading counterparties should realize that when trading futures, commodities and/or granting/writing options one could lose the full balance of their account. It is also possible to lose more than the initial deposit when trading futures and/or granting/writing options. All funds committed should be purely risk capital.