INVESTMENT SECTION

"A KNOWLEDGE COMMUNITY FOR THE SOCIETY OF ACTUARIES"

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RISKS AND REWARDS

THE NEWSLETTER OF THE INVESTMENT SECTION

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Better Liability Benchmarks for Defined Benefit Plans

by Aaron Meder and David Lavelle

Across the globe, there is a growing interest by defined benefit plan sponsors in designing investment policies that better incorporate the liability structure of plans. Specifically, the focus has been on the funding ratio, that is, the ratio of the market value of plan assets to the present value of plan liabilities. This is attributable to two primary factors: First, a large drop in funding ratios occurred during the 2000 to 2002 period, as a result of a simultaneous drop in equity markets, which lowered plan asset levels, and falling interest rates, which increased plan liabilities. Second, and perhaps more importantly, global pension reform continues apace and is providing greater incentives for sponsors to reduce funding ratio volatility, or face increasingly difficult financial statement considerations.

Successful implementation of a liability-based investment strategy requires the construction of a benchmark that represents the performance of a plan's liabilities:

- In a first step, an appropriate cash flow structure that approximates the liability structure of the plan must be developed.
- Second, the benchmark needs to be investable.

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SOCIETY OF ACTUARIES

RISKS AND REWARDS

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Chairperson's Corner

by Cathy Ehrlich

Over the last several years, the SOA has worked to strengthen the role of the Sections. This change coincided with the elimination of the Practice Areas and meant that the Sections were now responsible for providing a grassroots community, content for basic and continuing education, research and connecting to the strategic direction of the Society. As with any corporate reorganization, this new structure was described and documented in lengthy PowerPoint presentations complete with flowcharts, goals and suggested roles for all. The Investment Section Council dutifully spent many hours discussing these new roles and responsibilities and figuring out how nine busy people would take on all 13 suggested roles while still keeping their day jobs!

At almost the same time, the Risk Management Section was established allowing the Investment Section to get back to the business of investments. However, the spin-off of the Risk Management Section gave the Investment Section Council a bit of an identity crisis—for lack of a better term. As the name of our newsletter suggests, the business of investments has always involved the balancing of risk and reward. What was the Investment Section supposed to be about if risk was another section's responsibility?

As a way of better understanding the expectations of our membership during this period of change, we designed a Web-based survey. Happily, many of you took the time to respond to the survey and share your thoughts on what you need from the Investment Section, what we are doing well and where we are falling short. Donald Krouse has summarized the results of the survey and reported on them in this issue.

One of the first results from the survey that struck me was the high level of investment expertise shared by our members. I have spent the majority of my career simultaneously explaining investment concepts

to actuaries and actuarial concepts to investment professionals. In the early years, there was very little understanding on either side. Now there are a great number of our members who have the same expertise—if not the same credentials—as investment professionals.

The most tangible evidence of this level of expertise has been in the reinvigoration of the Investment Actuary Symposium. The symposium has expanded beyond topics that would only be of interest to investment actuaries. Now the event covers topics of interest to investment professionals in general—such as alternative investments, hedging and replication strategies and securitization. Last year, the Investment Section partnered with PRMIA to expand the audience for the symposium beyond our traditional actuarial membership and had over 350 attendees. This year, we are continuing to build on that momentum and have renamed the event the SOA/PRMIA Investment Symposium in recognition of its appeal to a wider group of investment professionals. I encourage all of you to attend the symposium this year which will be held on April 18-20 in New York City.

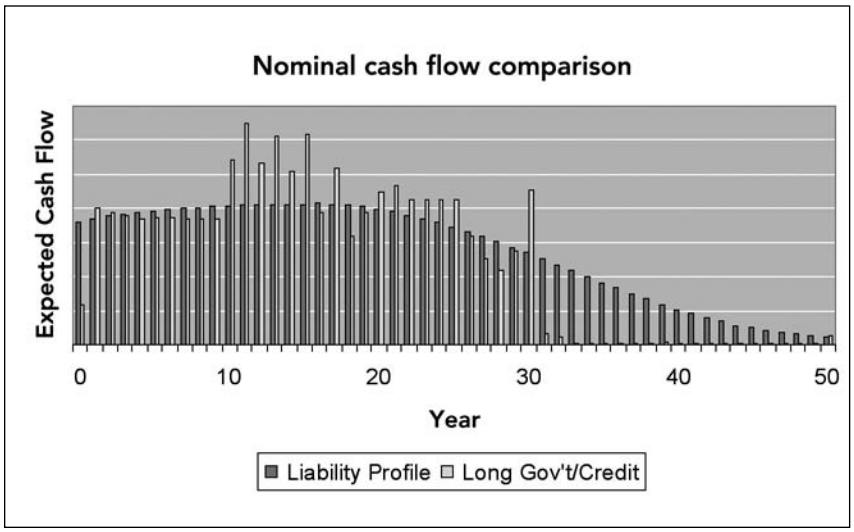
A second interesting result from the survey for me was that despite the reorganization, our members' most basic need continues to be for content—new knowledge and techniques that they can employ in their investment-related responsibilities at insurance companies, pension funds, banks and asset management firms. One of the most important ways of delivering this content is the one you are holding in your hands right now—the *Risks and Rewards* newsletter. Despite all the technology that is available to us, nothing replaces the convenience and accessibility of our traditional newsletter. This year the Investment Section Council will work to provide more support to our flagship publication. In addition, we will also be exploring other ways of delivering content to you—an updated Web site and webcasts are being discussed.

In the end, the Investment Section continues to do what it has always done—provide our members with content—through articles, meetings, symposia and seminars. And thanks to all of you who write, edit, recruit and speak—it seems to be working!

Catherine E. Ehrlich, FSA, MAAA, is an investment actuary with Swiss Re Life & Health America in Armonk, N.Y. She can be reached at Catherine_Ehrlich@swissre.com.

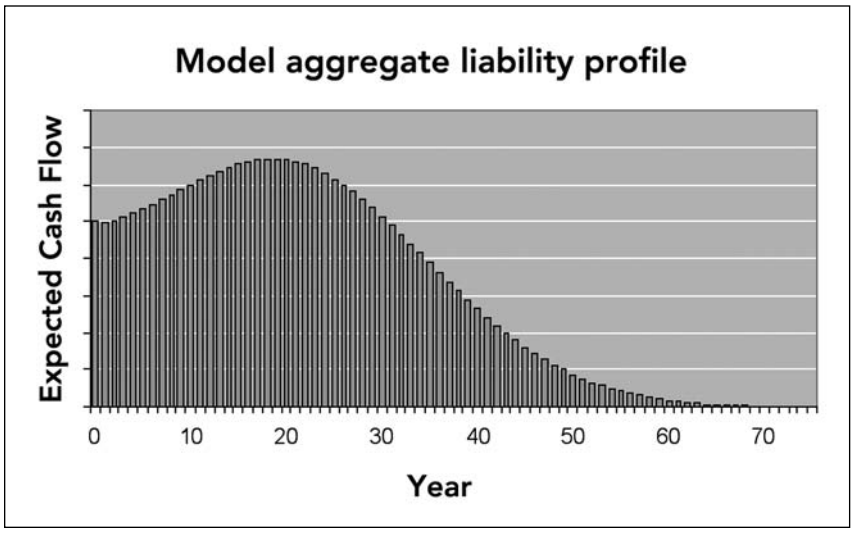
From page 1

Exhibit 1



Source: UBS Investment Bank, Lehman Brothers.

Exhibit 2



Source: UBS Investment Bank, Lehman Brothers.

The currently published indices available to sponsors and managers lack one or both of these important criteria, in our opinion. Either they are not directly investable, or they do not accurately mimic the interest rate exposure of a particular pension liability, because the underlying constituents of the index bear insufficient resemblance to an actual pension liability profile.

Thus, to provide plan sponsors, consultants and investment managers with a more useful starting point to compare their plan liabilities to, UBS partnered with International Index Company (ICC) to introduce a new suite of iBoxx U.S. Pension Liability Indices. The indices are designed to represent typical pension liabilities, and are modular so as to allow blended construction of a customized liability index for most plans. The new modular indices are:

- **iBoxx U.S. Pension Liability Index–Aggregate**, which mimics the overall performance of a model defined benefit plan in the United States, taking into consideration the passage of time and changes in the term structure of interest rates.

- **iBoxx U.S. Pension Liability Index—Active Member,** which mimics the overall performance of an active (non-retired) member liability profile for a model U.S. defined benefit plan with the same considerations as the Aggregate Index.

- **iBoxx U.S. Pension Liability Index—Retired Member,** which mimics the overall performance of a retired member liability profile for a model U.S. defined benefit plan with the same considerations as the Aggregate Index.

As outlined above, constructing a liability benchmark is a two-step process. First, a liability cash flow profile needs to be developed and second, the discount curve to calculate the present value of the cash flow profile needs to be selected. We discuss each of these issues in turn, followed by an example of how these indices can be combined to create

custom benchmarks for virtually any specific plan's liability profile.

Developing the liability cash flow profiles

Plan sponsors, consultants and investment managers create liability benchmarks to evaluate the performance of their investment strategies relative to the performance of a plan's liabilities. Changes in interest rates are one of the main drivers of liability performance. Therefore, the liability benchmark should accurately mimic the interest rate exposure of pension liabilities. Since the liabilities are discounted using the entire yield curve, the liabilities are sensitive not only to interest rate changes, but also to changes in the slope and shape of the yield curve. Accordingly, an appropriate liability benchmark must not only mimic the sensitivity of the liabilities to changes in interest rates, but also the slope and shape of the yield curve. Therefore, it is crucial for the actual liability profile to be reflected in the constituents of the benchmark. It is not enough to focus only on mimicking the duration of the liabilities. We must also strive to mimic the key rate duration of the liabilities across the entire yield curve.

For example, one common approach is to use a long-dated benchmark consisting of government and corporate bonds. The disadvantage of this approach is that even if the overall duration of the benchmark matches that of the liabilities, the key rate durations almost certainly will not match. In other words, this benchmark would have the same sensitivity as the liabilities to changes in the level of interest rates, but would not have the same sensitivity to changes in the slope or shape of the yield curve. This is shown in Exhibit 1 on page 4, which compares the expected cash flows for an actual liability profile to a long-dated index consisting of government and corporate bonds with 10-plus years to maturity. These two streams of cash flows have approximately the same duration of 11 years, but they do not have the same sensitivity to changes in the slope or shape of the yield curve.

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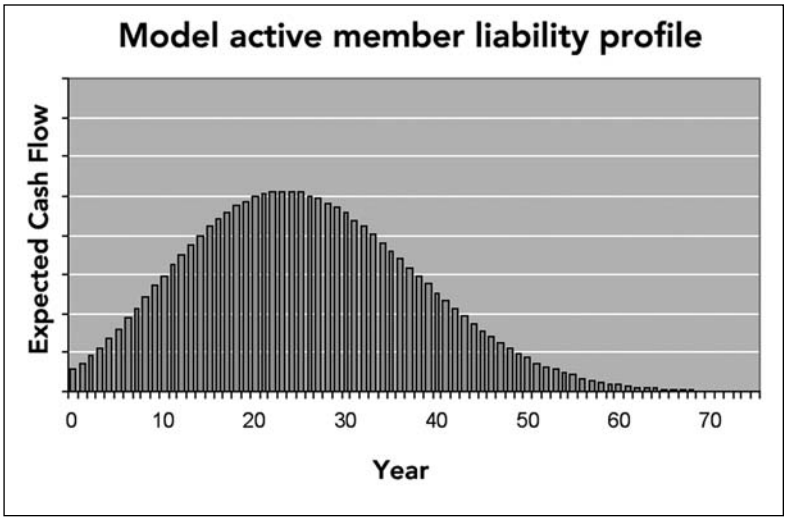
Exhibit 3



Source: Hewitt Associates

Exhibit 4

Source: Hewitt Associates

From page 5

Thus, the iBoxx U.S. Pension Liability Index—Aggregate uses liability cash flows that represent the model cash flows for a traditional defined benefit plan in the United States. Hewitt Associates, a global human resources services firm that consults on and administers defined benefit plans for thousands of large U.S. companies, provides representative cash flow data for the iBoxx U.S. Pension Liability Indices. The profile for the aggregate index is shown in Exhibit 2 on page 4.

However, not all pension liability profiles are like the model. Some plans have more mature populations and correspondingly shorter durations; some plans have less mature populations and correspondingly longer durations. As a result, this aggregate index may not provide a close enough match for all liability profiles. Thus, we split the aggregate index into an active member index and a retired member index that can be recombined using optimal weights that minimize the tracking error versus the actual liability profile. The liability profiles underlying the iBoxx US Pension Liability Index—Active Member and the iBoxx US Pension Liability Index—Retired Member are shown in Exhibit 3 and Exhibit 4, respectively on page 5.

Table 1

As of August 24, 2006	Active Member	Retired Member	Aggregate
Duration	17.7	8.0	13.1
Yield	5.5%	5.5%	5.5%

Source: Credit Delta

Table 2

As of August 24, 2006	Aggregate	Sample Profile	Retired Member
Duration	13.1	11.7	8.0
Yield	5.5%	5.5%	5.5%

Source: Credit Delta

Constructing a Customized Liability Benchmark from These Component Indices

As previously mentioned, depending on the proportion of active members to retired members, a particular plan sponsor may have a liability profile significantly different from the model aggregate liability profile. Looking at the extreme cases of a profile with only active members and another with only retired members versus the aggregate profile, Table 1 (to the left) shows that duration and the corresponding interest rate exposure can be significantly different.

For pension plans with liability profiles significantly different from the aggregate index, using the iBoxx U.S. Pension Liability Index—Aggregate as a benchmark may produce too large a tracking error relative to the actual liability benchmark. In these cases, a combination of the indices can be used to derive a customized liability benchmark with far less expected tracking error.

Table 2 in the left column shows an example of a sample liability profile that is more mature than the iBoxx U.S. Pension Liability Index—Aggregate. This liability profile has a duration significantly lower than the aggregate index, but higher than the retired index.

Using our proprietary modeling tool, we can optimize the combination of the indices in order to minimize tracking error relative to the actual liability. For this particular profile, the optimal combination of subindices is 61 percent of the retired index, and 39 percent of the active index.

Table 3 on page 7 details the tracking error relative to the actual liability for the aggregate benchmark and the optimized benchmark. The tracking error was almost eliminated in constructing the custom benchmark from the active and retired components.

Selecting the Discount Curve

When selecting the discount curve for a liability benchmark, the curve needs to be directly investable and representative of a pension plan's interest rate exposure. According to the Financial Accounting Standards Boards, which regulates the accounting of pension assets and liabilities, and the recently enacted Pension Protection Act of 2006, the expected liability cash flows should be discounted using the high-quality corporate bond yield curve.

Others have constructed the yield curve based on the yield of high-quality cash bonds that match the cash flows of the liability. Unfortunately, pension liability cash flows extend up to and beyond 50 years and high-quality cash bonds are extremely scarce past 20-year maturities. Therefore, constructing a yield curve this way would result in a hypothetical yield curve, based on a high degree of estimation. Importantly, a benchmark utilizing this yield curve would not be directly investable or replicable. Another approach is to use the Treasury yield curve as the discount curve; however, this does not reflect the credit spread embedded in the corporate bond yield curve.

We believe it is best to employ the extremely liquid, long-dated and high-quality yield curve based on LIBOR interest rate swaps, for the following reasons:

- Given the liquidity of interest rate swaps at both the short and long ends of the curve, a liability benchmark based on the swaps curve is far more investable than one based on a hypothetical yield curve.
- We prefer the LIBOR swap curve to the Treasury curve because it meets the definition of high quality and, therefore, will be representative of a pension plan's interest rate exposure to the corporate bond yield curve.

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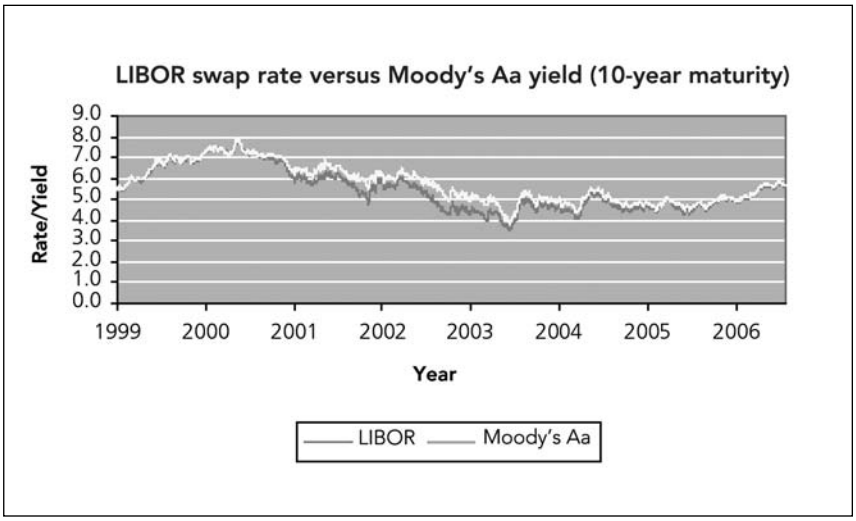
Table 3

	Sample Profile	Aggregate Index	Optimized Benchmark
Duration	11.7	13.1	11.7
Tracking error vs. sample profile	0%	1.1%	0.1%

Source: Credit Delta

Exhibit 5



Source: UBS Investment Bank, Bloomberg

From page 7

This is demonstrated in Exhibit 5 on page 7, which plots, for the 10-year maturity, the LIBOR interest rate swap rate versus the Moody's Aa corporate bond yield (constant maturity), for the past 7.5 years (January 1999 – July 2006).

The LIBOR curve provides a very close estimation for corporate bond yields at this 10-year maturity point with a correlation over this time period of .98. Our research shows that a similar degree of match occurs across various yield curve maturity points. While reliable empirical data do not exist for comparing longer-dated maturities, we posit that there is no better approximation of the true long-dated corporate yield curve than these LIBOR swap rates. Thus, the LIBOR swap discount methodology employed for the iBoxx U.S. Pension Liability Indices is most appropriate for constructing liability benchmarks for U.S. pension plans.

Conclusion

With the recent passage of the U.S. Pension Protection Act and a global move toward pension funding reform, the ability to quickly and accurately track a pension fund's ability to meet future obligations is critical. The iBoxx suite of three indices offers what we believe is the most accurate and comprehensive pension liability benchmark available today.

To manage the funding ratio more effectively, plan sponsors must develop solid investment strategies that consider plan liabilities in addition to many other factors. The iBoxx indices provide investable and appropriate benchmarks for such strategies, accurately reflecting the interest rate exposure of a particular liability stream and allowing blended construction of a customized liability index for most plans.

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Investment Section Survey Results

by Donald R. Krouse

Last year, the Investment Section Membership was surveyed to determine the value and importance placed on Investment Section topics and activities.

Twenty-one questions were asked relating to specific Investment topics. For each, respondents were asked how valuable each topic was to them (high, moderate or somewhat) and how adequate the Investment Section Council (ISC) was at addressing these needs (more than adequate, adequate, inadequate).

Eighteen questions were asked relating to ISC functions and activities. For 11 of these, respondents were asked how valuable the activity was to them and also how adequate the ISC is at providing the activity. The remaining seven questions asked of the importance of the ISC providing activities such as the *Risk & Rewards* newsletter, sessions at SOA meetings, seminars, research, etc.

Of the close to 4,100 members in the section, only 155 (less than 4 percent) responded. Of these, 54 percent work for life insurance companies and 27 percent work for consultants. Thirty-five percent identified themselves as having a risk management or investment management role, 34 percent valuation (including pension valuation), and the rest were from pricing, regulation, and other areas.

The summaries and conclusions presented herein reflect the opinions of these respondents.

Investment Topics

Respondents value the opportunity to gain knowledge, especially in regard to advanced investment topics and practical applications such as ALM and risk management. The ISC is perceived as *less than adequate* in meeting these needs. A significant value gap exists in this area.

Respondents place less value on the need for basic investment knowledge, accounting, regulation and other specialized knowledge. In these areas the value gap is significantly less (and in some cases nonexistent).

ISC Activities

Respondents identified *Risks & Rewards*, **advanced** sessions at SOA meetings, and specialized seminars/symposia as both valuable and important. The value gap in these areas is small.

Respondents also identified value in the ISC as being the go-to for research literature, experience studies, etc. In this, the ISC was identified as being inadequate: a significant value gap exists.

Respondents did not place as much value or importance on activities such as sponsoring SOA breakfasts or receptions, networking with other SOA sections, sponsoring books and sponsoring the NAAJ. Here the ISC is perceived as more than adequately addressing these topics.

Conclusion

The consistent message in the survey is the need for the ISC to more adequately address the areas that the respondents feel are important and valuable. Value gaps exist in the majority of responses. Areas in greatest need are more advanced/specialized topics: the presumption is that basic investment knowledge has already been attained by the membership.

The large value gap expressed in meeting these advanced topic needs seemingly contradicts the small value gap identified in providing sessions, symposia and *Risk & Rewards*. One possible conclusion is that, while the ISC does a good job in organizing the sessions and symposiums, the content provided at these sessions is not meeting the expectations of the membership.

The ISC has reviewed the results of the survey and is committed to improving the value proposition offered to the members. Any suggestions for specific speakers, topics, articles, research, etc. are always welcome! Please do not hesitate to contact any member of the Investment Section council with your ideas.

Donald R. Krouse, FSA, MAAA, is assistant vice president, Financial Projections, with Western & Southern Financial Group in Cincinnati, Ohio. He can be reached at donald.krouse@westernsouthernlife.com.

A New World of Fixed Income Opportunities

by Paul Abberley

North American pension plan sponsors are taking a closer look at foreign fixed income investing. There are two ways that global fixed income can benefit these plans: by providing additional less-correlated sources of return and a wider set of instruments for extracting the additional returns. (See table below)

The Benefits of Global Fixed Income Investing

The benefit of accessing these broader opportunity sets is illustrated in the following diagram on page 11. The vertical axis shows the risk-adjusted excess return (or information ratio) delivered by a portfolio in exchange for a specific level of risk (indicated along the horizontal axis) or equivalently, a specific level of target returns. The chart also illustrates how efficiently different portfolios can convert risk into returns. In particular, when the curve for a particular portfolio slopes downwards, its ability to convert risk into returns is falling.

The constrained curve shows the situation of a traditional domestic bond portfolio. As a plan sponsor targets higher levels of desired returns or risk, this curve turns downwards quickly. This reflects the fact that within a single domestic bond market, any investment manager will soon run out of top-conviction uncorrelated ideas. The manager will have to either use lower-quality ideas or additional expressions of the same basic yield curve view to try for higher returns—clearly degrading the ability to add returns per unit of additional risk.

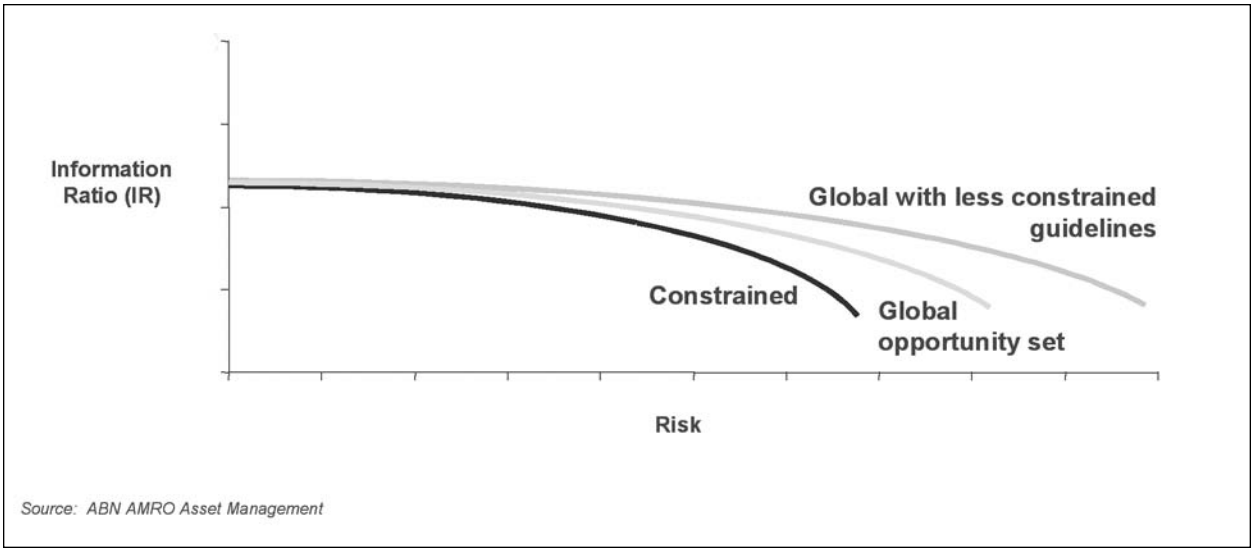
The second curve, labeled global opportunity set, shows the result of adding foreign bonds to the list of permitted securities, still within a traditional, long-only cash market bond policy framework. The greater availability of high-quality uncorrelated investment ideas allows the pension plan to achieve higher targeted risk or return levels before degradation occurs.

Finally, expanding the investment policy to permit derivatives and short positions results in the third curve (global with less constrained guidelines). In this case, with a full cupboard of bonds from around the world, as well as a complete array of investment techniques and instruments, the pension fund can achieve even higher levels of targeted returns or risk while still efficiently translating risk into returns.

Strategic Allocation or Tactical Opportunity?

In this article, we are not proposing a strategic allocation to foreign fixed income in a plan's investment policy, as we do not think we have a strong case to recommend strategic allocations. Making a strong case for a strategic allocation to foreign sovereign debt in particular implies a belief that fixed income markets in other developed countries offer a real (after inflation) long-term return differential over the domestic U.S. or Canadian market—a view we find difficult to support. Consequently, in our view, plan sponsors who simply add an allocation to sovereign

Additional Sources of Return	Wider Set of Instruments
Foreign interest rates	Futures
Investment grade foreign corporate bonds	Options
High yield corporate bonds	Forward transactions
Emerging market bonds	Credit default swaps & credit derivatives
Currency management	Active currency management



Source: ABN AMRO Asset Management

foreign bonds to the mandates of their domestic bond managers are likely to be disappointed.

Rather, we are proposing that foreign fixed income be used tactically as a source of excess return over and above the returns available in the domestic bond market. In this manner, pension plans will benefit by permitting their investment managers to access the global opportunities for additional returns using instruments that efficiently extract the alpha without bringing along an unnecessary further beta exposure.

Implications

Pension plans considering foreign fixed income investing must face a number of implications, including currency effects, governance requirements and liability mismatch.

Currency — The volatility of exchange rates is of a similar magnitude to the volatility of fixed income returns. This means that fluctuating exchange rates can have a dramatic impact on a foreign fixed income portfolio, which must be managed. Indeed, it is possible to do more than just manage the currency risk. It is also possible to use the currency management process as an additional source of portfolio alpha in its own right.

Governance — An expanded investment policy that includes more categories of assets and instruments implies an expanded scope of governance. If the additional asset types or investment tools fall outside the trustees' knowledge and comfort zones, governance problems can arise. Part of the solution may be for trustees to increase their knowledge where necessary. However, it is not reasonable to expect trustees to become subject matter experts in leading-edge derivative techniques! In our view, the other part of the solution is therefore for investment managers to build trust by being completely transparent and fully communicative.

Liability Mismatch — Pension liabilities are linked to the domestic fixed income markets. Introducing foreign fixed income assets has the potential to create an unwanted mismatch. Consequently, global fixed income management needs to continue reflecting domestic bond benchmarks. Fortunately, this can be readily accommodated by the tactical approach to global fixed income discussed above. We now turn to a more detailed examination of how to achieve this in practice.

The Domestic Plus Approach

A pension plan designed to obtain the benefits of global fixed income while managing the implications discussed previously can do so with an approach called domestic plus. The idea of the domestic plus approach is to maintain a Canadian domestic benchmark, in order to preserve the link to the plan's liabilities, while adding exposure to global assets using an overlay strategy.

In the domestic plus framework, the low correlation of the global assets reduces the overall risk profile of the portfolio. Top-down risk management is sized appropriately to the plan's own risk appetite, while the overlay mechanism lends itself readily to a fully transparent and intelligent attribution of performance across

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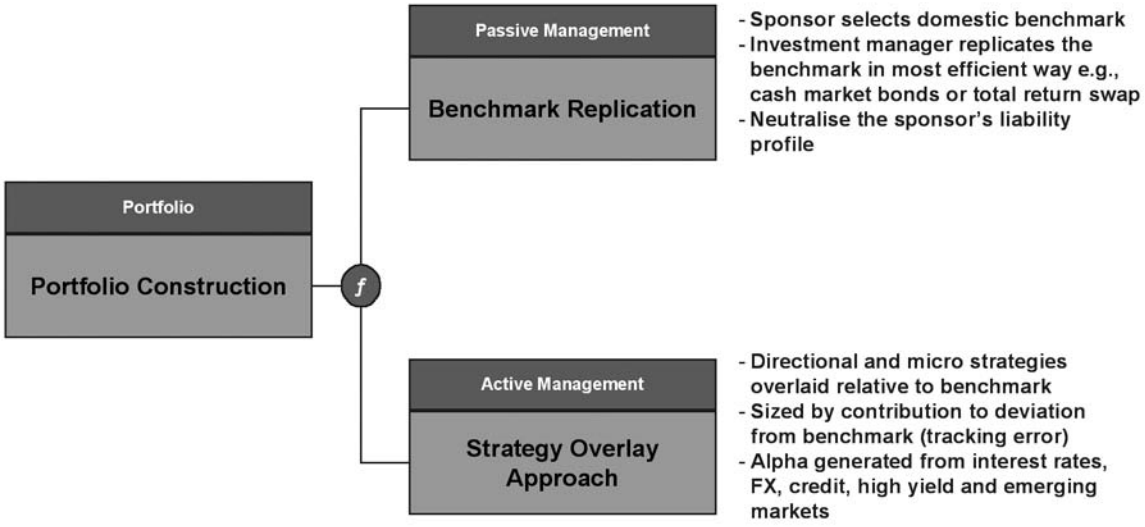
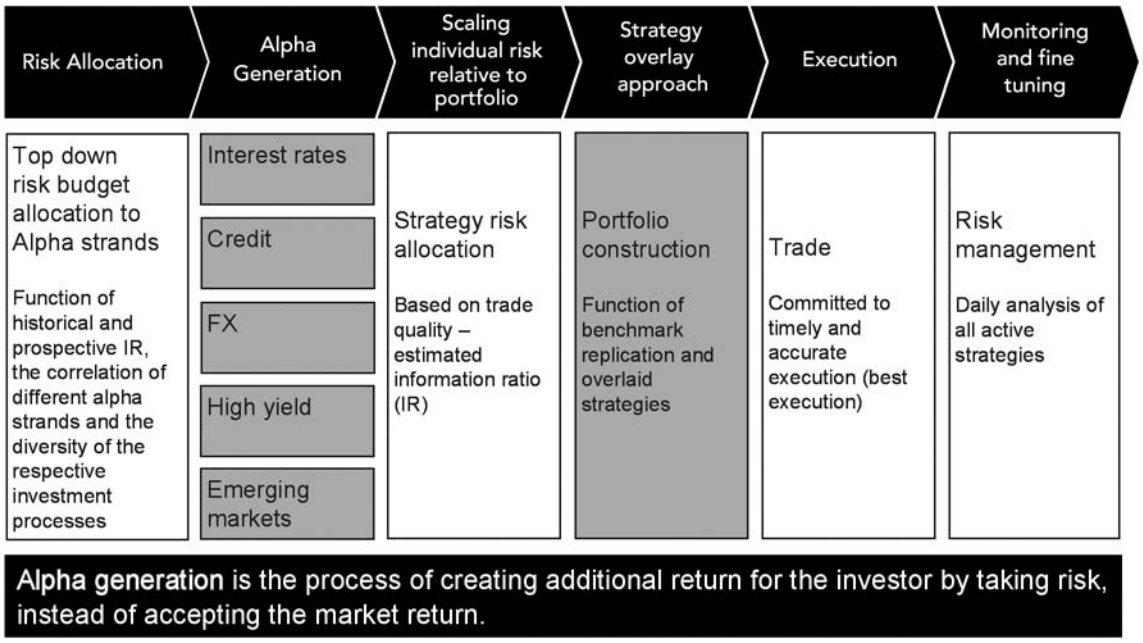
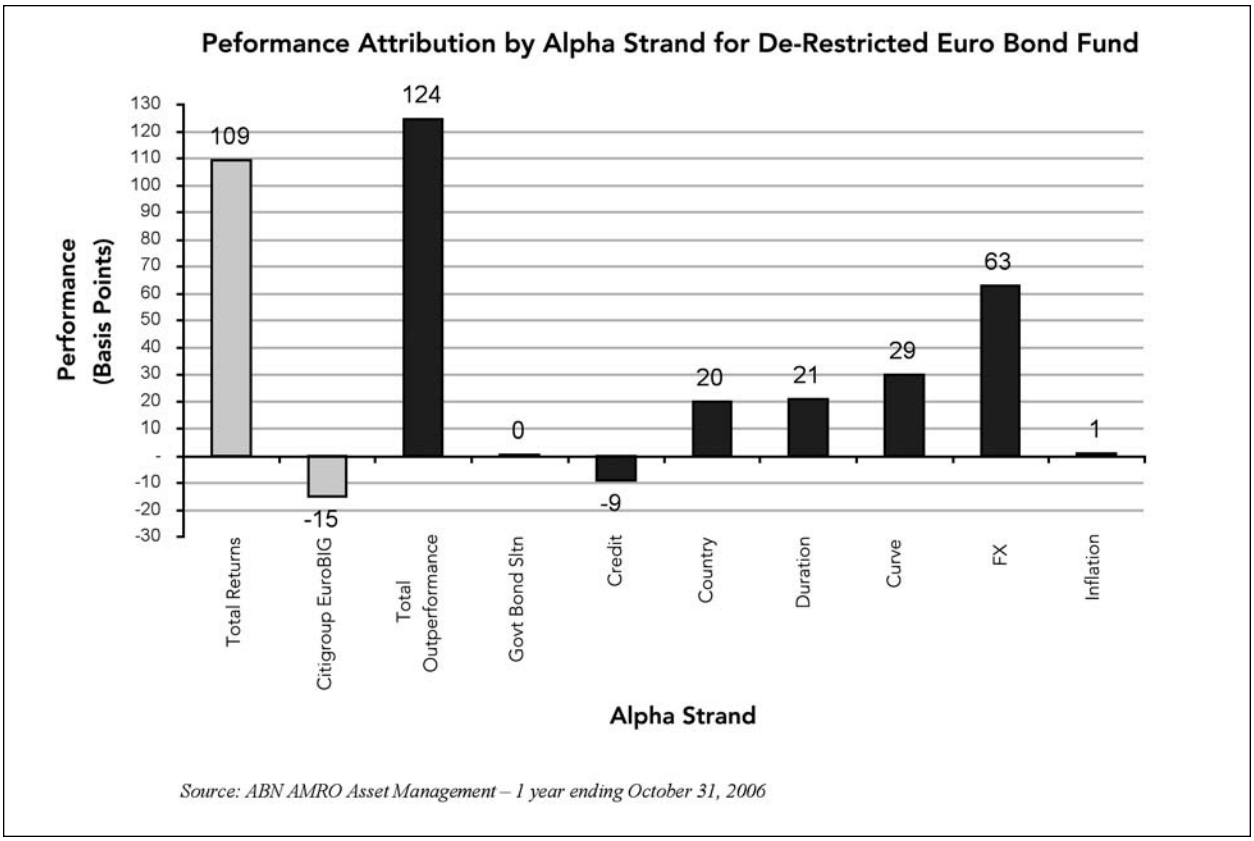
From page 11

The Domestic Plus Approach







Source: ABN AMRO Asset Management – 1 year ending October 31, 2006

the various global fixed income categories and across each individual investment decision.

Plan sponsors have different appetites for novelty as well as for risk. Some may wish to permit only those trades that will generate value relative to the underlying domestic bond benchmark; others will permit any trades in the broad fixed income world that can add value to the portfolio within its risk constraints. The domestic plus approach can accommodate the full continuum of plan sponsor attitudes. The common thread along this continuum is the use of a risk-driven investment framework in which the portfolio manager allocates the sponsor's risk appetite across a selection of uncorrelated opportunities recommended by teams that specialize in specific global fixed income alpha disciplines as illustrated on page 12.

The risk management environment ensures first of all that the portfolio is consistent with the pension plan's objectives. In addition, it contributes directly to portfolio construction by determining the size of each strategy that is used, based upon both the diversification effect and the quality of each trade. Finally, the risk management environment of the domestic plus approach provides the detailed attribution analysis required for full transparency and open communication with the trustees, as shown in the above graph.

Summary

By expanding the opportunities to diversify a pension portfolio and more efficiently convert investment risk into return, global fixed income investing can help pension plans meet their overall goals. These benefits cannot be gained by simply adding a strategic foreign bond allocation to existing U.S. or Canadian bond mandates. In contrast, a tactical, risk-driven "domestic plus" approach will enable pension plans to gain the benefits of global fixed income investing while retaining their liability-linked bond benchmarks and exercising a proper degree of governance over the fund.

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Economic Capital Models and Implied Ratings

by Tom Grondin

Economic Capital Models (ECMs) are a hot topic of discussion within the insurance industry recently. There is a lot of activity from both companies (internal ECMs) and regulators (overhauling regulatory frameworks). Of course, one of the key objectives of these ECMs is to determine the amount of capital needed to support the business.

What is the Target Level of Confidence?

There are many variations of models, but the growing standard appears to be one-year VAR models where the capital requirement is set to maintain a certain level of confidence in the fact that the company will be economically solvent at the end of one year. For company internal models, the target is set to maintain a certain claims paying rating from rating agencies such as S&P, Moody's and Fitch. For regulatory models, regulators tend to set the confidence level—at least in part—at what the implied financial strength ratings would be at that level. For regulatory models, this target confidence level essentially sets a minimum claims paying rating that companies should have to remain a going concern.

How Do Companies and Regulators Link Likelihood of Economic Insolvency in One Year to Implied Ratings?

The standard response is that they use historical default studies from the rating agencies. Following are the annual default probability tables and mean recovery rates from S&P[1] and Moody's[2]:

The most common approach is to read the probability of defaulting from either S&P or Moody's (as shown in Table 1) to establish the level of confidence needed in their ECM to support the company's target claims paying rating. For example, using the S&P data, a company that targets an AA credit rating would ascertain the probability of a company defaulting in one year to be 0.01 percent. This means that an AA company would default once in every 10,000 years. In other words, one in every 10,000 companies rated AA would default by the end of the year. Translating this to capital requirements within their ECM would target setting capital at the 99.99 percentile. If the Moody's default probabilities were used, the confidence level is ... well, let's just say higher.

Regulators have often been targeting a confidence level of 99.5 percentile. In setting this level,

Table 1: 1-year Default rates

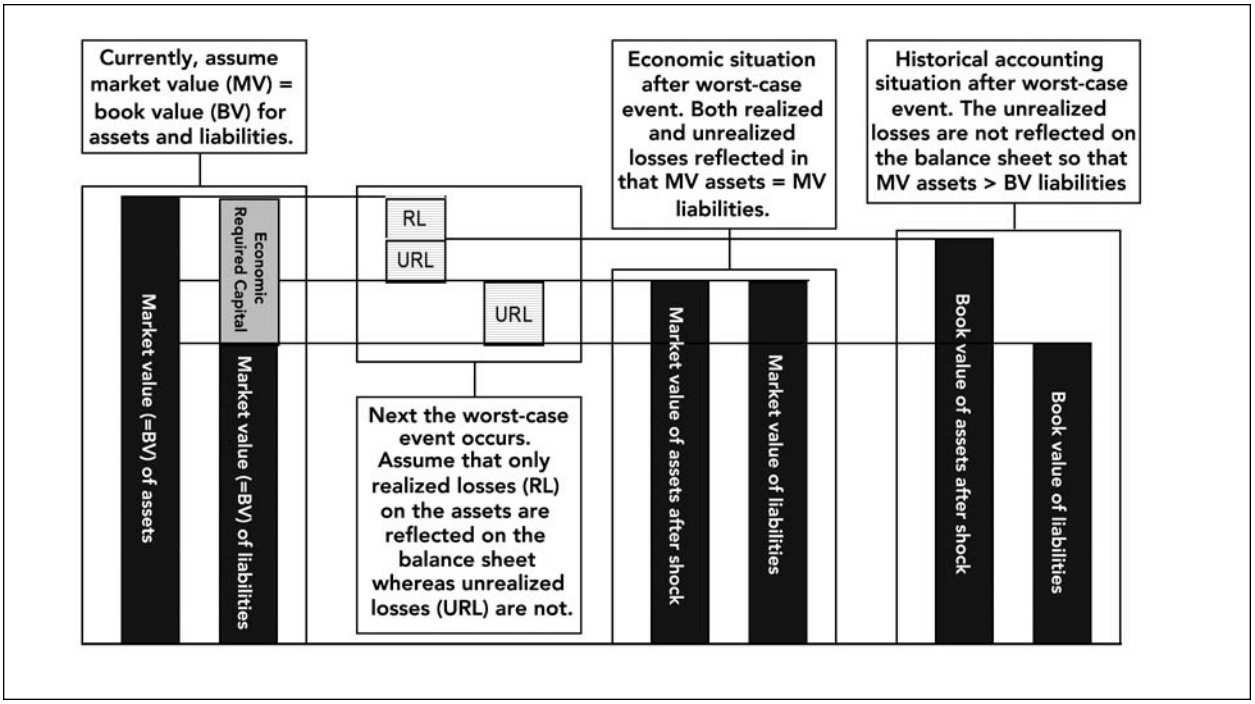
	S&P	Moody's
AAA	0.00%	0.00%
AA	0.01%	0.00%
A	0.04%	0.02%
BBB	0.27%	0.16%
BB	1.12%	1.16%
B	5.38%	6.03%
CCC/C	27.02%	23.12%

Table 2: Mean Recovery

	S&P	Moody's
Bank debt	77.5%	
Senior secured bonds	62.0%	57.4%
Senior unsecured bonds	42.6%	44.9%
Senior subordinated bonds	30.3%	39.1%
Subordinated bonds	29.2%	32.0%
Junior subordinated bonds	19.1%	28.9%

[1] Source: Annual 2005 Global Corporate Default Study And Rating Transitions

[2] Source: Default And Recovery Rates Of Corporate Bond Issuers, 1920 - 2004



they use a table similar to Table 1 to infer that this supports a BBB rating.

Using this approach to arrive at a link between target confidence levels in ECMs and implied claims paying ratings makes sense at first glance. It is unclear where this methodology started, but it is likely within the banking and consulting industry where ECMs first developed. However, this approach has startling shortcomings and we believe significantly over estimates the targeted confidence level under an economic solvency model that should be needed for a targeted claims paying rating.

What Is Wrong With This Approach?

The main problem with this approach is in the definition of insolvency itself. Rating agency historical default statistics do not reflect economic insolvency; they typically reflect a collection of approaches such as book value (statutory accounting) and cash flow or financing shortfalls resulting in declaration of insolvency. Management action and typically slow recognition of economic loss in financial reporting combine to produce a lower incidence of default, which creates an artificially high standard under an economic capital model. Management of the companies or the company's regulator (for industries that are regulated) declare insolvency or file for bankruptcy only after considering and acting upon all possible actions to avoid it. The decision to declare insolvency is not based on an economic assessment.

Under an economic framework, after a worst-case event has occurred, the market value of assets is still enough to support the market value of liabilities. The intent is that the business can be transferred to a third party at zero cost. Above is an illustration of this concept.

After a worst-case event, the realized and unrealized losses on the assets reduce the market value of assets while the realized and unrealized losses on the liabilities increases the market value of liabilities. In the above illustration, the company would be on the breach of economic insolvency whereas on a book value basis, the picture would be much more positive. Since the historical default loss data of rating agencies spans many years, it also spans several accounting regimes—including amortized cost accounting. Amortized cost accounting would have allowed the situation to deteriorate further past the worst-case event before the book value of assets would be less than the book value of liabilities. After declaration of default, the assets and liabilities would be liquidated. It is this liquidation that would force the recognition of the unrealized losses that are imbedded in the business. This helps to explain why recovery rates after declared default are well below 100 percent as shown in Table 2 on page 14. This supports that historical default loss data from rating agencies is not directly applicable to an economic solvency framework, as under historical accounting.

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Targeted Statistical Level of Confidence for Rating Categories

Rating Category	Target	Implied Standard Deviation Movement	Assessment
AAA	99.9	3.00	Extremely strong
AA	99.5	2.57	Very strong
A	98.4	2.14	Strong
BBB	95.7	1.71	Good

Statistical level of confidence is based on assumed normal distribution

An economic insolvency threshold would most often have been breached considerably sooner.

We also know that there are many companies and almost entire industries in some countries that have been technically economically insolvent at some point in the past ... just as some are still technically insolvent on an economic basis today. Most of these companies have not in the past, and will not in the future, actually default. Investors are still willing to support these companies because there exists a belief in management's ability to improve the situation. The point is that economic insolvency occurs at a significantly higher rate than what is represented in the actual declared insolvency situations measured by the rating agencies.

Some additional support for an alternative to this direct use of the historical probability of default approach can be seen from S&P's Financial Product Company ratings methodology. This rating's process is used for the financial product portions of some insurance companies in the United States. Under this approach, S&P had established a link to the claims paying ratings of insurance companies to the modeling results under the Financial Products Company model. This model methodology is much closer to a company's internal ECM then the standard risk-based capital models used by rating agencies and regulators. The link S&P has published in the Financial Product Company ratings methodology is[3]:

Although many factors enter the rating process of a company, capital adequacy plays a key role. From this table, we can see that AA ratings would call for a confidence level of 99.5 percent.

Concluding Remarks

It is not our intent to describe a complete objective process for the link between confidence levels in ECMs to claims paying ratings. However, there are sound arguments against using the historical default probabilities directly for establishing this link. This article is intended to promote awareness on this issue as many companies and regulators continue to follow the same logic. Declared insolvency does not occur at the same frequency of economic insolvency. Requiring an artificially higher standard for economic insolvency could raise capital requirements in the market and prices of insurance products. If the rating agencies used the same approach, the industry would not even enjoy the benefits the higher confidence level should afford them … higher ratings.

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[3] Source: "New Insurance Capital Model Embraces Trends in Risk Management," by Bob Roseman, January 7, 2002.

2007 Life Spring Meeting—Great Lineup of Session in Phoenix Sponsored by Your Investment Section

by Marc Altschull and Tony Dardis, Investment Section representatives on the 2007 Life Spring Meeting Planning Committee

The Investment Section is planning an exciting program at the 2007 Life Spring Meeting that will be held at the JW Marriott Desert Ridge May 10-11. This year's Spring Meeting is taking a slightly different format to previous years. A handful of special topic areas will be highlighted, with a number of sessions built around these topic areas. Having a wide variety of sessions will mean that each topic area can be examined in considerable depth and also cover the full range on the career ladder between the very technical and the managerial.

The highlighted topic area for the Investment Section at the meeting is Best Practices for Investment Policy. Three sessions are planned under this topic area:

Designing the Ideal Investment Policy

This will be our flagship session for the meeting. A panel of senior practitioners involved in developing investment policy for life insurers and pension funds will present a template for investment policy. As the discussion focal point, this template represents the panelists' collective views on best practices. The panelists will discuss some of the issues they have faced in developing investment policy and how these issues have been overcome. They will share their investment policies and engage the group for areas of improvement.

Integration of Risk Guidelines with Investment Policy

A panel of senior practitioners involved in the development of investment policy for life insurers and pension funds will discuss how risk management is incorporated into investment policy. Vital to success is aligning ALM policy and rigorous risk management into your investment policies. This session will include suggestions for synchronizing risk guidelines with investment policy.

Using Quantitative Analysis to Help Set and Monitor Investment Policy

Life and Pension financial modeling experts will discuss information on calculations needed to help design investment policy. They will demonstrate how investment policy and investment management decisions can be modeled for risk management and ALM. They will present the concept of a notional portfolio and explain how it can be used.

The other topic area at the meeting will be Investment Management in the Current Economy. Under this heading, the Investment Section will be presenting three more sessions:

Profiting from the Economic Outlook

A panel of prominent economists and futurists will discuss:

- What is the outlook for economic growth, interest rates, inflation and the global economy?
- What can we expect of the bond, equity and real estate markets?
- And, what might all these mean for the life, pensions and P&C markets?

Search for Yield in Current Economic Environment

A panel comprised of investment managers and actuaries will discuss how to search for yield with tight credit spreads and inverted yield curves. The current interest rate and bond market environment poses challenges for investment management. What does history tell us about what might happen next? How can insurers and pension funds pick up extra yield in this environment? What are some of the risks created by these approaches? What impact is the environment having on product and pension plan designs?

Modeling Equity Markets

In an interactive setting, life and pension financial modeling experts will present this session and address the following topics:

- Emerging and current techniques for modeling equity markets.
- Equity duration and its utility.
- Implications for insurers and pension funds for reversion in the equity markets.
- Actuarial assumptions impacted by mean revision.

I hope you'll all agree that the program that's planned by the Investment Section has a lot to offer. We look forward to seeing you in Phoenix!

Regards,

Tony and Marc

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Modern Multi-Asset Investing for DC

by Gareth Henry

Gone are the days when a strategy of investing in stocks until retirement (perhaps also introducing a few bonds into the mix) is likely to provide individuals with a prosperous, or even comfortable retirement.

The combination of low savings rates, rising longevity and uncertain returns from investments means that individuals must make changes to their investment plans if they are to avoid financial difficulties in their (so-called) golden years. Forced with the choice of adopting a smarter investment strategy or saving for longer, i.e., retiring later, I know which option I would choose.

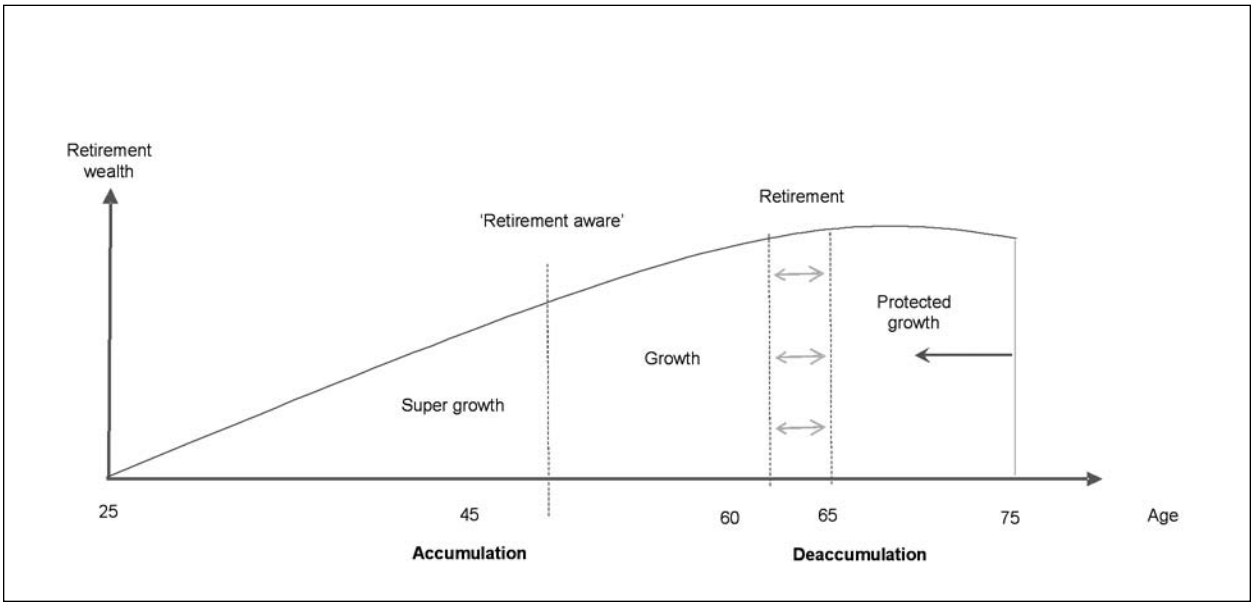
The market for life cycle portfolios tailored to the year that an individual will start withdrawing money appears to have boomed. Many of the portfolios are provided by index managers who offer a wide range of strategies, dependent on the investors' risk tolerances. Bonds and real estate investments are added to the stock portfolio at the appropriate time in the life cycle.

While life cycle portfolios are undoubtedly an improvement over a stock only portfolio, investment solutions need to be smarter than this. By further widening the range of asset types that portfolios have access to, and by combining the different asset types together in the appropriate way at the appropriate time, a real difference can be brought to bear on an individual's income in retirement.

Starting Out—the Young Have a Long Time Horizon

Imagine an individual starting out in his/her first job or one who has been working for 10 or even 20 years. This individual is still many years away from retirement and is unlikely to have made any concrete plans about when to retire. His/her investment time horizon is very long, perhaps 40 years or more in its entirety, or at the very least 20 years if he/she is considering retiring early. This is enough time to ride out at least two economic cycles. The amount of any pension savings that this individual is making is likely to be small, especially when considered against likely future earnings. It is therefore essential that the return achieved from these savings is maximized and this should be achieved by investing in higher risk

A New Framework



asset types. It will certainly not be achieved by holding bonds and individuals could well face regret in later years if their investment strategy has been too safe and their retirement pot is too small as a result.

Planning for Retirement—as Retirement Savings Grow, Individuals Should Seek to Protect What They Have Saved But Be Aware of Their Time Horizons

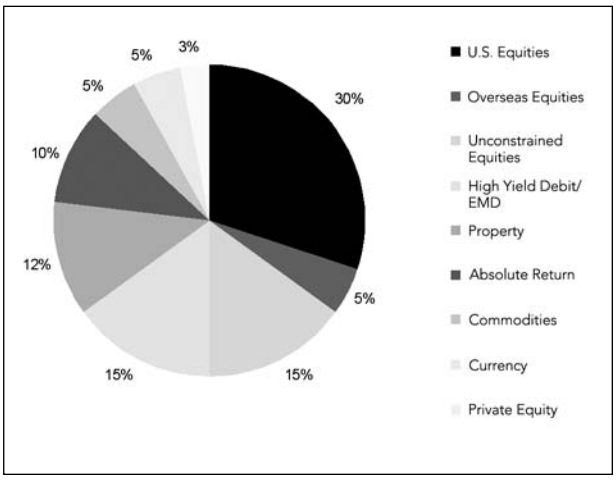
After the period of super growth, individuals reach a time when they should be retirement aware—when they assess what they have and what they may require. At this point they need to become more aware of the impact of negative returns upon their savings which should, in turn, lead to an awareness of downside risks. By including a wider range of diversifying asset types in their portfolio, similar returns to passive equities can be produced but with reduced risks. The chart below is an example of a portfolio structured to achieve these aims through diversification. Half of the portfolio is held in equities; here, different styles of investing, such as a fund designed to produce returns linked to a benchmark index and a fund where portfolio construction is undertaken without reference to a benchmark, are combined. The other half of the portfolio is invested in a wide range of alternative asset types that provide further diversification and thus help to reduce risk.

Retiring—as Individuals Move Into the Retirement Phase, They Should Be Aware That Their Time Horizon Could Still Be More Than 20 Years

Consider individuals who reach this phase and discover that their pension savings are insufficient to allow them to retire at the age they hoped to and/or provide them with their desired level of income. Some of these individuals may decide to try to build their savings pot by investing in high-risk assets at the very time they can ill afford to take on the extra risk, in a last-ditch attempt to stick to their retirement plans. This scenario forms the backbone of why targeted life cycle funds have been introduced; an individual who has planned sensibly and invested smartly in the first two phases should hopefully have a pot that meets their expectations.

The goal in this phase is to maintain an allocation to assets that seek to provide growth but increasingly to seek to protect the real value of savings as time passes. This can be achieved in different ways; one example is to blend the diversified asset portfolio

Diversified Asset Portfolio



with bonds, giving a more modern take on a traditional approach. Another method would be to structure a fund that combines a diversified asset portfolio with levels of capital protection, the level of protection increasing as an individual approached retirement. Care is needed in seeking the most appropriate product so that the cost of the protection does not erode too much of the return produced by the growth assets.

Maximizing Your Dollars

Let's look at the retirement wealth of an individual under two different strategies; the first follows a traditional stocks, bonds and asset allocation strategy, whilst the second adopts the phased approach introduced above, starting with higher returning equity investments before introducing alternative asset types.

Age	1 - Traditional Equity/Bond	2 - Modern DC Investing
25-50	Equity	High Alpha
50-60	Equity	Diversified Assets
60-65	Phased Equity/Bond*	Phased Diversified Asset/Bond*

**The phased split starts with 100 percent of equity or diversified assets and reduces in 10 percent increments to 50 percent with the balance in bonds at age 65.*

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These two strategies could be packaged in two different ways:

1. Similar to life cycling where the embedded investment strategy changes take place for the individual, or

2. Where the right building blocks, along with appropriate modelling tools are made available for individuals to build their own portfolios.

The second form of packaging would present extreme moral hazard for an individual if they were left to choose their own funds. It can be difficult to judge the most appropriate equity funds, let alone a private equity fund!

For an individual aged 25, earning $40,000, making 10 percent annual contributions and retiring at 65 on $120,000, the final accumulated pot using these two different strategies is shown in the table below.

The findings show that you can significantly enhance the returns of the portfolio under the modern approach, while the average risk figure over the entire period remains slightly lower. The real key is that the risk in the modern approach is taken at the most appropriate time in an individual's life.

In simple terms, the modern method of investing provides a superior return per unit of risk. This is down to two things—the return enhancing properties of the high alpha fund and the risk reducing properties of the alternative asset types within the diversified asset portfolio. When combining the two, it is theoretically possible to gain extra return, without taking any extra risk over the entire life time of the individual.

While an individual will be taking considerably more risk in the early phase in the form of high alpha equity, it may lead to regret-risk for that individual if they don't (and the possibility of running out of money in retirement).

Where individuals have built up a savings pot and reached the retirement-aware phase, it would not be prudent to continue to invest their entire portfolio in risky assets that could result in the erosion of the value of their pot. This is why we employ the use of diversified asset portfolios, which aim to produce a more stable level of returns. Note that in the modern approach we start investing in this diversified portfolio much earlier than we start phasing into bonds in the old method. In this way, the potential volatility of the high alpha equities is dampened down earlier and well before retirement.

	Traditional Equity/Bond	Modern Multi Asset
Expected Pot Size	$602,000	$791,000
Average Annual Volatility	14.9%	13.5%

Assumptions and Issues

Assumptions used in the below calculations

Expected (% p.a.)	Equity	High Alpha Equity	Diversified Assets	Bonds
Return	8	10	7.5	5
Risk	16	20	9	7

Issues

The major issues are twofold:

1. High alpha equities: to gain sustainable high alpha the assets must be invested either with a bias to inefficient markets (like EFEA or straight emerging markets) or have a structural bias such as small cap or growth. This may lead to high turnover of managers within the portfolio; manager selection may rest with the portfolio provider or worse still, the individual. New unconstrained methods of investing, such as best ideas or quantitative value investing, can have more sustainable high alpha sources; monitoring the manager and their ability to evolve their model or ideas is key.

2. Diversified assets: some assets in the portfolio may be difficult to access; private equity and hedge funds have liquidity issues that are likely to pose problems for individuals and even groups within retirement plans. This can be overcome in two ways: the first is the use of closed-ended funds investing in hedge funds currently being built in the United States (these have been around in the United Kingdom for several years). It may also be possible to invest in companies that specialize in private equity or BDC's, although this would erode some of the correlation arguments. The second would be aggregating assets and investing on a monthly or quarterly basis, but this will present cash drags on performance and issues with swing pricing if the underlying funds are single priced. Again this would only be available to larger plans, but benefit providers could aggregate individual contributions.

Conclusion

To really enjoy the golden years an individual needs to access the full spectrum of available asset classes. The challenge for the money managers is to provide sustainable high alpha funds along with greater access to alternatives.

The key for the individuals is education, and having comfort to invest in these assets—perhaps a case study on the Harvard Endowment Fund should be mandatory for all in retirement, but then again that may well be too late.

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New Uses for New Macro Derivatives

by Justin Wolfers

Editor's note: The following article is reprinted from the Federal Reserve Bank of San Francisco Economic Letter 2006-21. The opinions expressed in this article do not necessarily reflect the views of the management of the Federal Reserve Bank of San Francisco, or of the Board of Governors of the Federal Reserve System. Justin Wolfers is an assistant professor with the University of Pennsylvania and a visiting scholar, FRBSF.

Economic forecasters often look to the performance of futures markets to help predict such economic developments as movements in the price of oil and other commodities. In addition, relatively new financial market instruments, like Treasury Inflation Protected Securities help policymakers get a handle on the public's inflation expectations.

In the last few years, derivatives markets involving bets on future economic events have emerged. In October 2002, Goldman Sachs and Deutsche Bank joined forces to form a market in what they call "economic derivatives." This market allows investors to purchase instruments whose payoff is linked to growth in U.S. non-farm payrolls, retail sales, business confidence, and initial unemployment claims, as well as the Euro-area harmonized CPI. More recently, other U.S.-based markets have been created for GDP and the international trade balance, and plans are under way for instruments on the U.S. CPI.

For investors, these markets help hedge their portfolios against the uncertainties of economic outcomes. For forecasters and policymakers, these markets help pull together the best guesses of market participants, and thereby provide an informed consensus on how economic developments will unfold. This Economic Letter summarizes research by Gürkaynak and Wolfers (2005), which examines how these markets work and how useful they may be for economic predictions.

How Derivatives Markets for Events Work

In the economic derivatives market, a trader might purchase an instrument that pays $1 if the next employment report shows monthly growth in nonfarm payrolls of between 100,000 and 125,000 jobs. The transaction is structured so that the payoff is binary—either $1 if you are correct, or nothing if you are not; hence, these are called binary options. Similarly, a trader can decide to purchase an instrument that pays $1 if employment grows by 125,000 to 150,000 jobs. Indeed, around a dozen such options are typically offered, thereby allowing traders to take positions on the particular outcomes that they regard as most likely. Traders also have the option of selling (or going "short") on any outcomes that they think are particularly unlikely.

These options are traded in an auction that typically lasts for about an hour and which occurs either on the morning before the data release, or a few days before. As such, this market allows traders to hedge their portfolios so that they are not exposed to the particular risk—typically called event risk—that arises due to unexpected economic announcements causing sharp changes in the value of stocks and bonds.

A particularly interesting feature of this market is the mechanism used to match willing buyers with sellers. This market uses a pari-mutuel system, which is quite uncommon in financial markets, but much more common in horse racing. In the racing context, punters bet on their favorite horse, and all the money bet is put into a central pot; when the race is run, the house simply divides the money from this central pot among those who bet on the winning horse (with those who purchased more tickets receiving a

Figure 1

An example auction held on June 3, 2005

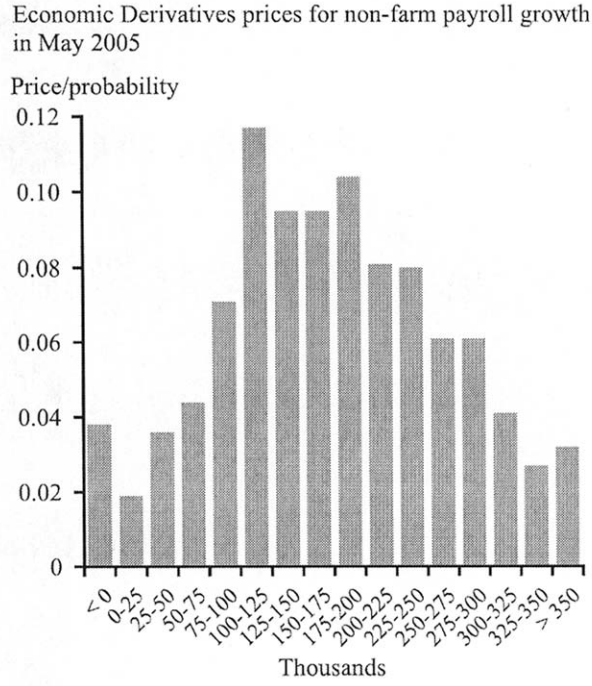
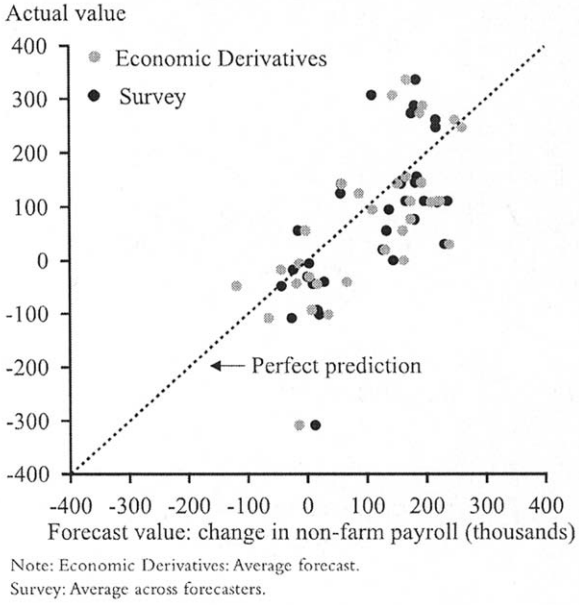


Figure 2

Comparing the forecast performances of markets and surveys for non-farm payrolls



Note: Economic Derivatives: Average forecast.
Survey: Average across forecasters.

proportionately larger share of the pot). In the economic derivatives context, the mechanism is similar, but instead of betting on a favorite horse, traders purchase tickets in their preferred economic outcome. An interesting feature of this mechanism is that the return to selecting the winning outcome is not known until all trades have been executed, although indicative estimates can be shown during the auction process.

Figure 1 shows the final prices from a specific auction in which traders took positions on the number of jobs created in May 2005. We see that traders were willing to pay 11.7 cents for the option paying $1 if payroll growth was indeed between 100,000 and 125,000 jobs. As such, it seems reasonable to infer that this particular outcome had about an 11.7% probability of occurring. Inferring probabilities from the prices of binary options has some intuitive appeal, and Wolfers and Zitzewitz (2006) argue that it has also proven to be quite accurate in many other prediction markets.

Gürkaynak and Wolfers also explore the question of whether risk-aversion might lead to a risk-premium, concluding that the evidence so far suggests that the relevant adjustment is sufficiently small that we can essentially ignore risk-adjustments.

Thus the prices on each of the outcomes shown in Figure 1 essentially provide a market-generated estimate of the full probability distribution of different outcomes. If the market is reasonably accurate, this distribution provides a set of forecasts of the likelihood of different outcomes that may be quite useful to forecasters and policymakers.

Using Data from Macro Derivatives Markets to Make Economic Forecasts

The particular advantage of a market-generated forecast is that these prices reflect the joint wisdom of the many traders operating in this market, and not just the idiosyncratic views of a particular forecaster. Previous research tells us that aggregating forecasts from many forecasters typically produces a much more accurate forecast than simply following a preferred forecaster.

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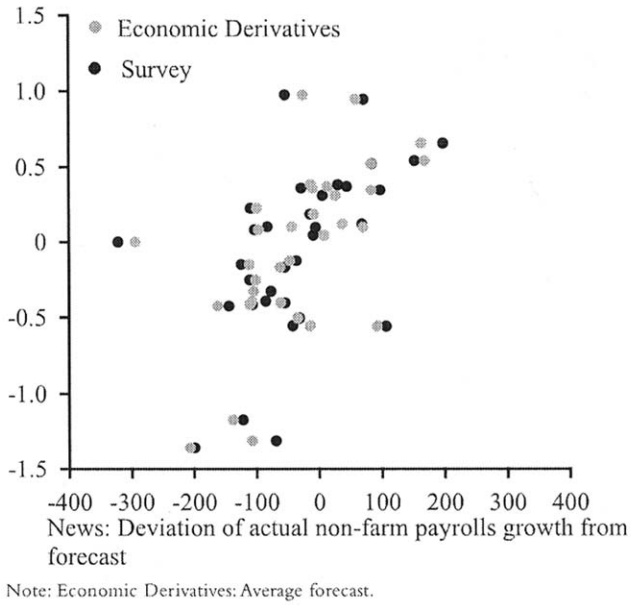
Figure 3

Predicting the response of the stock market to news about non-farm payrolls



Note: Economic Derivatives: Average forecast.
Survey: Average across forecasters.
* Window: *t*-5 minutes to *t*+25 minutes.

We now have data from the first 153 of these economic derivatives auctions and have compared them with an alternative forecast aggregator: the survey of the expectations of financial market analysts taken on the Friday prior to the data release. Figure 2 on page 23 shows this comparison for the most highly watched of our data series, monthly growth in non-farm payrolls. Specifically, we calculated the mean of the price distribution for each of the auctions in our sample, and the average forecast across forecasters from the Friday survey, and asked: Which better predicts the actual outcome? Figure 2 shows how similar the two competing sets of forecasts were. Even so, the Economic Derivatives forecasts were slightly (5 percent–10 percent) more accurate, although these differences were not statistically significant.

Another way of analyzing these data is to ask: how should one weight these two sets of forecasts to arrive at an optimal prediction? A regression analysis is needed to answer this question, and here the results were less equivocal: once one knows the economic derivatives forecast, there is no useful information in the survey-based forecast.This is consistent with the efficient markets hypothesis, which suggests that market prices tend to incorporate all publicly available information—including the published forecasts of other forecasters.

We have also performed a similar comparison of the predictive ability of market- and survey-based forecasts for retail sales growth, business confidence, and initial unemployment claims, and this further analysis confirmed this general pattern. The economic derivatives forecast encompasses all of the information available in the survey-based forecast.

Another implication of the efficient markets hypothesis is that the stock market should only respond to unexpected developments. Thus, even if non-farm payrolls grew strongly in a particular month, if that growth was expected, its announcement should not lead to any changes in stock prices. This raises the question: What movements in non-farm payrolls are expected, and what are unexpected?

The comparison of economic derivatives and survey-based forecasts provide two alternative baselines: We can compare actual outcomes to each of these forecasts, and ask which better predicts subsequent stock market movements. In order to isolate the specific stock market movements that were most likely to be driven by the announcement of economic news, we analyze the change in stock prices from 5 minutes before the announcement to a mere 25 minutes later. Figure 3 compares this stock market response to our two alternative measures of the unexpected component of non-farm payrolls. We find the measure based upon the economic derivatives data does a much better job in explaining the response of the stock market to economic news.

We have extended this analysis in two further directions, examining both forecasts of other

variables (business confidence, retail sales and initial unemployment claims), and the response of bond markets to economic news. In each case, we confirm our main conclusions: the economic derivatives market better predicts financial market responses to economic data than does the alternative survey-based measure.

Finally, there is an existing literature that suggests that economic forecasters tend to make systematic mistakes, in a manner consistent with some of the insights of behavioral economics. For instance, there is evidence that forecasters tend to stick with bad forecasts for too long and take insufficient account of recent data that should have led them to change their views. We performed similar tests on both of our forecast measures, finding some systematic evidence that the average survey-based forecast shows some of these problems. Interestingly, there is very little evidence that the market-based forecast displays these pathologies, although given our limited sample, this evidence should not be overstated.

Conclusion

Overall our analysis of the Economic Derivatives markets yielded quite convincing evidence that market-generated forecasts are very accurate and probably at least as accurate as any other form of forecast. This finding makes economic forecasting a very simple exercise for most of us: Rather than work through a complicated model of the economy, it is more accurate (and surely quicker!) simply to look to the prices in economic derivatives markets to assess the likelihood of various outcomes.

The underlying logic of these markets may eventually prove to be quite persuasive, and other research (Wolfers and Zitzewitz, 2004) has shown that analogous prediction markets have similar power in predicting outcomes as diverse as elections, baseball games, and movie successes. Ongoing research is examining the extent to which prediction markets may be harnessed to forecast outcomes of direct interest to both businesses and public policymakers. The intuition is simply that markets can make the wisdom of many of us easily accessible to all of us. ♂

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Disclosure

Liability-Driven Investments for Pension Funds

by Jon Palin

Editor's note: This article focuses on a particular form of liability-driven investment. It stresses the importance of looking beyond the pension plan to the wider interests of shareholders and plan members and suggests that bond investment is best if the sponsor is reasonably strong.

Pension Fund Investment—What Really Matters?

Ten years ago pension fund investment was all about assets. Now it's about assets and liabilities and their relative risk and return. Taking a broader view has led to a truer picture and better decision-making. But there's further to go. Explicitly considering the interests of individual shareholders and members gives a better answer.

A Motivating Example

To begin, what do pension fund investment decisions mean for a shareholder? We'll take a look at Bob, an individual who holds various investments. In particular he has shares in Acme Inc., a company that makes and sells cheese and has a defined benefit pension fund.

Bob's wealth depends on a combination of things:

(i) His own portfolio. Different assets will give different returns with different levels of risk: equities have a higher expected return than bonds, but equities have more variable returns.

(ii) The Acme pension plan. Bob has financial exposure to the plan even if he doesn't have legal ownership of the assets. Gains and losses in the plan directly affect Bob through lower or higher contributions in future. That's why the funding position appears on Acme Inc.'s balance sheet, and gains and losses appear in the profit and loss reserve.[1]

(iii) The performance of Acme Inc. excluding the pension plan.

Does Investment Strategy Matter?

What happens if the pension plan sells all of its equities and invests the proceeds in bonds? That means the pension fund has a lower expected return and a lower volatility. If Bob's own portfolio and the rest of Acme's business doesn't change, then Bob's overall position has a lower expected return and a lower variability.

Bob might not like that. Presumably he'd picked his portfolio, Acme included, to give him what he wanted. But if Bob doesn't like what the pension fund did, then he can do something about it. He can rearrange his own portfolio to invest more in equities and less in bonds. Doing this to the right degree will

[1] Although gains and losses don't affect the profit and loss, they do appear in the statement of recognized income and expenses (under the international accounting standard IAS19) and get added into the profit and loss reserve.

cancel out the effect of the change in the pension plan.

So it seems that pension investment doesn't matter to shareholders—they can get the same risk and return no matter what the pension plan does by taking compensating actions. In fact, that's not quite true. We've ignored tax so far and that makes a difference.

Tax Matters[2]

If all assets had the same tax treatment, and this didn't depend on where they were held, then tax would be irrelevant to our argument. In practice this is not the case.

Individuals typically pay a higher rate of tax on bonds than on equities. Taking the United Kingdom as an example, equity dividends are taxed at a lower rate than other income. And equities deliver more of their return as capital gains that are paid later, have a separate tax-free allowance, and attract taper relief (as you hold equities longer, more of the gain becomes tax-exempt).

In the pension plan, both bonds and equities are free of tax. But pension plans can no longer reclaim the tax credit on equity dividends while individuals can. So in comparison to an individual investor, equities are less tax-efficient than bonds when held in a pension plan.

It was stated above that if the pension plan sold its equities then Bob could compensate by holding more equities in his own portfolio and get the same return, ignoring tax. Once we allow for tax, Bob is better off because equities are more tax-efficient than bonds in his own portfolio and bonds are more tax-efficient than equities in the pension fund. Bob has the same risk as before and a higher return because of saving tax.

Company Financing

What if Bob doesn't want to have to change his own portfolio? In that case the same effect could be achieved by the company changing the way it is financed. In part (iii) above we mentioned the performance of Acme Inc. excluding the pension plan. We can split this in two parts:

(iii)(a) The operating profit of Acme Inc. By operating profit we mean the profit due to its core business activities—in Acme's case this refers to how good it is at making, marketing and selling cheese.

(iii)(b) The financing of Acme Inc. Companies can be financed entirely by equity or by a combination of equity and debt. Companies financed by debt have a shareholder return that is higher on average, but also more variable. We'll consider this in the next section.

In the pension plan, both bonds and equities are free of tax. But pension plans can no longer reclaim the tax credit on equity dividends while individuals can.

Aside—how does financing affect shareholder returns?

Suppose Acme Inc. was financed by equity worth 1,000, and it made an operating profit of 100. Then the shareholder return is 100 ÷ 1,000 = +10 percent. If operating profits were 0 or 200 then the shareholder return would be 0 percent or +20 percent.

If instead Acme was financed by 500 of equity and 500 of bonds paying 5 percent interest then the shareholder return would be different. The operating (i.e., cheese-related) profit is the same. But Acme has to pay interest to the bondholders of 500 to 5 percent = 25 before paying the shareholders. So the shareholder return is (100 – 25) ÷ 500 = +15 percent. If operating profits were 0 or 200, then the shareholder return would be –5 percent or +35 percent.

Financing	(1) Debt 0 : 1,000 Equity			(2) Debt 500 : 500 Equity		
Operating profit	0	100	200	0	100	200
Interest	0	0	0	25	25	25
Profit	0	100	200	-25	75	175
Shareholder return	0%	10%	20%	-5%	15%	35%

The operating profit is independent of financing; bondholders get a safe low return and the shareholders get what's left, which is a riskier return, but higher on average.

Pension Investment is Like Company Financing

We said earlier that Bob could compensate for a change in the pension plan's asset strategy by changing his own portfolio. Equally, the company could compensate by changing its own financing. If the

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[2] Disclaimer: This section is about right for the United Kingdom. But tax is complex and different features that may apply to particular countries, companies, industries or individuals.

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Acme pension fund moves from equities to bonds, then Acme Inc. could issue new debt and use the proceeds to buy back some of the equities it previously issued itself. This is like moving from situation (1) to (2) in the previous example above: it makes the shareholder's return higher on average and more risky.

... pension plans should invest in bonds and either the company or the individual should take compensating action.

Bob gets cash when some of his Acme Inc. shares are bought back by the company and he can invest this in other equities. If the refinancing is done in the right proportion, and if Bob buys equities in the same companies as those sold by the pension plan, this would leave his overall risk and return unchanged. There's less risk in the pension fund since it moved to bonds; more risk on the balance sheet since it's financed by more debt and less equity; and there's the same risk overall. That shouldn't affect Acme's credit rating since most rating agencies will include the pension fund's position in their assessment.

Tax matters again. Companies pay interest out of pre-tax profits and dividends out of post-tax profits. So debt financing is tax efficient. If the company responds to the pension plan selling equities by issuing debt and buying back equities then that's good news for Bob. He has the same risk as before and a higher return because the company is paying less tax.

Shareholders Should Want Pension Plans to Invest in Bonds

Let's be clear what we're proposing—pension plans should invest in bonds and either the company or the individual should take compensating action. Then the shareholder gets the same risk as before, but a higher return through tax-efficiency.

The argument doesn't depend on your views of future asset returns. The returns come through in exactly the same way both before (some equity investment) and after (bond investment and compensating action). Equities do equally well or badly in both cases. It's about holding the same assets overall but holding them in the right place.

The argument also doesn't depend on the nature of the pension benefit. The same liabilities appear both before and after, so the risk and return is unchanged, apart from the tax gain.

Why Doesn't This Happen More in Practice?

In the United Kingdom the prime example of this strategy being put into action was Boots, a pharmacy-led retailer that is one of the United Kingdom's hundred largest companies and has a multibillion pound pension plan.

Starting in 2000 the pension fund sold all of its equities and moved into long-dated bonds. After the transition was complete the company took compensating action; it changed its financing by buying back equities. This increase in risk was counteracted by the lower risk in the pension plan, so it didn't weaken the company's credit rating.

But most pension plans still invest heavily in equities—why should there be such a big gap between theory and practice?

Part of the answer lies in past actuarial practice. Ten years ago investment decisions were just based on assets. This seemed reasonable at the time as liabilities (apparently) didn't depend on market conditions: the actuary picked long-term assumptions, so liabilities were pretty stable.

Then financial economics and new accounting standards hit the U.K. profession and market-based valuations came along. Even today few valuations are done at pure market value, but liabilities do at least depend on financial markets. This, combined with turbulent market movements, has made the risk of pensions apparent and created conditions for liability driven investment to thrive—don't just look at the assets, look at the whole pension plan. Another step is needed—don't just look at the pension plan, look at the whole company—to make clear the benefits of the bonds in the pension plan and take compensating action strategy. If we only look at the pension plan, then there's no chance of compensating action and the strategy can't be understood.

What About Members?

To say whether bond investment in the pension plan is good for members, we need to consider the nature

of pension benefits. In practice, typical pension liabilities are bond-like, albeit they are linked to some unusual indices: salaries and longevity as well as inflation.

If the pension plan is invested in bonds then it makes sense to choose bonds that are similar to the liabilities. That means getting the right duration and the right dependence on inflation. Doing this gives greater predictability over the funding position and more certainty for members over whether their benefits will be paid.

With a really strong company, members may want to take equity risk: if it goes well they get the proceeds through benefit improvements, and if it goes badly the company picks up the pieces. That may be a good strategy if the employer really is strong and if benefit improvements really would be made.

What if There's a Surplus or Deficit?

In the unrealistic case where the pensions get paid exactly as promised (no defaulting on benefits through insolvency; and no benefit improvements) then any surplus or deficit now simply doesn't affect the argument as the shareholder is fully exposed to any gains or losses in the pension plan. Investing in equities might produce returns that help to meet the deficit, but that's true whether the equities are inside or outside the pension plan.

More realistically where there is a chance of benefits being other than expected—lower because the company defaults or higher than expected because of benefit improvements—we can take this into account. These are essentially financial options: default only has value if the funding level is low and benefit improvements only have value if the funding level is high. As with all options, the volatility of the assets will make a difference to the value.

The existence of the Pension Protection Fund[3] (PPF) complicates things further. It's another financial option to value, but if the PPF charges levies that reflect the risk appropriately, then there should be no advantage or disadvantage from a particular strategy.

The situation will vary for different companies. But it's generally the case that for strong companies--investment grade or close—the tax advantages of bond investment outweigh the value of default.

Investment and Funding—What Really Matters

By investing in equities the pension plan is not doing anything the sponsor or shareholder cannot do directly in a more tax-efficient way. Discussions about the asset allocation of a pension fund won't be fully productive if they only take account of the pension plan. To get a better answer we need to look at tax and the strength of the sponsor.

This approach, taking account of tax and sponsor strength, has applications for funding also. If you're a strong company, which will pay the benefits, then prefunding is good: get the money in early and use the tax shelter to full advantage. Some companies are worried about the risk of producing a surplus that they can't make use of, but if you're invested in bonds, which hedge the liabilities, then that isn't a problem. 

Further Reading

For more detail, including the Boots experience and a more mathematical approach, you might like to look at "Pensions and Capital Structure: Why Hold Equities in the Pension Fund?" available from *http://library.soa.org/library-pdf/m-rs04-1_03.pdf*

Disclaimer: This article expresses my own views and not necessarily those of my employer or any other organization.

If you would like to comment on this I would be happy to speak with you and you can contact me at *jon.palin@gmail.com*.

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[3] The Pension Protection Fund is broadly equivalent to the PBGC. It collects money from defined benefit pension plans and pays compensation to members of plans whose sponsor has become insolvent leaving a deficit.

Taking Stock—Are Inflation Fears Overdone?

by Nino Boezio

Yields have fallen to troubling low levels in the past several years. Troubling because they have put pressure on things such as pension plans by pricing liabilities higher, pricing annuities higher, and hurting pensioners (through their retirement accounts) and hurting organizations (such as endowments, charities and foundations) that rely on fixed income investments, to provide a major part of their income needs.

Who or what is to blame for the low yields? Are low yields bad? Now, corporations, governments and even the general public can borrow funds at low rates and use it to finance new spending and for internal investment or purchases, that in the past would have not made much economic sense.

However, we have to see that for every winner there is a loser.

The problem with the declining interest rate environment is that it was not really anticipated by many of the financial structures and programs that were set up over many decades. As a result, certain vehicles, such as pension plans, now have trouble surviving when the returns they need in order to provide the pensions promised are not there. Increasingly the return burden is now being pushed onto other asset classes such as equities and alternative investments to deliver the performance shortfall or difference. But even these other assets classes cannot deliver the required returns all of the time, and these other asset classes are often more volatile. Creativity in designing a new and improved portfolio also has its limitations (the talk about Liability Driven Investment or LDI has merit, but it cannot solve most of the problems, and much of the damage has already been done). And when the non-fixed income asset classes attract more funds, it can be anticipated that even their expected future return will be driven down. As a result, we can find a return spiral downward for many types of investments as we head into the future, and even inflated valuations.

What therefore should we do? Or should we accept that the declining interest rate environment is good overall for the economy, the public and investors?

Punishing Economic Growth

Historically, rising inflationary expectations have driven up yields, even if a large part of these yields, by definition, now reflected a larger inflationary component. Looking at the contrary scenario, which is what we have actually seen in the past 25 years, is that the real return on bonds has been declining. These declining real yields could be sending us a message that real economic growth is continually going to be downward biased, due to the actions of central banks (that are so obsessed with inflation), that they keep putting the brakes on the economy

whenever they think it is going to take off beyond levels that they feel they can control. But, this is all assuming that they know what the sustainable rate of economic growth is, the natural rate of unemployment is and when the pace of inflation is about to run amuck.

Since the early 1980s when inflation was at double digits, there has never been any desire to take a chance on allowing the economy to run too strong (but the definition of strong is subjective in my view). Worries about uncontrollable rampaging inflation have seemed to have been the overriding concern, even if these worries were not always based on fact, or were largely based on distant history that may not be completely applicable anymore.

Are Our Central Banks Unbiased?

It is hard to say that central bank policy is unbiased. It has been operating under a model that was initially set up to combat persistent inflation, as had occurred from the excesses of the 1970s. These excesses were precipitated in part by the oil crisis, excessive spending and fiscal irresponsibility. That central bank mindset is still to a large extent prevalent. And when in doubt, the central banks have often made the choice that the risk of slowing the economy down is of less concern than that of risking higher inflation. Overall, human nature is such that it does also tend to move to extremes or overshoot, rather than to hit the target. So in this case, it may be no surprise that perhaps banks have been overly punishing of economic growth, when they had any concerns or anxieties about the potential for a rise in inflation.

Lowering Yields Do Have Limits

Fortunately for economies like the United States', lowering central bank interest rates have resulted in greater economic growth (but of course a debate can ensue as to how much of the economic growth was tied to lowering interest rates, and how much of it would have occurred naturally anyway). However, as we saw in the last recession, the central bank rates hit levels that were quite low in recent history (see Table 1 on page 32) where the fed funds rate went as low as 1.0 percent in June 2003. There were serious concerns that if the interest rate stimulation did not work that time, there would not be much left over to maneuver any further, as the rates were already getting within striking distance of zero. Japan for example, found that lowering interest rates eventually did not work, and it was almost lending money for free (it took its discount rate down to 0.1 percent—see Table 2 on page 33). I could see such a dilemma facing the United States, the next time we are headed for a major or prolonged recession (currently rates may drop some from current levels as the economy appears to be slowing, but not to reach new lows. But if we get into a serious economic slump, there is not much stimulus left in central bank rates, in my view, to help the economy the next time—monetary policy as was the case in Japan, could then become a redundant tool). Japan in turn, tried to fix the problem by fiscal policy and through massive public works projects, but that accomplished little (interestingly, Japan had accumulated debt at the government level as a percentage of GDP, which makes the current U.S. deficit look pale in comparison—Japan has 2.5 times the ratio of debt to GDP than the United States).

... the central banks have often made the choice that the risk of slowing the economy down is of less concern that that of risking higher inflation. Overall, human nature is such that it does also tend to move to extremes or overshoot, rather than to hit the target.

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Winners and Losers

Here are winners and losers in the current interest rate game (i.e., when rates are still low and perhaps even going lower, and central banks continue the current mindset of keeping a lid on inflation, as their primary goal):

Winners (from low and predictable inflation and low interest rates)

Borrowers—

- Governments can borrow more with less of their budget going to debt servicing (that is one of the major ways the U.S. budget was balanced under president Bill Clinton—costs for debt servicing fell),
- Corporations can undertake more projects that would otherwise be unprofitable,
- Individuals can buy more and more expensive items (whether a home, car, etc). We all know that spending on things such as these has helped keep the economy going (e.g., via real estate spending).
- Those with hard tangible assets that lost value quickly under inflationary environments. For example, pensioners who have their pensions not indexed with inflation.
- The economy, in part spurred by a larger labor force. Individuals who are unable to retire financially secure, since their investments have not done so well (in part due to low interest rate returns) may now retire later and thus remain productive in the economy longer.
- Forecasters—whether for government, corporate or individuals, it is easier to predict outcomes when dealing with a stable inflation environment.
- More innovative investment strategies and designs being put forward, to achieve greater rates of return or to reduce risk (thinking outside the box).

Table 1
U.S. Federal Reserve

Federal Funds Target Rate History

History of the Target Fed Funds Rate from 1990 to The Present

Change Date	Rate (%)
1-Jan-90	8.25
13-Jul-90	8.00
29-Oct-90	7.75
14-Nov-90	7.50
7-Dec-90	7.25
19-Dec-90	7.00
8-Jan-91	6.75
1-Feb-91	6.25
8-Mar-91	6.00
30-Apr-91	5.75
6-Aug-91	5.50
13-Sep-91	5.25
10-Oct-91	5.00
6-Nov-91	4.75
11-Dec-91	4.50
20-Dec-91	4.00
9-Apr-92	3.75
2-Jul-92	3.25
4-Sep-92	3.00
4-Feb-94	3.25
22-Mar-94	3.50
18-Apr-94	3.75
17-May-94	4.25
16-Aug-94	4.75
15-Nov-94	5.50
1-Feb-95	6.00
6-Jul-95	5.75
19-Dec-95	5.50
31-Jan-96	5.25
25-Mar-97	5.50
29-Sep-98	5.25
15-Oct-98	5.00
17-Nov-98	4.75
30-Jun-99	5.00
24-Aug-99	5.25
16-Nov-99	5.50
2-Feb-00	5.75
21-Mar-00	6.00
16-May-00	6.50
3-Jan-01	6.00
31-Jan-01	5.50
20-Mar-01	5.00
18-Apr-01	4.50
15-May-01	4.00
27-Jun-01	3.75
21-Aug-01	3.50
17-Sep-01	3.00
2-Oct-01	2.50
6-Nov-01	2.00
11-Dec-01	1.75
6-Nov-02	1.25
25-Jun-03	1.00
30-Jun-04	1.25
10-Aug-04	1.50
21-Sep-04	1.75
10-Nov-04	2.00
14-Dec-04	2.25
2-Feb-05	2.50
22-Mar-05	2.75
3-May-05	3.00
30-Jun-05	3.25
9-Aug-05	3.50
20-Sep-05	3.75
1-Nov-05	4.00
13-Dec-05	4.25
31-Jan-06	4.50
28-Mar-06	4.75
10-May-06	5.00
29-Jun-06	5.25

Source: U.S. Federal Reserve

Table 2

The Basic Discount Rate and Basic Loan Rate (Previously Indicated as "Official Discount Rates") - Bank of Japan

(Percent per annum)

Effective Date	Discount Rate of Commercial Bills and Interest Rates on Loans Secured by Government Bonds, Specially Designated Securities and Bills Corresponding to Commercial Bills	Loans Secured by Other Collateral
1973 4. 2	5.00	5.25
5.3	5.50	5.75
7. 2	6.00	6.25
8.29	7.00	7.25
12.22	9.00	9.25
1975 4.16	8.50	8.75
6. 7	8.00	8.25
8.13	7.50	7.75
10.24	6.50	6.75
1977 3.12	6.00	6.25
4.19	5.00	5.25
9. 5	4.25	4.50
1978 3.16	3.50	3.75
1979 4.17	4.25	4.50
7.24	5.25	5.50
11. 2	6.25	6.50
1980 2.19	7.25	7.50
3.19	9.00	9.25
8.2	8.25	8.50
11. 6	7.25	7.50
1981 3.18	6.25	6.50
12.11	5.50	5.75
1983 10.22	5.00	5.25
1986 1.30	4.50	4.75
3.1	4.00	4.25
4.21	3.50	3.75
11. 1	3.00	3.25
1987 2.23	2.50	2.75
1989 5.31	3.25	3.50
10.11	3.75	4.00
12.25	4.25	4.50
1990 3.20	5.25	5.50
8.3	6.00	6.25
1991 7. 1	5.50	5.75
11.14	5.00	5.25
12.3	4.50	4.75
1992 4. 1	3.75	4.00
7.27	3.25	3.50
1993 2. 4	2.50	2.75
9.21	1.75	2.00
1995 4.14	1.00	1.25
9. 8	0.50	0.75

	The Basic Discount Rate and Basic Loan Rate
2001 1. 4	0.50
2.13	0.35
3. 1	0.25
9.19	0.10
2006.7.14	0.40

Source: Bank of Japan

Losers

- Investors in capital accumulation accounts such as IRAs, RRSPs, 401(k)s, etc., who now earn less income from any fixed income investments. This may cause such investors to even defer their retirement several years.
- Defined benefit pension plans—the investment returns are lower (from the fixed income component), liabilities are required to be stated higher, and thus funding is even costlier. Corporations with such plans are obviously burdened with this issue.
- Annuities for retirees have become more expensive to purchase, i.e., less payout per cost to buy.
- Insurance such as life insurance, where there is a cash build-up, is likely to be more expensive, unless offset by mortality improvements, leaner costs, etc.
- Organizations such as charities and foundations that find it harder to fund projects based on their lower earned income from fixed income investments.
- The economy, if it gets to the point where central banks no longer have much room to lower rates.
- Future returns on other investments (possibly), as money flows drive-up valuations.
- Portfolios in general, thus becoming more risky, as investors move to more risky investments than just bonds, in order to try and retain as much of the same rates of return as they previously enjoyed. Increasing risk is not often a good thing.
- A greater propensity for certain financial products to enter the market, and where they may prove to be disappointments. Vendors of such products may package risk in a way that not all risks are completely understood and appreciated.
- Society may lose as a whole, as everyone takes on more debt, since the debt serving costs are lower. This is assuming that we consider debt to be a bad thing. Of course, debt causes problems in that it makes everyone more vulnerable to a reversal of interest rate policy, under which rates

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are caused to drift up. Debt unfortunately has become a way of life for many, when it used to be just a last resort for certain essential purchases.

- Can encourage speculation, as the cost to borrow and thereby invest in risky projects may be seen as cheaper to do, using other people's money.

Can Interest Rates Go Higher on Their Own?

It is becoming harder to envision how rates can go higher based on the current economic environment. We would need a persistent strong economy that continues to fight any central bank rate hikes viciously, every step of the way. This is hard to see under current conditions. However, it is also possible that rates could go up if inflation becomes a really tangible change or spike, due to demand or supply shocks, such as for oil. But this can be a tricky scenario for a central bank to respond to (even though we note the U.S. Fed was responding to just that in the last couple of years) in that such cost inflation is not driven by the economy. Raising rates to counteract such inflation is somewhat awkward, in that the economy not only has to adjust to higher fuel costs, but also has to adjust to higher interest rates, a double-punishment for something it did not cause. Under this scenario as well, it is hard to see a persistent trend of higher interest rates, given current central bank (and sometimes other government agency) responses to such stimuli.

Some have claimed that maybe a currency crisis could precipitate a demand and realization for higher yields, such as could occur for the United States, if foreigners refuse to buy future U.S. debt, or sell what they currently own. So far the U.S. economy has proven time and again to be a strong force in the world, with incredible stability. Something would need to dramatically change, in order for U.S. yield rates to skyrocket in this regard. A loss in U.S. economic confidence would need to result, which could be caused by, say, a major terrorist event. But even then, societies in the past have had a tendency to adjust, cope and bounce back, so we cannot always be sure that any economy of the size and resources of the United States can be knocked out for very long.

Conclusion

Certainly in the past two decades, central banks should have been more willing to let the economy run stronger, especially when unemployment rates were at higher levels. Having paranoia about inflation has never proven to be justified. The central banks were in part fighting another war that no longer applied. Even though economic studies have shown that once inflation enters an economic system it may take years to wring it out, the fact of the matter is we have never even allowed such a possibility to take place. Central banks kept cooling things down before things even got too warm.

Now, with other issues such as very low rates of unemployment to consider, it may be harder to allow rates to run without generating some real inflation, but we still need to realize that the current inflation and central bank philosophy has caused other problems. The old adage, "if it ain't broke don't fix it," is still the common thread in much of the world's thinking about economic issues. But when we consider that the pension system is very broken, yields are getting so low that even charitable organizations and individual retirees cannot rely on bonds for their income needs, that central banks may now have little room to take rates too far down to stimulate the economy when another serious recession occurs, that governments and everyone else can borrow with more liberality, then we have allowed the pendulum to have swung too far.

Now one of the most important asset classes of the world, bonds, are not able to give us the security and income we have needed for decades, and thus we are facing an investment dilemma of even more troubling proportions than we have currently seen to date. We do need to change our economic philosophy. Otherwise we have to become used to a new world where old programs such as defined benefit pension plans for example, are now simply a bad idea—unless we can find ways to tie liabilities and funding costs to something other than bond-type investments, for bonds will continue to be expensive options, especially if yields continue to drift lower.

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