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Chairperson's Corner

by Carolyn E. Zimmerman

First of all, let me congratulate the newest members of the Pension Section Council—Bruce Cadenhead, Adrien LaBombarde, and Sylvia Pozezanac (our new Canadian representative). I also want to give a sincere thanks to the departing members of the Council, Amy Viener and Michel St. Germain. And while I'm at it—congratulations to our new officers: Amy Timmons, Chairperson; Colin England, Vice-Chairperson; Sylvia Pozezanac, Secretary; and Lindsay Malkewicz, Treasurer.

It looks like the new Council is already off to a good start, beginning to plan the program for the 1999 Spring Meeting in Seattle, June 16 through 18. Based on the feedback we received from the Maui meeting this past spring, we have decided to continue the concept of a "seminar-within-a-meeting," with a complete "track" of sessions on plan design. Part of this process is finding qualified speakers for each session

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Capital Market Assumptions—The Past Performance Future Returns Debate

by Jane Arnold and Jennifer Donnelly

Explicit Investment Assumptions

With the requirement that actuaries use explicit investment assumptions, more attention than ever must be paid to a pension plan's asset allocation strategy. Questions still remain, however. Given the plan's mix of asset classes, what is the appropriate investment assumption to use? What is the best technique to derive appropriate assumptions, and what is a defensible conclusion?

At the time this article was being submitted, these questions seem even more critical. The worldwide volatility in August and September has gripped everyone's attention. Just when fiduciaries and other investors were getting complacent—increasing equity allocations without a care in the world—the markets began to show their stuff.

In This Issue

How do you come up with reasonable assumptions when the markets are in turmoil? A look at history suggests that volatility is not foreign to investments (no pun intended). Because actuaries usually provide assumptions in a 30 to 40 year context, the current volatility should not have a major impact on deriving assumptions except as further history from which to learn.

Generally, in our consulting, we forecast using assumptions for any ten years. In most of our work, we do not try to predict the immediate future based on current market behavior. Rather, we put current market behavior into the context of the various historical periods we use for our work.

Our advice is aimed chiefly at fiduciaries. Yet, our clients' actuaries have access to our work and frequently find it useful in coming up with their own assumptions.

To help our clients arrive at appropriate investment policies and strategies, we use various computer models. These models relate asset needs to cash-flow requirements, calculate optimal portfolios, determine probable rates of return for various asset mixes, and help provide our clients with other quantitative information relevant to determining their asset allocation strategies.

In order to provide sound advice, we need to offer quantitative analyses, combined with judgment and expertise. If we do our job right, fiduciaries can create an investment strategy tailored to their needs and those of the monies for which they take responsibility.

The First Step

Before the first quantitative step can be taken, however, capital market assumptions must be developed. These assumptions include:

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Capital Market Assumptions
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- An inflation rate
- A rate of return for each investment class. The real return comprises the expected risk-free rate and a risk premium. The nominal return is inflation plus the real return.
- A standard deviation for each asset class. The standard deviation expresses volatility as a way of measuring risk.
- Correlation coefficients, to express the manner in which the returns of each asset class relate to those of other asset classes. A correlation of plus one is a perfect correlation; negative one means that an asset class performs in a manner that is opposite to the other asset class; and zero is a random correlation.

The capital market assumptions are the building blocks on which the quantitative analyses are performed. These assumptions are critical to the whole process, yet there is no universally prescribed method of determining them. No set of capital market assumptions is "right." It is only by looking backward that one can determine, for any given time frame, whether:

- Capital market assumptions were on target
- The spreads really did make sense
- The correlations worked as expected
- The risk was greater or less than projected
- The range of returns really was as anticipated.

To be useful in assisting fiduciaries design their policy and strategy, we want to achieve a set of internally consistent assumptions, justified by a sensible methodology, derived by individuals with economics and investment knowledge, experience, and judgment.

Challenges in Developing a Process

History Is Not All It Is Cracked Up to Be

The process is not a simple one. There is some comfort in using historical data. The results actually happened, so one can accuse us of messing with the numbers. Unfortunately, historical data can be a little quirky for some time periods. Sometimes events happen that are highly unlikely ever to happen again. Not only do past results not guarantee future results—past results may not indicate in any way what future results are likely to be.

So, Global Portfolio Strategies does not believe in using historical data exclusively. We need to adjust for fundamental economic and environmental changes that have occurred over time. In other words we need to understand and analyze the history.

What Data Should Be Used?

Further supporting the view that history alone is inadequate is the difference among asset classes. Not surprisingly, historical data vary among asset classes. Some asset classes have a great deal of history, with records from the mid-1920s. Some have a relatively short history, 10 to 20 years. And, some asset classes, which are not publicly traded—such as real estate, venture capital, many alternative investments—have unreliable histories, lacking trustworthy, consistently-derived data.

What Time Periods Are Relevant?

Even where we have all the available historical data, we still would need to determine what time periods to use. We can use the longest available time periods for each asset class to get the most data on each. Then, of course, the circumstances under which the history was created could be vastly different. Domestic stock history, which goes back to the 1920s includes such events as the Great Depression and World War II; international stock history goes back to the mid 1970s—well after both those events. Or, we can insist on using comparable time periods, in which case the longest time period under consideration is the one for which all classes have data—perhaps only 10 years—and we are ignoring as much as 45 years of information for a number of asset classes.

How Should the Asset Classes Be Defined?

The process is further complicated by definitional issues. We need to decide whether we will try to distinguish among fragile differences in investment classes. For example, do we derive capital market assumptions for domestic common stocks, or do we think we can distinguish among management styles—growth, value, momentum, sector analysis? If we think we can identify a quantitative difference, how do we deal with the manager movement among the styles over time?

Leaving aside styles and talking pure asset class definition, do we look at bonds as a single, broad category or make a distinction among intermediate and long-term bonds? And further, if we distinguish between intermediate- and long-term bonds, how do we define each of them? What is the threshold value in defining equity capitalization? How small is a small cap's cap? And, is there even a mid-cap asset class at all?

What's the Problem with Using Historical Data?

What Time Period Do We Use—and Is It Long Enough?

In our job, we look at a lot of numbers combined in lots of different ways. Table 1 on page 12 shows several cuts at lots of data. The basic message, simply, in all these data, is that history is not simple; history does not lead easily to straightforward conclusions. If we look at different time periods, we will draw different inferences—and reach different conclusions.

Our first cut at the data addresses the questions: what time period should we use, and how long a time period is long enough?

To keep the process basic and straightforward, we start with only three asset classes, looked at individually—domestic stock, bonds, and cash (Table 1).

At the extremes, if we use only 10 years of data as a basis for forecasting, we will anticipate a return for stocks that is about 750 basis points more than we would anticipate if we used 70 years of data. Our risk assumption would be about 750 basis points less. In that scenario alone, stocks look tremendously more advantageous using 10-year numbers than they do using 70-year numbers—a lot more return, and a lot less risk. Which figures should we use?

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Capital Market Assumptions
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The numbers for 30, 40, 50, and 60 years look very similar for stocks— both for risk and return. Maybe we should let the majority rule. But then, we are ignoring the longest time period and the most recent time period. Does that make sense?

Bonds, too, look a lot better using 10-year numbers than they do using 70-year numbers—nearly 600 basis points more return at less than 100 basis points more risk. Good trade-off. With bonds, no time periods are markedly similar. Return and risk generally decrease as the time period gets longer, with the exception of the 10-year time period, which has the highest return but a risk number that looks a lot like the 50-year number. No majority rules here and no real consensus either. What assumptions are right for bonds? Not surprisingly, Treasury Bills vary less than stocks and bonds over various time periods.

Capital market assumptions, whether historical or derived by investment professionals, are used to look quantitatively at various combinations of asset classes with an eye toward determining how we might generate mixes to achieve desired return at an acceptable level of risk.

The impact of the risk and return assumptions on these mixes is critical. To demonstrate the impact, we ran seven mixes, using only historical data, as shown in Table 2.

If we use 10 years of data, 20% exposure to stocks will achieve an expected return of over 11%, with a standard deviation less than 7. Little risk, nice return! Using 70 years of data, however, gives a very different picture. The highest expected return in any of the mixes is about 9½%, and that mix has 80% in stocks. The standard deviation for that mix is a little over 16, contrasted to the standard deviation of less than 7 in the first instance.

Risk and return assumptions make a huge difference in outcomes. It is critical to use sound, internally consistent assumptions derived from knowledgeable study of all the data. Judgment is key, and knowledge of the history of the capital markets is necessary (Figure 1). But, history alone is not enough.

TABLE 1

	Stocks		Bonds		Cash	
	Return	Risk	Return	Risk	Return	Risk
10 Years	18.04	12.05	11.12	8.53	5.40	0.45
20 Years	16.61	14.67	10.43	11.35	7.21	0.79
30 Years	12.09	15.07	8.84	10.37	6.73	0.70
40 Years	12.28	14.24	6.86	9.36	5.82	0.75
50 Years	13.10	14.03	5.82	8.58	4.97	0.83
60 Years	12.51	15.44	5.41	7.98	4.16	0.90
70 Years	10.63	19.77	5.22	7.65	3.59	0.92

How Do We Integrate Asset Classes with Shorter Histories?

So far, we have simply used three asset classes that all have 70-year histories. What happens when we want to use more, and not all of the asset classes we want to use have the same amount of historical data?

Rather than introduce more asset classes into our examples, we have designed a fictitious scenario: Suppose we only had 10 years of data for stocks, and 30 years for the other asset classes—or 50 years—or 70 years? The results are shown in Table 3.

Introducing the shorter time period for stocks into the mix in all cases improves the expected return and has various impacts on the risk. Although these scenarios are fictitious, since we really do have data on stocks going back to 1926, the result is important.

If we use purely historical figures from various time periods, we are comparing the proverbial apples and oranges. The returns for international stocks—where data go back to 1970—do not embrace the impact of the Great Depression, World War II, the abolition of the gold standard. High yield bonds and international bonds have even shorter histories. How do we treat returns and risk that occurred over various lengths of time?

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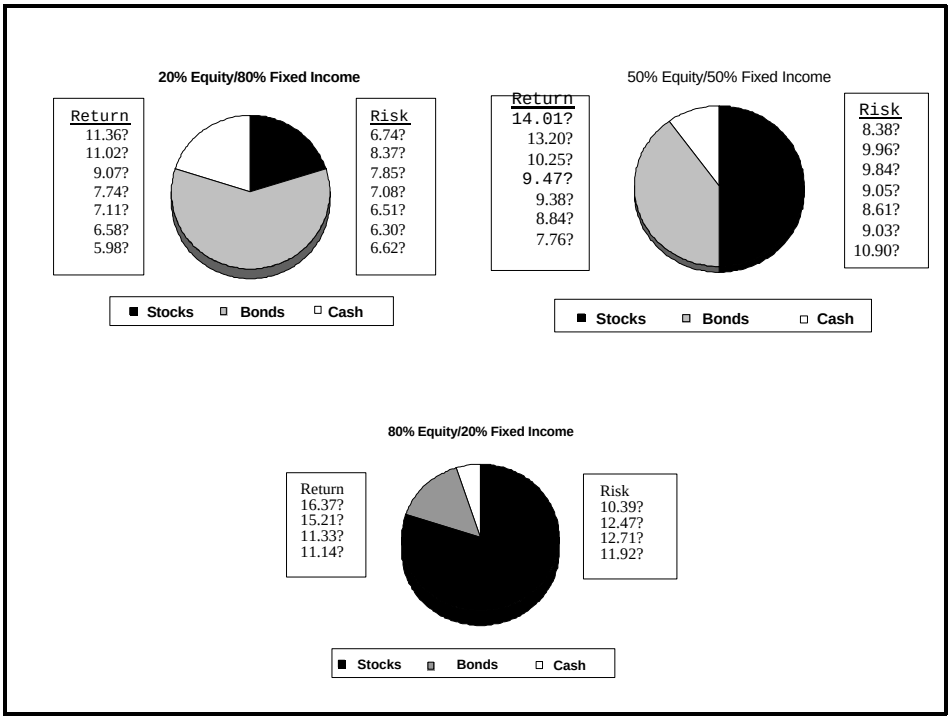
FIGURE 1



Capital Market Assumptions

TABLE 2

Mixes	Mix 1		Mix 2		Mix 3		Mix 4		Mix 5		Mix 6		Mix 7	
Stocks	20		30		40		50		60		70		80	
Bonds	60		55		50		40		30		25		15	
Cash	20		15		10		10		10		5		5	
	Return	Risk	Return	Risk	Return	Risk	Return	Risk	Return	Risk	Return	Risk	Return	Risk
10 Years	11.36	6.74	12.34	7.32	13.32	7.98	14.01	8.38	14.70	8.88	15.68	9.76	16.37	10.39
20 Years	11.02	8.37	11.80	8.88	12.58	9.57	13.20	9.96	13.82	10.56	14.60	11.63	15.21	12.47
30 Years	9.07	7.85	9.50	8.48	9.93	9.28	10.25	9.84	10.58	10.58	11.01	11.75	11.33	12.71
40 Years	7.74	7.08	8.33	7.68	8.92	8.46	9.47	9.05	10.01	9.81	10.60	10.95	11.14	11.92
50 Years	7.11	6.51	7.88	7.14	8.65	7.94	9.38	8.61	10.10	9.45	10.87	10.61	11.60	11.64
60 Years	6.58	6.30	7.35	7.11	8.13	8.11	8.84	9.03	9.55	10.11	10.32	11.45	11.03	12.69
70 Years	5.98	6.62	6.60	7.91	7.22	9.42	7.76	10.90	8.30	12.51	8.93	14.33	9.47	16.08

TABLE 3

Mixes	Mix 1		Mix 2		Mix 3		Mix 4		Mix 5		Mix 6		Mix 7	
Stocks	20		30		40		50		60		70		80	
Bonds	60		55		50		40		30		25		15	
Cash	20		15		10		10		10		5		5	
	Return	Risk	Return	Risk	Return	Risk	Return	Risk	Return	Risk	Return	Risk	Return	Risk
30/10 Years	10.26	7.80	11.28	8.25	12.31	8.79	13.23	8.98	14.15	9.30	15.17	10.08	16.09	10.57
30 Years	9.07	7.85	9.50	8.48	9.93	9.28	10.25	9.84	10.58	10.58	11.01	11.75	11.33	12.71
50/10 Years	8.09	6.78	9.36	7.35	10.62	8.01	11.85	8.40	13.07	8.90	14.33	9.77	15.55	10.40
50 Years	7.11	6.51	7.88	7.14	8.65	7.94	9.38	8.61	10.10	9.45	10.87	10.61	11.60	11.64
70/10 Years	7.46	6.25	8.82	6.89	10.19	7.61	11.47	8.11	12.75	8.70	14.11	9.61	15.39	10.31
70 Years	5.98	6.62	6.60	7.91	7.22	9.42	7.76	10.90	8.30	12.51	8.93	14.33	9.47	16.08

Capital Market Assumptions
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How Valid Is Any One Decade in Giving Clues to Returns and Risk in Another?

A look at each of our three asset classes on a decade-by-decade basis tells us that predictability is hard to infer. Here are the returns and standard deviation for each asset class for your viewing pleasure. For fun, we even added partial decades for the 1920s and the 1990s (Table 4).

For stocks, the 1950 decade was quite good. Expect a mediocre decade to follow? The 1960 decade was fairly mediocre. Expect a great decade to follow? The decade of the 1970s was equally mediocre. So, should we expect the 1980 decade to stay mediocre? The 1980 decade was strong, and the 1990 decade, until recently, looked equally as good, and with less volatility. Of course, the decade is not over yet.

Even Treasury Bills, an asset class with very little volatility, vary quite a bit from decade to decade, although until the partial decade of the 1990s there has been a pattern of increased return and risk.

Bond returns were going down starting in the partial decade of the 1920s for which we have data, then started going up in the 1960s and continued an upward trend until the partial decade of the 1990s. The 1990s, however, have a few more years to run.

Applying these historical data to our mixes, we get some fascinating results (Table 5).

In the decade of the 1970s, for example, the more stocks you added, the lower your return and the greater your risk. The difference between the first and the seventh mix is 100 basis points in return and approaching 700 basis points in risk. Who could have predicted that result?

Since the decade of the 1970s, the mixes have resumed the expected pattern of increasing in both return and risk as the stock exposure becomes greater.

A look at earlier decades shows a similar pattern. A precursor to the mixes in the decade of the 1970s, the mixes in the decade of the 1930s reflect decreasing returns and increasing risk as the stock exposure increases. In the following three decades—the 1940s, 1950s and 1960s—the more familiar pattern is resumed. The return and risk go up as the stock allocation is increased.

TABLE 4

	Stocks		Bonds		Cash	
	Return	Risk	Return	Risk	Return	Risk
1990–1997	16.61	12.29	10.41	8.35	4.90	0.37
1980s	17.46	16.42	12.88	13.74	8.85	0.74
1970s	5.84	15.95	6.11	7.74	6.26	0.50
1960s	7.81	12.22	1.45	5.87	3.89	0.37
1950s	19.35	11.84	–0.08	4.56	1.89	0.21
1940s	9.17	15.90	3.23	2.73	0.41	0.09
1930s	–0.05	37.83	4.87	5.44	0.19	0.03
1926–1929	19.19	19.83	4.99	3.96	0.27	0.00

Do the Tough Work Up-Front

The sets of historical data and the various mixes begin to tell the story. Capital market assumptions entail a lot more than using historical numbers. Using historical time periods at random, mixing time periods, relying solely on long time periods, or relying solely on the most recent 10 years may create indefensible conclusions. Worse yet, people who study the historical time periods can manipulate data to draw whatever conclusions suit their fancy. There has to be a better way—and there is.

Developing an Internally Consistent Set of Assumptions

A Multidisciplinary Approach Is Important

At Global Portfolio Strategies, we have always reevaluated our carefully derived capital market assumptions on a quarterly basis, fine tuning them and updating them as necessary. For this purpose, along with our own investment professionals, we utilize the expertise of individuals from diverse disciplines— economics, quantitative technology, stock portfolio management, and bond portfolio management. We even use actuaries!

As part of our regular quarterly analysis, we review and, where necessary, update our full set of capital market assumptions. We study the capital markets and amass historical data to derive a full, internally consistent set of capital market assumptions.

Using all the historical data our research finds is reliable, we analyze and compare them over many relevant time periods. In that way, we are able to incorporate long time periods into our analysis and also to compare time periods that reflect the longest time period for which information was available for a given asset class. We therefore can look at both long time periods and comparable time periods.

Next Step: Define Asset Classes and Time Period

We break down investment classes as far as we believe clear, valid distinctions can be made. Our current position is that we will not over-refine the definition of asset classes into many small subasset classes. For example, we divide domestic common stocks only between large capitalization and small capitalization stocks. We do not look at styles. With nearly identical risk and correlation characteristics for these subasset classes, the sensitivity to small differences in expected return is magnified. Because definition of these subasset classes is imprecise, often overlapping, and even different from one time period to the next, the magnification of small differences further exaggerates what may be, at base, minor distinctions.

Our decision, therefore, is to develop an internally consistent set of annualized, 10-year capital market assumptions for distinct asset classes, including: large capitalization domestic common stocks, small capitalization

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Capital Market Assumptions

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stocks, international stocks, international bonds, cash and cash equivalents, intermediate and long-term government and corporate bonds, high-yield bonds, venture capital, and equity real estate. Additional distinct asset classes are discussed and, using our process, can readily be incorporated into the system that was derived.

The Building Block Approach Uses Lots of Historical Data

The capital market assumptions were derived from the broad array of historical data that we had gathered and adjusted for fundamental economic and environmental changes that had occurred, such as the deregulation of markets and changes in interest rate levels.

Our process began with the derivation of an overall inflation assumption. Then, starting with cash and cash equivalents, we used historical data— especially spreads between asset classes—together with experience and judgment to build our system, one asset class at a time.

In building this system, we rely on some economic scenario assumptions: a fairly stable economy, a normal yield curve, and a disinflationary federal policy.

The System Is Understandable, Clear and Rigorous

The careful analytical system we use to derive our capital market assumptions allows us to explain its underpinnings in discussing the outcome of our analyses. Further, it permits us to fine-tune assumptions, if others would like to see quantitative analyses using differing views of the capital markets or the economy.

Table 6 on page 16 illustrates some of the capital market assumptions we have been using. Currently, we are again reviewing and possibly revising our capital market assumptions. In the process, we will review our current approach, run more numbers than most people would ever want to see, slice and dice data in every way we think will give us new insights. It is a rigorous process—and it should be.

Jane Arnold, JD, not a member of the Society, is Senior Vice President and Jennifer Donnelley is a Marketing/Client Specialist at Global Portfolio Strategies, Inc. in Bloomfield, Connecticut.

TABLE 5

Mixes	Mix 1		Mix 2		Mix 3		Mix 4		Mix 5		Mix 6		Mix 7	
	Return	Risk	Return	Risk	Return	Risk	Return	Risk	Return	Risk	Return	Risk	Return	Risk
Stocks	20		30		40		50		60		70		80	
Bonds	60		55		50		40		30		25		15	
Cash	20		15		10		10		10		5		5	
1990–1997	10.55	6.71	11.44	7.33	12.34	8.05	12.96	8.49	13.58	9.03	14.47	9.93	15.09	10.59
1980s	12.99	9.71	13.65	10.14	14.31	10.78	14.77	11.11	15.22	11.72	15.88	12.91	16.34	13.87
1970s	6.09	6.67	6.05	7.66	6.02	8.78	5.99	9.72	5.96	10.78	5.93	12.13	5.90	13.30
1960s	3.21	4.44	3.72	5.07	4.24	5.90	4.87	6.72	5.51	7.67	6.02	8.79	6.66	9.89
1950s	4.20	3.32	6.04	4.00	7.89	4.92	9.83	5.91	11.78	7.01	13.62	8.18	15.56	9.39
1940s	3.85	4.07	4.59	5.49	5.32	6.97	5.92	8.40	6.51	9.86	7.25	11.39	7.84	12.87
1930s	2.95	8.69	2.69	12.18	2.43	15.78	1.94	19.37	1.45	23.01	1.19	26.73	0.70	30.40
1926–1929	6.89	4.02	8.54	5.74	10.20	7.62	11.62	9.59	13.04	11.62	14.69	13.64	16.11	15.71

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Table 6 of this article not available on line.
Contact the Communications Department
and the Society office (874–706–3543)
for a hard copy.

TABLE 6