August 2001
Volume 13, No.1

THE PENSION FORUM

published by the Pension Section of the Society of Actuaries

INSIDE

FRONT

COVER

The Pension Forum is published on an ad hoc basis by the Pension Section of the Society of Actuaries. The procedure for submitting an article appears on page 100.

The Pension Forum is sent without charge to all members of the Pension Section.

All correspondence should be addressed to:

Daniel M. Arnold, FSA
Editor
The Pension Section
SOCIETY OF ACTUARIES
475 N. Martingale Road, Suite 800
Schaumburg, IL 60173-2226

Printed in the United States of America

BLANK

PAGE

The Pension

Forum

Volume 13, Number 1 July 2001

PENSION FORUM TABLE OF CONTENTS

Page

Survey of Asset Valuation Methods for Defined Benefit Pension Plans

Submitted by: **The Society of Actuaries' Committee on Retirement Systems Research**

The Pension

Forum

Volume 13, Number 1 July 2001

TABLE OF CONTENTS FOR SURVEY OF ASSET VALUATION METHODS FOR DEFINED BENEFIT PENSION PLANS

Page

EXECUTIVE SUMMARY

In 1998, the Society's Committee on Retirement Systems Research conducted a survey of asset valuation methods used in valuations of defined benefit plans. For this purpose, asset valuation methods were classified into four groups and nine specific methods, as follows:

- Fair market value (1 method)
- Discounted cash flow (1 method)
- Book value (3 methods: cost, amortized, contract)
- Smoothed value (4 methods: blend of cost and market, write-up, deferred recognition, average market value).

Pension actuaries who are members of the Society were surveyed and asked to provide details on the asset valuation methods used on each pension plan they valued, and some details about the plan, its investment mix and other related information. Approximately 6,000 questionnaires were mailed out and responses for a total of 9,983 plans were returned. Out of those responses, 9,670 were determined to be complete and consistent enough to be included in the study. This total included 9,026 U.S. plans (about 13% of all U.S. plans), 612 Canadian plans (about 9% of all Canadian plans) and 32 other plans.

The following table summarizes the relative frequency of asset valuation methods for the four categories listed above, shown separately by country and size of plan. "Small" plans are defined to be those with less than 100 participants. The percentages shown indicate relative frequency for all plans in the respective columns. For example, 65.3% of all small plans in the U.S. use fair market value.

Asset Valuation Method Relative Frequency				
	United States		Canada	
	Small Plans	Large Plans	Small Plans	Large Plans
Number of Responses [1]	5,799	3,168	274	311
Asset Valuation Group				
Fair Market Value	65.3%	48.6%	90.5%	47.3%
Discounted Cash Flow	0.0%	0.1%	0.0%	0.3%
Book Value	27.8%	13.9%	1.1%	4.5%
Smoothed Value	6.9%	36.4%	8.0%	42.1%
Other (including combination methods)	0.1%	1.0%	0.4%	5.8%

[1] *Results exclude 59 U.S. plan responses and 27 Canadian plan responses that failed to indicate the number of particpants covered.*

The survey found that fair market value is the most frequently used method, especially for smaller plans (smaller by both participant count and assets). Discounted cash flow is very rarely used in either country.

Book value methods are used considerably more frequently in the U.S. than in Canada. In the U.S., this category is dominated by contract value, a method that is not used at all in Canada. In both countries, cost value is used more frequently with government plans than with other plans.

Smoothed value methods account for a total 17% of plans in the United States and a total 25% of plans in Canada. Among the smoothed methods, write-up is the most frequently used in the U.S., and deferred recognition is the most frequently used in Canada. Some other findings related to smoothed value methods include:

- Five years is the most common smoothing period in both countries.
- Most U.S. plans use a corridor of 80% to 120% of fair market value; most Canadian plans use no corridor.
- Most U.S. plans using the write-up method use a write-up rate equal to the rate used to discount the liabilities, and make an adjustment to the preliminary value equal to a fixed percentage of the difference between fair market value and the preliminary value.
- In both countries, a majority of plans using the deferred recognition and average market value methods base the smoothing on either all investment experience in excess of an assumed rate or all realized and unrealized capital gains.
- The deferred recognition method is used more by pay-related plans than non-pay-related plans in the U.S. and less by pay related plans than non-pay-related plans in Canada.
- In both the U.S. and Canada, collectively bargained plans use smoothed methods more frequently (and fair market value less frequently) than non-bargained plans.
- In the U.S., most new asset methods are adopted on a prospective basis, whereas in Canada prior asset experience (usually including up to five years' worth) is typically reflected.
- During the period from 1988 through 1996, plan assets were "marked to market" sparingly in the U.S. (a low of 0.3% of all plans in 1989 to a high of 2.6% of all plans in 1996) and very rarely in Canada.

This survey represents the first phase of a two-phase research project. The objectives of the second phase are to fine-tune the classification system presented in this study, compare and contrast key characteristics of the various asset valuation methods, and assess each asset valuation method's effectiveness in achieving particular financial objectives.

INTRODUCTION

The Society of Actuaries' Committee on Retirement Systems Research recognizes the need for pension actuaries in the United States and Canada to be aware of the techniques available for use in the appropriate measurement of asset values in support of defined benefit plan liabilities. This project represents the first phase of a two-step study of asset valuation methods. The objectives of this first phase were (i) to suggest a standard classification system for the various asset valuation methods used by pension actuaries in North America, and (ii) to measure the relative prevalence of each method. The objectives of the second phase will be to fine-tune the classification system as appropriate, compare key characteristics of asset valuation methods, and assess each method's effectiveness in achieving various financial objectives.

Historically, little has been published on the subject of asset valuation method. Pension textbooks typically devote only a chapter or section to asset valuation methods and, often, research in this area has been hampered by a lack of standardized terminology. A small number of papers have been published in the SOA Transactions. A list of these papers and certain books that discuss the subject are included in the Bibliography section of this report.

To study the classification and prevalence of asset valuation methods, a Project Oversight Group (POG) appointed by the Committee, working with McGinn Actuaries, Ltd., developed a detailed survey that was to be completed by pension actuaries in the U.S. and Canada. In addition to collecting information on relative frequency, the survey was designed to collect related information such as the type of entity sponsoring the plan, plan size (in terms of both participant counts and plan assets), and actuarial cost method used in conjunction with the asset valuation method.

As part of this study, nine asset valuation methods were identified and classified into one of four categories:

- Fair market value (1 method)
- Discounted cash flow (1 method)
- Book value (3 methods)
- Smoothed value (4 methods)

Section 2 of the report provides a description of the nine methods, including possible adjustments and/or application of corridor limits that are necessary to fully describe the method. Section 3 of the report presents a discussion of the survey methodology, and Section 4 presents the actual survey results. Section 5 presents a bibliography of books and articles that discuss various aspects of asset valuation methods, and Section 6 includes a sample copy of the survey form.

DESCRIPTION OF ASSET VALUATION METHODS

Description of Nine Methods Included in Survey

The nine asset valuation methods described in the survey are summarized below. Many of the methods-especially those in the "Smoothed Methods" category-will typically require additional information (such as the types of returns subject to smoothing, potential adjustments towards fair market value, and application of any corridor limits) to completely describe the asset valuation process.

- ***Fair Market Value (FMV)*** – Asset valuation is based on the price for which the assets could be sold on the valuation date. (This method is also known as Fair Value, Market Value and Actual Value.)

- ***Discounted Cash Flow*** – This method discounts the future cash flow of the asset to the valuation date. Currently, it is common to discount the anticipated cash flow using a fixed interest rate. (This method is also known as the Present Value or Perpetuity method.)

- ***Book Value Methods*** – This category of methods is based on the use of a stated or fixed asset value other than fair market value.

  - ***Cost Value*** – Asset valuation is based on the price at which the asset was purchased. (This method is also known as Book Value or Acquisition Value.)
  - ***Amortized Value*** – This method is generally used for fixed income investments only. Under this method, valuation assets are calculated to be the par value or face value of the investment adjusted for the amortized premium or discount on the acquisition cost. The amortization typically extends over the period from the acquisition date to maturity (or first call) date.
  - ***Contract Value*** – Asset valuation is based on the value of the contract as stated by the issuing financial institution (typically an insurance company or bank). This method is frequently used in connection with Guaranteed Investment Contracts, Individual Participation Guarantee, Deposit Administration and similar general account investment contracts.

- ***Smoothed Value Methods*** – This category includes asset valuation methodologies that, while reflecting fair market value, incorporate a specific algorithm for smoothing market fluctuations.

  - ***Blend (or Average) of Cost and Market Values*** – This asset valuation method either blends the current Fair Market and Cost Values or averages the ratio of Fair Market Value to Cost Value over two or more years.

- Write-up - A preliminary asset value is developed by bringing forward the prior year's actuarial asset value, adding contributions, subtracting benefit payments (and possibly expenses), and increasing this result with assumed earnings. The assumed earnings can be based on either a specified fixed rate of return or on a variable rate determined by a specific formula (e.g., yield on T-bills plus 3%). This preliminary asset value could be subject to certain other adjustments to develop a final asset value. The adjustment to the preliminary asset value might include a partial adjustment toward Fair Market Value or a modification to keep the final asset value within a certain corridor. If no other adjustments are made, the preliminary asset value is the final asset value. (This method is also known as the **Long Term Appreciation** or **Long Range Yield** method.)

- Deferred Recognition – Under this method, only a portion of investment experience is recognized in the current year. A preliminary asset value is developed by subtracting (or adding) a portion of previously unrecognized gains (or losses) from the current Fair Market Value. The amounts deferred could be based on specific types of investment returns (i.e., realized and unrealized gains) or on overall returns in excess of (or less than) a specified rate. This preliminary asset value could be subject to certain other adjustments such as those outlined above for the Write-up Method, to develop a final asset value. If no other adjustments are made, the preliminary asset value is the final asset value. (This method is also known as the **FAS 87,** or **Adjusted Market** method.) This method can be shown to be equivalent to the Average Market Value described below.

- Average Market Value – A preliminary asset value is developed as the average of the current year Fair Market Value and one or more Adjusted Fair Market Values (AFMV) from prior years. The AFMV for each prior year is developed by adjusting that year's Fair Market Value to the valuation date, by adding contributions, subtracting benefit payments (and possibly expenses) and further adjusting by certain specific items of investment experience. This preliminary asset value could be subject to certain other adjustments to develop a final asset value. If no other adjustments are made, the preliminary asset value is the final asset value. (This method is also known as the **Average Value, IRS Average of Market, Average Accumulated Market,** or **Moving Average of Market** method.) This method can be shown to be equivalent to the Deferred Recognition Method described above.

Other Information Submitted by Survey Respondents

The research team encouraged respondents to provide additional details regarding the asset valuation methods they submitted, and many did so. The additional information supplied generally was of two types: (1) the use of a different asset method for different asset classes, and (2) the description of a method fundamentally distinct from any of the original nine described in the survey. The new smoothed value methods generally fell into one of the following two categories:

- **Trend-Line Method -** Under this method, the current Fair Market Value is multiplied by a trend-line factor based on an extrapolation of a least-squares regression line to the valuation date. Based on the descriptions received, this method seems to be most commonly applied separately to distinct asset classes. The regression line applicable to a given asset class is based on the ratio of an appropriate published index to the underlying Fair Market Value of assets in the class.

- **Average Unit Value Method -** Under this method, asset valuation is based on the product of an "average unit value" and an accumulated number of units. The average unit value is developed over a specified period of time, ending with the current year. (The contributor of this method did not provide any additional details concerning either the calculation of the annual unit values or the method used to accumulate units.)

Certain Regulatory Considerations in the United States

Section 412(c)(2) of the Internal Revenue Code specifies broad guidelines for the valuation of assets to be used in connection with minimum funding standards. In general, the value of plan assets "shall be determined on the basis of any reasonable actuarial method of valuation which takes into account fair market value" and which is permitted under regulations.

The regulations under § 1.412(c)(2)-1 provide additional details with respect to "reasonable" asset valuation methods. The list below highlights some of those details that are relevant to the general methodologies and special features discussed in this paper.

- **Amortized Value:** Paragraph (2)(B) of IRC Section 412(c)(2) permits the value of bonds to be determined on an amortized basis. This method is only available to multi employer plans, and an election to use this method, once made, can be revoked only with the consent of the Secretary of the Treasury.
- **Average Value:** This asset valuation method, described in subsection (b)(7) of the regulations, is a special case of the Average Market Value method described above. Additional details are presented in the "Automatic Approval" table below.
- **Corridor Limits:** In accordance with subsection (b)(6) of the regulations, a "reasonable" asset valuation method must produce an actuarial value that is not less than some minimum amount and not more than some maximum amount. Originally the minimum was set equal to the lesser of 80% of FMV and 85% of the "average value" mentioned above, but the 85% of average value limit was removed by the Pension Protection Act of 1987. Similarly, the maximum was originally set equal to the greater of 120% of FMV and 115% of average value, but the 115% limit was eliminated in 1987.

Enrolled Actuaries in the U.S. must receive approval from the Internal Revenue Service (IRS) to change the asset valuation method used to satisfy minimum funding standards. The IRS has identified certain methods that (subject to certain timing considerations) are granted "automatic" approval for such a change. Using the classification system presented in this paper, these so-called automatic approval methods are listed in the table on page 7.

IRS Revenue Procedure	AA #	IRS Description	Asset Valuation Methods Description				
			Method	Types of Earnings Subject to Smoothing	Smoothing Period	Adjustment Towards FMV?	Other Features
95-5	10	Fair Market Value	Fair Market Value	N/A	N/A	N/A	N/A
95-5 [1]	11	Average Value (without phase-in)	Average Market Value [2]	All *except* FMV appreciation & depreciation	≤ 5 years	N/A	Based on & 1.412 (c) (2)-1(b)(7) by direct reference
95-5 [1]	12	Average Value (without phase-in)	Average Market Value [2]	All *except* FMV appreciation & depreciation	≤ 5 years	N/A	Phases into full AA # 11 over not more than five years
98-10	15	Smoothed Market Value (without phase-in)	Deferred Recognition [3]	All	≤ 5 years	Yes	Preliminary asset value based on prior year FMV rolled forward (with cash flows) at valuation interest rate
98-10	16	Smoothed Market Value (without phase-in)	Deferred Recognition [3]	All	≤ 5 years	Yes	Starts with FMV; phases into full AA #15 over not more than five years
98-10	17	Average Value (with alternative phase-in)	Average Market Value [2]	All *except* FMV appreciation & depreciation	≤ 5 years	N/A	Starts with FMV; phases into full AA #11 over not more than five years

[1] *Clarified by Revenue Procedure 98-10*

[2] *Can be shown to be algebraically equivalent to a properly structured Deferred Recognition method*

[3] *Can be show to be algebraically equivalent to a properly structured Average Market Value method*

SURVEY METHODOLOGY

Basic Approach

Various approaches were considered for collecting asset valuation method information accurately and in a manner that would be considered representative of the majority of methods in use by pension actuaries across the U.S. and Canada. A survey approach was selected and physical data collection was accomplished via a standardized, commercial answer form suitable for mechanically scanning results into a computer data base file.

Survey Design

Published reference material was reviewed to gauge the scope and variety of asset valuation methods. This research, supplemented by the practical experience of the POG members, resulted in an identification of four categories of methods encompassing a total of nine distinct asset valuation methods (See Section 2). In addition to the nine asset valuation methods, a tenth option ("Other") was added to accommodate any other methods not explicitly described.

The survey also included certain questions designed to identify such aspects as the use of initialization techniques, the application of asset value adjustments (e.g., corridor limits), the incidence of marking assets to market value, and the use, where applicable, of specific smoothing techniques. Next, the survey was structured to distinguish between the use of a particular asset valuation method for funding purposes and the use of the same or a different method for financial accounting purposes.

Other plan-specific data also was requested in order to explore potential relationships between various plan characteristics and particular asset valuation methods. Plan characteristics investigated through the survey included:

- Type of plan sponsor (corporate, multi-employer, government)
- Type of plan (i.e., ERISA, non-ERISA, Canada; pay-related or not pay-related)
- Presence of collective bargaining agreements,
- Number of plan participants,
- Total fair market value of assets, and
- Percentage of assets invested in equities
- Actuarial cost method for funding

To collect survey data on a manageable basis for such a large number of plans, respondents were asked to group their small plans (less than 100 participants) by asset valuation method, and to complete ***one survey per method.*** For larger plans, respondents were asked to complete ***one survey per plan.*** A copy of the survey package is included in the Appendix.

Data Collected

Initially, surveys were mailed to over 3,900 SOA Pension Section members in the U.S. and Canada. Shortly after the first set of surveys was mailed, phone calls were made to the chief actuaries of a number of large consulting firms encouraging participation in the survey. Subsequently, the scope of the study was extended to include approximately 2,100 SOA members who indicated a pension interest, but who were not members of the Pension Section. Respondents were given four weeks from the date of the cover letter to complete and return the survey. However, due to a significant number of respondents who indicated their desire to complete the survey for submission after the original due date, the original deadline for responses was extended two weeks.

In total, responses covering 9,983 plans were received. Of those responses, the asset valuation methods indicated for 313 plans (all U.S. ERISA-covered corporate plans) were excluded from the study due to invalid or internally inconsistent responses. The total number of plans included in the survey results, therefore, is 9,670, including 9,026 U.S. plans, 612 Canadian plans, and 32 "other" miscellaneous plans.

The U.S. Department of Labor's (DOL) 1998 Abstract of 1994 Form 5500 Annual Reports includes summaries of various statistics regarding U.S. pension plans. The following table presents a comparison of the total number of U.S. plans reflected in this survey to the total number of defined benefit plans in the U.S. (excluding plans covering only one participant or not reporting participant count) that filed a Form 5500 for the 1994 plan year.

Number of Participants	Current Survey		DOL 1998 Abstract [1]		Survey Count/ DOL Count
	U.S. Plan Count [2]	Percent of Total	Plan Count	Percent of Total	
Less than 10	2598	29%	27278	40%	9.5%
10 thru 99	3201	36%	22975	34%	13.9%
100 thru 499	1342	15%	10270	15%	13.1%
500 thru 999	937	10%	2829	4%	33.1%
1,000 thru 4,999	600	7%	3709	5%	16.2%
5,000 thru 9,999	115	1%	644	1%	17.9%
Greater than 9,999	174	2%	649	1%	26.8%
Total	8967	100%	68354	100%	13.1%

[1] *Table B1. Distribution of Pension Plans (by participant size, 1994)*

[2] *59 U.S. plan responses failed to indicate the number of participants covered*

Although the data from the DOL report predates the current survey by a number of years, the researchers and POG members believe that the U.S. survey responses received constitute a reasonably representative sample of defined benefit plans in the United States. The comparison indicates that there was a heavier relative response rate among large U.S. plans, especially those with 500 or more participants. One possible reason for this phenomenon is discussed in the "Data Issues" section that follows.

The 1996 Statistics Canada report included 6,884 plans covering over 4.5 million participants. The report indicated that, like U.S. plans, the majority of Canadian plans covered fewer than 100 participants. The following table presents a comparison of the total number of Canadian plans reflected in this survey to the total number of defined benefit plans based on 1996 Statistics Canada data.

Number of Participants	Current Survey		DOL 1998 Abstract [1]		Survey Count/Statistics Canada Count
	Can. Plan Count [2]	Percent of Total	Plan Count	Percent of Total	
Less than 10	191	32%	2371	34%	8.1%
10 thru 99	83	14%	2222	32%	3.7%
100 thru 499	200	34%	1511	22%	13.2%
500 thru 999	40	7%	322	5%	12.4%
1,000 thru 4,999	50	9%	355	5%	14.1%
5,000 thru 9,999	6	1%	46	1%	13.0%
Greater than 9,999	15	3%	57	1%	26.3%
Total	585	100%	6884	100%	8.5%

[1] *Table 3: Number of plans and members by membership-size group -- Defined benefit plans*

[2] *27 Canadian plan responses failed to indicate the number of participants covered*

The category including Canadian plans with 10 – 99 participants was inexplicably underrepresented in the survey responses. Despite this slight skewing of results towards large Canadian plans, the researchers and POG members believe that the survey responses received for Canadian plans constitute a reasonably representative sample of all Canadian defined benefit plans.

Data Issues

Of the 9,983 plans for which responses were received, 15 plans were immediately excluded from the study due to missing or invalid responses.

A few actuaries who wanted to submit data on a large number of large plans requested permission to report these plans in small plan format, i.e., one form per asset valuation method. The research team decided that it was in the best interests of the study to include this information, as long as no distortions were introduced into the data set. In total, 41 survey forms were submitted in this manner, reflecting a total of 1,417 large plans. Upon further analysis, three of these forms, representing a total of 298 large U.S. ERISA-covered corporate plans, were excluded due to internal inconsistencies.

Shortly after the original set of survey forms were sent out, the research team called the chief actuaries at a number of large consulting firms in an effort to encourage participation in the survey. This could have contributed to the relatively heavy response rates for plans with over 500 participants. Also, since actuaries in large firms often gravitate

towards one or two asset valuation methods preferred by their particular firm, a disproportionately large number of submissions from these organizations might have produced some skewing effect on the relative frequency results for large plans.

SURVEY RESULTS

This section of the report is organized into 17 tables with accompanying commentary, followed by a discussion of other related topics at the end. The following display summarizes the tables included:

Table Number	Description
1	Relative Frequency of Asset Valuation Methods (Funding Purposes)
2	Asset Valuation Method Frequency (Funding Purposes) U.S. Compared to Canada
3 [1]	Asset Valuation Frequency by Plan Participant Count
4	Fair Market Value and Contract Value Methods Frequency (Funding Purposes) by Plan Participant Count
5 [1]	Asset Valuation Method Frequency (Funding Purposes) by Value of Plan Assets
6	Asset Valuation Method Frequency by Type of Entity Sponsoring Plan
7	Asset Valuation Method Frequency (Funding Purposes) for ERISA Plans Compared to Non-ERISA Plans
8	Asset Valuation Method Frequency (Funding Purposes) by Collective Bargaining Status
9	Asset Valuation Method Frequency (Funding Purposes) by Type of Benefit Formula
10 [1]	Asset Valuation Method Frequency (Funding Purposes) by Actuarial Cost Method
11 [1]	Asset Valuation Method Frequency (Funding Purposes) by Percentage of Common Stocks
12 [1]	Asset Valuation Method Frequency – Financial Accounting versus Funding
13 [1]	Asset Valuation Method Frequency (Financial Accounting Purposes) by Value of Plan Assets
14 [1]	Asset Valuation Method Frequency (Financial Accounting Purposes) by Percentage of Common Stocks
15 [1]	Years of Smoothing Period by Type of Asset Valuation Method
16 [1]	Years of Smoothing Period by Percentage of Common Stocks
17 [1]	Prior Asset Experience Reflected in Initial Application of Method

1 Consists of two separate table, "A" for U.S. results and "B" for Canadian results.

NOTE: Due to the rounding methodology used to develop percentages, totals may not add to 100 percent.

A total of 9,670 defined benefit plans (9,026 U.S., 612 Canada, and 32 "miscellaneous") were included in the survey. Table 1 summarizes the number of plans and relative frequency of the asset valuation methods indicated on the surveys:

TABLE 1
Relative Frequency of Asset Valuation Methods (Funding Purpose)

Asset Valuation Method Method		Number of Plans	Relative Frequency
1	Fair Market Value	5,827	60.3%
2	Cost Value	36	0.4%
3	Average (or Blend) of Cost & Market	182	1.9%
4	Discounted Cash Flow [1]	4	+
5	Amortized Value	17	0.2%
6	Contract Value	2,016	20.8%
7	Write-Up	912	9.4%
8	Deferred Recognition	448	4.6%
9	Average Market Value	174	1.8%
10	Other (including Combination) [2]	54	0.6%
Totals		9670	100%

[1] Throughout this survey results section, a plus sign (+) designates a positive percentage less than 0.05%, and a dash (-) designates no responses.

[2] Throughout the remainder of this survey results section, "Other" will be used to designate "Other" (including Combination)."

Note: Given that there were only 32 responses received for "miscellaneous" plans, those responses have been excluded from the remainder of this survey results section.

Table 2 summarizes the relative frequency (by number of plans) of each asset valuation method by country:

The survey findings indicate that actuaries in both countries utilize the Fair Market Value

TABLE 2
Asset Valuation Method Frequency (Funding Purposes)
U.S. Compared to Canada

	Asset Valuation Method	Relative Frequency	
		U.S.	Canada
1	Fair Market Value	59.6%	68.60%
2	Cost Value	0.2%	2.80%
3	Average (or Blend) of Cost & Market	1.7%	4.40%
4	Discounted Cash Flow [1+]	+	0.2%
5	Amortized Value	0.2%	0.2%
6	Contract Value [1-]	22.3%	-
7	Write-Up	9.9%	2.6%
8	Deferred Recognition	4.2%	11.1%
9	Average Market Value	1.5%	7.0%
10	Other	0.4%	3.1%
Totals		100.0%	100%

[1] Throughout this survey results section, a plus sign (+) designates a positive percentage less than 0.05%, and a dash (-) designates no responses.

method significantly more frequently than any other method. The Amortized Value and Discounted Cash Flow methods are the least utilized methods in both countries. Respondents reported using Cost Value for only 19 U.S. plans and 14 of these were government plans not subject to ERISA. It is also interesting to note that no respondent reported using Contract Value for any Canadian plan.

With the exception of the Write-Up method, each of the smoothed methods has greater overall relative frequency in Canada than in the United States. The most frequently used smoothed methods in the U.S. and Canada are the Write-Up method and Deferred Recognition method, respectively.

Tables 3A and 3B summarize the Asset Valuation Method Frequency by Participant Count for U.S. and Canadian plans, respectively. Not unexpectedly, the responses indicate that actuaries use the Fair Market Value method more frequently for plans with smaller participant counts. For example, Fair Market Value is used for over 90% of the 274 Canadian plans surveyed with fewer than 100 participants. In the U.S., of the 5,799 plans

with less than 100 participants that responded to the survey, over 65% use Fair Market Value and another 27% use Contract Value. Of the U.S. and Canadian plans with 5,000 or more participants responding, only 22.5% and 28.6%, respectively, use Fair Market Value.

TABLE 3A
Asset Valuation Method Frequency (Funding Purposes) by Plan Participant Count
(U.S. Only)

		Plan Participant Count						
		Small Plans Total = 5,799		Large Plans Total = 3,168				
		Less than 10	10 thru 99 Apr-00	100 - 4999	500 - 999	1,000 - 4,999	5,000 - 9,999	More than 9,999
	Number of Responses [1]	2,598	3,201	1,342	937	600	115	174
	Asset Valuation Method							
1	Fair Market Value	81.6%	52.0%	35.4%	74.5%	50.3%	27.8%	19.0%
2	Cost Value	-	0.1%	0.9%	0.2%	0.2%	0.9%	0.6%
3	Average (or Blend) of Cost and Market	-	1.0%	3.7%	3.1%	3.7%	4.3%	6.9%
4	Discounted Cash Flow	-	-	0.1%	-	0.2%	-	-
5	Amortized Value	-	0.4%	0.1%	-	0.2%	-	-
6	Contract Value	18.1%	35.1%	28.2%	3.9%	1.0%	-	-
7	Write-Up	0.2%	9.8%	22.1%	10.0%	19.0%	18.3%	29.3%
8	Deferred Recognition	-	0.4%	6.3%	6.2%	20.8%	37.4%	31.6%
9	Average Market Value	+	1.2%	2.8%	1.5%	2.5%	8.7%	9.2%
10	Other	-	0.1%	0.4%	0.5%	2.2%	2.6%	2.9%

[1] *Results exclude 59 U.S. plan responses that failed to indicate the number of participants covered.*

Caution should be used in interpreting the results for the largest Canadian plans (in the "5,000 - 9,999" and "Greater than 9,999" columns in Table 3B below) due to the small number of plans included in those categories. For example, the 66.7% using Fair Market Value in the "5,000 - 9,999" category represents only four plans, and the 26.7% using Cost Value in the "Greater than 9,999" category represents four large government plans.

TABLE 3B
Asset Valuation Method Frequency (Funding Purposes) by Plan Participant Count (Canada Only)

		Plan Participant Count						
		Small Plans Total = 274		Large Plans Total = 311				
		Less than 10	10 thru 99	100 - 4999	500 - 999	1,000 - 4,999	5,000 - 9,999	More than 9,999
Number of Responses[1]		191	83	200	40	50	6	15
Asset Valuation Method								
1	Fair Market Value	99.5%	69.9%	61.5%	22.5%	18.0%	66.7%	13.3%
2	Cost Value	0.5%	1.2%	4.0%	2.5%	2.0%	-	26.7%
3	Average (or Blend) of Cost and Market	-	6.0%	5.0%	12.5%	12.0%	-	6.7%
4	Discounted Cash Flow	-	-	-	-	2.0%	-	-
5	Amortized Value	-	1.2%	-	-	-	-	-
6	Contract Value	-	-	-	-	-	-	-
7	Write-Up	-	2.4%	1.5%	7.5%	10.0%	-	20.0%
8	Deferred Recognition	-	12.0%	15.0%	12.5%	34.0%	16.7%	26.7%
9	Average Market Value	-	6.0%	7.5%	32.5%	16.0%	16.7%	6.7%
10	Other	-	1.2%	5.5%	10.0%	6.0%	-	-

[1] *Results exclude 27 Canadian plan responses that failed to indicate the number of particpants covered.*

The U.S. and Canadian results exhibit significant differences in asset valuation method frequency as the participant size of the plan increases. Relative use of the Cost Value method for large plans, for example, is significantly greater in Canada due to legislated restrictions on Cost Value in the United States.

For U.S. plans, this decrease in the frequency of Fair Market Value is not linear with increasing plan sizes. However, if the frequency of Fair Market Value is added to the frequency of Contract Value, as summarized in Table 4 below, the decrease in the combined frequency is nearly monotonic as the participant count of the plan increases.

TABLE 4
Fair Market Value and Contract Value Methods Frequency
(Funding Purposes) by Plan Participant Count
(U.S. Only)

	Sub-Totals by Plan Participant Count						
	Less than 10	10 thru 99	100 - 4999	500 - 999	1,000 - 4,999	5,000 - 9,999	More than 9,999
Number of Responses [1]	2,598	3,201	1,342	937	600	115	174
Asset Valuation Method							
Fair Market Value	81.6%	52.0%	35.4%	74.5%	50.3%	27.8%	19.0%
Contract Value	18.1%	35.1%	28.2%	3.9%	1.0%	-	-
Combined Total	99.7%	87.1%	63.6%	78.4%	51.3%	27.8%	19.0%

[1] *Results exclude 57 U.S. plan responses that failed to indicate the number of participants covered.*

Tables 5A and 5B analyze the asset valuation method frequency by total fair market value of plan assets for the U.S. and Canada, respectively. (All dollar amounts are shown in local currency.) The results are consistent with the results of the analysis by participant count as summarized in Tables 3A and 3B. In both countries, the frequency of Fair Market Value (and Contract Value in the U.S.) generally decreases, and the frequency of the smoothed value methods generally increases as the fair market value of plan assets increases.

TABLE 5A
Asset Valuation Method Frequency (Funding Purposes) by Value of Plan Assets
(U.S. Only)

		Fair Market Value of Plan Assets				
		Less than $1 Million	$1 Million to $5 Million	$5 Million to $25 Million	$25 Million to $100 Million	Greater than $100 Million
Number of Responses[1]		4,652	2,335	1,205	461	358
Asset Valuation Method						
1	Fair Market Value	77.6%	45.1%	36.7%	43.4%	18.2%
2	Cost Value	+	0.2%	0.2%	1.3%	1.1%
3	Average (or Blend) of Cost and Market	0.3%	2.0%	3.8%	3.3%	8.1%
4	Discounted Cash Flow	-	+	0.1%	0.2%	-
5	Amortized Value	-	0.6%	-	0.2%	0.3%
6	Contract Value	18.7%	33.6%	27.4%	6.7%	0.3%
7	Write-Up	2.9%	14.4%	22.2%	14.5%	24.6%
8	Deferred Recognition	0.4%	1.8%	6.9%	23.0%	36.3%
9	Average Market Value	0.1%	2.1%	2.1%	5.6%	8.1%
10	Other	+	0.3%	0.7%	1.7%	3.1%

[1] *Results exclude 15 U.S. plan responses that failed to indicate asset size.*

TABLE 5A
Asset Valuation Method Frequency (Funding Purposes) by Value of Plan Assets
(U.S. Only)

		Fair Market Value of Plan Assets				
		Less than $1 Million	$1 Million to $5 Million	$5 Million to $25 Million	$25 Million to $100 Million	Greater than $100 Million
	Number of Responses [1]	118	52	248	57	61
	Asset Valuation Method					
1	Fair Market Value	93.2%	55.8%	73.8%	21.1%	18.0%
2	Cost Value	2.5%	1.9%	2.4%	3.5%	8.2%
3	Average (or Blend) of Cost and Market	1.7%	5.8%	3.2%	14.0%	9.8%
4	Discounted Cash Flow	-	-	-	1.8%	-
5	Amortized Value	-	1.9%	-	-	-
6	Contract Value	-	-	-	-	-
7	Write-Up	-	7.7%	-	7.0%	13.1%
8	Deferred Recognition	1.7%	15.4%	10.5%	24.6%	27.9%
9	Average Market Value	-	11.5%	6.0%	21.1%	16.4%
10	Other	0.8%	-	4.0%	7.0%	6.6%

1 *Results exclude 76 Canadian plan responses that failed to indicate asset size.*

Table 6 summarizes survey results by type of entity (corporate, multiemployer, and government) sponsoring the plan. The results in Table 6 exclude plans with less than 100 participants.

TABLE 6
Asset Valuation Method Frequency (Funding Purposes)
by Type of Entity Sponsoring Plan (Large Plans Only)

		U.S.			Canada		
		Corporate	Multi-employer	Government	Corporate	Multi-employer	Government
	Number of Responses	2,747	168	253	264	20	27
	Asset Valuation Method						
1	Fair Market Value	50.4%	17.9%	49.8%	52.7%	25.0%	11.1%
2	Cost Value	0.1%	-	5.1%	3.0%	-	22.2%
3	Average (or Blend) of Cost and Market	2.3%	14.3%	11.5%	4.9%	35.0%	7.4%
4	Discounted Cash Flow	0.1%	60.0%	-	-	5.0%	-
5	Amortized Value	0.1%	60.0%	-	-	-	-
6	Contract Value	15.2%	1.8%	80.0%	-	-	-
7	Write-Up	18.8%	19.0%	11.1%	3.4%	15.0%	7.4%
8	Deferred Recognition	9.4%	43.5%	13.4%	15.9%	15.0%	44.4%
9	Average Market Value	2.5%	2.4%	7.9%	13.3%	5.0%	7.4%
10	Other	1.1%	-	0.4%	6.8%	-	-

[1] *Results exclude 27 Canadian plan responses that failed to indicate the number of participants covered.*

The distribution of methods varies significantly by sponsoring entity. The portion of government sponsored plans using Cost Value is considerably larger that the portion of corporate or multiemployer sponsors. (This is not surprising in the U.S. given legislative requirements applicable to the valuation of ERISA-covered plans.) It is interesting to note the high frequency of the Deferred Recognition method among U.S. multiemployer plans and Canadian government plans. Care should be taken, however, when trying to draw any conclusions regarding multiemployer and government plans in Canada due to the small number of responses in these categories.

Table 7 provides analysis of the frequency of asset valuation methods in the U.S. between ERISA and Non-ERISA plans (only for plans reporting 100 or more participants). Non-ERISA plans tend to use Cost Value, Average (or Blend) of Cost and Market, and Average Market Value methods considerably more frequently than plans subject to ERISA.

TABLE 7
Asset Valuation Method Frequency (Funding Purposes) for ERISA Plans
(U.S. - Large Plans Only)

		ERISA Plans	Non-ERISA Plans
	Number of Responses	2,918	250
	Asset Valuation Method		
1	Fair Market Value	81.6%	47.6%
2	Cost Value	0.1%	5.2%
3	Average (or Blend) of Cost and Market	3.1%	10.8%
4	Discounted Cash Flow	0.1%	-
5	Amortized Value	0.1%	-
6	Contract Value	14.4%	1.2%
7	Write-Up	18.9%	10.4%
8	Deferred Recognition	11.3%	14.0%
9	Average Market Value	2.3%	10.4%
10	Other	1.1%	0.4%

Table 8 presents a comparison of the frequency of asset valuation methods used by plans whose active participants are subject to one or more collective bargaining agreements to non-bargained plans. Results are displayed separately for U.S. and Canadian Plans. In both the U.S. and Canada, collectively bargained plans use Fair Market Value less frequently than Non-Bargained Plans. The Average (or Blend) of Cost and Market, Deferred Recognition and Average Market Value Methods are used more frequently in plans subject to collective bargaining. Similar trends were reported in the U.S. and Canada.

TABLE 8
Asset Valuation Method Frequency (Funding Purposes)
by Collective Bargaining Status (Large Plans Only)

		U.S.		Canada	
		Bargained [1]	Non-Bargained	Bargained [1]	Non-Bargained
	Number of Responses	583	2,583	113	198
	Asset Valuation Method				
1	Fair Market Value	30.5%	52.7%	28.3%	58.1%
2	Cost Value	0.5%	0.5%	7.1%	3.0%
3	Average (or Blend) of Cost and Market	9.9%	2.3%	7.1%	7.1%
4	Discounted Cash Flow	0.3%	+	0.9%	-
5	Amortized Value	0.2%	0.1%	-	-
6	Contract Value	1.4%	16.0%	-	-
7	Write-Up	19.0%	18.0%	7.1%	3.0%
8	Deferred Recognition	28.3%	7.7%	32.7%	10.1%
9	Average Market Value	7.9%	1.8%	14.2%	11.1%
10	Other	1.9%	0.8%	2.7%	7.6%

[1] *Includes plans that are partially covered by one or more collective bargaining agreement.*

Table 9 exhibits the frequency of asset valuation method by benefit formula (pay related versus non-pay related). The Deferred Recognition method is used significantly more by non-pay related plans in the United States and by pay-related plans in Canada. Surprisingly, over 17% of the Canadian respondent's non-pay related plans used the Average (or Blend) of Cost and Market Method. However, this represents only nine plans.

TABLE 9
Asset Valuation Method Frequency (Funding Purposes)
by Type of Benefit Formula (Large Plans Only)

		U.S.		Canada	
		Pay Related	Non-Pay Related	Pay Related	Non-Pay Related
	Number of Responses [1]	2,611	462	260	51
	Asset Valuation Method				
1	Fair Market Value	51.0%	36.1%	46.9%	49.1%
2	Cost Value	0.6%	0.4%	5.0%	2.0%
3	Average (or Blend) of Cost and Market	3.1%	7.8%	5.0%	7.6%
4	Discounted Cash Flow	*	0.4%	-	2.0%
5	Amortized Value	0.1%	0.2%	-	-
6	Contract Value	15.9%	1.7%	-	-
7	Write-Up	16.8%	18.4%	5.0%	2.0%
8	Deferred Recognition	9.0%	28.1%	20.4%	7.8%
9	Average Market Value	2.6%	5.4%	11.5%	15.7%
10	Other	1.0%	1.3%	6.2%	3.9%

[1] *Results exclude 93 large U.S. plan responses that failed to provide information on type of formula.*

Tables 10A and 10B present survey results by the actuarial cost method used for plan funding purposes. In the U.S., the percentage of plans using Fair Market Value increase significantly when the Frozen Initial Liability cost method is used. The Contract Value method exhibits a similar pattern. In Canada, survey responses indicate that only the unit credit and projected unit credit funding methods are used with any frequency. The relative frequency of Fair Market Value decreases significantly when the projected unit credit funding method is used.

TABLE 10A
Asset Valuation Method Frequency (Funding Purposes) by Actuarial Cost Method
(U.S. - Large Plans Only)

		Actuarial Cost Method (Funding)				
		Standard Unite Credit	Projected Unit Credit	Entry-Age Normal	Frozen Initial Liability	All Others [1]
	Number of Responses [2]	317	727	537	1,117	468
	Asset Valuation Method					
1	Fair Market Value	38.2%	40.4%	34.3%	58.4%	60.7%
2	Cost Value	0.3%	0.4%	1.7%	0.1%	0.6%
3	Average (or Blend) of Cost and Market	1.6%	4.9%	8.3%	2.2%	2.6%
4	Discounted Cash Flow	0.3%	0.1%	0.2%	-	-
5	Amortized Value	-	-	0.4%	-	0.2
6	Contract Value	1.9%	3.0%	1.7%	31.3%	7.5
7	Write-Up	28.4%	28.8%	29.5%	2.3%	19.0%
8	Deferred Recognition	28.1%	14.5%	17.4%	3.8%	6.8%
9	Average Market Value	1.3%	5.0%	3.5%	1.8%	2.6%
10	Other	-	2.7%	2.4%	-	-

[1] *Includes Aggregate (263 plans), Individual Aggregate (198 plans), and all other methods (7 plans).*

[2] *Results exclude 95 large U.S. plan responses that failed to provide information on type of formula.*

TABLE 10B
Asset Valuation Method Frequency (Funding Purposes) by Actuarial Cost Method
(Canada - Large Plans Only)

		Actuarial Cost Method (Funding)				
		Standard Unite Credit	Projected Unit Credit	Entry-Age Normal	Frozen Initial Liability	All Others [1]
Number of Responses [2]		133	172	0	0	3
Asset Valuation Method						
1	Fair Market Value	63.2%	33.7%	-	-	66.7%
2	Cost Value	5.3%	4.1%	-	-	-
3	Average (or Blend) of Cost and Market	6.0%	8.1%	-	-	-
4	Discounted Cash Flow	0.8%	-	-	-	-
5	Amortized Value	-	-	-	-	-
6	Contract Value	-	-	-	-	-
7	Write-Up	2.3%	6.4%	-	-	-
8	Deferred Recognition	9.8%	25.0%	-	-	33.3%
9	Average Market Value	9.8%	14.5%	-	-	-
10	Other	3.0%	8.1%	-	-	-

[1] *Includes Aggregate (2 plans) and Individual Aggregate (1 plan)*
[2] *Excludes 3 plans that did not indicate a method for accounting.*

Table 11A and 11B exhibit survey results summarized by the percentage of common stock in the portfolio being valued. Other than the declining frequency of Contract Value as the percentage of common stock increase, these results show no pattern or consistency. In Canada, comparisons involving common stock percentages below 40% are not useful due to the small number of responses in those ranges.

TABLE 11A
Asset Valuation Method Frequency (Funding Purposes) by Percentage of Common Stocks (U.S. - Large Plans Only)

		Percentage of Common Stocks			
		Less than 20%	20% to 39%	40% to 59%	60% or greater
	Number of Responses [1]	698	298	663	1,198
	Asset Valuation Method				
1	Fair Market Value	12.5%	68.8%	38.8%	63.4%
2	Cost Value	1.6%	0.3%	0.8%	-
3	Average (or Blend) of Cost and Market	1.3%	8.7%	5.7%	2.9%
4	Discounted Cash Flow	0.3%	-	-	0.1%
5	Amortized Value	0.1%	0.7	-	-
6	Contract Value	59.0%	1.0%	0.5%	0.1
7	Write-Up	22.6%	9.4%	22.5%	17.0%
8	Deferred Recognition	2.1%	9.7%	22.5%	11.4%
9	Average Market Value	0.4%	1.3%	5.1%	3.3%
10	Other	-	-	1.2%	1.8%

[1] *Results exclude 311 large U.S. plan responses that failed to provide information on percentage of common stock.*

TABLE 11A
Asset Valuation Method Frequency (Funding Purposes) by Percentage of Common Stocks (Canada. - Large Plans Only)

		Percentage of Common Stocks			
		Less than 20%	20% to 39%	40% to 59%	60% or greater
Number of Responses [1]		10	13	248	36
Asset Valuation Method					
1	Fair Market Value	20.0%	7.7%	53.2%	27.8%
2	Cost Value	80.0%	-	-	13.9%
3	Average (or Blend) of Cost and Market	-	38.5%	6.0%	5.6%
4	Discounted Cash Flow	-	7.7%	-	-
5	Amortized Value	-	-	-	-
6	Contract Value	-	-	-	-
7	Write-Up	-	-	4.0%	11.1%
8	Deferred Recognition	-	7.7%	21.0%	11.1%
9	Average Market Value	-	15.4%	10.1%	27.8%
10	Other	-	23.1%	5.6%	2.8%

[1] *Results exclude four large Canadian plan responses that failed to provide information on percentage of common stock.*

Tables 12A and 12B present comparisons of asset valuation methods used (by large plans only) for financial accounting purposes relative to those used for ongoing funding purposes. Actuaries for large plans in the U.S. tend to use Fair Market Value considerably more frequently for financial accounting purposes than for funding purposes. This pattern is not so strong in Canada. The large-plan relative frequency of Fair Market value

TABLE 12A
Asset Valuation Method Frequency - Financial Accounting vs. Funding
(U.S. - Large Plans Only)

		Asset Valuation Method for Funding Purposes				
		Fair Market Value or Contract	Average or (Blend) of Costs and Market	Write-Up	Deferred Recognition	Average Market Value
Number of Responses [1]		1,915	94	553	290	77
Asset Valuation Method						
1	Fair Market Value	94.4%	73.4%	73.4%	44.1%	55.8%
2	Cost Value	-	-	0.4%	-	-
3	Average (or Blend) of Cost and Market	0.1%	23.4%	-	-	-
4	Discounted Cash Flow	-	-	-	-	-
5	Amortized Value	-	-	-	-	-
6	Contract Value	1.4%	-	-	-	-
7	Write-Up	+	-	10.1%	1.0%	1.3%
8	Deferred Recognition	3.6%	3.2%	17.0%	54.5%	2.6%
9	Average Market Value	0.5%	-	0.2%	0.3%	40.3%
10	Other	-	-	0.4%	-	-

[1] *Results exclude 188 large U.S. plan responses that failed to provide information and 51 plans that use other methods for funding.*

in the U.S. is 83.1% for financial accounting and 48.6% for funding. The corresponding percentages for large plans in Canada were both approximately 50%.

Many actuaries in the U.S. (and most in Canada) who use the Deferred Recognition and Average Market Value methods for funding purposes use the same method for financial accounting purposes. The standard FAS 87 Market-Related Value methodology for smoothing assets can be formulated as a variation of either of these two methods.

TABLE 12B
Asset Valuation Method Frequency - Financial Accounting vs. Funding
(Canada - Large Plans Only)

		Asset Valuation Method for Funding Purposes				
		Fair Market Value or Contract	Average or (Blend) of Costs and Market	Write-Up	Deferred Recognition	Average Market Value
	Number of Responses [1]	80	11	10	53	36
	Asset Valuation Method					
1	Fair Market Value	93.8%	72.7%	10.0%	20.8%	33.3%
2	Cost Value	-	-	-	-	-
3	Average (or Blend) of Cost and Market	-	18.2%	-	-	-
4	Discounted Cash Flow	-	-	-	-	-
5	Amortized Value	-	-	-	-	-
6	Contract Value	-	-	-	-	-
7	Write-Up	5.0%	9.1%	90.0%	-	-
8	Deferred Recognition	1.3%	-	-	79.2%	2.8%
9	Average Market Value	-	-	-	-	63.9%
10	Other	-	-	-	-	-

[1] *Results exclude 92 large Canadian plan responses that failed to provide information and 2 plans that use other methods of funding.*

Table 13A and 13B analyze the frequency of the asset valuation method used for financial accounting purposes by asset size for the U.S. and Canada respectively. The results are similar to the results of the analysis by Plan Participant Size as summarized in Tables 3A and 3B. In the U.S., the frequency of the both Fair Market Value method and Contract Value decreases as the asset value increases and the frequency of smoothed methods generally increases as the value of assets increases. In Canada, the pattern is not as clear.

TABLE 13A
Asset Valuation Method Frequency (Financial Accounting Purposes) by Value of Plan Assets (U.S. - Large Plans Only)

		Fair Market Value of Plan Assets				
		Less than $1 million	$1 Million to $5 Million	$5 Million to $25 Million	$25 Million to 100 Million	Greater than $100 Million
Number of Responses [1]		208	983	1,083	402	304
Asset Valuation Method						
1	Fair Market Value	93.8%	92.5%	89.5%	67.9%	42.1%
2	Cost Value	-	0.1%	0.3%	1.5%	1.6%
3	Average (or Blend) of Cost and Market	-	0.2%	0.8%	0.5%	3.6%
4	Discounted Cash Flow	-	-	0.1%	-	-
5	Amortized Value	-	-	-	-	-
6	Contract Value	1.0%	1.5%	0.8%	-	0.3%
7	Write-Up	0.5%	0.3%	1.0%	2.7%	11.5%
8	Deferred Recognition	3.8%	5.1%	6.4%	24.6%	32.9%
9	Average Market Value	1.0%	0.3%	0.7%	2.7%	6.6%
10	Other	-	-	-	-	1.3%

[1] *Results exclude 92 large Canadian plan responses that failed to provide information and 2 plans that use other methods of funding.*

TABLE 13A
Asset Valuation Method Frequency (Financial Accounting Purposes) by Value of Plan Assets (Canada - Large Plans Only)

		Fair Market Value of Plan Assets (in Canadian Dollars)				
		Less than $1 million	$1 Million to $5 Million	$5 Million to $25 Million	$25 Million to 100 Million	Greater than $100 Million
	Number of Responses [1]	4	11	105	42	58
	Asset Valuation Method					
1	Fair Market Value	75.0%	45.5%	60.0%	50.0%	32.8%
2	Cost Value	-	-	1.0%	2.4%	6.9%
3	Average (or Blend) of Cost and Market	-	-	1.0%	2.4%	-
4	Discounted Cash Flow	-	-	-	-	-
5	Amortized Value	-	-	-	-	-
6	Contract Value	-	-	-	-	-
7	Write-Up	-	9.1%	1.0%	7.1%	15.5%
8	Deferred Recognition	-	27.3%	23.8%	19.0%	24.1%
9	Average Market Value	-	18.2%	6.7%	14.3%	13.8%
10	Other	25.0%	-	6.7%	4.8%	6.9%

[1] *Results exclude 91 large Canadian plan responses that failed*

Table 14A and 14B present a summary of how the relative frequency of asset valuation methods used for financial accounting purposes varies as the percentage of common stock held in the portfolio increases. In the U.S., other than the general decline in frequency for Fair Market Value and the general increase in frequency for the smoothed methods as the percentage of common stock increases, the results show no strong patterns. In Canada, comparisons involving common stock percentages below 40% are not useful due to the small number of responses in those ranges.

TABLE 14A
Asset Valuation Method Frequency (Financial Accounting Purposes) by Percentage of of Common Stocks (U.S. - Large Plans Only)

		Percentage of Common Stocks			
		Less than 20%	20% to 39%	40% to 59%	60% or greater
	Number of Responses [1]	668	269	595	1,162
	Asset Valuation Method				
1	Fair Market Value	93.7%	91.4%	69.1%	80.6%
2	Cost Value	1.2%	0.4%	0.8%	0.1%
3	Average (or Blend) of Cost and Market	0.3%	1.5%	1.2%	0.9%
4	Discounted Cash Flow	0.1%	-	-	-
5	Amortized Value	-	-	-	-
6	Contract Value	3.6%	0.4%	-	-
7	Write-Up	-	1.1%	3.5%	2.6%
8	Deferred Recognition	0.9%	3.7%	22.2%	14.3%
9	Average Market Value	0.1%	1.5%	3.2%	1.2%
10	Other	-	-	-	0.3%

[1] *Results exclude 474 large U.S. plan responses that failed to provide information.*

TABLE 14B
Asset Valuation Method Frequency (Financial Accounting Purposes) by Percentage of of Common Stocks (Canada - Large Plans Only)

		Percentage of Common Stocks			
		Less than 20%	20% to 39%	40% to 59%	60% or greater
Number of Responses [1]		9	9	170	30
Asset Valuation Method					
1	Fair Market Value	22.2%	66.7%	50.0%	56.7%
2	Cost Value	66.7%	-	-	-
3	Average (or Blend) of Cost and Market	-	-	1.2%	-
4	Discounted Cash Flow	-	-	-	-
5	Amortized Value	-	-	-	-
6	Contract Value	-	-	-	-
7	Write-Up	-	-	7.1%	6.7%
8	Deferred Recognition	-	-	26.5%	16.7%
9	Average Market Value	-	-	9.4%	20.0%
10	Other	11.1%	33.3%	5.9%	-

[1] *Results exclude 93 large Canadian plan responses that failed to provide information.*

Tables 15A and 15B summarize the distribution of asset smoothing periods for those large plans that use a smoothed value method: Write-Up, Deferred Recognition, Average Market Value, or Other. The tables indicate that five years is generally the most common smoothing period in both the U.S. and Canada.

Table 15A displays one outlier for U.S. plans using the Write-Up method (where four-year smoothing is the most common), but analysis of the actual survey responses suggests that 140 out of 145 of the plans in this category appear to have been submitted by only two respondents.

Table 15A
Years of Smoothing Period by Type of Asset Valuation Method
(U.S. - Large Plans Only)

	Write-Up	Deferred Recognition	Average Market Value	Other
Number of Responses	289	316	87	16
Number of Years				
3 or less	4.5%	15.8%	19.5%	62.5%
4	50.2% [1]	3.2%	12.6%	-
5	33.6%	78.8%	66.7%	25.0%
6	1.7%	0.3%	-	-
7	0.3%	1.3%	1.1%	6.3%
8 or more	9.7%	0.6%	-	6.3%

[1] *140 out of 145 plans in this category appear to have been submitted by only two respondents.*

Table 15B
Years of Smoothing Period by Type of Asset Valuation Method
(Canada - Large Plans Only)

	Write-Up	Deferred Recognition	Average Market Value	Other
Number of Responses	12	51	35	16
Number of Years				
3 or less	8.3%	31.4%	28.6%	6.3%
4	25.0%	21.6%	5.7%	6.3%
5	58.3%	47.1%	65.7%	87.5%
6	-	-	-	-
7	-	-	-	-
8 or more	8.3%	-	-	-

Tables 16A and 16B summarize the distribution of asset smoothing periods (only for large plans that use one of the smoothed value methods) by percentage of common stocks. Once again, five years is generally the most common smoothing period in both the U.S. and Canada. Table 16A displays one outlier for U.S. plans with less than 20% of common stock exposure, but analysis of the actual survey responses suggests that the 140 of the 142 responses in that category appear to have been submitted by only two respondents.

In Canada, comparisons involving common stock percentages below 40% are not useful due to the small number of responses in those ranges.

Table 16A
Years of Smoothing Period by Percentage of Common Stocks
(U.S. - Large Plans Only)

	Percentage of Common Stocks			
	Less than 20%	20% to 39%	40% to 59%	60% or greater
Number of Responses	156	34	247	234
Number of Years				
3 or less	-	8.8%	16.6%	13.7%
4	91.0% [1]	-	5.7%	4.3%
5	8.3%	82.4%	68.0%	76.1%
6	0.6	2.9%	1.6%	-
7	-	-	0.4%	1.7%
8 or more	-	5.9%	7.7%	4.3%

[1] *140 out of 142 plans in this categroy appear to have been submitted by only two respondents.*

Table 16B
Years of Smoothing Period by Percentage of Common Stocks
(Canada - Large Plans Only)

	Percentage of Common Stocks			
	Less than 20%	20% to 39%	40% to 59%	60% or greater
Number of Responses	0	5	93	16
Number of Years				
3 or less	-	20.0%	19.4%	56.3%
4	-	-	15.1%	18.8%
5	-	82.4%	64.5%	25.0%
6	-	-	-	-
7	-	-	-	-
8 or more	-	-	1.1%	-

Tables 17A and 17B summarize the results of Question 13 of the survey, which deals with the years of prior asset experience, if any, that were reflected at the time when the current method was first adopted. A significant number of respondents in both countries answered Question 13 "Not Known" or left it unanswered.

Most large plan actuaries in the U.S. who answered this question other than "Not Known" adopted their particular smoothed value method on a "prospective only" basis, and virtually all who reflected past asset experience did so over five years or fewer. Inclusion of prior asset experience at initial application was relatively more common in Canada, with virtually all of those responses reflecting a period of five years or fewer.

Table 17A
Prior Asset Experience Reflected in Initial Application of Method
(U.S. - Large Plans Only)

	Sub-Totals by Smoothed Value Method			
	Write-Up	Deferred Recognition	Average Market Value	Other
Number of Responses [1]	468	315	88	16
Years of Prior Experience Reflected				
More than 5 years	0.9%	0.3%	-	-
5 Years or Less	26.1%	15.6%	18.2%	56.3%
Prospective Only	46.8%	46.0%	51.1%	25.0%
Not Known	26.3%	38.1%	30.7%	18.8%

[1] *Results exclude 175 U.S. responses for smoothed value method plans that left question 13 unanswered.*

Table 17B
Prior Asset Experience Reflected in Initial Application of Method
(Canada - Large Plans Only)

	Sub-Totals by Smoothed Value Method			
	Write-Up	Deferred Recognition	Average Market Value	Other
Number of Responses [1]	12	54	38	47
Years of Prior Experience Reflected				
More than 5 years	-	1.9%	5.3%	-
5 Years or Less	50.0%	35.2%	23.7%	27.7%
Prospective Only	16.7%	53.7%	13.2%	2.1%
Not Known	33.3%	9.3%	57.9%	70.2%

[1] *Results exclude 12 Canadian responses for Smoothed Value method plans that left question 13 unanswered.*

SURVEY RESULTS (Continued)

Other Survey Results

Survey Results Regarding Corridor Limits

A number of survey questions dealt with the use of various corridor limits as a component of the formal asset valuation methodology (for large plans not using the Fair Market Value methodology). The U.S. responses indicate that the vast majority of plans (85.7%) use the 80% – 120% of fair market value corridor needed to satisfy the IRC "reasonable" valuation method criterion. In fact, the next most frequently chosen answer in the U.S. was "no corridor" (11.3% of valid U.S. responses), most of which are used for plans not subject to IRC section 412(c). Over 92% of the valid Canadian responses indicated that no corridor limits are used.

Survey Results Regarding Marking Assets to Market

Item 11 of the survey questionnaire dealt with the timing of a technique often referred to as "marking-to-market." Under this technique, the otherwise calculated actuarial value of assets is reset equal to fair market value at a given point in time, often in combination with a prospective change in the underlying asset valuation methodology.

The results in the U.S. indicate a small but generally increasing proportion of large plans have marked to market at least once between 1988 and 1996. Since 1988, the year that had the lowest percent of plans marked to market was 1989, in which only 0.3% of eligible plans (i.e., large plans using an asset valuation method other than Fair Market Value) in the U.S. used this technique. The two biggest years since 1988 were 1996 and 1995, when 2.6% and 2.3%, respectively, of eligible plans used this option. The survey also indicates that in the U.S., the mark-to-market technique is more frequently used in combination with the Write-Up, Deferred Recognition, and Average Market Value methods than it is with the Average (or Blend) of Cost and Market method.

The survey results also indicate that marking-to-market is very rare in Canada. In fact, out of the 150 valid Canadian responses for this question, only 11 plans indicated that plan assets were ever marked-to-market over the entire period from 1988 through 1996.

Additional Results Regarding the Write-Up Method

Virtually all (95.6%) of the large U.S. plans that use the Write-Up method use a write-up rate equal to the rate used for discounting liabilities. Also, 84.1% of these plans include an adjustment to the preliminary value equal to a fixed percentage of the difference between FMV and the preliminary value. Only 8.8% do not make any adjustment to the preliminary value. (There were not enough Canadian plans reporting the Write-Up method to produce credible results.)

Additional Results Regarding the Deferred Recognition and Average Market Value Methods

The following table summarizes the relative frequency among large plans that reported using either the Deferred Recognition or Average Market Value method of the components of investment return that are subject to smoothing. (Based on a total of 432 responses in the U.S. and 91 responses in Canada.)

Components of Investment Return That Are Smoothed	U.S.	Canada
Number of Responses	13.4%	25.3%
Number of Years	37.7%	44.0%
3 or less	42.4%	20.9%
4	-	-
5	4.4%	8.8%
6	1.4%	1.1%
7	0.7%	0.0%

BIBLIOGRAPHY

Attwood, James A., Bassett, Preston, C. Calvert, Geoffrey N., Coutts, Alan H., Griffin, Jr., Frank L., "Valuation of Assets," *Transactions of the Society of Actuaries*, 1961, Vol. XIII, Part II - Discussions, pp. 95-100, Chicago, Illinois

Berin, Barnet N., *The Fundamentals of Pension Mathematics*, 1989; The Society of Actuaries, Schaumburg, 4th printing, pp. 18-20

Dyson, A.C.L., and Exley, C. J., "Pension Fund Asset Valuation and Investment," *British Actuarial Journal*, 1995, Vol. 1, III, pp. 471 - 557

Funnell, D. and Morse, P.F., "Selection of the Valuation Rate of Interest for a Pension Plan and Valuation of Pension Fund Assets," *Proceedings Canadian Institute of Actuaries*, 1973, Volume V, No. 2, pp. 1 - 56, Canadian Institute of Actuaries, Ottawa, Canada

Hamilton, James A. and Jackson, Paul H., "The Valuation of Pension Fund Assets", *Transactions of the Society of Actuaries*, 1968, Volume XX, Part I, pp. 386-436, Chicago, Illinois

McGill, Dan M. and Grubbs, Jr., Donald S., *Fundamentals of Private Pensions*, 1989, 6th Edition, pp. 483-491, Irwin, Homewood, Illinois

McGinn, Daniel F., *Actuarial Fundamentals for Multiemployer Plans*, 1992, 2nd Edition, pp. 49, 50, 95-99, International Foundation of Employee Benefit Plans, Inc., Brookfield, Wisconsin

McGinn, Daniel F., *Corporate Retirement Plans*, 1988, First Printing, pp. 111-114, International Foundation of Employee Benefit Plans, Inc., Brookfield, Wisconsin

McGinn, Daniel F., *Joint Trust Pension Plans*, 1978, First Printing, pp. 178-179, Richard D. Irwin, Inc., Homewood, Illinois

Samet, Michael J., Peach, Timothy P. and Zorn, W. Paul, *A Study of Public Employees Retirement Systems*, 1996, First printing, pp. 36, Society of Actuaries, Schaumburg, Illinois

Trowbridge, C.L., and Farr, C.E., *The Theory and Practice of Pension Funding*, 1976, First printing, pp. 88-94, Richard D. Irwin, Inc., Homewood, Illinois

Society of Actuaries
Survey of Pension Section Members
Asset Valuation Methods for Defined Benefit Pension Plans

The purpose of this survey is to collect information regarding the variety of methods used by pension actuaries in the United States and Canada to value defined benefit plan assets. If you served as the principal actuary during 1996:

- Please complete **one survey form *per plan***, for each plan you serve that has **100 or more participants.**

- Please complete **one survey form *per asset valuation method*** you use for plans that each have **fewer than 100 participants.** (Note: if you complete a single form for multiple small plans with one asset valuation method, you will be asked to provide additional information regarding cost methods and asset smoothing periods in Section IV of the survey. Therefore, when completing Sections I through III of the survey, you should base your answers on the plan that is most representative from the perspectives of cost methods and asset smoothing periods.)

Survey Instructions

Scantron standard form F-2637 (provided) is required for recording your answers to these survey questions. Use a number 2 or HB pencil to mark your answers on the form. Each answer bubble you mark must be filled-in completely to ensure accurate results. If you must change a response, erase the prior mark *thoroughly*. The top, right corner of each form provides an example of a properly marked answer bubble. **DO NOT USE THE TOP, LEFT BOX TO RECORD ANSWERS. All answers must be recorded beginning with row number 1 beneath this box.**

For more forms, please call McGinn Actuaries Ltd. at **(714) 634-8337** weekdays, 8:30 a.m. to 5:00 p.m. Pacific Standard Time.

SECTION I - General Information

1. What Type of Entity is the Plan Sponsor?
   (1) Corporate (includes multiple employer and non-profit)
   (2) Multiemployer (3) Government

2. Pension Plan Origin:
   (1) U.S. ERISA covered (2) U.S. non-ERISA covered
   (3) Canada (4) Other

3. Are Participants Covered Under a Collective Bargaining Agreement (CBA)?
   (1) Yes (2) No (3) Partial CBA Coverage

4. Total Number of Participants Covered by the Plan:
   (1) Fewer than 10 (4) 500 to 999 (7) 10,000 to 24,999
   (2) 10 to 99 (5) 1,000 to 4,999 (8) 25,000 to 49,999
   (3) 100 to 499 (6) 5,000 to 9,999 (9) More than 50,000

5. Indicate the amount of invested assets (fair market value):
   (1) Less than $1 Million (5) $100 Million to $250 Million
   (2) $1 Million to $5 Million (6) $250 Million to $500 Million
   (3) $5 Million to $25 Million (7) $500 Million to $1 Billion
   (4) $25 Million to $100 Million (8) More than $1 Billion

6. Indicate the type of benefit formula used to determine retirement benefits for <u>most</u> participants:
   (1) Non-pay related (e.g., $15 per month per year of service)
   (2) Pay Related

7. Indicate the cost method used to fund the plan liabilities:
   (1) Unit Credit (4) Frozen Initial Liability (7) Individual Aggregate
   (2) Projected Unit Credit (5) Attained Age Normal (8) Individual Level Premium
   (3) Entry Age Normal (6) Aggregate (9) Other

8. Indicate the approximate percentage of assets invested in common stocks for this plan:
   (1) 0 to 19 (2) 20 to 39 (3) 40 to 59
   (4) 60 to 79 (5) 80 to 100%

SECTION II - Plan Funding Information

Regarding the valuing of assets for plan funding purposes, please complete questions 9 through 19.

9. For plan funding purposes, indicate the asset valuation method you employ for the majority of assets: (See Description of Asset Valuation Methods)

(1) Fair Market Value Method (FMV)	(6) Contract Value Method
(2) Cost Value Method	(7) Write-up Method
(3) Average (or Blend) of Cost and Market Method	(8) Deferred Recognition Method
(4) Discounted Cash Flow Method	(9) Average Market Value Method
(5) Amortized Value Method	(10) Other (please describe on separate sheet)

10. Does the asset valuation method you selected in question 9 include one or more "corridors" (specified minimum and maximum values expressed in terms of fair market value (FMV) or average market value between which the final actuarial value must lie)?

(1) No corridor	(4) Yes; corridor of 85% - 115% of Average Market Value
(2) Yes; corridor of 90% – 110% of FMV	(5) Yes; combination of 3. and 4. above
(3) Yes; corridor of 80% – 120% of FMV	(6) Yes; other corridor

11. Indicate the most recent calendar years, if any, in which valuation assets were "marked to market" (i.e., actuarial value reset to fair market value):

(1)	1988	(3)	1990	(5)	1992
(7)	1994	(9)	1996		
(2)	1989	(4)	1991	(6)	1993
(8)	1995	(10)	N/A or Other		

If you selected any of the methods (1) through (6) in question 9, go directly to question 17.

12. If a smoothing technique is applied to any investments, please indicate period used in technique:

(1) 3 or fewer years	(3) 5 years	(5) 7 years
(2) 4 years	(4) 6 years	(6) 8 or more years

13. When the asset valuation method was first adopted, did the initial actuarial value reflect retrospective smoothing of prior asset experience or was all smoothing, if any, prospective?

(1) Retrospective smoothing of more than 5 years of prior asset experience
(2) Retrospective smoothing of 5 or fewer years of prior asset experience
(3) Prospective smoothing only
(4) Not known

Answer questions 14 and 15, only if you selected asset valuation method (7) Write-up Method:

14. What rate of return is used to develop the preliminary value?

(1) The same rate used to discount liabilities
(2) A specified long-term rate not necessarily equal to the rate used to discount liabilities
(3) Actual dividends and interest plus moving average of capital gains
(4) Moving average of actual prior rates earned by the fund
(5) Other

15. Does the asset valuation method include an annual adjustment toward market of the preliminary value (other than corridor-type adjustments)?

(1) No adjustment
(2) Yes; fixed percentage of difference between FMV and preliminary value
(3) Yes; variable percentage of difference between FMV and preliminary value
(4) Yes; other type of adjustment

Answer question 16, only if you selected asset valuation method (8) Deferred Recognition Method or (9) Average Market Value Method.

16. Which components of investment experience are subject to deferred recognition (if you selected asset valuation method (8) Deferred Recognition Method), or are excluded from the adjusted FMVs (if you selected asset valuation method (9) Average Market Value Method)?

    (1) All investment experience
    (2) All Investment experience in excess of (less than) an assumed rate
    (3) All realized and unrealized capital gains
    (4) Realized and unrealized capital gains in excess of (less than) an assumed rate
    (5) Unrealized capital gains only
    (6) Unrealized capital gains in excess of (less than) an assumed rate
    (7) Other

Answer questions 17 through 19, only if you use a combination of two or more asset valuation methods:

17. Indicate the method used for the majority of common stock assets:

    (1) Fair Market Value Method (FMV)
    (2) Cost Value Method
    (3) Average (or Blend) of Cost and Market Method
    (4) Discounted Cash Flow Method
    (5) Amortized Value Method
    (6) Contract Value Method
    (7) Write-up Method
    (8) Deferred Recognition Method
    (9) Average Market Value Method
    (10) Other (please describe on separate sheet)

18. Indicate the method used for the majority of fixed income assets:

    (1) Fair Market Value Method (FMV)
    (2) Cost Value Method
    (3) Average (or Blend) of Cost and Market Method
    (4) Discounted Cash Flow Method
    (5) Amortized Value Method
    (6) Contract Value Method
    (7) Write-up Method
    (8) Deferred Recognition Method
    (9) Average Market Value Method
    (10) Other (please describe on separate sheet)

19. Was the method indicated in question 18 influenced by a dedicated or immunized bond portfolio?

    (1) Yes
    (2) No

SECTION III - Plan Accounting Information

Regarding the valuing of assets for Financial Accounting purposes, please complete questions 20 through 25.

20. For financial accounting purposes, indicate the asset valuation method you employ:

(1) Fair Market Value Method (FMV)
(2) Cost Value Method
(3) Average (or Blend) of Cost and Market Method
(4) Discounted Cash Flow Method
(5) Amortized Value Method
(6) Contract Value Method
(7) Write-up Method
(8) Deferred Recognition Method
(9) Average Market Value Method
(10) Other (please describe on separate sheet)

21. If a smoothing technique is applied to any investments, please indicate period used in technique:

(1) 3 or fewer years
(2) 4 years
(3) 5 years
(4) 6 years
(5) 7 years
(6) 8 or more years

22. Which components of investment experience are subject to deferred recognition (if you selected asset valuation method (8) Deferred Recognition Method), or are excluded from the adjusted FMVs (if you selected asset valuation method (9) Average Market Value Method)?

(1) All investment experience
(2) All investment experience in excess of (less than) an assumed rate
(3) All realized and unrealized capital gains
(4) Realized and unrealized capital gains in excess of (less than) an assumed rate
(5) Unrealized capital gains only
(6) Unrealized capital gains in excess of (less than) an assumed rate
(7) Other

Answer questions 23 and 24, only if you use a combination of two or more asset valuation methods:

23. Indicate the method used for the majority of common stock assets:

(1) Fair Market Value Method (FMV)
(2) Cost Value Method
(3) Average (or Blend) of Cost and Market Method
(4) Discounted Cash Flow Method
(5) Amortized Value Method
(6) Contract Value Method
(7) Write-up Method
(8) Deferred Recognition Method
(9) Average Market Value Method
(10) Other (please describe on separate sheet)

24. Indicate the method used for the majority of fixed income assets:

(1) Fair Market Value Method (FMV)
(2) Cost Value Method
(3) Average (or Blend) of Cost and Market Method
(4) Discounted Cash Flow Method
(5) Amortized Value Method
(6) Contract Value Method
(7) Write-up Method
(8) Deferred Recognition Method
(9) Average Market Value Method
(10) Other (please describe on separate sheet)

25. Was the method indicated in question 24 influenced by a dedicated or immunized bond portfolio?

(1) Yes
(2) No

STOP! - If you have completed this survey on a "per method" basis, please continue below.

Use questions 26 through 28 to indicate the number (count) of plans for which you employ the asset valuation method indicated in question 9 above. Question 26 is used to indicate the hundreds position; question 27 is used to indicated the tens position and question 28 is used to indicate the ones position. For example, if you serve 107 small plans using the asset valuation method indicated in question 9 above, you would mark questions 26, 27 and 28 as follows:
26. (1)
27. (10)
28. (7)

Note: If you serve more than 1,000 plans using the same asset valuation method, enter 999 for questions 31 through 33.

SECTION IV - Information for Plans with Less than 100 Participants

26. Indicate the count (in the hundreds position) of the small plans for which you employ the asset valuation method chosen in question 9 above.

(1) 100	(3) 300	(5) 500	(7) 700	(9) 900
(2) 200	(4) 400	(6) 600	(8) 800	(10) less than 100

27. Indicate the count (in the tens position) of the small plans for which you employ the asset valuation method chosen in question 9 above.

(1) 10	(3) 30	(5) 50	(7) 70	(9) 90
(2) 20	(4) 40	(6) 60	(8) 80	(10) less than 10

28. Indicate the count (in the ones position) of the small plans for which you employ the asset valuation method chosen in question 9 above.

(1) 1	(3) 3	(5) 5	(7) 7	(9) 9
(2) 2	(4) 4	(6) 6	(8) 8	(10) 0

29. Indicate the proportion of these plans for which you use the cost method indicated in question 7 above.

(1) 0% to 49%	(2)50% to 74%
(3) 75% to 99%	(4) 100%

30. If you use a smoothing technique, please indicated the proportion of these plans for which you use the same time period as indicated in question 12 above.

(1) 0% to 49%	(2) 50% to 74%
(3) 75% to 99%	(4) 100%

BLANK

PAGE

The Pension

Forum

Volume 13, Number 1 July 2001

TABLE OF CONTENTS FOR PENSION PLAN ASSET VALUATION METHODS

Page

PENSION PLAN ASSET VALUATION METHODS

by M. Iqbal Owadally and Steven Haberman

Abstract: Various asset valuation methods are used in the context of funding valuations. The motivation for such methods and their properties are briefly described. Some smoothed value or market-related methods based on arithmetic averaging and exponential smoothing are considered and their effect on funding is discussed. Suggestions for further research are also made.

Actuarial Valuations

Special methods are often used to value the assets of pension plans. The choice of method should be consistent with the aim of the pension plan valuation. When solvency is being investigated, pension plan assets must be measured at the value at which they would be realized in the market. Specific methods are also prescribed in various jurisdictions for valuations that are carried out to verify compliance with maximum funding regulations or for accounting valuations. In the following, funding valuations are considered. Funding valuations are carried out to compare plan assets and liabilities and determine suitable contribution rates from a going-concern perspective. We also restrict ourselves to defined benefit plans.

Practical methods of valuing pension plan assets for funding purposes have been described and classified, notably by Jackson & Hamilton (1968), Trowbridge & Farr (1976, p. 88), Winklevoss (1993, p. 171) and in the recent survey by the Committee on Retirement Systems Research (1998). Market-related methods are used most frequently. The current market value of plan assets is used or else some average of current and past market values is taken in an attempt to remove short-term volatility (a smoothed value method). Market-related methods are based approximately on the economic valuation of both asset and liability cash flows by reference to the market. Pension liabilities are discounted at market discount rates, suitably risk-adjusted, or at the rates implied in asset portfolios that are dedicated or matched by cash flow to these liabilities. Pension liabilities, specially for active plan members with projection for future salary increases, are not perfectly immunized and volatility in asset values may not be fully reflected in liability values. Market values of plan assets are therefore averaged over short intervals to remove such volatility. Comparison of the pension plan liability and asset values provides a consistent measure of the unfunded liability so that contribution rates may be set to secure the long-term funding of pension benefits.

A more traditional asset valuation method, which was popular in the United Kingdom until recently, is the discounted cash flow method. Fixed-income securities, and pension liability cash flows matched by these securities, are valued by discounting cash flows at the same rate. The difference between income from plan assets and outgo (benefits and expenses) in each year is viewed as a surplus of cash that is reinvested in the asset portfolio held by the pension fund. Accumulating projected net proceeds at the rate of

reinvestment return would give an accumulated value of the surplus (or unfunded liability) in the plan. Asset and liability cash flows are discounted at that rate yielding present values of assets and liabilities, the difference between these values being the present value of the surplus of asset over liability cash flows (or unfunded liability) in the plan. Contributions may then be determined such that, when reinvested at the assumed rate of return, they liquidate the unfunded liability (Funnell & Morse, 1973). The method has also been used to value equities, under the Dividend Discount Model possibly with term-dependent dividend growth assumptions (Day & McKelvey, 1964).

Properties of Asset Valuation Methods

For funding purposes, an actuarial asset value is not an estimator of the fundamental worth of pension plan assets and is not superior to the market value. Asset valuation methods should satisfy certain desirable properties, irrespective of the methodology employed. The actuarial asset value should lead to a consistent, objective, realistic as well as stable measurement of the unfunded liability in a pension plan.

The consistency property refers to the fact that the values placed on assets and liabilities must be comparable since pension plan valuations involve the comparison of asset and liability cash flows and the subsequent determination of an unfunded liability and contribution rate. For example, historic book (cost) values of assets are not generally relevant relative to future pension liabilities. Fair pricing of assets and liabilities should be consistent by virtue of the no-arbitrage principle. Smoothing asset prices may arguably distort the comparison of asset and liability cash flows and the measurement of the unfunded liability. Nevertheless, asset values may be smoothed to remove impermanent fluctuations in security prices, driven by speculators or short-horizon investors, if it is believed that such volatility is not reflected in pension liability values and is irrelevant to long-term planning for retirement benefits. Excessive smoothing would not be acceptable, particularly as the plan sponsor's financial planning tends to be over a shorter term and will be influenced by volatile market conditions which cannot be ignored altogether. If an asset valuation method is not consistent with liability valuation, then systematic gains or losses will emerge, and such a method would not be acceptable, for example under the Standard of Practice for Valuation of Pension Plans of the Canadian Institute of Actuaries (1994, para. 5.01).

Pension plan assets should also be valued in an objective way. Market values of assets are objective in the sense that, absent accounting errors, two actuaries will employ the same value. Unsmoothed market values are clearly understood by financial managers, accountants and the sponsor's shareholders. If averaging techniques are used, their variety and opacity, specially if they are changed frequently, may appear to be somewhat arbitrary. Smoothed asset values would certainly not be objective for the determination of solvency. If equities are valued using the Dividend Discount Model, values become highly sensitive to the choice of dividend growth assumption and the smoothing effect may not be very transparent (Dyson & Exley, 1995). Details of any smoothing method should be disclosed according to Actuarial Standard of Practice No. 4 of the Actuarial Standards Board (1993) and should presumably be applied systematically and rationally.

Asset values must also be realistic. The primary objective of funding valuations is to determine a reasonable rate of contribution rather than to place an absolute value on plan

assets, but the asset value must nevertheless remain in some proximity to market values. Market values are relevant because market conditions do affect the plan sponsor, who ultimately contributes to the pension plan. Asset values that are off-market and distant from market conditions lead to artificial values of unfunded liability and contribution rates.

Asset valuation methods also stabilize and smooth the pension funding process. Actuarial valuations for funding purposes aim at measuring the shortfall (or surplus) of assets over liabilities so that contribution rates may be calculated in order to make good these shortfalls and secure assets to meet pension liabilities as and when they are due. Firms sponsor pension plans on a voluntary basis as well as through competitive pressures in the employment market. But plan sponsors are motivated to fund defined retirement benefits in advance when the contributions required are stabilized and spread over time, so that the costs arising from the uncertainty of long-term pension provision are not immediately borne. (It is not generally desirable however that the accounting pension expense be smoothed.) An unfunded liability is often defrayed over a number of years for that reason. Short-term variations in asset prices conflict with this stability objective. A fundamental reason for using special methods to value assets in the funding valuations of defined benefit pension plans is therefore to moderate volatility in asset values and generate a stable and smooth pattern of contribution rates (Anderson, 1992, p. 108; Ezra, 1979, p. 40; Winklevoss, 1993, p. 171).

The effect of the asset valuation method on the dynamics of pension funding is significant. Asset liability models turn out to be sensitive to the specification of the asset valuation method (Kingsland, 1982). Asset allocation decisions should not be based on the outcome of a funding valuation but may be influenced by the assessment of liability and assets and by the unfunded liability that is reported after such an actuarial valuation. The asset valuation method should not therefore lead to wrong investment decisions (Ezra, 1979, p. 110; Dyson & Exley, 1995). The way in which assets are valued certainly affects the timing of contributions, as the emergence of asset gains and losses depends on the value placed on plan assets. This has an indirect effect on the ex post cost of pension provision. Asset gains and losses are also amortized but it is often considered that this is not powerful enough to dampen their volatility and stabilize contributions, and consequently asset valuation methods themselves may need to incorporate a smoothing quality (Anderson, 1992, p. 108).

Smoothed Value Methods

Many smoothed value methods comprise a form of arithmetic averaging of market values. Exponential smoothing of market values is also common. Whatever form of smoothing or averaging is employed, a simple average of the market values at different points in time cannot be used. The market values must be adjusted. First, the time value of money must be considered and present values must be used. Second, allowance must be made for intermediate cash flows in the fund by adding contributions and subtracting benefit payments and possibly expenses (Anderson, 1992, p. 110).

The survey of the Committee on Retirement Systems Research (1998) supplies descriptions in general terms of various methods that are used in practice. One such

method is the "Average of Market'' or "Average Value" method. When arithmetic averaging is used, the market value of assets is also known as a "Moving Average of Market" with a typical averaging period of five years being used. As stated in the survey of the Committee on Retirement Systems Research (1998), this method may be shown to be equivalent to the "Deferred Recognition" (or "Adjusted Market") method. The latter defines the asset value as being the current market value of assets to which is added a portion of previous years' asset losses that have been deferred and are as yet unrecognized (Winklevoss, 1993, p. 173). One may further show that these methods are equivalent to a particular instance of a third method, the "Write-up" method. Under the Write-up method, a written-up or anticipated asset value is calculated as the previous year's actuarial asset value, adjusted for cash flows and written-up at some interest rate. An additional adjustment in line with the current market value of plan assets is subtracted from the anticipated value. The additional adjustment represents the recognition of a portion of previous years' losses.

Variants of these methods using exponential rather than arithmetic smoothing may also be developed. The exponential smoothing version of the Average of Market method is in effect an exponentially weighted infinite average of adjusted market values. This method is most commonly used in the equivalent Write-up format, with the additional adjustment in this case being a fraction of the difference between the current market value and the anticipated or written-up asset value. This is the usual version of the Write-up method. Sometimes the additional adjustment is only made so that the resultant actuarial asset value remains within a corridor of the current market value (Winklevoss, 1993, p. 174). The Write-up method is also known as a "Weighted Average" of the current market value and the anticipated or written-up asset value. It is also possible to formulate exponential smoothing in an equivalent Deferred Recognition style: the current market value is adjusted by adding an exponentially weighted average of the present value of past asset losses.

Analysis shows therefore that many asset valuation methods are equivalent (at least asymptotically, i.e. when initial conditions are ignored). The essential difference lies in whether arithmetic or exponential smoothing is employed. Averaging asset values leads to asset gains and losses being deferred. Arithmetic smoothing methods recognize gains/losses (along with interest) gradually over a moving interval, usually of five years. Exponential smoothing methods are unusual in that declining portions of asset gains and losses are deferred in perpetuity. This is not as inadvisable as may first appear. Smoothing using an infinite exponentially weighted average is perhaps more natural than averaging over a finite moving interval. Asset gains and losses emerge randomly and continually and are never completely removed in any case.

Asset Gain/Loss Amortization

Once the actuarial asset value is determined, the unfunded liability in the plan may be calculated, along with any actuarial intervaluation loss that has emerged. This actuarial loss is based on the smoothed asset value (rather than the current market value) and is therefore a smoothed loss. Contributions are calculated so that these smoothed actuarial losses are amortized over some future interval, typically five years. Asset gains and

losses are therefore deferred, and hence smoothed, twice, first by the asset valuation method and then by the gain/loss adjustment method. The method of asset valuation must therefore be chosen along with the method by which gains and losses are amortized. Trowbridge & Farr (1976, p. 73) thus refer to the "consistency between the asset valuation and the techniques of actuarial gain or loss adjustment".

It may be shown mathematically that there is considerable symmetry between an arithmetic averaging asset valuation method and the usual fixed-term amortization of gains and losses. One may choose not to directly amortize gains and losses but instead spread them forward over a moving term, as in spread-gain actuarial cost methods (Berin, 1989, p. 63; Aitken, 1994, p. 326) or as discussed by Trowbridge & Farr (1976, p. 85), Bowers et al. (1979) and Owadally & Haberman (1999) among others. It may then be shown mathematically that there is an identical exponential smoothing mechanism that is employed in the gain/loss spreading method and in exponential smoothing asset valuation methods.

It would appear intuitively that these exponential smoothing techniques lead to smoother contribution rates by contrast with moving arithmetic average methods and fixed-term amortization schedules. The smoothness of contribution rates when gain/loss spreading is used within the Aggregate and Frozen Initial Liability methods is indeed observed by Trowbridge & Farr (1976, p. 62). Hennington (1968) states that "The smoothness of the annual contribution is determined not only by the method for determining asset value but also by the actuarial funding method. […] An actuarial cost method involving a spreading of actuarial gains and losses makes it easier to use some of the market value methods." Berin (1989, p. 28) notes that the valuation of assets at market is less "risky" if a spread-gain funding method is used. Owadally & Haberman (1999) also find that spreading is more efficient than the direct amortization of gains and losses in the sense that more stable contribution rates and funding levels may be achieved.

Stochastic Modeling

Further analysis of asset valuation methods requires some consideration of the stochastic volatility of the returns on plan assets. Some simplifying assumptions are necessary. We have not considered separate categories of assets but have assumed that markets are efficient and that overall rates of return on assets held in the pension fund are independent and identically distributed from year to year. We assumed constant inflation and a stationary plan membership with known mortality and salary increases. Only asset gains and losses emerge as a consequence. For the sake of simplicity, it was also assumed that valuations occur regularly with a fixed valuation basis being used and that the only benefit is a pension at normal retirement age. It is then possible to decompose the unfunded liability into losses each year, obtain recurrence relations for the unfunded liability or for the loss and then derive the first two moments of the market and actuarial values of plan assets, of the contribution rate and of the intervaluation loss when the pension funding process becomes stationary.

Some interesting results may be obtained. Gains and losses emerge randomly owing to the volatility in investment returns. But if the asset valuation method is well-defined and if the actuarial assumption as to returns on plan assets is unbiased and is borne out

on average, then it may be shown that the expected or average gain or loss that emerges is zero, which satisfies the criterion for consistency. The variance of the funding process exhibits dependence on the asset valuation and gain/loss adjustment techniques. They have a complementary actuarial smoothing function and consideration should be given to their combined effect. It is apparent that excessive smoothing through very long amortization and averaging periods leads to instability in the pension funding system, which is reasonable because gains and losses are not removed fast enough and they accumulate. Indeed, the funded ratio (market value of plan assets as a percentage of actuarial liability) becomes more volatile if more smoothing is applied. Contribution rates do become more stable as longer averaging periods are used or as gains/losses are amortized over longer periods, but too much smoothing leads to contribution rates becoming more volatile and is therefore inefficient. If funding is stable, whether exponential or arithmetic smoothing asset valuation methods are used, it is possible to show that the actuarial asset values do not diverge from, and are less variable than, the market value of plan assets. The actuarial asset values remain realistically close to market values, but exhibit less volatility.

Conclusion

Numerical work appears to indicate that typical arithmetic averaging periods of up to five years (along with gain/loss amortization periods of up to five years) appear to be efficient in terms of stabilizing both the funded ratio and contribution rates in pension plans, which lends support to current actuarial practice. If exponential smoothing is used, such as when asset values are being written-up with adjustment, and gains and losses are being spread indirectly rather than amortized, then a combination of a spreading period of up to five years and a weighting in excess of 20% on current market value is efficient.

Mathematical modeling requires many simplifying assumptions but is useful in analyzing valuation methods and in understanding the intricate relationship between actuarial cost methods, gain/loss adjustment and asset valuation. More research, using numerical simulations and realistic models, is required to compare the various asset valuation methods and to investigate the effect of practical factors such as the IRS 20% corridor rule and the choice of averaging periods. Scenario and stochastic modeling are necessary, as is the use of historical rates of return and economic time series asset models. Further research on this subject is important so that actuaries are better able to address their clients' needs. With published objective research, actuaries can justify their methods and techniques to other professionals and can consequently represent their clients better and influence the standards set by accountants, regulators and lawmakers.

References

1) Actuarial Standards Board. (1993). *Actuarial Standard of Practice No. 4: Measuring Pension Obligations.* Pensions Committee of the Actuarial Standards Board, American Academy of Actuaries, Washington, D.C.

2) Aitken, W.H. (1994). *A Problem-Solving Approach to Pension Funding and Valuation.* Actex Publications, Winsted, Connecticut.

3) Anderson, A.W. (1992). *Pension Mathematics for Actuaries,* 2nd ed. Actex Publications, Winsted, Connecticut.

4) Berin, B.N. (1989). *The Fundamentals of Pension Mathematics.* Society of Actuaries, Schaumburg, Illinois.

5) Bowers, N.L., Hickman, J.C. & Nesbitt, C.J. (1979). The dynamics of pension funding: contribution theory. *Transactions of the Society of Actuaries,* 31, 93-122.

6) Canadian Institute of Actuaries (1994). *Standard of Practice for Valuation of Pension Plans.* Ottawa, Ontario, Canada.

7) Committee on Retirement Systems Research. (1998). Survey of asset valuation methods for defined benefit pension plans. Society of Actuaries, Schaumburg, Illinois.

8) Day, J.G. & McKelvey, K.M. (1964). The treatment of assets in the actuarial valuation of a pension fund. *Journal of the Institute of Actuaries,* 90, 104-147.

9) Dyson, A.C.L. & Exley, C.J. (1995). Pension fund asset valuation and investment. *British Actuarial Journal,* 1, 471-557.

10) Ezra, D.D. (1979). *Understanding Pension Fund Finance and Investment.* Pagurian Press, Toronto, Canada.

11) Funnell, D. & Morse, P.F. (1973). Selection of a valuation rate of interest for a pension plan and valuation of pension fund assets. *Proceedings of the Canadian Institute of Actuaries,* 5(2), 1-56.

12) Hennington, H.H. (1968). Discussion of "The valuation of pension fund assets" by Jackson & Hamilton (1968). *Transactions of the Society of Actuaries,* 20, 429-430.

13) Jackson, P.H. & Hamilton, J.A. (1968). The valuation of pension fund assets. *Transactions of the Society of Actuaries,* 20, 386-436.

14) Kingsland, L. (1982). Projecting the financial condition of a pension plan using simulation analysis. *Journal of Finance,* 37, 577-584.

15) Owadally, M.I. & Haberman, S. (1999). Pension fund dynamics and gains/losses due to random rates of investment return. *North American Actuarial Journal,* 3(3), 105-117.

16) Trowbridge, C.L. & Farr, C.E. (1976). *The Theory and Practice of Pension Funding.* Richard D. Irwin, Homewood, Illinois.

17) Winklevoss, H.E. (1993). *Pension Mathematics with Numerical Illustrations,* 2nd ed. University of Pennsylvania Press, Philadelphia, Pennsylvania.

M. Iqbal Owadally, M.A., Ph.D. is a Lecturer in the Department of Actuarial Science and Statistics at City University, London, England. Steven Haberman, A.S.A., F.I.A., M.A., Ph.D. is Professor of Actuarial Science and Dean of the School of Mathematics at City University, London, England. ***This research was funded by the corporate Actuarial Research Club, in the Department of Actuarial Science and Statistics at City University, to whom thanks are due.***

BLANK

PAGE

The Pension

Forum

Volume 13, Number 1 July 2001

TABLE OF CONTENTS FOR DISCOUNTED VALUE RETURNS ACTUARIAL PRINCIPLES APPLIED TO PERFORMANCE ANALYSIS

Page

DISCOUNTED VALUE RETURNS
ACTUARIAL PRINCIPLES APPLIED TO PERFORMANCE ANALYSIS

by Jon Spain, BSc, FIA, ASA, FCIArb

Abstract: This article is written against the United Kingdom background of occupational defined benefit retirement benefit scheme actuarial valuations over the last 30 years or so. While there has recently been pressure building up towards using market related returns, it is too early to say how far there has been any real change. That will only become apparent over the next two years, following which another article may then be timely.

In the United Kingdom, it has been traditional to treat assets in a similar manner to the liabilities. Bearing in mind that trustees are not forced sellers, pension scheme actuaries have reflected the perceived luxury of being able to take a long-term view rather than being forced to take the assets at market value. The assets are then treated in the same way as the liabilities, namely by discounting anticipated prospective proceeds. How that is done for different asset classes is a matter of detail not dealt with in this article.

In the early 1980s, I became convinced that performance measurement related to market values alone was not giving the trustees (or sponsor) sufficient information. Worse, I felt the results were positively misleading. As a simple example, suppose that two consecutive TWRs (market related time weighted returns, the normal statistic) are 20 % pa and -10 % pa, respectively. Ignoring compounding, the average return was 5 % pa. The first year's statistic was a poor indicator of what was to come.

The volatility of market value returns (or "MVRs") is very familiar to actuaries but the chart in Chart 1 gives a perspective for U.K. equities.

This is by no means my first article on this topic. The original articles were mainly printed in "The Investment Analyst" (1983-87). Around the same time, papers were accepted by the International Association of Consulting Actuaries (Bermuda 1986) and "Trust Law & Practice" (1986). Later on, in association with Nick Ryan, four further articles were published in "The Actuary (U.K. edition)" (1991). Since then, I have been occupied by other things but I have now returned!

The fairly simple algebraic definition of what I call "DVR" (discounted value return) is attached. It is based upon discounting prospective proceeds (capital and income) such that, over the period being analysed, the DVR satisfies a continuum condition over the period as a whole. In practice, other assumptions need to be made, such as dividend growth or when assets are sold. A survey of 27 U.K. schemes over 1979-84 indicated that the results were not unduly influenced by modest changes in such assumptions.

My initial thoughts were that DVR is "better" than MVR because it is far more stable (the volatility is effectively smoothed out). However, this ignores that, in reality, the trustees must have eventual liquidation in mind. For it cannot reasonably be assumed that a scheme will survive for ever. This gives market value some place, but certainly not the

dominant role, in the trustees' long-term planning process. After further thought, I have surmised that trustees might, and should, be interested in market value returns smoothed over, say, 10 years, upon which I have generally concentrated.

In a recent paper to the Institute of Actuaries (28 February 2000; see below), the comment was made that *"it is quite normal for a test of manager skill to require 15 years of data before that skill can be statistically proven"* (§ 3.10.4). This persuaded me that I should also look at periods lasting 15 years rather than 10 years.

A few 10 year curves are shown on my Web site (*www.jonspain.com/dvr*) for different combinations of period and asset class. For this article, I shall concentrate upon U.K. equities for the period starting on 31 December 1977. The portfolio analysed is the reinvested index (actual portfolios are not available).

Over the whole 10 years, the MVR was 21.0 % pa and the DVR was 19.5 % pa. What I am more interested in is how far the DVR is better at tracking the ultimate MVR. Over the first period of 3 years, the MVR and DVR were 17.5 % pa and 21.2 % pa, respectively. As percentages of 21.0 % pa, these represent 83 % and 101 %.

In Chart 2, I show the cumulative DVR (blue) and the cumulative MVR (green) as percentages of the final MVR (the horizontal yellow line) achieved over the whole period. In general, the blue line is nearer to the yellow line than the green line. Overall, this indicates a "better fit", which I have called *"DVR divergence."* The lower the number, the better. The ratio of the two areas (between blue and yellow and between green and yellow) is 0.453, which is pretty good. What about other periods?

Staying with U.K. equities, Chart 3 shows how the DVR divergence for 10 year periods varies over time. In general, DVR turns out to be a much better estimator of the eventual MVR than for MVR itself. There are, of course, exceptions such as 1979-89. For the 26 values available, the mean was 0.70 with a standard deviation of 0.37.

Turning to 15-year periods, what do the DVR divergence levels for U.K. Equities look like? Well, see Chart 4. Visually, low values being desirable, the DVR divergence levels appear to be better over 15 years than over 10 years (Chart 3). For the 21 values available, the mean was 0.55 with a standard deviation of 0.21.

Finally, I thought I would compare the two series of results. For simplicity, I have looked at periods having a common starting point. Other possible comparisons include having a common end or having the 10 years falling elsewhere within the 15 years. Chart 5 shows that the 15 year DVR divergence levels can be worse than over 10 years, but not by much. However, the extreme values seen in Chart 3 are avoided.

What I have tried to show is that showing short-term performance figures related to market values alone will normally not lead to sensible results over the longer term, which is crucial for trustees. While sponsors may wish to tell shareholders a different story, that should not blind them to the long-term funding consequences. There is an alternative called "DVR", which I advocate should be far more widely used.

A sports analogy may be helpful. In advising trustees, I think investment managers tend to play volleyball, close to the net. Trustees need advisors who play rugby, with the posts in the far distance, aiming at conversion into sustained returns. Going back to the 20 % pa/- 10 % pa example with which I started, being told that I lost a lot of the wonderful return in the second year is simply annoying. The original 20 % pa was certainly not helpful and I would want something better than that.

Comments are invited. For more background, please visit "www.jonspain.com/dvr," or email me at *dvr@jonspain.com.*

The above represents my own views and it should not be taken as being in any way supported by, or representative of, my employer.

Reference

"The Concept of Investment Efficiency and its Application to Investment Management Structures" (TM Hodgson, S Breban, CL Ford, MP Streatfield and RC Urwin).

APPENDIX : THE DEFINITION

Inevitably, the definition is mathematical but it's really not too heavy. Take a time interval (0,t) over which we are monitoring performance (whether the interval is open or closed can be ignored). The term **"DV"** always refers to **"discounted value."**

Define MV_0 *(*MV_t*)* to be the portfolio market value at time 0 (time t). For simplicity, we shall initially exclude net cashflows.

Suppose that the ***"DVR"*** is 100 ***j*** % pa (which is what we're trying to determine).

Define "f" to be a single-valued operator such that, at time ***u,*** we define $\boldsymbol{DV_u}$ by

$$\boldsymbol{DV_u = f\{MV_u, j\}}$$

Then, if there are no cash flows, we require

$$\boldsymbol{DV_0 * ((1+j)^t) = DV_t}$$

If there are net cash flows (benefits paid or contributions receivable), then they can be accommodated by accumulating from the payment dates until the end of the interval at the same rate of return.

In practice, for bonds, ***"f"*** would take the form of an amortization formula, allowing for capital and interest. For equities, something along similar lines could be adopted. Such formulae have been commonly adopted in the past. Other parameters may well be needed but the above has been generalized.

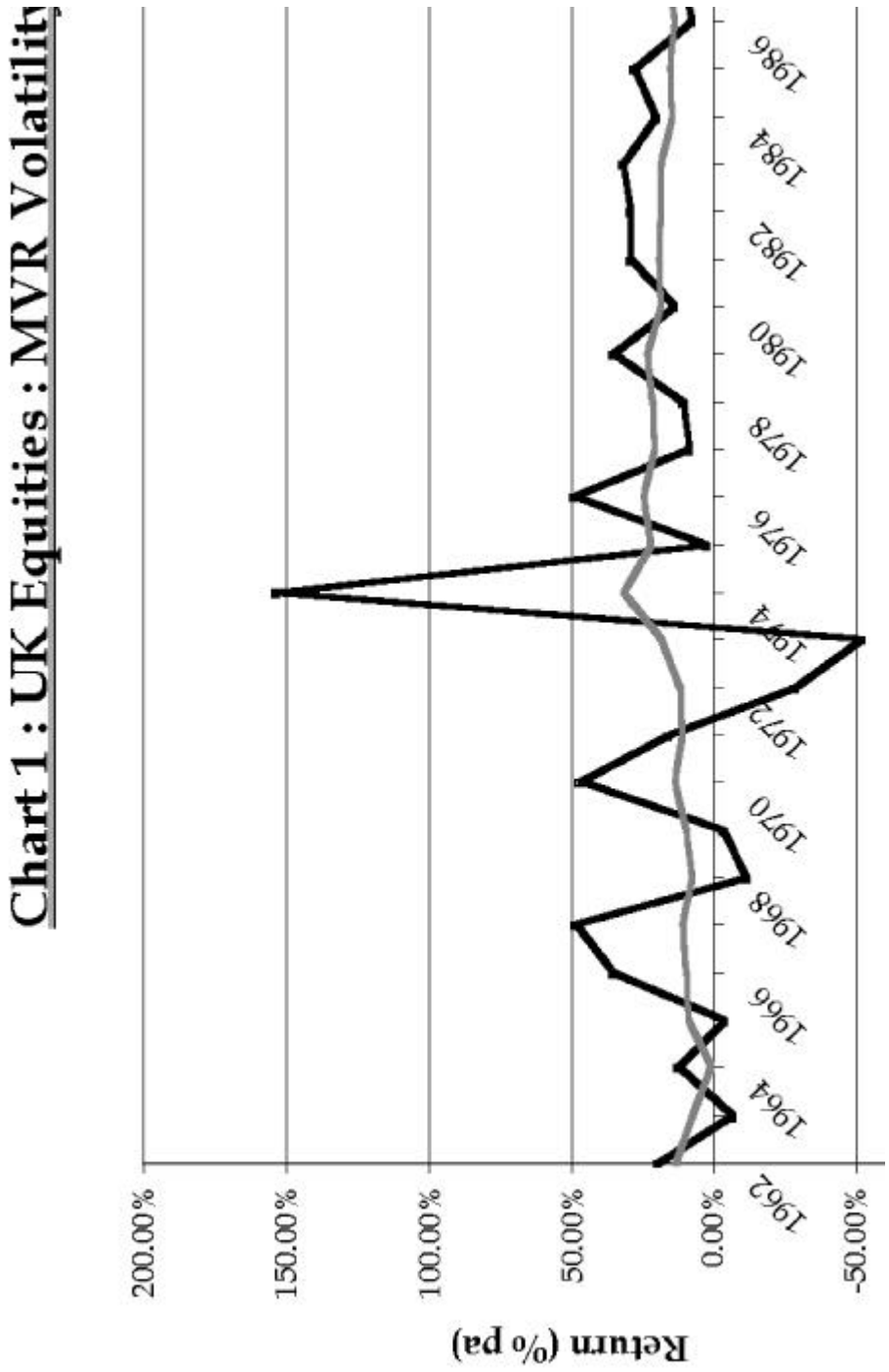
Chart 1 : UK Equities : MVR Volatility
Return (% pa)
200.00%
150.00%
100.00%
50.00%
0.00%
-50.00%
1962
1964
1966
1968
1970
1972
1974
1976
1978
1980
1982
1984
1986

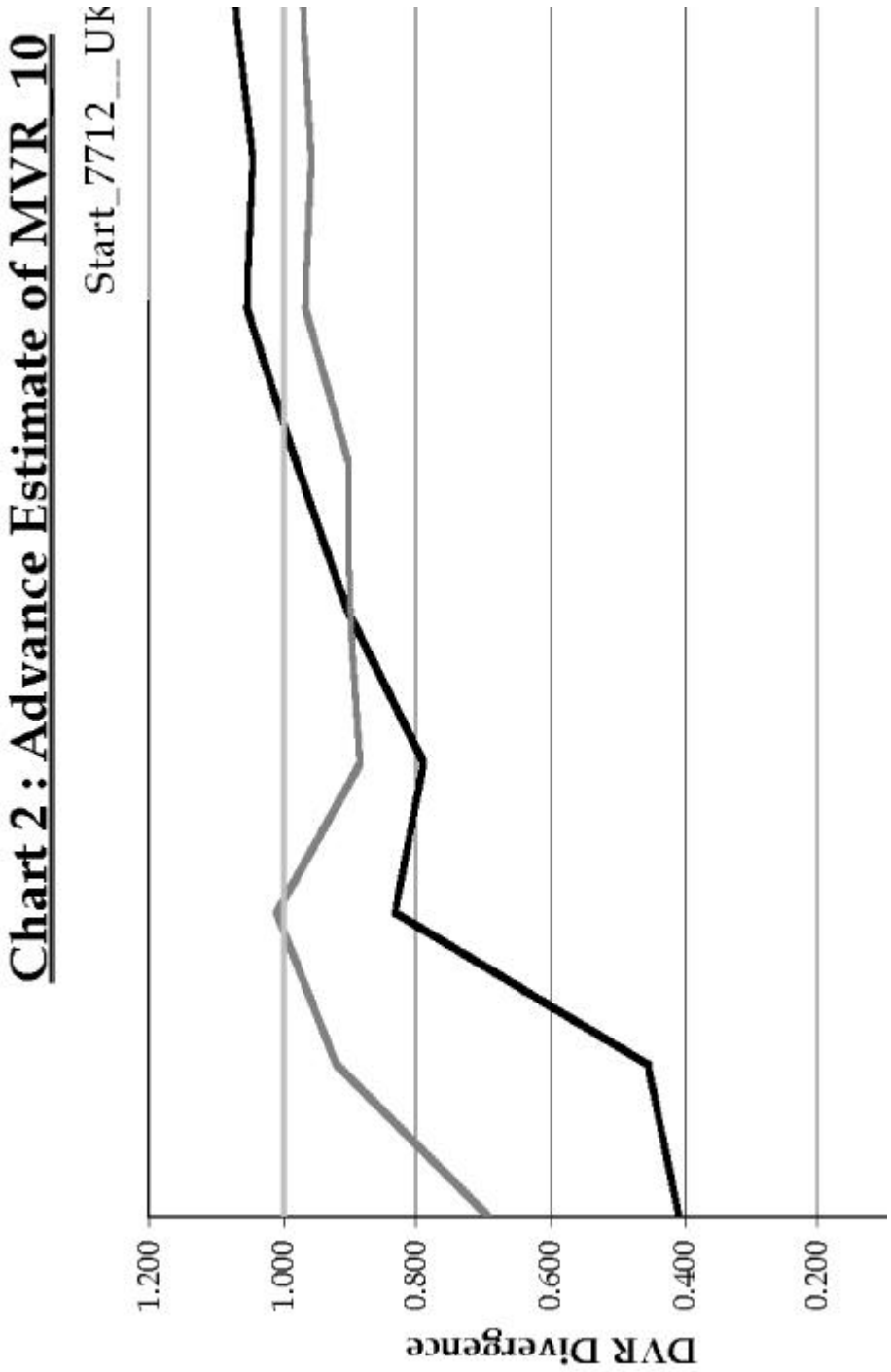
Chart 2 : Advance Estimate of MVR_10
Start_7712__UK
DVR Divergence
1.200
1.000
0.800
0.600
0.400
0.200

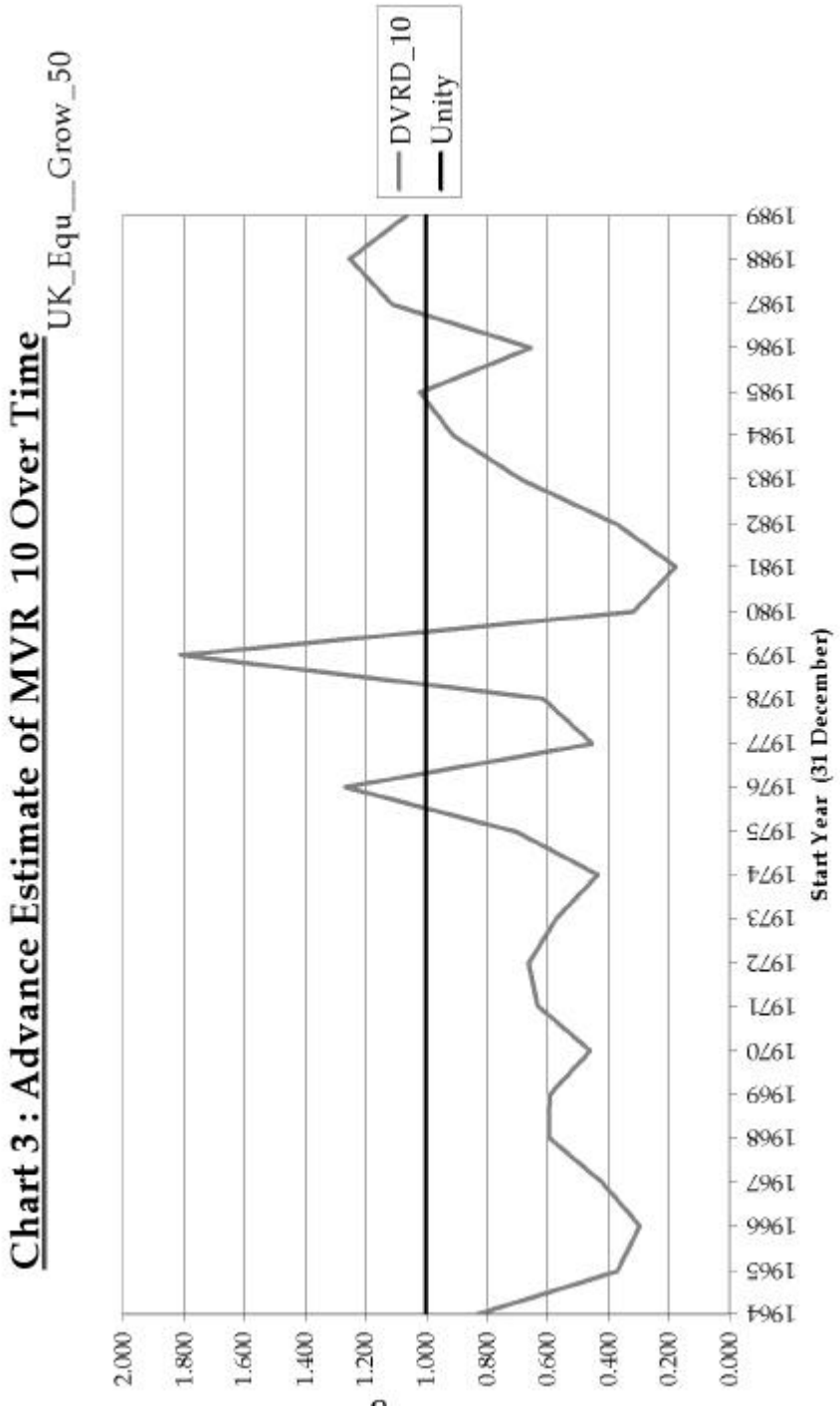
Chart 3 : Advance Estimate of MVR 10 Over Time
UK_Equ__Grow_50
DVRD_10
Unity
2.000
1.800
1.600
1.400
1.200
1.000
0.800
0.600
0.400
0.200
0.000
1964
1965
1966
1967
1968
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
Start Year (31 December)

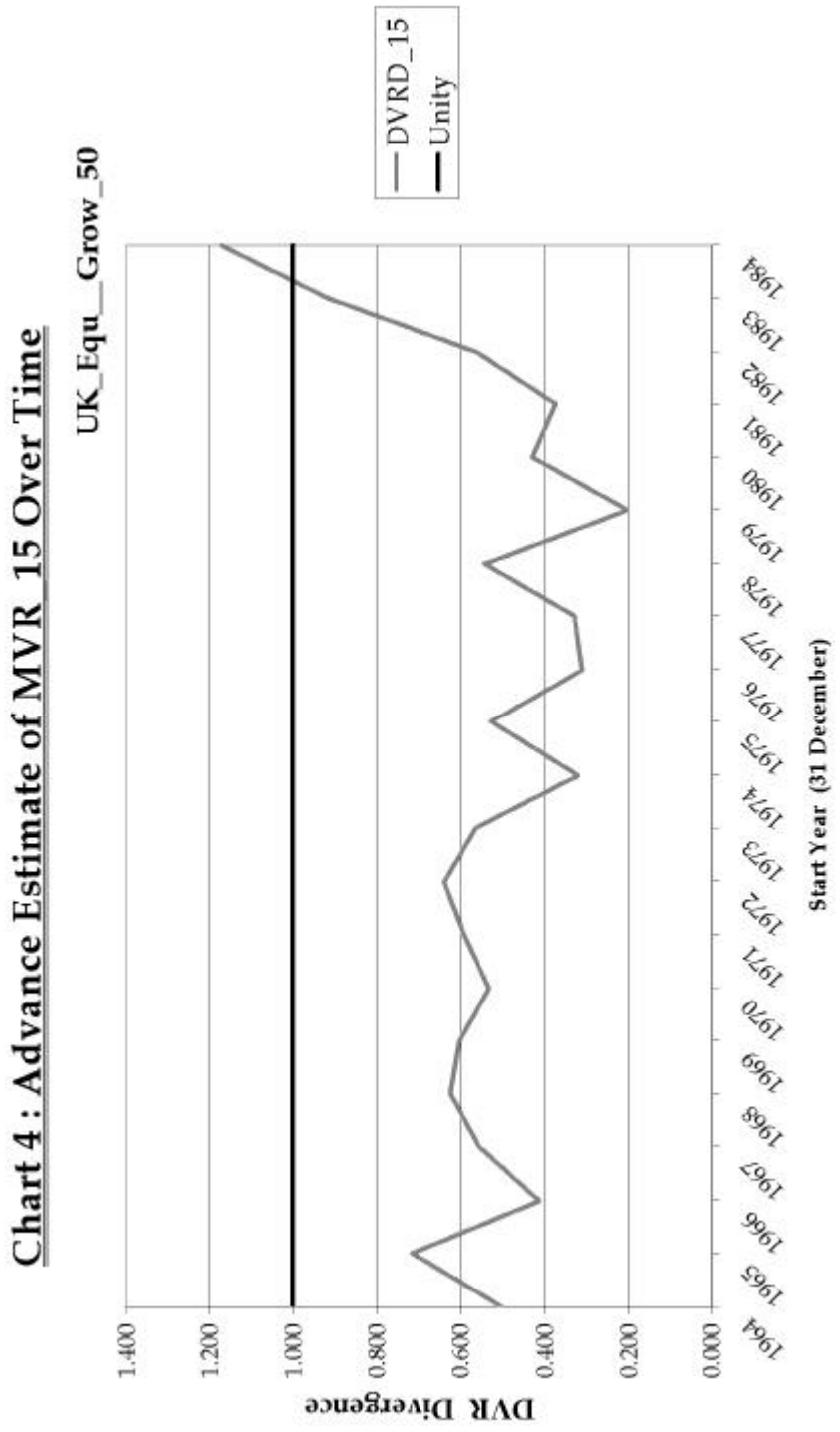
Chart 4 : Advance Estimate of MVR_15 Over Time
UK_Equ__Grow_50
DVRD_15
Unity
DVR Divergence
1.400
1.200
1.000
0.800
0.600
0.400
0.200
0.000
1964
1965
1966
1967
1968
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
Start Year (31 December)

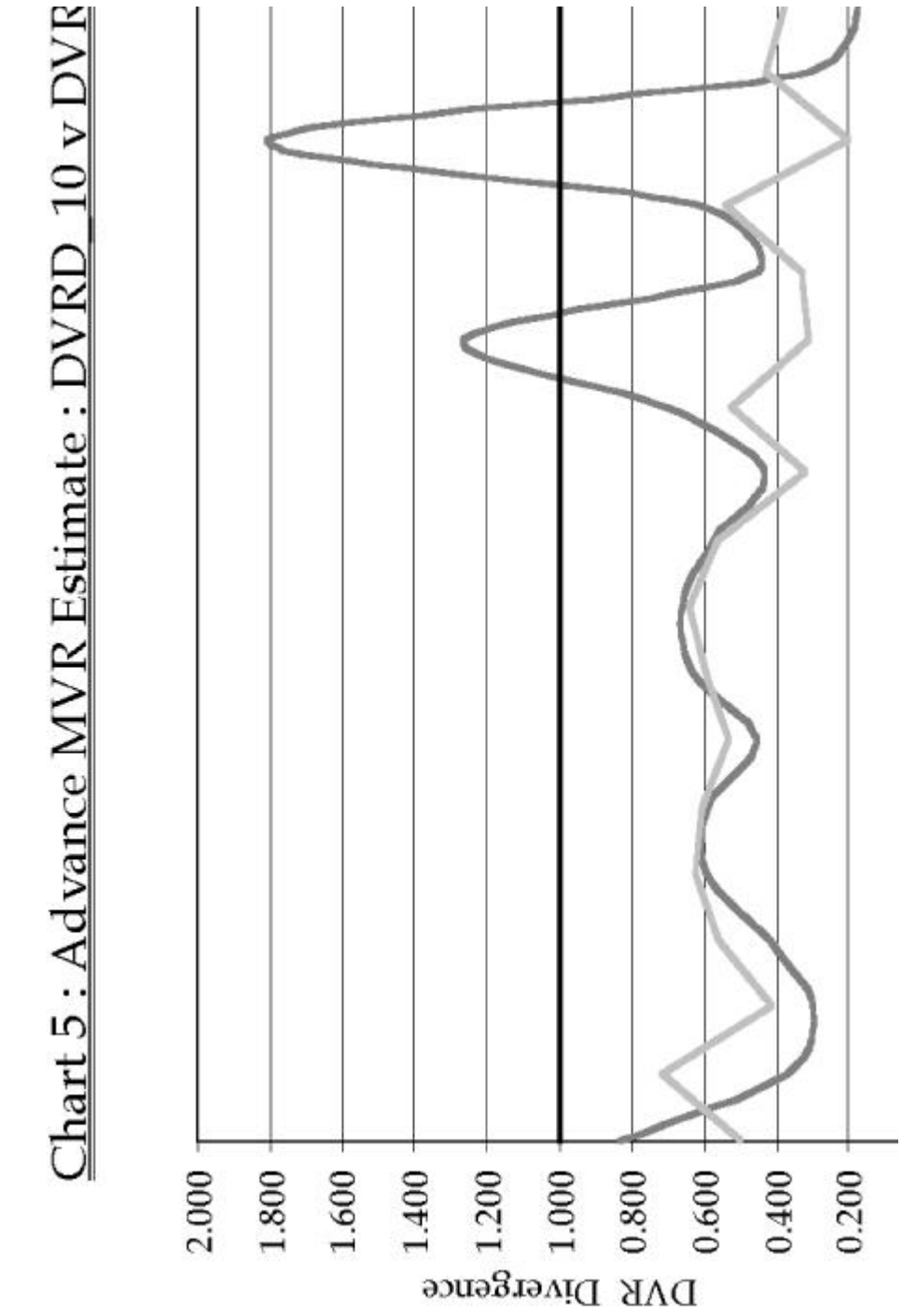
Chart 5 : Advance MVR Estimate : DVRD_10 v DVR
DVR Divergence
2.000
1.800
1.600
1.400
1.200
1.000
0.800
0.600
0.400
0.200

BLANK

PAGE

The Pension

Forum

Volume 13, Number 1 July 2001

TABLE OF CONTENTS FOR A LOOK AT DYNAMIC PENSION PLAN VALUATIONS

Page

A Look at Dynamic Pension Plan Valuations

by Chris Clark

Abstract: This paper discusses the usage of dynamic (i.e. open group) pension plan valuation in the current and possible future regulatory environment. Attention is initially given to various technical formulae and different theoretical approaches that may be used to perform this type of valuation in a reasonable and appropriate manner. Further discussion entails key assumptions for this methodology, as well as, assumption sensitivity, and reasonable bases for determining appropriate distributions for the number of new entrants (annually) and the age distribution of said new entrants. Usage of this type of valuation within the framework of the regulatory environment of the United States is reviewed and potential challenges associated with the use of dynamic valuation are also evaluated. The primary intent of this paper is to foster further discussion on this topic.

I. Introduction

This paper will proceed to discuss the following concepts related to dynamic pension plan valuation: various approaches to dynamic valuation; key assumption determination and sensitivity of said assumptions; uses of dynamic pension plan valuation in the current business environment; problems associated with dynamic pension plan valuation; and dealing with said problems. In Section II, effort will be made to show that performing a dynamic pension plan valuation is computationally viable with only minimal formulaic effort. Section III will emphasize the level of care that must be exercised in selecting new entrant assumptions, as well as, the sensitivity of plan costs to changes in new entrant assumptions. Section IV will then entail the value of the information provided by a dynamic pension plan valuation for a wide variety of applications and for a variety of layperson audiences. Lastly, Section V will discuss some of the more significant issues to be dealt with when performing a dynamic valuation. Additionally, Section V will attempt to show that, like most cost methods, the difficulties of the dynamic pension plan valuation approach can be overcome by exercising care in assumption selection and method application. Throughout, the basic purpose of this paper is to encourage additional discussion on the topic of using forecast-inclusive valuation methods.

II. Various Approaches to Dynamic Pension Plan Valuation

A. Background on Dynamic Pension Plan Valuation

As stated by Mr. Donald R. Fleischer, “the forecast valuation method is not a new concept for pension actuaries” [1, “The Forecast Valuation Method for Pension Plans”, Fleischer, TSA XXVII, 93]. Indeed suggestions for a formalized methodology have included: population projections with traditional cost methods evaluating plan liabilities on future, hypothetical valuation dates; complex, ongoing, open group valuations designed to maintain contributions as a level percent of payroll; and projections that are open group for a pre-determined period of time and then moved to a closed group analysis with a variety of spread-cost measures to mention but a few. Additionally, the United

States' Social Security system has, of course, utilized population projections from the beginning while, the PBGC currently has a "stochastic dynamic micro-simulation model" called PIMS (Pension Insurance Modeling System) that is used to "forecast and analyze [the] financial position of [the] PBGC and its insured plan sponsors" [2, "Computer Models for Retirement Policy," Anderson, SOA handout from the 2000 Spring Meeting – Las Vegas, 44]. Regardless of the many variations that have been considered in formal papers (and the unknown number of other, unique projections that have been utilized and/or developed at a client's request), the reality remains that the current regulatory environment has made forecast-inclusive methods unpopular by restricting their usage for purposes of funding and FASB valuations. As such, the following analysis of dynamic pension plan valuation will attempt to highlight the value of using a forecast-inclusive valuation method and, will discuss the uses for which such a method is best suited.

B. Formulae for Dynamic Pension Plan Valuation

While the concept of dynamic—or open group—valuation is certainly nothing new to the pension world, its typical usage has long been "to inform an employer about the future costs, funding obligations, and cash flow of the pension plan" [3, *Fundamentals of Private Pensions*–Seventh Edition, McGill et al, University of Pennsylvania Press, 500]. The value of such information to company management and stakeholders is obvious. Unfortunately, the current business environment does not generally lend itself to extensive usage of or even frequent requests for, such information. While much of this is readily explainable, the 'why' questions will be set aside temporarily to first discuss the intriguing question of 'how'.

The basic premise of this approach to dynamic pension plan valuation is to project expected PVFB for new entrants utilizing distributions for age of the new entrants and the number of new entrants annually. As use of a salary distribution versus an expected salary does not affect the results of the expected PVFB calculation; an expected salary is utilized to simplify the calculations.

$$PVFB_j = \int v^t * {}_tp_x^{(t)} * [AS_{j,x}] * \left(\left\{ \sum_{w=t-2}^{t} S_{x+w} \right\} \Big/ \{3 * S_x\} \right) * \%^{(s)} * [k_j + t] * [m_{x+t}^{(r)} * \%_{x+t}^{(r)} * \ddot{a}_{x+t}^{\{m\}} + m_{x+t}^{(d)} * \%_{x+t}^{(d)} * \ddot{a}_{y+t}^{\{m\}} + m_{x+t}^{(i)} * \%_{x+t}^{(i)} * \ddot{a}_{x+t}^{(i-t)\{m\}} + m_{x+t}^{(w)} * \%_{x+t}^{(w)} * {}_{NRA-x-t}\ddot{a}_{x+t}^{\{m\}}] * dt$$

$$\text{Total PVFB} = \sum_{i=1}^{n} PVFB_j$$

Key: $\%_{x+t}^{(r)}$ - percent of accrued, projected benefit paid immediately for early or normal retirement at age x + t (i.e. early retirement factors applied w/ factor at and beyond normal retirement age equal to 1)

$\%_{x+t}^{(d)}$ - percent of accrued, projected benefit paid immediately to beneficiary for death at age x + t (ex.: 50%* factor to convert from a single life annuity to a 50% joint-and-survivor annuity)

$\%_{x+t}^{(i)}$ - percent of accrued, projected benefit paid immediately for disability retirement at age x + t (frequently 1)

$\%_{x+t}^{(w)}$ - percent of accrued, projected benefit paid at normal retirement for withdrawal at age x + t

$\%^{(s)}$ - percent of salary used in calculation of accrued, projected benefit

${}_t p_x^{(t)}$ - aggregate probability of remaining active in the pension plan from age x to age x + t where the mortality decrement is viewed from a pre-retirement and pre-disability perspective

$\&\&_{x+t}^{(i-t)\{m\}}$ - single life annuity where the mortality decrement utilized is viewed from a post-disabled perspective

$\&\&_{x+t}^{\{m\}}$ - single life annuity for non-disabled retirees; x + t representing the participant's age and y + t representing the spouse's age

$AS_{j,x}$ - annual salary at age x for participant j

S_{x+w} - salary scale factor for age x + w

$$[AS_{j,x}]^* \left(\left\{ \sum_{w=t-2}^{t} S_{x+w} \right\} \Big/ \{3 * S_x\} \right) * \%^{(s)} * \left[k_j + t \right]$$

- this is the example used for calculating the accrued, projected benefit at age x + t. Obviously, this example is for a three-year final average salary plan for a participant that is not within three years of retirement.

n - total number of participants in the plan being evaluated

k_j - years of service for participant j

New Entrant information:

n_e - number of new entrants to the plan annually

f(n_e) - distribution of number of new entrants to the plan annually (zero inclusive); ultimate only

$f^{SU}(n_e)$ - distribution of number of new entrants to the plan annually (zero inclusive); select-and-ultimate

E(n_e) - expected number of new entrants to the plan annually

$PVFB_e$ - present value of future benefits for all new entrants to the plan; for this example, this should be the same as with (annual salary) replaced by (expected average new entrant salary), initialized to zero, and the formula valued against a distribution of new entrant ages

z - evaluation period for new entrants (typically one year)

x_e - new entrant age

f(x_e) - distribution of new entrant ages; ultimate only

$f^{SU}(x_e)$ - distribution of new entrant ages; select-and-ultimate

$$PVFB_{x_e} = PVFB_j * ES_{j,x} / AS_{j,x}$$

$$PVFB_e = \int PVFB_{x_e} * f(x_e) * d_{x_e}$$

$$PVFB_e^{SU} = \int PVFB_{x_e} * f^{SU}(x_e) * d_{x_e}$$

(for ultimate only assumptions)
or

Revised Total PVFB = $\sum_{i=1}^{n} PVFB_j + \&_{z|} * \int PVFB_e * f(n_e) * d_{n_e}$

(for select-and-ultimate assumptions)

As you will note from the information shown above, the evaluation period variable, z, is listed as typically being set to one year. The primary reason for this is to coincide with the period for which contributions are being made on behalf of the funding of the plan. Of course, this means there will be one more type of participant migration on which to perform gain/loss analysis. However, the expected liability calculation should be more accurate if an aggregate cost method is used so that the effect of the new entrants on the PVFB is limited to the PVFNC portion of the PVFB = PVAL + PVFNC equation. By only including one year's worth of new entrants into the NC calculation, the expected liability equation of: ExpPVAL(t+1) = PVAL(t) + NC(t) - benefit payments (all interest adjusted to the following time of plan valuation) should more accurately reflect the actual PVAL(t+1). Thusly, a typical plan would no longer expect to see actuarial losses each year in which the actuarial assumptions happen to be completely accurate.

Unfortunately, use of the modified PVFB calculation from the preceding paragraph with either the Aggregate or FIL cost methods may lead to a temporarily biased funding evaluation. This is due to the increase in NC which will, generally, increase contributions to assets and, the fact that the aforementioned methods assume that PVAL is equal to assets or, assets plus some amortized UAL, respectively. If we assume that assets are initially equal to some "true" PVAL value for the plan then, when the value of the increase in the prior year's NC due to using this approach (as accumulated with interest earnings to the point of the current year's valuation) exceeds the "true" liability that the plan has accrued for new entrants during the prior year, the inherent assumption that plan assets equal PVAL will overstate the PVAL value for the current year. Of course, this is not a new challenge to using either the Aggregate or FIL cost methods. In fact, this issue is somewhat self-correcting in that overstating one year's PVAL value reduces the PVFNC for that same year and, therefore, the respective NC as well. Additionally, it should be noted that until full funding is reached, this effect is similar to that which would result from simply contributing more than the minimum required contribution each year.

However, due to the potential for even short-term abuse that this methodology might imply for companies seeking to lighten their tax burden, it is suggested that a further modification to the aggregate funding approach be considered. Under this revised methodology PVAL would be defined as the PVAL resulting from the one of the individual cost methods. Consequently, PVFNC would simply be the modified PVFB less the AL resulting from the individual cost method. This leaves us with the entire PV for expected future entrants consistently and appropriately included in the PVFNC.

As use of a dynamic pension plan valuation removes the bias towards actuarial losses that is inherent in traditional methods, this type of approach seems to be theoretically preferable. Furthermore, this methodology has the value of producing results that represent a more realistic picture of plan liabilities. Therefore, it is particularly important to ensure that the assumptions unique to this type of approach are selected with care.

III. Key Assumptions Unique to Dynamic Valuations

Obviously, the distribution of new entrant ages, the expected average new entrant salary, and the distribution of the number of new entrants to the plan (annually) are the key assumptions that would not otherwise be dealt with in evaluating the liabilities of a defined benefit pension plan. Notably, "assumptions on the size of the work force can make a substantial difference in the long-range dollar costs of a pension plan" [4, "The Forecast Valuation Method for Pension Plans," Fleischer, TSA XXVII, 105]. Furthermore, "it is also necessary to picture accurately the characteristics of people who will enter the work force" [5, "The Forecast Valuation Method for Pension Plans," Fleischer, TSA XXVII, 105]. Therefore, it is crucial that the utmost care be taken to ensure that the assumptions be as accurate as possible for the period being evaluated. To this end, "it seems incumbent upon us [actuaries] to develop techniques that permit a best estimate regarding future participant group growth rates" [6, Discussion on "The Forecast Valuation Method for Pension Plans," Schnitzer, TSA XXVII, 130].

Some basic information regarding annual rates of new entrants is readily available from the age-service distributions prepared for Form 5500, however, detailed tables regarding annual entrant rates are not always so easily obtainable. This can lead to difficulties regarding what assumptions are reasonable for new entrants to plans connected with varying industries. To a lesser extent, this problem already exists in withdrawal tables. Currently, use of unnecessarily conservative withdrawal tables allows plans to load their valuation liabilities indirectly for new entrants. The option of a plan valuation method that specifically includes assumptions for new entrants would allow for (and hopefully, encourage the use of) more realistic assumptions throughout the plan valuation process. It may also lead to additional exhibits regarding gain/loss analysis by migration type for government forms filings.

When discussing how assumptions of this nature are to be determined, it seems clear that proper assumptions regarding new entrants should not be based solely on actuarial judgment. While studying a plan's experience involving new entrants is valuable, it provides little or no insight about the direction in which the employer/company may be headed. Beyond simple evaluation of current and expected hiring practices, changes to the business environment on a variety of levels (ex.: nationally, industry-wide, company specific, etc.) could have a dramatic impact on the company's hiring results. As such, utilizing select-and-ultimate new entrant projection rates would be preferable to ultimate only projection rates when projecting multiple years worth of new entrants. Of course, "a simple approach is to replace the deaths and terminations by employees of the same age while replacing retirements and allowing for expansion by introducing employees at selected younger ages" [7, "The Practical Application of Cash Flow Techniques to Pension Plans," Smith and Howe, CIA March 1974, 242]. Regardless, the plan sponsor's "management should assist the actuary in deciding on an appropriate set of assumptions" so that all information of relevance and significant value is fully considered when the assumptions are set [8, "The Forecast Valuation Method for Pension Plans," Fleischer, TSA XXVII, 95]. This does not mean to imply that actuarial techniques regarding population theory should be ignored. On the contrary, techniques for population projection are extremely useful when forecasting plan size. However, the subject of population theory is too extensive to include in this discussion.

IV. Uses of Dynamic Pension Plan Valuation

As previously stated, the current regulatory environment in the United States does not allow for the inclusion of expected new entrants in calculations for minimum required contributions, maximum tax-deductible contributions, or FASB 87/88 reporting. While this does limit the current potential for using dynamic pension plan valuation, it does not remove the value of the information provided by this type of valuation. Despite the regulatory restrictions, a wide variety of uses abound for the information provided by projecting pension valuation results.

As is obvious, a common reason for projecting pension valuation results is to provide information for budgetary planning purposes. Depending on the views of the plan sponsor, this may be restricted to simply projecting expected plan population characteristics and performing hypothetical funding and/or FASB valuations using traditional cost methods. However, the plan sponsor may be interested in utilizing dynamic pension plan valuation for:

- Projecting funding timelines and targets—such as funding for plan terminations and/or plan conversions;
- Evaluating the reasonability and practicality of funding goals—such as negotiated funding goals/ratios for collectively bargained plans or, the timing of plan terminations;
- Completing more detailed costs analyses on the effects of early-retirement windows, plan design changes, mergers/acquisitions, or other, miscellaneous possibilities (an example of which might be corporate restructuring for a single employer with multiple plans); or
- Simply in having a more realistic 'picture' of the effect of various contribution levels on expected plan liabilities and funding ratios—this is particularly important for company management, stakeholders, plan participants, and benefit guarantors. Additionally, this might best be accomplished by use of distributions instead of averages—regarding new entrant characteristics—when performing said valuation(s) and, if possible, stochastic simulation (or, more probably, by simply completing multiple projections with varying new entrant scenarios) to present a 'most probable' range of results for the various audiences. (Presumably, this should "do a better job" of providing a more realistic picture for the various audiences [9, Discussion on "Projections—How to Make Them and How to Use Them," Bronson, TSA II, 258].)

Furthermore, it is valuable to note that choosing to assume there will be no new entrants—as is done with traditional cost methods—is still a choice [10, Response to Discussion on "The Forecast Valuation Method for Pension Plans," Fleischer, TSA XXVII, 153].

It is the author's hope that, at some point in the future, some restricted version of a valuation method that allows for projecting new entrants might be considered acceptable for funding purposes by the Internal Revenue Service. The 'restricted' note is added in recognition of the sensitivity of the PVFB and normal cost results to new entrant

assumptions and consequently, the potential impact that changing normal cost would have on both the minimum required and the maximum tax-deductible contributions if such a method were summarily abused. For example, let us assume that we have approval for a method that allows us to define actuarial accrued liability as the accrued liability resulting from the Entry-Age Normal cost method. Further assume that normal cost for this method is defined as (PVFB - EANAL) / PVFS(alary) * (Total Salary of Participants Adjusted for New Entrants) with PVFB and PVFS having been calculated to include one year's worth of new entrants. (Realistically, the consideration of new entrants in the sum of the salary of participants would require one to take the present value of the projected new entrant salary for the coming plan year—a calculation in which timing considerations would be crucial.) Given the above situation, a change in the expected salary of new entrants would affect three portions of the normal cost calculation but, depending upon the selected salary scale assumption, might well affect the PVFB more significantly than the PVFS or the Adjusted Total Annual Salary. This would result in an increase in the normal cost portion of both the minimum required and maximum tax-deductible contributions. Assuming the plan in question is not fully funded, such a change would directly raise both contribution levels and offer the plan sponsor the opportunity to take a larger tax deduction than before.

As discussed in Section II, restricting the period for which new entrants are accounted for in performing the valuation is a simple and sensible method by which dynamic pension plan valuation can be utilized while making abuse of the new entrant component somewhat more difficult to hide. Certainly, there are a variety of other methods in existence by which sufficient restriction of the effect of new entrants on the calculations may be achieved—while maintaining a rational inclusion of new entrants in the valuation results—so as to provide the more realistic 'picture' of expected plans liabilities that was previously mentioned (and generally considered desirable). Furthermore, detailed discussion of these various methodologies is too extensive for inclusion in this brief paper. The key point is the same as noted by Mr. A. M. Niessen, "if a projection is to be more than just a very crude illustration, it should be prepared with great care, and should be as far as possible realistic" [11, "Projections—How to Make Them and How to Use Them," Niessen, TSA II, 237].

While the advent of modern computing technology certainly simplifies the mechanics of completing pension plan valuation projections, it does not remove the burden of (or need for) reasonable assumptions—both individually and in the aggregate. Careful tracking of and attention to gain/(loss) analysis on the plan immigration of new entrants will help to validate the accuracy of new entrant assumptions (an important factor given the sensitivity of plan cost estimates to new entrant assumptions). Regardless, there remain a number of issues that must be addressed before the use of dynamic pension plan valuation for funding purposes could be a realistic option.

V. Issues of Concern Associated with Dynamic Pension Plan Valuation

Dynamic pension plan valuation—much like the traditional cost methods—does have its challenges. First and foremost, is estimating the informational value to the plan sponsor of results from performing a hypothetical funding valuation using a dynamic pension plan valuation approach. This can be particularly challenging since the range of minimum required to maximum tax deductible contributions may not necessarily encompass the hypothetical contribution value from the dynamic pension plan valuation results. While this is all reasonably obvious, there are several important implications of the above information that should be separately considered.

Perhaps the most significant implication regards convincing a plan sponsor that the additional time and cost necessary to perform a valuation using a dynamic pension plan valuation approach for a specific plan is worthwhile given the value the resulting information carries for: the company's management, the company's stakeholders, the plan's participants, and the plan's benefit guarantors. The difficulty associated with showing that the information's value equates to or exceeds the value of the additional time and cost necessary to complete a dynamic pension plan valuation (beyond the standard, required valuation using currently available cost methods) will, of course, depend heavily on what the reasons for doing a dynamic pension plan valuation for the given plan happen to be. As discussed in Section IV, there are a variety of uses for the information from performing a dynamic pension plan valuation and not all will be valuable to all plan sponsors in all situations. Consequently, the informational needs of the individual plan sponsor need to be considered when discussing whether or not a dynamic pension plan valuation adds sufficient value to warrant the time and expense.

Another significant issue is whether or not reasonable accuracy can be achieved by utilizing selected assumptions for a single set of results. Projecting a probable range of results certainly has value (an excellent discussion of which is found in Mr. Robert J. Myers' paper entitled "Some Considerations in Pension Fund Valuation," TASA XLVI, 51-58). However, plan sponsors often prefer information to be provided on a 'most probable' basis, which a range of results does not—by itself—provide. In the author's opinion, the best set of results for a forecast-inclusive valuation method would include both a probable range of results and a separate set of 'most probable' results. Of course, time and cost are generally key determining factors as to whether or not the above would be practical to provide. Still a single set of 'most probable' results would seem to be preferable to both maintain consistency with typical valuation standards and to help simplify the "major problem facing all pension actuaries, namely, making the results understandable to non-actuaries" [12, Discussion on "Projections—How to Make Them and How to Use Them," Myers, TSA II, 254].

Further complicating the above issue is the ease with which a single assumption set may be manipulated to abuse the dynamic pension plan valuation methodology. In fact, given how sensitive valuation results can be to minor changes in key assumptions, it is

conceivable that a set of assumptions that utilize averages instead of distributions could significantly distort a single set of results. In attempts to both avoid abuse of the dynamic pension plan valuation methodology and to help ensure the use of reasonably accurate assumptions, the following suggestions are made:

1. Distributions should always be used for the assumptions regarding number of new entrants (annually) and ages of new entrants. As an example of the importance of using distributions, readers should consider the implications of the following quote: "In our current United States and Canadian practice, . . . the number of employees at relatively advanced ages but with short service is substantial. This occurs in part because of relatively high job mobility on this continent." [13, Discussion on "Projections—How to Make Them and How to Use Them," Stark, TSA II, 269]. Of particular note is the fact that Mr. Stark made this comment in 1950 and job mobility has risen significantly since then.

2. Gain/(loss) analysis should be performed separately for the new entrant portion of expected liability. Additionally, it is the author's opinion that if a form of dynamic pension plan valuation was to become an approved cost method for funding purposes, such gain/(loss) analysis should be required for annual Form 5500 disclosure. Given the additional time and expense that evaluating this additional disclosure would cost the IRS, this would seem a rather significant obstacle to be overcome before a broad-based forecast-inclusive valuation method would be generally accepted for funding purposes.

While the above discussion of the challenges associated with dynamic pension plan valuation is far from complete (nor was it intended to be), it would seem that the most significant problems of dynamic valuation have been addressed. The primary purpose of this discussion was twofold. First, to show that although dynamic pension plan valuation has its problems, they are not insurmountable. Secondly, to note that there are problems inherent with any cost method and, that proper selection and use of any valuation methodology requires the judicious use of professional judgment.

VII. Conclusions

This paper has shown that performing a dynamic pension plan valuation is a feasible and practical alternative to traditional valuation methods. Furthermore, while the sensitivity of plan cost estimates to changes in new entrant assumptions is an important issue, the need for reasonably accurate assumptions (particularly on a select-and-ultimate basis) is not a new item of consideration for pension actuaries and is a manageable concern. As has been discussed (albeit briefly), forecast-inclusive methods are useful in a variety of situations and can provide valuable information to plan sponsors, company stakeholders, plan participants, and benefit guarantors. Lastly, the discussion of some of the more significant issues connected with performing a dynamic pension plan valuation has demonstrated that, like most cost methods, the difficulties of using a dynamic pension plan valuation methodology can be overcome by exercising care in assumption selection and method application. Throughout, the primary intent of this paper has been to encourage additional discussion regarding the use forecast-inclusive valuation methods. It is the author's sincere hope that this last point, in particular, has been accomplished.

VIII. Bibliography

Anderson. 2000. "Computer Models for Retirement Policy," (Session 44 handout; 2000 SOA Spring Meeting-Las Vegas) Society of Actuaries.

Fleischer, D. 1975. "The Forecast Valuation Method for Pension Plans," *Transactions: Society of Actuaries* Vol. 27, pages 93-154.

Howe, D. & Smith, A. 1974. "The Practical Applications of Cash Flow Techniques to Pension Plans," *Proceedings: Canadian Institute of Actuaries* Vol. 5, No. 2, pages 222-263.

McGill, D. et al. 1996. *Fundamentals of Private Pensions* (Seventh Edition), University of Pennsylvania Press.

Niessen, A. 1950. "Projections-How to Make Them and How to Use Them," *Transactions: Society of Actuaries* Vol. 2, pages 235-278.

The Pension

Forum

Volume 13, Number 1 July 2001

TABLE OF CONTENTS FOR AN INDEX ADJUSTMENT ASSET SMOOTHING TECHNIQUE

Page

An Index Adjustment Asset Smoothing Technique

by Richard R. Joss

Abstract: In this paper we will present an asset smoothing technique where the asset values are adjusted based on reasonable investment indices. Using this technique with carefully selected indices allows a plan sponsor to invest a pension portfolio aggressively, yet without concern that unexpected market shifts could cause material changes in the pension expense or contribution requirements.

Background

Actuaries and accountants, in consultation with plan sponsors, have often used asset-smoothing techniques in determining the market related actuarial value of a plan's assets for FAS 87 or other pension actuarial calculation purposes. The natural reason offered for using such a technique is to avoid some of the market swings which can occur if the full impact of investment gains or losses are recognized each year. Traditionally, the most common asset smoothing techniques have employed some sort of rolling average of gains or losses. This allows losses incurred in one year to be offset by gains in another, producing a less volatile asset build up. Frequently these gains or losses have been measured against a rather simplisticly determined expected asset value.

The Basic Concept

However, some plan sponsors might want to consider a new asset smoothing technique, one which is designed to recognize the various components of asset gains or losses. For each asset class, the projected value would be determined using a reasonable index for that asset class. The difference between the projected assets and the actual market value would be smoothed over a fixed period, such as five years.

This method may provide for more effective smoothing of pension plan asset values, and may be superior to the traditional techniques because it provides for the partial recognition of the various different components of expected gains or losses on assets. Recognition of these *expected* gain or loss components will help the plan's actuarial asset value stay better aligned with the anticipated market values, smoothing out unanticipated market value swings.

Description of the Method

The following is a more detailed general description of the asset method.

1. A preliminary expected market value of assets is determined. This result is based on the prior year's actuarial asset value, plus actual contributions, plus expected investment income less actual distributions. The expected income component would be determined using a reasonable index which reflects the various assets actually invested. For example if the funds consisted of 50% bond investments and 50% stock investments, 50% of the index could be based on the KL Bond Index change for the year, and 50% of the index could be based on the S&P 500 Index for the year. The resulting index would be used to derive the expected investment income.

2. The unexpected gain/loss for each year is then determined by taking the difference between this expected market value and the actual market value of assets.

3. The unexpected gain or loss is spread out over a period of years not to exceed five years. For example, the unrecognized asset gain could be set as 2/3 of the current year's unexpected gain plus 1/3 of the previous year's unexpected gain.

4. The actuarial value of assets is then set at the actual market value of asset less the unrecognized asset gain.

5. If desired, and in order to meet IRS requirements, the result in step 4 may then adjusted, if necessary, to be sure that it falls within a corridor of plus or minus 20% of the actual market value.

Sample Calculation

The asset method is illustrated in the following sample calculation.

	1995	**1996**	**1997**
Actual Index Adjustment (50% KL Bond Index + 50% S&P Index changes)	N/A	8.0%	16.0%
Actual Market Value of Assets (12/31)	$1,000	$1,000	$1,300
Contributions for Year	N/A	$75	$75
Disbursements for Year	N/A	$70	$80

Determination of Actuarial Value of Assets:

	1996	1997
1. Preliminary Expected Value		
a. Last Year's Value	$1,000	$1,057
b. This Year's Index	8.0%	16.0%
c. Preliminary Expected Investment Income (a. x b.)	$80	$169
d. Actual Contributions	$75	$75
e. Actual Disbursements	$70	$80
f. Expected Asset Value (a. + c. + d. – e.)	$1,085	$1,221

		1996	1997
2.	Unexpected Gain (Losses) for Yr. ((Market Value)-1.)	(85)	79
3.	Unrecognized Gain (Loss)		
	a. 2/3 Current Year	(57)	53
	b. 1/3 Prior Year	N/A	(28)
	c. Total	(57)	25
4.	Actuarial Value of Assets ((Market Value) - 3.)	$1,057	$1,275
5.	Corridor Adjustment (If Desired)		
	a. Low value: 80% x Market Value	800	1,040
	b. High value: 120% x Market Value	1200	1,560
	c. Adjustment necessary	-0-	-0-

Comments

The method appears as if it would be quite advantageous to sponsors who wish to "immunize" their pension portfolios against changes in bond yield rates. Certainly one way to immunize such a portfolio would be to actually invest the pension fund assets in bonds. While this would protect the sponsor against yield rate changes (if yield rates drop, the value of the portfolio rises), it would do so at great long-term expense. The sponsor would not be able to invest in potentially higher yielding equity investments.

Using an Index Adjusted Asset Smoothing Technique, the sponsor could fully invest the pension portfolio in equity securities, yet still be protected against bond yield rate changes. To accomplish this goal, the Index for the fund (specifically chosen because of the 100% equity nature of the fund) would be defined as the change in the KL Bond Index plus 5.4%. The 5.4% factor was determined as the difference between the 5.8% rate of return average for long-term corporate bonds (1926-1998) and the 11.2% rate of return average for large company stocks. (Both average return factors are taken from Stocks, Bonds, Bills and Inflation—*1999 Yearbook*). Using this index would allow an equity portfolio to reflect bond-yield rate changes that would be consistent with such changes in a bond portfolio.

Another possible use of the method is for sponsors who are concerned about fluctuation in the equity markets. In this case the index for the equity portfolio could be set at its long term average (11.2%), or at current bond yields plus a historical difference. Either index approach would tend to significantly dampen the effects of equity fluctuation.

Summary

Using an index adjustment asset smoothing technique enables plan sponsors to use an actuarial value of assets which more closely tracks the plan's anticipated actual market value, adjusted for potential factors such as bond yield rate changes. While the numerical illustration presented above was completed using a 50/50 weighting of two outside market adjustment indices, it is anticipated that other reasonable weightings and other reasonable long-term indices would also be acceptable, as long as they reflected the actual assets of the investment portfolio.

BLANK

PAGE

The Pension

Forum

Volume 13, Number 1 July 2001

TABLE OF CONTENTS FOR THE EVOLUTION OF AVERAGING MECHANICS USED IN THE ACTUARIAL ASSET VALUATION METHOD OF THE NEW YORK CITY RETIREMENT SYSTEMS

Page

The Evolution Of Averaging Mechanics Used In The Actuarial Asset Valuation Method Of The New York City Retirement Systems

by Robert C. North, Jr.

Abstract: For the last thirteen years, actuarial valuations of the New York City Retirement Systems ("NYCRS") have included an Actuarial Asset Valuation Method ("AAVM") based on a five-year moving average of Market Values. During this period, however, the underlying mechanics of the averaging process have been changed twice and there have been three Market Value Restarts ("MVRs"). This article focuses primarily on the changes in the averaging mechanics of the five-year averaging process with specific focus on:

- *The definitions of what earnings are averaged.*
- *What percentages of those earnings are averaged into the Actuarial Asset Value ("AAV") each year.*

Background—Overview of Changes

A five-year average of Market Values AAVM was first used for all assets in the June 30, 1988 actuarial valuations of the NYCRS. These actuarial valuations were used to determine employer contributions payable for Fiscal Year 1989 (i.e., July 1, 1988 to June 30, 1989).

Before that time the NYCRS utilized an AAVM that included an averaging method for valuing equities and valued fixed income securities at amortized cost.

Since that time, however, there have been two major changes in the averaging mechanics used in the AAVM, specifically:

- June 30, 1991: What earnings are averaged, and
- June 30, 1996: How rapidly those earnings are averaged.

Note: there have also been three Market Value Restarts employed in the last thirteen years (i.e., as of June 30, 1991, June 30, 1995 and June 30, 1999) and these will be discussed briefly at the end of this article.

Although this may seem like a significant number of changes to the AAVM over a limited number of years, each change in the AAVM had its purpose and was chosen by the Actuary who has sole responsibility for its selection. It should also be noted that the choice of AAVM for the NYCRS is not subject to Internal Revenue Service ("IRS") rules or regulations.

The bulk of this article will focus on the evolution of the averaging mechanics used in the AAVM of the NYCRS.

Typical AAVM in use before June 30, 1991

The AAVM chosen for the June 30, 1988 actuarial valuations of the NYCRS was one of the versions of the five-year average of Market Values AAVM prescribed in IRS Regulation 1.412(c)(2)-1 and commonly in use at that time ("Typical AAVM").

Under this Typical AAVM total investment return was divided into two components: "Cash Income" (i.e., bond coupons, stock dividends, etc.) and "Appreciation" (i.e., the difference between the total investment return and Cash Income). Cash Income was then recognized immediately and Appreciation was averaged into the Actuarial Asset Value at a rate of 20% per year.

This Typical AAVM methodology generally works quite well. It does however, for most asset allocations, have a conservative bias in that it produces Actuarial Asset Values that are expected, on average, to lag Market Values.

Illustration of Problems with Typical AAVM

The expected lag of AAV behind Market Value ("MV") for the Typical AAVM may not be the best choice for an "averaging" method but it does reflect the underlying characteristics of the assets being valued. To the extent that any Appreciation is expected, that Appreciation gets averaged into the AAV over time. Since most portfolios are not expected to provide returns from only Cash Income, there is expected Appreciation and, hence, an expectation that AAV will lag MV.

Beyond the issue of the expected lag of AAV behind MV, the Typical AAVM can also produce anomalous results during periods when asset allocations are changing. This problem was illustrated in a somewhat dramatic fashion when two of the five NYCRS who, prior to 1990, were then entirely invested in fixed income securities ("Bonds"), decided to diversify 50% of their assets into equity securities ("Stocks").

Typically, Stocks have greater expected returns that Bonds but provide less expected Cash Income and, during such a diversification process, it is possible for the Actuarial Asset Value to actually be less in a more diversified portfolio than in an undiversified portfolio, even if the diversified portfolio earned more and had a greater Market Value.

This can happen, of course, because Bonds tend to have greater levels of Cash Income than do Stocks and, under the Typical AAVM, all Cash Income is included in AAV but Appreciation is averaged into AAV.

For example, assume that the total expected return is 6% per year for Bonds and 10% per year for Stocks, and that the expected Cash Income components are 6% and 2%, respectively. Then, by deduction, the expected Appreciation component equals 0% for Bonds and 8% for Stocks.

For a 50% Bonds/50% Stocks portfolio, total expected return would be 8%, split equally between Cash Income and Appreciation.

Then, during a year in which earnings and income exactly equal those expected, MV would increase 6% for an all Bonds portfolio, 10% for an all Stocks portfolio and 8% for a 50% Bonds/50% Stocks portfolio.

Under the Typical AAVM, for the first year of averaging, the AAV in this example would increase 6.0% for an all Bond portfolio but only 4.8% (i.e., 4% Cash Income plus 20% of 4% Appreciation) for a 50% Bonds/50% Stocks portfolio.

Taken to a greater extreme, the AAV for the all Stocks portfolio would increase only 3.6% (i.e., 2% Cash Income plus 20% of 8% Appreciation). This consequence of the Typical AAVM had the potential to occur for two of the NYCRS since their asset allocations were adjusted to include more Stocks during Fiscal Years 1991, 1992 and 1993. The resulting impact on the AAV was difficult to explain and, given that asset diversification was done primarily to increase expected returns, difficult to justify.

Consequently, the Typical AAVM was revised effective with the June 30, 1991 actuarial valuations.

Prior AAVM Effective June 30, 1991

Effective with the June 30, 1991 actuarial valuations, the averaging mechanics employed in the Actuarial Asset Valuation Method for the NYCRS was modified to average "Unexpected Return" instead of averaging Appreciation. This methodology will be referred to as the Prior AAVM.

For the NYCRS Unexpected Return ("UR") has been defined as the difference between the total investment return and the expected total investment return ("Expected Return").

Expected Return for a Fiscal Year has been defined as the Actuarial Interest Rate ("AIR") as of the prior June 30 multiplied by the AAV as of that prior June 30 adjusted for cash flow during the Fiscal Year.

Note: although there are significant benefits to defining Expected Return as the AIR multiplied by Market Value instead of AAV, using MV causes future projections of employer contributions to show actuarial gains and/or losses from investments whenever the earnings projected are based on AAV.

Under the Prior AAVM, Unexpected Returns were recognized in the AAV at a uniform rate of 20% per year, or at a cumulative rate of 20%, 40%, 60%, 80% and 100% over a period of five years.

In addition, under the Prior AAVM, the AAV was no longer limited to any corridor (e.g., AAV was not constrained to equal between 80% and 120% of MV).

Modified AAVM Effective June 30, 1996

As one component of an overall review of actuarial assumptions and methods as of June 30, 1995, the Actuary reestablished Actuarial Asset Value to equal Market Value as of that date.

Effective as of June 30, 1996, the averaging mechanics employed in the Prior AAVM were revised to better fit with the environment within which the NYCRS were then and are now continuing to operate. Except for a modest period of phase in as noted hereafter, this Modified AAVM changed the pattern at which Unexpected Returns are recognized over five years.

Specifically, under the Modified AAVM Unexpected Returns are recognized at a rate of 10%, 15%, 20%, 25% and 30% per year, or at a cumulative rate of 10%, 25%, 45%, 70% and 100% over a period five years. Again, AAV calculated under the Modified AAVM is not constrained to any corridor around MV.

Note: Because employers had already adjusted their Fiscal Year 1997 budgets assuming that the Prior AAVM methodology would continue in effect and Fiscal Year 1996 had significant investment gains that were already being anticipated in employer budgets, the UR for Fiscal Year 1996 was scheduled to be phased into the Modified AAVM at a cumulative rate of 20%, 35%, 45%, 70% and 100% over five years.

Reasoning for Modified AAVM—Financial Impact

To understand the impact of investment gains or losses on employer contributions to the NYCRS, consider a "One-Standard Deviation Event" ("OSDE"). As used herein, an OSDE represents the change in the rate of return on investments that would occur if actual returns were one standard deviation from those expected.

Back in 1991, the asset allocation policies of most of the NYCRS were approximately 50% Stocks/50% Bonds. Using reasonable risk/return expectations, a OSDE would occur if the rate of return on the portfolio for one year equaled approximately 10% greater or less than the expected rate of return (e.g., either -2.0% or +18.0% given a hypothetical AIR assumption of 8.0% per annum).

By 1996, with asset allocation policies of 70% Stocks/30% Bonds, a OSDE would result in a rate of return on the portfolio for one year equal to plus or minus approximately 12% of the expected rate of return (e.g., either -4.0% or +20.0% given a hypothetical AIR assumption of 8.0% per annum).

This difference reflects the somewhat greater expected volatility of the portfolios. Note: the increased volatility of the 70% Stocks/30% Bonds portfolios is less than it would have otherwise been but for further diversification of the asset subclasses that were utilized in the 50%/50% portfolios.

Nevertheless, this increased expected volatility, together with the substantial increase in the amount of assets held by the NYCRS, largely due to the extraordinary investment returns of the 1990s, results in the increased likelihood each year that there could be a substantial impact on employer contributions to the NYCRS from either good or poor investment performance.

To illustrate, the following Table I compares the impact of a OSDE based upon the June 30, 1990 and June 30, 1996 assets of the NYCRS and the asset allocation policies generally in effect or adopted in conjunction with the actuarial assumptions and methods effective at those dates.

TABLE I

Impact of a One Standard Deviation Event
on Employer Contributions to the NYCRS
($ Millions)

	As of June 30	
ITEM	1990	1996
MV of Assets	$40,800	$66,100
Percentage Gain/Loss on Account of a One Standard Deviation Event	10%	12%
Dollar Gain/Loss on Account of a One Standard Deviation Event	$ 4,080	$ 7,932
Impact on Employer Contributions • Prior AAVM • Modified AAVM	 $ 82 $ 41	 $ 159 $ 79
Employer Contributions for Following Fiscal Year	$ 1,750	$ 1,470
Impact on Employer Contributions as a Percentage of Employer Contributions • Prior AAVM • Modified AAVM	 4.7% 2.3%	 10.8% 5.4%

As illustrated in Table I, the theoretical impact on Fiscal Year 1997 employer contributions of a hypothetical One Standard Deviation Event under the Modified AAVM as of June 30, 1996 equaled $79 million. This is little different than the impact on Fiscal Year 1991 employer contributions of a hypothetical OSDE under the Prior AAVM as of June 30, 1990 (i.e., $82 million).

As a percentage of employer contributions, a hypothetical OSDE using the Modified AAVM would have represented only a slightly greater percentage impact on Fiscal Year 1997 employer contributions (i.e., 5.4%) than a OSDE using the Prior AAVM would have represented as a percentage of Fiscal Year 1991 employer contributions (i.e., 4.7%).

Of course, by the fourth year following a significant investment gain or loss, the year-to-year resulting change in employer contributions would be greater under the Modified AAVM than under the Prior AAVM (i.e., a phase-in amount of 25% of Unexpected Return during the fourth year under the Modified AAVM versus 20% under the Prior AAVM).

Overall, however, relative to the Prior AAVM and cumulative phase-in schedule of 20%, 40%, 60%, 80% and 100% over five years, the Modified AAVM with its cumulative phase-in schedule of 10%, 25%, 45%, 70% and 100% over five years delays the impact of investment gains and losses. In particular, if an investment loss has occurred, the Modified AAVM provides employers with more time to react and prepare for the consequent increases in their contributions.

Brief Overview of Market Value Restarts

As noted earlier, during the past nine years there have been three Market Value Restarts under the AAVM used for the NYCRS.

The June 30, 1991 MVR was motivated by the need for employer budget relief but was undertaken in an economic environment that was still fully consistent with that in effect as of the most recent review of the economic actuarial assumptions (i.e., June 30, 1990).

The June 30, 1995 MVR and the June 30, 1999 MVR were undertaken in conjunction with overall reviews of actuarial assumptions and methods and were designed to reestablish consistency between the asset and liability sides of the actuarial balance sheets.

Although the author believes each of these MVRs was fully justified on its own merits under the specific economic conditions then existing, he is also fully cognizant of the fact that MV was always greater than AAV when a MVR was undertaken.

The author also acknowledges that the popularity of a MVR seems to be highly correlated with the amount of budgetary relief that a MVR would create and with the budgetary needs that exist.

General Observations, Comments and Summary

It is generally agreed that one of the primary purposes of an Actuarial Asset Valuation Method is to reduce the impact of short-term fluctuations in the value of assets used for actuarial valuation purposes. By doing so, it is possible to reduce the volatility of employer pension contributions.

In recent years the assets of the NYCRS have grown significantly and the portfolios have been diversified. More assets, subject to greater expected fluctuations in value, suggested that the AAVM be reviewed to see if it was still doing the job for which it was intended.

Those reviews led to changes in the AAVM for the NYCRS.

In 1991 the changes avoided having increased rates of return on a Market Value basis create lesser rates of return on an Actuarial Asset Value basis.

In 1996 the changes reduced the short-term impact of unexpected investment gains and losses.

Table II at the end of this article presents the formulas used to calculate Actuarial Asset Values used in the actuarial valuations of the NYCRS from June 30, 1988 to June 30, 2000 and those that are expected to be used for June 30, 2001 to June 30, 2003.

The author believes that the evolution of the averaging mechanics in the AAVM used by the NYCRS from the Typical AAVM to the Prior AAVM to the Modified AAVM has improved the ability of employers participating in the NYCRS to respond to adverse investment markets and has reduced the potential demands for other changes in actuarial assumptions and methods that could have longer-term, more damaging impacts on funding.

Of course, only a bear market, unseen in the 1990's, will test the robustness of the Modified AAVM to achieve it objectives.

TABLE II

Formulas Used to Calculate Actuarial Asset Values

$$AAV_{6/30/88} = MV_{6/30/88} - .80*A_{FY88} - .60*A_{FY87} - .40*A_{FY86} - .20*A_{FY85}$$

$$AAV_{6/30/89} = MV_{6/30/89} - .80*A_{FY89} - .60*A_{FY88} - .40*A_{FY87} - .20*A_{FY86}$$

$$AAV_{6/30/90} = MV_{6/30/90} - .80*A_{FY90} - .60*A_{FY89} - .40*A_{FY88} - .20*A_{FY87}$$

$$AAV_{6/30/91} = MV_{6/30/91}$$

$$AAV_{6/30/92} = MV_{6/30/92} - .80*UR_{FY92}$$

$$AAV_{6/30/93} = MV_{6/30/93} - .80*UR_{FY93} - .60*UR_{FY92}$$

$$AAV_{6/30/94} = MV_{6/30/94} - .80*UR_{FY94} - .60*UR_{FY93} - .40*UR_{FY92}$$

$$AAV_{6/30/95} = MV_{6/30/95}$$

$$AAV_{6/30/96} = MV_{6/30/96} - .80\#*UR_{FY96}$$

$$AAV_{6/30/97} = MV_{6/30/97} - .90*UR_{FY97} - .65\#*UR_{FY96}$$

$$AAV_{6/30/98} = MV_{6/30/98} - .90*UR_{FY98} - .75*UR_{FY97} - .55*UR_{FY96}$$

$$AAV_{6/30/99} = MV_{6/30/99}$$

$$AAV_{6/30/00} = MV_{6/30/00} - .90*UR_{FY00}$$

$$AAV_{6/30/01} = MV_{6/30/01} - .90*UR_{FY01} - .75*UR_{FY00}$$

$$AAV_{6/30/02} = MV_{6/30/02} - .90*UR_{FY02} - .75*UR_{FY01} - .55*UR_{FY00}$$

$$AAV_{6/30/03} = MV_{6/30/03} - .90*UR_{FY03} - .75*UR_{FY02} - .55*UR_{FY01} - .30*UR_{FY00}$$

Reflects phase in of Fiscal Year 1996 Unexpected Return.

$AAV_{6/30/xx}$ = Actuarial Asset Value as of June 30, xx (19xx or 20xx).

$MV_{6/30/xx}$ = Market Value as of June 30, xx.

A_{FYxx} = Appreciation for Fiscal Year xx. Equals Total Return for Fiscal Year xx minus Cash Income for Fiscal Year xx.

CF_{FYxx} = Cash Flow for Fiscal Year xx. Equals total contributions minus disbursements for Fiscal Year xx.

UR_{FYxx} = Unexpected Return for Fiscal Year xx. Equals Total Return for Fiscal Year xx minus Expected Return for Fiscal Year xx.

Expected Total Return for Fiscal Year xx: Equals $(AAV_{6/30/xx-1}) + .5*CF_{FYxx})$ times AIR_{FYxx}.

BLANK

PAPER

PROCEDURE FOR PREPARING ARTICLES FOR THE PENSION FORUM

Pension Section News is intended as a medium for the timely exchange of ideas and information of interest to pension actuaries. *The Pension Forum* is for the publication of full papers and is issued on an ad hoc basis by the Pension Section.

All articles will include a by-line (name, with title and employer, if you wish) to give you full credit for your effort. *The Pension Forum* is pleased to publish articles in a second language if a translation is provided by the author.

So that we can efficiently handle articles and papers, please use the following format when submitting articles and papers to either *Pension Section News* or the *Pension Forum.*

Mail articles on diskette using either ASCII or Microsoft Word files, or send scannable copy, i.e, typed copy that is single-spaced with 72-character lines. Headlines are typed upper and lower case. Carriage returns are put in only at the end of paragraphs. The right-hand margin is not justified.

If this is not clear or you must submit in another manner, please call Joe Adduci (847-706-3548) at the Society of Actuaries for help.

Please send a copy of article (hard copy only) to:

Daniel M. Arnold, FSA
Hooker & Holcombe, Inc.
65 LaSalle Road
West Hartford, CT 06107
Phone: (860) 521-8400
Fax: (860) 521-3742
E-mail: *darnold@hhconsultants.com*

Please send original hard copy and diskette to:

Joseph B. Adduci
Integrated Communications
Society of Actuaries
475 N. Martingale Road, Suite 800
Schaumburg, IL 60173-2226
Phone: (847) 706-3548
Fax: (847) 273-8548
E-mail: *jadduci@soa.org*

INSIDE

BACK

COVER

(blank)

BACK

COVER

(blank)