

Pension Plan Turnover Database Construction

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Abstract

Employee termination and retirement rates affect the valuation of employee benefit plans and thus are of concern to actuaries. To provide timely experience for the profession, the Society of Actuaries Pension Plan Turnover and Retirement Rates Committee organized a data collection effort. Thirty-two contributors provided almost 1.8 million life years of pension plan turnover data for years 1994-2000.

This report documents the data assembly and verification procedures used in collecting the data. As a consequence of this documentation, we are able to make several recommendations regarding future data collection efforts.

The data are described in detail. The descriptions include an analysis of turnover by plan characteristics, such as plan industry and benefit formula, and by individual record characteristics, such as age and service. These descriptions are meant to familiarize readers with the nature of the data and are not to be used directly in valuation of pension plans. A subsequent report will address our recommendations for using this turnover information in plan valuations.

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Section 1. Introduction

Background

Employee termination and retirement rates significantly affect employee benefits costs for pension and retiree medical plans. In response to the need of practitioners in this area, the Society of Actuaries (SoA) sponsored a research project to calculate and publish statistics on termination and retirement rates of pension plan participants, based on recent experience.

The SoA asked pension consulting firms and insurers to contribute data for this project. These firms were asked to submit beginning and end of year census data for active participants for five or more plans for five recent years.

Purpose

The SoA requested researchers to design a database suitable for constructing employee termination and retirement tables from the contributed data received, while protecting its confidentiality.

The project was awarded to the Actuarial Science, Risk Management and Insurance Department of the School of Business at the University of Wisconsin at Madison in April of 2001. Most contributors submitted data in April, May, and June of that year. More data were submitted throughout the year of 2001 and into the year of 2002.

Objective

Following are the objectives that the SoA identified for the project:

- Design the database structure
- Reformat contributed data arriving in a variety of formats on a variety of media into a standardized format
- Verify the reasonableness of each contributed dataset, and contact each data contributor to resolve any discrepancies
- Using plan summaries, assign a “type of exposure” code for each participant such as “eligible to retire with full benefits,” “eligible to retire with reduced benefits,” or “not eligible to retire”
- Devise a method for encrypting the identity of the contributing pension consulting firms and insurers. It was necessary for the researchers to contact original data sources in order to respond to questions that may arise when the SoA reviews the database. However, it was imperative that the original data source for any data element not be identifiable by anyone other than the researcher.
- Populate the database with the contributed data
- Produce a summary report, describing the volume and distribution of the data in the database and the structure of the database. Include such information as the number of contributing plan sponsors and exposure of life years, completed years of service, attained age, gender, accrued pension benefit, benefit formula, form of pension payment, industry benefit structure, region and population size.

Confidentiality and Data Security

We realized that it would be absolutely essential for us to be able to trace data back to contributors and to have access to those contributors, in order to investigate anomalies in their data sets and resolve discrepancies. At the same time, we understood the importance of maintaining confidentiality throughout both the exchange of information and manipulation of the data. To that end, several measures were taken to secure the privacy of all contributors and to prevent their data from being publicly exposed.

Only miniature data sets, carved out of contributors' larger data sets, were sent electronically over our network. The data were imported, checked, and analyzed on a PC devoted to the project, where the statistical package used to analyze the data was installed locally. In order to maximize data security, data were transferred using zip disks and/or writeable CDs. Plan identification was encrypted using random numbers. All data sets, along with the complete database, were given password protection and were backed-up and routinely checked.

Section 2. Data Provided

2.1 Contributor Data

In response to the Society of Actuaries request for data for the Pension Plan Turnover Study, 32 contributors submitted data. However, not all contributors submitted data for five or more plans for five recent years. For example, out of a combined 115 plans, 93 of those plans had data for five recent years. Following are three specific requests made by the SoA, along with how contributors and their data responded to those requests.

The SoA requested three preferred file types—Excel, Lotus, and ASCII. As seen in Table 2.1, all 115 plans contributed were submitted in either Excel or ASCII.

	EXCEL	ASCII (Text)
By Number Of Plans	60	55
Percentage of Total Plans	52.2	47.8
Percentage Of Total Life Years	49.3	50.7

The SoA requested three preferred mediums—Diskette, CD, or Encrypted email attachment. All contributors used at least one of the three preferred mediums.

And, lastly, the SoA requested a preferred data format (see **Appendix I**). All contributors used either the preferred format or a mapping to assist researchers with converting the data to the preferred format. One contributor's mapping proved challenging and it set the stage for the development of a multi-year check (see **Section 3.2** for more details).

2.2 Database Structure

The primary database structure was designed using the array style format in the Statistical Analysis System (SAS). SAS is a statistical software package that is widely used for analyzing data. This array style format resembles closely the spreadsheet format of MS Excel.

Prior to starting integrity checks and before employee records were transferred to our temporary database, we reformatted all contributor data sets into a standardized format (see **Appendix I**). Both Excel and ASCII files were converted into a SAS data set. The reformatting process was accomplished using both Excel data formatting procedures and the *Import* command in SAS, along with length, format, and informat statements in the SAS editor.

For contributors who left their data files unrestricted or general (i.e., no security or locking and no formatting or reference restrictions), importing their data files into SAS was straightforward and required very little time. However, for contributors who placed restrictions on their data files, more time was needed to modify the original data files before importing them into SAS. According to the particulars of each digression, the time consumed fluctuated significantly.

After each contributor data set was changed to a uniform format, we stored the data sets into a temporary database and performed numerous integrity checks on each one. We then contacted each contributor to report data anomalies found in that contributor's data set. Contributors were quite tolerant and assisted us with curing those incongruities. After reconciling each data set, we placed the data sets in our primary database.

The primary database can be thought of as a subdivision of a spreadsheet file used in Access. The characteristics of an employee are represented by a record that consists of a single row and fifteen columns—with each column corresponding to a descriptive variable name such as “gender”, “date of birth” and the like. In many instances, employees have five rows or five records that correspond to each year in the plan. For those employees, the portion of their information that does not vary over time was repeated in each of the five rows.

For employees who participated in the plan more than one year, some information, such as the beginning and end of year status, as well as the date of termination, may have changed from one year to the next. There were certain restrictions imposed on each record before it was transferred to the primary database and those constraints will be discussed to a great extent in **Section 3**.

Plan design elements were not explicitly incorporated into the primary database. However, they were incorporated in a separate Excel spreadsheet (which can be easily imported into SAS). For Phase II, the primary database will be merged with the appropriate elements of the plan design spreadsheet to assess the importance of those variables.

The completed primary database represents the combined information from 115 pension plans, with 93 of those plans containing five years of experience data, and the remaining 22 plans containing four or fewer years of experience data. Applying the integrity checks described in Sections 3 and 4, the combined experience of approximately 2,181,000 life years of experience was reduced 19% to 1,768,312 for use.

Section 3. Initial Data Verification

The first set of data checks applied include those specified in Appendix I, that are also discussed in Section 3.1. We also include the Section 3.2 “multi-year” checks as part of our initial data verification process. Section 4 then describes a second set of data checks; these data checks were motivated by some data inconsistencies that arose as part of the analysis of the data.

3.1 Individual Record Checks

The integrity checks that were requested by the SoA are listed below, using bullets:

- Confirm that there are no blanks in the sex field
- Confirm that the dates of birth are such that attained age is greater than or equal to 15 and less than 80. The years of birth should be before 1985 and after 1915
- Confirm that the dates of hire are such that age at hire is greater than or equal to 15 and less than 70
- Confirm no annual salaries are beyond reasonable minimums and maximums for the pension plan in question. In general, we don’t expect to see the rate of annual pay to be under \$10,000 and we expect to see very few rates of annual pay over \$200,000
- Confirm that there are no blanks in the status indicator field
- Confirm that the date of exit is no more than twelve months prior to the plan year-end
- Confirm that there is a date of exit (if readily available) and a condition of exit for every data record with an end of year status indicator of other than “A”

Additionally, using the six steps listed below, we performed a more extensive inspection on each record to test whether or not a record would be placed in the primary database and, also, to ensure that each record met certain criteria.

Step 1: Failure to include a beginning of year status indicator (**boy**) or an end of year status indicator (**eoy**) was a “fatal” error for a record. If a contributor could not provide this information or we were not able to deduce it from a prior or subsequent year, then the record was no longer viable for the project and was discarded. Hence all records were removed from the temporary database where **boy** was blank or **eoy** was blank or both and there was no way to recover the information. We note, however, that we were successful in recovering most, if not all blank status indicators when prior or subsequent year data were provided.

In a few of the above scenarios (i.e., two consecutive years were missing), contributors stated that the status indicators could not be recovered. For example, the crisis from September 11, 2001, where some contributors lost data files, was one of the reasons a few contributors gave for not being able to recover their data. Also, a small number of contributors stated that it would be too expensive to recover their data.

Step 2: Records were eliminated from the temporary database where the employee’s beginning of year status was inactive (**boy=I**) and that employee’s end of year status was different than active (**eoy not A**). However, if an employee’s **boy=I** and that employee’s **eoy=A**, the record

was not discarded. The database was organized in such a way that an employee's status could be tracked throughout the number of plan years.

Step 3: To maintain consistency throughout the record inspection phase, each contributor was contacted to make certain the record being inspected matched the original record submitted by that contributor. For example, if the attained age of an employee was less than 15, our integrity check program flagged that result as an "error." We then contacted the contributor of that plan to verify the accuracy of our finding and, when appropriate, to fix the record.

Step 4: Logical conditions parallel to those requested by the SoA were checked, as well, to verify the reasonableness of each record in the data set. For example, one integrity check determined whether or not there was a concentration of salaries exceeding \$200,000. However, contributors were asked also whether or not it was reasonable for one or more of their employees in his or her twenties to earn \$500,000 a year.

Similarly, contributors were questioned about salaries less than \$10,000. From this question, some contributors reported that several of their employees earning less than \$10,000 were retirees who returned to the industry and worked up to 83 ½ hours per month. We retained such data as it accurately reflects an employment situation.

Step 5: Many other aspects of a record were investigated. We controlled the data, using a variety of statistical tools from SAS, which allowed us to perform different levels of integrity checks on each record. Many of those tools were used to check for the "reasonableness" of the data. For example, the data were explored using **PROC MEANS** to compute descriptive statistics, **PROC FREQ** to create frequency tables, and **PROC UNIVARIATE** to identify unusual observations.

Step 6: The primary database was populated with records that, for the most part, met all integrity checks requested by the SoA and endured the inspection of our six-step procedure. For example, the primary database consists, almost exclusively, of data where an employee's date of birth shows that he or she had attained an age greater than or equal to 15 and less than 80. Also, that employee's age at hire was greater than or equal to 15 and less than 70. However, we call attention to the fact that not all employees were expected to meet the age restrictions, since some employees, after retiring, returned to the job market to work part time.

3.2 Multiple Year Checks

Motivated by the data format used by one contributor, which had a large number of life years in the data set, a multi-year check was developed. This contributor provided only a current year status indicator unlike the other contributors who provided both a **boy** and **eoy** status indicator. From the documentation provided by the contributor, the reason for this file format was that the data were to be used for valuation purposes.

As described in Section 3.1, we used both the **boy** and **eoy** status indicators to separate those records into active or inactive employees. If an employee was active at the end of the first year (i.e., **eoy=A**) and not active at the beginning of the second year (i.e., **boy not A**), then a flag was turned on to indicate that the employee had terminated.

However, for this special contributor, a typical turnover from one year to the next was determined by matching the years. That is, we needed to generate **eo**y and **bo**y indicators for this contributor by matching records over years.

Subsequently, after developing the ability to match records over multiple years, a multi-year check on all of the files was performed. For example, if an employee was active at the end of the year, then that employee was expected to be active at the beginning of the following year. The multi-year check was used to verify whether or not that anticipated consequence occurred.

Using this particular check, a critical error made by one contributor was discovered. That contributor, when faced with potential terminations towards the end of plan years, did not update the record when subsequent information was made available.

For example, consider the active employee who becomes disabled one month prior to the end of the plan year. The employee's status is unknown at the end of plan year so the contributor records an "A" for active (that is, no status change). The employee officially terminates one month after the next plan year. However, the status for the following plan year begins with inactive and ends with a termination (or some other ending status).

In order to include this termination in the database, the multiple year history of this employee was checked and the last year record updated, and thus corrected.

Also, during the multi-year check, it was discovered that another contributor, in an effort to assist the researchers with possible future endeavors, submitted a large number of records (approximately 146,000) where employees had retired or died.

Those inactive records, along with another estimated 122,400 records that were eliminated as a result of **Step 1** and **Step 2** (see **Section 3.1**), account for the difference between the total number of records that were entered into our temporary database and the total number of records that survived all integrity checks and record inspections.

Section 4. Additional Data Verification

This section describes six types of problems with the data and steps needed to address them. Specifically:

<u>Section</u>	<u>Records Deleted</u>	
4.1	12,312	Problems in either age or service
4.2	124,526	Plan eligibility difficulties
4.3	2,248	Data conversion difficulties
	5,131	Records that could cause bias in the analysis which were recorded inactive at the beginning of the year and active at year end
4.4	-0-	Summarizes handling of “young retirees”
4.5	-0-	Summarizes handling of “older terminations”
4.6	-0-	Significant events affecting each plan
--	3	Records with beginning of year status equal to death

Total	144,220	

The reduction of 412,688 records from 2,181,000 to 1,768,312 reflects 144,220 enumerated above 122,400 records in Steps 1 and 2 of Section 3.1 and 146,068 of one contributor with a large number of employee records showing retirement and death (discussed in next to last paragraph on page 6).

Three additional records were deleted because they had a beginning of year status equal to “death.” Moreover, during the course of our investigation, we discovered that we inadvertently added 2,183 records (year 2000 records from random plan id 615) that contained incomplete information. These records were also deleted from the database.

In summary, after this data verification, there are 1,768,791 life years of exposure available for analysis.

4.1. Problems in Either Age or Service

There were 12,312 records with problems in age, service or both. For age, these were records with the date of birth missing or age is less than 18 or age exceeding 70. For service, these are records with date of hire missing or service less than zero. These records are not considered in subsequent analyses. Table 4.1.1 shows the clustering by plan. Here, 26 of the plans accounted for 12,019 of these records, with an additional 52 plans that have fewer than 20 records. We do not consider this to be a source of bias in our estimation procedures.

Number of Life Years	Age			Service		Problems with both age and Service
	Missing	<18	>70	Missing	<0	
4880	0	0	0	4878	2	0
1909	0	6	162	0	1743	2
1748	959	272	517	0	0	0
1292	0	0	1292	0	0	0
795	8	359	436	0	0	0
209	0	0	209	0	0	0
131	0	28	27	80	0	4
126	0	0	126	0	0	0
119	0	0	118	0	1	0
92	0	53	39	0	0	0
87	0	73	14	0	0	0
85	0	10	75	0	0	0
64	0	0	64	0	0	0
57	0	0	57	0	0	0
55	0	15	40	0	0	0
52	0	40	12	0	0	0
47	0	21	26	0	0	0
42	14	3	25	0	0	0
41	0	0	41	0	0	0
37	0	12	25	0	0	0
31	3	2	26	3	0	3
27	0	16	11	0	0	0
25	0	7	5	0	13	0
24	0	0	24	0	0	0
22	0	1	20	0	1	0
22	0	0	22	0	0	0
Totals for 78 plans						
12,312	986	935	3,671	4,963	1,768	11

Note: This table gives plans with more than 20 problems. There are an additional 52 plans with fewer than 20 problems.

4.2. Plan Eligibility Difficulties

Most data contributed were originally collected primarily for the purposes of pension plan valuation. Among other things, this induces specific biases for turnover rates for individuals with low years of service. Specifically, valuation systems do not include individuals that are not eligible for participation in the pension plan. Thus, it is difficult to assess the turnover rates for people with low service years because records are usually not maintained for employees who terminate prior to completing the age and service requirement for participation in the pension plan.

For example, consider a pension plan with a year-end date of 31 December 2000 and a one-year eligibility requirement as well as an individual who began work on 1 July 1999.

- If the individual terminates employment before 1 July 2000, then the person is never in the pension plan and, in general, databases do not record the termination. This means that our first year estimates are biased downward, in that we are not counting as many terminations as we should. We note, however, that some data providers do provide information about these terminations.
- If the individual terminates employment at 1 September 2000, then this person was in the plan at the time of termination. Because this worker did participate in the plan, some databases count the person as a termination by year-end. However, other databases will not, as the person was not in the plan as of the prior year's (31 December 1999) valuation and will have no future benefits for the current year (31 December 2000) valuation. (It may also depend on whether this person has any vested benefits. Most plans in our study required five years for full vesting but provided for immediate eligibility.) Again, there is the possibility that our estimates are biased; without this record, first year service termination estimates are higher than they otherwise would be, whereas second year service termination estimates are lower.
- If the individual does not terminate employment by 31 December 2000, then we always see the person. This means that estimators for completed years of service for 0 and beyond will be unbiased.

The difficulty is two-fold. To provide reliable estimates of turnover at the low service years, one needs to know the plan eligibility requirements. Moreover, one needs to understand the convention that the data provider uses for handling terminations in the early years.

Tables 4.2.1 and 4.2.2 document the extent of this difficulty. Here, we report data from 37 plans representing 124,526 life years of exposure. Table 4.2.1 shows that 58,206 life years have no terminations at all in this cell; this is clearly a problem. Moreover, when examining the trend for each plan such as in Table 4.2.2, the percentage of terminations was clearly skewed by reporting conventions. Note that Tables 4.2.1 and 4.2.2 represent the same information, just sorted differently.

Specifically, we examined experience on a plan-by-plan basis. That is, we looked at turnover rates for each year of completed year of service (new hire to 0 through 5, inclusive), by plan. Then, we examined trend rates within a plan.

Here is the strategy used to mitigate this problem. If the termination rates for early service years were not in alignment with later years, then the record was eliminated. For example, we eliminated records from many plans with new hires where the termination rate was zero. These plans obviously only kept individuals that stayed in the plan and did not keep those that terminated.

In future years, we recommend that the committee collect plan eligibility information. Moreover, the convention for including early service terminations should be documented by each data provider.

**Table 4.2.1. Records to be Deleted Due to Plan Eligibility Difficulties
– Sorted by Termination Rate**

Random Plan ID	Completed Years of Service	ACTIVE	RETIRED	DISABLED	OTHER	DEATH	TERM	TOTAL	
291	0	100.0	0.0	0.0	0.0	0.0	0.0	20,460	
393	new hire	100.0	0.0	0.0	0.0	0.0	0.0	15,389	
255	1	100.0	0.0	0.0	0.0	0.0	0.0	5,682	
57	0	100.0	0.0	0.0	0.0	0.0	0.0	2,948	
381	new hire	99.6	0.0	0.4	0.0	0.0	0.0	2,286	
237	0	100.0	0.0	0.0	0.0	0.0	0.0	2,067	
423	new hire	100.0	0.0	0.0	0.0	0.0	0.0	1,496	
627	new hire	100.0	0.0	0.0	0.0	0.0	0.0	1,382	
273	0	100.0	0.0	0.0	0.0	0.0	0.0	1,212	
387	new hire	100.0	0.0	0.0	0.0	0.0	0.0	1,207	
171	new hire	99.6	0.0	0.0	0.4	0.0	0.0	809	
171	0	99.4	0.0	0.0	0.6	0.0	0.0	497	
171	1	98.5	0.0	0.0	1.5	0.0	0.0	330	
669	0	99.1	0.0	0.3	0.6	0.0	0.0	320	
681	0	100.0	0.0	0.0	0.0	0.0	0.0	288	
609	new hire	100.0	0.0	0.0	0.0	0.0	0.0	237	
399	0	100.0	0.0	0.0	0.0	0.0	0.0	233	
657	0	100.0	0.0	0.0	0.0	0.0	0.0	212	
207	0	100.0	0.0	0.0	0.0	0.0	0.0	204	
639	0	100.0	0.0	0.0	0.0	0.0	0.0	185	
405	0	100.0	0.0	0.0	0.0	0.0	0.0	145	
645	0	100.0	0.0	0.0	0.0	0.0	0.0	138	
633	new hire	100.0	0.0	0.0	0.0	0.0	0.0	123	
255	0	100.0	0.0	0.0	0.0	0.0	0.0	95	
693	new hire	100.0	0.0	0.0	0.0	0.0	0.0	92	
621	new hire	100.0	0.0	0.0	0.0	0.0	0.0	69	
429	0	100.0	0.0	0.0	0.0	0.0	0.0	41	
651	new hire	100.0	0.0	0.0	0.0	0.0	0.0	28	
399	new hire	100.0	0.0	0.0	0.0	0.0	0.0	9	
645	new hire	100.0	0.0	0.0	0.0	0.0	0.0	7	
57	new hire	100.0	0.0	0.0	0.0	0.0	0.0	6	
657	new hire	100.0	0.0	0.0	0.0	0.0	0.0	3	
615	new hire	100.0	0.0	0.0	0.0	0.0	0.0	2	
681	new hire	100.0	0.0	0.0	0.0	0.0	0.0	1	
639	new hire	100.0	0.0	0.0	0.0	0.0	0.0	1	
429	new hire	100.0	0.0	0.0	0.0	0.0	0.0	1	Subtotal
207	new hire	100.0	0.0	0.0	0.0	0.0	0.0	1	58,206
687	new hire	99.8	0.0	0.0	0.0	0.0	0.2	577	
279	0	99.8	0.0	0.0	0.0	0.0	0.2	1,532	
375	new hire	99.4	0.0	0.1	0.0	0.1	0.3	2,009	
159	new hire	99.7	0.0	0.0	0.0	0.0	0.3	995	
231	0	99.5	0.0	0.0	0.0	0.0	0.5	3,233	
285	0	99.4	0.0	0.0	0.0	0.0	0.6	180	
417	new hire	99.3	0.0	0.0	0.0	0.0	0.7	152	
213	new hire	99.0	0.2	0.0	0.0	0.0	0.8	497	
687	0	98.7	0.0	0.0	0.0	0.0	1.3	5,998	
663	0	98.6	0.0	0.0	0.0	0.0	1.4	591	
147	0	98.6	0.0	0.0	0.0	0.0	1.4	295	
243	0	98.5	0.0	0.0	0.0	0.0	1.4	32,918	
309	new hire	98.4	0.0	0.0	0.0	0.0	1.6	633	

177	new hire	98.1	0.0	0.0	0.0	0.0	1.9	619	
339	0	96.5	0.0	0.0	0.6	0.0	3.0	542	
663	new hire	96.7	0.0	0.0	0.0	0.0	3.3	30	
177	0	96.3	0.0	0.0	0.0	0.0	3.7	3,817	
339	new hire	93.5	0.0	0.0	2.2	0.0	4.3	93	
675	new hire	94.8	0.0	0.0	0.0	0.0	5.2	965	
21	new hire	93.2	0.0	0.0	0.0	0.0	6.8	2,294	
297	new hire	93.1	0.0	0.0	0.0	0.0	6.9	2,375	
615	0	91.0	0.0	0.0	0.0	0.0	8.99	267	
147	new hire	87.5	0.0	0.0	0.0	0.0	12.5	8	
231	new hire	65.3	12.7	0.0	0.0	0.0	22.0	118	
243	new hire	63.3	0.0	0.0	0.0	0.0	36.7	2,264	
249	new hire	7.3	0.1	0.0	16.0	0.0	76.7	3,316	
273	new hire	0.0	0.0	0.0	0.0	0.0	100.0	1	Total
237	new hire	0.0	0.0	0.0	0.0	0.0	100.0	1	124,526

**Table 4.2.2. Records to be Deleted Due to Plan Eligibility Difficulties
– Sorted by Random Plan ID**

Random Plan ID	Completed Years of Service	ACTIVE	RETIRED	DISABLED	OTHER	DEATH	TERM	TOTAL
21	new hire	93.2	0.0	0.0	0.0	0.0	6.8	2,294
57	0	100.0	0.0	0.0	0.0	0.0	0.0	2,948
57	new hire	100.0	0.0	0.0	0.0	0.0	0.0	6
147	0	98.6	0.0	0.0	0.0	0.0	1.4	295
147	new hire	87.5	0.0	0.0	0.0	0.0	12.5	8
159	new hire	99.7	0.0	0.0	0.0	0.0	0.3	995
171	new hire	99.6	0.0	0.0	0.4	0.0	0.0	809
171	0	99.4	0.0	0.0	0.6	0.0	0.0	497
171	1	98.5	0.0	0.0	1.5	0.0	0.0	330
177	0	96.3	0.0	0.0	0.0	0.0	3.7	3,817
177	new hire	98.1	0.0	0.0	0.0	0.0	1.9	619
207	0	100.0	0.0	0.0	0.0	0.0	0.0	204
207	new hire	100.0	0.0	0.0	0.0	0.0	0.0	1
213	new hire	99.0	0.2	0.0	0.0	0.0	0.8	497
231	0	99.5	0.0	0.0	0.0	0.0	0.5	3,233
231	new hire	65.3	12.7	0.0	0.0	0.0	22.0	118
237	0	100.0	0.0	0.0	0.0	0.0	0.0	2,067
237	new hire	0.0	0.0	0.0	0.0	0.0	100.0	1
243	0	98.5	0.0	0.0	0.0	0.0	1.4	32,918
243	new hire	63.3	0.0	0.0	0.0	0.0	36.7	2,264
249	new hire	7.3	0.1	0.0	16.0	0.0	76.7	3,316
255	1	100.0	0.0	0.0	0.0	0.0	0.0	5,682
255	0	100.0	0.0	0.0	0.0	0.0	0.0	95
273	0	100.0	0.0	0.0	0.0	0.0	0.0	1,212
273	new hire	0.0	0.0	0.0	0.0	0.0	100.0	1
279	0	99.8	0.0	0.0	0.0	0.0	0.2	1,532
285	0	99.4	0.0	0.0	0.0	0.0	0.6	180
291	0	100.0	0.0	0.0	0.0	0.0	0.0	20,460
297	new hire	93.1	0.0	0.0	0.0	0.0	6.9	2,375
309	new hire	98.4	0.0	0.0	0.0	0.0	1.6	633

339	0	96.5	0.0	0.0	0.6	0.0	3.0	542
339	new hire	93.5	0.0	0.0	2.2	0.0	4.3	93
375	new hire	99.4	0.0	0.1	0.0	0.1	0.3	2,009
381	new hire	99.6	0.0	0.4	0.0	0.0	0.0	2,286
387	new hire	100.0	0.0	0.0	0.0	0.0	0.0	1,207
393	new hire	100.0	0.0	0.0	0.0	0.0	0.0	15,389
399	0	100.0	0.0	0.0	0.0	0.0	0.0	233
399	new hire	100.0	0.0	0.0	0.0	0.0	0.0	9
405	0	100.0	0.0	0.0	0.0	0.0	0.0	145
417	new hire	99.3	0.0	0.0	0.0	0.0	0.7	152
423	new hire	100.0	0.0	0.0	0.0	0.0	0.0	1,496
429	0	100.0	0.0	0.0	0.0	0.0	0.0	41
429	new hire	100.0	0.0	0.0	0.0	0.0	0.0	1
609	new hire	100.0	0.0	0.0	0.0	0.0	0.0	237
615	0	91.0	0.0	0.0	0.0	0.0	9.0	267
615	new hire	100.0	0.0	0.0	0.0	0.0	0.0	2
621	new hire	100.0	0.0	0.0	0.0	0.0	0.0	69
627	new hire	100.0	0.0	0.0	0.0	0.0	0.0	1,382
633	new hire	100.0	0.0	0.0	0.0	0.0	0.0	123
639	0	100.0	0.0	0.0	0.0	0.0	0.0	185
639	new hire	100.0	0.0	0.0	0.0	0.0	0.0	1
645	0	100.0	0.0	0.0	0.0	0.0	0.0	138
645	new hire	100.0	0.0	0.0	0.0	0.0	0.0	7
651	new hire	100.0	0.0	0.0	0.0	0.0	0.0	28
657	0	100.0	0.0	0.0	0.0	0.0	0.0	212
657	new hire	100.0	0.0	0.0	0.0	0.0	0.0	3
663	0	98.6	0.0	0.0	0.0	0.0	1.4	591
663	new hire	96.7	0.0	0.0	0.0	0.0	3.3	30
669	0	99.1	0.0	0.3	0.6	0.0	0.0	320
675	new hire	94.8	0.0	0.0	0.0	0.0	5.2	965
681	0	100.0	0.0	0.0	0.0	0.0	0.0	288
681	new hire	100.0	0.0	0.0	0.0	0.0	0.0	1
687	0	98.7	0.0	0.0	0.0	0.0	1.3	5,998
687	new hire	99.8	0.0	0.0	0.0	0.0	0.2	577
693	new hire	100.0	0.0	0.0	0.0	0.0	0.0	92
Total		95.9	0.0	0.0	0.4	0.0	3.7	124,526

4.3. Beginning of Year Status equals “I”

The committee asked the question as to why so many people (12,357) were coded as disabled at the beginning of the year yet were active at the end of the year. As it turned out, the answer to the question was simple – for beginning of year status, the “I” code is interpreted to mean inactive at the beginning of the year (whereas the “I” code for end of year status means disabled). Thus, we simply mislabeled this table.

However, before realizing this, we investigated the source of this difficulty by examining plans that had most of the “I” at the beginning of the year records. In the course of our investigation, we discovered some coding errors for six large plans from a single contributor. This contributor provided pension valuation records – that is, the status of an employee at valuation date was provided. From this, we had to write some fairly sophisticated SAS code in order to assign a

beginning of year and end of year status for each record (the principle is straightforward but the coding difficulties were substantial).

In any event, when we corrected the code another 2,294 records were omitted from the database.

Moreover, there were 5,131 records that were “inactive” at the beginning of the year although active at the end of the year. These were also deleted. Here, inactive records include retirees, on leave, vested and non-vested terminations.

4.4. Young Retirees

The concept of “retiring” from the labor force has become vague; many workers ease into retirement through phased retirement plans, others “retire” at ages of 50 and younger only to work in other jobs, and so forth. Table 4.4.1 summarizes 127 young retirees from 21 plans; here, we define “young” to mean age nearest birthday at the beginning of the plan year less than 50. Each row corresponds to a plan; information includes the number of retirees, the minimum and maximum ages, earliest age/service requirements for the plan as well as the plan benefit structure and type.

For most of these young retirees, we changed the end of year status from retirement to vested termination. The exceptions were:

- For the second plan listed with 19 retirees at age 49 and earliest retirement age of 50, we used plan contributor coding.
- For the fourth, ninth and seventeenth plans listed, we checked to see that the years of service requirement was met.

Table 4.4.1. Records with end of year retirement status and age less than 50

#	Number of Retirees	Minimum Age	Maximum Age	Earliest Age/Service For Any Early Retirement	Benefit Structure	Type
1	55	24	49	55/10	stand-alone db	final average pay
2	19	49	49	50/10	defined benefit/dc	final average pay
3	16	40	49	55/5	defined benefit/nsop	final average pay
4	12	41	49	55 or 30yrs svc	stand-alone db	flat dollar
5	3	46	49	55/10	not reported	cash balance
6	3	32	46	age 55 or 85 age/service	defined benefit/nsop	flat dollar
7	2	36	38	55/10 or 62/5	defined benefit/dc	final average pay
8	2	31	33	55/10	defined benefit/dc	final average pay
9	2	49	49	age 55 or 80 age/service	defined benefit/nsop	flat dollar
10	2	49	49	55/5 or 85pts	defined benefit/dc	final average pay
11	1	35	35	55/5	defined benefit/dc	other
12	1	42	42	55/5	defined benefit/dc	final average pay
13	1	49	49	55/1	defined benefit/dc	final average pay
14	1	45	45	55/10	stand-alone db	flat dollar
15	1	44	44	55/2	stand-alone db	final average pay
16	1	41	41	57	defined benefit/nsop	flat dollar
17	1	49	49	55 or 20yrs svc	stand-alone db	other
18	1	45	45	55	defined benefit/dc	final average pay
19	1	29	29	55/10	defined benefit/dc	final average pay
20	1	48	48	55/10	stand-alone db	final average pay
21	1	49	49	55/15	stand-alone db	final average pay
Total	127	Notes: Here "db" means defined benefit, "dc" means defined contribution and "nsop" means not sure of other programs.				

4.5. Older Terminations

For the purposes of this report, our primary method of distinguishing between terminations and retirement (particularly at older ages) was through reliance of plan administrators. We relied on the data supplied to us.

To investigate this assumption, Table 4.5.1 provides information on the form of payment and the condition of exit for all 182,164 whose end of the year status was not listed as active (including deaths, disabilities, terminations and transfers). This table shows that we have some information about form of payments and condition of exit status although the information is far from complete.

Table 4.5.2 gives the same breakdowns by form of payment and condition of exit for those listed as vested or non-vested terminations and who had satisfied the plan’s age and year of service requirements for (reduced benefits) retirement. For those who received an immediate lump sum or pension, we overrode the plan administrators’ decision and converted these to retirees.

Table 4.5.3 summarizes information for those 2,364 records where the form of payment was either blank or unknown. These records come from 67 different plans; we list 11 plans that have the most records in Table 4.5.3, by size of the number of records unresolved. Based on this table, we essentially relied on the plan administrator’s judgment. If a record satisfied age/service requirements for retirement, the form of payout was blank or unknown and the termination status was as a vested retirement, we classified this as a retiree. If a record satisfied age/service requirements for retirement, the form of payout was blank or unknown and the termination status was as a non-vested retirement, we considered this record to be in error. From Table 4.5.3, this results in omitting an additional 479 records.

**Table 4.5.1. Frequency of Condition of Exit versus Form of Payment,
All Records with End of Year Status as Not Active**

Form of Payment	Condition of Exit							Total
	Downsizing, Plant Closure	Frozen Benefit	Normal Departure	Conditions Unknown	Temporary Incentive to Leave	Benefits Transferred	Blank	
Blank	2,758	111	24,013	30,414	0	43	19,554	76,893
Deferred Pension	105	138	17,262	9,793	0	16	2,622	29,936
Immediate Lump Sum	57	5	6,941	942	0	0	6,749	14,694
Immediate Pension	72	2	5,316	1,437	186	0	3,887	10,900
Unknown	1	47	28,235	20,815	0	43	600	49,741
Totals	2,993	303	81,767	63,401	186	102	33,412	182,164

**Table 4.5.2. Frequency of Condition of Exit versus Form of Payment,
All Records with End of Year Status as Termination (Vested or Not)
Records satisfying age/service requirements for early retirement**

Form of Payment	Condition of Exit							Total
	Downsizing, Plant Closure	Frozen Benefit	Normal Departure	Conditions Unknown	Temporary Incentive to Leave	Benefits Transferred	Blank	
Blank	762	0	212	3	0	0	749	1,726
Deferred Pension	6	0	585	396	0	0	60	1,047
Immediate Lump Sum	11	0	585	237	0	0	145	978
Immediate Pension	0	0	0	265	0	0	0	265
Unknown	0	0	225	337	0	1	75	638
Totals	779	0	1,607	1,238	0	1	1,029	4,654

**Table 4.5.3. Frequency of Form of Payout, Condition of Exit, and Termination Type, by Plan
Records satisfying age/service requirements for early retirement
Records have form of payout as blank or unknown and end of year status as a termination**

Plan	Form of Payment		Condition of Exit					Termination Type		Total
	Unknown	Blank	Downsizing, Plant Closure	Normal Departure	Conditions Unknown	Benefits Transferred	Blank	Vested	Non- Vested	
1	0	815	761	54	0	0	0	815	0	815
2	0	649	0	0	0	0	649	435	214	649
3	249	0	0	0	249	0	0	209	40	249
4	0	96	0	96	0	0	0	0	96	96
5	84	0	0	0	84	0	0	71	13	84
6	69	0	0	0	0	0	69	69	0	69
7	6	33	0	0	0	0	39	39	0	39
8	0	34	0	0	0	0	34	0	34	34
9	33	0	0	33	0	0	0	6	27	33
10	0	32	0	32	0	0	0	29	3	32
11	29	0	0	29	0	0	0	29	0	29
Subt	470	1,659	761	244	333	0	791	1,702	427	2,129
Totals over 67 plans (only 11 plans are displayed above)										
Total	638	1,726	762	437	340	1	824	1,885	479	2,364

4.6. Turnover by Significant Event

Table 4.6.1 shows that plans with significant events had somewhat higher termination and retirement rates. However, many other plan variables exhibited much more significant variation in termination rates. Because no pattern seemed to strongly suggest a bias, we retained all the data in the analysis.

Specifically, on the plan checklist, plan contributors had the opportunity to indicate whether a significant event affected the plan, as well as the plan year in which the event occurred. Significant events include: merger, acquisition, divestiture, early retirement window, other incentives to leave, downsizing, plant closure, outsourcing of non-core functions, plan termination, substantial plan provision changes, and significant number of rehires.

Table 4.6.1 shows a decomposition of rates by significant events. There were 29 plans that reported a significant event of any type. Plans reporting a significant event had higher termination rates (10.62%) compared to those that did not (8.30%). We also compared the experience of plans with significant events in the year or years of events to other records surrounding the event. Here, we see the largest difference in termination rates.

In an effort to examine the data more closely for sources of bias, we isolated those significant events that we considered more serious to the worker. Specifically, we examined downsizing, plant closure, early window, outsourcing of non-core functions, plan termination and so forth, as important significant events. The analysis shows the experience for the five plans with this special type of significant event was comparable to the overall experience, even when isolating experience in the year of the event.

Thus, although significant event is clearly an important determinant of turnover, the order of magnitude is comparable to other plan level variables examined in Section 2. Thus, we did not exclude data from a plan simply because the plan underwent a “significant change.” The rationale is that significant events are frequently encountered in pension plan valuations and this volatile experience should not be omitted.

Table 4.6.1. Turnover by Significant Events

Plan Variable	Number of Plans	Total Life Years	End of Year Status					
			Active	Retired	Disabled	Other	Death	Termination
Any significant event								
Yes	29	309,910	86.60	1.61	0.13	0.95	0.09	10.62
No	86	1,458,881	90.36	0.96	0.10	0.21	0.08	8.30
Any significant event – analysis of experience in the year of significant event								
Yes	29	185,314	85.70	1.52	0.10	0.55	0.08	12.05
No	86	1,583,477	90.17	1.02	0.11	0.31	0.08	8.31
Totals	115	1,768,791	89.70	1.07	0.11	0.34	0.08	8.70

Section 5. Plan Characteristics

This section describes various characteristics of the database, according to variables available at the plan level.

5.1. Plan Organization

Table 5.1 shows that single-employer private plans (SEPPs) are most common, both in terms of number of plans and life years of exposure. Compared to SEPPs, the private multi-employer plans have comparable retirement rates yet higher termination rates. Compared to SEPPs, public sector plans have higher retirement rates but lower termination rates.

Organization Type	Number of Plans	End of Year Status						Total Life Years
		Active	Retired	Disabled	Other	Death	Termination	
Single-employer private plan	107	89.79	1.05	0.11	0.38	0.08	8.60	1,558,525
Multi-employer private plan	4	88.66	1.12	0.11	0.07	0.03	10.01	177,615
Public Sector plan	4	92.73	2.54	0.00	0.00	0.13	4.60	32,172
Totals	115	89.73	1.08	0.11	0.34	0.08	8.67	1,768,312

5.2. Plan Pay Type

Table 5.2 shows that the split between hourly and salaried plans is fairly even, with no pay type dominating the others. Retirement rates are fairly even among plans with different pay types. Hourly and “don’t know” have larger termination rates when compared to salaried and “other combination” plans.

Pay Type	Number of Plans	End of Year Status						Total Life Years
		Active	Retired	Disabled	Other	Death	Termination	
More than 90% Hourly	27	86.02	0.84	0.31	1.14	0.08	11.62	314,452
More than 90% Salary	31	91.05	1.43	0.08	0.16	0.07	7.22	567,959
Other combination	19	91.71	0.64	0.03	0.12	0.10	7.41	647,748
Don't know	38	86.06	1.78	0.12	0.30	0.07	11.66	238,153
Totals	115	89.73	1.08	0.11	0.34	0.08	8.67	1,768,312

5.3. Plan Workforce

Table 5.3 shows that non-union plans are most common, both in terms of numbers of plans and especially in terms of life years of exposure. There does not seem to be strong differences in retirement or termination rates based on the type of workforce.

Workforce Type	Number of Plans	End of Year Status						Total Life Years
		Active	Retired	Disabled	Other	Death	Termination	
More than 90% Unionized	26	88.81	1.74	0.40	1.00	0.09	7.97	228,914
More than 90% Non-Union	52	90.03	0.92	0.05	0.17	0.07	8.75	1,327,923
Other mixture	8	89.02	1.37	0.20	0.96	0.10	8.35	145,070
Don't know	29	88.39	1.30	0.11	0.02	0.11	10.06	66,405
Totals	115	89.73	1.08	0.11	0.34	0.08	8.67	1,768,312

5.4. Industry

Table 5.4 shows the distribution of the data by industry, using the first digit of the SIC code to differentiate industries. (The Standard Industrial Classification, SIC, code is available at the Census Bureau at <http://www.census.gov/epcd/naics/nsic2ndx.htm>.) Not surprisingly, Table 5.4 shows some strong differences among plan experiences based on industry. This is true for retirement rates but is even more apparent when looking at termination rates.

Industry	Number of Plans	End of Year Status						Total Life Years
		Active	Retired	Disabled	Other	Death	Termination	
1-Mining, Construction	3	94.43	1.13	0.04	0.58	0.27	3.54	2,569
2-Manufacturing 1	17	87.36	1.40	0.11	1.41	0.08	9.65	219,450
3-Manufacturing 2	30	94.26	0.73	0.61	0.07	0.10	4.23	157,983
4-Services	13	92.03	0.69	0.04	0.34	0.11	6.79	522,672
5-Trade	5	87.34	1.26	0.02	0.19	0.03	11.15	334,165
6-Financial Services	13	85.40	1.32	0.14	0.18	0.08	12.89	144,195
7-Personal Services	5	85.46	0.84	0.09	0.11	0.13	13.38	22,331
8-Professional Services	17	93.06	0.99	0.01	0.00	0.06	5.88	216,343
9-Tax Exempts	7	91.21	2.48	0.00	0.00	0.11	6.20	37,062
Could not be easily classified	5	83.66	1.72	0.16	0.05	0.05	14.35	111,542
Totals	115	89.73	1.08	0.11	0.34	0.08	8.67	1,768,312

5.5. Nation

Table 5.5 shows the US/Canada splits. For these data, Canadians experienced lower termination rates and higher retirement rates.

Table 5.5. Turnover Rates by Nation

Nation	Number of Plans	End of Year Status						Total Life Years
		Active	Retired	Disabled	Other	Death	Termination	
US	106	89.38	0.92	0.06	0.25	0.08	9.30	1,548,741
Canada	9	92.13	2.19	0.42	0.98	0.10	4.19	219,571
Totals	115	89.73	1.08	0.11	0.34	0.08	8.67	1,768,312

5.6. Region

Table 5.6 shows the same information for Canada but more detailed geographic information for the US (An appendix provides regional descriptions). We used the four US Census regions for categorizing the data. Table 5.6 shows that the South had much higher termination rates, compared to the other US regions.

Table 5.6. Turnover Rates by Region

Region	Number of Plans	End of Year Status						Total Life Years
		Active	Retired	Disabled	Other	Death	Termination	
US – Northeast	20	89.52	0.95	0.02	0.09	0.04	9.38	64,011
US – Midwest	42	93.81	1.02	0.06	0.11	0.08	4.92	139,259
US – South	15	80.53	0.50	0.10	0.03	0.05	18.80	164,664
US – West	6	93.78	0.40	0.01	0.15	0.02	5.63	92,387
US – Widely Dispersed or Unknown	23	89.78	1.02	0.07	0.32	0.09	8.74	1,088,420
Canada	9	92.13	2.19	0.42	0.98	0.10	4.19	219,571
Totals	115	89.73	1.08	0.11	0.34	0.08	8.67	1,768,312

5.7. Population Size

Table 5.7 shows that plans domiciled in small cities (less than 100,000) experienced the lowest termination rates.

Population Size	Number of Plans	End of Year Status						Total Life Years
		Active	Retired	Disabled	Other	Death	Termination	
<100,000	43	90.45	0.85	0.11	1.56	0.08	6.94	150,958
100,000-1,000,000	27	89.52	1.31	0.07	0.15	0.07	8.88	103,899
>1,000,000	21	90.56	0.53	0.12	0.09	0.08	8.62	780,096
Widely Dispersed or Unknown	24	88.71	1.68	0.10	0.38	0.08	9.05	733,359
Totals	115	89.73	1.08	0.11	0.34	0.08	8.67	1,768,312

5.8. Benefit Structure

Table 5.8 shows that stand-alone defined benefit plans had the lowest termination rates and the highest retirement rates. Plans that had a combination of defined benefit and defined contribution were most prevalent, both in terms of number of plans and life years of exposure.

Benefit Structure	Number of Plans	End of Year Status						Total Life Years
		Active	Retired	Disabled	Other	Death	Termination	
Stand Alone Defined Benefit	38	90.90	1.86	0.22	0.86	0.09	6.07	362,057
Defined Benefit/Defined Contribution	60	89.49	0.81	0.08	0.22	0.08	9.33	1,153,731
Defined Benefit/Not Sure of Other Programs	14	89.47	1.27	0.09	0.00	0.07	9.11	237,994
Defined Contribution /Not Sure of Other Programs	2	86.47	0.23	0.00	0.00	0.03	13.27	3,519
Not Reported	1	82.60	0.61	0.00	2.54	0.13	14.12	11,011
Totals	115	89.73	1.08	0.11	0.34	0.08	8.67	1,768,312

5.9. Benefit Formula

Table 5.9 shows that final and career average pay plans had lower termination rates when compared to cash balance plans. Other plans had the highest termination rate.

Table 5.9. Turnover Rates by Benefit Formula

Type of Benefit Formula	Number of Plans	End of Year Status						Total Life Years
		Active	Retired	Disabled	Other	Death	Termination	
Final Average Pay	58	90.08	1.01	0.10	0.18	0.09	8.54	1,296,144
Career Average Pay	8	92.48	0.97	0.04	0.06	0.04	6.42	130,813
Cash Balance	7	89.29	1.06	0.00	0.30	0.03	9.32	103,246
Other	7	79.30	1.51	0.08	3.12	0.11	15.89	18,860
Flat Dollar	30	86.72	1.50	0.23	1.29	0.06	10.19	204,265
Life Cycle / Pension Equity	5	92.39	1.83	0.35	0.01	0.23	5.20	14,984
Totals	115	89.73	1.08	0.11	0.34	0.08	8.67	1,768,312

5.10. Social Insurance

Table 5.10 shows that plans were roughly equally divided between being integrated (or not) with social insurance (Social Security in the US, CPP/QPP in Canada).

Table 5.10. Turnover Rates by Social Insurance Integration

Integrated with Social Insurance?	Number of Plans	End of Year Status						Total
		Active	Retired	Disabled	Other	Death	Termination	
Yes	33	87.49	1.57	0.06	0.35	0.08	10.45	723,412
No	40	91.53	0.64	0.15	0.31	0.09	7.29	862,044
Not Reported	42	90.05	1.23	0.11	0.44	0.06	8.11	182,856
Totals	115	89.73	1.08	0.11	0.34	0.08	8.67	1,768,312

5.11. Membership

Table 5.11 shows that most plans are based on employment, both in terms of the number of plans and life years of exposure. Plans based on membership had higher termination and retirement rates than plans based on employment.

Table 5.11. Turnover Rates by Membership Type

Membership	Number of Plans	End of Year Status						Total Life Years
		Active	Retired	Disabled	Other	Death	Termination	
Based on Employment	80	90.85	0.86	0.04	0.17	0.08	7.99	1,301,137
Based on Membership	35	86.59	1.68	0.28	0.82	0.08	10.55	467,175
Totals	115	89.73	1.08	0.11	0.34	0.08	8.67	1,768,312

5.12. Recovery of Past Service

The plan checklist asks contributors whether “Upon re-hire following breaks in service, is recovery or purchase of past service allowed?” Table 5.12 shows 5% lower termination rates and 21% lower retirement rates between those that responded yes compared to those that responded no.

Table 5.12. Turnover Rates by Recovery of Past Service

Recovery Allowed?	Number of Plans	End of Year Status						Total Life Years
		Active	Retired	Disabled	Other	Death	Termination	
“Yes”	56	89.66	1.01	0.06	0.32	0.08	8.86	1,169,497
“No”	37	88.54	1.28	0.25	0.48	0.07	9.38	451,368
Not Sure	22	93.86	1.05	0.03	0.03	0.08	4.96	147,447
Totals	115	89.73	1.08	0.11	0.34	0.08	8.67	1,768,312

5.13. Vesting Pattern

Table 5.13 shows that 90% of plans used a cliff vesting pattern.

Table 5.13. Turnover Rates by Vesting Pattern

Type of Vesting Pattern	Number of Plans	End of Year Status						Total Life Years
		Active	Retired	Disabled	Other	Death	Termination	
Cliff	103	89.67	0.96	0.12	0.36	0.08	8.81	1,633,672
Stepped Pattern	10	87.58	1.17	0.02	0.00	0.07	11.16	27,374
Not Reported	2	91.05	2.95	0.00	0.02	0.08	5.90	107,266
Totals	115	89.73	1.08	0.11	0.34	0.08	8.67	1,768,312

5.14. Years Required for Full Vesting

Table 5.14 shows that 78% of plans require 5 years for full vesting.

Table 5.14. Turnover Rates by Years Required for Full Vesting

Fully Vested at End of Year	Number of Plans	End of Year Status						Total Life Years
		Active	Retired	Disabled	Other	Death	Termination	
0	4	94.73	1.19	1.62	0.00	0.20	2.26	52,935
1	1	84.26	2.62	0.00	0.00	0.33	12.79	305
2	7	91.51	2.53	0.05	1.22	0.08	4.60	175,508
3	2	86.58	0.17	0.00	0.00	0.00	13.25	3,585
5	90	89.31	0.90	0.06	0.25	0.08	9.40	1,519,879
7	7	91.28	1.30	0.09	0.00	0.07	7.25	5,366
10	1	94.53	2.92	0.18	0.00	0.00	2.37	548
Not Reported	3	95.65	1.93	0.00	0.58	0.04	1.80	10,186
Totals	115	89.73	1.08	0.11	0.34	0.08	8.67	1,768,312

5.15. Eligibility for Post-Retirement Health Benefits

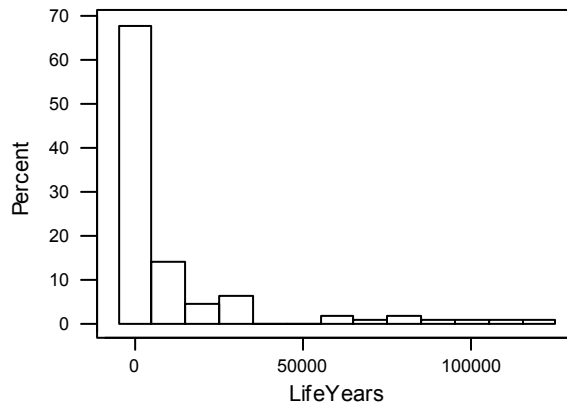
Table 5.15 shows that plans that offered members post-retirement health benefits enjoyed lower termination and retirement rates.

Table 5.15. Turnover Rates by Eligibility for Post-Retirement Health Benefits

Eligible for Post-Retirement Health Benefits?	Number of Plans	End of Year Status						Total Life Years
		Active	Retired	Disabled	Other	Death	Termination	
More than 90%	24	91.29	0.71	0.15	0.50	0.10	7.24	828,062
Less than 10%	28	88.66	1.66	0.06	0.07	0.08	9.47	148,589
Other Mixture	8	89.82	1.81	0.09	0.33	0.07	7.87	344,118
Not Sure	55	87.11	1.00	0.07	0.13	0.05	11.65	447,543
Totals	115	89.73	1.08	0.11	0.34	0.08	8.67	1,768,312

5.16. Distribution by Plan Size

There were 115 plans entered into the database. One plan was large, having 450,910 life years of exposure. Even without this large plan, the distribution of exposure by plans was skewed. The following histogram summarizes the distribution for the remaining 114 plans.



Section 6. Individual Characteristics

This section describes various characteristics of the database, according to variables available at the individual level.

6.1. End of Year Status

As noted above, the end of the year statuses are: active (or “continuation”), retired, disabled, death, termination and “other.” Here, termination includes vested as well as non-vested terminations. The “other” includes primarily transfers to another plan of the same employer or different employer, through reciprocal transfer agreement, or as a result of merger, acquisition or divestiture. However, a few plans also provide information on employees on a temporary leave of absence.

As described in Section 4.3, records with beginning of the year status as inactive were omitted. Only those that were active at the beginning of the year or that entered during the year (coded as either active or a new entrant by plan administrators) are considered.

Table 6.1 shows the number of life years by beginning and end of year status. For example, there were 153,934 life years that began the year as active or entered during the year (and thus labeled a “new hire”) and ended the year as some type of termination (either vested or non-vested). This corresponds to a 8.67 ($= 100 \cdot 153,291 / 1,768,312$) percent termination rate.

Table 6.1. Distribution of End of Year Status							
Beginning of Year Status	End of Year Status						Total
	Active	Retired	Disabled	Other	Death	Termination	
Active at Beginning of the Year	1,576,125	19,044	1,894	5,812	1,410	151,785	1,756,070
New Hire	10,502	66	0	167	1	1,506	12,242
All Actives - Count	1,586,627	19,110	1,894	5,979	1,411	153,291	1,768,312
All Actives - Percentage	89.73	1.08	0.11	0.34	0.08	8.67	100.00

6.2. Gender

The table shows substantial exposure of both males and females. The data we have are about 58% males, 41% females and 1% unisex.

Table 6.2. Gender Distribution		
Gender	Count	Percentage
Female	721,468	40.80
Male	1,031,051	58.31
Unisex	15,790	0.89
Missing	3	0.00
Total	1,768,312	100.00

6.3. Age

The data provides turnover rates, given in percentages. We computed the age of the individual, at the beginning of the year, on an age nearest birthday basis.

Table 6.3 summarizes turnover by age, for ages 18-70, inclusive. For example, there were 92,111 records that had age nearest birthday from 18 to 24 at the beginning of the plan year. Of those, $92,111 * 78.75 / 100 = 72,537$ were active by plan year-end date, and so forth.

Table 6.3. Turnover by Age							
Age Nearest Birthday	Total Life Years	Turnover					
		Active	Retired	Disabled	Other	Death	Termination
18-24	92,111	78.75	0.00	0.02	0.33	0.02	20.89
25-34	498,400	86.99	0.00	0.05	0.42	0.03	12.52
35-44	630,407	92.27	0.00	0.08	0.33	0.05	7.27
45-54	388,732	93.33	0.44	0.14	0.28	0.12	5.69
55-64	146,483	86.99	9.79	0.38	0.27	0.29	2.27
65-70	12,179	71.00	25.22	0.13	0.29	0.47	2.90
Total	1,768,312	89.73	1.08	0.11	0.34	0.08	8.67

6.4. Service

This table provides turnover rates, by service. Here, service is the number of completed years at the beginning of the plan year. The “new hires” are those that entered employment sometime during the plan year. In contrast to new hires, those with zero years of completed service were active at the beginning of the plan year and had been working for less than one year.

Table 6.4. Turnover by Service							
Completed Years of Service	Total Life Years	Turnover					
		Active	Retired	Disabled	Other	Death	Termination
new hires – 1	292,355	81.40	0.15	0.04	0.47	0.03	17.91
2-4	386,156	86.82	0.15	0.05	0.36	0.04	12.57
5-9	454,511	92.23	0.58	0.09	0.32	0.08	6.70
10 or more	635,290	93.53	2.43	0.18	0.28	0.13	3.45
Total	1,768,312	89.73	1.08	0.11	0.34	0.08	8.67

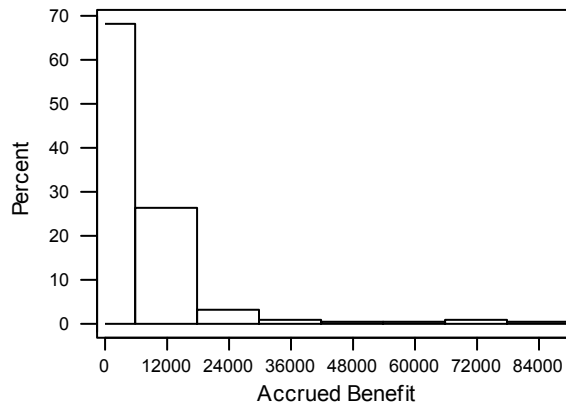
6.5 Readily Available Variables

As can be seen from the Appendix I Data request, several variables at the individual level were requested “if readily available.” These variables were used in the Section 4 integrity checks but will not be used in the subsequent reports. In general, because these variables were provided at the option of the contributor, they were subject to less scrutiny than other variables in Section 5 and Sections 6.1-6.5.

It may be that in subsequent Turnover studies these variables will become of greater interest. Thus, the remainder of this subsection documents what the contributors provided without a guarantee as to the reliability of the data.

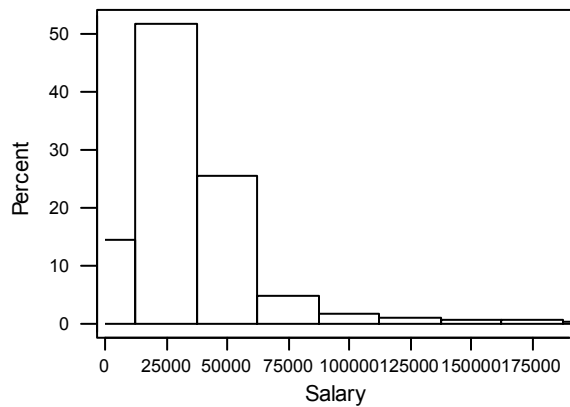
6.5.1 Annual Accrued Benefit

For annual accrued benefits, 95 plans submitted data. This represented 1,225,370 life years or approximately 69% of the total life years in the primary database. Of these data submitted, 301,997 of these records were zero. An additional 175 records had accrued benefits in excess of \$100,000. For the remaining 923,673 records, the median accrued benefit was \$3,300. The following figure gives a better sense of the distribution of accrued benefits for these records.



6.5.2 Annual Salary

For salaries, 102 plans submitted data. This represented 1,616,256 life years or approximately 91% of the total life years in the primary database. Of these data submitted, 35,411 of these records were zero. An additional 9,139 records had salary in excess of \$200,000. For the remaining 1,571,706 records, the median salary was \$31,007. The following figure gives a better sense of the distribution of salary for these records.



6.5.3 Form of Payment

Contributors were asked to provide a “Form of payment, if applicable” using the codes specified in **Appendix I**. Table 6.5.3 specifies the form of payment by end of year status. Here, the inactive status includes retired, disabled, other, death and termination. There were many records where the form of payment was either missing or unknown.

Table 6.5.3. Frequency by Form of Payment and End of Year Status

Form of Payment	End of Year Status		Total
	Inactive	Active	
Deferred pension	29,936		29,936
Immediate pension	10,900	2	10,902
Immediate lump sum	14,694	8	14,702
Other	110		110
Unknown	49,532	560,150	609,682
Information Not Available	76,513	1,026,467	1,102,980
Totals	181,685	1,586,627	1,768,312

6.5.4 Condition of Exit

Contributors were asked to provide a “Condition of Exit” using the codes specified in **Appendix I**. Table 6.5.4 specifies the condition of exit by end of year status. Here, the inactive status includes retired, disabled, other, death and termination. There were many records where the condition of exit was either missing or unknown.

Condition of Exit	End of Year Status		
	Inactive	Active	Total
Normal departure	81,598	570,412	652,010
Downsizing	2,992		2,992
Temporary incentive to leave	186		186
Frozen benefit	303		303
Benefits and assets transferred	102	1,199	1,301
Conditions unknown	63,345	193,511	256,856
Information Not Available	33,159	821,505	854,664
Total	181,685	1,586,627	1,768,312

6.5.5 Type of Hire and Past Service

Contributors were asked to specify the type of hire used in the hire date through the codes specified in **Appendix I**. If the type of hire was a re-hire, they were requested to provide past service. Table 6.5.5 specifies the type of hire by past service status. Here, the inactive status includes retired, disabled, other, death and termination. There were many records where the type of hire and past service were either missing or unknown.

Type of Hire	No	Some	Missing	Total
	Past Service	Past Service		
Adjusted			161,209	161,209
Original	615,001		195,922	810,923
Re-Hire	366	26,865	2,772	30,003
Unknown	100,089	5,105	88,187	193,381
Information Not Available	36	77	572,683	572,796
Total	715,492	32,047	1,020,773	1,768,312

6.5.6 Date of Exit

Contributors were asked to provide a “Date of Exit, if applicable and readily available” using the codes specified in **Appendix I**. Table 6.5.6 specifies the date of exit by end of year status. Here, the inactive status includes retired, disabled, other, death and termination. Approximately 86% of the records had the date of exit was missing.

Date of Exit	End of Year Status		Total
	Inactive	Active	
Available	141,293	111,282	252,575
Information Not Available	40,392	1,475,345	1,515,737
Total	181,685	1,586,627	1,768,312

Section 7. Concluding Remarks

Being the recipients of the second time the Society of Actuaries has gathered data for a non-mortality decrement study of pension plan members, our direction was enhanced both by the recommendations submitted to the SoA by the researchers from the original investigation on the subject and the consistency of the contributors to adhere, as best they could, to those recommendations which were incorporated in the Society of Actuaries request for turnover data. It is our hope, as well, that our observations below will facilitate future research on pension plan turnover.

Specifically, some of the Excel files had security or locking restrictions on selected fields. In practice, this caused substantial difficulties for importing the data. Some other Excel data sets represented the “date field” using a general format, not a date format. In order to import those data sets into SAS with the field as a date, the original files had to be re-formatted and then resubmitted to the import stage. We recommend that in future data requests, the providers remove all such restrictions.

Also, text files gave us the most difficulties. For files that were fixed formats or with a standard delimited format, we experienced no difficulty. However, one major contributor provided a file without any separation between fields at all and without a fixed format. This caused us major difficulties. Another contributor provided a text file with spaces for a delimited but with variable formatting (that is, the same field had a length that varied by record). This also caused major importing difficulties. We recommend either contributors be made aware of the difficulties faced when providing these types of file formats or the task force committee continues to allow for the time needed to correct such problems, so that future research projects can take advantage of large data files.

As described in Section 4.2, we recommend that the committee collect plan eligibility information. Moreover, the convention for including early service terminations should be documented by each data provider.

We recommend, additionally, that the data request ask that that each data contributor include an anonymous plan sponsor ID number, so that we know whether our 115 plans come from say, 90 different sponsors or 10 different sponsors. And, lastly, the data request should ask for an overall employer size on future plan design checklists.

Acknowledgements

The research of Edward W. (Jed) Frees was supported by the Fortis Health Insurance Professorship of Actuarial Science.

Moreover, the authors thank the Turnover Committee, Society staff and the Data Contributors for their contributions to the project.

Pension Plan Turnover and Retirement Rates Committee

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APPENDIX I: ACTUAL DATA REQUEST LETTER

The Society of Actuaries sent out communication to all potential data contributors asking them to submit their data in a preferred format, whenever possible. That preferred format follows:



SOCIETY OF ACTUARIES
475 N. MARTINGALE RD., SUITE 800, SCHAUMBURG, IL 60173-2226

847/706-3500

847/706-3599 FAX

Preferred Format of Turnover Study Data

The preferred file type is one of:

- Excel
- Lotus
- ASCII

The preferred medium is one of:

- Diskette
- CD
- Encrypted email attachment

In each data file, there should be one data record (row) per member per plan year.

If you are contributing five plan years of data for a certain pension plan, we would expect to receive five data files. Each data file would contain one record (row) for each individual who was a member for some or all of that plan year.

Please remember that you may provide the data in whatever format is most convenient to you. What we ask is that you provide us with a mapping to allow us to convert your data contribution to the “preferred format” outlined below. This will permit us to combine your data with other contributions and to complete the experience study.

Please provide whatever data is available, and leave the other fields blank. If the format you plan to use is materially different from this “preferred format”, please contact Tom Edwalds – tedwalds@soa.org or (847) 706-3578 – to discuss.

Column ¹	Data Item
1	Plan ID (non-identifying alpha or numeric indicator) – this is to assist the researcher in referencing the plan if any follow-up is needed; we recommend a two- to five-digit identifier.

2	Employee ID number – these will also assist if the researcher has any questions, and they need not be a Social Security Number or Social Insurance Number. The same employee identifier should be used for a particular employee for all years of the study.
3	Sex (M or F or U for unisex or X for unknown)
4	Date of birth (dd/mm/yyyy or mm/dd/yyyy or mm/yyyy) – the day can be omitted, if privacy concerns dictate
5	Date of most recent hire (dd/mm/yyyy or mm/dd/yyyy or mm/yyyy) – the day can be omitted, if privacy concerns dictate
6	Date is of original hire, re-hire, adjusted (due to breaks in service), or unknown (O or R or A or U)
7	If re-hire, number of years of past service credited
8	Annual salary, using the plan’s definition of salary (if available)
9	Annual accrued benefit as at the beginning of the plan year (if readily available)
10	Beginning of Year Status indicator (see below)
11	End of Year Status indicator (see below)
12	Date of exit, if applicable and readily available (dd/mm/yyyy or mm/dd/yyyy or mm/yyyy) – the day can be omitted, if privacy concerns dictate
13	Form of payment, if applicable
14	Conditions of exit (see below)
15	Plan year-end for this Data Record (mm/yyyy)

¹ If a spreadsheet is used, the Columns above should map to columns in the spreadsheet. If an ASCII file is used, please provide data in a similar layout, along with a mapping to indicate which ASCII columns map to the Columns above.

Annual Salary:

We would expect that the salary provided would be the annual salary as at the beginning of the plan year. If that is unavailable, please use the most current salary available, and note what was used when you return the Plan Design Checklist.

Beginning of Year Status Indicators:

N = new entrant during plan year, not a member at the beginning of the plan year

A = active member at beginning of plan year

I = inactive at beginning of plan year

End of Year Status Indicators:

A = active member at end of plan year

T = non-vested termination during the plan year

V = vested termination during the plan year (fully or partly)

R = retired during the plan year

I = became disabled during the plan year

D = died during the plan year (condition of exit code would normally be N)

X = transferred to another plan of the same employer or different employer, through

reciprocal transfer agreement, or as a result of merger, acquisition or divestiture

Conditions of Exit Indicators:

N = normal departure, no special conditions

(event can occur before, on, or after normal retirement age, and would include death)

D = downsizing, plant closure, etc.

W = temporary incentive to leave (severance window, early retirement window, etc. – either inside or outside the plan)

F = a frozen benefit remains in the plan (use only with end of year status X)

X = benefits and assets transferred to the new plan (use only with end of year status X)

U = conditions unknown

O = other

Form of Payment:

L = immediate lump sum

P = immediate pension

D = deferred pension

U = unknown

O = other

Instructions to Firms Submitting Data in own Format

We expect that most contributors will choose to use their own format, the format in which the data is currently available.

There should be one data record per member per plan year. All data records should be combined into one data file per pension plan per plan year.

If you are contributing five plan years of data for a certain pension plan, we would expect to receive five data files. Each data file would contain one record (row) for each individual who was a member for some or all of that plan year.

Please indicate the codes and/or formats used for:

- Sex
- Dates
- Status indicators
- Conditions of exit

Please indicate the mapping of your status codes to the study's standard codes.

Please indicate the mapping of your data records to the study's standard data format.

Integrity Checks

Prior to submitting your data contributions, please perform the following integrity checks:

- Confirm that there are no blanks in the sex field.
- Confirm that the dates of birth are such that attained age is greater than or equal to 15 and less than 80. The years of birth should be before 1985 and after 1915.
- Confirm that the dates of hire are such that age at hire is greater than or equal to 15 and less than 70.
- Confirm no annual salaries are beyond reasonable minimums and maximums for the pension plan in question. In general, we don't expect to see the rate of annual pay to be under \$10,000 and we expect to see very few rates of annual pay over \$200,000.
- Confirm that there are no blanks in the status indicator field.
- Confirm that the date of exit is no more than twelve months prior to the plan year-end.
- Confirm that there is a date of exit (if readily available) and a condition of exit for every data record with an end of year status indicator of other than A.

Industry Category

In the Plan Design Checklist, please use the Standard Industry Codes as outlined in the pages that follow. Although the list of codes is quite long, we decided to include it in this package for your convenience in completing the Plan Design Checklist.

(Note: Industry codes have not been attached.)

Plan Design Checklist - 2000 SOA Turnover Study

Plan ID: _____ (should match first column of data file)

Organization	Pay Type	Workforce
Multi-employer private plan	More than 90% Hourly	More than 90% Unionized
Single-employer private plan	More than 90% Salaried	More than 90% Non-union
Multiple-employer private plan (US)	Other combination	Other mixture
Public sector plan	Don't know	Don't know

Standard Industry Code (see attached listing for assistance)

SIC is: _____

Location of Plan Members

United States	Canada	More than 50% of members are located in a metropolitan area with population of:
Province or State: _____		more than 1 million 100,000 - 1,000,000
(if more than 50% of members are in one location)		under 100,000
or		or
Members are widely dispersed		Not sure of size but city/town is: _____
		or
		Members are widely dispersed

Benefit Structure

Stand-alone defined benefit	Benefit Formula is:	
Defined benefit, also have defined contribution	FAP _____%/_____%	Life cycle/pension equity
Defined benefit, not sure of other programs	CAP _____%/_____%	Cash balance
Defined contribution, not sure of other programs	Flat dollar	Other: _____
	Integrated with Social Security/CPP/QPP	Y N

Plan Design

Credited service:	Vesting pattern:
Based on membership/plan participation	Cliff or Stepped pattern
Based on employment	
Upon re-hire following breaks in service, is recovery or purchase of past service allowed:	Fully vested at end of year:
Yes No	2 7
Not sure	5 Other: _____
Does Plan offer disability benefits?	Eligibility for Post-Retirement health benefits:
Yes No	More than 90% of members Other mixture
	Less than 10% of members Not sure
Earliest age/service for any early retirement _____	Definition of Salary:
	Base only
Earliest age/service for unreduced early retirement _____	Includes bonuses and commissions
	Includes overtime
Plan year-end (day/month): _____	Multiple definitions
	Salary provided is:
	Capped by IRS/DNR max
	or
	Uncapped

