

CASUALTY ACTUARIAL SOCIETY
EDUCATION POLICY COMMITTEE

TRAVEL TIME REPORT

ANNUAL REPORT TO THE BOARD OF
DIRECTORS ON TRAVEL TIME STATISTICS
FOR CANDIDATES OF THE CASUALTY
ACTUARIAL SOCIETY

NOVEMBER 2004

Version 1.3

Table of Contents

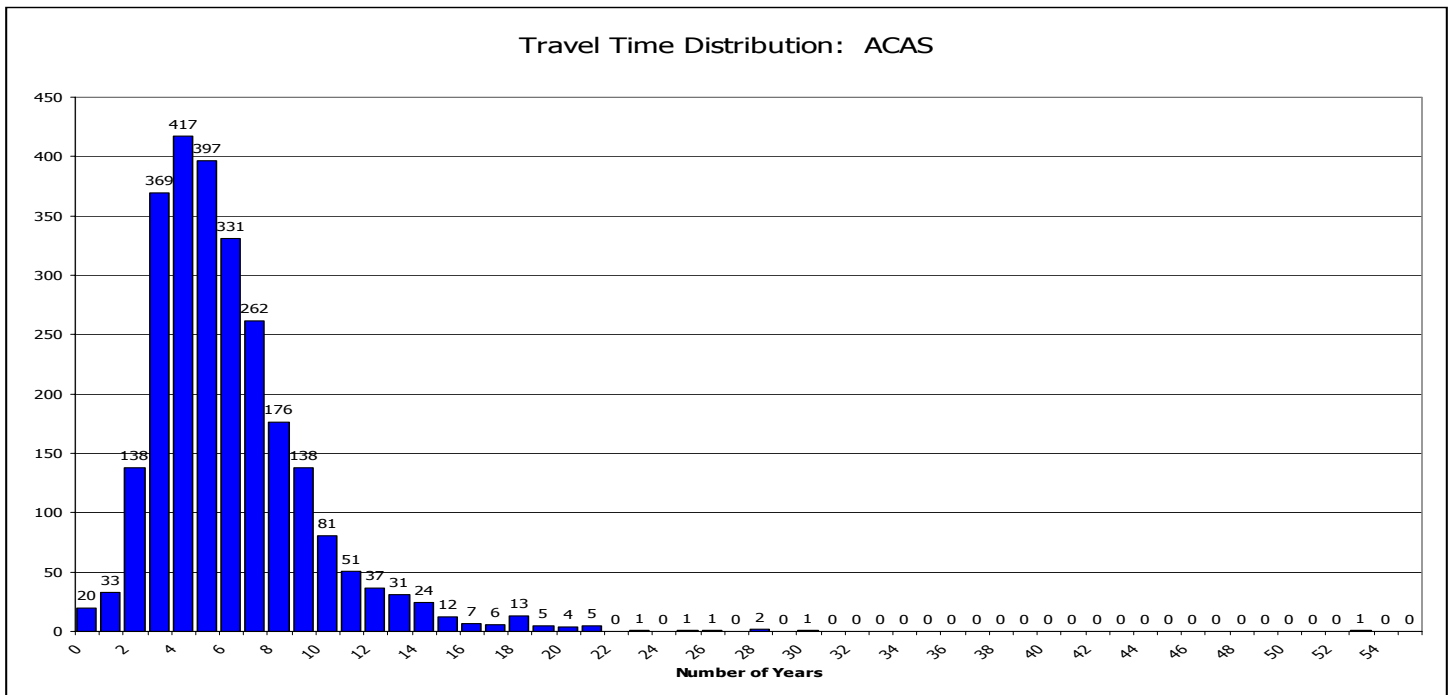
Executive Summary	1
Results and Analysis	4
Average Travel Times For Graduating Classes	4
Distribution of Travel Times for Members	6
Median Travel Times for Starting Cohorts	9
Percentage Completion for Starting Cohorts	13
Exam Progress Statistics	18
Appendix A: Data and Methods	24
Data Transformations	27
Significant Notes About The Data	29

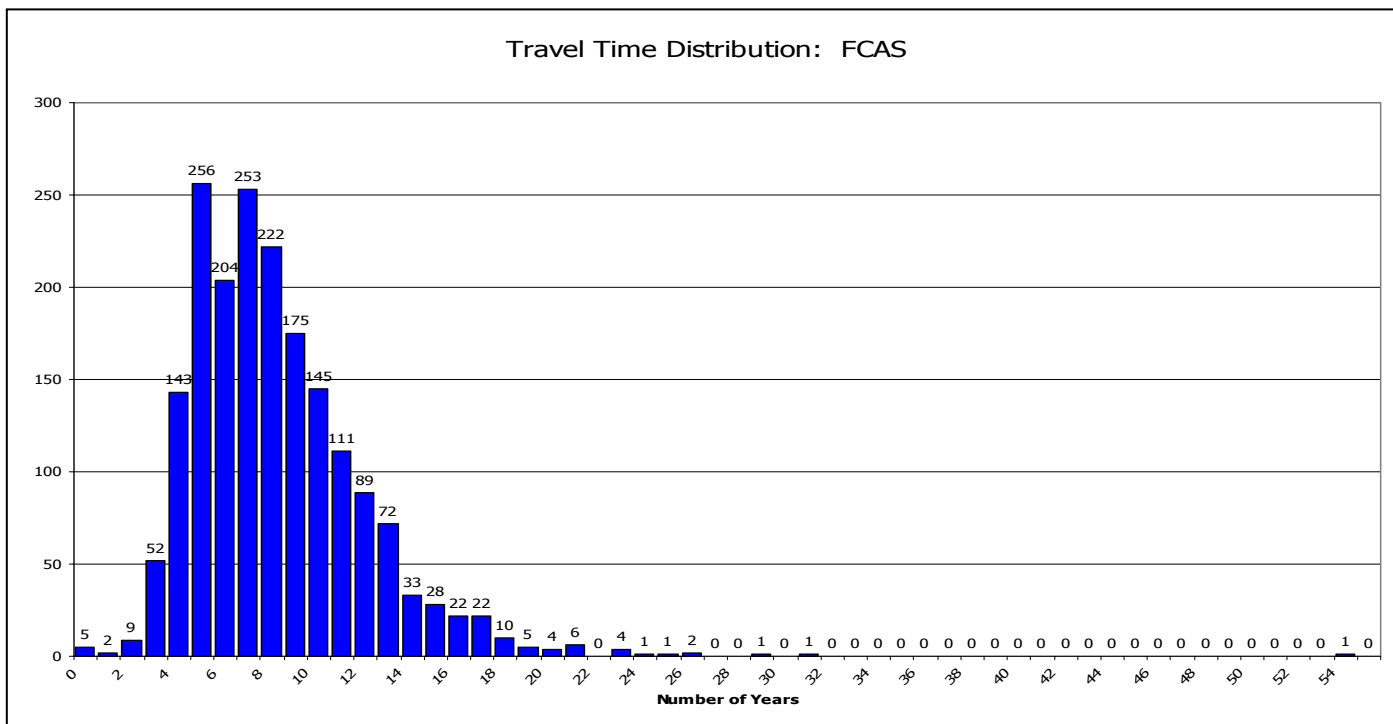
EXECUTIVE SUMMARY

The Education Policy Committee has recently completed work on a detailed results database that permits more in-depth study of candidate progress than was previously possible. Based on these newly available statistics, it is clear that the CAS has never achieved travel time within the five to seven year goal proposed by the Board of Directors. While large numbers of candidates achieve Fellowship within a five to seven year timeframe, many candidates have historically required much longer to achieve Fellowship. Statistics are similarly skewed for candidates reaching Associateship. The heavily skewed distribution of candidate travel times affects both mean and median measures of candidate travel time.

Specifically, this report draws the following conclusions:

- The distribution of travel times is heavily skewed with a few candidates taking **much** longer than the median to achieve designations. This heavily influences traditional travel time statistics based on averages for graduating classes. In fact, the heavy right tail impacts median measures based on starting year as well.





- Median travel time to Fellowship based on the newer statistics (credential reception vs. date of first employment as defined by the Board of Directors) still appears to be about 8.5 years (starting cohorts for 1970-1992). Only one mature starting cohort has ever achieved a median travel time of less than 7 years – class of 1973. The CAS has never achieved travel times in line with Board directives of 5-7 years.
- There are encouraging trends in the percentage of recent starting cohorts reaching designations within five years, particularly for Fellowship. This may indicate a pending decrease in median travel time for recent starting cohorts. While these data are yet immature, there are early indications that improvements in the exam system over the past decade are resulting in decreased travel times.
- Lack of first employment date for large numbers of candidates who are not members makes interpretation of the board definition of travel time somewhat difficult. It is recommended that future studies use earliest examination dates in place of first employment dates to produce a second set of statistics. Previous studies have indicated that this definition produces median travel times that are comparable to those based on date of first employment.
- Using the current board definition of travel time, there does not appear to be a clear degradation of travel time resulting from the partitioning of exams in the early 1990's. While past statistics have indicated that partitioning may have increased travel time by reducing the number of exams taken by candidates in any particular sitting, contemporary statistics do not reflect an increase in travel time resulting from partitioning.
- Enrollment for the joint exams has increased sharply in recent years, indicating a renewed interest in the actuarial profession. Current perceptions

regarding travel time barriers are not preventing historically large numbers of students from entering the profession. Despite perceptions during the last decade that travel times were spiraling upward, record numbers of students are now entering the actuarial profession. For joint exams 1 and 2, the enrollment statistics are:

Exam		S 2000	F 2000	S2001	F2001	S2002	F2002	S2003	F2003	S2004
1	Exams Taken	2667	2526	3498	3508	4860	4740	5398	5647	6577
2	Exams Taken	1903	1952	2115	2115	2549	2758	2710	3356	3656

RESULTS AND ANALYSIS

The CAS examination process is lengthy and subject to significant variation across candidates and across examination sessions. For this reason, analysis of travel time statistics is similar to analysis of reserves for long-tail casualty insurance. For that reason, this report includes several different statistics that must be analyzed in concert with one another. Equally important in this analysis, much like any analysis of a long-tailed distribution, study must continue and additional statistics must be developed that enhance our understanding of the process. It is the hope of the Education Policy Committee (EPC) that standardization of data structures will allow greater numbers of volunteers to submit proposals for new statistics and to even submit applications and queries that can be exercised against the CAS database to produce these statistics while maintaining the anonymity of individual results.

Among the statistics presented in this report are:

- Average Travel Times for Graduating Classes,
- Distribution of Travel Times for Members,
- Median Travel Times for Starting Cohorts,
- Percentage Completion for Starting Cohorts, and
- Exam Progress Statistics.

Each of these appears below with separate discussion.

AVERAGE TRAVEL TIMES FOR GRADUATING CLASSES

This analysis provides two separate statistics for each graduating class of Associates and Fellows. These statistics were developed several years ago, commissioned by Pat Grannan and are frequently referred to as the Grannan statistics.

The Potential Sittings statistic (the “old” method) represents the average number of potential sittings between first CAS examination taken and receipt of a credential across each graduating class¹. This measure is roughly equivalent to the average time between sitting for one’s first examination and receiving either the Associateship or Fellowship designation.

The second statistic, Actual Sittings, represents the average number of exam sittings required to reach Associateship or Fellowship across graduating classes. The Potential Sittings statistic excludes exams 3A (regression and time series), 3C (Numerical Analysis), and the pre-partitioned part 3 in determining the starting point for each candidate.

¹ Two sittings are added to represent exams 1 and 2 under the pre-2000 exam structure.

These statistics are analogous to calendar-year insurance statistics. Each graduating class consists of members who started at many different points in time. Embedded in each average are historical trends in size of each starting cohort, drop out rates, and travel time for each starting cohort.

The following statistics include results up through the May, 2004 examination sessions:

Fellowship Class

Graduating Class	FCAS Class Size	Potential Sittings to Achieve FCAS	Actual Number of Sittings to FCAS
Fall 2000	135	17.6	16.8
Spring 2001	29	18.1	16.7
Fall 2001	116	19.2	18.1
Spring 2002	19	18.5	19.3
Fall 2002	145	19.5	18.2
Spring 2003	30	17.2	17.9
Fall 2003	128	20.2	18.8
Spring 2004	41	17.6	17.4
Fall 2004	99	20.5	18.4

Associateship Class

Graduating Class	ACAS Class Size	Potential Sittings to Achieve ACAS	Actual Number of Sittings to ACAS
Fall 2000	33	11.9	15.3
Spring 2001	33	14.6	17.4
Fall 2001	92	12.7	13.7
Spring 2002	38	15.2	16.7
Fall 2002	114	15.8	16.2
Spring 2003	38	15.7	16.3
Fall 2003	108	15.6	16.4
Spring 2004	28	17.0	18.3
Fall 2004	122	13.2	15.0

Notes

- Class refers to the CAS meeting when members are recognized (i.e., six months after the exam sitting).

- Potential Sittings to Achieve ACAS/FCAS refers to the method of tracking travel time prior to the implementation of the 2000 education and examinations structure. It will be included in this report for a few years in order to make comparisons with improved methods. [The old method tracked the number of potential examination sessions from the first CAS-specific examination until achieving the designation. Sittings for Parts 1 & 2 (pre-2000) were included, but only for the successful examination sessions.]
- Actual Number of Sittings to ACAS/FCAS shows the average number of exam sessions that the candidates actually sat for examinations to achieve the specified designation. This includes a February sitting for Parts 1 and 2 in the pre-2000 structure.
- Differences between the old and new calculations: The old method was consistent but only listed CAS-specific exams and added two additional sittings to represent successful completion of old Parts 1 and 2. It demonstrated how many potential sittings there were from the “starting point” until the attainment of the designation regardless of whether the candidate actually sat for an exam every session. Old Parts 3A and 3C were not included in the count—nor was the old pre-partitioned Part 3. In preparing the new class statistics that will be used for the classes of 2000 and beyond, the CAS Office obtains the complete history of joint examinations for each candidate and adds it to the CAS database. This new statistic accurately reflects the number of exam sessions in which the candidate actually participated, including joint exams.

For reasons explained later in this report, it is difficult to draw conclusions from this data set alone. Travel time to Fellowship appears stable at 8.5 to 9.5 years based on actual sittings. Travel time to Associateship exhibits a marked improvement in the fall 2004 class, falling from over 8 years to seven and a half years.

DISTRIBUTION OF TRAVEL TIMES FOR MEMBERS

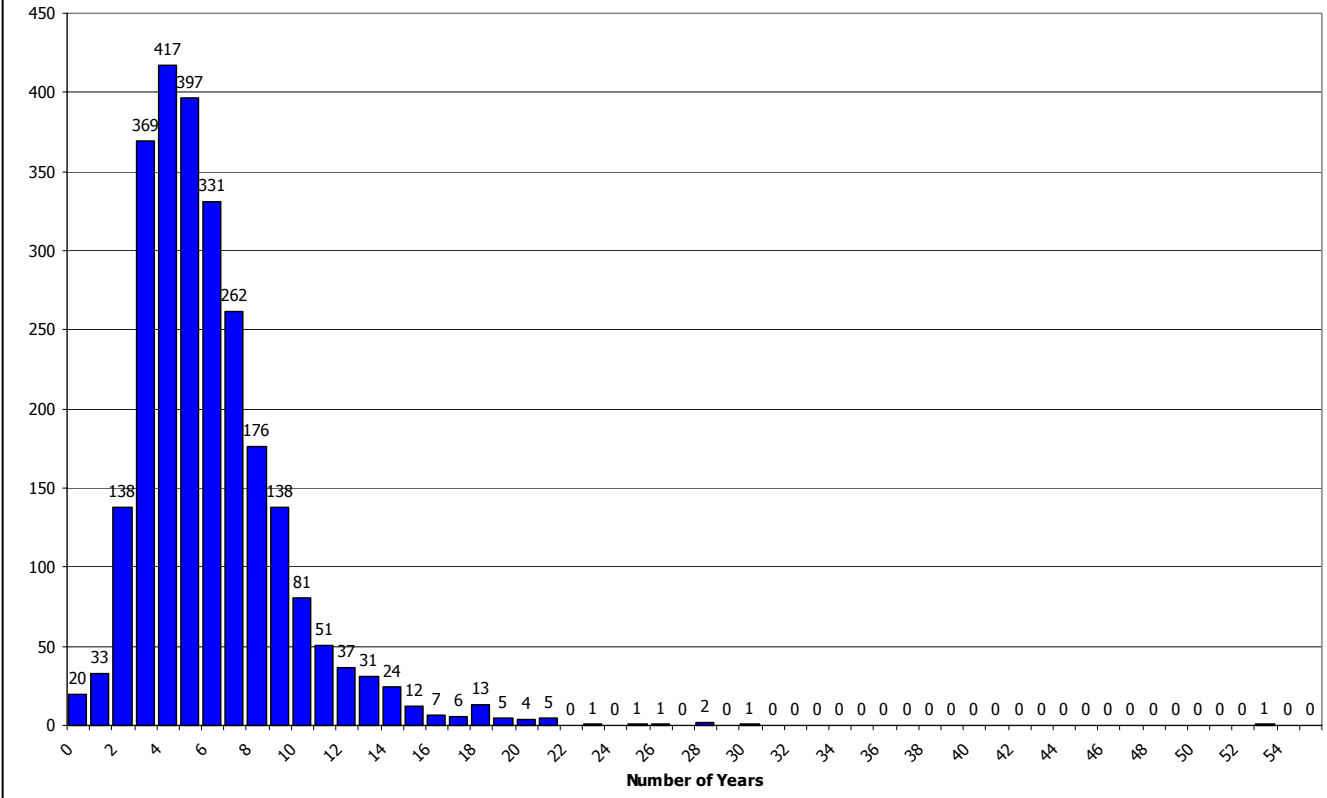
In 2002, the Board of Directors adopted a revised definition of travel time in order to better understand underlying trends. This revised definition contemplates the time from first full-time employment in a casualty actuarial position until attainment of an Associateship or Fellowship designation. Implementation of this statistic required that the CAS collect the date of first employment from its members. As of the date of this report, the CAS has collected the following employment date statistics:

Candidate/Member Population vs. Collection of Employment Dates

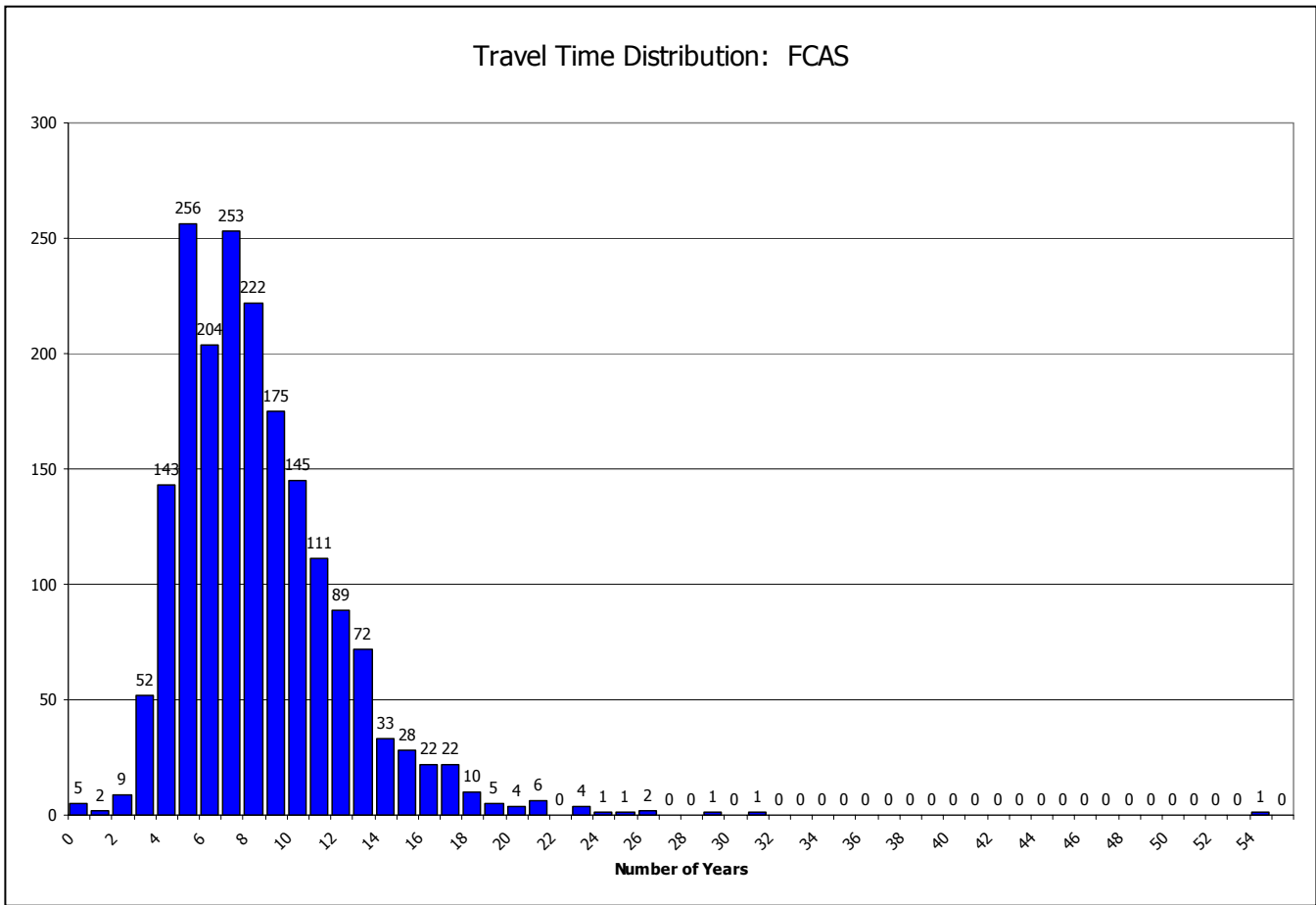
Membership Category	Total Population	Number Having Recorded First Employment Dates
ACAS	1,137	685
FCAS	2,502	1,879
STUD (Candidate)	12,494	584

For each Associate and Fellow having recorded First Employment dates, a travel time was computed. Results, rounded to the nearest year, are displayed in histograms below:

Travel Time Distribution: ACAS



Travel Time Distribution: FCAS



In both histograms, the furthest most left bar represents the number of members who achieved their designations in less than one half year after starting their first full time casualty actuarial job (including those who achieved their designations before beginning full time employment). The second bar represents members achieving their designations more than one half year but less than or equal to 1.5 years after starting work.

Both populations are skewed with heavy right tails. Given the number of members in each graduating class, the data points in the right tail can have a dramatic effect on average travel times. For example, the Fellowship class for Spring 2004 contains one member who first sat for an examination in 1982 and two who first sat in 1988. Collectively, these three candidates contribute 2.5 sittings (over a full year) to the average travel time for this class as measured in the graduating class statistics. The Fall 2004 class of Fellows contains two candidates who first sat in 1978 and three who first sat in 1982, 1983, and 1984 respectively. The contribution of these five candidates is more than one full year towards the average travel time for their graduating class.

MEDIAN TRAVEL TIMES FOR STARTING COHORTS

In order to remove some of the distortions inherent in the statistics representing average travel times for graduating classes caused by the skewed distribution of travel times, a new set of statistics were created in 2002. These statistics group members by year of first employment (“starting cohort”) and compute median, rather than mean, travel times for each group. Additionally, medians are computed for each starting cohort in total (all members reaching the given designation) and for each starting cohort truncated at each of five and 10 years.

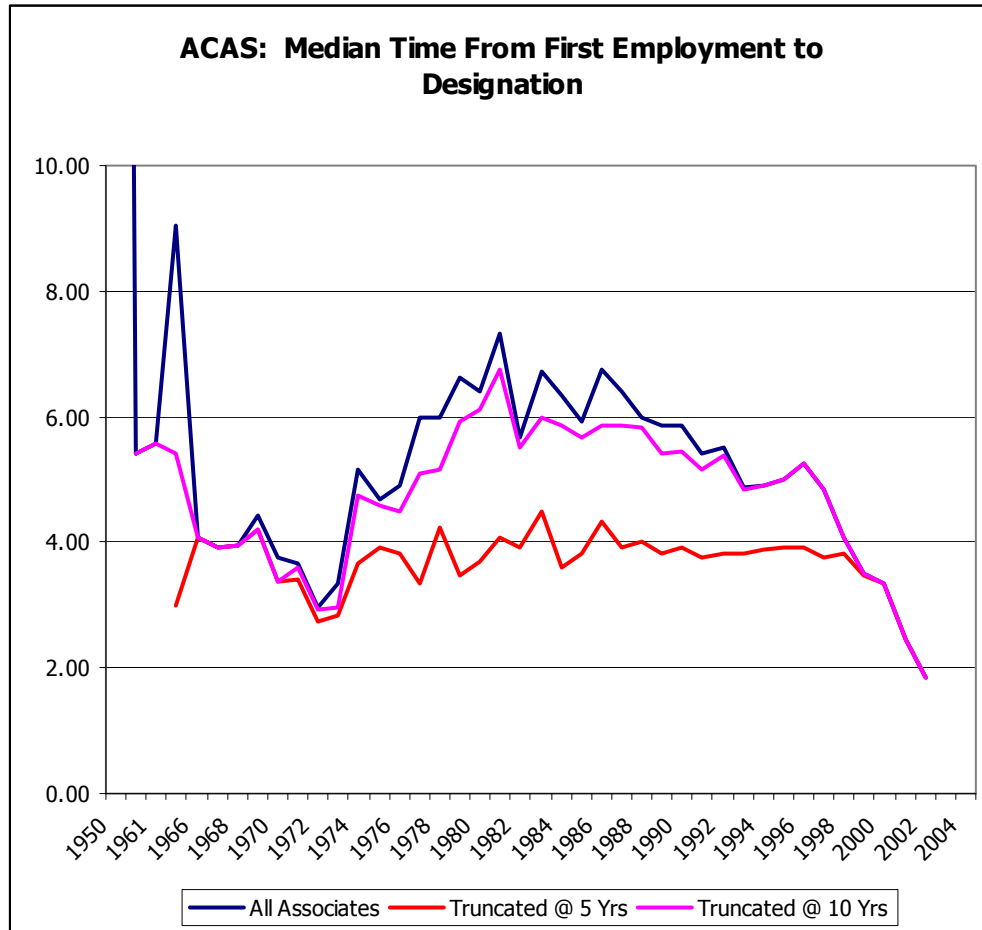
These data should be viewed carefully, as more recent cohorts are truncated and will continue to “develop” over time. Cells highlighted in gray are not fully developed. Obviously, all cells representing the entire population are potentially truncated until all members of a given starting class reach designations or retire from the examination process.

Travel Time Statistics for Associates: Median Travel Time For Starting Cohorts

Year of First Employment	All Candidates			Truncated @ 5 Yrs		Truncated @ 10 Yrs	
	Number of Candidates	Number of Associates	Median Travel Time	Number of Associates	Median Travel Time	Number of Associates	Median Travel Time
1950	1	1	52.92	0		0	
1960	1	1	5.42	0		1	5.42
1961	1	1	5.58	0		1	5.58
1964	4	4	9.04	2	3.00	3	5.42
1966	4	4	4.08	4	4.08	4	4.08
1967	9	9	3.92	7	3.92	9	3.92
1968	4	4	3.96	4	3.96	4	3.96
1969	7	7	4.42	6	4.21	6	4.21
1970	24	24	3.75	20	3.38	20	3.38
1971	35	35	3.67	28	3.42	33	3.58
1972	42	42	2.96	35	2.75	40	2.92
1973	53	53	3.33	39	2.83	50	2.96
1974	45	45	5.17	21	3.67	37	4.75
1975	41	41	4.67	25	3.92	39	4.58
1976	57	57	4.92	31	3.83	49	4.50
1977	61	60	6.00	25	3.33	48	5.08
1978	70	69	6.00	29	4.25	58	5.17
1979	74	74	6.63	20	3.46	58	5.92
1980	66	65	6.42	20	3.71	58	6.13
1981	52	51	7.33	14	4.08	43	6.75
1982	56	55	5.67	21	3.92	51	5.50
1983	66	64	6.71	19	4.50	55	6.00
1984	67	64	6.33	21	3.58	54	5.88
1985	64	63	5.92	21	3.83	55	5.67
1986	107	104	6.75	32	4.33	86	5.88
1987	148	141	6.42	51	3.92	114	5.88
1988	115	108	6.00	41	4.00	94	5.83
1989	151	140	5.88	52	3.83	121	5.42
1990	182	166	5.88	69	3.92	152	5.46
1991	140	131	5.42	59	3.75	119	5.17
1992	155	140	5.50	62	3.83	130	5.38
1993	144	128	4.88	69	3.83	125	4.83
1994	166	147	4.92	78	3.88	147	4.92
1995	117	99	5.00	51	3.92	99	5.00
1996	151	115	5.25	55	3.92	115	5.25
1997	132	95	4.83	54	3.75	95	4.83
1998	116	75	4.08	61	3.83	75	4.08
1999	84	41	3.50	40	3.46	41	3.50
2000	78	23	3.33	23	3.33	23	3.33
2001	86	14	2.46	14	2.46	14	2.46
2002	85	4	1.83	4	1.83	4	1.83
2003	75	0		0		0	
2004	14	0		0		0	

Notes: Because many candidates do not report joint exams to the CAS until they accept a full time casualty position, the number of total candidates in recent years will increase over time.

Displayed graphically, these data are somewhat easier to interpret:

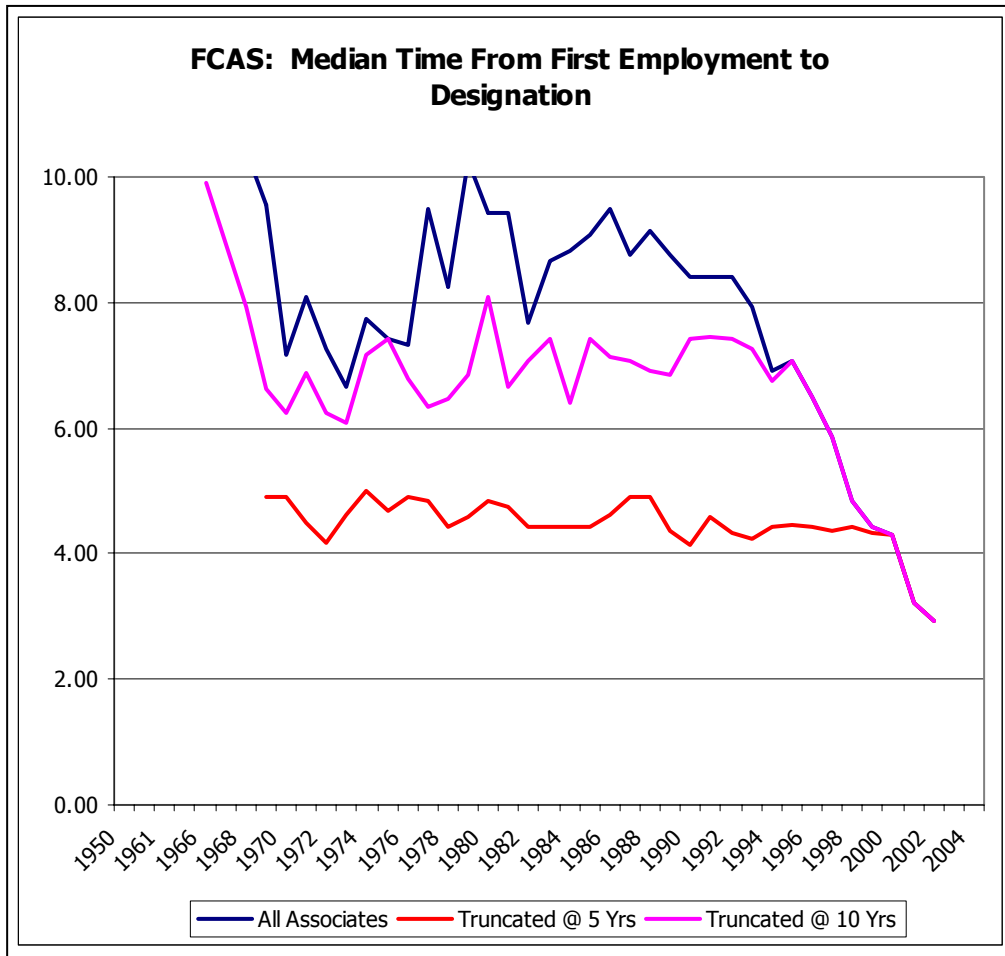


Keeping in mind that the data prior to 1970 are very sparse, travel time appears to have peaked in the early 1980's, following the transition in 1975 that increased the number of exams required from 5 to 7. The transition to partitioned exams in 1990 does not appear to increase travel time as had been previously feared. Statistics have been included in previous reports that indicate that students sat for fewer exams following partitioning; leading many to conclude that partitioning increased travel time. However, these statistics are questionable. Recall that, prior to 2000, the CAS did not consistently report failures on joint examinations. The database therefore does not include many records for partitioned exams 3A, 3b, and 3C. Exam progress statistics included later in this report similarly exclude these exams. That is, a student sitting for 3A, 3C, and 4A represents only 0.5 exams in those statistics, while that same candidate actually sat for more than one exam. The effect of the 2000 transition is not yet evident in this data set.

Travel Time Statistics for Fellows: Median Travel Time For Starting Cohorts

Year of First Employment	All Candidates			Truncated @ 5 Yrs		Truncated @ 10 Yrs	
	Number of Candidates	Number of Fellows	Median Travel Time	Number of Fellows	Median Travel Time	Number of Fellows	Median Travel Time
1950	1	1	53.92	0		0	
1960	1	1	17.42	0		0	
1961	1	1	12.58	0		0	
1964	4	2	13.79	0		0	
1966	4	4	10.96	0		3	9.92
1967	9	9	10.92	0		5	8.92
1968	4	4	10.42	0		3	7.92
1969	7	6	9.54	1	4.92	4	6.63
1970	24	20	7.17	3	4.92	14	6.25
1971	35	32	8.08	3	4.50	24	6.88
1972	42	33	7.25	8	4.17	26	6.25
1973	53	43	6.67	8	4.63	34	6.08
1974	45	33	7.75	3	5.00	26	7.17
1975	41	33	7.42	7	4.67	27	7.42
1976	57	45	7.33	7	4.92	34	6.79
1977	61	42	9.50	7	4.83	25	6.33
1978	70	56	8.25	7	4.42	38	6.46
1979	74	61	10.25	7	4.58	31	6.83
1980	66	55	9.42	4	4.83	35	8.08
1981	52	36	9.42	3	4.75	20	6.67
1982	56	41	7.67	6	4.42	30	7.08
1983	66	47	8.67	4	4.42	29	7.42
1984	67	47	8.83	8	4.42	29	6.42
1985	64	44	9.08	3	4.42	29	7.42
1986	107	70	9.50	2	4.63	38	7.13
1987	148	95	8.75	9	4.92	55	7.08
1988	115	82	9.13	5	4.92	48	6.92
1989	151	98	8.75	14	4.38	61	6.83
1990	182	125	8.42	8	4.13	83	7.42
1991	140	93	8.42	9	4.58	68	7.46
1992	155	95	8.42	14	4.33	67	7.42
1993	144	97	7.92	11	4.25	79	7.25
1994	166	106	6.92	18	4.42	97	6.75
1995	117	67	7.08	10	4.46	67	7.08
1996	151	77	6.50	16	4.42	77	6.50
1997	132	72	5.88	22	4.38	72	5.88
1998	116	56	4.83	37	4.42	56	4.83
1999	84	23	4.42	18	4.33	23	4.42
2000	78	16	4.29	16	4.29	16	4.29
2001	86	10	3.21	10	3.21	10	3.21
2002	85	1	2.92	1	2.92	1	2.92
2003	75	0		0		0	
2004	14	0		0		0	

Here again, graphical display makes these figures somewhat easier to interpret.



Again, data prior to 1970 are very sparse and travel times appear to have peaked in the early 1980's. No clear trends appear as a result of the 1990 transition. The effect of the 2000 transition is not yet evident in the data. For the period from 1970 to 1992, the average median travel time is approximately 8.5 years. Standard deviation for classes starting 1970-1992 is .91. Of all Classes from 1970 to present, only the class of 1973 succeeded in achieving a median travel time less than seven years. It is therefore clear that dramatic changes in the examination structure will be required in order to achieve the goal of a median travel time in the 5-7 year range.

PERCENTAGE COMPLETION FOR STARTING COHORTS

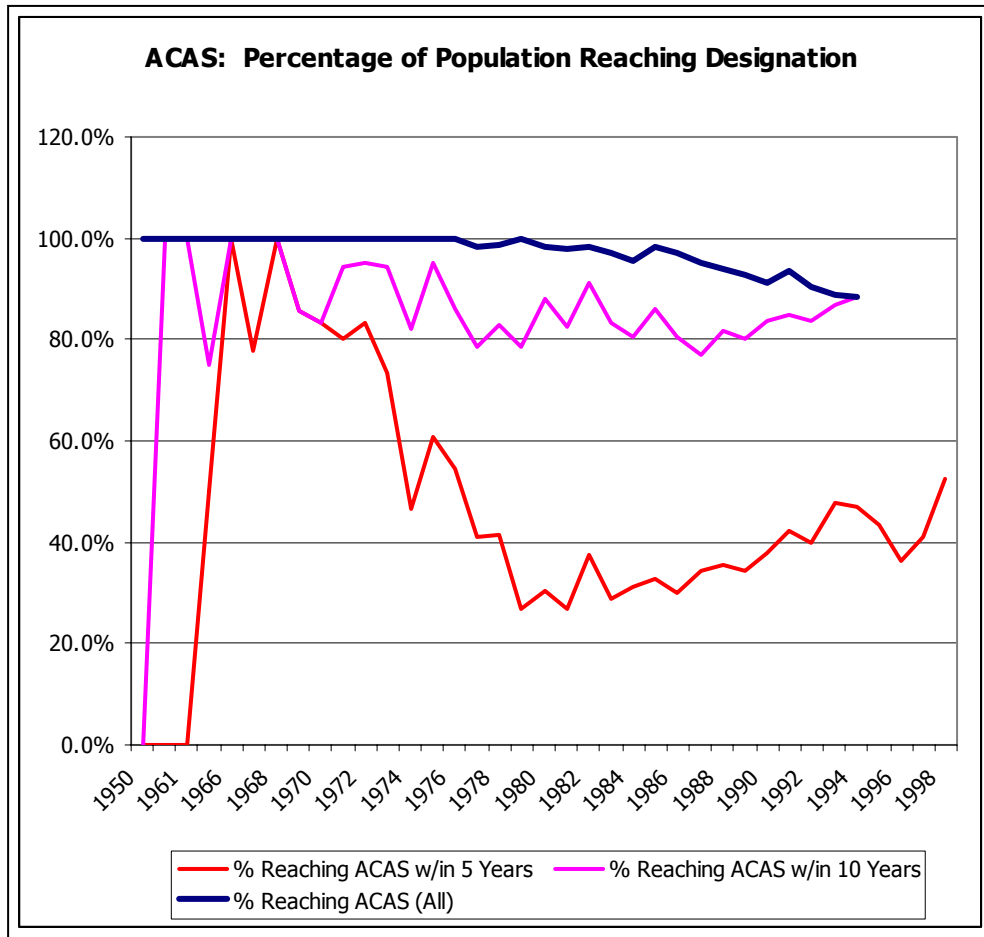
Another means of analyzing travel time data is to look at the percentage of each cohort that reaches Associateship or Fellowship within a given number of years. This is a predictor of future direction in median travel time for starting cohorts. If greater numbers of candidates reach designations earlier, median travel time can be expected to decrease. If the percentage of candidates reaching designations at early points falls, median travel time can be expected to increase. It should be noted that this statistic is heavily influenced by the recording of date of first employment. The CAS database contains records for over 16,000 individuals. Of these, only 3,148 have recorded employment dates. For candidates that dropped out of the examination system prior to

the capture of this data element, there is no cost effective means available to capture their employment dates. These candidates are therefore not included in the population prior to this century. The exclusion of these candidates therefore causes the completion percentages for early years to be inflated. The inclusion of these candidates going forward will cause percentages to fall. For future reports, it might be beneficial to compute travel time for both date of first employment and for date of first recorded examination result. The latter data element can cause some distortions, due to the absence of joint exam failures from the database and the coding of some dates as 1900/01 for joint exam results. However, reasonable adjustments for these data shortcomings should produce results that are useful and more robust than statistics based solely on date of first employment. Early studies utilizing date of first exam produced median travel time results comparable to those using first employment date after suitable adjustments. Following the earlier convention, cells highlighted in gray are not fully mature.

Completion Percentages for Associateship by Starting Cohort

Year of First Employment	Number of Candidates	% Reaching ACAS w/in 5 Years	% Reaching ACAS w/in 10 Years	% Reaching ACAS (All)
1950	1	0.0%	0.0%	100.0%
1960	1	0.0%	100.0%	100.0%
1961	1	0.0%	100.0%	100.0%
1964	4	50.0%	75.0%	100.0%
1966	4	100.0%	100.0%	100.0%
1967	9	77.8%	100.0%	100.0%
1968	4	100.0%	100.0%	100.0%
1969	7	85.7%	85.7%	100.0%
1970	24	83.3%	83.3%	100.0%
1971	35	80.0%	94.3%	100.0%
1972	42	83.3%	95.2%	100.0%
1973	53	73.6%	94.3%	100.0%
1974	45	46.7%	82.2%	100.0%
1975	41	61.0%	95.1%	100.0%
1976	57	54.4%	86.0%	100.0%
1977	61	41.0%	78.7%	98.4%
1978	70	41.4%	82.9%	98.6%
1979	74	27.0%	78.4%	100.0%
1980	66	30.3%	87.9%	98.5%
1981	52	26.9%	82.7%	98.1%
1982	56	37.5%	91.1%	98.2%
1983	66	28.8%	83.3%	97.0%
1984	67	31.3%	80.6%	95.5%
1985	64	32.8%	85.9%	98.4%
1986	107	29.9%	80.4%	97.2%
1987	148	34.5%	77.0%	95.3%
1988	115	35.7%	81.7%	93.9%
1989	151	34.4%	80.1%	92.7%
1990	182	37.9%	83.5%	91.2%
1991	140	42.1%	85.0%	93.6%
1992	155	40.0%	83.9%	90.3%
1993	144	47.9%	86.8%	88.9%
1994	166	47.0%	88.6%	88.6%
1995	117	43.6%	84.6%	84.6%
1996	151	36.4%	76.2%	76.2%
1997	132	40.9%	72.0%	72.0%
1998	116	52.6%	64.7%	64.7%
1999	84	47.6%	48.8%	48.8%
2000	78	29.5%	29.5%	29.5%
2001	86	16.3%	16.3%	16.3%
2002	85	4.7%	4.7%	4.7%
2003	75	0.0%	0.0%	0.0%
2004	14	0.0%	0.0%	0.0%

Graphically, these results produce the following:

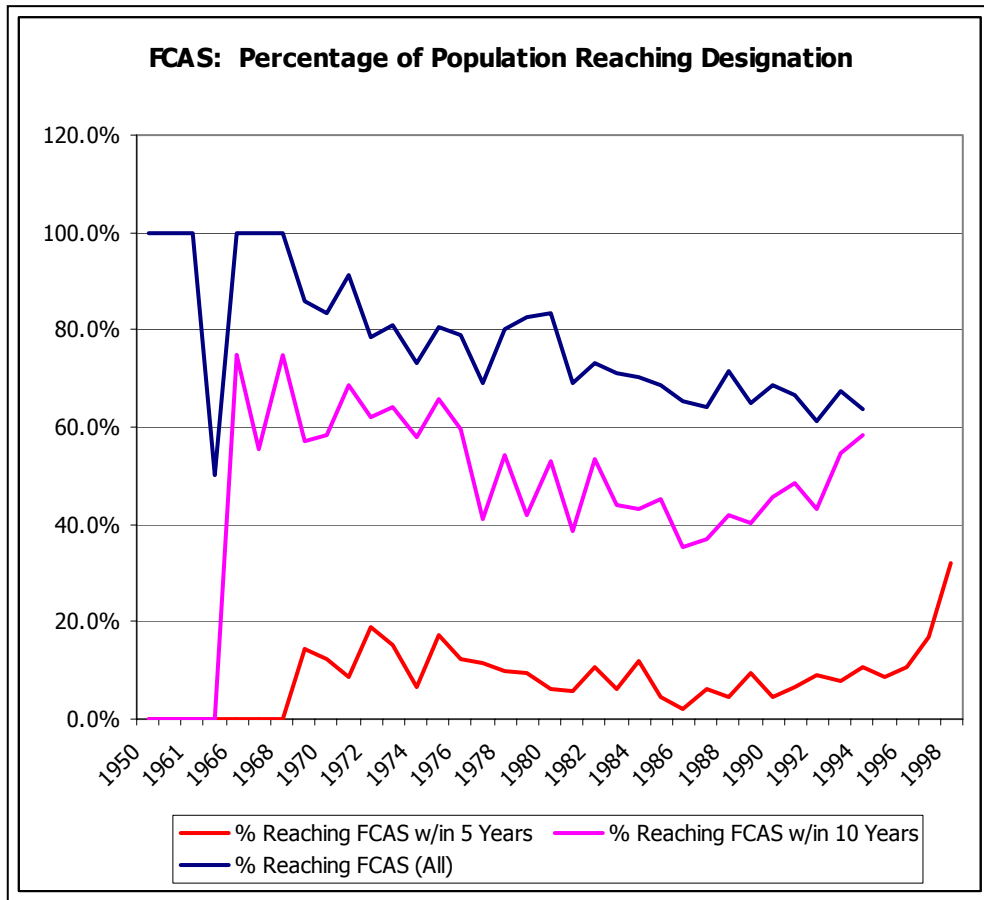


There appear to be some encouraging trends in the percentage of candidates reaching their Associateship within five years. Despite the fact that data points in the late 90's are more likely to be depressed by candidates that will ultimately drop out, but who have not yet (recall that date of first employment is now requested on exam registration forms), the proportion of each starting cohort completing Associateship within five years is increasing. The decline from 1993 to 1996 may represent the effect of the year 2000 transition, during which students shifted their exam taking patterns in an attempt to maximize post-transition credits. That is, during this period, it was common for students to skip partitioned parts 3-5 where credit could potentially be lost in the transition and attempt 6 and 7 for which the transition provided full credit. It is very encouraging that completion percentages increase dramatically in the late 90's. Candidates in these cohorts benefit from improvements in the exam construction process implemented at the same time.

Completion Percentages for Fellowship by Starting Cohort

Year of First Employment	Number of Candidates	% Reaching FCAS w/in 5 Years	% Reaching FCAS w/in 10 Years	% Reaching FCAS (All)
1950	1	0.0%	0.0%	100.0%
1960	1	0.0%	0.0%	100.0%
1961	1	0.0%	0.0%	100.0%
1964	4	0.0%	0.0%	50.0%
1966	4	0.0%	75.0%	100.0%
1967	9	0.0%	55.6%	100.0%
1968	4	0.0%	75.0%	100.0%
1969	7	14.3%	57.1%	85.7%
1970	24	12.5%	58.3%	83.3%
1971	35	8.6%	68.6%	91.4%
1972	42	19.0%	61.9%	78.6%
1973	53	15.1%	64.2%	81.1%
1974	45	6.7%	57.8%	73.3%
1975	41	17.1%	65.9%	80.5%
1976	57	12.3%	59.6%	78.9%
1977	61	11.5%	41.0%	68.9%
1978	70	10.0%	54.3%	80.0%
1979	74	9.5%	41.9%	82.4%
1980	66	6.1%	53.0%	83.3%
1981	52	5.8%	38.5%	69.2%
1982	56	10.7%	53.6%	73.2%
1983	66	6.1%	43.9%	71.2%
1984	67	11.9%	43.3%	70.1%
1985	64	4.7%	45.3%	68.8%
1986	107	1.9%	35.5%	65.4%
1987	148	6.1%	37.2%	64.2%
1988	115	4.3%	41.7%	71.3%
1989	151	9.3%	40.4%	64.9%
1990	182	4.4%	45.6%	68.7%
1991	140	6.4%	48.6%	66.4%
1992	155	9.0%	43.2%	61.3%
1993	144	7.6%	54.9%	67.4%
1994	166	10.8%	58.4%	63.9%
1995	117	8.5%	57.3%	57.3%
1996	151	10.6%	51.0%	51.0%
1997	132	16.7%	54.5%	54.5%
1998	116	31.9%	48.3%	48.3%
1999	84	21.4%	27.4%	27.4%
2000	78	20.5%	20.5%	20.5%
2001	86	11.6%	11.6%	11.6%
2002	85	1.2%	1.2%	1.2%
2003	75	0.0%	0.0%	0.0%
2004	14	0.0%	0.0%	0.0%

Graphically:



Here again, trends are encouraging, particularly with regard to the percentage of starting cohorts achieving Fellowship within five years. Sharp increases in the late 90's may be the effect of improvements in the exam system and the reduction of the system from 10 to 9 exams. It is notable, however, that the percentage of candidates achieving fellowship within five years is still less than 40% and the percentage achieving Fellowship within 10 years is less than 60%. It will difficult to achieve a median travel time of 5-7 years under these circumstances.

EXAM PROGRESS STATISTICS

Two additional indicators of travel time are examination pass ratios and average candidate examination progress. Examination pass ratios provide data on number of candidates sitting and number passing for each examination part. Average candidate examination progress indicates the average number of examinations passed in each examination session.

Examination Pass Ratios:

Exam		S 2000	F 2000	S2001	F2001	S2002	F2002	S2003	F2003	S2004
1	Exams Taken	2667	2526	3498	3508	4860	4740	5398	5647	6577
	Passed	618	857	1167	1178	2096	1713	2057	2313	2225
	Raw Pass Ratio	23.2	33.9	33.4	33.6	43.1	36.1	38.1	41.0	33.8
	Effective Pass Ratio	26.3	36.7	37.4	37.9	46.5	41.5	41.3	46.5	38.5
2	Exams Taken	1903	1952	2115	2115	2549	2758	2710	3356	3656
	Passed	509	629	676	860	949	1360	961	1314	945
	Raw Pass Ratio	26.7	32.2	32.0	40.7	37.2	49.3	35.5	39.2	25.8
	Effective Pass Ratio	29.4	33.6	35.2	43.0	40.1	51.8	37.6	40.7	27.9
3	Exams Taken	1375	1466	1526	1450	1776	1765	2077	231	364
	Passed	438	528	651	605	745	705	820	101	112
	Raw Pass Ratio	31.9	36.0	42.7	41.7	41.9	39.9	39.5	43.7	30.8
	Effective Pass Ratio	36.5	39.3	46.2	45.6	46.4	43.4	42.8	51.5	38.1
4	Exams Taken	913	963	1008	1149	1272	1283	1215	1610	1728
	Passed	309	356	409	491	564	739	613	823	864
	Raw Pass Ratio	33.8	37.0	40.6	42.7	44.3	57.6	50.5	51.1	50.0
	Effective Pass Ratio	37.3	41.0	43.3	46.5	47.7	60.3	51.8	53.5	52.1
5	Exams Taken	606	n/a	524	n/a	458	n/a	497	n/a	563
	Passed	216	n/a	190	n/a	199	n/a	214	n/a	229
	Raw Pass Ratio	35.6	n/a	36.3	n/a	43.4	n/a	43.1	n/a	40.7
	Effective Pass Ratio	42.9	n/a	43.7	n/a	49.4	n/a	46.1	n/a	42.9
6	Exams Taken	n/a	623	n/a	596	n/a	543	n/a	583	n/a
	Passed	n/a	189	n/a	208	n/a	217	n/a	228	n/a
	Raw Pass Ratio	n/a	30.3	n/a	34.9	n/a	40.0	n/a	39.1	n/a
	Effective Pass Ratio	n/a	40.6	n/a	44.7	n/a	48.0	n/a	45.4	n/a
7-CN	Exams Taken	40	n/a	48	n/a	47	n/a	58	n/a	48
	Passed	18	n/a	19	n/a	19	n/a	23	n/a	15
	Raw Pass Ratio	45.0	n/a	39.6	n/a	40.4	n/a	39.7	n/a	31.3
	Effective Pass Ratio	46.2	n/a	41.3	n/a	43.2	n/a	42.6	n/a	31.9
7-US	Exams Taken	516	n/a	494	n/a	442	n/a	378	n/a	373
	Passed	202	n/a	203	n/a	207	n/a	164	n/a	163
	Raw Pass Ratio	39.1	n/a	41.1	n/a	46.8	n/a	43.4	n/a	43.7
	Effective Pass Ratio	46.9	n/a	45.0	n/a	50.2	n/a	44.8	n/a	45.2
8	Exams Taken	319	n/a	310	n/a	349	n/a	331	n/a	309
	Passed	129	n/a	124	n/a	176	n/a	170	n/a	148
	Raw Pass Ratio	40.4	n/a	40.0	n/a	50.4	n/a	51.4	n/a	47.9
	Effective Pass Ratio	45.4	n/a	44.6	n/a	54.7	n/a	53.6	n/a	51.4
9	Exams Taken	n/a	324	n/a	308	n/a	299	n/a	338	n/a
	Passed	n/a	126	n/a	135	n/a	138	n/a	127	n/a
	Raw Pass Ratio	n/a	38.9	n/a	43.8	n/a	46.2	n/a	37.6	n/a
	Effective Pass Ratio	n/a	45.8	n/a	49.3	n/a	50.4	n/a	41.5	n/a

From these data, three observations are worthy of note:

- Enrollment in the early examinations is up very sharply, indicating increased interest in the profession. Note, the apparent drop in enrollment for Exam 3 in the fall 2003 sitting is the result of the implementation of a separate CAS exam 3. Statistics for Exam 3 for fall 2003 and spring 2004 do not include candidates sitting for the SoA Exam 3.
- Pass ratios for Spring 2004 fell from the all-time high levels observed in the Fall 2003 examination sessions. Except for Exam 2, pass ratios appear to be in line with historical norms.

Travel Time: Exam Progress Statistics

A. CAS-Specific Exams

<u>CAS Examination</u>	<u>Exam Progress</u> ¹	<u>Pass Ratio</u> ²	<u>Average Number of Exams Taken</u> ³
<i>The following statistics are for CAS-administered exams. In 1983, the CAS administered Exams 4-10.</i>			
Spring 1983	0.36	0.35	1.02
Fall 1983	0.29	0.29	1.01
Spring 1984	0.38	0.38	1.01
Fall 1984	0.35	0.35	1.01
Spring 1985	0.36	0.36	1.02
Fall 1985	0.40	0.39	1.02
Spring 1986	0.37	0.37	1.02
Fall 1986	0.38	0.37	1.01
Spring 1987	0.37	0.36	1.02
Fall 1987	0.35	0.35	1.01
Spring 1988	0.35	0.34	1.02
Fall 1988	0.36	0.36	1.01
Spring 1989	0.36	0.35	1.01
Fall 1989	0.39	0.39	1.01
Spring 1990	0.33	0.33	1.01
<i>Fall 1990, CAS begins to administer Exam 3B. Exam 5 is partitioned into two parts.</i>			
Fall 1990	0.26	0.34	0.76
Spring 1991	0.33	0.38	0.87
Fall 1991	0.28	0.36	0.77
<i>Spring 1992, CAS partitions Exam 4 into two parts.</i>			
Spring 1992	0.30	0.38	0.80
Fall 1992	0.30	0.38	0.81
Spring 1993	0.29	0.38	0.78
Fall 1993	0.30	0.38	0.78
Spring 1994	0.30	0.38	0.79
Fall 1994	0.30	0.39	0.76
Spring 1995	0.29	0.37	0.78
Fall 1995	0.27	0.36	0.76
Spring 1996	0.31	0.40	0.78
Fall 1996	0.29	0.40	0.74
Spring 1997	0.30	0.38	0.79
Fall 1997	0.24	0.33	0.73
Spring 1998	0.31	0.38	0.81
Fall 1998	0.24	0.34	0.73
Spring 1999	0.30	0.40	0.77
Fall 1999	0.29	0.40	0.73
<i>Spring 2000, CAS administers non-partitioned Exams 5-9.</i>			
Spring 2000	0.38	0.38	1.01
Fall 2000	0.38	0.38	1.01
Spring 2001	0.39	0.39	1.01

Continued on next page.

¹ The number of full examination equivalents passed per candidate. (This is a product of the second and third columns.)

² The number of full examination equivalents passed per exam equivalent taken.

³ The number of full examination equivalents taken per candidate.

<u>CAS Examination</u>	<u>Exam Progress</u>	<u>Pass Ratio</u>	<u>Average Number of Exams Taken³</u>
<i>Fall 2001, learning objectives developed for Fall Exams. CAS implements pass mark panels.</i>			
Fall 2001	0.38	0.38	1.00
<i>Spring 2002, CAS implements item writer training (starting with Fall Exams). Learning objectives developed for Spring Exams.</i>			
Spring 2002	0.46	0.46	1.00
Fall 2002	0.42	0.42	1.00
Spring 2003	0.46	0.45	1.01
<i>Fall 2003, CAS begins to administer its own version of Exam 3.</i>			
Fall 2003	0.40	0.40	1.00
Spring 2004	0.41	0.40	1.01

B. Joint Exams

1. All Candidates

<u>CAS/SoA Examination</u>	<u>Exam Progress¹</u>	<u>Pass Ratio²</u>	<u>Average Number of Exams Taken³</u>
Spring 2000	0.28	0.27	1.03
Fall 2000	0.35	0.34	1.03
Spring 2001	0.37	0.36	1.04
Fall 2001	0.40	0.38	1.05
Spring 2002	0.44	0.42	1.07
Fall 2002	0.45	0.43	1.06
Spring 2003	0.41	0.39	1.06
<i>Fall 2003, CAS administers its own version of Exam 3 that is reported with CAS-specific exams.</i>			
Fall 2003	0.45	0.42	1.07
Spring 2004	0.36	0.34	1.06

2. CAS Candidates

<u>CAS/SoA Examination</u>	<u>Exam Progress¹</u>	<u>Pass Ratio²</u>	<u>Average Number of Exams Taken³</u>
Spring 2000	0.23	0.23	1.02
Fall 2000	0.28	0.27	1.01
Spring 2001	0.28	0.27	1.01
Fall 2001	0.34	0.33	1.03
Spring 2002	0.37	0.36	1.04
Fall 2002	0.49	0.47	1.04
Spring 2003	0.41	0.39	1.04
<i>Fall 2003, CAS administers its own version of Exam 3 that is reported with CAS-specific exams.</i>			
Fall 2003	0.45	0.44	1.03
Spring 2004	0.32	0.31	1.04

¹ The number of full examination equivalents passed per candidate. (This is a product of the second and third columns.)

² The number of full examination equivalents passed per exam equivalent taken.

³ The number of full examination equivalents taken per candidate.

Note

The Exam Progress Statistics for exams jointly administered by the CAS and SoA are presented separately because the two societies maintain independent databases with different candidate identification numbers. The first chart provides statistics for all candidates who took joint exams; the second chart represents only those candidates who indicate on their application forms that they work in the property-casualty industry.

Key observations from these data are:

- Enrollment has increased sharply in the past two years for exams 1 and 2. This would indicate increased interest in the actuarial profession and an increasing supply of future actuaries.
- Exam progress for joint exams is down from historically high levels in 2003. Progress is now in line with historical norms.
- Average number of exams taken during the partitioning period should be viewed cautiously. The database does not contain records for all failed attempts on joint exams. These exam attempts are therefore not contemplated in the average number of exams taken. That is, during partitioning, it was possible for a candidate to take partial exams in the CAS system at the same time as exams in the Joint Structure (1, 2, 3A, 3C). The latter are not included in the statistics above unless the candidate passed.

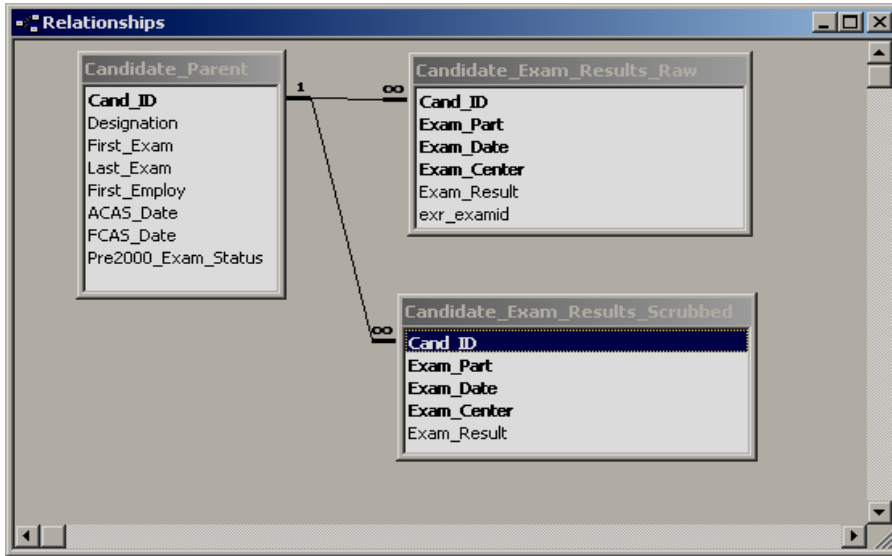
APPENDIX A: DATA AND METHODS

All data presented in this report are derived from examination and membership databases maintained by CAS staff². These databases are updated following each exam session to reflect individual exam results and membership status. Data include exam results from both CAS exams and from exams administered jointly by the CAS and SoA. CAS staff members export a portion of this data and provide it to the Education Policy Committee (EPC) for study. Included in the export are the following data elements:

Field Name	Contents
MAS_ID	CAS Membership Master ID Number
MAS_DESIGN	CAS Membership Status (ACAS, FCAS, Student, Affiliate, etc.)
EXR_EXSIT	Date of Examination (YYYY/MM)
EXR_EXAMID	Examination Part
EXR_CENTID	Examination Center
EXR_GRADE	Examination Result (Pass, Fail, Not-Take, etc.)
EHI_OEXSTA	Examination Credits Prior to 2000 Transition
EHI_CEXSTA	Current Examination Credits
MAS_FTEMPL	Date of Full Time Employment
MAS_ACAS	Date ACAS Achieved
MAS_FCAS	Date FCAS Achieved

² Some statistics here include results from joint examinations and are derived from the SoA database. Such statistics include candidates for the SoA and candidates that have not yet declared a preference between the Life/Health and Property/Casualty track.

The EPC scrubs, normalizes, and transforms this table into the following three tables using Microsoft Access:



These tables contain the following data:

Table: Candidate_Parent	
Field	Contents
Cand_ID	CAS Membership Master ID Number
Designation	CAS Membership Status (ACAS, FCAS, Student, Affiliate, etc.)
First_Exam	Date of first examination record found in Candidate_Exam_Results_Scrubbed. Converted into decimal format for ease of use (i.e. 1998/06 => 1998.5).
Last_Exam	Date of last examination record found in Candidate_Exam_Results_Scrubbed. Converted into decimal format for ease of use (i.e. 1998/06 => 1998.5).
First_Employ	Date of first full time P&C employment if reported by candidate. Converted into decimal format for ease of use (i.e. 1998/06 => 1998.5). For candidates with no reported date, this field contains zero.
ACAS_Date	Date ACAS conferred. Converted into decimal format for ease of use (i.e. 1998/06 => 1998.5). For candidates not having achieved Associateship, this field contains zero.
FCAS_Date	Date FCAS conferred. Converted into decimal format for ease of use (i.e. 1998/06 => 1998.5). For candidates not having achieved Associateship, this field contains zero.
Pre2000_Exam_Status	Free form string containing a list of all pre-2000 exams for which the candidate had credit prior to the transition. For example, "1, 2, 3A, 4B".

Candidate_Parent is used to construct the travel time statistics displayed in this report.

Table: Candidate_Exam_Results_Raw	
Field	Contents
Cand_ID	CAS Membership Master ID Number
Exam_Part	Standardized exam identifier (see below). Converted from exr_exam_id
Exam_Date	Recorded date (YYYY/MM) for which the candidate registered for the exam.
Exam_Center	Abbreviated examination center
Exam_Result	Pass, Fail, Not-Take, etc.
Exr_Exam_ID	Examination part label from raw data (see below).

Candidate_Exam_Results_Raw is used only for ensuring correct record counts and conversion of examination part labels.

Table: Candidate_Exam_Results_Scrubbed	
Field	Contents
Cand_ID	CAS Membership Master ID Number
Exam_Part	Standardized exam identifier (see below). Converted from exr_exam_id
Exam_Date	Recorded date for which the candidate registered for the exam. Converted to decimal format for ease of use (i.e. 1998/06=>1998.5).
Exam_Center	Abbreviated examination center
Exam_Result	Converted from raw data into Pass, Fail, or Did Not Sit. Note that blank results in the raw data are not imported into this table.

Candidate_Exam_Results_Scrubbed is intended for future use in detailed studies of candidate progress. For example, this table was used in a 2003 study that used Markov Chains to examine the relationship between the current and prior sitting. That study indicated a strong correlation between passing in prior and current sittings. That is, students who pass are more likely to pass the next exam sitting.

It is hoped that publication of these data structures will allow greater numbers of volunteers, including students, to construct queries and applications to assist in the study of travel time. In the coming months, the EPC will publish “dummy” data that conforms to these structures that volunteers can use to construct such tools. Once such tools are constructed and tested against faux data, they can be delivered to the CAS office for application to real data. This plan protects the anonymity of candidate examination records while increasing the pool of volunteers capable of assisting in the construction of new tools and metrics for the study of those data.

DATA TRANSFORMATIONS

In order to make the construction of queries simpler, several of the data fields have been transformed. This section describes these transformations.

Dates:

All dates are transformed into decimal format using the rule:

$$\text{Decimal Date} = \text{Year} + \text{Month}/12$$

In this fashion, it is possible to compute the difference between dates in the tables without using special query logic.

Exam Results:

Exam result labels are entered by hand and do not always conform to established data entry standards. The following table contains the transformations from raw data to standardized labels:

Raw Data	Converted Value
FAIL	FAIL
NOT-TAKE	DID NOT SIT
PASS	PASS
REFUND	DID NOT SIT
TRANSFER	DID NOT SIT
HOLD	DID NOT SIT
INVA	DID NOT SIT
INVALID	DID NOT SIT

Exam Part Labels:

Exam part labels as coded in the raw data are difficult to use because their ASCII sort order is not the natural order in which we are accustomed to seeing them and because Microsoft Access SQL does not distinguish between upper and lower case letters. The following table contains the raw data labels and their converted values: The Exam_Value represents the percentage of an exam attributed to each part label.

Raw Data	Converted	Exam_Value
1	01X	1
2	02X	1
3A	03A	0.33
3B	03B	0.33
3b	03b	0.33
3C	03C	0.34
3	03X	1
4A	04A	0.5
4B	04B	0.5
4	04X	1
5A	05A	0.5
5B	05B	0.5
5	05X	1
6	06X	1
7C	07C	1
7U	07U	1
7	07X	1
8C	08C	1
8	08X	1
9	09X	1
PC	0PC	0
10	10X	1

SIGNIFICANT NOTES ABOUT THE DATA

Users of this data, including readers of this report, should be aware that the data have significant limitations. An understanding of these limitations is critical to anyone analyzing statistics drawn from this data set. The following points describe the currently known limitations:

- The CAS databases do not contain a complete examination history for every candidate. The databases were constructed in the late 1980's. At that time, an effort was undertaken to locate as many exam results as possible. However, for some candidates, not all history was available.
- Prior to 2000, results for joint exams were often entered with an examination date of 1900/01.
- Prior to 2000, failed attempts on joint examinations were frequently not entered into the database.
- Waivers are frequently coded with the date on which the waiver was approved rather than a May or November date.
- Dates coded for achievement of ACAS and FCAS are recorded as the date of the meeting during which the member was formally recognized. This date is generally six months after the exam sitting during which the candidate sat.
- Dates of first P&C employment are now routinely collected by the CAS for all candidates registering for CAS exams. An attempt is ongoing to collect this data for current members. However, this data element is not present for many candidates who left the process without achieving a designation and for a significant number of members.