

CASUALTY ACTUARIAL SOCIETY  
EDUCATION POLICY COMMITTEE

# 2007 TRAVEL TIME REPORT

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

February 2008

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## EXECUTIVE SUMMARY AND DISCUSSION

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Travel time statistics for CAS candidates continue to be challenging to compile and interpret. Since no single metric can fully convey all aspects of interest regarding travel time, our report applies several different measures of progress. From our analysis of these metrics, we draw the following conclusions:

- For the most efficient candidates, travel times are decreasing and have been decreasing for some time. The fastest 50% of candidates from the late 1990's have travel times one to two years shorter than the fastest 50% of candidates from the 1980's. Exam partitioning does not appear to have had a detrimental effect on travel time. There is a recent up tick in travel time that bears monitoring.
- Travel time is well above the goal of five to seven years defined by the Board of Directors. Median travel time is currently about 8.5 years to Fellowship. This is an improvement from the levels in the 1980's but an increase from the level in the 1970's. A new measure introduced this year indicates that travel time from first exam has been consistently around 10 years. Travel time from first employment, however, has been improving because the average time from first exam to first employment is increasing. This new measure, however, confirms that travel time from first employment is currently 8.5. It is possible that the difference is because students are taking exams earlier in their college years, however it could be due to fewer employment opportunities for students with 1 exam.
- Although travel time is higher than for comparable professions, candidates are entering the profession at a record pace. Statistics from the joint exams and from the CAS exams show sharp increases in the number of candidates sitting. Travel time does not appear to be deterring the growth of the profession.
- The demographic constituency of the candidate pool is changing and that change affects travel time. Students who are older upon accepting their first casualty employment have shorter travel times. In addition, the average student sitting for their first exam is older today than in past years. However, we have relatively few other demographic markers in the database that we can use to analyze candidate progress. For example, the percentage of members in consulting positions has increased over the past decade. We do not have enough data to study how that shift might affect the candidate population. We do not have any means of controlling for employer support of the exams, but suspect that the effect of shifts in the level of support in different employment categories might be affecting travel time.
- Significant numbers of candidates drop out of the process before becoming members of the CAS. Currently only about 20% of candidates will reach the Associateship level and only 18% will reach the fellowship level (see Data Based on Date of First Exam).
- There have been a number of significant changes in the examination system since 1990. These changes disrupt the flow of candidates through the system and affect the supply of candidates to employers (see Travel Time: Exam Progress Statistics).

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## RESULTS AND ANALYSIS

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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. Some statistics derived from the raw data are subject to “development” in that additional data will emerge as candidates in certain cohorts continue to complete examinations and report them to the CAS and while existing members report their dates of first employment. 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. In this year’s report we have added an analysis of travel time from first exam. We believe that this new approach can be expanded over time to replace many of the existing statistics. For this report we have also updated all the statistics from last year’s report both for continuity and because they are insightful.

Among the statistics presented in this report, updated to include results through the May 2007 examination sessions, are:

- Distribution of Travel Times for Members,
- Median Travel Times for Starting Cohorts,
- Percentage Completion for Starting Cohorts,
- Travel Times by Candidate Age,
- Development Factor Approach to Travel Time from First Exam, and
- Exam Progress Statistics.

Each of these appears below with separate discussion.

### 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 September 2007, the CAS has collected the following employment date statistics:

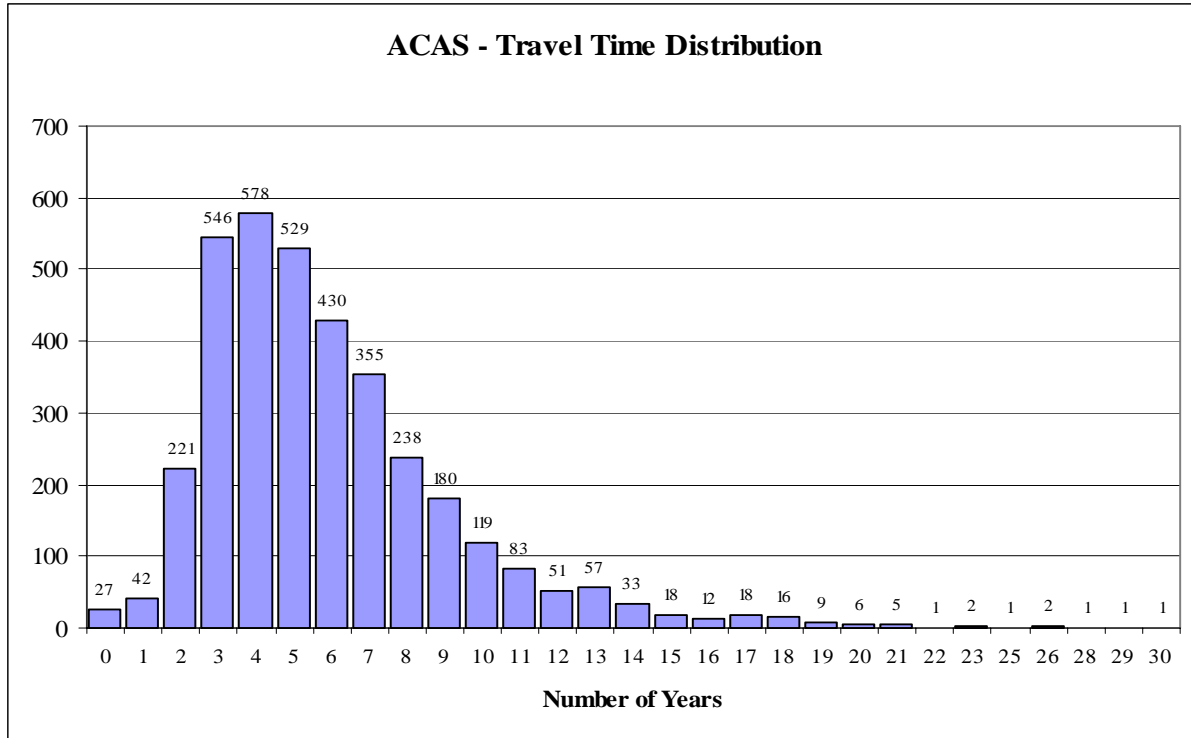
#### Candidate/Member Population vs. Collection of Employment Dates

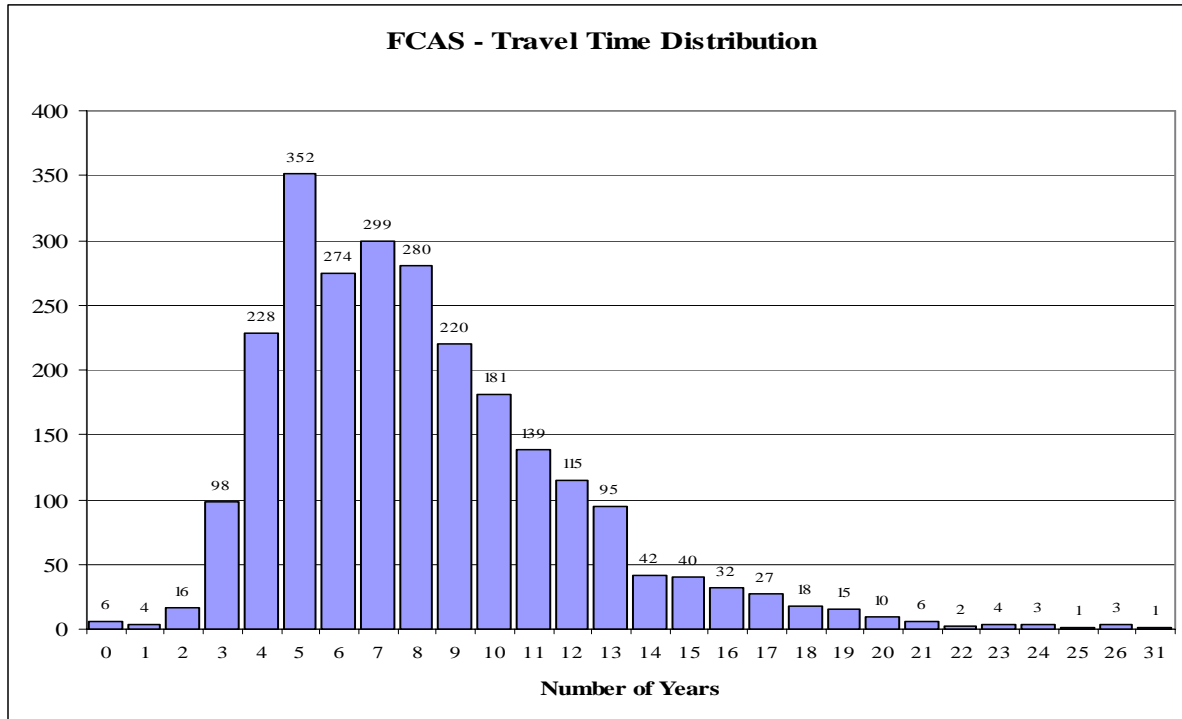
Membership Category	Total Population	Number Having Recorded First Employment Dates
ACAS	1,473	1,135
FCAS	2,955	2,511
STUDENT	17,393	1,852

These statistics represent an increase in the percentage of individuals in the database having coded first employment dates. In last year’s report, 75.6% of Associates and 83.6% of

Fellows had submitted dates of first employment. This year, 77.1% of Associates and 85.0% of Fellows have submitted first employment dates to the CAS office. CAS Staff also continue to comb and scrub the data to correct illogical entries.

For each Associate and Fellow having recorded first employment dates, a travel time was computed as the difference between receipt of the credential at a CAS meeting less the first employment date. Results, rounded to the nearest year, are displayed in histograms below:





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 1.5 years after starting work.

Both populations are skewed with heavy right tails. The six-year point in the FCAS histogram is curious. One plausible hypothesis is that candidates in the seven year class will have gaps in their exam history that represent situations in which these candidates had to wait a full year between examination sittings to complete their final exam because examinations beyond part 4 (part 5 throughout much of the history) are offered only once per year.

**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 truncated at each of five and 10 years.

These data should be viewed carefully, as more recent cohorts are significantly truncated and will continue to “develop” over time. Cells highlighted in gray are not fully developed<sup>1</sup>. Obviously, all cells representing the entire population will continue to “develop” 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 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
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
1965	3	3	5.50	1	3.92	3	5.50
1966	6	6	4.42	5	4.25	6	4.42
1967	9	9	3.92	7	3.92	9	3.92
1968	5	5	4.00	4	3.96	4	3.96
1969	9	9	4.00	8	3.67	9	4.00
1970	27	27	3.58	23	3.42	23	3.42
1971	42	41	3.67	34	3.42	39	3.58
1972	51	51	3.00	41	2.75	48	2.92
1973	62	62	3.42	42	2.83	56	3.17
1974	48	48	5.17	23	3.67	41	4.83
1975	48	47	4.92	26	3.88	43	4.67
1976	64	63	5.17	32	3.88	52	4.63
1977	69	69	5.92	31	3.50	56	4.88
1978	73	70	5.83	30	4.29	61	5.17
1979	92	88	6.71	24	3.79	66	5.88
1980	74	74	6.42	22	3.63	66	6.21
1981	64	60	7.13	16	4.29	51	6.75
1982	66	64	5.75	23	3.92	58	5.54
1983	72	67	6.75	19	4.50	56	6.08
1984	79	75	6.58	24	3.50	60	5.71
1985	77	76	6.42	24	3.88	63	5.83
1986	133	120	6.50	40	4.29	99	5.75
1987	177	163	6.42	59	3.92	133	5.92
1988	135	123	6.08	46	4.00	106	5.83
1989	189	172	6.08	58	3.83	135	5.50
1990	214	189	5.92	78	3.92	169	5.42
1991	179	155	5.42	68	3.58	140	5.25
1992	187	162	5.54	71	3.83	145	5.25
1993	176	158	5.21	76	3.79	140	4.83
1994	208	182	5.38	83	3.92	163	5.00
1995	158	117	5.42	53	3.83	110	5.29
1996	199	149	6.25	53	3.83	136	5.88

<sup>1</sup> No cell in the overall median column can be considered fully developed until no active candidate remains that has not completed the examinations. Cells in the truncated column are considered not fully developed when any candidate in the starting year has not yet had the full number of years to sit for exams and receive their credential.

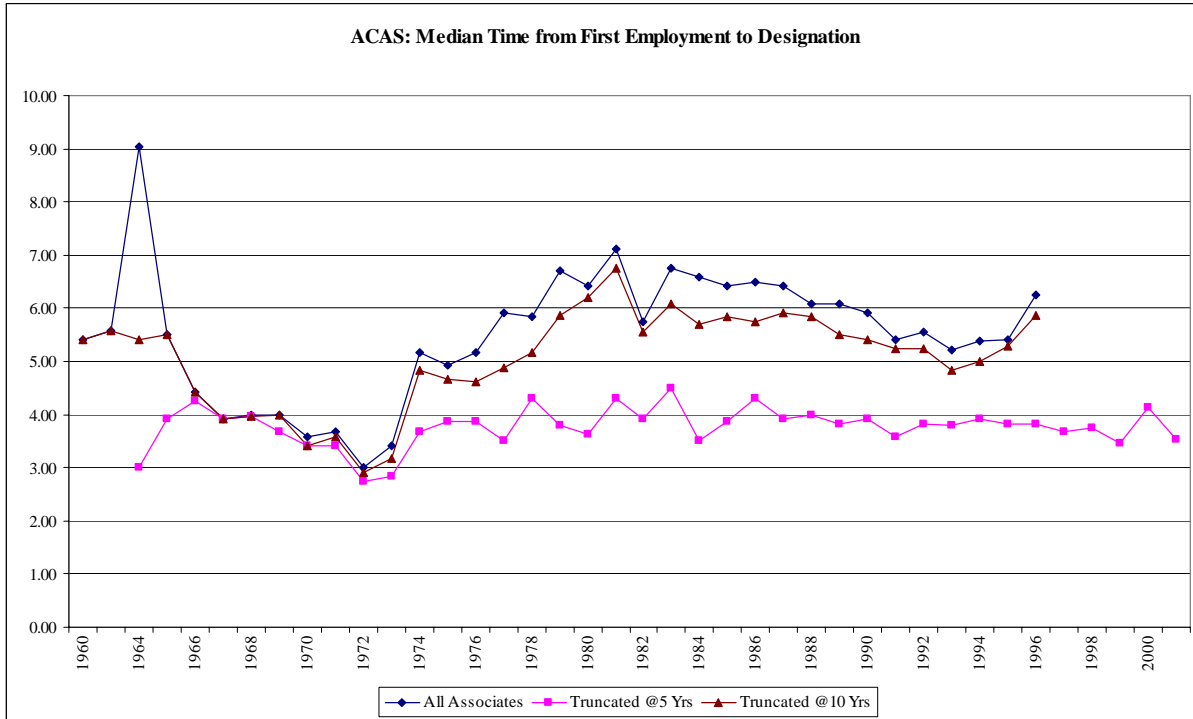
1997	179	123	5.50	52	3.67	119	5.42
1998	198	128	5.08	65	3.75	128	5.08
1999	166	90	5.42	40	3.46	90	5.42
2000	173	85	4.92	44	4.13	85	4.92
2001	241	90	4.42	60	3.54	90	4.42
2002	309	117	4.17	90	3.71	117	4.17
2003	369	127	3.42	127	3.42	127	3.42
2004	362	68	2.96	68	2.96	68	2.96
2005	305	37	2.42	37	2.42	37	2.42
2006	157	6	1.63	6	1.63	6	1.63
2007	43	1	0.83	1	0.83	1	0.83

Notes: Because many candidates are unknown to the CAS until they enroll in their first CAS exam, and many are still taking joint exams when they begin casualty employment, the total number of candidates in recent year cohorts will increase over time. For example, in last year's report, there were 334 candidates in the 2004 starting cohort versus 362 in this year's report<sup>2</sup>.

Displayed graphically, these data are somewhat easier to interpret:

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<sup>2</sup> The 43 candidates in 2007 will almost certainly exceed 300 when the reporting is complete.



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, this interpretation of those statistics now appears to be questionable. New statistics which were first included two years ago provide evidence that exam partitioning may not have had a materially deleterious effect on candidate travel time<sup>3</sup>. Older reports also included statistics on mean travel times for graduating classes. Those statistics were often cited as indicating sharp increases in travel time. Statistics here based on starting year and using median and earlier percentiles do not show sharp increases. The latest points on this graph do, however, give cause for some concern. These increases are likely due to the change in the exam system in 2000. The travel times to fellowship (see next two pages) do not show a corresponding increase.

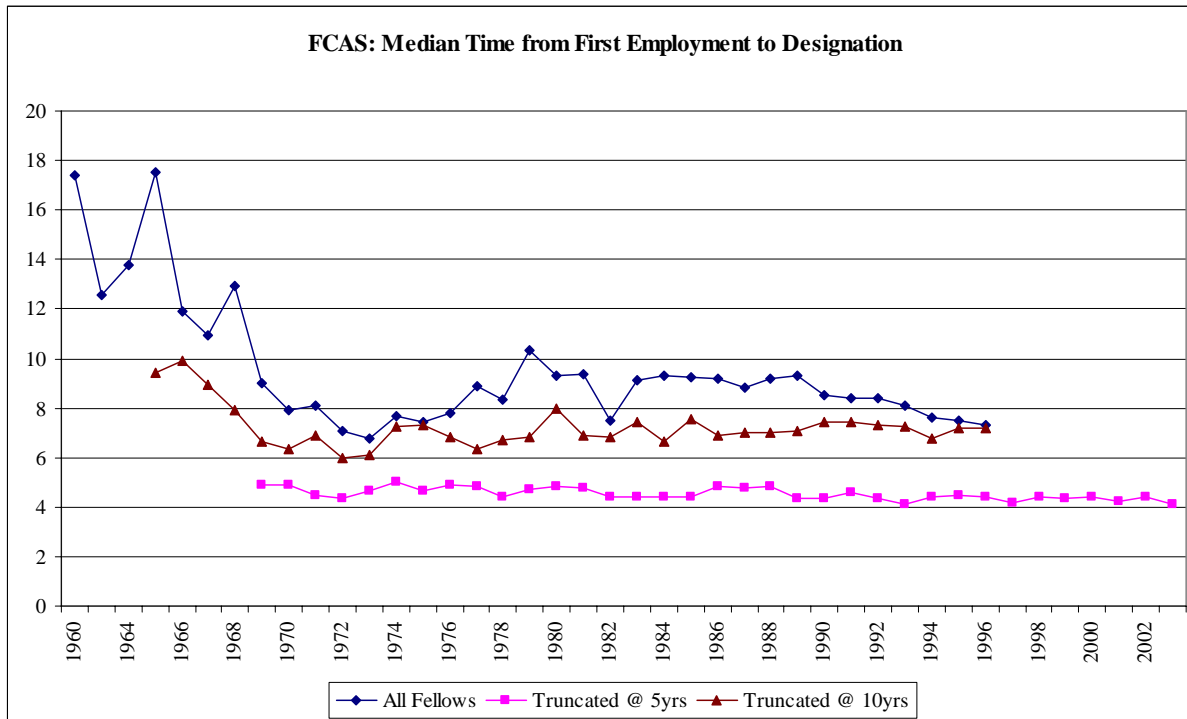
<sup>3</sup> See "Fisher Statistics" below.

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

Year of 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
1960	1	1	17.42	0		0	
1961	1	1	12.58	0		0	
1964	4	2	13.79	0		0	
1965	3	3	17.50	0		1	9.42
1966	6	5	11.92	0		3	9.92
1967	9	9	10.92	0		5	8.92
1968	5	5	12.92	0		3	7.92
1969	9	6	9.00	1	4.92	4	6.63
1970	27	21	7.92	3	4.92	15	6.33
1971	42	38	8.08	3	4.50	28	6.92
1972	51	40	7.08	10	4.38	30	6.00
1973	62	46	6.75	8	4.63	36	6.08
1974	48	35	7.67	3	5.00	29	7.25
1975	48	37	7.42	7	4.67	28	7.29
1976	64	52	7.79	7	4.92	38	6.83
1977	69	50	8.88	9	4.83	31	6.33
1978	73	57	8.33	7	4.42	40	6.71
1979	92	71	10.33	8	4.71	35	6.83
1980	74	62	9.29	5	4.83	40	8.00
1981	64	42	9.38	3	4.75	24	6.88
1982	66	43	7.50	6	4.42	32	6.83
1983	72	50	9.13	4	4.42	29	7.42
1984	79	56	9.29	8	4.42	32	6.63
1985	77	53	9.25	3	4.42	34	7.54
1986	133	86	9.21	3	4.83	48	6.88
1987	177	113	8.83	12	4.79	64	7.00
1988	135	94	9.17	7	4.83	55	7.00
1989	189	118	9.29	15	4.33	69	7.08
1990	214	138	8.50	9	4.33	89	7.42
1991	179	115	8.42	9	4.58	77	7.42
1992	187	112	8.42	16	4.38	77	7.33
1993	176	119	8.08	15	4.08	91	7.25
1994	208	132	7.58	19	4.42	98	6.79
1995	158	85	7.50	10	4.46	72	7.17
1996	199	101	7.33	16	4.42	90	7.21
1997	179	91	6.42	22	4.17	87	6.42
1998	198	94	5.79	40	4.42	94	5.79
1999	166	49	5.92	18	4.33	49	5.92
2000	173	57	5.42	21	4.42	57	5.42
2001	241	60	4.83	33	4.25	60	4.83
2002	309	69	4.58	45	4.42	69	4.58
2003	369	60	4.13	60	4.13	60	4.13
2004	362	27	3.42	27	3.42	27	3.42
2005	305	5	2.50	5	2.50	5	2.50

2006	157	1	0.67	1	0.67	1	0.67
2007	43	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 1993, the average median travel time is approximately 8.5 years. Standard deviation for classes starting 1970-1992 is 0.90 years. Of all Classes from 1970 to present, only the class of 1973 succeeded in achieving a median travel time less than seven years. Travel times truncated at 5 and 10 years have been very stable.

#### 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 almost 22,000 individuals. Of these, only 5,498 have recorded employment dates. Note that the CAS database increased in size by almost 2,000 candidates in the past 12 months. Date of first employment is now required for all candidates registering for examinations<sup>4</sup>. For candidates that dropped out of

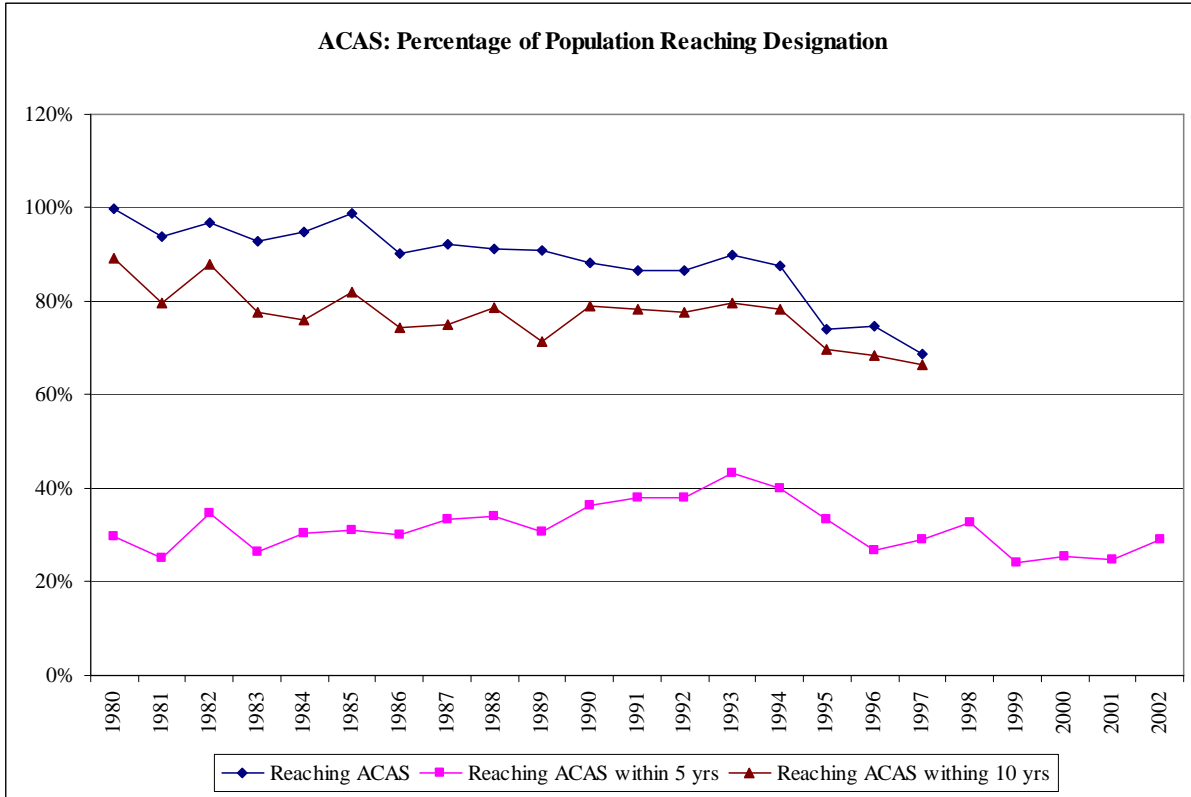
<sup>4</sup> The registration form asks for this information. Not all candidates complete this field.

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. 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. Following the earlier convention, cells highlighted in gray are not fully mature. Data prior to 1980 was removed as it is not meaningful.

**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)
1980	74	29.7%	89.2%	100.0%
1981	64	25.0%	79.7%	93.8%
1982	66	34.8%	87.9%	97.0%
1983	72	26.4%	77.8%	93.1%
1984	79	30.4%	75.9%	94.9%
1985	77	31.2%	81.8%	98.7%
1986	133	30.1%	74.4%	90.2%
1987	177	33.3%	75.1%	92.1%
1988	135	34.1%	78.5%	91.1%
1989	189	30.7%	71.4%	91.0%
1990	214	36.4%	79.0%	88.3%
1991	179	38.0%	78.2%	86.6%
1992	187	38.0%	77.5%	86.6%
1993	176	43.2%	79.5%	89.8%
1994	208	39.9%	78.4%	87.5%
1995	158	33.5%	69.6%	74.1%
1996	199	26.6%	68.3%	74.9%
1997	179	29.1%	66.5%	68.7%
1998	198	32.8%	64.6%	64.6%
1999	166	24.1%	54.2%	54.2%
2000	173	25.4%	49.1%	49.1%
2001	241	24.9%	37.3%	37.3%
2002	309	29.1%	37.9%	37.9%
2003	369	34.4%	34.4%	34.4%
2004	362	18.8%	18.8%	18.8%
2005	305	12.1%	12.1%	12.1%
2006	157	3.8%	3.8%	3.8%
2007	43	2.3%	2.3%	2.3%

Graphically, these results produce the following:



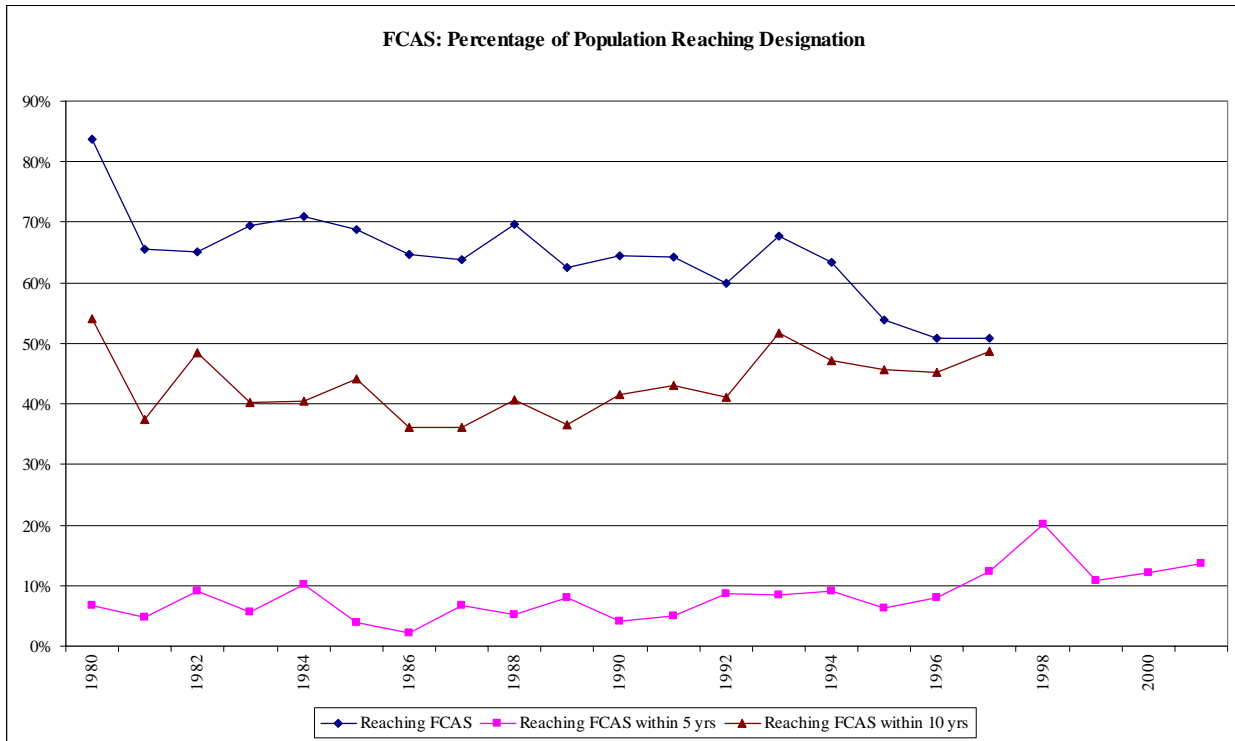
Prior to 1990 the number of candidates may be understated. The recent declines are likely due to the exam system changes in 2000.

**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)
1980	74	7%	54%	84%
1981	64	5%	38%	66%
1982	66	9%	48%	65%
1983	72	6%	40%	69%
1984	79	10%	41%	71%
1985	77	4%	44%	69%
1986	133	2%	36%	65%
1987	177	7%	36%	64%
1988	135	5%	41%	70%
1989	189	8%	37%	62%
1990	214	4%	42%	64%
1991	179	5%	43%	64%
1992	187	9%	41%	60%
1993	176	9%	52%	68%
1994	208	9%	47%	63%
1995	158	6%	46%	54%
1996	199	8%	45%	51%
1997	179	12%	49%	51%

1998	198	20%	47%	47%
1999	166	11%	30%	30%
2000	173	12%	33%	33%
2001	241	14%	25%	25%
2002	309	15%	22%	22%

Graphically, these results produce the following:

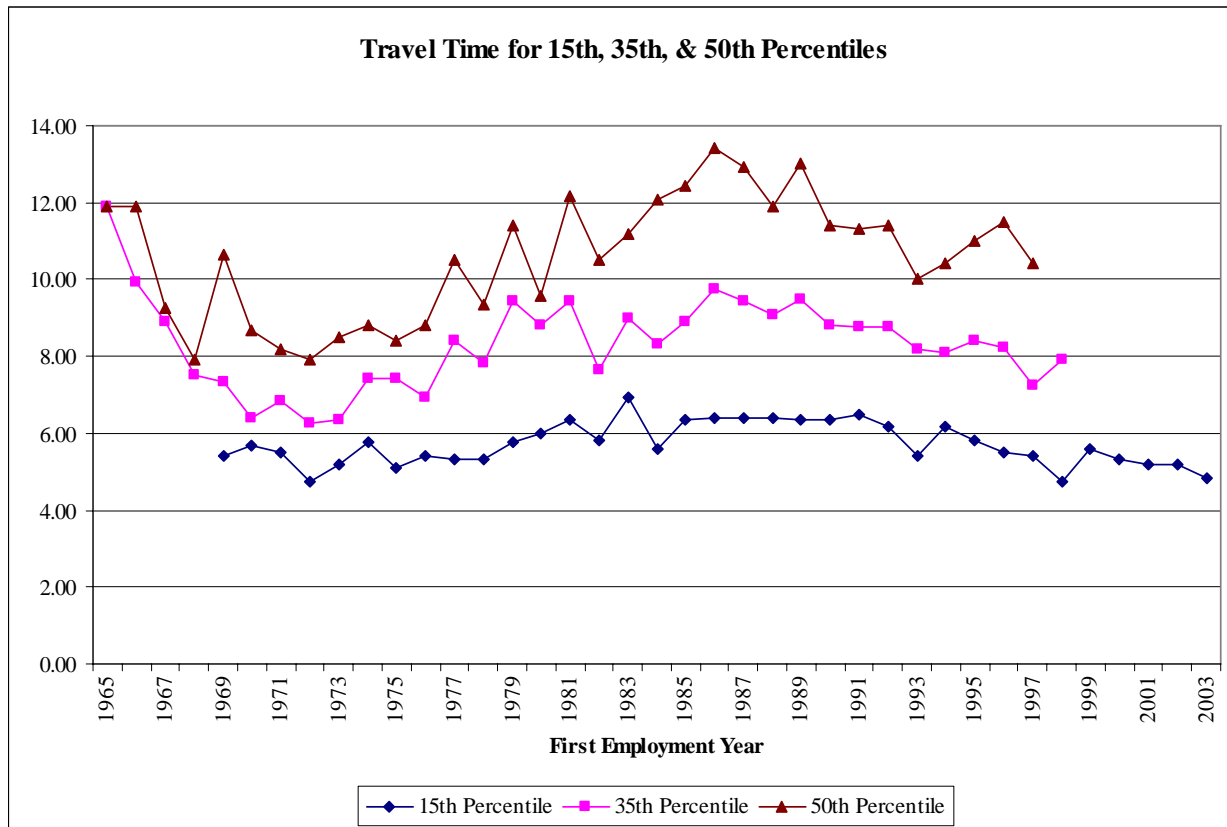


Trends are encouraging, particularly with regard to the percentage of starting cohorts achieving Fellowship within five years. Sharp increases in the late 90's may be the effect of improvements in the exam system and the reduction of the system from 10 to 9 exams. It is notable, however, that the percentage of candidates achieving fellowship within five years is still less than 20% and the percentage achieving Fellowship within 10 years is less than 50%. It will be difficult to achieve a median travel time of 5-7 years under these circumstances. The spike in completion percentage for the 1998 year bears watching. Candidates in 1997 through 1999 would have been under the greatest pressure to complete examinations prior to the transition in order not to lose credit.

**PERCENTAGE COMPLETION: FISHER STATISTICS**

In order to reduce the uncertainty inherent in the emerging nature of the percentage completion statistics, Ginda Fisher suggested an alternative statistic. Ms. Fisher suggested that candidates be grouped by starting year and ranked by travel time (date of designation versus first employment date). Various percentiles could then be directly compared across starting cohorts. In the graphs below, the 15<sup>th</sup> percentile can be interpreted as the 15<sup>th</sup> fastest candidate in a starting class of 100. Once the population in a starting cohort becomes reasonably stable, that is, no new candidates enter the population by virtue of reporting their date of first employment, these statistics will cease to develop. By comparing various travel

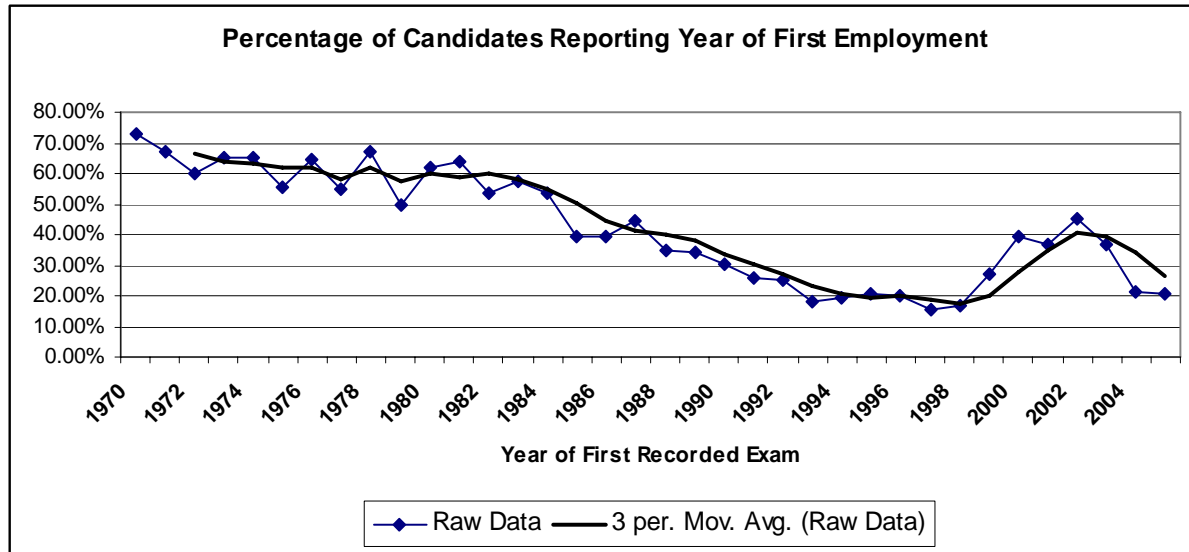
time percentiles for starting cohorts, we can determine whether faster candidates in each cohort are progressing more quickly than those in other starting cohorts. The results of this organization of the data are very interesting. Results are shown in each percentile where the given percentile is defined. That is, for the 50<sup>th</sup> percentile, 50% of the starting cohort must have reached Fellowship. In this data set, the last starting cohort for which 50% of the class has reached Fellowship is the class reporting year of first employment in 1997.



Intermediate percentiles indicate results similar to those above. Analysis of these results is both encouraging and worthy of additional monitoring. For candidates having reported date of first employment, the fastest students are moving more quickly through the examination process. At the 35<sup>th</sup> and 50<sup>th</sup> percentiles, students in the late 1990's are completing fellowship almost two years faster than their colleagues in the late 1980's, at least until the most recent periods for which statistics are available for these percentiles. Again, these students would have been most heavily impacted by the exam system changes in 2000.

In analyzing these results, it is useful to know how various points on the graph are likely to develop in the future. Recall, that in the CAS database, only 25% of candidates have coded first employment dates. As CAS Staff add additional first employment dates into the data, the size of various starting cohorts will increase. This will cause the travel time for any desired percentile of that population to likely increase. New data points are more likely to be candidates who have not yet achieved Fellowship or who have just reached Fellowship. Anecdotal evidence indicates that most candidates fill out their year of first employment on the Fellowship application, presumably because they do not want to have processing delayed because they did not complete every item.

In this respect, it is important to know how various cohorts are likely to have reported their employment dates in order to determine whether this statistic has any likely bias. As a proxy for this statistic, candidates were grouped by year of first exam<sup>5</sup> and coding of first employment date. The percentage of candidates first sitting in a given year with coded dates of first employment are shown below.



This graph indicates that reporting of year of first employment suffers from severe truncation during the 1990's. This could indicate that the Fisher Statistic, while promising for future monitoring, may not represent a valid picture of historical travel time across periods where capture of first employment date across the population is not consistent.

This graph also implies a high rate of candidates dropping out of the process. The CAS now captures date of first employment on exam registration forms. The fact that a very low percentage of candidates from the late 1990's have coded dates of first employment implies that these candidates are no longer taking exams and have not reached at least Associateship status. These statistics are consistent with similar studies conducted by the Society of Actuaries (SoA). The SoA determined that approximately 80% of candidates who sit for their first exam ultimately drop out of the exam process without completing at least an Associateship. The same statistics from the SoA indicate that 70% of candidates completing their old Exam 150 (the watershed "Life Contingencies" exam) fail to complete a Fellowship designation. Initial investigations of the CAS data indicate that far fewer CAS candidates drop out once reaching exam #4<sup>6</sup>.

In order to remove some of the uncertainty in these statistics, the Education Policy Committee repeated the production of the Fisher Statistics using year of first examination in place of year of first employment. This compilation of the data removes the truncation

<sup>5</sup> Year of first exam is defined to be either joint exam or CAS exam, whichever is reported first in the data.

<sup>6</sup> Based on a study of candidates passing our exam 4/4B in the period 1990-1995, over 50% have completed their ACAS or FCAS designation.

produced by the lack of collection of employment dates. Analysis of these statistics indicates that the apparent improvement in travel time indicated above is real and not an artifact of the employment date collection process. Because statistics based on year of first exam contain much larger populations, smaller percentiles are necessary. For example, the 1998 starting cohort, based on year of first employment, contains 198 candidates. The same cohort, based on year of first recorded examination sitting, contains 523 candidates. Tabular and graphic results of the Fisher Statistic based on year of first examination appear on the following pages.

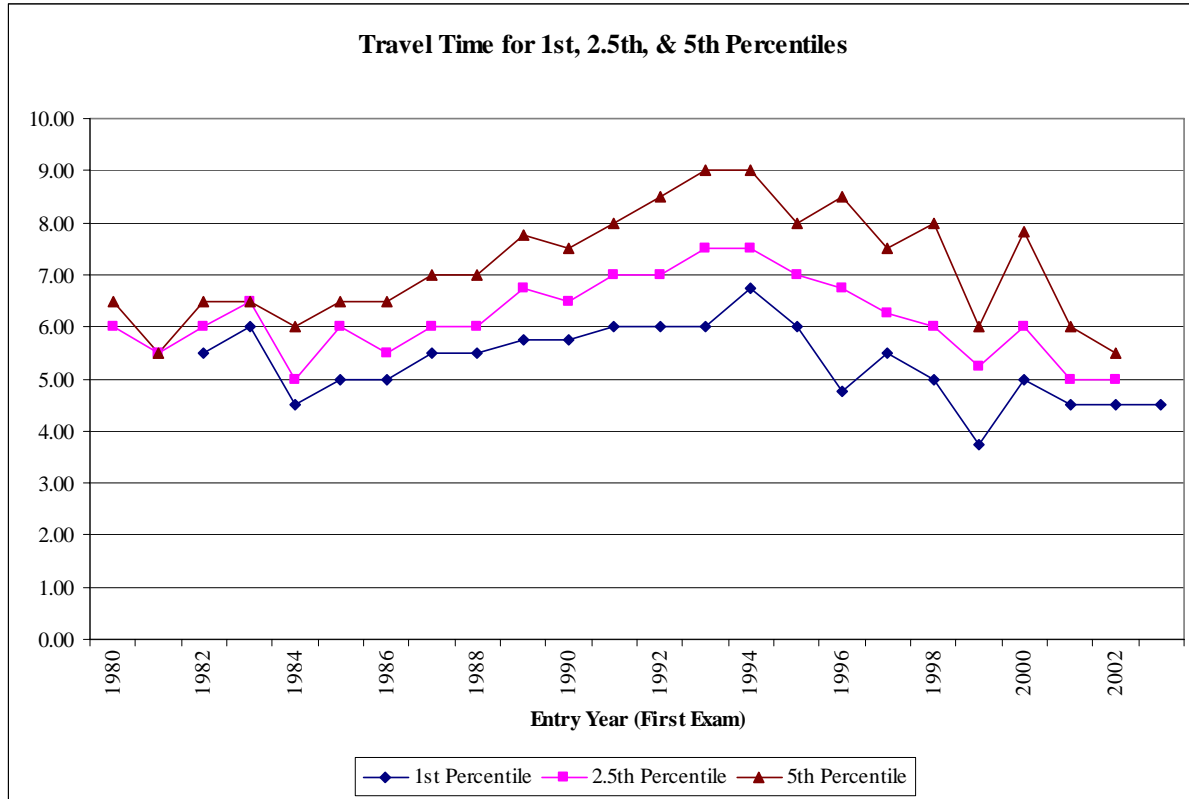
**Fisher Statistics By Year of First Examination Attempt**

Entry Year	Candidates	Travel Time for Various Percentiles of Entering Class					
		0.5 th	1st	2.5th	5th	10th	15th
1980	86			6.00	6.50	7.00	7.50
1981	87			5.50	5.50	6.50	7.00
1982	108		5.50	6.00	6.50	7.00	7.50
1983	111		6.00	6.50	6.50	7.50	9.00
1984	138		4.50	5.00	6.00	7.50	8.00
1985	217	5.00	5.00	6.00	6.50	7.50	8.50
1986	307	4.50	5.00	5.50	6.50	7.50	8.50
1987	460	5.00	5.50	6.00	7.00	9.00	11.00
1988	510	5.00	5.50	6.00	7.00	9.00	11.50
1989	734	5.50	5.75	6.75	7.75	9.75	11.75
1990	934	5.50	5.75	6.50	7.50	9.75	12.50
1991	924	5.00	6.00	7.00	8.00	10.75	13.75
1992	920	5.50	6.00	7.00	8.50	10.75	15.50
1993	814	5.50	6.00	7.50	9.00	12.75	
1994	745	5.50	6.75	7.50	9.00	11.75	
1995	713	5.00	6.00	7.00	8.00		
1996	771	4.50	4.75	6.75	8.50		
1997	856	5.00	5.50	6.25	7.50		
1998	523	4.75	5.00	6.00	8.00		
1999	169		3.75	5.25	6.00	6.50	7.00
2000	1,043	4.50	5.00	6.00	7.83		
2001	683	4.00	4.50	5.00	6.00		
2002	865	4.00	4.50	5.00	5.50		
2003	890	4.50	4.50				
2004	917						
2005	1,721						
2006	1,809						
2007	1,158						

Here, the effect of the 2000 transition is immediately apparent. Note the dramatic drop in number of candidates attempting their first examination in the 1998 and 1999 years with a corresponding bulge in new candidates in 2000. For candidates that elected to begin sitting in these years immediately prior to the transition, progress has been exceptional.

For reference purposes, the number of candidates sitting for their first exam (reported to the CAS) is already at 1,158 for one sitting in 2007.

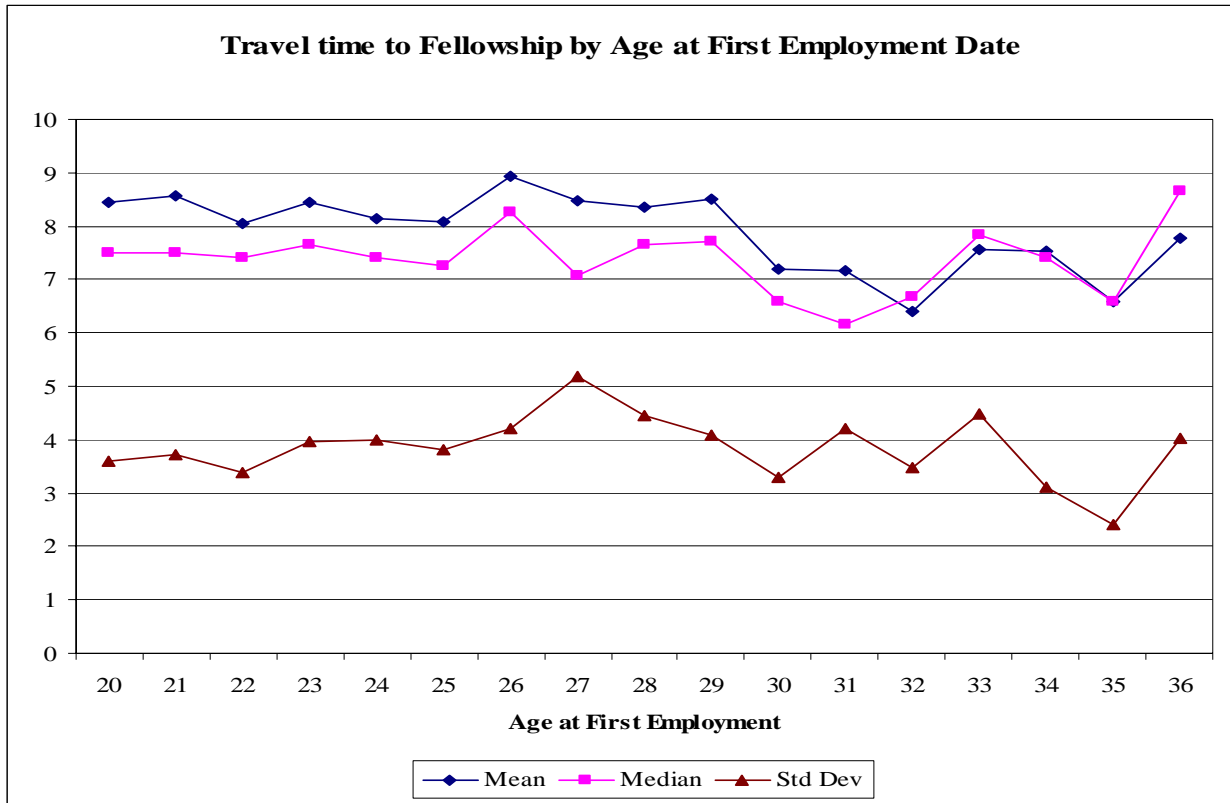
Graphic results follow below:



The trend in the latter 1990's in these statistics is clear. The most efficient candidates across the entire population of candidates is progressing through the exams at a faster rate in more recent years. Travel time is improving dramatically for the most efficient candidates.

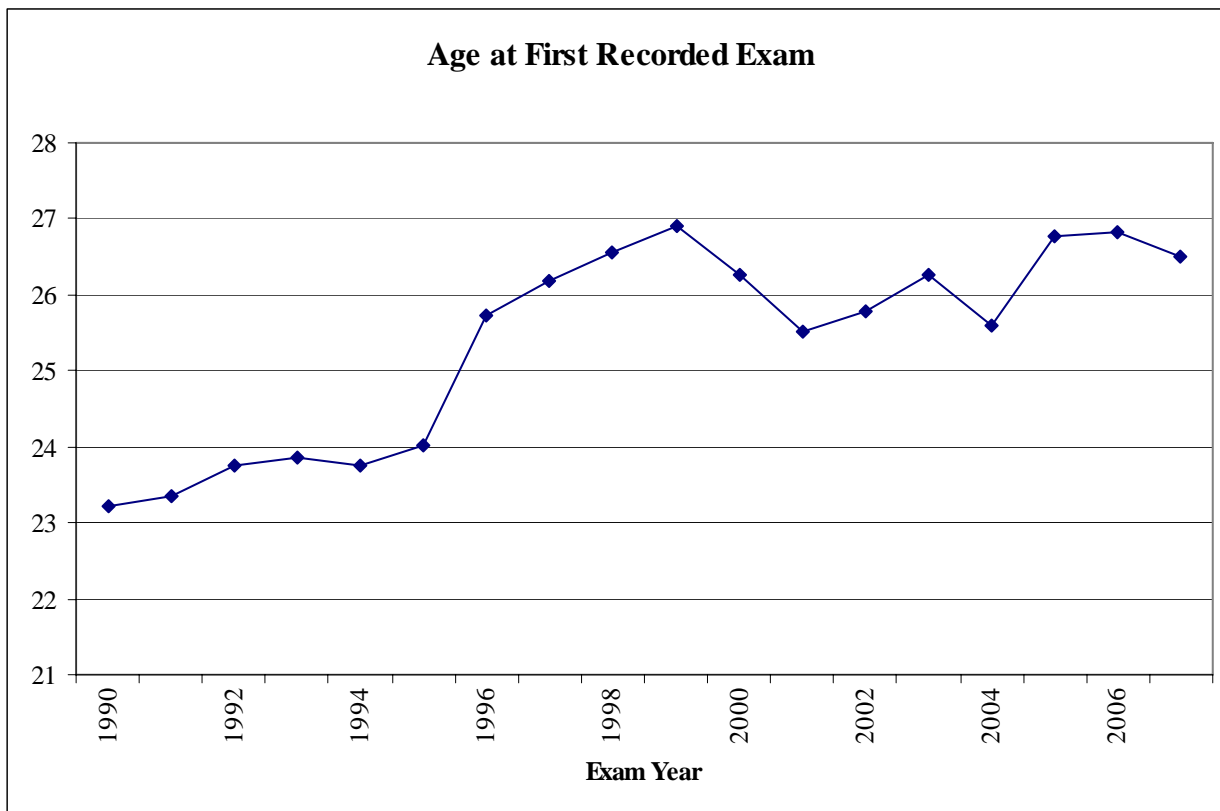
**TRAVEL TIMES BY CANDIDATE STARTING AGE: SCHWARTZ STATISTICS**

Arthur Schwartz suggested that grouping travel times by the starting age of candidates might provide useful insight into the travel time process. Accordingly, the Education Policy Committee constructed travel time statistics for candidates according to their age at date of first employment. Travel time is computed here according to difference between date of first employment and date of receipt of designation at the CAS meeting. Compilation of this statistic required that candidates have valid birthdates and first employment dates. Results of this analysis are quite interesting.



Candidates entering the profession in their early 30's experience shorter travel times than those entering earlier (sample sizes are smaller for older candidates). Standard deviation of travel time increases through the late twenties and then decreases. This may be indicative of the effect of life experiences (i.e. marriage, children, job changes, etc) on travel time. Candidates whose age profile places them generally beyond these life events at time of first employment progress more quickly through exams. Alternatively (or coincidentally), more mature candidates may be more focused or more disciplined in their approach to the examinations.

The Schwartz statistics further indicate an interesting trend in the candidate population. Grouping candidates by age at first employment produces the following graphic:



This graph clearly indicates that the average age of entering candidates (reporting both birth date and date of first employment) is increasing. Given that older candidates generally report shorter travel time, this may be an indicator that median travel times are likely to decrease as the candidate age demographic changes.

**DATA BASED ON DATE OF FIRST EXAM**

For this year’s report we have added an analysis based on year of first exam. Travel time from date of first employment can then be calculated by subtracting the average time from first exam to first employment. The main advantage of this metric is that only 25% of the candidates in our data base have a valid date of first employment while almost all candidates have a valid date of first exam. An additional reason for introducing this metric is that date of first employment is reported late and as a result many of the statistics in the earlier sections of this report will change each year. In some cases these changes can have a significant impact on our conclusions. It should be noted that the data based on date of first exam also changes from year to year so this approach is not perfect; however, these changes are much smaller than the changes based on date of first exam and we believe that they are easier to estimate with a reasonable degree of accuracy.

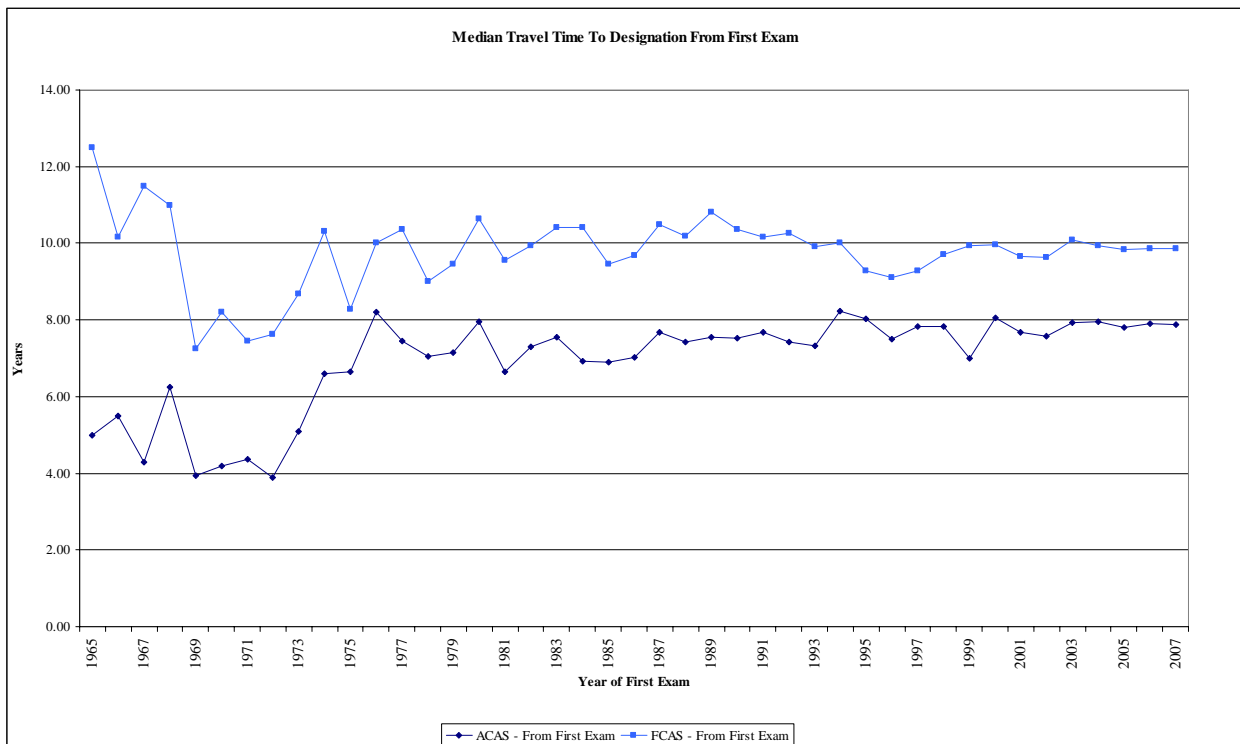
In this analysis we have constructed triangles showing the number of Associates and Fellows by elapsed time from the date of first exam. We have then used traditional actuarial methods (Bornhuetter-Ferguson) to complete the triangle. Median travel time is then estimated from the completed triangle.

The following table shows a summary of our results where the data has been grouped in 5 year intervals to provide a clearer picture of the long term trends.

### Projected Travel Time from First Exam

Year Of First Exam	Projected Ultimate Number		Median Travel Time From First Exam		Average Time From First Exam to First Employ		Travel Time From First Employ	
	ACAS	FCAS	ACAS	FCAS	Wgtd Avg	Selected	ACAS	FCAS
1970 to 1974	372	278	4.92	8.49	0.32	0.32	4.60	8.17
1975 to 1979	521	390	7.31	9.44	0.69	0.69	6.62	8.75
1980 to 1984	435	316	7.28	10.18	0.34	0.34	6.94	9.84
1985 to 1989	1,103	709	7.39	10.26	0.99	0.99	6.41	9.27
1990 to 1994	1,057	814	7.61	10.17	1.90	1.90	5.71	8.27
1995 to 1999	523	470	7.66	9.43	1.46	1.46	6.20	7.97
2000 to 2004	1,112	935	7.80	9.82	0.91	1.40	6.40	8.42
Total	6,699	2,953	6.80	10.22	0.75	0.98	5.98	8.76

The travel time from first exam to Fellowship/Associateship is shown by year in the following graph.



The table and graph show that travel time from date of first exam has consistently been about 10 years for Fellowship. The average time from first exam to date of first employment has been increasing (i.e. candidates are writing their first exams earlier). Therefore, travel time measured from date of first employment is improving but it is still about 8.5 (consistent with our prior analysis). Travel time measured from date of first exam is approximately flat.

We believe that estimating travel time from the date of first exam yields more reliable results, and confirms that that the improvement in travel time from first employment is real..



The travel time from first employment to Associateship has been fairly stable since the mid 1970's when the number of Associateship exams was increased from 5 to 7. The travel time to Fellowship has improved by almost 2 years since the early 1980's but is unchanged from the early 1970's.

It should be noted that the estimates for the most recent three or four years are based on our selected development patterns and reflect little actual experience.

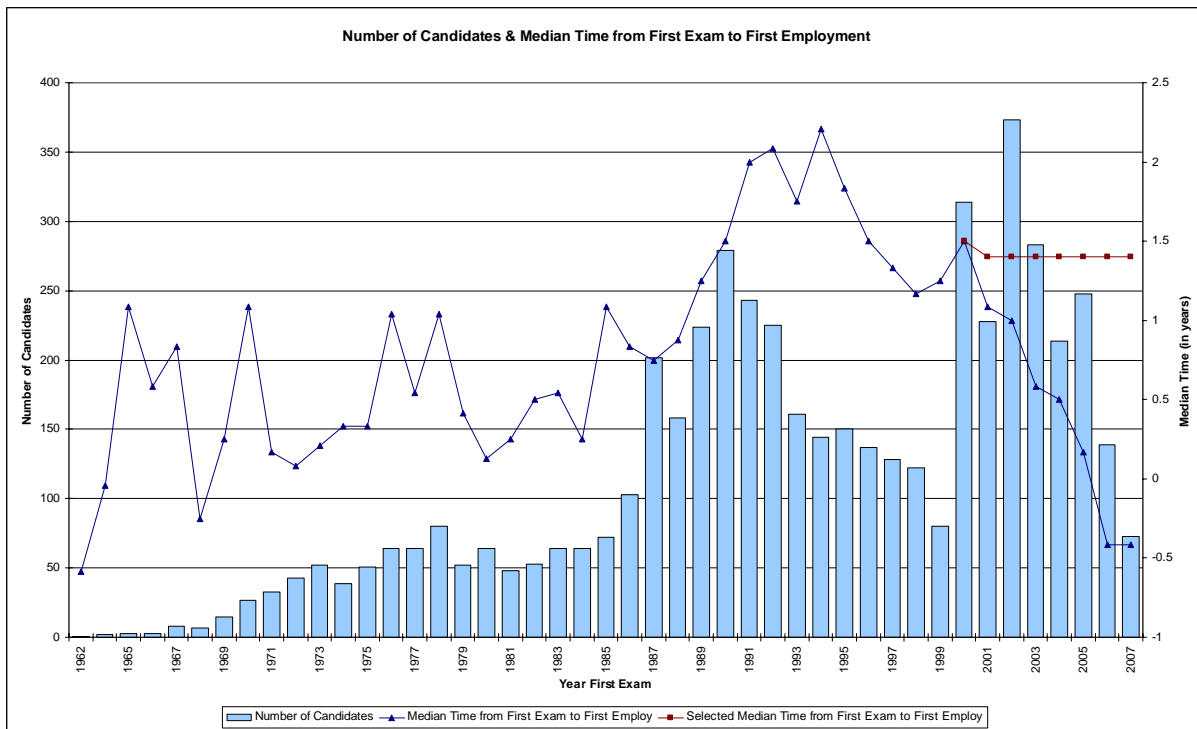
The following table shows success ratios of candidates by year of first exam, including projected success ratios based on our analysis.

**Projected Ultimates**

Year of First Exam	# of Candidates		# of ACAS			# of FCAS		
	Reported	Projected Ultimate	Reported	Projected Ultimate	Success Ratio	Reported	Projected Ultimate	Success Ratio
1965	9	9	8	8	89%	7	7	78%
1966	13	13	11	11	85%	11	11	85%
1967	14	14	13	13	93%	11	11	79%
1968	23	23	16	16	70%	15	15	65%
1969	32	32	30	30	94%	18	18	56%
1970	57	57	50	50	88%	49	49	86%
1971	74	74	68	68	92%	52	52	70%
1972	93	93	85	85	91%	58	58	62%
1973	94	94	83	83	88%	60	60	64%
1974	99	99	86	86	87%	59	59	60%
1975	114	114	98	98	86%	76	76	67%
1976	127	127	110	110	87%	76	76	60%
1977	130	130	104	104	80%	89	89	68%
1978	137	137	111	111	81%	81	81	59%
1979	123	123	98	98	80%	68	68	55%
1980	102	102	82	82	80%	65	65	64%
1981	102	102	79	79	77%	66	66	65%
1982	121	121	85	85	70%	65	65	54%
1983	125	125	92	92	74%	50	50	40%
1984	150	150	97	97	65%	70	70	47%
1985	240	240	141	141	59%	94	94	39%
1986	338	338	179	179	53%	115	115	34%
1987	498	498	252	252	51%	155	155	31%
1988	545	545	219	223	41%	140	144	26%
1989	774	774	300	308	40%	192	201	26%
1990	955	955	287	296	31%	204	218	23%
1991	935	935	237	247	26%	166	181	19%
1992	936	936	219	231	25%	155	175	19%
1993	821	821	133	142	17%	104	122	15%
1994	751	751	129	141	19%	95	118	16%
1995	711	711	103	115	16%	68	91	13%
1996	769	769	89	103	13%	67	98	13%
1997	855	855	104	127	15%	77	124	15%
1998	518	518	69	90	17%	44	79	15%
1999	167	167	61	88	53%	47	78	47%
2000	1034	1,034	107	186	18%	55	153	15%
2001	682	717	107	222	31%	61	210	29%
2002	863	926	111	292	32%	49	242	26%
2003	887	1,014	41	196	19%	9	148	15%
2004	915	1,143	17	216	19%	2	182	16%
2005	1717	2,472	18	521	21%	1	445	18%
2006	1799	2,634	0	525	20%	0	473	18%
2007	1139	2,211	0	441	20%	0	397	18%
Total	20,601	23,716	4,340	6,699	28%	2,953	5,297	22%

It should be noted that the databases were constructed in the late 1980's and despite our best efforts data by date of first exam is not complete prior to 1990. Therefore, success ratios for those years are likely overstated and the number of candidates understated. Success ratios declined in the mid 1990's, likely due to candidates dropping out in the dot com boom. Success ratios have increased recently but not to the levels of the early 1990's. Currently we estimate that 20% of candidates will achieve their Associateship and 18% will get their fellowship. The number of candidates increased dramatically in 2005 with further growth in 2006. The number of candidates in 2007 has been estimated based on partial data but current indications there will be a modest decline from 2006 levels. It should also be noted that success ratios appear to be negatively correlated to the number of candidates. This observation has not been confirmed by a detailed analysis which should be considered for future reports. If this is the case the success ratios in 2005, 2006 and 2007 may be overstated.

The following chart shows the number of candidates with a valid date of first exam and the average time from first exam to first employment.



The dramatic decline in the in the medium time between first exam and first employment for the most recent years is due to the fact that many of these candidates are not currently employed. The graph clearly indicates that very few of these candidates have reported their dates of first employment. As these dates are reported it is likely that the average time from first exam to first employment will increase. Our judgemental estimates for the ultimate values are also shown.

The following exhibits show the Associateship and Fellowship triangles, our selected development factors and initial selected success ratios and our projected ultimate number of Associates and Fellows.

**Projected ACASs**

Year Of First Exam	Estimate of total # of candidates	Report # ACAS	Selected Success Ratio	Expected Percentage Unreported	Expected # Of New ACAS	Projected Ultimate # of ACAS
1965	9	8	89%	0.0%	0	8
1966	13	11	85%	0.0%	0	11
1967	14	13	93%	0.0%	0	13
1968	23	16	70%	0.0%	0	16
1969	32	30	94%	0.0%	0	30
1970	57	50	88%	0.0%	0	50
1971	74	68	92%	0.0%	0	68
1972	93	85	91%	0.0%	0	85
1973	94	83	88%	0.0%	0	83
1974	99	86	87%	0.0%	0	86
1975	114	98	86%	0.0%	0	98
1976	127	110	87%	0.0%	0	110
1977	130	104	80%	0.0%	0	104
1978	137	111	81%	0.0%	0	111
1979	123	98	80%	0.0%	0	98
1980	102	82	80%	0.0%	0	82
1981	102	79	77%	0.0%	0	79
1982	121	85	70%	0.0%	0	85
1983	125	92	74%	0.0%	0	92
1984	150	97	65%	0.0%	0	97
1985	240	141	59%	0.0%	0	141
1986	338	179	53%	0.0%	0	179
1987	498	252	51%	0.0%	0	252
1988	545	219	41%	2.0%	4	223
1989	774	300	40%	2.5%	8	308
1990	955	287	31%	3.1%	9	296
1991	935	237	26%	3.9%	10	247
1992	936	219	25%	5.1%	12	231
1993	821	133	17%	6.5%	9	142
1994	751	129	19%	8.3%	12	141
1995	711	103	16%	10.7%	12	115
1996	769	89	13%	13.8%	14	103
1997	855	104	15%	18.0%	23	127
1998	518	69	17%	23.8%	21	90
1999	167	61	50%	31.9%	27	88
2000	1,034	107	18%	41.9%	79	186
2001	717	107	29%	54.8%	114	222
2002	926	111	29%	67.1%	181	292
2003	1,014	41	19%	78.4%	155	196
2004	1,143	17	19%	90.6%	200	216
2005	2,472	18	21%	98.6%	502	521
2006	2,634	0	20%	99.6%	525	525
2007	2,211	0	20%	99.9%	442	441
Total	23,716	4340	28%	35.2%	2,358	6,699

**Projected FCASs**

Year Of First Exam	Estimate of total # of candidates	Report # FCAS	Selected Success Ratio	Expected Percentage Unreported	Expected # Of New FCAS	Projected Ultimate # of FCAS
1965	9	7	78%	0.0%	0	7
1966	13	11	85%	0.0%	0	11
1967	14	11	79%	0.0%	0	11
1968	23	15	65%	0.0%	0	15
1969	32	18	56%	0.0%	0	18
1970	57	49	86%	0.0%	0	49
1971	74	52	70%	0.0%	0	52
1972	93	58	62%	0.0%	0	58
1973	94	60	64%	0.0%	0	60
1974	99	59	60%	0.0%	0	59
1975	114	76	67%	0.0%	0	76
1976	127	76	60%	0.0%	0	76
1977	130	89	68%	0.0%	0	89
1978	137	81	59%	0.0%	0	81
1979	123	68	55%	0.0%	0	68
1980	102	65	64%	0.0%	0	65
1981	102	66	65%	0.0%	0	66
1982	121	65	54%	0.0%	0	65
1983	125	50	40%	0.0%	0	50
1984	150	70	47%	0.0%	0	70
1985	240	94	39%	0.0%	0	94
1986	338	115	34%	0.0%	0	115
1987	498	155	31%	0.0%	0	155
1988	545	140	26%	2.9%	4	144
1989	774	192	26%	4.3%	9	201
1990	955	204	23%	6.2%	14	218
1991	935	166	19%	8.5%	15	181
1992	936	155	19%	11.2%	20	175
1993	821	104	15%	14.6%	18	122
1994	751	95	16%	19.4%	23	118
1995	711	68	13%	25.4%	23	91
1996	769	67	13%	31.6%	31	98
1997	855	77	14%	37.8%	47	124
1998	518	44	15%	44.4%	35	79
1999	167	47	35%	52.9%	31	78
2000	1,034	55	15%	62.9%	98	153
2001	717	61	28%	74.0%	149	210
2002	926	49	25%	83.1%	192	242
2003	1,014	9	15%	91.2%	139	148
2004	1,143	2	16%	98.3%	180	182
2005	2,472	1	18%	99.9%	444	445
2006	2,634	0	18%	99.9%	473	473
2007	2,211	0	18%	99.9%	397	397
Total	23,716	2953	22%	44.2%	2,341	5,297

ACAS -Cummulative Triangle:

Year of First Exam	Number of Candidates	Reported Number of ACAS																				
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	ult
1965	8	0	3	4	4	5	5	5	5	5	5	6	6	6	6	6	7	7	7	7	7	8
1966	11	0	0	0	4	6	6	7	8	8	9	9	9	9	9	9	9	10	10	10	10	11
1967	13	0	3	3	8	10	11	11	12	12	12	13	13	13	13	13	13	13	13	13	13	13
1968	16	0	1	4	6	7	9	14	14	14	14	15	15	15	15	15	16	16	16	16	16	16
1969	30	0	2	12	20	25	25	28	28	28	29	29	29	29	29	29	29	29	29	29	29	30
1970	50	2	10	15	30	37	40	41	44	46	46	46	46	47	47	47	47	47	47	50	50	50
1971	68	3	8	24	36	47	47	49	54	57	57	59	60	61	61	62	64	66	66	66	66	68
1972	85	5	18	37	52	57	62	66	69	73	76	77	78	78	78	78	78	80	82	83	84	85
1973	83	3	14	26	39	44	50	60	64	67	72	72	73	74	75	75	79	80	81	82	82	83
1974	86	0	4	8	20	35	43	48	55	59	63	68	69	70	72	73	74	75	78	80	81	86
1975	98	0	2	5	23	36	48	59	71	75	80	81	87	91	92	93	93	93	93	95	95	98
1976	110	0	0	7	20	35	43	52	57	65	79	81	87	91	95	97	98	101	107	109	110	110
1977	104	0	0	6	17	29	43	53	62	78	89	91	93	97	98	99	99	99	102	103	103	104
1978	111	0	0	3	10	27	49	62	71	76	82	88	97	101	106	106	107	109	109	109	110	111
1979	98	0	0	4	11	24	37	56	68	73	83	88	91	92	93	95	95	96	96	98	98	98
1980	82	0	0	1	3	16	28	36	48	59	66	69	72	74	76	78	78	80	81	81	81	82
1981	79	1	2	3	10	23	38	52	62	70	71	72	74	76	76	77	77	78	79	79	79	79
1982	85	0	0	0	9	20	35	45	52	64	69	73	77	81	81	81	82	82	83	84	84	85
1983	92	0	0	4	10	19	30	46	55	64	73	79	82	82	83	86	86	86	87	87	89	92
1984	97	0	0	5	10	21	43	57	65	78	85	90	93	93	95	95	95	95	96	96	96	97
1985	141	0	0	1	14	41	62	85	96	105	115	124	127	131	135	140	140	140	141	141	141	141
1986	179	0	0	5	15	48	79	100	127	151	162	162	164	170	177	177	178	178	179	179	179	179
1987	252	0	0	5	28	62	86	122	146	169	185	194	205	220	222	227	232	241	245	249	252	252
1988	219	0	0	8	21	50	82	114	142	156	172	185	195	198	204	207	213	216	219	219	219	
1989	300	0	0	8	28	72	107	152	196	219	252	267	270	277	281	285	289	294	298	300		
1990	287	0	0	5	32	68	110	148	177	213	235	245	256	264	274	277	284	287	287			
1991	237	0	0	5	20	39	78	117	154	183	192	202	212	219	226	228	236	237				
1992	219	0	0	2	20	50	88	118	149	158	171	187	194	204	210	217	219					
1993	133	0	0	3	15	26	49	76	82	88	102	116	124	128	133	133						
1994	129	1	1	1	13	26	42	57	76	94	105	113	123	129								
1995	103	0	0	1	7	21	33	49	66	78	88	91	99	103								
1996	89	0	1	5	13	21	33	52	59	72	79	89	89									
1997	104	0	0	3	8	29	38	58	77	93	102	104										
1998	69	0	0	1	6	20	25	42	53	66	69											
1999	61	0	0	2	5	15	38	51	58	61												
2000	107	0	0	1	14	30	55	77	107													
2001	107	0	0	4	19	55	95	107														
2002	111	0	0	3	39	90	111															
2003	41	0	0	3	31	41																
2004	17	0	1	6	17																	
2005	18	0	0	18																		
2006	0	0	0																			
2007	0	0	0																			
Total	4340																					

**Weighted Average LDFs ACAS -Cummulative Triangle:**

	1 to 2	2 to 3	3 to 4	4 to 5	5 to 6	6 to 7	7 to 8	8 to 9	9 to 10	10 to 11
<b>Age-to-Age LDFs</b>										
all	4.667	3.743	2.914	1.922	1.478	1.323	1.187	1.127	1.093	1.043
last 20	3.000	29.667	5.069	2.304	1.599	1.385	1.222	1.152	1.107	1.048
last 15	3.000	19.333	5.756	2.233	1.608	1.397	1.227	1.153	1.101	1.051
last 10	3.000	23.000	5.483	2.245	1.559	1.385	1.248	1.152	1.108	1.050
last 7	3.000	37.000	6.550	2.295	1.519	1.375	1.285	1.172	1.103	1.075
Selected	3.000	3.743	6.550	2.295	1.519	1.375	1.285	1.172	1.120	1.075
<b>Cummulative LDFs</b>										
all	343.970	73.708	19.693	6.758	3.516	2.379	1.798	1.515	1.344	1.230
last 20	4469.903	1489.968	50.224	9.907	4.299	2.689	1.941	1.589	1.380	1.246
last 15	3263.390	1087.797	56.265	9.776	4.377	2.722	1.948	1.588	1.377	1.250
last 10	3558.634	1186.211	51.574	9.407	4.190	2.688	1.941	1.555	1.350	1.219
last 7	7505.707	2501.902	67.619	10.324	4.498	2.961	2.153	1.675	1.429	1.296
Selected	780.245	260.082	69.487	10.609	4.622	3.043	2.212	1.722	1.469	1.312
	11 to 12	12 to 13	13 to 14	14 to 15	15 to 16	16 to 17	17 to 18	18 to 19	19 to 20	20 to ult
<b>Age-to-Age LDFs</b>										
all	1.037	1.025	1.018	1.011	1.009	1.015	1.016	1.014	1.004	1.020
last 20	1.041	1.027	1.019	1.011	1.009	1.014	1.016	1.014	1.004	1.020
last 15	1.041	1.028	1.022	1.013	1.005	1.012	1.019	1.012	1.005	1.019
last 10	1.034	1.026	1.015	1.015	1.002	1.014	1.011	1.010	1.004	1.020
last 7	1.052	1.036	1.027	1.015	1.020	1.013	1.009	1.006	1.006	1.005
Selected	1.052	1.036	1.027	1.020	1.015	1.012	1.009	1.006	1.006	1.020
#REF!										
<b>Cummulative LDFs</b>										
all	1.179	1.138	1.110	1.091	1.079	1.069	1.054	1.038	1.024	1.020
last 20	1.189	1.142	1.112	1.091	1.079	1.070	1.055	1.038	1.024	1.020
last 15	1.190	1.143	1.112	1.088	1.074	1.069	1.056	1.036	1.023	1.019
last 10	1.160	1.122	1.094	1.078	1.062	1.060	1.046	1.034	1.024	1.020
last 7	1.205	1.146	1.106	1.077	1.061	1.040	1.026	1.017	1.011	1.005
Selected	1.220	1.160	1.120	1.090	1.069	1.053	1.041	1.031	1.026	1.020

**FCAS - Cumulative Triangle:**

Year of First Exam	Number of Candidates	Reported Number of FCAS																				
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	ult
1965	7	0	0	0	0	0	0	0	0	0	2	3	4	6	6	6	6	6	7	7	7	7
1966	11	0	0	0	0	0	0	0	2	4	7	8	8	9	9	9	9	10	11	11	11	11
1967	11	0	0	0	0	0	0	0	3	4	4	6	7	7	10	10	11	11	11	11	11	11
1968	15	0	0	0	0	0	0	2	3	5	6	10	12	14	15	15	15	15	15	15	15	15
1969	18	0	0	0	0	4	8	10	12	12	13	14	16	16	16	16	16	16	17	17	17	18
1970	49	0	0	0	4	6	13	18	28	31	35	39	40	43	45	45	45	48	48	48	48	49
1971	52	0	0	1	4	11	18	27	34	37	39	43	44	46	47	49	50	50	50	50	50	52
1972	58	0	0	2	5	11	17	29	33	34	43	48	48	51	52	54	55	55	55	55	55	58
1973	60	0	0	0	1	8	11	23	29	37	43	44	47	49	49	51	51	53	57	57	57	60
1974	59	0	0	0	1	4	8	15	20	26	31	34	38	43	43	44	49	51	52	53	55	59
1975	76	0	0	1	3	11	20	26	42	50	53	57	62	66	67	69	70	71	72	72	73	76
1976	76	0	0	0	0	3	13	25	30	35	42	48	52	59	61	64	64	64	69	75	76	76
1977	89	0	0	0	2	4	14	21	32	39	46	53	60	68	72	77	80	82	83	84	86	89
1978	81	0	0	0	0	5	16	26	38	44	49	54	62	65	66	71	73	76	77	78	78	81
1979	68	0	0	0	0	2	9	17	24	35	41	49	53	55	59	59	61	63	65	65	66	68
1980	65	0	0	0	0	2	5	12	19	30	32	39	43	49	50	53	55	58	59	61	62	65
1981	66	0	0	0	0	2	6	21	28	33	41	46	51	61	63	63	63	65	65	65	65	66
1982	65	0	0	0	0	1	5	13	20	30	37	41	49	51	52	55	56	58	60	60	61	65
1983	50	0	0	0	0	0	2	11	14	20	26	32	38	39	42	43	44	45	45	48	49	50
1984	70	0	0	0	1	4	9	12	23	31	36	43	47	58	61	64	65	66	67	68	70	70
1985	94	0	0	0	0	4	8	23	33	48	57	63	72	81	84	85	86	90	91	91	93	94
1986	115	0	0	0	1	8	13	27	43	56	67	77	86	92	102	105	106	109	111	112	112	115
1987	155	0	0	0	0	5	15	31	48	62	78	84	97	102	111	117	122	135	144	150	153	155
1988	140	0	0	0	0	5	17	32	46	65	76	84	98	108	118	120	126	134	136	140	140	
1989	192	0	0	0	0	3	13	36	53	72	94	116	137	152	166	179	182	188	192	192		
1990	204	0	0	0	0	3	26	49	66	89	113	130	147	165	183	191	201	202	204			
1991	166	0	0	0	1	7	14	33	55	74	100	112	123	143	156	159	162	166				
1992	155	0	0	0	1	3	16	33	54	72	93	110	125	135	145	150	155					
1993	104	0	0	0	0	3	13	26	41	55	71	79	88	94	100	104						
1994	95	0	0	0	1	3	9	20	33	52	67	79	86	93	95							
1995	68	0	0	0	0	4	12	25	39	48	52	62	66	68								
1996	67	0	0	0	1	10	18	24	39	56	60	65	67									
1997	77	0	0	0	2	7	25	40	53	65	74	77										
1998	44	0	0	0	1	6	15	20	32	39	44											
1999	47	0	0	1	2	6	14	31	45	47												
2000	55	0	0	1	1	14	26	42	55													
2001	61	0	0	0	5	20	46	61														
2002	49	0	0	0	6	32	49															
2003	9	0	0	0	2	9																
2004	2	0	0	0	2																	
2005	1	0	0	1																		
2006	0	0	0																			
2007	0	0	0																			
Total	2952																					

**Weighted Average LDFs FCAS - Cummulative Triangle:**

	1 to 2	2 to 3	3 to 4	4 to 5	5 to 6	6 to 7	7 to 8	8 to 9	9 to 10	10 to 11
<b>Age-to-Age LDFs</b>										
all	1.000	1.000	7.833	5.111	2.367	1.816	1.461	1.290	1.203	1.136
last 20	1.000	1.000	13.000	6.240	2.449	1.864	1.494	1.332	1.220	1.141
last 15	1.000	1.000	12.500	5.652	2.484	1.803	1.497	1.324	1.224	1.140
last 10	1.000	1.000	11.000	5.286	2.162	1.660	1.517	1.306	1.235	1.143
last 5	1.000	1.000	16.000	5.063	1.923	1.540	1.427	1.226	1.142	1.117
Selected	1.000	1.000	13.000	5.063	1.923	1.540	1.427	1.270	1.180	1.120
<b>Cummulative LDFs</b>										
all	686.160	686.160	686.160	87.595	17.138	7.242	3.987	2.728	2.115	1.758
last 20	1620.373	1620.373	1620.373	124.644	19.975	8.156	4.376	2.930	2.200	1.803
last 15	1399.892	1399.892	1399.892	111.991	19.814	7.976	4.424	2.956	2.233	1.825
last 10	927.334	927.334	927.334	84.303	15.949	7.377	4.445	2.930	2.243	1.816
last 5	828.093	828.093	828.093	51.756	10.223	5.316	3.453	2.420	1.974	1.728
Selected	749.955	749.955	749.955	57.689	11.395	5.926	3.849	2.697	2.124	1.800

	11 to 12	12 to 13	13 to 14	14 to 15	15 to 16	16 to 17	17 to 18	18 to 19	19 to 20	20 to ult
<b>Age-to-Age LDFs</b>										
all	1.114	1.096	1.062	1.038	1.027	1.033	1.023	1.016	1.012	1.031
last 20	1.125	1.100	1.067	1.039	1.029	1.034	1.023	1.016	1.012	1.029
last 15	1.127	1.101	1.074	1.037	1.028	1.037	1.023	1.019	1.014	1.029
last 10	1.123	1.094	1.082	1.039	1.030	1.037	1.021	1.018	1.013	1.025
last 5	1.094	1.092	1.078	1.044	1.034	1.040	1.025	1.016	1.012	1.015
Selected	1.100	1.090	1.080	1.060	1.040	1.030	1.025	1.020	1.015	1.030
<b>Cummulative LDFs</b>										
all	1.548	1.390	1.268	1.194	1.150	1.120	1.084	1.059	1.043	1.031
last 20	1.581	1.405	1.278	1.197	1.152	1.120	1.083	1.059	1.042	1.029
last 15	1.600	1.421	1.291	1.202	1.159	1.127	1.087	1.062	1.043	1.029
last 10	1.590	1.416	1.294	1.197	1.152	1.119	1.078	1.056	1.038	1.025
last 5	1.547	1.414	1.295	1.201	1.151	1.113	1.070	1.044	1.027	1.015
Selected	1.607	1.461	1.340	1.241	1.171	1.126	1.093	1.066	1.045	1.030

## **EXAM PROGRESS STATISTICS**

Two additional indicators of travel time are examination pass ratios and average candidate examination progress. Examination pass ratios (next page) provide data on number of candidates sitting and number passing for each examination part. Average candidate examination progress (pages 23 and 24) indicates the average number of examinations passed in each examination session.

## Examination Pass Ratios:

Exam		S2000	F2000	S2001	F2001	S2002	F2002	S2003	F2003	S2004	F2004	S2005	F2005	W2006	Sp2006	Su2006	F2006	W2007	Sp2007	
1	Exams Taken	2667	2526	3498	3508	4860	4740	5398	5647	6577	5432	6374	2995	3501	3051	2898	2748	3050	3519	
	Passed	618	857	1167	1178	2096	1713	2057	2313	2225	1993	2485	1103	1316	1064	1002	908	1138	1289	
	Raw Pass Ratio	23.2	33.9	33.4	33.6	43.1	36.1	38.1	41.0	33.8	36.7	39.0	36.8	37.6	34.9	34.6	33.0	37.3	36.6	
	Effective Pass Ratio	26.3	36.7	37.4	37.9	46.5	41.5	41.3	46.5	38.5	40.6	44.6	43.1	43.4	41.0	40.6	38.3	44.2	41.7	
Exam		S2000	F2000	S2001	F2001	S2002	F2002	S2003	F2003	S2004	F2004	S2005	F2005	S2006	F2006	S2007				
2	Exams Taken	1903	1952	2115	2115	2549	2758	2710	3356	3656	3525	5275	4446	4824	4444	4043				
	Passed	509	629	676	860	949	1360	961	1314	945	1464	3857	1815	2185	1952	1929				
	Raw Pass Ratio	26.7	32.2	32.0	40.7	37.2	49.3	35.5	39.2	25.8	41.5	73.1	40.8	45.3	43.9	47.7				
	Effective Pass Ratio	29.4	33.6	35.2	43.0	40.1	51.8	37.6	40.7	27.9	44.5	75.8	46.9	49.1	47.5	52.6				
3	Exams Taken	1375	1466	1526	1450	1776	1765	2077	231	364	368	339	346	375	368	357				
	Passed	438	528	651	605	745	705	820	101	112	133	136	116	133	115	121				
	Raw Pass Ratio	31.9	36.0	42.7	41.7	41.9	39.9	39.5	43.7	30.8	36.1	40.1	33.5	35.5	31.3	33.9				
	Effective Pass Ratio	36.5	39.3	46.2	45.6	46.4	43.4	42.8	51.5	38.1	42.2	47.4	41.7	43.9	40.6	42.5				
4	Exams Taken	913	963	1008	1149	1272	1283	1215	1610	1728	2006	1580	1788	2119	2050	2079				
	Passed	309	356	409	491	564	739	613	823	864	1032	835	905	1128	1157	887				
	Raw Pass Ratio	33.8	37.0	40.6	42.7	44.3	57.6	50.5	51.1	50.0	51.4	52.8	50.6	53.2	56.4	42.7				
	Effective Pass Ratio	37.3	41.0	43.3	46.5	47.7	60.3	51.8	53.5	52.1	53.9	55.0	52.7	56.0	59.3	44.9				
5	Exams Taken	606	n/a	524	n/a	458	n/a	497	n/a	563	n/a	679	n/a	708	n/a	892				
	Passed	216	n/a	190	n/a	199	n/a	214	n/a	229	n/a	313	n/a	286	n/a	396				
	Raw Pass Ratio	35.6	n/a	36.3	n/a	43.4	n/a	43.1	n/a	40.7	n/a	46.1	n/a	40.4	n/a	44.4				
	Effective Pass Ratio	42.9	n/a	43.7	n/a	49.4	n/a	46.1	n/a	42.9	n/a	50.0	n/a	45.1	n/a	47.8				
6	Exams Taken	n/a	623	n/a	596	n/a	543	n/a	583	n/a	630	n/a	733	n/a	841	n/a				
	Passed	n/a	189	n/a	208	n/a	217	n/a	228	n/a	235	n/a	300	n/a	332	n/a				
	Raw Pass Ratio	n/a	30.3	n/a	34.9	n/a	40.0	n/a	39.1	n/a	37.3	n/a	40.9	n/a	39.5	n/a				
	Effective Pass Ratio	n/a	40.6	n/a	44.7	n/a	48.0	n/a	45.4	n/a	43.2	n/a	46.1	n/a	43.3	n/a				
7-CN	Exams Taken	40	n/a	48	n/a	47	n/a	58	n/a	48	n/a	60	n/a	74	n/a	80				
	Passed	18	n/a	19	n/a	19	n/a	23	n/a	15	n/a	25	n/a	32	n/a	35				
	Raw Pass Ratio	45.0	n/a	39.6	n/a	40.4	n/a	39.7	n/a	31.3	n/a	41.7	n/a	43.2	n/a	43.8				
	Effective Pass Ratio	46.2	n/a	41.3	n/a	43.2	n/a	42.6	n/a	31.9	n/a	41.7	n/a	44.4	n/a	44.9				
7-US	Exams Taken	516	n/a	494	n/a	442	n/a	378	n/a	373	n/a	405	n/a	449	n/a	459				
	Passed	202	n/a	203	n/a	207	n/a	164	n/a	163	n/a	182	n/a	208	n/a	181				
	Raw Pass Ratio	39.1	n/a	41.1	n/a	46.8	n/a	43.4	n/a	43.7	n/a	44.9	n/a	46.3	n/a	39.4				
	Effective Pass Ratio	46.9	n/a	45.0	n/a	50.2	n/a	44.8	n/a	45.2	n/a	47.4	n/a	48.4	n/a	41.6				
Exam		S2000	F2000	S2001	F2001	S2002	F2002	S2003	F2003	S2004	F2004	S2005	F2005	S2006	F2006	S2006				
8	Exams Taken	319	n/a	310	n/a	349	n/a	331	n/a	309	n/a	311	n/a	377	n/a	418				
	Passed	129	n/a	124	n/a	176	n/a	170	n/a	148	n/a	131	n/a	177	n/a	192				
	Raw Pass Ratio	40.4	n/a	40.0	n/a	50.4	n/a	51.4	n/a	47.9	n/a	42.1	n/a	46.9	n/a	45.9				
	Effective Pass Ratio	45.4	n/a	44.6	n/a	54.7	n/a	53.6	n/a	51.4	n/a	45.2	n/a	50.4	n/a	49.0				
9	Exams Taken	n/a	324	n/a	308	n/a	299	n/a	338	n/a	360	n/a	416	n/a	469	n/a				
	Passed	n/a	126	n/a	135	n/a	138	n/a	127	n/a	146	n/a	192	n/a	157	n/a				
	Raw Pass Ratio	n/a	38.9	n/a	43.8	n/a	46.2	n/a	37.6	n/a	40.6	n/a	46.2	n/a	33.5	n/a				
	Effective Pass Ratio	n/a	45.8	n/a	49.3	n/a	50.4	n/a	41.5	n/a	44.1	n/a	49.7	n/a	35.6	n/a				

From these data, two observations are worthy of note:

- Enrollment in the early examinations increased sharply through 2004 but it has flattened out or declined in 2005/6. 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 subsequent do not include candidates sitting for the SoA Exam 3. This trend has continued through the upper level exams where we are seeing record enrollment.

## Travel Time: Exam Progress Statistics

### A. CAS-SPECIFIC EXAMS

<u>CAS Examination</u>	<u>Exam Progress</u> <sup>1</sup>	<u>Pass Ratio</u> <sup>2</sup>	<b>Average Number of Exams Taken</b> <sup>3</sup>
<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

*Spring 2000, CAS administers non-partitioned Exams 5-9.*

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.***

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

<sup>2</sup> The number of full examination equivalents passed per exam equivalent taken.

<sup>3</sup> The number of full examination equivalents taken per candidate.

<u>CAS Examination</u>	<u>Exam Progress</u>	<u>Pass Ratio</u>	<b>Average Number of Exams Taken</b>
<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
Fall 2004	0.38	0.38	1.01
<i>January 2005, Validation by Educational Experience (VEE) introduced for Economics, Corporate Finance, and Applied Statistical Methods.</i>			
Spring 2005	0.44	0.44	1.01
Fall 2005	0.41	0.41	1.00
Spring 2006	0.43	0.42	1.01
Fall 2006	0.36	0.36	1.00
Spring 2007	0.43	0.43	1.01

## B. JOINT EXAMS

### 1. ALL CANDIDATES

<u>CAS/ SoA Examination</u>	<u>Exam Progress<sup>1</sup></u>	<u>Pass Ratio<sup>2</sup></u>	<b>Average Number of Exams Taken<sup>3</sup></b>
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

Fall 2004	0.43	0.41	1.06
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*January 2005, Validation by Educational Experience (VEE) introduced for Economics, Corporate Finance, and Applied Statistical Methods.*

Spring 2005	0.60	0.54	1.11
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Fall 2005	0.45	0.41	1.09
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Spring 2006	0.46	0.44	1.06
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Fall 2006	0.46	0.43	1.06
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Spring 2007	0.45	0.43	1.05
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## 2. CAS CANDIDATES

<u>CAS/ SoA Examination</u>	<u>Exam Progress<sup>1</sup></u>	<u>Pass Ratio<sup>2</sup></u>	<u>Average Number of Exams Taken<sup>3</sup></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
Fall 2004	0.42	0.41	1.03
<i>January 2005, Validation by Educational Experience (VEE) introduced for Economics, Corporate Finance, and Applied Statistical Methods.</i>			
Spring 2005	0.57	0.54	1.05
Fall 2005	0.48	0.46	1.04
Spring 2006	0.48	0.47	1.02
Fall 2006	0.52	0.51	1.03
Spring 2007	0.43	0.42	1.03

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

<sup>2</sup> The number of full examination equivalents passed per exam equivalent taken.

<sup>3</sup> The number of full examination equivalents taken per candidate.

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### **NOTE**

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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:

- Exam progress and number of exams taken in recent sittings are 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.

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**APPENDIX A: DATA AND METHODS**

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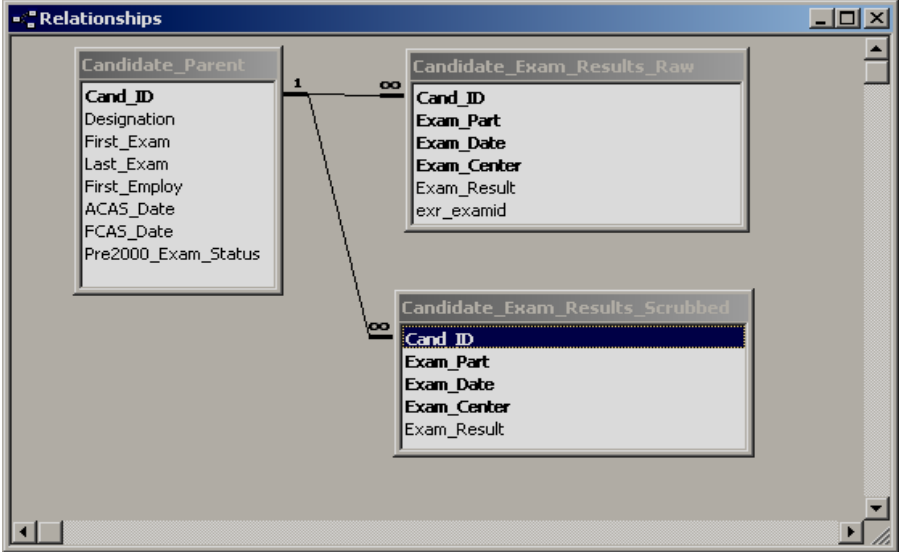
All data presented in this report are derived from examination and membership databases maintained by CAS staff<sup>7</sup>. These databases are updated following each exam session to reflect individual exam results and membership status. Data include exam results from both CAS exams and from exams administered 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

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<sup>7</sup> 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:

<b>Table: Candidate_Parent</b>	
Field	Contents
Cand_ID	CAS Membership Master ID Number
Cand_DOB	Candidate Date of Birth. For candidates with no reported date, this field contains zero.
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.

<b>Table: Candidate_Exam_Results_Raw</b>	
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.

<b>Table: Candidate_Exam_Results_Scrubbed</b>	
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.

EXR_EXAMID	Converted_Exam	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
VE	0VE	0.34
VF	0VF	0.33
VS	0VS	0.33
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.