
Actuaries

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Significant Points

- A strong background in mathematics is essential; actuaries must pass a series of examinations to gain full professional status.
- About 6 out of 10 actuaries are employed in the insurance industry.
- Employment opportunities should remain good for those who qualify, because the stringent qualifying examination system restricts the number of candidates.

Nature of the Work

Through their knowledge of statistics, finance, and business, actuaries assess the risk of events occurring and help create policies that minimize risk and its financial impact on companies and clients. One of the main functions of actuaries is to help businesses assess the risk of certain events occurring and formulate policies that minimize the cost of that risk. For this reason, actuaries are essential to the insurance industry.

Actuaries assemble and analyze data to estimate the probability and likely cost of an event such as death, sickness, injury, disability, or loss of property. Actuaries also address financial questions, including those involving the level of pension contributions required to produce a certain retirement income level and the way in which a company should invest resources to maximize return on investments in light of potential risk. Using their broad knowledge of statistics, finance, and business, actuaries help design insurance policies, pension plans, and other financial strategies in a manner which will help ensure that the plans are maintained on a sound financial basis.

Most actuaries are employed in the insurance industry, specializing in either life and health insurance or property and casualty insurance. They produce probability tables or use more sophisticated dynamic modeling techniques that determine the likelihood that a potential event will generate a claim. From these tables, they estimate the amount a company can expect to pay in claims. For example, property and casualty actuaries calculate the expected number of claims resulting from automobile accidents, which varies depending on the insured person's age, sex, driving history, type of car, and other factors. Actuaries ensure that the price, or premium, charged for such insurance will enable the company to cover claims and other expenses. This premium must be profitable, yet competitive with other insurance companies. Within the life and health insurance fields, actuaries help to develop long-term-care insurance and annuity policies, the latter a growing investment tool for many individuals.

Actuaries in other financial service industries manage credit and help price corporate security offerings. They also devise new investment tools to help their firms compete with other financial service companies. Pension actuaries work under the provisions of the Employee Retirement Income Security Act (ERISA) of 1974 to evaluate pension plans covered by that Act and report on the plans' financial soundness to participants, sponsors, and Federal regulators. Actuaries working for the government help manage social programs such as Social Security and Medicare.



Actuaries need a strong background in mathematics and statistics.

Actuaries may help determine company policy and may need to explain complex technical matters to company executives, government officials, shareholders, policyholders, or the public in general. They may testify before public agencies on proposed legislation that affects their businesses or explain changes in contract provisions to customers. They also may help companies develop plans to enter new lines of business or new geographic markets by forecasting demand in competitive settings.

Consulting actuaries provide advice to clients on a contract basis. The duties of most consulting actuaries are similar to those of other actuaries. For example, some may evaluate company pension plans by calculating the future value of employee and employer contributions and determining whether the amounts are sufficient to meet the future needs of retirees. Others help companies reduce their insurance costs by lowering the level of risk the companies take on. For example, they may provide advice on how to lessen the risk of injury on the job. Consulting actuaries sometimes testify in court regarding the value of potential lifetime earnings of a person who is disabled or killed in an accident, the current value of future pension benefits (in divorce cases), or other values arrived at by complex calculations. Some actuaries work in reinsurance, a field in which one insurance company arranges to share a large prospective liability policy with another insurance company in exchange for a percentage of the premium.

Work environment. Actuaries have desk jobs, and their offices usually are comfortable and pleasant. They often work at least 40 hours a week. Some actuaries—particularly consulting actuaries—may travel to meet with clients. Consulting actuaries also may experience more erratic employment and be expected to work more than 40 hours per week.

Training, Other Qualifications, and Advancement

Actuaries need a strong foundation in mathematics, statistics, and general business. They generally have a bachelor's degree and are required to pass a series of exams in order to become certified.

Education and training. Actuaries need a strong background in mathematics and general business. Usually, actuaries earn an undergraduate degree in mathematics, statistics or actuarial science, or a business-related field such as finance, economics or business. While in college, students should complete coursework in economics, applied statistics and corporate finance, which is a requirement for professional certification. Furthermore, many students obtain internships to gain experience in the profession prior to graduation. About 100 colleges and uni-

versities offer an actuarial science program, and most offer a degree in mathematics, statistics, economics, or finance.

Some companies hire applicants without specifying a major, provided that the applicant has a working knowledge of mathematics—including calculus, probability, and statistics—and has demonstrated this knowledge by passing one or two actuarial exams required for professional designation. Companies increasingly prefer well-rounded individuals who, in addition to having acquired a strong technical background, have some training in business and liberal arts and possess strong communication skills.

Beginning actuaries often rotate among different jobs in an organization, such as marketing, underwriting, financial reporting and product development, to learn various actuarial operations and phases of insurance work. At first, they prepare data for actuarial projects or perform other simple tasks. As they gain experience, actuaries may supervise clerks, prepare correspondence, draft reports, and conduct research. They may move from one company to another early in their careers as they advance to higher positions.

Licensure. Two professional societies sponsor programs leading to full professional status in their specialty: the Society of Actuaries (SOA) and the Casualty Actuarial Society (CAS). The SOA certifies actuaries in the fields of life insurance, health benefits systems, retirement systems, and finance and investment. The CAS gives a series of examinations in the property and casualty field, which includes car, homeowners, medical malpractice, workers compensation, and personal injury liability.

Three of the first four exams in the SOA and CAS examination series are jointly sponsored by the two societies and cover the same material. For this reason, students do not need to commit themselves to a specialty until they have taken the initial examinations, which test an individual's competence in probability, statistics, and other branches of mathematics and finance. The first few examinations help students evaluate their potential as actuaries. Many prospective actuaries begin taking the exams in college with the help of self-study guides and courses. Those who pass one or more examinations have better opportunities for employment at higher starting salaries than those who do not.

Many candidates find work as an actuary immediately after graduation and work through the certification process while gaining some experience in the field. In fact, many employers pay the examination fees and provide their employees time to study. As actuaries pass exams, they are often rewarded with a pay increase. Despite the fact that employers are supportive during the exam process, home study is necessary and many actuaries study for months to prepare for each exam.

The process for gaining certification in the Casualty Actuarial Society is predominantly exam based. To reach the first level of certification, the Associate or ACAS level, a candidate must complete seven exams, attend one course on professionalism and complete the coursework in applied statistics, corporate finance, and economics required by both the SOA and CAS. This process generally takes from 4 to 6 years. The next level, the Fellowship or FCAS level, requires passing two additional exams in advanced topics, including investment and assets and dynamic financial analysis and the valuation of insurance. Most actuaries reach the fellowship level 2 to 3 years after attaining Associate status.

The certification process of the Society of Actuaries blends exams with computer learning modules and coursework. After

taking the initial exams, candidates must choose a specialty: group and health benefits, individual life and annuities, retirement benefits, pensions, investments or finance/enterprise risk management. To reach the Associate or ASA level, a candidate must complete the initial four exams, the coursework in applied statistics, corporate finance and economics required by the SOA and CAS, eight computer modules with two corresponding assessments and a course in professionalism. This process generally takes from 4 to 6 years. To attain the Fellowship or FSA level, a candidate must pass two additional exams within a chosen specialty and must complete three computer modules and a professionalism course. Attaining Fellowship status usually takes an additional 2 to 3 years after becoming an Associate.

Specific requirements apply to pension actuaries, who verify the financial status of defined benefit pension plans for the Federal Government. These actuaries must be enrolled by the Joint Board of the U.S. Treasury Department and the U.S. Department of Labor for the Enrollment of Actuaries. To qualify for enrollment, applicants must meet certain experience and examination requirements, as stipulated by the Board.

Other qualifications. In addition to knowledge of mathematics, computer skills are becoming increasingly important. Actuaries should be able to develop and use spreadsheets and databases, as well as standard statistical analysis software. Knowledge of computer programming languages, such as Visual Basic for Applications, SAS, or SQL, is also useful.

To perform their duties effectively, actuaries must keep up with current economic and social trends and legislation, as well as with developments in health, business, and finance that could affect insurance or investment practices. Good communication and interpersonal skills also are important, particularly for prospective consulting actuaries.

Advancement. Advancement depends largely on job performance and the number of actuarial examinations passed. Actuaries with a broad knowledge of the insurance, pension, investment, or employee benefits fields can rise to administrative and executive positions in their companies. Actuaries with supervisory ability may advance to management positions in other areas, such as underwriting, accounting, data processing, marketing, and advertising. Increasingly, actuaries with knowledge of business are beginning to rise to high-level positions within their companies, such as Chief Risk Officer, Chief Financial Officer, or other executive level positions. These generally require that actuaries use their abilities for assessing risk and apply it to the entire company as a whole. Furthermore, some experienced actuaries move into consulting, often by opening their own consulting firm. Some actuaries transfer to college and university faculty positions. (See the section on teachers—postsecondary elsewhere in the *Handbook*.)

Employment

Actuaries held about 18,000 jobs in 2006. Over half of all actuaries were employed by insurance carriers. Approximately 21 percent work for professional, scientific and technical consulting services. Others worked for insurance agents and brokers and in the management of companies and enterprises industry. A relatively small number of actuaries are employed by government agencies.

Job Outlook

Employment of actuaries is expected to grow rapidly through 2016. Job opportunities should remain good for those who

qualify, because the stringent qualifying examination system restricts the number of candidates.

Employment change. Employment of actuaries is expected to increase by about 24 percent over the 2006-16 period, which is much faster than the average for all other occupations. Employment growth in the insurance industry—the largest employer of actuaries—is expected to continue at a stable pace, while more significant job growth is likely in other industries, such as health care and consulting firms.

Steady demand by the insurance industry should ensure that actuarial jobs in this key industry will remain stable during the projection period. Although relatively few new jobs will be created, actuaries will continue to be needed to develop, price, and evaluate a variety of insurance products and calculate the costs of new risks. The demand for actuaries in life insurance has been growing rapidly as a result of the rise in popularity of annuities, a financial product offered primarily by life insurance companies. In addition, the risk of terrorism and natural disasters has created a large demand for actuaries in property insurance.

Some new employment opportunities for actuaries should also become available in the health-care field as health-care issues and Medicare reform continue to receive attention. Increased regulation of managed health-care companies and the desire to contain health-care costs will continue to provide job opportunities for actuaries, who will also be needed to evaluate the risks associated with new medical issues, such as genetic testing and the impact of new diseases. Others in this field are involved in drafting health-care legislation.

A significant proportion of new actuaries will find employment with consulting firms. Companies that may not find it cost effective to employ their own actuaries are increasingly hiring consulting actuaries to analyze various risks. Other areas with notable growth prospects are information services and accounting services. Also, because actuarial skills are increasingly seen as useful to other industries that deal with risk, such as the airline and the banking industries, additional job openings may be created in these industries.

Despite the increase in employment overall, there has been some decline in the demand for pension actuaries. This is due in large part to the decline of defined benefit plans, which required review by an actuary, in favor of investment based retirement funds, such as 401ks.

Job prospects. Opportunities for actuaries should be good, particularly for those who have passed at least one or two of the initial exams. In addition, a small number of jobs will open up each year to replace actuaries who leave the occupation to retire or transfer new jobs. Candidates with additional knowledge or experience, such as computer programming skills, will be particularly attractive to employers. Most jobs in this occupation are located in urban areas, but opportunities vary by geographic location.

Projections data from the National Employment Matrix

Occupational Title	SOC Code	Employment, 2006	Projected employment, 2016	Change, 2006-2016	
				Number	Percent
Actuaries	15-2011	18,000	22,000	4,300	24

NOTE: Data in this table are rounded. See the discussion of the employment projections table in the *Handbook* introductory chapter on *Occupational Information Included in the Handbook*.

Earnings

Median annual earnings of actuaries were \$82,800 in May 2006. The middle 50 percent earned between \$58,710 and \$114,570. The lowest 10 percent had earnings of less than \$46,470 while the top 10 percent earned more than \$145,600.

According to the National Association of Colleges and Employers, annual starting salaries for graduates with a bachelor's degree in actuarial science averaged \$53,754 in 2007.

Insurance companies and consulting firms give merit increases to actuaries as they gain experience and pass examinations. Some companies also offer cash bonuses for each professional designation achieved. A 2007 survey by Life Office Management Association, Inc. of the largest U.S. insurance and financial services companies indicated that the average base salary for an entry-level actuary was \$53,111. Associate actuaries, who direct and provide leadership in the design, pricing, and implementation of insurance products, received an average salary of \$109,167. Actuaries at the highest technical level without managerial responsibilities reportedly were paid an average of \$125,946.

Related Occupations

Actuaries need a strong background in mathematics, statistics, and related fields. Other workers whose jobs involve such skills include accountants and auditors, budget analysts, economists, market and survey researchers, financial analysts and personal financial advisors, insurance underwriters, mathematicians, and statisticians.

Sources of Additional Information

Career information on actuaries specializing in pensions is available from:

► American Society of Pension Actuaries, 4245 N. Fairfax Dr., Suite 750, Arlington, VA 22203.

Internet: <http://www.aspa.org>

For information about actuarial careers in life and health insurance, employee benefits and pensions, and finance and investments, contact:

► Society of Actuaries (SOA), 475 N. Martingale Rd., Suite 600, Schaumburg, IL 60173-2226.

Internet: <http://www.soa.org>

For information about actuarial careers in property and casualty insurance, contact:

► Casualty Actuarial Society (CAS), 4350 N. Fairfax Dr., Suite 250 Arlington, VA 22203.

Internet: <http://www.casact.org>

The SOA and CAS jointly sponsor a Web site for those interested in pursuing an actuarial career.

Internet: <http://www.BeAnActuary.org>

For general information on a career as an actuary, contact:

► American Academy of Actuaries, 1100 17th St.NW., 7th Floor, Washington, DC 20036.

Internet: <http://www.actuary.org>