



# Lecture 13

## Insurance Companies & Pension Funds

Mingzhu Wang  
SKKU ISS 2019



# Agenda

- Insurance Companies
- Fundamentals of Insurance
- Growth and Organization of Insurance Companies
- Types of Insurance
- Pensions
- Types of Pensions
- Regulation of Pension Plans
- Case study: USS



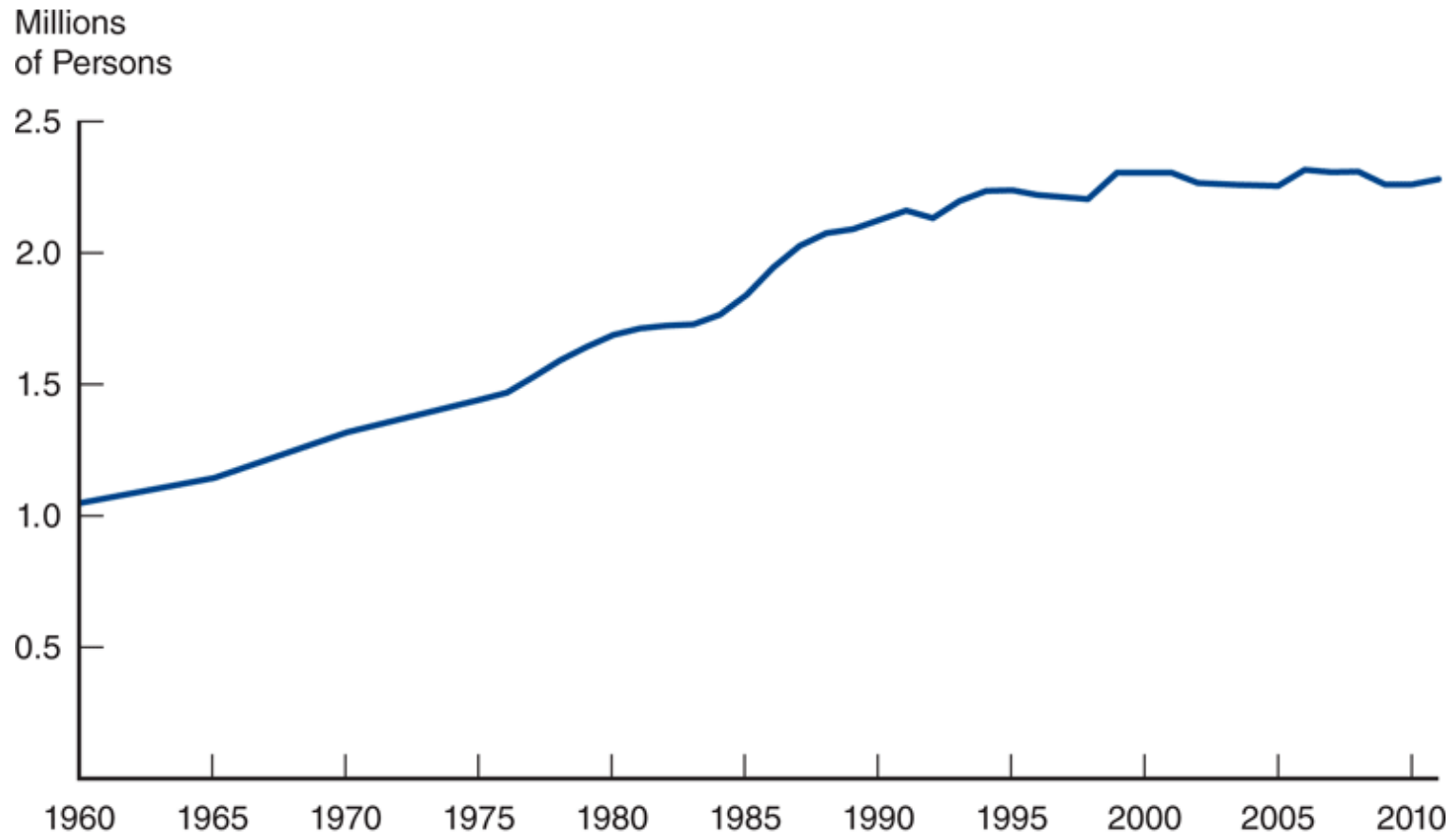
# Insurance Companies

- Insurance companies assume the risk of their clients in return for a fee, called the **premium**.
- Most people purchase insurance because they are risk-averse - they would rather pay a **certainty equivalent** (the premium) than accept a gamble



# Insurance Companies: Major Employer

Number of Persons Employed in the U.S. Insurance Industry,  
1960–2011



Source: <https://www.acli.com/>.



# Fundamentals of Insurance

Although there are many types of insurance and insurance companies, there are seven basic principles all insurance companies are subject to:

1. There must be a relationship between the insured and the beneficiary. Further, the beneficiary must be someone who would suffer if it weren't for the insurance.



# Fundamentals of Insurance

2. The insured must provide full and accurate information to the insurance company.
3. The insured is not to profit as a result of insurance coverage.
4. If a third party compensates the insured for the loss, the insurance company's obligation is reduced by the amount of the compensation.



# Fundamentals of Insurance

5. The insurance company must have a large number of insured so that the risk can be spread out among many different policies.
6. The loss must be quantifiable. For example, an oil company could not buy a policy on an unexplored oil field.
7. The insurance company must be able to compute the probability of the loss's occurring.



# Fundamental Insurance Principles and Issues

- Risk Pooling is the source of all value in insurance
- Moral Hazard dealt with partially by deductions and co-insurance
- Selection bias dealt with by group policies, by testing and referrals, and by mandatory government insurance





# Risk Pooling

- If  $n$  policies, each has independent probability  $p$  of a claim, then the number of claims follows the binomial distribution. The standard deviation of the fraction of policies that result in a claim is

$$\sqrt{p(1-p)/n}$$

- Law of large numbers: as  $n$  gets large, standard deviation approaches zero.



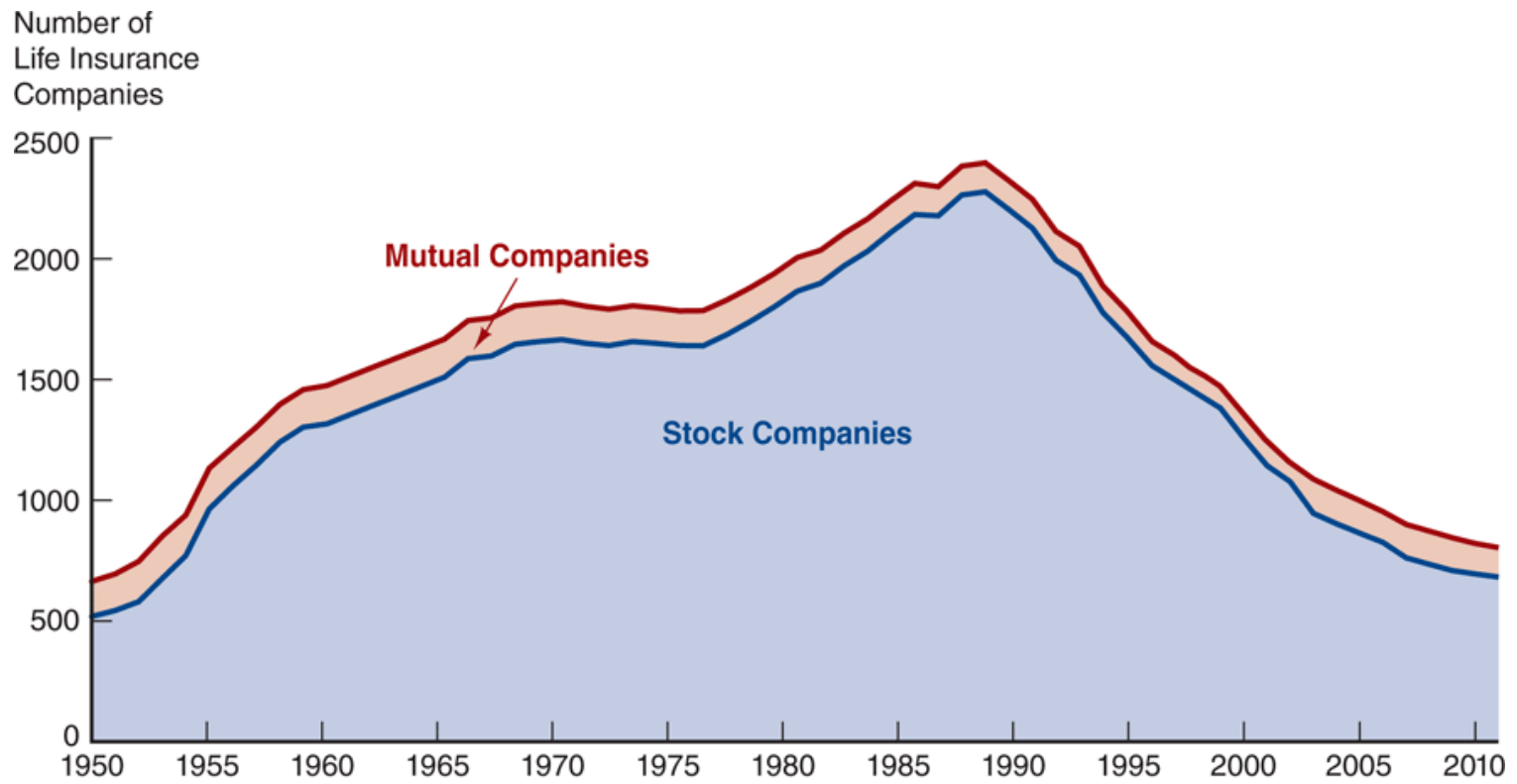
# Growth and Organization of Insurance Companies

- Insurance companies may be organized in two difference ways:
  - A **stock company** is owned by shareholders and has a profit motive
  - A **mutual insurance company** is owned by the policyholders and attempts to provide the lowest cost insurance



# Growth and Organization of Insurance Companies

## Number of Life Insurance Companies in the United States (1950–2011)



Source: <https://www.acli.com>, *Life Insurance Fact Book*.



# Types of Insurance

Insurance is classified by which type of undesirable event is covered:

- Life Insurance
- Health Insurance
- Property and Casualty Insurance



# Life Insurance

Life insurance policies come in many forms. Some of the typical policies include:

- Term Life: the insured is covered while the policy is in effect, usually 10 - 20 years.
- Whole Life: similar to term life, but allows the policyholder to borrow against the policies cash value. When the term of policy expires, the insured can get the cash value of the policy.



# Life Insurance

Life insurance policies come in many forms. Some of the typical policies include:

- Universal Life: includes both a term life portion and a savings portion.
- Annuities: pays a benefit to the insured until death, to cover retirement years.



# Expected Life of Persons at Various Ages

Age	Male	Female	Total Population
0	76.2	81.1	78.7
1	75.7	80.5	78.2
5	71.8	76.6	74.3
15	61.9	66.7	64.4
25	52.4	56.9	54.8
35	43.1	47.2	45.3
45	33.9	37.8	36.0
55	25.4	28.8	27.2
65	17.7	20.3	19.2
75	11.0	12.9	12.2
85	5.9	7.0	6.6
100	2.1	2.4	2.4

Source: *Life Insurance Fact Book, 2012*, Table 12.2 (American Council of Life Insurers).



# Sample Annual Premiums

Typical Annual Premiums on a \$100,000 Term Policy for a 40-Year-Old Male Nonsmoker

Age of Insured (years)	Cost (\$)
40	134
41	147
42	153
45	192
50	286
55	461
60	810



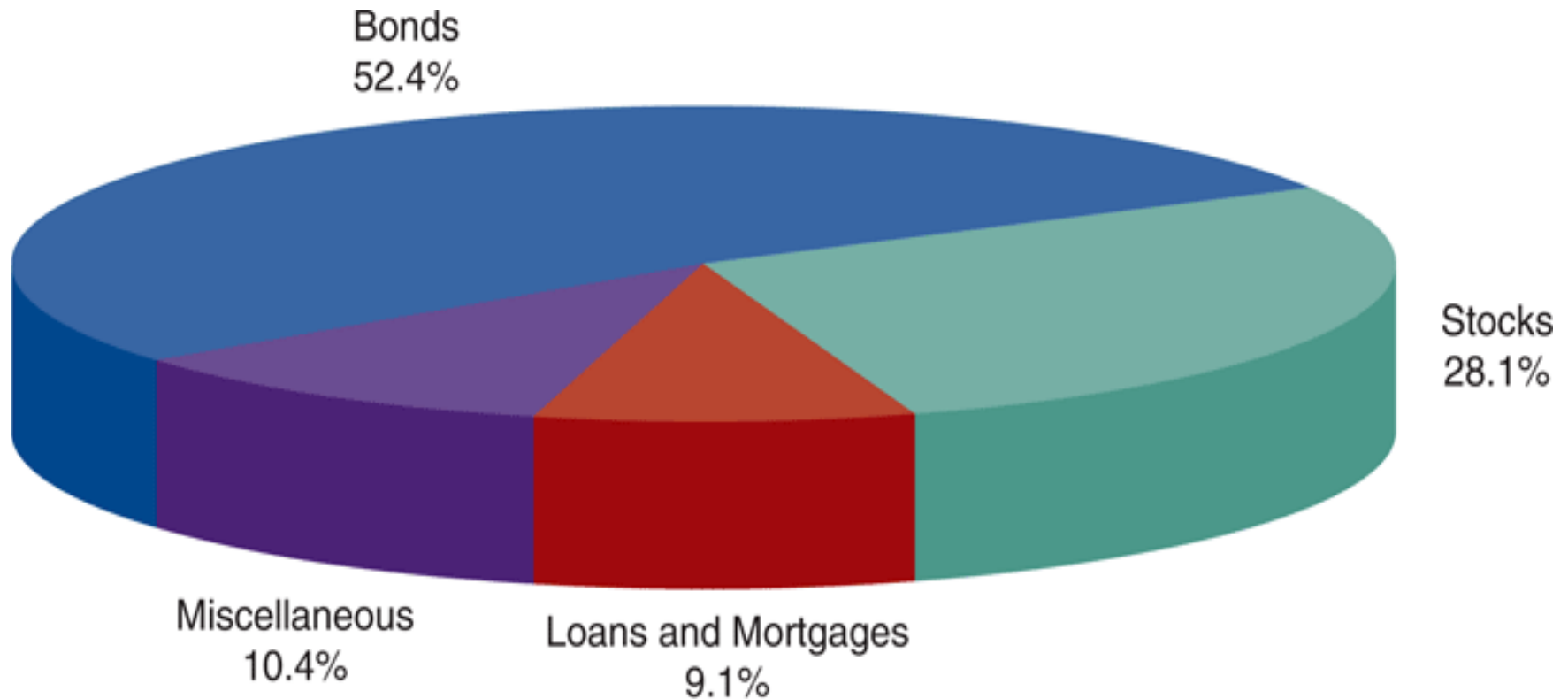


# Life Insurance: Company Assets and Liabilities

- Two fund sources:
  - They receive premiums that must be used to payout future claims when the insured dies
  - They receive premiums paid into pension funds managed by the life insurance company
- Two primary liabilities:
  - Life insurance payouts
  - Pension fund payouts



# Distribution of Life Insurance Company Assets (2011)

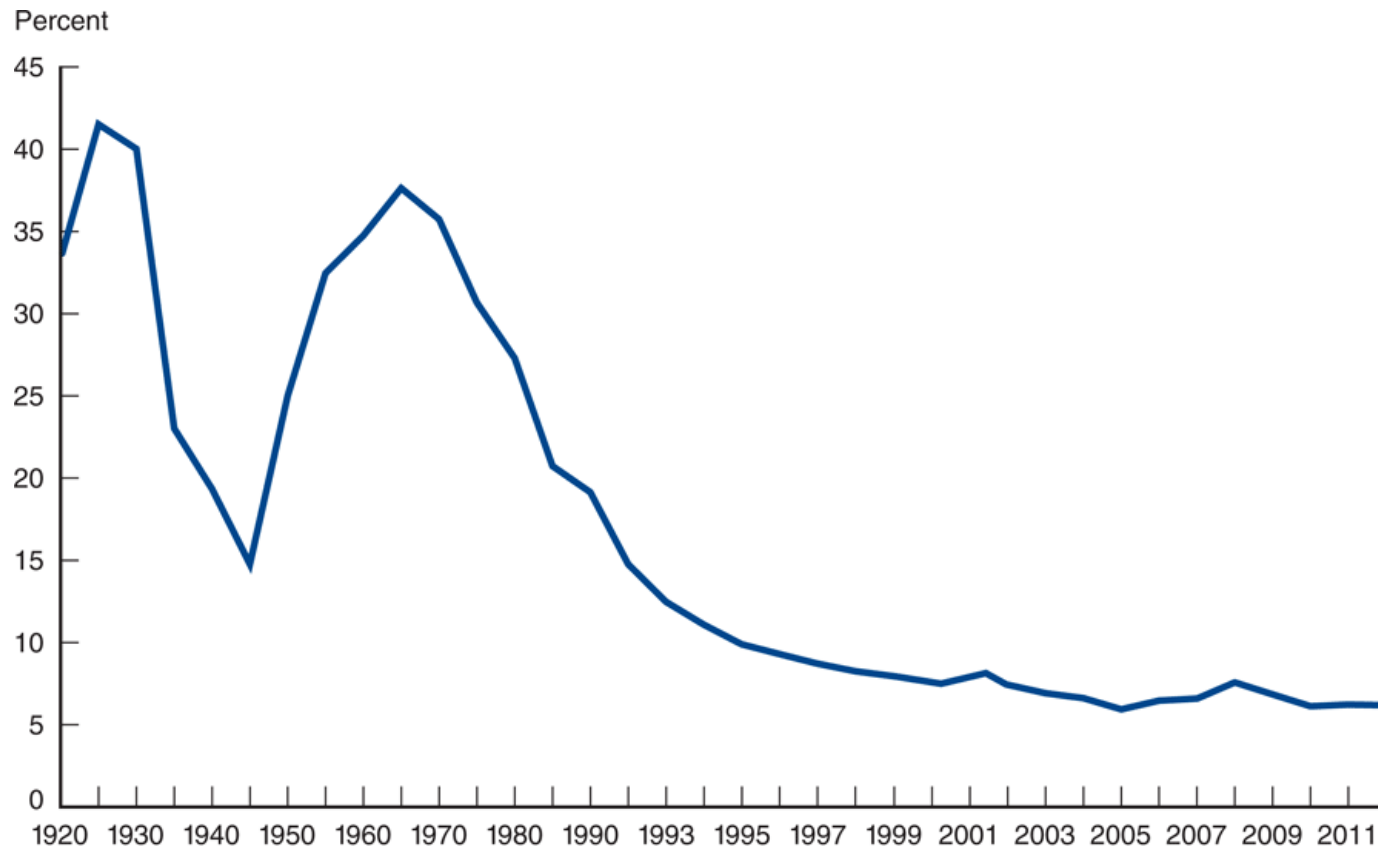


Source: *Life Insurance Company Fact Book*, 2012, Table 2.1 (American Council of Life Insurers), <https://www.acli.com/Tools/Industry%20Facts/Life%20Insurers%20Fact%20Book/Pages/RP12>.



# Life Insurance Company Assets Invested in Mortgages

Percentage of Life Insurance Company Assets Invested in Mortgages, 1920–2012



Source: Federal Reserve Flow of Funds Accounts, Table L117, <http://www.federalreserve.gov/releases/z1/Current/z1.pdf>.



# Health Insurance

- Health insurance policies are vulnerable to the adverse selection problem - those with health problems are more likely to seek coverage.
- Individual policies must be priced assuming adverse selection.
- Most health insurance is offered through group policies.



# Health Insurance

Health insurance is a hot topic in the political environment, focusing on increased costs and availability of coverage.

- Insurance programs are attempting to shift costs to the employers.
- Health Maintenance Organizations are another attempt to keep costs down.



# Property and Casualty Insurance

- Property Insurance: protects businesses and owners from the risk associated with ownership.
  - Named-peril policies: insures against any losses **only** from perils specifically named in the policy
  - Open-peril policies: insures against any losses **except** from perils specifically named in the policy
- Casualty Insurance
- Reinsurance



# Property and Casualty Insurance

- Casualty Insurance: also known as liability insurance, it protects against financial losses because of a claim of negligence.
- Reinsurance: allocates a portion of the risk to another company in exchange for a portion of the premium.



# US Government Regulation of Insurance

- McCarran Ferguson Act 1945 delegated insurance regulation to the states. Fifty different state regulators.
- National Association of Insurance Commissioners (NAIC) creates standardized suggested laws.
- In 1993 the NAIC adopted risk-based capital requirements.
- Gramm-Leach-Bliley Financial Modernization Act of 1999 allowed banks to affiliate with insurance companies





# Pensions

- *Definition:* A **pension plan** is an asset pool that accumulates over an individual's working years and is paid out during the nonworking years.
- Developed as elders began relying less on children for care during their later years.
- Also became popular as life expectancy increased.



# Types of Pensions

- Defined-Benefit Pension Plans: a plan where the sponsor promises the employee a specific benefit when they retire.
- For example, Annual Retirement Payment =  $2\% \times \text{average of final 3 years' income} \times \text{years of service}$



# Types of Pensions

- Defined-Benefit Pension Plans place a burden on the employer to properly fund the expected retirement benefit payouts.
  - Fully funded:** sufficient funds are available to meet payouts
  - Overfunded:** funds exceed the expected payout
  - Underfunded:** funds are not expected to meet the required benefit payouts



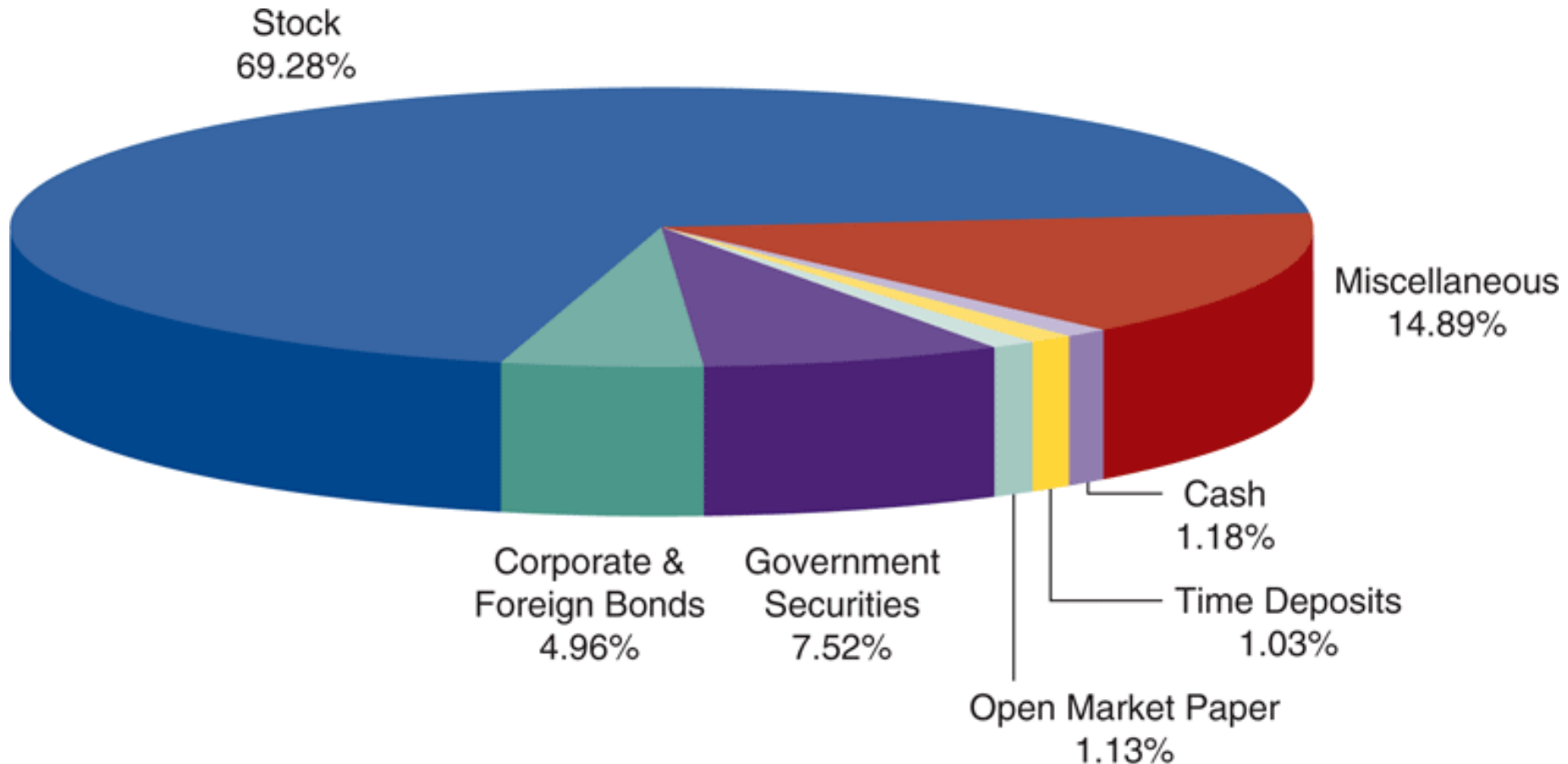
# Types of Pensions

- Defined-Contribution Pension Plan: a plan where a set amount is invested for retirement, but the benefit payout is uncertain.
- Private Pension Plans: any pension plan set up by employers, groups, or individuals
- Public Pension Plan: any pension plan set up by a government body for the general public (e.g., Social Security)



# Private Pension Plan Assets

Distribution of Private Pension Plan Assets (end of 2012)



Source: <http://www.federalreserve.gov/releases/z1/current/z1.pdf>, Table L116.



# Regulation of Pension Plans (U.S.)

- Pension Reform Act of 1978 authorized **individual retirement accounts**.
  - Enjoy a preferential tax treatment
  - Keogh plans are similar plans for self-employed individuals
  - SIMPLE IRAs are simplified retirement plans for small businesses.
- Pension Protection Act of 2006 was passed to address the growing problem of failed pension plans. It provides stronger funding rules, greater transparency, and a stronger pension insurance system.



# Case Study - USS

- Universities Superannuation Scheme (USS) is a private pension scheme in the UK with over £50 billion under management.
- Its members include academic and academic-related staff (including senior administrative staff) in many.
- By 2014, USS had become the UK's second largest pension scheme.
- By 2017, USS had over 400,000 members.



# Changes of 2011

- USS closed its final salary scheme to new members, replacing it with a career average revalued earnings (CARE) scheme for new members.
- Contribution rates for members still in the final salary section rose from 6.35% to 7.5%.
- The retirement age was linked to the UK state retirement age.





# Changes of 2011 (Con't)

- The scheme changed from being 'balance-of-cost' (in which sponsors are ultimately responsible for meeting promised pensions) to a 'cap-and-share' rule, in which extra contributions would, if necessary, be met 35% by members and 65% by sponsors.
- The indexation of deferred pensions and pensions in payment was changed from the **retail price index** to the less generous **consumer price index**, and uprating of accrued benefits was capped.



# Research on these rule changes

- Researchers find that 'the pre-October 2011 scheme was not viable in the long run', whereas the post-October 2011 scheme was 'probably viable in the long run', though it faced medium-term problems as the effects of the changes on the state of the fund would take time to be felt.
- Subsequent research found that these rule changes reduced the state's tax subsidy to members by £1.86 billion and to sponsors by £0.9 billion, increasing UK government wealth by £2.86 billion.
- The reduced wealth of post-2011 entrants was equivalent to an 11% drop in their total compensation or a 13% drop in their salaries.



# Changes of 2016

- Despite the changes of 2011, USS continued to identify deficits, leading to further negotiations, industrial action, and eventually dramatic changes being implemented in April 2016.
- The final-salary pension scheme (only available to members who joined before the 2011 changes) was closed. All active members thereafter switched to the CARE scheme, with benefits being based on career-average earnings.
- Employee contributions rose to 8%, and employer contributions from 16% to 18% of salary.

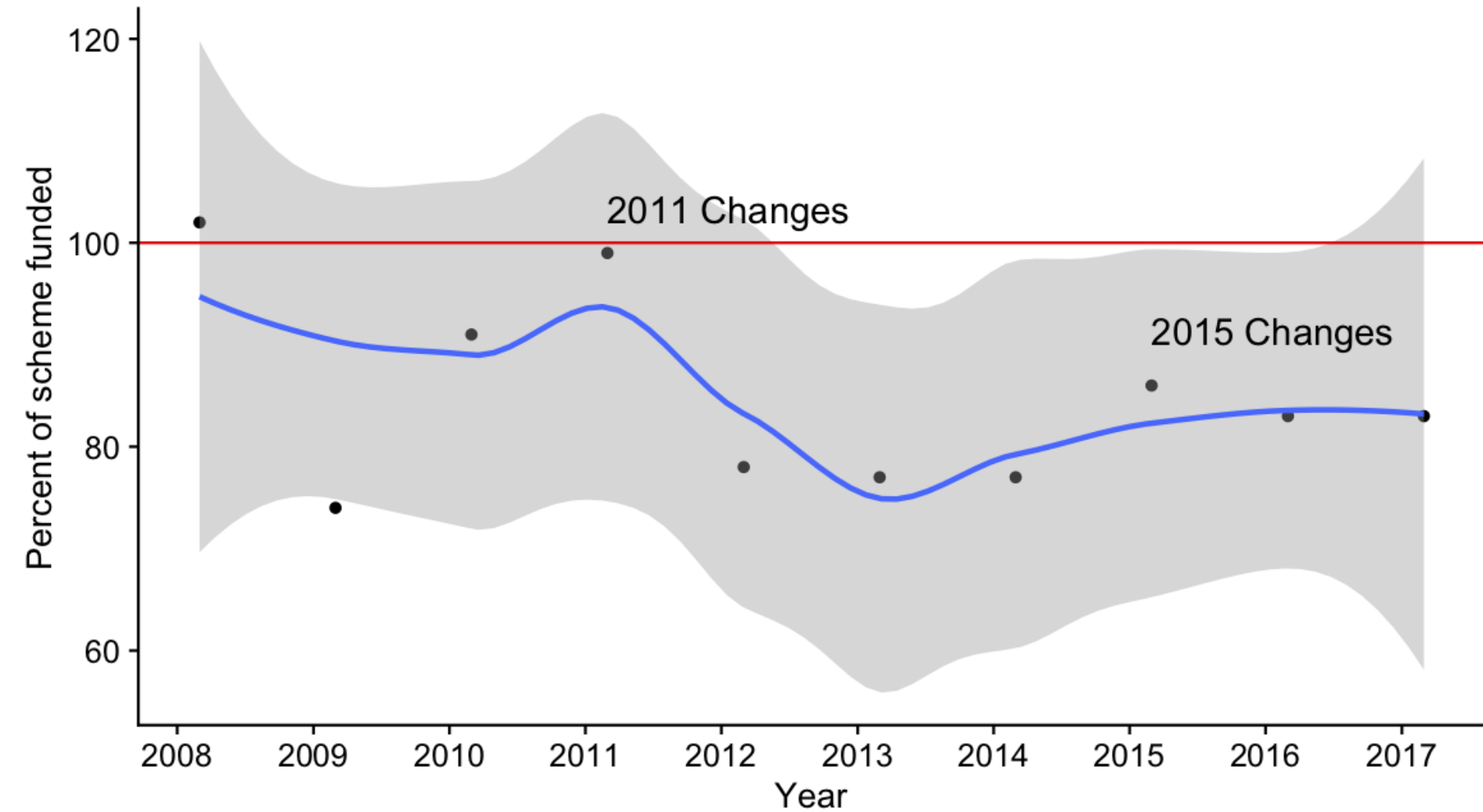


# 2017 Statistics

- The USS scheme reported a technical deficit of £17.5 billion in July 2017, reported as the largest shortfall in the UK at that time.
- Under diverse conventional accounting rules, the scheme has been in deficit for several years.
- The actuary estimated the scheme was 91% funded (£3.1 billion deficit) according to the scheme specific funding regime, 80% funded on an FRS17 basis, and 57% funded on a buy-out basis.



## USS Balance sheet





# Criticisms of USS

- In 2014, USS's highest-paid executive, received a 50% pay increase, to £900,000.
- In 2017, it was found that the USS pension scheme has offshore investments in tax havens.
- In 2018, it was noted that pay for USS's chief executive rose from £484,000 in 2017 to £566,000 in 2018, while two staff members earned over £1m, and running costs stood at £125m per annum.



# 2018 UK higher education strike

- The University and College Union (UCU), a trade union representing 110,000 staff at UK universities, began a strike on 22 February 2018 as part of an industrial action against 64 universities, represented by Universities UK (UUK). The dispute concerned proposed changes to the USS.
- The first wave of strike action escalated over fourteen strike days between 22 February to 20 March, the longest-ever strike in UK higher-education history.



