

State and local pension pressure compounded by coronavirus shock

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Pre-coronavirus pension risks higher than years preceding the Great Recession

Larger unfunded liabilities

2019: \$4.1 trillion (19% of US GDP)

2007: \$1.6 trillion (11% of US GDP)

Similar scale of asset risk

2019 assets: \$4.8 trillion (22% of US GDP) (62% corporate equities)

2007 assets: \$3.3 trillion (23% of US GDP) (56% corporate equities)

Higher annual costs

Contributions relative to revenues at or near historical peaks for many...

...but often do not "tread water" under reported discount rates

Weaker cash flow

Negative non-investment cash flow (NICF) will constrain asset accumulation without higher contributions

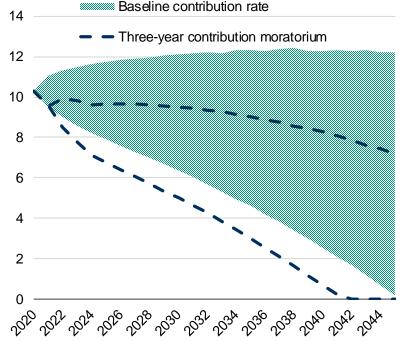
Less pension "smoothing" capacity

Government contribution decisions in coming years will be a differentiating factor impacting pension risk

Pension systems with significantly negative NICF are most susceptible

- » Example large US public retirement system, with
 - ~ -4% NICF, 11 year asset/benefit coverage in 2019
 - 24% probability of depletion by 2045, based on current (baseline) statutory contribution rate
 - 39% probability of depletion by 2045, if three-year contribution moratorium, followed by return to baseline
- » Asset depletion presents additional risks
 - "PAYGO jump" cost increase
 - No ability to spare gov't budget without benefit impairment
 - May also lose active employee contributions to an insolvent retirement system

Asset / benefit coverage, 25% – 75% confidence band



Source: Moody's Investors Service

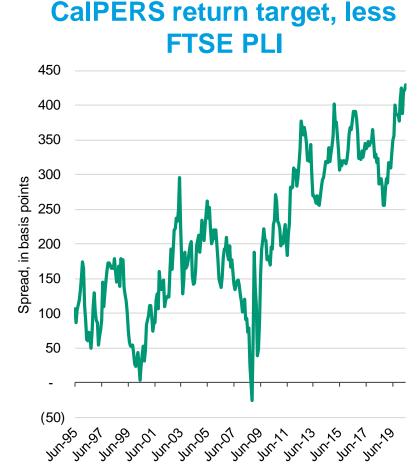
Lower for longer interest rates mean higher risk to providers of guaranteed annuities

» Boyd, et al:

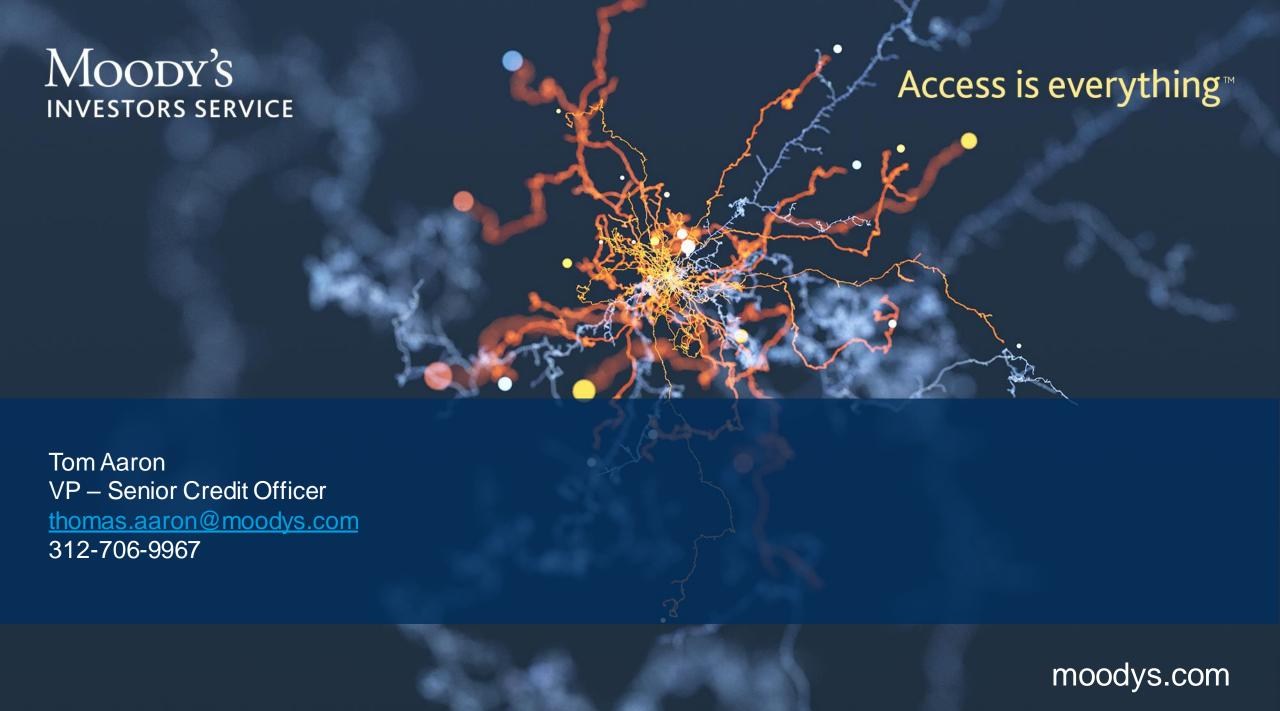
- benefit contingencies provide governments some downside protection...
- ...but materiality of risk-reduction is limited
- COLA changes provide liability savings potential, often a focal point of litigation

» Costrell & McGee

- Lower near-term contributions & volatile investments → higher risk of unexpectedly high future contributions
- "Expected contribution" weighted composite acknowledges solvency risk not always visible in governmental pension accounting



Sources: CalPERS, Society of Actuaries



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