

A nighttime cityscape featuring a dense cluster of illuminated skyscrapers and a complex network of highways with light trails from traffic. The scene is set against a dark sky with some clouds.

Retirement benefit risks loom over
many governments' credit quality

July 2019

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Full market value funding would insulate pension sponsors from numerous risks

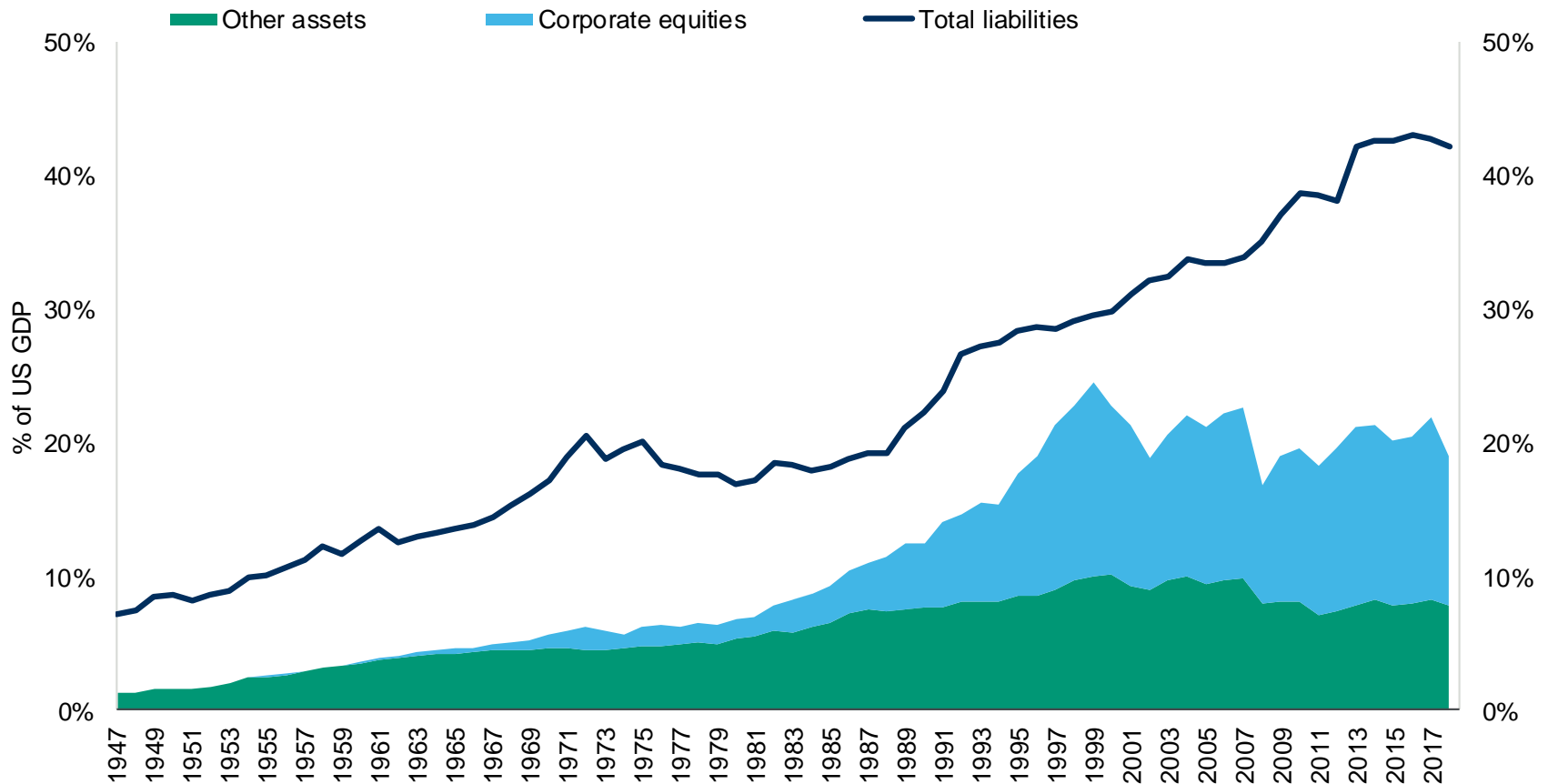
- » Reduces reliance on future investment returns to cover current costs
 - Employer normal cost, CalPERS Highway Patrol:
 - › 19.1% of payroll @ 7.0% discount rate
 - › 40.0% of payroll @ 5.0% discount rate
- » Asset-liability matching mitigates interest rate risk
 - Assets and accrued benefits with same duration impacted equivalently by changes in market interest rates
- » Prevents higher costs at economically inopportune points in time (i.e., “generational equity”)
 - Mitigates risk that economy / tax base cannot concurrently pay for current government services, bonded debt and legacy employee retirement obligations

Pensions are “must-pay” obligations for most state and local governments

- » Pension unaffordability = debt unaffordability
 - Risks are higher than ever for many, but vary significantly
- » Most state and local governments have high investment grade ratings
- » Service solvency a key credit consideration & proxy for “sustainability”
 - Unfunded liabilities are debt-like obligations, a claim on future resources
 - Bondholder risk rises as pensions + other fixed costs “crowd-out” essential services
- » Bond default and/or bankruptcy usually precedes pension benefit defaults
 - Puerto Rico
 - Detroit, MI
 - California cities of Vallejo, Stockton & San Bernardino
 - Harvey, IL

Public pension liabilities and assets at historically elevated levels relative to US economic base

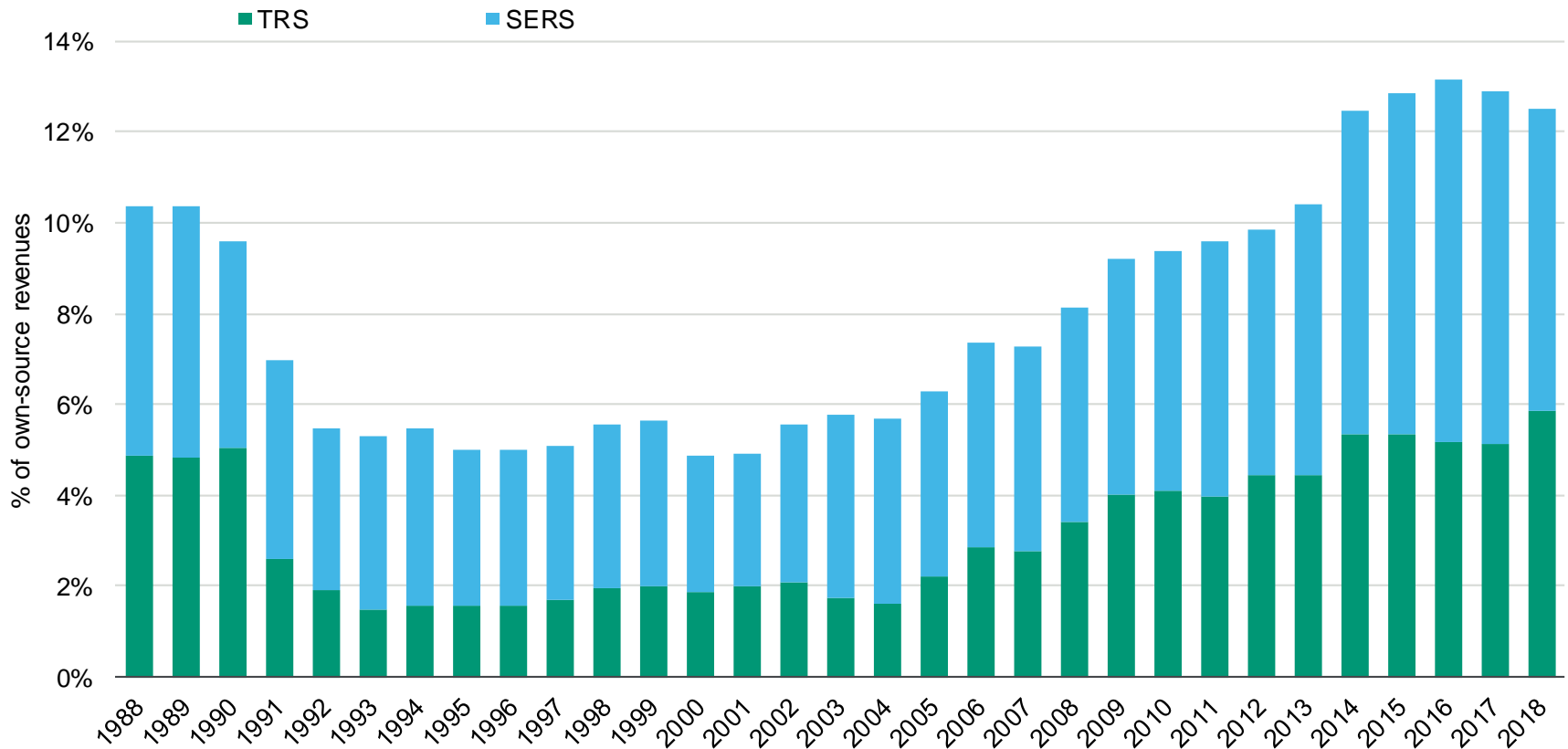
Unfunded liabilities soar when discount rate adjusted: \$4.7 trillion reported by Federal Reserve as of year-end 2018



Source: Board of Governors of the Federal Reserve System, "Financial Accounts of the United States"

Government pension contributions are higher than ever, for many

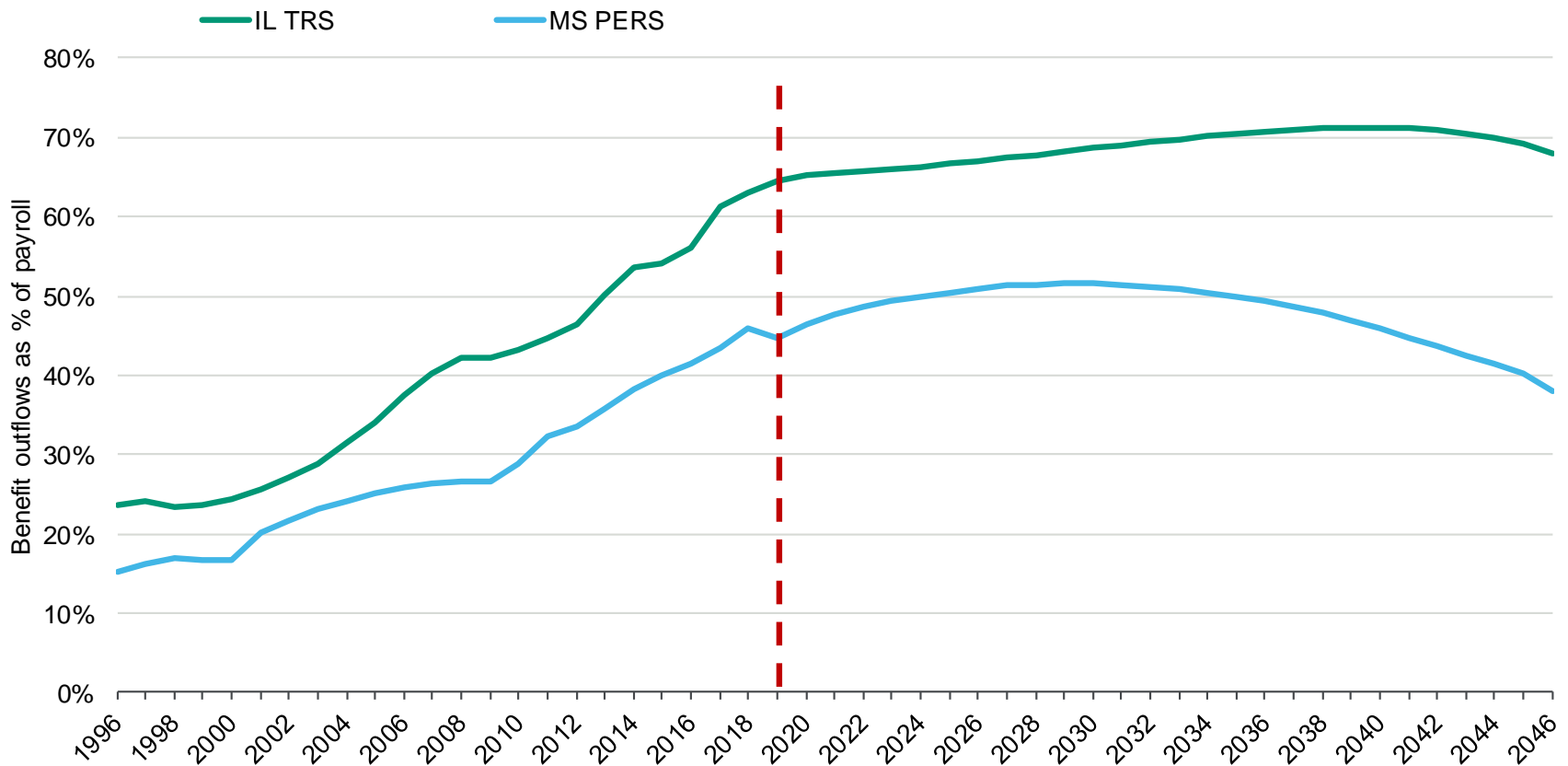
Contributions to Connecticut's two largest pension systems, % of revenue



Sources: System actuarial valuations and state comprehensive annual financial reports

Benefit outflows to remain near peak levels of economic significance for ~next 20 years

Benefit outflows as % of active employee payroll



Source: Teachers' Retirement System of Illinois, Public Employees' Retirement System of Mississippi

Pay-as-you-go *can* be affordable

...but not always

» City of Portland, OR

- Closed public safety system funded with dedicated levy

» State of Indiana

- Largest system by total liability has some assets, but is close to PAYGO
- Balance sheet burden of unfunded liabilities is essentially at median for state governments

» State of Kentucky

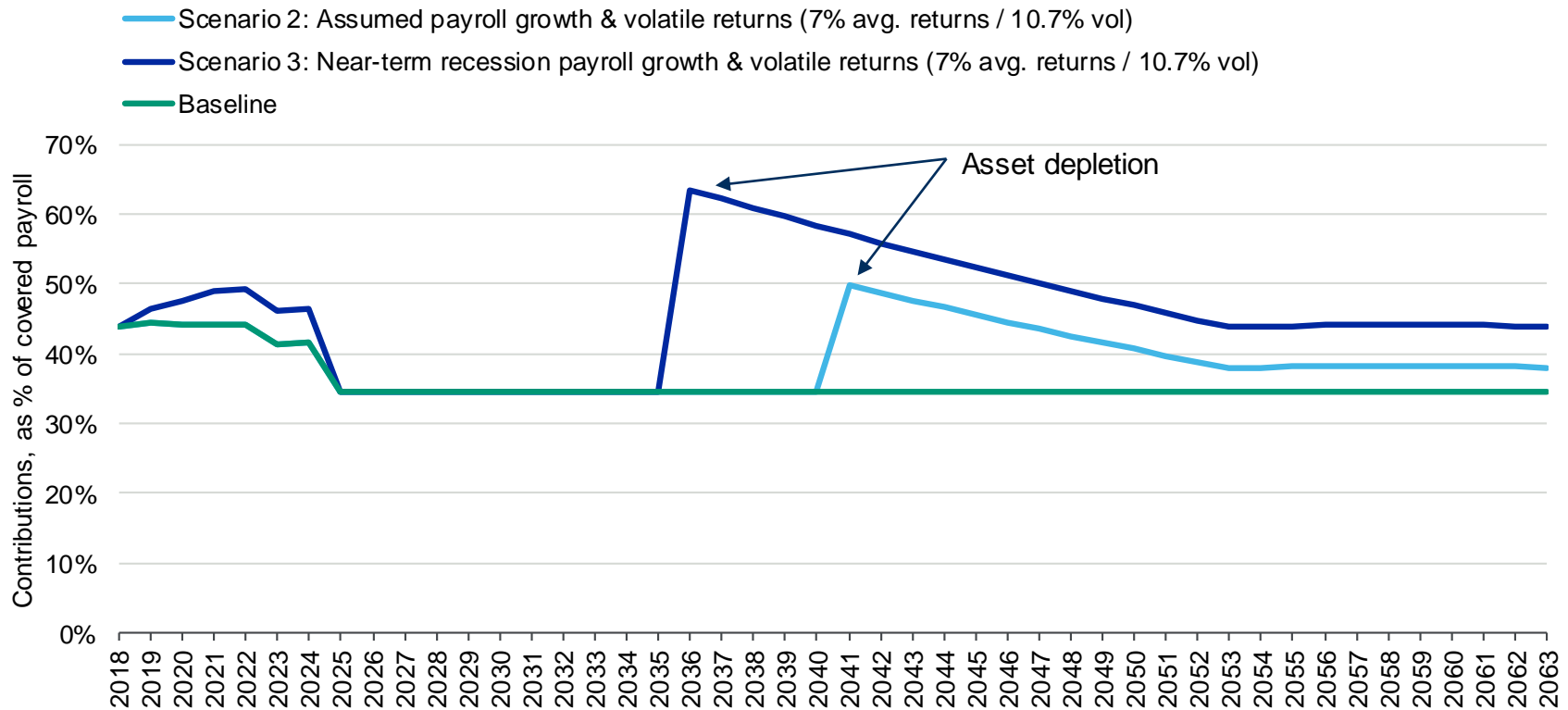
- Contributions to “non-hazardous” state employees system now very close to PAYGO
- Higher pension costs have driven one participating employer into bankruptcy

» Commonwealth of Puerto Rico

- Bond defaults have enabled government services and PAYGO pension benefit payments to continue

Negative cash flow raises importance of investment return path

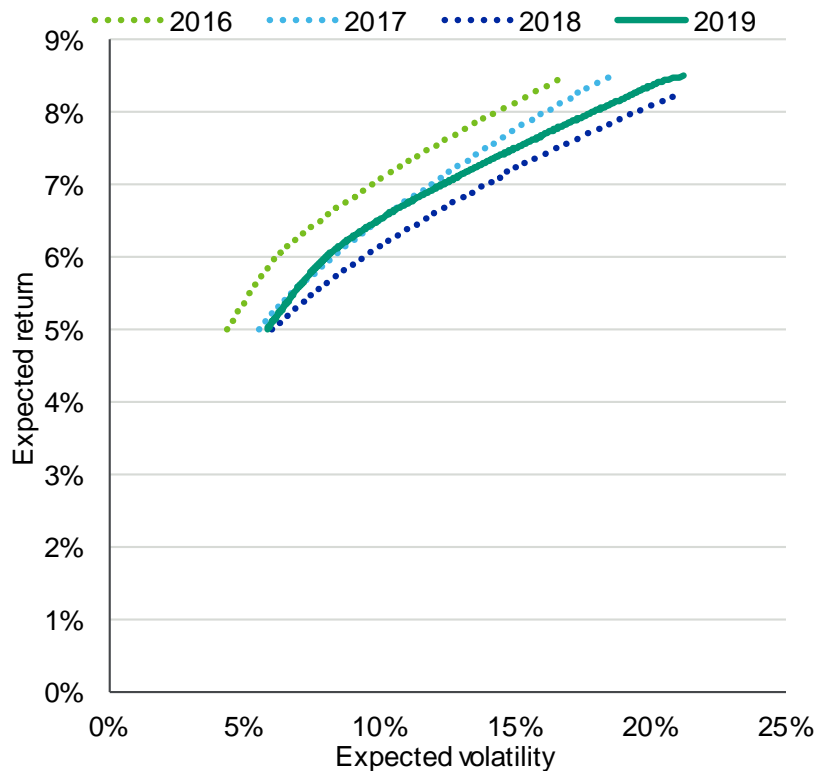
Near-term recession stands to cause more credit damage than last, due to funding position and heavy benefit outflows



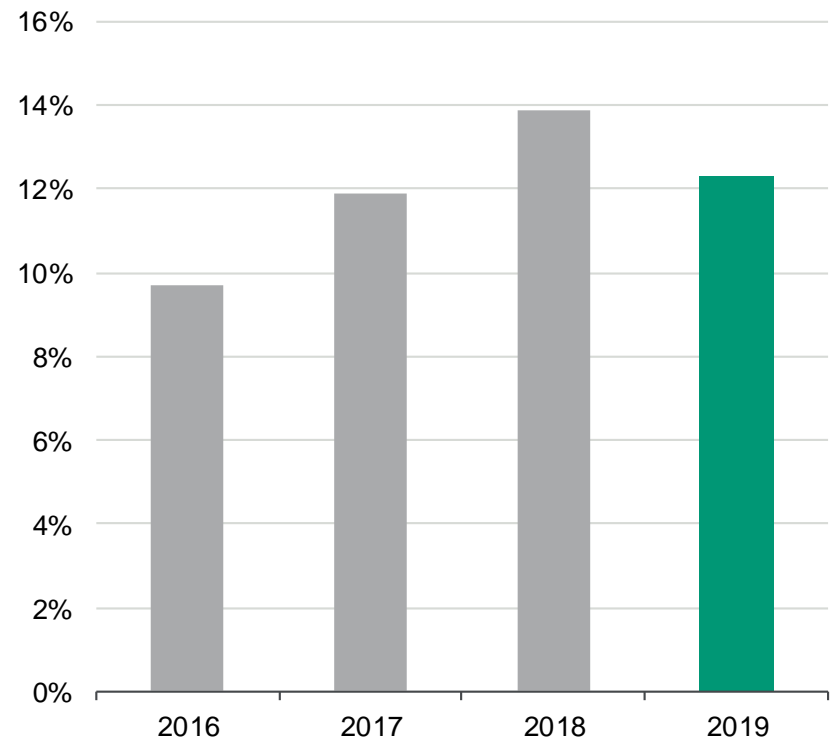
Source: Moody's Investors Service, based on Dallas Police & Fire Pension Fund actuarial valuation

Reach for yield means high expected volatility for US public pension portfolios

Macro-investment risk-return map



Expected volatility required for 7.0% expected returns



Source: Moody's Investors Service, based on JP Morgan 10-year capital markets assumptions

Many governments face limited ability to change benefits for current employees

Diverse answers emerging from state courts on key legal questions concerning pension reforms

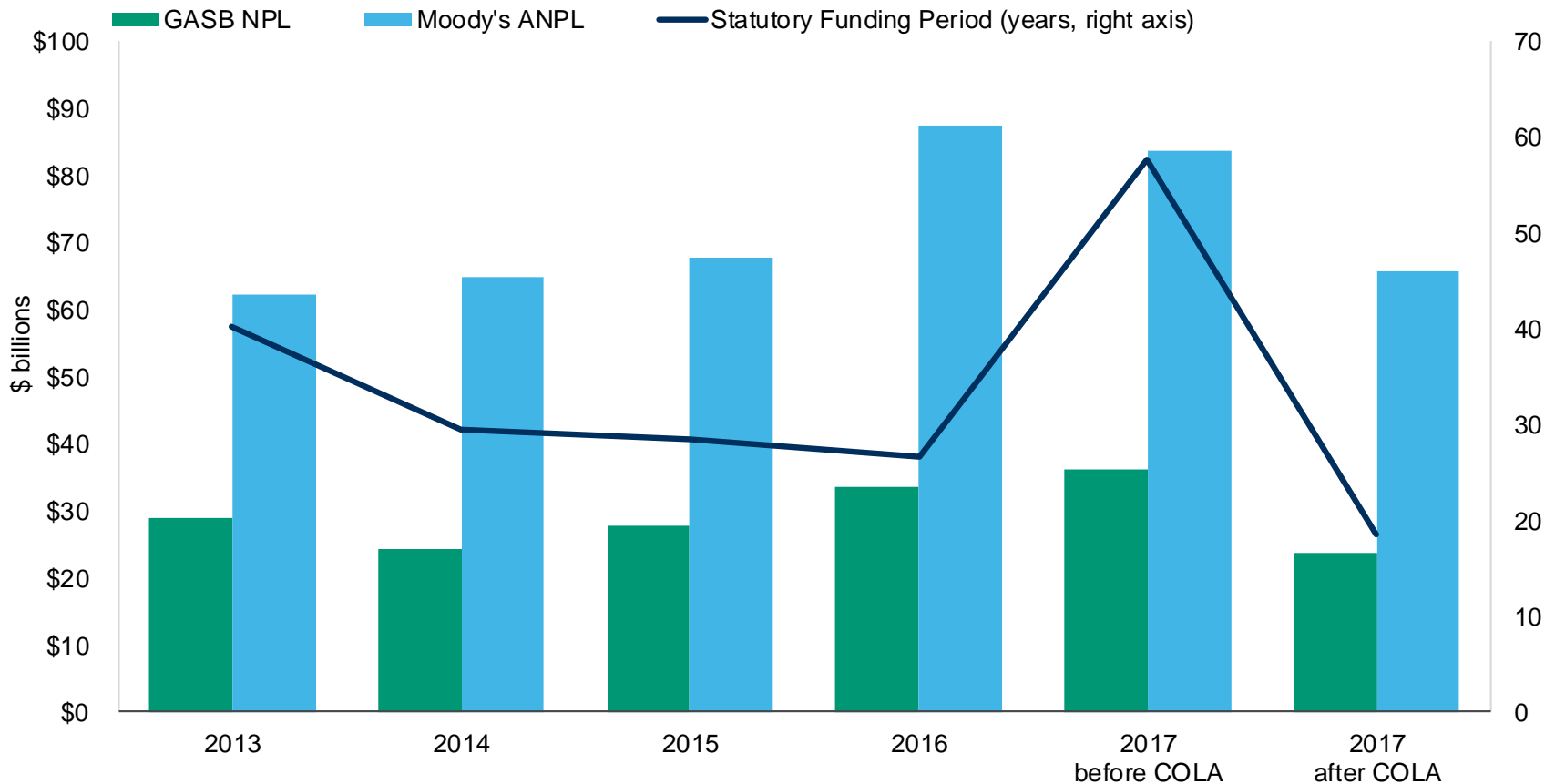
- » Can benefits be changed prospectively for current employees' future work?
 - Examples: Yes in Florida, No in Illinois

- » Can cost-of-living adjustments be changed prospectively for current employees?
 - Examples: Yes in Oregon, No in New York

- » Can cost-of-living adjustments be changed for current retirees?
 - Examples: Yes in New Jersey, No in California

Ohio's benefit flexibility is significant

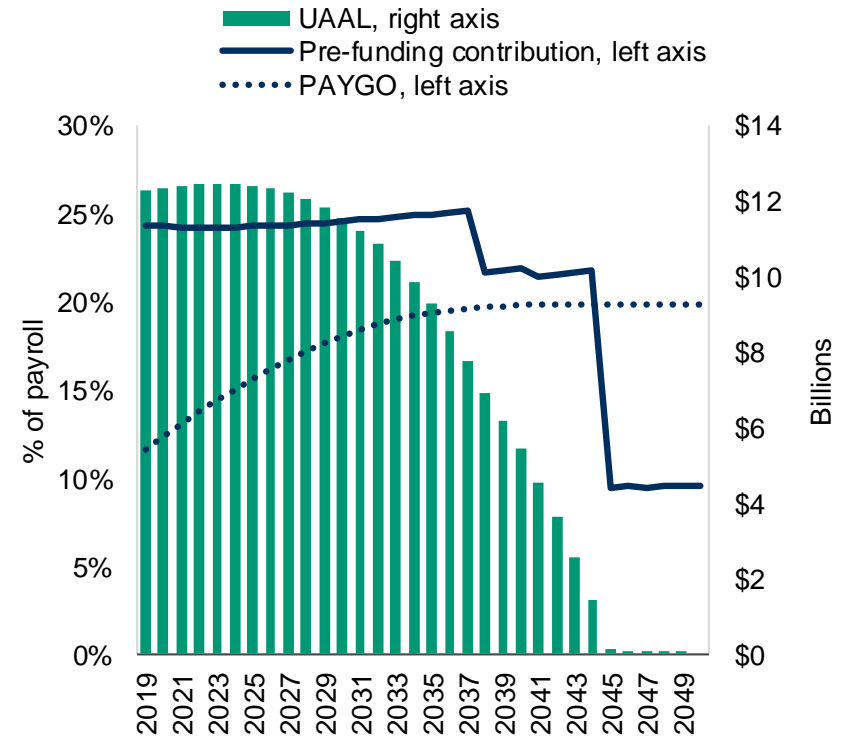
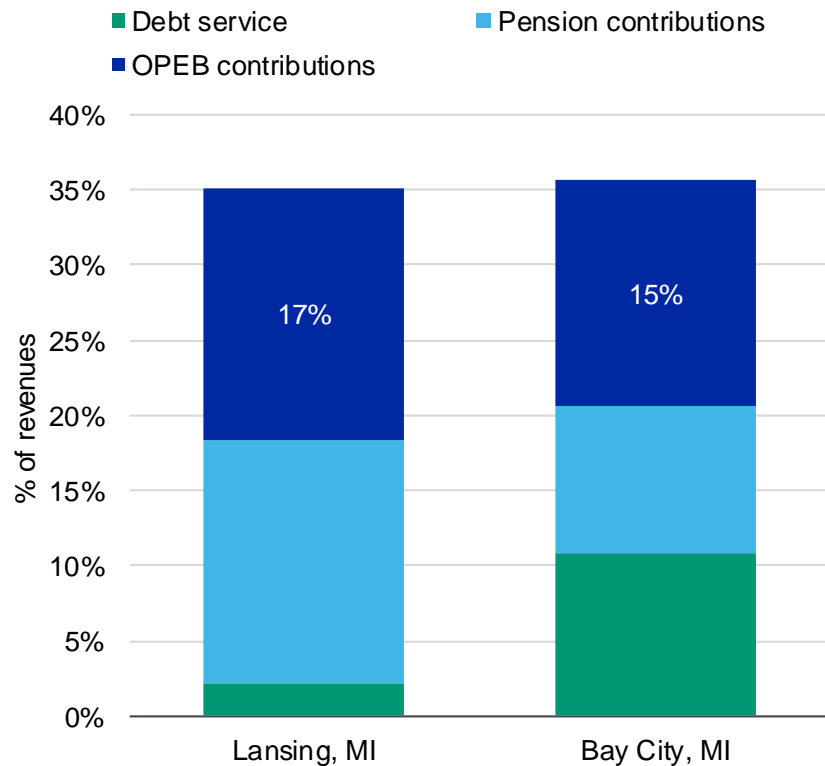
COLA suspension reduced STRS' unfunded liabilities and statutory funding period



Sources: State Teachers Retirement System of Ohio, Moody's Investors Service

OPEBs a primary “fixed cost” driver for some governments

Hawaii contributing “more and sooner” to retire unfunded OPEB liability and lower long-term OPEB costs (right-hand chart)



Source: Moody's Investors Service, Hawaii EUTF actuarial valuation

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