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The "California Rule" and Public Pensions

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The current debate on public employee pensions focuses heavily on the "California Rule"[1]. Strangely (to an economist) this is a rule that does not affect the *total* compensation that an employer must pay an employee --- which can indisputably go up or down --- nor does it restrict the ability of employers to lay people off. Rather, the rule constrains (in ways still being litigated) the ability of employers and employees to structure total compensation by limiting certain downward adjustments in benefit formulas.

There are three ways in which California public employees would benefit from being allowed to negotiate changes to their benefits, including downward adjustments in pension formulas for future work:

(1) Greater flexibility in negotiating how compensation will be distributed between current salary, pensions, medical benefits, and other compensation.

(2) Flexibility in choice of investments. Currently a very large fraction of employee compensation is in the form of pension benefits, which are entirely held in the form of annuities provided by a deeply underfunded insurance company (e.g. CalPERS) and backed by public employers, many of whom are financially stressed and have questionable ability to raise taxes. Employees might prefer to make other retirement investments, or use money for purposes such as a house down payment.

(3) Reduced incentives to "farm out" services currently performed by public employees. The combination of formula changes and lower interest rates mean that employees are receiving a

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[1] According to the California Rule "The pension offered at hire becomes a "vested right," protected by contract law, that cannot be cut, unless offset by a new benefit of comparable value. The pension can be increased, however, even retroactively for past work as happened for state workers under landmark legislation, SB 400 in 1999."

much higher percentage of their compensation in the form of pensions than 20 years ago. If workers on the margin value more salary more than equal cost pension benefits and public employers are required to offer public employees packages with high pension benefits they may find it cheaper to subcontract work to private firms that can hire equal quality workers at lower cost by offering a more attractive mix of compensation.[2]

So why are advocates of the *status quo* fighting so hard for the narrowest possible interpretation of the "California Rule"[3]? The answer is that over the last 20 years extraordinarily aggressive accounting has allowed public employers to account for a promise of $100 in benefits at an accounting cost of less than $50. This accounting makes possible deals that give the employees higher benefits while the politicians can report lower costs, so everyone wins except the taxpayer. This approach, which has meant understating costs for decades as unrecognized pension costs have soared, has lead even some prosperous localities to incur unfunded debts equal to the equivalent of 10 years' payroll. It is uncertain that taxpayers will agree to come up with the money to fund such enormous payments for past work, and full payment becomes less likely as the debts continue to grow.

The implication is that while negotiating deals for high benefits at artificially low accounting costs benefitted employees in the past, when plan promises were reasonably likely to be made good by taxpayers, debts have become so large that there is now enormous risk in such compensation; risk that is not well explained to employees. *if* CalPERS does not reform its accounting and *if* employers continue to ignore the real economic costs of the benefits they

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[2] As a related example, CalPERS itself (CalPERS "2016 Annual Review of Funding Levels and Risks", September 20, 2016) refers to the "Charter Schools Phenomenon", as many new schools find that they can provide a better financial package for their teachers by staying out of the Defined Benefit system and CalPERS. CalPERS focuses on the erosion of the employee base which will spread a fixed debt to retired employees over a "tax base" of a smaller number of active employees. This would not be an issue for an adequately funded plan which would have set aside the money for retirees' pensions during their working careers.

[3] Among the questions one might ask are: Does additional salary count as a benefit? If the price of providing a given benefit changes are employee and employer nonetheless obligated to negotiate for the at least the same amount of the benefit? If a city wished to replace its defined benefit pension plan with a defined contribution plan how would benefits under the old and new plans be valued to meet the "comparable value" requirement?

offer rather than just looking at the current accounting cost and *if* taxpayers can eventually be persuaded or forced to pay off all promised benefits in full by making pension contributions that will likely exceed 50 percent of payroll *then* in fact the employees would benefit from forcing taxpayers to continue to allow the politicians to negotiate contracts with very large pension benefits.

The way to think of it is this: Employees lend part of their compensation to employers in return for the promise of a future payment. Let's say that the payment is $200 twenty years from now. What is the amount of the debt that the employer has incurred that should be taken into account as part of the employee's compensation if the benefit is highly likely to be paid, as with the debt of a highly rated insurance company or corporation? Under current market conditions economists, insurance companies, and the Pension Benefit Guaranty Corporation would say that something like $100 is appropriate, with the employer borrowing from the employee at 3-4 percent interest. CalPERS has said to state and local governments, "We will say instead that the loan is for $50 at 7.50 percent interest, so that you only have to report a $50 current cost. But if tomorrow you want to pay off your loan (by making a lump sum payment to CalPERS which will then be responsible for paying the benefit) we will calculate it the same way as an insurance company, and you will have to pay $100." Even though cities and the state use CalPERS accounting as reporting their annual pension costs the reality is that CalPERS' calculation is more akin to the minimum payment that a credit card company will charge. Just making your minimum payment does not mean you have really balanced your budget; it just kicks the can down the road.

Without the accounting issue there would be no benefit for public employees from a narrow interpretation of the California Rule. The accounting cost of any compensation package would be the same to the employer as the economic cost and it would always be in both public employers' and employees' interest to allocate any given amount of compensation in the way that worked best for the employees. In fact, if California voters ever pass a "Truth in Finance" or "Truth in Accounting" proposition that required employers to value newly accrued benefits at their true cost everyone would want a flexible interpretation of the California Rule (once advocates of the *status quo* lost their litigation fighting the proposition!).

The rest of this brief elaborates on these points. The first three sections address the benefits to everyone --- employees, retirees, and taxpayers --- from allowing a flexible interpretation of the California Rule. The fourth section explains in more detail the accounting issues and how they have contributed to the enormous fiscal problems that have developed. Finally, the fifth section addresses the issue of why benefits are increasingly at risk, making benefit accruals an increasingly less good way for employees to be compensated.

1. Flexibility in the Allocation of Compensation

A. A simple example with a Defined Contribution plan

Assume that an employer has a Defined Contribution pension plan. A representative employee was earning a salary of $100,000 per year but also received a Defined Contribution benefit (like an IRA or 401(k)) of another 40 percent, or $40,000, for a total compensation of $140,000.[4] A new contract is negotiated and over the period of the contract compensation will rise by 10 percent, to $154,000. If the parties are constrained to maintaining the same pension formula then salary will rise to $110,000 and pension contributions to $44,000. Without the constraint the parties might alternatively agree to a $114,000 salary and $40,000 in pension benefits --- or for example a $124,000 salary with $30,000 in pension benefits. A restriction on the pension formula does not restrict the overall compensation of the employees; it simply requires that the fraction of that compensation devoted to pensions cannot change --- even if both sides would prefer it. It is simply a constraint that limits the ability of the parties to choose the best allocation of the compensation package.[5]

[4] Businesses face limits on their qualified Defined Contribution pension plans so they would have to offer no more than 25 percent of salary as a pension contribution in a tax-qualified plan.

[5] While the talk about pensions focuses on reducing pensions relative to salary there is a further issue about benefits where it is uncertain about whether employees will want more or less such compensation in the future. For example, say that employees receive a package of medical benefits or scholarship benefits. The ideal allocation to these benefits might rise or fall in the future. But if the parties are constrained to never institute a cut then they might have to set current benefits below optimal levels to maintain flexibility.

The exact same logic applied in this example applies equally well to Defined Benefit plans, even though those plans are typically described in much more confusing ways.

B. An Example for a Defined Benefit Plan

Now assume that the employer has a Defined Benefit plan. This plan provides employees with a benefit equal to 3 percent of their final year's salary times the number of years worked. Again consider a representative employee earning $100,000 per year as her salary. The person has worked 20 years so if she retired today her pension would be .60 x $100,000 or $60,000 per year from the retirement age until the end of her life. That $60,000 pension is based on past work and should not (and would not) be reduced by anything this court decides.

But what if the person works a 21st year without a raise? The pension would rise to .63 x $100,000 = $63,000. So the employee would be earning an additional $3,000 pension for working an additional year. The value of that additional pension would be based on the appropriate interest rate and mortality table used to discount the future payments. We'll get back to that calculation later but say for now that the economic value is $15 for every additional $1 of pension, or $45,000. Then the employee's effective compensation for the year would be $100,000+$45,000 = $145,000.

Another way to provide the same compensation would be to cap the pension at 60 percent of final salary and give the employee a raise to $104,500, increasing her pension by $2,700, to .60 x $104,500 = $62,700. The higher salary would offset the $300 smaller pension increase: total compensation would be $104,500 + 15 x $2,700 = $145,000.[6] A third way would be to cap the Defined Benefit plan at $60,000 and pay the additional year's compensation in the form of say $116,000 in salary and $29,000 to a Defined Contribution (e.g. 401(k) or 403(b)) pension plan,

[6] As with other benefits such as medical care and college tuition payments each employee's individual compensation each year (including salary and all benefits) will not reflect differences in that year's salary. However, from the standpoint of the aggregate negotiations between unions and employers obviously both the cost and value of the benefits package is considered. So the kind of calculation we do above should be thought of more as applying to the aggregation of all employees in a given year rather than to each employee each year.

the employee choosing amongst various options as to how the money is invested on his or her behalf.

The two parties both benefit from flexibility in allocating whatever compensation is negotiated. Public pensions are often higher than what is negotiated in the private sector. It might be reasonable for employees to choose to accept smaller pension increases in return for more cash than their employers could or would otherwise pay.

Think of what happens when long term interest rates fall sharply, as has been the case during the careers of many public employees: The present value of any given pension award becomes much greater and the percentage of an employee's compensation that is composed of pension benefits becomes much higher if a constant formula is employed. Perhaps when interest rates were higher and a $3,000 annuity could be acquired for $30,000 an employee with total compensation of $145,000 would have wanted $115,000 in salary and a $3,000 annuity. Is it clear that as interest rates have fallen and the cost of the annuity rose to $45,000 that the employee would want to have her future salaries cut so that the same ratio of salary to annuity could be maintained, as some argue the California Rule requires? Would it not make everyone better off to allow negotiations that permit other forms of compensation rather than insist on increasing the share of compensation that goes to pensions?

2. Flexibility in Choice of Investments

To an economist, a Defined Benefit plan is simply a Defined Contribution plan in which the employee has only one option for investing her pension compensation: in deferred annuities sold not by a regular insurance company but by an "insurer" (in this case CalPERS, CalSTRS, UCRS, or one of California's many "independent" pension systems) that does not meet normal insurance company funding standards and is backed by the worker's own employer.

Why would anyone want to have all their pension wealth (and in the case of most public employees the vast majority of their financial wealth) entirely invested in such a squirrelly asset? If you wanted to buy annuities why not acquire them from an insurer that had the assets to back up the promised benefits in conformance with state regulations for insurance companies instead of one that had less than 50 cents on hand for every dollar of promised

benefits? Furthermore, many investors might prefer not to have so much of their wealth tied up in annuities even if they felt certain that their benefits were safe. Why not diversify into various other forms of investments?

3. Prospect of Jobs Being Outsourced

Consider the above example of a Defined Benefit plan where the employer is constrained to paying the employee $45,000 in pension compensation for every $100,000 of salary. However, employees value this pension benefit at only $30,000 and would rather have more current compensation. A subcontractor can then offer a package that is equally attractive to employees at lower cost by providing more salary and less pension. The contractor will then be able to pass on this saving in bidding for a contract to take over service provision from public employees.[7] On the margin this financial incentive would lead to more outsourcing because the private sector provider would be subjected to one less constraint than the public sector employer.

4. Why opponents of pension reform like Defined Benefit plans and high pension compensation

From the above it may seem odd that politicians and public sector employees negotiate for large Defined Benefit pensions. Why would you want so much of your compensation invested in that one particular asset?

The answer lies in the extremely aggressive accounting techniques used for pension financing. These techniques, which have no serious economic justification, allow employers to vastly understate the cost of the benefits they provide relative to the cost of defeasing those liabilities with a private insurer or even CalPERS itself and so pretend to run a balanced budget when they are actually far in deficit. Throughout the system for every $100 of pension debt employers have taken on (based on the insurance company cost) CalPERS has only recorded an "actuarial" debt of about $60. Furthermore, because of various other CalPERS accounting

[7] This is purely the benefit that the contractor would have in not being bound by the California rule. Of course there may be other efficiencies or inefficiencies from transferring service provision to the private sector but those are unaffected by the interpretation of the California Rule.

techniques for determining pension contributions --- techniques that go well beyond those allowed in the private sector --- only about 70 percent of the lesser amount, or about $42 of that liability has been funded and so counted towards employers' past budgets[8].

The difference between the real liability and the amount paid was extra compensation that the politicians were able to pay without accounting for it. So for every $100 in benefits promised to employees about $58 ($100 minus $42) has yet to be accounted for in employer budgets. If the politicians are willing to pay more in real compensation if costs can be understated by over half then a big Defined Benefit plan is a way for the employees to negotiate a larger compensation package while allowing the employer to claim lower labor costs. For example, let's say that the employees only value at $80 benefits that cost the employer $100 to provide. They still will be very happy to sacrifice $70 in current salary for those benefits. The politician who only cares about the current accounting cost (that is, the minimum payment demanded by CalPERS) rather than the economic cost will regard providing $100 in benefits that are only accounted for at $42 or even $60 as an attractive alternative to paying $70 in cash. Of course these costs ultimately come home to roost.

How are the values of pension liabilities calculated? Economists, insurance companies, and the Pension Benefit Guaranty Corporation (PBGC) all do the calculation in roughly the same way: They calculate an amount roughly equal to what it would cost the employer to buy an annuity from an insurance company to cover the future benefits or else calculate the amount that would have to be set aside in high quality bonds to cover the expected cost, given mortality tables. Similarly, if a city (such as Carmel) wishes to withdraw from the CalPERS system, CalPERS calculates the cost of the city's promised benefits using the high quality bond approach in determining the debt pay-off amount. In the current environment this approach leads to the PBGC discounting future obligations at 4 percent. CalPERS itself currently uses a 3.25 percent rate to discount terminated liabilities.[9]

[8] CalPERS had a 69 percent funded rate based on its actuarial calculations on June 30, 2016. See "CalPERS Annual Report Details Fund Finances", January 5, 2017.
[9] See CalPERS "2016 Annual Review of Funding Levels and Risks", September 20, 2016.

However, for the purposes of calculating an actuarial liability CalPERS uses an interest rate of over 7 percent. This accounts for the difference between $100 and $60 in actuarial liabilities. Remember the point that when an employee agrees to accept a pension benefit in lieu of other compensation he is effectively lending money to the employer and the amount loaned is the present value of the future promise. CalPERS will take the same promise that an insurance company will say is worth $100 at 4 percent and call the amount of the loan $60 at 7 percent, but with a $40 pre-payment penalty. This allows the public employer to account for the cost of incurring the new liability as only $60.

Much of the remaining difference (between $60 and $42) is caused by the difference in how the system treats surpluses and deficits relative to actuarial expectations. If the stock market is good and plans have excess assets, as in the turn of the century tech bubble, the surplus can be dissipated (through contribution "holidays" and benefit increases) as fast as the politicians want. For example, in 1998-99 when the appropriate interest rate for discounting liabilities was 5 to 5.50 percent CalPERS, using an 8 percent rate, declared its plans to be overfunded by over 40 percent.[10] Using the Schools plan as an example, contribution rates of over 13 percent in 1980-81 fell to 0 for 1998-2002. At the same time benefit formulas for many plans were increased over the years, with many increases applied retroactively to past service. After two slightly down stock market years, the plans became underfunded even by CalPERS actuarial standards.

But when the plans went into deficit did contributions increase sharply in the same way as they dropped in good times? Hardly! CalPERS used double and sometimes triple "smoothing" accounting techniques that mean that for every $15 million in losses that a pension fund suffered employers were only asked to contribute about an extra $60,000 the first year, and not much more the second, according to CalPERS' former Deputy Chief Actuary.[11] This makes

[10] See e.g. CalPERS "Schools Pool Actuarial Valuation as of June 30, 2015" pp.25-26.

[11] See "CalPERS Potential Changes to Your Contribution Rates", December 7, 2010, video transcript. According to David Lamoreaux, CalPERS Deputy Chief Actuary, "What we've been using for years is we have a method where we basically spread gains and losses over a 30 year period and then we amortize those over 30. Now just to help you better understand what that really means is, let's say we lose $15 Million in one year. So the 15 years spreading means that we're going to take that 15 million and we're going to spread it over 15 years. So, year one we

the point that the CalPERS contribution calculation is really about a minimum required payment rather than a true estimate of the full cost. It is only in 2016-17 that School Plan contribution rates even matched 1980-81 levels: See Figure 1. However, because the can has been kicked down the road for so long as the deficit has continued to build, rates are now beginning to soar.

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recognize one million. Then that one million we don't charge the employer for it right away, we amortize that over a 30 year period. And the 30 year period comes out to be about 6%. So, 6% of one million is about $60,000. ***So you can see that if we lose $15 Million, in year one we ask the employer only to pay $60,000 toward it***. So you can see how it's really smoothed over time. And the idea behind this is that hopefully it's, you know, it's, we know that gains and losses are meant to cancel one another over time. So the idea behind it is in year two if we had a gain of $15 Million, then the whole thing gets wiped out and we really never had to increase rate that much for employers. So that's the whole idea behind smoothing. Now what really happened is, if you recall, this works great when you have like, you know, small gains and small losses from year to year. But what we really saw in 2008 and 2009, if you recall, CalPERS lost 24%. Our return was negative 24%. That was 32% below what we assume as actuaries. We, our long term expected return is seven and three quarters, about, almost 8%. And we had a negative 24. So that's a 32% difference. And what we found out is the methods we were using to smooth the rates were not, would not have been able to cope with such a big decline and it would have caused dramatic increases to employer rates in 11/12. So, what our board did is in June 2009 they adopted a temporary change to our method that's basically phasing the impact over a three year period."

Figure 1

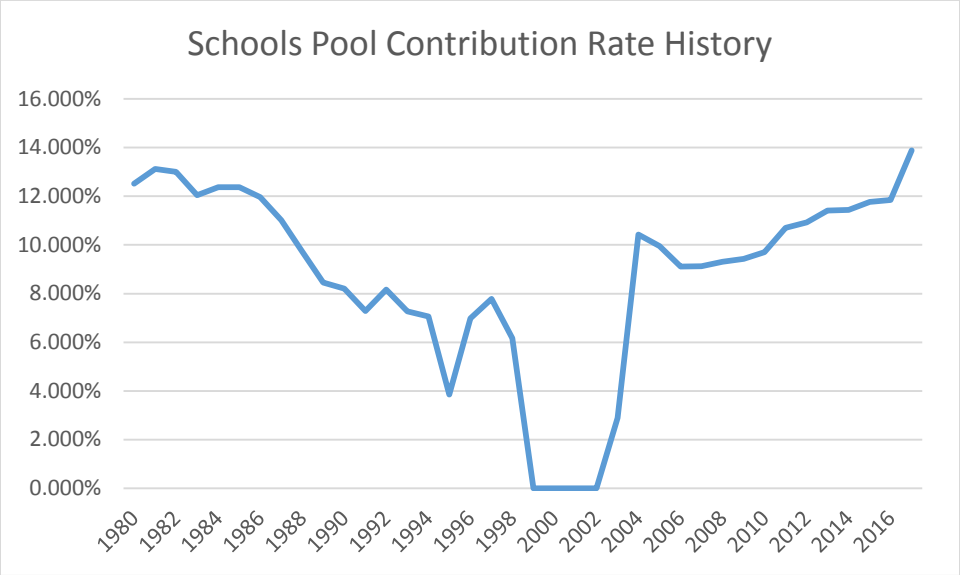


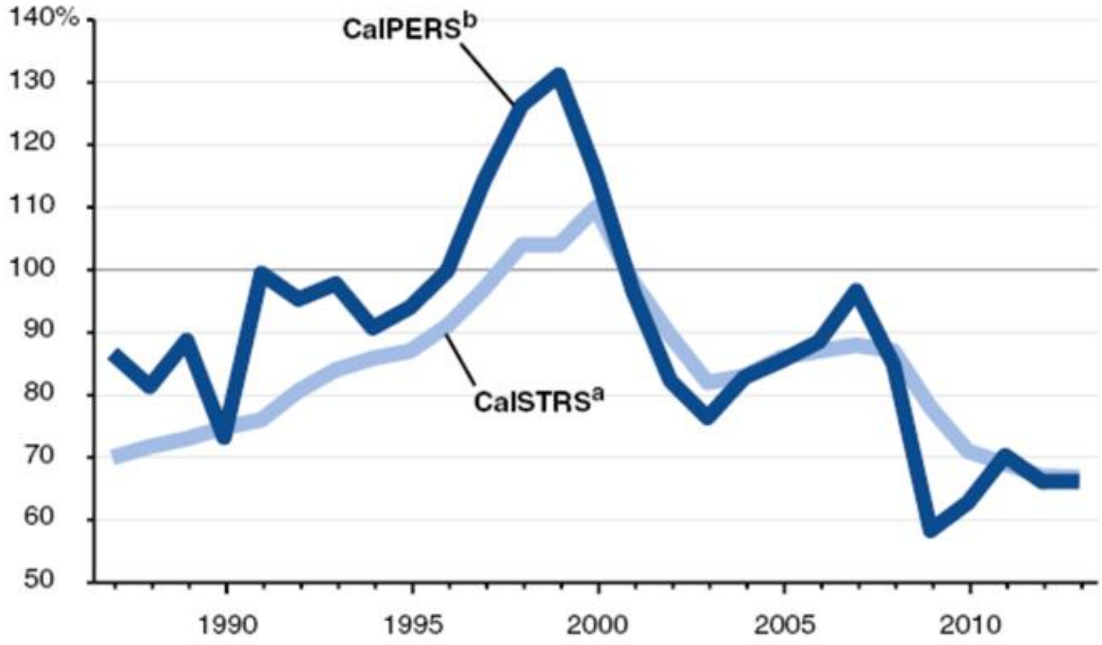
Figure 1 shows the history of contributions to the CalPERS Schools plan: The funding rate was above 13 percent in 1980. It dropped all the way to zero for 4 years at the turn of the century but only got back above 13 percent this year. The consequence of all that underfunding is that there will be big funding increases in the future. Source: CalPERS Schools Pool Actuarial Valuation June 30, 2015 p.25

As an analogy to the CalPERS procedures for quickly dissipating gains and foot dragging when it comes to making up losses, think of a man who supplements his income by trading stocks. He budgets in that he will make $10,000 each period to help cover his fixed expenses. The first period his luck is good and he makes $100,000 so he is $90,000 ahead. But instead of saving that $90,000 against possible future losses he quickly dissipates that surplus, much as CalPERS and the politicians did in 1998-2002. The next period he loses $80,000. He has still made as much as he expected (a net of $20,000) over the two periods but because he spent the first period surplus he must now go into debt for the $90,000 he overspent in the first period. If the stock trader follows CalPERS procedures for dealing with deficits he will pay in $360 the first year and little more the second; far less than the interest that will accumulate on the debt. This is how even on an actuarial basis CalPERS plans have managed to ring up big deficits even in periods when on average their investments have made their expected return. The fast dissipation of surplus and the slow response to deficit is shown in Figure 2.

Figure 2

Historical Funded Ratios Reported by CalPERS and CalSTRS

Assets as Percent of Accrued Liabilities



[a] Reflects funded ratio for CalSTRS pension program.

[b] Reflects funded ratio for CalPERS pension program. Excludes assets and liabilities for pension benefits for local government employees.

Note: CalPERS assets reflected on market value basis while CalSTRS assets reflected on actuarial value basis.

When actuarial funding rates went into surplus during the turn-of-the-century Tech Bubble CalPERS eliminated contributions on many plans while benefits were simultaneously increased. By 2001-2 the plans were in significant deficit and since then the deficit has grown, even using CalPERS' high discount rates. If CalPERS valued its liabilities like an insurance company it would only have assets of about 40 percent of accrued liabilities. Source: "Addressing California's Key Liabilities: An LAO Report", Mac Taylor, Legislative Analyst, May 7, 2014, p. 25.

CalPERS' actuarial system has so many odd provisions to "smooth" contributions that in some cases the system calls for negative contributions or a negative amortization rate of an unfunded liability. When that happens CalPERS institutes an *ad hoc* process which it calls "Fresh Start" to throw out the calculations and limit the obvious craziness.[12]

The consequence is that Palo Alto, which has experienced multiple economic miracles over the past 50 years which presumably led to a constant stream of higher-than-expected income, finds itself with an unfunded pension debt that is about $1 billion according to the economic approach and $300 million even based on the actuarial calculations. This against an annual payroll of less than $100 million. So the city has effectively rolled up a debt equal to over 10 years' payroll. See Table 1.[13]

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[12] See CalPERS "Actuarial Amortization Policy" p.5.

[13] Data from www.pensiontracker.org . The actual numbers for Palo Alto in 2015 (the most recent available at this writing) were: payoff (market liability) $1.791 billion, actuarial liability $1.075 billion, offsetting assets $0.736 billion for a deficit of $1.055 billion on a market basis. This compared with a payroll of $92.8 million, so the deficit was 11.37 times the annual payroll.

Table 1

Palo Alto's Pension Debts

June 30, 2015 Valuation

(1) Market Liability (3.250% discount rate)	$1,791,242,266
(2) Value of Assets	$ 736,200,690
(3) Unfunded Debt (1)-(2)	$1,055,041,576
(4) Funding Percentage (2)/(1)	41.1%
(5) CalPERS Actuarial Liability (7.50% discount rate)	$1,074,633,744
(6) Unfunded Actuarial Debt (5)-(2)	$ 338,433,054
(7) Actuarial Funded Ratio (2)/(6)	68.5%

Data from www.pensiontracker.org based on CalPERS reports. Were the Palo Alto pension plan regulated like an insurance company it would have to put in over $1 billion (plus any reserves required for safety) to stay in business. CalPERS' calculation says that the city has a debt of "only" $1,074,633,744 offset by $736 million in assets but this calculation treats that debt, with a weighted average duration of about 13 years (so like a zero coupon bond payable in 13 years) as growing at interest rate of 7.50% with the city not being allowed to pay off any of the debt early.

Regardless of what the court decides, that debt of 10 years' worth of payroll will put the squeeze on Palo Alto's budget in the years to come, likely sooner rather than later. Palo Alto makes pension contributions equal to more than 29 percent of payroll but because of past sins this amount ($27 million per year) covers less than 3 percent interest on the existing unfunded liability, let alone the cost of any new benefits being accrued by the current labor force.[14] For other places around the state and country with similar debts but without Palo Alto's economic prospects problems will be even tougher.[15] Let's say that voters decide they don't want to continue down this path and instead ask that cities and counties negotiate Defined Contribution plans going forward, so that each year's pension cost is appropriately accounted for and fully funded. Why shouldn't they have that right?

Opponents of pension reform try to justify this great understatement of liabilities in three bogus ways:

First, they claim that while the high quality bond rate may be 4 percent or less the pension fund assets will be invested in riskier assets such as stocks and private equity which have higher expected returns, and on that basis 7 percent or more is justified. But this is wrong. Let's say you take out a mortgage for $100,000 at 4 percent. You then invest the proceeds in risky assets with an expected return of 7 percent. That does not mean that your debt, which would cost you $100,000 to pay off, should be valued at less than $100,000.[16] For an excellent explanation of this see the animated video produced by Nobel Prize winner William F. Sharpe.[17]

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[14] Adding in employee contributions of $7.5 million means that in total contributions cover 3.28 percent of the termination liability debt. Even using the CalPERS actuarial calculation in effect that year the actuarial deficit was $319 million accumulating at a 7.5 percent interest rate so $23.9 million of the $27 million contribution would go to interest on the unfunded debt. So debt would have to increase by the total value of new benefits less just the remaining contribution of $3.1 million plus the employee contribution of $7.5 million ($27 million less $10.6 million).

[15] As an example, www.pensiontracker.org data showed San Jose with a market pension debt of $12.102 billion and an actuarial liability of $7.174 billion offset by only $5.164 billion in assets. This debt amounted to over 16 years' payroll on a market basis and 4.74 years' payroll even on the vastly understated actuarial basis.

[16] Basically, you are providing your house as collateral for the loan. If you try the CalPERS approach and put $70,000 of the mortgage proceeds into the market hoping to make enough

The second argument is that the 7 percent rate CalPERS is assuming going forward[18] is reasonable because it is less than the geometric average rate of return it has earned over the past 30 years. But in August 1987 one could buy 30 year Treasury bonds paying almost 9 percent a year[19], so an 8 percent discount rate on debt would have been conservative.[20] Now long-term treasury bonds pay about 3 percent and the appropriate rate to discount future payments guaranteed by the state is much lower. Figure 3 shows the history of the 10 year Treasury bond yield compared to the CalPERS discount rate. When interest rates were going up over the first part of the chart CalPERS raised the interest rate at which it imputed future pension promises --- a reasonable approach. But as interest rates began to fall CalPERS did not similarly reduce the rate in its calculations, leading to a large understatement of the present value of promised benefits.

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to cover the $100,000 in payments your house is acting as insurance to the lender in case your investments don't meet your expectations. The value of the insurance is $30,000. If there were no risk the lender would put the money into the market herself rather than lend to you at a low rate. Here, the employer (and ultimately the taxpayer) is the guarantor against a shortfall.

[17] See https://www.youtube.com/watch?v=Mk87_qg4ObA.

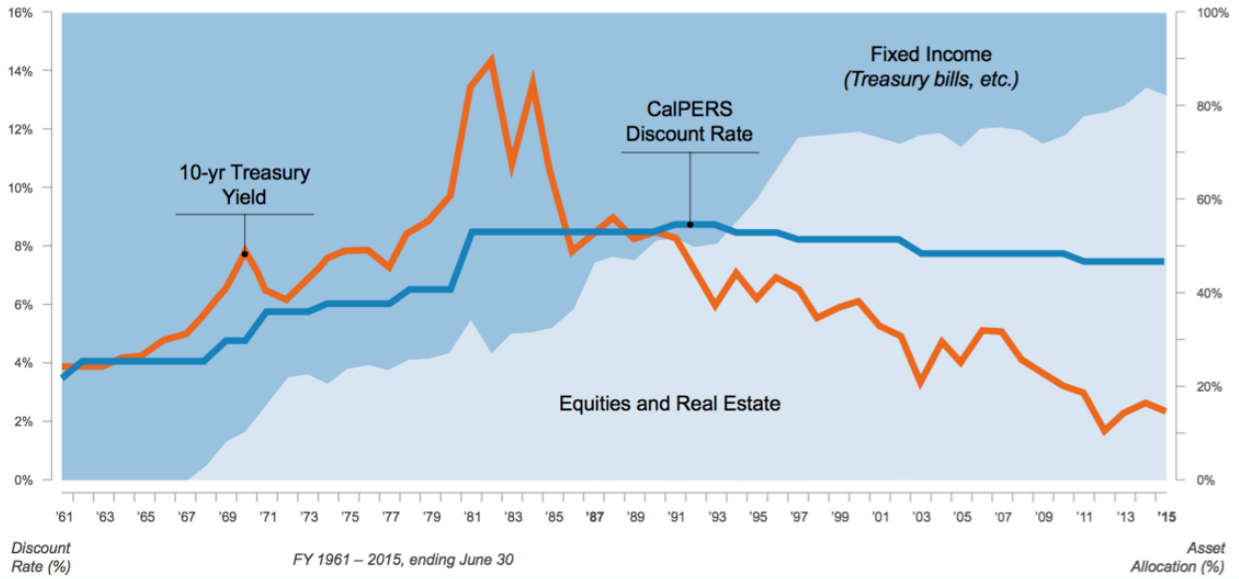
[18] Calpers is in the process of reducing its discount rate from 7.50 percent to 7 percent over a period of several years.

[19] See https://fred.stlouisfed.org/data/GS30.txt.

[20] One partial explanation of how we got into this situation is that, after having raised its discount rate as interest rates rose in 1960-1980 CalPERS decided to maintain the higher rate assumptions as rates fell after 1990, perhaps on the theory that if they waited until rates returned to the assumed discount rate the contribution increases would not be necessary. Twenty seven years later they still are waiting and the problem has compounded. For a graph comparing the 10 year Treasury rate with the CalPERS interest rate assumption see CalPERS, "Understanding the CalPERS Discount Rate and the Effect on Employer Contributions" slide 3.

Figure 3

CalPERS Discount Rate vs. 10 Year Treasury Yield



CalPERS raised its discount rate from 1960 into the 1980s as interest rates went up and it became reasonable to discount future liabilities at a higher rate. But when rates started to fall they did not symmetrically reduce their rate assumptions. Because of this CalPERS only accounts for about 60 percent of what an economist would say is the true pension liability. Source: "Understanding the CalPERS discount rate and the Effect on Employer Contributions" CalPERS slide presentation February 6, 2017 slide 3, reproduced here as Figure 3.

The third argument is that while corporations will come and go our states will continue forever. The implication is that the state is a better risk bearer than a company in being able to even out the costs over time. Even putting aside the evidence that governments are not very good at holding on to the surpluses generated in the good times, making them poor at smoothing[21] it should be clear that economically governments do not have a superior ability to bear investment risk relative to the stock market. After all, in the stock market risk is born by investors in proportion to their stock market holdings: The top 1 percent wealthiest people in the country, who are generally those best able to bear financial risk, have about half the stock market risk. When the State of California or some municipality takes on risk those losses must be made up by tax increases and spending cuts. While the top 1 percent of earners do pay half of state income taxes (accounting for a third of state revenue) other revenues and expenditures are distributed much more evenly across the population, so much risk is born by people without much wealth, many of whom can ill afford tax increases or benefit cuts.

Furthermore, even if the state was a good risk bearer and could be counted to be around forever that is no guarantee that it can earn a 7 percent return over time. That number is just a guess of the long-term rate of return; a guess that keeps on changing[22]. The market obviously thinks that the long-term expected rate of return is lower now than it did 20 years ago. The United States has been the most successful country in the world since 1900 and that has been

[21] Consider for example the contributions and benefit increases during the turn of the century internet bubble that moved plans from a significant actuarial surplus to deficit in about three years while the good average returns of the past 15 years have not closed the deficit. When CalPERS reports that it has met its actuarial expected returns over the past 20 years and at the same time that its funding status has significantly worsened it is an indication of a structural problem. After June 30 2015 CalPERS could no longer report it was meeting its long term return projections. As of June 30, 2016 CalPERS reported 3, 5, 10, 15, and 20 year returns below its target. See https://www.bloomberg.com/news/articles/2016-07-18/calpers-largest-u-s-pension-fund-earned-0-6-last-fiscal-year . For the year ended June 30, 2017 CalPERS returned 11.2 percent but remains only 68 percent funded on an actuarial basis. https://www.calpers.ca.gov/page/newsroom/calpers-news/2017/preliminary-fiscal-year-investment-returns

[22] Note that CalPERS now apparently projects a 5.80 percent return over the next ten years and a 7.83 percent return thereafter. See http://www.cnbc.com/2017/02/08/calperss-sees-58-percent-return-with-new-allocation-below-7-percent-goal.html

reflected in domestic asset returns. But if we look internationally we see that there is a tremendous variation in the realized returns on stocks and bonds in different countries, even across such a long horizon, and most countries have had lower returns than the U.S.[23] And even small deviations in the realized return from the expected can translate to large gains or losses over very long horizons.

5. Benefit Safety

We now turn to the issue of benefit safety. Begin with the following remark: It is logically inconsistent to say that on the one hand the pension benefits promised to employees are as safe as if they were promised by a high quality insurance company and on the other hand say that it is appropriate to value those benefits at 60 percent. Effectively, when there is $42 set aside to cover benefits that would be worth $100 if safe and CalPERS values the benefits at $60 it is implying that the unsecured benefits are only worth about a third of what they would be worth were they certain to be paid.[24] The benefits are either safe and worth $100 or worth only $60 because they are very risky. They cannot simultaneously be safe and worth $60.

Since the CalPERS actuarial number is primarily based on political rather than economic considerations it is not a meaningful estimate of the expected default rate on pension benefits. However, the economic deficit of the pension plans, which www.pensiontracker.org calculated to total $969 billion for California public employers as of June 30, 2015, is real. One way or another it must be made up by some combination of investing luck, higher taxes, benefit cuts, high inflation that erodes benefits, layoffs, or other compensation sacrifices by employees to cover the deficit. The point here is that there is great risk to the employees (the risk of layoffs and other sacrifices) even if somehow all benefits accrued to date are seemingly paid in full. And it is certainly possible that many employers will not pay benefits in full even with salary

[23] See "Credit Suisse Global Investment Returns Yearbook 2017 Summary Edition" by Elroy Dimson, Paul Marsh, and Michael Staunton.

[24] That is, the employee has $42 in secured benefits and $58 in unsecured benefits. Treating the secured benefits as being worth full value, if the total value of the package is worth $60 then the unsecured $58 is only worth $18, or about a third of face value.

cuts and the like. The benefits are surely not as secure as if they were funded in the way we would require of a private insurer.

We have already seen defaults in a number of jurisdictions around the country, including some here in California. These include Central Falls, RI, Detroit, MI, Loyalton, CA , LA Works, CA, (a joint powers authority of several cities), Prichard, AL, Stockton, CA, Vallejo, CA, and San Bernardino, CA . Puerto Rico appears likely to default as well; the New York Times reports that teachers throughout the country are at risk of losing out in the long term because of underfunded pensions.[25]

So what do we have to look forward to for the future? Because CalPERS is only recognizing 60 percent of benefit costs even if it were fully funded according to its calculations an economist would say it needs another $40 for every $60 being contributed. The school employer contribution rate, scheduled to be 21.5 percent in 2021-22 with a 7.5 percent discount rate, is now expected to be 26.4 percent if all actuarial assumptions are met, just from a reduction in the discount rate to 7 percent.[26] See Table 2.

[25] See "In Puerto Rico, Teachers' Pension Fund Works Like a Ponzi Scheme" by Mary Williams Walsh, March 8, 2017.

[26] See e.g. "Understanding the CalPERS Discount Rate and the Effect on Employer Contributions" February 6, 2017, slide 13.

Table 2

School Employer Contribution Rates – Before and After

Valuation Date	FY Impact	From June 30, 2015 Annual Valuation Report with Discount Rate of 7.5%	Projection with Discount Rate Change
6/30/2015	2016-17	13.888%	13.888%
6/30/2016	2017-18	15.8%	15.8%
6/30/2017	2018-19	17.7%	18.7%
6/30/2018	2019-20	19.7%	21.6%
6/30/2019	2020-21	21.1%	24.9%
6/30/2020	2021-22	21.5%	26.4%
6/30/2021	2022-23	n/a	27.4%
6/30/2022	2023-24	n/a	28.2%

CalPERS has scheduled a reduction in its assumed investment return to 7.375% for the 2018-19 contribution year, 7.25% for 2019-2020, and 7.00% for 2020-2021. Source: "Understanding the CalPERS discount rate and the Effect on Employer Contributions" CalPERS slide presentation February 6, 2017 slides 7 and 14.

So already because of past "smoothing" the current contribution rate of 13.9 percent will almost double even in the 7 percent CalPERS accounting world. Now imagine what the contribution rate will have to be if CalPERS implemented a 3.5 percent cut in its discount rate, to 4 percent, instead of a 0.5 percent cut. How willing will taxpayers be to finance the future rates likely to be required by economic reality? CalPERS itself projects that the contribution rate for various categories of state employees would double or triple (depending on the time over which the outstanding debt was amortized) if it simply cut the discount rate to 5.50 percent.[27] Remember, economists would regard the 5.50 percent assumption to still be inappropriately high. See Table 3.

[27] See CalPERS "State Actuarial Valuation as of June 30, 2015" pp. 61-66.

Table 3

Contribution Rates Explode at More Conservative Discount Rates

Employer Contributions as Percent of Payroll, CalPERS 2015 Risk Analysis

State Employee Category	7.50%/ 30 Year Am.	5.50%/ 30 Year Am.	5.50%/ EARSP Am.
Misc. Tier 1	26.646	49.2	75.6
Misc. Tier 2	26.095	47.0	73.5
Industrial	18.365	39.6	53.4
Safety	18.753	38.4	53.1
Peace Officers/Firefighters	40.276	79.1	115.0
Highway Patrol	48.719	89.6	125.1

See "CalPERS State Actuarial Valuation --- June 30, 2015". CalPERS provided data using two different policies for paying down the existing unfunded liabilities. Under the first set of assumptions ---- those used at the time and referred to in this report --- liabilities are paid under a "30 year rolling amortization" which means that they never actually get paid down --- see the earlier footnote about "smoothing". Also, assets could be valued for actuarial purposes at much more than their market value in bad times, further affecting the calculation of necessary contributions. The EARSP amortization is the rate necessary, according to CalPERS, if the remaining balance is to be funded over employees' **E**stimated **A**verage **R**emaining **S**ervice **P**eriod.

Furthermore, because the ratio of employed to retired participants is falling (CalPERS projects the overall ratio to fall below 1 in the next few years and then to continue falling) a large fraction of the high rates need to finance the Defined Benefit plans will still be needed even if we immediately switched all future pension accruals to a Defined Contribution plan. When employees received pension promises against a well-funded system in the 1980s, one that used discount rates that were lower than the Treasury bond rate, they could reasonably believe that they would get the benefits that they negotiated. The same confidence would be misplaced today. As it becomes progressively less likely that the marginal dollar of pension accruals will be paid by taxpayers continued high rates of Defined Benefit pension accruals make less sense for everyone.[28]

Here is an analogy: Say a creditor wins a legal judgement against a debtor. The debtor has the right to go after both the debtor's assets and some part of its future income. So long as the size of the judgement is not much more than the debtor's assets each extra dollar of judgement is worth something like a dollar to the creditor. But when the judgement exceeds the debtors' assets by 8 years of the debtor's income (roughly the ratio of the market unfunded CalPERS liability to the size of the state budget) getting the judgement increased further will likely be worth little if anything to the creditor. Rather, the creditor's focus should be on increasing the payments the debtor makes rather than increasing the promises for the future. Moving the pension system to one in which we make realistic promises to public employees and put money aside to pay for those new promises simultaneously, while beginning to slowly whittle down the existing mountain of promises is what pension reform is really about. Continuing the *status quo* of focusing on piling less and less likely to be paid additions onto our pension promises will end badly for everyone. Instead, we should be focusing on honoring as much as possible the

[28] CalPERS itself warns of the risk of higher taxes to pay for past benefits: "High employer contribution rates impose significant financial stress and may increase the risk that employers will default and be unable to make their required contributions. Since future employer contributions are one of the funding sources for the benefit payments, a default by the employer would result in increased risk to the members' benefits. The level of financial stress associated with any particular level of contributions will differ significantly by employer." CalPERS 2016 Annual Review of Funding Levels and Risks, September 20, 2016.

promises already made while making realistic, fully funded promises going forward. A maximally flexible interpretation of the California rule is a first step in that direction.

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