

Issue Paper
Governmental Employer Funding Of Defined Benefit Plans
And
CalPERS Employer Rate Smoothing Policies

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I. Introduction

Well before the latest round of defined benefit versus defined contribution controversy surfaced in California, the CalPERS actuarial staff realized that the sharp lowering and then raising of employer contributions was causing problems for California's public employers. The actuarial staff had started an investigation into the issue and presented a half day workshop on rate fluctuation to the CalPERS Board in September 2004. That workshop explained the impact of current Board policy on asset allocation and actuarial smoothing and rate setting methods on employers' contribution rates.

Following that workshop, the CalPERS actuarial staff undertook a significant study of CalPERS' smoothing and rate setting methodology and in March 2005 (first reading) and April 2005 (adopted in second reading) sent a new set of such policies to the CalPERS Board.

This issue paper will compare the prior and current methods and discuss issues associated with the new methodology.

II. The Nature of Pension Actuarial Work and Funded Status

All actuarial calculations are based upon a number of assumptions about the future. There are demographic assumptions about the percentages of employees that will terminate, die, become disabled, or retire in each future year. There are economic assumptions about future inflation, future investment returns and future salary increases for employees. By far the assumption having the most dramatic impact on the actuarial calculations is the assumption of the investment return for each year into the future until the last dollar is paid to current members. It must be understood that these assumptions are very long term predictors of the future and will almost certainly not be realized on a year by year basis. For example, the 20 year compound return for CalPERS Public Employees Retirement Fund has been in excess of 9% while individual yearly returns included such diverse results as a negative 7.23% and a positive 20.1%. Our current long term assumption is 7.75%.

The point is that the funded status (discussed below) is a measurement that can vary significantly from year to year. It could be said that too much is made of funded status. What is important is that progress be made over the long term towards funding future benefits, not the current funded status at any one point in time. Of course the future financial viability of the sponsoring employer is critical. I often ask individuals whether they would rather be in a plan that is 75% funded or one that is 85% funded. They always respond “The 85% funded plan”. I then add that the plan that is currently 75% funded was 45% funded 10 years ago and has made steady progress from that point to its current 75% status. On the other hand, the 85% plan was 125% funded 10 years ago and has steadily declined from that point to the 85% status today. Now choose.

Let's define funded status. When a new employee is hired, there is created an obligation to pay that individual “something” at “sometime” after the employee terminates. The “something” and “sometime” depends on when and how the employee terminates. It could be a refund of employee contributions with interest at the time of termination. It may be a death benefit payable to a spouse, or a disability or service retirement when the employee retires or when the employee reaches “retirement age” years after termination of employment. Further, the amount payable may depend on some unknown future salary. The actuarial assumptions discussed above are used to establish a probability of occurrence for each of these hundreds of possible futures for the employee and is assigned a probability through the use of actuarial assumptions. These assumptions are derived from past experience as well as the actuary's anticipation of future trends. Based on these probabilities and assumptions regarding future salary increases and investment returns, three important values are computed.

1. The first is called the Present Value of Benefits. This amount represents the total dollars needed today to pay for all future benefits for all current (but not future) employees without the need for future contributions at all. This dollar amount is not needed until all employees terminate employment, if all actuarial assumptions are met – a big if.
2. The second, and perhaps most important amount, is the Normal Cost. This is the “annual premium” needed each year of the employee's career to pay for an employee's total benefit, if all assumptions are met. This is usually expressed as a percent of the employee's pay. So, it is expected to grow in dollars in proportion to the employee's pay. Said another way, the Normal Cost is that percent of pay that, with investment earnings, will accumulate over the employee's career to an amount sufficient to pay for that employee's benefit.
3. The third amount to be determined is called the Accrued Liability. This is the assets that would be on hand now if all Normal Costs had been collected in the past and all actuarial assumptions had been met in the past, including the expected amount of investment return. This can also be described in future terms as the Present Value of Benefits less the Present Value of future Normal Costs, i.e. all the money you'll need less all the future annual premiums yet to

be paid. So, the Accrued Liability is a measure of the current desirable level of assets or where you'd like to be right now; at zero for a brand new employee, advancing in dollars over the employee's career, and equal to the Present Value of Benefits when the employee terminates.

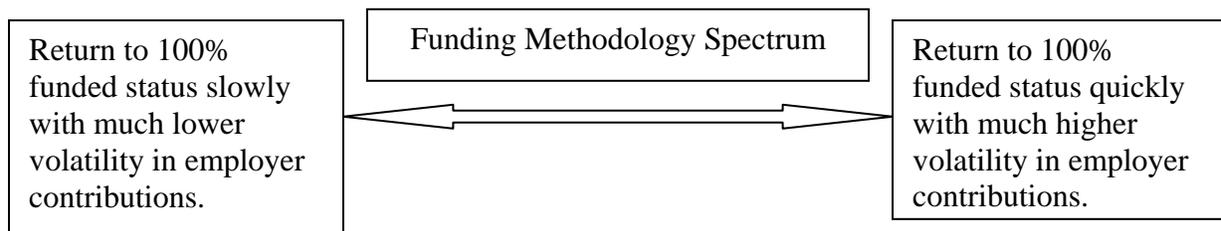
The plan's funded status is equal to the plan's actual assets divided by the plan's desired level of assets (i.e. divided by the plan's accrued liability). When actual assets are less than the accrued liability, the plan is simply behind schedule in accumulating assets and contributions in excess of normal cost must be collected to start making up the shortfall. When actual assets are more than the accrued liability, the plan is ahead of schedule in accumulating assets and contributions less than normal cost can be collected. To repeat a point made earlier, it is the nature of investing in assets that rise and fall in value that sometimes the plan is ahead of schedule and sometimes it is behind schedule.

The average funded ratio of CalPERS' plans stood at about 138% (on a market value basis) at the height of the stock market boom, through about June 30, 2000. Some of this surplus was spent on benefit improvements. Then there came one of the deepest and longest declines in the stock market's history and lowered the average funded ratio of CalPERS plans to about 80%. About 20% of that decrease in funded status was due to benefit improvements and 80% due to the decline in asset values. The markets have experienced a significant rebound since their low point and the average CalPERS plan's funded ratio now stands at approximately 93% (on a market value basis).

III. Funded Status versus Smoothing

It is important to understand that any "smoothing" in the rate setting process comes at the expense of the funded status of the plan. That is the more you smooth the slower you return to 100% funded whether you start above or below 100% funded status. To see this, consider the extreme example of no smoothing of any kind. In this case, the employer contribution required each year is the amount necessary to bring the plan back to 100% funded status by the end of the coming year. So, if the plan is 100% funded and assets drop 10%, the employer's contribution might increase by 60% of pay or more for the coming year to make up the 10% of asset loss. At the other end of the spectrum, extreme smoothing would be allowing the employer's contribution to remain level (say at Normal Cost) regardless of the plan's funded status. It has been shown by modeling that attempting this level of smoothing increases the chances of plan insolvency to highly unacceptable levels (say a 50% or 60% chance of insolvency).

So, the goal must be to strike the proper balance between protecting the plan's funded status and smoothing the employer's contributions over time. Of course, the point of proper balance may differ according to different points of view. There is a spectrum of approaches regarding funding progress versus stability of employer's contributions.



There are significant differences between private sector and public sector employers which result in significant differences with respect to appropriate choice of where to be on this funding spectrum. In many instances, the life expectancy of private sector employers is shorter than the life expectancy of the pension promises made by the company. Therefore, recent trends in federal legislation regarding the funding of private sector defined benefit plans have been strongly slanted toward short term solvency rather than long term funding. On the other hand, most public sector employers will be there to back up their pension promises for the long term. So, public sector employers can afford to focus on very long term funding, and corresponding significantly lower contribution volatility than their private sector counterparts.

There is also a lack of symmetry in this view. A policy set to eliminate unfunded liability quickly (a conservative approach when the plan is behind schedule) essentially backfires when applied to the same plan in a surplus position. This is because such a policy drives employer rates down too quickly in a surplus environment. Similarly, a less conservative policy set to lower employer contributions slowly when the plan is in surplus works just the opposite when applied to the plan in an unfunded liability position. That is, such a policy will take much longer to return the plan to 100% funded status. Nevertheless, the Board's fiduciary counsel has opined on multiple occasions that symmetry is required.

It should also be noted that plans with higher benefit levels and earlier anticipated retirement ages must accumulate more assets per person earlier in the employees' career than plans with lower benefits and higher retirement ages. Further, the more assets per person, the more volatile the employer contributions reaction to asset swings. So, plans have varying levels of volatility according to the level of benefits and the ages at which employees are expected to retire.

IV. The CalPERS study of smoothing methods.

CalPERS' actuarial staff set about studying the impact of various asset smoothing and amortization methods on the plan's funded status as well as employer contribution rates. We took suggested smoothing methods from various sources

and ended up studying 32 different methods. We generated 1,500 scenarios of future asset returns using a statistical normal distribution based on CalPERS asset allocation to generate the scenarios. Each of the 1,500 scenarios consisted of 50 years worth of future investment returns. For each of these 1,500 scenarios we computed the plan’s funded status and employer contribution rate for each of the next 50 years. We did this analysis for plans with varying levels of benefits and expected retirement ages, i.e. for plans with varying degrees of expected volatility.

CalPERS set the following objectives:

- Seek the smoothing method that “best” simultaneously:
 - Minimizes any negative impact on the funded status of the plans.
 - Minimizes the volatility in the employer’s contribution.
 - Minimizes the average future employer contribution.
- Select a method that produces employer rates that **comply with** the generally accepted accounting standards as provided by Governmental Accounting Standards Board Statement No. 27 (**GASB 27**).

V. Comparison of new and prior methods.

The Board, upon staff’s recommendation, adopted a method which met the objectives above and reduced the plan’s volatility (fluctuation in employer’s rate) by at least 50%. The recommendation and Board approval included a minimum employer contribution when a plan is in a surplus position (funded status greater than 100%). The minimum employer contribution is equal to the plan’s normal cost less 30 year amortization of the plan’s surplus.

Comparison of Prior and New Methods

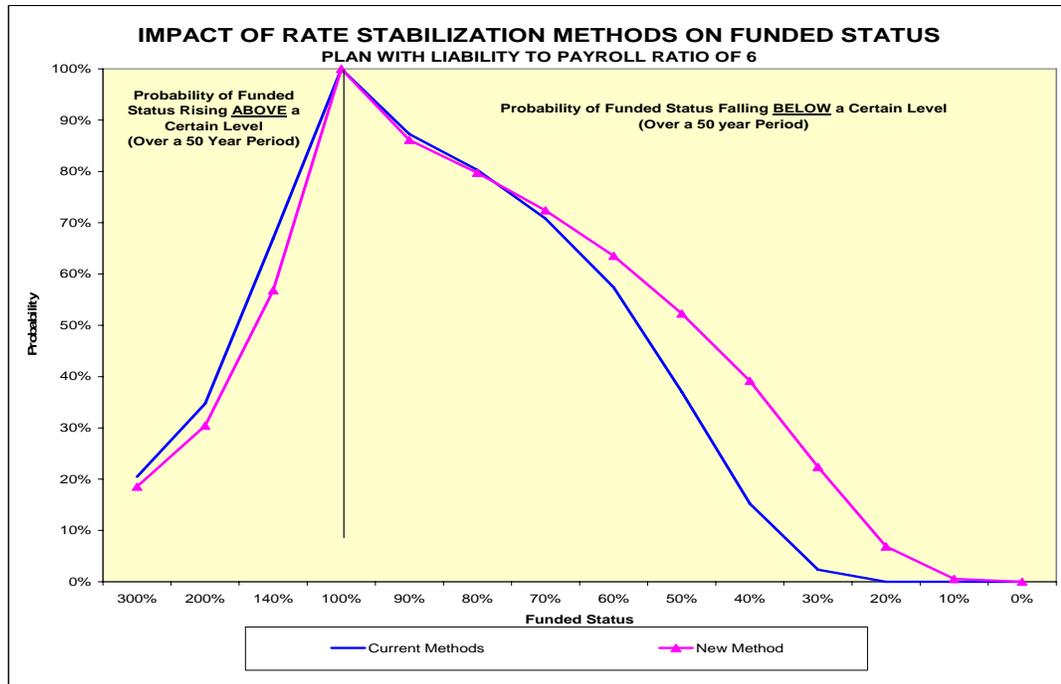
	Prior Method	New Method
Spread of Asset Gains/Losses	3 year asymptotic	15 year asymptotic
Actuarial Value Corridor	90% - 110%	80% - 120%
Amortization of Gains/Losses	10% of Unamortized Amount	30 Year rolling (about 6% of unamortized amount)
Minimum Contribution	None	Normal Cost less 30 year amortization of any surplus
Amortization of Plan Amendments, Changes in Methods or Assumptions	20 Year Declining	20 Year Declining

VI. Impact of New Methods on Funded Status and Employer Rates.

The new methods:

- Reduce the standard deviation of the annual change in employer rates (the volatility) by 52%,
- Increase the average employer contributions by .2% of payroll
- Produce employer rates that are compliant with GASB 27

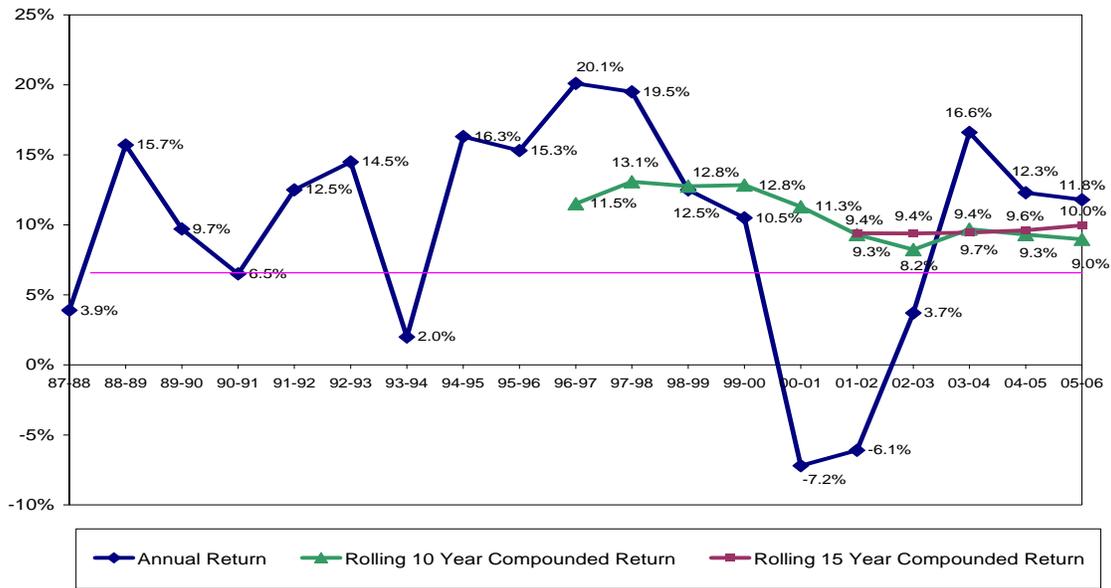
- Impact the funded status as shown in the graph below. The x-axis in the funded status of the plan and the y axis is the probability of the plans hitting that funded status at some point during the 50 year projection period. So, the new method increases the probability of lower funded status and lowers the probability of large surplus accumulation. This is the balance required to reduce contribution volatility by 52%.



So, the chances of lower funded status are increased, but “not by much”, and the expected volatility in employer rates was cut by more than one-half.

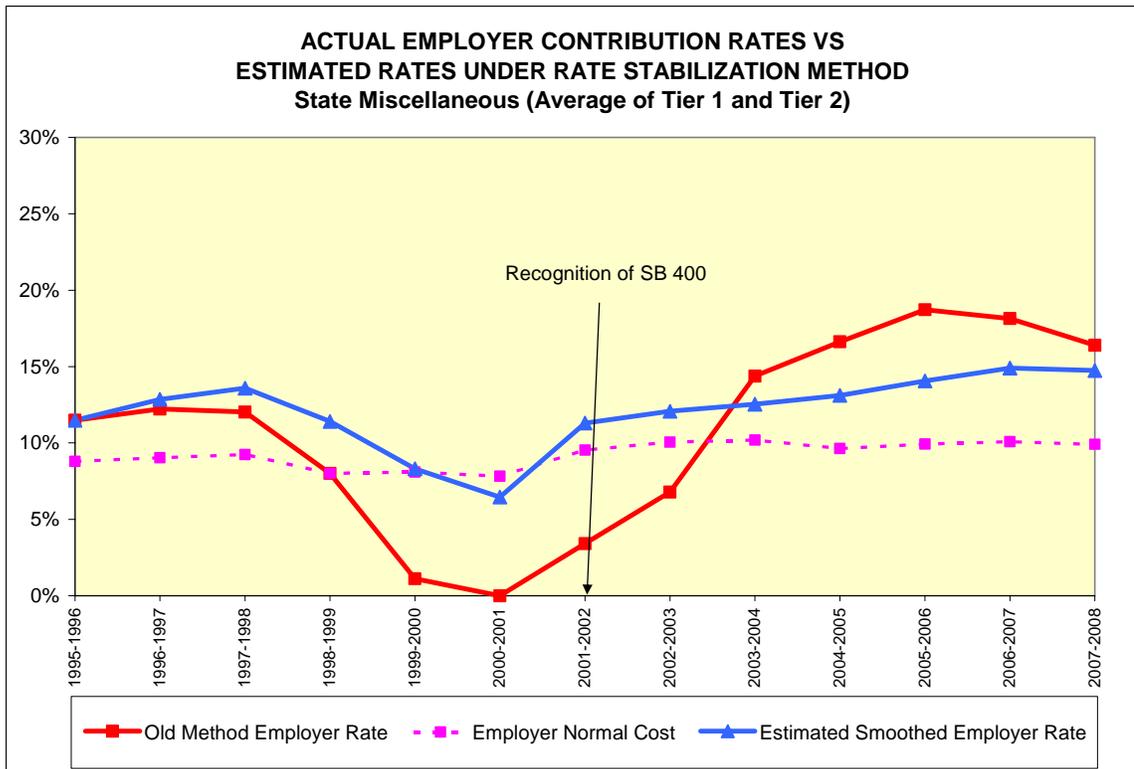
VII. Results of the Change in Smoothing Methodology

The chart below shows the historic investment returns of the Public Employees’ Retirement Fund. The blue curve shows the annual returns. The green curve shows the rolling 10 year compound returns for the prior the past 10 years. He purple curve shows the 15 year compound returns for the past 5 years. The pink line is the actuarially assumed long term compound return of 7.75%. Clearly, despite the volatility in the annual investment returns, the longer terms compound investment returns surpass the actuarially assumed return.



These facts raise a compelling question. “Why, when investment returns in the long run are consistent and above the actuarially assumed return, have employer rates fluctuated so dramatically? The answer is that what appeared to be conservative smoothing techniques (i.e. 3 year recognition of asset gains and losses coupled with short amortization periods) actually lead to significant swings in employer contributions. Employer contributions rates went down too quickly when the markets rose dramatically in the late 1990s and went up too fast when the markets crashed in the early 2000s.

While there is no way to completely eliminate the fluctuations in employer rates, either up or down, what can be accomplished is that the employer rates move more slowly in either direction. Certainly the new methods do that. In fact, had these new methods been put in place in 1995-96, employer contribution rates would have been considerably smoother without harming the plan’s funded status. See for example the employer contributions for the State miscellaneous plan in the next graph.

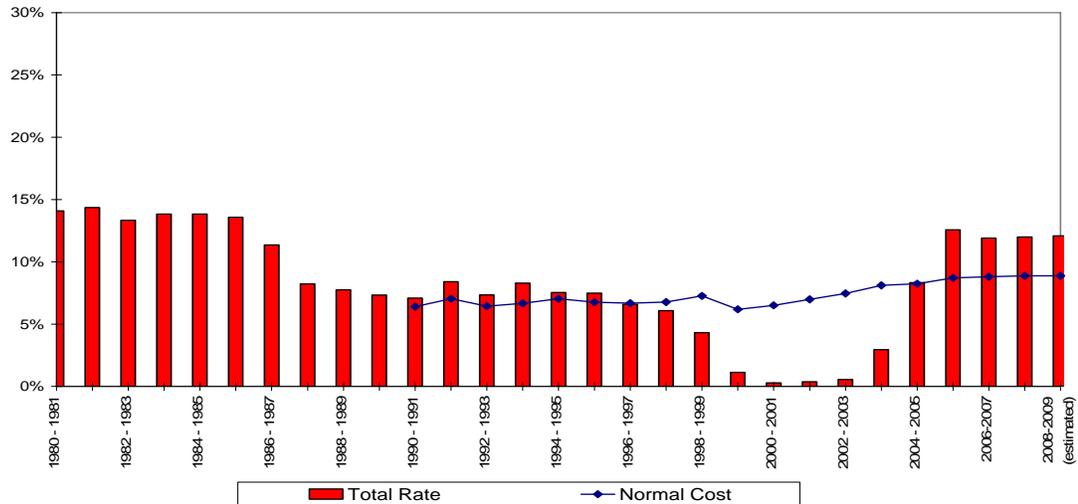


The red curve in the graph above is the actual rates set for this plan since the 1995-96 fiscal year, the purple curve is that plan’s normal cost (which increased due to SB 400 in fiscal 2001-02, and the blue curve represents the rates that would have been set had the new smoothing methods been put in place in 1995-96.

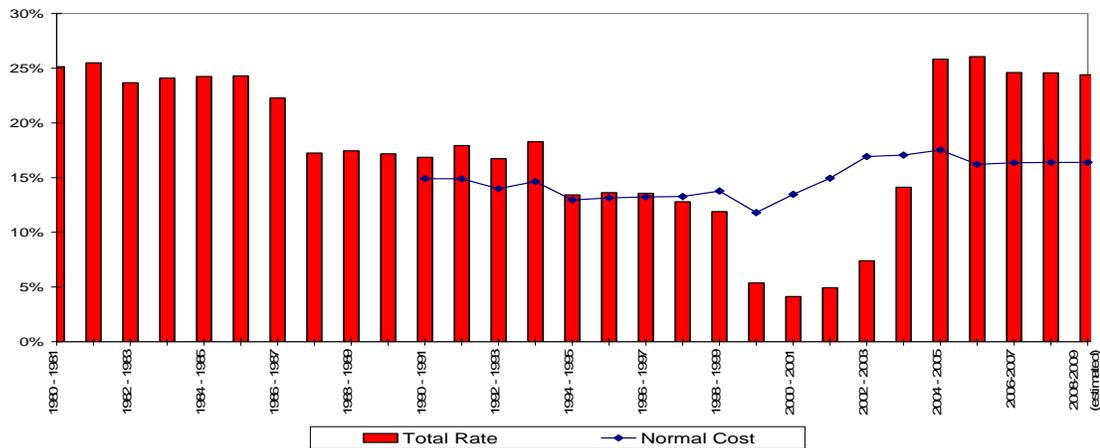
VIII. Impact on employer rates

Unfortunately, the new methods were put in place when employer rates were at their highest in 20 or 25 years. The vertical bars in the graphs below show the average employer contribution rate for all miscellaneous and safety plans at CalPERS since 1980-81. The blue curve in the graphs is the average normal cost for all plans. Note that while the graphs include the effect of benefit improvements across public agency plans over the years, the overwhelming reason for the increase in employer rates is the market downturn in 2000-2003.

History of Average Employer Contribution Rates for Public Agency Miscellaneous Plans



History of Average Employer Contribution Rates for Public Agency Safety Plans

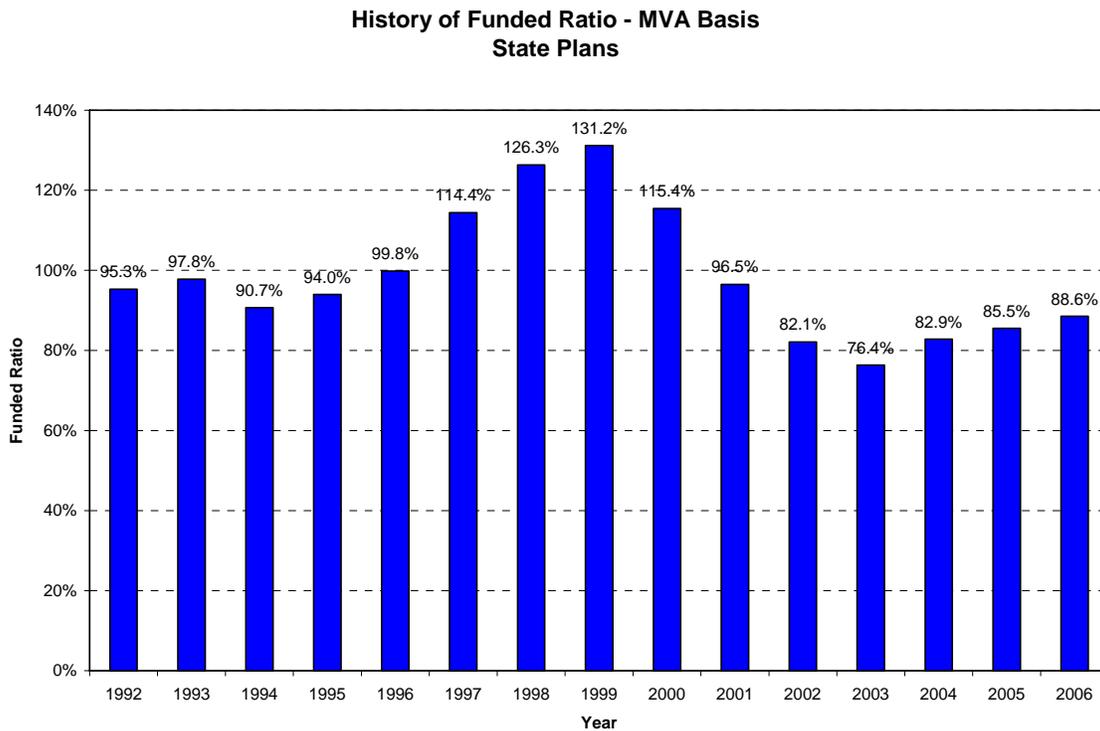


CalPERS implemented smoothing in response to great market volatility. There was no way to know then, nor is there any way to know now the future direction of the markets. It is equally likely that the new smoothing methods will help ease future increases in rates as it is that the new methods will slow down decreases in rates.

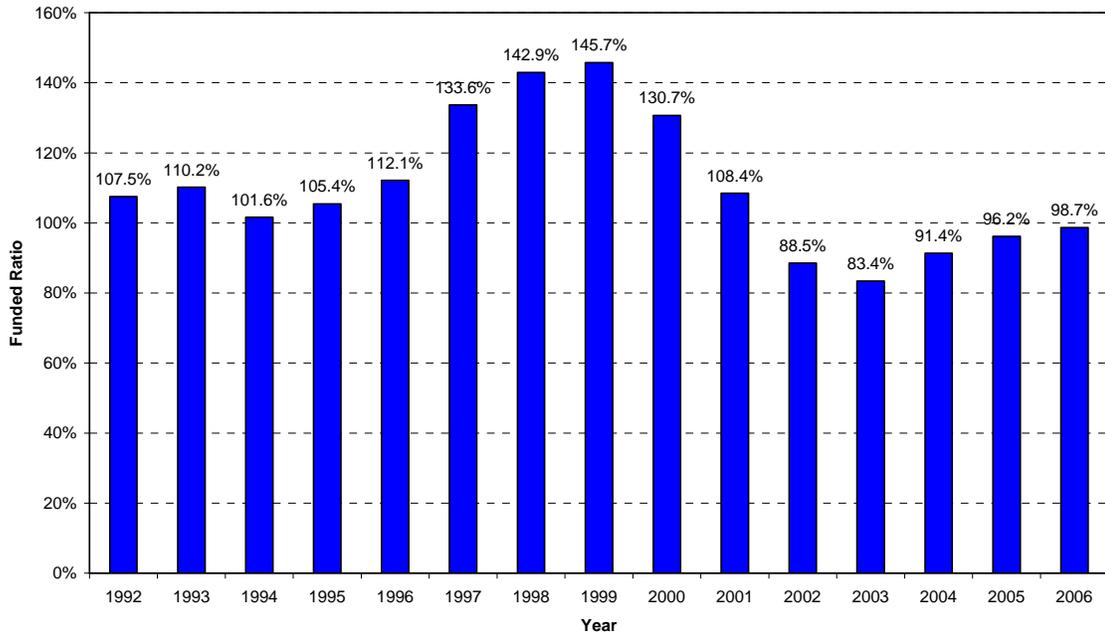
That being said, the impact on employer rates has been very positive so far. For example, about 75% of all local public agency plans experienced an employer rate change of less than 1% of pay between 2005-06 and 2006-07. The remaining 25% of plans included those that improved benefits and had a planned change in employer rate.

IX. Impact on funded status

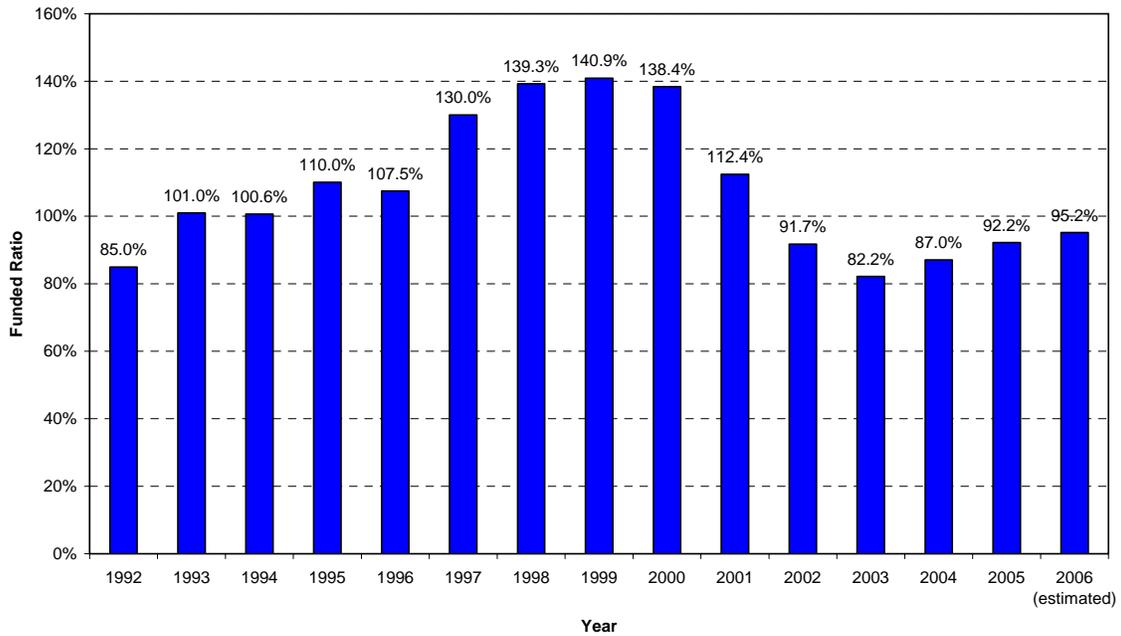
It is the position of the CalPERS Chief Actuary, that funded status should be based on the market value of assets rather than the smoothed market value of assets. The market value of assets is the true indicator of the plan's ability to pay future benefits. The smoothed actuarial value of assets is used to compute the surplus or unfunded liability which is amortized over time as part of the employer's contribution rate. However, this is a smoothing technique on the employer's rate and not a true measure of the plan's ability to pay future benefits. The history of the funded status of CalPERS plans for the State, Schools Pool, and Public agencies on a market value of assets basis is show below.



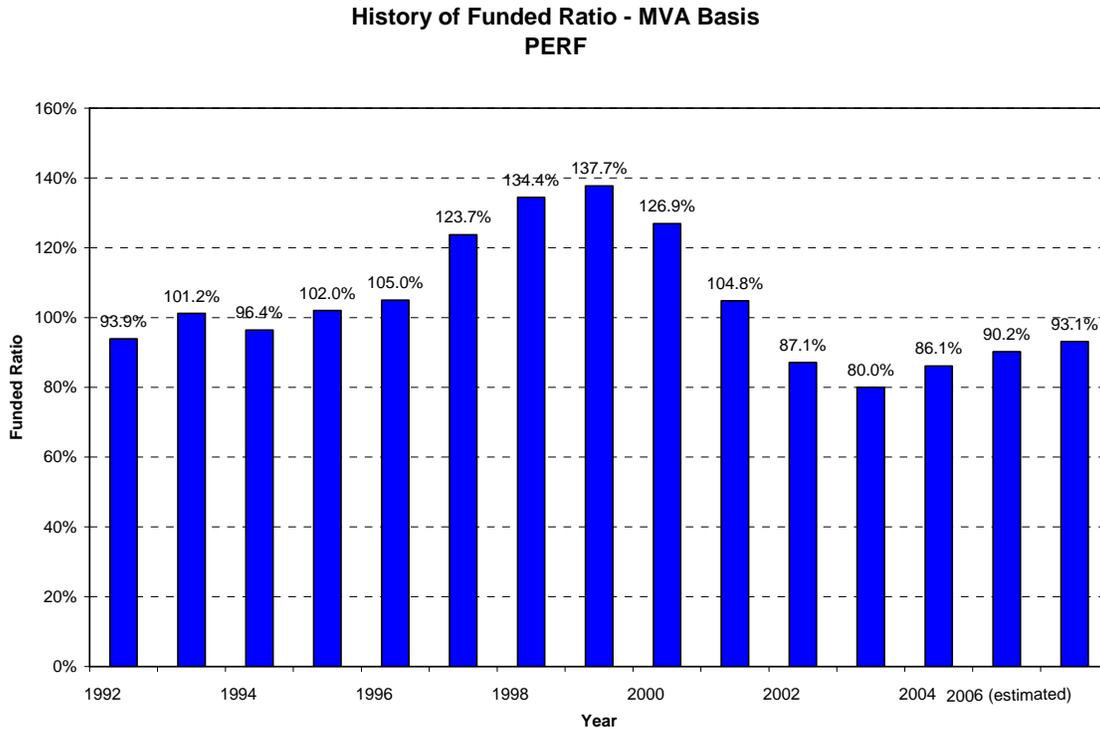
**History of Funded Ratio - MVA Basis
Schools Pool**



**History of Funded Ratio - MVA Basis
Public Agencies**



The overall funded status of the entire Public Employees' Retirement Fund is shown below.



From these graphs it can be clearly seen that the funded status of all plans at CalPERS dropped significantly upon the market crash in early 2000. However, market returns have improved dramatically and the smoothing techniques have not allowed employer rates to drop as quickly. So, all plans are recovering nicely and marching back to one hundred percent funded status fairly quickly.

X. Future Plans for CalPERS Smoothing Policies

One issue remains with our smoothing methodology. That is, “How do we bring the employer’s rates back towards normal cost as the plans approach one hundred percent funding. Said another way, how do we provide “a soft landing” for employer contributions without abruptly changing our smoothing methods. The CalPERS actuarial staff is currently analyzing refinements to our smoothing policies that would do just that. Namely, we are working on a mathematical mechanism that avoids having employer contributions “stuck” too high or too low when the plan approaches one hundred percent funding on a market value of assets basis. This work should be complete and delivered to the CalPERS Board for their approval by the end of this calendar year, in time for next rate setting at CalPERS.