The Evolution of OCERS Unfunded Actuarial Accrued Liability

Steve Delaney, CEO

December 31, 2021 Valuation

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The Orange County Employees Retirement System (OCERS) is a public pension plan providing a defined benefit lifetime pension to many of Orange County's diverse community of public servants – from firefighters and deputy sheriffs to bus drivers and court clerks.

OCERS conducts an annual valuation of the OCERS Trust Fund to determine its current economic status. In the most recent valuation, for the period ending December 31, 2021, the system's professional actuary (The Segal Group) calculated the Unfunded Actuarial Accrued Liability (UAAL) of the fund to be approximately $4.53 billion. At the start of the millennium, as of December 31, 2000, there was no UAAL at all, the system being more than 100% funded. The drivers and components that contributed to the evolution of OCERS' current UAAL are the subjects of this paper.

WHAT IS AN UNFUNDED ACTUARIAL ACCRUED LIABILITY (UAAL)?

UAAL is the difference between the actuarial accrued liability and the actuarial value of assets accumulated to finance a public pension. In simpler terms, if you compare the cost of OCERS' pension promises with the actuarial value of OCERS' assets, the promises currently exceed the assets. That shortfall is OCERS' Unfunded Actuarial Accrued Liability.

Assuming no change in the underlying pension benefit formulas, a fully funded pension system with no UAAL (as was the case for OCERS in 2000), generally means that all of the actuary's assumptions as to the cost of the fund and growth of liabilities have been met, and the present value of the system's accumulated assets are sufficient to pay out all of the pension promises to plan members.

But how does a public pension plan accrue the necessary funds for paying out benefits, and how can that process lead to a gap between the amount of assets held, and the present value of those future benefits?

A pension system's approach to building its assets in order to pay future benefits is not unlike the approach taken by many families saving for their children's college education. If you expect your child's education is going to cost $100,000 eighteen years from now, you have three basic options:

(1) You could deposit a single lump sum amount representing the present value of that future cost into a savings account, similar to an endowment or trust, calculated to grow with sufficient earnings to total $100,000.

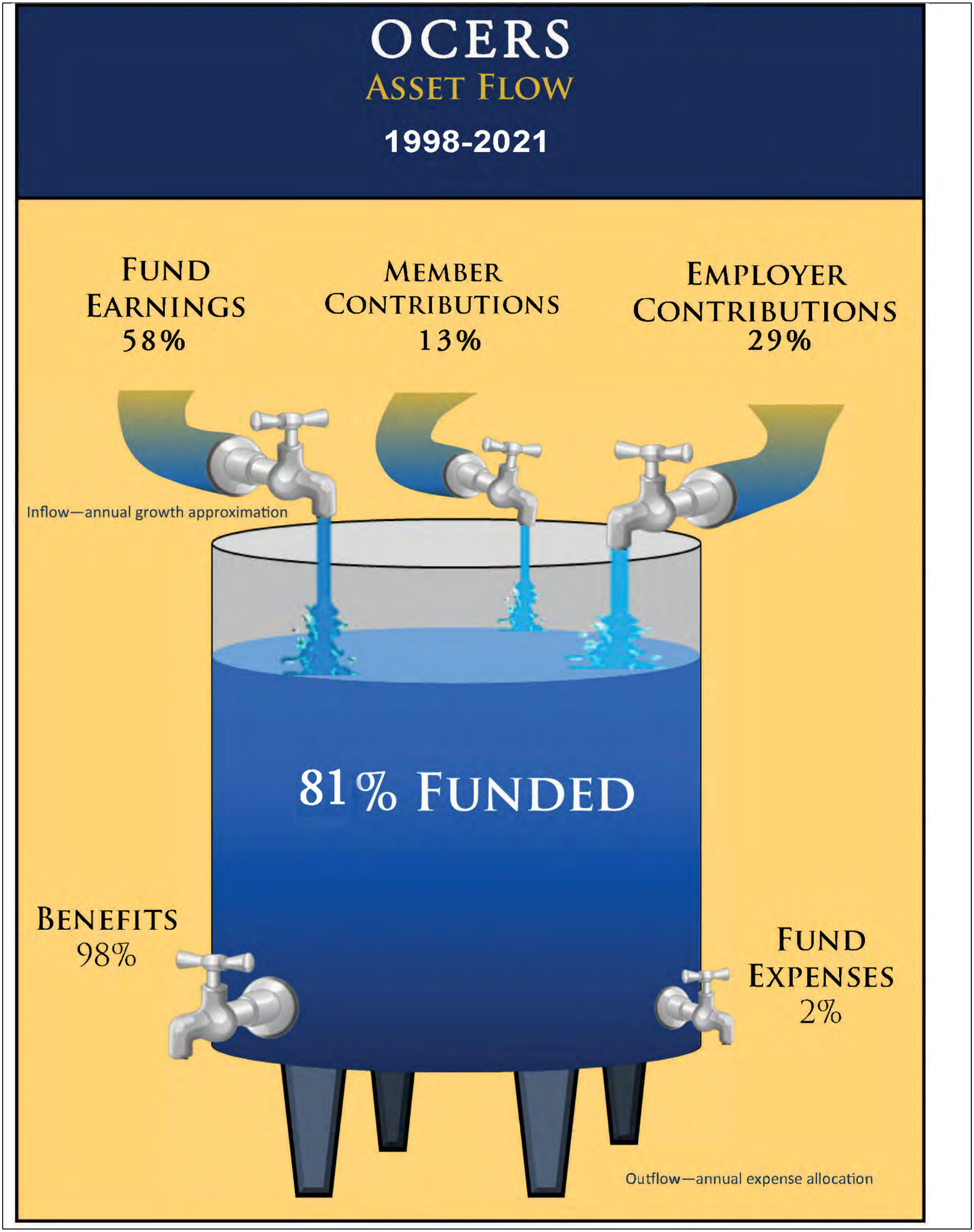
(2) You could save over time, depositing a certain percent of the salary you earn each year into an account and again assume that sufficient interest earnings will accrue to fully fund the cost when the big day arrives.

(3) You could wait until the child turns 18 and pull from your available resources at that time to pay the entire $100,000 in a single payment.

Public pension plans face similar choices in determining the best method for accruing sufficient resources to fund a member's benefit at retirement. Like most American families, the majority of public pension plan systems choose to pay a level percent of salary each year, in order to gradually grow the amount needed to fund future retirements.

Determining how much to contribute each year is a primary challenge for any public pension system. For that reason, public pension plans use the expertise of a professional actuary to assist in planning the funding of those retirement benefits over the long term, allowing investment earnings on the contributions to fund the majority of the pension costs. In Orange County those investment earnings provide the largest portion of retirement benefits being paid, greatly reducing the cost to Orange County's employees and taxpayers in providing public services to our community.

The job of a pension plan actuary includes estimating (or assuming) how much money should be contributed each year so the plan will have enough funds to pay the benefits promised by the plan throughout the lifetime of the member. The year-to-year stream of contributions should be as smooth and consistent as possible to avoid wreaking havoc on the budget of the employer.


OCERS
ASSET FLOW
1998-2021
FUND EARNINGS 58%
MEMBER CONTRIBUTIONS 13%
EMPLOYER CONTRIBUTIONS 29%
Inflow—annual growth approximation
81% FUNDED
BENEFITS 98%
FUND EXPENSES 2%
Outflow—annual expense allocation

The graphic above shows a snapshot of OCERS' funded status as of December 31, 2021, while the representation of cash inflows and outflows reflect the period of 1998 through 2021.

HOW DID OCERS' CURRENT UAAL DEVELOP?

The long-term cost of retiree benefits is based on a host of variables, the future values of which are unknown. Many different events can cause a UAAL to develop or even disappear. While actuaries try to pin down these variables through the use of best or at least reasonable assumptions and professional methodologies, the unexpected should be expected to occur.

There are six assumptions in particular that have the greatest impact on the actuary's estimates of plan funding:

1. The assumed rate of return on investments
2. The rate of increase in salaries for actives and the change in cost-of-living-adjustment (COLA) for retirees
3. Member mortality
4. The age at which members choose to retire
5. How many members become disabled
6. How many members terminate their service earlier than anticipated

Finally, there are two other events that can have great impact on plan funding, events the actuaries can't anticipate:

(1) plan changes, that is, when a benefit formula is changed in some unanticipated manner by the employer, and
(2) differing actual experience, that is, when actual experience indicates that previous assumptions must be modified to reflect a more current reality. A key example here is life expectancy, which with the continued advances in medicine challenges actuaries in being able to accurately project average life expectancies in the coming decades.

Either will generally have an "unfunded" impact on the cost of the system, though savings can occur as well, as in fact happened in the period of 2009 through 2012 with a slowing in projected salary increases due to the challenging economic times.

First, a summary history of OCERS' UAAL as well as the plan's funded status:

(In 000's)

Actuarial Valuation Date December 31	Valuation Value of Plan Assets	Total Unfunded Actuarial Accrued Liability (UAAL)	Funded Ratio
1985	$613,863	$462,121	57.05%
1986	$713,506	$507,409	58.44%
1987	$821,884	$522,098	61.16%
1988	$985,030	$468,828	67.75%
1989	$1,136,210	$515,778	68.78%
1990	$1,297,575	$543,340	70.49%
1991	$1,576,131	$196,763	88.84%
1992	$1,807,319	$332,763	84.45%
1993	$2,024,447	$280,572	87.83%
1994	$2,177,673	$372,386	85.40%
1995	$2,434,406	$199,478	92.43%
1996	$2,675,632	$176,262	93.82%
1997	$3,128,132	$204,835	93.85%
1998	$3,504,708	$177,978	95.17%
1999	$3,931,744	$85,535	97.87%
2000	$4,497,362	($162,337)	103.74%
2002	$4,695,675	$978,079	82.76%
2003	$4,790,099	$1,309,334	78.53%
2004	$5,245,821	$2,158,151	70.85%
2005	$5,786,617	$2,303,010	71.53%
2006	$6,470,000	$2,298,960	73.77%

Actuarial Valuation Date December 31	Valuation Value of Plan Assets	Total Unfunded Actuarial Accrued Liability (UAAL)	Funded Ratio
2007	$7,288,900	$2,549,786	74.08%
2008	$7,748,380	$3,112,335	71.34%
2009	$8,154,687	$3,703,891	68.77%
2010	$8,672,592	$3,753,281	69.79%
2011	$9,064,355	$4,458,623	67.03%
2012	$9,469,208	$5,675,680	62.52%
2013	$10,417,125	$5,367,917	65.99%
2014	$11,449,911	$4,963,213	69.76%
2015	$12,228,009	$4,822,348	71.72%
2016	$13,102,978	$4,830,483	73.06%
2017	$14,197,125	$5,438,302	72.30%
2018	$14,994,420	$5,708,929	72.43%
2019	$16,036,953	$5,879,861	73.17%
2020	$17,525,117	$5,379,858	76.51%
2021	$19,488,761	$4,527,312	81.15%

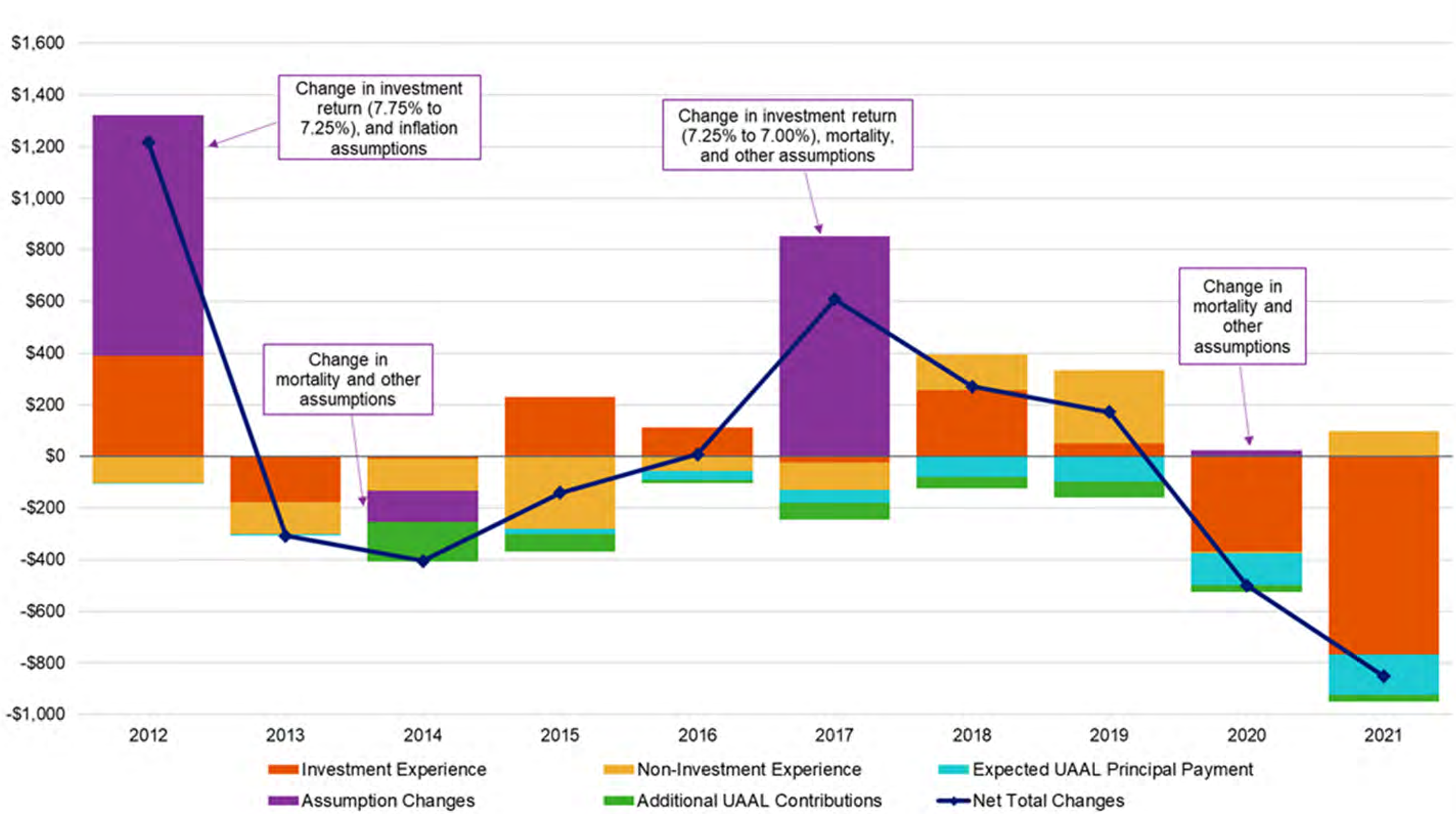
As shown in the table above, the annual calculation of OCERS' UAAL can swing dramatically from year to year, such as **1990-91** when the UAAL shrank from $543 million to $196 million, a reduction of nearly 40% in a single year due primarily to the remarkable earnings of that year (1991: 20.25%); or **2002-03** when the UAAL grew from $978 million to $1.3 billion, an increase of approximately 30% reflecting both assumption and benefit changes the year before, as well as the delayed recognition of some heavy investment losses incurred in the three prior years.

FACTORS THAT CHANGED THE UAAL

The bar chart that follows on the next page illustrates on a single chart some of the same historical factors that have caused changes in OCERS' UAAL amounts since 2000 as reported in this document. Among the factors that have had a negative impact (i.e., increase in OCERS' UAAL) are reductions in the investment rate assumption, improvement in mortality, and certain periods of unfavorable investment experience such as during the Great Recession. Of course such negatives are somewhat offset by positive factors (i.e., decrease in OCERS' UAAL) such as smaller salary increases received by active members and smaller cost-of-living increases received by retirees and beneficiaries than those expected under the actuarial assumptions. And of course, good investment returns such as 2017 and 2019 when the fund returned more than double the assumed rate of 7%.

It is important to note that OCERS has taken significant strides in risk management over this same time period resulting in long-term plan sustainability. This includes strengthening of assumptions, particularly the expected return discount rate, and adopting a funding policy that eliminates negative amortization and promotes intergenerational equity. These changes may result in higher UAAL and associated contributions in the short term, but in the medium to long term avoid both deferring contributions and allowing unmanaged growth in the UAAL. Such decisions are essential for OCERS' fiscal health on a going forward basis.

Factors that Changed UAAL in December 31, 2012 to 2021 Valuations ($ Millions)

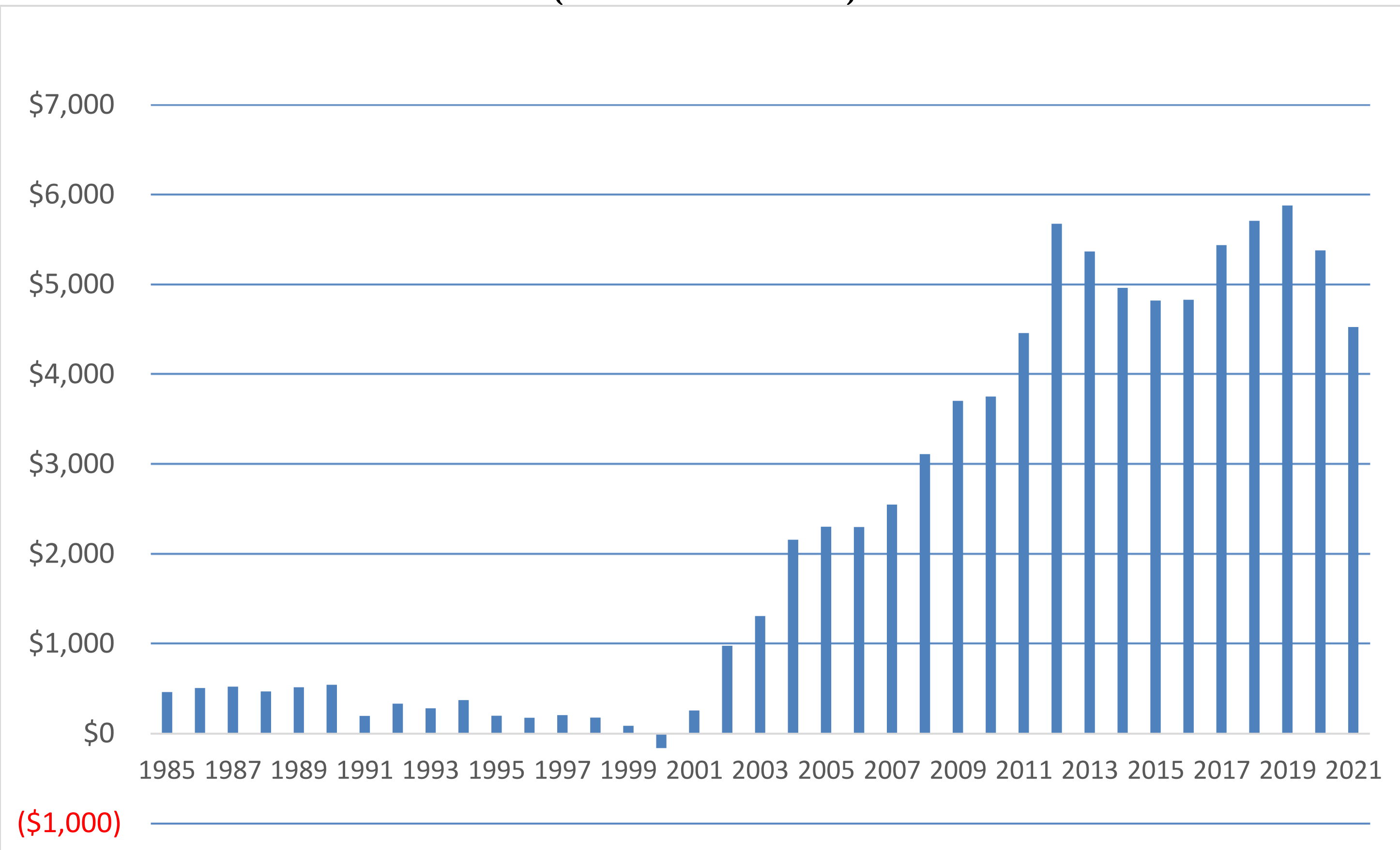


Note: The primary source of investment losses shown in the December 31, 2012 valuation is the 2008 market decline ("the Great Recession"), which was recognized in the valuation value of assets over five years.

A VISUAL REVIEW OF THE UAAL HISTORY

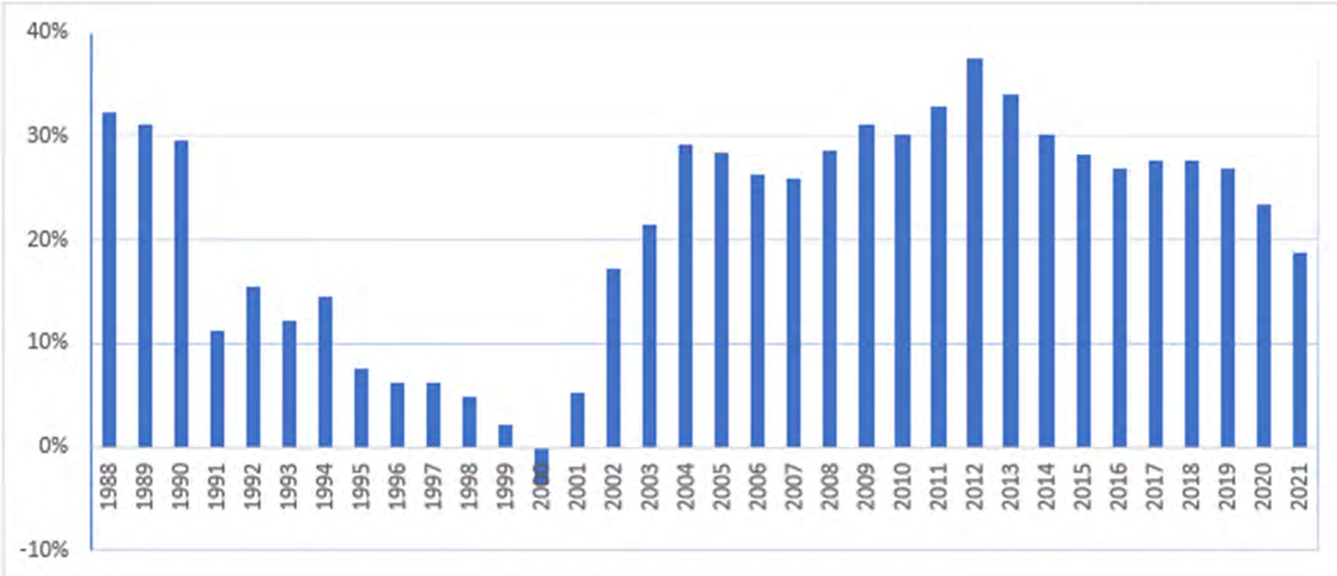
Two different approaches to viewing the UAAL in context of the OCERS Fund are displayed in the following tables. In the first table the historical amount of UAAL is displayed, reflecting the growth of the UAAL in total dollars. Identifying trends and determining how best to address the cautionary tale being shared is an important task of any decision maker when it comes to pension design.

OCERS Total UAAL
(Dollars in Thousands)



In the following table, the UAAL is now reflected as a percentage of the total actuarial accrued liability, both funded and unfunded, to put it into perspective. This is an important point to keep in mind as the OCERS plan continues to mature over time. Note for example that while the total UAAL increased in 2010 by approximately $50 million dollars, the funded ratio of the plan actually improved, as the total assets available to pay the plan's liabilities increased at an even faster rate.

OCERS HISTORY UAAL as a % of Total Actuarial Accrued Liability



CONCLUSION:

As this review has shown, both past experience and assumptions (that try to predict the future using that past experience) often change and have a major impact on the system's future costs. Actuaries use long economic cycles to make their assumptions. They do not often adjust their assumptions in response to year-to-year fluctuations in actual experience. Rather, actuarial assumptions are typically changed only following careful assessment of ongoing and durable trends in experience. Because public pension plans such as OCERS take a very long view of the time horizon, recognizing that in 2021 our average general and safety member retired with approximately 21 and 22 years of service, respectively. OCERS is designed specifically to allow time to exercise its smoothing effect on the costs associated with the variability of life and its vagaries.

While this document tracks the evolution of the OCERS UAAL as it has developed especially since the year 2000, keep in mind that the actuary can only show from one year to the next what the initial impact a given event may have on future liability projections using the assumptions adopted by the OCERS Board as of that measurement date. It cannot show what specific long-term impact of that same event may be in later years should the initial assumption prove different from actual experience. An example of this was the increase in benefits that occurred in 2004, when a number of key benefit formulas were changed by the plan sponsor, leading to a change in the projection regarding future liabilities to be paid out, and creating an immediate increase in the UAAL of $365 million. Will the ultimate cost of that benefit adjustment be $365 million? Not likely. But it was an estimate developed using the best assumptions available at the time to prepare that projection. Can we track that specific change in the plan design to see what the ultimate cost might truly be? Not really. The OCERS plan is large and complex, with over 49,000 members making individual life choices that will impact the ultimate cost, either positively or negatively, over a very long period of time. Once the initial event is priced into the cost of the plan, then it is the plan as a whole that gets valued in future years, composed of the many smaller decisions made year after year, and determining the course of the UAAL.

No matter how one looks at the UAAL, it is important to keep certain points in mind. The UAAL is only an estimate based on many different inputs and assumptions that are all subject to refinement. The UAAL is not an absolute number such as the fixed amount of your home mortgage but is a fluid estimate that will both rise and fall as it is revised annually based upon actual experience. Under a well-structured plan with conservative assumptions, the deviations will include both positive (as was the case most recently in 2016) and negative (such as in 2008) amounts in the short run, but tend to smooth to the actuary's assumed assumptions over time. The causes of transitory shortfalls and surpluses will be captured in improved assumptions and appropriate contribution rates over time, ensuring a secure financial foundation for the promises made to Orange County's public servants.

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YEAR BY YEAR REVIEW:

It is current history that has raised the most questions from both employers, members and the public who want to better understand how the current UAAL has evolved over the past couple of decades. In the following pages the data used in calculating the UAAL from calendar year 2000 when OCERS last had a surplus, through 2021, is presented in table format, with commentary on the events of each year that had primary impact on determining if the UAAL rose or fell for that given year.
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2000

Development of UAAL/(Surplus) for Year Ended December 31, 2000

1.	**UAAL at beginning of year**		$85,534,716
2.	Total normal cost at middle of year		
3.	Amortization Payment		(6,752,601)
4.	Interest		11,403,640
5.	Expected UAAL		$90,185,755
6.	Actuarial (gain)/loss and other changes		
	a. Gain on investment	$(286,267,436)	
	b. Loss on salary increases	24,584,670	
	c. Loss on new retirees	29,186,796	
	d. Gain on mortality	(28,835,682)	
	e. Other experience (gain)/loss	8,809,049	
	f. Benefit improvements		
	g. Change in actuarial assumptions		
	h. Total changes		(252,522,603)
7.	**(Surplus) at the end of the year**		$(162,336,848)

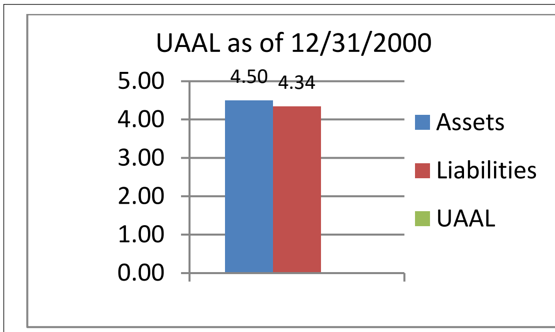
IMPACTING EVENTS

Calendar year 2000 is a key year, and emblematic of how public pension systems are designed to smooth out the highs and lows of plan costs over time, OCERS moves from a UAAL of $85 million at the start of the year to a surplus of $162 million as the year comes to a close.

There were no significant changes in Plan provisions in calendar year 2000.

Though total fund returns for 2000 were only 3.28% that exceeded the policy benchmark and ranked OCERS in the top quartile of the Callan Public Plan Sponsor Database. Altogether the recognition of past and current smoothed earnings lowered the UAAL by over $286 million.

The actuarial value of assets passed the actuarial value of liabilities in 2000, and the Plan was 103.7% funded at the end of the calendar year.



In billions

2001

Development of UAAL/(Surplus) for Year Ended December 31, 2001

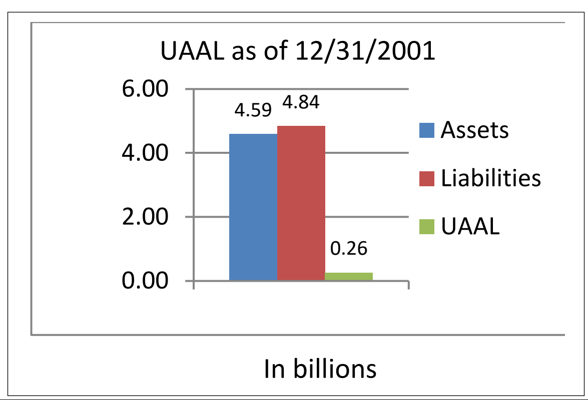
1.	**(Surplus) at beginning of year**		$(162,336,848)
2.	Total normal cost at middle of year		
3.	Amortization Payment		(11,193,795)
4.	Interest		7,117,033
5.	Expected UAAL		$(158,260,086)
6.	Actuarial (gain)/loss and other changes		
	a. Loss on investment	$221,191,812	
	b. Loss on salary increases	40,447,786	
	c. Loss on new retirees	48,490,180	
	d. Other experience (gain)/loss	19,791,339	
	e. Change in actuarial assumptions	(34,094,126)	
	f. Impact of 3%@50 for Law Enforcement (Safety)	119,488,767	
	g. Total changes		415,315,758
7.	**UAAL at the end of the year**		$257,055,672

IMPACTING EVENTS

While not significant, changes to the assumed withdrawal rates, the assumed termination rates, the assumed service-connected disability rates and the assumed retirement rates taken together actually lowered future liabilities by approximately $34 million.

The change in the retirement benefit for Law Enforcement (safety) members to a 3% per year of service benefit payable at age 50 increased future liability by approximately $119 million.

The OCERS portfolio experienced a loss of -3.24% in calendar year 2001, with an earnings assumption of 8%. That loss, though smoothed led to an increase of the UAAL by $221 million.



2002

Development of UAAL for Year Ended December 31, 2002

1.	**UAAL at beginning of year**		$257,055,672
2.	Total normal cost at middle of year		
3.	Amortization Payment		12,123,329
4.	Interest		27,502,107
5.	Expected UAAL		$296,681,108
6.	Actuarial (gain)/loss and other changes		
	a. Loss on investment	$220,329,452	
	b. Loss on salary increases	91,886,000	
	c. Loss on new retirees	82,392,000	
	d. Other experience (gain)/loss	48,763,0690	
	e. Change in actuarial assumptions	148,339,453	
	f. Impact of 3%@50 for Firefighters; Probation become Safety under the 2%@50 formula retro; 3%@50 fwd.	89,688,449	
	g. Total changes		$681,398,423
7.	**UAAL at the end of the year**		$ 978,079,531

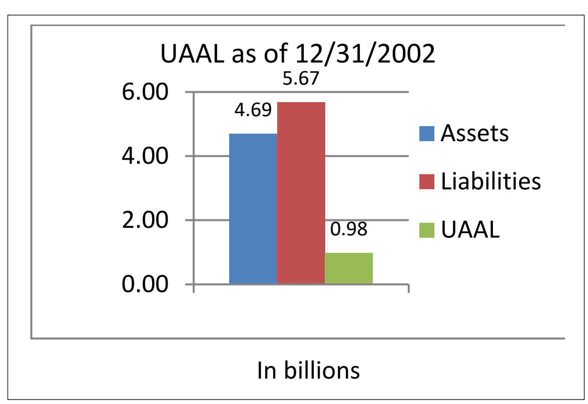
IMPACTING EVENTS

OCERS experienced negative returns in 2002 as did much of the market. A loss of -5.46%, when the assumption was for earnings of 8% led to an effective hit of -13.46% on the funding position of the plan. Even with smoothing in place, more than $220 million in losses were applied to the UAAL.

With the market having been down for a couple of years in a row, the OCERS Board revisited its earnings assumption and lowered the portfolio's assumed rate of return from 8% annual to 7.5%. That change in earnings assumption indicated there would be lower investment earnings to offset plan costs. Taken together with a lowering of the assumption for future salary increases (when salaries don't grow as fast as anticipated, fewer contributions than anticipated will be flowing to the system) from 5.5% to 4.5% annually, led to a $148 million increase in the UAAL.

On the benefit side, the formula for firefighters was improved to 3% of final average salary at age 50.

Effective June 28, 2002 Probation Services Unit employees became safety members and started accruing benefits in the 2%@50 retirement plan formula. Tier 1 employees hired prior to July 15, 1977 and who remained continuously employed thru June 28, 2002, had their general member service retroactively upgraded to the safety plan formula. Tier 2 employees with seven (7) or more years of service, had 90% of their general member service upgraded to the safety plan formula. Tier 2 employees with less than seven (7) years of service, had 80% of their general member service upgraded to the safety plan formula. The County of Orange Probation department paid for the plan upgrade of service as did the employees by paying a 2% share of employer cost. Additionally, all of the Tier 2 employees were given an opportunity to pay the employee and employer contributions necessary to upgrade the remainder of their general service into the safety plan formula.



2003

Development of UAAL for Year Ended December 31, 2003

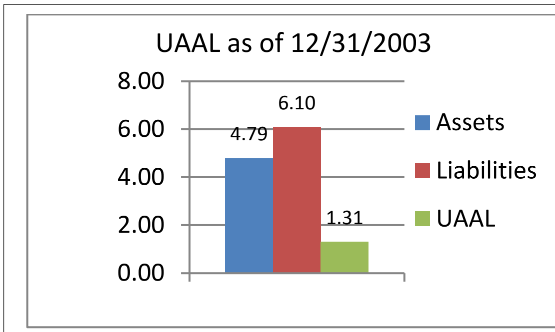
1.	**UAAL at beginning of year**		$ 978,079,531
3.	Total normal cost at middle of year		
4.	Amortization Payment		(58,355,527)
5.	Interest (7.5%)		78,359,367
6.	Expected UAAL		$ 998,083,371
7.	Actuarial (gain)/loss and other changes		
	a. Loss on investment	$ 287,828,001	
	b. Gain on salary increases	(103,234,000)	
	c. Loss on new retirees	119,420,000	
	d. Other experience (gain)/loss	4,898,374	
	e. Change in actuarial assumptions		
	f. Impact of new formula for City of San Juan Capistrano, and City of Rancho Santa Margarita	2,337,899	
	g. Total changes		311,250,274
8.	**UAAL at the end of the year**		$1,309,333,645

IMPACTING EVENTS

Despite a great year for the market, with the OCERS portfolio returning 19.84% in 2003, that wasn't enough to offset the smoothed losses of prior years continuing to be recognized in the valuation, with the UAAL growing by over $287 million on that basis alone.

Even with the lower salary growth assumption adopted in the previous year, member salaries did not grow as fast as anticipated, so while fewer contributions came in, that was offset by lower growth in pension liabilities, leading to a reduction in the UAAL of $103 million.

The cities of San Juan Capistrano and Rancho Santa Margarita adopted improved benefit formulas for their general service members, 2.7%@55 for San Juan Capistrano, and 2.5%@55 for Rancho Santa Margarita.



In billions

2004

Development of UAAL for Year Ended December 31, 2004			
1.	**UAAL at beginning of year**		$1,309,334,000
2.	Changes in methods and procedures		106,630,000
3.	Total normal cost at middle of year		188,163,000
4.	Actual employer/member contributions		(279,940,000)
5.	Interest		102,756,000
6.	Expected UAAL		$1,426,943,000
7.	Actual (gain)/loss and other changes		
	a. Gain on investment	$(50,536,000)	
	b. Other experience (gain)/loss	19,372,000	
	c. Benefit improvements	365,409,000	
	d. Change in actuarial assumptions	579,681,000	
	e. Change to 3.5% inflation assumption and Entry Age Normal funding method	33,129,000	
	f. Change in investment return	(215,487,000)	
	g. Total changes		731,208,000
8.	**UAAL at the end of the year**		$2,158,151,000

IMPACTING EVENTS

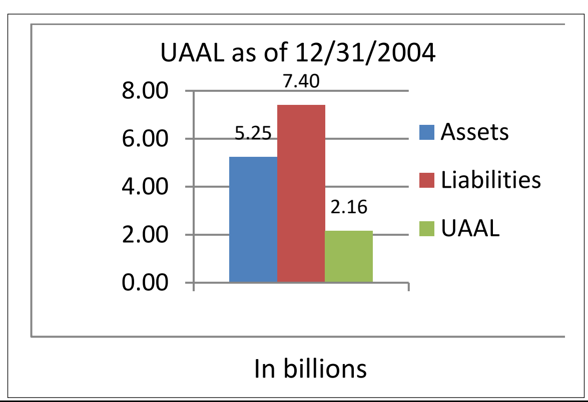
Two major events occurred in 2004, a change in actuarial services from Towers Perrin to The Segal Group led to a review and change in actuarial methods, procedures, and assumptions. There were also several retirement benefit formula improvements

Moving from one actuary to another is an uncommon event The change in valuation methods and procedures between Towers Perrin and The Segal Group led to an increase in the UAAL of $107 million. 2004 is the only year you will find the "Changes in Methods and Procedures" line entry capturing the impact of that change in this document.

In addition to reflecting a change in methods and procedures, the 2004 valuation also includes a number of basic actuarial assumption changes regarding future salary increases, rates of withdrawal at termination, and rates of retirement. Those changes added an additional $580 million to the UAAL.

An improvement in benefits as Probation members adopted the 3%@50 formula, Orange County Sanitation District adopted 2.5%@55, and The County of Orange general members adopted 2.7%@55, increased the UAAL by $365 million.

A gain for the fund was the recognition that the current portfolio composition would earn an assumed rate of return of 7.75%, an increase over the previous 7.5%. That assumption that greater earnings would assist in offsetting costs lowered the UAAL by $215 million.



2005

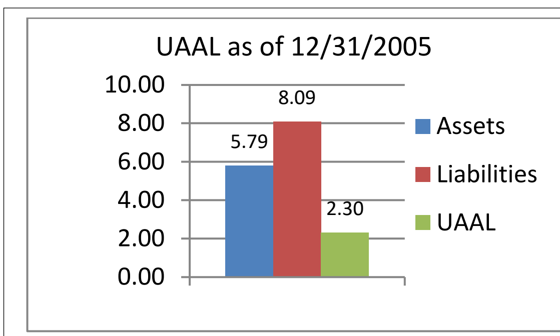
Development of UAAL for Year Ended December 31, 2005			
1.	**UAAL at beginning of year**		$2,158,151,000
2.	Total normal cost at middle of year		297,420,000
3.	Actual employer/member contributions		(345,111,000)
4.	Interest		165,409,000
5.	Expected UAAL		$2,275,869,000
6.	Actuarial (gain)/loss and other changes		
	a. Gain on investment	$(39,536,000)	
	b. Loss on salary increases	16,544,000	
	c. Change in methodology used to calculate benefits for deferred vested members	(15,335,000)	
	d. Other experience (gain)/loss	65,468,000	
	e. Benefit improvements		
	f. Change in actuarial assumptions		
	g. Total changes		27,141,000
7.	**UAAL at the end of the year**		$2,303,010,000

IMPACTING EVENTS

2005 is an example of how over the long term a defined benefit plan experiencing a period of rising costs can correct itself and move to a more stable norm. Though the UAAL rose just over $27 million in 2005, which was smaller as a percentage than the positive rise in the overall size of the portfolio, causing the funded status of the plan to improve from 70.85% at the start of the year, to 71.53% by the end of the year.

A positive return on the OCERS portfolio of 8.83%, exceeding the assumed earnings rate of 7.75%, allowed for application of a portion (after smoothing) of those investment gains to offset some larger losses where the economic and demographic experience through 2005 was negatively different from the actuarial assumptions.

A change in actuarial methodology used in calculating benefits for deferred vested members with reciprocal service led to a reduction in the UAAL of $15 million.



In billions

2006

Development of UAAL for Year Ended December 31, 2006			
1.	**UAAL at beginning of year**		$2,303,010,000
2.	Total normal cost at middle of year		300,072,000
3.	Actual employer/member contributions		(425,950,000)
4.	Interest		173,606,000
5.	Expected UAAL		$2,350,738,000
6.	Actuarial (gain)/loss and other changes		
	a. Gain on investment	$(112,612,000)	
	b. Loss on salary increases	21,679,000	
	c. Other experience (gain)/loss	39,155,000	
	d. Benefit improvements		
	e. Change in actuarial assumptions		
	f. Total changes		(51,778,000)
7.	**UAAL at the end of the year**		$2,298,960,000

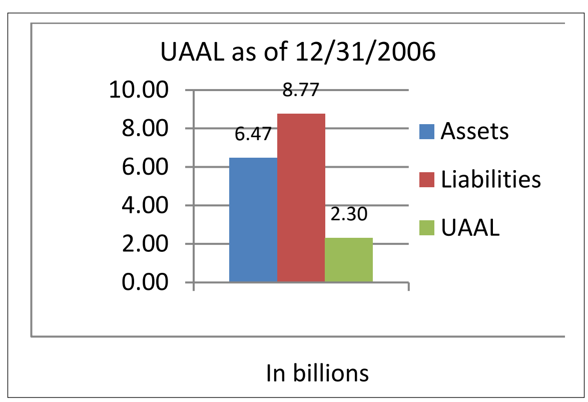
IMPACTING EVENTS

2006 is another example, like that of 2005, of how over the long term a defined benefit plan can correct itself and move to a more stable norm. In 2006 the UAAL dropped in relatively modest terms, by approximately $5 million. Overall however the funded status of the plan again improved, moving from 71.53% at the start of the year, to 73.77% by the end of the year. At the same time the aggregate employer contribution rate (the average of the County of Orange and all special districts combined) decreased from 24.27% of payroll to 24.01%. In turn, the aggregate employee's contribution rate similarly decreased from 10.39% of payroll to 10.36%.

Much of the positive movement in 2006 can be attributed to the 13.55% positive portfolio returns, exceeding the assumed earnings rate of 7.75%, allowing for application of a portion (after smoothing) of those investment gains towards the existing UAAL.

There were no benefit plan changes or any actuarial assumption changes in 2006.

The City of Rancho Santa Margarita did withdraw from OCERS in 2006 in order to move to CalPERS. There were no retirees with service earned with the City of Rancho Santa Margarita, so no long term pension liabilities were left behind with the OCERS plan upon the City's departure.



2007

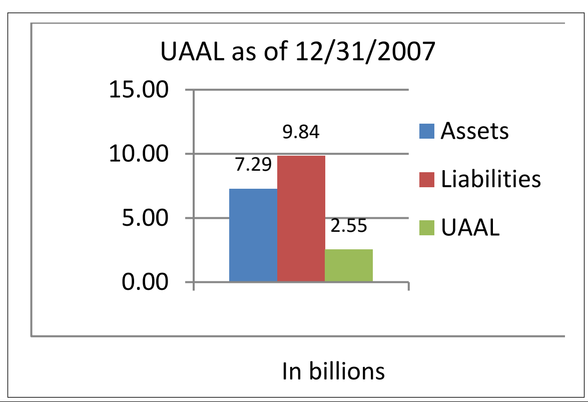
Development of UAAL for Year Ended December 31, 2007			
1.	**UAAL at beginning of year**		$2,298,960,000
2.	Total normal cost at middle of year		324,706,000
3.	Actual employer/member contributions		(486,212,000)
4.	Interest		171,911,000
5.	Expected UAAL		$2,309,365,000
6.	Actuarial (gain)/loss and other changes		
	a. Gain on investment	$(176,681,000)	
	b. Loss on salary increases	136,417,000	
	c. Other experience (gain)/loss	43,538,000	
	d. Benefit improvements		
	e. Change in actuarial assumptions	237,147,000	
	f. Total changes		240,421,000
7.	**UAAL at the end of the year**		$2,549,786,000

IMPACTING EVENTS

2007 saw a positive return on the OCERS portfolio of 10.75%, exceeding the assumed earnings rate of 7.75%, allowing for application of a portion (after smoothing) of those investment gains to offset some large changes in the actuarial assumptions.

Coming out of a triennial Actuarial Experience Study, analyzing the period of January 1, 2005 through December 31, 2007, a number of actuarial assumptions were changed in the areas of mortality, termination of membership, rates of retirement, salary growth, and annual payoffs, leading to an increase in the UAAL of approximately $237 million.

A benefit change for the Cemetery District, moving to a 2% of final average salary at age 55 for future service only, was too negligible to have an impact on plan funding.



2008

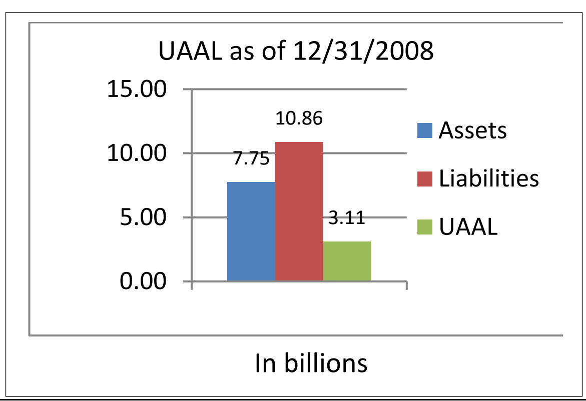
Development of UAAL for Year Ended December 31, 2008

1.	**UAAL at beginning of year**		$2,549,786,000
2.	Changes in methods and procedures		
3.	Total normal cost at middle of year		361,097,000
4.	Actual employer/member contributions		(532,656,000)
5.	Interest		190,961,000
6.	Expected UAAL		$2,569,188,000
7.	Actuarial (gain)/loss and other changes		
	a. Loss on investment	$257,752,000	
	b. Loss on salary increases	97,561,000	
	c. Loss on new retirements	54,911,000	
	d. Other experience (gain)/loss	17,159,000	
	e. Benefit improvements		
	f. Change in actuarial assumptions	115,764,000	
	g. Total changes		543,147,000
8.	**UAAL at the end of the year**		$3,112,335,000

IMPACTING EVENTS

2008 saw massive losses in the market by public pension systems across the country, with the Dow Jones Industrial Average (DJIA) down by -33.8%, the worst single year decline since the Great Depression. OCERS did remarkably well, declining by only -20.71%. Yet, even with smoothing of gains and losses in place, that decline led to a loss of $257.7 million that had to be recognized in the calculation of the 2008 UAAL.

Changes in service retirement rates for General members under improved benefit formulas required a change in actuarial assumptions, leading to an increase in the UAAL of $115.7 million.



2009

Development of UAAL for Year Ended December 31, 2009

1.	**UAAL at beginning of year**		$3,112,335,000
2.	**Inclusion of Additional Premium Pay Items**		228,051,000
3	**ADJUSTED UAAL for beginning of year**		3,340,386,000
4.	Changes in methods and procedures		
5.	Total normal cost at middle of year		396,025,000
6.	Actual employer/member contributions		(545,215,000)
7.	Interest		253,099,000
8.	Expected UAAL		$3,444,295,000
9.	Actuarial (gain)/loss and other changes		
	a. Loss on investment	$322,523,000	
	b. Gain on lower than expected salary increases	(77,858,000)	
	c. Other experience (gain)/loss	14,931,000	
	d. Benefit improvements		
	e. Change in actuarial assumptions		
	f. Total changes		259,596,000
8.	**UAAL at the end of the year**		$3,703,891,000

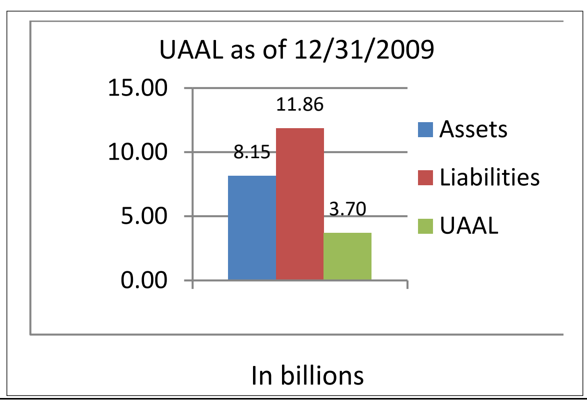
<u>IMPACTING EVENTS</u>

A major challenge for the 2009 valuation was the discovery, and inclusion of a pre-existing liability. The impact of "premium pay" [uniform allowance, bilingual requirements, etc.] on final compensation earnable had been underreported to the actuary since 2004. With proper reporting, the recognition of a liability that had been present, but unvalued, added an additional $228 million to the adjusted beginning UAAL figure for the year.

Despite increasing assets (on a market value) by over $1 billion in calendar year 2009, an 18.54% return, OCERS actually takes a loss on investments in 2009, in the amount of $322,523,000. Because OCERS smooths both gains and losses, only $120,722,000 of the gains in 2009 were recognized, while $444,350,000 of deferred losses had to be recognized in turn flowing out of the prior year 2008. Because there were some remaining gains to be recognized from prior years still being smoothed in as well, the actual calculation for the Loss on Investment in 2009 looked like this:

2005	$ 3,887,000
2006	64,826,000
2007	47,222,000
2008	(444,350,000)
2009	120,722,000
TOTAL	$(207,693,000)

The difference between the loss of $207.7 million from smoothing and the actual loss of $322.5 million recognized in the valuation was due to investment income that was not generated as the value of assets used in the valuation at the start of the year was actually more than the market value by about $1.5 billion.



2010

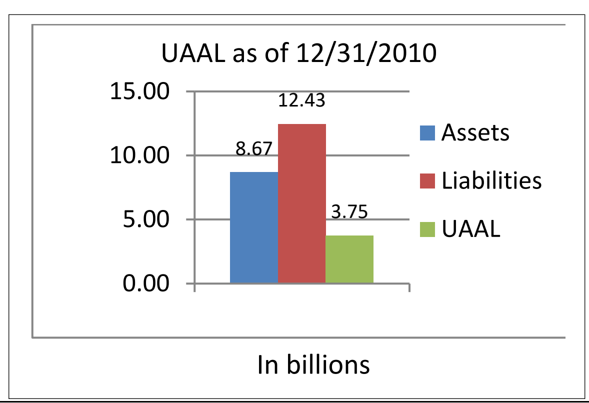
Development of UAAL for Year Ended December 31, 2010

1.	**UAAL at beginning of year**		$3,703,891,000
2.	Changes in methods and procedures		
3.	Total normal cost at middle of year		389,458,000
4.	Actual employer/member contributions		(565,242,000)
5.	Interest		280,240,000
6.	Expected UAAL		$3,808,347,000
7.	Actuarial (gain)/loss and other changes		
	a. Loss on investment	$224,044,000	
	b. Gain on lower than expected salary increases	(215,936,000)	
	c. Loss on new retirements		
	d. Other experience (gain)/loss	(63,174,000)	
	e. Benefit improvements		
	f. Change in actuarial assumptions		
	g. Total changes		(55,066,000)
8.	**UAAL at the end of the year**		$3,753,281,000

IMPACTING EVENTS

With continued economic stress, many of OCERS plan sponsors delayed filling vacancies, did not provide any cost-of-living adjustments to current salaries, and some even experienced wage reductions, combining to provide a large gain of more than $215 million in savings as future liabilities did not rise as quickly as the actuary assumed would be the case under normal market conditions.

Overall the system UAAL did increase by approximately $50 million, primarily due to lower than expected investment returns. While the system actually earned 11.74%, more than the assumed rate, due to smoothing, the ongoing recognition of losses coming out of 2008 continued to hold down any possible gain on investments. Still, this was an interesting year as even with a smoothed loss of $224 million, the funded ratio of the plan, that is total assets compared to total liabilities actually improved, moving from 68.77% the year prior to 69.79% at the end of 2010.



2011

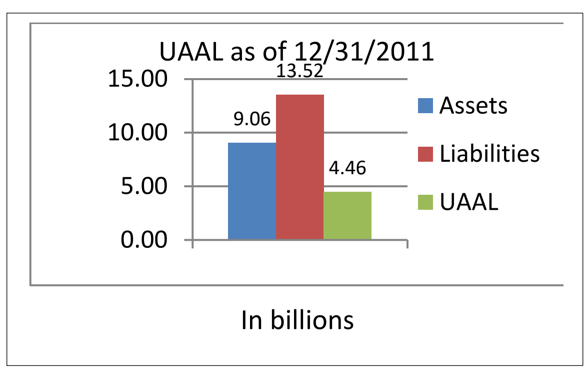
Development of UAAL for Year Ended December 31, 2011

1.	**UAAL at beginning of year**		$3,753,281,000
2.	Changes in methods and procedures		
3.	Total normal cost at middle of year		385,008,000
4.	Actual employer/member contributions		(598,271,000)
5.	Interest		282,615,000
6.	Expected UAAL		$3,822,633,000
7.	Actuarial (gain)/loss and other changes		
	a. Loss on investment	$388,935,000	
	b. Gain on lower than expected salary increases	(174,558,000)	
	c. Full-Time equivalent salary reporting adjustment for part time employees	73,448,000	
	d. Retiree continuance form code change	42,619,000	
	e. Reclassify some active members as deferred	(6,295,000)	
	f. Loss on new retirements		
	g. Other experience (gain)/loss	(52,001,000)	
	h. Benefit improvements		
	i. Change in actuarial assumptions	363,842,000	
	j. Total changes		635,990,000
8.	**UAAL at the end of the year**		$4,458,623,000

IMPACTING EVENTS

Every three years OCERS performs an experience study to determine how closely the actuary's assumptions are hewing to actual experience. The 2011 valuation was impacted by a number of assumption changes that flowed from the December 31, 2010 experience study, increasing the UAAL by $363,842,000. Those changes included (1) higher liability from recognition that General service retirees and all General and Safety beneficiaries were living longer than assumed, and (2) slightly higher individual salary increases, (3) offset to some degree by expectation of later service retirements, (4) fewer disability retirements, (5) more terminations and (6) slightly lower annual payoffs.

A very important change in an economic assumption also occurred, with the introduction of a 0.25% across the Board salary increase assumption. Though in the short term many OCERS plan sponsors have continued with layoffs, delayed hires, and reductions in overall salary payroll, the long term projection by the actuary is that salaries will increase. With the addition of this assumption, there is now a consideration that over long periods of time wage inflation will be higher than price inflation by 0.25% per year.



A major IT software conversion project also led OCERS to further refine the data reported to the actuary. Three of those data refinements had an impact on this year's UAAL as well:

Determining that full-time equivalent salaries (calculated by adjusting actual pensionable salaries with earnable salaries during those pay periods when the member is not working full-time) would more accurately reflect likely final compensation used to determine retirement benefits. That clarification added $73,448,000.

Confirming those retirees who have spouses eligible for a continued benefit following the member's death added $42,619,000.

Confirming that some members who had been classified as active and therefore still accruing a liability, were in fact deferred and had reduced the UAAL by $6,295,000.

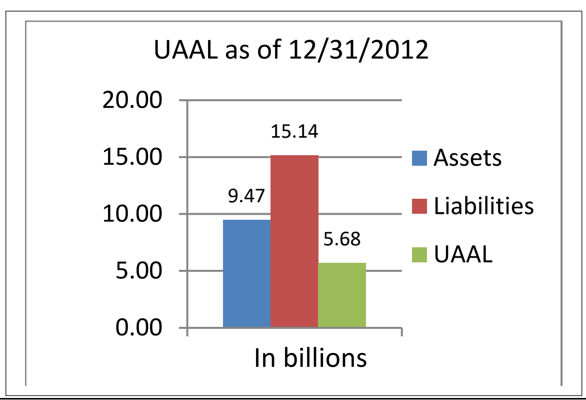
2012

Development of UAAL for Year Ended December 31, 2012

1.	**UAAL at beginning of year**		$4,458,623,000
2.	Changes in methods and procedures		
3.	Total normal cost at middle of year		410,258,000
4.	Actual employer/member contributions		(627,964,000)
5.	Interest		337,107,000
6.	Expected UAAL		$4,578,024,000
7.	Actuarial (gain)/loss and other changes		
	a. Loss on investment	$387,808,000	
	b. Gain on lower than expected salary increases	(244,750,000)	
	c. Loss on new retirements		
	d. Other experience (gain)/loss	19,979,000	
	e. Benefit improvements		
	f. Change in actuarial assumptions	934,619,000	
	g. Total changes		1,097,656,000
8.	**UAAL at the end of the year**		$5,675,680,000

IMPACTING EVENTS

The 2012 valuation was impacted by economic assumption changes that flowed from the December 31, 2012 Review of Economic Actuarial Assumptions, increasing the UAAL by $934,619,000. Those changes included (1) decreasing the net investment return assumption from 7.75% per annum to 7.25% per annum, (2) decreasing the inflation assumption from 3.50% per annum to 3.25% per annum, and (3) increasing the current real “across the board” salary increase assumption from 0.25% to 0.50%. The $934,619,000 fully represents the effect of the change in earnings assumptions, as the cost impact of the other two (decrease inflation, increase salary assumptions) had a canceling effect on one another.



2013

Development of UAAL for Year Ended December 31, 2013

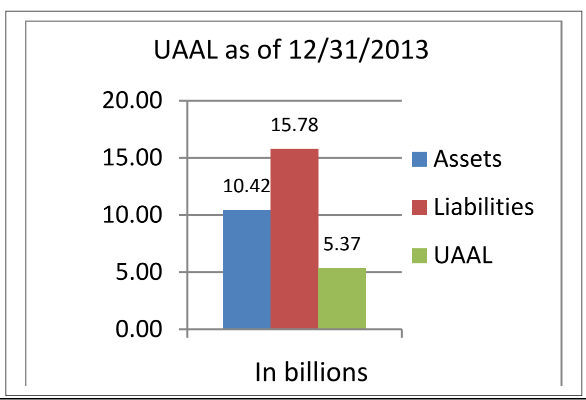
1.	**UAAL at beginning of year**		$5,675,680,000
2.	Changes in methods and procedures		
3.	Total normal cost at middle of year		457,762,000
4.	Actual employer/member contributions		(667,788,000)
5.	Interest		403,873,000
6.	Expected UAAL		$5,869,527,000
7.	Actuarial (gain)/loss and other changes		
	a. Gain on investment	$(176,930,000)	
	b. Gain on lower than expected salary increases	(294,326,000)	
	c. Loss on new retirements		
	d. Other experience (gain)/loss	(30,354,000)	
	e. Benefit improvements		
	f. Change in actuarial assumptions		
	g. Total changes		(501,610,000)
8.	**UAAL at the end of the year**		$5,367,917,000

IMPACTING EVENTS

The UAAL decreased in 2013 to $5,367,917,000. The decrease in unfunded liability is mainly due to higher than expected investment returns of $176 million (after smoothing), and lower than expected salary increases saving another $294 million. When salary growth is less than anticipated there is less payroll as a basis for spreading cost, but more importantly, for the UAAL, that lower salary growth means lower future earned benefit liabilities.

Through the end of 2017, there is an additional $262 million in deferred investment gains still to be recognized, which represents about 2% of the market value of assets. As noted in the introduction to this study, delaying the full recognition of such gains (or losses) allows for more stability in contribution rates. Were the full $262 million in deferred gains to be immediately recognized, OCERS funded ratio would rise from 65.99% to 67.65%.

Beginning with the December 31, 2013 valuation, OCERS began to include in the valuation report the decrease (or increase) in the UAAL by employer rate group (as found on pages 128 and 129 of the 2013 valuation). As of December 31, 2013, $3,872,000,000 of the UAAL is charged to general member service while the remaining $1,495,000,000 is related to safety member service.



2014

Development of UAAL for Year Ended December 31, 2014

1.	**UAAL at beginning of year**		$5,367,917,000
2.	Changes in methods and procedures		
3.	Total normal cost at middle of year		454,221,000
4.	Expected employer/member contributions		(829,361,000)
5.	Interest		376,931,000
6.	Expected UAAL		$5,369,708,000
7.	Actuarial (gain)/loss and other changes		
	a. Gain from add'l UAAL contributions	$(151,485,000)	
	b. Loss from actual contributions less than expected	89,407,000	
	c. Gain from investment return	(9,570,000)	
	d. Gain from lower than expected salary increases	(125,746,000)	
	e. Gain from lower than expected COLA increases	(153,484,000)	
	f. Other experience (gain)/loss	66,554,000	
	g. Benefit improvements		
	h. Change in actuarial assumptions	(122,171,000)	
	i. Total changes		(406,495,000)
8.	**UAAL at the end of the year**		$4,963,213,000

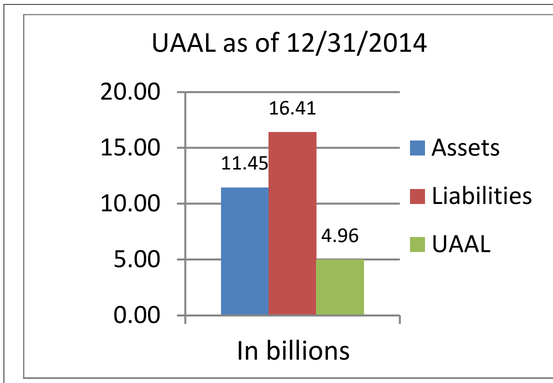
IMPACTING EVENTS

As in 2013, the UAAL once again decreased in 2014 to $4,963,213,000. A small investment gain of $9,570,000 was attributed to the fund recognizing prior year gains despite actually earning less than the assumed earnings rate of 7.25%. Additional factors contributing to the decrease in the UAAL included lower than expected salary increases, saving $125 million - when salary growth is less than anticipated there is less payroll as a basis for spreading cost, but more importantly, for the UAAL, that lower salary growth means lower future earned benefit liabilities. A $153,484,000 gain accrued due to low inflation as only 1.0% was statutorily granted in 2014 for retiree COLAs, despite the actuary having assumed a possible 3% (the maximum allowable) COLA when setting contribution rates.

The loss of $66,554,000 noted in the general category of "other experience" was primarily driven by more retirements than had been anticipated.

Beginning with the December 31, 2013 valuation, OCERS began to include in the valuation report the decrease (or increase) in the UAAL by employer rate group (as found on pages 139 and 140 of the 2014 valuation). As of December 31, 2014, $3,365,137,000 of the UAAL accrued from general member service while the remaining $1,598,076,000 accrued from safety member service.

A series of actuarial assumption changes led to a $122,701,000 reduction in the UAAL, with a net change to mortality (improved for safety members, but offset by a reduction among general members) comprising approximately $33,000,000 of that reduction.



2015

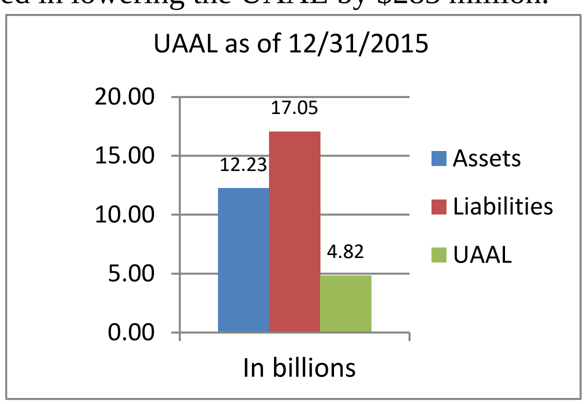
Development of UAAL for Year Ended December 31, 2015

1.	**UAAL at beginning of year**		$4,963,213,000
2.	Changes in methods and procedures		
3.	Total normal cost at middle of year		455,105,000
4.	Expected employer/member contributions		(822,863,000)
5.	Interest		347,804,000
6.	Expected UAAL		$4,943,259,000
7.	Actuarial (gain)/loss and other changes		
	a. Gain from add'l UAAL contributions	($69,852,000)	
	b. Loss from actual contributions less than expected	44,960,000	
	c. Loss from investment return	229,138,000	
	e. Gain from lower than expected COLA increases	(119,367,000)	
	f. Gain from lower than expected salary increases	(282,696,000)	
	g. Loss from higher than expected retirement experience increases	62,070,000	
	h. Other experience (gain)/loss	14,836,000	
	i. Total changes		(120,911,000)
8.	**UAAL at the end of the year**		$4,822,348,000

IMPACTING EVENTS

For the third year in a row, OCERS UAAL has decreased at a faster rate than would be expected if all assumptions were met. The UAAL at December 31, 2015 was $140,865 million lower than at the end of 2014 despite having net investment returns of -0.45%. Due to the smoothing of investment gains/losses over five years, the UAAL increased in 2015 by $229 million for earning less than assumed, but a deferred loss on investments of $680 million will be added to the UAAL over the next four years.

The current year's recognition of investment losses were offset by other gains which netted to a lower UAAL at the end of the year. The primary contributing factor for the decrease is actual salary increases being lower than assumed. As discussed in previous years, when salary growth is less than anticipated there is less payroll as a basis for spreading cost, but more importantly, for the UAAL, that lower salary growth means lower future earned benefit liabilities. In 2015, lower than expected salary growth resulted in lowering the UAAL by $283 million. Another factor that contributed to the decline in UAAL was having lower than expected COLA increases in benefit payments. Low inflation is still being experienced and as such, the Board granted retirees a 1.5% COLA in 2015 instead of the assumed maximum allowable COLA of 3%. This resulted in a reduction in the UAAL of $119 million. Lastly, additional UAAL contributions were made by OCFA and OC Sanitation District which contributed to a $70 million decrease in UAAL.



2016

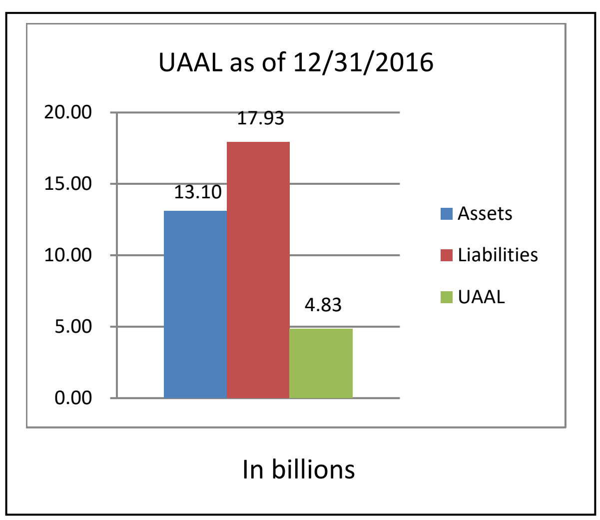
Development of UAAL for Year Ended December 31, 2016

1.	**UAAL at beginning of year**		$4,822,348,000
2.	Total normal cost at middle of year		442,698,000
3.	Expected employer/member contributions		(807,757,000)
4.	Interest		330,501,000
5.	Expected UAAL		$4,787,284,000
6.	Actuarial (gain)/loss and other changes		
	a. Gain from add'l UAAL contributions	($13,654,000)	
	b. Loss from actual contributions less than expected	5,142,000	
	c. Loss from investment return	113,103,000	
	d. Gain from lower than expected COLA increases	(186,039,000)	
	e. Loss from higher than expected salary increases	204,603,000	
	f. Loss from higher than expected retirement experience increases		
	g. Other experience (gain)/loss	12,631,000	
	h. Total changes		43,199,000
7.	**UAAL at the end of the year**		$4,830,483,000

IMPACTING EVENTS

Following three years of successive declines in the amount of OCERS UAAL, the December 31, 2016 valuation found the UAAL grew slightly by approximately $8 million in the last year. The UAAL growth occurred despite the portfolio earning 8.7% or $1,010 million which was higher than the assumed rate of return of 7.25% or $840 million. The resulting $170 million gain on investments for the current year, however, is not recognized immediately. Instead, it is "smoothed" into the actuarial valuation evenly over five years (20% each year). Smoothing of investment gains/losses is one of the actuarial levers used by pension systems to help reduce "cost shocks" by averaging investment performance over a period of time. By utilizing a five year smoothing method for investment gains/losses, plan sponsors are not faced with volatile contribution rates and they are able to budget for cost impacts due to investment performance over time.

The greater than assumed earnings achieved in 2016 does play a positive role in controlling system costs, even with the rise in the UAAL for the current year. By recognizing 20% of the $170 million in gains, or $34 million, in the current year, the amount of deferred investment losses from prior years was reduced. This will continue to be the case for the next four years as the remaining investment gains from 2016 are recognized in future valuations. For example, in the 2015 valuation, there were $169 million of net deferred losses related to investment performance between 2012 and 2015 that were scheduled to be recognized in the 2017 valuation.



2016 Continued

Now, when adding in the smoothed gains from 2016, the scheduled net deferred losses to be recognized in the 2017 valuation are reduced to $135 million, a reduction of $34 million.

The future reduction in the recognition of deferred losses for 2017 through 2020 as a result of the 2016 investment gains can be seen when comparing the schedule on page 5 of the 2016 valuation with page 5 of the 2015 valuation.

The schedule above outlines many of the additional events that ultimately impacted the change in the UAAL as of December 31, 2016 when compared to the prior year.

Some employers made additional contributions to pay down their UAAL, resulting in the $13 million reduction. (line 6a)

Despite having earned $170 million more on our investments in 2016 than anticipated, the total smoothed gains and losses over the past five years led to the $113 million total smoothed loss that was recognized this year. (line 6c)

Inflation continues to run below the 3% annual cost of living allowance (COLA) assumption that is built into the valuation of retiree benefits. A 2% COLA was granted to retirees in 2016, which from an actuarial perspective reduced the UAAL by $186 million. The $186 million reduction represents the additional benefits related to COLA that would have otherwise been paid had inflation reached the assumed rate of 3%. (line 6d)

Finally, after having lagged assumptions for several years, salary increases in 2016 began to catch up in a significant way, exceeding the annual assumed projection of salary increases and adding an additional $204 million to the UAAL. (line 6e)

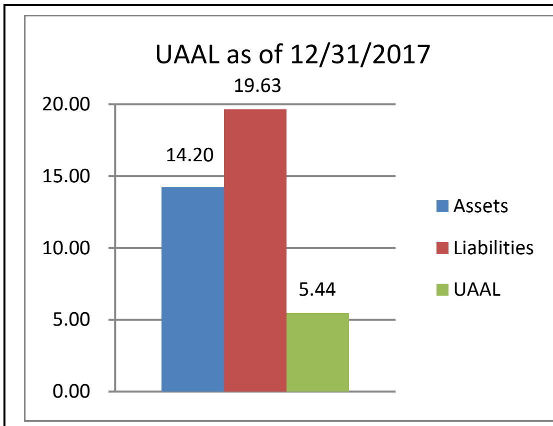
2017

Development of UAAL for Year Ended December 31, 2017

1.	**UAAL at beginning of year**		$4,830,483,000
2.	Additional UAAL Contributions from Children and Families and Law Library to pay-off UAAL		(3,800,000)
3.	UAAL at beginning of year after reflecting additional UAAL contributions from Children and Families and Law Library to pay-off UAAL		4,826,683,000
4.	Total normal cost at middle of year		468,525,000
5.	Expected employer and member contributions		(854,874,000)
6.	Interest		336,342,000
7.	Expected UAAL		4,776,676,000
8.	Actuarial (gain)/loss and other changes:		4,776,676,000
	a. Gain from additional UAAL	(36,348,000)	
	b. Loss from actual contributions less than expected	37,726,000	
	c. Gain from investment return	(24,401,000)	
	d. Gain from lower than expected COLA increases	(95,796,000)	
	e. Gain from higher than expected salary increases	(66,399,000)	
	f. Other experience loss	17,348,000	
	g. Gain from asset transfer from O.C. Sanitation District UAAL Deferred Account	(24,042,000)	
	h. Changes in actuarial assumptions	853,538,000	
	Total Changes		661,626,000
9.	**UAAL at the end of the year**		$5,438,302,000

IMPACTING EVENTS

2017 is an excellent example of the challenges that any public pension system faces in the short term. The OCERS investment portfolio earned more than double that had been assumed, returning 14.74% or approximately $1.9 billion, and yet despite that the UAAL increased by nearly $608 million, decreasing the funded level of the system on a valuation value of assets basis from 73.1% to 72.3%. Despite those great earnings, two things were balancing out those great returns, and Items 8(c) and (h) combined tell the story of what occurred:



In billions

Item 8 (c) shows that even with all those additional dollars flowing into the pension investment portfolio, only $24,401,000 was available to help lower the UAAL in the current valuation. First, that is because the system only recognizes one-fifth of any investment gain or loss in a given year, in a process called "smoothing" to help ensure our plan sponsors don't face the volatility of wildly fluctuating contribution rates which would be the case were the entire investment gain or loss be immediately included with each year's valuation. Second, the system had losses from prior years that were still being recognized or "smoothed" and offset a portion of those gains.

Still, even $24 million is a reduction to the UAAL. Now we move to Item 8(h) that tells the rest of the story.

Item 8(h) shows that the impact of updating the assumptions the OCERS Board of Trustees puts in place to help guide how much has to be saved in order to have the resources necessary to meet the pension promises made and those assumptions must be updated from time to time to reflect actual experience, and changing those assumptions can have a major financial impact. In 2017 the OCERS Board of Trustees recognized two primary challenges to the then current assumptions – the first and most impactful of those was mortality, our members are simply living longer than had been assumed in earlier years. And by living longer, the system needs more dollars than earlier anticipated in order to pay those additional benefits. Second, the financial markets have changed over time, especially after the Great Recession, and the recognition that finding solid, risk balanced investment opportunities would be challenging in the coming years, led the Board of Trustees to lower what it assumes it will earn on the investment portfolio from 7.25% to 7.0%.

The change in the mortality assumption alone added approximately $753 million to the UAAL. The change in the earnings assumption, offset by a reduction in the inflation assumption (from 3.00% to 2.75%) together with some other more minor changes to other assumptions such as the cost of living, added nearly $100 million more. Taken all together, the changes to the actuarial assumptions add more than $853 million to the UAAL.

A couple of other numbers to take note of –

Item 8(a) reflects the growing number of OCERS plan sponsors who have paid in additional dollars to the fund in order to lessen the cost of any UAAL attached to their particular employees. With OCERS now charging 7 cents in interest for every dollar in UAAL attributed to an employer, paying that liability down faster than under the current 20-year amortization plan can make a lot of financial sense.

Item 8(b) reflects the interest cost of the 18-month delay from the time that OCERS' actuary completes an annual valuation, and the date that an employer and members must first begin paying the increased contribution rate. A necessary expense to allow employers the time to plan and budget for salary and pension expenses. Also, there is a contribution loss when the employer's annual payroll grows at less than what is assumed in the valuation.

Item 8(d) reflects the savings gained by the fact that with lower inflation, OCERS only paid a 2% cost-of-living adjustment to our retired member's benefits, though we actuarially budget for a 3% COLA that is possible under OCERS plan provisions."

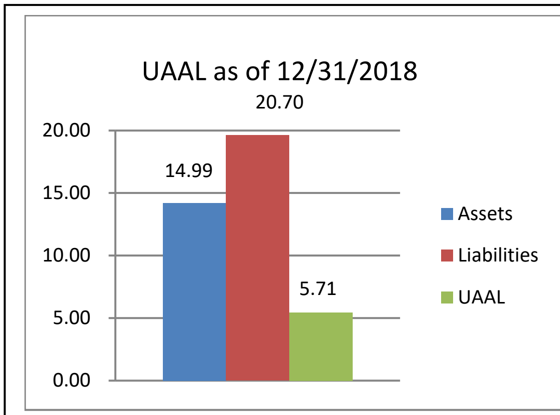
2018

Development of UAAL for Year Ended December 31, 2018

1.	**UAAL at beginning of year**		$5,438,302,000
2.	Total Normal Cost at middle of the year		508,322,000
3.	Expected employer and member contributions		(961,688,000)
4.	Interest		372,542,000
5.	Expected Unfunded Accrued Liability at end of year		5,357,478,000
6.	Changes due to:		
	a. Investment losses (on value of assets)	255,908,000	
	b. Difference in actual versus expected contributions (including loss from phase-in)	120,939,000	
	c. Additional UAAL payments from Cypress Parks and Recreation and OCFA and anticipated payments from DOE and U.C.I.	(27,674,000)	
	d. Transfer from O.C. Sanitation District UAAL Deferred Account	(14,589,000)	
	e. Difference in actual versus expected salary increases	(71,908,000)	
	f. Difference in actual versus expected COLA increases	24,279,000	
	g. Other experience loss	64,496,000	
	Total Changes		351,451,000
	UAAL at the end of the year		$5,708,929,000

IMPACTING EVENTS

Comparing the earnings of the OCERS investment portfolio in 2017 (14.79%) to the losses incurred in 2018 (-2.46%) is an instructive snapshot of the type of market volatility that pension funds must plan for and adjust over the decades and decades of both the service and eventual retirement of our members. A swing in contribution rates based just on the returns in 2017 and losses in 2018 would make planning and budgeting for this important component of our participating employers salary benefit package extremely difficult.



In billions

Such volatility demonstrates why OCERS staff routinely encourage our members and other stakeholders to not focus unduly on short term investment results, but instead look to short term investment results, but instead look to the long term fund accomplishments. In addition, there are tools used by actuaries at the Board's approval to assist in appropriate budgeting for pension expenses as they occur in a volatile market.

"Smoothing" is one such tool. By spreading the differences between actual market returns and OCERS expected market returns (which is presently 7% per year) over a five year period, the impact of year-over-year short term volatility is dampened. Reflected in item 6(a) we see the actuary recognizing one-fifth of the large loss suffered in 2018, offsetting part of that loss by one-fifth of the gains made in 2017, as well as portions of gains and losses still remaining to be recognized from 2016, 2015 and the final one-fifth from 2014.

Taken as a whole, OCERS still has a net deferred investment loss of $644.7 million to be smoothed over the coming four years. Again demonstrating the volatility that comes naturally from any investment plan, OCERS by contrast had $455.4 million in net deferred investment gains at the end of 2017.

Another tool that has been used by the actuary, at the direction of the OCERS Board of Retirement, is to phase in, over a three year period the cost impact of implementing more conservative plan assumptions. When the Board concurred in 2017 with the actuary's findings that members are living longer, and therefore, our assumptions regarding mortality had to be lengthened, there was an immediate cost impact. The Board, however, chose to assist our participating employers in better planning and budgeting for that increase by directing the cost to be phased in over a three year period. That modified cost impact is partially reflected in item 6(b).

Other items that had an impact on the UAAL include:

Item 6(e), while salaries did not grow as quickly as assumed, which would cause a decrease in expected contributions, greater savings were accrued because liabilities flowing from those assumed salary increases never accrued. That led to an actual reduction in the UAAL of nearly $72 million.

Item 6(f) COLA for 2018 came in at 3% which was greater than the assumed 2.7% COLA amount adding an additional $24,279,000.00 to the UAAL.

Item 6(g) covers a number of impacts such as member retiring earlier than assumed, more deaths than assumed, and other such variances.

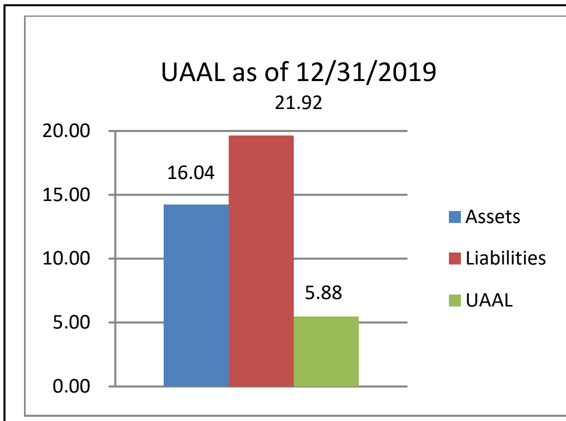
2019

Development of UAAL for Year Ended December 31, 2019

1.	**UAAL at beginning of year**		$5,708,929,000
2.	Total Normal Cost at middle of the year		516,408,000
3a.	Expected employer and member contributions		(1,002,599,000)
b.	Additional UAAL contributions from O.C. Sanitation District and TCA		(20,143,000)
4.	Interest		387,158,000
5.	Expected Unfunded Accrued Liability at end of year		$5,589,753,000
6.	Changes due to:		
	a. Investment losses (on value of assets)	$50,514,000	
	b. Difference in actual versus expected contributions (including loss from phase-in)	125,415,000	
	c. Additional UAAL payments from Vector Control and O.C.F.A. and anticipated payments from DOE and U.C.I.	(23,327,000)	
	d. Transfer from O.C. Sanitation District UAAL Deferred Account	(18,631,000)	
	e. Difference in actual versus expected salary increases	(52,716,000)	
	f. Difference in actual versus expected COLA increases	131,220,000	
	g. Other experience loss	77,633,000	
	Total Changes		$290,108,000
	UAAL at the end of the year		$5,879,861,000

IMPACTING EVENTS

On a market value basis, 2019 was a very strong year as the actual market return of 14.79% was well in excess of the 7.00% assumed by the actuary in the valuation. However, on a smoothed basis, a portion of the superior return from 2019 was utilized to offset the deferred investment losses carried over from the 2018 valuation which resulted in the system recognizing a net $50.5 million in investment losses in this year's valuation.



In billions

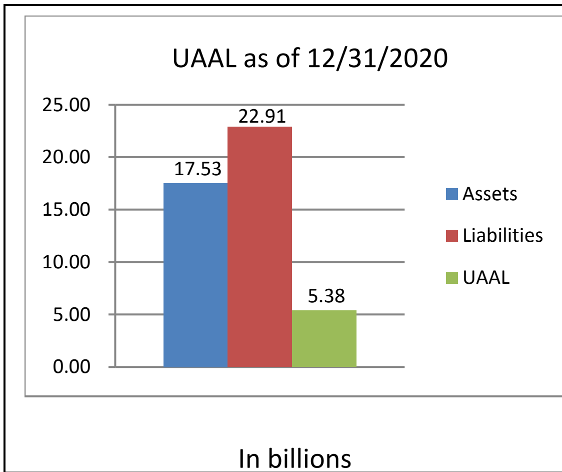
However, the system has built up a sizeable $479.2 million in deferred investment gains which can be used to either mitigate investment losses after December 31, 2019 and/or to offset other increases in UAAL.

Besides investment losses on a smoothed basis, the system has $131.2 million in losses from higher actual versus expected COLA increases paid to retirees. Even though a maximum COLA of up to 3% was adopted by the plan sponsors for all retirees, only a 2.75% COLA was assumed in the valuation based on a lower expectation of future change in consumer prices by the actuary.

2020

Development of UAAL for Year Ended December 31, 2020

1.	**UAAL at beginning of year**		$5,879,861,000
2.	Normal Cost at middle of year		529,849,000
3.	Expected employer and member contributions		(1,050,381,000)
4.	Interest		397,256,000
5.	Expected UAAL at end of year		$5,756,585,000
6.	Changes due to:		
	a. Investment gains (after smoothing)	$(370,675,000)	
	b. Additional UAAL contributions from OCFA and anticipated payments from DOE and UCI	(25,295,000)	
	c. Difference in actual versus expected contributions	110,129,000	
	d. Difference in actual versus expected salary increases	(62,291,000)	
	e. Effect of higher than expected COLA increases in 2020	34,044,000	
	f. Effect of lower than expected COLA increases in 2021	(157,888,000)	
	g. Changes in actuarial assumptions	24,273,000	
	h. Effect of reallocating present value benefits between NC and AAL	(37,783,000)	
	i. Other experience loss	108,759,000	
	Total Changes		$(376,727,000
	UAAL at the end of the year		$5,379,858,000



IMPACTING EVENTS

With a rate of return on the Market Value of Assets of 12.01% for calendar year 2020, the OCERS funding position continues to improve.

Because of the actuarial practice of smoothing investment gains and losses over a five year period, OCERS' actuary only credited OCERS with a rate of return of 9.31% on the Valuation Value of Assets at the end of 2020 including the recognition of prior year investment gains and losses, against an expected return of 7%. With a number of recent years, including 2020 exceeding the OCERS expected return of 7%, the fund now has a positive "unrecognized return" of $969+ million. That is a large cushion of positive dollars waiting to be blended into the “actuarial value” of the OCERS fund over the next four years.

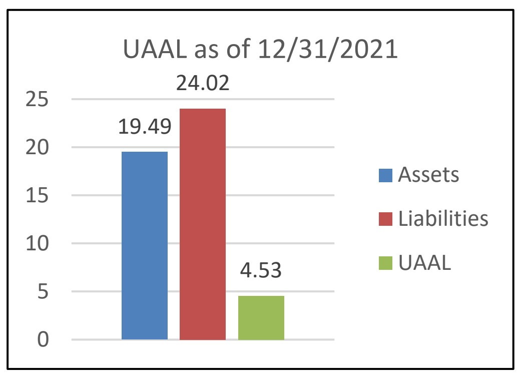
That cushion will play an important part in helping OCERS reach a projected fully funded status - that is a payoff of all unfunded liabilities, by the end of calendar year 2032. That cushion will play an important part in helping OCERS reach a projected fully funded status - that is a payoff of all unfunded liabilities, by the end of calendar year 2032, if all the actuarial assumptions were to be met. Further, if the system were to earn 14% instead of 7% in 2021, it will allow OCERS to reach full funding two years earlier.

Another positive as noted in the list of impactful events above, was the payment of more than $25 million in additional dollars by an OCERS participating employer to speed the payoff of their unfunded liability, a sound fiscal decision similar to the efforts taken by a number of OCERS’ participating employers over the past several years. The Orange County Fire Authority (OCFA) has been paying additional dollars since 2013 when the OCFA Board approved an “Expedited Pension UAAL Payment Plan.” Since that time, OCFA has paid a total of $142.5 million in additional payments toward its UAAL, and has saved well in excess of $46.8 million in interest charges through the end of 2021. At this rate, depending upon whether OCFA continues this program of accelerated funding, OCFA will have paid off its unfunded liability (UAAL) sometime between 2025 and 2027.

2021

Development of UAAL for Year Ended December 31, 2021

1.	**UAAL at beginning of year**		$5,379,858,000
2.	Normal Cost at middle of year		528,397,000
3.	Expected employer and member contributions		(1,046,511,000)
4.	Interest		360,203,000
5.	Expected UAAL at end of year		$5,221,947,000
6.	Changes due to:		
	a. Difference in actual versus expected contributions	$56,468,000	
	b. Additional UAAL contributions from OCFA and SJC, and anticipated payments from DOE and UCI	(25,536,000)	
	c. Investment gains (after smoothing)	(767,019,000)	
	d. Difference in actual versus expected salary increases	(87,162,000)	
	e. Higher than expected COLA increases in 2022	148,830,000	
	f. Other gains	(20,216,000)	
	Total Changes		$(694,635,000)
7.	**UAAL at the end of the year**		$4,527,312,000



IMPACTING EVENTS

There was significant reduction in the UAAL in 2021, dropping by nearly $700 million. Three primary events influenced the amount of that reduction as reflected in the table on this page.

First and foremost, an investment gain of $767 million was actuarially recognized. While the OCERS portfolio actually earned more than that, recall that we “smooth” gains and losses over five years, with only one-fifth of 2021’s gains in particular being applied, as well as gains and losses from the prior four years.

2021 saw high inflation, so the Cost of Living Adjustment (COLA) for the year came in at 3%. Our actuarial projections had expected 2.75%. That additional percentage of COLA added nearly $149 million to the UAAL. OCERS reviews it’s assumptions every three years. The next “Triennial” study which will look at this assumption and others will occur next year, in the summer of 2023.

Finally, it appears our employers delayed hiring of new staff in 2021, leading to slower growth in salaries than had been projected. Interestingly that slow growth had both positive and negative impacts on the overall UAAL. Lower than expected salaries had the negative impact of lowering the amount of contributions paid, which increased the UAAL by more than $56 million. At the same time however, those lower salaries meant total future pension liabilities did not grow as fast as expected, reducing the UAAL by more than $87 million.