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TO: PUBLIC PENSION WORKING GROUP**FROM:** LRC STAFF**DATE:** JANUARY 24, 2019**RE:** SOURCES OF UNFUNDED LIABILITY

During the January 15, 2019 meeting of the Public Pension Working Group, LRC staff were asked to provide information regarding the sources of unfunded liabilities across the TRS, KERS Non-hazardous, and CERS non-hazardous systems that had been reported over time. Below is a summary of information currently available:

Teacher Retirement System:

Since 2013, three different studies have been conducted to outline the sources of unfunded liabilities of the TRS pension plan. Each cover slightly different time frames of review and below is a summary of each:

1. December 2013 - TRS Response to Interim Joint Committee on State Government

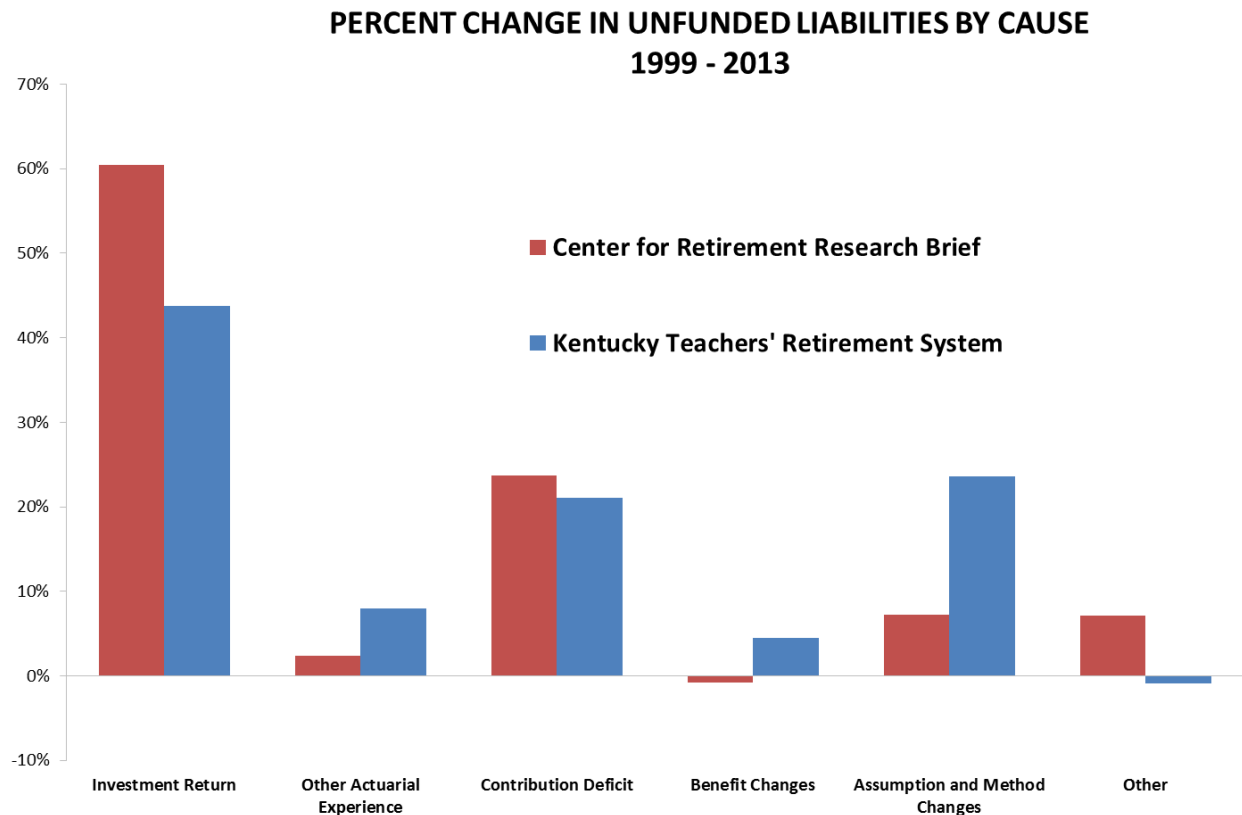
In response to a request made during the November 23 meeting, TRS provided an historical attribution of the unfunded actuarial liability for TRS during the period of FY2008-2013. Below is a summary of the response:

	UAL, Beginning	Investment Performance	Ad Hoc COLA/ Benefits	Methods/ Assumptions	Contribution Shortfall	Medical Fund Allocation	phics & Salary	Other	UAL, Ending
2008	\$5,970.0	\$668.6	\$0.0	\$0.0	\$0.0	\$100.9	\$251.4	\$148.1	\$7,139.0
2009	7,139.0	1,024.1	0.0	0.0	60.5	101.2	5.2	184.4	\$8,514.4
2010	8,514.4	1,026.3	0.0	0.0	82.3	(389.3)	(2.9)	262.2	\$9,493.0
2011	9,493.0	521.2	0.0	743.1	121.5	8.4	(85.8)	259.2	\$11,060.6
2012	11,060.6	740.5	0.0	(29.6)	208.6	8.5	(4.5)	298.4	\$12,282.5
2013	12,282.5	146.6	0.0	920.7	261.0	(6.2)	(110.0)	359.9	\$13,854.5
Total Increase		\$4,127.3	\$0.0	\$1,634.2	\$733.9	(\$176.5)	\$53.4	\$1,512.2	\$7,884.5

A copy of the complete response is attached to this memo (Attachment #1).

2. August 2015 – KTRS Funding Work Group Actuary

In 2015, the KTRS Funding Work Group hired an external actuary, Flick Fornia, who provide an historical attribution of the unfunded liability for TRS during the period of FY1999-2013. Below is a chart of the results:



A copy of Mr. Fornia's slide outlining the sources of unfunded liabilities is attached to the memo (Attachment #2), while a full copy of the presentation can be found at the following link:

https://trs.ky.gov/wp-content/uploads/2015/12/20150828_PTA.pdf

3. May 2017 – PFM Pension Performance and Best Practices Analysis

In 2017, Report #2 of the Pension Performance and Best Practices Analysis conducted by PFM and PRM Consulting Group, provided an historical attribution of the unfunded liability growth from FY2005-2016. Below is a summary of results:

TRS						
Factors Increasing the Unfunded Pension Liability 06.30.2005 to 06.30.2016						
Actuarial Backloading	Assumption Changes	Plan Experience	Investment Performance	Funding Shortfalls	COLAs	Total
\$3,278	\$1,958	\$232	\$2,940	\$1,588	\$0	\$9,996

The executive summary of Report #2, which includes a summary of the sources of unfunded liabilities is attached to the memo (Attachment #3), while a full copy of the presentation can be found at the following link: <https://pensions.ky.gov/Documents/2017%2005%2022%20-%20Report%202%20FINAL%205.22.17%20-%20Historical%20and%20Current%20Assessment.pdf>

Kentucky Retirement System Plans (KERS Non-Haz/CERS Non-Haz):

Since 2012, a review of the sources of unfunded liabilities of the KERS and CERS Non-hazardous pension plans has been conducted two times. Both cover slightly different time frames of review and below is a summary of each:

1. 2012 Task Force on Public Pensions and 2015 Update

During the 2012 Task Force on Public Pension, KRS staff provided a historical attribution of the unfunded liability for KERS and CERS during the period of FY2006-2011 as calculated by their actuary. In addition, after completion of the 2015 annual valuation, KRS staff provided an update to include the period of FY2011-2015. Below is a summary of the results:

KERS Non-Hazardous								
	UAL, Begin	Investment Performance	COLA/ Benefits	Methods/ Assumptions	Contribution Shortfall	Demographics & Salary Exp	Other	UAL, Ending
2006	\$2,000	\$186	\$251	\$702	\$34	\$195	\$232	\$3,601
2007	3,601	(55)	212	0	100	84	147	4,089
2008	4,089	12	245	0	179	128	158	4,811
2009	4,811	308	160	(12)	198	131	269	5,864
2010	5,864	324	102	0	216	(37)	326	6,795
2011	6,795	243	113	0	221	(129)	212	7,455
2012	7,455	325	117	0	236	(53)	180	8,260
2013	8,260	166	0	0	249	(18)	94	8,751
2014	8,751	(129)	0	0	224	68	212	9,126
2015	9,126	(57)	0	695	0	27	218	10,009
Total		\$1,323	\$1,200	\$1,385	\$1,657	\$396	\$2,048	\$8,009

CERS Non-Hazardous								
	UAL, Begin	Investment Performance	COLA/ Benefits	Methods/ Assumptions	Contribution Shortfall	Demographics & Salary Exp	Other	UAL, Ending
2006	\$326	\$150	\$135	\$313	\$0	\$41	\$51	\$1,017
2007	1,017	(53)	118	0	0	60	51	1,192
2008	1,192	28	129	0	0	83	141	1,573
2009	1,573	344	101	44	0	36	164	2,262
2010	2,262	354	55	0	0	7	234	2,912
2011	2,912	230	62	0	0	35	49	3,288
2012	3,288	341	71	0	0	(71)	(37)	3,592
2013	3,592	165	0	0	0	29	(44)	3,742
2014	3,742	(219)	0	0	0	83	49	3,655
2015	3,655	(103)	0	606	0	38	69	4,265
Total		\$1,237	\$671	\$963	\$0	\$341	\$727	\$3,939

A copy of the 2012 and 2015 analyses are attached to this memo (Attachments #4 and #5).

2. May 2017 – PFM Pension Performance and Best Practices Analysis

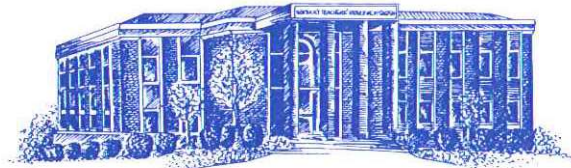
In 2017, Report #2 of the Pension Performance and Best Practices Analysis conducted by PFM and PRM Consulting Group, provided a attribution of the unfunded liability growth from FY2005-2016. Below is a summary of results:

Factors Increasing the Unfunded Pension Liability 06.30.2005 to 06.30.2016						
KERS Non Hazardous						
Actuarial Backloading	Assumption Changes	Plan Experience	Investment Performance	Funding Shortfalls	COLAs	Total
\$1,153	\$2,319	\$539	\$1,249	\$2,561	\$1,291	\$9,112
CERS Non Hazardous						
Actuarial Backloading	Assumption Changes	Plan Experience	Investment Performance	Funding Shortfalls	COLAs	Total
\$1,269	\$984	\$372	\$1,138	(\$220)	\$672	\$4,215

The executive summary of Report #2, which includes a chart summarizing the sources of unfunded liabilities is attached to this memo (Attachment #3), while a full copy of the presentation can be found at the following link: <https://pensions.ky.gov/Documents/2017%2005%2022%20-%20Report%20%20FINAL%205.22.17%20-%20Historical%20and%20Current%20Assessment.pdf>

TEACHERS' RETIREMENT SYSTEM OF KENTUCKY

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M E M O R A N D U M

TO: Interim Joint Committee on State Government

- Senator Joe Bowen, Co-Chair
- Representative Brent Yonts, Co-Chair
- Members of the Committee

FROM: Gary L. Harbin, CPA
Executive Secretary

RE: Supplemental Information and Materials

DATE: December 23, 2013

At the meeting of the Interim Joint Committee on State Government on November 20, 2013, KTRS was asked to produce certain supplemental information and materials. In response to the questions, please note the following:

1. Question from Representative Yonts: What is the historical attribution of the unfunded actuarial liability for the Kentucky Teachers' Retirement System during the period from fiscal year 2008 through fiscal year 2013?

KTRS Response: Attached is the historical attribution of unfunded actuarial liability for KTRS for the period from fiscal year 2008 through 2013. This schedule confirms that liabilities are growing at 7.5% while the market has returned near zero for more than a dozen years. KTRS's focus on value investing, low investment and administrative costs, and top 7% investment performance over the last 5 years has mitigated much of the bad news from Wall Street. The five year smoothing methodology used by the actuary resulted in the actuary reporting \$14.9 billion as the value of plan assets as of June 30, 2013 compared to market value of assets at that date of \$16.1 billion.

The S&P 500 notable highs over the last thirteen years and at the close of fiscal year 2013 are as follows: 1552.87 at March 24, 2000; 1565.26 at October 9, 2007; 1606.28 at June 30, 2013. Since June 30, 2013, the market has exhibited the first breakout above these notable highs and is currently trading at 1826.90 at December 22, 2013.

KTRS's total fund returns during this period and over thirty years are set forth in the schedule below. Please note that KTRS's 30 year rate of return as of September 30, 2013 is 9.07%, which is consistent with the actuarial assumed rate of 7.5%.

	<u>1 Year</u>	<u>3 year</u>	<u>5 Year</u>	<u>10 Year</u>	<u>30 Year</u>
June 30, 2013	14.14	12.41	6.62	6.42	8.93
September 30, 2013	14.48	11.18	9.06	6.84	9.07

The historical attribution schedule also details the marked trend wherein the required employer contribution is increasing exponentially because the employer contribution is not being regularly paid on an annual basis. Since fiscal year 2008, the state has not paid the additional annual employer contributions necessary to pre-fund the benefit requirements of members of the retirement system. Over this period of time, because the state has not been able to fund the retirement system, the state's additional annual employer contribution has grown significantly from \$60.5 million (fiscal year 2009) to \$261 million (fiscal year 2013). Moreover, if the required contributions are not made for fiscal years 2014 to 2016, the employer contribution shortfall will increase by \$1.2 billion. The following schedule details the growth of the additional annual retirement contributions payable by the state:

Fiscal Year	Cumulative Increase as a % of Payroll	Cumulative Increase of Annual Retirement Appropriations Payable by the State
2009	1.88	\$ 60,499,800
2010	2.46	82,331,200
2011	3.59	121,457,000
2012	5.81	208,649,000
2013	7.27	260,980,000
2014	8.02	299,420,000
2015	10.42	386,400,000
2016	12.97	487,400,000

(Source: KTRS Report of the Actuary on the Annual Valuation Prepared as of June 30, 2013).

In 2010, the General Assembly enacted the "Shared Responsibility" solution for pre-funding retiree health insurance, which eliminated \$5.2 billion in liability for retiree medical insurance. This historic legislation put retiree health insurance on a sustainable path with dedicated funding. The solution also helped the long-term funding of the retirement plan because the practice of borrowing retirement contributions to pay for current health insurance costs was eliminated. Additionally, the state repaid some of the retirement plan funds borrowed in past years. These actions helped ensure the security of the medical insurance of retired teachers, improved the financial condition of the Commonwealth, and eased burdens on taxpayers.

KTRS benefits are reasonable and cost effective compared to other types of retirement plans. The KTRS investment program has performed well year after year, and the costs of administration of the retirement plan are some of the lowest in the country. KTRS's positive qualities are the result of many years of consistent control and oversight by the Board of Trustees according to state law.

2. Question from Senator Blevins: What investments does KTRS maintain within Kentucky?

KTRS Response: Each year KTRS reports to the General Assembly the retirement system's investments within the Commonwealth of Kentucky. As of June 30, 2013, KTRS had approximately \$318 million in in-state investments, consisting largely of commercial real estate, single family and multi-family mortgages, bonds of corporations headquartered in Kentucky and debt obligations of state and local government entities. KTRS actively seeks investments which support the economic welfare of the Commonwealth wherever consistent with the fiduciary duty that assets be managed "...solely in the interests of the active contributing members and annuitants..." of the retirement system.

Additionally, KTRS has substantial investment holdings in companies doing business within Kentucky. KTRS has hundreds of millions of dollars in equity holdings in the following publicly traded companies that have substantial economic impact on the Commonwealth: Apple, Inc., General Electric, United Parcel Service, Humana, Amazon, Yum Brands, Ford, Brown-Forman, JPMorgan Chase, Ashland, Inc., Tempur Sealy International, and Lexmark International.

These companies employ thousands of Kentuckians, pay state and local taxes, and are solid investments for ensuring the retirement security of teachers. For example, Apple is KTRS's largest equity holding. Kentucky and its teachers, through KTRS's equity holdings, have shared in Apple's success. The gorilla glass used in Apple's iPhone is made by Corning in Harrodsburg, KY (among other places). Amazon (KTRS's 8th largest equity holding) is a significant employer in Kentucky with a large distribution center in Lexington and several smaller locations around the state. UPS, Humana, Ford, GE, and Yum Brands are major economic drivers in Louisville. Brown-Forman, Ashland, Tempur Sealy, and Lexmark are Kentucky-based companies with significant economic impact.

Kentucky Teachers Retirement System
Historical Attribution of Unfunded Actuarial Liability

(in millions)

Interest Rate	Fiscal Year	Unfunded Actuarial Liab. (Beg. Of Year)	Actuarial Returns Actual vs. Assumed Investment (G)/L *	AD Hoc COLA / Benefits	Methods / Actuarial Assumptions	Employer Contribution Shortfall	Net Medical Fund Allocation	Demographic & Salary Experience	Other	Unfunded Actuarial Liab. (End of Year)
7.50%	2008	5,970.0	668.6	0.0	0.0	0.0	100.9	251.4	148.1	7,139.0
7.50%	2009	7,139.0	1,024.1	0.0	0.0	60.5	101.2	5.2	184.4	8,514.4
7.50%	2010	8,514.4	1,026.3	0.0	0.0	82.3	(389.3)	(2.9)	262.2	9,493.0
8.00%	2011	9,493.0	521.2	0.0	743.1	121.5	8.4	(85.8)	259.2	11,060.6
8.00%	2012	11,060.6	740.5	0.0	(29.6)	208.6	8.5	(4.5)	298.4	12,282.5
7.68%	2013	12,282.5	146.6	0.0	920.7	261.0	(6.2)	(110.0)	359.9	13,854.5
Total Increase			4,127.3	0.0	1,634.2	733.9**	(176.5)	53.4	1,512.2	7,884.5

Unfunded Accrued Liability - End of Year (based on Market Value of Assets as of 6/30/2013)

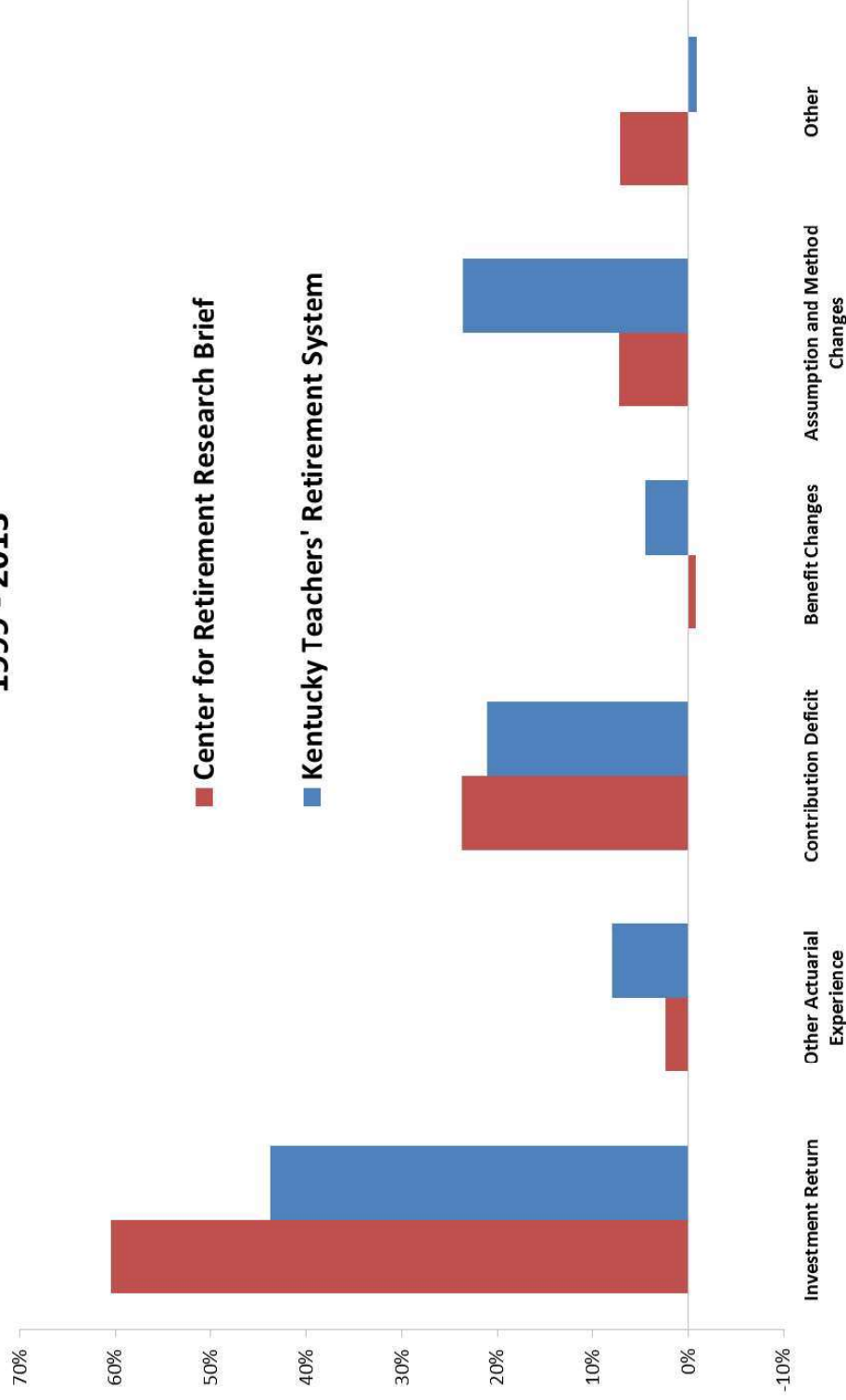
* Earnings on actuarial value of assets greater than or less than expected based on the assumed annual interest rate.

** Additional shortfall for fiscal years 2014 to 2016 will be \$1,173.2 if required contributions are not made during that time.

12,708.4

Sources of increase in unfunded liabilities: KTRS vs National Averages

PERCENT CHANGE IN UNFUNDED LIABILITIES BY CAUSE
1999 - 2013





I. Executive Summary

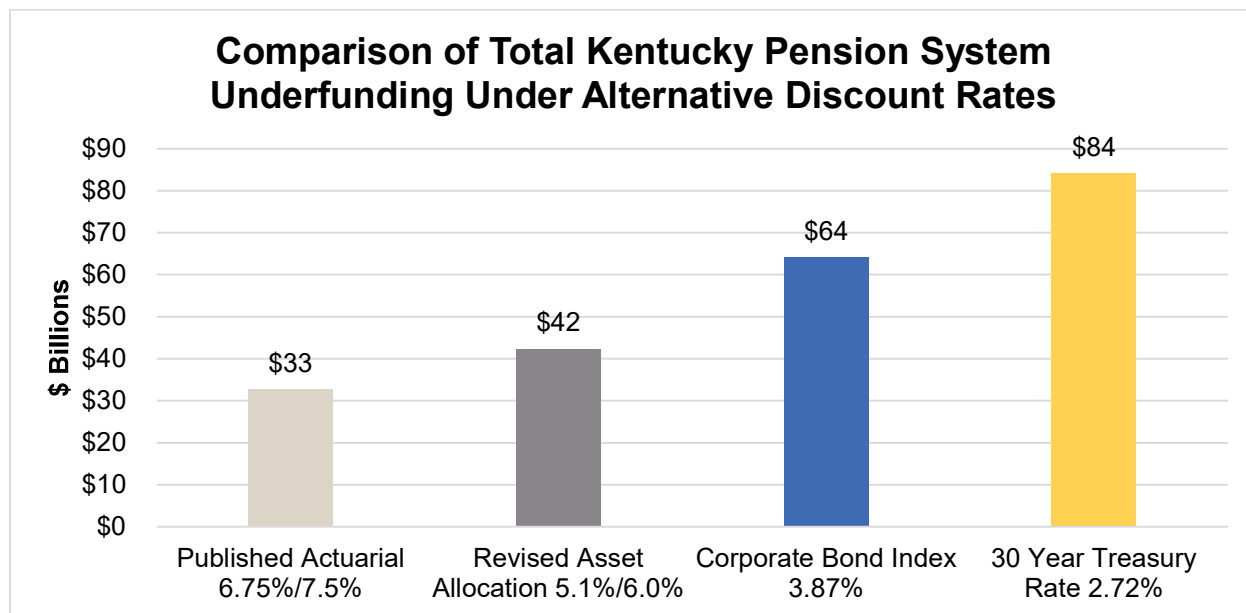
The Commonwealth of Kentucky sponsors three major retirement systems, collectively providing pensions and retiree healthcare benefits to tens of thousands of retired state, local government, school district, and nonprofit employees across the state. Within these three major systems, there are eight pension plans in all, each with different operating practices and benefit plan designs, covering specific employee groups.

For the pensioners and current workers within these covered groups, the reliability and security of these retirement programs are paramount. At the same time, these systems represent a significant investment for Kentucky's taxpayers, and their affordability and financial sustainability bear strongly on the capacity of the Commonwealth and its local governments to address other critical public needs.

Large Unfunded Liabilities

In the aggregate, the Commonwealth of Kentucky faces a funding shortfall across its pension systems of \$33 billion even assuming the funds achieve targeted investment return rates of 6.75-7.5% ("published actuarial rate").

Figure 1



Source: PRM Consulting Group based on analysis of the actuarial reports

Based on alternate return assumptions for a 10-year investment horizon and increased liquidity requirements consistent with an updated KRS policy, the unfunded liability would rise to \$42 billion ("Revised Asset Allocation rate"). Using weighted average rates across the yield curve for a



corporate bond index used in private sector pension reporting (“Corporate Bond Index”) the projected unfunded liability would total \$64 billion, and with the equivalent average rate for U.S. Treasuries, it would total \$82 billion – more than 7 times Kentucky’s annual General Fund spending.¹

In addition, according to the most recent actuarial valuations, Kentucky’s retiree health benefits are underfunded by approximately \$6 billion, over and above the pension shortfall.

Weakest Pension Funding of Any State

The Commonwealth’s share of the retirement system aggregate pension underfunding has been calculated by the credit rating agency, Standard & Poor’s (“S&P”), as the worst among the 50 states – with just 37.4% of total current obligations now funded, compared to a national median of 74.6% as of FY2015, the most recent period reported by S&P on this basis.²

- While the funding levels vary among the eight different plans supported by the Commonwealth, all are underfunded, and only the comparatively small Legislative and Judicial plans are funded at or above national averages.
- The primary pension plan for civilian state employees, the Kentucky Employees Retirement System Non-Hazardous pension plan (KERS-NH) was only 16% funded as of the end of FY2016 – one of the most challenged pension programs in the nation. This funded ratio was based on the actuarial assumptions as of June 30, 2016 and would be lower using more conservative assumptions.

The Commonwealth’s unfunded liability is also one of the largest in proportion to the revenues available to pay for the liabilities, draining resources from other critical needs. According to the credit rating agency Moody’s Investors Service, Kentucky had the third-highest net pension liability among the states when measured as a percentage of governmental revenues using standardized actuarial assumptions. This ratio for Kentucky’s liability at 185% of total annual revenues was more than twice the average state burden of 75% and more than three times the median of 60%.

Eroding Financial Condition

As recently as FY2002 the KERS-NH plan was over 100% funded, and the Kentucky Teachers’ Retirement System (TRS) plan was nearly 90% funded. The funded status of KERS-NH dropped precipitously and constantly thereafter, despite benefit reform efforts including the implementation of new benefit tiers for new hires in 2008 and 2014. Overall, the KERS-NH financial position fell

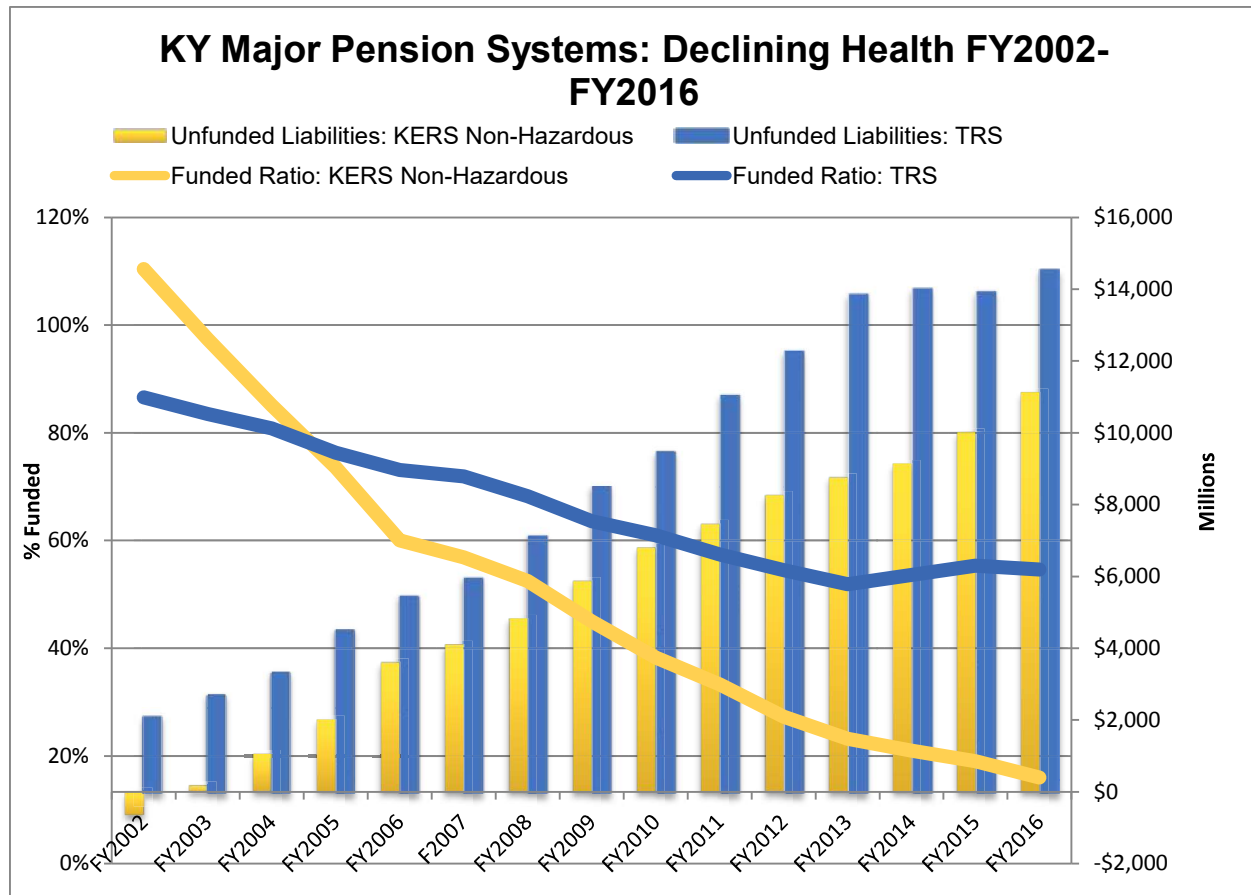
¹ Corporate bond index rates from Citibank pension discount curve as of April 30, 2017; U.S. Treasury yield curve as of May 4, 2017.

² Standard & Poor’s, *U.S. State Pensions: Weak Market Returns Will Contribute to Rise in Expense*, September 12, 2016.



from a net asset surplus to an unfunded liability of over \$11 billion. The declining health of the TRS pension fund has been more gradual and less severe, but nonetheless steady. Overall, the amount of TRS unfunded liabilities increased by nearly 600% between FY2002 and FY2016 as seen in Figure 2.

Figure 2



Source: Commonwealth of Kentucky valuation reports for KRS, TRS, KJFRS, as of 6/30/16

Multiple Factors Drove the Decline

Multiple factors contributed to the deteriorating funded status of Kentucky's pensions across the past decade, with the relative impact of these factors varying among the Commonwealth's different plans.

In the aggregate across all plans, the largest single factor underlying the decline was an actuarial funding approach that effectively "back-loaded" payments such that – even if the Commonwealth and other member employers had met all of the calculated actuarial funding requirements each and every year – these payments would still have been less than the annual interest on the Unfunded



Actuarial Liability (“UAL”), causing the UAL to grow. This “actuarial back-loading” is further detailed in Section V of the full report that follows. In addition, each of the plans modified various actuarial assumptions over this period – for example, adopting somewhat more conservative investment return assumptions and reflecting improving longevity by adjusting mortality rates. Together, the actuarial back-loading and assumption adjustments drove nearly half of the aggregate growth in underfunding (47%), and led to a majority of the shortfalls in the TRS and CERS-NH plans.

The past decade also saw many years of weak investment returns. Performance below actuarial assumptions led to about one-third of the aggregate funding decline. Although much of this experience was driven by the failure of the overall market to meet actuarial assumptions (which were even higher than current rate assumptions for much of this ten-year period), plan-specific investment performance below market-wide results was also a factor for most of the plans.

As seen in Table 1, for the TRS and KERS-NH plans in particular, Commonwealth payment levels below the Actuarially Required Contribution (ARC) were also significant factors, leading to 15% of the total funding decline across all plans. Other contributing factors were cost of living adjustment (“COLA”) benefit enhancements granted in the earlier years of the decade evaluated, which created a new liability that has never been funded, and other elements of plan experience (such as mortality rates) that varied from actuarial assumptions then in effect.



Table 1

Causes	Factors Increasing the Unfunded Pension Liability 6/30/2005 to 6/30/2016 (Amounts in \$Millions)									
	TRS	KERS-NH	KERS-H	CERS-NH	CERS-H	SPRS	KJRP	KLRP	TOTAL	% of Total
Actuarial Back-loading	\$3,278	\$1,153	\$89	\$1,269	\$353	\$111	\$31	\$2	\$6,286	25%
Actuarial Assumption Changes	1,958	2,319	82	984	249	50	25	5	5,672	22%
Plan Experience	232	539	39	372	107	107	43	2	1,441	6%
Investment: Market Performance Below Assumption	1,926	639	80	931	297	45	5	2	3,925	15%
Investment: Plan Performance Below Market	1,014	610	(5)	207	82	8	14	0	1,930	8%
Funding Less Than the ARC	1,588	2,561	(10)	(220)	(133)	42	(11)	3	3,820	15%
COLAs	0	1,291	68	672	267	72	27	3	2,400	9%
Total	\$9,996	\$9,112	\$343	\$4,215	\$1,222	\$435	\$133	\$17	\$25,473	100%

Cash Flow Trends and Solvency Risks

With this eroding funded status, three large Kentucky retirement systems, KERS-NH, CERS-NH, and TRS, have had negative cash flow for at least seven recent years, defined as inflows (employer



contributions, employee contributions, dividends and interest) being less than outflows (benefit payments, administrative and operating expenses).

KERS-NH has had severe negative cash flow of over \$100 million every year since at least FY2002, and TRS has had negative cash flow nine of the last ten years, with the only exception being FY2011 when the proceeds of a \$465.4 million pension obligation bond boosted system assets on a one-time basis. For CERS-NH, while the magnitude of the negative cash flow is smaller, it is nonetheless consistent – and has increased in recent years. In the near-term, such negative cash flow across these plans requires the liquidation of assets to meet current obligations, which can make it more difficult to achieve investment goals, or a more conservative investment strategy that allocates a relatively larger share of assets to liquidity and matches asset maturities to liabilities. Over the longer-term, such negative cash flows can ultimately threaten the solvency of the plans.

Table 2

Total Kentucky Pension Fund Cash Flows FY2006-FY2016			
Inflows + Interest/Dividends – Outflows (\$ in 000s)			
Fund	Inflows	Outflows	Cash Flow
KERS-NH	\$4,792,048	\$9,061,781	\$(4,269,733)
KERS-H	477,393	502,187	(24,794)
SPRS	304,008	512,277	(208,269)
CERS-NH	5,428,274	5,744,284	(316,010)
CERS-H	1,942,982	1,780,890	162,092
TRS	13,612,859	15,866,112	(2,253,253)
Total	\$26,557,564	\$33,467,531	\$(6,909,967)

The at-risk condition of the KERS-NH plan in particular is highlighted by comparing the fund net position to the annual benefit payments. As of year-end FY2016, the KERS-NH fund had assets of just under \$2.0 billion, which represented barely two years (783 days) of benefit payments on hand. Considering that KERS-NH lost \$2.2 billion in plan assets in FY2008-FY2009, it is apparent that the system's ability to maintain assets for a pre-funded retirement system is acutely vulnerable to a sharp downturn that further threatens solvency.

Under current assumptions, including the statutory schedule for paying down the unfunded liabilities that backloads principal payments, the funded ratio for KERS-NH is estimated by the actuary to continue to decline, before gradually rising beginning in FY2023 – but only if all actuarial assumptions are met. In fact, even if the current assumptions of 6.75% annual investment returns and 4% annual payroll growth are achieved and the payment schedule is met in full, KERS-NH is still not estimated to reach 20% funded until FY2030, as can be seen in Table 3. A more conservative amortization schedule for paying down unfunded liabilities, a level dollar amortization – similar to a standard home mortgage schedule - would cost significantly more in the short term



but would make faster progress in reducing the unfunded liability, would eliminate reliance on changes in payroll as a variable, and would not backload principal payments as does the current funding schedule.

Table 3

Comparison of Pension Amortization Schedules KERS-NH June 30, 2016 Valuation and Actuarial Assumptions Level % of Payroll (Current Baseline Amortization Method as Defined in 2013SB2 vs. Level \$ Amortization (\$ in Millions)						
Year	Employer Contribution		Unfunded Liability		Funded Ratio	
	Level %	Level \$	Level %	Level \$	Level %	Level \$
2019	\$731.7	\$1,082.2	\$11,620.2	\$11,257.9	12.9%	15.6%
2020	752.6	1,113.1	11,741.1	10,981.7	12.2%	17.9%
2021	793.3	1,117.3	11,788.5	10,642.9	12.0%	20.5%
2022	817.6	1,151.5	11,813.5	10,245.4	11.9%	23.6%
2023	851.9	1,099.4	11,804.5	9,874.7	12.1%	26.5%
2024	879.0	1,134.5	11,766.7	9,442.6	12.4%	29.7%
2025	912.1	1,071.0	11,692.2	9,046.9	13.0%	32.7%
2026	942.7	1,106.9	11,581.0	8,587.5	13.8%	36.1%
2027	976.7	1,040.2	11,427.5	8,166.3	14.9%	39.2%
2028	1,010.4	1,076.1	11,229.1	7,679.9	16.3%	42.7%
2029	1,044.0	1,005.8	10,983.0	7,233.8	18.0%	46.0%
2030	1,080.6	1,041.0	10,682.7	6,721.3	20.1%	49.7%
2031	1,114.8	968.8	10,327.0	6,249.2	22.5%	53.1%
2032	1,154.6	1,003.4	9,906.7	5,709.9	25.5%	57.0%
2033	\$1,190.7	\$929.8	\$9,421.5	\$5,211.2	28.9%	60.7%

Source: Cavanaugh MacDonald³

Note: Actuarial assumptions include 6.75% earnings assumption, 4% payroll growth, and 26-year remaining amortization period.⁴

³ Certain actuarial data and calculations have been developed by Cavanaugh Macdonald Consulting LLC, plan actuaries for the KERS and TRS systems, under a subcontract with PFM in order to help ensure the accuracy of the estimates and projections herein.

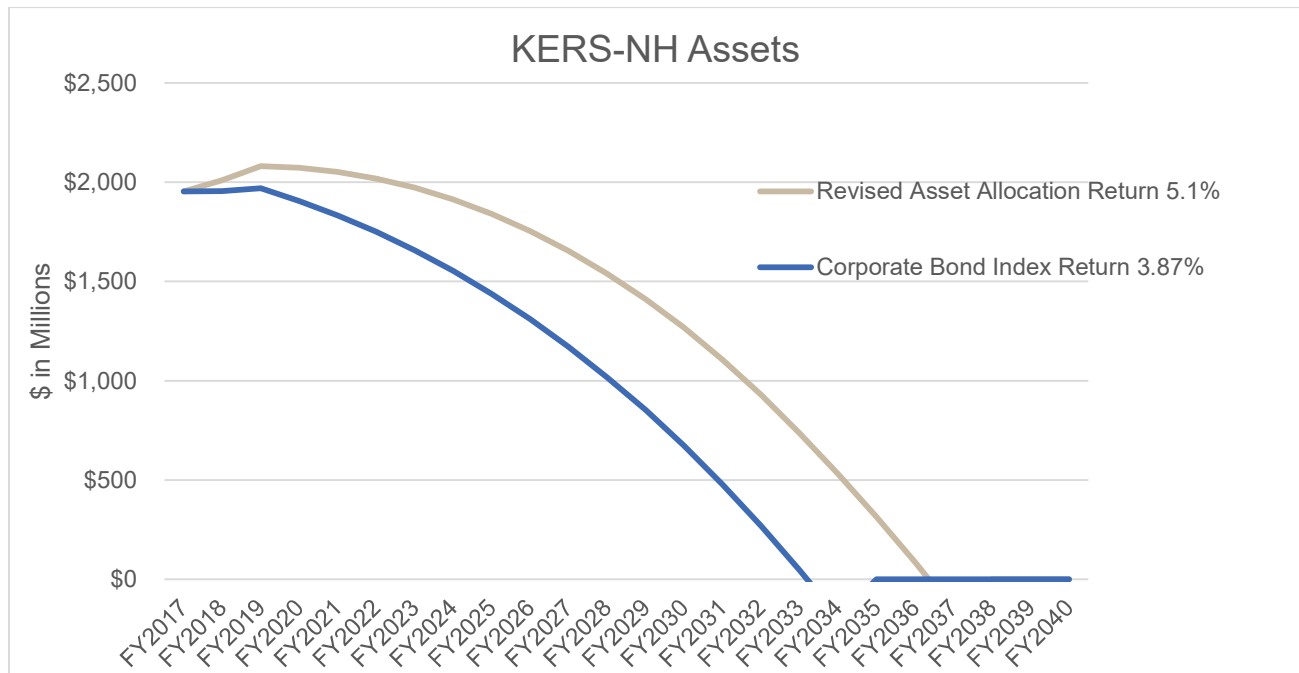
⁴ The level dollar amortization schedule is estimated to fluctuate somewhat due to the Commonwealth's biennial budget structure, and conversion of the amortization estimate to a payroll basis by the actuary's model.



Further, continued solvency requires full funding. If the Commonwealth reverts to the pattern of underfunding the system that it followed from FY2004-FY2014, we project that the KERS-NH fund will be depleted by FY2022, just five years away.

Evaluating cash flows in a solvency analysis over a 30-year period under a range of alternative scenarios, we further project that KERS-NH will also become insolvent, even if more elevated recent patterns of budgetary contributions are maintained and a reduced payroll growth is assumed. Following ten years of a negative 1% compounded annual change in payroll, a 0% payroll growth assumption was applied, or effectively a level dollar amortization, rather than the 4% now assumed by the plan's actuaries. Following years of budgetary underfunding, the FY2016 through FY2018 budgets funded more than the Actuarially Determined Contribution (ADC). If the FY2016 or the average of the FY2016-2018 budgeted contributions are maintained going forward, KERS-NH is still projected to become insolvent, assuming either the Revised Asset Allocation or Corporate Bond Index return assumptions of 5.1% or 3.87%. If the enhanced overfunding of the FY2017-2018 budgets were maintained for future contributions, the plan is projected to remain solvent, even with 0% payroll growth and the Revised Asset Allocation or Corporate Bond Index investment returns.

Figure 3



Source: PRM Consulting Group

Note: 0% Payroll Growth. Ultimate contribution of FY2016 budget (\$672 Million) annually



Similarly, while the TRS has a higher funded level and more assets on hand, we also project that the TRS could become insolvent in the decades ahead if the FY2018 employer contribution amount is not increased in future years and plan assets do not earn well above the private sector pension discount rate.

Competitive Benefits

The benefits offered to the Commonwealth's employees – including both pensions and retiree healthcare – are generous compared to the national and regional private sector. Section VI of this report on "Benefit Structure" encompasses detailed benchmarking of plan design and value. Key findings include:

- Most private employers nationally now support retirement primarily through 401(k)-style defined contribution ("DC") plans, and funding for retiree healthcare benefits has become increasingly rare across private industry. Relative to the 12 largest private Kentucky employers, the value of retirement benefits for the KRS plans also compares highly favorably.
- While public employers are still more likely to provide traditional defined benefit ("DB") pensions and retiree healthcare benefits, most states – including Kentucky – have modified benefits within the past decade to address sustainability concerns. In addition to the Commonwealth and its "hybrid" cash balance plan for recently hired KERS and CERS participants, 18 other states nationally now offer hybrid and/or DC plans for civilian workers.
- While Kentucky teachers do not participate in Social Security, the value of their DB pension nonetheless provides a comparatively generous overall benefit. Among the advantages of Kentucky's teacher plan, participants can retire at any age with 27 years of service or at age 55 with 10 years of service (5 years of service if hired before 7/1/2008). As a result, according to actuarial reports, the average age at retirement of a TRS member is 55 – below the age when teachers in many other states are even eligible for full benefits.
- Of 20 states benchmarked in detail for this report, Kentucky was also among just four that fully fund the employer contribution for teacher pensions at the state level. In contrast, nine states require local school districts to fully fund these contributions, and seven states share a portion of the contribution with local districts.

Next Steps

By evaluating the scale of Kentucky's retiree benefit funding pressures, analyzing the factors that have contributed to this challenge, and benchmarking approaches elsewhere, this Pension Report #2 is intended to provide important background and context for moving forward.



In the forthcoming Report #3, we will present ideas and alternatives for improving the long-term security, reliability, and affordability of these benefit programs. Building on our analysis of factors that have led to the current conditions, including our previous Report #1 on transparency and governance, areas to be addressed prospectively are expected to include:

- Actuarial method and assumptions
- Investment practices and approach
- Benefit levels and risk exposure
- Funding policy

Through past legislative reforms, recent Board actions, and significant additional funding in FY17-18, Kentucky has already taken positive steps in many of these critical areas. Nonetheless, the continued scale of the Commonwealth's remaining challenge requires further strong, corrective action.

A status quo approach is not sustainable.



Cavanaugh Macdonald

CONSULTING, LLC

The experience and dedication you deserve

November 30, 2011

Mr. William A. Thielen
Chief Operations Officer
Kentucky Retirement Systems
Perimeter Park West
1260 Louisville Road
Frankfort, KY 40601

Re: UAL Attribution

Dear Bill:

As requested, we have attempted to breakdown the change in the unfunded accrued liabilities (UAL) of each of the pension funds into major categories in an effort to identify the sources of UAL increase over the last 6 years.

Enclosed with this letter are some tables that assign changes in the UAL for each System to one of several sources. Please note that increases in the UAL, or actuarial losses, are shown as positive numbers and decreases, or actuarial gains, are shown as negative numbers. We have only been the actuary since the June 30, 2006 valuation and therefore do not have access to the necessary information to provide a breakdown of each UAL as it existed on June 30, 2005. The sources of UAL change are:

- Asset gain or loss from investment return above or below the assumed investment return, as reflected in the change in the actuarial value of assets each year.
- The additional liability recognized each year for the cost of living adjustment (COLA) granted that year.
- Changes in accrued liability due to benefit changes enacted into law.
- Changes in accrued liability due to updates to the actuarial assumptions used in the annual valuations as a result of experience investigations that are performed periodically to compare actual plan experience to that assumed.
- The shortfall in employer contributions made to the funds as a result of legislative action reducing the contributions from those recommended by the Board of Trustees.
- The change in UAL due to the difference between actual and expected experience due to demographic events (retirement, withdrawal, death and disability) and well as individual pay increases above or below expected.
- An "Other" category that includes such items as the effect of negative amortization of the UAL, financial transaction timing differences, data corrections, software changes, etc.



As a reminder, the negative amortization issue refers to the impact of financing the UAL as a level percent of payroll. When this is done, the dollar amount of the contributions is not sufficient to cover the interest accrual on the UAL balance until the amortization period drops below 16-17 years. As a result the UAL grows in dollar amount during that period of time, even if the actuarially determined contribution is actually made to the fund.

The amounts in each category should be viewed as best estimate numbers in many cases as there is some interplay between some of the categories that makes absolute assignment of gain or loss very difficult.

I certify that I am a member of the American Academy of Actuaries and that I meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained herein.

If you have any questions, please give me a call.

Sincerely,

A handwritten signature in blue ink, reading 'Thomas J. Cavanaugh'.

Thomas J. Cavanaugh FSA, FCA, MAAA, EA
Chief Executive Officer
TJC:tjc

Enc.



Kentucky Employees Retirement System

KERS Non-Haz									
Val Year	UAL BOY	Asset (G)/L	COLA	Benefits	Assumptions	Employer Contribution Shortfall	Demographic and Salary Experience	Other	UAL EOY
2006	2,000	186	118	133	702	34	195	232	3,601
2007	3,601	(55)	212			100	84	147	4,089
2008	4,089	12	245			179	128	158	4,811
2009	4,811	308	205	(45)	(12)	198	131	269	5,864
2010	5,864	324	102			216	(37)	326	6,795
2011	6,795	243	113			221	(129)	212	7,455
		1,018	995	88	690	948	371	1,345	

KERS Haz									
Val Year	UAL BOY	Asset (G)/L	COLA	Benefits	Assumptions	Employer Contribution Shortfall	Demographic and Salary Experience	Other	UAL EOY
2006	34	7	14	5	18	1	10	(8)	81
2007	81	(11)	15			1	9	(3)	92
2008	92	(1)	12			1	9	4	116
2009	116	27	9	(6)	10	2	0	15	172
2010	172	27	5			3	4	(27)	185
2011	185	16	6			5	(2)	1	211
		65	61	(1)	28	12	30	(18)	

KERS Total									
Val Year	UAL BOY	Asset (G)/L	COLA	Benefits	Assumptions	Employer Contribution Shortfall	Demographic and Salary Experience	Other	UAL EOY
2006	2,034	193	132	138	720	36	205	224	3,682
2007	3,682	(65)	227	-	-	100	92	145	4,181
2008	4,181	10	257	-	-	180	137	162	4,927
2009	4,927	335	214	(51)	(2)	199	131	283	6,036
2010	6,036	351	107	-	-	219	(33)	299	6,980
2011	6,980	259	119	-	-	226	(131)	213	7,666
		1,083	1,056	87	718	960	401	1,326	



County Employees Retirement System

CERS Non-Haz								
Val Year	UAL BOY	Asset (G)/L	COLA	Benefits	Assumptions	Demographic and Salary Experience	Other	UAL EOY
2006	326	150	63	72	313	41	51	1,017
2007	1,017	(53)	118		-	60	51	1,192
2008	1,192	28	129		-	83	141	1,573
2009	1,573	344	101		44	36	165	2,262
2010	2,262	354	55		-	7	235	2,912
2011	2,912	230	62		-	35	49	3,288
		1,053	528	72	357	261	692	

CERS Haz								
Val Year	UAL BOY	Asset (G)/L	COLA	Benefits	Assumptions	Demographic and Salary Experience	Other	UAL EOY
2006	343	38	23	25	83	13	(20)	505
2007	505	(21)	57		-	21	7	569
2008	569	11	43		-	8	20	652
2009	652	113	46		(4)	(7)	27	827
2010	827	117	21		-	(3)	(39)	923
2011	923	73	24		-	28	31	1,079
		331	214	25	79	61	26	

CERS Total								
Val Year	UAL BOY	Asset (G)/L	COLA	Benefits	Assumptions	Demographic and Salary Experience	Other	UAL EOY
2006	669	189	86	97	396	54	31	556
2007	1,522	(75)	175	-	-	81	58	620
2008	1,761	39	172	-	-	91	162	793
2009	2,225	457	147	-	40	29	192	992
2010	3,089	471	76	-	-	4	196	1,158
2011	3,835	303	86	-	-	63	80	1,128
		1,384	742	97	436	322	718	



State Police Retirement System

SPRS									
Val Year	UAL BOY	Asset (G)/L	COLA	Benefits	Assumptions	Employer Contribution Shortfall	Demographic and Salary Experience	Other	UAL EOY
2006	105	11	8	(9)	(35)	2	5	86	173
2007	173	(5)	16			4	8	3	199
2008	199	(1)	16			7	9	91	321
2009	321	17	11	(10)	(3)	9	1	(75)	272
2010	272	18	6			10	4	5	314
2011	314	13	7			7	6	2	349
		53	64	(19)	(38)	40	34	111	1,628



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November 13, 2015

Mr. William A. Thielen
Executive Director
Kentucky Retirement Systems
Perimeter Park West
1260 Louisville Road
Frankfort, KY 40601

Re: UAL Attribution

Dear Bill:

As requested, we have updated the unfunded accrued liabilities (UAL) attribution work for each of the pension funds. The attribution of the UAL into major categories is an effort to identify the sources of UAL increase over the last 7 years.

Enclosed with this letter are updated tables that assign changes in the UAL for each System to one of several sources. Please note that increases in the UAL, or actuarial losses, are shown as positive numbers and decreases, or actuarial gains, are shown as negative numbers. In addition, the numbers do not add exactly due to rounding. As previously noted, the sources of UAL change are:

- Asset gain or loss from investment return above or below the assumed investment return, as reflected in the change in the actuarial value of assets each year.
- The additional liability recognized each year for the cost of living adjustment (COLA), if any, granted that year.
- Changes in accrued liability due to benefit changes, if any, enacted into law.
- Changes in accrued liability due to updates to the actuarial assumptions used in the annual valuations as a result of experience investigations that are performed periodically to compare actual plan experience to that assumed.
- The shortfall in employer contributions made to the KERS and SPRS funds as a result of legislative action reducing the contributions from those recommended by the Board of Trustees.
- The change in UAL due to the difference between actual and expected experience due to demographic events (retirement, withdrawal, death and disability) and well as individual pay increases above or below expected.
- An "Other" category that includes such items as the effect of negative amortization of the UAL, financial transaction timing differences, data corrections, software changes, etc.

Mr. William A. Thielen
November 13, 2015
Page 2



Again as a reminder, the negative amortization issue refers to the impact of financing the UAL as a level percent of payroll. When this is done, the dollar amount of the contributions is not sufficient to cover the interest accrual on the UAL balance until the amortization period drops below 16-17 years. As a result the UAL grows in dollar amount during that period of time, even if the actuarially determined contribution is actually made to the fund.

The amounts in each category should be viewed as best estimate numbers in many cases as there is some interplay between some of the categories that makes absolute assignment of gain or loss very difficult.

I certify that I am a member of the American Academy of Actuaries and that I meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained herein.

If you have any questions, please give me a call.

Sincerely,

A handwritten signature in blue ink that reads 'Todd B. Green' followed by a horizontal line.

Todd B. Green ASA, FCA, MAAA
Principal and Consulting Actuary

Enc.



Kentucky Employees Retirement System

KERS Non-Hazardous									
Val Year	UAL BOY	Asset (G)/L	COLA	Benefits	Assumptions	Employer Contribution Shortfall	Demographic and Salary Experience	Other	UAL EOY
2008	4,089	12	245			179	128	158	4,811
2009	4,811	308	205	(45)	(12)	197	131	269	5,864
2010	5,864	324	102			216	(37)	326	6,795
2011	6,795	243	113			221	(129)	212	7,455
2012	7,455	325	117			236	(53)	180	8,260
2013	8,260	166				249	(18)	94	8,751
2014	8,751	(129)				224	68	212	9,126
2015	9,126	(57)			695	0	27	218	10,009
		1,192	782	(45)	683	1,522	117	1,669	

KERS Hazardous									
Val Year	UAL BOY	Asset (G)/L	COLA	Benefits	Assumptions	Employer Contribution Shortfall	Demographic and Salary Experience	Other	UAL EOY
2008	92	(2)	12			1	9	4	116
2009	116	27	9	(6)	10	2	0	14	172
2010	172	27	5			3	4	(26)	185
2011	185	16	6			5	(2)	1	211
2012	211	30	7			3	(5)	9	255
2013	255	16				6	(2)	3	278
2014	278	(19)				2	12	16	289
2015	289	(7)			52	0	1	4	339
		88	39	(6)	62	22	17	25	

KERS Total									
Val Year	UAL BOY	Asset (G)/L	COLA	Benefits	Assumptions	Employer Contribution Shortfall	Demographic and Salary Experience	Other	UAL EOY
2008	4,181	10	257			180	137	162	4,927
2009	4,927	335	214	(51)	(2)	199	131	283	6,036
2010	6,036	351	107			219	(33)	300	6,980
2011	6,980	259	119			226	(131)	213	7,666
2012	7,666	355	124			239	(58)	189	8,515
2013	8,515	182				255	(20)	97	9,029
2014	9,029	(148)				226	80	228	9,415
2015	9,415	(64)			747		28	222	10,348
		1,280	821	(51)	745	1,544	134	1,694	



County Employees Retirement System

CERS Non-Hazardous								
Val Year	UAL BOY	Asset (G)/L	COLA	Benefits	Assumptions	Demographic and Salary Experience	Other	UAL EOY
2008	1,192	28	129			83	141	1,573
2009	1,573	344	101		44	36	164	2,262
2010	2,262	354	55			7	234	2,912
2011	2,912	230	62			35	49	3,288
2012	3,288	341	71			(71)	(37)	3,592
2013	3,592	165				29	(44)	3,742
2014	3,742	(219)				83	49	3,655
2015	3,655	(103)			606	38	69	4,265
		1,140	418		650	240	625	

CERS Hazardous								
Val Year	UAL BOY	Asset (G)/L	COLA	Benefits	Assumptions	Demographic and Salary Experience	Other	UAL EOY
2008	569	11	43			8	21	652
2009	652	113	46		(4)	(7)	27	827
2010	827	117	21			(3)	(39)	923
2011	923	73	24			28	31	1,079
2012	1,079	112	28			(11)	55	1,263
2013	1,263	59				(2)	3	1,323
2014	1,323	(64)				52	10	1,321
2015	1,321	(28)			167	24	33	1,517
		393	162		163	89	141	

CERS Total								
Val Year	UAL BOY	Asset (G)/L	COLA	Benefits	Assumptions	Demographic and Salary Experience	Other	UAL EOY
2008	1,761	39	172			91	162	2,225
2009	2,225	457	147		40	29	191	3,089
2010	3,089	471	76			4	195	3,835
2011	3,835	303	86			63	80	4,367
2012	4,367	453	99			(82)	18	4,855
2013	4,855	224				27	(41)	5,065
2014	5,065	(283)				135	59	4,976
2015	4,976	(131)			773	62	102	5,782
		1,533	580		813	329	776	



State Police Retirement System

SPRS									
Val Year	UAL BOY	Asset (G)/L	COLA	Benefits	Assumptions	Employer Contribution Shortfall	Demographic and Salary Experience	Other	UAL EOY
2008	199	(1)	16			7	9	91	321
2009	321	17	11	(10)	(3)	9	1	(74)	272
2010	272	18	6			10	4	4	314
2011	314	13	7			7	6	2	349
2012	349	19	9			8	(3)	6	388
2013	388	9				8	1	4	410
2014	410	(12)				7	24	10	439
2015	438	(5)			40		7	6	486
		58	49	(10)	37	56	49	49	