Texas Municipal Retirement System
Actuarial Valuation Report
as of December 31, 2015

May 20, 2016

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Today’s Agenda

- Summary of System-wide Results
- Asset Performance
- Funded Status
- Contribution Requirements
- Future Expectations
- Summary
## Summary of System-wide Results

<table>
<thead>
<tr>
<th></th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Actuarial Accrued Liability (AAL)</td>
<td>$26,647</td>
<td>$28,117</td>
<td>$28,379</td>
</tr>
<tr>
<td>Actuarial Value of Assets</td>
<td>$22,861</td>
<td>$24,348</td>
<td>$24,348</td>
</tr>
<tr>
<td>Unfunded Actuarial Accrued Liability (UAAL)</td>
<td>$3,786</td>
<td>$3,769</td>
<td>$4,031</td>
</tr>
<tr>
<td>Funded Ratio</td>
<td>85.8%</td>
<td>86.6%</td>
<td>85.8%</td>
</tr>
</tbody>
</table>

**Full Contribution Rates:**

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>Straight Average</td>
<td>8.39%</td>
<td>8.33%</td>
<td>9.02%</td>
</tr>
<tr>
<td>Payroll Weighted Average</td>
<td>12.63%</td>
<td>12.54%</td>
<td>13.24%</td>
</tr>
<tr>
<td>Normal Cost %</td>
<td>7.86%</td>
<td>7.88%</td>
<td>8.41%</td>
</tr>
<tr>
<td>Prior Service %</td>
<td>4.77%</td>
<td>4.66%</td>
<td>4.83%</td>
</tr>
</tbody>
</table>
### Aggregate BAF Valuation ($ in millions)

Reconciliation of Unfunded Actuarial Accrued Liability ("UAAL")

<table>
<thead>
<tr>
<th></th>
<th>Change in UAAL</th>
<th>Impact on Funded Ratio</th>
<th>Impact on Full Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>UAAL @ BOY</td>
<td>$3,786</td>
<td>85.8%</td>
<td>12.63%</td>
</tr>
<tr>
<td>Interest (7.00%)</td>
<td>268</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Amortization Payments*</td>
<td>(274)</td>
<td>0.8%</td>
<td>(0.09%)</td>
</tr>
<tr>
<td>Asset Performance</td>
<td>71</td>
<td>-0.3%</td>
<td>0.08%</td>
</tr>
<tr>
<td>Benefit Changes</td>
<td>37</td>
<td>-0.1%</td>
<td>0.08%</td>
</tr>
<tr>
<td>Assumption/Method Changes</td>
<td>262</td>
<td>-0.8%</td>
<td>0.70%</td>
</tr>
<tr>
<td>Contributions different than Actuarially Determined</td>
<td>(42)</td>
<td>0.1%</td>
<td>(0.01%)</td>
</tr>
<tr>
<td>Liability (Gains)/Losses</td>
<td>(77)</td>
<td>0.3%</td>
<td>(0.15%)</td>
</tr>
<tr>
<td>UAAL @ EOY</td>
<td>$4,031</td>
<td>85.8%</td>
<td>13.24%</td>
</tr>
</tbody>
</table>

*No longer have “negative” amortization as the funding period has reached approximately 21 years*
Non-Investment Experience

- Actual CPI of 0.73% was less than the 3.00% assumption, so liability for repeating COLAs was less than expected
  - System-wide, created a Liability Gain of about $110 million
  - 2014 CPI of 0.76% resulted in a system-wide gain of about $100 million
  - 2013 CPI of 1.50% resulted in a system-wide gain of about $60 million

- Valuation uses 3-year smoothing on salaries
  - The 2014-2015 salary experience was close to expected, still some deferred gains from prior valuations are being reflected in this valuation
  - System-wide, created a Liability Gain of about $50 million

- For active employees:
  - Average age decreased by 0.1 from last year to 43.2 years
  - Average service is 10.6 years and decreased by 0.1 from last year
Summary of Benefit Changes

- **Total Changes**
  - 48 cities made changes that impacted the total retirement rate since the last valuation
  - Increases in Benefits: 45
  - Decreases in Benefits: 3

- **Number of cities changing matching ratio, deposit rate, and eligibilities**: 28
Summary of Benefit Changes (cont)

- USC Changes
  - Ad Hoc USC 13
  - Rescind/Decrease Repeating USC 2

- COLA Changes
  - Ad Hoc COLA 11
  - New Repeating COLA 1
  - Rescind/Decrease Repeating COLA 2
Yields based on Market Value of Assets

5.30% average compound return (on market value) over the last 10 years
Market and Actuarial Values of Assets

AVA is currently 102.5% of MVA, was 96.6% last year

AVA was Book Value prior to 2009
Contributions vs. Benefits and Refunds

* Includes member and employer contributions
** Includes administrative and investment expenses
Projected Contributions vs. Benefits and Refunds

$Millions

Investment Earnings are now helping to pay the benefits


Contributions *

Benefits & Refunds **

* Includes member and employer contributions
** Includes administrative and investment expenses

Assumes no recognition of current deferred investment gains/losses
Actuarial Value of Assets (Smoothed) vs. Actuarial Accrued Liability (AAL)

$ amounts are in Billions

$12.5 $13.3 $14.2 $15.1 $16.3 $17.0 $18.3 $19.8 $21.3 $22.9 $24.3 $25.3 $26.6 $28.4

*Liabilities for years prior to 2013/2007 reflect PUC/UC method and prior assumptions
*Years prior to 2013/2007 reflect PUC/UC method and prior assumptions
Projected Funded Ratio

Assumes all assumptions are met in future years
Projected Funded Ratio
(Longer Term)

Assumes all assumptions are met in future years
Projected Funded Ratio: System-wide

- Assumes ADEC met each year
- Assumes continuation of current amortization policy & payroll grows at 3.00% per year
- Investment returns are only variable in the stochastic process
The percentile represents the proportion of employers below the point. For example, the 75th percentile is 98%, meaning that 75% of cities have a funded ratio less than 98%. Conversely, 25% of the cities have a funded ratio of 98% or greater.
Distribution of Single Equivalent Amortization Periods

Remaining average period in years
0 would be overfunded
Historical Dollar Weighted Contribution Rates for TMRS

2016 and 2017 are projected rates based upon phase-in minimum
The percentile represents the proportion of employers below the point. For example, the 75th percentile is 13.53%, meaning that 75% of cities have a rate less than 13.53%.
Distribution of Changes: By City
Total Changes in Full Retirement Rate

Rounded to nearest 0.5% change in rate
Distribution of Changes: Impact on Full Rate Due to Change in Assumptions

Rounded to nearest 0.2% change in rate
Distribution of Changes: Payroll Weighted Total Changes in Full Retirement Rate

Rounded to nearest 0.25% change in rate
Projected Aggregate Employer Contribution Rate

- Assumes ADEC met each year, projected from market value of assets as of December 31, 2015.
- Assumes continuation of current amortization policy & payroll grows at 3.00% per year.
- Investment returns are variable in the stochastic process.

For Fiscal Year

- Median Expectation
- 25th-75th percentile of expectation
Phase-In

- As of this valuation, 71 TMRS cities still had phase-in bases from the 2013 changes.
- A new phase-in base was established in conjunction with the 2015 valuation if the change in actuarial assumptions & methods caused a City’s rate to increase by more than 0.50% net of any experience gain. The City could phase-into that increase by 0.50% per year.
  - 400 cities fall into this category
  - Average new phase-in base for these cities is 0.40%
- The new base is combined with the remaining base from 2013 and will be phased in by 0.50% per year.
  - 431 cities have a phase-in rate this year
  - Expected Runoff:
    - 145 cities with a phase-in in 2016 valuation (15% of overall payroll)
    - 43 cities with a phase-in in 2017 valuation (3% of overall payroll)
    - 13 cities with a phase-in in 2018 valuation (0% of overall payroll)
    - 7 cities with a phase-in in 2019 valuation (0% of overall payroll)
    - 2 cities with a phase-in in 2020 valuation (0% of overall payroll)
- We continue to recommend cities contribute their full rate.
1.32% average increase in active members since 2005; 2.8% increase in 2015
6.54% average increase in retired members since 2005; 5.7% increase in 2015
There are currently 1.9 actives for every retiree, down from 3.1 in 2005
Measures of Leverage

- As the plan matures, the ratio of assets to payroll will continue to climb, and could eventually double compared to today’s ratio
- This ratio correlates with how large a potential loss could be in relation to the impact on the contribution rates
- Example: $1,000,000 asset; 10% loss yields:
  - $1,000,000 * .1 = $100,000 / amortization factor 16.29 = increase in annual contribution of $6,140
  - If payroll is $250,000 (4.0 ratio), this is 2.46% of payroll
  - If payroll is $150,000 (6.7 ratio), this is 4.09% of payroll
Measures of Leverage
Sustainability

- **Sustainability is (per Google, Dictionary, etc)**
  - the capacity to endure
  - the endurance of systems and processes
  - pertaining to a system that maintains its own viability by using techniques that allow for continual reuse
  - able to be supported as with the basic necessities or sufficient funds
  - able to be used without being completely used up or destroyed

- **Per Wikipedia:** “**Sustainability** can also be defined as a socio-ecological process characterized by the pursuit of a common ideal. An ideal is by definition unattainable in a given time/space but endlessly approachable, and this endless pursuit is what builds in sustainability in the process”
The following is a list of metrics that can be used to assess the sustainability of a pension plan.

This can be used to gain a larger picture of sources of risk on a pension plan.

Please note the aggregate results are much more meaningful than the impact of any one item.

Also, it is unnecessary to achieve a 5 star result on each item to be considered sustainable. In fact, that type of result may suggest too much conservatism.
## Sustainability Checklist

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
<th>Stars</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you have a legally required contribution amount based on accepted actuarial practices?</td>
<td>Yes</td>
<td>*****</td>
</tr>
<tr>
<td>Does the contribution amount automatically adjust if certain minimums are not met?</td>
<td>Yes</td>
<td>*****</td>
</tr>
<tr>
<td>Have you met the required contribution each year over the past 10 years?</td>
<td>Yes</td>
<td>*****</td>
</tr>
<tr>
<td>What is the amortization period for the current UAAL based on the required contribution?</td>
<td>21 Years</td>
<td>****</td>
</tr>
<tr>
<td>What is the amortization period for new losses?</td>
<td>25 Years</td>
<td>****</td>
</tr>
<tr>
<td>What is the sum of your amortization period and asset smoothing period?</td>
<td>35 Years</td>
<td>****</td>
</tr>
<tr>
<td>What is your investment return assumption?</td>
<td>6.75%</td>
<td>*****</td>
</tr>
<tr>
<td>Does your current investment policy and target asset allocation support the current assumption?</td>
<td>Yes</td>
<td>****</td>
</tr>
<tr>
<td>What is your payroll (revenue) growth assumption?</td>
<td>3.00%</td>
<td>****</td>
</tr>
<tr>
<td>Are there any benefits, that are likely to be paid, not reflected in the liabilities and contributions?</td>
<td>Yes^</td>
<td>***</td>
</tr>
<tr>
<td>Are any of the liabilities contingent on future experience?</td>
<td>No#</td>
<td>***</td>
</tr>
<tr>
<td>What is your short – intermediate term negative cash flow as a % of assets?</td>
<td>0-1%</td>
<td>*****</td>
</tr>
<tr>
<td>What is your longer term negative cash flow as a % of assets?</td>
<td>2-3%</td>
<td>*****</td>
</tr>
<tr>
<td>What is your current active to retiree ratio?</td>
<td>1.9</td>
<td>****</td>
</tr>
<tr>
<td>What is your longer term active to retiree ratio?</td>
<td>1.0-1.3</td>
<td>**</td>
</tr>
<tr>
<td>What is your ratio of accrued liability to payroll?</td>
<td>4.9</td>
<td>****</td>
</tr>
<tr>
<td>What is your longer term ratio of accrued liability to payroll?</td>
<td>6.5-7.5</td>
<td>**</td>
</tr>
</tbody>
</table>

^ It is possible to get interest credits to member accounts higher than 5%. Also, ad hoc COLAs are possible, but have a strong funding policy. # COLAs are tied to actual CPI, which is usually correlated to economic growth. Annuity Purchase Rates adjust to reflect changes in mortality.
Sustainability Checklist

- TMRS grades out well on the checklist
  - Required actuarial contributions
  - Closed amortization periods in the 20-25 year range
  - Reasonable investment return and payroll growth assumptions
  - Manageable short and long term cash flow needs
  - Benefit that automatically adjusts to changing mortality patterns

- Items to pay attention to
  - Longer term liability (or asset) to payroll ratios will increase contribution rate volatility
  - As the System achieves higher funded ratios, could be pressure to enhance benefits in ways not currently anticipated in the funding policy
    - May or may not be based on good experience
In Summary

- Overall System-wide “health” continues to improve
  - Overall funded levels continue to improve
  - Even with the lower discount rate, contributions rates have remained relatively stable

- With no changes in assumptions, the expectation is for an increasing funded ratio over the next few valuations and continued stability in the contribution rates, System-wide