Michigan Department of Treasury
Bureau of Investments

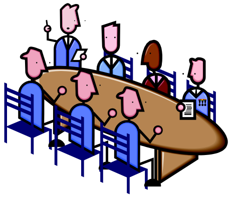
March 28, 2019

Executive Summary

- Long term market returns have been robust and in the next ten years most industry experts anticipate lower returns.
- Therefore, most plans are lowering (or have lowered already) their plans actuarial assumed rate of return.
- The plans substantially beat peers in all time periods.

Bureau of Investments

As of January 1, 2019



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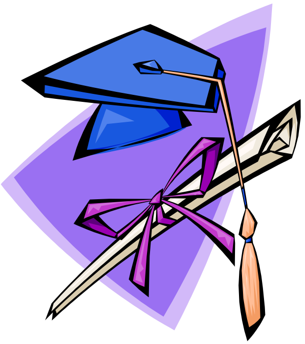
As of February 2018



- 73 BOI Employees
- 44 Investment Professionals
- 43 Individuals with a Masters Degree or higher
- 16 CFA Charter holders
- 16 Other professional designations
- Total of $91.0 billion assets under management (as of 12/31/18)
- The large investment pool is an advantage for the plans

Funded Ratio

State Employees

Year	Market Value of Assets	Actuarial Value of Assets	Actuarial Accrued Liability	Funded Ratio Based on Actuarial Value
2017	$11,807	$11,884	$17,881	66.5%
2016	$10,980	$10,937	$17,016	64.3%
2015	$10,732	$10,417	$16,237	64.2%
2014*	$10,975	$9,962	$16,173	61.6%
2013	$9,923	$9,438	$15,648	60.3%
2012	$9,272	$9,447	$15,654	60.3%
2011	$8,655	$10,212	$15,597	65.5%
1983	$1,842	$1,752	$2,369	74.0%

($ in Millions)

*Revised actuarial assumptions and/or methods.

Source: Pension Plans Component Unit Financial Reports and Actuarial Valuations, years ending in September

Pension Plan only

Funded Ratio

Judges

Year	Market Value of Assets	Actuarial Value of Assets	Actuarial Accrued Liability	Funded Ratio Based on Actuarial Value
2017	$265	$268	$270	99.3%
2016	$255	$254	$251	101.1%
2015	$257	$249	$257	96.9%
2014*	$271	$246	$257	95.8%
2013	$253	$240	$252	95.1%
2012	$240	$246	$250	98.5%
2011	$224	$267	$252	106.0%
1983	$57	$57	$81	70.4%

($ in Millions)

*Revised actuarial assumptions and/or methods.

Source: Pension Plans Component Unit Financial Reports and Actuarial Valuations, years ending in September

Pension Plan only

Contributions and Distributions

FY 2018

State Employees

Contributions		
Members	$	35.6
Employer		650.7
Total Contributions	$	686.3
Less:		
Pension Benefit Distributions		1,362.2
Net	**$**	**(675.9)**

- Equal to (per quarter on average) $ (169.0)
- Or about 5.3% of total market value of fund

Figures are in millions

Judges

Contributions		
Members	$	0.7
Employer		1.7
Total Contributions	$	2.4
Less:		
Pension Benefit Distributions		23.8
Net	**$**	**(21.4)**

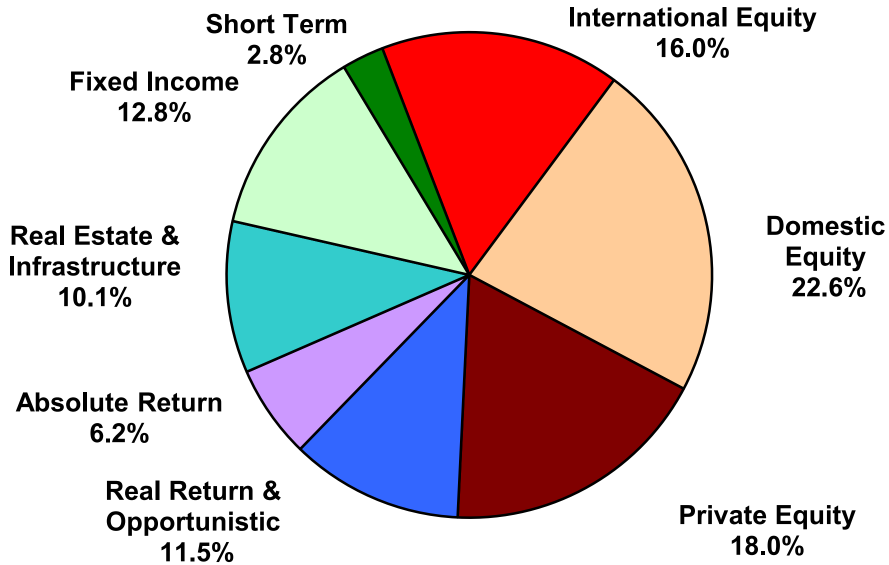
- Equal to (per quarter on average) $ (5.4)
- Or about 8.4% of total market value of fund

Figures are in millions

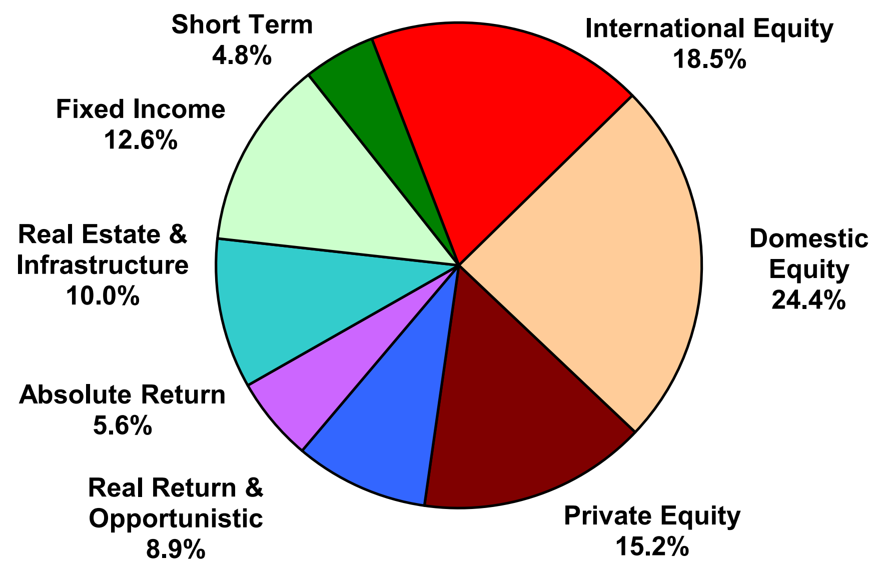
Asset Allocation

As of December 31, 2018

State Employees



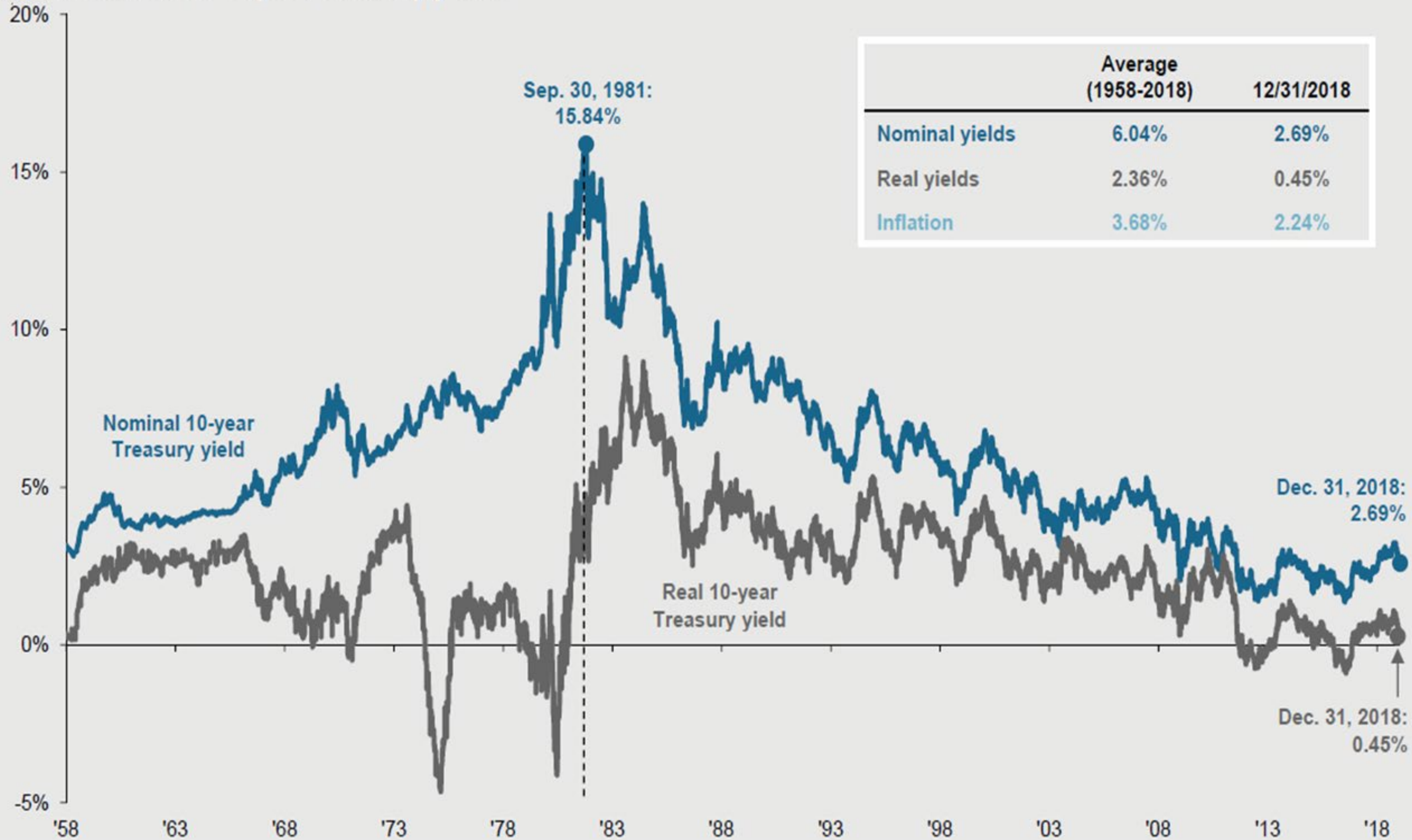
Judges



Diversification is essential to protect the funds. However, still reliant on equity markets to generate the actuarial assumed rate of return.

Fixed income

Nominal and real 10-year Treasury yields



	Average (1958-2018)	12/31/2018
Nominal yields	6.04%	2.69%
Real yields	2.36%	0.45%
Inflation	3.68%	2.24%

Source: BLS, FactSet, Federal Reserve, J.P. Morgan Asset Management.
Real 10-year Treasury yields are calculated as the daily Treasury yield less year-over-year core CPI inflation for that month except for December 2018, where real yields are calculated by subtracting out November 2018 year-over-year core inflation.
Guide to the Markets – U.S. Data are as of December 31, 2018.

J.P.Morgan
Asset Management

S&P 500 – Last 10 Years

Time-Weighted Rates of Return

Public Funds (DB) > $10 Billion

As of December 31, 2018

State Employees

Asset Class w/Benchmark	One Year* Rate	One Year* Rank	Three Years* Rate	Three Years* Rank	Five Years* Rate	Five Years* Rank	Seven Years* Rate	Seven Years* Rank	Ten Years* Rate	Ten Years* Rank
Total Plan	**2.7%**	**5**	**8.7%**	**12**	**8.0%**	**4**	**9.8%**	**5**	**9.6%**	**13**
Median - Greater than $10 Billion	-2.1%		6.7%		5.6%		8.2%		8.5%	

Judges

Asset Class w/Benchmark	One Year* Rate	One Year* Rank	Three Years* Rate	Three Years* Rank	Five Years* Rate	Five Years* Rank	Seven Years* Rate	Seven Years* Rank	Ten Years* Rate	Ten Years* Rank
Total Plan	**2.7%**	**5**	**8.7%**	**11**	**7.9%**	**5**	**9.6%**	**6**	**9.2%**	**21**
Median - Greater than $10 Billion	-2.1%		6.7%		5.6%		8.2%		8.5%	

*Annualized Returns

Source: State Street Investment Analytics

Time-Weighted Rates of Return

Individual asset classes doing well on a relative basis

State Employees

Asset Class w/Benchmark	12/31/2018 Five Years Rate	12/31/2018 One Year Rate
Total Plan*	**8.0%**	**2.7%**
Median*	5.6%	-2.1%
Domestic Equities	**8.3%**	**-3.8%**
S&P 1500 Index	8.3%	-5.0%
International Equities	**2.0%**	**-14.3%**
Blended Benchmark	0.7%	-14.2%
Bonds	**3.9%**	**1.2%**
Barclays Aggregate	2.5%	0.0%

*Comparison universe is the State Street Universe comprised of Public Funds greater than $10 Billion on the Total Plan level and greater than $1 Billion for asset classes.

Time-Weighted Rates of Return

State Employees

Asset Class w/Benchmark	12/31/18 Five Years Rate	12/31/18 One Year Rate
Private Equity	**14.6%**	**18.2%**
Alternative Blended Benchmark	17.2%	21.4%
Real Estate and Infrastructure	**12.0%**	**12.2%**
NCREIF Open Fund Index Net	9.4%	7.4%
Absolute Return	**4.0%**	**4.3%**
HFRI FOF Cons 1 month lagged	2.1%	0.6%
Real Return and Opportunistic	**13.6%**	**19.5%**
Benchmark	7.2%	7.3%
Cash Equivalents	**1.0%**	**2.2%**
30-Day T-Bill	0.6%	1.8%

*Comparison universe is the State Street Universe comprised of Public Funds greater than $10 Billion on the Total Plan level and greater than $1 Billion for asset classes.

U.S. Economy

- Forecasted for decelerating growth globally.
- Housing is moderating.
- Auto sales are moderating.
- Tax cut provided fiscal stimulus, but impact moderating.
- Labor market has tightened significantly and may increase inflation, but this hasn't yet been the case.

Concerns

- Decelerating global economy.
- Need to address U.S. long-term liabilities.
- World is uncertain (Iran, North Korea, Russia, etc.).
- Federal trade policies – China, Europe, NAFTA.
- Equity market volatility has increased (from historically low levels to normal).

Conclusion

- We have experienced a ‘Bull Market’ since 2009, but for how much longer?
- The plans substantially beat peers in all time periods.
- The U.S. economy is doing well.