Maryland State Retirement and Pension System

MARYLAND
STATE RETIREMENT
and PENSION SYSTEM

Maryland Pension Risk Mitigation Act

Risk Assessment

January 2021

Introduction

In accordance with HB 993, The Maryland Pension Risk Mitigation Act, the Board of Trustees is submitting an assessment of risk for the several Systems. The overarching risk to the System is a failure to meet pension obligations in full and on time. There are many potential causes for such a failure. This report will focus on risks associated with the investment program.

The Board of Trustees is charged with the responsibility of managing the assets of the Maryland State Retirement and Pension System. Investment policies are designed to support the fulfillment of the Board's mission to optimize risk-adjusted returns to ensure that sufficient assets are available to pay benefits to members and beneficiaries when due.

In pursuing this mission, the most powerful tool at the Board's disposal is its long-term strategic asset allocation policy. The strategic asset allocation policy establishes a mix of investment types (stocks, bonds, real estate, etc.) that collectively are modeled to produce the required return with the least risk over the horizon of the pension liabilities. The Board works with its independent investment consultant and staff to establish this long-term policy. Beyond this top-down approach, the Investment Division also contributes to the System's risk management process in its implementation of the strategic asset allocation.

A mix of techniques are utilized at both levels of the investment process. The Board of Trustees and the Investment Division regularly engage with other market participants, including public pension plan peers, financial institutions, and academia, to ensure the System's investment policies and procedures represent leading practices.

Collectively, the Board's strategic allocation and the implementation of that allocation by staff could lead to heightened risk of a funding shortfall if:

1. The collection of assets in the strategic asset allocation fail to achieve the expected returns
2. The collection of assets in the strategic asset allocation achieve the average return over long periods of time, but experience extreme negative returns in the near term, reducing the value of System assets
3. The implementation of the strategic asset allocation by Investment Division staff markedly underperforms the benchmark returns
4. The implementation of the strategic asset allocation does not maintain sufficient liquidity to make benefit payments

Assessment of the System's Investment Risk

Strategic Asset Allocation

Periodically, the System conducts an asset allocation review that evaluates long-term expected returns for the System as well as a variety of different measures of risk.

Regarding return objectives, the asset allocation review incorporates different considerations driving the System's long-term return requirements including factors such as its actuarial assumed rate of return, policy benchmark (i.e. market return of the strategic asset allocation assuming it could be invested passively), expected future inflation, projected cash flows, and liability status. This exercise analyzes the prospects for achieving the return objective using the System's existing asset classes, as well as any opportunities that may increase return or reduce risk by investing in new or alternative asset classes. In addition, the review compares the System's asset allocation to peer retirement systems. The expected return over a twenty-year horizon of the System's strategic allocation is 7.2%, based on Meketa Investment Group's capital market expectations as published in their 2020 Interim Asset Study of Assumption published as of June 30, 2020, on the heels of the COVID-19 crisis and sharp rebound in financial markets.

The asset allocation review also analyzes numerous measures of risk including statistical and scenario-based approaches. These approaches help evaluate the risk that a period of underperformance could severely impact the existing pool of assets. These approaches include:

- Historical Scenarios Analysis: Assessing how the System would have performed in different historical scenarios with its current asset allocation. There are many different types of events that could result in sub-par returns for the System. In particular, extreme shocks such as the Global Financial Crisis and the Stagflation of the 1970s would have the most severe impact.

Historical Negative Scenario Analysis
Cumulative Return

Scenario	Current Policy (%)
Taper Tantrum (May - Aug 2013)	-1.5
Global Financial Crisis (Oct 2007 - Mar 2009)	-23.6
Popping of the TMT Bubble (Apr 2000 - Sep 2002)	-6.6
LTCM (Jul - Aug 1998)	-8.0
Rate spike (1994 Calendar Year)	1.6
Crash of 1987 (Sep - Nov 1987)	-9.3
Strong dollar (Jan 1981 - Sep 1982)	3.8
Volcker Recession (Jan - Mar 1980)	-4.5
Stagflation (Jan 1973 - Sep 1974)	-20.1

Source: Meketa Investment Group

- Stress Testing: Estimating the possible risk of various changes in market conditions (e.g., interest rates, credit risk, currency fluctuations) by varying degrees. The largest market risk factors are equity market declines and widening credit spreads.

Stress Testing: Impact of Market Movements
Expected Return under Stressed Conditions

What happens if (over a 12-month period):	Current Policy (%)
10-year Treasury Bond rates rise 100 bps	3.1
10-year Treasury Bond rates rise 200 bps	-1.4
10-year Treasury Bond rates rise 300 bps	-5.7
Baa Spreads widen by 50 bps, High Yield by 200 bps	0.6
Baa Spreads widen by 300 bps, High Yield by 1000 bps	-19.5
Trade Weighted Dollar gains 10%	-2.6
Trade Weighted Dollar gains 20%	-1.5
U.S. Equities decline 10%	-5.2
U.S. Equities decline 25%	-15.1
U.S. Equities decline 40%	-23.4

Source: Meketa Investment Group

- Value at Risk (VaR) and CVaR: Statistical measures of potential large drawdowns in the market value of investments. VaR is a measure of the risks to the System in the majority of potential outcomes, generally 67% to 99% of the time. The System's conditional value at risk (CVaR), evaluates the range of outcomes assuming the market is already outside the reasonably expected range. This is often described as a tail risk or black swan event. The System's one-month CVaR, as reflected in the below table, indicates the policy allocation could lose 8.8% of market value in a single month. This potential loss of 8.8% is an average of the worst 1% of cases, so it possible for an extreme outlying event to produce a greater loss.

Conditional Value at Risk

Scenario	Current Policy (%)
CVaR (%):	
1 month	-8.8
3 months	-14.4
6 months	-19.2
CVaR ($ mm):	
1 month	-4,502
3 months	-7,374

Source: Meketa Investment Group

- Economic Regime Management (ERM) Factor Sensitivity: A measure of the System's exposure to several economic risk factors (e.g., interest rate, growth, inflation). The largest risk exposure to the System is Systemic Risk, which was the main driver of the global financial crisis during the 2008-2009 period. Because most of the volatility of returns is a result of equity price risk, the

System is also sensitive to changes in growth rates. Interest rate and inflation surprises have smaller impacts on the System.

ERM: Portfolio Sensitivity Comparison
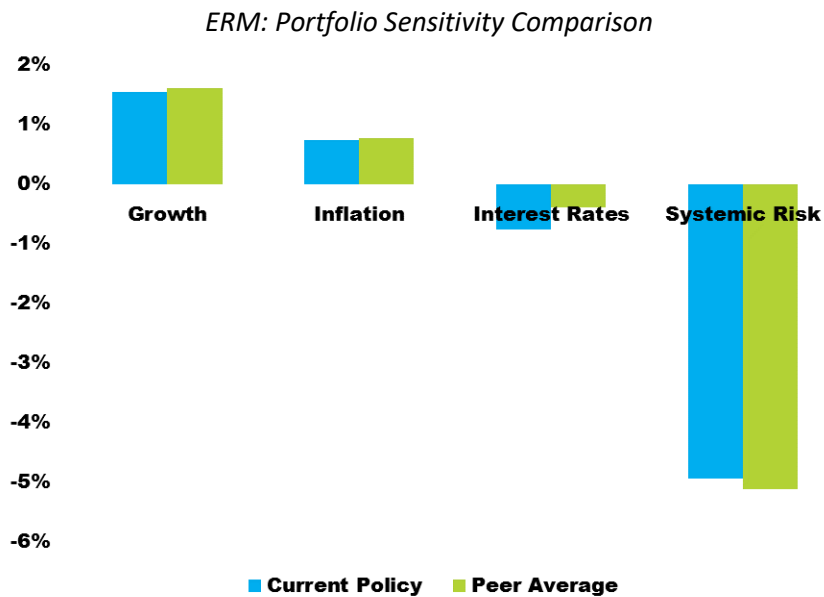
Source: Meketa Investment Group

- Funded Ratio Impacts: Evaluating changes to the System's funded ratio based on both historical scenarios and stress tests, as well as varying the sequence of investment returns over time. An equity market downturn has the most serious negative impact on funded status. Additionally, because the System currently pays more in benefits than it receives in contributions from the employees and employers, the sequence of returns is important. That is, the System could earn its actuarial rate of return, on average, over the next twenty years but still find itself well short of its anticipated funded status. For example, if the System has weak returns in years 1-10 offset by stronger returns in the future, the System's ending funded status would be projected to be lower than if it produced its assumed rate of return in each year.

Stress Testing: Impact of Market Movements
Funded Status under Stressed Conditions

| What happens if (over a 12-month period):	Current Policy (%)
10-year Treasury Bond rates rise 100 bps	74.3
10-year Treasury Bond rates rise 200 bps	71.0
10-year Treasury Bond rates rise 300 bps	67.9
Baa Spreads widen by 50 bps, High Yield by 200 bps	72.5
Baa Spreads widen by 300 bps, High Yield by 1000 bps	58.0
Trade Weighted Dollar gains 10%	70.2
Trade Weighted Dollar gains 20%	70.9
U.S. Equities decline 10%	68.3
U.S. Equities decline 25%	61.2
U.S. Equities decline 40%	55.1

Source: Meketa Investment Group

- Tracking Error Attribution: Estimates the expected variation in performance versus peers over time. While not a direct risk to the System, it is important for Trustees to evaluate the asset allocation relative to the peer average. Tracking error is a metric that can be used to measure the variability of the System's returns versus the peer average. With the current asset allocation, the System can expect long-term variability of the difference between the System's return and the peer average return (tracking error) to average 1.5% per annum due to differences in asset allocation. The vast majority of tracking error stems from the System's allocations to equities and rate sensitive fixed income differing from peers. Supplemental information in the report discusses the process of determining asset class expected returns and risk, as well as a comparison to peers' expected return forecasts. However, the System's expected return exceeds the expected peer return by 0.2% per annum and the variability of that return is lower. A good portion of the 1.6% tracking error is a result of the expected peer returns being lower and more volatile.

Sources of Tracking Error
System Policy versus Peers

Source: Meketa Investment Group

Comparison of Asset Allocation versus Peers
## Current Allocation versus InvestorForce > $1 Billion Public DB Plan Universe
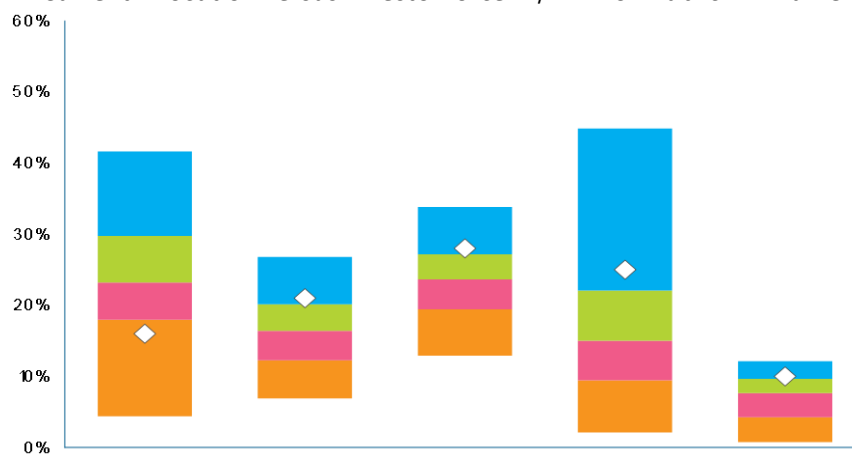
	US Equity	Non-US Equity	Fixed Income	Alternatives	Real estate
5th	41.6	26.8	33.8	44.8	12.1
25th	29.7	20.1	27.2	22.1	9.7
Median	23.2	16.4	23.6	15.0	7.7
75th	18.0	12.3	19.4	9.4	4.3
95th	4.4	6.9	12.9	2.1	0.8
Current Policy	*16*	*21*	*28*	*25*	*10*

Source: Meketa Investment Group, MSCI InvestorForce. The composite is composed of 91 plans as of September 30 2020. The peer median does not add to 100% due to the manner in which it is calculated (e.g., median vs average) and the exclusion of cash. Alternatives includes private equity, hedge funds, natural resources, commodities, and infrastructure.

To complement Meketa's analysis above, the Investment Division is also able to utilize a risk budgeting tool provided by one of the System's investment managers, Bridgewater Associates, to perform an asset-liability management analysis of the strategic policy. The chart below presents a stress test of the System's funding ratio using 10-year time horizons, re-sampled every two years, since 1925. According to this analysis, using historical asset class returns and historical cash yields, there is a 64% chance of ending the prospective 10-year period at 85% funded. As reported in the fiscal year 2020 Comprehensive Annual Financial Report, the System targets a funding ratio of 85% by 2030. As a note of caution, however, prospective returns are not anticipated to be of the same magnitude as those included in this analysis due in part to the current low level of interest rates. To be clear, this analysis is not a forecast but is a helpful starting point to evaluate the sensitivity to lower expected returns.

Historical Stress Test of Funding Ratio over 10-year Periods (1925-Present)
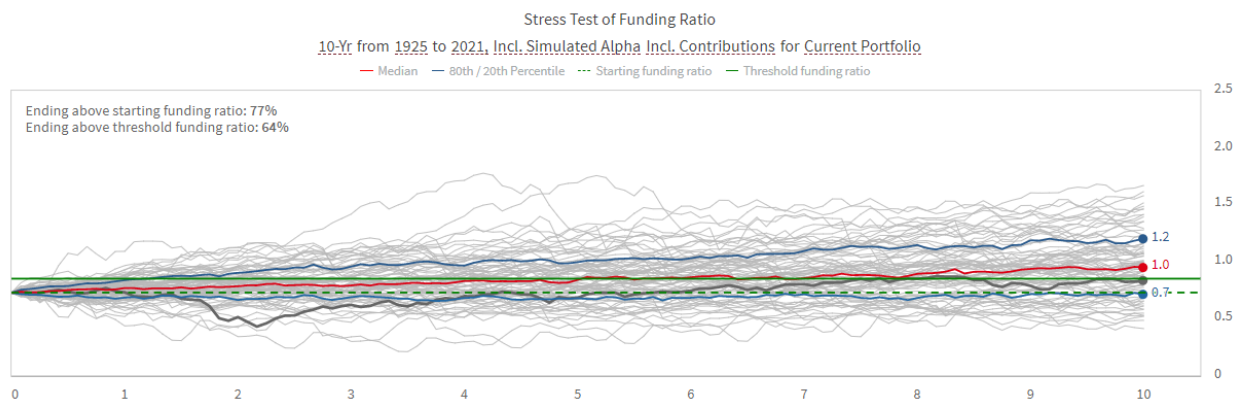
The below table expresses the ending funding ratios in terms of annualized total returns based on historical asset class performance and historical cash yields. Again, this information is not intended to serve as a forecast but as a basis for understanding the relationship between total returns and funding status over a 10-year timeframe.

Scenario Outcome	Ending Funding Ratio	Annualized Total Return (Historical Cash)
Median	1.0	9.4%
20th Percentile	0.7	7.5%
80th Percentile	1.2	12.9%

Source: Maryland State Retirement Agency, Bridgewater Associates

Climate Change Analysis

In addition to the traditional tools to evaluate the risk of not generating sufficient returns, the System has worked with Meketa to evaluate the risk that an externality such as climate change could impact the results. Meketa's simulation-based analysis contemplates a two degree temperature increase in alignment with common time period conventions (i.e., global temperature increase over pre-industrial baseline by 2100). The analysis relies on historical factor definitions (e.g., global growth domestic product, energy prices, and financial market indicators) and their past behaviors to generate direct and indirect relationships among factors. These relationships drive the simulations each of which can be thought of as a way the world could look in the future.

The results of the analysis imply that, although there is significant variation across asset classes and industries, the median expected return for the System is estimated to be lower than a "Base Case" scenario where global temperatures are more stable. Over the intermediate term (10-year time horizon), Meketa would expect the climate shocked portfolio to return 6.33% annualized, approximately 0.5% behind the base case expectation.
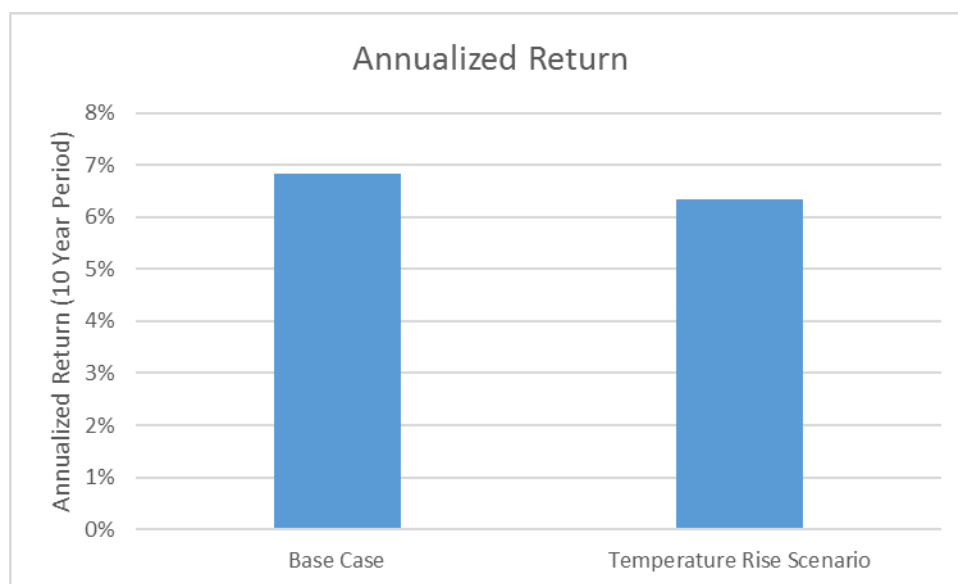
Source: Meketa Investment Group

As shown in the table below, Meketa's analysis suggests long-term U.S. government bonds might do better in the temperature rising scenario. Conversely, natural resources equities are sensitive to a rise in carbon dioxide emissions, while real estate and infrastructure may also be negatively affected by rising sea levels and temperatures.

10-year Return Comparison by Asset Class

Asset Class	Base Case	Temp Rise	Difference
Natural Resources (Public)	7.18%	4.34%	-2.83%
Core Private Real Estate	5.79%	3.03%	-2.76%
Emerging Market Equity	8.81%	6.87%	-1.94%
Global Macro	4.00%	2.21%	-1.79%
Infrastructure (Public)	7.20%	5.52%	-1.68%
Emerging Market Bonds (major)	4.20%	2.79%	-1.40%
Developed Market Equity (non-US)	7.78%	6.65%	-1.13%
High Yield Bonds	4.95%	4.12%	-0.82%
TIPS	2.08%	1.33%	-0.75%
Bank Loans	4.47%	3.79%	-0.68%
Private Equity	9.07%	8.43%	-0.64%
Total System Portfolio	*6.83%*	*6.33%*	*-0.50%*
Hedge Funds	4.26%	3.77%	-0.49%
Investment Grade Corporate Bonds	2.83%	2.41%	-0.42%
US Equity	7.17%	6.88%	-0.30%
Emerging Market Bonds (local)	4.29%	4.14%	-0.15%
Event-Driven	5.15%	5.44%	0.29%
Long-term Government Bonds	2.40%	3.62%	1.22%

Source: Meketa Investment Group

Meketa's analysis also examines the impact on industry sectors using the MSCI USA Index as a reference universe of publicly traded stocks. Forecast equity market impacts are concentrated in sectors with exposure to fossil fuel use and pricing such as materials, consumer staples, energy, and utilities.

10-year Return Comparison by Global Industry Classification Standard ("GICS") Sectors
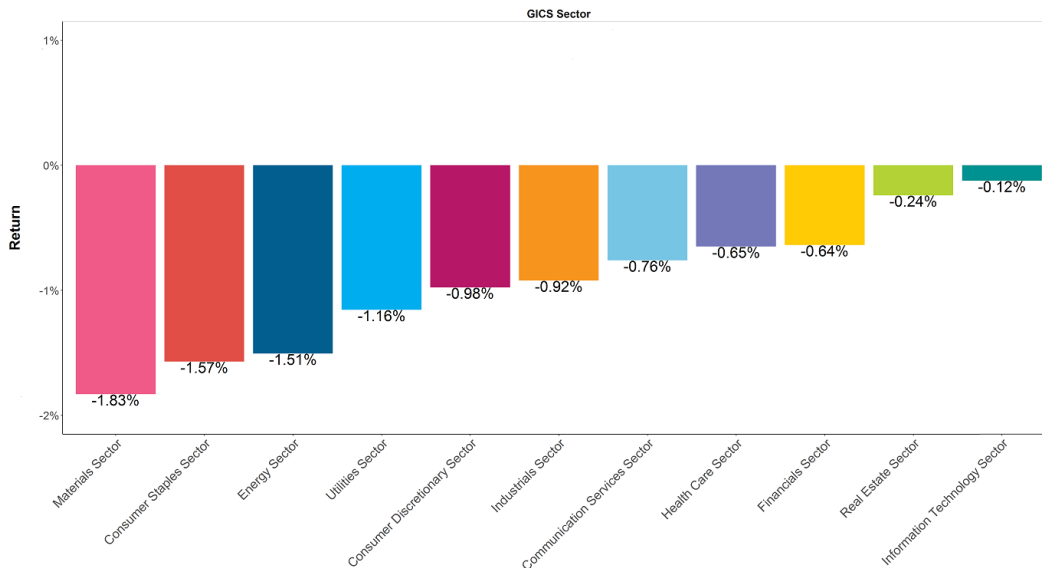

Source: Meketa Investment Group

Carbon Footprint of Public Equity Portfolio

Another tool to evaluate the risks associated with climate change is through the System's exposure to carbon emissions. Through its risk analytics service, MSCI BarraOne, the Investment Division is able to gain insights on carbon exposure in financial markets, as well as the System's policy portfolios. MSCI ESG Carbon Metrics is a system that seeks to measure a company's carbon exposure along two dimensions of current emissions and fossil fuel reserves. The latter represents potential future emissions. MSCI and many other analytics firms continue to enhance their capabilities around measuring the carbon footprint of investment portfolios. However, the current state of the industry remains focused on public equity markets and relies on self-reported data and extrapolations of information provided by reporting companies to non-reporting companies. As shown in the literature review section of this report, many organizations are working to broaden reporting across asset classes and improve measurement techniques.

The exhibit below shows carbon footprint by sector according to MSCI data. The data is applied to the relative sector weights of the System's public equity portfolio versus the public equity policy index. The portfolio's carbon footprint is 125.4 metric tons as compared to 131.7 for the policy index. This result is expected because Staff's implementation is designed to be close to the policy index with a modest bias to growth sectors such as information technology, consumer sectors, and health care. In terms of more carbon intensive sectors, the portfolio is slightly overweight industrials and underweight utilities, energy, and materials.

MSCI All Country World IMI Index – Carbon Footprint by Sector
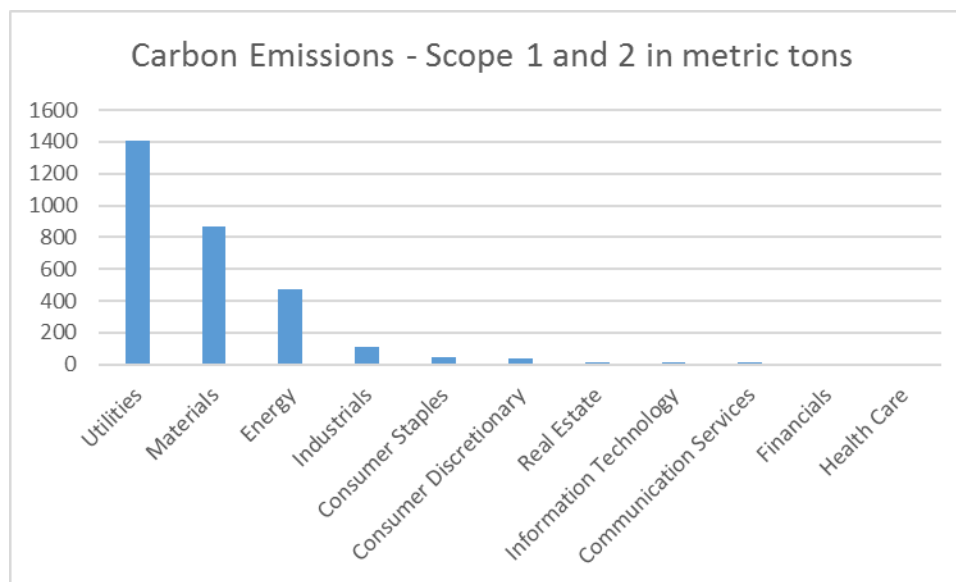
Source: Maryland State Retirement Agency, MSCI BarraOne

Implementation Risk Management

Once the Board of Trustees establishes the System's strategic asset allocation, the Chief Investment Officer, working with investment staff, specialty consultants and asset managers, is responsible for implementation. To capture the different types of risks associated with the implementation process,

the Investment Division utilizes MSCI's x-sigma-rho methodology based on "Manager Risk Contribution: Attributing Risk in a Multi-Manager Portfolio" (Miller, Rao, 2014). The Investment Division utilizes this approach to calculate a forward-looking tracking error, which measures the variability in the difference between realized and benchmark returns, broken down according to three distinct phases of the investment process as follows:

1. Allocation risk – the risk that results from an over- or under-weight position in a particular asset class
2. Style risk – the risk that results from assigning a benchmark to a manager that is different from a particular asset class benchmark
3. Selection risk – the risk that results from a manager building a portfolio of securities that is different from the constitution of the assigned benchmark

The System's portfolio produces an expected tracking error, or "total active risk," of 0.85% versus the strategic policy index as of 6/30/2020, meaning that approximately 67% of the time, the realized return will be within a range of +/- 0.85% around the expected outperformance above the benchmark return. At June 30, 2019, the vast majority – nearly 80% – of total active risk can be attributed to security selection decisions, a function of the Investment Division's belief that markets exhibit varying degrees of efficiency across asset classes and geographies, providing opportunities for skilled investors to add value. Selection risk within the Growth asset class, which includes public and private equity, constitutes the bulk of overall selection risk.

Total Active Risk (basis points)

Asset class	Allocation Risk (bps)	Selection Risk (bps)	Style Risk (bps)	Total Active Risk (bps)
Growth	-1	57	11	68
Rates	5	1	4	11
Credit	0	2	0	2
Real Assets	2	2	1	5
Absolute Return	-1	4	-5	-1
Multi Asset	0	-1	0	0
Cash	1	0	0	1
Total	**8**	**66**	**11**	**85**

Total Active Risk (Contribution to Risk)

Asset class	Allocation Risk	Selection Risk	Style Risk	Total Active Risk
Growth	-0.59%	67.18%	12.83%	79.42%
Rates	6.24%	1.52%	4.99%	12.76%
Credit	0.06%	2.22%	-0.49%	1.79%
Real Assets	2.37%	2.74%	1.33%	6.45%
Absolute Return	-0.67%	4.61%	-5.49%	-1.55%
Multi Asset	0.04%	-0.61%	0.00%	-0.57%
Cash	1.69%	0.00%	0.00%	1.70%
Total	**9.15%**	**77.68%**	**13.17%**	**100.00%**

Source: Maryland State Retirement Agency, State Street, FactSet

To contextualize this estimate of tracking error, the following chart displays the tracking error forecast as of 6/30/2020 against historical realized tracking error. While actual realized tracking error generally has been below the current forecasted tracking error after the spike following the global financial crisis, the Investment Division believes the forecast is a reasonable long-term estimate supported by a bottom-up review of each manager in the System's current portfolio. Realized tracking error steadily decreased since the beginning of 2016 due in part to a market regime characterized by low volatility before turning marginally higher in 2018 and again in early 2020 as the global pandemic gripped markets.
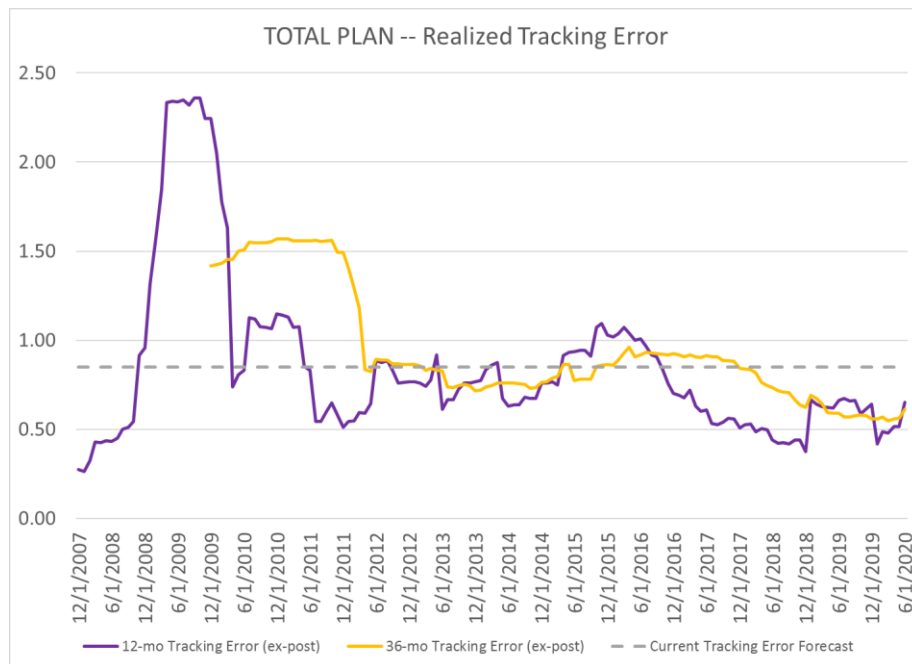
Source: Maryland State Retirement Agency, State Street, FactSet

- Liquidity Analysis: Another area where the combination of strategic asset allocation and implementation could create undue risk is liquidity. Meketa, evaluates the System's ability to continue to meet its cash needs amidst a weak equity market scenario. Even in an extremely negative scenario, similar to the Global Financial Crisis, the System would still maintain ample liquidity to meet its near-term obligations.

Liquidity Stress Test

Metric	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Ending Market Value	54,767.0	54,174.7	40,746.8	37,199.5	35,527.5	33,784.5
Net flows	0.0	-1,638.0	-1,503.0	-1,598.0	-1,672.0	-1,743.0
Flows as percentage of Market Value	0%	-3.0%	-2.8%	-3.9%	-4.5%	-4.9%
Assets Sold in Duress	0.0	0.0	-678.0	-1,072.7	-1,141.7	-1,190.2
Percentage of Outflows sold in duress	0%	0%	45%	67%	68%	68%
Percentage of Assets sold in duress	0%	0%	1.3%	2.6%	3.1%	3.4%
Remaining liquid Market Value	42,115.8	41,074.6	30,755.7	27,658.5	25,986.5	24,243.5
Total Illiquid Assets	12,651.2	13,100.1	9,991.2	9,541.0	9,541.0	9,541.0
Percentage of Illiquid Assets	23%	24%	25%	26%	27%	28%
Portfolio Return	0.0%	1.9%	-22.0%	-4.8%	0.0%	0.0%

Notes: Assets sold that have decreased in value by more than 10% in order to meet the System's obligations (assuming the System rebalanced to its target allocations). Remaining liquid market value includes all System assets that could be readily liquidated within 30 days. Returns in Years 1, 2 and 3 reflect asset class returns from the 4th Quarter 2007, Calendar Year 2008, and 1st Quarter 2009, respectively. Years 4 and 5 assume 0% returns in all asset classes.
Source: Meketa Investment Group

Review of Recent Studies and Actions

The State Retirement Agency staff conducted a review of recent studies and actions with respect to portfolio risks with the goal of identifying leading practices not currently employed that could be recommended for inclusion in the Investment Policy Manual.   As is the case with long-term returns, the primary determinant of portfolio risk is asset allocation. Academic and commercial finance professionals have been developing tools to analyze these risks for many decades. In the last decade, innovations have changed the analysis from a focus on asset class risks relating to stocks and bonds, to one of risk classes such as growth and inflation. These innovations have provided helpful insights into asset allocation but have not substantially changed the mix of assets employed. More recently, the advent of "Big Data" and artificial intelligence has offered the hope that traditional risk management tools may be used more effectively. For example, with the exception of the climate change analysis, the scenario analyses described above are only performed for a handful of potential scenarios. Enhanced computing techniques allow for a much more comprehensive set of scenarios, and artificial intelligence can improve the choice of scenarios to consider.

Much of the recent literature addressing investment risk has focused on Environmental, Social and Governance (ESG), including climate change, as investment risks that should be incorporated in the investment process. While the notion of ESG risk is not new, the measurement of ESG risk is still in its early stages. Most research focuses on risks to individual companies and industries, particularly companies with publicly traded stocks and bonds. The measurement of ESG risk at the company level is challenged by the lack of standardization in the types, level and forms of disclosure made by public companies, and the paucity of data available for private companies. Moreover, from a risk management perspective, individual company risks are best addressed at the portfolio implementation level. The industry is still developing portfolio construction tools focused on asset classes or risk classes that incorporate ESG and climate change.

Listed below are areas of research that were explored for the potential identification of leading practices, including samples of activities and research conducted by staff and Meketa Investment Group:

Risk Management and Asset Allocation

Maryland State Retirement and Pension System Whitepaper: Illiquid Asset Classes and Strategic Asset Allocation (June 2020). Strategic asset allocation studies typically rely on mean variance optimization, a method which incorporates specific risk, return, and correlation estimates while making certain assumptions about illiquid asset classes. In this common framework, private assets are modeled as having a fixed allocation throughout time and priced contemporaneously with liquid asset classes. Given the long horizon of strategic considerations, these assumptions are not unrealistic. However, the practical reality of investing in private equity and other illiquid asset classes introduces short-term frictions that conflict with this long term perspective. The first section of this whitepaper describes a complementary approach to mean variance optimization that relaxes the assumption of constant asset class weights. Next, staff presents a statistical framework for estimating risk characteristics for illiquid asset classes and implications for long-term risk expectations. The paper concludes with a discussion of short-term liquidity stress testing.

Institutional Society of Risk Professionals (ISRP) Membership. ISRP was established in 2011 to encourage cooperation among investment risk professionals. The purpose of this organization is to facilitate

research and sharing of leading practices in the risk industry. The members are like-minded, long-term investors with broad asset allocation mandates and similar risk management issues. The Investment Division participates on quarterly calls with other ISRP members and attends the annual conference.

CFA Institute AI Pioneers in Investment Management (September 2019). The report focuses on three types of artificial intelligence: 1) natural language processing, computer vision, and voice recognition; 2) machine learning; and 3) techniques to process alternative and unstructured data. In a survey, the researchers found relatively few are currently using AI/big data techniques in their investment processes. They identified five major hurdles to successful adoption of AI and big data in investment processes: cost, talent, technology, leadership vision, and time. The report also includes several case studies ranging from a hedge fund using machine learning to enhance trading strategy to Bloomberg's sentiment analysis tools that have grown to cover social media platforms like Twitter.

Investing in a Low Interest Rate Environment (November 2020). Meketa Investment Group presented the implications of low interest rates at the November 2020 meeting of the Investment Committee of the Board of the Trustees. Among the primary considerations is the prospect of lower future returns across asset classes which creates a challenge with respect to meeting the System's actuarial return target. Moreover, the low level of interest rates could diminish the diversifying properties of fixed income asset classes going forward. Meketa recommends a combination of strategies to improve the odds of success including a barbell approach to asset allocation, prudent use of leverage, and opportunistic investments in select areas such as real estate and infrastructure.

Environmental, Social, and Governance

Maryland State Retirement and Pension System ESG Risk Committee Report (January 2020). As an update to the initial report from February 2018, this report documents the activities of the System's ESG Risk Committee. The report reiterates the System's principles for responsible investing and outlines how ESG considerations are integrated into the investment. The next update is anticipated in January 2022.

Investing Responsibly, Norges Bank Investment Management (August 2020). As one of the largest funds in the world, Norway's sovereign wealth fund – officially the Government Pension Fund Global – owns almost 1.5% of all shares in listed companies globally, according to its website. On August 28, 2020, management published a review of the fund's 20 year history of investing responsibly. The following excerpt is from the press release at the time of publication:

> In 20 years, the fund has grown to become the largest single owner in the world's stock markets. How we exercise our rights and manage our responsibilities as an owner has evolved rapidly. In this publication, we share our experience as an investor in over 9,000 companies. The fund started out as a reluctant owner. Today, we vote at more than 11,000 shareholder meetings and have nearly 3,500 meetings with companies every year. We publish expectations of companies that make clear our priorities as a long-term owner. We contribute actively to the development of international standards on responsible business conduct.

Aggregate Confusion Project: MIT Sloan Sustainability Initiative and Mass PRIM announce collaboration to improve the quality of ESG measurement in the financial sector (September 2020). As noted in the press release, the partnership seeks to build on the work of researchers at MIT School of Management to improve the quality of ESG reporting. The project's key goals are:

1. Reduce the level of noise in measuring specific ESG categories such as labor treatment, carbon emissions, and product safety;
2. Understand the effect of ESG-driven investment flows on stock price and firm behavior;
3. Develop smarter ways to aggregate ESG factors into composite indices;
4. Reliably assess investor preferences to enable ESG indices to be more customized and attuned to investors' values.

BP Energy Outlook 2020 Edition (September 2020). As stated on the company's website, the Energy Outlook explores the forces shaping the global energy transition out to 2050 and the key uncertainties surrounding that transition. The global energy system is likely to undergo a fundamental restructuring in order to decarbonize, which will create challenges and opportunities for the industry. Three main scenarios – Rapid, Net Zero, and Business-as-usual – provide a range of possible outcomes to understand the range of uncertainties ahead.

Letter from President Paxson: Brown's action on climate change (March 2020). In a letter to the Brown University community, President Christina H. Paxson provided an update on the institution's efforts to confront climate change. She describes the actions taken by the endowment in writing, "Nearly two years ago, the Investment Office decided to sell its entire exposure to fossil fuels, a process that takes time due to the illiquid nature of some investments. To date, 90% of investments in companies that extract fossil fuels have been sold, and the remainder is being liquidated as it becomes possible to do so. In the meantime, the Investment Office has made no new investments in this area."

J.P. Morgan Long-Term Capital Market Assumptions (November 2020). J.P. Morgan includes an article, "Weighing the investment implications of climate change policy," in the latest annual release of its capital markets assumptions. The article maintains the impact of a transition to a low carbon on economic growth, inflation, and interest rates globally probably will be limited. However, the manner in which the transition takes place (e.g., government-led with subsidies and fiscal support) as well as regional and sector differences will impact which asset classes and economies fare better or worse. For example, the article hypothesizes that equilibrium interest rates could rise by up to 60 basis points in a transition characterized by meaningful and sustained fiscal support from governments around the world.

Recommendation of Best Practices for the Investment Policy Manual

The Board of Trustees regularly reviews and updates the Investment Policy Manual in consultation with the Investment Division. Several recent revisions have been made to enhance the policies and procedures with respect to risk management, as well as corporate governance and proxy voting. The risk management section provides the purpose, asset allocation, analytical measures, non-market risks, liquidity risk, counterparty risk, and leverage risk.

In addition, the corporate governance and proxy voting section addresses the following topics:

1. Board of Directors
2. Shareholder Rights and Defenses
3. Capital/Restructuring
4. Compensation
5. Social/Environmental Issues
    a. Animal Rights
    b. Consumer Issues
    c. Climate Change and the Environment
    d. Diversity
    e. General Corporate Issues
    f. International Issues, Labor Issues, and Human Rights
    g. Sustainability
6. Routine/Miscellaneous

After reviewing the System's risk management processes in comparison with the leading practices of peers and new research from academic literature, it appears the System engages in leading practices concerning the evaluation and management of risks associated with the investment of System assets. While there are no recommendations of best practices to incorporate in the Investment Policy Manual at this time, the Board of Trustees and the Investment Division will continue to review studies and actions of other market participants to ensure the System's policies and procedures incorporate leading practices to the extent practicable.