COMMONWEALTH OF PENNSYLVANIA
PUBLIC SCHOOL EMPLOYEES' RETIREMENT SYSTEM

Tail Risk Mitigation Strategy Policy

TABLE OF CONTENTS

Revision History

Tail Risk Mitigation Strategy Established	**November 12, 2020**
Policy Revised	**March 5, 2021**
Policy Revised	**March 15, 2022**
Budget Increase from 12.5 bps to 25 bps is effective July 1, 2022	
Policy Revised	**May 31, 2024**

I. SCOPE

This Policy applies to investments in the Tail Risk Mitigation Strategy ("Strategy") within the Pennsylvania, Public School Employees' Retirement System ("PSERS") Defined Benefit Fund (the "Fund").

II. PURPOSE

This Policy provides the broad strategic framework for managing investments in the Strategy.

III. ROLES AND RESPONSIBILITIES

Roles and Responsibilities related to this Policy are identified within PSERS' Investment Policy Statement ("IPS").

IV. INVESTMENT PHILOSOPHY

The Fund has significant broad-based equity risk exposure from the Target Asset Allocation depicted in the IPS. As a result of this exposure, the Fund is expected to suffer losses during severe equity drawdowns. This is known as left tail risk or simply tail risk. Left tail risk events are known to be larger and occur more frequently than predicted by a normal distribution.

Over long-term investment holding periods diversified portfolios generally provide better risk-adjusted returns than less diversified portfolios. A potential consequence of greater diversification is relying upon lower historical correlations among the underlying assets. During periods of severe equity market stress, the correlations of most assets tend to increase; therefore, increasing expected losses given the increase in forecast risk.

In the Investment Philosophy section of the IPS (section V.), belief statement 4. Risk states that (i) the path of compounding of returns over time matters, (ii) drawdown risk should be mitigated, and (iii) liquidity should be managed to reasonably ensure that the fund can meet its obligations during periods of market dislocations. The Strategy is intended and expected to help with each of these belief statements by providing significant payoffs in such equity drawdowns. The Strategy supplements diversifying assets, such as Long Treasuries (Nominal Bonds), that generally provide a level of protection against equity market risk; however, the Strategy does so in a more explicit manner. The success of the Strategy necessitates that it be in place for the medium- to long-term.

As "insurance" against large equity drawdowns, there is an associated cost for this protection. It is the goal of the Investment Office ("IO") to minimize this cost through active management of the Strategy while providing the greatest payoff in the event of a severe equity market decline. It is the objective of the IO to manage the Strategy actively, systematically, and transparently. Management fees, trading costs, and other expenses will be monitored and controlled.

V. ALLOCATION

PSERS will allocate a fixed annual budget ("Budget") each fiscal year to make investments in the Strategy not to exceed 25 basis points (0.25%) of Fund Net Asset Value ("NAV"). The NAV shall be the amount calculated by Office of Financial Manament ("OFM") for June 15 of the prior fiscal year (or the next succeeding business day if June 15 is not a business day) that is provided to the IO by OFM in a daily e-mail entitled "Daily Pension Fund NAV *Investment Portfolio* as of dd.mm.yy". The NAV provided by OFM will be revised to reflect the NAV reported as "Pension Total Investments" in the Statements of Fiduciary Net Position in the audited financial statements as of June 30. The Budget is expected to be applied as evenly as market circumstances permit. In certain market environments, the desired level of protection may not be achievable given the fixed nature of the Budget; conversely it may not be necessary to spend the entire Budget to achieve the desired level of protection.

The desired level of protection is a function of the Target Asset Allocation and how those capital allocations result in Public Market Equity risk, which can be determined explicitly by the IO and/or by a third-party provider. Most asset classes have some exposure (positive or negative) to Public Market Equities. The aggregate (summation) of these allocation weights multiplied by their exposure to Public Market Equities results in the Plan's Public Market Equities risk exposure ("Public Market Equity Beta"). The goal of the Strategy is to focus on the contribution of the Plan's Public Market allocations to Public Market Equity Beta.

In general terms, the Plan's estimated Public Market Equity Beta has been between 50% and 60%, which has been approximately evenly split between Public and Private Markets. This means that the Plan's estimated Public Market Equity Beta contributed by Public Markets allocations has been between 25% and 30% – this represents the proportion of the Plan that the Strategy seeks to protect, which is defined as the desired level of protection. Note, an estimated Public Market Equity Beta contributed by Public Markets allocations of between 25% and 30% means that for each +/-1% move in the Public Market Equity index, it is expected for the value of the Plan's assets to move by between +/-0.25% and +/-0.30%, all else equal. At the Budget amount defined in this Policy, it is expected that the program can generally hedge half of the Public Market Equity beta contributed by public markets.

The Strategy is intended to be diversified between externally managed and internally managed mandates. The CIO shall have full discretion in determining the allocation to internally and externally managed mandates; provided that if the CIO would like to allocate in excess of 50% of the Strategy budget to internally managed mandates, it shall be voted by Resolution of the Board.

VI. PERMISSIBLE INSTRUMENTS

Externally managed Strategy assets may be invested in options on a variety of traditional asset classes including, but not limited to, global equity, global fixed income, credit, and commodities. While the use of non-equity instruments or other instruments that are volatility based may increase basis risk (using historical relationships), they may be available at a lower cost than equity instruments and produce a similar amount of expected protection. Assets may also be invested in a variety of less traditional asset classes such as equity volatility and equity variance (the most well known of which is the VIX volatility index (the "VIX"), provided there is sufficient liquidity. Instruments used may be exchange-traded or over-the-counter and may be physical securities or derivatives (see Derivatives and Leverage Policy), although significant preference will be given to exchange-traded instruments.

The internally managed Strategy budget will generally be used to purchase exchange-traded equity index put options and equity volatility index call options as means of protecting against severe equity market drawdowns. The use of options on other asset classes is expected to be minimal in volume and frequency, generally occurring only during periods of abnormally high market volatility. Instruments including, but not limited to, equity index futures and VIX futures can be used to synthetically close or hedge option positions. Additional constraints may be applied in investment manager portfolio guidelines or comparable governing documents.

VII. PERFORMANCE OBJECTIVES

The Strategy is designed to provide a large payoff in the event of severe equity market drawdowns. As the timing and potential path of future market events are impossible to predict in advance, the IO will attempt to construct a strategy portfolio that will provide protection in a wide variety of adverse market environments.

In most years, it is expected that the Strategy will not provide a payoff in excess of its annual budget. Importantly, the maximum loss in any year is the annual budget; losses will not exceed this budget.

There is a lack of consensus among market participants as to the most appropriate benchmark for tail risk mitigation strategies, since objectives can differ significantly among participants. For example, some participants may prefer to hedge a longer-term less severe market loss at a much greater cost of protection than that of a shorter-term more severe market loss at a lower cost of protection.

In very broad terms, the payoff profile for the Strategy will have the general contours of a 25% out-of-the-money put option on the S&P 500 with a 3 month expiry, where this protection is periodically rolled and systematically monetized in whole or in part after or amidst a severe equity market drawdown.

For performance reporting purposes, the Strategy will be reflected as an independent line item within the PSERS Total Fund Composite. For the avoidance of doubt, the performance of the Strategy will not be reflected within Equity Exposure. In addition, the loss rate on invested assets will also be monitored and reported[1].[1]

An Investment Manager within the Strategy may be assigned a specific benchmark, and the specific benchmark, if assigned, may vary from Investment Manager to Investment Manager.

VIII. RISK MANAGEMENT

Risk is managed through a combination of quantitative and qualitative constraints. The following sub-sections identify the key risks within the Tail Risk Mitigation Strategy:

A. Active Risk

The Strategy represents insurance against severe market drawdowns, and given the infrequency of such drawdowns, the performance of the Strategy is expected to be negative across most market environments. The extent of negative returns is constrained by the annual premium budget as explained above. The extent of any positive returns is uncertain and may vary significantly depending on the nature of the drawdown.

B. Liquidity Risk

Investment structure impacts liquidity. Therefore, consideration is given to separate accounts and internally managed accounts over commingled accounts, given their greater control and transparency. Instruments will be liquid in order to monetize (lock-in) any payoff arising as a result of a large equity market drawdown. Significant preference will be given to instruments that trade in deep and highly liquid markets in order to reduce the likelihood that deteriorating market liquidity during a period of market stress will negatively impact trade execution quality.

C. Currency Risk

It is expected that investments within the Strategy will be primarily U.S. Dollar based and that currency risk will not be a significant factor.

[1] This is intended to capture the percentage of dollars lost (gained) as a percentage of invested dollars over the period. i.e. If $50 million is invested during the reporting period and monetizing positions yields a $5 million gain and $20 million in principal recovery, the loss rate would be 50%.

D. Manager Risk

The maximum allocation to a single External Manager mandate shall be determined at the CIO's discretion. There may be allocations to multiple External Managers throughout the life of this Strategy. The CIO shall have discretion on the timing of reducing any External Manager portfolio exceeding the limit in order to manage the economic impact of such a change. However, the CIO is not permitted to allocate additional exposure to those portfolios currently above the limit. Investments should have clearly articulated and viable exit strategies through which assets can be disposed of or liquidated upon termination of any External Manager.

E. Derivatives Risk

Derivatives usage and limitations as well as risk management are specified in manager guidelines and shall comply with the Derivatives and Leverage Policy.

F. Counterparty Risk

Counterparty risk will be as prescribed and evaluated in the Derivatives and Leverage Policy. In general, the Strategy will seek to limit counterparty risk through the use of exchange-traded options as its primary instruments. Non-exchange traded instruments may be used on a limited basis in accordance with the Derivatives and Leverage Policy.

G. Leverage Risk

Leverage usage and limitations as well as risk management are specified in manager guidelines and shall comply with the Derivatives and Leverage Policy.

H. Portfolio Risk

A key component of managing the Strategy is actively monetizing the gains and redeploying the gains in other asset classes while maintaining some level of protection. Monetizing gains enables rebalancing, but may reduce the size of the hedge in order to do so; not monetizing preserves the size of the hedge, but risks losing all unrealized gains if the market rebounds. Some proportion of realized gains may be reinvested into purchasing protection at the discretion of the IO to help mitigate the risk of a reduction in hedge size.

IX. MONITORING AND REPORTING

See Monitoring and Reporting section of the IPS.