

BEFORE THE BOARD OF COMMISSIONERS OF LANE COUNTY, OREGON

ORDER AND RESOLUTION NO: 22-05-24-13 IN THE MATTER OF AUTHORIZING FINANCING OF
FULL FAITH AND CREDIT BONDS AND RELATED
MATTERS.

A. Lane County, Oregon (the "County") is authorized by Oregon Revised Statutes ("ORS") 238.692 to 238.698 (the "Act") to issue revenue bonds pursuant to ORS Chapter 287A to finance its pension liability as defined in ORS 238.692(1); and

B. ORS 238.694(4) limits the amount of revenue bonds that the County may issue under the Act to no more than five percent of the real market value of the taxable property within the boundaries of the County, unless the charter of the County provides a lower limit; and

C. The charter of the County does not limit the amount of revenue bonds the County may issue under the Act; and

D. The County has an unfunded actuarial liability (the "Pension Liability") to the Oregon Public Employees Retirement System ("OPERS") and,

E. OPERS' actuary estimated that the County's Pension Liability was approximately \$270,020,187 as of December 31, 2020; and

F. ORS 238.697 requires that the County (1) obtain a statistically based assessment from an independent economic or financial consulting firm regarding the likelihood that investment returns on bond proceeds will exceed the interest cost of the bonds under various market conditions and (2) make a report (the "Report") available to the general public that (a) describes the result of the assessment and (b) discloses whether the County has retained the services of an independent SEC-registered advisor; and

G. The Report is attached hereto as Exhibit A and the County has obtained an assessment (the "Assessment"), dated January 6, 2022 from ECONorthwest, an independent economic consulting firm, which is attached to the Report; and

H. The County understands that the Assessment is based on facts and assumptions that are subject to change; and

I. OPERS requires the County to pay its Pension Liability over a period of years with interest at the OPERS assumed earnings rate, which is currently 6.90%; and

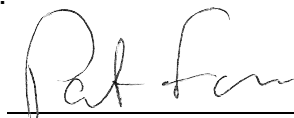
J. Current interest rates in the bond market are below that rate of return that OPERS may receive in the future creating the opportunity for the County to finance all or a portion of its Pension Liability and to potentially reduce its costs.

RESOLUTION

1. The Board of Commissioners (the "Board") of the County hereby authorizes the issuance of full faith and credit bonds ("Bonds") in accordance with this resolution and in an amount which does not exceed the amount necessary to produce net proceeds equal to the Pension Liability as reported by the OPERS's actuary as of the expected date of the lump sum payment, plus estimated costs of issuing the Bonds.
2. Bond proceeds shall be used to pay all or a portion of the Pension Liability and to pay costs of issuing the Bonds. The County may direct that a portion of the Bond proceeds be directly paid to OPERS after closing and a portion be retained by the County for payment to OPERS over time as determined by the County Administrator or the County Treasurer, or the person designated by either of those individuals to act under this resolution (each a "County Official").
3. As of the date of this resolution, OPERS charges the County a rate of 6.90 percent per annum on its unfunded liability because that is the assumed rate of return that OPERS expects, over the long term, to earn on its investments. Issuing Bonds at a lower rate of interest and depositing proceeds at OPERS in a Side Account ("Side Account") may reduce costs for the County if the rate of return on the Bond proceeds deposited in the Side Account exceeds the borrowing costs. To maximize the potential for the rate of return on the OPERS fund to exceed the rate of interest on the Bond, the Bond shall not be sold at a true interest cost of more than 4.5% per annum.
4. The County Official shall compare the cash flows required to pay the Bonds to the payroll rate credit currently estimated from the Side Account and determine a Bond structure which the County Official estimates will be advantageous to the County.
5. The County Official is authorized to execute a letter to be sent to OPERS requesting the necessary payoff figures and to pay any fees required in connection therewith or, if such letter has been executed prior to the adoption of this resolution, the Board hereby ratifies such action.
6. In addition, the County Official may, on behalf of the County, and without further action by the Board:
 - a. Sell or issue the Bonds in one or more series, which may be sold at different times.
 - b. Participate in the preparation of, authorize the distribution of, and deem final any official statement or other disclosure documents relating to the Bonds.
 - c. Enter into covenants for the benefit of owners of the Bonds that are intended to improve the terms under which the Bonds are issued.

- d. Apply for ratings on the Bonds and purchase municipal bond insurance or obtain other forms of credit enhancements for the Bonds, enter into agreements with the providers of credit enhancement, and execute and deliver related documents.
 - e. Publish a notice of sale, receive bids and award the sale of each series of the Bonds to the bidder complying with the notice and offering the most favorable terms to the County, or select one or more underwriters or other lenders and negotiate the sale of any series with those underwriters or other lenders.
 - f. Appoint a paying agent, municipal advisor, bond counsel, and/or any other professionals whose services are desirable for the Bonds and negotiate the terms of and execute any agreements with such professionals.
 - g. Establish the final principal amount, payment schedule, interest rates (subject to the limit in Section 3 of this resolution), and other terms of the Bonds.
 - h. Undertake to provide continuing disclosure for the Bonds in accordance with Rule 15c2-12 of the United States Securities and Exchange Commission and any other applicable requirements of the United States Securities and Exchange Commission and any other federal agencies.
 - i. Enter into one more bond declarations or similar documents, which describe the terms of the Bonds.
 - j. Execute and deliver any agreements or other documents, and take any other action in connection with the Bonds that a County Official finds is desirable to issue the Bonds in accordance with this resolution.
7. The Bonds shall be payable from all lawfully available funds of the County and shall be secured by the County's full faith and credit and taxing power within the limitations of Article XI, Sections 11 and 11b of the Oregon Constitution as permitted by the Act and ORS 287A.315.
8. This resolution shall take effect on the date of its adoption by the Board.

Dated this 24th day of May, 2022.



Pat Farr, Chair
Lane County Board of Commissioners

Exhibit A

Report on Bonds

Prior to the issuance of the full faith and credit bonds, Lane County has obtained a statistically based assessment from ECONorthwest entitled “Issuance of Pension Obligation Bonds – A Risk/Reward Analysis” dated January 6, 2022 (the “Assessment”) pursuant to ORS 238.697(1)(a).

The County has prepared this report pursuant to ORS 238.697(1)(b) (the “Report”).

In connection with the issuance of its full faith and credit bonds, the County has retained the services of Piper Sandler & Co., an independent municipal advisor registered with the Securities and Exchange Commission.

The Assessment is attached to this Report as Exhibit 1.

A description of the results of the Assessment follows:

DATE: January 10, 2022

FROM: ECONorthwest

SUBJECT: Pension Obligation Bond Analysis Executive Summary

Introduction

ECONorthwest recently conducted an analysis to evaluate the risks and rewards of issuance of Pension Obligation Bonds (POBs) by public employers that are part of the Oregon Public Employee Retirement System (OPERS).¹ For this analysis, we assumed that officials of governmental entities receiving our report are in a position to finance such bonds. Proceeds from the POBs would be added to, or used to create, side account balances to be managed in the same way as other PERS assets, by the Investment Division of the Oregon Treasury under the guidance of the Oregon Investment Council (OIC). This executive summary outlines the motivation for issuing POBs, our analytic methodology, and findings from our analysis. Additional details about the analysis are presented in our main report.

Background

Like many other states, Oregon's PERS has seen a growing gap between the cost of PERS benefits promised to participating public employees and the funding available for those benefits, resulting in an unfunded actuarial liability (UAL). Resolving the UAL will require increasing contributions from participating public employers over a long period of time. Pension obligation bonds, if issued in an economical manner and invested in a higher yielding portfolio, can potentially improve the ability of employers to pay their share of PERS obligations to the OPERS fund. Whether or not issuance of POBs makes sense in this setting will depend upon the likely evolution of side account returns relative to true interest cost (TIC) of the POBs.

Employers may benefit if the TIC of a bond issue is low relative to the potential return opportunities of a PERS side account over the same future period as the bond issues. However, this outcome is by no means assured. The true interest cost of carrying the POB debt would be known, but the employer also has to consider the risks associated with the fact that the future rate of returns to side account deposits are not known with

¹ The analysis provided in this document was developed by ECONorthwest for informational purposes only. All possible professional care was taken to prepare a realistic emulation of the likely POB side account behavior, and the OPERS procedures for accommodating POBs. State of the art modeling and statistical software was employed in this exercise. It should be recognized, however, that there are practical limits to the precision with which market and agency behavior can be modeled. The generic nature of the modeling performed may or may not be relevant to the circumstances of any one public employer. Additionally, nothing herein should be construed as offering investment advice or fairness opinions for the purpose of issuing securities. For this, interested parties should seek out professional counsel.

certainty. This uncertainty may have consequences for future expenses of the PERS system and revenues needed to pay the POB debt.

Portfolio allocation and other decisions made by the OIC influence the performance of the OPERS assets, as can the timing of the issuance of POBs. The primary determinants of the risk to POB issuers are (1) uncertainty in the performance of the asset classes that comprise the side account, (2) asset allocation choices made by the trustees of that account, and (3) the interactions of these factors with the POB strategy of the public employer(s).

To quantify these risks, our analysis models side account performance over time under various market conditions and bond issuance scenarios. The results quantify the potential risks and rewards of POBs under the assumed conditions.

Methodology

The model simulates side account performance using portfolio allocation targets obtained from OIC documents, and on forecasts of anticipated asset returns, based on reports from Oregon Treasury Investment Division staff, their consultants, and OPERS actuaries. We combine this information with assumptions about side account management. Specifically, we assume:

1. Side account balances are amortized at a constant share of payroll over the remaining life of the side account (assumed to expire on 12/31/2041, during fiscal year 2042).
2. Funds equal to the relevant percent of payroll are removed from the account as employer rate relief.
3. Earnings on side account deposits are credited annually.

To characterize the distribution of potential benefits to employers of POB issuance, we conduct 20,000 simulations of side account performance over the life of the account for each of four assumed POB TICs (2.5 percent, 3.5 percent, and 4.5 percent). Each simulation represents a different, potential future path of account returns over time. For each simulation, we compare the benefits provided to employers in the form of rate relief to the cost of bond repayment. In doing so, we quantify two important measures of risk and reward:

- **The net present value (NPV) of POB issuance.** This measure identifies the current value to employers of future benefits of POB issuance (the extent to which rate relief obtained exceeds bond repayments).

- **The probability that NPV is greater than zero.** This measure of risk identifies the likelihood, given the assumptions in the model, that the current value of POB issuance would prove beneficial to the employer (if NPV falls below zero, POB issuance is more costly to the employer than not issuing bonds).

Summary of findings

The findings presented below refer to an initial side account deposit of \$1 million. The results can be scaled to approximate the potential risks and rewards of larger or smaller deposits. For example, a \$2 million deposit would generate a benefit or loss of two times the dollar amounts shown in the charts and tables below. The probability that the NPV is greater than zero depends on the TIC, not on the size of the initial deposit.

Our analysis assumes a maturity date for the bonds in fiscal year 2042. **The projected annualized geometric mean return over the term of the bonds is 6.7 percent,**² with a 5th percentile annualized return of 2.9 percent and a 95th percentile annualized return of 10.6 percent.

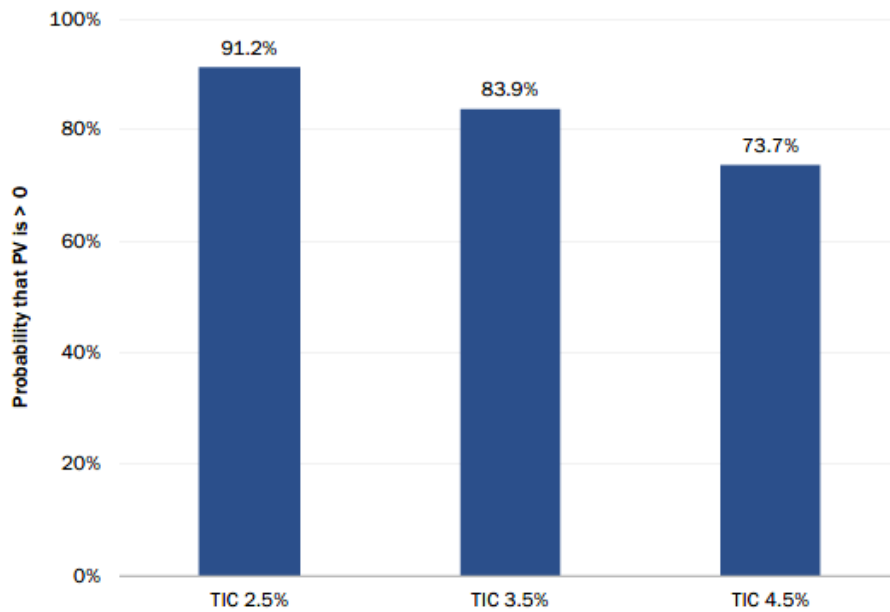
Figure 1 shows the probability that the net present value of POB issuance is greater than zero. As the chart demonstrates, this probability declines as the TIC increases. Figure 2 illustrates the range (5th percentile, median, and 95th percentile) of net present values obtained from the simulations for each TIC. This distribution shifts downward as TIC increases.

The 5th percentile net present value falls below zero at every TIC. With a TIC of 2.5 percent, the 5th percentile net present value is less than one percent of the initial deposit. This ratio increases with TIC (16.1 percent at 3.5 percent TIC and 26.3 percent at 4.5 percent TIC). These values, in combination with the probabilities described above, quantify some of the financial risks of POB issuance.

Figure 3 provides additional detail about the distribution of outcomes. As illustrated in earlier figures, outcomes at every point in the distribution are more positive at lower TICs. Net present values are also somewhat more volatile at lower TICs, as evidenced by the higher standard deviation of the calculated net present value.

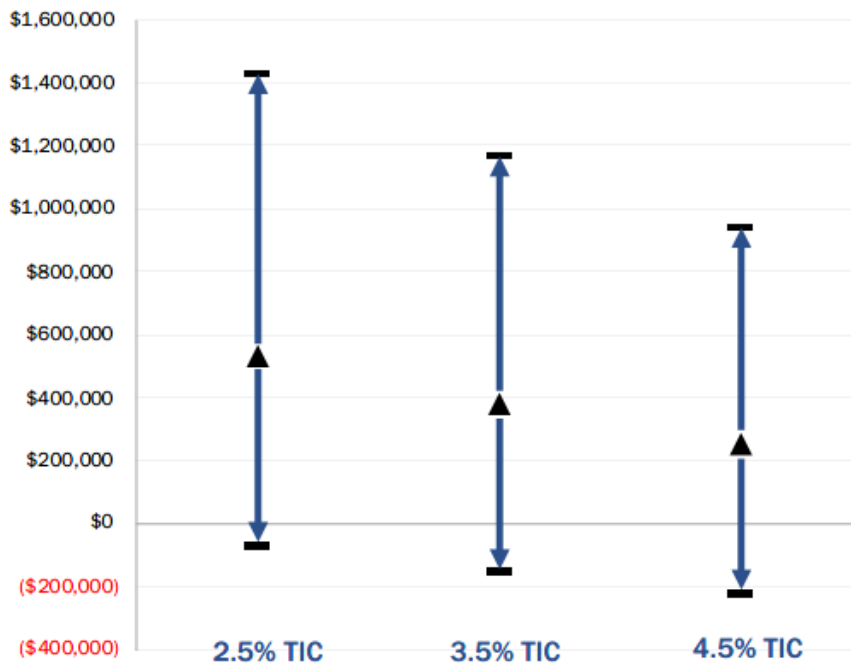
² The geometric mean return is a required statistic that borrowers will need to supply annually to the State Treasurer under ORS 238.697.

Figure 1: Probability that the net present value of POB issuance is greater than zero, various TICs



Source: ECONorthwest.

Figure 2: 5th percentile, mean, and 95th percentile net present value, various TICs



Source: ECONorthwest.

Figure 3: Distribution of net present value and probability of a positive net present value, various TICs

No. of Tranches	1	1	1
Rate (TIC)	2.5%	3.5%	4.5%
Mean	\$532,169	\$380,827	\$249,506
Std Deviation	\$478,197	\$420,247	\$370,684
Maximum	\$5,115,607	\$4,334,906	\$3,671,543
Minimum	\$(442,078)	\$(484,204)	\$(521,188)
95th Perc	\$1,433,780	\$1,170,804	\$945,826
90th Perc	\$1,135,804	\$914,213	\$722,099
75th Perc	\$769,779	\$589,757	\$434,891
50th Perc	\$443,956	\$304,281	\$182,808
25th Perc	\$197,986	\$86,494	\$(10,533)
10th Perc	\$20,226	\$(70,448)	\$(149,981)
5th Perc (VaR)	\$(71,045)	\$(150,608)	\$(220,678)
Zero Bound Perc	91.2%	83.9%	73.7%

Source: ECONorthwest.

For the modeled scenarios, the expected value to employers of a POB strategy is positive in net present value terms, with the expect value being a non-trivial proportion of POB funding under the scenarios modeled in this summary. However, there is also a non-trivial probability that the net present value of POBs is zero or less. This probability increases as the TIC increases.

In determining whether to pursue a POB issue, employers should also assess the potential effect of several additional considerations on the anticipated benefits:

- Actual issuance TIC may differ from those in the scenarios
- The TIC does not capture some issuance costs
- The employer's payroll growth rate may differ significantly from that assumed by the PERS actuary³

³ As of December 2021, the assumed payroll growth rate was 3.4 percent. This assumption was retrieved from Oregon's PERS By The Numbers report, which can be accessed here: <https://www.oregon.gov/pers/Documents/General-Information/PERS-by-the-Numbers.pdf>.

**Exhibit 1
Assessment**

**Issuance of Pension
Obligation Bonds
*A Risk/Reward Analysis***
Update

January 6, 2022

**Andrew Dyke, PhD
Randall J. Pozdena, PhD**

ECONorthwest
ECONOMICS • FINANCE • PLANNING

Introduction



- Introduction and purpose of this analysis
- Approach
 - Monte Carlo Methodology
 - Asset Return and Allocation Assumptions
 - Alternative Scenarios Modeled
- Model Findings
 - Side Account Performance and the Potential Benefits of POBs to Employers
- Implications
- Acknowledgements, Caveats and Disclaimers

This analysis was prepared to assist issuers of POBs in understanding the risks and returns of POBs under hypothetical conditions. Individuals should seek professional guidance concerning the relevance of this analysis to their circumstances.

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- POBs are bonds issued by state or local governments to fund public employee pension obligations
 - First issued by City of Oakland in 1986 to arbitrage between tax-exempt borrowing rates and higher market investment yields of pension assets
 - The public employer benefits if the returns on investments of bond funds are greater than the costs of borrowing
- The Tax Reform Act of 1986 eliminated tax exemption for POBs
 - Higher yields of diversified portfolios relative to borrowing costs revived POB arbitrage opportunities in 1990s
- Still seen as a potential way to lower cost of pension funding
 - Use is heaviest by high-UAL plans, including Oregon

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Purpose of this Analysis

- Measure the potential risks and rewards of POBs
- The potential advantages of POBs to public employers depend upon the relative performance of the investment vehicle (“side account”) and POB issuance costs
 - Issuance of POBs may reduce employer costs of pension funding
 - However, high side account yields are not achieved without risk
- Key measures of POB performance
 - The mean expected net present value (NPV) of side account returns relative to POB total interest costs
 - The risk profile of the NPV given uncertainty about side account returns

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Approach



Approach: Monte Carlo Simulation

- Quantifying advantages to issuers is complex
 - The future path of asset yields is not known precisely
 - Side account management and actuarial treatment of POB contributions must be emulated
- ECONorthwest uses Monte Carlo techniques to simulate uncertainty in side account performance
 - Individual asset class returns are stochastic
 - Rebalancing behaviors are linked to asset returns paths
- ECONorthwest POB model also emulates POB and Plan features
 - Alternative True Interest Cost (TIC) of the POB issue
 - Actuarial treatment of POB contributions

This analysis was prepared to assist issuers of POBs in understanding the risks and returns of POBs under hypothetical conditions. Individuals should seek professional guidance concerning the relevance of this analysis to their circumstances.

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Model Assumptions

- Three issuance cost (TIC) assumptions: 2.5%, 3.5%, and 4.5%
- Our analysis uses the portfolio target and assumed asset returns characteristics current as of December 2021.
- Initial portfolio allocation based on OPERF assets as of 10/31/2021.
- All analyses assume a \$1 m total POB contribution to facilitate scaling.
- Net present value calculations include calculated earnings through December 2041 (assumed end of the side account) and bond costs through June 2042.
- We apply a discount rate of 2.5% to calculate net present value.

This analysis was prepared to assist issuers of POBs in understanding the risks and returns of POBs under hypothetical conditions. Individuals should seek professional guidance concerning the relevance of this analysis to their circumstances.

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Asset Return and Allocation Assumptions

Asset Class	Future Returns and Volatility		Portfolio Allocation		
	Mean	St. Dev.	Range	Target	Current*
Public Equity	6.5%	18.0%	25.0 - 35.0%	30.0%	27.5%
Real Assets	7.5%	18.8%	2.5 - 10.0%	7.5%	6.3%
Diversifying Strategies	4.4%	9.9%	2.5 - 10.0%	7.5%	3.6%
Fixed Income	1.7%	4.0%	15.0 - 25.0%	20.0%	20.7%
Private Equity	8.5%	28.0%	15.0 - 27.5%	20.0%	26.6%
Real Estate	6.2%	13.8%	7.5 - 17.5%	12.5%	10.7%
Risk Parity	5.2%	12.0%	0.0 - 3.5%	2.5%	2.4%
Opportunity Portfolio	–	–	0.0 - 5.0%	0.0%	2.2%

Source: ECONorthwest from OIC data.

Notes:

*Current allocation is based on 10/31/2021 valuation.

Asset Return and Allocation Assumptions

Asset Class Returns Correlation over Time							
Asset Class	Public Equity	Fixed Income	Risk Parity	Private Equity	Real Estate	Real Assets	Diversifying Strategies
Public Equity	1.00	0.08	0.73	0.80	0.41	0.72	0.19
Fixed Income	0.08	1.00	0.49	0.00	0.23	0.23	0.25
Risk Parity	0.73	0.49	1.00	0.20	0.29	0.37	0.32
Private Equity	0.80	0.00	0.20	1.00	0.44	0.64	0.07
Real Estate	0.41	0.23	0.29	0.44	1.00	0.62	0.04
Real Assets	0.72	0.23	0.37	0.64	0.62	1.00	0.19
Diversifying strategies	0.19	0.25	0.32	0.07	0.04	0.19	1.00

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Account Amortization

- Side account balances are influenced by amortization procedures
 - Balances amortized as a constant percent of payroll over remaining life of the side account (the account is assumed to end on 12/31/2041)
 - Each year, the percent of payroll that is determined by the amortization is taken out of the modeled side account balance for employer rate relief
 - Assumed earnings rate of 6.9% and 3.4% payroll growth rate are used in amortization
- Current plan procedures are incorporated:
 - Credited earnings and deducted transfers to the Employer Reserve for rate relief are accommodated
- Earnings are credited annually at the simulated portfolio rate of return
 - Applied to the beginning balance for the year minus one half of the amount taken out for rate relief

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Model Results

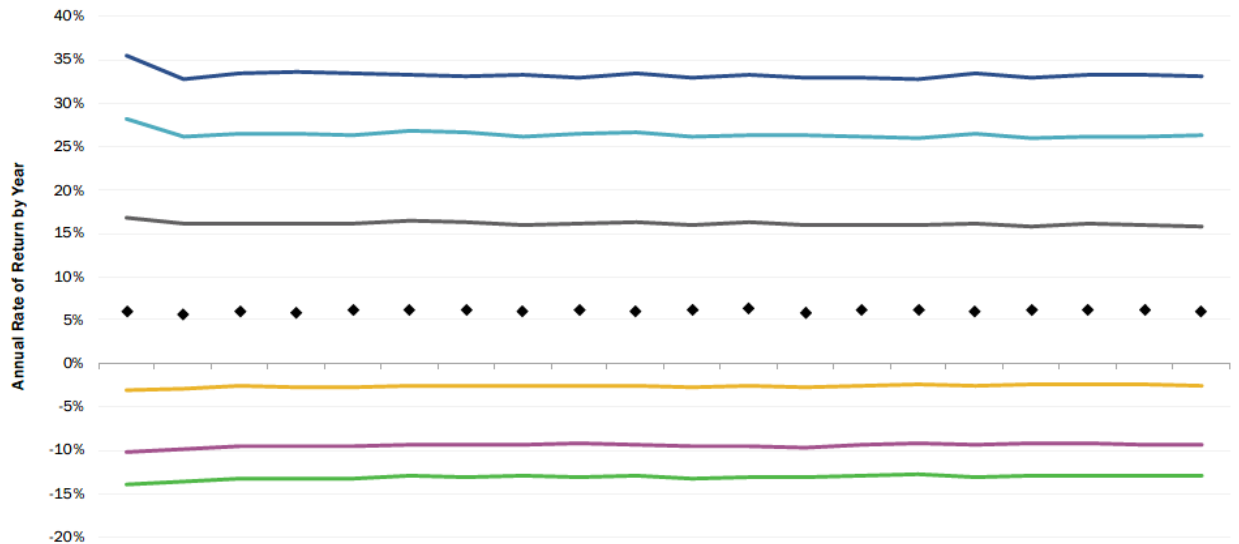


Mean Annual Side Account Returns

- The forecast extends to fiscal year 2042, the last year the side account exists
 - **Trend in mean annual return:** Decreases from 7.8% in 2023 to 7.5% as of the 2042 forecast horizon
 - **Trend in 95th percentile return:** Decreases from 35.4% in 2023 to 33.1% as of the 2042 forecast horizon
 - **Trend in 5th percentile return:** Increases from -14.0% in 2023 to -13.0% as of the 2042 forecast horizon
- Trends are similar to recent forecasts by consultants to OIC/OST and OPERS

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Mean Annual Side Account Return and Range



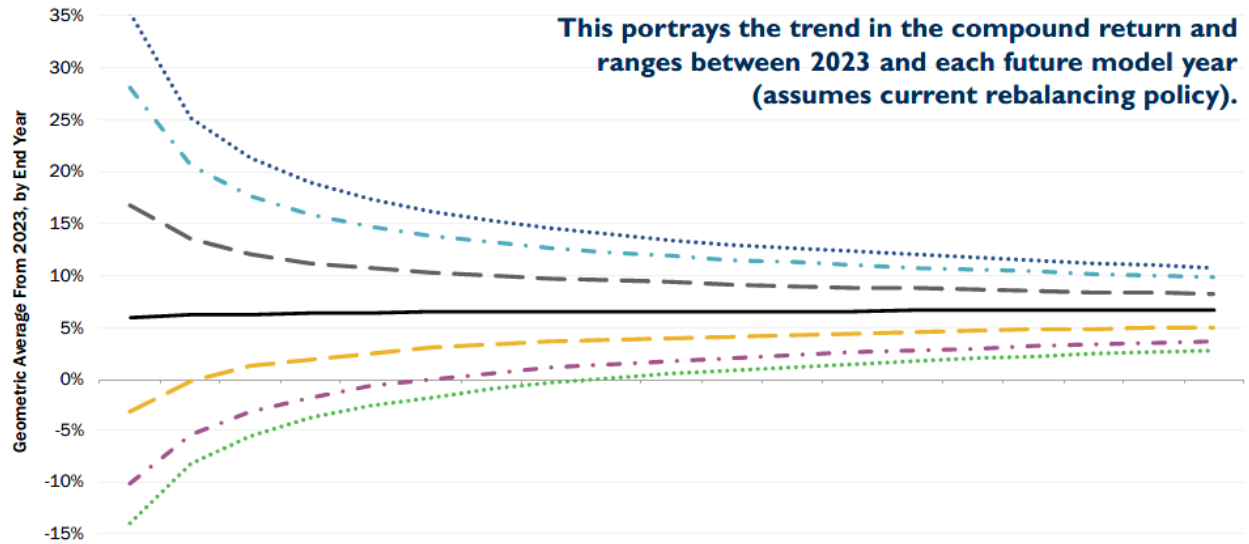
Percentile	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
95th	35.4%	32.8%	33.4%	33.5%	33.5%	33.3%	33.1%	33.2%	32.9%	33.5%	32.9%	33.2%	32.9%	33.0%	32.8%	33.5%	32.9%	33.3%	33.2%	33.1%
90th	28.1%	26.1%	26.5%	26.5%	26.3%	26.8%	26.7%	26.1%	26.4%	26.6%	26.2%	26.4%	26.3%	26.2%	26.0%	26.5%	26.0%	26.2%	26.1%	26.3%
75th	16.8%	16.1%	16.1%	16.0%	16.1%	16.4%	16.3%	15.9%	16.2%	16.2%	15.9%	16.2%	16.0%	15.9%	16.0%	16.1%	15.8%	16.1%	16.0%	15.8%
50th	6.0%	5.7%	6.1%	5.9%	6.2%	6.2%	6.1%	6.0%	6.2%	5.9%	6.1%	6.3%	5.9%	6.1%	6.2%	6.0%	6.1%	6.1%	6.1%	6.0%
25th	-3.1%	-2.9%	-2.6%	-2.7%	-2.7%	-2.6%	-2.6%	-2.6%	-2.5%	-2.5%	-2.7%	-2.5%	-2.7%	-2.5%	-2.4%	-2.5%	-2.5%	-2.5%	-2.5%	-2.6%
10th	-10.2%	-9.9%	-9.5%	-9.5%	-9.6%	-9.3%	-9.4%	-9.3%	-9.2%	-9.3%	-9.5%	-9.5%	-9.6%	-9.3%	-9.2%	-9.4%	-9.2%	-9.2%	-9.3%	-9.3%
5th	-14.0%	-13.6%	-13.3%	-13.3%	-13.2%	-13.0%	-13.0%	-13.0%	-13.1%	-12.9%	-13.3%	-13.1%	-13.1%	-13.0%	-12.8%	-13.2%	-12.9%	-13.0%	-13.0%	-13.0%

Geometric Mean Returns

- Fiscal year 2042 is the assumed final year of bonds
 - The projected annualized geometric mean return over the term of the bonds is 6.7%
 - The 95th percentile return is 10.6%
 - The 5th percentile return is 2.9%
- These forecast returns are also similar to those derived by other consultants to OIC and OPERS

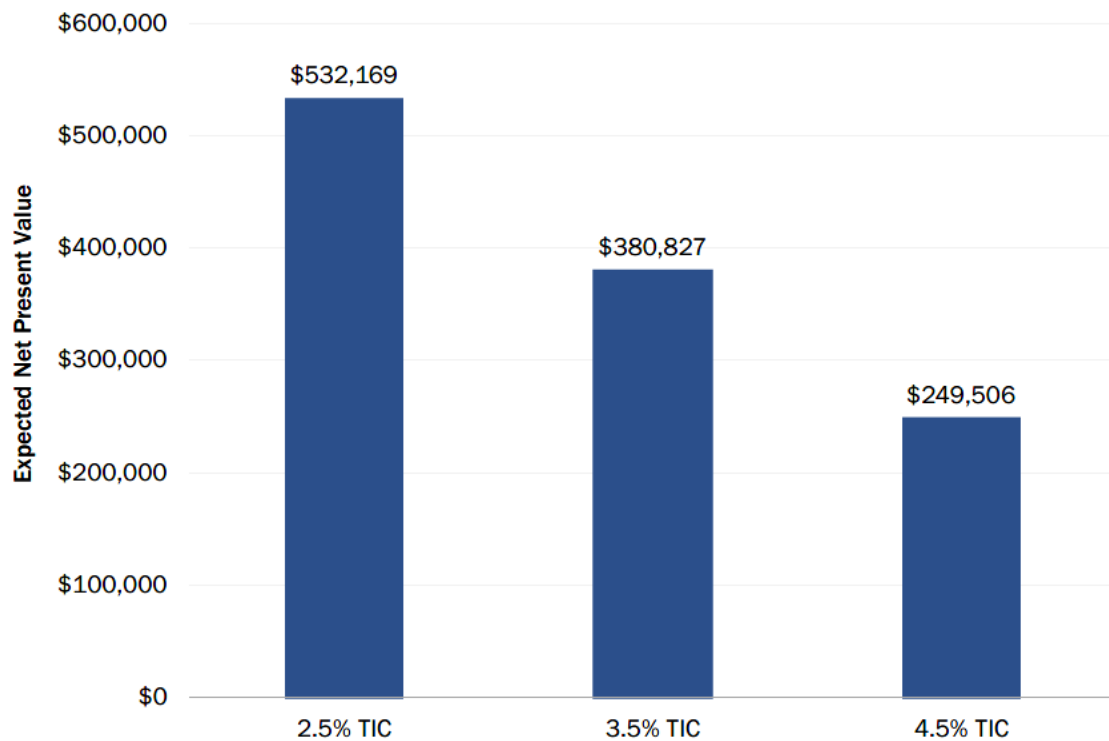
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Geometric Mean Returns from 2023, by Year



Percentile	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
95th	35.4%	25.2%	21.3%	19.0%	17.3%	16.1%	15.2%	14.5%	14.0%	13.4%	13.0%	12.6%	12.3%	12.0%	11.7%	11.5%	11.2%	11.0%	10.8%	10.6%
90th	28.1%	20.5%	17.6%	15.9%	14.7%	13.9%	13.2%	12.7%	12.2%	11.8%	11.5%	11.2%	11.0%	10.7%	10.5%	10.3%	10.1%	10.0%	9.8%	9.7%
75th	16.8%	13.5%	12.1%	11.2%	10.7%	10.3%	10.0%	9.7%	9.5%	9.3%	9.1%	9.0%	8.8%	8.7%	8.6%	8.5%	8.4%	8.3%	8.2%	8.2%
50th	6.0%	6.1%	6.2%	6.4%	6.4%	6.5%	6.5%	6.5%	6.5%	6.6%	6.6%	6.6%	6.6%	6.6%	6.6%	6.6%	6.6%	6.6%	6.6%	6.6%
25th	-3.1%	-0.2%	1.2%	1.9%	2.5%	3.0%	3.3%	3.6%	3.8%	4.0%	4.1%	4.3%	4.4%	4.5%	4.6%	4.7%	4.9%	4.9%	5.0%	5.1%
10th	-10.2%	-5.4%	-3.1%	-1.8%	-0.7%	-0.1%	0.6%	1.0%	1.4%	1.7%	2.0%	2.3%	2.5%	2.7%	3.0%	3.1%	3.3%	3.5%	3.6%	3.7%
5th	-14.0%	-8.2%	-5.5%	-3.8%	-2.6%	-1.8%	-1.0%	-0.4%	0.1%	0.5%	0.8%	1.1%	1.5%	1.7%	2.0%	2.2%	2.4%	2.6%	2.8%	2.9%

NPV of the POB strategy varies inversely with TIC



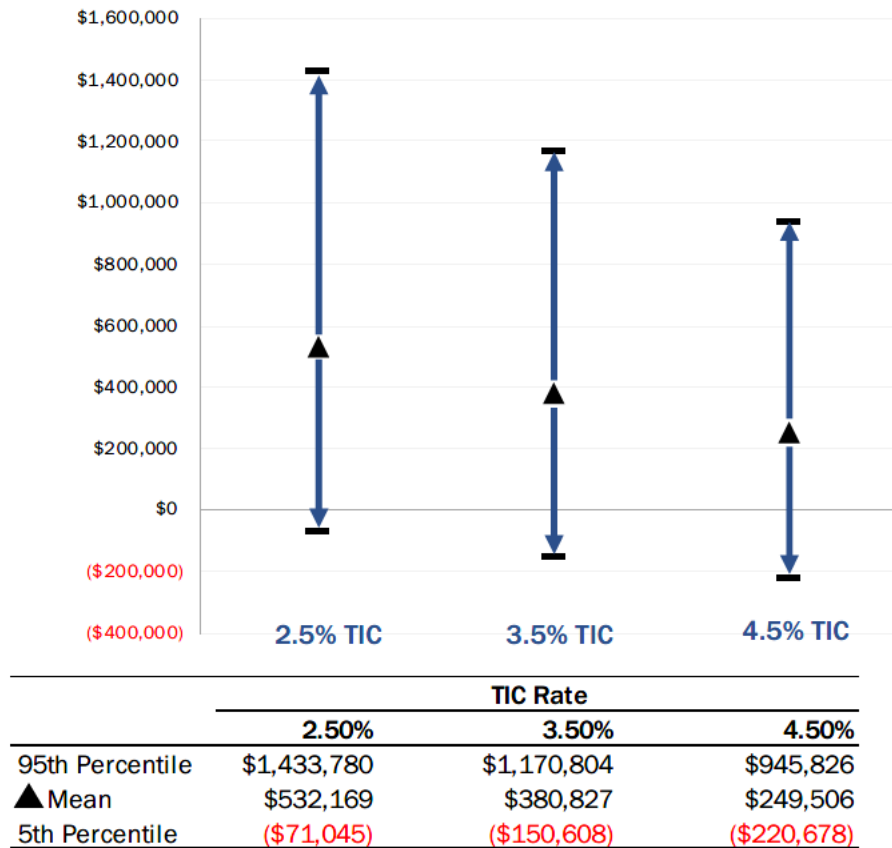
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Measuring the risk of POBs

- Value at risk (VaR) provides one measure for the risk of POB issuance
- The 5th percentile VaR identifies the outcome the model indicates would be exceeded with a 95 percent probability
- In other words, there is a 95 percent chance the net present value will be positive or reflect a smaller loss than the VaR and a 5 percent chance the NPV will be a larger loss.

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The Effect of TIC on NPV of POBs



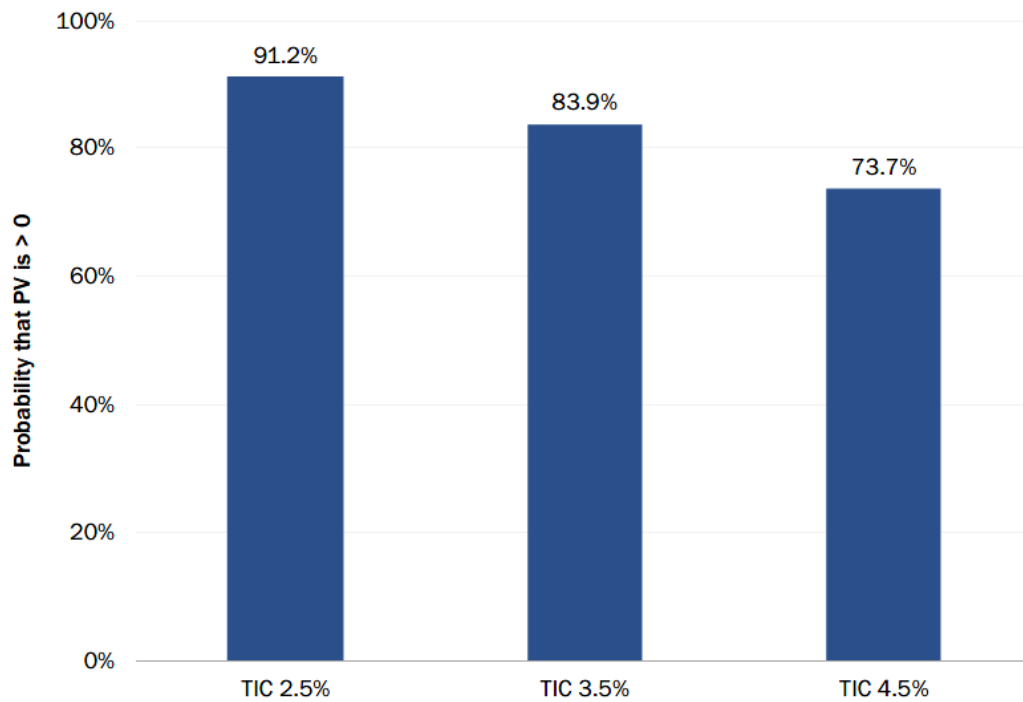
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POB Probability of Success: NPV > \$0

- The “probability of success” is another perspective on risk
 - The VaR measures the 5th percentile dollar value at risk
 - The zero bound measures the overall probability of the dollar value of the NPV benefit being more than zero (i.e., success)
- Model results
 - The probability of a positive NPV is lower for higher TICs
 - Probabilities of being above zero range from a high of 91.2% (TIC 2.5%) to 73.7% (TIC 4.5%).

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Probability that NPV is More than \$0



Summary Statistics, by Scenario

No. of Tranches	1	1	1
Rate (TIC)	2.5%	3.5%	4.5%
Mean	\$532,169	\$380,827	\$249,506
Std Deviation	\$478,197	\$420,247	\$370,684
Maximum	\$5,115,607	\$4,334,906	\$3,671,543
Minimum	\$(442,078)	\$(484,204)	\$(521,188)
95th Perc	\$1,433,780	\$1,170,804	\$945,826
90th Perc	\$1,135,804	\$914,213	\$722,099
75th Perc	\$769,779	\$589,757	\$434,891
50th Perc	\$443,956	\$304,281	\$182,808
25th Perc	\$197,986	\$86,494	\$(10,533)
10th Perc	\$20,226	\$(70,448)	\$(149,981)
5th Perc (VaR)	\$(71,045)	\$(150,608)	\$(220,678)
Zero Bound Perc	91.2%	83.9%	73.7%

This table summarizes the simulations of the net present value of potential gains from implementing a POB strategy. All dollar amounts are per \$1 million of POB funding.

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- The expected value to employers of a POB strategy is positive (in net present value terms)
 - The expected value is non-trivial proportion of POB funding under the scenarios modeled
- However, there is a non-trivial probability that the net present value of POBs is zero or less, and the probability increases with TIC
- Important considerations for individual employers
 - The actual issuance TIC
 - Some issuance costs are not included in TIC
 - Whether the employer's payroll growth rate is the same as currently assumed by the PERS actuary

Acknowledgements, Caveats, and Disclaimers

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The analysis provided in this document was developed by ECONorthwest for informational purposes only. All possible professional care was taken to prepare a realistic emulation of the likely POB side account behavior, and the OPERS procedures for accommodating POBs. State of the art modeling and statistical software was employed in this exercise. It should be recognized, however, that there are practical limits to the precision with which market and agency behavior can be modeled. The generic nature of the modeling performed may or may not be relevant to the circumstances of any one public employer. Additionally, nothing herein should be construed as offering investment advice or fairness opinions for the purpose of issuing securities. For this, interested parties should seek out professional counsel.

This analysis takes the narrow perspective of measuring the potential benefits of POB issuance to current employers and taxpayers. Whether use of pension obligation bonds is good public policy is a matter of professional debate and is not addressed herein.

This analysis was prepared to assist issuers of POBs in understanding the risks and returns of POBs under hypothetical conditions. Individuals should seek professional guidance concerning the relevance of this analysis to their circumstances.

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