

SWIB Board Meeting of December 14, 2022

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Name of Meeting: Regular Meeting of the Board of Trustees
Date/Time: Tuesday, December 13, 2022 5:30 pm
Location: Great Dane Pub & Brewing Co.
Address: 123 E. Doty Street, Madison WI 53703

Estimated Time	OPEN SESSION
5:30 pm	<p>Reception*</p> <p>Great Dane Pub & Brewing Co. 123 E. Doty Street Madison, WI</p> <p>Adjourn until Wednesday, December 14, 2022</p>

**The Reception is open to the public. If a member of the public wishes to attend, please notify SWIB at 608-261-9341 or email dawn.tuescher@swib.state.wi.us on or before December 13th.*

Name of Meeting: Regular Meeting of the Board of Trustees

Date/Time: Wednesday, December 14, 2022 9:00 am

Room: Board Room, 2nd Floor

Address: 121 E. Wilson St., Madison WI 53703

OPEN SESSION	
1. Committee Reports – Open Session Items	<ul style="list-style-type: none"> A. Strategic Planning and Corporate Governance Committee B. Benchmark and Performance Committee C. Audit and Finance Committee D. Compensation and Workforce Development Committee
2. Consent Agenda	<ul style="list-style-type: none"> A. Minutes of September 14, October 18-19, and November 14, 2022 B. Recommended Actions from Committee Agendas – Open Session Items
3. Investment Performance and Market Updates	<ul style="list-style-type: none"> A. Board Investment Performance Report, Q3 2022 B. Callan Quarterly Report
4. Annual Presentation on Cost Benchmarking	
5. Asset Allocation Recommendations for 2023	
6. Investment Committee Open Session Business	<ul style="list-style-type: none"> A. Amendments to WRS Investment Committee Investment Guidelines B. Approved Open Session Investment Committee Meeting Minutes for August 23, September 27 and October 25, 2022 C. Final Open Session Agenda for November 22, 2022 and Draft Open Session Agendas for December 15, 2022 and January 24, 2023
7. Quarterly Investment Update, Q3 2022	
CLOSED SESSION*	
RECONVENE IN OPEN SESSION	
8. Announcement of Matters Taken Up in Closed Session	

* The motion to go into closed session at this meeting is made pursuant to Sections 19.36(5) and 19.85(1)(e) of the Wisconsin Statutes to (a) consider confidential and proprietary strategies for the investment of public funds relating to specific proprietary investment strategies of internal WRS portfolios, asset allocation, and risk management, and (b) approve prior closed session minutes that discuss the same. The Board may convene in additional closed sessions or announce additional closed session items at the meeting in accordance with the procedure outlined in the Attorney General's Opinion reported at 66 OAG 106 (1977). Whenever a closed session is held, the Board will subsequently reconvene in open session to cover remaining agenda items.

9. In the Absence of Questions, the Following Reports will be Filed Without Comment
(For informational purposes):

- A. Quarterly Charges to Funds Reports, Q3 2022
- B. Private Markets and Funds Alpha Commitments, Q3 2022

10. Future Items for Discussion

- A. Annual Board Agenda Plan

11. Motion to Adjourn

NOTES: Items may be taken in order other than listed.

Estimated times are for planning purposes only. Agenda items will last until discussion is concluded.

The meeting site is physical accessible. Upon prior request, reasonable accommodations will be provided.

Board Meeting

Tab 1 – Committee Reports – Open Session Items

- A. Strategic Planning and Corporate Governance Committee
- B. Benchmark and Performance Committee
- C. Audit and Finance Committee
- D. Compensation and Workforce Development Committee

Board Meeting

Tab 2 – Consent Agenda

- A. Minutes of September 14, October 18-19, and November 14, 2022
- B. Recommended Actions from Committee Agendas – Open Session Items

Regular Meeting of the Board of Trustees

Wednesday, December 14, 2022

STATE OF WISCONSIN INVESTMENT BOARD

CONSENT AGENDA – OPEN SESSION ITEMS

Proposed Motions:

1. Move to approve the Open Session Minutes, Closed Session Minutes, and Executive Closed Session Minutes of September 14, October 18-19, and November 14, 2022, in each case, as presented.
2. Move to: (i) approve the benchmark changes, as recommended by SWIB's benchmark consultant, Verus Advisory, and SWIB's Investment Committee; (ii) approve the effective date of October 1, 2022 for the international small cap equities provisional benchmark that was approved by SWIB's Investment Committee in September 2022; (iii) approve an effective date on or after January 1, 2023, in connection with corresponding asset allocation changes, for all other recommended benchmarks; and (iv) approve that all other benchmarks remain unchanged, each as recommended by the Benchmark and Performance Committee.
3. Move to approve the Total Cost of Management Plan for Calendar Year 2023, as recommended by the Audit and Finance Committee.
4. Move to approve the amended Compensation Philosophy, as amended and recommended by the Compensation and Workforce Development Committee.
5. Move to approve the amended Incentive Compensation Plan — Unclassified Investment Management Staff, as recommended by the Compensation and Workforce Development Committee.
6. Move to approve the Relative Performance Maximums effective beginning in 2023, as recommended by Verus Advisory and the Compensation and Workforce Development Committee.

STATE OF WISCONSIN INVESTMENT BOARD
Board of Trustees Meeting – Open Session

Wednesday, September 14, 2022

Offices of the Investment Board
121 East Wilson Street, Madison, Wisconsin

Board Members Present:

Dave Stein, Chair
Barb Nick, Vice Chair & Secretary
Esther Ancel, Trustee
Kathy Blumenfeld, Trustee
Jeff DeAngelis, Trustee
Kristi Palmer, Trustee
Dave Schalow, Trustee
Clyde Tinnen, Trustee
John Voelker, Trustee

Staff/Others Present:

Nathan Ballard, Senior Legal Counsel
Brandon Brickner, Internal Audit Director
Sara Chandler, Chief Legal Counsel
Hassan Chehime, Head of Risk Management
Edwin Denson, Executive Director/Chief Investment Officer
Anne-Marie Fink, Private Markets & Funds Alpha Chief Investment Officer
Greg Fletcher, Performance Director
Jameson Greenfield, Chief Financial Officer
Mike Jacobs, Agency Business Director
Dave Jordan, Head of Non-Investment Grade Fixed Income
Rochelle Klaskin, Deputy Executive Director/Chief Administrative Officer
Mike Shearer, Head of Investment Grade Fixed Income
Nick Stanton, Head of Multi-Asset Strategies
Dawn Tuescher, Executive Administrative Assistant
Eileen Neill, Verus Advisory
Judith Stadler, Public Attendee
(Some individuals may have attended only portions of the meeting.)

Trustee Stein, Chair of the Board, declared a quorum was present and called the Board of Trustees meeting to order at 9:29 a.m. on September 14, 2022.

1. Committee Reports – Open Session Items

A. Strategic Planning and Corporate Governance Committee

Trustee Nick, Chair of the Strategic Planning and Corporate Governance Committee, reported that in open session, after approving the prior meeting minutes, the Committee heard a report from SWIB's Private Equity Consultant, StepStone. The Committee also heard updates on: (1) corporate governance, proxy voting, and ESG trends; (2) the new SWIB facilities; (3) the upcoming October Board Workshop; and (4)

Project Centum. The Committee also recommended amendments to the Total Cost of Management Plan and Policy. During closed session, the Committee received an additional confidential update regarding Project Centum, heard a report on SWIB's Venture Capital portfolio, and received an update on Board and staff consultant contracts. In executive closed session, the Committee met with Edwin Denson, Executive Director/Chief Investment Officer, for an update on his 2022 performance goals.

B. Audit and Finance Committee

Trustee Palmer, Chair of the Audit and Finance Committee, reported that in open session the Committee approved: **(1)** prior meeting minutes; **(2)** the 2021 Wisconsin Retirement System audited financial statements, which included an unmodified opinion from the Legislative Audit Bureau (LAB); **(3)** the Internal Audit draft audit reports for Internal Equity Index Portfolios and Shorting and Borrowing; and **(4)** an update to the 2022 Internal Audit Plan. The Committee also reviewed open audit issues, previewed the 2023 Internal Audit Plan, and heard an update on the quarterly cost of management. In closed session, after approving prior meeting minutes, the Committee heard a 2022 Security Management, IT and Data Management Update.

C. Compensation and Workforce Development Committee

Trustee Stein, Chair of the Compensation and Workforce Development Committee, reported that in open session, the Committee: **(1)** approved prior meeting minutes; **(2)** considered and recommended amendments to the Compensation Plan; and **(3)** considered and recommended amendments to the Incentive Compensation Deferral Policy. The Committee also received a recruiting update and heard from staff and McLagan regarding the long-term incentive plan to be considered by the Board at the October Board Workshop.

D. Benchmark and Performance Committee

Trustee Schalow, Chair of the Benchmark and Performance Committee, reported that in open session the Committee approved prior meeting minutes and received an Annual Benchmark Preview from staff and Eileen Neill, Verus Advisory.

2. Consent Agenda

Sara Chandler, Chief Legal Counsel, distributed a proposed consent agenda. Trustee Stein asked whether there were any motions listed on the consent agenda that should be removed for further discussion and individual action. Hearing none, he referred to the following items on the consent agenda:

- Move to approve the Open Session Minutes and Closed Session Minutes of June 15, 2022 and August 4, 2022, in each case, as presented.
- Move to approve the amended Total Cost of Management Plan and Policy, as recommended by the Strategic Planning and Corporate Governance Committee.
- Move to approve the amended Compensation Plan, as recommended by the Compensation and Workforce Development Committee.
- Move to approve the amended Incentive Compensation Deferral Policy, as recommended by the Compensation and Workforce Development Committee.

Motion: A motion was made by Trustee Stein and seconded by Trustee Palmer to approve the consent agenda, as presented. The motion passed unanimously.

3. Investment Forum Recap

Edwin Denson, Executive Director/Chief Investment Officer, reviewed the topics and format of the June 2022 Investment Forum and asked for Trustee feedback. Mr. Denson stated that the virtual format made it easier to secure desired speakers and increased attendance, noting that 180 participants attended the Forum and a majority of those responding to the follow up survey indicated a preference for the virtual format.

4. Fiduciary & Public Records Topics

Sara Chandler, Chief Legal Counsel, noted that training videos on the topics of Fiduciary Duties and Public Records, which were recently sent to all Trustees, were also available on the BoardEffect portal. She asked that Trustees notify staff when they have completed the courses and offered to answer any questions.

5. Investment Performance and Market Updates

A. Board Investment Performance Report, Q1 2022

Greg Fletcher, Performance Director, presented the *Investment Performance Report*, as of June 30, 2022, included on pages 28-58 of the meeting materials. Mr. Fletcher reported that **(a)** the Core Trust Fund (CTF) returned -10.13% net of fees in Q2 2022, resulting in underperformance relative to the benchmark of -15 basis points (bps) for the quarter, **(b)** the CTF returned -7.27% net of fees for the one-year period, resulting in an excess return of 49 bps, **(c)** the CTF five-year net-of-fee return of 7.76% outperformed the Policy Benchmark by 53 bps on an annualized basis, and **(d)** the CTF gross return outperformed the 60/40 Reference Portfolio return by 95.8% (cumulative) over the past 20 years, which equates to \$33.9 billion.

Mr. Fletcher highlighted that the CTF net-of-fee return outperformed its benchmark for the one-, three-, five-, ten-, and twenty-year time periods and CTF gross-of-fee return outperformed its benchmark for the thirty-year time period. The Variable Trust Fund (VTF) had excess returns over its benchmark for the one- and ten-year periods. Mr. Fletcher then noted that SWIB's investment management has added more than \$2.4 billion above benchmark returns to the WRS over the last five years.

Mr. Fletcher then referenced that the percentage of WRS assets that were internally managed had declined to 42% due to the impact of the denominator effect and that the percentage of actively managed assets continued to increase in 2022. Next, Mr. Fletcher: **(a)** provided a breakdown of CTF asset class exposures, noting that the portfolio remains well diversified and the private markets asset classes (Private Equity/Debt and Real Estate) remain elevated due to the denominator effect; **(b)** reviewed the asset class performance for the CTF over various time periods; **(c)** reviewed VTF performance and asset class exposures, noting asset class exposures were within target range; and **(d)** noted that all Separately Managed Funds had positive relative performance over most time periods, with four slightly under-performing over the year-to-date and one-year time periods, including one for which SWIB does not determine the allocation strategy.

Mr. Fletcher concluded by reviewing the *Leverage Performance*, included on page 45 of the meeting

materials. He noted that policy leverage contributed 174 bps of loss to CTF absolute performance year-to-date, as expected in a negative return environment.

B. Callan Quarterly Report

Mr. Fletcher noted that the *Callan Quarterly Report Summary* as of June 30, 2022 was included on pages 46-50 of the meeting materials. He highlighted that SWIB's total fund unadjusted rankings are in the second quartile of peer returns over the 3-, 5-, and 10-year periods and at the third quartile for the 1-year period. Mr. Denson called attention to the 10-year return consistency, noting that SWIB's disciplined approach to risk and asset allocation versus the policy target and peers generated meaningful outperformance following Q1 2020, but noted that peers have seen a rebound in performance during 2022.

6. Investment Committee Open Session Business

A. Amendments to WRS Investment Committee Investment Guidelines

Ms. Chandler discussed amendments to the *SWIB Investment Committee WRS Investment Guidelines*, made by the Investment Committee on June 28, 2022 and included on pages 60-105 of the meeting materials. She noted (a) minor updates to the guidelines related to exchange-traded notes (ETNs); (b) an increase to the total exposure limit for below-investment grade security issues in the mortgage-backed securities (MBS) portfolio from 15% to 20% of the portfolio, consistent with similar limitations for the high-yield bond and investment grade credit portfolios, (c) global changes applicable to the portfolios in the Private Markets & Funds Alpha (PMFA) division so that external consultants are no longer required to provide a written recommendation for prospective investments with new managers and instead to provide investment staff the discretion to use consultants, (d) removal of the limitation that no more than 2% of the CTF may be invested in venture capital, consistent with the removal of the corresponding regulatory requirement in prior years, and (e) new ex-ante tracking error soft risk parameter discussion triggers for the high-yield bond and leveraged loan portfolios.

C. Approved Open Session Investment Committee Minutes

Ms. Chandler stated that the approved open session minutes of the May 24, June 28, and July 26, 2022 Investment Committee meetings were included on pages 106-123 of the meeting materials for the Board's review and noted that staff had previously reviewed the agendas for these meetings with the Board.

D. Agendas for Upcoming Meetings

Ms. Chandler also stated that the final open session agenda for the August 23, 2022 Investment Committee meeting and the draft open session agendas for the September 27 and October 25, 2022 meetings were included on pages 124-129 of the meeting materials for the Committee's review.

7. Quarterly Investment Update, Q2 2022

Mr. Denson presented the *Quarterly Investment Update*, included on pages 131-149 of the meeting materials. Mr. Denson began by noting that the CTF 5-year rolling return trend has come down from previous levels, but still remains above the actuarial target rate of return as of June 30, 2022. He then provided a brief commentary on the CTF 5-year return estimate, which projects a five-year annualized return of 10.4% using NEPC assumptions for 2022, but which is reduced to 7.2% when using preliminary realized year-to-date returns through the end of July. He commented that the CTF year-to-date estimated

and non-official performance as of the meeting date was -11%, which lowers the five-year annualized return projection to approximately 6.8%. Noting that every asset class benchmark has experienced losses this year, Mr. Denson commented that the five-year estimate is impacted by two key components, the losses across the market in 2022, but also the fact that a positive 15.8% return for 2017 is no longer included in the five-year calculation.

Mr. Denson then provided an asset class review, noting that global equities have rebounded after steep selloffs in the first two quarters and U.S. equity price-to-earnings ratios have risen recently while emerging market price-to-earnings ratios have continued to decrease. He concluded by noting that inflation has surprised on the high side and remains consistently elevated.

8. Motion to Convene in Closed Session

Motion: A motion to convene in closed session (i) pursuant to Sections 19.36(5) and 19.85(1)(e) of the Wisconsin Statutes to (a) consider confidential and proprietary strategies for the investment of public funds relating to specific proprietary investment strategies of internal WRS portfolios and risk management, and (b) approve prior closed session minutes that discuss the same; and (ii) pursuant to Section 19.85(1)(c) of the Wisconsin Statutes to review performance evaluation data for SWIB's board of trustees was made by Trustee Stein and seconded by Trustee Tinnen.

The Chair called for a roll call vote.

Ancel-Aye	Blumenfeld-Aye	DeAngelis-Aye	Nick-Aye	Palmer-Aye
Schalow-Aye	Stein-Aye	Tinnen-Aye	Voelker-Aye	

There being nine ayes and no nays, the Chair declared the motion passed. The Board convened in closed session at 10:25 a.m. and reconvened in open session at 1:32 p.m.

9. Announcement of Board Actions Relating to Items Taken up in Closed Session

Trustee Stein announced that while in closed session the Board received a closed-session quarterly investment update, an update on risk management, and discussed Investment Committee closed session business. In executive closed session, the Board completed its annual board self-evaluation.

10. Reports Filed Without Comment

In the absence of questions, the following reports, included on pages 226-244 of the meeting materials, were filed without comment: **(a)** draft open session minutes of May 18, 2022 Enterprise Risk and Compliance Committee Meeting, **(b)** New Contracts, Q2 2022; **(c)** Quarterly Charges to Funds Report, Q2 2022; and **(d)** Private Markets and Funds Alpha Commitments, Q2 2022.

11. Future Items for Discussion

There were no future items for discussion noted.

12. Adjourn

Motion: A motion to adjourn was made by Trustee Stein and seconded by Trustee Tinnen. The motion passed unanimously, and the meeting was adjourned at 1:33 p.m.

Date of Board Approval: _____

Signed: _____
Barb Nick, Board Secretary

STATE OF WISCONSIN INVESTMENT BOARD

Board of Trustees Meeting – Open Session

Wednesday/Thursday, October 18-19, 2022

Hyatt Regency Milwaukee
Milwaukee, Wisconsin

Board Members Present for Both Days:

Barb Nick, Chair
Clyde Tinnen, Vice Chair
Esther Ancel, Trustee
Kathy Blumenfeld, Trustee
Jeff DeAngelis, Trustee
Kristi Palmer, Trustee
Dave Schalow, Trustee
Dave Stein, Trustee
John Voelker, Trustee

Staff/Others Present:

Nathan Ballard, Senior Legal Counsel
Sara Chandler, Chief Legal Counsel
Stefano Cavaglia, Senior Portfolio Manager – Asset & Risk Allocation
Hassan Chehime, Head of Risk Management
Edwin Denson, Executive Director/Chief Investment Officer
Derek Drummond, Head of Funds Alpha
Anne-Marie Fink, Private Markets & Funds Alpha Chief Investment Officer
Jameson Greenfield, Chief Financial Officer
Brian Heimsoth, Senior Portfolio Manager – Asset & Risk Allocation
Mike Jacobs, Agency Business Director
Dave Jordan, Head of Non-Investment Grade Fixed Income
Rochelle Klaskin, Deputy Executive Director/Chief Administrative Officer
Leo Kropywiansky, Senior Portfolio Manager – Asset & Risk Allocation
Diane Linn, Senior Portfolio Manager – Multi-Asset Strategies
Lin Maung, Senior Portfolio Manager – Private Equity
Jason Rector, Portfolio Manager – Funds Alpha
Andrea Ruiz, Senior Portfolio Manager – Asset & Risk Allocation
Susan Schmidt, Head of Equities
Edouard Senechal, Senior Portfolio Manager – Asset & Risk Allocation
Mike Shearer, Head of Investment Grade Fixed Income
Nick Stanton, Head of Multi-Asset Strategies
Dawn Tuescher, Executive Administrative Assistant
Mariko Boswell, PIMCO
Kevin Gray, PIMCO
Manny Roman, PIMCO
Steve Kaplan, University of Chicago
Jack Lew, Lindsay Goldberg
Chris Levell, NEPC
Joe Nankof, NEPC
Anne Brummitt, Public Attendee
Anne Steinberg, Public Attendee
(Some individuals may have attended only portions of the meeting.)

TUESDAY, OCTOBER 18, 2022

Open Session

Trustee Stein started off by announcing that his term as a Trustee would be ending in May 2023. In order to ensure an efficient and smooth transition, he was stepping down as Chair of the Board, and Governor Evers had just appointed Trustee Nick as the new Chair and Trustee Tinnen as Vice Chair. Trustee Stein noted that he will continue to serve in his capacity as a trustee through the March 2023 Board meeting, and congratulated Trustees Nick and Tinnen on their new roles.

Trustee Nick, Chair of the Board of Trustees, thanked Trustee Stein for his service as Board Chair, declared a quorum was present, and called the Board of Trustees meeting to order at 1:00 p.m.

1. Workshop Welcome

Chair Nick welcomed staff, Trustees, and guests to SWIB's annual workshop and introduced Edwin Denson, Executive Director/Chief Investment Officer.

2. Workshop Kickoff

Mr. Denson also thanked Trustee Stein and congratulated Trustee Nick before welcoming attendees to the workshop and reviewing the topics to be covered over the two-day meeting.

3. The Role of Technology in Asset Management and Investing

Anne-Marie Fink, Private Markets & Funds Alpha Chief Investment Officer, introduced Emmanuel "Manny" Roman, Chief Executive Officer and Managing Director of PIMCO. Mr. Roman discussed the important role that technology plays in a modern investment management firm, highlighting PIMCO's substantial investment in IT professionals and technology. Mr. Roman walked through a number of areas that are heavily reliant on technology, including risk management, business strategy and client relations. On the investment side, artificial intelligence (AI) technology can help PIMCO identify and understand what drives an investor's decision to invest, which can be critical information for refining PIMCO's strategies, anticipating and delivering on investor needs, and providing investors with valuable resources for their own investment process and portfolio construction. Mr. Roman noted that technology can even help PIMCO's human resources department to locate talent and identify traits and skills that will better predict a successful hire. He concluded by noting that while technology can be complicated and expensive, PIMCO has yet to find an area of their business where investments in technology have not paid off.

4. An Academic Perspective on the State of Private Markets

Ms. Fink introduced Steve Kaplan, Neubauer Family Distinguished Service Professor of Entrepreneurship and Finance at the University of Chicago Booth School of Business. Mr. Kaplan's presentation focused on private equity and presented an overview of the private equity market as well as a data- and research-intensive examination of private equity value creation, predictors of success, and the future of private equity.

Mr. Kaplan noted that since 1980 commitments to private equity partnerships have steadily increased both in dollar value and as a percentage of U.S. stock market capitalization. When taking into account the use of leverage, the equivalent of approximately 10-15% of the value of the U.S. stock market is invested in private equity. Over that same timespan, the number of public companies has declined, making private equity a more important part of the U.S. economy. Mr. Kaplan provided a detailed view on what it is that private equity firms actually do to generate returns, arguing that the data suggests that value creation is a much larger component than cost cutting.

When reviewing performance of the private equity markets over time, Mr. Kaplan identified that regardless of how performance is measured and irrespective of vintage year or market cycle, the data shows that private equity has consistently outperformed the S&P 500 over the last thirty years even after accounting for fees. Notwithstanding that outperformance, Mr. Kaplan's research suggests that while performance has been successful at the asset class level, meaningful dispersion among managers does exist and the persistence of success at the individual manager level is hard to predict. Mr. Kaplan concluded by predicting that private equity will remain a viable asset class for some time, even in the face of higher multiples and anticipated market volatility, and made the case for the importance of private equity to a well-constructed and durable portfolio.

5. Asset Allocation

Chris Levell, NEPC, presented the Asset Allocation Review, included on pages 65-100 in the meeting materials. Mr. Levell started with a summary of NEPC's 2023 asset allocation recommendations for the Core Trust Fund (CTF) to **(a)** increase the target allocations to Private Equity/Debt from 12% to 15% and Real Estate from 7% to 8%; **(b)** effect a corresponding 4% decrease in the Public Equity allocation; **(c)** expand the ranges around the Private Equity/Debt and Real Estate allocations to account for growth and liquidity factors; and **(d)** adjust the Public Equity sub-asset class allocations to reflect current MSCI index weights (with a China half-weight) while maintaining the Public Fixed Income sub-asset class allocations. No changes were recommended for the Reference Portfolio or the Variable Trust Fund (VTF).

In discussing the market environment, Mr. Levell touched on current high inflation, noting that the Fed Funds rate will need to converge with the CPI inflation measure in order to facilitate the "soft landing" desired by economists and investors. With that in mind, investor expectations for the Fed Funds rate continue to climb. Further, the strength in the U.S. Dollar is hurting foreign currencies, creating a problematic loop.

In closing, Mr. Levell discussed the joint work performed by staff and NEPC to review the role of private markets exposure in the CTF. He noted the benefits of private markets exposure, including higher returns and lower volatility, as well as constraints posed by the illiquidity of the asset class. He reviewed the results of both cash flow and asset projections, highlighting that liquidity is currently ample given the size and composition of the CTF. Nevertheless, both private markets assets and exposure are expected to grow over time. He then shared **(a)** five-year forward-looking scenario analysis of private markets exposure comparing five potential economic environments, **(b)** historical data examining the impact on private markets exposure from the past year and the Great Financial Crisis, and **(c)** stochastic simulations aimed at identifying the 5% and 95% confidence level for a distribution of Private Equity/Debt and Real Estate exposure using the recommended 2023 targets, and answered questions.

6. Long Term Incentive Plan

Rochelle Klaskin, Deputy Executive Director/Chief Administrative Officer, presented the proposed Long-Term Incentive Compensation Plan, included on pages 109-123 of the meeting materials. Ms. Klaskin highlighted the material terms of the plan, including eligibility, award formula, vesting, and payout percentages based on Core Trust Fund (CTF) performance, and answered questions.

The Trustees noted that this was the fourth presentation to the Board on the proposal and that the Board has had robust deliberations regarding the benefits, terms, and purpose of the plan. Further they discussed that: **(1)** the plan reflected the Board's independent compensation consultant recommendation to provide market-based competitive pay for employees and to promote retention; **(2)** the plan aligned sustained long-term investment performance with employee compensation and retention; **(3)** the performance metrics used in the plan were intended to further align participants with the interests of beneficiaries and stakeholders of the funds SWIB manages; and **(4)** staff had incorporated Trustee feedback throughout the process in a collaborative and responsive fashion.

Motion: A motion was made by Trustee Nick and seconded by Trustee Stein to approve the State of Wisconsin Investment Board Long-Term Incentive Compensation Plan, as presented in the materials. The motion passed unanimously

The Board recessed at 5:03 p.m.

THURSDAY, OCTOBER 19, 2022

Open Session

Chair Nick declared that a quorum was present and called the second session of the Board Workshop to order at 9:00 a.m.

1. Macroeconomic and Geopolitical Perspectives

Ms. Fink introduced, Jack Lew, Managing Partner at Lindsay Goldberg and former Secretary of the Treasury of the United States, and Mr. Lew provided his perspectives on a number of global and domestic topics. Mr. Lew addressed macroeconomic and global political topics ranging from the recent National Congress of the Chinese Communist Party and U.S. China relations to the ongoing conflict in Ukraine and potential scenarios for ending the conflict. Mr. Lew discussed the recent turmoil in the UK economy and the risk that other countries may face similar circumstances, with central bank policy critical to avoiding more significant economic breakdown.

Closer to home, Mr. Lew discussed the upcoming U.S. elections, expressing the challenges with predicting the outcomes particularly with recent economic news adding to the uncertainty. With respect to monetary policy, he discussed current and expected actions by the Federal Reserve to continue to respond to inflation. Mr. Lew concluded by providing a brief overview of what he sees in the companies within the portfolios that he manages, stating that there does not seem to be a major resistance to price increases, concerns related to supply chains remain but are less dramatic than they were several months ago, and concerns over the job market seem to be waning as well.

2. U.S. Economic Update

Leo Kropywiansky, Senior Portfolio Manager – Asset & Risk Allocation, provided a U.S. Economic Update, included on pages 125-151 of the meeting materials. Mr. Kropywiansky expects that inflation is likely peaking, but it remains above the Fed’s 2.0% target, and SWIB’s outlook is now for moderating inflation, but at a slower pace than many investors project. Mr. Kropywiansky reviewed several key indicators, including personal consumption expenditures (PCE), supply chain pressures, goods inflation, and rent inflation, noting that while inflation measures of some are starting to ease, they all remain higher than desired and point to a longer recovery than anticipated.

Focusing on the housing market, he observed that in a short two-year period, housing market over-valuation has reached levels not seen since 2006. An environment of low rates and COVID-related isolation led to a large increase in second home purchases, driving home prices up significantly and driving available inventory down. As some of these trends reverse, a period of outright house price decline is likely, which may also lead to some easing of rent inflation. If pricing continues to decline to a level that would make home purchasing more attainable, rent inflation may ease even more dramatically, but he warned that this process will take time and likely won’t be seen until 2023.

3. Asset Allocation Corridor Treatment Review

Brian Heimsoth, Senior Portfolio Manager – Asset & Risk Allocation, provided a review of the Asset Allocation Corridor Treatment, included on pages 152-164 of the meeting materials. Mr. Heimsoth began with a brief overview of the asset allocation process, policy benchmarks, and active risk. He explained the importance of dynamic adjustments to asset allocation targets and policy benchmarks and how the corridor treatment allows for a more accurate assessment of SWIB’s active risk. By allowing target allocations, allocation rebalancing ranges, and the policy benchmark to adjust as private market allocations increase or decrease – in a large part due to factors outside SWIB’s control – the corridor treatment ensures that active risk appropriately measures intentional investment decisions and avoids the need to sell high-conviction positions or reach for investment opportunities for the sole purpose of adhering to strict and inflexible asset allocation targets. Mr. Heimsoth reviewed some examples of the corridor treatment’s application and concluded with a review of the Private Equity and Real Estate allocations over time.

4. Workshop Wrap-Up

Mr. Denson thanked the presenters and attendees for their participation and recognized the staff for their efforts in coordinating the workshop.

Motion: A motion to convene in closed session pursuant to Sections 19.36(5) and 19.85(1)(e) of the Wisconsin Statutes to consider confidential and proprietary strategies for the investment of public funds relating to specific proprietary investment strategies of internal WRS portfolios and risk management was made by Trustee Blumenfeld and seconded by Trustee Nick.

The Chair called for a roll call vote.

Ancel-Aye	Blumenfeld-Aye	DeAngelis-Aye	Nick-Aye	Palmer-Aye
Schalow-Aye	Stein-Aye	Tinnen-Aye	Voelker-Aye	

There being nine ayes and no nays, the Chair declared the motion passed. The Board then convened in closed session at 11:33 a.m. and reconvened in open session at 1:18 p.m.

5. Adjourn

Motion: A motion to adjourn the meeting was made by Trustee Nick and seconded by Trustee Ancel. The motion passed unanimously, and the meeting adjourned at 12:52 pm.

Date of Approval: _____

Signed: _____
Barb Nick, Board Secretary

DRAFT

STATE OF WISCONSIN INVESTMENT BOARD
Board of Trustees Meeting – Open Session

Monday, November 14, 2022

Via Teleconference

Board Members Present: Barb Nick, Chair
Clyde Tinnen, Vice-Chair
Esther Ancel, Trustee
Jeff DeAngelis, Trustee
Kristi Palmer, Trustee
Dave Schalow, Trustee

Staff/Others Present: Sara Chandler, Chief Legal Counsel
Edwin Denson, Executive Director/Chief Investment Officer
Rochelle Klaskin, Deputy Executive Director/Chief Administrative Officer
Dawn Tuescher, Executive Administrative Assistant

Open Session

Trustee Nick, Chair of the Board of Trustees, declared a quorum was present and called the Board of Trustees meeting to order at 1:01 p.m.

1. Motion to Convene in Closed Session

Motion: A motion was made by Trustee Palmer and seconded by Trustee Ancel to convene in closed session pursuant to §19.85(1)(e) of the Wisconsin Statutes to consider confidential information relating to the negotiation of contracts with consultants for the investment of public funds and to deliberate confidential strategies for the investment of public funds.

Trustee Nick called for a roll call vote.

Ancel-Aye DeAngelis-Aye Nick-Aye Palmer-Aye Schalow-Aye
Tinnen-Aye

There being six ayes and no nays, Trustee Nick declared the motion passed. The Board convened in closed session at 1:02 p.m. and reconvened in open session at 4:17 p.m.

2. Announcement of Board Actions Relating to Items Taken up in Closed Session

Trustee Nick announced that while in closed session the Board met with candidates for Board Governance consultant. After presentations from the candidates, the Trustees deliberated and made a tentative selection subject to contracting.

3. Adjourn

Hearing no further business, Trustee Nick adjourned the meeting at 4:19 p.m.

Date of Approval: _____

Signed: _____
Barb Nick, Board Secretary

DRAFT

Board Meeting

Tab 3 – Investment Performance and Market Updates

- A. Board Investment Performance Report, Q3 2022
- B. Callan Quarterly Report



Investment Performance Report

as of September 30, 2022



Executive Summary

September 30, 2022

- The Core Trust Fund returned (5.04%) net of fees in Q3, resulting in excess performance of +10 bps in Q3. For one year, the Core Trust Fund has returned (13.35%) net of fees, resulting in an excess return of +25 bps.
- The Core Trust Fund five-year net of fee return of +5.85% outperforms the Policy Benchmark by +50 bps on an annualized basis.
- The Core Trust Fund gross return outperformed the 60/40 Reference Portfolio return by +101.7% (cumulative) over a 20-year period, which equates to \$32.6 billion over the same period.

WRS Performance

as of September 30, 2022

Fund	Net of All Fee and Expense Return %			
	Calendar – YTD	1 Year	3 Year	5 Year
Core Trust Fund	(17.64)	(13.44)	5.22	5.76
Core Trust Fund Benchmark	(17.78)	(13.60)	4.61	5.35
Excess	+0.13	+0.16	+0.62	+0.41
Net Excess Value Add (\$M)	+\$232.8	+\$268.6	+\$2,223.5	+\$2,415.0
Variable Trust Fund	(25.00)	(19.71)	4.90	5.78
Variable Trust Fund Benchmark	(25.10)	(19.84)	5.01	5.87
Excess	+0.10	+0.13	(0.11)	(0.09)
Net Excess Value Add (\$M)	+\$13.8	+\$16.8	(\$24.1)	(30.6)

(Annualized Return shown for all periods greater than 1 yr)

Fund	Net of Fee and Expense Return %			Gross of Fee Return %
	5 Year	10 Year	20 Year	30 Year
Core Trust Fund	5.85	6.90	7.64	8.01
Core Trust Fund Benchmark	5.35	6.48	7.40	7.51
Excess	+0.50	+0.41	+0.25	+0.50
Variable Trust Fund	5.84	9.04	8.73	8.50
Variable Trust Fund Benchmark	5.87	8.97	8.71	8.15
Excess	(0.03)	+0.07	+0.02	+0.35

(Annualized Return shown for all periods greater than 1 yr)

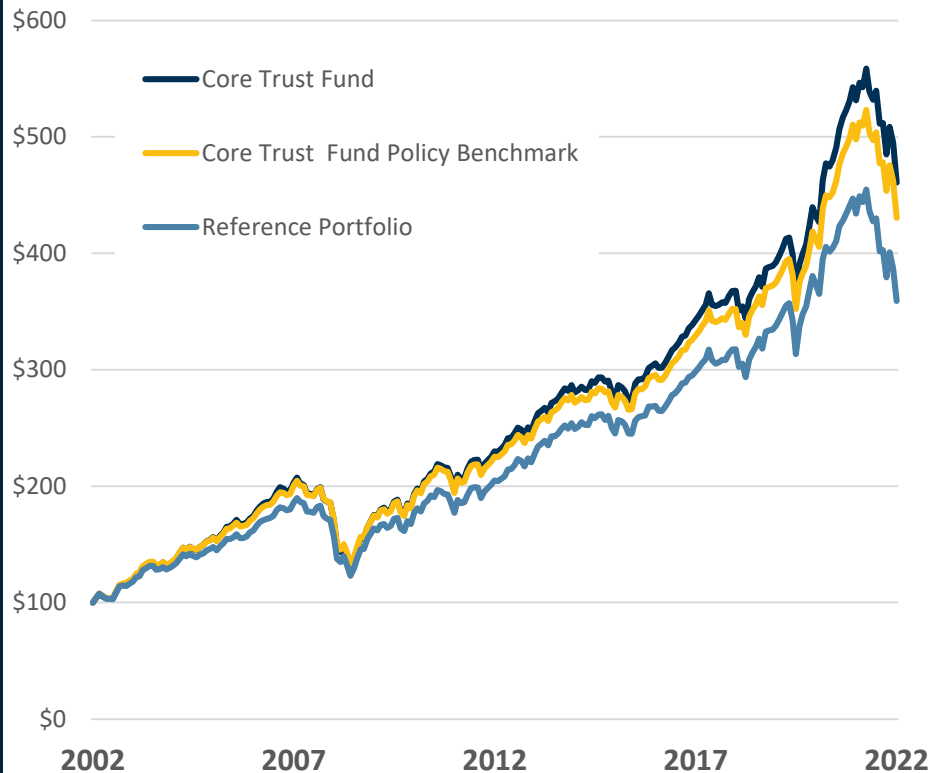
SWIB's investment management has added more than \$2.3 billion above benchmark returns over the last five years to the WRS.

Excess returns may contain rounding differences

CTF Performance vs. 60/40 Reference Portfolio

20-year cumulative return¹: October 1, 2002, to September 30, 2022

Indexed Benefit of CTF's Asset Allocation & Active Management Over Time



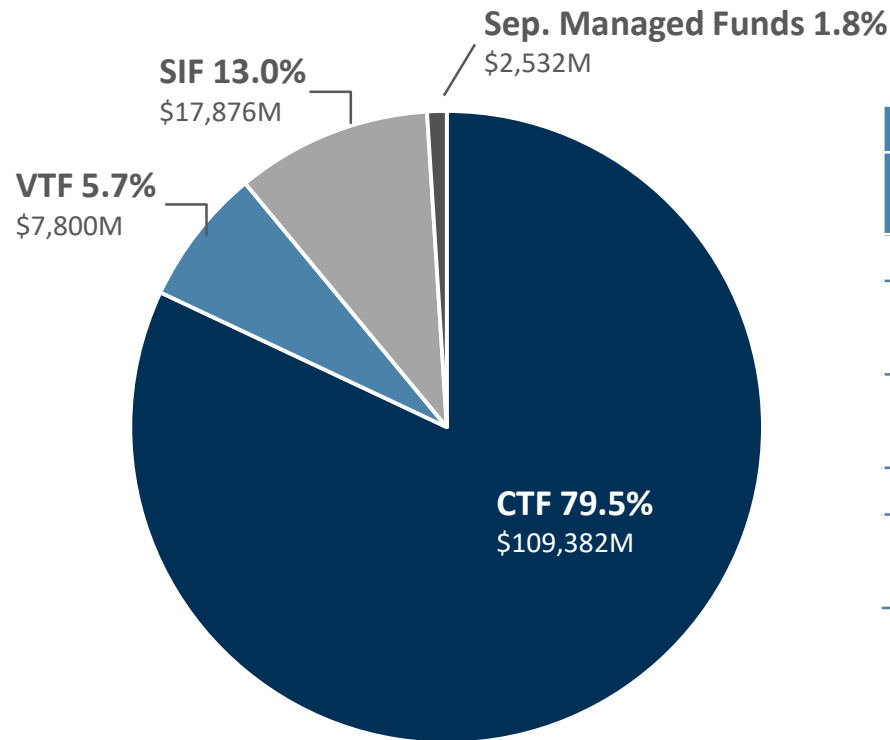
Portfolio / Benchmark	Annualized Gross Return	Cumulative Gross Return	Cumulative \$ Value Added
Reference Portfolio ² (60% equity/40% bonds)	6.6%	258.9%	= Passive Market Return
Benefit of CTF Asset Allocation			
CTF Policy Benchmark	7.6%	330.5%	+\$23.4B
Benefit of CTF Active Management			
CTF Actual Results	7.9%	360.6%	+\$9.2B
CTF Excess Return vs. Reference Portfolio	+1.3% pts	+101.7% pts	+\$32.6B

¹ Core Trust Fund beginning market value, as of October 1, 2002, was \$44.4B and ending market value, as of September 30, 2022, was \$109.4B

² Reference Portfolio is composed of 60% MSCI World and 40% Bloomberg US Gov't / Credit (rebalanced monthly)

Total Assets Under Management (AUM)

as of September 30, 2022



Gross Market Value of Assets (\$millions)			
By Fund	9/30/2021	9/30/2022	1 Year Change
Total WRS	140,947	117,182	(23,766)
Core Trust Fund	130,657	109,382	(21,275)
Variable Trust Fund	10,290	7,800	(2,491)
State Investment Fund (SIF) ¹	14,648	17,876	+3,229
Separately Managed Funds	2,348	2,532	+184
Total SWIB AUM	\$157,943	\$137,590	(\$20,353)

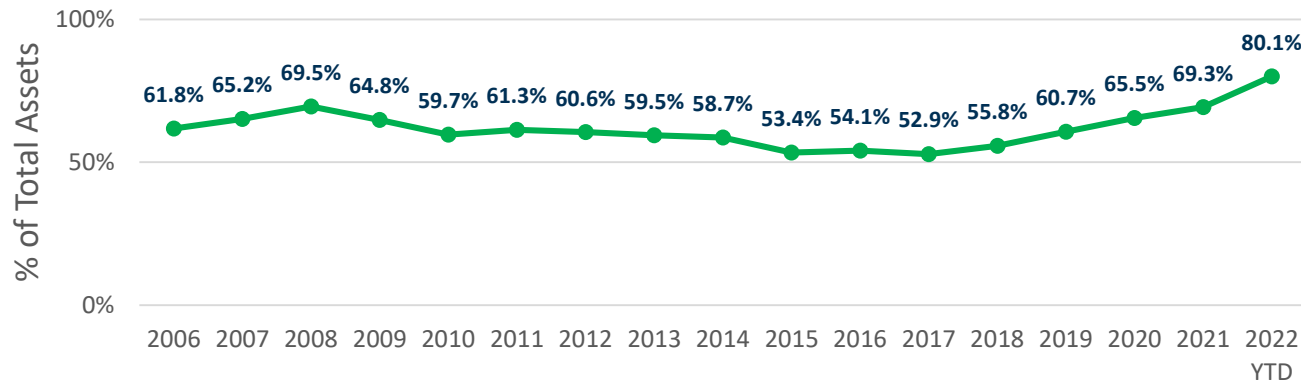
¹ Excludes cash invested in SIF held on behalf of CTF and VTF

Refer to the disclosure section for additional details

WRS Assets as of September 30, 2022

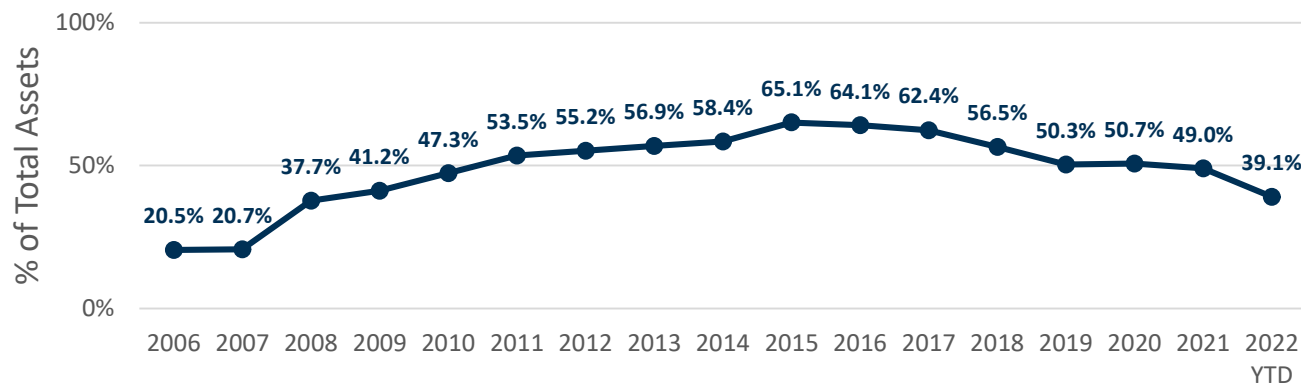
Breakdown of Active vs. Passive and Internal vs. External

Actively Managed Assets



Actively managed assets are a larger share of WRS AUM

Internally Managed Assets

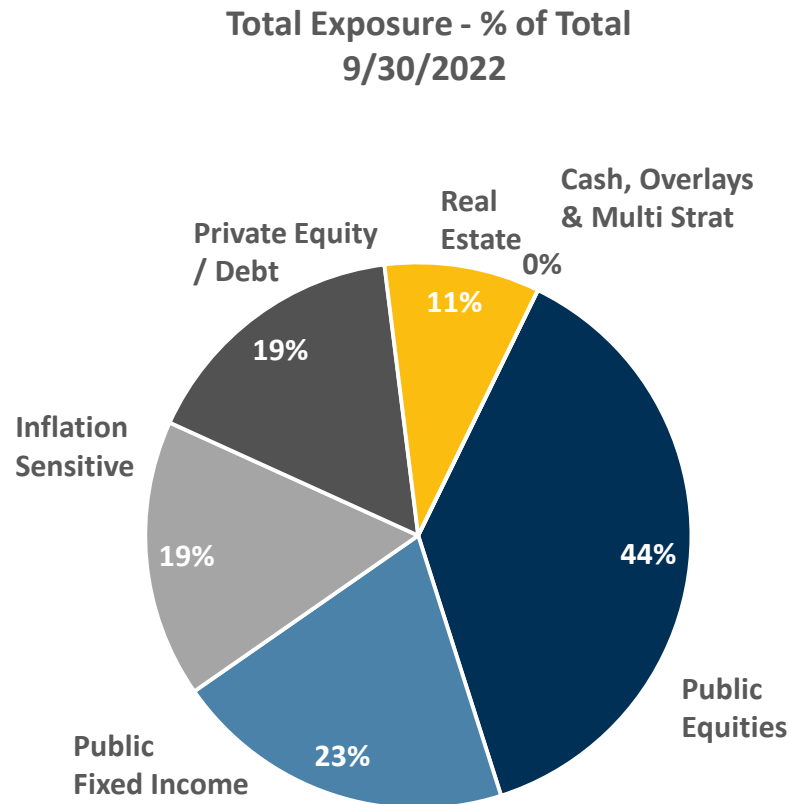


46% of Total SWIB Assets (including SIF) are internally managed

Refer to the disclosure section for additional details

Core Trust Fund Assets Under Management

Breakdown by Asset Class as of September 30, 2022



Total Exposure \$ & Adjusted AUM (\$millions)			
Total CTF by Asset Class	Total Exposure \$ 9/30/2021	Total Exposure \$ 9/30/2022	Year over Year Change
Public Equities	66,149	47,690	(18,459)
Public Fixed Income	31,067	25,483	(5,584)
Inflation Sensitive	20,905	20,740	(165)
Real Estate	9,021	11,584	+2,563
Private Equity / Debt	16,696	20,449	+3,753
Multi Asset	4,427	8	(4,419)
Cash & Overlays	(971)	(8)	+963
Total Exposure	\$147,296	\$125,945	(21,351)
<i>Less: Policy Leverage</i>	<i>16,639</i>	<i>16,563</i>	<i>(76)</i>
Total CTF AUM	\$130,657	\$109,382	(21,275)

Total Exposure is composed of the gross market value of investments, plus beta exposure added or offset through derivative instruments

Core Trust Fund Allocation

All exposures shown as of September 30, 2022

Allocation – Exposure View

Strategies	(\$ millions)	As % of Total Fund		Target Range %	Notes
	Total Exposure	Portfolio Exposure %	Benchmark Target %		
Public Equities	47,690	43.60	43.51	37.51 – 49.51	<p>Public & Private exposures include cash</p> <p>Strategies include exposure management investments</p> <p>Cash / Overlays: Includes liquidity, overlay cash, cash used to fund synthetic beta related to Alpha Pool.</p> <p>Benchmark Target weights are adjusted monthly to reflect the actual exposure to Private Equity/Debt and Real Estate. Offsetting adjustments are made to Public Equities and Public Fixed Income.</p> <p>* Target ranges reflect Board-approved corridor treatment</p> <p>Additional CTF leverage details available in disclosure section</p>
Global Developed	36,922	33.76	33.76		
US Small Cap	3,305	3.02	3.00		
International Small Cap	2,989	2.73	2.65		
Emerging Markets	4,473	4.09	4.09		
Public Fixed Income	25,483	23.30	23.20	17.20 – 29.20	
Investment Grade	16,148	14.76	14.73		
Non-Investment Grade	6,653	6.08	6.15		
Emerging Market Debt	2,682	2.45	2.32		
Inflation Sensitive	20,740	18.96	19.00	14.0 – 24.0	
Real Estate	11,584	10.59	10.59	actual exposure*	
Private Equity / Debt	20,449	18.69	18.69	actual exposure*	
Multi Asset	8	0.01	0.00	0.0	
Cash / Overlays	(8)	(0.01)	0.00		
Leverage	(16,563)	(15.14)	(15.00)	(20.0) to (10.0)	
Total Fund – Total Exposure	\$125,945	115.14	115.00	110.0 – 120.0	
Total Fund – Market Value	\$109,382	100.00	100.00		

Asset \$ exposures and % weights may contain rounding differences

Core Trust Fund: Asset Class Returns

as of September 30, 2022

Asset Class Group: Public Equities	Performance Start Date	Total Exposure Value (\$millions)	Net of External Manager Fee Return %				
			Calendar YTD	1 Year	3 Year	5 Year	10 Year or ITD
Public Equities	12/31/2002	\$47,653	(25.42)	(20.67)	4.04	4.85	7.77
Benchmark			(25.53)	(20.63)	4.39	5.10	7.89
Excess			+0.11	(0.05)	(0.35)	(0.25)	(0.11)
Global Developed	2/28/2017	\$36,263	(25.09)	(19.58)	4.47	5.44	6.75
Benchmark			(25.15)	(19.27)	5.04	5.82	7.11
Excess			+0.06	(0.31)	(0.57)	(0.38)	(0.36)
US Small Cap	2/28/2017	\$3,305	(25.53)	(22.45)	4.78	4.70	5.53
Benchmark			(24.63)	(23.02)	4.50	3.68	4.80
Excess			(0.89)	+0.57	+0.28	+1.02	+0.73
International Small Cap	1/31/2020	\$2,983	(32.23)	(32.00)			(4.97)
Benchmark			(31.87)	(31.80)			(4.97)
Excess			(0.36)	(0.20)			+0.00
Emerging Market ex China	3/31/2022	\$3,462					(22.87)
Benchmark							(22.47)
Excess							(0.40)
Emerging Market China	3/31/2022	\$853					(19.61)
Benchmark							(19.90)
Excess							+0.28

(periods greater than 1 yr show annualized return, since inception returns shown for strategies with less than 10-year history)

Excess returns may contain rounding differences
Refer to the disclosure section for additional details

Core Trust Fund: Asset Class Returns

as of September 30, 2022

Asset Class Group: Public Fixed Income & Inflation Sensitive	Performance Start Date	Total Exposure Value (\$millions)	Net of External Manager Fee Return %				
			Calendar YTD	1 Year	3 Year	5 Year	10 Year or ITD
Public Fixed Income	12/31/2003	\$25,480	(16.56)	(16.51)	(3.13)	(0.06)	1.01
Benchmark			(15.32)	(15.27)	(3.16)	(0.08)	0.90
Excess			(1.24)	(1.23)	+0.03	+0.02	+0.11
Investment Grade US Credit	2/28/2022	\$6,041					(14.63)
Benchmark							(13.73)
Excess							(0.90)
US Treasuries	2/28/2022	\$7,777					(10.88)
Benchmark							(10.82)
Excess							(0.05)
MBS	4/30/2020	\$2,021	(15.65)	(16.54)			(6.69)
Benchmark			(13.66)	(13.98)			(6.15)
Excess			(1.99)	(2.56)			(0.53)
High Yield	7/31/2019	\$4,621	(20.40)	(19.32)	(1.66)		(1.32)
Benchmark			(14.29)	(13.64)	(0.69)		(0.31)
Excess			(6.11)	(5.68)	(0.97)		(1.01)

(periods greater than 1 yr show annualized return, since inception returns shown for strategies with less than 10-year history)

Excess returns may contain rounding differences
Refer to the disclosure section for additional details

Core Trust Fund: Asset Class Returns

as of September 30, 2022

Asset Class Group: Public Fixed Income & Inflation Sensitive	Performance Start Date	Total Exposure Value (\$millions)	Net of External Manager Fee Return %				
			Calendar YTD	1 Year	3 Year	5 Year	10 Year or ITD
Emerging Market Debt - USD	6/30/2005	\$1,318	(23.13)	(23.56)	(6.43)	(2.29)	1.14
Benchmark			(23.95)	(24.28)	(7.15)	(2.62)	1.08
Excess			+0.82	+0.73	+0.72	+0.33	+0.06
Emerging Market Debt - Local	7/31/2017	\$1,363	(18.21)	(20.49)	(7.04)	(4.37)	(3.97)
Benchmark			(18.57)	(20.63)	(7.06)	(3.92)	(3.53)
Excess			+0.36	+0.14	+0.02	(0.45)	(0.44)
Inflation Sensitive	12/31/2003	\$20,736	(13.57)	(11.55)	0.95	2.28	0.57
Benchmark			(13.61)	(11.57)	0.79	2.15	0.50
Excess			+0.04	+0.02	+0.16	+0.13	+0.07

(periods greater than 1 yr show annualized return, since inception returns shown for strategies with less than 10-year history)

Excess returns may contain rounding differences
Refer to the disclosure section for additional details

Core Trust Fund: Asset Class Returns

as of September 30, 2022

Asset Class Group: Private Markets & Other Strategies	Performance Start Date	Total Exposure Value (\$millions)	Net of External Manager Fee Return %				
			Calendar YTD	1 Year	3 Year	5 Year	10 Year or ITD
Real Estate	12/31/2003	\$11,584	15.54	23.72	11.33	9.63	11.23
Benchmark			20.58	28.31	11.66	9.55	10.02
Excess			(5.04)	(4.59)	(0.33)	+0.08	+1.21
Private Equity / Debt	11/30/2006	\$20,449	3.78	10.11	20.85	18.11	15.56
Benchmark			(0.12)	6.12	17.20	14.65	12.91
Excess			+3.90	+3.99	+3.64	+3.47	+2.65
<i>Other strategies:</i>							
Alpha Pool Overlay	1/31/2011	\$11,238	1.26	1.78	5.65	3.46	3.15
Benchmark (set to zero as of 1/1/2019)		(at 1/1/22 = \$6,336)	0.00	0.00	0.00	0.59	1.51
Excess			+1.26	+1.78	+5.65	+2.86	+1.64
Multi Asset	3/31/2003	\$8	(21.28)	(17.29)	3.25	4.08	4.64
Benchmark		(at 1/1/22 = \$4,619)	(21.11)	(17.33)	2.07	3.83	5.53
Excess			(0.17)	+0.03	+1.18	+0.25	(0.89)
Emerging Market Equity	2/28/2017	\$80	(28.90)	(29.15)	(2.41)	(2.49)	0.60
Benchmark		(at 1/1/22 = \$4,039)	(27.14)	(28.08)	(2.02)	(1.75)	1.33
Excess			(1.76)	(1.07)	(0.38)	(0.74)	(0.73)

(periods greater than 1 yr show annualized return, since inception returns shown for strategies with less than 10-year history)

Excess returns may contain rounding differences
Refer to the disclosure section for additional details

Core Trust Fund: Asset Class Returns

Net of External Mgr Fee - Excess Returns as of September 30, 2022



Excess Return - % points

¹ Either 10-year annualized return or Since Inception (ITD) annualized return is used if there is insufficient return history

Excess returns may contain rounding differences
Refer to the disclosure section for additional details

Core Trust Fund: Alpha Pool Overlay

as of September 30, 2022

Alpha Pool Return	Performance Start Date	Market Value (\$ millions)	Net of External Manager Fee Return %				
			Calendar YTD	1 Year	3 Year	5 Year	10 Year
Total Alpha Pool Composite	1/31/2011	\$11,238	1.26	1.78	5.65	3.46	3.15

- Prior to the inclusion of Global Macro and Multi Strat sub strategies to the Pool in 1Q 2022, Hedge Fund sub strategy assets composed > 90% of the Alpha Pool Composite
- Each sub strategy in the composite incurs the cost of implementation expense (assessed on a pro rata basis using AUM).

Alpha Pool: Key Sub Strategies	Inclusion Date	Market Value (\$ millions)	Calendar YTD or Since Inclusion Net Return %
Hedge Funds	1/31/2011	\$7,207 (64%)	2.77
Global Macro	3/1/2022	\$1,433 (13%)	-6.10
Multi Strat	2/1/2022	\$2,285 (20%)	2.50

Alpha Pool Overlay Return (Alpha Pool + Beta Return)	Calendar YTD	1 Year	3 Year	5 Year	10 Year
CTF Policy Benchmark (Beta)	(17.78)	(13.60)	4.61	5.35	6.48
Alpha Pool Overlay Return (Alpha Pool + Beta)	(16.52)	(11.82)	10.26	8.81	9.63

(Annualized Return shown for all periods greater than 1 yr)

Excess returns may contain rounding differences
Refer to the disclosure section for additional details

Variable Trust Fund

as of September 30, 2022

Performance

Fund	Performance Start Date	Market Value (\$ millions)	Net of External Manager Fee Return %				
			Calendar YTD	1 Year	3 Year	5 Year	10 Year
Variable Trust Fund	6/30/77	\$7,799	(24.97)	(19.66)	4.95	5.84	9.04
Variable Trust Fund Benchmark			(25.10)	(19.84)	5.01	5.87	8.97
Excess			+0.13	+0.17	(0.06)	(0.03)	+0.07

(Annualized Return shown for all periods greater than 1 yr)

Portfolio Allocation

By Portfolio	(\$ millions)	As % of Total Fund		
	Total Exposure	Portfolio Exposure	Exposure Target	Target Range
Public Equities	7,776	99.70	100.00	
US Equities	5,418	69.47	70.00	65.0 – 75.0%
International Equities	2,358	30.23	30.00	25.0 – 35.0%
Cash & Overlays	24	0.30	0.00	
Total Fund	\$7,800	100.00	100.00	

- *Asset class exposures are within the Target Range*

Excess returns may contain rounding differences
Refer to the disclosure section for additional details

Separately Managed Funds

as of September 30, 2022

Fund	Performance Start Date	Market Value (\$ millions)	Net of External Manager Fee Return %				
			Calendar YTD	1 Year	3 Year	5 Year	10 Year or ITD
State Investment Fund (SIF)	6/30/1975	\$19,074	0.70	0.72	0.57	1.14	0.70
SIF Benchmark			0.86	0.87	0.56	1.12	0.68
Excess			(0.16)	(0.15)	+0.01	+0.01	+0.02
State Life Insurance Fund	10/31/1994	\$95	(21.41)	(20.44)	(4.60)	(0.16)	1.57
No Benchmark							
Historical Society Endowment Fund	12/31/1993	\$20	(22.52)	(16.88)	5.67	6.95	9.09
SHS Benchmark			(21.91)	(16.45)	5.31	6.72	8.91
Excess			(0.61)	(0.42)	+0.36	+0.23	+0.18
Injured Patients & Families Comp. Fund	10/31/1993	\$1,321	(16.73)	(15.41)	(1.02)	1.53	2.98
IP&FC Benchmark			(16.24)	(15.07)	(1.49)	1.23	2.48
Excess			(0.49)	(0.35)	+0.47	+0.30	+0.50
UW System Long Term Fund	3/31/2018	\$486	(18.05)	(14.37)	4.26		4.91
UW System Benchmark			(18.11)	(14.45)	4.06		4.70
Excess			+0.06	+0.08	+0.20		+0.22
UW Cash Management Fund	4/30/2022	\$609					(5.76)
UW Cash Management Benchmark							(5.65)
Excess							(0.11)

(periods greater than 1 yr show annualized return, since inception returns shown for strategies with less than 10-year history)

Excess returns may contain rounding differences
Refer to the disclosure section for additional details

Leverage Performance

As of September 30, 2022

CTF Policy Leverage Performance

as of September 30, 2022

Core Trust Fund	Net of External Manager Fee Return %			
	Calendar YTD	1 Year	3 Year	5 Year
Unlevered Returns (as estimated):				
Portfolio ¹	(15.22)	(11.43)	5.15	5.61
CTF Benchmark Return ¹	(15.42)	(11.67)	4.45	5.12
Excess Return	+0.20	+0.25	+0.70	+0.49
Portfolio Return (Unlevered)	(15.22)	(11.43)	5.15	5.61
Absolute Return from Leverage ^{1,2}	(2.36)	(1.93)	0.16	0.23
Implementation (+) or (-)	0.00	0.00	+0.01	+0.01
Levered Returns (as reported):				
Portfolio	(17.58)	(13.35)	5.32	5.85
CTF Benchmark	(17.78)	(13.60)	4.61	5.35
Excess	+0.20	+0.25	+0.72	+0.50

(Annualized Return shown for all periods greater than 1 yr)

Leverage notes:

¹ The Unlevered Portfolio Return, Unlevered CTF Benchmark Return, Absolute Return from Leverage and Implementation (+) or (-) are estimated

² Policy leverage was first introduced into the CTF and the benchmark at the end of April 2012

- Policy leverage at SWIB is implemented passively. Therefore, it generally does not contribute to active risk or excess returns¹
- Policy leverage amplifies absolute returns (whether positive or negative), which is an important component in SWIB's strategy to meet the 7% actuarial target over the long-term
- The CTF benchmark return is levered to create an apples-to-apples comparison for evaluating relative performance of the CTF (i.e., excess return)

Excess returns may contain rounding differences
Refer to the disclosure section for additional details

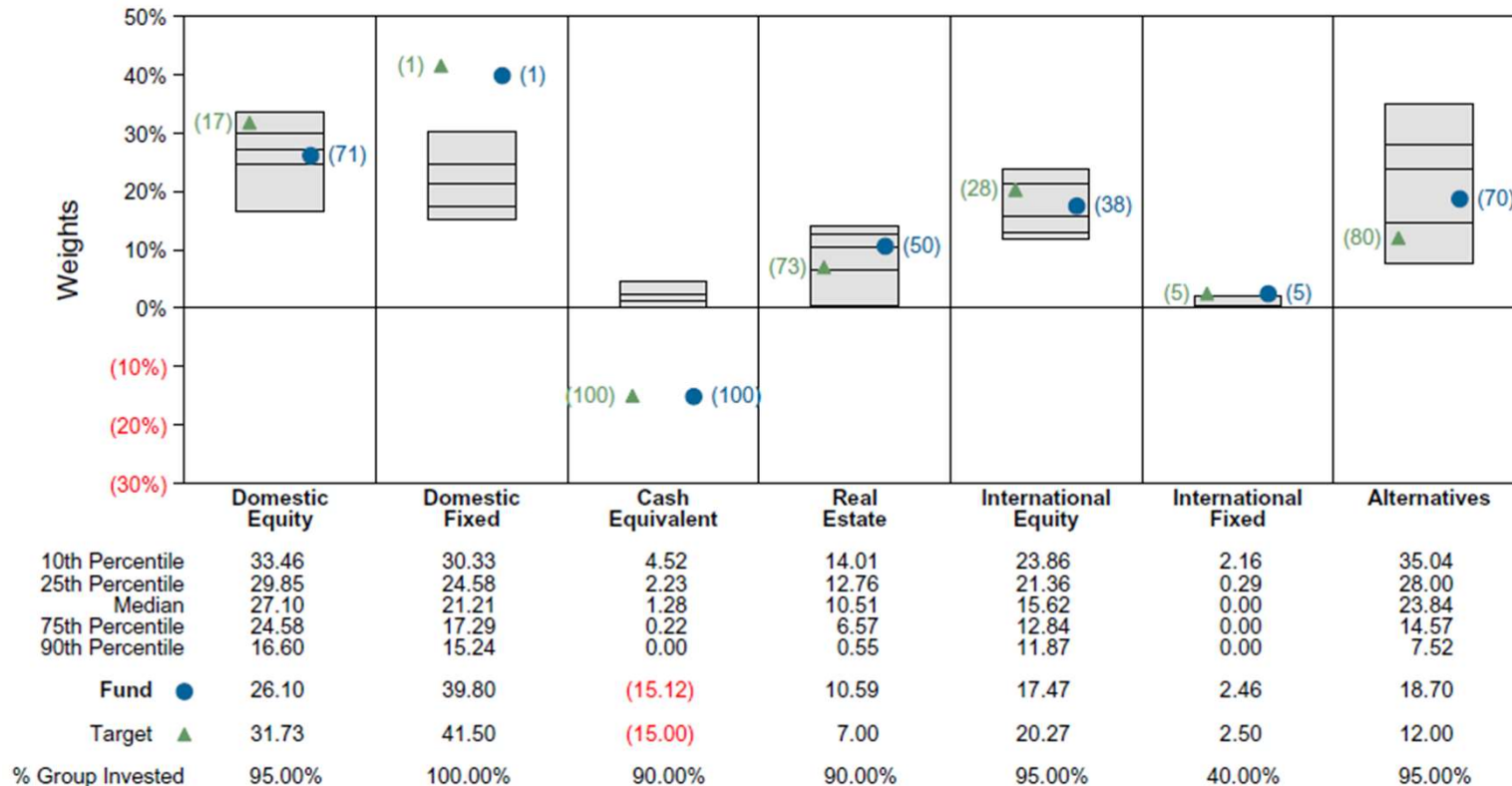
Callan Quarterly Report Summary

3rd Quarter 2022

Callan Peer Rank Update

CTF Asset Allocation Comparison to Peer Group (9.30.2022)

Asset Class Weights vs Callan Public Fund Spons- V Lg DB (>10B)

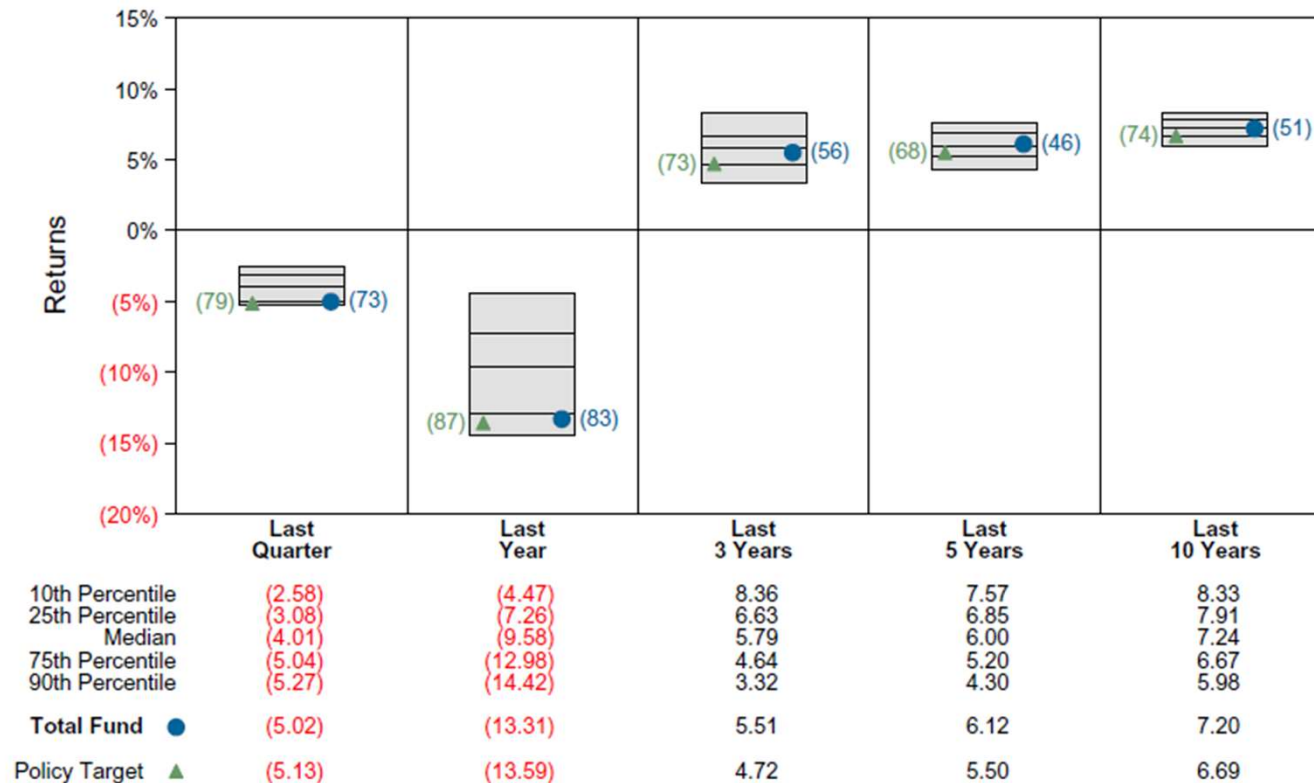


- SWIB's use of policy leverage enables more risk reducing/diversifying assets without sacrificing growth assets

Callan Peer Rank Update

CTF Performance vs. Peer Group (Gross Return, 9.30.2022)

Callan Public Fund Spons- V Lg DB (>10B)

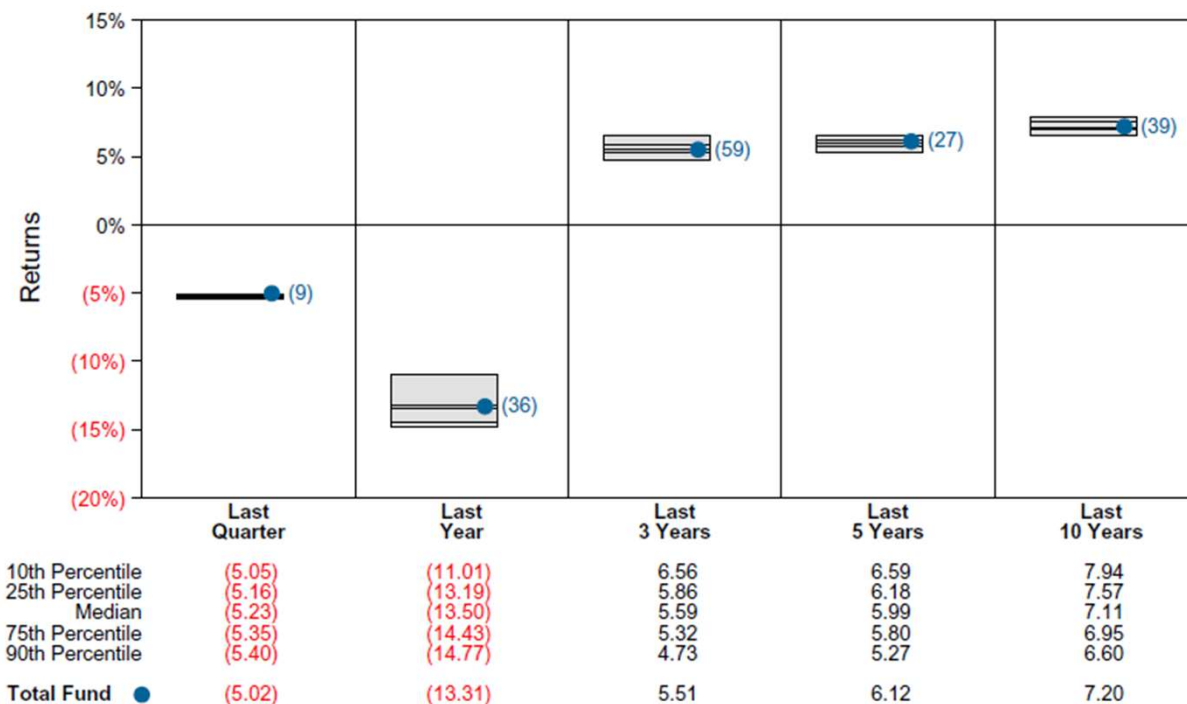


- Longer term 3-, 5- and 10-year periods near median
- 4th quartile for most recent 1-year period

Callan Peer Rank Update

*CTF Performance on Asset Allocation Adjusted Basis vs. Peer Group
(Gross Return, 9.30.2022)*

Asset Allocation Adjusted Ranking

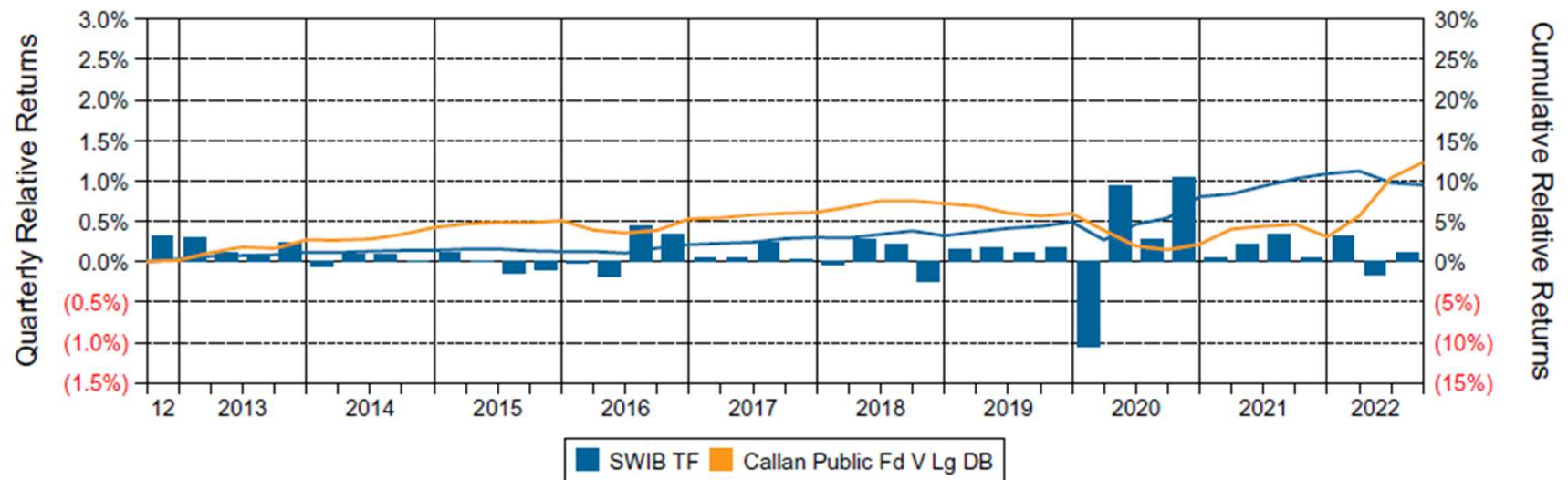


- Uses adjustment to peer universe to match the CTF risk-balanced allocation
- Experienced comparative recovery in most recent quarter (within top decile)
- 2nd quartile ranking over 1-, 5-, and 10-year periods

Callan Peer Rank Update

10 Year Return Consistency vs. > \$10B Peer Group (9.30.2022)

Cumulative and Quarterly Relative Returns vs Target



- CTF cumulative performance vs. peers impacted by YTD 2022 results
- CTF relative returns vs. Policy Benchmark positive in Q1 and Q3 2022

Report Disclosures

Glossary, Definitions & Data Sources

Report Disclosures

Key Terms and Portfolio Return Information

Term	Description / Definitions
Gross of Fee Return ("GoF Return")	The returns generated in investment portfolios (or accounts) that reflect the deduction of transaction expenses incurred as a result of executing a trade or acquiring or disposing of the investment. In some instances, these expenses are not readily separable from the cost of the investment and are not distinctly recorded within accounting records invoiced by third parties. Security lending income is included in GoF return (however, Security Lending expense is not). Starting on 1/1/2021, the SWIB practice of "grossing up" external management fees, performance fees and any identifiable carried interest by crediting the investment accounts was discontinued. The use of GoF Return is limited to performance comparison to gross benchmark returns, long term CTF / VTF return periods where GoF is the sole return type available and for the purpose of fulfilling data submissions to consultants for peer performance comparison purposes.
Net of Fee Return ("NoF Return")	The GoF return that reflects additional deductions for external management fees, performance fees and any identifiable carried interest incurred in investment portfolios. SWIB has account records to support NoF return history over approximately 20 years.
Net of All Return ("NoA Return")	The NoF return that reflects additional deductions for administrative expenses, categorized by SWIB as either Direct or Indirect expenses, that are permitted to be charged directly to the Trust Funds under statutory authority. The Cost Allocation Protocol governs the allocation methods and booking processes to allocate expenses at the investment account level. Examples of the type of expenses that fall under this category, include custody and banking fees, general operating expenses and investment consulting services. Security Lending expense is included in NoA Return. The recording of official, NoA return at the portfolio or account level began in 1/1/2017.
Annualized Return Calculation	SWIB reports containing portfolio and benchmark return calculations for time periods greater than 1 year generally utilize a geometric averaging calculation. Returns shown for periods of less than 1 year are not presented utilizing the annualization calculation method. In this instance, compound returns are reported for the specified calendar period (e.g., month to date, quarter to date or year to date). Annualized Return = $((1 + r^1) \times (1 + r^2) \times (1 + r^3) \dots)^{\frac{\text{calendar units}}{\text{time interval measured}}} - 1$; $r^{(n)}$ = series of holding period returns and calendar units are often expressed as days, months or years
Cumulative Return Calculation	SWIB uses the cumulative return calculation ("cumulative basis") to reflect the aggregate amount an investment has gained or lost over time for portfolios and benchmarks. This measurement shares aspects of the annualized return calculation, however, it excludes the geometric averaging. Cumulative Return = $((1 + r^1) \times (1 + r^2) \times (1 + r^3) \dots) - 1$; $r^{(n)}$ = series of holding period returns

Report Disclosures

Key Terms and Portfolio Return Information

Term	Description / Definitions
Excess Return % ("Excess")	Portfolio return or security level return minus the benchmark return. Portfolio or Composite Returns are generally compared against benchmarks with a similar level of risk. It is widely used as a measure of the value added by the portfolio or investment manager or the manager's ability to outperform the market.
Net Excess Value Add \$ ("NEVA")	Net Excess Value Add \$ ("NEVA") calculates the portfolio's performance return in total dollars relative to a benchmark. NEVA is a measure used to assess the value-add dollars that a particular investment strategy or team generated over specified time periods. NEVA is also used to monitor the return objectives set forth in the annual Active Risk Budget which is prepared for the CTF and VTF funds managed by SWIB.
SWIB Inception To Date Reporting	The Quarterly Performance Summary discloses a reporting period described as 10 years or ITD . The return disclosed in this reporting field yields either 10-year annualized returns for funds or portfolios with at least 10 years of return history or the data field may revert to the return since inception for portfolios with less than 10 years of history. The quarterly report provides a performance start date for those portfolios with the abbreviated return history.
Performance Start Date	The date denotes the initial period of a portfolio or composites' return data series that is stored and calculated by the SWIB Performance Measurement Service Agent.
Time-weighted Rate of Return	A method of calculating period-by-period returns that reflects the change in value and negates the effects of external cash flows. This methodology is applied to portfolios that are processed with daily frequency and where daily valuation updates of the underlying instruments are available.
Modified Dietz Total Rate of Return	A measurement that evaluates a portfolio's return based on a weighted calculation of its cash flow. The method considers the timing of cash flows and assumes a constant rate of return over the specified time period. This methodology is applied to portfolios and composites that are processed with monthly frequency (and where only monthly valuation updates are available).
Policy Benchmark	The Fund level Benchmark as approved by the Benchmark Committee. The Benchmark is composed of multiple indices that reflect the Fund's exposure to a diverse set of investment strategies. (can also referred to as "Policy Target" as implemented through SWIB's Asset Allocation plan).
Reference Portfolio	Hypothetical global portfolio comprised of 60% MSCI World Net (using a SWIB custom net variant as of 2010) and 40% Bloomberg Barclays Government Credit Index. The return is presented on a gross of fee basis and assumes no contributions or withdrawals.

Report Disclosures

Key Terms and Portfolio Return Information

Term	Description / Definitions
Custom weighted or calculated benchmarks	<p>SWIB managed funds and / or portfolios may require the construction of custom benchmarks that are created through applying static or asset weighted calculations to achieve a blended benchmark that is representative of the investment strategy. When available or feasible, SWIB will request its third-party benchmark data provider(s) to blend benchmarks as a part of the market data service. If this option is not available, SWIB will calculate the benchmark using market data inputs.</p> <p>In certain cases, SWIB may customize a benchmark to more accurately reflect the SWIB managed Fund's tax status and actual tax rate experience in non-U.S jurisdictions with investment portfolio with-holding taxes applicable to dividends and capital gains. This type of custom benchmark is designated as "SWIB Custom Net".</p>
Gross Market Value	The price at which the fund investor can buy or sell the underlying investment instruments held in the portfolio at a given time multiplied by the quantity held, plus any accrued income. The Gross Market Value of a portfolio is the market value of the portfolio or composite without any deduction for SWIB expenses.
Total Exposure	For SWIB managed funds governed by the WRS Investment Policy, this measure reflects the total value of the fund's exposure to investable markets by asset class and sub asset class. Total Exposure is inclusive of those instruments utilized under the WRS Leverage Use Policy to achieve the asset exposures approved under the asset allocation strategy and active risk target.
Internally Managed Portfolios	Portfolios managed by SWIB investment professionals. Each internal portfolio is assigned compulsory investment guidelines and is also assigned "soft risk parameters." Soft risk parameters refer to desired characteristics and/or risk exposures.
Externally Managed Portfolios	Portfolios managed by third-party investment managers hired by SWIB. External active and passive managers operate under contractual investment guidelines approved by SWIB's Investment Committee or by SWIB's investment management staff, as designated in the Investment Committee Charter.
Active Management	Actively managed portfolios have the objective of out-performing their respective benchmarks (or generating alpha) by using investment insights or quantitative tools to deploy buy, hold, and sell decisions. This style of management will result in portfolio positioning decisions that will add active risk and generate higher tracking error. Actively managed portfolios are governed through investment guidelines and soft risk parameters.
Passive Management	Passively managed portfolios have the objective of closely tracking the returns and risk of their respective benchmarks. This style of management usually involves mirroring the benchmark security holdings (or constituents) to closely replicate the benchmark risk and return.



Report Disclosures

Key Terms and Portfolio Return Information

Term	Description / Definitions
Note on report data sources	<p><u>Return Calculations</u> Bank of New York Mellon, Global Risk Services (BNYM GRS), an independent 3rd party, provides services related to custodial records, accounting and performance return calculations for SWIB managed funds. BNYM also serves as the source for certain standard, market-based benchmarks and static weight blended benchmarks.</p> <p><u>Benchmark Market Data and Selection Process</u> The data source for this information is provided by multiple investment industry market data vendors and analytics firms depending on the investment strategy. The SWIB Benchmark and Performance Committee governs the benchmark selection process. An independent consultant (selected by the Board of Trustees or “Board”) makes recommendations to initially select or change benchmarks.</p> <p><u>Peer Rank Return Comparison Data</u> This information is provided and processed by industry consultants that consume return information for SWIB managed funds and then provide investor universe return comparisons and analytics using proprietary databases. When consultant info is included in the Quarterly Performance Summary the preparer of the work is identified.</p>

Leverage Disclosures

Calculation formulas to estimate impact

Report Disclosures

Notes on CTF Leverage Analysis

Term	Description / Definitions
Portfolio Return (Unlevered)	<p>This is an estimated-only CTF return because SWIB does not implement a CTF unlevered portfolio to calculate actual performance against. Leverage is used to expand the CTF's entire asset base. All definitions that include (unlevered) are ESTIMATES only for this reason.</p> <p>It is estimated by:</p> <ol style="list-style-type: none"> 1) <u>Excess Return (Levered)</u> is first subtracted from the <u>Portfolio Return (Levered)</u>¹; 2) The result of Step 1 is then divided by the <u>Policy Leverage Factor</u>; then 3) <u>Excess Return (Levered)</u> is added back to the result of Step 2 and that number is then adjusted to account for the cost of financing (i.e., the expense of acquiring leverage, which would not be applicable to an unlevered portfolio). $\text{Portfolio Return (Unlevered)} = \left(\frac{\text{Portfolio Return (Levered)} - \text{Excess Return (Levered)}}{\text{Policy Leverage Factor}} \right) + \text{Excess Return (Levered)} - \text{cost of implementation}$ <p>¹ Note, because <u>Excess Return (Levered)</u> is the difference between two similarly "levered" portfolios (Portfolio Return (Levered) and Benchmark Return (Levered)), it represents outperformance that is not attributable to leverage. Accordingly, it is subtracted first as it would be inaccurate to reduce such amount by the Policy Leverage Factor for purposes of this calculation.</p> <p><u>Policy Leverage Factor</u> is the amount of the approved Policy Leverage during any given period, time weighted for multi-year periods. Policy Leverage was first introduced into the CTF Portfolio and Benchmark at the end of April 2012 and was raised from 10% to 15%, effective Calendar Year 2021.</p>
CTF Benchmark Return (Unlevered)	<p>Estimated by the <u>Benchmark Return (Levered)</u> divided by the <u>Policy Leverage Factor</u> for the period.</p>

Report Disclosures

Notes on CTF Leverage Analysis

Term	Description / Definitions
Excess Return (Unlevered)	<p>The Excess Return (Unlevered) is the excess return that it is estimated SWIB would have achieved if it did not implement leverage for the CTF.</p> <p>Estimated as <u>Portfolio Return (Unlevered)</u> minus <u>Benchmark Return (Unlevered)</u>.</p> <p>Can also be estimated by taking the actual <u>Excess Return (Levered)</u> minus <u>Implementation (+) or (-)</u> (see below for definition).</p>
Absolute Return from Leverage	<p>Estimated by the <u>Portfolio Return (Levered)</u> minus <u>Portfolio Return (Unlevered)</u> minus <u>Implementation (+) or (-)</u>.</p>
Implementation (+) or (-)	<p>The relative cost of financing (i.e., the actual cost of financing minus the CTF benchmark cost of financing). The CTF benchmark cost of financing is the CTF cash benchmark, previously LIBOR plus 30 bps and now BSBY plus 30 bps. Implementation (+) or (-) can also result from outperformance or underperformance relative to how efficiently SWIB replicates the index in connection with policy leverage (this is called basis risk).</p> <p>Can either be positive or negative. When the leverage implementation is achieved at a cost saving compared to the CTF cash benchmark (i.e., less than the CTF cash benchmark), it is positive (+); but when it is achieved with additional cost compared to the CTF cash benchmark (i.e., more than the CTF cash benchmark), it is negative (-). Cost savings can generate minor excess returns for the CTF. Basis risk can also generate minor contributions to or detractions from relative performance with respect to policy leverage.</p>
Portfolio Return (Levered)	<p>Actual performance of the CTF Portfolio for the period presented, from all strategies including Policy Leverage.</p>
CTF Benchmark Return (Levered)	<p>Actual performance of the CTF Benchmark for the period, taking into account the use of Policy Leverage.</p>
Excess Return (Levered)	<p>Actual excess return of the CTF. Portfolio Return (Levered) minus Benchmark Return (Levered).</p>

Board Meeting

Tab 4 – Annual Presentation on Cost Benchmarking



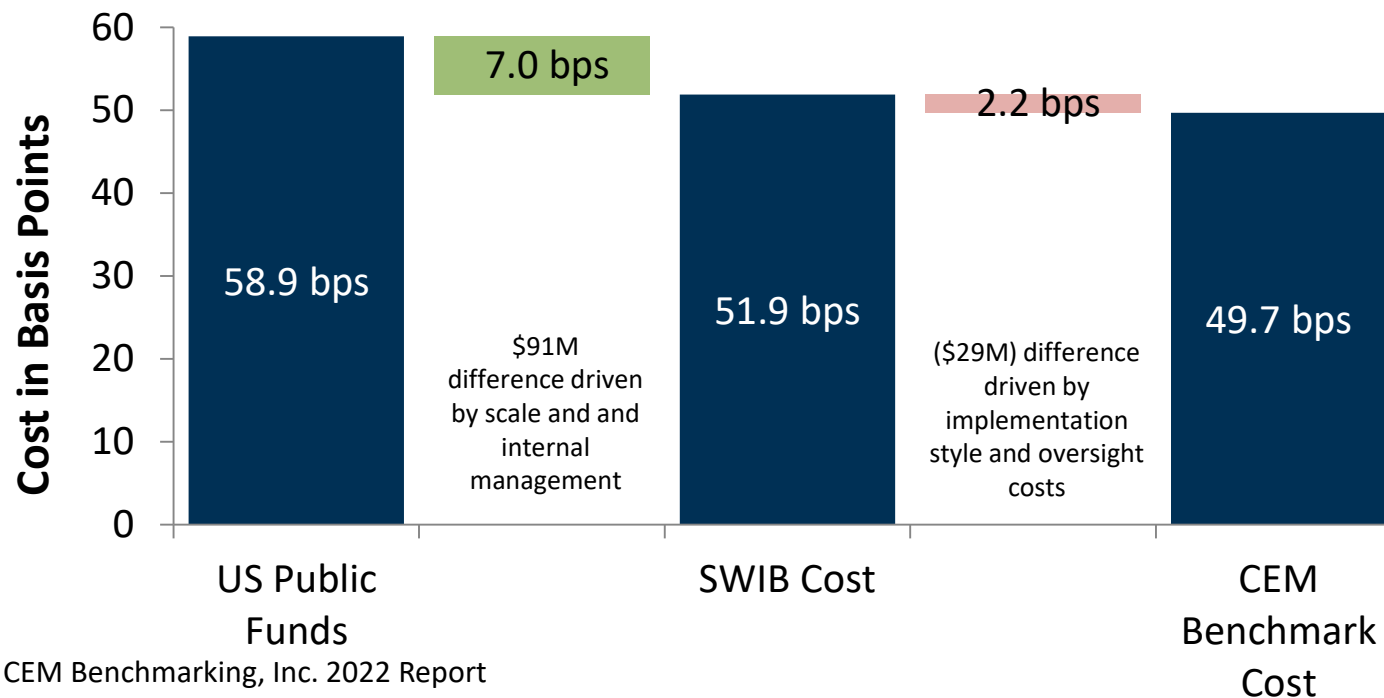
SWIB's Cost Effectiveness Annual Evaluation

December 14, 2022



SWIB's Total Cost Compared to US Public Funds and CEM Benchmark in 2021

SWIB's costs are 7.0 bps, or \$91 million, lower than US public fund average and 2.2 bps, or \$29 million, higher than the CEM Benchmark, which is adjusted for asset mix.



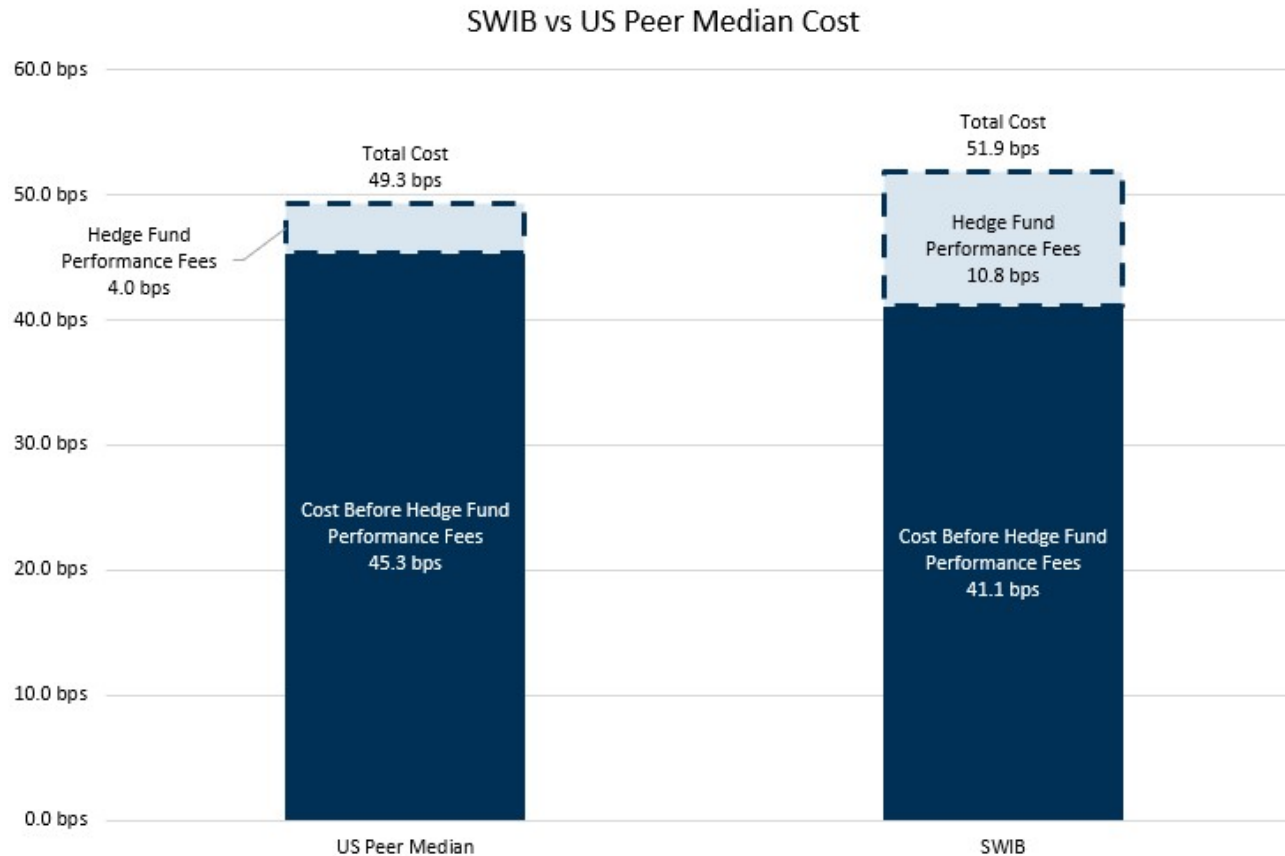
Data source: CEM Benchmarking, Inc. 2022 Report

- The CEM Benchmark is a hypothetical measure using peer group average costs by asset type to form an estimate of the average peer group cost to manage a portfolio with the same asset class mix as SWIB's. This measure does not consider how the exposures are achieved (e.g. active vs passive; internal vs external). Due to this, the costs from SWIB's relatively higher share of active investing outpace the benefits derived from a relatively higher mix of internal investment management.



2021 SWIB Cost Compared to US Peer Median

SWIB's cost of 51.9 bps is higher than peer median of 49.3 bps. However, when adjusted for performance fees, SWIB's costs are lower than the peer median by 4.2 bps.



Internal Management Is More Cost Effective

SWIB's cost for internal active management remains considerably lower than the cost for external active management.

2021

Public Market Asset Type (active strategies)	Internal Mgmt Cost (bps)	External Mgmt Cost (bps) ¹
Global Large Cap Equity	11.2	40.8
Small Cap Equity	13.5	66.5
Domestic Fixed Income	8.7	11.3
High Yield Fixed Income	7.4	31.3

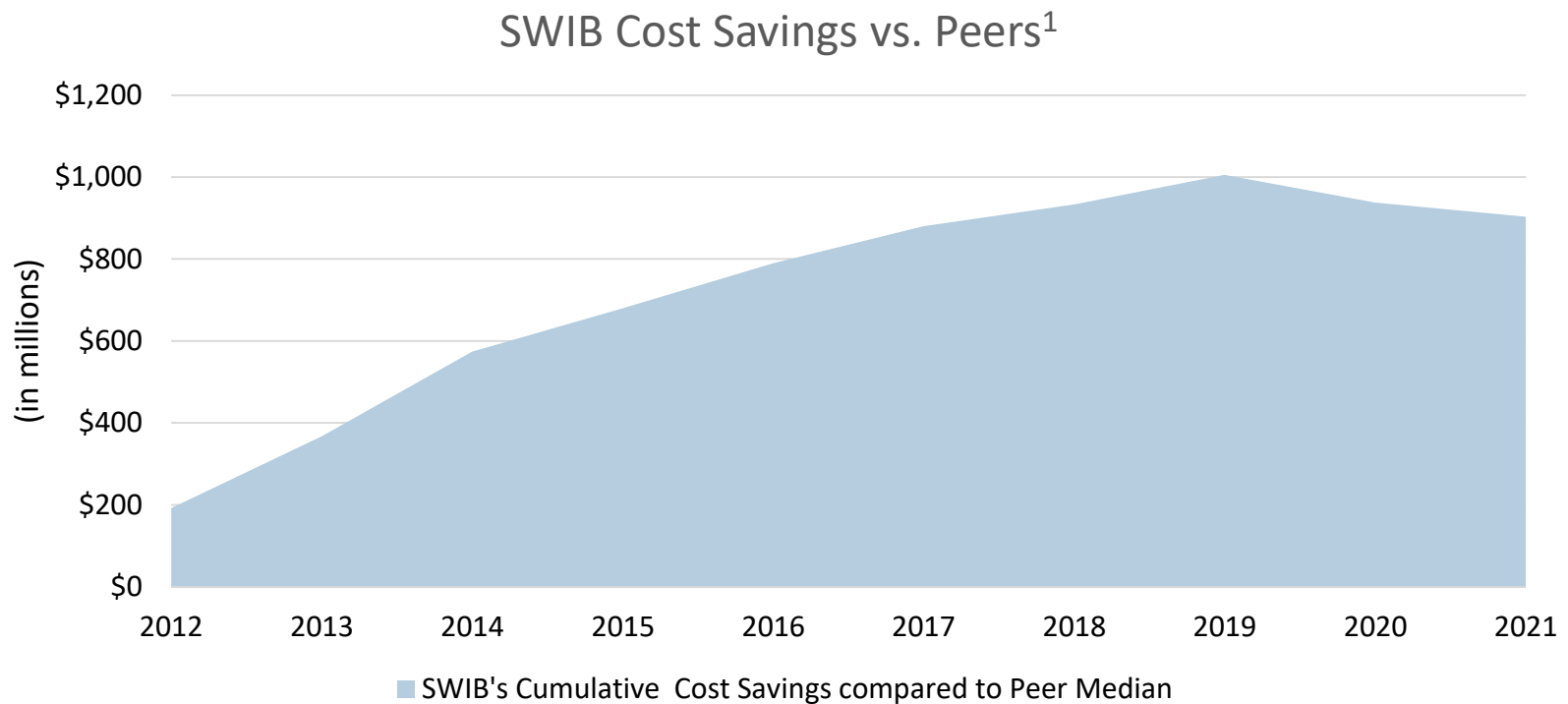
Notes

¹ External management costs represent the median cost for SWIB's CEM public fund peers for each asset class. SWIB engages external managers for Global Large Cap Equity at a cost of 34.1 bps and Domestic Fixed Income at a cost of 13.3 bps.

Data source: CEM Benchmarking, Inc. 2022 Report

SWIB saved \$903 million vs. peers from 2012-2021

SWIB's cost savings advantage has narrowed in recent years as SWIB has made additional investments in infrastructure required by more complex internal management.



¹This analysis compares SWIB's savings vs. the peer group median costs for every \$100 under management and multiplies that average savings by SWIB's median assets under management.

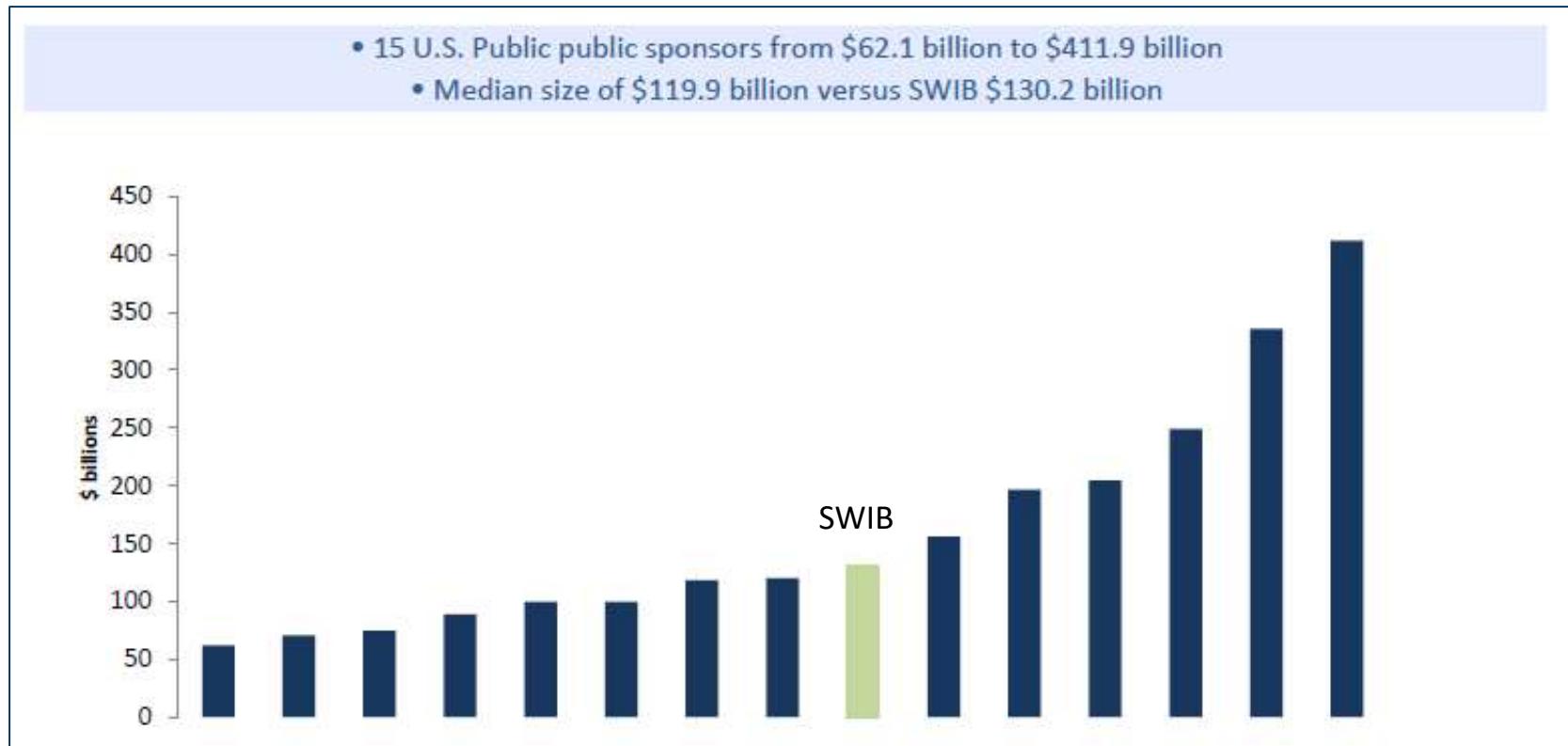
Appendix

U.S. Public Universe In 2021 CEM Report

1	<i>Anonymous U.S. Fund No. 1</i>	24	<i>North Carolina Retirement Systems</i>
2	Arlington County	25	Ohio Police and Fire Pension Fund
3	<i>California State Teachers' Retirement System</i>	26	Oklahoma Police Pension & Retirement System
4	<i>CalPERS</i>	27	<i>Oregon Public Employees Retirement Fund</i>
5	City of Austin Employees' Retirement System	28	Pennsylvania Public School Employees Retirement System
6	District of Columbia Retirement Board	29	Pension Benefit Guaranty Corporation
7	East Bay Municipal Utility District	30	Public Employees Retirement Association of New Mexico
8	Educational Employees' Supplementary Retirement - Fairfax County Virginia	31	<i>Public Employees Retirement System of Nevada</i>
9	<i>Florida State Board of Administration</i>	32	Rhode Island State Employees Retirement System
10	Houston Police Officers Pension System	33	Seattle City Employees' Retirement System
11	Illinois Municipal Retirement Fund	34	South Carolina Retirement System Investment Commission
12	Indiana Public Retirement System	35	<i>State of Tennessee</i>
13	Iowa Public Employees' Retirement System	36	<i>State of Wisconsin Investment Board</i>
14	Kansas Public Employees Retirement System	37	State Universities Retirement System of Illinois
15	Kentucky Teachers' Retirement System	38	<i>STRS Ohio</i>
16	<i>LACERA</i>	39	Tacoma Employees' Retirement System
17	Los Angeles City Employees' Retirement System	40	<i>Teacher Retirement System of Texas</i>
18	Los Angeles County Metropolitan Transit	41	Teachers' Retirement System of Louisiana
19	Los Angeles Water & Power Employees Retirement Plan	42	The City of Milwaukee
20	Louisiana Municipal Police Employees' Retirement System	43	Utah Retirement Systems
21	Missouri State Employees' Retirement System	44	<i>Virginia Retirement System</i>
22	Montana Board of Investments	45	<i>Washington State Investment Board</i>
23	<i>New York City Retirement Systems</i>	46	West Virginia Investment Management Board

Funds in italics are also included in Peer group

Peer Group For SWIB



Data source: CEM Benchmarking, Inc. 2022 Report

SWIB's Total Cost Exceeds the CEM Benchmark in 2021 Due To...

	Excess Cost/ (Savings)	
	\$000s	bps
1. Lower cost implementation style		
• More active management, less lower cost passive	33,905	2.6
• Less external management, more lower cost internal	(46,556)	(3.6)
• More LPs as a percentage of external	6,751	0.5
• Less fund of funds	(7,156)	(0.5)
• More co-investment as a percentage of LP/Co	(5,876)	(0.5)
• More overlays	5,602	0.4
	(13,329)	(1.0)
2. Paying more than peers for some services		
• External investment management costs	(3,416)	(0.3)
• Internal investment management costs	9,513	0.7
• Oversight, custodial & other costs	36,010	2.8
	42,107	3.2
Total fund excess cost (due to structural differences)	28,777	2.2

Data source: CEM Benchmarking, Inc. 2022 Report

Board Meeting

Tab 5 – Asset Allocation Update and Recommendations for 2023



ASSET ALLOCATION RECOMMENDATION

BOARD OF TRUSTEES

DECEMBER 2022

Christopher Levell, ASA, CFA, CAIA, Partner
Joe Nankof, ASA, Principal



PROPRIETARY & CONFIDENTIAL

TOPICS

- **Summary of Recommendations**
- **Market Update as of 9/30/2022**
- **Analysis of Private Market Ranges**
- **Background & Assumptions**
- **Recommendations**
- **Appendix**



SUMMARY OF RECOMMENDATIONS

- 1. As in past years, recognize part of the increase in private markets at the portfolio level**
 - Private Equity/Debt from 12% to 15%
 - Real Estate from 7% to 8%
- 2. Reduce public equity from 52% to 48% to fund private market increases**
- 3. Expand the range around private markets given growth as well as liquidity and modeling analysis**
- 4. No material changes to sub-asset class allocations**
 - Public Equity to adjust to MSCI index weights (with China large cap half-weight)



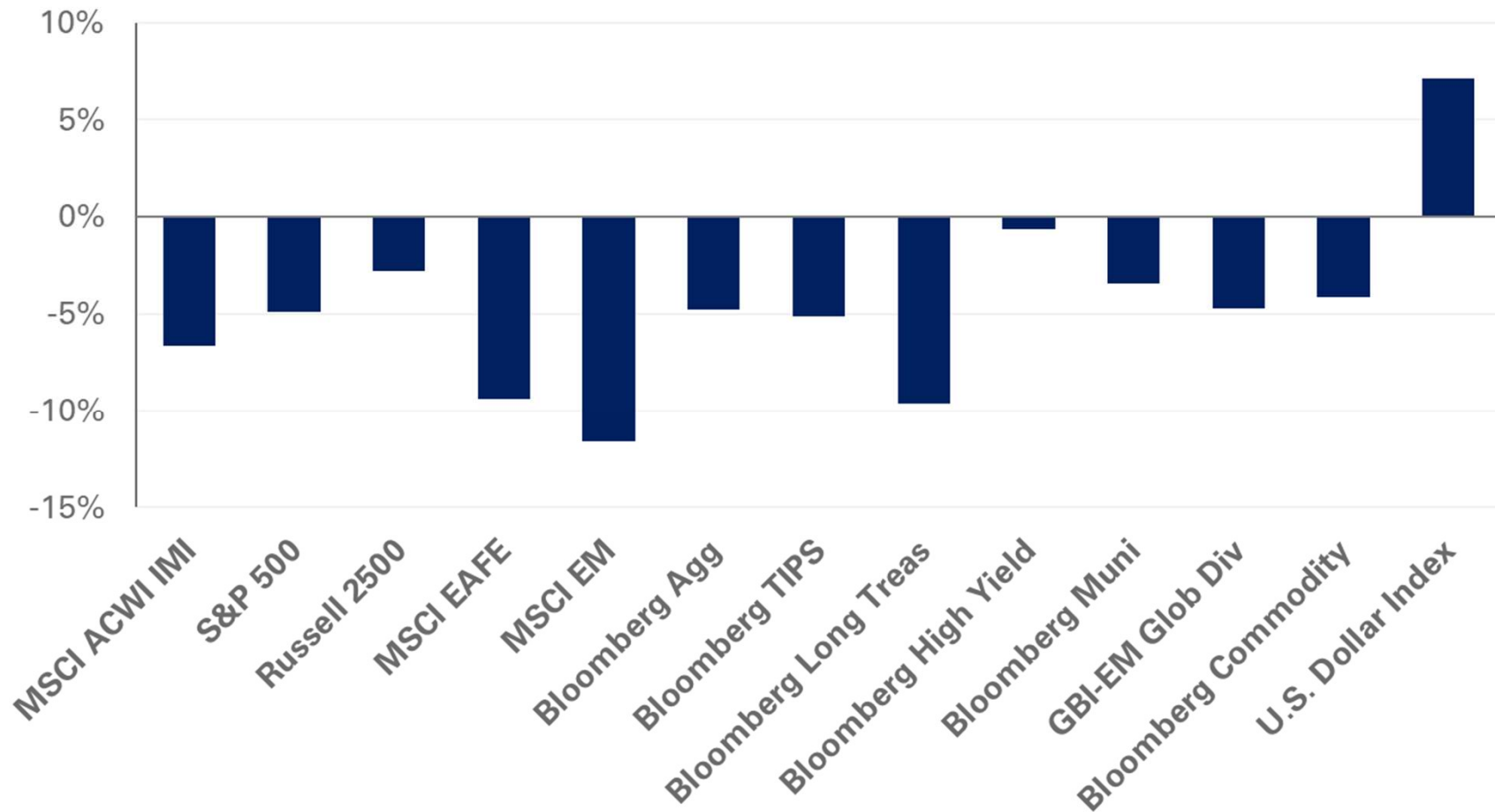


MARKET UPDATE AS OF 9/30/2022

PROPRIETARY & CONFIDENTIAL

GLOBAL ASSETS BROADLY DECLINED

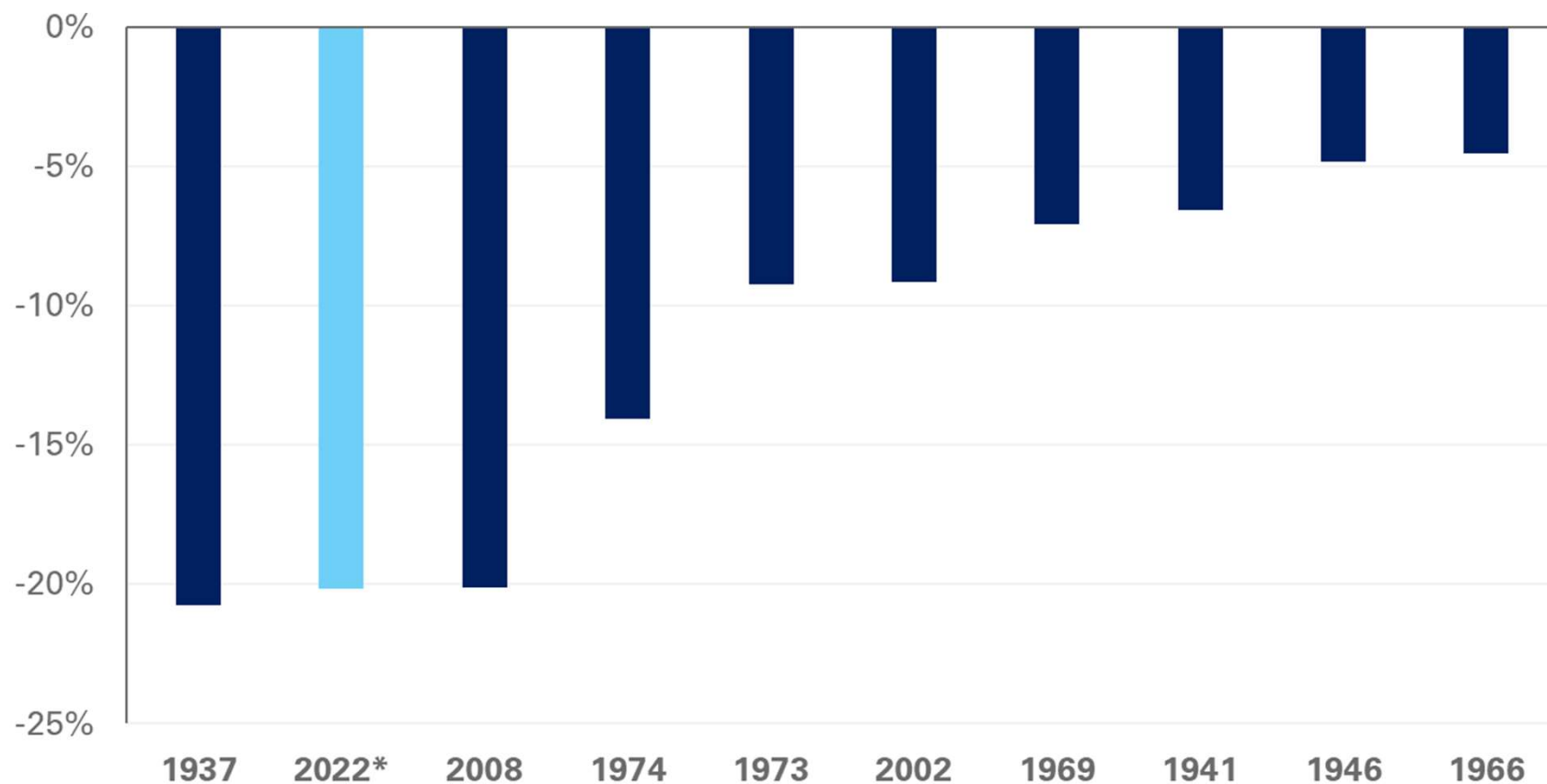
QUARTERLY TOTAL RETURNS



Sources: MSCI, S&P, Russell, MSCI, Bloomberg, JPM, FactSet

60/40 PORTFOLIO ON TRACK FOR WORST YEAR

WORST ANNUAL RETURNS: 60/40 PORTFOLIO



60/40 Portfolio represents 60% S&P 500 and 40% U.S. Aggregate Bonds (post 1975) and 40% Treasury (prior to 1974)

Data calculated from 12/31/1936; 2022 represents returns through the first nine months of the year

Sources: S&P, Bloomberg, FactSet



THE S&P 500 INDEX REMAINS IN A BEAR MARKET

LENGTH AND DEPTH OF S&P 500 BEAR MARKETS

Start	End	Length of Bear Market (Months)	Length of Recovery* (Months)	S&P 500 Decline
01/03/2022	?	9*	?	-24%*
02/19/2020	03/23/2020	1	5	-34%
10/09/2007	03/09/2009	17	59	-55%
03/24/2000	10/09/2002	31	80	-47%
08/25/1987	12/04/1987	3	20	-34%
11/28/1980	08/12/1982	21	3	-27%
01/11/1973	10/03/1974	21	69	-48%

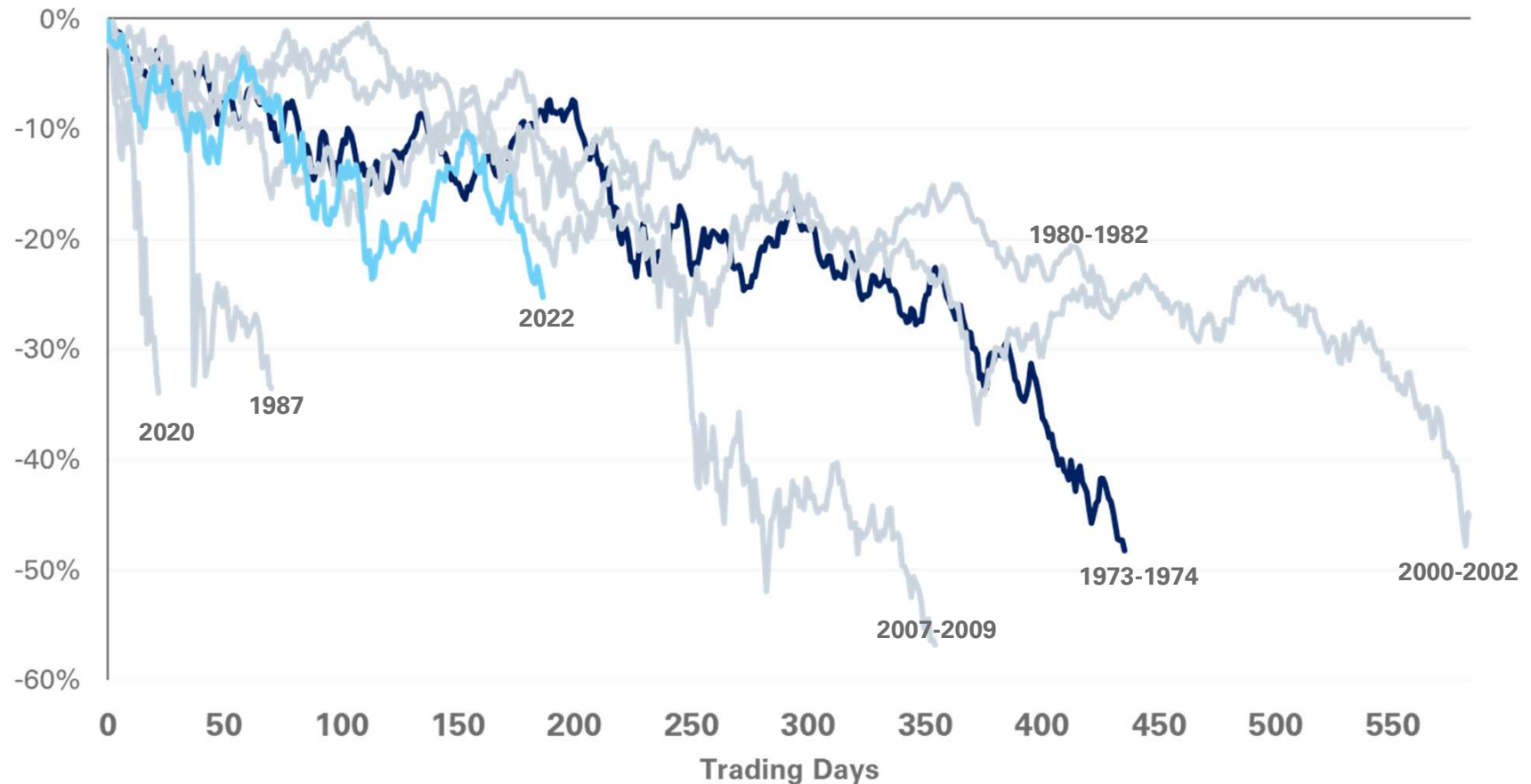
Notes: 2022 bear market is ongoing; represents historical bear markets since 1970. *Length of Recovery represents time to recoup losses from the start of the bear market.

Sources: S&P, FactSet, NEPC



THE BEAR MARKET IS TRENDING WITH THE PAST

HISTORICAL S&P 500 BEAR MARKET PATHS RELATIVE TO TODAY



Sources: S&P, FactSet, NEPC

THE MOVEMENT IN RATES HAS BEEN SIGNIFICANT

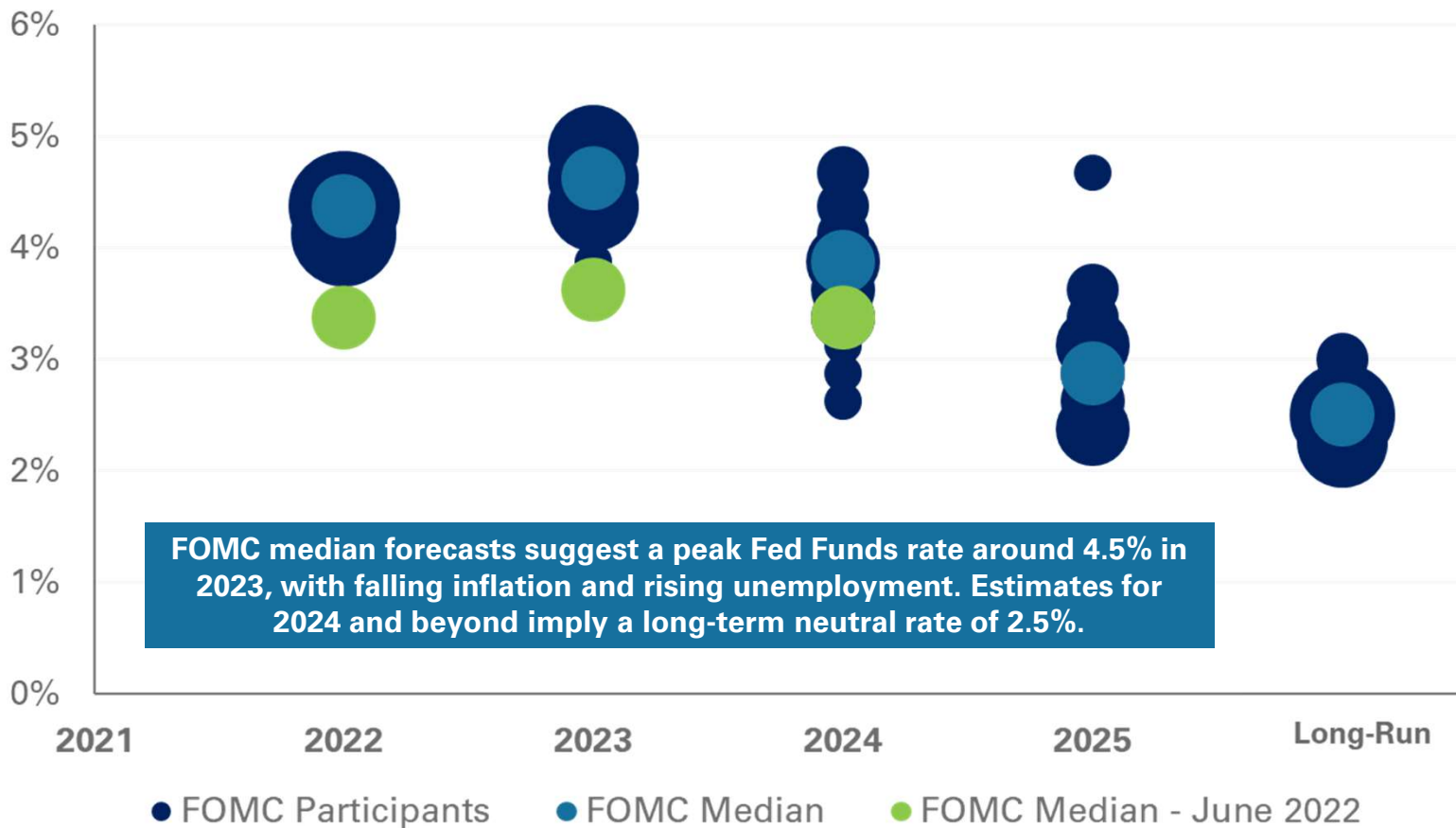
NUMBER OF FED RATE HIKES $\geq 0.75\%$ IN A CALENDAR YEAR



Sources: Federal Reserve, FactSet, NEPC

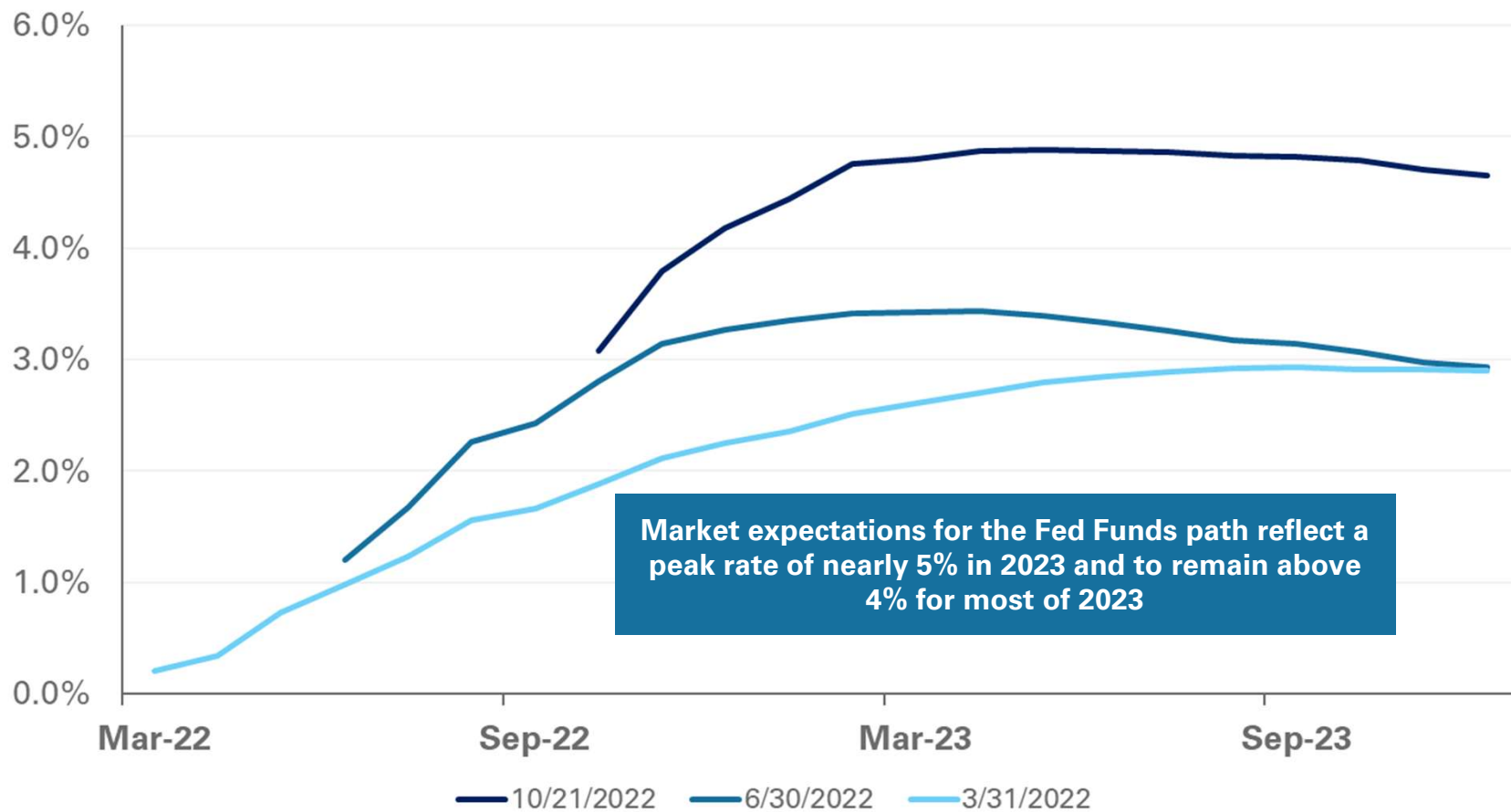
FOMC PROJECTS LOWER RATES IN 2024

FOMC DOT PLOT PROJECTIONS



FED FUNDS EXPECTATIONS CONTINUE TO RISE

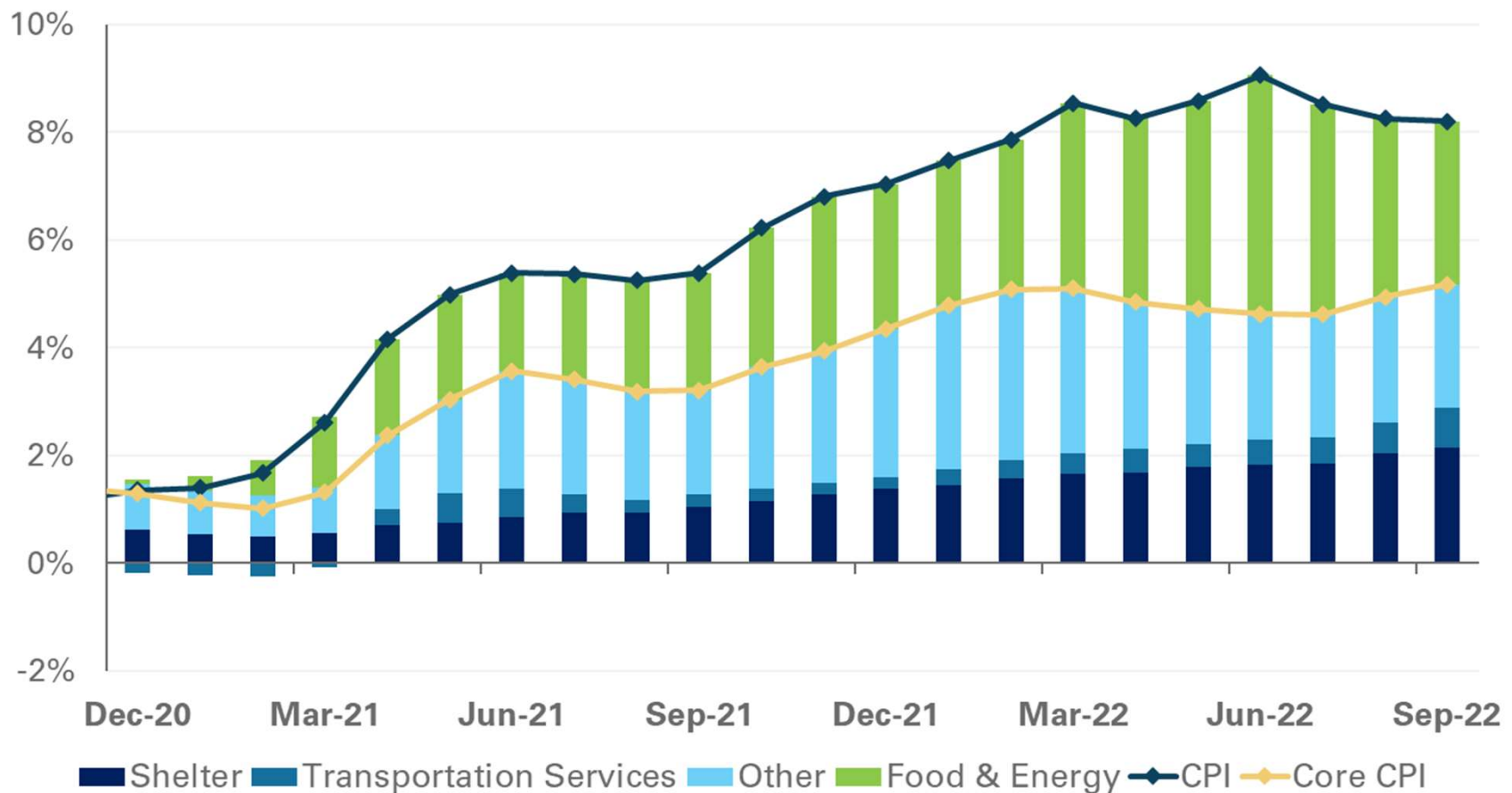
FEDERAL FUNDS FUTURES



Source: FactSet

CORE INFLATION CONTINUES TO REMAIN HIGH

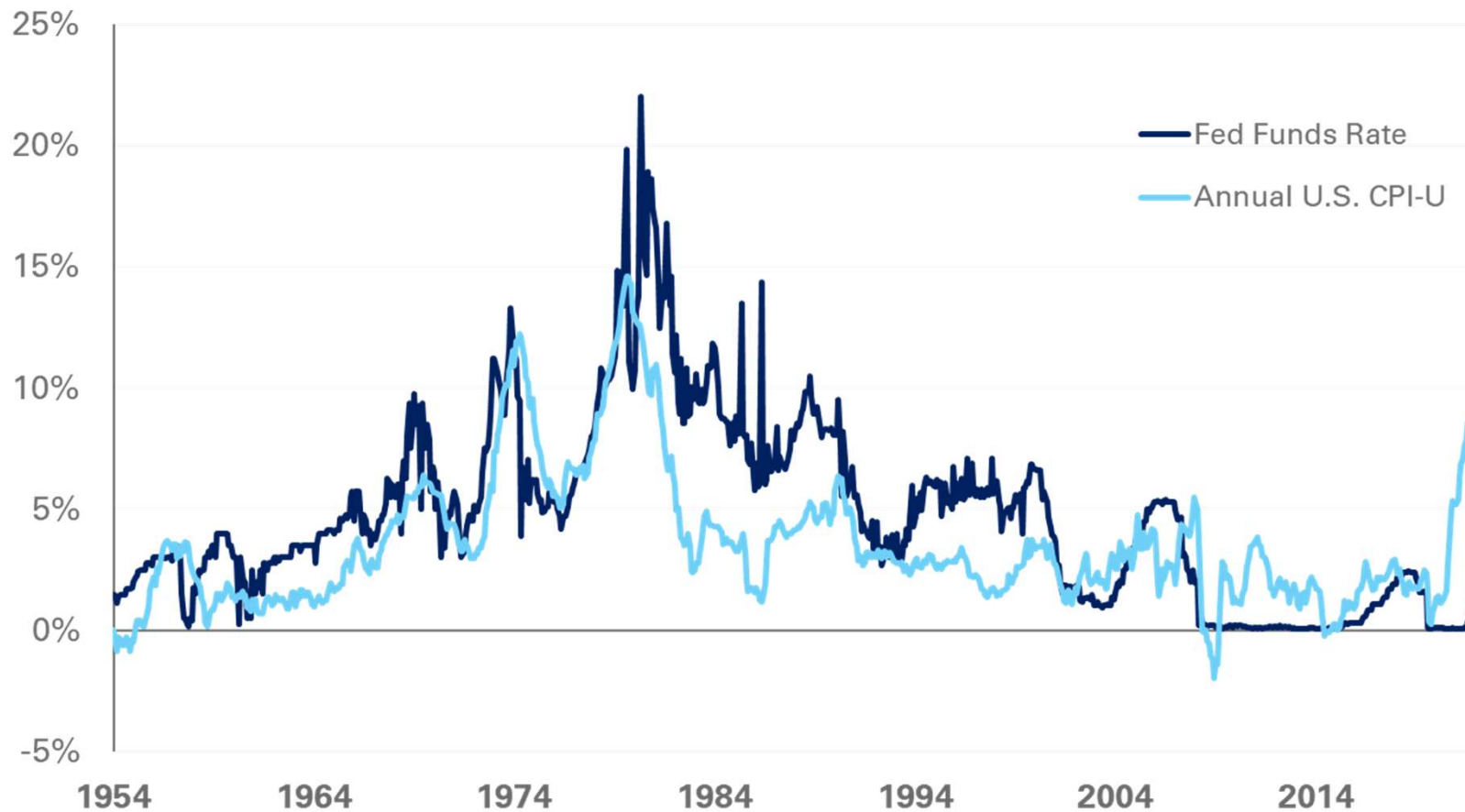
ANNUAL U.S. CPI-U CHANGES



Sources: Department of Labor, FactSet

INFLATION AND FED FUNDS NEED TO CONVERGE

HISTORICAL RELATIONSHIP BETWEEN FED FUNDS AND INFLATION



ANALYSIS OF PRIVATE MARKET RANGES



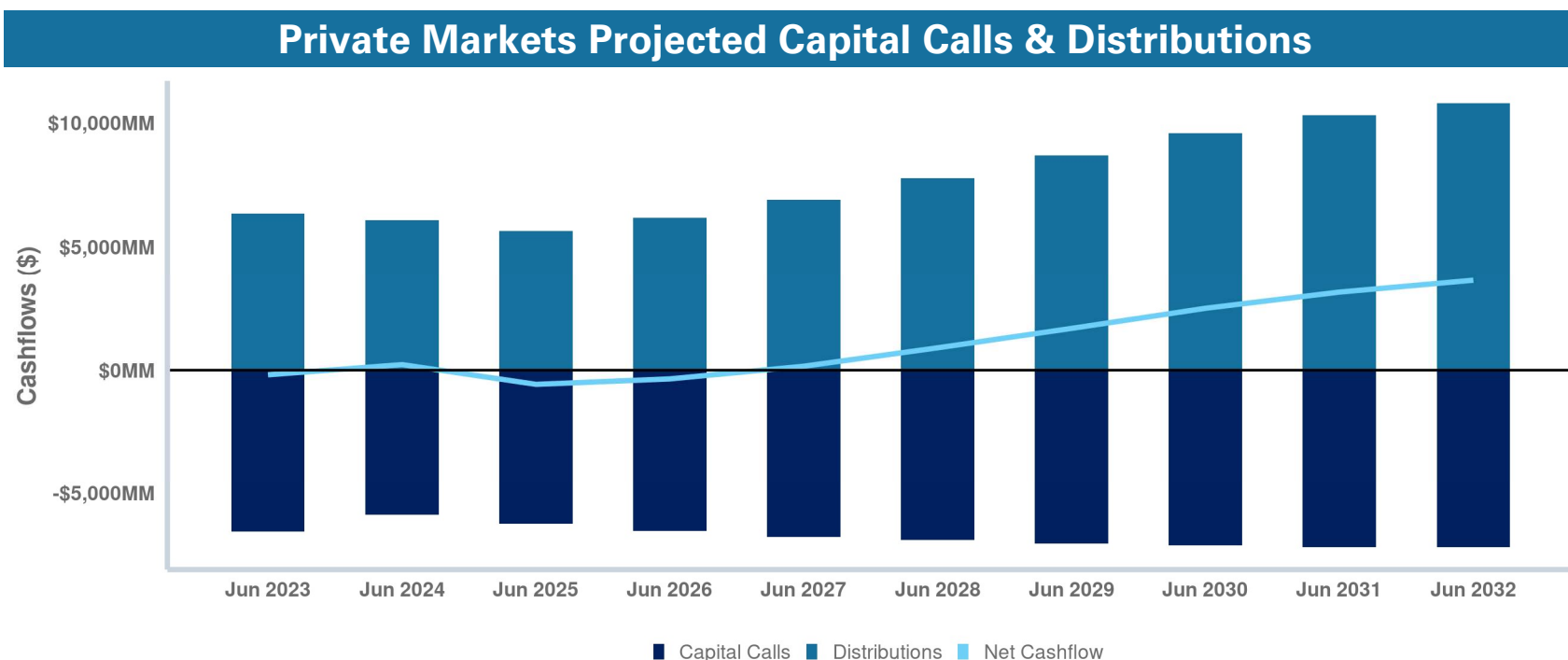
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PRIVATE MARKETS OBSERVATIONS

- **Private markets are an important and growing share of the CTF**
 - Higher expected return from illiquidity premium
 - Less volatile prices from appraisal process and lag
 - Denominator effect this year and whenever public assets decline
 - Alignment with dividend objectives from lower realized volatility
 - Good track record of alpha outperformance
 - Strong WRS funded status allows continued private markets growth
- **Over time, portfolio demands for liquidity may become a constraint**
 - Private markets
 - Leverage
 - Internal management activities
- **NEPC has projected private markets on our pacing, liquidity, and scenario models**
- **SWIB Staff has examined private market on historical stress tests and forward-looking stochastic projection**



CASH FLOW PROJECTIONS

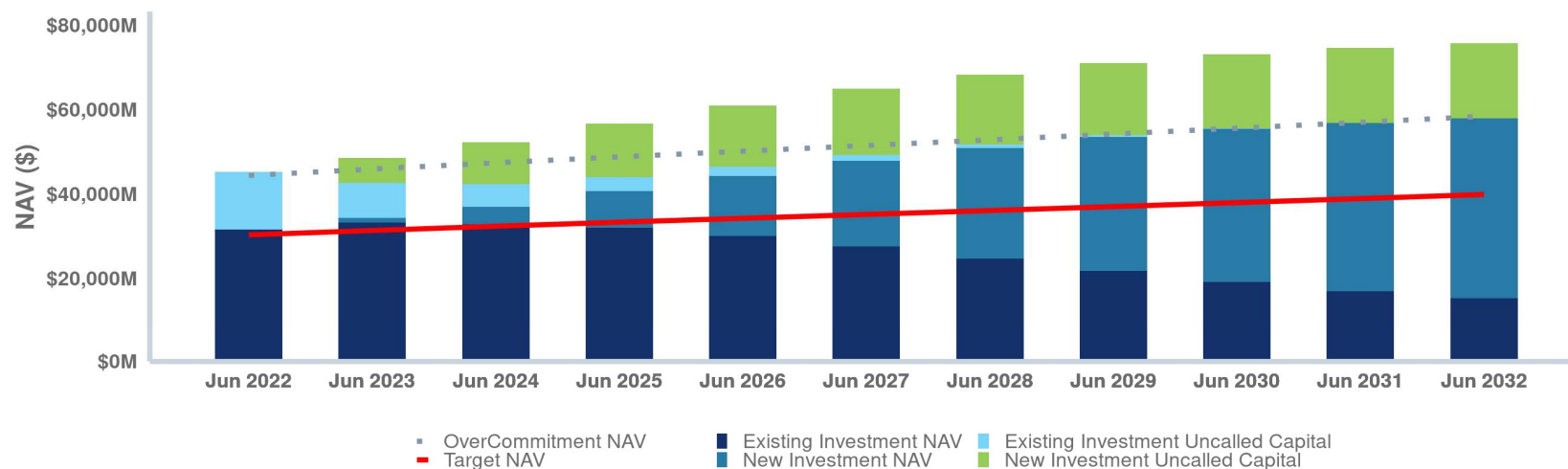


- NEPC modeled private markets and expects flat cashflow for several years
- That is, near term growth in private markets will depend on market conditions and what is happening to the rest of the portfolio
- Liquidity is ample given size and composition of the Core Trust Fund



ASSET PROJECTIONS

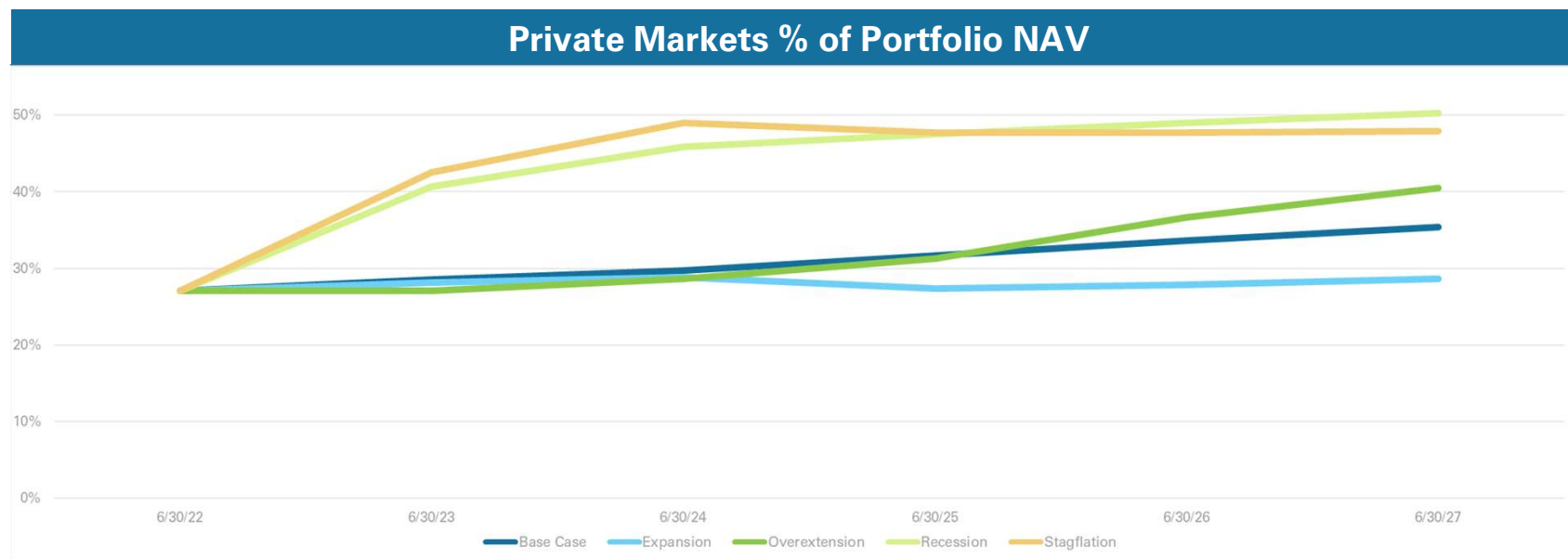
Private Markets Portfolio Projections



- **Private market pacing plans require forward commitment to maintain exposure**
 - Capital is called over time
 - Distributions need to be redeployed
- **Private markets do have an expected return advantage over public markets that can result in faster growth as a percentage of the portfolio over time**



SCENARIO ANALYSIS



- **Scenarios examine extreme conditions in capital markets**
 - Each assumed to continue down a growth & inflation trend for five years, although markets tend to mean-revert sooner
- **When public markets sell off, the denominator effect could lead to an even larger increase in the private market share of allocation**
 - Also expect capital calls to accelerate given future opportunity
 - Liquidity remains ample

Historical Approach

Year ending 12/2008 and year ending 6/2022

Market Environment:

Approach	Change in CTF AUM	Public Equity Return	Private Equity Return	Private Real Estate Return
Historical: 2008	-28%	-40.4%	-6.2%	-1.1%
Historical: 2022	-10%	-15.8%	+25.1%	+27.3%

Private Equity/Debt range results:

Approach	Target	Denominator Effect *	Cap Call Effect **	Denominator & Cap Call Effect
Historical: 2008	5%	1.6%	1.5%	+/-3.1% (62% of target)
Historical: 2022	12%	4.9%	1.4%	+/-6.3% (53% of target)

Real Estate range results:

Approach	Target	Denominator Effect	Cap Call Effect	Denominator & Cap Call Effect
Historical: 2008	5%	1.0%	0.2%	+/-1.2% (24% of target)
Historical: 2022	7%	2.7%	0.3%	+/-3.0% (43% of target)

*Denominator Effect: In a major down market, the total fund AUM decreases significantly while private market are less impacted in the near term as their public market counterparts, resulting a denominator effect.

**Cap call: Draw down on a capital commitment.

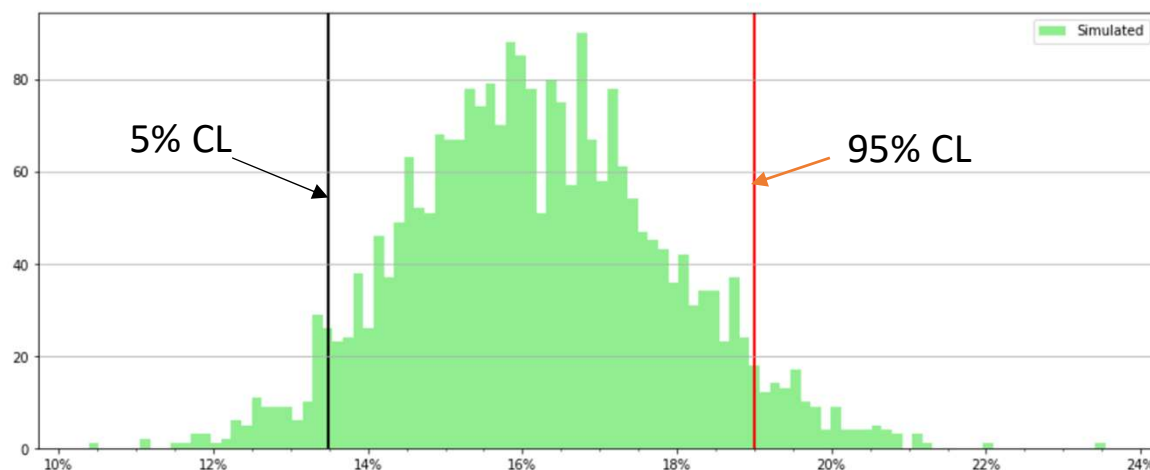
Stochastic Approach

- Characteristics of private investments
 - Quarterly reporting with one-quarter lag
 - Valuation lagged and infrequent
 - Private market returns relative to public markets appear smoothed (less realized volatility/variation) and have significant serial correlations
 - Private assets lagging public markets creates a denominator effect
 - Capital calls tend to increase during/after large public market downturns
- Simulations to determine ranges for private market allocations
 - Use NEPC Capital Market Assumptions of 6/30/2022
 - Simulate returns based on expected mean returns and covariance matrix of all asset classes
 - Simulated private market returns are smoothed using assumed serial correlations and 1 quarter reporting lag
 - Run simulations to create a distribution of private market allocations and determine the ranges at 5% and 95% confidence levels and at one-year horizon

Stochastic Ranges from Simulations

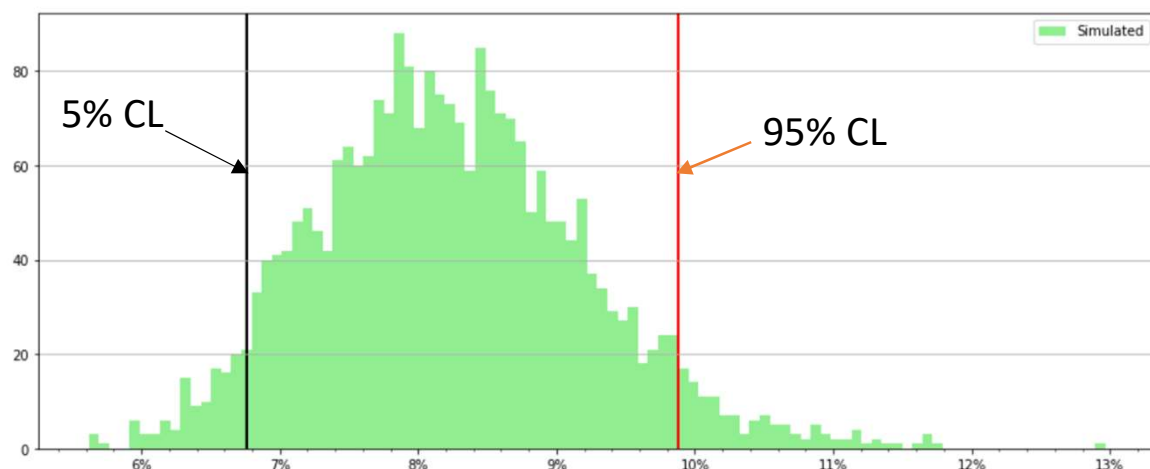
(does not include cap calls and distributions)

Private_Equity_Debt - Simulated Allocation Distributions, Smoothed Vol, Lag 3m



Private Equity/Debt simulated allocation at the 95CL is ~+4.0% greater than 15% target

Real_Estate - Simulated Allocation Distributions, Smoothed Vol, Lag 3m



Real Estate simulated allocation at the 95CL is ~+1.9% greater than 8% target

Summary

Private Equity/Debt range results:

Approach	Target	Denominator Effect	Cap Call Effect	Denominator & Cap Call Effects
Historical: 2008	5%	1.6%	1.5%	+/-3.1% (62% of target)
Historical: 2022	12%	4.9%	1.4%	+/-6.3% (53% of target)
Stochastic	15%	4.0%	2.5%*	+/-6.5% (43% of target)
Recommended	15%	4.5%	2.5%	+/-7.0% (47% of target)

Real Estate range results:

Approach	Target	Denominator Effect	Cap Call Effect	Denominator & Cap Call Effects
Historical: 2008	5%	1.0%	0.2%	+/-1.2% (24% of target)
Historical: 2022	7%	2.7%	0.3%	+/-3.0% (43% of target)
Stochastic	8%	1.9%	0.3%*	+/-2.2% (28% of target)
Recommended	8%	3.5%	0.5%	+/-4.0% (50% of target)

*Using historic capital call averages adjusting for allocation targets

PRIVATE MARKETS CONCLUSIONS

- **Private Markets will tend to grow as a share of the portfolio and can increase notably in public market downturns**
- **The liquidity needed to fund private market capital calls remains ample**
- **An expansion of private markets ranges should limit disruption of public market assets in most environments, and allow the appraisal marking process to “catch-up”**
 - Recommend range of 15% +/- 7% for Private Equity/Debt
 - Recommend range of 8% +/- 4% for Real Estate
- **We suggest that the “off year” between projections by the actuary GRS have a focus on liquidity**



BACKGROUND AND ASSUMPTIONS



PROPRIETARY & CONFIDENTIAL

HISTORICAL CONTEXT



- **Over time, the tangent optimal Sharpe ratio portfolio changes**
 - Varying cash assumptions
 - Equities generally between 1/3rd to half
 - Large differences in public fixed income and TIPS
- **Not optimal to over-engineer portfolio based on annual fluctuations**



Source: NEPC historical assumptions; public markets frontier

CURRENT ENVIRONMENT

- **Last year, we noted strong returns have a number of consequences**
- **This year's losses have opposite impacts**
 - Contributions increase and retiree dividends decrease over time, subject to smoothing process
 - But future expected returns are higher and support the actuarial expected return
- **The statutory 5% annuitization rate is a hard limit**
- **The “Goldilocks Zone” of 6 to 8% expected returns is significantly easier to achieve**



NEPC 6/30/2022 FORECASTS

Asset Class	Long Term Expected Return	10 Year Expected Return	Standard Deviation
Public Equity	7.6%	6.7%	17.8%
Public Fixed Income	5.3%	5.3%	6.1%
Inflation Sensitive Assets	3.6%	3.0%	5.8%
Private Equity/Debt	9.6%	9.0%	19.5%
Real Estate	5.2%	4.4%	15.0%



Public Equity based on current MSCI market capitalizations.
Private Equity/Debt values based on build up of 71.6% buyout, 12.5% venture, 13.0% direct lending, and 2.9% credit opportunities



RECOMMENDATIONS

PROPRIETARY & CONFIDENTIAL

RECOMMENDED ASSET ALLOCATION

	Current Policy Portfolio	Proposed Policy Portfolio	<i>Proposed Rebalance Ranges</i>
Public Equity	52%	48%	42% - 54%
Public Fixed Income	25%	25%	19% - 31%
Inflation Sensitive Assets	19%	19%	14% - 24%
Private Equity/Debt	12%	15%	8% - 22%
Real Estate	7%	8%	4% - 12%
Total	115%	115%	110%* - 120%
<i>10 Yr Expected Return</i>	6.7%	6.7%	*SWIB Staff allowed to eliminate leverage, i.e., down to 100%
<i>30 Yr Expected Return</i>	7.3%	7.4%	
<i>Standard Deviation</i>	12.8%	12.7%	
<i>Sharpe Ratio 10 Yr</i>	0.298	0.302	
<i>Target Active Risk</i>	1.2%	1.2%	



PUBLIC EQUITY SUB-ASSET STRUCTURE

	Current Equity Allocation	% of Total Portfolio	Proposed Equity Allocation	% of Total Portfolio
Global Equities	77.6%	40.4%	79.5%	38.2%
US Small Cap Equities	6.9%	3.6%	6.5%	3.1%
Int'l Small Cap Equities	4.6%	2.4%	4.1%	2.0%
Emerging Market Large Cap				
China	1.9%	1.0%	1.6%	0.8%
x-China	7.5%	3.9%	6.8%	3.2%
Emerging Market Small Cap	1.5%	0.8%	1.5%	0.7%
<i>10 Yr Expected Return</i>	<i>6.8%</i>		<i>6.7%</i>	
<i>30 Yr Expected Return</i>	<i>7.6%</i>		<i>7.6%</i>	
<i>Standard Deviation</i>	<i>17.9%</i>		<i>17.8%</i>	
<i>Sharpe Ratio 10 Yr</i>	<i>0.221</i>		<i>0.218</i>	



Note: Proposed based on 9/30/2022 MSCI market values.

PUBLIC FIXED INCOME SUB-ASSET STRUCTURE

	Current Allocation	% of Total Portfolio	Adjusted Allocation	% of Total Portfolio
US Government	24%	6.0%	No Changes	
US Investment Grade	24%	6.0%		
Mortgage-Backed	8%	2.0%		
Long Treasuries	4%	1.0%		
High Yield Bonds	20%	5.0%		
Levered Loans	10%	2.5%		
Emerging Market Debt*	<u>10%</u>	<u>2.5%</u>		
	100%	25.0%		
<i>Asset Duration</i>	<i>6.1</i>			
<i>10 Yr Expected Return</i>	<i>5.3%</i>			
<i>30 Yr Expected Return</i>	<i>5.3%</i>			
<i>Standard Deviation</i>	<i>6.1%</i>			
<i>Sharpe Ratio 10 Yr</i>	<i>0.403</i>			



*Blended 50%/50% External and Local

REFERENCE PORTFOLIO ATTRIBUTION

- Based on NEPC assumptions, below is a forward-looking attribution of SWIB portfolio decisions relative to the reference portfolio

	10 Year Expected Return	Standard Deviation	30 Year Expected Return
Reference Portfolio	5.96%	11.0%	6.55%
Private Markets	+ 0.44%	+ 0.8%	+0.47%
Portfolio Structure	- 0.05%	- 0.6%	-0.06%
Leverage	+ 0.32%	+ 1.5%	+ 0.39%
Adjusted Portfolio	6.67%	12.7%	7.35%



VARIABLE RETIREMENT TRUST ALLOCATION

	Current & Proposed Policy Portfolio	Rebalancing Range
US Equities	70%	65% - 75%
International Equities incl. Emerging	30%	25% - 35%
<i>10 Yr Expected Return</i>	<i>6.8%</i>	
<i>30 Yr Expected Return</i>	<i>7.7%</i>	
<i>Standard Deviation</i>	<i>17.9%</i>	
<i>Sharpe Ratio 10 Yr</i>	<i>0.223</i>	
<i>Target Active Risk</i>	<i>0.6%</i>	





APPENDIX

PROPRIETARY & CONFIDENTIAL

CAPITAL MARKET ASSUMPTIONS

JUNE 30, 2022

	Asset Class	10-Year Return	30-Year Return	Standard Deviation
MACRO	Inflation	2.4%	2.5%	—
	Cash	2.9%	2.9%	0.6%
	US Leverage Cost	3.2%	3.3%	0.6%
	Non-US Cash	1.5%	2.2%	0.6%
EQUITY	US Large-Cap Equity	5.8%	6.9%	16.6%
	US Small/Mid-Cap Equity	7.2%	7.5%	20.7%
	Non-US Developed Equity	6.4%	7.0%	19.6%
	Non-US Developed Equity (USD Hedge)	6.5%	7.2%	17.6%
	Non-US Developed Small-Cap Equity	7.4%	7.8%	24.2%
	Emerging Market Equity	9.6%	9.5%	28.3%
	Emerging Market Small-Cap Equity	9.3%	9.6%	34.4%
	<i>Global Equity</i>	<i>6.8%</i>	<i>7.7%</i>	<i>17.9%</i>
	Hedge Fund – Equity	5.5%	5.9%	11.4%
	Private Equity – Buyout	8.3%	8.9%	19.0%
	Private Equity – Growth	9.3%	9.9%	31.5%
	Private Equity – Early Stage Venture	10.5%	10.7%	45.0%
	Private Equity – Secondary	7.8%	8.3%	20.0%
	Non-US Private Equity	11.0%	11.0%	32.0%
	<i>Private Equity</i>	<i>9.8%</i>	<i>10.3%</i>	<i>25.2%</i>
	China Equity	9.4%	9.3%	28.6%
	US Microcap Equity	8.0%	8.4%	25.8%
CREDIT	US TIPS	3.0%	3.6%	5.8%
	US Treasury Bond	3.2%	3.4%	5.3%
	US Corporate Bond	5.2%	5.3%	7.3%
	US Mortgage-Backed Securities	3.4%	3.7%	6.5%
	<i>US Aggregate Bond</i>	<i>3.8%</i>	<i>4.0%</i>	<i>5.6%</i>
	US High Yield Corporate Bond	6.9%	6.9%	11.2%
	US Leveraged Loan	6.6%	6.3%	9.1%
	Emerging Market External Debt	7.3%	6.5%	13.0%
	Emerging Market Local Currency Debt	6.9%	5.9%	13.0%
	Non-US Government Bond	2.1%	2.8%	9.3%
	Non-US Government Bond (USD Hedge)	2.3%	3.0%	4.0%
	Global Government Bond	2.5%	3.0%	7.4%
	<i>Global Government Bond (USD Hedge)</i>	<i>2.6%</i>	<i>3.2%</i>	<i>4.0%</i>
	Non-US Inflation-Linked Bond (USD Hedge)	1.7%	2.6%	5.9%
	<i>Global Multi-Sector Fixed Income</i>	<i>5.9%</i>	<i>5.8%</i>	<i>7.8%</i>
	<i>Absolute Return Fixed Income</i>	<i>5.4%</i>	<i>5.3%</i>	<i>5.8%</i>
	US Municipal Bond	4.0%	3.5%	6.0%
	US Municipal Bond (1-10 Year)	3.0%	3.1%	4.5%
	US High Yield Municipal Bond	5.0%	5.2%	12.0%
	Hedge Fund – Credit	6.5%	6.6%	10.2%
	Private Debt - Credit Opportunities	7.9%	8.1%	14.4%
	Private Debt – Distressed	8.7%	9.1%	14.3%
	Private Debt - Direct Lending	7.6%	8.6%	10.5%
	<i>Private Debt</i>	<i>8.0%</i>	<i>8.7%</i>	<i>11.6%</i>

Italicized asset classes are derived composites, representing blends of core asset classes.
10- and 30-year assumptions represent NEPC's geometric return assumptions as of 6/30/2022.



CAPITAL MARKET ASSUMPTIONS

JUNE 30, 2022

	Asset Class	10-Year Return	30-Year Return	Standard Deviation
CREDIT	US Short-Term TIPS (1-3 Year)	2.8%	3.2%	3.2%
	US Short-Term Treasury Bond (1-3 Year)	3.1%	3.2%	2.1%
	US Short-Term Corporate Bond (1-3 Year)	4.4%	4.3%	3.0%
	US Short-Term High Yield Corporate Bond (1-3 Year)	5.5%	5.0%	8.5%
	US Intermediate-Term TIPS (3-10 Year)	3.1%	3.7%	5.4%
	US Intermediate-Term Treasury Bond (3-10 Year)	3.2%	3.6%	5.5%
	US Intermediate-Term Corporate Bond (3-10 Year)	5.3%	5.4%	6.5%
	US Long-Term Treasury Bond (10-30 Year)	3.2%	3.4%	11.6%
	US Long-Term TIPS (10-30 Year)	3.5%	3.8%	10.9%
	US Long-Term Corporate Bond (10-30 Year)	5.4%	5.5%	10.7%
	20+ Year US Treasury STRIPS	3.1%	3.3%	20.9%
	<i>US Long-Term Government/Credit</i>	<i>4.4%</i>	<i>4.6%</i>	<i>10.3%</i>
	US Corporate Bond - AAA	4.3%	4.4%	6.0%
	US Corporate Bond - AA	4.3%	4.4%	5.9%
	US Corporate Bond - A	4.8%	4.8%	7.2%
	US Corporate Bond - BBB	5.5%	5.5%	8.0%
	US Corporate Bond - BB	7.2%	7.3%	9.8%
	US Corporate Bond - B	7.4%	7.0%	11.7%
	US Corporate Bond - CCC/Below	2.3%	1.7%	20.6%
	US Securitized Bond	4.1%	4.5%	8.4%
	US Collateralized Loan Obligation	4.7%	4.6%	7.3%
	US High Yield Securitized Bond	6.6%	6.8%	11.2%
	US High Yield Collateralized Loan Obligation	7.3%	7.1%	10.8%
	US Taxable Municipal Bond	4.5%	5.2%	7.5%
	10 Year US Treasury Bond	3.4%	3.9%	7.4%
	10 Year Non-US Government Bond (USD Hedge)	1.4%	2.5%	5.1%
REAL ASSETS	Commodity Futures	3.4%	3.3%	18.5%
	Midstream Energy	6.0%	6.7%	28.6%
	<i>Public Real Assets (Multi-Asset)</i>	<i>5.5%</i>	<i>5.9%</i>	<i>14.1%</i>
	US REIT	6.1%	7.3%	21.4%
	Global Infrastructure Equity	6.1%	6.7%	20.3%
	Global Natural Resources Equity	6.4%	6.7%	23.2%
	Gold	4.4%	4.4%	16.3%
	Core Real Estate	4.4%	5.2%	15.0%
	Non-Core Real Estate	5.7%	6.7%	17.5%
	Private Debt - Real Estate	5.3%	5.7%	11.4%
	Private Real Assets - Natural Resources	7.9%	8.4%	32.5%
	Private Real Assets - Infrastructure	6.1%	6.8%	12.6%
MULTI-ASSET	Hedge Fund - Macro	5.4%	5.5%	9.2%
	<i>Hedge Fund</i>	<i>6.0%</i>	<i>6.3%</i>	<i>8.6%</i>
	<i>60% S&P 500 & 40% US Aggregate Bond</i>	<i>5.3%</i>	<i>6.1%</i>	<i>10.3%</i>
	<i>60% MSCI ACWI & 40% US Aggregate Bond</i>	<i>6.0%</i>	<i>6.6%</i>	<i>11.0%</i>

Italicized asset classes are derived composites, representing blends of core asset classes.
10- and 30-year assumptions represent NEPC's geometric return assumptions as of 6/30/2022.



CAPITAL MARKET ASSUMPTIONS

SEPTEMBER 30, 2022

	Asset Class	10-Year Return	30-Year Return	Standard Deviation
MACRO	Inflation	2.4%	2.5%	—
	Cash	3.9%	3.3%	0.6%
	US Leverage Cost	4.2%	3.7%	0.6%
	Non-US Cash	2.1%	2.5%	0.6%
EQUITY	US Large-Cap Equity	6.1%	7.2%	16.6%
	US Small/Mid-Cap Equity	7.1%	7.6%	20.7%
	Non-US Developed Equity	6.6%	7.1%	19.6%
	Non-US Developed Equity (USD Hedge)	6.8%	7.3%	17.6%
	Non-US Developed Small-Cap Equity	7.6%	7.8%	24.2%
	Emerging Market Equity	10.3%	9.8%	28.3%
	Emerging Market Small-Cap Equity	9.6%	9.7%	34.4%
	<i>Global Equity</i>	<i>7.1%</i>	<i>7.8%</i>	<i>17.8%</i>
	Hedge Fund – Equity	6.2%	6.2%	11.4%
	Private Equity – Buyout	8.3%	9.0%	19.0%
	Private Equity – Growth	9.3%	10.0%	31.5%
	Private Equity – Early Stage Venture	10.6%	10.8%	45.0%
	Private Equity – Secondary	7.8%	8.4%	20.0%
	Non-US Private Equity	11.2%	11.1%	32.0%
	<i>Private Equity</i>	<i>9.9%</i>	<i>10.4%</i>	<i>25.2%</i>
	China Equity	10.3%	9.6%	28.6%
	US Microcap Equity	8.1%	8.4%	25.8%
	US TIPS	4.4%	4.3%	5.8%
	US Treasury Bond	4.2%	4.1%	5.3%
	US Corporate Bond	6.3%	6.0%	7.3%
CREDIT	US Mortgage-Backed Securities	4.5%	4.3%	6.5%
	<i>US Aggregate Bond</i>	<i>4.9%</i>	<i>4.7%</i>	<i>5.6%</i>
	US High Yield Corporate Bond	7.5%	7.5%	11.2%
	US Leveraged Loan	7.6%	6.7%	9.1%
	Emerging Market External Debt	8.5%	7.2%	13.0%
	Emerging Market Local Currency Debt	7.0%	6.0%	13.0%
	Non-US Government Bond	2.5%	3.1%	9.3%
	Non-US Government Bond (USD Hedge)	2.7%	3.3%	4.0%
	Global Government Bond	3.0%	3.4%	7.6%
	<i>Global Government Bond (USD Hedge)</i>	<i>3.1%</i>	<i>3.5%</i>	<i>4.0%</i>
	Non-US Inflation-Linked Bond (USD Hedge)	3.5%	3.4%	5.9%
	<i>Global Multi-Sector Fixed Income</i>	<i>6.7%</i>	<i>6.3%</i>	<i>7.8%</i>
	<i>Absolute Return Fixed Income</i>	<i>6.2%</i>	<i>5.8%</i>	<i>5.8%</i>
	US Municipal Bond	4.8%	4.0%	6.0%
	US Municipal Bond (1-10 Year)	3.8%	3.6%	4.5%
	US High Yield Municipal Bond	6.0%	5.8%	12.0%
	Hedge Fund – Credit	7.3%	7.1%	10.2%
	Private Debt - Credit Opportunities	8.4%	8.5%	14.4%
	Private Debt – Distressed	9.3%	9.5%	14.3%
	Private Debt - Direct Lending	8.6%	9.0%	10.5%
	<i>Private Debt</i>	<i>8.8%</i>	<i>9.1%</i>	<i>11.6%</i>

Italicized asset classes are derived composites, representing blends of core asset classes.
10- and 30-year assumptions represent NEPC's geometric return assumptions as of 9/30/2022.



CAPITAL MARKET ASSUMPTIONS

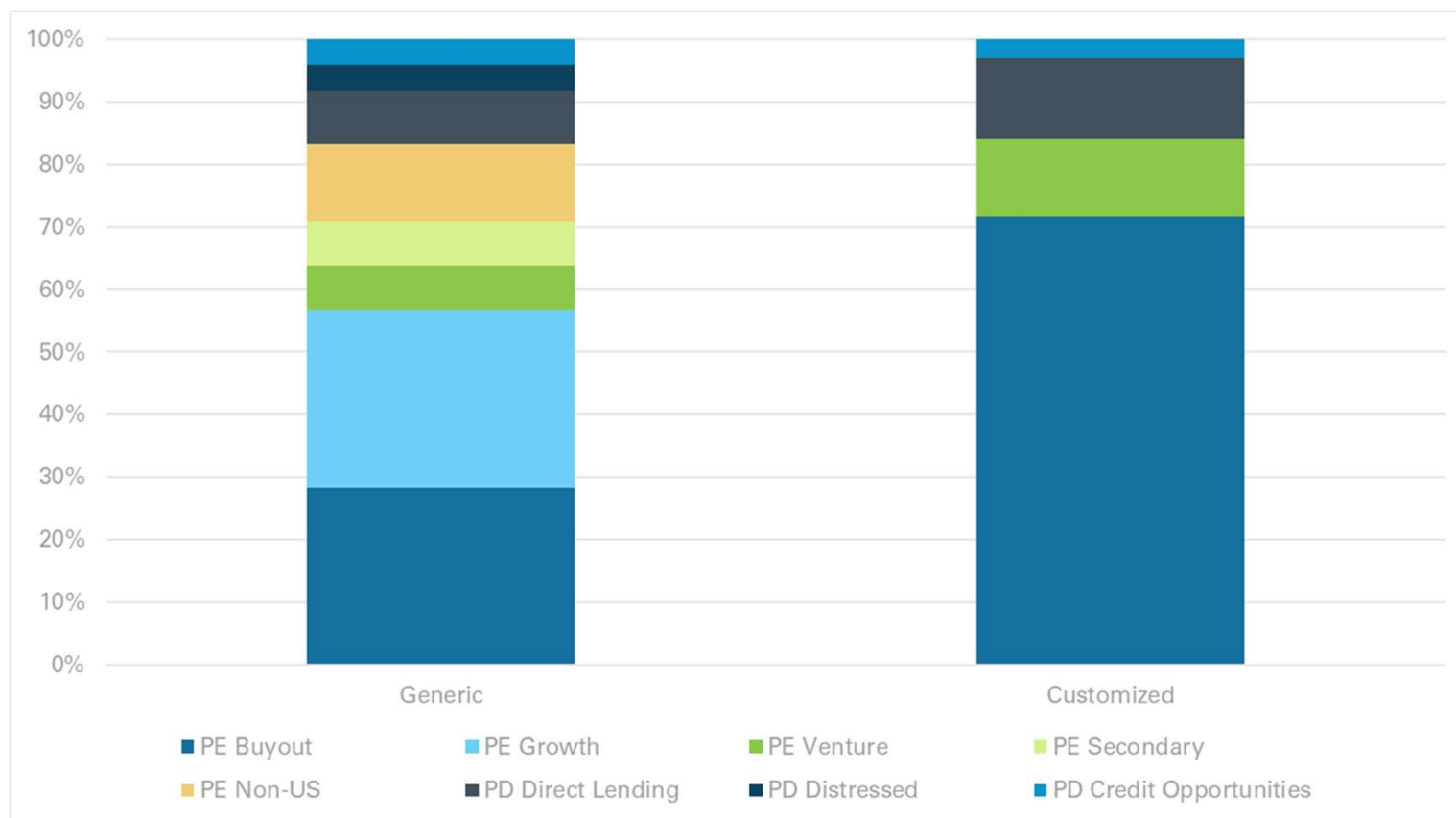
SEPTEMBER 30, 2022

	Asset Class	10-Year Return	30-Year Return	Standard Deviation
CREDIT	US Short-Term TIPS (1-3 Year)	4.2%	3.8%	3.2%
	US Short-Term Treasury Bond (1-3 Year)	4.2%	3.7%	2.1%
	US Short-Term Corporate Bond (1-3 Year)	5.4%	4.9%	3.0%
	US Short-Term High Yield Corporate Bond (1-3 Year)	6.7%	5.5%	8.5%
	US Intermediate-Term TIPS (3-10 Year)	4.4%	4.3%	5.4%
	US Intermediate-Term Treasury Bond (3-10 Year)	4.2%	4.1%	5.5%
	US Intermediate-Term Corporate Bond (3-10 Year)	6.3%	6.0%	6.5%
	US Long-Term TIPS (10-30 Year)	4.6%	4.7%	10.9%
	US Long-Term Treasury Bond (10-30 Year)	4.1%	4.2%	11.6%
	US Long-Term Corporate Bond (10-30 Year)	6.5%	6.3%	10.7%
	20+ Year US Treasury STRIPS	4.0%	4.2%	20.9%
	<i>US Long-Term Government/Credit</i>	<i>5.4%</i>	<i>5.4%</i>	<i>10.2%</i>
	US Corporate Bond - AAA	5.5%	5.2%	6.0%
	US Corporate Bond - AA	5.3%	5.0%	5.9%
	US Corporate Bond - A	5.9%	5.5%	7.2%
	US Corporate Bond - BBB	6.6%	6.2%	8.0%
	US Corporate Bond - BB	8.4%	8.1%	9.8%
	US Corporate Bond - B	7.6%	7.2%	11.7%
	US Corporate Bond - CCC/Below	1.7%	1.7%	20.6%
	US Securitized Bond	5.3%	5.1%	8.4%
	US Collateralized Loan Obligation	5.8%	5.1%	7.3%
	US High Yield Securitized Bond	8.7%	7.9%	11.2%
	US High Yield Collateralized Loan Obligation	8.6%	7.6%	10.8%
	US Taxable Municipal Bond	5.6%	5.8%	7.5%
	10 Year US Treasury Bond	4.4%	4.6%	7.4%
	10 Year Non-US Government Bond (USD Hedge)	2.0%	2.9%	5.1%
REAL ASSETS	Commodity Futures	4.1%	3.1%	18.5%
	Midstream Energy	7.1%	7.0%	28.6%
	<i>Public Real Assets (Multi-Asset)</i>	<i>6.5%</i>	<i>6.3%</i>	<i>14.1%</i>
	US REIT	7.0%	7.6%	21.4%
	Global Infrastructure Equity	7.2%	7.3%	20.3%
	Global Natural Resources Equity	7.4%	7.2%	23.2%
	Gold	5.2%	4.9%	16.3%
	Core Real Estate	4.5%	5.3%	15.0%
	Non-Core Real Estate	5.9%	6.7%	17.5%
	Private Debt - Real Estate	6.0%	6.0%	11.4%
	Private Real Assets - Natural Resources	8.8%	8.6%	32.5%
	Private Real Assets - Infrastructure	7.2%	7.2%	12.6%
MULTI-ASSET	Hedge Fund - Macro	5.9%	5.7%	9.2%
	<i>Hedge Fund</i>	<i>6.7%</i>	<i>6.6%</i>	<i>8.6%</i>
	<i>60% S&P 500 & 40% US Aggregate Bond</i>	<i>5.9%</i>	<i>6.5%</i>	<i>10.3%</i>
	<i>60% MSCI ACWI & 40% US Aggregate Bond</i>	<i>6.5%</i>	<i>6.9%</i>	<i>11.0%</i>

Italicized asset classes are derived composites, representing blends of core asset classes.
10- and 30-year assumptions represent NEPC's geometric return assumptions as of 9/30/2022.



PRIVATE EQUITY/DEBT BUILD-UP



ASSET ALLOCATION

Overview and Recommendations for 2023

December 14, 2022

Edwin Denson
Executive Director/Chief Investment Officer

In Consultation with NEPC and the Investment Committee

2023 RECOMMENDATIONS SUMMARY

Strategic Asset Allocation Targets and Ranges

2023 Core Trust Fund recommendation and expectations:

	<u>Policy Targets*</u>	<u>Ranges*</u>
Public Equity	48%	42% - 54%
Public Fixed Income	25%	19% - 31%
Inflation Sensitive Assets	19%	14% - 24%
Private Equity/Debt	15%	8% - 22%
Real Estate	<u>8%</u>	4% - 12%
Total (Including Leverage)	115%	110%[†] - 120%
 <i>10 Yr. Expected Return</i>	 <i>6.7%</i>	
<i>30 Yr. Expected Return</i>	<i>7.4%</i>	
<i>Expected Standard Deviation</i>	<i>12.7%</i>	
<i>10 Yr. Expected Sharpe Ratio</i>	<i>0.30</i>	
 Target Active Risk	 120bps +/-60bps	

The Board of Trustees' external asset allocation consultant, NEPC, provided the following capital market assumptions used to develop the asset allocation recommendation and expectations:

<u>Asset Class</u>	<u>Long Term Expected Return</u>	<u>10 Year Expected Return</u>	<u>Standard Deviation</u>
Public Equity	7.6%	6.7%	17.8%
Public Fixed Income	5.3%	5.3%	6.1%
Inflation Sensitive Assets	3.6%	3.0%	5.8%
Private Equity/Debt	9.6%	9.0%	19.5%
Real Estate	5.2%	4.4%	15.0%

* Policy Targets and Ranges will vary from the above table. This is due to the Asset Allocation Corridor Treatment which requires that Private Equity/Debt and Real Estate asset class Policy Targets be derived from actual AUM, and then corresponding Policy Targets and Ranges for Public Equities and Public Fixed Income are adjusted. Mandatory rebalancing for Public Equities and Public Fixed Income as set forth in the Board of Trustees WRS Investment Policy is not triggered by the ranges in the above table, but by these adjusted ranges.

[†] SWIB Staff allowed to eliminate leverage, i.e., down to 100%

- The recommended 2023 Policy Target for Public Equity (48%) is 4% lower than the 2022 target.
- The recommended 2023 Policy Targets for Public Fixed Income (25%) and Inflation Sensitive Assets (19%) are unchanged.
- The recommended 2023 Policy Target for Private Equity/Debt (15%) is 3% higher and the Policy Target for Real Estate (8%) is 1% higher to both reflect actual allocations and maintain the target close to the mid-point of the corridor treatment ranges.
- The recommended 2023 Policy Target for Policy Leverage (15%) is unchanged.
- The Target Active Risk of 120 basis points \pm 60 basis points will be maintained for the Core Trust Fund for 2023.
- The recommended 2023 Policy Targets may be implemented at any time after approval by the Board of Trustees as determined and approved by the ED/CIO, subject to market conditions and operational readiness.

2023 Variable Trust Fund recommendation and expectations:

	<u>Policy Targets</u>	<u>Ranges</u>
U.S. Equities	70.0%	65.0-75.0%
International Equities	30.0%	25.0-35.0%
	100.0%	
 <i>10 Yr. Expected Return</i>	 <i>6.8%</i>	
<i>30 Yr. Expected Return</i>	<i>7.7%</i>	
<i>Expected Standard Deviation</i>	<i>17.9%</i>	
<i>10 Yr. Expected Sharpe Ratio</i>	<i>0.22</i>	
 Target Active Risk	 60bps \pm 30bps	

- The recommended 2023 Policy Targets and Ranges are unchanged from 2022.
- The Target Active Risk of 60 basis points \pm 30 basis points will be maintained for the Variable Trust Fund for 2023.

2023 ASSET ALLOCATION OVERVIEW

Since the late 1980s, SWIB has conducted an asset allocation exercise annually, leading to policy and funding recommendations at the beginning of each calendar year. In the late 1990s, the process was expanded to include several planning sessions with investment staff, senior staff, consultants, and Trustees. SWIB's process includes a full asset/liability modeling process, stress testing, and discussion sessions with the Board every other year, opening the schedule to consideration of other strategic issues or structural asset allocation adjustments in the "off years". SWIB launched the "off-year" process for the 2023 asset allocation during the October Board meeting attended by Trustees, staff and consultants.

The key theme from the review and discussion centered around private market allocations and ranges in the context of the fund's overall liquidity profile. Private Equity/Debt and Real Estate targets were modeled through time to better understand the overall fund's liquidity profile as it relates to the pacing of unfunded commitments and distributions. The private market allocations were also assessed over multiple economic environments to understand how the allocations evolve if a particular economic environment persists. The conclusion was the fund's liquidity profile is sufficient to allow for the higher private market allocations and the current pacing plan for commitments which is desirable to maintain the allocations over time.

Private Equity/Debt and Real Estate ranges were analyzed from both historical and ex-ante approaches to quantify the denominator effect and potential increased capital calls during times of market disruption. The range analysis supports the recommendation to increase the Private Equity/Debt range from the target $\pm 5\%$ to the target $\pm 7\%$. The analysis for Real Estate supports an increase in the range from the target $\pm 3\%$ to the target $\pm 4\%$. The ranges for these two asset classes determine when the asset allocation corridor treatment is in effect. The widening of the rebalancing ranges around the private market allocations has been calibrated so that the asset allocation corridor treatment, which accepts the actual allocation of Private Equity/Debt and Real Estate as the target allocation while within the range, will be effective about 90% of the time.

The 2023 asset allocation recommendations at the asset class and sub-asset class levels are discussed below.

1. The sub-asset class targets within Public Equity (see proposed sub-asset class targets on next page) align the allocation with the global investible market in both the regional and capitalization spectrum dimensions by representing the MSCI ACWI IMI while preserving a half weight to China large cap. This year the recommendation contemplates that the sub-asset class targets will be reset and aligned with the capitalization of the MSCI ACWI IMI with 50% weight to China large cap throughout next year. This will reduce rebalancing within the asset class relative to the process of updating the sub-asset class targets on an annual basis. This will also position the asset class structure for simplification next year.
2. The sub asset class changes within Public Fixed Income (see proposed sub-asset class targets on the next page) did not change this year.
3. The recommendation to increase Private Equity/Debt from 12% to 15% and increase Real Estate from 7% to 8% reflects both longer term liquidity and pacing aspects of the asset classes as well as aligns policy targets within the corridor treatment ranges. Both Private Equity/Debt and Real Estate current allocations are above the mid-point of the corridor treatment ranges due to expectations of a reversal of the denominator effect in 2023 as private asset valuations catch up with the public market valuations.
4. Active return (return in excess of the policy benchmark) is an important contributor to overall fund return and diversifies risk. The recommendation to increase private asset class allocations (described above) from primarily passive allocations will likely create additional opportunities to increase active return.

Strategic Sub-Asset Class Allocation Targets

2023 Core Trust Fund recommendation and expectations:

<u>Public Equity</u>	<u>Policy Target[‡]</u>
Global	38.2%
US Small Cap	3.1%
Int'l Small Cap	2.0%
EME Large Cap China	0.8%
EME Large Cap ex China	3.2%
EME Small Cap	<u>0.7%</u>
	48.0%
 <u>Public Fixed Income</u>	 <u>Policy Target</u>
US Government	6.0%
US Investment Grade Credit	6.0%
MBS	2.0%
Long Treasuries	1.0%
High Yield Bonds	5.0%
Levered Loans	2.5%
EMD (External)	1.25%
EMD (Local Currency)	<u>1.25%</u>
	25.0%

[‡] Public Equity sub-asset class targets reflect the market capitalization of the MSCI ACWI Investable Market Index (IMI) with a 50% weight to the China large cap component as of 9/30/2022. The sub-asset class targets will be reset and aligned with the MSCI capitalizations throughout next year as part of the policy implementation.

Board Meeting

Tab 6 – Investment Committee Open Session Business

- A. Amendments to SWIB Investment Committee WRS Investment Guidelines
- B. Approved Open Session Investment Committee Meeting Minutes of August 23, September 27, and October 25, 2022 Meetings
- C. Final Open Session Agenda for November 22, 2022 Meeting and Draft Open Session Agendas for December 15, 2022, and January 24, 2023 Meetings

SWIB Investment Committee
WISCONSIN RETIREMENT SYSTEM
INVESTMENT GUIDELINES

Revised as of

~~June 28~~ September 27, 2022

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I. INTRODUCTION

The SWIB Board of Trustees (the “Board”) has delegated to the investment staff of SWIB standing authority to manage the assets of the Core Retirement Trust Fund (the “Core Fund”) and the Variable Retirement Trust Fund (the “Variable Fund”), which together make up the Wisconsin Retirement System (the “WRS”), pursuant to the Board’s WRS Investment Policy and to section 25.15(2) of the Wisconsin Statutes and section IB 2.02 of the Wisconsin Administrative Code. The Investment Committee was created to provide oversight of WRS¹ investments within the parameters established by the Board and pursuant to the Investment Committee’s Charter approved by the Board. To properly and prudently execute its delegated authority and oversight functions, the Investment Committee has established guiding policies, guidelines and procedures, which are set forth in this document, the Investment Committee Investment Guidelines (these “IC Guidelines”). These IC Guidelines articulate the policies and guidelines that are employed in the day-to-day management of the WRS assets by SWIB’s staff. This document will be reviewed periodically and updated as necessary by the Investment Committee to reflect changes in investment strategies and to reflect best industry practices for prudent investors. Notwithstanding the delegation of authority by the Board to the Investment Committee for the establishment, approval, and amendment of the policies, guidelines and procedures included in these IC Guidelines, the Board reserves all rights to modify and amend these IC Guidelines at any time in its discretion. Any changes to these IC Guidelines will be periodically reported to the Board. In addition to these IC Guidelines, SWIB staff may also have to comply with Risk, Compliance Division or legal requirements, and review operational readiness with Operations staff prior to the trading of the instruments and securities authorized herein.

II. LEVERAGE USE POLICY

Introduction

Leverage is an exposure to an asset that is not fully collateralized by cash assets or an exposure to an asset acquired that has not been fully funded. Leverage by itself does not necessarily create additional market risk or variation in market returns. Leverage may result in greater diversification and lower market risk than an unlevered portfolio under normal market conditions. The funds managed by SWIB can have exposure to leverage through different structures, instruments and vehicles.

SWIB uses leverage in two primary ways. The first is to express the overall policy asset allocation, which includes leverage (“Policy Leverage”). Generally, Policy Leverage is implemented passively. The total amount of Policy Leverage is approved by the Board through the WRS asset allocation process. The Board-approved asset allocation targets for each asset class together with the approved Policy Leverage is called the “Policy Portfolio.” The second use of leverage is to fund the alpha pool (“Alpha Pool Leverage”), which overlays alpha-producing strategies on the overall Core Fund Policy Portfolio. Those alpha

¹ The Investment Committee also has oversight of the State Investment Fund and other funds managed by SWIB as described in the Board’s SIF and Separately Managed Funds Investment Policy and Guidelines.

strategies are funded with additional leverage but are not part of the Policy Portfolio. The total amount of Alpha Pool Leverage is limited by the Board-approved active risk target and range.

Certain internal active portfolios are also authorized to use portfolio-specific leverage. The Core Fund may provide limited unallocated cash to such internal active portfolios, and to other portfolios, to fund short-term financing needs, and charge a market-based funding rate to the applicable portfolio. Active internal and external portfolios may also fund portfolio leverage by financing assets within the portfolio.

Use of leverage introduces distinct liquidity risk that can vary based on leverage sources and margin requirements. Often, leverage requires liquid assets to satisfy margin obligations. Liquidity risk is managed by monitoring the level of liquidity required in various market scenarios and ensuring that an adequate reserve of liquid assets is available to meet commitments in times of market stress. Having a variety of leverage sources diversifies the liquidity risk and cost under varied market scenarios.

Leverage may be generated using derivative instruments (such as futures, forwards, options, and swaps), through the use of repurchase agreements (repo) to borrow capital against fully paid assets, or by explicit borrowing through other capital markets mechanisms (such as lines of credit, debt issuance or securities lending). Sources of leverage are evaluated based on liquidity risk, counterparty risk, cost, and stability. The balancing of these dimensions can vary through time as market conditions vary, especially with respect to liquidity.

Leverage Use Philosophy

Leverage is used where it can improve investment portfolio efficiency in terms of return for risk versus alternative choices that do not use leverage. Leverage will also be used to improve portfolio diversification and reduce portfolio concentration.

Leverage Monitoring

Detailed reporting is regularly (i.e., daily, monthly and quarterly) produced by SWIB to provide feedback regarding leverage exposures for review by portfolio managers, the head of Asset and Risk Allocation (ARA), the Risk Management Division, and the Executive Director/Chief Investment Officer (ED/CIO). Leverage use risk metrics are reported at least quarterly to the Investment Committee. Leverage use is also periodically reported by the ED/CIO to the Board.

Policy and Alpha Pool Leverage Guidelines

1. Leverage ratios govern leverage derived from beta sources (i.e., from levered asset class exposures). Established leverage ratio ranges for each levered asset class are set forth below. Current Leverage Ratio is defined as the ratio of notional exposure to capital available in the portfolio (or total exposure to unencumbered exposure in the case of repo). If the Current Leverage Ratio for any levered asset class exceeds the Maximum Target Leverage Ratio, SWIB will, within 30 days (unless such time limit is waived with majority approval of the rebalancing task force), reduce

exposure or add capital to bring the Current Leverage Ratio within the established range. A Current Leverage Ratio below the Minimum Target Leverage Ratio will be monitored as part of the overall optimization of capital and funding costs.

<i>Levered Asset Class</i>	Minimum Target Leverage Ratio	Target Leverage Ratio	Maximum Target Leverage Ratio
<i>US Large Cap Equity</i>	2.7	3.3	4.0
<i>US Small Cap Equity</i>	2.7	3.3	4.0
<i>MSCI World xUS Equity</i>	2.7	3.3	4.0
<i>US TIPS</i>	6.0	8.0	10.0
<i>US Treasuries</i>	8.0	10.0	12.0

III. DERIVATIVES USE POLICY

Introduction

A "derivative instrument" is an investment instrument which usually derives its value and marketability from an underlying instrument which represents direct ownership of an asset or a direct obligation of an issuer (e.g. a "spot" or cash market instrument). SWIB recognizes that derivatives provide a means through which SWIB can implement investment strategies in a more cost and time efficient manner than through the physical investment of the underlying securities. Additionally, derivatives can be used to facilitate SWIB's risk management activities including risk mitigation. Derivatives include such instruments as futures, swaps, options and currency forwards and may be exchange traded, traded over-the-counter (OTC) and/or cleared.

Derivatives Use Objectives

The overall strategic objective of SWIB's use of derivatives is to facilitate risk exposure management and to manage the cost of investing. Objectives for derivatives use include:

1. Constructing portfolios with risk and return characteristics that could not efficiently be created using underlying physical securities,
2. Changing systematic exposures without executing trades in the underlying physical securities,
3. Hedging or managing risks, and
4. Effecting varying active and passive investment strategies including, but not limited to: portable alpha, currency hedging, equitization, relative value trades, transition management, and rebalancings.

Derivatives Use Monitoring and Reporting

Derivatives use exposures will be monitored by portfolio managers that employ derivatives, the ED/CIO and the Risk Management Division. The Investment Committee will monitor derivatives use exposures and risk metrics on a quarterly basis or more frequently as needed.

Derivatives Guidelines Applicable to all WRS Internal Portfolios:

1. Exchange-traded derivatives must be traded on a recognized exchange approved by the Investment Committee, except for exchange-traded derivatives that are traded pursuant to Exchange for Related Position (EFRP) transactions, which are traded off-exchange and not subject to this requirement. Such approved exchanges are listed on *Appendix 1*. As additional exchanges are approved *Appendix 1* shall be updated without amendment to these IC Guidelines.
2. OTC derivatives may only be traded with counterparties with which SWIB has a current International Swap and Derivative Association (ISDA) agreement that includes a Credit Support Annex (CSA).

In addition:

- a) The counterparty, or its guarantor, must, on each date on which a transaction is entered into, have an actual credit rating of not less than: (1) "A2/P2" on short-term debt from S&P or Moody's; and/or (2) "Baa2/BBB" on long-term debt from S&P or Moody's.
- b) The collateral that SWIB holds under a CSA may be invested in the following:
 - i. Bank deposit accounts;
 - ii. Any money market fund having a rating of at least "Aaa" by Moody's or at least "AAA" by S&P;
 - iii. Overnight commercial paper having a rating of at least "P-1" by Moody's and "A-1" by S&P;
 - iv. Overnight repurchase agreements with U.S. government, agency or dollar cash collateral;
 - v. Overnight reverse repurchase agreements with U.S. government, agency or dollar cash collateral; and
 - vi. The State Investment Fund or similar short term investment funds.
3. For clarity, Items 1 and 2 do not apply to exchange-traded funds (ETFs), or to over-the-counter derivatives entered into on behalf of SWIB, or a title-holding entity that is wholly-owned by SWIB, by either an external manager or advisor in connection with a real estate separate account.
4. Investments may be made in exchange-traded notes (ETNs) which are traded on exchanges included on an approved-exchange list maintained by the Compliance

Division. The Risk and Compliance Divisions shall be notified upon any investment in a new ETN.

5. Investments may be made in put option contracts and call option contracts on securities, futures or an index of a group of securities. Put and call options may be purchased or sold on investments that could be held in the portfolio if the options were exercised.
6. Currency exposure management is permitted (but not required) through the use of exchange-traded currency instruments, and through the use of spot and forward contracts in foreign currencies (including FX Swaps). Direct currency hedging is permitted to directly hedge currency exposure back to the U.S. dollar. Cross-currency exposure management to transfer out of an exposed currency and into a benchmark currency is permitted.
7. Guideline limits and soft parameters for each portfolio will be applied to the aggregate exposures which include both physical and synthetic securities.
8. New derivatives instruments will be reviewed and approved by the Investment Committee before their implementation or use.
9. SWIB shall not enter into new derivatives agreements with new counterparties until the ED/CIO has approved the agreement. Each relevant division head or portfolio manager shall submit to the ED/CIO a written summary of any proposed addition of a relationship that may require evaluation of counterparty credit risks. Such relationship may involve (a) entering into a master netting or trading agreement with a new counterparty, which acts either as a principal or as an agent on behalf of multiple principals, or (b) hiring an external manager to implement a strategy that may require the manager to evaluate and monitor counterparty credit risks on SWIB's behalf (excluding external managers selected by Private Markets and Funds Alpha staff pursuant to their portfolio guidelines). The ED/CIO will review all proposals of such new relationships to determine that (i) the addition of the relationship is consistent with SWIB's investment goals and strategies, (ii) the appropriate loss and drawdown limits for the credit risk associated with the proposed counterparty relationship have been considered, and (iii) appropriate due diligence has been conducted. The relevant division head or portfolio manager ("Initial Division User") shall retain responsibility for monitoring any such approved relationship. If another division expects to use the derivatives agreement for trading strategies after its initial approval, the ED/CIO, Initial Division User and the new division lead shall agree on the strategy for monitoring for the counterparty.

IV. Rebalancing Procedures

1. Mandatory rebalancing is triggered by the procedures in the Board's WRS Investment Policy and the procedures below, as applicable. The Core Fund and Variable Fund asset mixes will be reviewed at least monthly for potential rebalancing.

2. A rebalancing task force will consist of the ED/CIO and the heads of ARA, Global Public Markets Strategies (GPMS) and Private Markets & Funds Alpha (PMFA). The ED/CIO may call a meeting of the rebalancing task force to consider a discretionary rebalancing from time to time. In consultation with the rebalancing task force, and with a majority approval of the task force, a discretionary rebalancing may be initiated pursuant to the plan developed by the ARA Division.
3. Discretionary rebalancing may be used to bring public market asset classes partially or fully back to their strategic target weights, to reduce or use active risk, to otherwise minimize asset allocation drift, or to intentionally overweight or underweight an asset or sub-asset class.
4. In connection with any rebalancing, the ARA Division will develop and implement a plan (a "Rebalancing Plan") to affect the rebalancing. The Rebalancing Plan will include the total amount of each asset class to be bought and sold, the intended market exposures, and the time frame of purchases and sales. The Rebalancing Plan is based on best estimates of market prices, private market valuations, and benefits cash flows for when the rebalance will take effect. To the extent that the market prices are different at the time of a rebalancing from the anticipated market prices, valuations or cash flows, the Rebalancing Plan may be subsequently adjusted for additional purchases and/or sales to true up the market exposures to the anticipated levels of the originally approved rebalancing without further approval by the rebalancing task force.
5. The ARA Division, under the supervision of the head of ARA, has the discretion to approve intra-month allocation adjustments of unallocated fund-level cash to passive portfolios and to manage asset class mis-alignments. Such adjustments may be, for example, to allocate unallocated fund-level cash arising from a distribution, to raise liquidity to fund private markets capital calls, to adjust for benchmark weight changes, or to otherwise make adjustments during the month as conditions may arise to return the asset allocation to its intended allocation targets consistent with most recently approved Rebalancing Plan. The manner in which intra-month allocation adjustments of unallocated fund-level cash are allocated or cash deficits are funded depends on the source of such unallocated cash or cash deficit and shall follow Guideline 8 below, as applicable. Only passive portfolios may be utilized for allocations or deallocations. Once unallocated fund level cash is allocated to a passive portfolio, investment of such cash shall be made in accordance with the underlying passive portfolio's guidelines. Aggregate daily portfolio allocations or deallocations shall not exceed \$250 million unless approved by the ED/CIO.
6. Exchange-traded and OTC options or other derivatives may be purchased or sold in conjunction with managing asset class exposure and rebalancing. The aggregate notional value of the options will be limited to 2% of the market value of the trust fund at the date of purchase. The term of options used for this purpose may not exceed one year.
7. Cleared derivatives traded on a swap execution facility (SEF) may only be traded on or pursuant to the rules of the SEFs of which SWIB is a member or participant.

8. In connection with any rebalancing, the following procedures will be followed with respect to the following asset classes:
 - a. The Multi-Asset Strategy Class will rebalance 50% to Public Equities and 50% to Public Fixed Income. Accordingly, in connection with any rebalancing, for any percentage increase of assets in Multi-Asset, there will be a corresponding 50% reduction to Public Equities and a corresponding 50% reduction to Public Fixed Income, and vice versa if the Multi-Asset assets decrease. The rebalancing does not have to be proportional through the sub-asset classes.
 - b. The Real Estate Asset Class will rebalance 50% to Public Equities and 50% to Public Fixed Income. Accordingly, in connection with any rebalancing, for any percentage increase in Real Estate there will be a corresponding 50% reduction to Public Equities and a corresponding 50% reduction to Public Fixed Income, and vice versa if the Real Estate assets decrease. The rebalancing does not have to be proportional through the sub-asset classes.
 - c. The Private Equity Asset Class will rebalance on a 1 for 1 basis to Public Equities. Accordingly, in connection with any rebalancing, for any percentage increase in Private Equity there will be a corresponding 1% reduction to Public Equities. The rebalancing does not have to be proportional through the sub-asset classes.

V. Drawdown Procedures

1. On an annual basis, the Investment Committee shall approve the active risk budget for the next calendar year and the relative drawdown limits per strategy (based on percentage of assets under management (AUM)) for the Core Trust Fund. The relative drawdowns are measured against the benchmark for each strategy on a monthly basis by the Risk Management Division. Relative drawdown limits are intended to protect the Core Trust Fund from large relative drawdowns. Given the active risk that each strategy is expected to take and achieve, the Investment Committee acknowledges that (1) the relative drawdown limits may be reached in any given market environment, and (2) the probability of reaching the drawdown limits is not remote for the levels of active risk approved in the active risk budget.
2. If and when 60% of the relative drawdown limit is reached during the calendar year for any given strategy, the division head, the strategy head, the head of Risk Management, and the ED/CIO will all meet to discuss the relative drawdown limit, attribution, and outlook for the calendar year. The meeting will be documented by email confirmation sent to the Chief Legal Counsel and the head of Compliance.
3. If and when 90% of the relative drawdown limit is reached during the calendar year for any given strategy, the division head, strategy head, the head of Risk Management, and the ED/CIO will all meet to create a plan to address the drawdown for the strategy. The plan may require the strategy to reduce risk, stay the course until a given set of market conditions exist, make certain trades, and/or provide

[timing for implementation of the plan. A copy of the plan will be presented to the Investment Committee, generally at the next scheduled meeting.](#)

VI. ~~V.~~ WRS General and Portfolio Guidelines – Internal Management

Each internal portfolio is assigned compulsory investment guidelines. Portfolio managers are generally not allowed to deviate from compulsory guidelines. If a deviation from compulsory guidelines occurs or is expected to occur, the staff member who becomes aware of it must immediately notify the head of the Compliance and Risk Management divisions, ED/CIO, and the division head of the asset class in which the deviation occurred. Upon receiving notice of a deviation or potential deviation, the ED/CIO and relevant division head will either take action to correct the deviation or obtain a waiver approved by the ED/CIO. If the ED/CIO is not available, then the waiver may be granted by any division head (other than the division head of the portfolio that is requesting the waiver) and the Deputy Executive Director, in consultation with the head of Risk Management. All waivers will be reported to the Investment Committee and documented in the Investment Committee's meeting minutes.

All internal portfolios are also assigned "soft risk parameters." Soft risk parameters refer to desired characteristics and/or risk exposures. Portfolio managers are allowed, however, to deviate from soft parameters in pursuit of excess return or efficiency, subject to Investment Committee inquiry, discussion and concurrence of the continued exposure. Soft risk parameters for each portfolio are detailed in *Appendix 2*.

The following general compulsory guidelines ("General Guidelines") are applicable to all internally managed portfolios. Individual portfolio guidelines appear subsequently.

1. All portfolios must be managed in accordance with the fiduciary standards set forth in section 25.15(2) of the Wisconsin Statutes.
2. Credit quality rating requirements refer to an entire rating level, e.g., "A or better" includes "A-" and better ratings. The lower of split ratings is used. Investment grade securities are those rated "BBB-" or better (or the equivalent rating agency rating).
3. Fixed income securities backed by the full faith and credit of the U.S. government will be classified as U.S. government securities for purposes of these guidelines.
4. Any sovereign debt obligation (or the issuer in the event the obligation is unrated) in which SWIB invests must be rated "B3/B-" or above, unless otherwise approved in advance by the Investment Committee based on its guidelines for individual business case determinations.
5. Public equity investments in markets designated as "developed" or "emerging" are investments in entities that are incorporated or organized in countries included in the MSCI World Index or the MSCI Emerging Market Index, respectively. Public fixed income investments in markets designated as "emerging" are investments in the debt of countries (or of companies incorporated or organized in countries) included in the JP Morgan Emerging Markets Diversified Index. Public fixed income

investments in the debt of countries (or of companies incorporated or organized in countries) not included in the JP Morgan Emerging Markets Diversified Index will be designated as “developed.”

6. The Board approves the benchmarks for the Core Trust Fund and Variable Trust Fund, which are listed in *Appendix 3*. When new benchmarks are approved by the Board or modified by the Board, *Appendix 3* shall be updated without amendment to these IC Guidelines.
7. The Risk Management Division will monitor the risk exposures of all WRS portfolios. The head of Risk Management may recommend modifications to portfolio exposures to manage risk exposures. With the ED/CIO’s concurrence, the manager of a portfolio will make changes as recommended by the head of Risk Management. In addition to such recommendations, drawdown control procedures for all active internal WRS portfolios will be implemented and monitored by the Risk Management Division and adhered to by the portfolios.
8. Portfolios may utilize cash instruments or derivatives in their investment strategy. All investments used will be subjected to the risk analysis and monitoring processes at the portfolio, asset class and fund levels. New derivative and investment instruments will be reviewed with and approved by the Investment Committee prior to implementation.
9. Exposure limits and credit quality exposure limits are to be applied at the time of purchase. Unless otherwise indicated, “value” shall mean market value including un-invested cash.
10. To-be-announced mortgage-backed securities (TBA MBS) may be traded only with a counterparty with which SWIB has a current Master Securities Forward Transaction Agreement (MSFTA), and the settlement of any forward TBA contract shall not be more than 90 days from the date of the trade.
 - a. The counterparty, or its guarantor, must, on each date on which a transaction is initiated, have a credit rating of not less than “Baa2/BBB” on long-term debt from S&P or Moody’s.
 - b. If the counterparty is not rated, then its parent must have such a rating and must guarantee the obligations of the counterparty.
 - c. If a counterparty or its parent is downgraded to a credit rating below “Baa2/BBB” after the initiation of a trade, then trades may be initiated with that same counterparty only to reduce the existing exposure to that downgraded counterparty.

A. Small Cap Portfolios

The Small Cap Portfolios are invested primarily in publicly traded equity securities that are registered with the Securities and Exchange Commission, including common stocks, preferred stocks, ETFs, American Depositary Receipts (ADRs), American Depositary Shares (ADSs), convertible bonds, securities issued in initial public offerings, and when-issued

securities. The Small Cap Portfolios may also be invested in equity securities that are publicly traded on stock exchanges in other developed countries.

1. When aggregated with other SWIB portfolios, no more than 20% of outstanding shares of any single issuer, excluding shares held in commingled funds and ETFs, may be owned.
2. When aggregated with other SWIB portfolios, no single issuer's equity securities may represent more than 3%, excluding shares held in commingled funds and ETFs, of the total market value of all SWIB equity portfolios.
3. When aggregated with other SWIB portfolios, securities subject to restrictions on trading pursuant to Rule 144 under the Securities Act of 1933 shall not constitute more than 1% of the market value of all SWIB equity portfolios.
4. Up to 10% of each portfolio's market value may be invested in international and emerging markets companies through common stocks, ADRs, ADSs, or country-specific ETFs. All international and emerging markets stock transactions must be in equity securities that are publicly traded on a stock exchange in a developed country.
5. Portfolios may use exchange-traded futures contracts or ETFs to equitize cash and receivables.
6. Portfolios may sell short any securities that may be purchased under applicable guidelines and may then use the proceeds from the short sale to purchase additional approved securities. The total value of the short sales in a portfolio may not exceed 50% of a portfolio's market value.
7. Except as provided in 4 above, securities must be issued by an entity that is incorporated in the United States; provided that investment is also permitted if the issuer is incorporated in a tax haven outside the United States if 1) the company's headquarters are located in the U.S. or 2) the headquarters are located in Belize, Bahamas, Bermuda, British Virgin Islands, Cayman Islands, Channel Islands, Cook Islands, Isle of Man, Marshall Islands, Panama, Liberia or Netherland Antilles and the primary exchange for the issuer's securities is located in the U.S.
8. The aggregate notional value of put options sold and not covered by portfolio cash is limited to 10% of the market value of the portfolio. The aggregate notional value of call options sold and not covered by the underlying security positions is limited to 10% of the market value of the portfolio.

B. Global Equity Portfolios

The global sector portfolios are invested primarily in publicly traded equity securities, including common stocks, preferred stocks, ADRs, ADSs, ETFs, convertible bonds, securities issued in initial public offerings, and when-issued securities, in each case that are issued and traded in U.S. and non-U.S. developed markets. Collectively, the global sector portfolios are referred to herein as the "global sector aggregate portfolio."

1. Investments in companies whose headquarters and/or primary exchange are located in emerging market countries shall not exceed 5% of the global sector aggregate portfolio's market value.
2. The global sector aggregate portfolio may own no more than 10% of outstanding shares of a single issuer, excluding shares held in commingled funds and ETFs.
3. No single issuer's equity securities, excluding shares held in commingled funds and ETFs, as a percentage of the total market value of the global sector aggregate portfolio, may exceed the greater of (i) 4.0% and (ii) the benchmark weight of the issuer plus 2.5%.
4. Securities subject to restrictions on trading pursuant to Rule 144 of the Securities Act of 1933 shall not constitute more than 1% of the market value of the global sector aggregate portfolio.
5. Securities offered or sold to U.S. investors pursuant to Regulation D or Rule 144A under the Securities Act of 1933 may be purchased if they are publicly traded on a stock exchange in a developed country.
6. Sector portfolios may use exchange-traded futures contracts or ETFs to equitize cash and receivables.
7. Sector portfolios may sell short any securities that may be purchased under applicable guidelines and may then use the proceeds from the short sale to purchase additional approved securities. The total value of the short sales in the global sector aggregate portfolio may not exceed 50% of the portfolio's market value.
8. The aggregate notional value of put options sold and not covered by portfolio cash is limited to 10% of the market value of the portfolio. The aggregate notional value of call options sold and not covered by the underlying security positions is limited to 10% of the market value of the portfolio.

C. Passive Portfolios

The objective of the passive portfolios is to closely track the returns and risk of their respective benchmarks.

1. The universe for inclusion in the portfolio shall be the full respective benchmark for each portfolio. Non-benchmark securities may be held from time-to-time as a result of corporate actions, purchases or sales in advance of expected changes to the benchmark. Activity or retention of non-benchmark securities will only occur after the portfolio is entitled to receive the security and if the portfolio manager deems it beneficial to performance and not significantly detrimental to tracking error.
2. Securities offered or sold to U.S. investors pursuant to Regulation D or Rule 144A under the Securities Act of 1933 may be purchased if they are publicly traded on a stock exchange in a developed country.

3. Portfolios may use physical securities or synthetic instruments, including exchange-traded futures contracts, ETFs, swaps, or other Investment Committee-reviewed derivative instruments to equitize cash and receivables, to achieve policy fund level leverage within Trustee-approved limits; for liquidity purposes; to replicate beta for the alpha-beta overlay; or for other passive investment strategies. Passive portfolios used to achieve policy fund level leverage shall be monitored by the ARA Division so that the Policy Leverage does not exceed Board-approved limits.
4. Portfolios may sell short from time to time as a result of corporate actions, benchmark changes or other similar events to more closely, more efficiently and/or more cost effectively track the returns and risk of their respective benchmarks if the portfolio manager deems it beneficial to performance and not significantly detrimental to tracking error. Short positions may not be used to intentionally take active risk. The portfolios may short any securities that may be purchased under Guidelines #1-3 and may then use the proceeds from the short sale to purchase additional approved securities.

D. Investment Grade Credit Portfolio

The Investment Grade Credit Portfolio is primarily invested in publicly traded and Rule 144A investment grade corporate bonds or other fixed income instruments, primarily in the United States and other developed markets. Subject to the limitations set forth below, the portfolio may also invest in bank loans, convertible, and equity securities.

1. Maximum single issuer concentration is limited to 8% of the portfolio's market value on a net basis for developed markets investment grade issuers and 3% for all other issuers, in each case, excluding Treasuries, Treasury futures and ETFs.
2. Positions may be purchased long and sold short, and the use of leverage will be incorporated in ex-ante risk assessments and active risk/tracking error contributions. The portfolio may take short exposure by shorting individual securities, including cash bonds and equity securities, utilizing single name CDS and CDX index securities, and shorting ETFs that have been approved by Compliance and included on an approved ETF trading list (including put or call options thereon).
3. The portfolio may use eligible derivative instruments to manage the duration, yield curve exposure, currency, interest rate, equity, and market exposure of the portfolio. Eligible derivatives include (i) credit index swaps (e.g., CDX) and single-name CDS; (ii) futures, forwards and swaps on securities, indices, and interest rates; (iii) options on securities, including equity securities.
4. Effective duration of the portfolio shall remain within two years of the assigned benchmark's duration.
5. Emerging market (EM) debt investment is limited to securities rated "B-" or above and:
 - a. EM sovereign debt must be of countries in the JP Morgan Emerging Market Bond Index Global Diversified ("JP Morgan EM Bond Index").

- b. EM corporate debt must be of issuers in the Bloomberg US Credit Index.
 - c. Gross EM debt shall not exceed 15% of the portfolio's market value on a long or short basis (i.e., long % + short %). EM FX forwards used to hedge currency risk will not be counted against the EM debt exposure threshold.
- 6. Further limits:
 - a. Non-investment grade securities shall not exceed 20% of the portfolio's market value on a gross basis.
 - b. Exposure to bank loans shall not exceed 10% of the portfolio's market value on a net basis.
 - c. Exposure to convertible securities shall not exceed 10% of the portfolio's market value on a net basis.
 - d. Equity exposure shall not exceed 2% of the portfolio's market value on a net basis.
- 7. Ex-ante tracking error shall not exceed 5% as measured by SWIB's standard model used at any given time by SWIB's Risk Management Division. If market conditions (compared to active management actions) cause the portfolio's ex-ante tracking error to exceed this limit, then the portfolio will not be deemed to be out of compliance with these guidelines and this guideline will not be deemed to be violated; except that, if the portfolio's ex-ante tracking error exceeds 5% then the portfolio may not trade or take any other action which is predicted to increase the ex-ante tracking error of the portfolio.
- 8. Gross exposure for the portfolio shall not exceed 200% of the portfolio's market value, and net exposure for the portfolio shall not exceed 150% of the portfolio's market value, in each case unless approved by the ED/CIO.

E. U.S. TIPS Index Portfolio

The U.S. TIPS Index Portfolio is invested in U.S. Treasury Inflation-Protected Securities (TIPS).

- 1. Individual securities must be U.S. TIPS which are included in the Barclays U.S. TIPS benchmark.
- 2. The portfolio's option adjusted duration should be +/- ~~15%~~ 1 year of the benchmark duration.

F. Currency Overlay

To separate the management of currency risk from the risk of asset allocation and security selection, a currency overlay may be established at the fund level for the Core Fund and/or the Variable Fund. The ED/CIO, the head of ARA, and the internal Global Macro portfolio manager shall set the currency overlay strategy.

1. The amount of the overlay will be expressed in relation to the size of the aggregate non-U.S. market value of the internally managed Global Sector Portfolios and the internally managed MSCI World ex U.S. Index Portfolio. This amount is referred to as the “portfolio reference value.” For example, if the Global Sector Portfolios have a non-U.S. market value of \$1 billion and the MSCI World ex U.S. Index Portfolio has a market value of \$1 billion, then the portfolio reference value is \$2 billion.
2. Only the currencies in the MSCI All Country World Index (ACWI) may be used to implement the currency overlay.
3. Currencies may be bought or sold.
4. Positions in any individual non-U.S. currency may be taken equal to +/- 10% of the portfolio reference value for major currencies (Euro, UK Sterling and Japanese Yen) and +/- 5% for all other ACWI currencies. For example, if the portfolio reference value is \$2 billion, individual currency positions in major currencies could be taken of +/- \$200 million.
5. Up to 25% of the portfolio reference value may be hedged into U.S. dollars.
6. The risk of the currency overlay strategy in aggregate will be limited to 25% of the active risk target for the total trust fund, which is set by the Board.
7. Limits shall be calculated using the notional value of the currency instruments (*i.e.*, forwards and futures) and the portfolio reference value at the time of purchase.

G. Exposure Management Portfolios

Portfolios may be established at the asset class level for multi-asset, public equity and public fixed income asset classes to provide for adjustment and management of the Core Fund and Variable Fund exposures and to utilize or adjust active risk of the Core Fund and Variable Fund. In determining portfolio investments, exposures held in both internally and externally managed portfolios will be considered. These portfolios may also be used to express investment strategies and ideas where the sizing of the investment requires it to be outside of an individual internal portfolio.

Each strategy and/or investment idea expressed in the portfolios shall be approved by any three of the ED/CIO and the heads of ARA, GPMS and PMFA. Portfolio oversight will be the responsibility of the ARA Division, and the Investment Committee will monitor each investment in the portfolios. The Investment Committee shall establish procedures to monitor these portfolios. These portfolios may invest in any instrument approved for the relevant asset class portfolios described elsewhere in these guidelines. The portfolios may use derivative instruments.

Portfolios will not have a separate benchmark or risk target, but will be included within the benchmark and risk parameters for the applicable aggregated asset class. The portfolios may include, for example, investments strategies to adjust aggregate equity beta, the allocations between specific sectors or sub-asset class exposures, currency exposures, volatility exposure, or credit exposure or duration.

H. Multi-Strat Portfolio

1. The Multi-Strat portfolio is authorized to invest in or short any instrument or derivative, subject to guidelines 5 and 6 below and the general guidelines contained herein.
2. Strategies may be managed either by internal investment staff or by an external manager.
3. Leverage and derivatives may be used to implement individual strategies and to adjust the market exposure of the Multi-Strat portfolio.
4. The Multi-Strat portfolio's aggregate ex-ante tracking error will not exceed 12% as measured by SWIB's standard model used at any given time by SWIB's Risk Management Division. If market conditions (compared to active management actions) cause the portfolio's ex-ante tracking error to exceed this limit, then the portfolio will not be deemed to be out of compliance with these guidelines and this guideline will not be deemed to be violated; except that, if the portfolio's ex-ante tracking error exceeds 12% then the portfolio may not trade or take any other action which is predicted to increase the ex-ante tracking error of the portfolio.
5. The ED/CIO and Head of Risk Management must be informed prior to the launch of a new strategy within the Multi-Strat portfolio. New strategies must be reported to the Investment Committee reasonably promptly following the launch.
6. ED/CIO approval, along with notice to the Head of Risk Management, is required prior to the Multi-Strat portfolio investing in an investment instrument or derivative that was previously approved by the Investment Committee for use by other asset class portfolios. Investment in such instruments must be reported reasonably promptly to the Investment Committee. Investment Committee review and approval is required prior to the Multi-Strat portfolio investing in any new investment instruments or derivatives not previously approved by the Investment Committee for any asset class portfolios.

I. Global Macro Portfolio

The Global Macro portfolio implements discretionary or systematic investment strategies by trading in exchange-traded and OTC instruments in interest rates, equity, credit, currency, commodity, and volatility markets.

1. The Global Macro portfolio is authorized to invest in or short any instrument or derivative, except as set forth in Guideline 6 below, subject to Guideline 5 below.

2. Strategies may be managed either by internal investment staff or by an external manager.
3. Leverage and derivatives may be used to implement strategies and to adjust the market exposure of the Global Macro portfolio. The use of leverage will be incorporated in ex-ante risk assessments and active risk contributions.
4. The portfolio's aggregate ex-ante tracking error will not exceed 20% as measured by SWIB's standard model used at any given time by SWIB's Risk Management Division. If market conditions (compared to active management actions) cause the portfolio's ex-ante tracking error to exceed this limit, then the portfolio will not be deemed to be out of compliance with these guidelines and this guideline will not be deemed to be violated; except that, if the portfolio's ex-ante tracking error exceeds 20% then the portfolio may not trade or take any other action which is predicted to increase the ex-ante tracking error of the portfolio.
5. ED/CIO approval, along with notice to the Head of Risk Management, is required prior to the portfolio investing in an investment instrument or derivative that was previously approved by the Investment Committee for use by other asset class portfolios. Investment in such instruments must be reported reasonably promptly to the Investment Committee. Investment Committee review and approval is required prior to the portfolio investing in any new investment instruments or derivatives not previously approved by the Investment Committee for any asset class portfolios.
6. Investment is not permitted in the following tranching structured credit securities: asset-backed securities, collateralized debt obligations, collateralized loan obligations, collateralized mortgage obligations, credit risk transfer securities, private label mortgage-backed securities, commercial mortgage-backed securities, and residential mortgage-backed securities.
7. Currency forward contracts will be limited to a maximum tenor of one-year.

J. Long Treasury Portfolio

The Long Treasury portfolio is a long duration, but not long-only, portfolio primarily invested in US Treasury securities, including nominal and inflation-indexed Treasuries and Treasury strips, and other US Government issued debt such as Agency debentures (which include debt, or bonds, issued by a US federal agency or a government-sponsored enterprise (GSE)). It may also invest in other fixed income securities, certain ETFs, and certain derivatives, as outlined below.

1. Securities other than nominal US Treasury securities including principal and interest strips, US Treasury Futures, and ETFs investing primarily in nominal US Treasury securities, but otherwise permitted in these portfolio guidelines, may not exceed 25%, in the aggregate, of the portfolio's market value.

2. Effective duration of the portfolio shall remain within five years of the assigned benchmark's duration.
3. The portfolio may invest long or short in ETFs that invest primarily in US Treasury securities and that have been approved by Compliance and included on an approved trading list (including put or call options thereon).
4. The portfolio's aggregate ex-ante tracking error will not exceed 3% as measured by SWIB's standard model used at any given time by SWIB's Risk Management Division. If market conditions (compared to active management actions) cause the portfolio's ex-ante tracking error to exceed this limit, then the portfolio will not be deemed to be out of compliance with these guidelines and this guideline will not be deemed to be violated; except that, if the portfolio's ex-ante tracking error exceeds 3% then the portfolio may not trade or take any other action which is predicted to increase the ex-ante tracking error of the portfolio.
5. Except for US Treasury securities, US Treasury Futures, and ETFs, no single issue may exceed 8% of the portfolio's market value.
6. The portfolio may use repurchase agreements and reverse repurchase agreements for cash management.
7. Derivatives use is permitted as allowed by SWIB's derivative policies for the purposes of duration, interest rate, yield curve, and volatility management. Derivatives use is permitted through the use of (a) exchange-traded and over-the-counter interest rate instruments, including futures and options, (b) interest rate swaps and swaptions, (c) total return swaps (TRS), and (d) other volatility derivatives (including options).
8. All instruments permitted in these guidelines may be traded long or short. Gross exposure for the portfolio shall not exceed 200% of the portfolio's market value, and net exposure for the portfolio shall not exceed 150% of the portfolio's market value, in each case unless approved by the ED/CIO.

K. Mortgage-Backed Securities Portfolio

The Mortgage-Backed Securities (MBS) portfolio is primarily invested in Agency-issued mortgage-related securities, including MBS pools, collateralized mortgage obligations (CMOs), credit risk transfer (CRT) securities, as well as other securities in the structured products sector such as TBA MBS, commercial mortgage-backed (CMBS), asset-backed (ABS), and private label mortgage-related securities. It may also invest in other fixed income securities, certain ETFs, and certain derivatives as outlined below.

1. Securities other than agency-issued mortgage-related securities (e.g., pools, CMOs, CRTs), mortgage TBAs, and mortgage ETFs, but otherwise permitted in these portfolio guidelines and with effective duration of greater than one year, may not exceed 25%, in the aggregate, of the portfolio's market value.

2. Effective duration of the portfolio shall remain within two years of the assigned benchmark's duration.
3. Private label MBS may not exceed 10% of the portfolio's market value. Private label mortgage securities backed by borrower collateral other than prime may not exceed 5% of the portfolio's market value.
4. The portfolio may invest long or short in ETFs that invest primarily in U.S. MBS and that have been approved by Compliance and included on an approved trading list (including put or call options thereon).
5. The portfolio's aggregate ex-ante tracking error will not exceed 5% as measured by SWIB's standard model used at any given time by SWIB's Risk Management Division. If market conditions (compared to active management actions) cause the portfolio's ex-ante tracking error to exceed this limit, then the portfolio will not be deemed to be out of compliance with these guidelines and this guideline will not be deemed to be violated; except that, if the portfolio's ex-ante tracking error exceeds 5% then the portfolio may not trade or take any other action which is predicted to increase the ex-ante tracking error of the portfolio.
6. Except for TBA MBS, US Treasuries and ETFs, no single issue may exceed 5% of the portfolio's market value. No single BBB-rated issue may exceed 2% of the portfolio's market value. The average rating of securities covered by these limits will be "Baa2/BBB" or better. No single issue rated below investment grade may exceed 1% of the portfolio's market value. Each tranche of a securitized product is considered a separate issue. Total exposure to issues rated below investment grade may not exceed 20% of the portfolio's market value, in the aggregate.
7. Fixed income securities with an effective duration of one year or less (i) may not, in the aggregate, exceed 25% of the portfolio's market value, and (ii) will have an average credit rating of "A" or better. The portfolio may also use repurchase agreements and reverse repurchase agreements for cash management.
8. Derivatives use is permitted for the purposes of duration, interest rate, yield curve, mortgage credit, and volatility management. Derivatives use is permitted through the use of (a) exchange-traded interest rate instruments, including futures and options, (b) interest rate swaps and swaptions, (c) MBS options, (d) other volatility derivatives (including options), and (e) credit index swaps (e.g., CMBX, CDX).
9. All instruments permitted in these guidelines may be traded long or short. Excluding the TBA Strategy, gross exposure for the portfolio shall not exceed 200% of the portfolio's market value, and net exposure for the portfolio shall not exceed 150% of the portfolio's market value, in each case unless approved by the ED/CIO.
10. CLOs collateralized by corporate bank loans may not exceed 3% of the portfolio's market value.

~~L.K.~~ High-Yield Bond Portfolio

The High-Yield Bond Portfolio is eligible to invest in any instruments included in the assigned benchmark — primarily U.S. dollar denominated publicly-traded and Rule 144A high-yield corporate bonds or other fixed income instruments rated between BB+/Ba1 and B-/B3. Subject to the limitations set forth below, the portfolio may also invest in non-U.S. dollar denominated bonds of issuers located outside of the United States, as well as convertible, preferred securities and equity securities.

1. The portfolio shall maintain at minimum a weighted average rating of B-. Subject to the forgoing, the portfolio may hold fixed income instruments rated below B-/B3 as well as unrated securities, provided the unrated securities have been assigned an internal SWIB rating by portfolio management staff using similar rating methodologies as the rating agencies.
2. Effective duration of the portfolio shall remain within +/- five years of the assigned benchmark's effective duration.
3. Positions may be purchased long and sold short, and the use of leverage will be incorporated in ex-ante risk assessments and active risk/tracking error contributions. The portfolio may take short exposure by shorting individual securities, cash bonds, buying single name CDS, shorting the CDX index, shorting high-yield and equity ETFs that have been approved by Compliance and included on an approved ETF trading list (including put or call options thereon), as well as shorting the underlying equity of a leveraged issuer.
4. Instruments not included in the benchmark, but otherwise permitted in these portfolio guidelines, may not exceed 25% of the portfolio's market value on a long or short basis (i.e., long % + short %). For the avoidance of doubt, any instrument that is subsequently removed from the portfolio's benchmark due solely to the instrument's maturity falling below the benchmark's stated thresholds shall not be deemed to be out of benchmark for purposes of the 25% limitation described in this Guideline #4.
5. Maximum single issuer concentration is limited to 5%, excluding Treasuries, Treasury futures and holdings of ETFs, of the portfolio's market value on a net basis.
6. Gross exposure to non-U.S. Dollar denominated instruments shall not exceed 10% of the portfolio's market value on a long or short basis (i.e., long % + short %).
7. Gross exposure to emerging market corporate debt is limited to (a) securities that are rated "B-/B3" or above and (b) issuers incorporated or organized in countries included in the JP Morgan Emerging Markets Diversified Index, and in aggregate shall not exceed 5% of the portfolio's market value on a net basis.
8. Exposure to any single industry sector shall remain within 20% of the assigned benchmark's industry sector weighting on a net basis.
9. Exposure to high-yield bank loans shall not exceed 10% of the portfolio's market value on a net basis.

10. Ex-ante tracking error shall not exceed 5% as measured by SWIB's standard model used at any given time by SWIB's Risk Management Division. If market conditions (compared to active management actions) cause the portfolio's ex-ante tracking error to exceed this limit, then the portfolio will not be deemed to be out of compliance with these guidelines and this guideline will not be deemed to be violated; except that, if the portfolio's ex-ante tracking error exceeds 5% then the portfolio may not trade or take any other action which is predicted to increase the ex-ante tracking error of the portfolio.
11. The portfolio may use eligible derivative instruments to manage the duration, yield curve exposure, currency, interest rate, and market exposure of the portfolio. Eligible derivatives include (i) CDS (as described in more detail under Guideline #3 above); (ii) futures contracts on securities, indices, and interest rates; (iii) forward contracts for securities, indices, and interest rates; (iv) swap contracts for securities, indices, and interest rates; (v) options on high yield and equity ETFs (as described in more detail under Guideline #3 above); and (vi) options on the underlying equity of a leveraged issuer.
12. Gross exposure for the portfolio shall not exceed 200% of the portfolio's market value, and net exposure for the portfolio shall not exceed 150% of the portfolio's market value, in each case unless approved by the ED/CIO.

M. Leveraged Loan Portfolio

The Leveraged Loan Portfolio is eligible to invest in any instruments included in the assigned benchmark — primarily U.S. dollar denominated publicly-traded and senior secured syndicated leveraged loans. Subject to the limitations set forth below, the portfolio may also invest in non-U.S. dollar denominated loans and/or bonds of issuers located outside of the United States, as well as collateralized loan obligations (CLOs), derivatives, convertible, preferred securities and equity securities.

1. No less than 75% of the portfolio's market value can be invested in single-name first-lien bank loans, total return swaps on leveraged loans, and/or ETFs with a diversified portfolio of first-lien bank loans, in aggregate.
2. The portfolio shall maintain at minimum a weighted average rating of B. Subject to the foregoing, the portfolio may hold fixed income instruments rated below B-/B3 as well as unrated securities, provided the unrated securities have been assigned an internal SWIB rating by portfolio management staff using similar rating methodologies as the rating agencies.
3. Positions may be purchased long and sold short, and the use of leverage will be incorporated in ex-ante risk assessments and active risk/tracking error contributions. The portfolio may take short exposure by shorting individual securities, including cash bonds and equity securities, utilizing single name CDS and CDX index securities, and shorting ETFs that have been approved by Compliance and included on an approved ETF trading list (including put or call options thereon).

4. Instruments not included in the benchmark, but otherwise permitted in these portfolio guidelines, may not exceed 50% of the portfolio's market value on a long or short basis (i.e., long % + short %).
5. Maximum single issuer concentration is limited to 5%, excluding Treasuries, Treasury futures and holdings of ETFs, of the portfolio's market value on a net basis.
6. Gross exposure to non-U.S. Dollar denominated instruments shall not exceed 10% in the aggregate of the portfolio's market value on a long or short basis (i.e., long % + short %).
7. Aggregate exposure to second-lien loan instruments is limited to 15% of the portfolio's market value on a long or short basis (i.e., long % + short %), and maximum exposure to a single second-lien loan instrument is limited to 2.5% of the portfolio's market value on a long or short basis (i.e., long % + short %).
8. Ex-ante tracking error shall not exceed 5% as measured by SWIB's standard model used at any given time by SWIB's Risk Management Division. If market conditions (compared to active management actions) cause the portfolio's ex-ante tracking error to exceed this limit, then the portfolio will not be deemed to be out of compliance with these guidelines and this guideline will not be deemed to be violated; except that, if the portfolio's ex-ante tracking error exceeds 5% then the portfolio may not trade or take any other action which is predicted to increase the ex-ante tracking error of the portfolio.
9. The portfolio may use eligible derivative instruments to manage the yield curve, currency, interest rate, and market exposures of the portfolio. Eligible derivatives include (i) CDS (as described in more detail under Guideline #3 above); (ii) futures contracts on securities, indices, and interest rates; (iii) forward contracts for securities, indices, and interest rates; (iv) swap contracts for securities, indices, loans, and interest rates; (v) options on leveraged loans, indices, and/or equity ETFs (as described in more detail under Guideline #3 above); and (vi) options on the underlying equity of a leveraged issuer.
10. Gross exposure for the portfolio shall not exceed 200% of the portfolio's market value, and net exposure for the portfolio shall not exceed 150% of the portfolio's market value, in each case unless approved by the ED/CIO.

N. ~~M.~~ Short Term Credit Portfolio

The Short-Term Credit Portfolio is an investment vehicle of cash and short-term investments of the WRS designed to achieve a return equal to a bank yield index + 30 bps. Its investment objectives are: 1) Safety of principal; 2) Return Objective; and 3) Liquidity.

Portfolio Allocation

(Percent of Portfolio at Par Value)

Treasuries, Agencies, and FDIC Insured Bank Deposits	0-100%
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Repurchase Agreements	0-100%
Commercial Paper	0-100%
Corporate Notes	0-100%
Certificates of Deposit/Time Deposits	0-50%
Bankers' Acceptances	0-50%
Yankee/Euro Certificates of Deposit/Time Deposits (U.S. Dollars)	0-50%

Maturity Guidelines

(Maximum)

Consistent with the portfolio purpose and objectives, the portfolio weighted average maturity will not exceed one year (the weighted average maturity of floating rate securities is based on interest rate reset dates).

Repurchase Agreements	1 year
Reverse Repurchase Agreements	1 year
U.S. Treasuries and Agencies	5 years
Commercial Paper/Bankers' Acceptances	1 year
Corporate Notes – Fixed Rate	3.1 years
Corporate Notes – Floating Rate	5.1 years
Certificates of Deposit/Time Deposits	5 years
Yankee/Euro Certificates of Deposit/Time Deposits	5 years

Issuer Exposure

(Percent of Portfolio at Par Value)

The maximum exposure for each issuer/guarantor/counterparty shall be in the aggregate as follows:

U.S. Treasury Bills and U.S. Agency Discount Notes	No limit
Repurchase Agreements (Gov't/Agency Collateral)	25%
Repurchase Agreements (Other Collateral)	5%
Commercial Paper and Corporate Notes	5%
Certificates of Deposit/Time Deposits	5%
Bankers' Acceptances	5%
Yankee/Euro Certificates of Deposit/Time Deposits (U.S. Dollars)	5%

Wisconsin CD Program – individual bank (unless a higher limit from another category applies.)	\$20MM or 3% of bank assets, whichever is less
Bank Deposits	Up to the amount guaranteed by the FDIC or the amount allowable for a bank instrument, whichever is higher

CREDIT QUALITY

The minimum rating of an issuer/counterparty shall be the lowest in the event of a split rating and shall be as follows:

U.S. Treasury Bills and U.S. Agency Discount Notes	No minimum
Repurchase Agreements	BBB
Commercial Paper	A-2/P-2
Unrated Wisconsin Company Commercial Paper (maximum maturity of 90 days and percentage of the portfolio in unrated CP cannot exceed 15%)	Unrated
Corporate Notes, Bankers' Acceptances, Certificates of Deposit/Time Deposit, Bank Deposits and Yankee/Euro Certificates of Deposit/Time Deposits (U.S. Dollars) greater than 1 year	A
Corporate Notes, Bankers' Acceptances, Certificates of Deposit/Time Deposit, Bank Deposits and Yankee/Euro Certificates of Deposits (U.S. Dollars) less than 1 year (the percentage of the portfolio in BBB cannot exceed 15%).	BBB
Wisconsin CD Program – individual bank	Unrated

O. ~~N.~~ **General Guidelines specific for Private Markets and Funds Alpha Portfolios**

1. The portfolio manager shall be responsible for notifying the ED/CIO of any referrals or significant contacts by or on behalf of SWIB Trustees regarding consideration of an investment opportunity.
2. The Private Markets & Funds Alpha (PMFA) staff shall report to the Trustees all portfolio commitments to non-public investments.
3. Each portfolio manager shall obtain written confirmation from legal counsel (which may be external legal counsel) that documentation has been satisfactorily

completed prior to closing of any investment in his or her portfolio that involves negotiated SWIB documentation.

4. Each portfolio manager shall submit to the head of PMFA a written summary of any proposed investment. The head of PMFA will review all such investments to determine that a) the investment falls within the portfolio's investment guidelines, including limits on invested capital, b) the investment is consistent with the portfolio's established strategy, and c) the appropriate due diligence standards are being applied. No such investment may be closed without approval of the head of PMFA or ED/CIO depending upon the nature and amount of the investment as required in the relevant portfolio guidelines. The portfolio manager shall retain responsibility for each investment decision. External managers with delegated investment discretion operate under separate authority. For purposes of this paragraph, "investments" does not include the individual properties within a Real Estate Equity Portfolio separate account tranche, but does include the tranche that holds such properties.

5. Dollar limitations for commitments to funds or other investments do not apply to incidental and customary contractual reinvestment, indemnity, reserve or similar obligations incorporated into the terms of an investment, provided such obligations are not expected to be material.

6. Private equity and venture capital investments in markets designated as "developed" or "emerging" are investments in countries included in the MSCI World Index or the MSCI Emerging Market Index, respectively. Real estate investments in markets designated as "developed" or "emerging" are investments in properties in countries included in the EPRA/NAREIT Developed Index and the EPRA/NAREIT Emerging Market Index, respectively.

7. Funds or commingled investments shall be considered U.S., non-U.S., "developed" or "emerging" based on their primary strategy and not on a look-through basis to the underlying investments.

8. Exposure limits and credit quality exposure limits are to be applied at the time of purchase. The term "exposure" is defined as the net asset value plus unfunded commitments.

9. A "follow-on fund" is generally defined as an investment or an investment vehicle that has the same sponsor or manager and is either parallel to, or has a substantially similar investment strategy as, a fund in which SWIB is or has been an investor.

10. SWIB staff may determine to engage a consultant to review prospective investments, perform operational due diligence on prospective investments, or otherwise assist staff in the evaluation of investment opportunities and/or managers.

P. ~~Q.~~ Private Debt Portfolio

The overall objective of the Private Debt Portfolio (the “Private Debt Portfolio” includes both the Wisconsin Private Debt Portfolio and the Non-Wisconsin Private Debt Portfolio) is to invest funds of the Core Fund in market rate fixed income instruments consistent with SWIB’s fiduciary responsibilities that are primarily private loans negotiated by SWIB directly or as part of an investor group that includes banks or other institutional investors. The two portfolios are invested as follows:

- Wisconsin Private Debt Portfolio – This portfolio’s investments will consist of loans or fixed income securities issued by companies or entities that are headquartered in Wisconsin, have existing operations in Wisconsin, or intend to apply the proceeds to new business operations in Wisconsin which contribute to the Wisconsin economy.
- Non-Wisconsin Private Debt Portfolio – This portfolio can invest in loans or fixed income securities issued by companies or entities located in or doing business in the United States.

The Private Debt Portfolio may also include securities sold to SWIB pursuant to Rule 144A or in the public fixed income markets. Investments may be made in fixed income instruments and in instruments with both fixed income and equity features.

1. Investments may carry a rating from a national rating agency, the National Association of Insurance Commissioners (NAIC) or SWIB. Notwithstanding the provisions of the General Guidelines above, the Portfolio Manager may make investments that carry a “BBB” or better rating from a national rating agency or the NAIC, provided that if the investment carries only a SWIB rating, it shall be approved by the head of PMFA, regardless of size.
2. Investments may be made in below investment grade instruments provided that such investments do not in the aggregate constitute more than 25% of the Private Debt Portfolio’s par value. Any investment below investment grade requires approval from the head of PMFA.
3. The Private Debt Portfolio’s aggregate portfolio issuer limits shall be scaled by quality and a purchase may not cause the Private Debt Portfolio’s exposure to a borrower or issuer to exceed the following limits (at par value):

Rating	Maximum Position
U.S. Gov’t/Agency	No Limit
“AA” or higher	\$100 MILLION
“A”	\$75 MILLION
“BBB”	\$50 MILLION
“BB” or less	\$25 MILLION

4. The Private Debt Portfolio shall maintain at minimum a weighted average rating of “BBB”, where “AAA”=4, “AA”=3, “A”=2, “BBB”=1, and “BB” or less =0.
5. Other guideline limitations notwithstanding, portfolio managers or other staff authorized by the head of PMFA may modify or waive terms of investments in the portfolio and generally take any and all other actions that are necessary and reasonable to protect, maintain or enhance the value of SWIB’s position in the investments.

Q. ~~P.~~ Venture Capital Portfolio

The SWIB Venture Capital Portfolio (the “Venture Capital Portfolio” includes both the Wisconsin Venture Capital Portfolio and the Non-Wisconsin Venture Capital Portfolio) consists of venture capital or venture capital-related investments and invests as follows:

- The Non-Wisconsin Venture Capital Portfolio shall make venture capital investments on a global basis in limited partnership or other fund vehicles, through strategic partnerships, or as co-investments in venture-backed companies or publicly traded companies that were venture backed.
- The Wisconsin Venture Capital Portfolio shall make venture capital investments in limited partnership or other fund vehicles or strategic partnerships that are either located in Wisconsin and/or which target Wisconsin as a primary market or as co-investments in venture-backed companies or publicly traded companies that were venture backed that are located or have operations in Wisconsin.

1. Any other guidelines notwithstanding, the Venture Capital Portfolio commitments are subject to the following approvals:

Approval By:	Head of PMFA	ED/CIO
New Manager		
• Venture Capital Funds	Up to \$60 million or less	More than \$60 million
• Venture Capital Co-Investments	Up to \$20 million or less	More than \$20 million
Follow-on Commitments		
• Venture Capital Funds	Up to \$75 million	More than \$75 million
• Venture Capital Co-Investments (excluding funds of one)	Up to \$25 million	More than \$25 million
SWIB ownership equal to or	ED/CIO, provided that notice shall be given to the ED/CIO if	

greater than 50% of an individual fund (excluding funds of one and any fund/vehicle through which a co-investment is made)	ownership of an individual fund (excluding a fund/vehicle through which a co-investment is made) is equal to or greater than 33 1/3%
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2. No more than 45% of the Venture Capital Portfolio's exposure may be invested outside of the U.S., without the approval of the ED/CIO. No more than 20% of the Venture Capital Portfolio's exposure may be invested in emerging markets. No more than 5% of the Venture Capital Portfolio's exposure may be invested in companies located in emerging markets.
3. Venture capital investments may be made through funds, strategic partnerships, or co-investments. Venture capital co-investments (excluding funds of one) must be made in one of the following ways:
 - (1) alongside a fund with the same sponsor or manager as a fund in which SWIB is or has been an investor,
 - (2) alongside a fund with the same sponsor or manager as a fund on which SWIB is conducting due diligence and is actively evaluating for a prospective commitment, or
 - (3) as approved by the ED/CIO.
4. From time to time, SWIB may consider formation of fund investments where it may participate both as a general partner and as limited partner.
5. Venture capital co-investments made within the Wisconsin Venture Capital Portfolio are limited to companies with their headquarters or primary operations in Wisconsin. Co-investments in the Non-Wisconsin Venture Capital Portfolio may not make up more than 15% of the Venture Capital Portfolio's exposure.
6. Neither the aggregate exposure (including co-investments) to any fund manager or sponsor, nor the aggregate amount of investments in any company, may exceed 20% of the Venture Capital Portfolio's exposure without approval of the ED/CIO.
7. No single co-investment (excluding funds of one) shall exceed 10% of the Venture Capital Portfolio's exposure.
8. The Venture Capital Portfolio may make co-investments in public company securities through private placements, including PIPEs, or other offerings. Co-investments in public company securities shall not exceed 10% of the Venture Capital Portfolio's exposure. For purposes of this guideline, public company securities received via a distribution are not counted and are expected to be sold as soon as reasonably practicable.
9. Subject to the approval thresholds and the restrictions above, the Venture Capital Portfolio Manager or other staff authorized by the head of PMFA may modify or waive terms of investments in the portfolio and generally take any and all other actions that

are necessary and reasonable to protect, maintain or enhance the value of SWIB's position in the investments.

R. ~~Q.~~ Private Equity Portfolio

The Private Equity Portfolio consists of private equity or private equity-related investments, made on a global basis, in limited partnership or other fund vehicles, strategic partnerships, and co-investments in operating or holding companies. Investment guidelines and soft parameters shall be applied to the aggregate composition of the Private Equity Portfolio (including the Legacy, Private Equity Co-Investment, Current Return and Current Return Co-Investment Portfolios), unless otherwise stated.

1. Any other guidelines notwithstanding, all portfolio commitments are subject to the following approvals:

	Head of PMFA	ED/CIO
New Manager		
• Funds or Strategic Partnerships	\$150 million or less	Over \$150 million
• Co-Investments	\$50 million or less	Over \$50 million
Follow-on Commitments		
• Funds or Strategic Partnerships	\$300 million or less	Over \$300 million
• Co-Investments	\$100 million or less	Over \$100 million
SWIB ownership equal to or greater than 50% of an individual fund (excluding a fund/vehicle through which a co-investment is made)	ED/CIO, provided that notice shall be given to the ED/CIO if ownership of an individual fund (excluding a fund/vehicle through which a co-investment is made) is equal to or greater than 33 1/3%	

2. The Private Equity Portfolio shall not include investments in venture capital funds.
3. Investments may be made through funds, strategic partnerships, or co-investments. Co-investments must be made in one of the following ways:
 - (1) alongside a fund with the same sponsor or manager as a fund in which SWIB is or has been an investor,
 - (2) alongside a fund with the same sponsor or manager as a fund on which SWIB is conducting due diligence and is actively evaluating for a prospective commitment, or
 - (3) as approved by the ED/CIO.

4. Neither the aggregate exposure (including co-investments) to any fund manager or sponsor, nor the aggregate amount of investments in any company, may exceed 10% of the total Private Equity Portfolio's exposure without approval of the ED/CIO.
5. No more than 45% of the Private Equity Portfolio's exposure may be invested outside of the U.S., without the approval of the ED/CIO. No more than 20% of the Private Equity Portfolio may be invested in emerging markets.
6. No more than 45% of the Private Equity Co-Investment Portfolio's exposure may be invested outside of the U.S., without the approval of the ED/CIO. No more than 20% of the Private Equity Co-Investment Portfolio's exposure may be invested in companies located in emerging markets.
7. The Private Equity Co-Investment Portfolio may make co-investments in public company securities through private placements, including PIPEs, or other offerings. Co-investments in public company securities shall not exceed 10% of the Private Equity Co-Investment Portfolio's exposure. For purposes of this guideline, public company securities received via a distribution are not counted and are expected to be sold as soon as reasonably practicable.
8. Other guideline limitations notwithstanding, portfolio managers or other staff authorized by the head of PMFA may modify or waive terms of investments in the portfolio and generally take any and all other actions that are necessary and reasonable to protect, maintain or enhance the value of SWIB's position in the investments.

S. ~~R.~~ Real Estate Equity Portfolio Guidelines

The Real Estate Equity Portfolio contains investments in a broad range of real estate and real estate-related assets, including equity and debt investments, either solely, or through investment vehicles and structures such as public or private Real Estate Investment Trusts (REITs), public or private real estate company securities, limited liability corporations, limited partnerships, joint ventures, separate accounts or co-investment vehicles. Investment guidelines and soft parameters for Real Estate shall be applied, on an invested basis, to the aggregate composition of the Real Estate Equity Portfolio (except that all REIT portfolios shall be included in the aggregate as Core holdings).

All portfolio commitments are subject to the following approvals:

	Head of PMFA	ED/CIO
Commingled Fund		
• New Fund	\$150 million or less	Over \$150 million
• Follow-on Fund	\$300 million or less	Over \$300 million
Core - Separate Account*	\$300 million or less	Over \$300 million

Non-Core – Separate Account*	\$200 million or less	Over \$200 million
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*With respect to a separate account tranche, approval is required for the tranche, but not for individual investments within the tranche.

1. Aggregate exposure (including co-investments) to any commingled fund manager or sponsor may not exceed 20% of the Real Estate Equity Portfolio's exposure without approval of the ED/CIO. This does not apply to real estate investments for which SWIB has sole discretion to select, retain, and terminate manager(s) and/or advisor(s) without cause.
2. Aggregate direct public REIT and real estate company stock holdings (excluding underlying commingled fund holdings and externally managed REIT Portfolios) may not exceed 15% of the Real Estate Equity Portfolio's exposure and portfolio investments in any one public REIT or company may not exceed 3% of the Real Estate Equity Portfolio's exposure. SWIB's direct ownership position in any public REIT or company may not exceed 20% of outstanding voting equity, without ED/CIO approval. Any externally managed REIT portfolio(s) will be managed under separate authority, with guidelines set out in the management agreement(s) between SWIB and the selected manager(s).
3. No more than 45% of the Real Estate Equity Portfolio's exposure may be invested outside the U.S., without the approval of the ED/CIO. No more than 20% of the Real Estate Equity Portfolio's exposure may be invested in emerging markets, and no more than 10% of the Real Estate Equity Portfolio's exposure may be invested in separate accounts invested in emerging markets.
4. Other guideline limitations notwithstanding, the portfolio manager or other staff authorized by the head of PMFA may: modify or waive terms of investments in the portfolio, including without limitation mortgages and leases on real estate in the portfolio; enter into new mortgages and leases; execute deeds and bills of sale; make expenditures for maintenance and improvements; grant easements; hire consultants, service providers, real estate advisors and property managers; and generally take any and all other actions that are necessary and reasonable to protect, maintain or enhance investment value of SWIB's position in the investments.
5. Prior to funding a direct investment (including a property within a separate account tranche) where real property is a material component, the property shall be evaluated for the presence of environmental and code compliance issues. If environmental issues that require action by governmental authorities exist, then funding shall not occur until an adequate remediation program is in place. If code compliance issues exist, then an adequate plan to bring the property into compliance shall be in place.
6. SWIB may not initiate improvement or development of real property owned or controlled by SWIB without making provisions for compliance with applicable Federal, state and local codes and ordinances.

I. ~~S.~~ Current Return Portfolio

The Current Return Portfolio consists of current return or certain equity-related investments, made on a global basis, in limited partnership or other fund vehicles, strategic partnerships, and co-investments in operating or holding companies. Investments may be made in fixed income instruments and in instruments with both current pay and equity features. Investment guidelines and soft parameters shall be applied to the aggregate composition of the Private Equity Portfolio (including the Legacy, Private Equity Co-Investment, Current Return and Current Return Co-Investment Portfolios), unless otherwise stated.

1. Any other guidelines notwithstanding, all portfolio commitments are subject to the following approvals:

	Head of PMFA	ED/CIO
New Manager		
• Funds or Strategic Partnerships	\$150 million or less	Over \$150 million
• Co-Investments	\$50 million or less	Over \$50 million
Follow-on Commitments		
• Funds or Strategic Partnerships	\$300 million or less	Over \$300 million
• Co-Investments	\$100 million or less	Over \$100 million
SWIB ownership equal to or greater than 50% of an individual fund (excluding a fund/vehicle through which a co-investment is made)	ED/CIO, provided that notice shall be given to the ED/CIO if ownership of an individual fund (excluding a fund/vehicle through which a co-investment is made) is equal to or greater than 33 1/3%	

2. Investments may be made through funds, strategic partnerships, or co-investments. Co-investments must be made in one of the following ways:
 - (1) alongside a fund with the same sponsor or manager as a fund in which SWIB is or has been an investor;
 - (2) alongside a fund with the same sponsor or manager as a fund on which SWIB is conducting due diligence and is actively evaluating for a prospective commitment; or
 - (3) as approved by the ED/CIO.
3. Neither the aggregate exposure (including co-investments) to any fund manager or sponsor, nor the aggregate amount of investments in any company, may exceed 10% of the total Private Equity Portfolio's exposure without approval of the ED/CIO.

4. No more than 45% of the Current Return Portfolio's exposure may be invested outside of the U.S., without the approval of the ED/CIO. No more than 20% of the Current Return Portfolio may be invested in emerging markets.
5. No more than 45% of the Current Return Co-Investment Portfolio's exposure may be invested outside of the U.S., without the approval of the ED/CIO. No more than 20% of the Current Return Co-Investment Portfolio's exposure may be invested in companies located in emerging markets.
6. The Current Return Co-Investment Portfolio may make co-investments in public company securities through private placements or other offerings. Co-investments in public company securities shall not exceed 10% of the Current Return Co-Investment Portfolio's exposure. For purposes of this guideline, public company securities received via a distribution are not counted and are expected to be sold as soon as reasonably practicable.
7. Other guideline limitations notwithstanding, portfolio managers or other staff authorized by the head of PMFA may modify or waive terms of investments in the portfolio and generally take any and all other actions that are necessary and reasonable to protect, maintain or enhance the value of SWIB's position in the investments.

U. **Hedge Fund Portfolio**

The Hedge Fund Portfolio ("HF Portfolio") will be comprised primarily of direct investments in hedge funds and is intended to generate a low-beta, alpha-oriented return stream.

1. The HF Portfolio will be comprised of the following investment vehicles:
 - a. *Direct Investments or Fund-of-Funds*: SWIB intends for its portfolio to be comprised primarily of direct investments in hedge funds rather than fund-of-funds vehicles that use an intermediary investment advisor(s) to select and allocate to hedge funds through a commingled fund, but SWIB may make investments in fund-of-fund vehicles, as may be deemed appropriate by Funds Alpha staff and otherwise approved hereunder.
 - b. *Hedge Funds or Separately Managed Accounts ("SMAs")*: Investments can be made in limited liability partnerships with other investors or, in some cases depending upon the manager and size of investment, in separately managed accounts. SWIB expects its investments will be in limited liability vehicles rather than SMAs, but may make use of SMAs if it is in the best interest of SWIB to do so.
 - c. *Special Opportunity Investments*: SWIB may invest a portion of its portfolio in special opportunity investments, which may include: interests in the equity or revenues of hedge fund managers, co-invest, or external manager "best ideas" opportunities. Special Opportunity Investments will be capped at 20% of the market value of the total HF Portfolio.

2. Hedge Fund Investment Strategies:

- a. *Event-Driven* – investments up (debt or credit) and down (equity) the corporate capital structure where an expectation exists for realized profits over a short to medium time frame as a result of a known catalyst such as a merger, spinoff, or restructuring.
- b. *Long-Short Equity* – long and short investments in publicly traded stocks.
- c. *Tactical Trading* – global investments in indexes, commodities, interest rates, and currencies and, in each case, their derivatives as a result of relative value or directional forecasts from a systematic or discretionary approach.
- d. *Relative Value* – strategies that seek to take advantage of price differentials by buying and selling different yet related securities. Relative value strategies include fixed income arbitrage, insurance linked, long/short credit, quantitative strategies, structured credit, and volatility-related investments.
- e. *Multistrategy* – funds that invest across multiple asset classes, typically (but not always) with multiple portfolio managers. Most multistrategy funds diversify across three or more underlying strategies.

The HF Portfolio has the following target weightings and ranges to the individual hedge fund strategies:

	<u>Target Allocation</u>	<u>Target Maximum</u>
Relative Value	20%	40%
Event-Driven	15%	30%
Long-Short Equity	20%	30%
Tactical Trading	20%	40%
Multistrategy	20%	40%
Special Opportunity Investments	5%	20%
	100%	

3. Approvals: HF Portfolio allocations are subject to the following approvals:

	Head of PMFA	ED/CIO
New Funds		
• Core	Up to \$300 million	More than \$300 million
• Special Opp/ Co-invest	Up to \$50 million	More than \$50 million
Additional Subscriptions to Existing Funds and/or Follow-On Funds		
• Core	Up to \$400 million aggregate invested	More than \$400 million

• Special Opp/ Co-invest	Up to \$100 million aggregate invested	More than \$100 million
SWIB ownership equal to or greater than 50% of an individual fund, calculated at the master fund level (excluding funds of one and a fund/vehicle through which a co-investment is made)	ED/CIO, provided that notice shall be given to the ED/CIO if ownership of an individual fund (excluding funds of one and a fund/vehicle through which a co-investment is made) is equal to or greater than 33 1/3%	

4. The aggregate exposure to any hedge fund manager or sponsor (including co-investments) may not exceed 15% of the total HF Portfolio's exposure without approval of the ED/CIO.
5. Other guideline limitations notwithstanding, portfolio managers or other staff authorized by the head of PMFA may modify or waive terms of investments in the portfolio and generally take any and all other actions that are necessary and reasonable to protect, maintain, or enhance the value of SWIB's position in the investments.
6. All redemptions, terminations or reductions of capital will be at the discretion of the Funds Alpha Manager and the head of PMFA.

V. ~~U~~-Beta One Portfolio

The Beta One Portfolio will be comprised primarily of direct investments in strategies of external managers that are intended to generate both (1) a beta or SWIB policy benchmark return and (2) an active alpha return stream above the benchmark. These managers are referred to as Beta One External Managers due to their dual mandate to manage both a Core Fund asset allocation benchmark and a tracking error around the given benchmark. The manager is expected to deliver the total return of the benchmark (or beta of one), plus an excess return (alpha) over the benchmark. This is distinctive compared to SWIB's external hedge fund portfolio, which is designed to deliver only an excess return or alpha. This section does not govern passive external managers which the Asset and Risk Allocation Division oversees and monitors.

1. Investments in Beta One External Managers will be comprised of the following investment vehicles:
 - a. *Separately Managed Accounts* ("SMAs"): SWIB intends for its portfolio to be comprised primarily of direct investments in various strategies via SMAs, the assets of which would reside at SWIB's custodial bank.
 - b. *Commingled Investments or Fund Investments*: Investments can be made in commingled funds and/or limited liability partnerships with other investors or in a Fund-of-One structure where SWIB is the sole investor.

2. Investment Strategies and Broad Guidelines for Beta One External Managers:
 - a. *Equities* – strategies will be comprised of various fundamental, quantitative and other approaches intended to produce an active return above the respective benchmarks. Strategies will be invested in traditional long only portfolios, active extension formats (i.e. 130/30, 150/50) and other public equity securities approaches across various styles, geographies and market cap weights. A limited use of shorting (up to 50%) may be used in the active extension format in non-SMAs.
 - b. *Fixed Income* – strategies will be comprised of various fundamental, quantitative, and other approaches intended to produce an active return above the respective benchmarks. Strategies will primarily be invested in traditional long only portfolios across the credit quality spectrum, varying geographies, including emerging and frontier market debt, high yield and structured securities. Derivatives may be used primarily for duration and currency management and will be set forth in the individual manager guidelines.
 - c. Notwithstanding any shorting permitted above and pursuant to SWIB’s policies, the investment guidelines for SMAs will prohibit the Beta One External Managers from shorting any securities and from purchasing securities in certain secondary offerings.
3. Any use of derivatives, leverage, and shorting allowed will be incorporated into the ex-ante risk assessments and active risk contributions.
4. Approvals: Beta One External Manager allocations are subject to the following approvals:

Investment	Head of PMFA	ED/CIO
New Manager Relationship	Up to \$1.75 billion	More than \$1.75 billion
Additional Subscriptions to Existing Manager	Up to \$2 billion	More than \$2 billion
Includes all Funds Alpha investments with the Manager, regardless of vehicle, strategy or portfolio.		

5. Other guideline limitations notwithstanding, the Funds Alpha Manager or other staff authorized by the head of PMFA may modify, amend or waive terms of Beta One Manager investment management agreements and generally take any and all other actions that are necessary and reasonable to protect, maintain, or enhance the value of SWIB’s position in the investments.

6. All redemptions, terminations or reductions of capital will be at the discretion of the Funds Alpha Manager and the head of PMFA in consultation with the head of ARA for policy benchmark exposure consideration.
7. Notwithstanding the above discretion regarding redemptions, terminations or reductions, if the Risk Management Division determines that certain risk attributes in the context of the total Core Fund or the aggregate Beta One Portfolio are undesirable for the Core Fund or the aggregate portfolio, then the head of Risk Management may recommend redemptions, terminations or reductions to portfolio exposures. With the ED/CIO's concurrence, the Funds Alpha Manager will make the changes as recommended by the head of Risk Management.

W. ~~V.~~ Private Markets and Funds Alpha Overage Portfolios

Portfolios may be established at the asset class level for private equity, co-invest, real estate, venture capital, hedge fund, and private debt asset classes to provide for (i) excess exposure to certain investment ideas where the sizing of the investment requires it to be held, in part, outside of an individual internal portfolio or (ii) hedging transactions using public or private securities. In each case, a primary investment must be made by the relevant private markets or hedge fund portfolio with the excess exposure or hedging transaction being allocated to an overage portfolio. The relevant private markets or funds alpha portfolio manager will be responsible for portfolio oversight and monitoring of the investment, including the securities in the overage portfolio.

These portfolios may also be used to express investment strategies and ideas that do not fit clearly in any of the private markets or funds alpha portfolios but are attractive from a risk/return perspective. In such cases, no primary investment will be made in the existing private markets portfolios, and the ED/CIO will designate a portfolio manager that will be responsible for portfolio oversight and monitoring.

These portfolios may invest in (1) any instrument approved for the relevant private markets asset class portfolios described elsewhere in these guidelines, and (2) any other public or private securities or derivatives approved for trading by SWIB solely for hedging purposes. Each investment idea expressed in the portfolios shall be approved by the head of PMFA, the relevant portfolio manager, and a majority of the ED/CIO and the heads of ARA and GPMS. Any approved investment shall be reported to the Investment Committee on a monthly basis. Other governance, monitoring, compliance or reporting for the investment may also be specified in the approval. Portfolios will not have a separate benchmark or risk target, but will be included within the benchmark and risk parameters for the applicable aggregated asset class, portfolio, or Core Trust Fund, as applicable and as approved at the time of the investment. If the investment will use active risk assigned to exposure management, it will be noted in the investment approval.

VII. ~~VI.~~ EXTERNAL MANAGEMENT

Portfolios may be managed internally by SWIB investment professionals or externally by money management firms. In making the decision on how the portfolios will be managed, SWIB compares the resources, expertise, and cost of internal management versus external management. If the decision is made to manage the portfolios externally, SWIB will determine whether a separate account or commingled fund best suits SWIB's needs.

External active and passive managers operate under contractual investment guidelines approved by SWIB's Investment Committee or by SWIB's investment management staff, as designated in the Investment Committee Charter.

APPENDIX 1 - APPROVED EXCHANGES

Approved Exchanges for Derivatives Trading as of March 29, 2022*

Australian Securities Exchange
BOX Options Exchange
CBOE Exchanges
Chicago Board of Trade
Chicago Mercantile Exchange
London Stock Exchange
Eurex Exchange
Euronext Exchanges
ICE Futures Exchanges
International Securities Exchange
Montreal Exchange
Nasdaq Exchanges
New York Mercantile Exchange
NYSE Exchanges
Osaka Exchange
TMX (Toronto Stock Exchange)
Tokyo Stock Exchange

*Approved exchanges shall include any and all exchanges that may be acquired by, merged with or otherwise reorganized with or into, or any subset of, any of the above-listed exchanges subsequent to the date above provided that such exchange continues to clear through a Qualifying Central Counterparty (QCCP). This list may be updated for such organizational or name changes from time to time by Legal & Compliance without any additional action of the Investment Committee, and all additions or changes shall be deemed Approved Exchanges for purposes of the WRS Investment Committee Investment Guidelines effective as of the date of such acquisition, merger or reorganization. On a quarterly basis, Compliance shall provide notice to the Investment Committee if there have been any such changes to the list.

The Multi-Asset and Exposure Management Portfolios are approved to trade on any of the above exchanges and any other exchange whose clearing house is a Qualifying Central Counterparty (QCCP) as defined by the Bank for International Settlement (BIS).

APPENDIX 2 - SOFT RISK PARAMETERS

SOFT RISK PARAMETERS – ASSET CLASS AND PORTFOLIO

PORTFOLIO ASSET CLASS CHARACTERISTIC	ASSET CLASS	DISCUSSION TRIGGER
Asset Class Exposure*	Core Fund	
	Global Equities	Target ± 4.6%
	EM Equities	Target ± 2.8%
	Small Cap	Target ± 4.9%
	EAFE Small Cap	Target ± 4.3%
	U.S. Inv Grade	Target ± 4.8%
	High Yield and Levered Loans	Target ± 5.1%
	EM Debt	Target ± 5.6%
	Variable Fund	
	U.S. Equity	Target ± 5.0%
	Int'l Equity	Target ± 5.0%
*Post-Corridor Treatment		
Maximum Small Cap Exposure	CTF Domestic Public Equities	2.75x Benchmark
	VTF Domestic Public Equities	2.75x Benchmark
Ex Ante Tracking Error	Public Equities	0.75% - 2.25%
	Public Fixed	0.4% - 1.2%
	Core Fund	0.6% - 1.8%
	Variable Fund	0.3% - 0.9%
Counterparty Exposure (internal and external separate account portfolios)	WRS (Core and Variable Funds)	5 bp exposure (net of collateral, if any) to a single counterparty
Duration	Public Fixed	+/- 15% 1 year of Benchmark
Base Portfolio	Global Sector Aggregate Portfolio	8-12% of Aggregate Sector Portfolio

PORTFOLIO ASSET CLASS CHARACTERISTIC	ASSET CLASS	DISCUSSION TRIGGER
Scaled Portfolio	Global Sector Aggregate Portfolio	88-92% of Aggregate Sector Portfolio
ACTIVE/INDEXED EQUITIES		
Minimum Number of Holdings		
	Small Cap Diversified Consolidation	100
	Global Sector Aggregate Portfolio	Lesser of 100 names or 25% of index names
Ex Ante Tracking Error	Passives (Core Fund and Variable Fund Consolidation):	
	MSCI US	10 bp annualized
	MSCI ex US	20 bp annualized
	MSCI US Small Cap	30 bp annualized
	Global Utilities Index Portfolio	80 bp annualized
	Small Cap Diversified Consolidation	2% - 6%
	Global Sector Aggregate Portfolio	1% - 4%
Maximum Position Size (Excluding ETFs)		
	Passives	5% notional value of futures
Single Name Concentration	Small Cap Diversified Consolidation	Benchmark weight \pm 2%
	Global Sector Aggregate Portfolio	Benchmark weight \pm 2%
Maximum Total Value of Short Sales	Global Sector Aggregate Portfolio	40% of portfolio value
Maximum ETF Exposure	Passives	5% of portfolio value
	Small Cap Diversified Consolidation	+/- 15% of portfolio value
	Global Sector Aggregate Portfolio	+/- 15% of portfolio value
Maximum Company Ownership (Excluding ETFs)	Small Cap Diversified Consolidation	10% of outstanding

PORTFOLIO ASSET CLASS CHARACTERISTIC	ASSET CLASS	DISCUSSION TRIGGER
	Global Sector Aggregate Portfolio	10% of outstanding
Top Ten Holdings	Small Cap Diversified Consolidation	25% of portfolio
P/E Ratio	Small Cap Diversified Consolidation	50%-150% of Benchmark
	Global Sector Aggregate Portfolio	50%-150% of Benchmark
Maximum Sector Exposure	Small Cap Diversified Consolidation	Benchmark weight $\pm 10\%$
	Global Sector Aggregate Portfolio	Benchmark weight $\pm 5\%$
Maximum Notional Uncovered Sold Calls	Passives	5% of portfolio value
	Small Cap Diversified Consolidation	5% of portfolio value
	Global Sector Aggregate Portfolios	5% of portfolio value
Maximum Notional Uncovered Sold Puts	Passives	5% of portfolio value
	Small Cap Diversified Consolidation	5% of portfolio value
	Global Sector Aggregate Portfolio	5% of portfolio value
Maximum Cash	Passives	1% in unequitized cash
	Small Cap Diversified Consolidation	5%
	Global Sector Aggregate Portfolio	5%
FIXED INCOME		
Duration	IG Credit	+/- 1 year of assigned Benchmark
	MBS	+/- 1 year of assigned Benchmark
Maximum Corporate Industry Sector Exposure	IG Credit	Greater of 10% or 3 x Benchmark

PORTFOLIO ASSET CLASS CHARACTERISTIC	ASSET CLASS	DISCUSSION TRIGGER
Ex Ante Tracking Error	IG Credit	3.0%
	MBS	3.0%
	High Yield	3.0%
	Lev Loans	3.0%
Maximum Equity Exposure	High Yield	5% of portfolio value
	Lev Loans	5% of portfolio value
Maximum investments in a single issuer, in the aggregate (excluding instruments listed in SIF guideline #2)	State Investment Fund	5% of portfolio value
MULTI-ASSET		
Ex ante volatility (tracking error) range	Multi-Strat	3% to 8%, measured with a trailing two-year risk sampling period
	Global Macro	2.5% to 12.5%, measured with a trailing two-year risk sampling period
Ex-Ante Equity Beta		
Ex-Ante Spread Beta	Multi-Strat and Global Macro	Range of -0.3 to +0.3 with a target of zero over a market cycle. This is measured ex ante with a trailing two-year risk sampling period
Ex-Ante Rates Beta		
Ex-Ante FX Carry Beta		
PRIVATE MARKETS & FUNDS ALPHA		
Maximum Co-Investments	Private Equity	30% of core Private Equity Portfolio for Private Equity Co-Investments 30% of Current Return Portfolio for Current Return Co-Investments
Maximum Co-Investments alongside funds with the same sponsor or manager as a fund on which SWIB was conducting due diligence and actively evaluating for a prospective commitment at the time of co-investment ²	Private Equity	5% of core Private Equity Portfolio for Private Equity Co-Investments 5% of Current Return Portfolio for Current Return Co-Investments

² If SWIB subsequently commits to a limited partnership or other fund vehicle of the sponsor or manager, then such co-investment shall no longer be included for purposes of calculating this soft parameter.

PORTFOLIO ASSET CLASS CHARACTERISTIC	ASSET CLASS	DISCUSSION TRIGGER
Minimum Funds	Private Equity	80% of aggregate Private Equity Portfolio
Maximum Venture Capital Exposure	Venture Capital	25% of Private Equity & Debt
Maximum Development Risk (Direct Holdings Only)	Real Estate	10%
Maximum Single Property Type Exposure - Quarterly	Real Estate	50%
Minimum Core Holdings (Including REIT portfolios)	Real Estate	50%
Maximum Value Holdings	Real Estate	30%
Maximum Opportunistic Holdings	Real Estate	30%
Maximum Core Portfolio Leverage	Real Estate	50%
Maximum Core Fund/Deal Leverage (Must be non-recourse to SWIB)	Real Estate	65%
Maximum Real Estate Equity Portfolio Leverage	Real Estate	60%
Maximum Holdings with Leverage > 80%	Real Estate	10%
Maximum Debt Holdings	Real Estate	25%
Ex ante volatility (tracking error) range	Hedge Fund	2.5% to 6.5%, measured with a trailing two-year risk sampling period
	Beta One	1.0% to 2.0%
Equity Delta to the S&P 500	Hedge Fund	Range of -0.3 to +0.3 with a target of zero over a market cycle. This is measured ex ante with a trailing two-year risk sampling period
Target Beta	Beta One	Range of 0.85 to 1.15 with a target of 1.0
Maximum one-year annual Conditional Value at Risk (CVaR)	Hedge Fund	7% based on trailing two-year risk sampling period
Maximum Hedge Fund Active Risk Contribution	Hedge Fund	6.0 bps of Core Fund active risk

PORTFOLIO ASSET CLASS CHARACTERISTIC	ASSET CLASS	DISCUSSION TRIGGER
Maximum General Partner/Investment Manager Portfolio Concentration	Hedge Fund	12%
	Beta One	25%

APPENDIX 3 – CTF AND VTF BENCHMARKS

**State of Wisconsin Investment Board
Target State Benchmarks 2022¹**

Core Trust Fund Benchmark²		
	Current Benchmark	
Public Equity	52% Fixed Blend of Six Components ³	- Current and previous benchmark asset classes are weighted by asset class strategic target weights - Current Benchmark updated 4/30/2012 to include Cash, which reflects leverage
Public Fixed Income	25% Fixed Blend of Eight Components ⁴	
Inflation Sensitive	19% Bloomberg US Treasury Inflation-Linked Bond Index	
Private Equity/Debt	12% Roll-Up of Five Components ⁵	
Real Estate	7% NCREIF Open End Diversified Core Equity (ODCE)	
Cash	(-15%) Bloomberg Short Term Bank Yield Index (BSBY) + 30bps	
Total	100%	
Variable Trust Fund Benchmark		
	Current Benchmark	
Domestic Equities	70% MSCI USA Investable Market Index	
International Equities	30% MSCI All Country World Index (ACWI) ex US Custom Net Index	
Total	100%	

Note: Roll-Up refers to the market-weighted aggregation of benchmark components or indices, based on SWIB's actual market exposures.

¹ Reflects target weights under the 2022 Asset Allocation implementation plan as of 8/31/2022.

² The major asset class weights are established through the annual asset allocation exercise; Private Equity weights float between 9% and 15% and Real Estate weights float between 4% and 10%. The Private Equity excess weights are taken from Public Equities, Real Estate excess weights are taken 50% from Public Equities and 50% from Public Fixed Income.

³ Public Equity Benchmark: Fixed Blend of Six Components
 77.60% MSCI World Custom Net Index
 6.90% MSCI USA Small Cap Index
 4.60% MSCI EAFE Small Cap Custom Net Index
 7.50% MSCI Emerging Market ex China Custom Net Index
 1.90% MSCI Emerging Market China Custom Net Index
 1.50% MSCI Emerging Market Small Cap Custom Net Index

⁴ Public Fixed Income Benchmark: Fixed Blend of Eight Components
 24.00% Bloomberg Credit Index
 8.00% Bloomberg Mortgage-Backed Securities Index
 24.00% Bloomberg Treasury Index
 4.00% Bloomberg Long Treasury Index
 20.00% BofA Merrill Lynch Corporate HY Ba/B Index
 10.00% S&P / LTSA U.S. Leveraged Loan 100 Index
 5.00% JPM EMBI Global Diversified
 5.00% JPM GBI-EM Diversified

⁵ Private Equity/Debt Benchmark: Roll-Up of Five Components
 Component One: State Street Private Equity Index
 Component Two: State Street Global Exchange Private Equity Index – Venture Capital
 Component Three: Private Equity Legacy (SW050300) Actual Portfolio Returns
 Component Four: Bloomberg Duration-Adjusted Baa Corporate plus 20 basis points
 Component Five: Burgiss Global Senior Debt Universe

Effective 1/1/2010, the tax treatment of the MSCI benchmark updated to a custom net-of-tax benchmark based on SWIB-specific tax treatment.

STATE OF WISCONSIN INVESTMENT BOARD
Investment Committee Meeting–Open Session

Tuesday, August 23, 2022

Offices of the Investment Board
121 East Wilson Street, Madison, Wisconsin

Committee Members Present: Edwin Denson, Executive Director/Chief Investment Officer (Chair)
Anne-Marie Fink, Private Markets & Funds Alpha–Chief
Investment Officer
Stefano Cavaglia, Senior Portfolio Manager–Asset & Risk
Allocation
Derek Drummond, Head of Funds Alpha
Diane Linn, Senior Portfolio Manager–Multi-Asset Strategies
Lin Maung, Senior Portfolio Manager–Private Equity
Jason Rector, Portfolio Manager–Funds Alpha
Mike Shearer, Head of Investment Grade Fixed Income
Nick Stanton, Head of Multi-Asset Strategies
Ivy Zhang, Senior Portfolio Manager–Asset & Risk Allocation

Sara Chandler, Chief Legal Counsel (non-voting)
Hassan Chehime, Head of Risk Management (non-voting)
Rochelle Klaskin, Deputy Executive Director/Chief Administrative
Officer (non-voting)

Also in Attendance: Joe Amoyal, Senior Portfolio Manager–Non-Investment Grade Fixed
Income
Nathan Ballard, Senior Legal Counsel
Chelsey Barczak, GPMS Business Director
Brandon Brickner, Internal Audit Director
Kate Burkart-Paulson, Senior Legal Counsel
Bill Campbell, Data Management Director
Bridget Chen, Senior Analyst–Investment Grade Fixed Income
Christian Comito, Portfolio Manager–Investment Grade Fixed
Income
Trey Edgerle, Compliance Analyst
Greg Fletcher, Performance Director
Tom Freeman, Director of Quantamental Research
Jameson Greenfield, Chief Financial Officer
Brian Heimsoth, Senior Portfolio Manager–Asset & Risk Allocation
John Heshelman, Senior Portfolio Manager–Non-Investment
Grade Fixed Income
Mike Jacobs, Agency Business Director
Phil Johnson, Senior Portfolio Manager–Non-Investment Grade
Fixed Income
Dave Jordan, Head of Non-Investment Grade Fixed Income
Salah Khalaf, Portfolio Manager–Private Markets & Funds Alpha
Leo Kropywiansky, Senior Portfolio Manager–Asset & Risk
Allocation

Jason Krueger, Compliance Analyst
Lisa Lange, Director of Compliance & Senior Legal Counsel
Alex Li, Analyst–Asset & Risk Allocation
Shan Lo, Senior Portfolio Manager–Multi-Asset Strategies
Jon Loboda, Performance Measurement Operations Manager
Matt Marek, Senior Analyst–Asset & Risk Allocation
Damian Maroun, Head of Trading and Execution
Edward Martinez, PMFA Business Director
Frank Mazzucco, Legal Counsel
Joy Mukherjee, Senior Portfolio Manager–U.S. Small Cap Strategy
Chad Neumann, Senior Portfolio Manager–Global Large Cap
Strategy
Anand Rakesh, Director of Risk Analytics & Financial Engineering
Systems
Jay Risch, Government Relations Liaison
Tom Robinson, Head of Corporate Governance
Jason Rothenberg, Head of Real Estate
Susan Schmidt, Head of Equities
Edouard Senechal, Senior Portfolio Manager–Asset & Risk
Allocation
Matt Terpstra, Internal Auditor
Dawn Tuescher, Executive Administrative Assistant
Rob Vanderpool, Fund Administration Director
Terri Wilhelm, Senior Paralegal
Zhenping Wang, Analyst–Asset & Risk Allocation
Marc Gesell, Verus
Chris Levell, NEPC
(Some individuals may have attended only portions of the meeting.)

OPEN SESSION

With a quorum present, Edwin Denson, Chair of the Investment Committee, called the meeting to order at 1:01 p.m.

1. Approval of the Minutes

Mr. Denson asked if there were any comments on either the open or closed session minutes of the July 26, 2022 Investment Committee (IC) meeting. Hearing no comments, Mr. Denson stated that the Committee could approve both the open and closed session minutes in open session.

Motion: A motion was made by Mr. Stanton and seconded by Mr. Shearer to approve both the open session and the closed session minutes of July 26, 2022, as presented. The motion passed unanimously.

2. Q2 2022 Quarterly Updates

A. Small Cap Diversified Strategy

Joy Mukherjee, Senior Portfolio Manager–U.S. Small Cap Strategy, referred to the *Small Cap Diversified Strategy Review*, included on pages 12-16 in the meeting materials. He reported that the small cap diversified portfolio, which transitioned from the Russell 2000 to the MSCI USA Small Cap Index benchmark as of April 1, underperformed by 142 basis points (bps) during the first half of 2022. He noted that strong security selection in the health care and consumer sectors positively impacted performance, while the information technology, energy, materials, and financials sectors detracted. Mr. Mukherjee confirmed that the portfolio was in compliance with its guidelines and soft risk parameters as of June 30, 2022, with the exception of the soft risk parameter related to ex ante tracking error, which the team decreased temporarily in connection with the benchmark transition and the uncertain market environment. Finally, he answered questions regarding the team’s coverage of new companies included in the new benchmark and whether the new benchmark’s sector weights differed significantly from those of the legacy benchmark.

B. Global Large Cap Equities

Chad Neumann, Senior Portfolio Manager–Global Large Cap Strategy, provided the *Global Sector Aggregate Strategy Review*, included on pages 17-21 in the meeting materials. Mr. Neumann reported that the global sector aggregate portfolio underperformed its benchmark by approximately 70 bps in Q2 due to stock selection and a challenging market environment. He noted that Susan Schmidt, Head of Equities, had joined SWIB and that staff are working with Ms. Schmidt to develop a proposal for the successor global large cap equity strategy.

Mr. Neumann then reported that sector performance remained volatile in Q2, as the information technology sector positively impacted performance while sectors most impacted by rising inflation and higher interest rates, including consumer discretionary, materials, and communication services, detracted. Lastly, Mr. Neumann stated that the portfolio was in compliance with its guidelines and soft risk parameters as of June 30, 2022, with the exception of the soft risk parameter related to ex ante tracking error, which is low while many sectors are indexed during the portfolio’s restructuring.

C. Funds Alpha

Derek Drummond, Head of Funds Alpha, presented the *Funds Alpha Q2 2022 Update*, included on pages 22-29 in the meeting materials. He highlighted that Funds Alpha generated approximately \$416 million in Excess Value Added (EVA) year-to-date across all three business lines and that managers across all Funds Alpha portfolios remained defensively positioned. He also noted that, with over \$12.5 billion allocated year-to-date, the team is nearing the end of its asset allocation and active risk budget implementation for the year. With respect to tracking error, he reported that the beta one equity portfolio tracking error remains above its long-term target, and the hedge funds portfolio’s tracking error has continued to decline.

Mr. Drummond then commented on the current hedge fund market environment, noting that (a) dispersion remains high at the country and sector level, but not at the individual asset

level, **(b)** liquidity is scarce across asset classes, **(c)** corporate activity has increased over the past few months, and **(d)** macroeconomic uncertainty, coupled with central bank policies and mid-term elections, may create opportunities to generate alpha. He also answered questions regarding factors contributing to the overall lack of liquidity in the market.

Regarding the active management environment going forward, Mr. Drummond highlighted that **(a)** Q2 corporate earnings remained strong, but may decrease in the coming quarters, **(b)** the economic slowdown in China may have wide-ranging implications, and **(c)** additional actions by the Federal Reserve may alter the opportunity set for managers.

Finally, Mr. Drummond confirmed that the portfolios were in compliance with their guidelines and soft risk parameters and answered questions regarding the recent allocations to China specialist managers.

3. Convene in Closed Session

Motion: A motion to go into closed session at this meeting as authorized pursuant to Sections 19.85(1)(e) and 19.36(5) of the Wisconsin Statutes to consider confidential strategies for the investment of public funds, including **(a)** the review of active risk profiles of portfolio investments and the Core and Variable Trust Funds, **(b)** the review of specific proprietary investment strategies and investment instruments related to small cap equities, global large cap equities, funds alpha, currency exposure and exposure management, and **(c)** the review of broker information was made by Ms. Fink and seconded by Mr. Drummond.

The Chair called for a roll call vote.

Denson-Aye	Fink-Aye	Cavaglia-Aye	Drummond-Aye
Linn-Aye	Maung-Aye	Rector-Aye	
Shearer-Aye	Stanton-Aye	Zhang-Aye	

There being ten ayes and no nays, Mr. Denson declared the motion passed. The Committee convened in closed session at 1:25 p.m. and reconvened in open session at 4:20 p.m.

4. Announcement of Committee Actions Relating to Items Taken up in Closed Session

Mr. Denson announced that, while in closed session, the Committee **(a)** reviewed active risk profiles of portfolio investments and the Core and Variable Trust Funds, **(b)** reviewed specific proprietary investment strategies and investment instruments related to small cap equities, global large cap equities, funds alpha, currency exposure and exposure management, and **(c)** reviewed broker information.

5. QIR Certification

Lisa Lange, Director of Compliance and Senior Legal Counsel, presented a proposal that the Committee appoint Jon Simon as a Qualified Independent Representative (QIR) for Fixed Income ETF Total Return Swaps, as set forth on pages 206-211 in the meeting materials. She noted that the appointment would be for all approved counterparties with whom SWIB has a master netting agreement for such instruments and would be in addition to Mr. Simon's prior appointment as a QIR for Fixed Income Total Return Swap Baskets. Ms. Lange noted

that Amendment No. 1 to Mr. Simon's signed Internal QIR Certificate and Agreement documenting his relevant knowledge and experience were included in the meeting materials for the Committee's review. She also explained that Mr. Simon would be subject to quarterly and annual certifications regarding his QIR status as a condition of his employment.

Motion: A motion was made by Mr. Drummond and seconded by Mr. Shearer to approve that Jon Simon meets all of the QIR Criteria with respect to Fixed Income ETF Total Return Swaps for all approved counterparties with whom SWIB has a master netting agreement for such instruments, from time to time, and he is approved to act and is hereby appointed as a QIR with respect to such counterparties. The motion passed unanimously.

6. Currency Task Force Report

Mr. Denson noted that a copy of the agenda for the August 15, 2022 Currency Task Force meeting, with additional materials for reference, was included on pages 212-219 in the meeting materials for the Committee's information.

7. Research Task Force Report

Stefano Cavaglia, Senior Portfolio Manager–Asset & Risk Allocation, presented the *Research Task Force Report*, included on pages 220-221 in the meeting materials. Mr. Cavaglia reviewed the Research Task Force's recent projects, including (a) planning the June Investment Forum, which was held on June 14-15, (b) hosting a Business Intelligence Advisors (BIA) training for staff, focused on information collection designed specifically to inform the investment process, and (c) holding an informational session open to all staff, which summarized the Research Task Force's work and outlined opportunities for all staff to participate.

8. Quarterly Performance Review (Q2 2022)

Mr. Denson noted that the *Investment Performance Report*, as of June 30, 2022, was included on pages 222-232 in the meeting materials for the Committee's information.

9. Soft Risk Parameters

Hassan Chehime, Head of Risk Management, noted that the report *Soft Risk Parameters–Asset Class and Portfolio*, as of July 31, 2022, was included on pages 233-234 in the meeting materials for the Committee's review. He noted that there was one new discussion trigger this month relating to the public fixed income asset class ex ante tracking error, while the discussion triggers relating to ex ante tracking error for the leveraged loan and beta one portfolios had been dropped since last month.

10. Future Meeting Topics

Mr. Denson noted that draft agendas for the September 27, 2022 and October 25, 2022 IC meetings were included on pages 235-238 in the meeting materials for the Committee's review.

11. Adjournment

Motion: A motion to adjourn the meeting was made by Mr. Rector and seconded by Mr. Drummond. The motion passed unanimously, and the meeting adjourned at 4:26 p.m.

Date of Committee Approval: 9/27/2022

Signed: /s/ Sara Chandler
Sara Chandler, Secretary
Investment Committee

STATE OF WISCONSIN INVESTMENT BOARD
Investment Committee Meeting–Open Session

Tuesday, September 27, 2022

Offices of the Investment Board
121 East Wilson Street, Madison, Wisconsin

Committee Members Present: Edwin Denson, Executive Director/Chief Investment Officer (Chair)
Anne-Marie Fink, Private Markets & Funds Alpha–Chief
Investment Officer
Stefano Cavaglia, Senior Portfolio Manager–Asset & Risk
Allocation
Derek Drummond, Head of Funds Alpha
Diane Linn, Senior Portfolio Manager–Multi-Asset Strategies
Lin Maung, Senior Portfolio Manager–Private Equity
Jason Rector, Portfolio Manager–Funds Alpha
Mike Shearer, Head of Investment Grade Fixed Income
Nick Stanton, Head of Multi-Asset Strategies
Ivy Zhang, Senior Portfolio Manager–Asset & Risk Allocation

Sara Chandler, Chief Legal Counsel (non-voting)
Hassan Chehime, Head of Risk Management (non-voting)

Also in Attendance: Joe Amoyal, Senior Portfolio Manager–Non-Investment Grade Fixed
Income
Nathan Ballard, Senior Legal Counsel
Brandon Brickner, Internal Audit Director
Kate Burkart-Paulson, Senior Legal Counsel
Bill Campbell, Data Management Director
Bridget Chen, Senior Analyst–Investment Grade Fixed Income
Christian Comito, Portfolio Manager–Investment Grade Fixed
Income
Dan Cox, Senior Portfolio Manager–Investment Grade Fixed
Income
Kliton Duri, Senior Portfolio Manager–Non-Investment Grade
Fixed Income
Chris Eckerman, Senior Portfolio Manager–Private Equity
Trey Edgerle, Compliance Analyst
Greg Fletcher, Performance Director
Jameson Greenfield, Chief Financial Officer
Brian Heimsoth, Senior Portfolio Manager–Asset & Risk Allocation
John Heshelman, Senior Portfolio Manager–Non-Investment
Grade Fixed Income
Phil Johnson, Senior Portfolio Manager–Non-Investment Grade
Fixed Income
Ryan Johnston, Analyst–Funds Alpha
Dave Jordan, Head of Non-Investment Grade Fixed Income
Salah Khalaf, Portfolio Manager–Private Markets & Funds Alpha
Jason Krueger, Compliance Analyst

Lisa Lange, Director of Compliance & Senior Legal Counsel
Bill Luetzow, Legal Counsel
Shan Lo, Senior Portfolio Manager–Multi-Asset Strategies
Jon Loboda, Performance Measurement Operations Manager
Damian Maroun, Head of Trading and Execution
Edward Martinez, PMFA Business Director
Scott Parrish, Head of Private Equity
Chris Prestigiacomo, Head of Private Debt & Venture Capital
Anand Rakesh, Director of Risk Analytics & Financial Engineering
Systems
Jay Risch, Government Relations Liaison
Tom Robinson, Head of Corporate Governance
Joe Roth, Business Analyst
Jason Rothenberg, Head of Real Estate
Andrea Ruiz, Senior Portfolio Manager–Liquidity, Inflation &
Rates Mgmt.
Edouard Senechal, Senior Portfolio Manager–Asset & Risk
Allocation
Chris Spiering, Senior Portfolio Manager–Non-Investment
Grade Fixed Income
Matt Terpstra, Internal Auditor
Rob Thornton, ARA Business Director
Dawn Tuescher, Executive Administrative Assistant
Rob Vanderpool, Fund Administration Director
Chris Levell, NEPC
(Some individuals may have attended only portions of the meeting.)

OPEN SESSION

With a quorum present, Anne-Marie Fink, Private Markets & Funds Alpha–Chief Investment Officer, called the meeting to order at 1:00 p.m.

1. Approval of the Minutes

Ms. Fink asked if there were any comments on either the open or closed session minutes of the August 23, 2022 Investment Committee (IC) meeting. Hearing no comments, Ms. Fink stated that the Committee could approve both the open and closed session minutes in open session.

Motion: A motion was made by Mr. Rector and seconded by Mr. Stanton to approve both the open session and the closed session minutes of August 23, 2022, as presented. The motion passed unanimously.

2. Approval of Provisional Benchmark

Sara Chandler, Chief Legal Counsel, reviewed the governance regarding benchmark approvals and noted that the IC can approve provisional benchmarks to take effect immediately, with the review and approval of the Board of Trustees' Benchmark and Performance Committee scheduled for the next regular meeting in December. She noted that

a recommendation from Verus Advisory, the Board's benchmark consultant, was included on pages 11-15 in the meeting materials.

Greg Fletcher, Performance Director, then reviewed Verus's memo, dated September 27, 2022. He explained that Verus was asked to provide a recommendation regarding the benchmark for external managers within the beta one portfolio implementing international small cap equity mandates. The current benchmark, the MSCI EAFE Small Cap Index, was adopted in 2019 when international small cap equity was added to the asset allocation and includes only developed market countries. With the inclusion of emerging market small cap equity in the 2022 asset allocation, staff is looking to add managers to the beta one portfolio with strategies that cover both developed and emerging markets. To facilitate these broader mandates, the recommended benchmark, the MSCI ACWI Ex USA Small Cap USD, covers the entire international small cap equity investable universe.

Mr. Fletcher then reviewed how the benchmark's qualities meet the Board's overall benchmark philosophy, discussed the specific benefits of implementing the recommended benchmark, and confirmed that the overall asset class would retain its existing benchmark at the Core Trust Fund (CTF) level. The relevant mandates will be funded during the fourth quarter, so the provisional benchmark is intended to be effective October 1, 2022.

Motion: A motion was made by Mr. Cavaglia and seconded by Mr. Drummond to approve, and to recommend to the Board of Trustees' Benchmark and Performance Committee, the provisional benchmark, effective as of October 1, 2022, for the Beta One international small cap equity portfolio of the MSCI All Country World Index (ACWI) Ex USA Small Cap USD Custom Net, as presented and recommended by SWIB's benchmark consultant, Verus Advisory, in its memo dated September 27, 2022. The motion passed unanimously.

3. Amendments to Investment Committee WRS Investment Guidelines

Ms. Chandler discussed the proposed amendments to the *SWIB Investment Committee Wisconsin Retirement System Investment Guidelines*, included on pages 16-63 in the meeting materials. She noted first that the procedures related to relative drawdown monitoring and reporting that have been in place since 2017 had been added to the guidelines. Ms. Chandler then introduced the guidelines for the new long treasury portfolio, noting that they were largely modeled off of the guidelines for the existing fixed income portfolios. Mike Shearer, Head of Investment Grade Fixed Income, answered questions regarding the guidelines as well as the instruments expected to be included in the portfolio.

Next, Ms. Chandler noted two instances where duration measures were amended to reflect deviation from the benchmark in years rather than percentages to increase consistency and ease of testing. Lastly, she referenced a new soft risk parameter for the tracking error of the Global Utilities Index Portfolio in response to an internal audit recommendation.

Motion: A motion was made by Mr. Rector and seconded by Mr. Stanton to approve the proposed amendments to the *SWIB Investment Committee WRS Investment Guidelines*, as presented in the Committee materials. The motion passed unanimously.

4. Private Markets & Funds Alpha Division Update

Ms. Fink presented the *Private Markets & Funds Alpha Quarterly Report*, included on pages 64-65 in the meeting materials. She commented that the percentage of CTF and Variable Trust Fund (VTF) assets from the Private Markets & Funds Alpha (PMFA) division increased from year-end 2021 to August 31, 2022 as a result of the “denominator” effect, approved asset allocation changes, and positive investment returns across the PMFA division for the year.

5. Q2 2022 Quarterly Updates

A. Private Equity

Scott Parrish, Head of Private Equity, presented the *Quarterly Activity Report – Private Equity*, included on pages 66-88 in the meeting materials. He provided a private equity market update for the first half of 2022, noting that **(a)** global private equity fundraising dollars decreased relative to the first half of 2021, while the number of funds raised increased slightly, **(b)** U.S. private equity deal activity in dollars and number of deals has increased slightly year-over-year, while the number of exits and exit value declined significantly, and **(c)** portfolio company exit activity was split between strategic acquirers and sponsor-to-sponsor transactions, with no market for IPOs for private equity-backed companies.

Mr. Parrish reported that, as of June 30, 2022, the market value of the aggregate private equity asset class, including the venture capital, private debt, and overage portfolios, made up approximately 17.2% of the CTF. He observed that cash flow activity was significantly lower in the first half of 2022 relative to the first half of 2021, potentially due to sponsors funding transactions on subscription lines of credit.

With respect to performance, Mr. Parrish highlighted that the private equity portfolios all outperformed their benchmarks for the one-, three-, and five-year time periods and that, as of March 31, 2022, the combined private equity and co-investment portfolios achieved second quartile performance for vintage years 2014-2019 and first quartile performance for 2020 and 2021. He also discussed the five-year internal rates of return (IRRs) for the portfolios’ sub-strategies, noting particularly strong performance in growth equity while the lower performance from credit/distressed is expected to improve as distressed managers call more capital in the current market environment.

Mr. Parrish then discussed the private equity portfolio’s **(a)** public versus private portfolio company exposure, noting that public exposure had decreased following liquidations and lower valuations, and **(b)** industry diversification, noting the increases in energy and healthcare. He highlighted that all commitments made in Q2 2022 were to existing managers, reviewed the portfolio pipeline for Q3 2022, and confirmed that the portfolio remained in compliance with all investment guidelines.

B. Real Estate

Jason Rothenberg, Head of Real Estate, presented the *Quarterly Activity Report – Real Estate*, included on pages 89-102 in the meeting materials. He discussed the current market environment, noting that **(a)** strong core real estate returns have been driven by both declining capitalization rates and continued strong net operating income (NOI) growth,

(b) capitalization rates remain at historic lows but are expected to increase, (c) there has been a significant decrease in expectations for real estate returns in the second half of 2022, and (d) pricing and the denominator effect across the industry are creating headwinds for fundraising.

Mr. Rothenberg then reviewed the real estate portfolio, noting that the portfolio's market value of approximately \$10.8 billion as of June 30, 2022 represented approximately 9.3% of the CTF, which may increase as managers call capital to take advantage of better pricing opportunities while exits may decrease in the short term. He also noted that the real estate investment and operations teams had completed a significant eFront upgrade, which is expected to result in enhanced data systems and reporting in coming quarters.

Mr. Rothenberg reviewed the portfolio's performance, reporting outperformance relative to the benchmark over the three-, five-, and ten-year time periods, with strong absolute returns for the one-year time period despite negative relative returns. He discussed the new commitments made in the quarter and highlighted the Asia-focused commitments made to take advantage as the patterns observed in the U.S. spread throughout the world. Lastly, he (a) referred the Committee to the active pipeline under review, noting that the team is continuing to balance commitment pacing with overall allocation guidance, (b) confirmed that the portfolio remained in compliance with its investment guidelines, and (c) answered questions regarding property-level expenses and inflation, particularly in the multi-family sector.

C. Private Debt

Chris Prestigiacomo, Head of Private Debt & Venture Capital, presented the *Private Debt Portfolio Investment Committee Quarterly Report*, included on pages 103-114 in the meeting materials. He provided a private debt market update for the first half of 2022, noting that (a) after a record year in 2021, fundraising has slowed significantly, consistent with the broader market selloff and volatile macro environment, (b) experienced managers that have shown the ability to invest across credit cycles are still having success fundraising, (c) the direct lending investment strategy overall has grown from less than 4% of the private debt market in 2007 to almost half of the market in 2021, with investors also becoming more interested in the distressed debt space recently, and (d) dry powder available to invest has dropped to its lowest level in four years due to the current difficult fundraising environment after significant capital was deployed in 2021.

Mr. Prestigiacomo reported that the new loan closed during Q2 2022 was a below-investment grade (BIG) holding, resulting in current aggregate BIG holdings of 10%, up from 5% in Q1 but below the portfolio maximum of 25%. He then reviewed the portfolio's (a) characteristics, noting that average coupon increased slightly, while average life and duration decreased, (b) barbell credit strategy, with staff targeting loans of both higher and lower credit quality than the benchmark to maintain an overall portfolio weighting of BBB, and (c) sector mix, noting that the historical overweight to industrial and underweight to financials arises from the opportunity set of the portfolio's legacy geographic limitations. Comparing the Wisconsin and non-Wisconsin loans in the portfolio, he commented that the average coupon is higher for Wisconsin loans due to higher BIG loans outstanding in Wisconsin, and he noted that the team is continuing to expand its market opportunity outside of the legacy non-Wisconsin region.

Lastly, Mr. Prestigiacomo reviewed the portfolio's performance, highlighting that the portfolio outperformed its benchmark over all time periods, despite negative absolute performance for the one-year period, and reported that there were no problem credits or workouts in the portfolio, which remained in compliance with its guidelines.

6. Convene in Closed Session

Motion: A motion to go into closed session at this meeting as authorized pursuant to sections 19.85(1)(e) and 19.36(5) of the Wisconsin Statutes to consider confidential strategies for the investment of public funds, including (i) the review of active risk profiles of portfolio investments and the Core and Variable Trust Funds, (ii) the review of specific investment strategies related to asset allocation, and (iii) the review of specific proprietary investment strategies and investment instruments related to private equity, real estate, private debt, venture capital and exposure management was made by Mr. Maung and seconded by Mr. Drummond.

Ms. Fink called for a roll call vote.

Denson-Aye	Fink-Aye	Cavaglia-Aye	Drummond-Aye
Linn-Aye	Maung-Aye	Rector-Aye	
Shearer-Aye	Stanton-Aye	Zhang-Aye	

There being ten ayes and no nays, Ms. Fink declared the motion passed. The Committee convened in closed session at 1:41 p.m. and reconvened in open session at 3:14 p.m.

7. Announcement of Committee Actions Relating to Items Taken up in Closed Session

Ms. Fink announced that, while in closed session, the Committee (a) reviewed active risk profiles of portfolio investments and the Core and Variable Trust Funds, (b) reviewed specific investment strategies related to asset allocation, and (c) reviewed specific proprietary investment strategies and investment instruments related to private equity, real estate, private debt, venture capital and exposure management.

8. Corporate Governance Update

Tom Robinson, Head of Corporate Governance, presented the Corporate Governance Update, included on pages 256-263 in the meeting materials. He reported that SWIB's proxy voting support levels through Q2 2022 are similar to prior years. He highlighted that (a) overall support for directors in the U.S. remains high though there is some decline in support for executive compensation packages, particularly where discretionary awards lack transparency, (b) an accommodative posture from the SEC has led the number of non-binding environmental and social shareholder proposals to hit all-time highs in the U.S., though support declined as many proposals were overly prescriptive, redundant, or lacked a business purpose, and (c) gender and ethnic diversity on boards has continued to improve, resulting in modest increases in board size.

Mr. Robinson then reviewed SWIB's voting trends, noting that SWIB continues to vote with management approximately 85% of the time and that meeting and proposal counts are on track to reach all-time highs. He shared additional proxy voting observations regarding

(a) director independence, noting incremental improvements across multiple markets coupled with a growing concern in Japan regarding committee independence, and (b) say on pay, noting that average support levels have declined, and executive compensation plans are increasingly incorporating environmental and social metrics. Lastly, he highlighted the new “universal proxy rule,” which is expected to increase activist activity and make it easier to target individual directors.

9. Transition Update (Q2 2022)

Joe Roth, Business Analyst, reviewed the five transition events for Q2 2022 on the *Transition Management Summary, Q2 2022*, included on page 264 in the meeting materials. He highlighted that all five transitions were complicated with multiple tranches, and that each fell within the established shortfall tolerance ranges.

The first two transitions, completed by a new transition manager, Northern Trust, were undertaken in connection with approved asset allocation changes for the small cap diversified portfolio and the portfolio’s benchmark change from the Russell 2000 to MSCI USA Small Cap Index in both the CTF and the VTF.

The remaining three transitions, all managed by the BlackRock Transition Management team, implemented (i) the de-coupling of emerging markets strategies into China and ex-China and (ii) the approved asset allocation policy change to increase exposure to emerging market equities.

10. October Board Workshop Preview

Ms. Chandler provided an overview of the upcoming October Board Workshop to be held in Milwaukee on October 18-19, 2022. The Workshop will include (a) three presentations by external speakers sourced by the PMFA Division, (b) three presentations by Asset & Risk Allocation staff on factor investing, the U.S. economic environment, and asset allocation, (c) NEPC’s preview of the asset allocation recommendations to be presented to the Board for approval in December 2022, including a deep dive on private markets exposure, and (d) a vote on a proposed long-term incentive plan.

11. Soft Risk Parameters

Hassan Chehime, Head of Risk Management, noted that the report *Soft Risk Parameters—Asset Class and Portfolio*, as of August 31, 2022, was included on pages 265-266 in the meeting materials for the Committee’s review. He noted that there was one new discussion trigger this month relating to the investment grade credit portfolio’s active duration, while the discussion trigger relating to the ex ante tracking error for the public fixed income asset class had been dropped since last month.

12. Future Meeting Topics

Ms. Fink noted that draft agendas for the October 25, 2022 and November 22, 2022 IC meetings were included on pages 267-270 in the meeting materials for the Committee’s review.

13. Adjournment

Motion: A motion to adjourn the meeting was made by Mr. Maung and seconded by Mr. Shearer. The motion passed unanimously, and the meeting adjourned at 3:32 p.m.

Date of Committee Approval: 10/25/2022

Signed: /s/ Sara Chandler
Sara Chandler, Secretary
Investment Committee

STATE OF WISCONSIN INVESTMENT BOARD
Investment Committee Meeting–Open Session

Tuesday, October 25, 2022

Offices of the Investment Board
121 East Wilson Street, Madison, Wisconsin

Committee Members Present: Edwin Denson, Executive Director/Chief Investment Officer (Chair)
Anne-Marie Fink, Private Markets & Funds Alpha–Chief
Investment Officer
Stefano Cavaglia, Senior Portfolio Manager–Asset & Risk
Allocation
Derek Drummond, Head of Funds Alpha
Diane Linn, Senior Portfolio Manager–Multi-Asset Strategies
Lin Maung, Senior Portfolio Manager–Private Equity
Jason Rector, Portfolio Manager–Funds Alpha
Mike Shearer, Head of Fixed Income Strategies
Nick Stanton, Head of Multi-Asset Strategies
Ivy Zhang, Senior Portfolio Manager–Asset & Risk Allocation

Sara Chandler, Chief Legal Counsel (non-voting)
Hassan Chehime, Head of Risk Management (non-voting)
Rochelle Klaskin, Deputy Executive Director/Chief Administrative
Officer (non-voting)

Also in Attendance: Nathan Ballard, Senior Legal Counsel
Chelsey Barczak, GPMS Business Director
Brandon Brickner, Internal Audit Director
Kate Burkart-Paulson, Senior Legal Counsel
Bridget Chen, Senior Analyst–Investment Grade Fixed Income
Christian Comito, Portfolio Manager–Investment Grade Fixed
Income
Dan Cox, Senior Portfolio Manager–Investment Grade Fixed
Income
Kliton Duri, Senior Portfolio Manager–Non-Investment Grade
Fixed Income
Trey Edgerle, Compliance Analyst
Greg Fletcher, Performance Director
Jameson Greenfield, Chief Financial Officer
Brian Heimsoth, Senior Portfolio Manager–Asset & Risk Allocation
John Heshelman, Senior Portfolio Manager–Non-Investment
Grade Fixed Income
Mike Jacobs, Agency Business Director
Phil Johnson, Senior Portfolio Manager–Non-Investment Grade
Fixed Income
Salah Khalaf, Portfolio Manager–Private Markets & Funds Alpha
Jason Krueger, Compliance Analyst
Lisa Lange, Director of Compliance & Senior Legal Counsel

Jonathan Levine, Senior Portfolio Manager–Investment Grade
Fixed Income
Shan Lo, Senior Portfolio Manager–Multi-Asset Strategies
Jon Loboda, Performance Measurement Operations Manager
Jeff Lucas, Senior Portfolio Manager–Multi-Asset Strategies
Bill Luetzow, Legal Counsel
Edward Martinez, PMFA Business Director
Frank Mazzucco, Legal Counsel
Chad Neumann, Senior Portfolio Manager–Global Large Cap
Strategy
Anand Rakesh, Director of Risk Analytics & Financial Engineering
Systems
Jay Risch, Government Relations Liaison
Tom Robinson, Head of Corporate Governance
Andrea Ruiz, Senior Portfolio Manager–Liquidity, Inflation &
Rates Mgmt.
Susan Schmidt, Head of Equities
Edouard Senechal, Senior Portfolio Manager–Asset & Risk
Allocation
Jon Simon, Senior Portfolio Manager–Investment Grade Fixed
Income
Chris Spiering, Senior Portfolio Manager–Non-Investment
Grade Fixed Income
Matt Terpstra, Internal Auditor
Rob Thornton, ARA Business Director
Dawn Tuescher, Executive Administrative Assistant
Rob Vanderpool, Fund Administration Director
Marc Gesell, Verus Advisory
Chris Levell, NEPC
(Some individuals may have attended only portions of the meeting.)

OPEN SESSION

With a quorum present, Edwin Denson, Chair of the Investment Committee, called the meeting to order at 1:02 p.m.

1. Approval of the Minutes

Mr. Denson asked if there were any comments on either the open or closed session minutes of the September 27, 2022 Investment Committee (IC) meeting. Hearing no comments, Mr. Denson stated that the Committee could approve both the open and closed session minutes in open session.

Motion: A motion was made by Mr. Shearer and seconded by Ms. Linn to approve both the open session and the closed session minutes of September 27, 2022, as presented. The motion passed unanimously.

2. Annual Benchmark Presentation

Marc Gesell, Verus Advisory, the Board of Trustees' benchmark consultant, presented the results of the State Investment Fund (SIF) benchmark review, included on pages 12-16 in the meeting materials, which was undertaken as part of the 2022 annual benchmark review process. He discussed Verus' recommendation that the SIF benchmark be changed to the two-month average of the daily closing yield on four-week U.S. Treasury Bills, as published by the U.S. Treasury. Mr. Gesell noted that the SIF's three primary objectives are, in order of priority, safety of principal, liquidity, and rate of return. Given recent liquidity demands on the portfolio and the expectation that such pressures are likely to continue, he observed that it has been challenging for the Liquidity, Inflation and Rates Management (LIRM) team to seek the level of return implied by the current benchmark while continuing to prioritize safety of principal and liquidity. He also highlighted that changing to the new benchmark would mitigate the mismatch between current benchmark construction timing and SIF portfolio construction. Mr. Gesell and Greg Fletcher, Performance Director, then led the Committee's discussion regarding the calculation and implementation of the new benchmark, which would, if approved by the Board, be effective on January 1, 2023.

Motion: A motion was made by Ms. Fink and seconded by Mr. Rector to approve, and to recommend to the Board of Trustees' Benchmark and Performance Committee, the change to the State Investment Fund (SIF) benchmark to the two-month average of the daily closing yield on four-week U.S. Treasury Bills, as published by the U.S. Treasury, as presented and recommended by SWIB's benchmark consultant, Verus Advisory, as part of its Annual Benchmark Review in its memo dated October 25, 2022. The motion passed unanimously.

3. Q3 2022 Quarterly Updates

Nick Stanton, Head of Multi-Asset Strategies, presented the *Global Public Markets Strategies Quarterly Update, Q3 2022*, included on pages 17-26 in the meeting materials. Mr. Stanton reported on performance from the Global Public Market Strategies division for Q3 2022, noting that only one of the seven division strategies generated positive performance relative to its benchmark year-to-date, with all division strategies and benchmarks exhibiting negative absolute returns year-to-date. He also commented that performance had stabilized moderately since the end of Q2 2022, and confirmed that each portfolio was in compliance with its guidelines during Q3 2022.

Andrea Ruiz, Senior Portfolio Manager—Liquidity, Inflation & Rates Mgmt., reported that **(a)** the SIF returned positive absolute performance but negative performance relative to its benchmark for the year, in large part due to the rising interest rate environment, and **(b)** the short-term credit portfolio returned positive absolute and relative performance year-to-date.

Mike Shearer, Head of Fixed Income Strategies, then provided a market review, included on pages 27-30 in the meeting materials. He noted that **(a)** rising inflation and concerns about the Federal Reserve continuing to raise interest rates contributed to persistent market volatility and greater recessionary concerns, **(b)** changing geopolitical conditions, including recent currency and government bond price fluctuations in the United Kingdom, also contributed to elevated volatility, **(c)** sovereign rates continued to increase with higher volatility in both developed and emerging markets, **(d)** the U.S. dollar strengthened materially relative to both developed and emerging market currencies in the third quarter,

(e) credit spreads for U.S. investment grade credit ended flat for the quarter despite significant volatility during the quarter, while spreads for high yield bonds widened moderately, and (f) performance of the equity markets mirrored the broader risk-off trend with declines in broad-based indices, particularly in emerging markets.

4. Convene in Closed Session

Motion: A motion to go into closed session at this meeting as authorized pursuant to sections 19.85(1)(e) and 19.36(5) of the Wisconsin Statutes to consider confidential strategies for the investment of public funds, including (i) the review of active risk profiles of portfolio investments and the Core and Variable Trust Funds, and (ii) the review of specific proprietary investment strategies and investment instruments related to short-term credit, investment grade and non-investment grade fixed income, multi-asset and exposure management was made by Mr. Rector and seconded by Mr. Stanton.

Mr. Denson called for a roll call vote.

Denson-Aye	Fink-Aye	Cavaglia-Aye	Drummond-Aye
Linn-Aye	Maung-Aye	Rector-Aye	
Shearer-Aye	Stanton-Aye	Zhang-Aye	

There being ten ayes and no nays, Mr. Denson declared the motion passed. The Committee convened in closed session at 1:16 p.m. and reconvened in open session at 3:33 p.m.

5. Announcement of Committee Actions Relating to Items Taken up in Closed Session

Mr. Denson announced that, while in closed session, the Committee (a) reviewed active risk profiles of portfolio investments and the Core and Variable Trust Funds, and (b) reviewed specific proprietary investment strategies and investment instruments related to short-term credit, investment grade and non-investment grade fixed income, multi-asset and exposure management.

6. Separately Managed Funds Update

Rob Thornton, ARA Business Director, and Jon Simon, Senior Portfolio Manager–Investment Grade Fixed Income, presented the annual *Separately Managed Funds Update*, included on pages 161-176 in the meeting materials. Mr. Thornton noted that the Asset & Risk Allocation (ARA) division is responsible for the oversight of the Separately Managed Funds (SMFs), with all rebalancing performed in accordance with the corresponding SMF’s guidelines, and that SWIB fixed income staff continue to perform active portfolio management for a portion of the State Life Insurance Fund (SLIF).

Mr. Thornton then reviewed the investment objectives, asset allocations and performance for each SMF, noting that (a) the Injured Patients & Family Compensation Fund includes a portion actively managed by an external manager as well as passive investments, (b) the UW System Long Term Fund’s public markets investments are held in BlackRock passive index funds and its existing private markets investments will gradually roll off, (c) the UW System Cash Management Fund, a new SMF as of May 31, 2022, is also largely invested in BlackRock passive index funds with an allocation to an actively managed BlackRock

floating rate income fund, (d) the State Historical Society Trust Fund is invested in BlackRock passive index funds, and (e) the SLIF is made up entirely of investment-grade fixed income assets. He commented that each SMF had negative absolute performance over the one-year period in the challenging investment environment, but that relative performance was generally positive for the three-, five-, and ten-year periods.

Mr. Simon then reviewed the performance and strategy of the SLIF, including the unique focus on maximizing income return and minimizing any realized losses and the laddered buy-and-hold strategy, and answered questions regarding the annual level of turnover in the SLIF's portfolio holdings.

7. October Workshop Board Debrief

Sara Chandler, Chief Legal Counsel, provided a summary of the October Board Workshop, noting that feedback has been favorable. She highlighted that sessions included (a) presentations from the ARA division on factor investing, the current macroeconomic environment, and SWIB's use of the corridor treatment in asset allocation, (b) NEPC's preview of their annual asset allocation recommendations, including a deep dive on allocations to private markets investments, (c) approval of a long-term incentive compensation plan, and (d) remarks from external speakers, including Jack Lew, managing partner at Lindsay Goldberg and former U.S. Treasury Secretary, Manny Roman, CEO of PIMCO, and Steven Kaplan, Professor at the University of Chicago Booth School of Business.

8. Soft Risk Parameters

Hassan Chehime, Head of Risk Management, noted that the report *Soft Risk Parameters—Asset Class and Portfolio*, as of September 30, 2022, was included on pages 177-178 in the meeting materials for the Committee's review. He noted that there were two new discussion triggers this month relating to the ex ante tracking error for the mortgage-backed securities (MBS) and beta one portfolios.

9. Future Meeting Topics

Mr. Denson noted that draft agendas for the November 22, 2022 and December 15, 2022 IC meetings were included on pages 179-182 in the meeting materials for the Committee's review.

10. Adjournment

Motion: A motion to adjourn the meeting was made by Ms. Fink and seconded by Mr. Maung. The motion passed unanimously, and the meeting adjourned at 3:54 p.m.

Date of Committee Approval: 11/22/2022

Signed: /s/ Sara Chandler
Sara Chandler, Secretary
Investment Committee

AGENDA / NOTICE

Name of Meeting: Staff Investment Committee Meeting
Date/Time: Tuesday, November 22, 2022 1:00 pm
Room: Presentation Room – 1st Floor
Address: 121 E. Wilson St., Madison WI 53703

Est. Time Minutes	Action Item	Topic	Presenter
		OPEN SESSION	
	Motion	1. Approval of the Minutes – Open Session A. October 25, 2022	
15	Motion	2. 2023 Asset Allocation Recommendations	Chris Levell, NEPC
10	Motion	3. Annual Benchmark Presentation	Eileen Neill, Verus
35		4. Q3 2022 Quarterly Updates A. Global Large Cap Equities B. Small Cap C. Funds Alpha	Susan Schmidt Joy Mukherjee Derek Drummond
	Motion	CLOSED SESSION*	
	Motion	RECONVENE IN OPEN SESSION	
		5. Announcement of Committee Actions Relating to Items Taken Up in Closed Session	
5	Motion	6. QIR Certification	Lisa Lange
5		7. Brokerage Task Force Report	Damian Maroun
5		8. Currency Task Force Report	Chirag Gandhi
5		9. Research Task Force Report	Stefano Cavaglia
		10. Quarterly Performance Review (Q3 2022) (No presentation unless requested)	

* A motion to go into closed session at this meeting is authorized pursuant to sections 19.85(1)(e) and 19.36(5) of the Wisconsin Statutes (a) to consider confidential strategies for the investment of public funds, including (i) the review of active risk profiles of portfolio investments and the Core and Variable Trust Funds, (ii) the review of specific proprietary investment strategies and investment instruments related to small cap equities, global large cap equities, funds alpha, currency exposure, asset and risk allocation and exposure management, and (iii) the review of broker information, and (b) to discuss and approve prior closed session minutes that discuss the same. The Committee may convene in additional closed sessions or announce additional closed session items at the meeting in accordance with the procedure outlined in the Attorney General's Opinion reported at 66 OAG 106 (1977). Whenever a closed session is held, the committee will subsequently reconvene in open session to cover remaining agenda items.

		11. Soft Risk Parameters (No presentation unless requested)	
		12. Future Meeting Topics	
	Motion	13. Motion to Adjourn	
		<p><i>NOTES: Items may be taken in order other than listed.</i></p> <p><i>The meeting site is physical accessible. Upon prior request, reasonable accommodations will be provided.</i></p>	

Future Meetings

12/15/22 – December Committee Mtg.
 1/24/23 – January Committee Mtg.
 2/23/23 – February Committee Mtg.
 3/28/23 – March Committee Mtg.
 4/25/23 – April Committee Mtg.
 5/23/23 – May Committee Mtg.
 6/27/23 – June Committee Mtg.
 7/25/23 – July Committee Mtg.
 8/22/23 – August Committee Mtg.
 9/26/23 – September Committee Mtg.
 10/24/23 – October Committee Mtg.
 11/28/23 – November Committee Mtg.
 12/21/23 – December Committee Mtg.

Voting Committee Members:

Edwin Denson (Chair), Executive Director/Chief Investment Officer
Anne-Marie Fink, Private Markets & Funds Alpha–CIO
Stefano Cavaglia, Senior Portfolio Manager–Asset & Risk Allocation
Derek Drummond, Head of Funds Alpha
Diane Linn, Senior Portfolio Manager–Multi-Asset Strategies
Lin Maung, Senior Portfolio Manager–Private Equity
Jason Rector, Portfolio Manager–Funds Alpha
Mike Shearer, Head of Fixed Income Strategies
Nick Stanton, Head of Multi-Asset Strategies
Ivy Zhang, Senior Portfolio Manager–Asset & Risk Allocation

Non-voting Committee Members

Rochelle Klaskin, Deputy Executive Director/CAO
Sara Chandler (Secretary), Chief Legal Counsel
Hassan Chehime, Head of Risk Management

AGENDA / NOTICE

Name of Meeting: Staff Investment Committee Meeting
Date/Time: Thursday, December 15, 2022 1:00 pm
Room: Presentation Room – 1st Floor
Address: 121 E. Wilson St., Madison WI 53703

Est. Time Minutes	Action Item	Topic	Presenter
		OPEN SESSION	
	Motion	1. Approval of the Minutes – Open Session A. November 22, 2022	
5		2. Private Markets & Funds Alpha Division Update	Anne-Marie Fink
30		3. Q3 2022 Quarterly Updates A. Private Equity B. Real Estate C. Private Debt	Scott Parrish Jason Rothenberg Chris Prestigiacomo
	Motion	CLOSED SESSION*	
	Motion	RECONVENE IN OPEN SESSION	
		4. Announcement of Committee Actions Relating to Items Taken Up in Closed Session	
10		5. Transition Update (Q3 2022)	Joe Roth
		6. Soft Risk Parameters (No presentation unless requested)	
		7. Future Meeting Topics	
	Motion	8. Motion to Adjourn	
		<p><i>NOTES: Items may be taken in order other than listed.</i></p> <p><i>The meeting site is physical accessible. Upon prior request, reasonable accommodations will be provided.</i></p>	

* A motion to go into closed session at this meeting is authorized pursuant to sections 19.85(1)(e) and 19.36(5) of the Wisconsin Statutes (a) to consider confidential strategies for the investment of public funds, including (i) the review of active risk profiles of portfolio investments and the Core and Variable Trust Funds, and (ii) the review of specific proprietary investment strategies and investment instruments related to private equity, real estate, private debt, venture capital, and exposure management, and (b) to discuss and approve prior closed session minutes that discuss the same. The Committee may convene in additional closed sessions or announce additional closed session items at the meeting in accordance with the procedure outlined in the Attorney General's Opinion reported at 66 OAG 106 (1977). Whenever a closed session is held, the committee will subsequently reconvene in open session to cover remaining agenda items.

Future Meetings

1/24/23 – January Committee Mtg.
 2/23/23 – February Committee Mtg.
 3/28/23 – March Committee Mtg.
 4/25/23 – April Committee Mtg.
 5/23/23 – May Committee Mtg.
 6/27-23 – June Committee Mtg.
 7/25/23 – July Committee Mtg.
 8/22/23 – August Committee Mtg.
 9/26/23 – September Committee Mtg.
 10/24/23 – October Committee Mtg.
 11/28/23 – November Committee Mtg.
 12/21/23 – December Committee Mtg.

Voting Committee Members:

Edwin Denson (Chair), Executive Director/Chief Investment Officer
Anne-Marie Fink, Private Markets & Funds Alpha–CIO
Stefano Cavaglia, Senior Portfolio Manager–Asset & Risk Allocation
Derek Drummond, Head of Funds Alpha
Diane Linn, Senior Portfolio Manager–Multi-Asset Strategies
Lin Maung, Senior Portfolio Manager–Private Equity
Jason Rector, Portfolio Manager–Funds Alpha
Mike Shearer, Head of Fixed Income Strategies
Nick Stanton, Head of Multi-Asset Strategies
Ivy Zhang, Senior Portfolio Manager–Asset & Risk Allocation

Non-voting Committee Members

Rochelle Klaskin, Deputy Executive Director/CAO
Sara Chandler (Secretary), Chief Legal Counsel
Hassan Chehime, Head of Risk Management

Name of Meeting: Staff Investment Committee Meeting
Date/Time: Tuesday, January 24, 2023 1:00 pm
Room: Presentation Room – 1st Floor
Address: 121 E. Wilson St., Madison WI 53703

Est. Time Minutes	Action Item	Topic	Presenter
		OPEN SESSION	
	Motion	1. Approval of the Minutes – Open Session A. December 15, 2022	
5	Motion	2. Amendments to SWIB Investment Committee Charter	Sara Chandler
20		3. Q4 2022 Quarterly Updates	Mike Shearer Nick Stanton
	Motion	CLOSED SESSION*	
	Motion	RECONVENE IN OPEN SESSION	
		4. Announcement of Committee Actions Relating to Items Taken Up in Closed Session	
		5. Soft Risk Parameters (No presentation unless requested)	
		6. Future Meeting Topics	
	Motion	7. Motion to Adjourn	
		<p><i>NOTES: Items may be taken in order other than listed.</i></p> <p><i>The meeting site is physical accessible. Upon prior request, reasonable accommodations will be provided.</i></p>	

* A motion to go into closed session at this meeting is authorized pursuant to sections 19.85(1)(e) and 19.36(5) of the Wisconsin Statutes (a) to consider confidential strategies for the investment of public funds, including (i) the review of active risk profiles of portfolio investments and the Core and Variable Trust Funds and (ii) the review of specific proprietary investment strategies and investment instruments related to short-term credit, investment grade and non-investment grade fixed income, multi-asset and exposure management, and (b) to discuss and approve prior closed session minutes that discuss the same. The Committee may convene in additional closed sessions or announce additional closed session items at the meeting in accordance with the procedure outlined in the Attorney General's Opinion reported at 66 OAG 106 (1977). Whenever a closed session is held, the committee will subsequently reconvene in open session to cover remaining agenda items.

Future Meetings

2/23/23 – February Committee Mtg.
 3/28/23 – March Committee Mtg.
 4/25/23 – April Committee Mtg.
 5/23/23 – May Committee Mtg.
 6/27-23 – June Committee Mtg.
 7/25/23 – July Committee Mtg.
 8/22/23 – August Committee Mtg.
 9/26/23 – September Committee Mtg.
 10/24/23 – October Committee Mtg.
 11/28/23 – November Committee Mtg.
 12/21/23 – December Committee Mtg.

Voting Committee Members:

Edwin Denson (Chair), Executive Director/Chief Investment Officer
Anne-Marie Fink, Private Markets & Funds Alpha–CIO
Stefano Cavaglia, Senior Portfolio Manager–Asset & Risk Allocation
Derek Drummond, Head of Funds Alpha
Diane Linn, Senior Portfolio Manager–Multi-Asset Strategies
Lin Maung, Senior Portfolio Manager–Private Equity
Jason Rector, Portfolio Manager–Funds Alpha
Mike Shearer, Head of Fixed Income Strategies
Nick Stanton, Head of Multi-Asset Strategies
Ivy Zhang, Senior Portfolio Manager–Asset & Risk Allocation

Non-voting Committee Members

Rochelle Klaskin, Deputy Executive Director/CAO
Sara Chandler (Secretary), Chief Legal Counsel
Hassan Chehime, Head of Risk Management

Board Meeting

Tab 7 – Quarterly Investment Update, Q3 2022



Quarterly Investment Update

Board Meeting

December 14, 2022

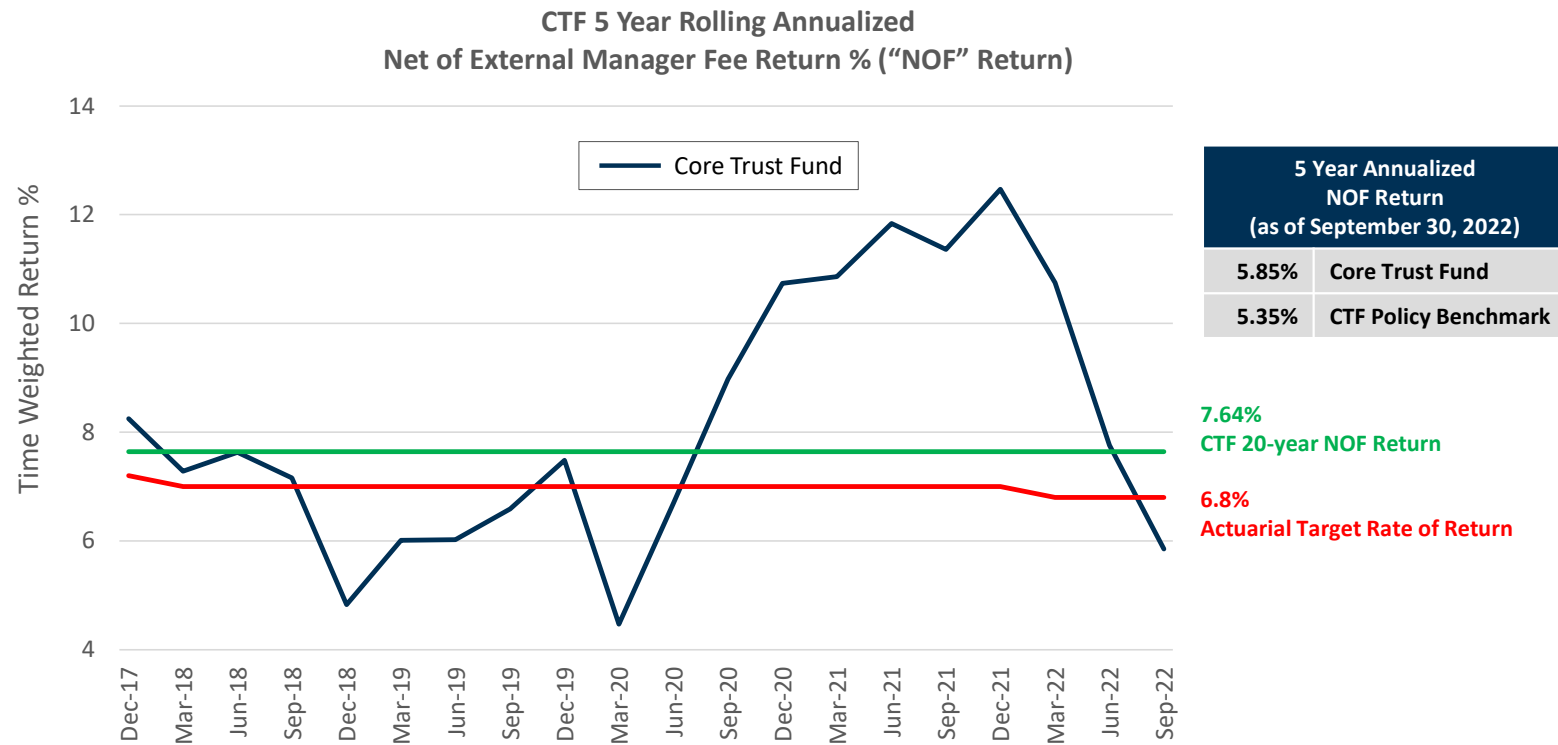
STATE OF WISCONSIN
INVESTMENT BOARD

Performance Trends & Outlook

2

CTF 5 Year Rolling Return Trend

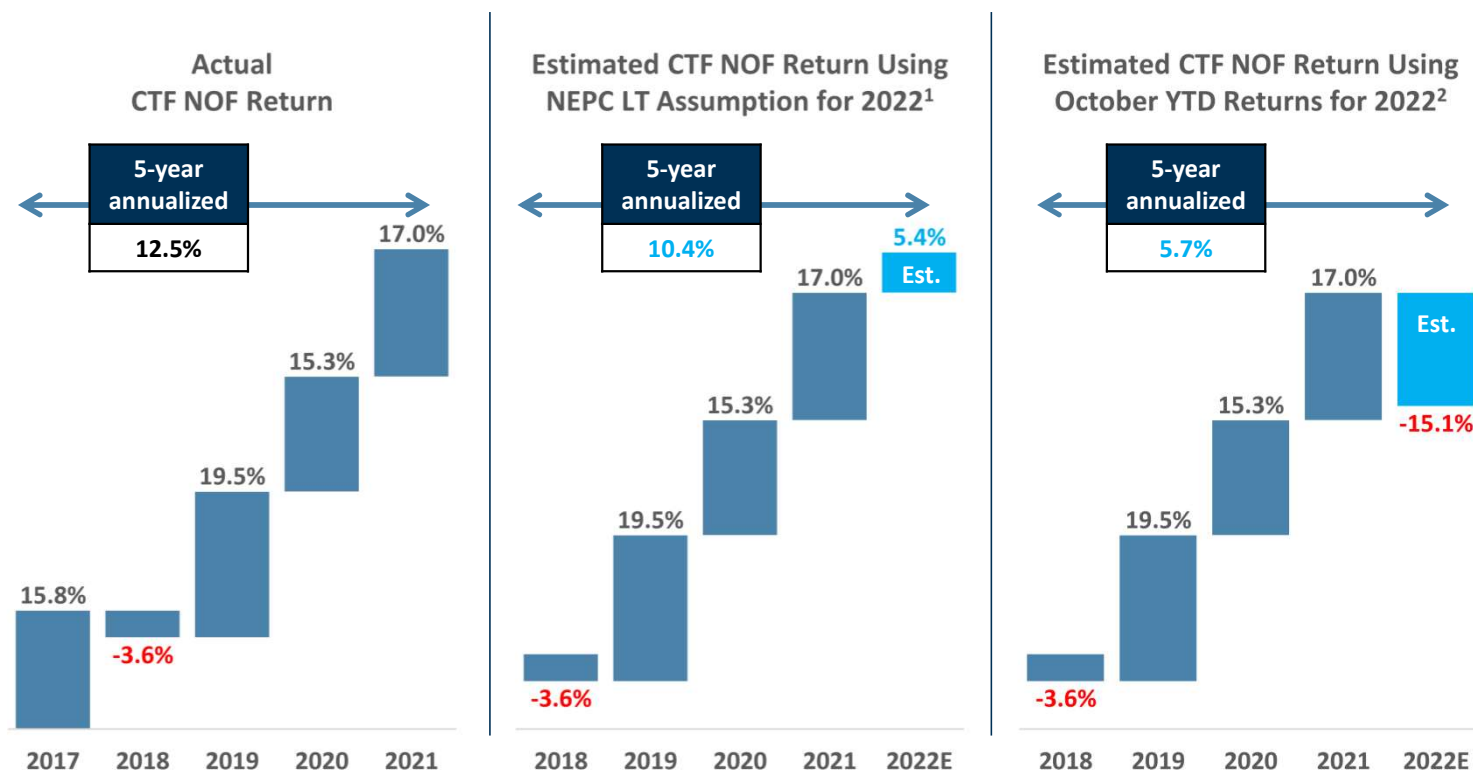
Quarter-end Results Through September 30, 2022



3

CTF 5-year Return Estimate

Calendar year and 5-year annualized returns



¹ The NEPC 10-year expected return assumption is used to estimate 2022

² October 2022 return is Preliminary

CTF Policy Benchmark & Other Indices

Equity and Fixed Income asset classes declined severely this year

October 31, 2022: Total Rate of Return %, Annualized					
Index Name (Gross Return Basis, unless noted)	YTD	1yr	5yr	10yr	10yr volatility
CTF Policy Benchmark (Gross)	(15.3)	(13.6)	5.9	7.0	8.3
MSCI USA	(18.8)	(16.5)	10.4	12.7	14.7
MSCI USA Small Cap	(15.4)	(16.3)	7.3	11.2	18.3
MSCI World ex US Equities	(22.2)	(22.0)	0.4	4.1	14.5
MSCI World ex US Equities (Local)	(9.6)	(8.1)	3.6	7.8	12.1
MSCI EAFE Small Cap	(28.9)	(30.0)	(0.9)	6.0	15.9
MSCI Emerging Markets ex China	(22.5)	(21.5)	0.7		
MSCI China	(42.7)	(47.8)	(9.5)	0.1	20.6
MSCI ACWI	(20.8)	(19.6)	5.8	8.5	14.1
MSCI ACWI (Local)	(16.7)	(15.0)	7.0	10.2	12.9
Bloomberg US Gov't / Credit	(16.2)	(16.0)	(0.3)	0.9	4.3
ICE BOFA High Yield BB/B	(11.8)	(10.9)	2.1	4.0	7.1
Bloomberg U.S. TIPS	(12.5)	(11.5)	2.2	1.0	5.1

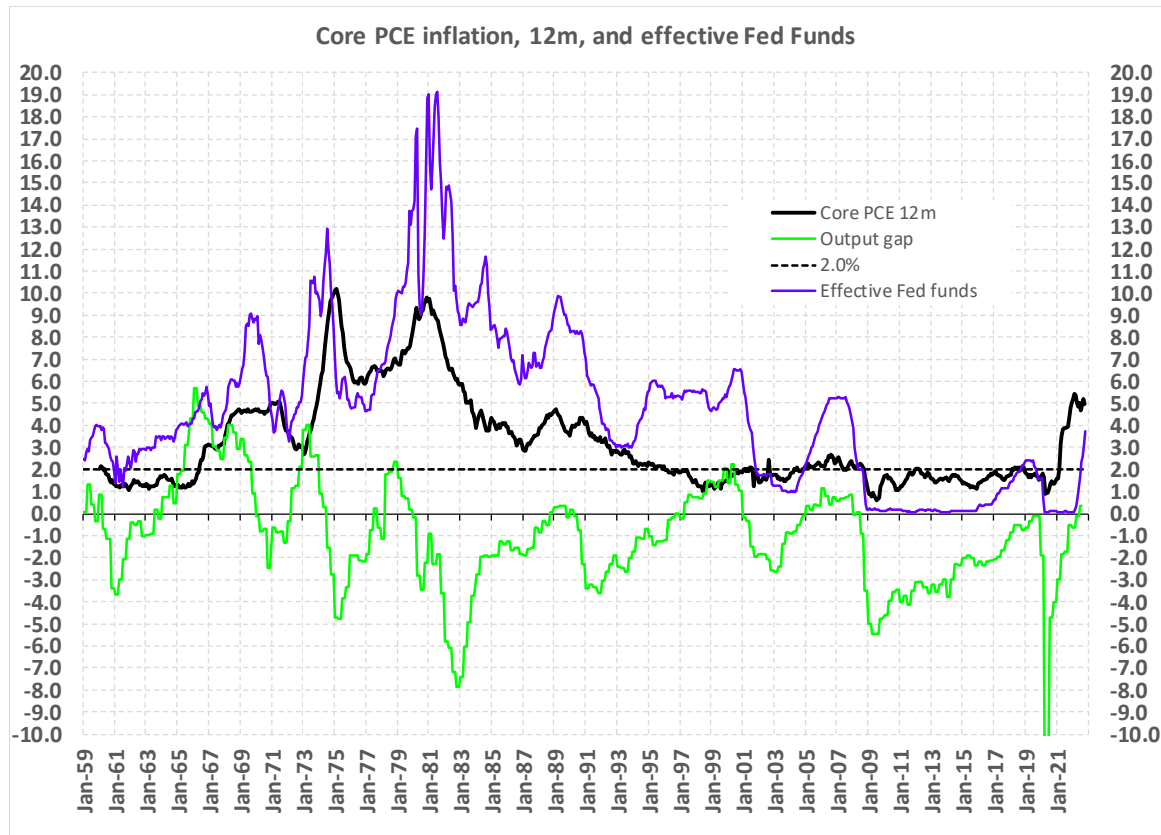
Source: Factset, SWIB

Economic Update

Inflation & Growth Outlook



Inflation is likely peaking, but is way above the Fed's 2.0% target

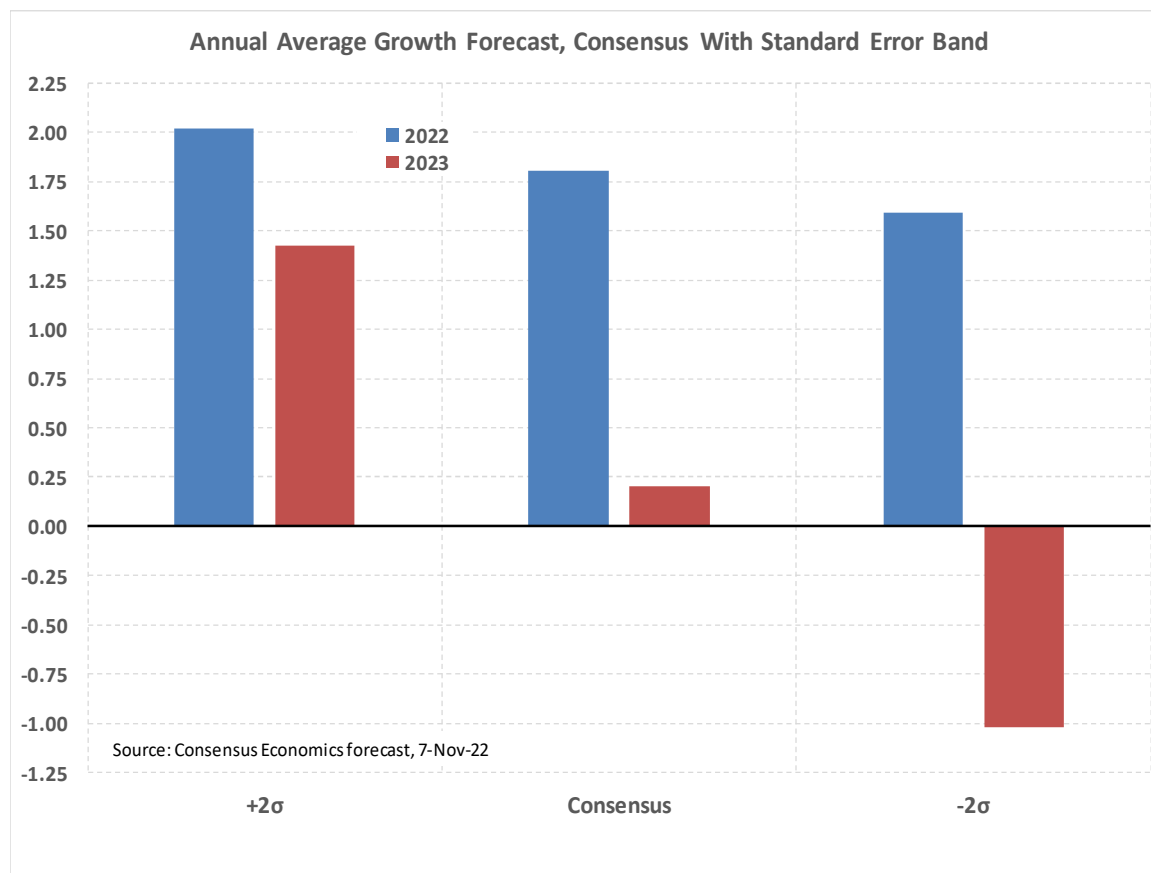


- Bringing high inflation down always involves central bank tightening.
- Higher interest rates moderate demand growth in the economy to below the “potential” or supply-side rate of economic growth (the rate consistent with not straining supplies of labor and capital).
- The green “output gap” at left captures periods where demand outruns supply (positive) and where demand growth is below supply growth (negative).
- Notable periods of negative output gaps are the Volcker disinflation of '81-'83, the recessions of '91 and '01, and the global financial crisis of '08-'09.
- The Fed is intent on lowering inflation from its current unacceptably high rate.
- This will require slowing demand growth and creating a negative output gap.

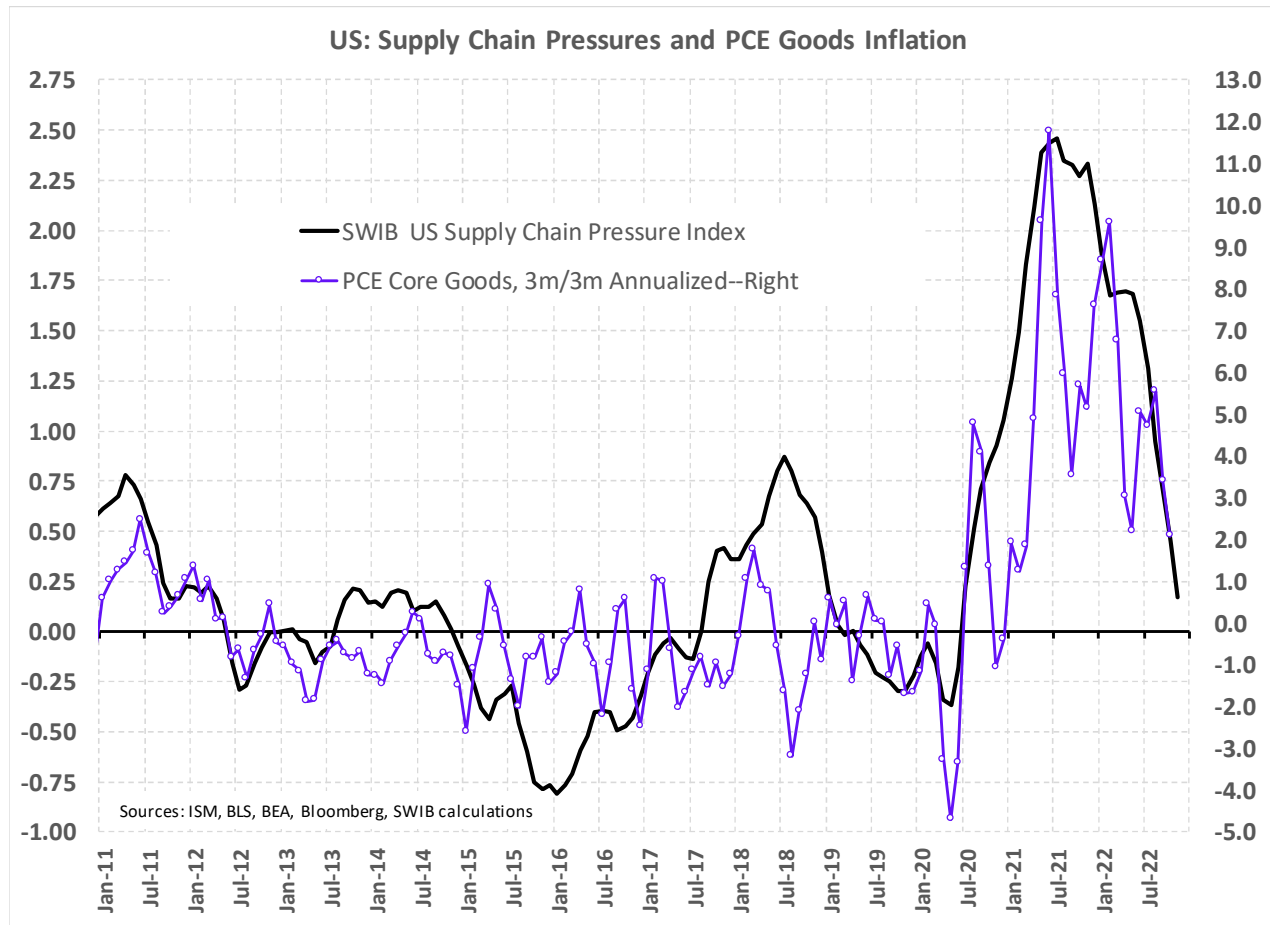
SWIB outlook is for moderating inflation, but at a slower pace than consensus, or (stale) FOMC SEP

Core PCE Outlook	Wgt	Y/Y Actual			Y/Y Forecast			Contribs to change				
		Mar-22	Jun-22	Oct-22	Dec-22	Dec-23	Dec-24	Jun-22	Oct-22	Dec-22	Dec-23	Dec-24
Core PCE	100.0%	5.4	5.0	5.0	4.9	3.6	2.9	-0.33	-0.05	-0.13	-1.28	-0.69
New motor vehicles	2.4%	12.3	11.2	8.3	8.0	5.5	3.5	-0.03	-0.07	-0.01	-0.06	-0.05
Used motor vehicles	1.7%	35.2	7.6	2.1	-2.0	2.0	2.0	-0.48	-0.10	-0.07	0.07	0.00
Other durable goods	10.3%	5.2	4.9	2.0	3.8	3.0	2.5	-0.03	-0.17	0.05	-0.08	-0.05
Core nondurables	13.0%	4.6	5.1	5.3	5.5	3.5	2.0	0.07	0.01	0.03	-0.26	-0.20
Housing	16.8%	4.5	5.6	7.0	7.2	6.0	5.3	0.17	0.25	0.03	-0.20	-0.12
Core utilities	0.8%	4.0	4.5	4.8	6.0	3.5	3.5	0.00	0.00	0.01	-0.02	0.00
Health care	17.9%	2.0	2.6	2.8	2.7	2.5	2.5	0.11	0.03	-0.02	-0.04	0.00
Motor vehicle rental	0.2%	23.4	-7.7	-3.5	0.0	0.0	1.0	-0.05	0.01	0.01	0.00	0.00
Air transportation	1.0%	30.4	31.1	33.7	20.0	10.0	3.5	0.04	0.05	-0.14	-0.10	-0.06
Other transp services	2.4%	4.3	6.9	10.3	7.0	2.5	2.5	0.06	0.08	-0.08	-0.11	0.00
Food services	6.9%	7.2	7.8	8.1	7.9	4.5	2.5	0.05	0.03	-0.01	-0.24	-0.14
Accommodation	1.2%	22.0	8.9	5.5	5.0	3.5	2.5	-0.13	-0.04	-0.01	-0.02	-0.01
Education services	2.1%	1.9	2.2	2.2	2.5	2.2	2.2	0.01	0.00	0.01	-0.01	0.00
Financial & insurance	8.7%	1.9	0.5	-0.2	1.5	2.0	2.5	-0.13	-0.06	0.15	0.04	0.04
Other household svcs	11.2%	4.4	4.8	4.5	4.3	3.0	2.2	0.06	-0.03	-0.02	-0.15	-0.09
Non-profit consumption	3.4%	12.8	10.4	9.1	6.0	2.5	2.0	-0.07	-0.04	-0.11	-0.12	-0.02
Core PCE forecasts		Mar-22	Jun-22	Oct-22	Dec-22	Dec-23	Dec-24					
SWIB		5.4	5.0	5.0	4.9	3.6	2.9					
FOMC SEP 21-Sep-22		5.4	5.0	5.0	4.5	3.1	2.3					
BBG Consensus 1-Dec-22		5.4	5.0	5.0	4.8	3.0	--					

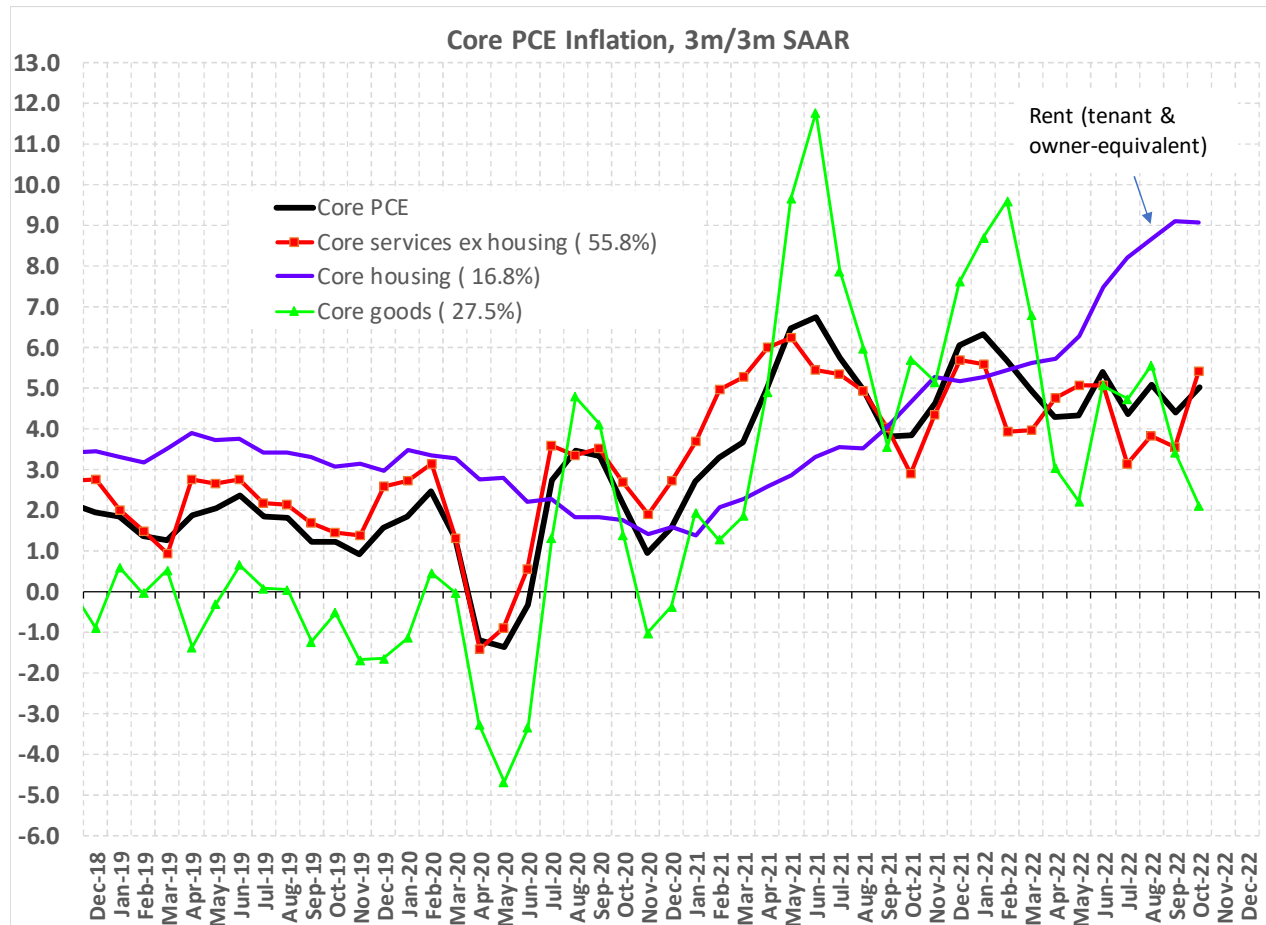
Consensus sees sharply slower real growth in 2023, with outright contraction a live possibility



Supply-chain pressures and goods price inflation have eased, but are still high relative to 2010's



Goods inflation seeing lower peaks and troughs, but services inflation still high, especially housing

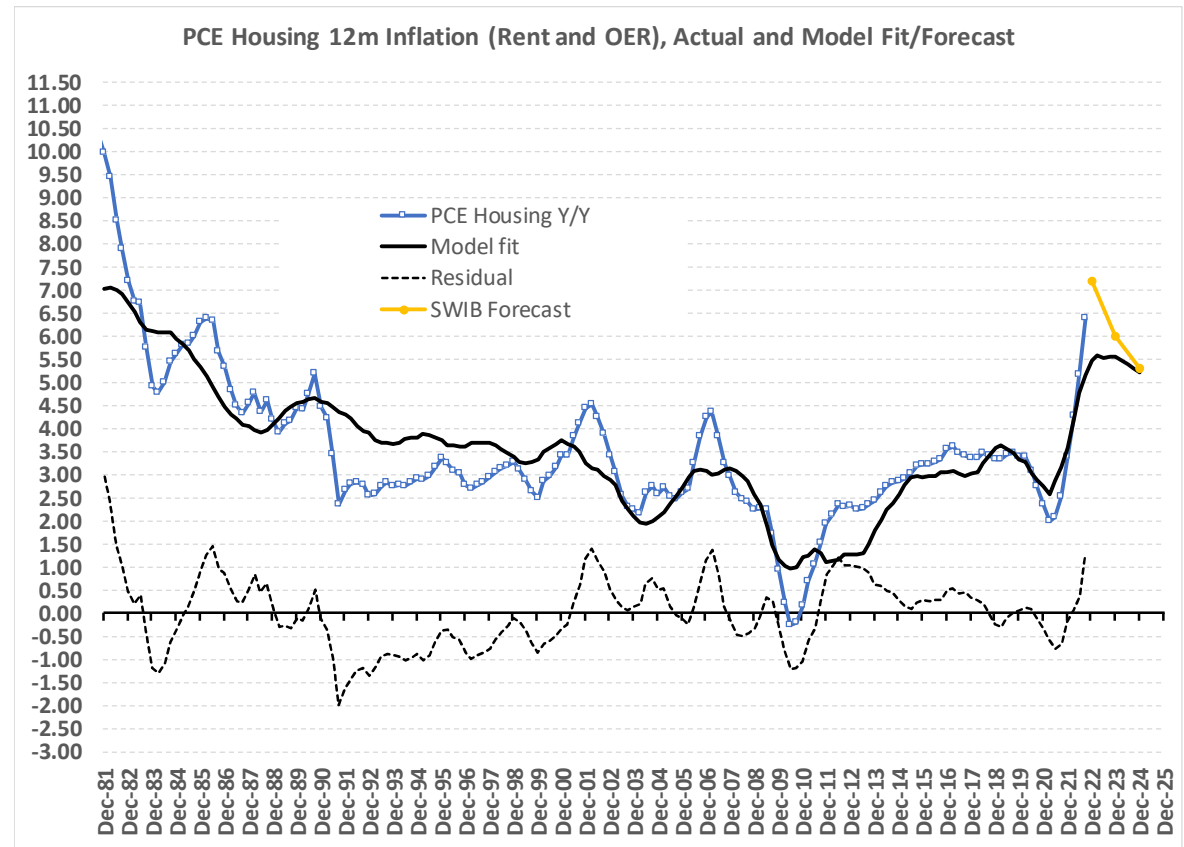


- Services ex housing are labor-intensive and the majority of personal consumption.
- While on this measure inflation is below its last two peaks, it remains worryingly high, reflecting a still-strong labor market and nominal wage pressures.
- Housing inflation (tenant rent, owner-equivalent rent) is at a 40-year high.

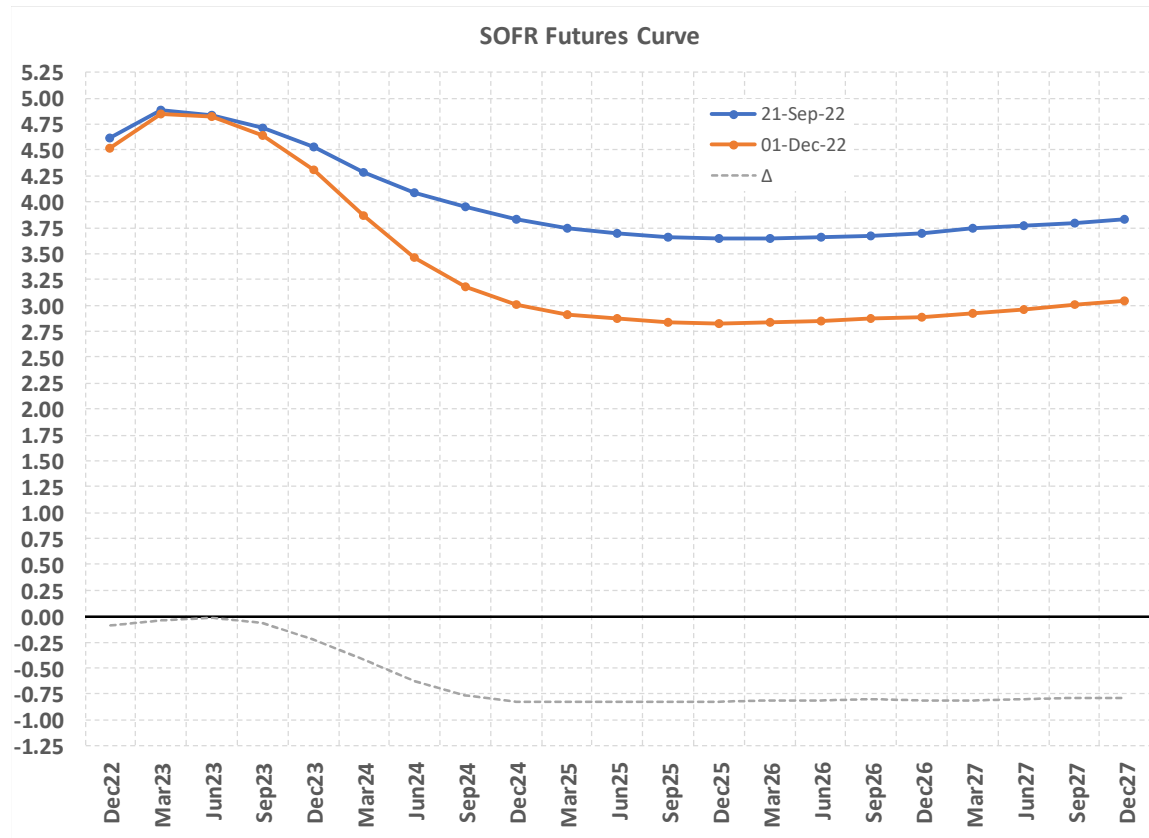
12

Rent inflation is high, and likely to stay high in the next two years

- Rental inflation pickup has been sharp.
- High-priced housing is unaffordable for many potential buyers, forcing them to rent.
- The rental vacancy rate is now at a 40-year low.
- However, a period of slower house price appreciation is ahead, with outright declines quite possible.
- Improved housing affordability should help cap rental inflation. This process will take time.

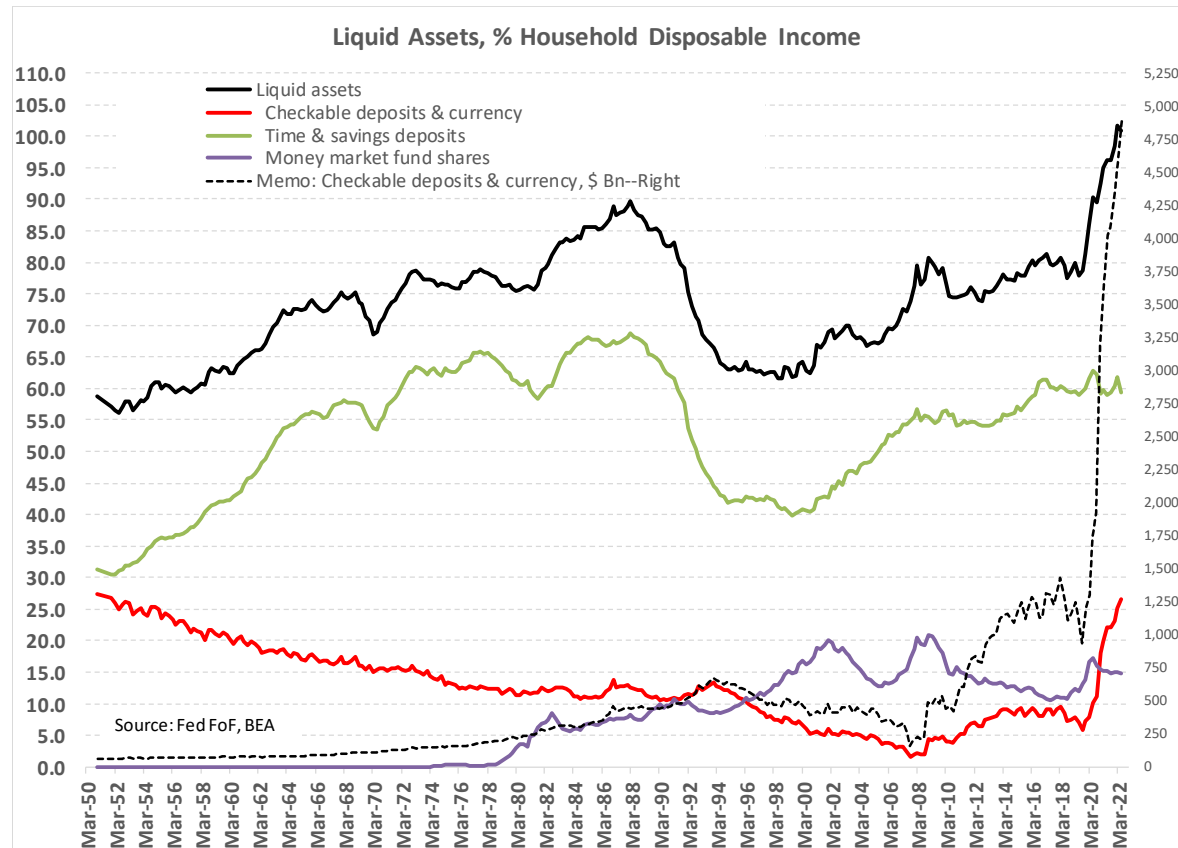


Current SOFR futures prices see Fed tightening to the same level as of last FOMC SEP on 21-Sep, but with considerably lower rates in 2024 and beyond. SWIB sees upside risk to the peak Fed Funds rate.



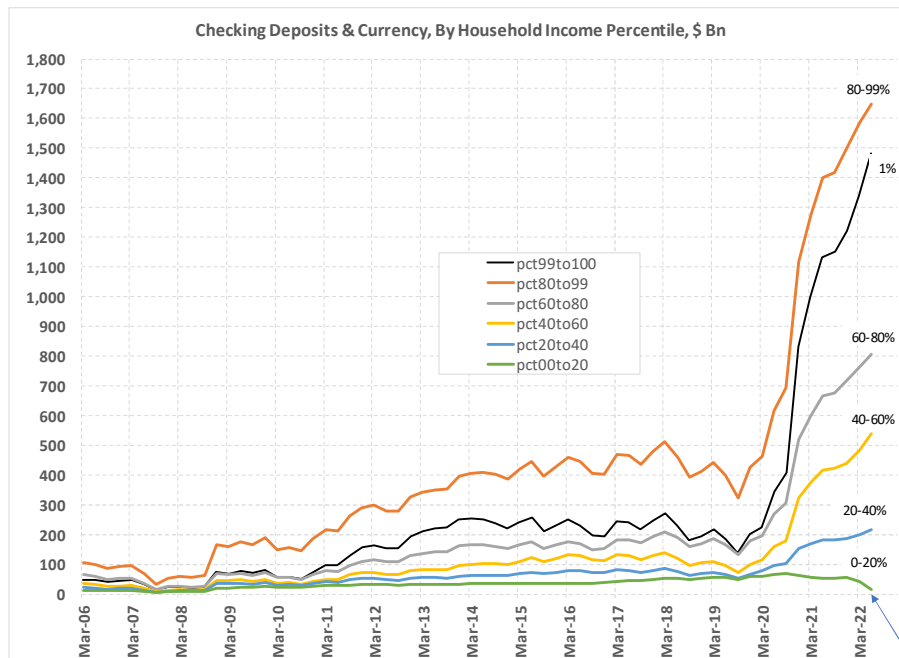
Next Fed decision (and new SEP) due on 14-Dec.

High savings rates and pandemic relief payments have left households with lots of liquid assets
Nearly \$5 trillion sitting in checking accounts & currency—a decent cushion for whatever lies ahead

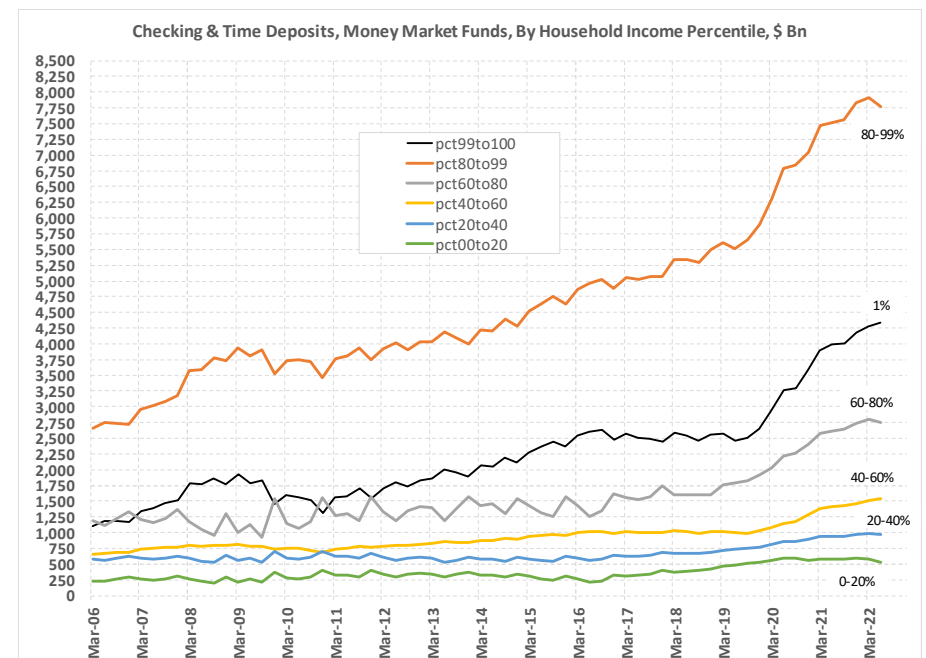


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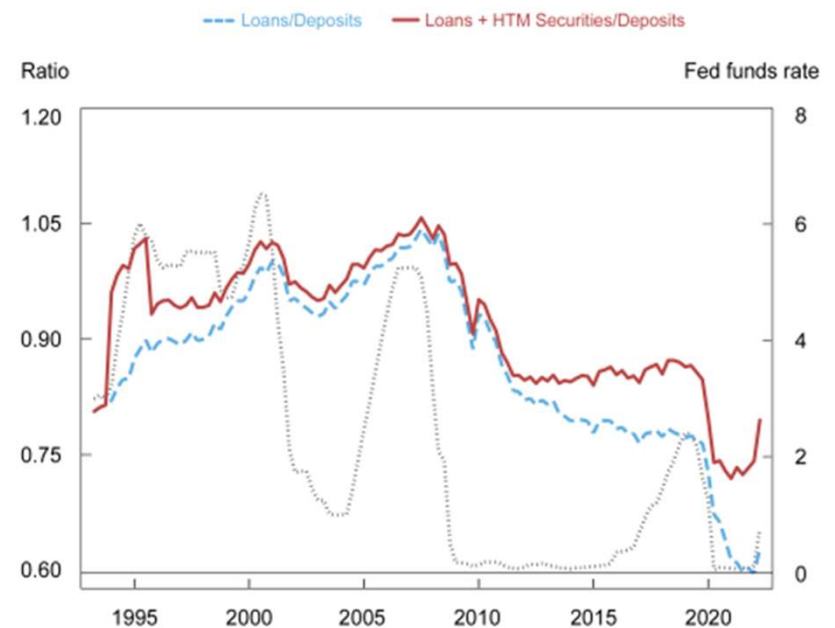
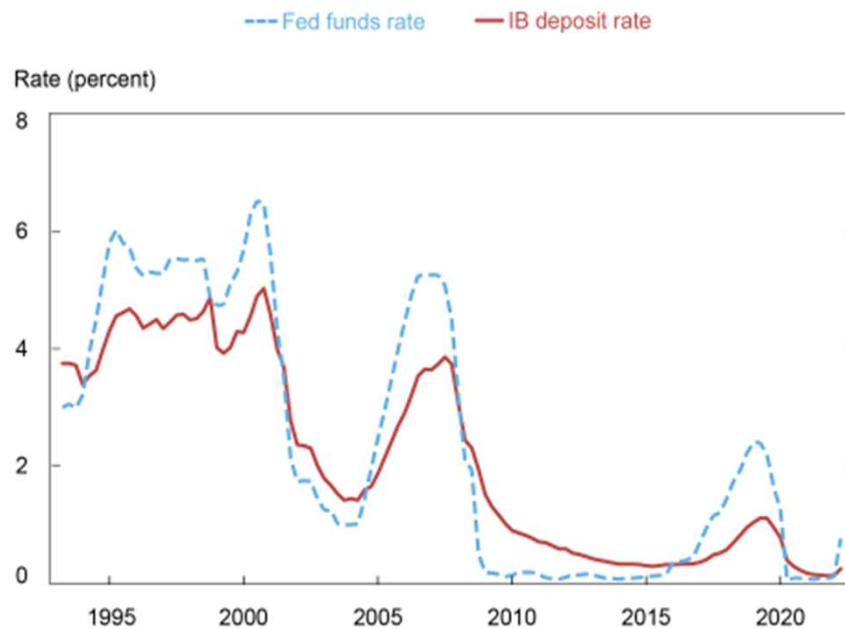
Top 80% of households by income have elevated liquid assets, but immediate liquidity (checking & currency) is low and running down for the bottom 20%--this could have implications for labor force participation



Source: Fed Distributional Financial Accounts

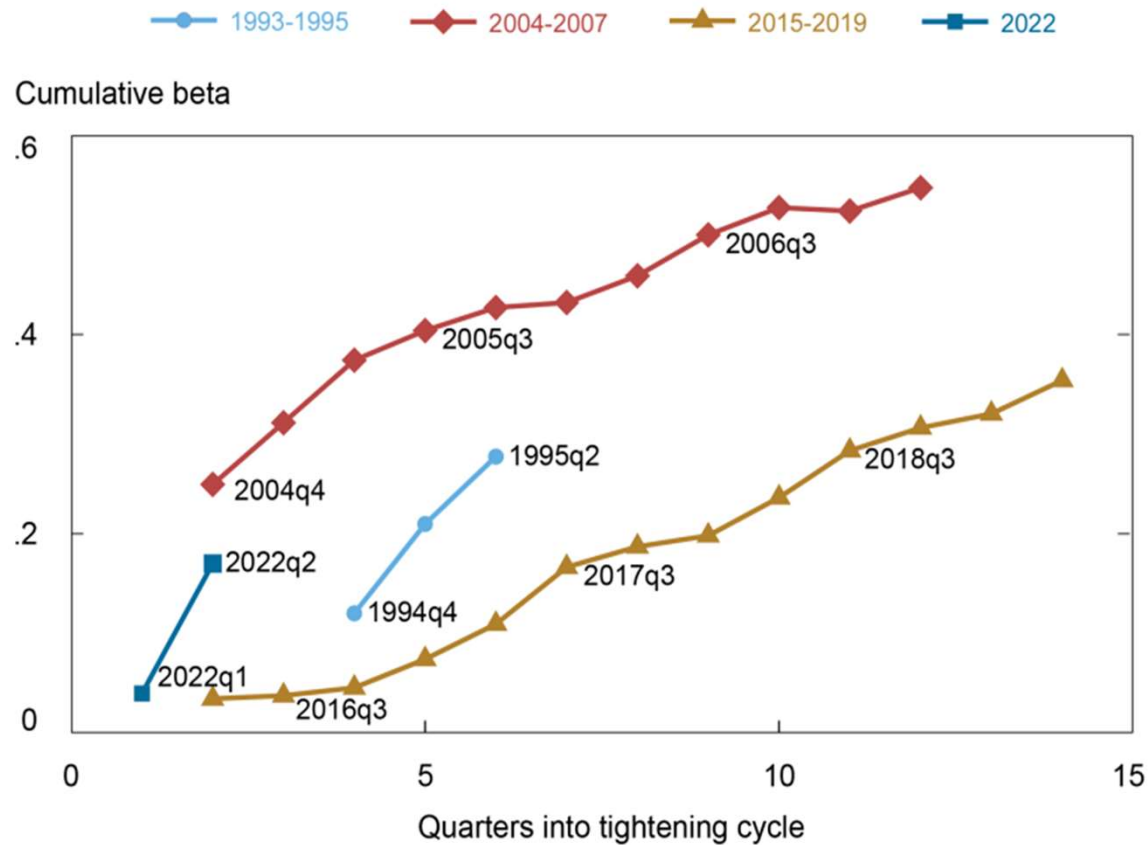


Rates paid by banks on interest-bearing deposits are likely to have low pass-through from Fed Funds increases, as loan/deposit ratios are quite low—enough deposits, relatively few long-term assets to fund



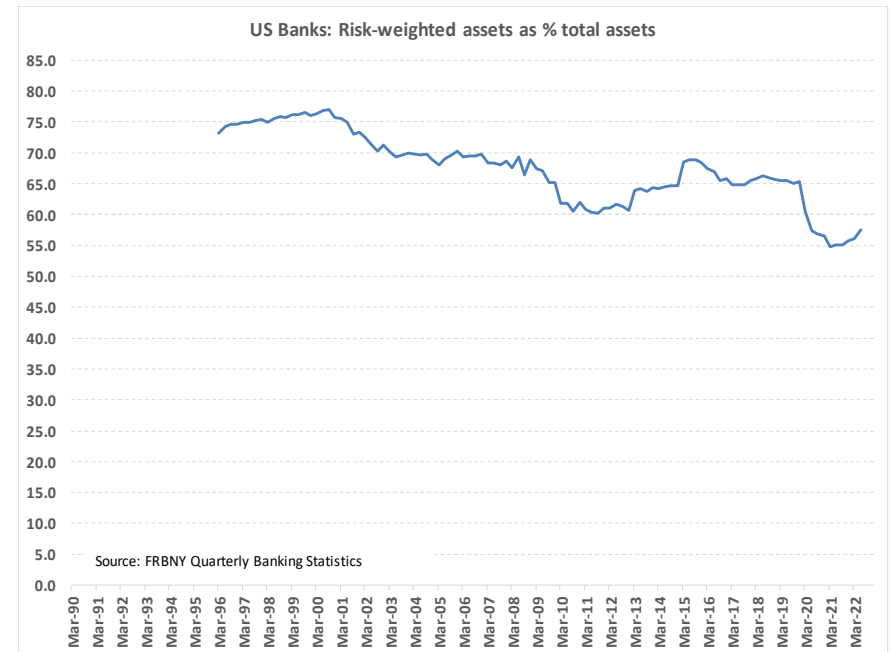
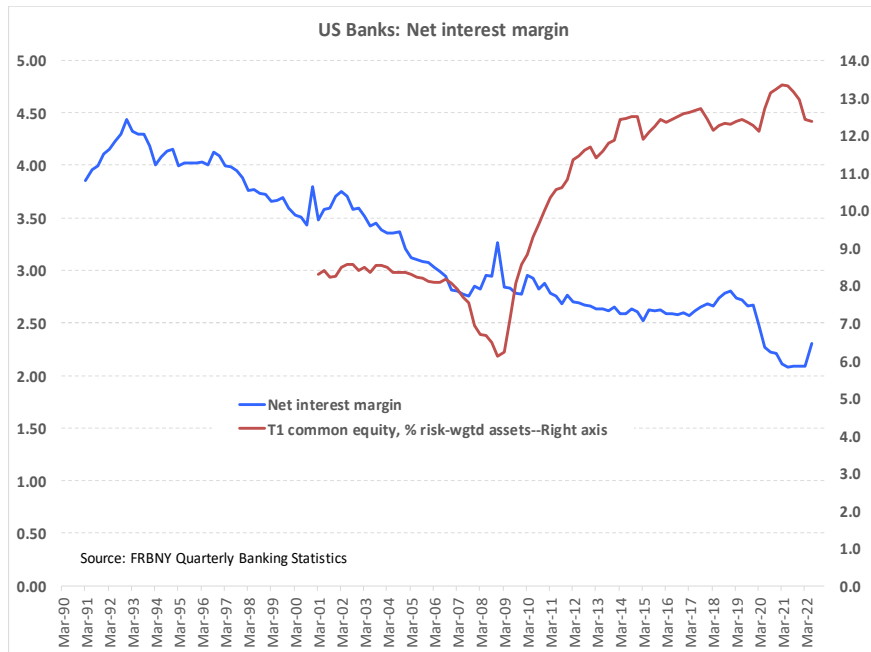
Source: Kang-Landsberg & Plosser, “How Do Deposit Rates Respond to Monetary Policy?” NY Fed, 21-Nov-22

Beta of bank deposit rates to Fed Funds rate, by tightening cycle



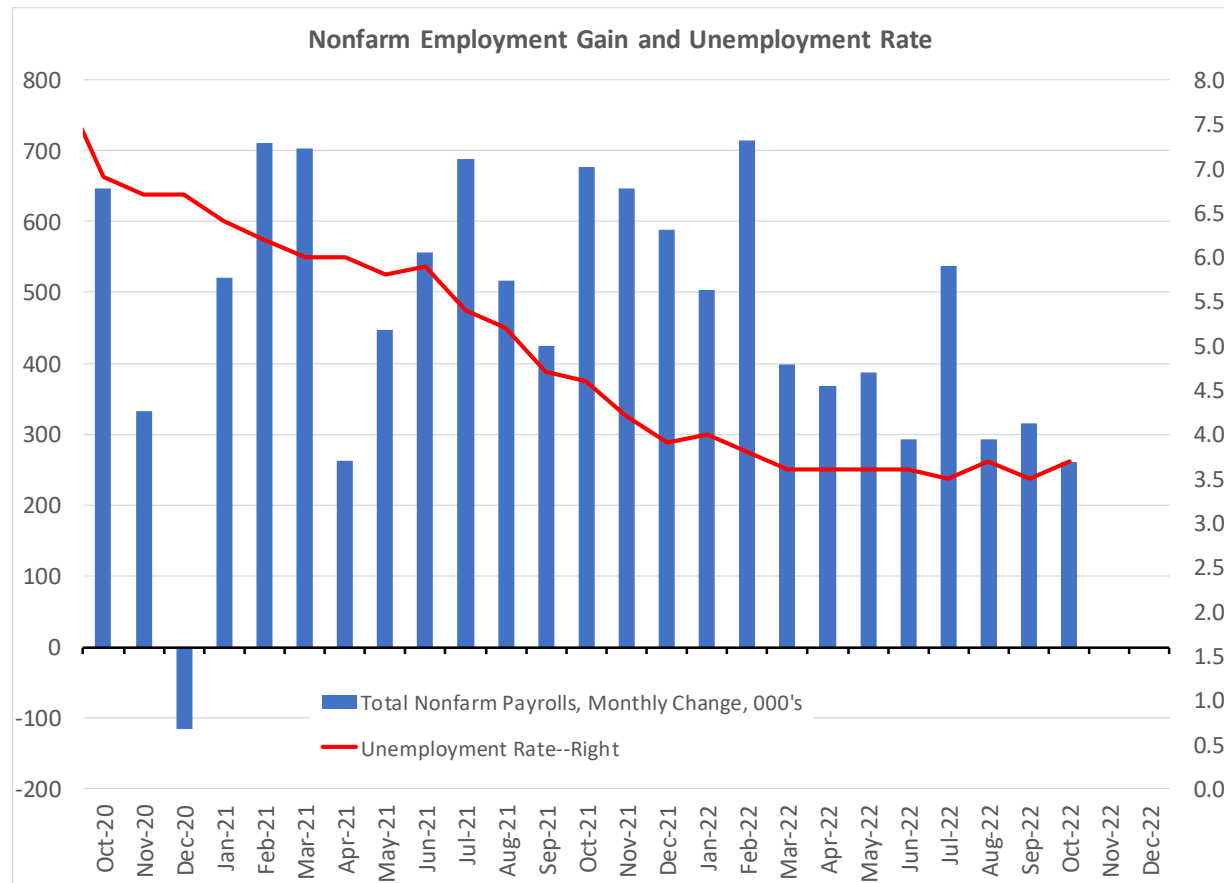
Source: Kang-Landsberg & Plosser, "How Do Deposit Rates Respond to Monetary Policy?" NY Fed, 21-Nov-22

Net interest margin—a measure of profitability of the basic banking business—is at a 30-year low. The decline has been secular, but post-GFC rules have also suppressed NIM by incentivizing banks to hold more capital and to be prudent with risky (high-interest-rate) assets.



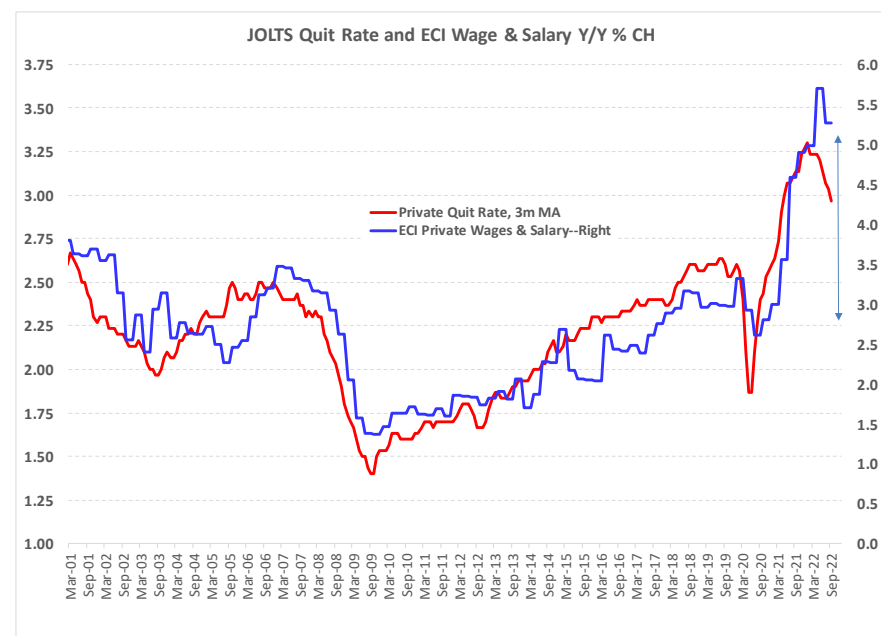
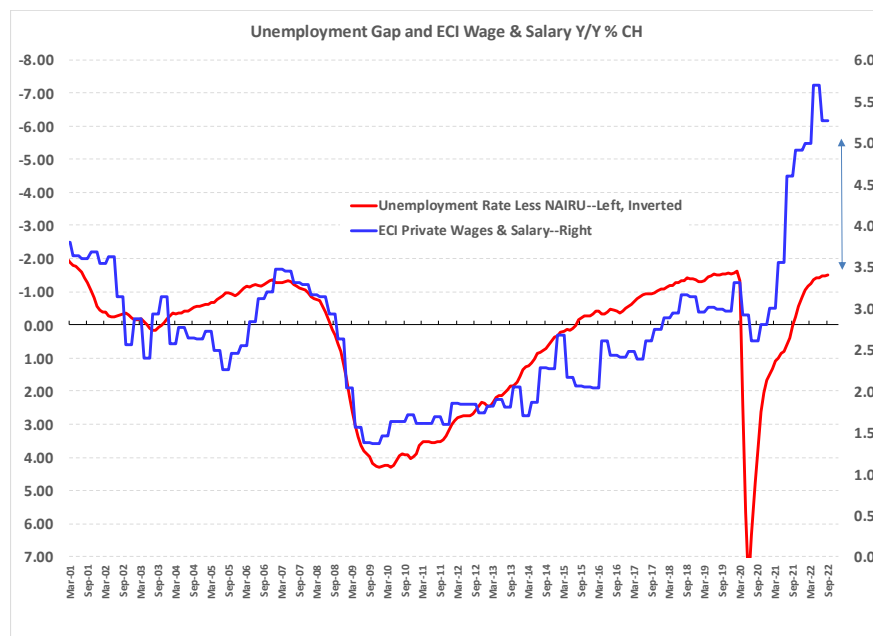
Labor Market

The labor market remains tight: it's hard to say we're (already) in recession given slowing but still sizeable employment gains and a low unemployment rate



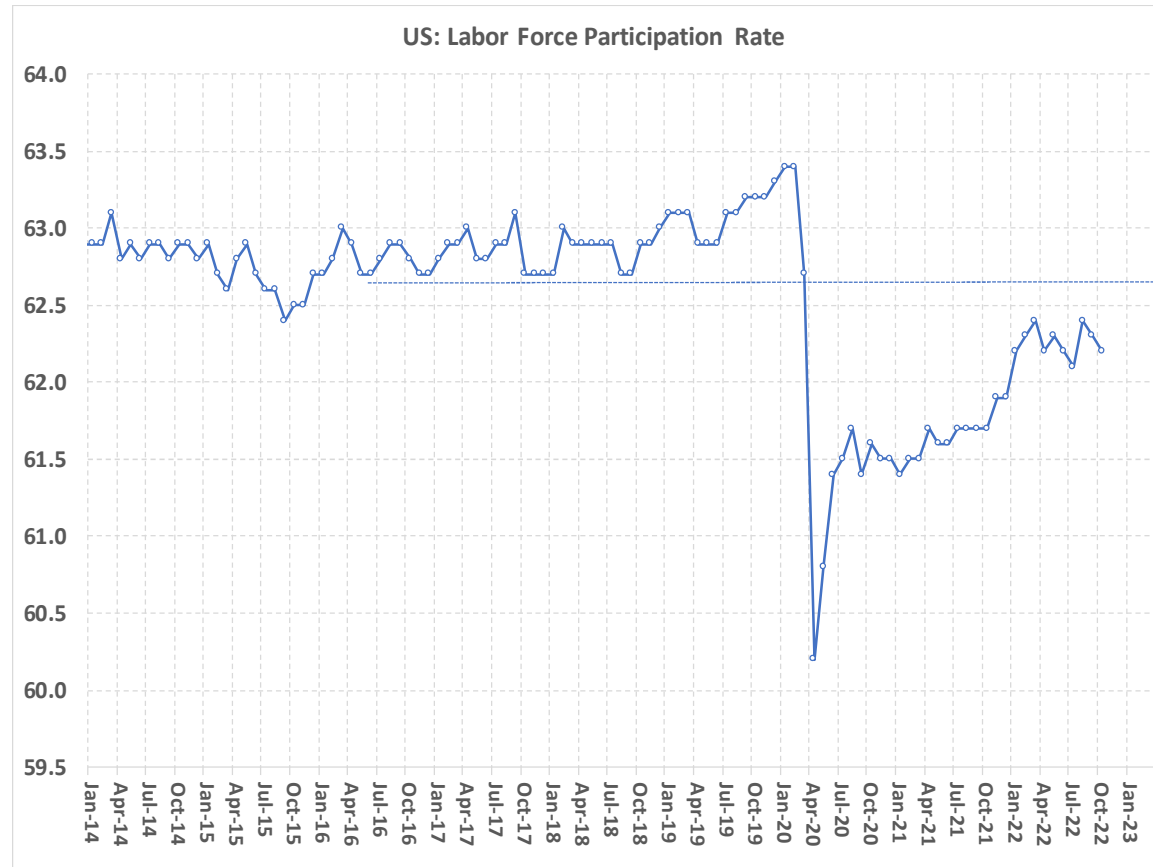
21

**Traditional wage Phillips curve can't account for current high wage inflation.
Quit rate might be the better overall indicator of labor market tightness—it is still high but falling.**



Labor force participation gains have stalled, and the rate remains below pre-pandemic levels

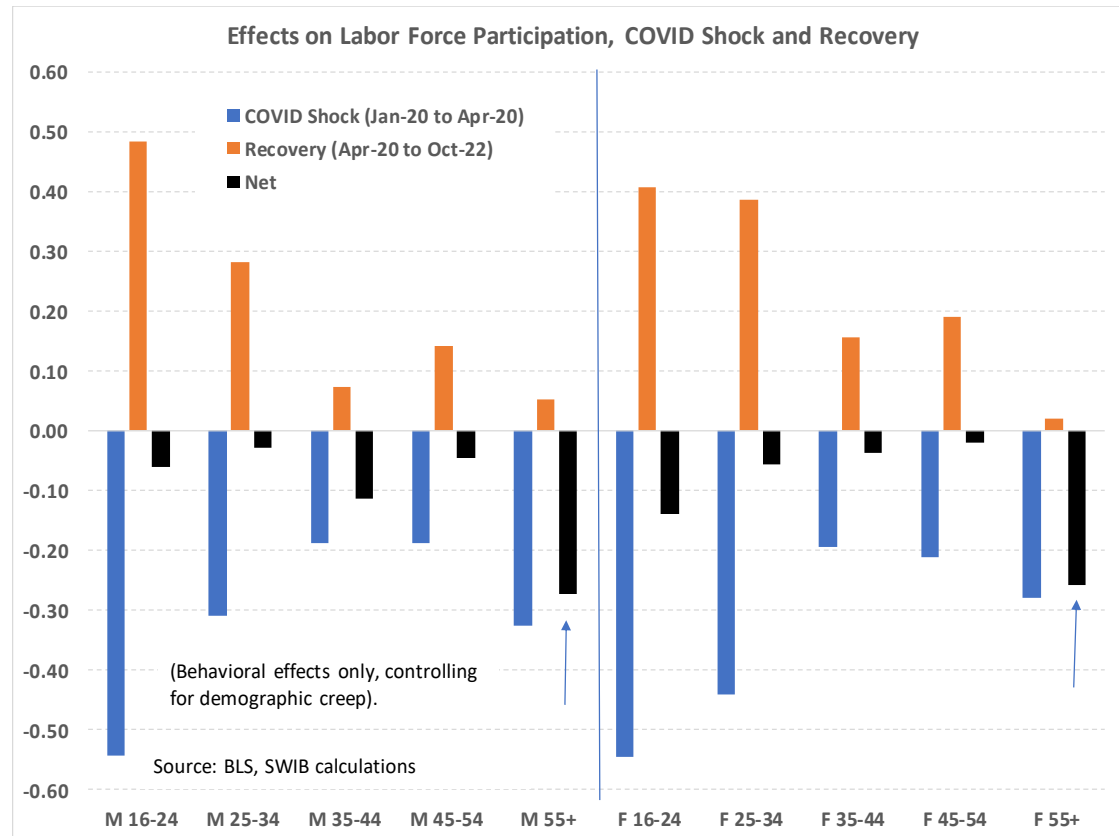
Further gains in labor supply would help moderate wage gains, but are taking time



23

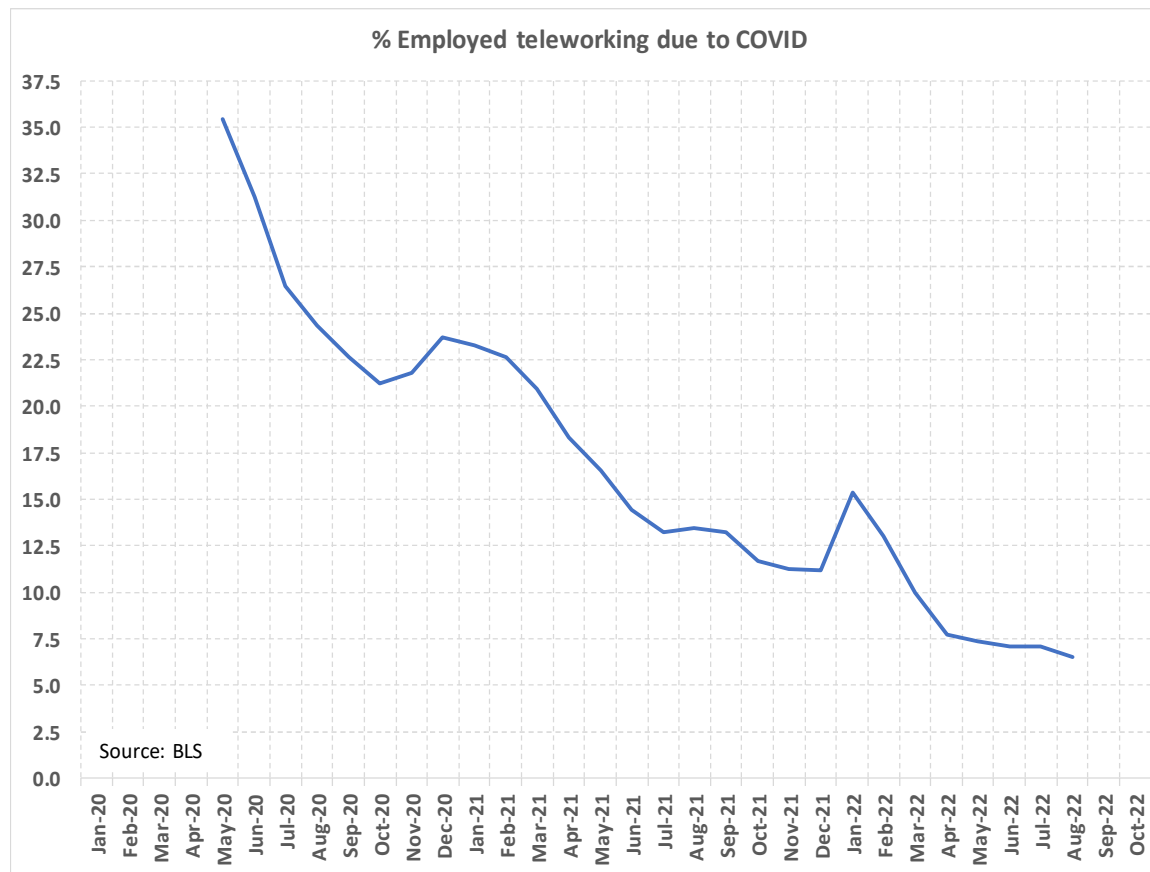
Big declines in participation across all demographic groups

Further gains in labor supply would help moderate wage gains, but are taking time



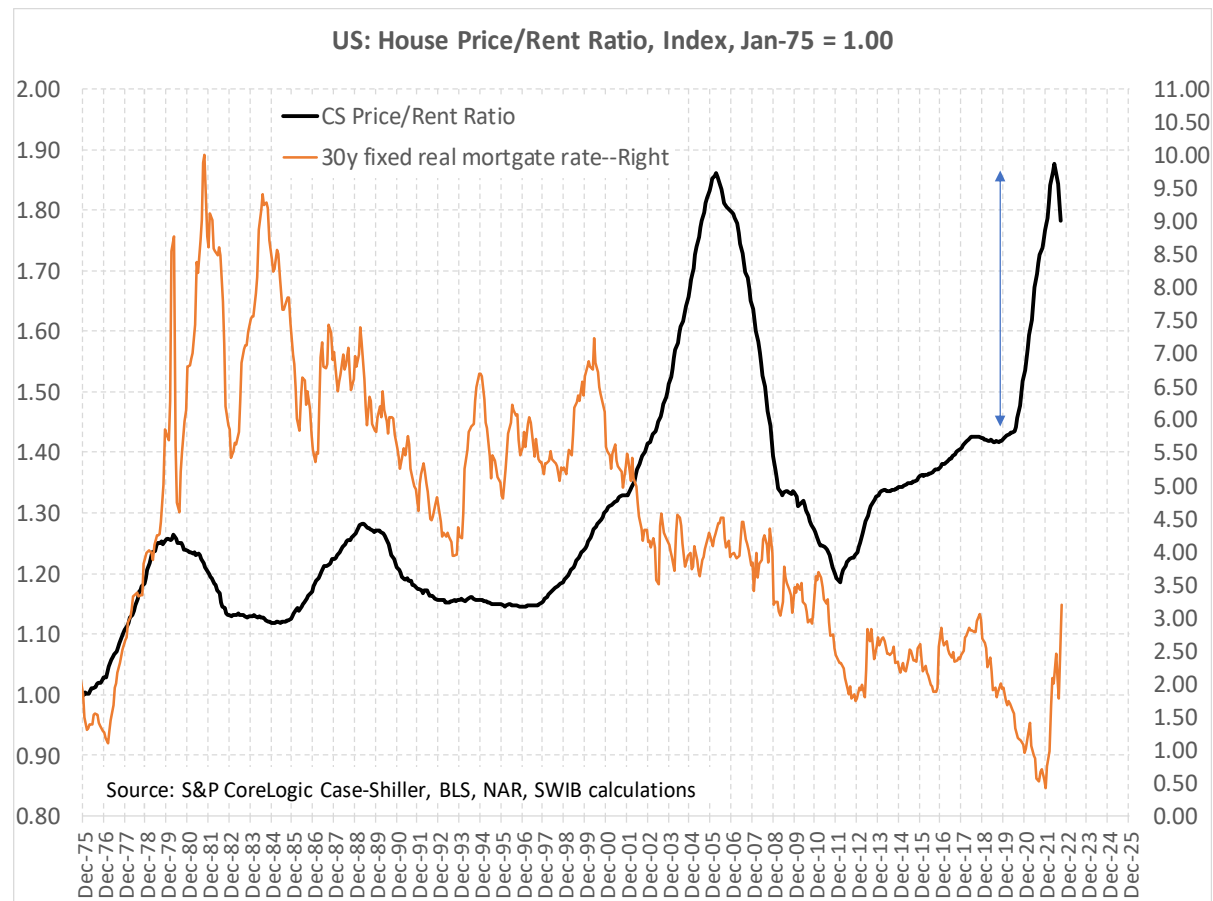
- Onset of COVID saw big drops in participation across all age and sex groups.
- The recovery since the Apr-20 participation trough has been less than complete.
- Exit of both M and F aged 55+ from the labor force (retirements, early retirements) leave overall participation 53 bp below the pre-COVID level.
- M aged 35-44 (-12 bp) and F aged 16-24 (-14 bp) are also notable in holding participation down relative to pre-COVID levels.

Rate of COVID-related remote work has fallen, but a residual 10 million workers still at it in Aug-22



Housing Market

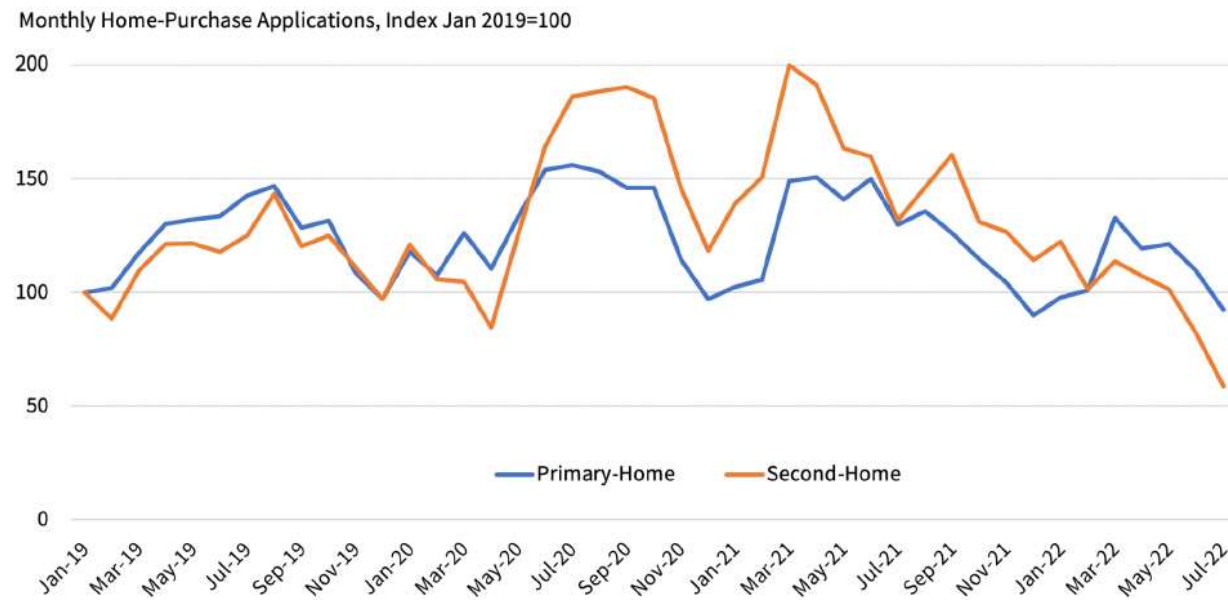
Housing market overvaluation has reached lofty 2006 levels in a (short) two-year period



- Easy monetary policy, COVID-related 2nd-home buying were two big forces behind the run-up.
- Both forces are in reverse now, portending a correction of current extreme over-valuation.

COVID-related demand for 2nd homes was notable, but is now in decline

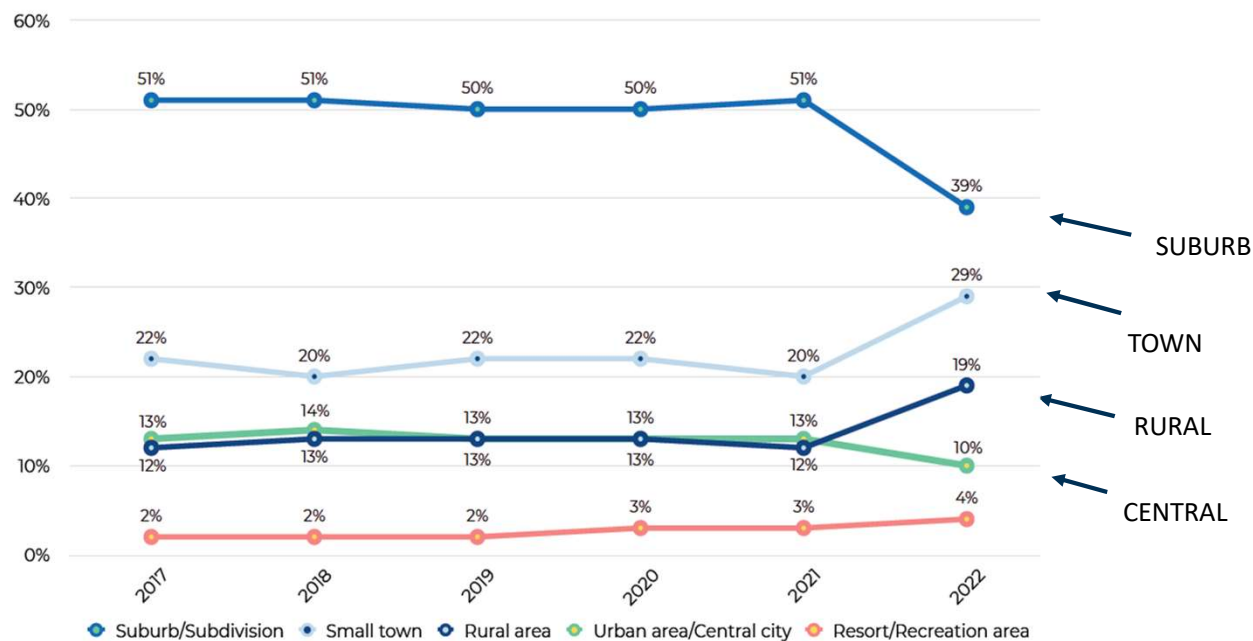
Figure 1: Second Home Purchase Applications Trend Lower than Pre-pandemic Levels



Source: Zillow

Home-buying has shifted away from suburbs and central cities, towards small towns and rural areas

Exhibit 2-6 Location of Home Purchased, 2017-2022
(Percentage Distribution)



- This shift is consistent with expectations that at least some remote work arrangements will be maintained post-COVID.

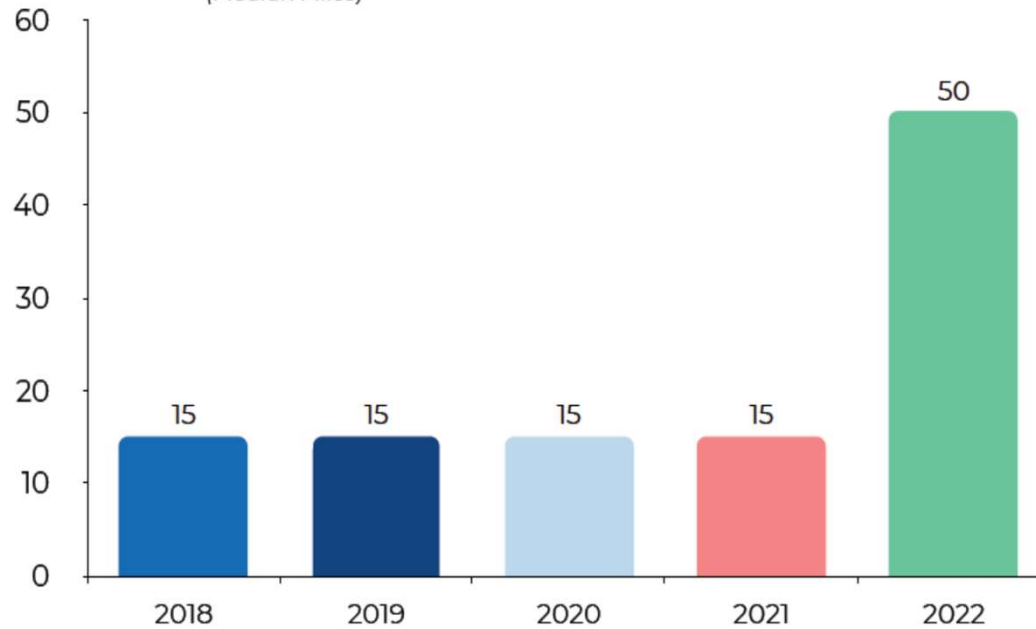
- Will this expectation be realized?

Source: NAR 2022 Profile of Home Buyers and Sellers

Buyers in 2022 moved unusually long distances

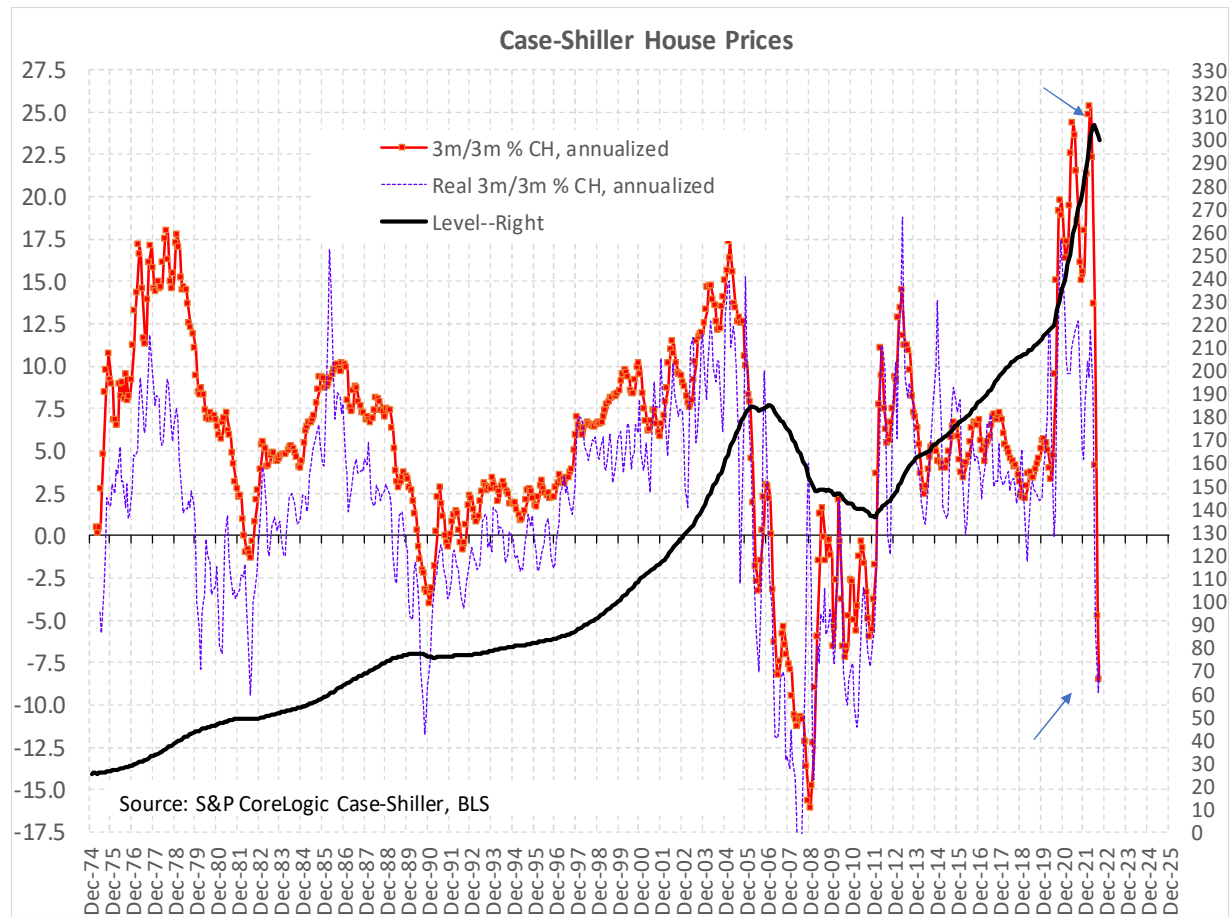
Exhibit 2-9 Distance Between Home Purchased and Previous Residence, 2018-2022

(Median Miles)



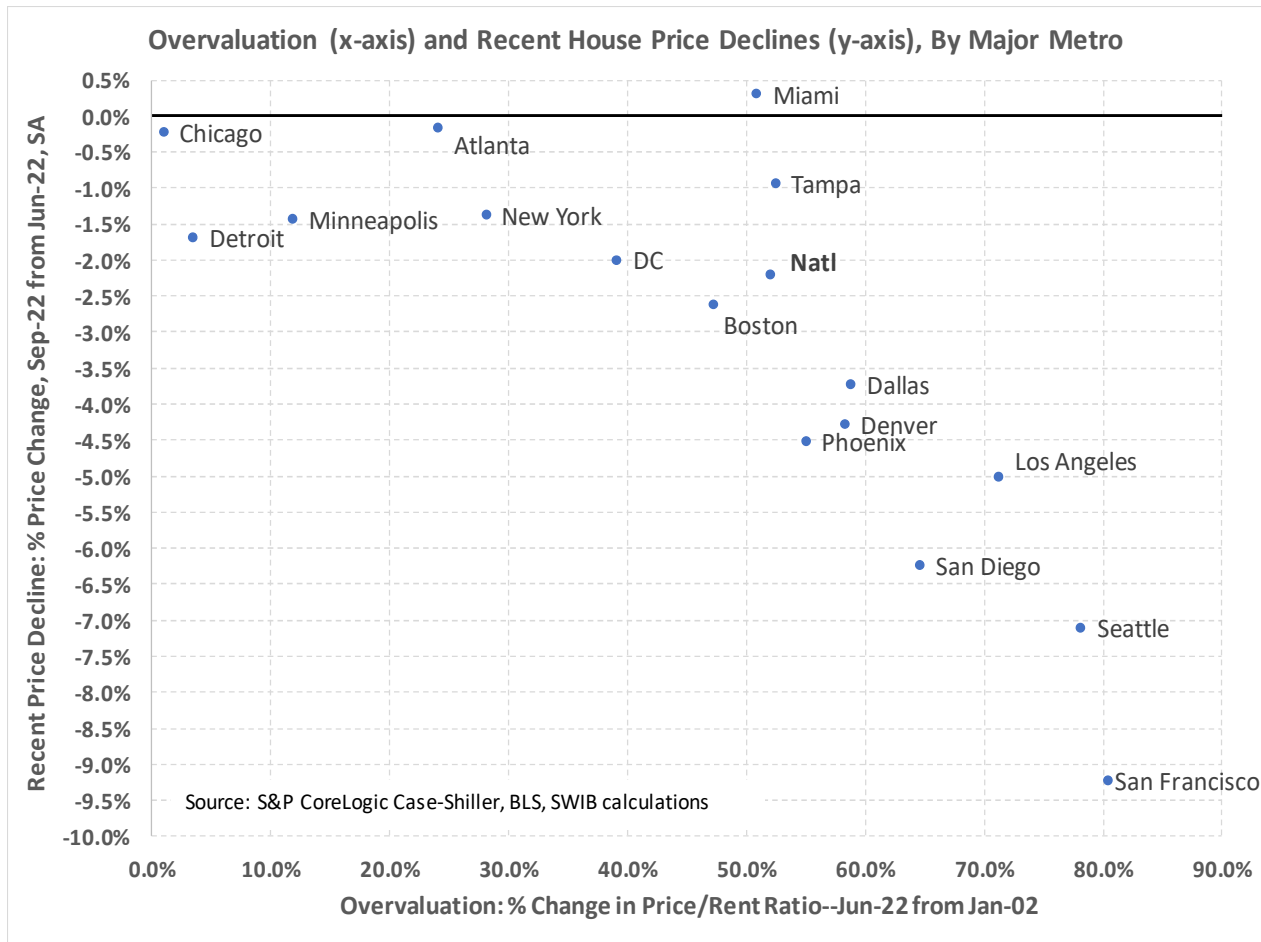
Source: NAR 2022 Profile of Home Buyers and Sellers

House price appreciation has slowed sharply, and a period of outright decline has begun



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Cities with biggest price declines Sep-22 from Jun-22 became the most overvalued in the last 20 years

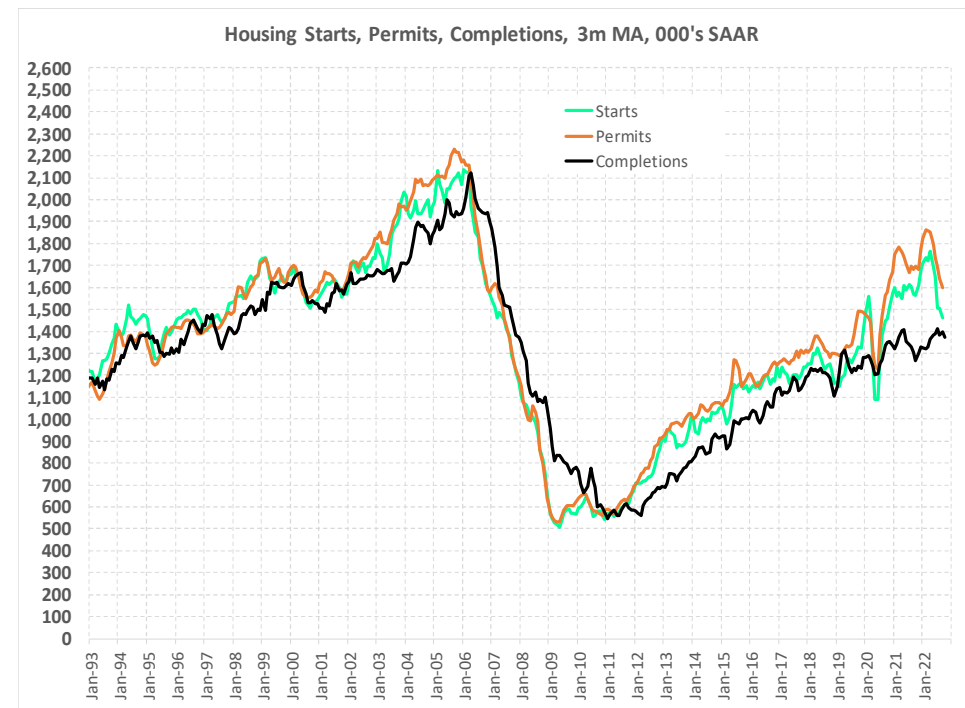
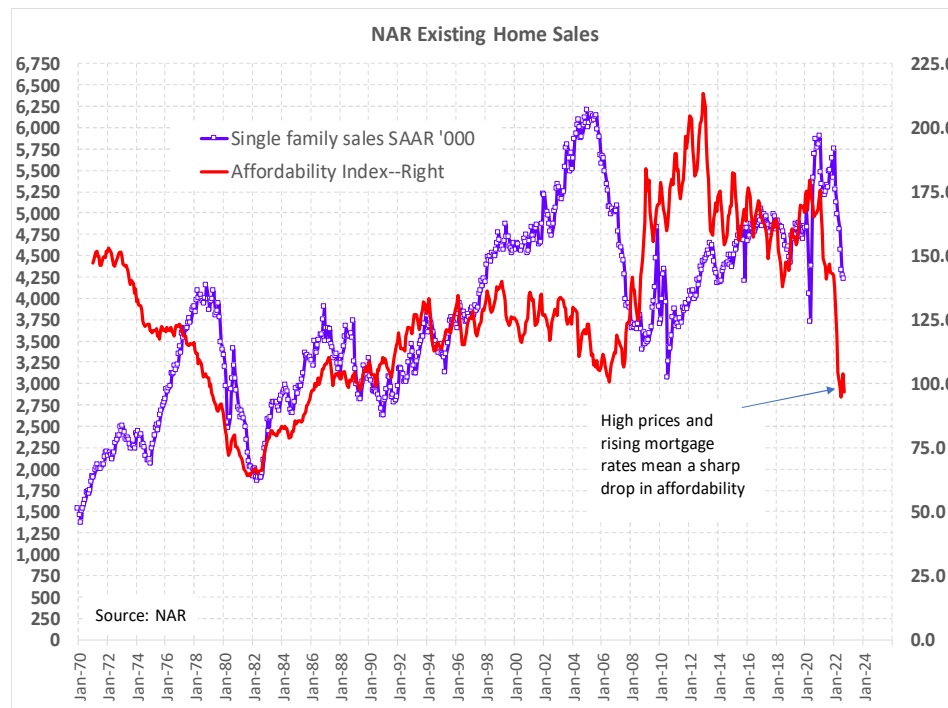


- E.g., in San Francisco, where the price/rent ratio inflated 80% since Jan-02, prices have fallen 9% in the three months to August.

- Overvalued west coast has corrected the most so far.

- Florida still defying gravity.

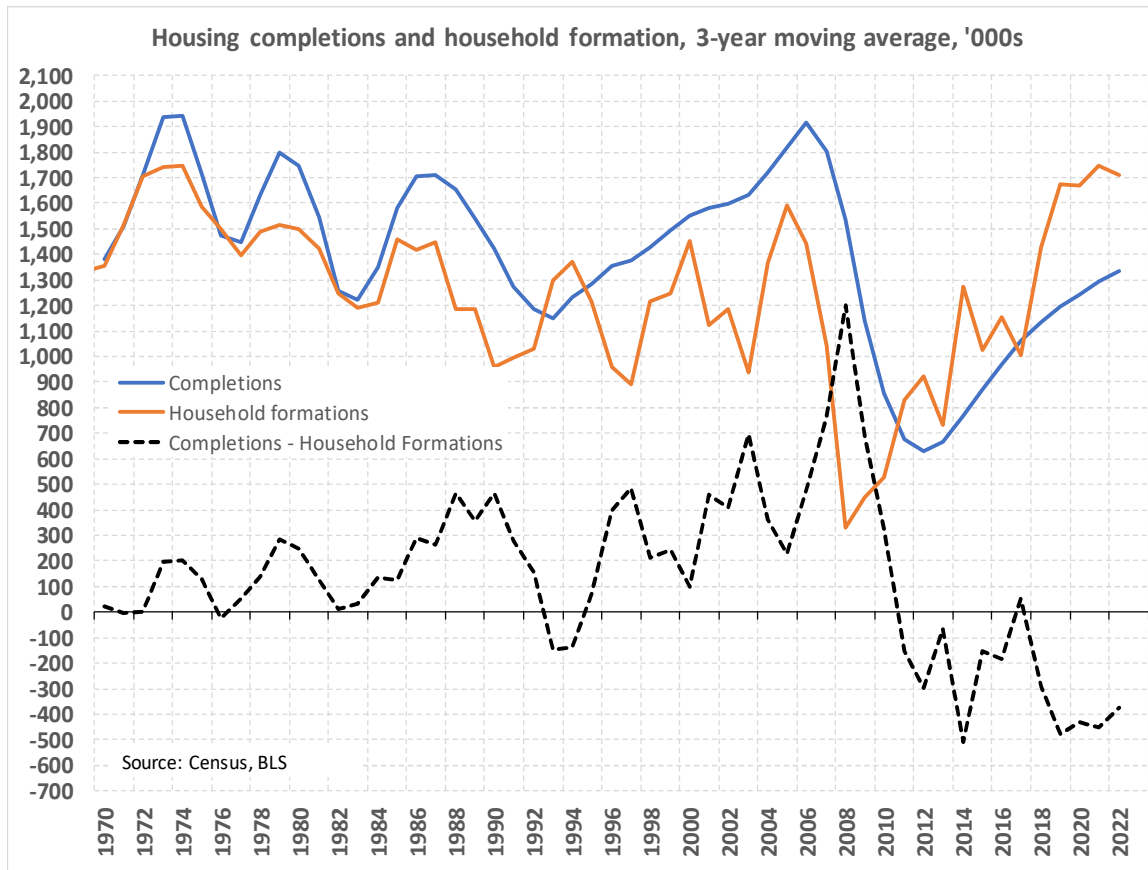
Interest-sensitive housing sales and construction activity are declining
(although completions are still steady at a 1.37 mn SAAR rate).



How much might house prices correct?

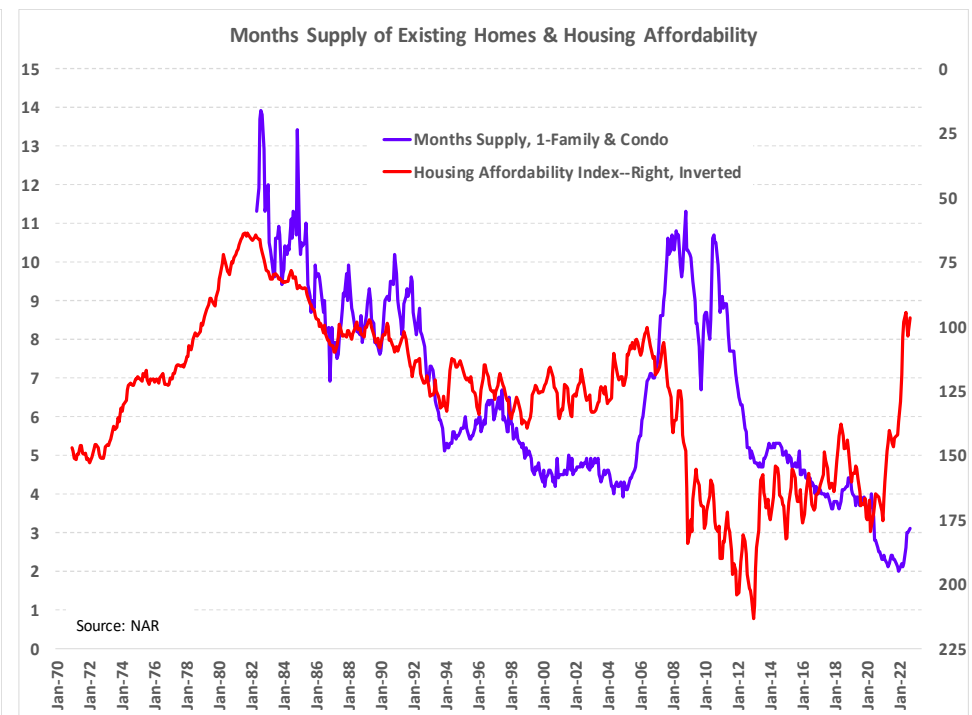
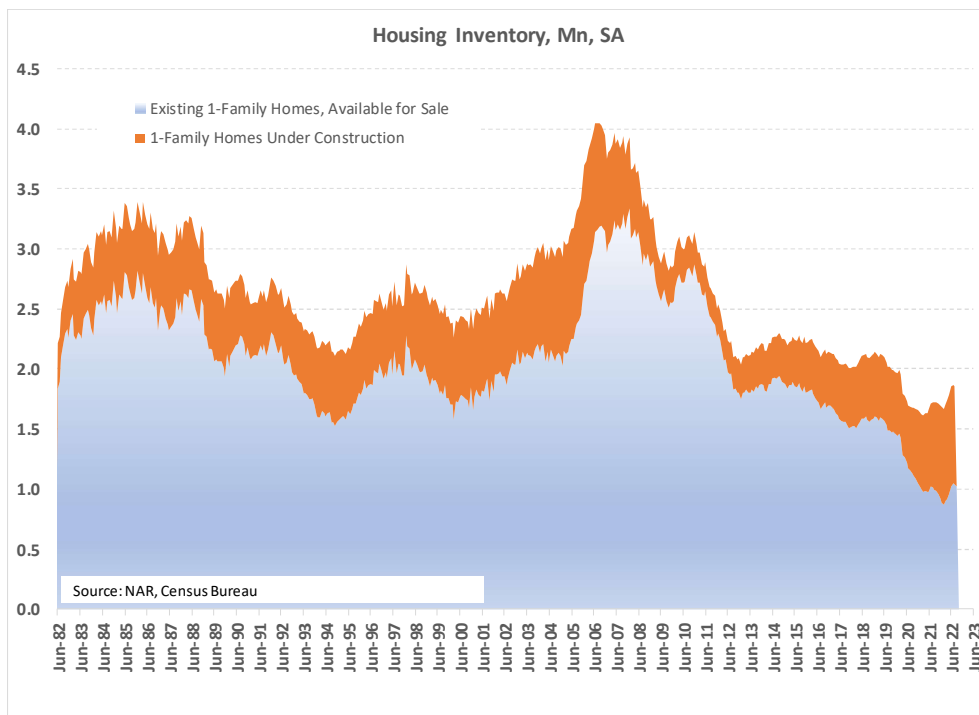
- While housing is overvalued and will see price declines, the correction won't be as deep as that of 2006-11, and is pretty unlikely to cause as much stress for households and the financial system.
- #1: Demand has outstripped supply over the last decade, leaving the market fundamentally short of housing.
- #2: Household balance sheets are in much better shape than in over-extended 2006-7, and debt service ratios are much lower.
- #3: Mortgage borrowing and lending has been prudent relative to the go-go 2000's, and banks have bigger capital cushions.
- Some borrowers could still get into cash-flow trouble in the coming year, particularly if there is an at-least-mild recession with rising unemployment...
- ...and buyers that were "last in" to the recent house-price run-up could conceivably find themselves in a position of at least moderate negative equity...
- ...but on the whole a wave of defaults and distressed selling as in 2008-10 seems implausible.

Demand for housing has outstripped supply over the last decade

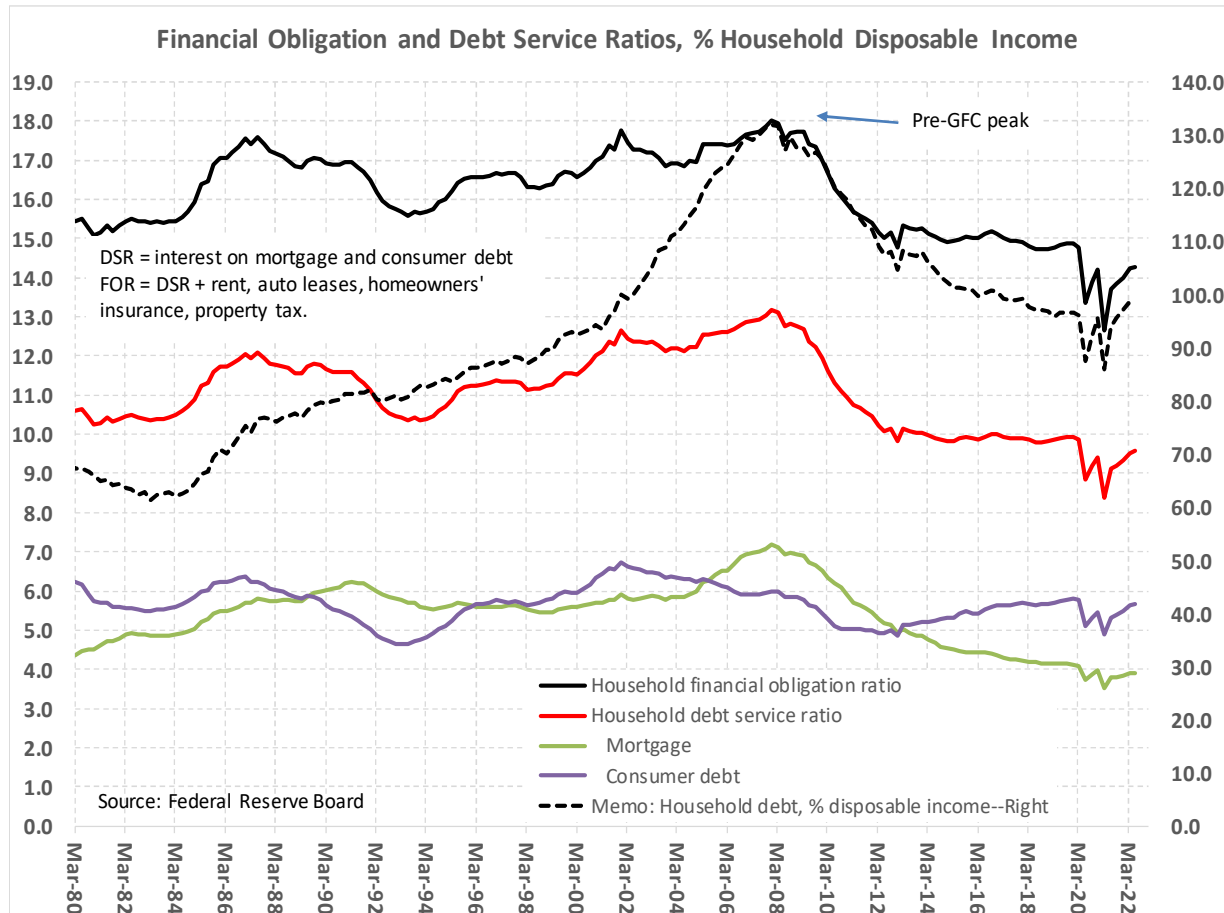


- Building contracted during 2006-11 and has not since rebounded to accommodate a rebound in household formations.
- The flow mismatch looks to have left the US with a too-low stock of housing.
- Low stocks were met with low interest rates and strong COVID-related demand to cause the sharp 2020-22 house price gains.
- While rates have risen and COVID factors are fading, the basic undersupply situation is intact, and will only slowly be corrected.

Stock of homes for sale is low relative to 2006-10 and 1980's (S&L crisis)



Household financial obligations ratios are at low levels relative to 2006-08



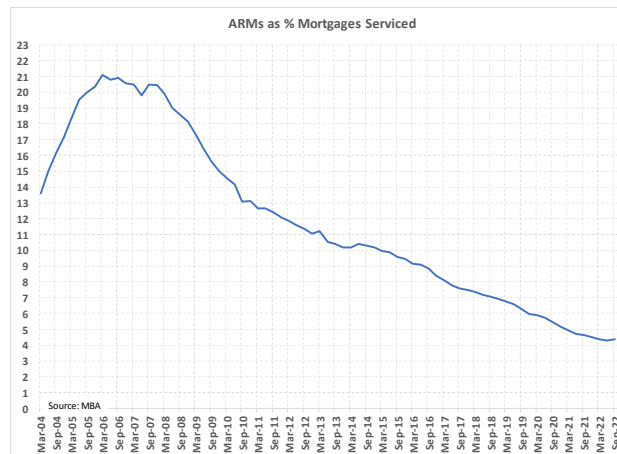
- Some households could experience difficulties servicing debt, especially if there is a recession in 2023.
- But in aggregate, financial obligations relative to income are historically low, and much lower than in 2006.

High mortgage rates will curtail new demand, but relatively few borrowers have locked at the recent highs. Importantly, floating rate mortgages are out of fashion and borrower creditworthiness is high.

Exhibit 7: The average mortgage borrower holds a note rate 300 bps below current market mortgage rates
30-year fixed conforming mortgage rates and the outstanding weighted average note rate

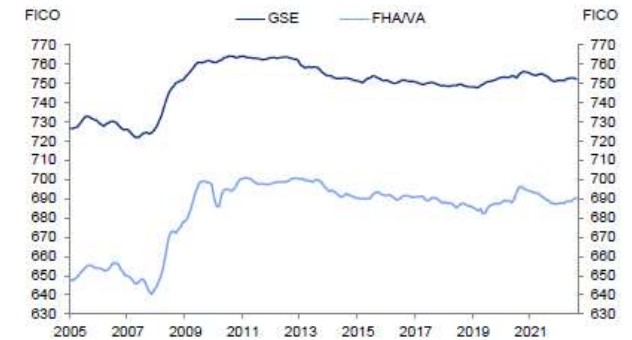


Source: eMBS, Freddie Mac, Goldman Sachs Global Investment Research



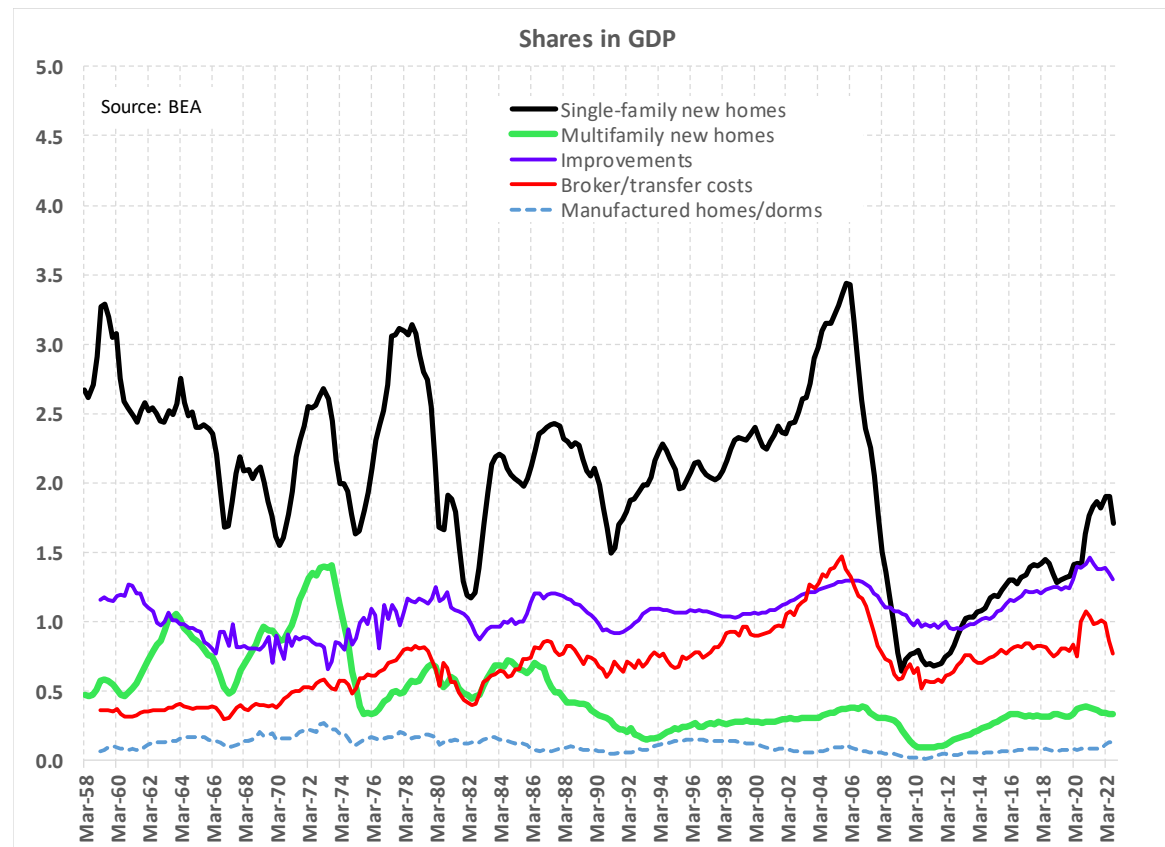
Source: MBA

Exhibit 25: FICO scores at origination remain elevated relative to pre-GFC levels
Average FICO at origination for purchase mortgages



Source: Black Knight, eMBS, Goldman Sachs Global Investment Research

Dependence of economy on housing activity is low by historical standards, and given supply-demand imbalance, correction in construction could be moderate

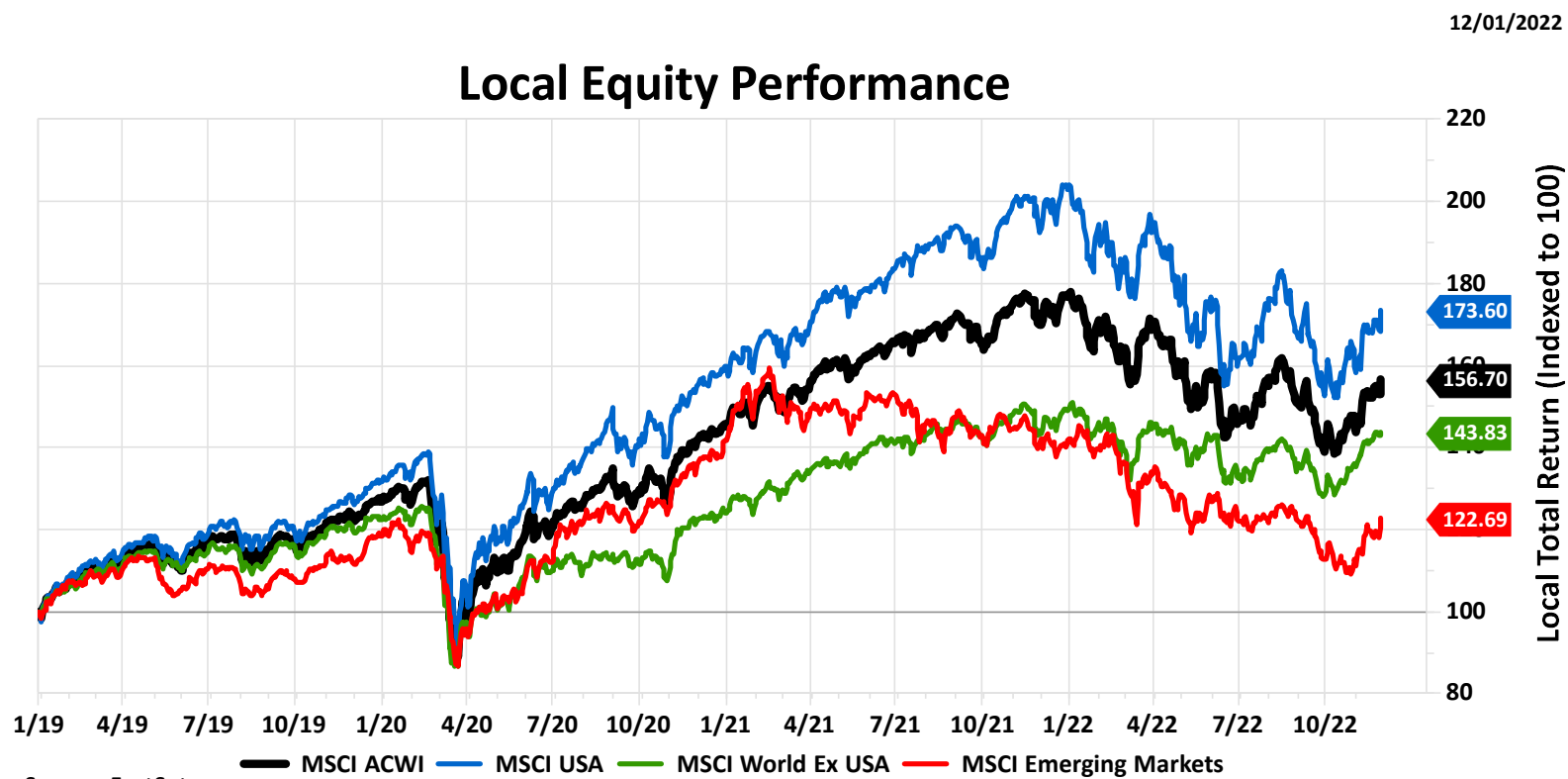


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Asset Class Review

Global Equities - Performance

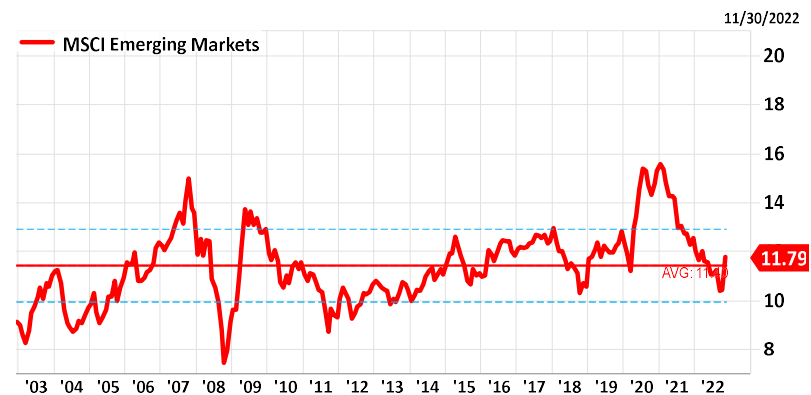
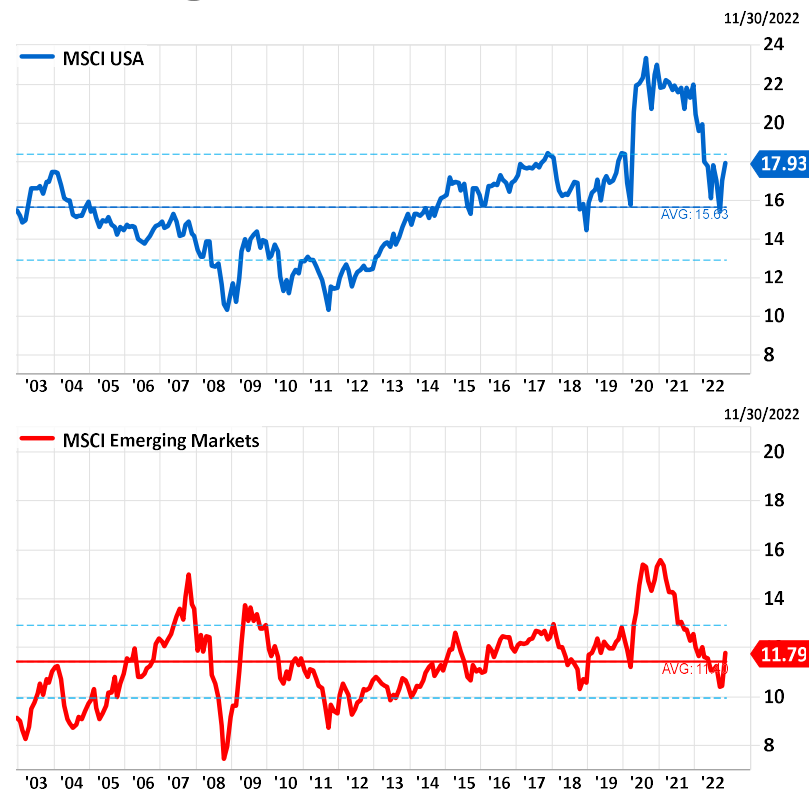
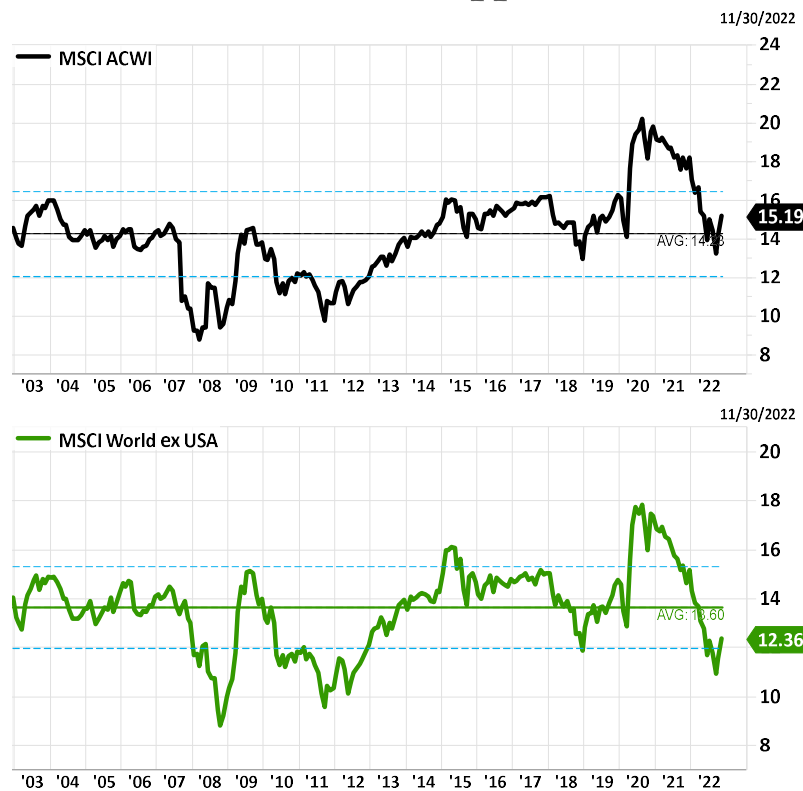
Equity markets have been volatile in the past few months



Source: FactSet

Global Equities - Valuation

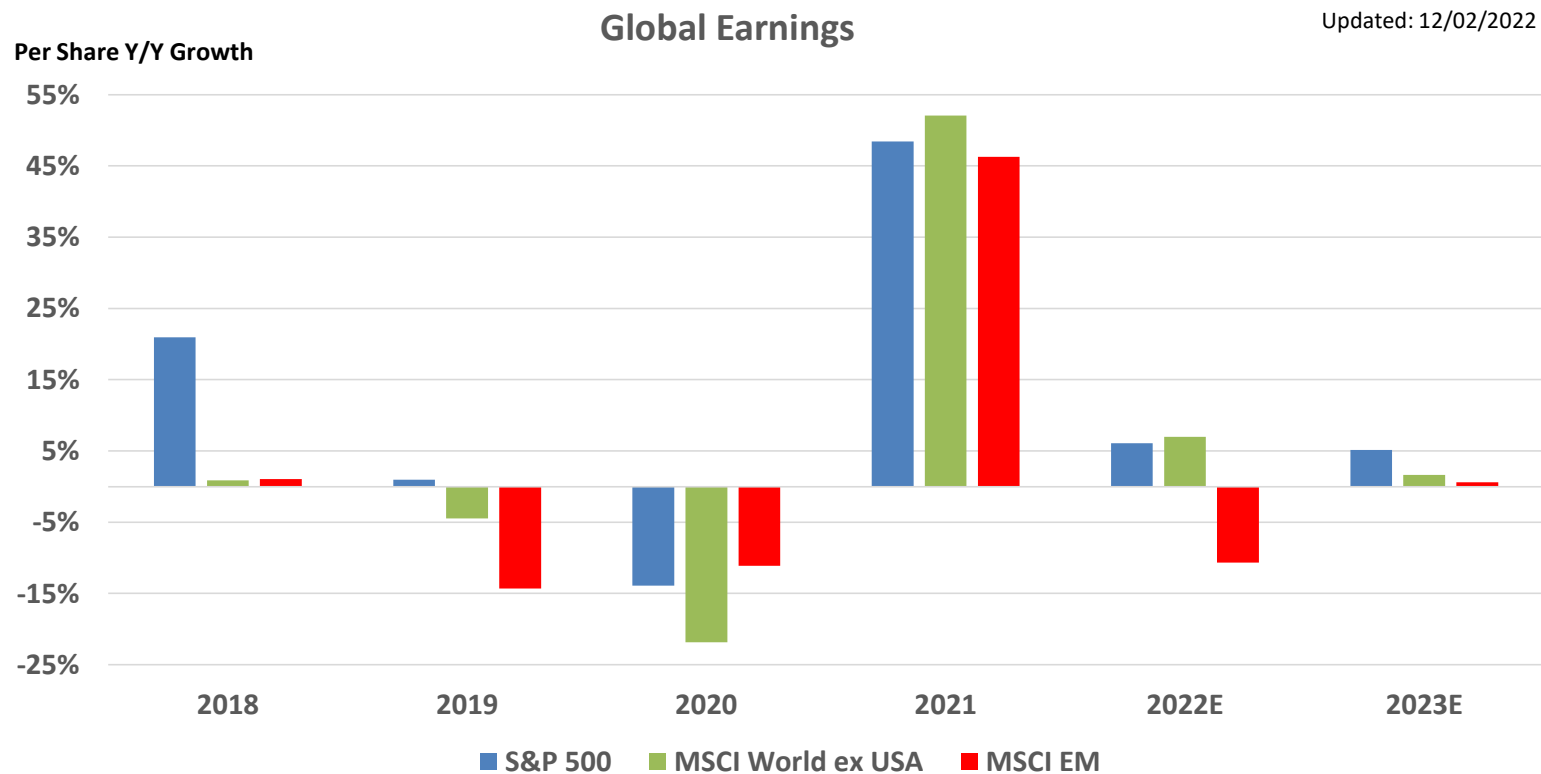
EM P/E ratios have dropped below the 20-year average level



Source: FactSet Market Aggregates - Next Twelve Month P/E Ratio, monthly, 20-year Average with 1 Std. Dev. Bands

Earnings Growth

Emerging Markets have struggled in 2022



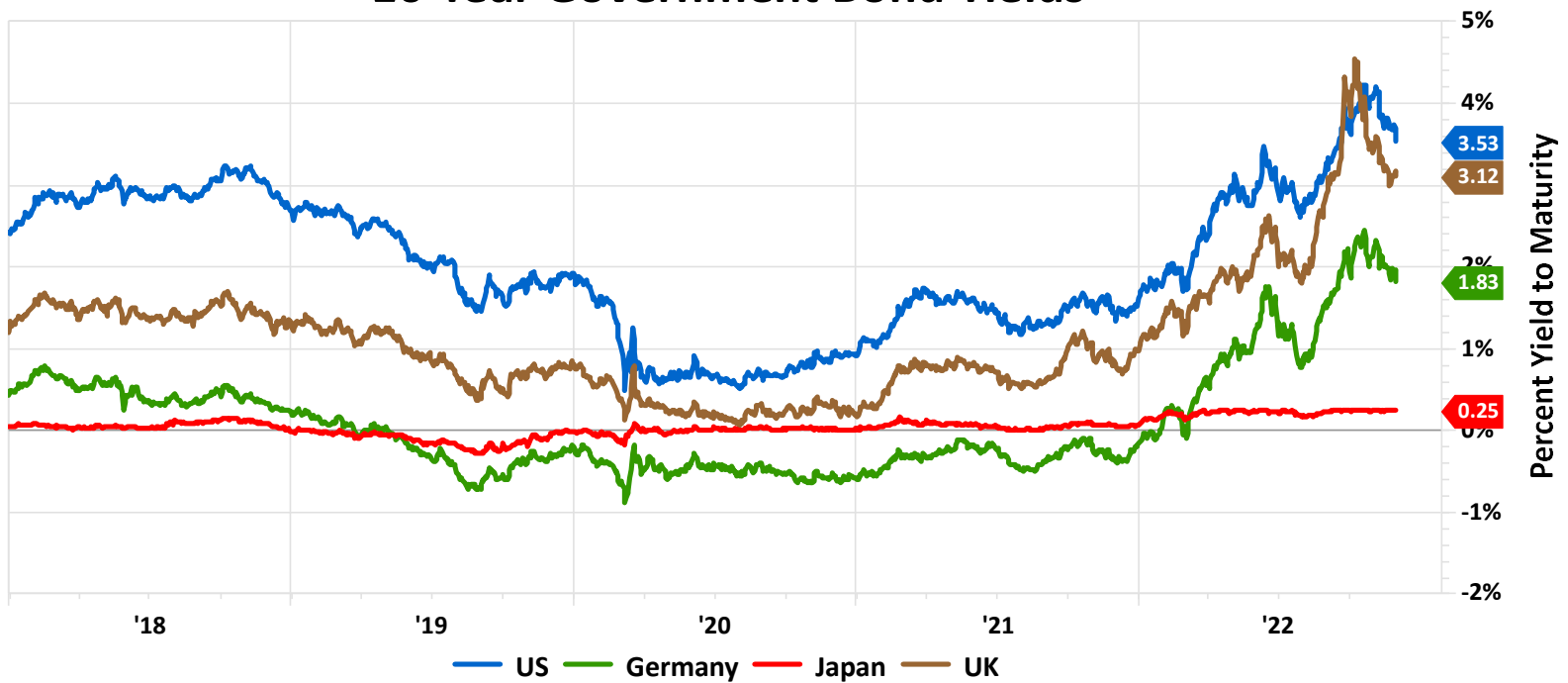
Source: Analyst Consensus; FactSet

Global Bonds

US yield retreats from recent high as investors weigh inflation and global economic growth

12/01/2022

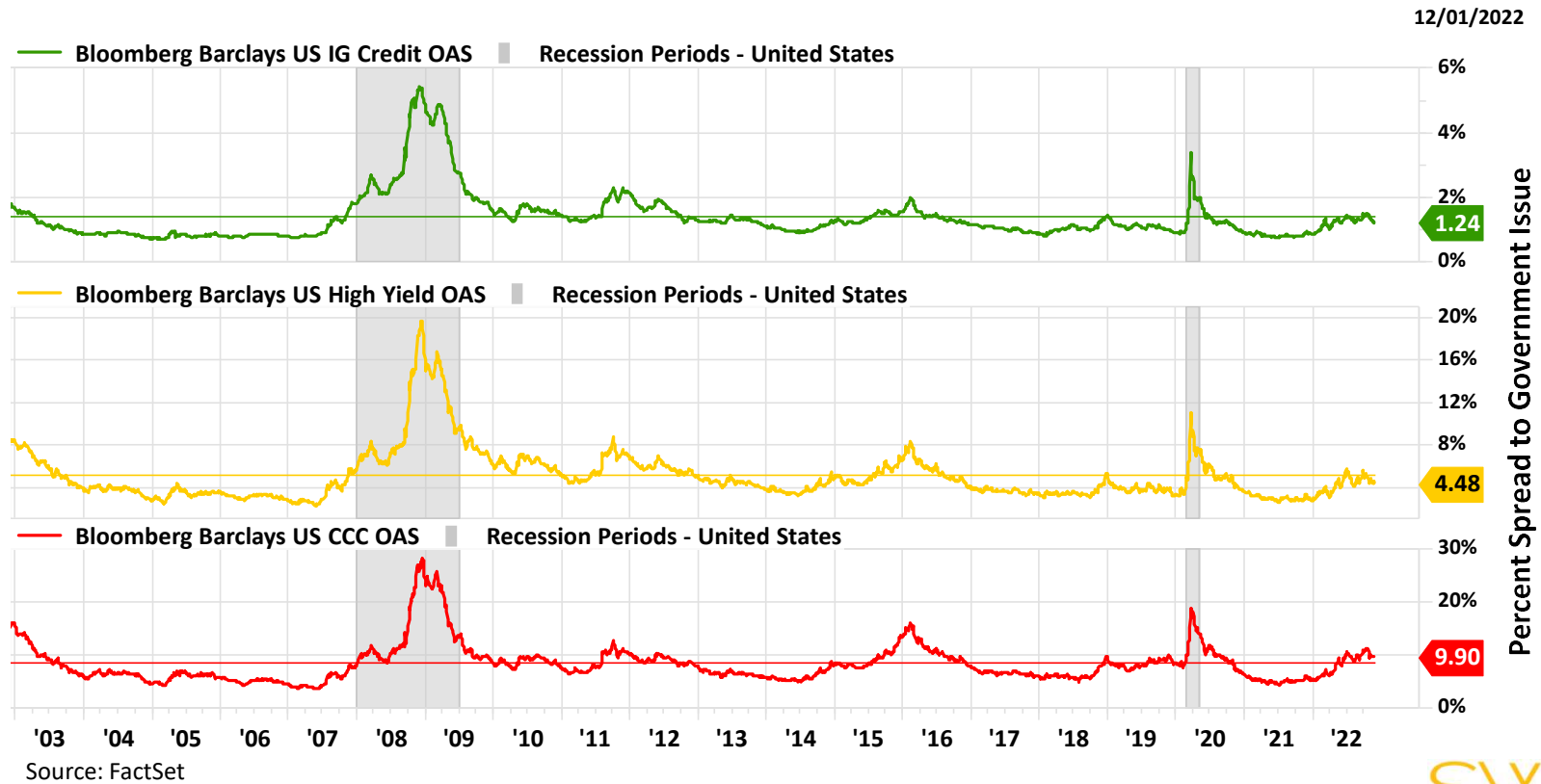
10-Year Government Bond Yields



Source: FactSet

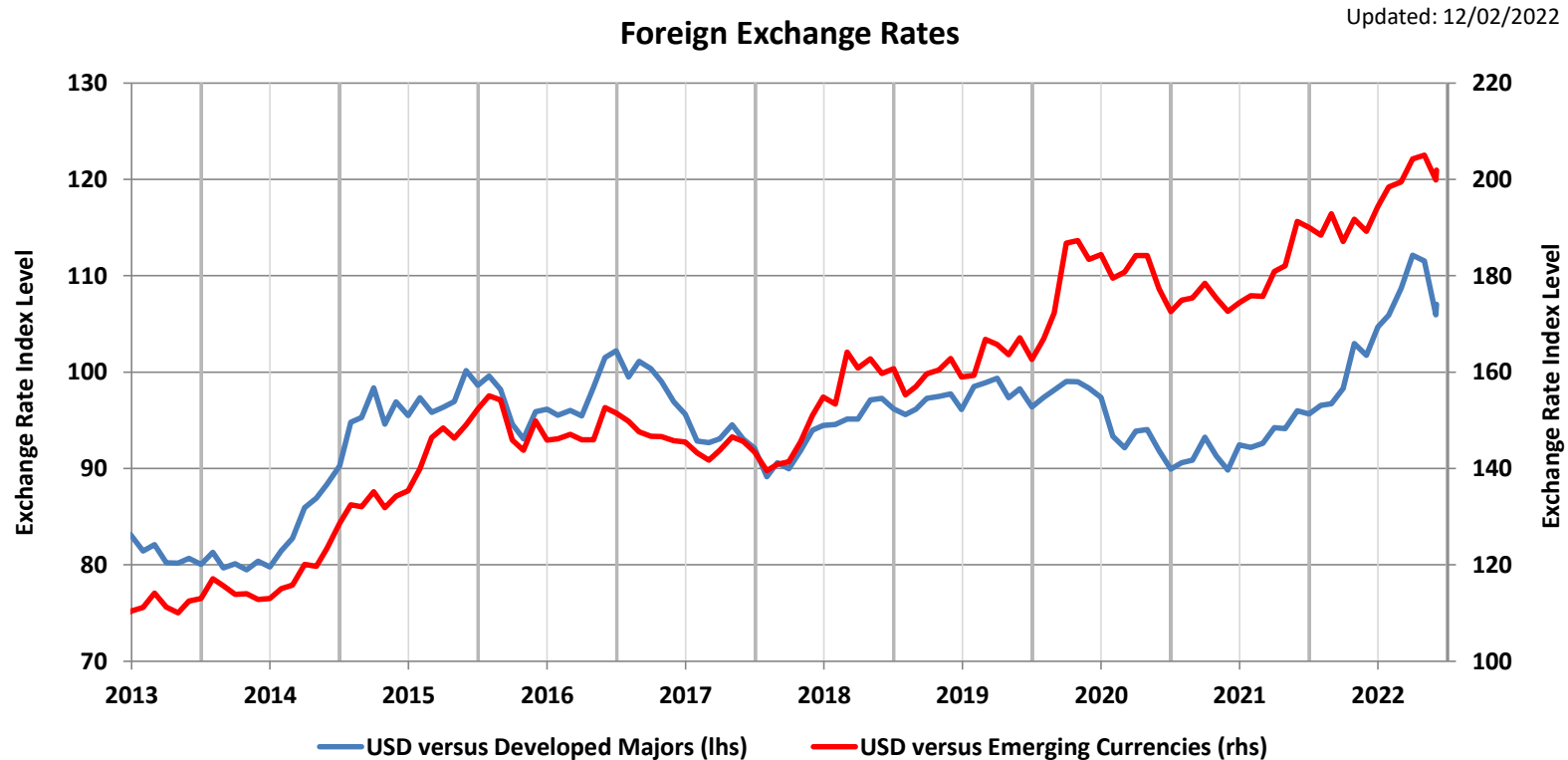
Credit Sectors

Spreads are higher and have reached the long run averages



Currency Performance

Surging U.S. Dollar has reversed course in recent weeks



Source: Bloomberg, DXY Index, JPM Emerging Markets Currency Index (Inverted)

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U.S. Inflation

Medium term expectations are tamer following recent Fed rate hikes

US 5 Year Breakeven Inflation

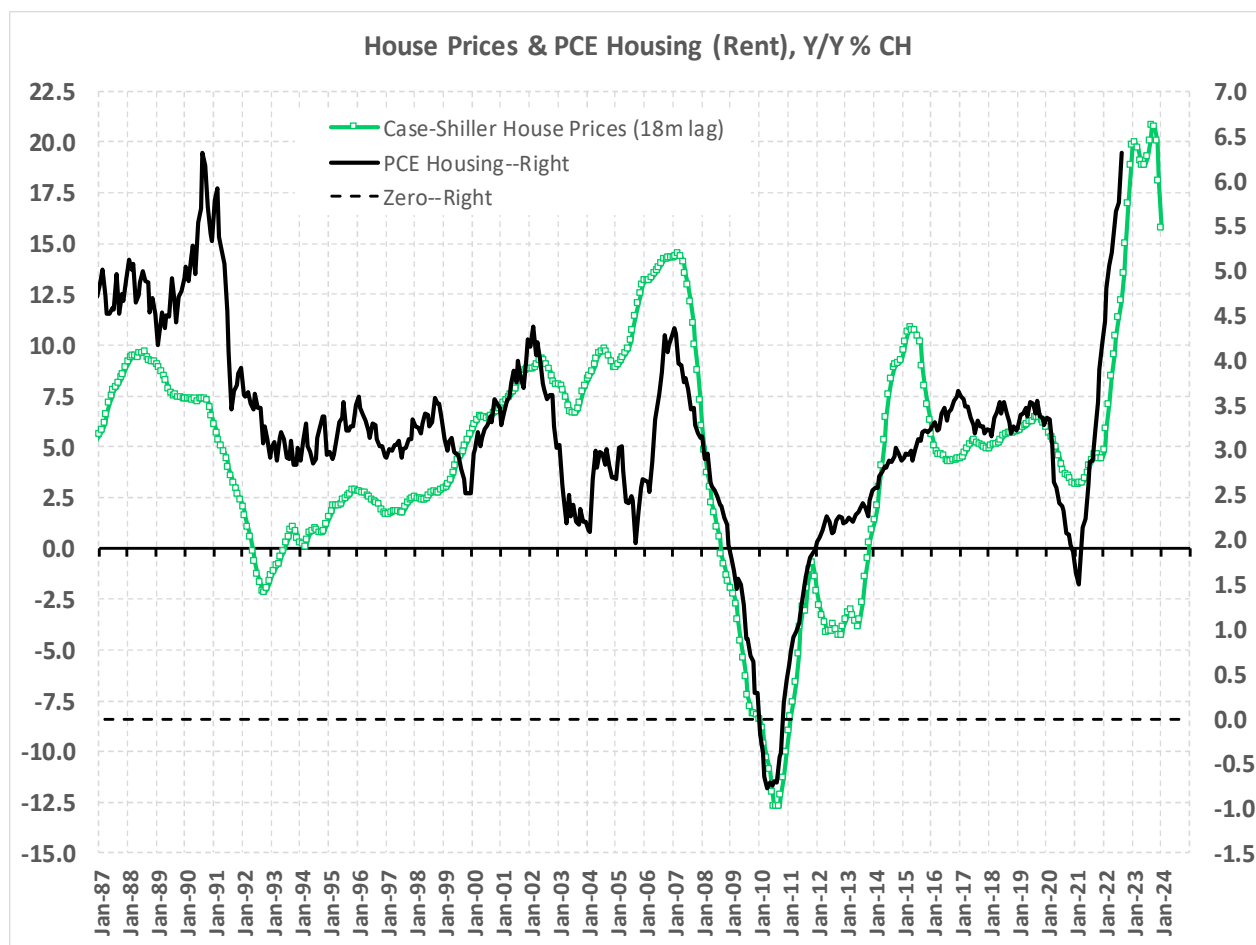
As of: 12/02/2022



Source: Bloomberg

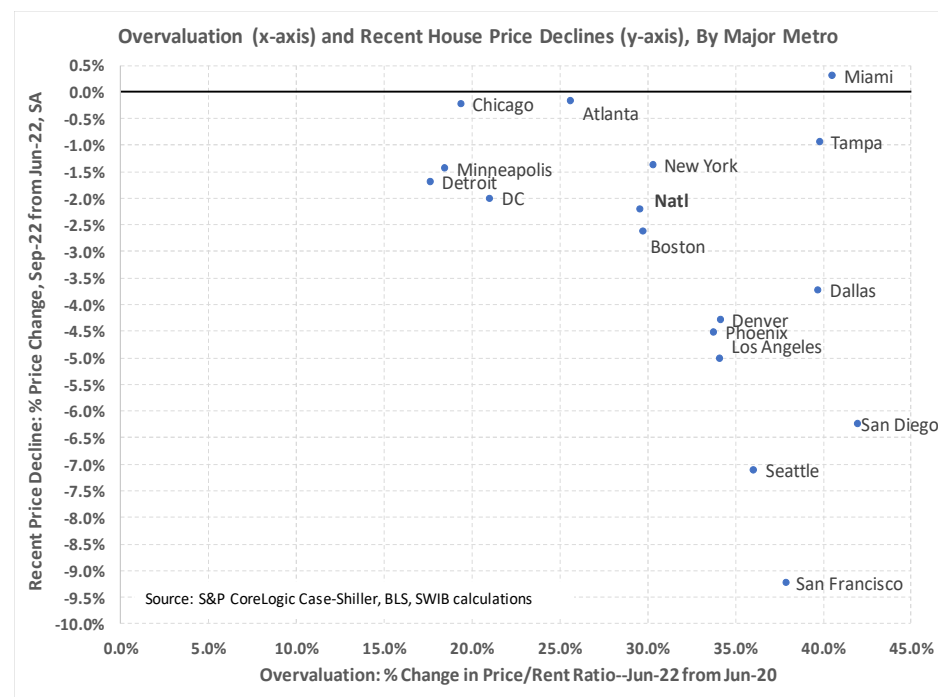
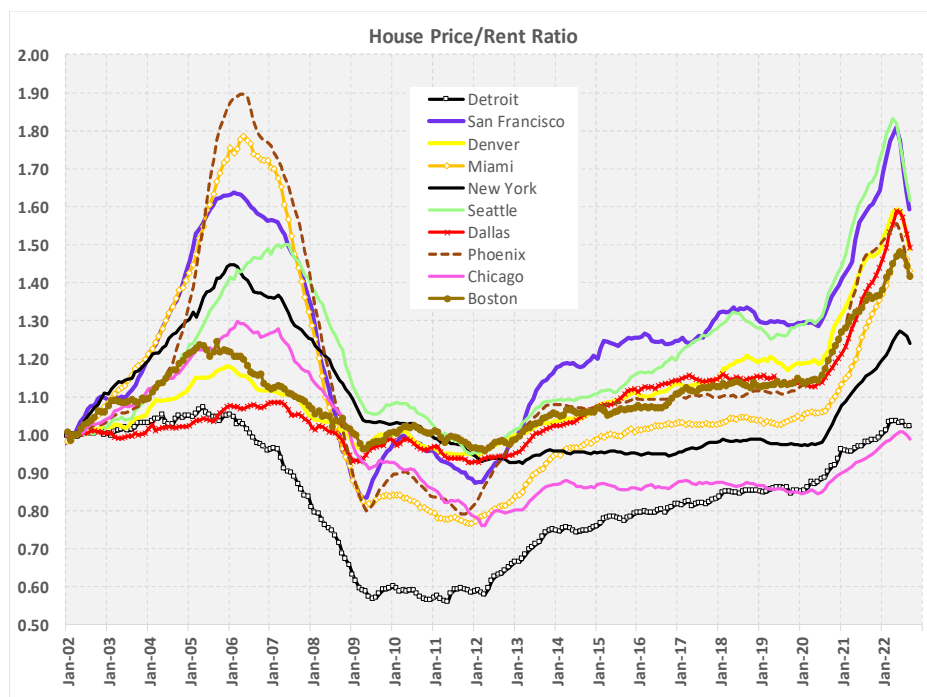
Appendix

Slower house price inflation will ease rent inflation, but it could take a while

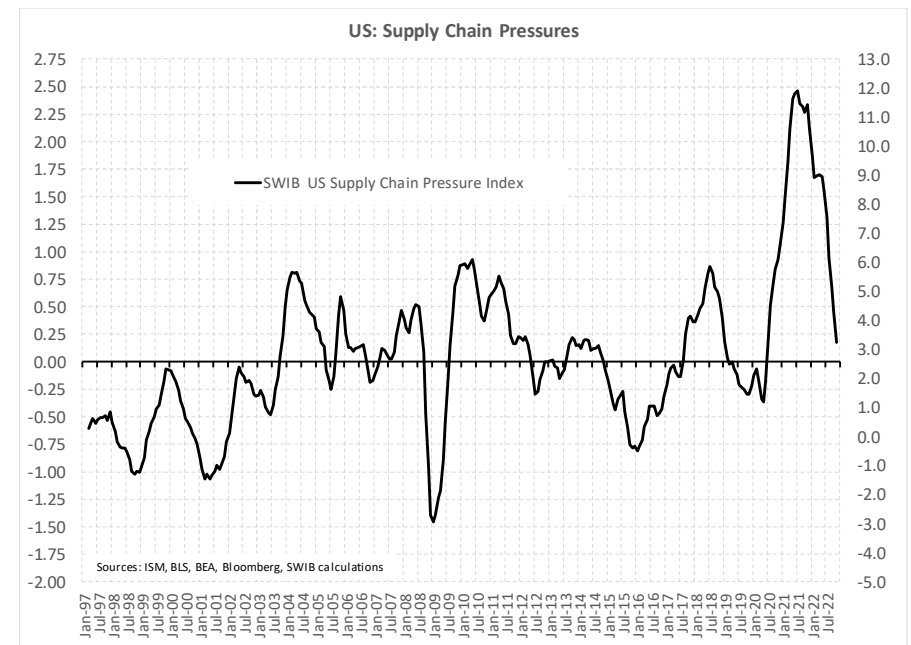
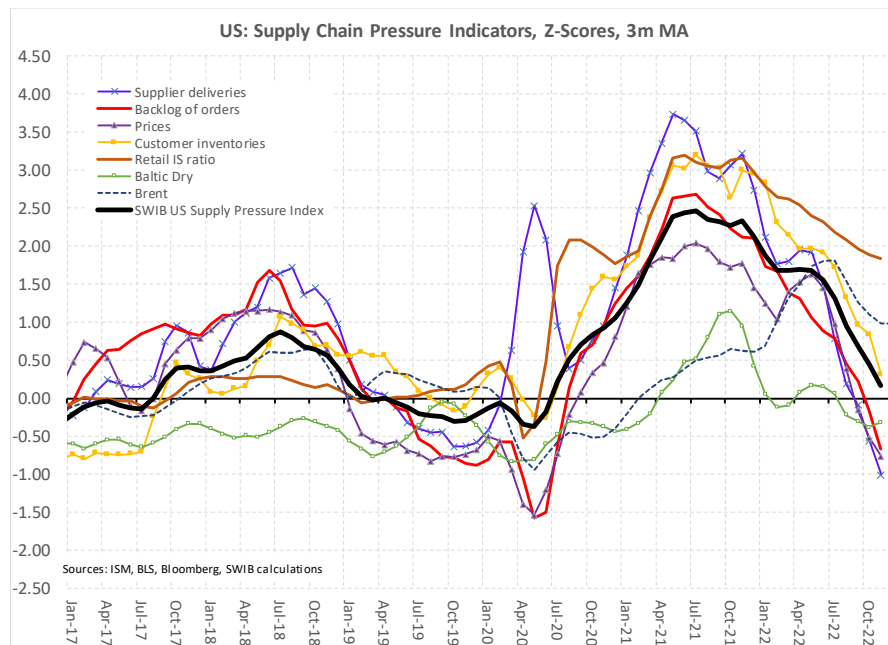


- Slower house price appreciation, or outright decline, will improve affordability for households that are currently renting or living with family.
- This process can take time – maybe a year-and-a-half if past cycles are any indication of the future.
- If this is the case, some stabilization and even easing of rent inflation is on the cards in 2023.

US cities have had varied development of price/rent ratios over the last 20 years. All saw increases in price/rent over the two years from Jun-20 to Jun-22, and most are now declining in price.



SWIB Supply Chain Pressure Index



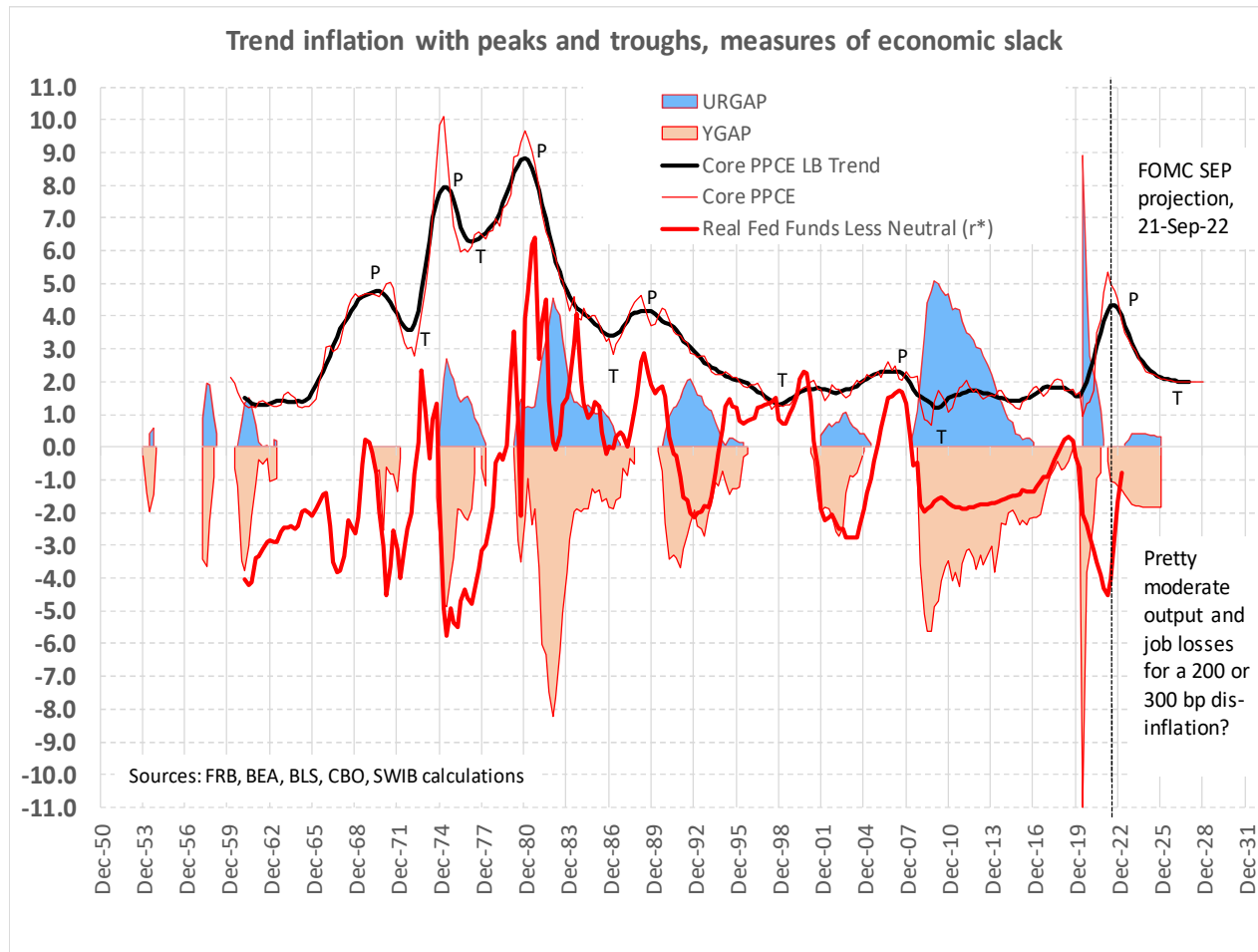
FOMC 21-Sep-22 Summary of Economic Projections

Table 1. Economic projections of Federal Reserve Board members and Federal Reserve Bank presidents, under their individual assumptions of projected appropriate monetary policy, September 2022

Percent

Variable	Median ¹					Central Tendency ²					Range ³				
	2022	2023	2024	2025	Longer run	2022	2023	2024	2025	Longer run	2022	2023	2024	2025	Longer run
Change in real GDP	0.2	1.2	1.7	1.8	1.8	0.1–0.3	0.5–1.5	1.4–2.0	1.6–2.0	1.7–2.0	0.0–0.5	–0.3–1.9	1.0–2.6	1.4–2.4	1.6–2.2
June projection	1.7	1.7	1.9		1.8	1.5–1.9	1.3–2.0	1.5–2.0		1.8–2.0	1.0–2.0	0.8–2.5	1.0–2.2		1.6–2.2
Unemployment rate	3.8	4.4	4.4	4.3	4.0	3.8–3.9	4.1–4.5	4.0–4.6	4.0–4.5	3.8–4.3	3.7–4.0	3.7–5.0	3.7–4.7	3.7–4.6	3.5–4.5
June projection	3.7	3.9	4.1		4.0	3.6–3.8	3.8–4.1	3.9–4.1		3.5–4.2	3.2–4.0	3.2–4.5	3.2–4.3		3.5–4.3
PCE inflation	5.4	2.8	2.3	2.0	2.0	5.3–5.7	2.6–3.5	2.1–2.6	2.0–2.2	2.0	5.0–6.2	2.4–4.1	2.0–3.0	2.0–2.5	2.0
June projection	5.2	2.6	2.2		2.0	5.0–5.3	2.4–3.0	2.0–2.5		2.0	4.8–6.2	2.3–4.0	2.0–3.0		2.0
Core PCE inflation ⁴	4.5	3.1	2.3	2.1		4.4–4.6	3.0–3.4	2.2–2.5	2.0–2.2		4.3–4.8	2.8–3.5	2.0–2.8	2.0–2.5	
June projection	4.3	2.7	2.3			4.2–4.5	2.5–3.2	2.1–2.5			4.1–5.0	2.5–3.5	2.0–2.8		
Memo: Projected appropriate policy path															
Federal funds rate	4.4	4.6	3.9	2.9	2.5	4.1–4.4	4.4–4.9	3.4–4.4	2.4–3.4	2.3–2.5	3.9–4.6	3.9–4.9	2.6–4.6	2.4–4.6	2.3–3.0
June projection	3.4	3.8	3.4		2.5	3.1–3.6	3.6–4.1	2.9–3.6		2.3–2.5	3.1–3.9	2.9–4.4	2.1–4.1		2.0–3.0

Is the FOMC dis-inflation projection too optimistic?



- Major disinflations of the sort now needed in the US are usually brought about by central bank tightening.
- Major disinflations also require sacrifices of jobs and GDP relative to full-employment levels (potential GDP, non-cyclical unemployment rate).
- These sacrifices are captured by the blue (jobs) and orange (GDP) shaded areas.
- The 21-Sep 22 FOMC Summary of Economic Projections (SEP) is contextualized at left.
- The SEP has attracted some commentary. Can a disinflation from current 4%-5% core PCE inflation back to the Fed's 2% inflation target by 2025 really be achieved with only modest output losses, and even more modest job losses?

How much sacrifice is enough?

Disinflation episodes								
FOMC 21-Sep-2022 SEP in blue								
				1	2	3		
Inflation peak	Inflation trough	Peak inflation	Trough inflation	Dis-inflation	GDP loss, %-years	Job loss, %-years	GDP sacrifice ratio (2/1)	Job sacrifice ratio (3/1)
Sep-70	Sep-72	4.8	3.6	1.2	2.0	0.0	1.65	0.01
Jun-75	Mar-77	7.9	6.3	1.7	5.6	3.6	3.31	2.12
Dec-80	Mar-87	8.8	3.4	5.4	21.3	12.6	3.96	2.34
Sep-89	Dec-98	4.2	1.3	2.9	12.0	5.6	4.19	1.95
Mar-06	Mar-10	2.3	1.2	1.1	7.6	6.6	6.76	5.84
Jun-22	Dec-25	4.3	2.1	2.2	6.0	0.9	2.74	0.42
Average and median excluding FOMC projection:								
Average		5.6	3.1	2.5	9.7	5.7	4.0	2.5
Median		4.8	3.4	1.7	7.6	5.6	4.0	2.1

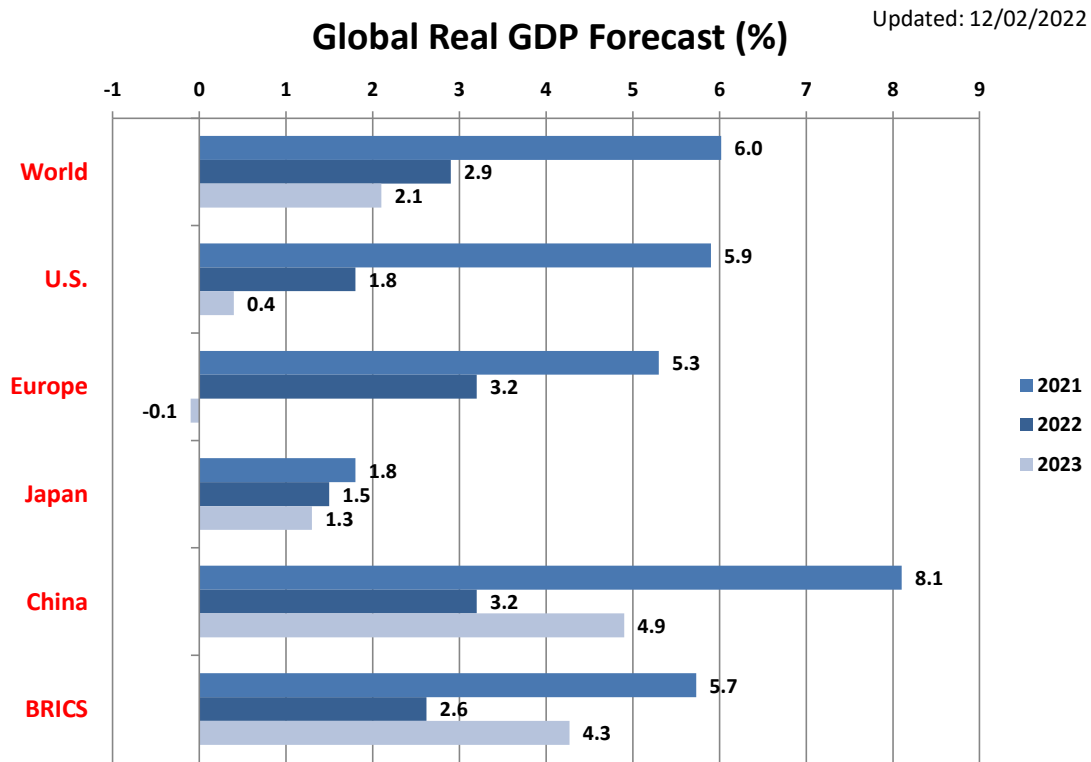
- “Sacrifice ratios” quantify an unattractive truth: disinflation requires GDP losses relative to potential GDP, and high unemployment rates relative to the full-employment rate (currently maybe 4.0%).
- The FOMC SEP sees 220 bps of disinflation by 2025, and 600 bps of GDP loss, for a GDP sacrifice ratio of:

$$2.74 = 600/220$$
and excess unemployment of 90 bps for a job sacrifice ratio of:

$$0.42 = 90/220$$
- These are low ratios by the standards of past disinflations.
- There’s a risk that bigger losses will be necessary to bring inflation under control...
- ...which could mean that the Fed funds rate will need to go higher than currently envisioned and stay there for longer.

Global Growth

EM growth rebound expected for 2023

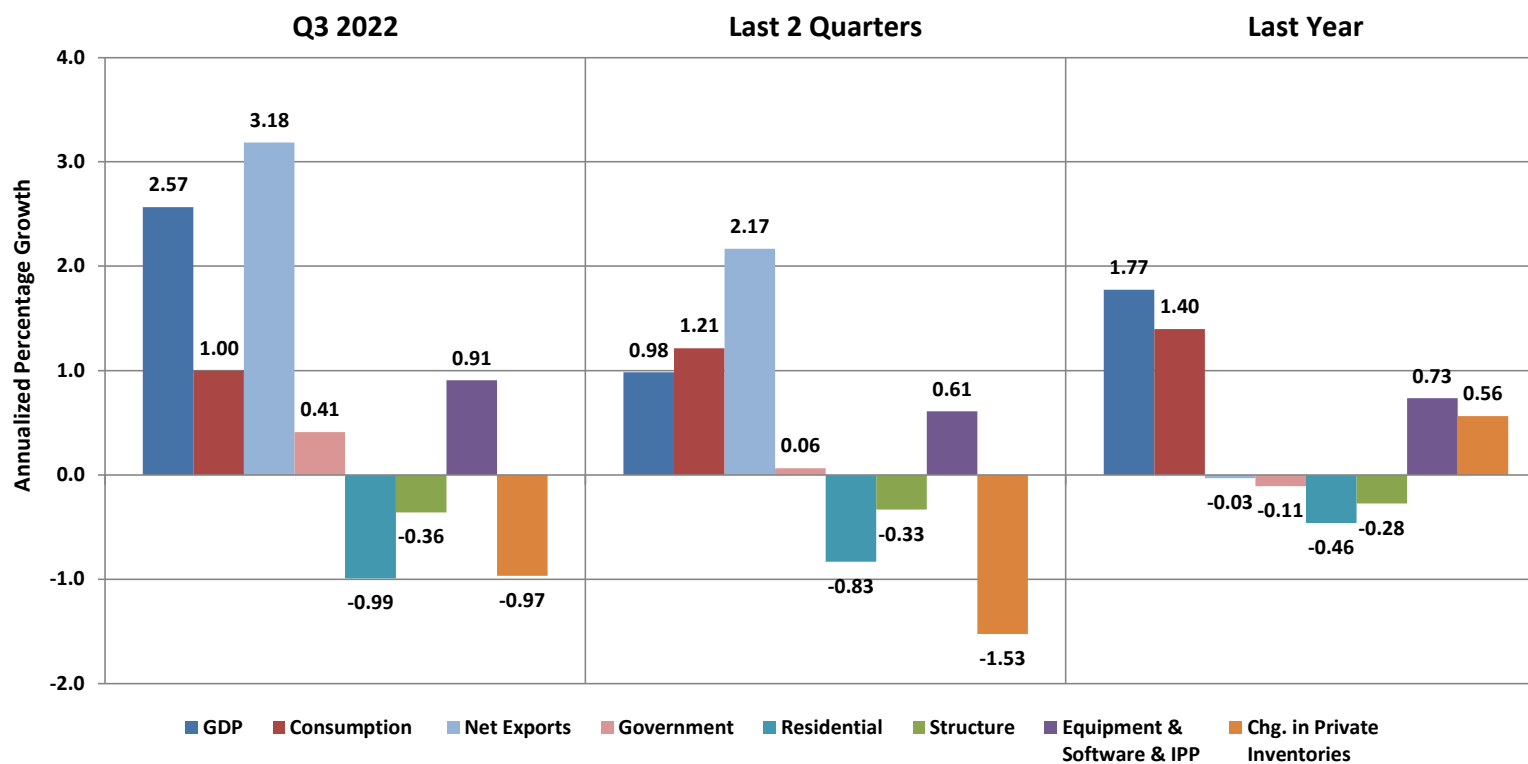


Source: Bloomberg Consensus

55

U.S. Growth

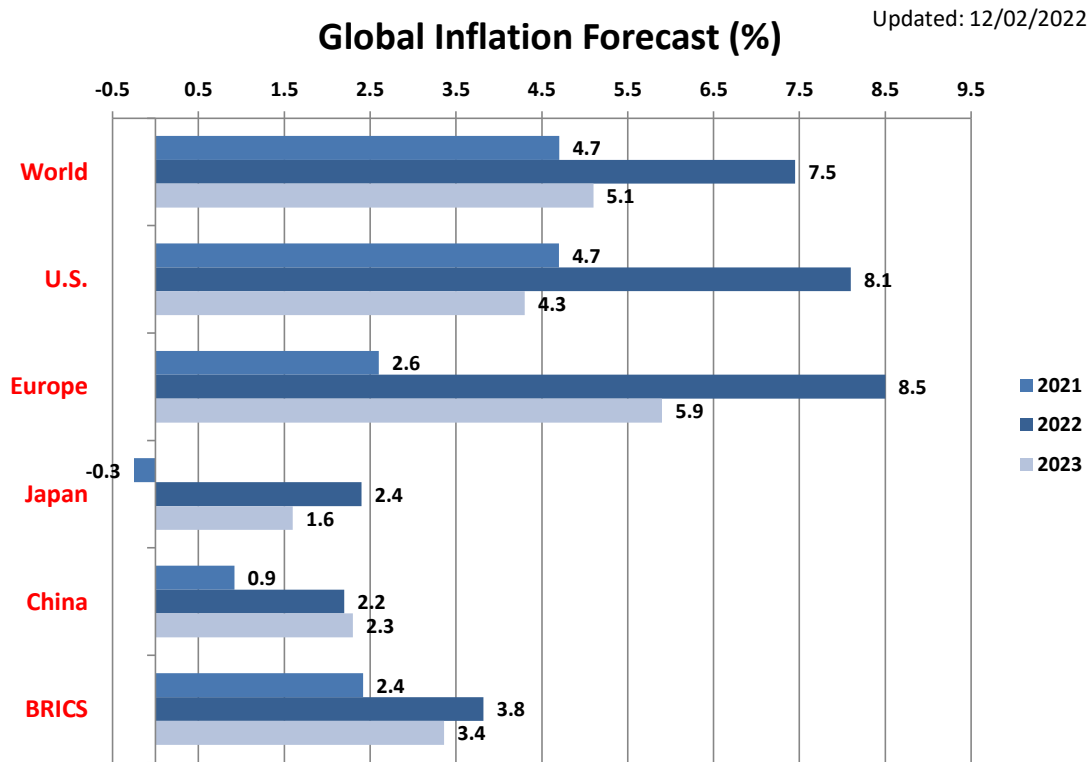
Stronger net exports have boosted GDP recently



Source: Bloomberg, Bureau of Economics Analysis

Global Inflation

Consensus expectations for 2023 are for easing inflation

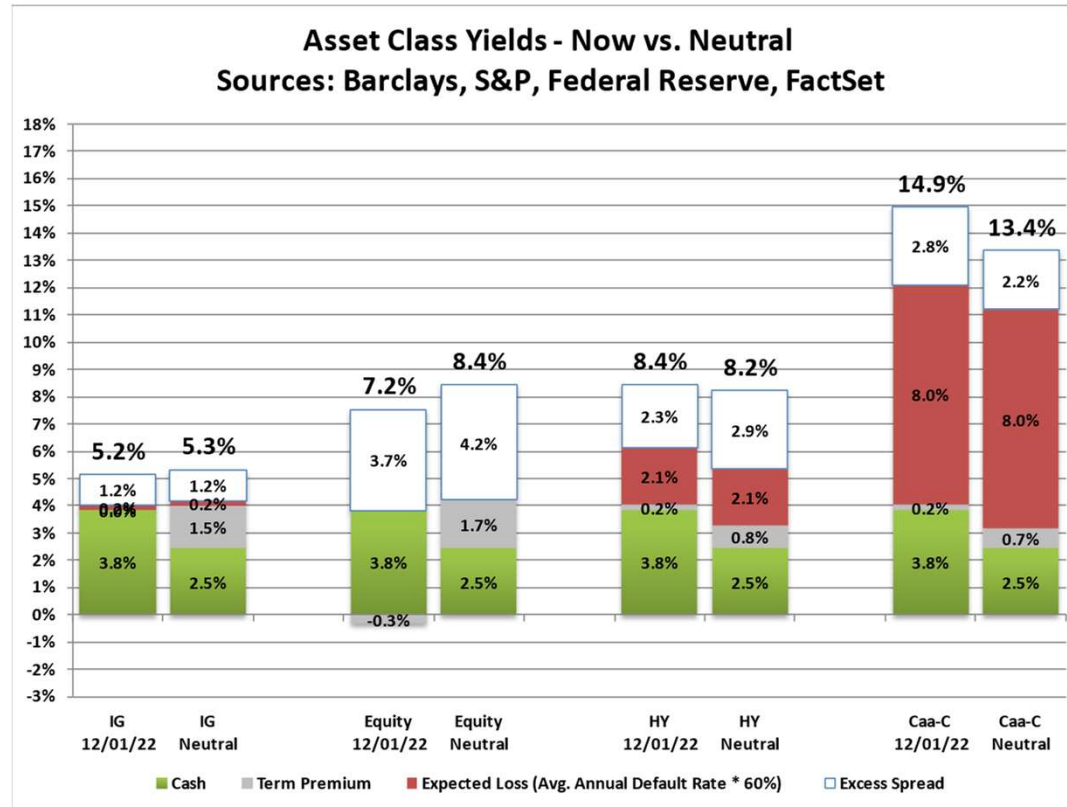


Source: Bloomberg Consensus

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Asset Yields

Yield on cash investments has well surpassed equilibrium



58

Valuation Indicators

U.S. Bond yield is well above the norm

Valuation Metric	Valuation Date	Current	1 Yr	5Yr	10 Yr	All Data	Earliest Data
10 Year Treasury Yield (%)	Nov-2022	3.8	2.6	2.0	2.1	5.9	Jan-62
S&P 500 Forward P/E (NTM)	Nov-2022	17.6	18.4	19.0	17.7	16.4	Jan-90
MSCI xUS Forward P/E (NTM)	Nov-2022	12.2	12.9	14.8	14.8	14.0	Feb-05
Private Equity Multiple (EBITDA, Large)	Sep-2022	11.9	11.8	11.4	10.7	9.2	Jan-94
Barclays Corp Investment Grade OAS (bps)	Nov-2022	147	134	119	125	131	Jun-89
Barclays Corp High Yield OAS (bps)	Nov-2022	468	425	405	432	496	Jan-94
US Inflation (Calendar YoY %)	Nov-2022	7.7	8.0	3.5	2.4	3.8	Jan-62
US Real GDP Growth (Calendar YoY %)	Nov-2022	1.8	3.3	2.2	2.2	3.0	Dec-61
US Volatility	Nov-2022	23.1	26.1	21.5	18.2	19.8	Jan-90
Europe Volatility	Nov-2022	20.9	27.7	22.0	21.1	24.0	Jan-99
UK Volatility	Nov-2022	16.8	21.6	19.3	17.2	18.5	Jan-00
Japan Volatility	Nov-2022	18.2	24.1	22.3	22.6	24.6	Jan-98

US 2022 GDP Growth Forecast: 1.8%

US 2022 CPI Forecast: 8.1%

Source: FactSet, Bloomberg

Board Meeting

Tab 8 – Announcement of Matters Taken Up in Closed Session

Board Meeting

Tab 9 – In the Absence of Questions, the Following Reports will be filed without comment (for informational purposes):

- A. Quarterly Charges to Funds Report, Q3 2022
- B. Private Markets and Funds Alpha Commitments, Q3 2022

November 15, 2022

Senator Howard Marklein, Co-Chair
Joint Committee on Finance
P.O. Box 7882
Madison WI 53707-7882

Representative Mark Born, Co-Chair
Joint Committee on Finance
P.O. Box 8952
Madison WI 53708-8952

Senator Robert Cowles, Co-Chair
Joint Legislative Audit Committee
P.O. Box 7882
Madison WI 53707-7882

Secretary Kathy Blumenfeld
Department of Administration
101 East Wilson Street
P.O. Box 7864
Madison, WI 53707-7864

Dear Senator Marklein, Senator Cowles, Representative Born, and Secretary Blumenfeld:

State statutes require the State of Wisconsin Investment Board (SWIB) to report all expenses charged to the trust funds under management and the number of full-time equivalent positions created or abolished during the quarter¹. The information contained in this report is for the quarter ended September 30, 2022.

Total Cost of Management Summary	4Q2021	1Q2022	2Q2022	3Q2022	Trailing 4 Qtr Total	% of Total
Internal Operating Expenses						
Operating Budget Expenses	\$ 14,225,300	\$ 14,062,637	\$ 42,801,859	\$ 13,275,388	\$ 84,365,184	61.4%
Custodial, Investment Operations & Banking	1,752,273	1,803,372	1,692,456	1,647,965	6,896,066	5.0%
Legal	821,846	625,000	625,000	625,000	2,696,846	2.0%
Investment Research & Consulting	10,521,546	10,007,468	9,150,155	9,112,954	38,792,123	28.3%
Total Internal Operating Expenses	\$ 27,320,965	\$ 26,498,477	\$ 54,269,470	\$ 24,661,307	\$ 132,750,219	96.6%
Securities Lending Agent Expenses	\$ 784,251	\$ 1,282,912	\$ 1,412,138	\$ 1,198,959	\$ 4,678,260	3.4%
Total SWIB Operating Costs	\$ 28,105,216	\$ 27,781,389	\$ 55,681,608	\$ 25,860,266	\$ 137,428,479	100.0%
External Investment Management Fees						
Externally Managed Separate Account Fees						
Beta One & Other - Separately Managed	\$ 9,818,853	\$ 12,730,351	\$ 6,621,385	\$ 15,970,497	\$ 45,141,086	6.8%
Supplemental Information - External Fund Fees						
Real Estate	\$ 17,693,091	\$ 19,209,516	\$ 19,257,344	\$ 20,775,122	\$ 76,935,074	11.5%
Private Equity & Venture Capital	61,375,539	56,999,361	72,498,709	67,722,428	258,596,036	38.7%
Hedge Funds	42,415,360	72,033,779	60,862,749	58,023,466	233,335,355	35.0%
Beta One & Other - External Funds	4,722,875	18,411,505	26,091,654	3,044,345	52,270,379	7.8%
Total External Investment Management Fees	\$ 136,025,718	\$ 179,384,512	\$ 185,331,841	\$ 165,535,858	\$ 666,277,930	100.0%
Total Cost of Management	\$ 164,130,934	\$ 207,165,901	\$ 241,013,449	\$ 191,396,124	\$ 803,706,409	

SWIB operating costs are charged to the trust funds under management. Externally managed fund fees for commingled assets are netted against investment returns generated by SWIB's external fund holdings. It is important to consider costs in the context of value-added investment returns. For example, during the five years ended December 31, 2021, after consideration of all expenses, costs, and fees, SWIB generated more than \$2.2 billion in additional profits beyond what would have been

¹Wisconsin Statutes Section 25.17 (13m): Investment-related costs and expenses charged to the WRS Trust Funds, State Investment Fund, State Life Insurance Fund, Historical Society Endowment Fund, Injured Patients and Families Compensation Fund and UW Trust Fund. Investment transaction expenses, such as trading commissions and interest expense, are included in investment returns, and therefore not included in this report.

generated by the benchmark portfolio SWIB is measured against. These profits all go directly into the Wisconsin Retirement System for the benefit of its beneficiaries.

Attachment A provides a breakdown of the amount and percentage of assets managed under each type of dedicated and commingled account or partnership, and the change in the amount and percentage from the prior calendar quarter. As of September 30, 2022, SWIB's total authorized positions are 290 as shown in the table below.

Assets Under Management & Positions		
	6/30/2022	9/30/2022
Internal Management	48.4%	46.4%
External Management	51.6%	53.6%
Total SWIB Positions	290	290

In addition, Attachment B provides details of the services provided to SWIB and their associated quarterly costs. For definitions of the expense categories presented in the Total Cost of Management Summary table, please refer to Attachment C.

As new investment strategies are implemented and markets continue to evolve, SWIB will continue evaluating the most efficient means to manage the trust fund assets. Please contact us if you have any questions or comments about this report.

Sincerely,



Edwin Denson
Executive Director/Chief Investment Officer

Attachments

cc: Members, Joint Committee on Finance
Members, Joint Committee on Audit
Robert Lang, Legislative Fiscal Bureau
Joe Chrisman, Legislative Audit Bureau

Total Assets Under Management

Wisconsin Retirement System (WRS)	12/31/2021		3/31/2022		6/30/2022		9/30/2022	
	Amount (in millions)	Percent	Amount (in millions)	Percent	Amount (in millions)	Percent	Amount (in millions)	Percent
Internally Managed	\$72,165	49.0%	\$64,161	45.5%	\$52,094	41.7%	\$45,843	39.1%
Externally Managed Dedicated Accounts	36,740	25.0%	36,289	25.8%	27,907	22.4%	26,743	22.8%
Externally Managed Commingled Accounts	38,311	26.0%	40,434	28.7%	44,852	35.9%	44,579	38.0%
1. Passive Index Funds	2,857	1.9%	2,283	1.6%	1,689	1.4%	1,711	1.5%
2. Limited Partnerships	26,574	18.1%	28,548	20.3%	30,212	24.2%	30,771	26.3%
3. Actively Managed Commingled Accounts	8,881	6.0%	9,603	6.8%	12,950	10.4%	12,097	10.3%
TOTAL WRS Assets	\$147,217	100.0%	\$140,884	100.0%	\$124,853	100.0%	\$117,165	100.0%
State Investment Fund - Internally Managed	\$16,051		\$16,930		\$18,401		\$17,876	
Separately Managed Funds - Internally Managed	\$123		\$111		\$101		\$93	
Separately Managed Funds - Externally Managed	\$2,276		\$2,095		\$2,409		\$2,438	
Total Assets Under Management	\$165,666		\$160,020		\$145,764		\$137,573	
Total Internal Management	\$88,338	53.3%	\$81,202	50.7%	\$70,596	48.4%	\$63,813	46.4%
Total External Management	\$77,328	46.7%	\$78,818	49.3%	\$75,168	51.6%	\$73,760	53.6%

STATE OF WISCONSIN INVESTMENT BOARD
Expenses for All Funds Under Management
Quarter Ending September 30, 2022

EXPENSE CATEGORY ¹	SERVICE PROVIDED	EXPENSES
<u>Internal Operating Expenses</u>		
Staff Compensation	Staff Compensation	\$ 9,780,360
Fringe Benefits	Fringe Benefits	2,058,268
Equipment, Supplies & Services	General Supplies & Services	1,436,760
Total Internal Operating Expenses		\$ 13,275,388
<u>Custodial, Investment Operations and Banking Fees</u>		
BNY Mellon Asset Servicing - Custody	Master Custody Services	\$ 256,191
BNY Mellon Asset Servicing - Investment Operations	Investment Operating Services	1,389,798
Markit NA	Investment Data Management Software	2,000
US Bank	Banking Fees	(23)
Total Custodial, Investment Operations and Banking Fees		\$ 1,647,966
<u>Legal Fees</u>		
Cox Castle & Nicholson LLP	Legal Work for Investment Strategies	\$ 40,942
DLA Piper LLP (US)	Legal Work for Investment Strategies	78,209
Godfrey & Kahn SC	Legal Work for Investment Strategies	35,040
Husch Blackwell	Legal Work for Investment Strategies	4,750
Latham & Watkins LLP	Legal Work for Investment Strategies	14,698
Legal Services Expense Accrual	Legal Work for Investment Strategies	350,002
Quarles & Brady	Legal Work for Investment Strategies	93,608
Vedder Price PC	Legal Work for Investment Strategies	7,750
Total Legal Fees		\$ 625,000
<u>Investment Counsel</u>		
Aksia LLC	Hedge Fund Investment Consulting	\$ 193,750
Alex Solutions	Research and Data Services	39,750
Apex Systems	Investment Consulting Services	49,503
Arb Journal	Regulatory Research & Analysis	22,000
Arthur Selender	Investment Consulting Services	20,000
Backstop Solutions Group	Investment Software	33,474
Baele Consulting	Investment Consulting Services	4,570
BCA Research Inc	Global & Domestic Fixed Income Strategy Research	34,125
BITA Risk Limited	Risk Oversight Services	47,250
Blackrock Financial Management Inc	Risk Services	75,000
Bloomberg Finance LP	Market, Company, Industry & Benchmark Information	796,992
BNY Mellon Asset Servicing - Eagle/Pace	Investment Consulting Services	219,780
Bridge Consulting Partners Ltd	Investment Consulting Services	71,280
Business Intelligence Advisors, Inc.	Advisory Services	37,878
Callan Associates Inc	Investment Consulting & Performance Benchmarking	18,750
Capital Economics LTD	Market Research	58,593
Carahsoft Technology Corp	Investment Consulting Services	8,922
CBJL Incorporated	Investment Consulting Services	97,580
CFRA Research	Investment Research Services	17,325
Charles River System Inc	Portfolio Management Trading Software & Services	238,055
CoStar Portfolio Strategy	Real Estate Consulting & Research Services	28,738
CUSIP Global Services	Research and Data Services	16,250
Dacheng Xiu	Investment Research	37,500
Datacamp Inc	Research and Data Services	185
Deutsche Bank	Tax registration fees	14,160
Dow Jones News Service	Company and Industry News Services	322
DTCC – EPN	Trade Settlement Service	3,000
DTCC ITP LLC	Trade Settlement Service	4,214
EFront Financial Solutions Inc	Private Markets Portfolio Management Services	162,453
Elevation LLC	Research and Data Services	15,000
Eric Siegel Consulting LLC	Investment Consulting Services	3,650
Euromonitor International	Research and Data Services	19,766
FactSet Research Systems Inc	Financial & Economic Database	978,106
FIS Data Systems Inc.	Research and Data Services	15,969
Fitch Solutions Inc	Credit Rating Services	17,500
Gallagher	Insurance and Risk Management Services	15,533
Gartner Inc	Technology Sector Research	19,523
Global Financial Data Inc	Research and Data Services	31,500

EXPENSE CATEGORY ¹	SERVICE PROVIDED	EXPENSES
Green Street Advisor	Real Estate Analytics	16,937
Haver Analytics	Global Macroeconomic Research	22,740
Healthy Markets Association	Research & Data Service	20,000
Ice Data LP	Fixed Income Indices	11,858
IHS Markit KY3P LLC	Risk Management Services	22,340
InsiderScore LLC	Investment Research & Analytics	20,000
Institutional Shareholder Services Inc	Proxy Voting Analysis	41,914
Intelligent Automation Consulting	Automation Consulting Services	22,500
Investment Research Expense Accrual	Investment Research	850,000
IPC Systems Inc	Trading Telecommunication System	8,906
IT-Venture LTD	Investment Consulting Services	6,425
Joyce C Knauff & Associates	Investment Consulting Services	32,500
Keystone Consulting Inc	Investment Information Technology Consulting Services	267,440
Kreischer Miller LLP	Investment Consulting Services	14,500
Law Debenture Corporate Services Limited	Investment Consulting Services	2,248
London Stock Exchange	London Stock Exchange Data	(78)
Mackey LLC	Research Management System	53,366
Manalo Advisors Limited	Research and Data Services	3,750
Markit Group Limited	Investment Consulting Services	63,090
Markit NA	Investment Data Management Software	19,250
Markit-EDM Limited	Investment Consulting Services	185,384
Matrix IDM, LLC	Investment Consulting Services	26,600
McLagan Partners Inc	Investment Compensation Data and Analysis	46,813
Meketa Investment Group	Public Markets External Manager Consultant	66,930
MNI Market News	Research and Data Services	2,835
Moodys Analytics	Economic, Currency & Bond Analysis	80,237
MSCI - Barra	Research and Data Services	32,500
MSCI Inc - Risk Metrics Solutions	Research and Data Services	330,300
MSCI, Inc	Research and Data Services	45,634
My Data Outlet International, LLC	Research and Data Services	30,500
NEPC LLC	Investment Consulting Services	50,000
Newsfile	Investment Research	995
Novus Partners Inc	Profit & Loss Analytics System	18,885
Nuware Technology Corp	Investment Information Technology Consulting Services	189,712
NYSE Market Inc	New York Stock Exchange Data	6,240
Odeon Capital Group, LLC	Research and Data Services	6,000
Oliver James	Investment Consulting Services	82,656
Options Price Reporting Authority	Quote System for Options Market	2,393
Pacific Pension & Investment Institute	Access to Investment Research	14,000
Pac-invest	Research and Data Services	8,510
PremiaLab	Investment Research	20,785
Preyer	Investment Consulting Services	33,333
Refinitiv	Research Pricing (Autex, Baseline, FirstCall)	202,112
Russell Investment Group	Index Data	8,932
Rystad Energy AS	Investment Research	7,500
S&P Global Market Intelligence	Industry & Corporate Research	134,867
SailPoint Technologies, Inc.	Information Security Software	18,750
Seaport Global Securities LLC	Research and Data Services	2,650
Sharp Decisions Inc	Investment Information Technology Consulting Services	76,864
Simcorp USA, Inc.	Investment System	1,489,766
Simmons & Simmons	Global Regulatory Services	6,527
Snowflake Inc	Research and Data Services	25,000
Solve Advisors Inc	Investment Research	9,000
Standards Board for Alternative Investments Limited	Investment Membership	2,390
StepStone Group	Private Equity Consulting Services	249,685
StepStone Group Real Estate	Real Estate Consulting Services	57,883
SWIFT SC	Research and Data Services	964
SystemsAccountants	Investment Information Technology Consulting Services	79,360
Taranis, Inc.	Investment Information Technology Consulting Services	79,200
Telsey Advisory Group	Consumer Sector Research	(4,808)
The Nasdaq Stock Market, LLC	Research & Data Services	4,500
Toronto Stock Exchange	Market Data	14,199
TradeWeb	On-Line Fixed Income Trading Services	10,188
Trivariate Research LP	Investment Research	10,000
Unit4 Business Software Inc	Financial & Administration Services System	69,827
Urban Land Institute	Investment Consulting Services	1,100
Vadim Moroz	Investment Consulting Services	67,500
Verus Advisory Inc	Benchmarking Consulting Services	42,000
Virtu ITG Analytics LLC	Trading Transaction Cost Analysis	20,500

EXPENSE CATEGORY ¹	SERVICE PROVIDED	EXPENSES
Visible Alpha LLC	Research and Data Services	25,633
V-Soft Consulting Group Inc	Investment Information Technology Consulting Services	3,600
WallachBeth Capital LLC	Investment Consulting Services	3,000
Wolverine Execution Services LLC	Options Trading Platform	1,395
WorldBridge Partners Inc	Recruitment Consulting	113,998
Yipit, LLC	Research and Data Services	30,000
Total Investment Counsel		\$ 9,112,954
<u>Separate Account Public Market Management Fees</u>		
Acadian Asset Management	Public Market Management Fees	\$ 406,007
Alliance Bernstein	Public Market Management Fees	7,288,932
Blackrock	Public Market Management Fees	1,528,690
Dodge and Cox	Public Market Management Fees	690,994
eSecLending	Public Market Management Fees	2,528
Fidelity Investments	Public Market Management Fees	1,139,768
Parametric	Public Market Management Fees	1,404,655
Prudential Global Investment Management (PGIM)	Public Market Management Fees	1,161,053
Wellington Trust Company	Public Market Management Fees	2,347,870
Total Separate Account Public Market Management Fees		\$ 15,970,497
<u>Securities Lending Agent Fees</u>		
BNY Mellon Asset Servicing	Securities Lending Agent Fees	\$ 1,198,959
Total Securities Lending Agent Fees		\$ 1,198,959
Total Quarterly Charges to Funds		\$ 41,830,764

¹All costs reported are on an accrual basis except for internal operating costs which are on a cash basis of accounting. Negative expense amounts are due to accrual adjustments and/or other miscellaneous adjustments.

Explanation of Expenses

Internal Operating Expenses

Internal operating expenses consist primarily of staff compensation and fringe benefits. SWIB employs a staff of professional investment and support staff to manage trust fund assets. Other internal operating expenses consist of office equipment, supplies, business travel, information technology equipment and services, and general services.

Custodial & Banking Fees

Wisconsin Certificate of Deposit Program: Under a contract with SWIB, Bankers' Bank administers the program under which the State Investment Fund (SIF) purchases certificates of deposit from Wisconsin-based banks and thrifts. Most administrative costs are paid by the participating banks. SWIB's expenses help underwrite other administrative costs, such as insurance that SWIB requires to be purchased.

BNY Mellon: Provides master custodial and administrative services (safekeeping of assets, income collection, valuations and accounting) for public and private domestic and foreign securities in the Wisconsin Retirement System (WRS), the SIF, and the other separately managed trust funds. In addition, SWIB receives performance measurement and analytical services through its contract with BNY Mellon, which serves as the official book of record for SWIB's accounting and performance measurement functions. BNY Mellon provides data and analytical tools used by SWIB for compliance and risk management. These include global collateral management, data management, and hosting services. Fees for these services are established by contract.

US Bank: The State of Wisconsin contracted with US Bank to be the state's working bank. The fees paid to US Bank by the SIF reflect bank service charges that are not directly applicable to the fund participants.

Legal Fees, Services, and Expenses

Under authority delegated by the Attorney General, pursuant to s. 25.18 (1) (a) Statutes, SWIB may employ legal counsel for any matters arising out of the scope of its investment authority. This includes legal services relating to bankruptcies, class actions, private markets transactions, fiduciary advice, securities law, investment litigation, and other similar matters.

Investment Counsel

Current law gives SWIB the authority to employ investment counsel in any matters arising out of the scope of its investment authority. Investment research and services provided include global market, industry, economic and company information, financial and performance analytics, news information, pricing and exchange data, credit ratings, financial modeling, economic forecasting, trading services, and a variety of Board consultations. These services enable SWIB to perform due diligence on current and future holdings and assist in monitoring investments.

Securities Lending Agent Fees

Securities lending programs generally earn income through the reinvestment of cash collateral posted by borrowers and through the collection of fees for loans where non-cash collateral is posted. SWIB's securities lending income is shared with the agent to pay the costs associated with the administration of the program. Securities lending agent fees are reported as expenses.

Externally Managed Separate Account Fees

External asset managers have been delegated authority within guidelines established by SWIB to determine investment strategy and purchase securities in SWIB's name within a SWIB account. Fees are typically assessed as a percentage of the market value of assets under management and in some cases, fees are based on investment performance.

External Funds Fees

SWIB invests in separate legal entities managed by external investment managers to gain exposure to select strategies including Public Markets, Private Equity, Venture Capital, Real Estate and Hedge Funds. In exchange for their investment management services, the external managers charge a fee within the entity they manage. Fees are typically assessed as a percentage of the market value of assets under management, commitments, and in some cases are based on investment performance. While the fees charged to these external vehicles do not meet the statutory definition of a cost or expense to SWIB, they are currently included in SWIB's total cost of management. Accordingly, these fees are reported as supplemental information.

Private Equity Commitments*

July 2022 – September 2022

<i>Investment</i>	<i>Commitment (millions)</i>
Blackstone Green Private Credit Fund III	\$50.0
Flexpoint Fund V-A	\$83.3
Flexpoint Overage Fund V-A	\$16.7
LEA Mittelstandspartner II-A	€43.5
Lime Rock Partners IV	\$43.0
Lime Rock Partners V	\$85.0
Lime Rock Partners VI	\$10.0
Lime Rock Resources IV-A	\$25.0
Lime Rock Resources IV-C	\$12.5
ParkerGale Capital III	\$30.0
Providence Equity Partners IX	\$150.0
Quantum Energy VIII	\$62.1
Quantum Energy VIII Co-Investment	\$12.9

**Includes Current Return Portfolio*

Private Equity Commitments*

July 2022 – September 2022

<i>Investment</i>	<i>Commitment (millions)</i>
Shamrock Capital Content Fund III	\$50.0
Sixth Street Lending Partners	\$100.0
Information Technology Co-Investment	\$40.0
Information Technology Co-Investment	€9.0
Information Technology Co-Investment	\$8.0
Industrials Co-Investment	\$10.0
Consumer Co-Investment	\$25.0

**Includes Current Return Portfolio*

Private Debt Investments/Commitments

July to September 2022 (Third Quarter)

<i>Investment</i>	<i>Investment/Commitment</i>
None	\$0
Total	\$0

Real Estate Commitments

July 2022 – September 2022

<i>Investment</i>	<i>Commitment (millions)</i>
AIGGRE U.S. Real Estate Fund IV, L.P.	\$100
Heitman Life Storage Co-Investment I, L.P.	\$116
MM BIG Peninsula Co-Invest Member LLC	\$25
6651 N. I-35 Cold Storage Venture LLC	\$50
BlackChamber Real Estate Opportunity Fund II, LP	\$30
BlackChamber Fund II Priority Co-Invest	\$60
BC Co-Invest Brambleton Tech Park, LP	\$13
Sentinel Separate Account	\$150
Total	\$543

Funds Alpha Commitments*

July – September 2022

Manager	Commitment (Millions)
LibreMax SOP II	\$ 50
Badgerstone	\$ 125
Symmetry Adaptive	\$ 76
PCAF	\$ 75
PIMCO GCOF	\$ 25
Oak Hill	\$ 500
Driehaus	\$ 75
Walleye	\$ 200
Gramercy	\$ 25
Total	\$ 1,151

**Includes Hedge Funds and Beta One*

Board Meeting

Tab 10 - Future Items for Discussion

2023 Board Meeting and Agenda Plan

March 2023	
SPCG	<p>Open Session</p> <ul style="list-style-type: none"> • Real Estate Strategy Report and Market Outlook • Corporate Governance Program Update • June Investment Forum Preview • Project Centum Update <p>Executive Closed Session</p> <ul style="list-style-type: none"> • ED/CIO Goals Review
Audit & Finance	<p>Open Session</p> <ul style="list-style-type: none"> • Annual Charter Review • Open Audit Issues Report • Approval of Draft Audit Reports • Audit Plan Status • 2023 Internal Audit Goals • Financial Reporting • Administrative Reports <p>Executive Closed Session</p> <ul style="list-style-type: none"> • Evaluation of Internal Audit Director • Internal Audit Director Salary Recommendation
Compensation & Workforce Development	<p>Open Session</p> <ul style="list-style-type: none"> • Annual Charter Review • Recruiting Update • Strategic Results Scorecard Approval • Incentive Compensation Program Review • Scoring of Strategic Results Scorecard / Review Division Scorecards • Incentive Compensation Award Recommendations <p>Executive Closed Session</p> <ul style="list-style-type: none"> • Incentive Compensation Award Recommendation for Specific Individuals • ED/CIO Evaluation and Compensation
Board Meeting	<p>Open Session</p> <ul style="list-style-type: none"> • Committee Reports • Election of Secretary and Assistant Secretary • Annual Committee Assignments • Proposed Meeting Dates for Next Year • Investment Performance and Market Updates; Callan Peer Report (onsite) • Investment Committee Open Session Business • Quarterly Investment Update • Q4 Direct Charges to Funds / PMFA Commitments <p>Closed Session</p> <ul style="list-style-type: none"> • Risk Management Update • Investment Committee Closed Session Business <p>Executive Closed Session</p> <ul style="list-style-type: none"> • Incentive Compensation Award Recommendations for Specific Individuals

2023 Board Meeting and Agenda Plan

June 2023	
SPCG	<p>Open Session</p> <ul style="list-style-type: none"> Hedge Fund Strategy Report and Market Outlook Project Centum Update <p>Executive Closed Session</p> <ul style="list-style-type: none"> ED/CIO Goals Review
Audit & Finance	<p>Open Session</p> <ul style="list-style-type: none"> Open Audit Issues Report Approval of Draft Audit Reports Affirmations and Disclosures Audit Plan Status Five-Year Audit Summary Financial Reporting Administrative Reports <p>Executive Closed Session</p> <ul style="list-style-type: none"> LAB Review of Statements of Economic Interest
Compensation & Workforce Development	<p>Open Session</p> <ul style="list-style-type: none"> Annual Charter Review Recruiting Update
INVESTMENT FORUM	
Board Meeting	<p>Open Session</p> <ul style="list-style-type: none"> Committee Reports Investment Performance and Market Updates; Callan Peer Report Investment Committee Open Session Business Quarterly Investment Update Q1 Direct Charges to Funds / PMFA Commitments <p>Closed Session</p> <ul style="list-style-type: none"> Risk Management Update Investment Committee Closed Session Business
INVESTMENT FORUM	

2023 Board Meeting and Agenda Plan

September 2023	
SPCG	<p>Open Session</p> <ul style="list-style-type: none"> • Private Equity Strategy Report and Market Outlook • Corporate Governance 2023 Proxy Voting Review, ISS Update, and ESG Trends • Trustee Manual Review/Policies Update • October Workshop Preview • Project Centum Update <p>Closed Session</p> <ul style="list-style-type: none"> • Annual Consultant Reporting • Security Management, IT, and Data Management Update <p>Executive Closed Session</p> <ul style="list-style-type: none"> • ED/CIO Goals Review
Audit & Finance	<p>Open Session</p> <ul style="list-style-type: none"> • WRS Audited Financial Statements • Open Audit Issues Report • Approval of Draft Audit Reports • Audit Plan Status • 2024 Audit Plan Preview • Financial Reporting • Administrative Reports
Benchmark & Performance	<p>Open Session</p> <ul style="list-style-type: none"> • Annual Benchmark Preview
Board Meeting	<p>Open Session</p> <ul style="list-style-type: none"> • Committee Reports • Investment Forum Recap • Biennial Ethics Training • Fiduciary Training • Public Records Training • Investment Performance and Market Updates; Callan Peer Report • Investment Committee Open Session Business • Quarterly Investment Update • Q2 Direct Charges to Funds / PMFA Commitments <p>Closed Session</p> <ul style="list-style-type: none"> • Risk Management Update • Investment Committee Closed Session Business <p>Executive Closed Session</p> <ul style="list-style-type: none"> • Board Self-Evaluation with Governance Consultant

OCTOBER BOARD WORKSHOP
<ul style="list-style-type: none"> • Outside Speakers • Asset Allocation review with Actuaries

2023 Board Meeting and Agenda Plan

December 2023	
SPCG	<p>Open Session</p> <ul style="list-style-type: none"> Beta One Strategy Report and Market Outlook Annual Charter Review Project Centum Update <p>Executive Closed Session</p> <ul style="list-style-type: none"> ED/CIO Goals Review
Audit & Finance	<p>Open Session</p> <ul style="list-style-type: none"> SIF Audited Financial Statements Open Audit Issues Report Approval of Draft Audit Reports Audit Plan Status Strategic Plan Review Proposed 2024 Audit Plan Financial Reporting, including Budget and Position Request Administrative Reports <p>Executive Closed Session</p> <ul style="list-style-type: none"> LAB Review of Statements of Economic Interests
Benchmark & Performance	<p>Open Session</p> <ul style="list-style-type: none"> Annual Charter, Policies, and Philosophy Review Benchmark Consultant Report
Compensation & Workforce Development	<p>Open Session</p> <ul style="list-style-type: none"> Compensation Philosophy Review Compensation Consultant Incentive Compensation Plan Changes for Next Performance Year Incentive Compensation Projections Annual RPM Review People Metrics Recruiting Metrics <p>Executive Closed Session</p> <ul style="list-style-type: none"> Succession Planning
Board Meeting	<p>Open Session</p> <ul style="list-style-type: none"> Committee Reports Investment Performance and Market Updates; Callan Peer Report Cost Benchmarking Report Asset Allocation Recommendation Quarterly Investment Update Investment Committee Open Session Business Q3 Direct Charges to Funds / PMFA Commitments <p>Closed Session</p> <ul style="list-style-type: none"> Asset Allocation Implementation Risk Management Update Investment Committee Closed Session Business Annual Review of Expected Tail Loss Analysis