ECKLER

One Investment Joint Investment Board

Education Session #3

November 15, 2024

Eckler - Who We Are

Canada's largest independent actuarial and traditional investment consulting firm

- Conflict free
- Unbiased
- Does not offer OCIO or investment management services
- Leader in the OCIO advisory space
- Provides governance and investment consulting to multiple boards across Canada

Portfolio Construction

What is Portfolio Construction

- *“Portfolio construction is the process of understanding how different asset classes, funds and weightings impact each other, their performance and risk and how decisions ladder up to an investor’s objectives.”* (Blackrock)

- The process …

- What are the key objectives for the portfolio
  - Minimize volatility
  - Capital protection
  - Generate returns
- What are the “pain points” for potential outcomes
  - Capital impairment
  - Inflation and decrease in real spending
  - Probability of corrective actions
- Allocate portfolio among various asset classes to optimally meet the key objectives
  - Respecting the risk tolerance

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Asset Class Inputs

- Expected Returns
  - For each asset class under consideration, forecast the long-term average return that is expected to be achieved.
- Variability of Expected Returns
  - Noting that the expectation is a best (educated) guess, forecast the degree at which, in any given period, the actual return could be different from the long-term average.
  - Provides insight into the probability that your educated guess is accurate.
- Correlations of Expected Returns
  - Not all asset classes provide the same rate of return at the same time (COVID example):
    - Canadian equities returned -21% for the first three months of 2020 – below the long term expected return.
    - Federal bonds returned +5% for the first three months of 2020 – above the long-term expectations.
  - Correlation measures the tendencies of returns to be above or below the long-term expectations at the same time.

Asset Class Inputs

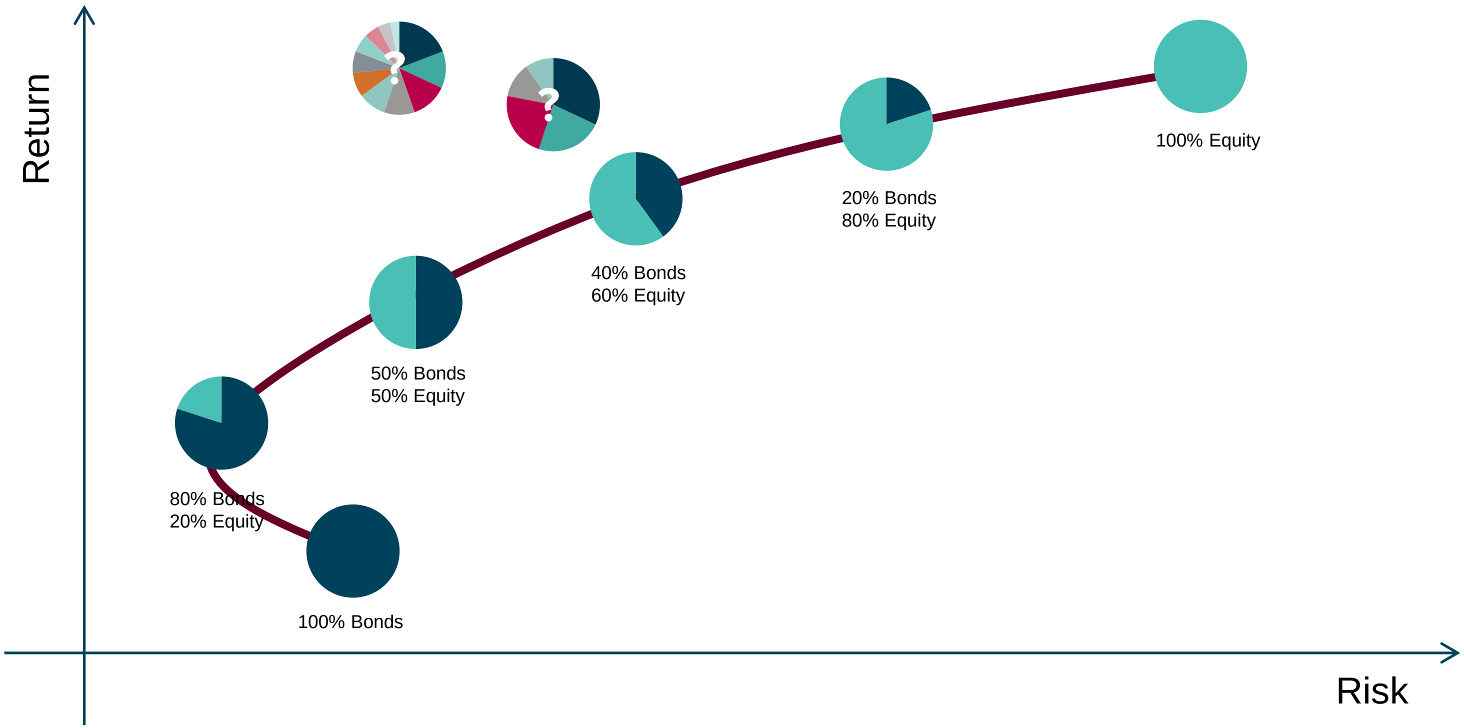
- Expressing Correlations - relative measure ranging from (1.0) to 1.0
  - Perfect negative correlation = (1.0) (i.e., when one is above, the other is below)
  - Perfect positive correlation = 1.0 (i.e., both are above or below at the same time)
  - Perfect uncorrelated assets = 0.0 (i.e., no related pattern of returns)

- In designing a diversified portfolio, you prefer low or negatively correlated patterns of returns between asset classes:
  - During the first quarter of COVID an all-Canadian equity portfolio generated a return of -21%, a portfolio of 50% Canadian equities and 50% bonds generated a -10% return (a result of low correlation between bonds and equities).
  - Taken one step further, a sampling of Eckler's client base with material alternatives allocations returned above -7% during the same quarter, a result of the incorporation of multiple asset classes with varied correlations designed to dampen overall volatility and protect capital.
  - Important to consider that correlations can break down or change during periods of extreme market stress – **capital market contagion.**

- The goal of portfolio construction is to find the "secret formula" of which asset classes to include at what percentages in order to maximize the portfolio risk adjusted performance after fees.

Graphically

- Generally, investment risk in a portfolio is tightly linked to equity exposure.
  - High expected returns come with higher volatility (risk).



Diversification

2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
10%	8%	9%	27%	16%	31%	32%	18%	6%	52%	20%	10%	16%	41%	24%	22%	21%	28%	4%	25%	16%	28%	-6%	23%
8%	3%	-6%	27%	15%	24%	26%	10%	-17%	35%	18%	5%	15%	37%	11%	19%	8%	17%	1%	23%	16%	25%	-8%	15%
3%	0%	-7%	23%	14%	13%	20%	4%	-21%	28%	13%	0%	15%	31%	11%	19%	8%	16%	-2%	18%	14%	15%	-10%	14%
-6%	-4%	-12%	14%	11%	12%	17%	3%	-29%	17%	10%	-9%	13%	13%	11%	4%	8%	14%	-6%	16%	10%	11%	-12%	2%
-7%	-6%	-13%	13%	9%	11%	15%	-6%	-30%	12%	9%	-9%	8%	12%	9%	4%	7%	9%	-7%	16%	9%	10%	-12%	12%
-11%	-13%	-17%	7%	7%	6%	13%	-9%	-33%	7%	7%	-10%	7%	4%	7%	2%	2%	8%	-7%	12%	6%	-3%	-13%	7%
-28%	-17%	-23%	5%	3%	2%	4%	-11%	-42%	5%	2%	-16%	4%	-1%	4%	-8%	-2%	3%	-9%	7%	6%	-3%	-14%	7%

- MSCI Emerging Markets
- MSCI EAFE Index
- MSCI ACWI Small Cap
- S&P / TSX Composite Index
- FTSE Canada Universe Bond Index
- S&P 500 Index
- 60 / 40 Balanced Fund*

* 40% fixed income; 30% Canadian equities; 30% global equities

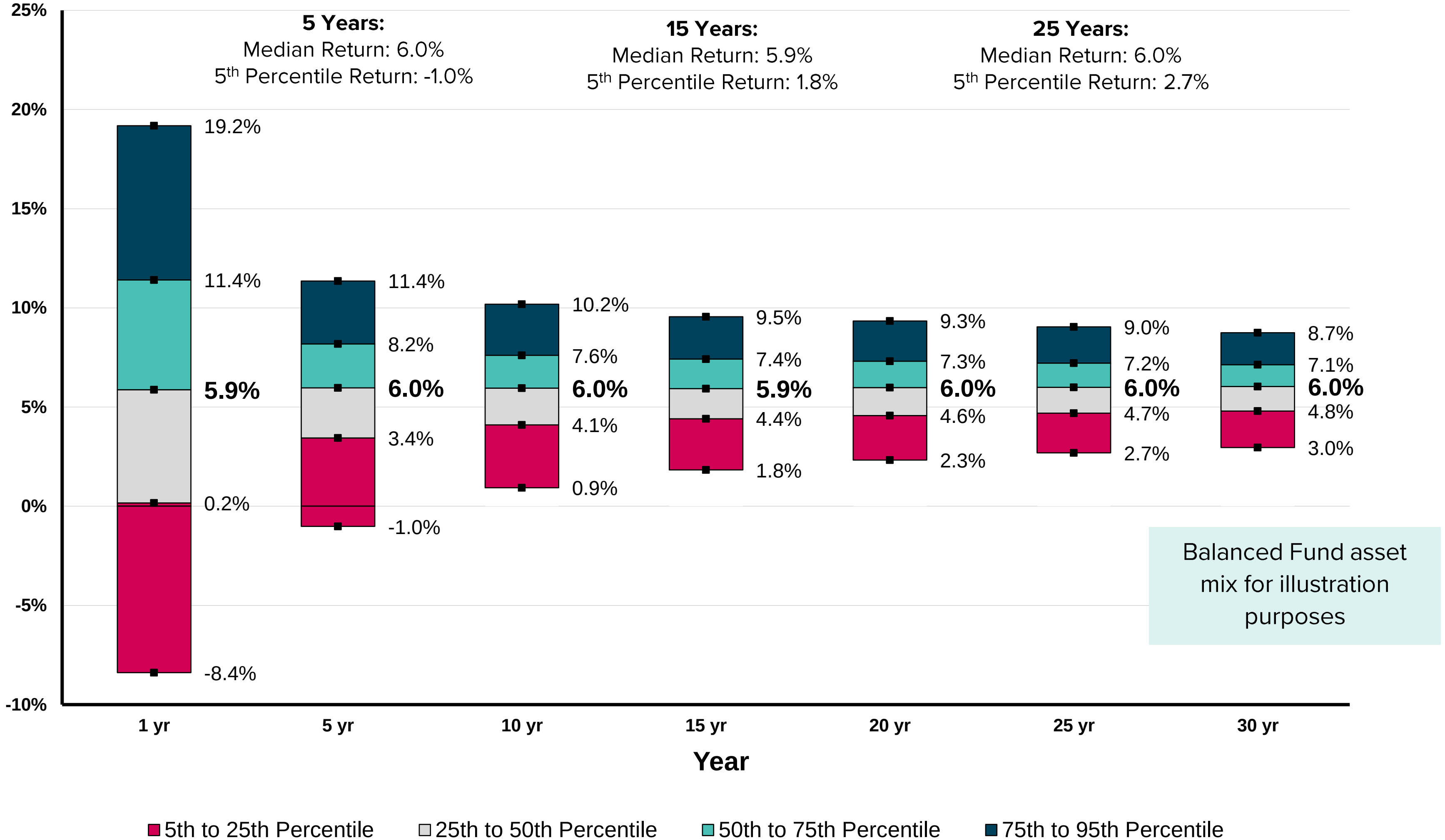
- Canadian Equity 24-year average return = 6.6%; volatility = 15.6%
- Balanced Fund 24-year average return = 5.6%; volatility = 8.6%
- Risk adjusted return ratios:
  - Balanced Fund: 0.65 (5.6% / 8.6%)
  - Canadian Equity : 0.42 (6.6% / 15.6%)

Portfolio Modelling

- Use stochastic modelling to determine distribution of possible forward-looking outcomes:
  - Derive probability distribution of outcomes.
  - Considers the past but focuses on future expectations of key variables: Interest rates, inflation, bond yields.
  - Assumes active management can compensate for fees.
- Model expected risk and return of the varying asset mixes:
  - Model 5,000 possible outcomes per year over the investment horizon.
  - Analysis over a 10-to-15+ year investment horizon (varies by portfolio).
- Expected return – median return:
  - Mid-point of the distribution – Consider the median as the “best guess”.
  - 50% would be higher; 50% would be lower.
- Expected risk – 5th percentile return:
  - Lowest 5% of possible outcomes; 95% of simulations would be higher.

Illustrated Returns – Annualized

30 Year Projection of Annualized Investment Returns



Setting Goals and Objectives

- Why are you here?
- What are you trying to achieve?
- What are your “measurable” goals and objectives?
  - For the Board / for the investment portfolio?
- Sets the foundation for all decision making.
- Goals and objectives can be set independently of investment strategy, but they have to be consistent:
  - E.g., – ESG beliefs could be constrained if portfolio implementation is through pooled funds.
  - Conflicts have to be addressed and resolved.
- Make sure the goals you set are “SMART” …

SMART Goals

- "**S**"pecific
- "**M**"easurable
- "**A**"ttainable
- "**R**"ealistic
- "**T**"ime bound
- A good example for an institutional portfolio…
  - Achieve a 10-year annualized gross rate of return of 6% to support a real spending target of 4% per annum while limiting capital impairment.
  - Satisfies most criteria, however, it may not be realistic depending on macroeconomic results in early years (if a market correction occurs early on, the spending target and capital impairment goals may be at odds).

Risk Management Framework

- Identify which risks are the most significant, can have the greatest impact on the ability to achieve goals:
  - “Risk ranking”.
- For most institutional investors, accepting some level of investment risk is necessary to support the goals of the portfolio (spending, benefit payments, long-term growth, etc.).
- Decide on how to approach each risk.

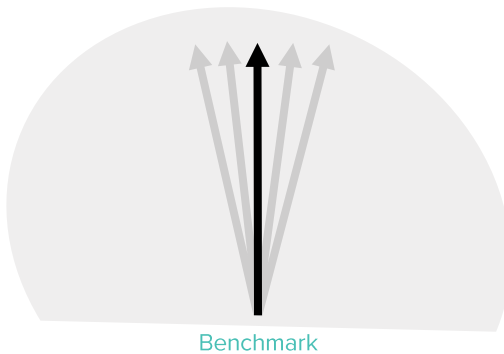
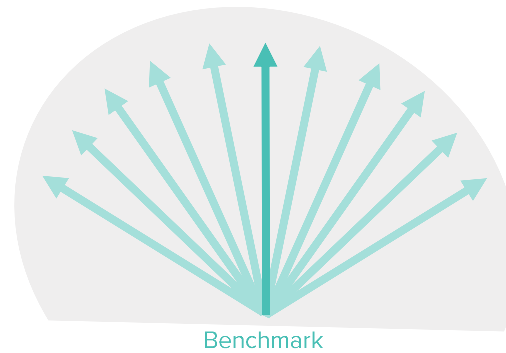
The risk decision

Risk Budgeting - Classification

- Risks can be classified as:
  - Rewarded: should have higher expected return.
  - Unrewarded: does not have higher expected return.
- Only risks that can be rewarded should be assumed.
- Risks can also be viewed on whether or not you can insure against them:
  - Can be hedged: you can easily avoid or mitigate.
  - Cannot be hedged: you cannot easily avoid.
- Whether or not you hedge a risk will depend on the expectation that the unhedged risk has sufficient reward, relative to the hedged risk.
- Some risks are simply unforeseen and unavoidable:
  - E.g., political / regulatory.

Implementation Considerations

Passive or Active Investing

	Passive Management	Active Management
		
Objective	Closely track the performance of an index	Add value in excess of an index
Buy & sell decisions	The investment manager buys securities in proportion to the index weight, without any fundamental analysis or cash weight	The investment manager is the ultimate decision-maker of which securities to buy, and at what portfolio weight
Implementation approaches	• Full replication (equity) • Stratified sampling (fixed income)	• Fundamental • Quantitative

Equity Style

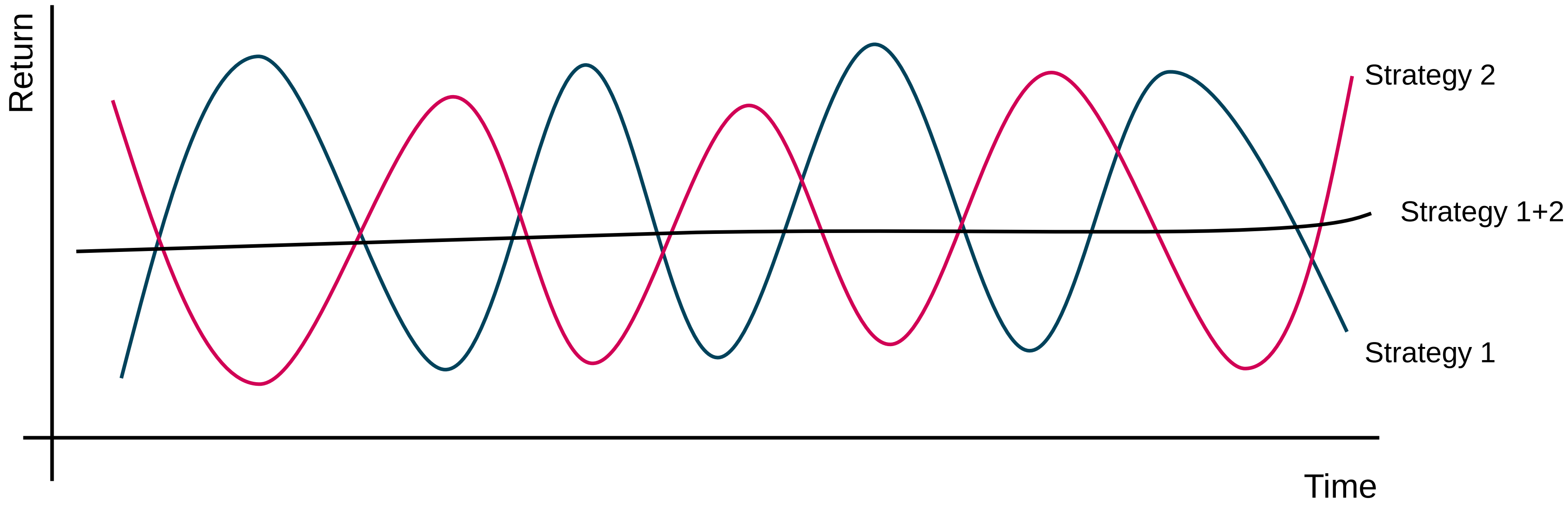
- Types of equity managers:
  - **Value:** looking for "bargains". Stock trading at a price below the perceived value. Low price to earnings ratio, low price to book value. The decision is tied to valuation.
  - **Growth**: less concern over valuation. Looking for companies with rapidly growing sales and earnings. Anticipate future growth in stock price will follow.
  - **Core/Blend**: expected to draw from both approaches.

- Unfortunately it is not that clear cut:
  - some growth biased managers also consider value in the investment decision making process.
  - multiple approaches to value investing.

- Capitalization Approach (classifications can be different)
  - A company capitalization is calculated as (share price x No of shares outstanding).
    - **Small Cap Focus:** Companies between $250 million and $2 billion.
    - **Mid Cap Focus:** Companies Between $2 and $10 billion.
    - **Large cap focus**: Companies over $10 billion.
      - Also mega cap (NVIDIA, Amazon, Alphabet, etc...).

Offsetting Implementation

- Recall correlation from earlier!
  - Based on style and approach, individual strategies in the same asset class can also have low correlations.



- Decision making considerations:
  - Size of total allocation to the asset class.
  - Impact on portfolio management fees.

Segregated Accounts & Funds

- Following decisions related to active management and equity style, the use of pooled or segregated account structures can also be examined:
  - Both approaches have pros and cons – will depend on client and strategy.

- Segregated accounts allow investors to directly hold the individual securities comprising the strategy:
  - This structure typically involves a custodian that holds the securities in the name of the client with the investment manager retaining trading authority in the account.
  - Allows clients to implement specific constraints and potentially employ securities lending.

- Many investors today opt to utilize pooled funds made available by investment managers where clients purchase units of the fund which holds the underlying securities:
  - This structure can provide flexibility around the use of custodians and can potentially reduce fees depending on scale and manager pricing.
  - Reduces the ability for client specific constraints with trading costs / securities lending income spread across all unit holders.

Fund Structures & Liquidity

- In the private market space, the ability to utilize segregated accounts is restricted to large mandates given the nature of the underlying investments.

- Private market funds are available in two main structures: open-ended or closed-ended.

Open-ended funds:

- Are ‘evergreen’ and managed on a continuous basis, allowing investors to stay in the fund for as long as they choose.
- Allow for redemptions if requested, usually within three to 12 months depending on the amount.

Closed-ended funds:

- Have a finite lifespan normally lasting at least 5+ years until fund assets are liquidated and investment income is distributed to investors.
- Are more restrictive for clients to request redemptions.
- When investors receive their money back at the end of the fund's life, they need to select a new fund or manager to invest in.

Focus areas for Boards

- The decisions made at the investment policy level (asset mix) are typically the largest focus for most boards – has the largest impact on the expected risk / return profile of the portfolio.
- Important to also understand the strategies being utilized within the portfolio to implement the policy – where an OCIO is engaged, implementation tasks are delegated with the board focused on reviewing the OCIO.
- Most boards cannot commit the time involved to review all aspects required at the implementation stage – fiduciary duty is better spent in other areas.
- Ongoing monitoring and a strong governance structure provides for the ongoing feedback and assessment of the portfolio.

Investment Oversight and Monitoring

Investment Monitoring

- The monitoring function of an institutional investment portfolio is typically built around frequent performance reporting (monthly to quarterly) with more in-depth asset mix and/or policy reviews being conducted on an annual basis.

- Performance reporting should link back to the investment policy in terms of the metrics / benchmarks set out by the Board for the various components of the portfolio.

- Both absolute and relative performance assessments are useful to determine if the investment managers / strategies are performing within expectations.

- Qualitative assessment is as crucial (if not more) than quantitative to ensure there is a forward-looking aspect to monitoring.

Benchmark Setting - SAMURAI

- **S**pecified in advance – known to both the manager and client.
- **A**ppropriate – consistent with the mandate / investment style.
- **M**easurable – possible to calculate on a frequent and timely basis.
- **U**nambiguous – individual securities and weights are clearly identifiable.
- **R**eflective of current opinions – should be familiar with the securities within the benchmark and develop an opinion on attractiveness (should not include obscure securities).
- **A**ccountable – manager/client should accept ownership of the benchmark.
- **I**nvestable – must be possible to recreate and invest in the benchmark.
- **Not all benchmarks / strategies will check all boxes – Best Fit.**

Monitoring Example

Periods Ending June 30, 2024	1 Quarter	YTD	1 Year	4 Years	5 Years	10 Years	Info Ratio (5 Years)	Risk Adjusted Return Ratio (5 Years)	Up Market Capture (5 Years)	Down Market Capture (5 Years)
Percentile Ranking	***20***	***10***	***12***	***39***	***12***	***1***	***2***	***25***	***21***	***39***
Total Fund	**1.67%**	**8.27%**	**13.61%**	**8.58%**	**8.21%**	**8.18%**	**0.58**	**0.84**	**1.12**	**1.07**
Benchmark[1]:	1.86%	7.03%	11.70%	7.64%	7.20%	7.01%		0.79	1.00	1.00
Value Added:	(0.19%)	1.24%	1.91%	0.94%	1.01%	1.17%				

The fund achieved a rate of return of 1.67% for this quarter, 0.19% below the fund's benchmark objective. Over five years, the fund has earned an annualized return of 8.21%, **surpassing the fund's benchmark return by 1.01%.**

Over the past five years, when the benchmark produced a positive return for the quarter, the fund **captured 112% of the positive returns**. When the benchmark produced a negative return for the quarter, the fund **captured 107% of the negative returns**. On average, the fund outperformed the benchmark in positive markets while lagging in negative ones.

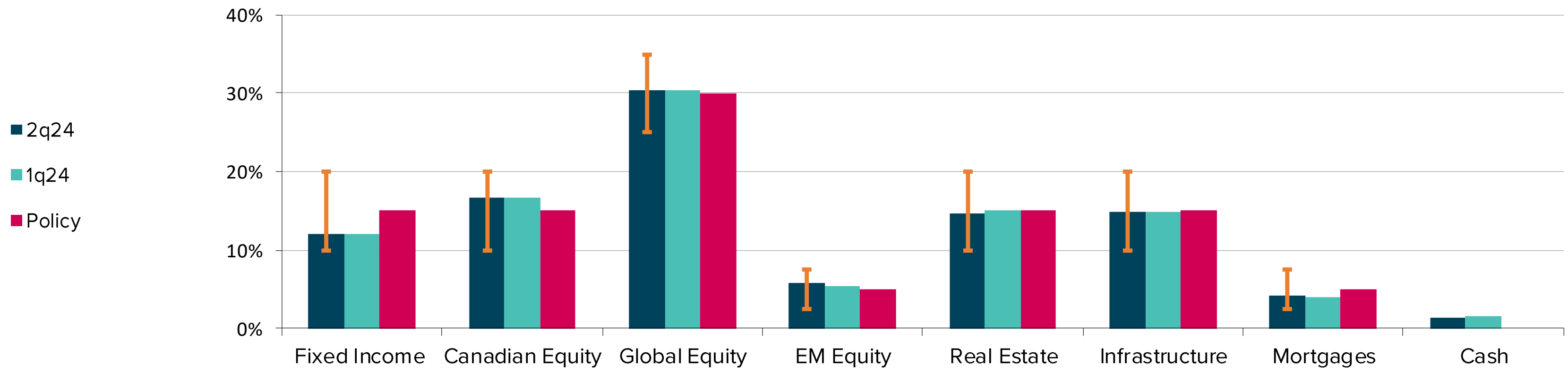
The total fund market value increased by 1.59% since last quarter. The total value of the fund at June 30, 2024 was $2,555,234,887 (market) and $1,985,093,503 (book).

Trend Analysis & End Point Sensitivity

5 Years Ending	5 Year Added Value	Info Ratio	Sharpe Ratio	Standard Deviation	Tracking Error	Hit Ratio	Market Capture	
							Bear	Bull
2q24	1.01%	0.58	0.61	9.8%	1.7%	75.0%	106.6%	111.9%
1q24	1.16%	0.67	0.65	9.8%	1.7%	80.0%	106.6%	113.3%
4q23	0.79%	0.47	0.68	9.9%	1.7%	75.0%	106.6%	109.6%
3q23	0.69%	0.41	0.46	10.1%	1.7%	75.0%	105.2%	109.6%
2Q23	0.78%	0.47	0.54	10.0%	1.7%	75.0%	105.5%	110.2%
1Q23	0.87%	0.52	0.60	10.0%	1.7%	75.0%	105.5%	110.7%
4Q22	0.70%	0.42	0.51	9.9%	1.7%	70.0%	105.9%	110.3%
3Q22	0.61%	0.37	0.50	9.8%	1.7%	70.0%	105.9%	109.6%
2Q22	0.45%	0.28	0.52	9.8%	1.6%	70.0%	109.9%	110.1%
1Q22	0.63%	0.39	0.84	8.6%	1.6%	75.0%	114.6%	111.3%
4q21	1.32%	1.73	1.17	7.9%	0.8%	80.0%	97.7%	111.0%
3q21	1.37%	1.82	1.10	7.8%	0.8%	80.0%	97.7%	112.1%
2q21	1.42%	1.89	1.18	7.8%	0.8%	80.0%	97.7%	111.9%
1q21	1.23%	1.53	1.11	7.7%	0.8%	75.0%	97.7%	110.6%
4q20	1.10%	1.25	1.03	7.8%	0.9%	70.0%	97.7%	109.8%
3q20	1.14%	1.25	0.99	7.7%	0.9%	70.0%	97.7%	110.6%
2q20	1.25%	1.27	0.84	7.7%	1.0%	70.0%	91.1%	109.9%
1q20	1.22%	1.24	0.61	6.8%	1.0%	70.0%	92.8%	113.1%
4q19	1.26%	1.28	1.34	5.4%	1.0%	70.0%	88.5%	112.4%
3q19	1.18%	1.26	1.33	5.4%	0.9%	70.0%	88.5%	111.6%

Asset Mix Compliance

The following chart shows the asset mix of the total fund at the end of the two most recent quarters compared to the Fund's policy asset mix. The orange lines indicate the limits of the asset mix ranges. When the current weight (the top of the dark blue bar) does not fall within this range, rebalancing is necessary.



	Fixed Income	Canadian Equity	Global Equity	EM Equity	Real Estate	Infrastructure	Mortgages	Cash
Current Weighting	12.0%	16.7%	30.5%	5.8%	14.7%	14.9%	4.1%	1.3%
Policy Minimum	10.0%	10.0%	25.0%	2.5%	10.0%	10.0%	2.5%	0.0%
Policy Weighting	15.0%	15.0%	30.0%	5.0%	15.0%	15.0%	5.0%	0.0%
Policy Maximum	20.0%	20.0%	35.0%	7.5%	20.0%	20.0%	7.5%	0.0%
Over / (Under)	(3.0%)	1.7%	0.5%	0.8%	(0.3%)	(0.1%)	(0.9%)	1.3%

The Fund was overweight Canadian equity, global equity, emerging market equity, and cash while underweight fixed income, real estate, infrastructure, and mortgages when compared to the policy asset mix.

At the end of the quarter, there were no policy violations.

Qualitative Assessment

Investment Manager / OCIO	Mandate	Performance Objectives	Objectives Achieved	Manager Changes	Overall Rating
OCIO	Indexed Fixed Income	Index + 0.1% RAR above index	No Yes	No recent turnover. Firm AUM remains stable. Further OCIO due diligence included in the annual OCIO monitoring report.	**Pass**
OCIO	Canadian Equity	Index + 1.0% Top third ranking RAR above Index RAR above median	No No No No	No recent turnover. Firm AUM remains stable. Further OCIO due diligence included in the annual OCIO monitoring report.	**Fail**
OCIO	Global Equity	Index + 1.0% Top third ranking RAR above Index RAR above median	Yes No Yes Yes	No recent turnover. Firm AUM remains stable. Further OCIO due diligence included in the annual OCIO monitoring report.	**Pass**
OCIO	Emerging Market Equity	Index + 1.0% Top third ranking RAR above index RAR above median	No No Yes Yes	No recent turnover. Firm AUM remains stable. Further OCIO due diligence included in the annual OCIO monitoring report.	**Pass**
Alternative Manager #1	Real Estate	Above index RAR above index	Yes No	Significant organizational turnover within past twelve months.	**Fail**
Alternative Manager #2	Infrastructure	Above index RAR above index	Yes Yes	No recent changes, announced retirement of CIO in 2025.	**Pass**

Monitoring and OCIO mandates

- Within an OCIO governance structure, the decisions related to underlying investment managers / strategies is delegated to the OCIO.
  - Receiving ongoing reporting and qualitative assessments of the underlying managers / strategies can be useful to the Board but does not represent a decision factor.

- Monitoring an OCIO relationship contains aspects of traditional investment manager monitoring but also requires an additional qualitative assessment around the advisory services of the OCIO.
  - The OCIO is also providing strategic advice around policy creation and asset mix, important to assess if these services are delivering value.

- Eckler has experience assisting multiple investors manage and monitor their OCIO programs – in our experience it pays dividends in the long term to conduct frequent assessments to uncover areas where the client and OCIO may have different expectations related to service delivery / quality.

ECKLER