CONFIDENTIAL

STATEMENT OF INVESTMENT POLICY AND OBJECTIVES

VERSION 1.8

September 2023

CONTENTS

DOCUMENT OVERVIEW

REVISION HISTORY

Name	Date	Change	Version
Cambridge Partners and NZMB	26 October 2017	Initial Draft	1.0
Cambridge Partners and NZMB	31 October 2017	Initial Draft – edits	1.1
Cambridge Partners and NZMB	13 November 2017	Edits	1.2
Cambridge Partners and NZMB	20 November 2017	Edits	1.3
Cambridge Partners and NZMB	14 December 2017	Edits	1.4
NZMB	24 January 2018	Edits	1.5
NZMB and Cambridge Partners	8 September 2020	Insertion of Approved Amendments – Reserve Buffer and Cash Asset Class Portfolio limits	1.6
NZMB and Cambridge Partners	2 September 2022	Reserves Buffer amendment removed after review and reserve integrated back in portfolio.	1.7
NZMB & Cambridge Partners	August and September 2023	SIPO and Strategic Asset Allocation Review.	1.8
NZMB	December 2023	Updated for audited 2023 Reserves balances	1.8.1

1. INTRODUCTION

The New Zealand Meat Board's (Meat Board) objectives when investing are the generation of income to fund industry good, and capital growth to protect the Meat Board's ability to make a meaningful contribution to the cost of restoring access to export markets following an industry crisis.

1.1 LEGAL REQUIREMENTS

The Meat Board Act 2004 gives the Meat Board its statutory authority and powers. The purpose of the Act is:

- To provide for the New Zealand Meat Board to establish and operate meat export quota management systems and to provide for compliance audits in relation to such systems; and
- To make provision for the ownership and use of the Meat Board's assets.

The objects of the Meat Board are to facilitate the capture of, for New Zealand and in the interests of the meat industry, the best possible ongoing returns available from quota markets, and manage reserves and other assets in the interests of livestock farmers and meet its financial obligations and reserves policy as set out in Section 12 of the Meat Board Act.

1.2 PHILOSOPHY

The Meat Board is a risk averse entity and therefore seeks to minimise risk arising from its investment activities. Foreign exchange, liquidity, credit and interest rate risks are risks the Meat Board seeks to manage, not capitalise on.

Due to the likelihood of a contingency event coinciding with a negative currency event, it is the policy of the Board (reconfirmed in 2023) to invest all funds invested in international equities and international fixed interest in an unhedged fashion.

1.3 TAX POLICY

The Meat Board and Beef + Lamb New Zealand (B+LNZ) consolidated tax group has at 30 September 2022 $72.2 million of tax losses to offset against taxable income. These tax losses are unlikely to be utilised and this should be taken into account in the Meat Board's investment activities.

1.4 CAPITAL BASE

As the commencement of the new investment policy in 30 September 2017, the following capital base was available to provide funding for industry good:

Contingency Fund:	$55.0 million
Quota Jeopardy Reserve:	$ 2.5 million
General Reserve:	$12.8 million
Total	$70.3 million

At 30 September 2023 the capital base available to the Board was

Contingency Fund:	$66.29 million
Quota Jeopardy Reserve:	$ 3.1 million
General Reserve*:	$ 9.92 million
Total	**$79.31 million**

*The general reserve is net after the investment fluctuation Reserve

The contingency fund and the quota Jeopardy reserve has been inflation adjusted since this new investment policy was implemented in the 2018 financial year.

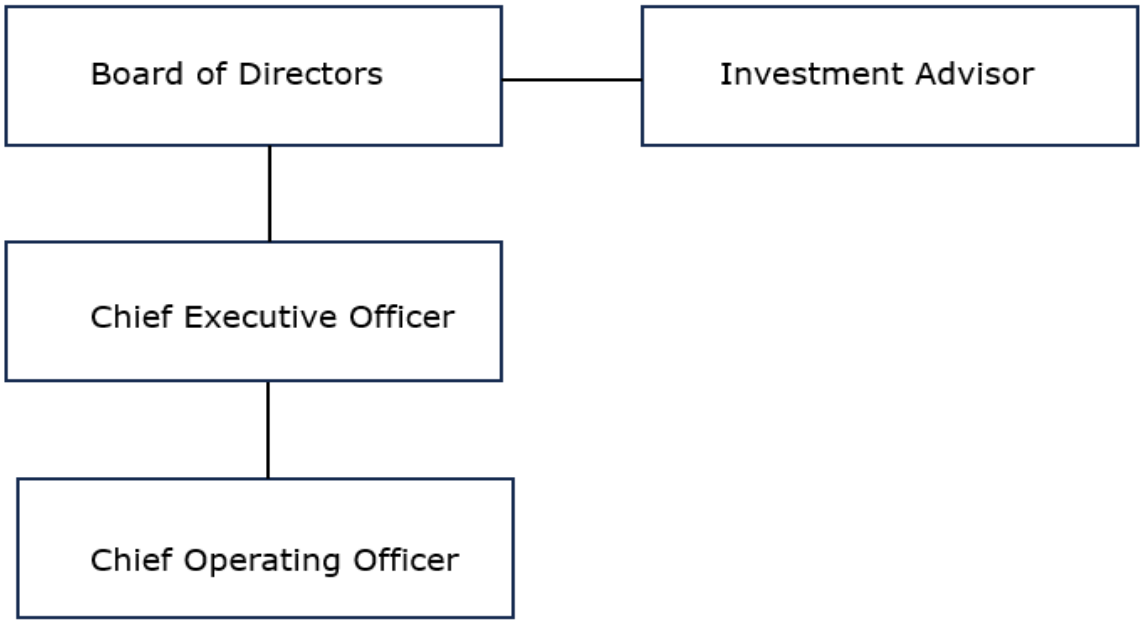
The Board's Reserves Policy (2023) has the objective of

- using cash returns (interest and dividends) to (a) fund reserve management expenditure and (b) the remainder to be available for industry good funding, and
- equity returns to grow the value of the reserves over time.

2. STRUCTURE

2.1 INVESTMENT ORGANISATIONAL STRUCTURE

The Meat Board's investment organisational chart is as follows.



3. BACKGROUND AND PURPOSE

The purpose of this Statement of Investment Policy and Objectives (SIPO) is to assist the Board, Meat Board executives, the Investment Advisor and the Investment Manager(s) in effectively supervising, monitoring and evaluating the management of the investment portfolio ("the portfolio").

The SIPO defines the key responsibilities, and the operating parameters within which the investments and their ongoing management are to operate. The SIPO should at all times encourage the use of methodologies and processes that reflect industry best practice, encompass the principles of good corporate governance, and reflect the vision of the Board.

The investment activities are defined in various sections of the SIPO by:

- Stating in a written document the Meat Board's attitudes, expectations, objectives and guidelines for investment.
- Clearly defining an investment structure for managing the portfolio. This structure includes various asset classes, investment management styles, asset allocation and acceptable investment ranges that, in total, are expected to produce an appropriate level of diversification and total return over the investment time horizon.
- Establishing formal criteria to monitor, evaluate and review the performance of securities on a regular basis.
- Encouraging effective communication between the Board, Meat Board executives, Investment Advisor and the Investment Manager(s).
- Complying with all applicable fiduciary, prudence and due diligence requirements that experienced investment professionals would utilise, and with applicable laws, rules and regulations.
- Providing guidelines and criteria for the appointment of Investment Manager(s).

4. OBJECTIVES, RISK TOLERANCE AND STRATEGIC ASSET ALLOCATION

4.1 GUIDING PRINCIPLES

The guiding principles which govern the Meat Board's investment activities are as follows:

- The Meat Board's time horizon is in perpetuity, subject to a contingent event, and it intends to hold investments for the long term.
- There is a positive relationship between risk and return, higher expected returns means higher risk.
- Every investment has an associated level of risk. This risk is best mitigated by diversification.
- Investors' who have a Strategic Asset Allocation ("SAA"), and a Statement of Investment Policy and Objectives ("SIPO") which they follow, generally outperform investors who do not (Brinson et al, see Appendix 2 (1)).
- Frequent trading, completely liquidating all investments, or allocating all investments to one specific sector which is predicted to outperform, is speculation, not investment and is likely to lead to underperformance (Hoffmann et al, see Appendix 2 (2)).
- Periodic rebalancing back to SAA target weights is likely to enhance investment returns over the long term (Jaconetti et al, see Appendix 2 (3)).
- Periodic review of the SIPO is likely to ensure that any material changes in circumstances are captured and reflected in the management of the portfolio. Reviews should occur not less than three yearly.
- Liquidity means being able to sell an investment when you want to, at or close to the prevailing market price.
- Over the long term, there is no material difference in expected return between Environmental, Social and Governance (ESG) screened investments and non-screened investments (Milonas et al, The Performance of ESG Funds vis-à-vis Non-ESG Funds, see Appendix 2 (4)).

4.2 OBJECTIVES

The Meat Board's primary investment objectives are:

- To protect and maintain the real value of the current investment assets and all future additions to investment assets.
- To maximise investment returns within reasonable and prudent levels of risk.
- To ensure all investments are liquid.
- To maintain an appropriate asset allocation in order to make distributions as required while preserving the real value of the Meat Board's capital from the effects of inflation.
- To invest, to the extent practicable, in a manner that is consistent with the approach taken by the Guardians of the NZ Super Fund. This means that, where practical, the Meat Board seeks to invest in a manner that will avoid prejudice to New Zealand's reputation in the world community and incorporate Environmental, Social and Governance (ESG) considerations into its investment activities.

- To grow the real value of reserves to a total of $100 million in 2022 inflation adjusted dollars, above which would allow investment returns above $100 million to be available for industry good funding.

4.3 Investment Beliefs

The Meat Board's approach to investing is framed by a set of clearly defined over-arching beliefs that drive investment decisions. The Meat Board's investment philosophies are as follows:

- Strong governance and well defined investment decision making structures enable appropriate investment decisions to be made.
- Setting an SAA that is appropriate to the objectives and risk tolerance is the primary determinant of long term success.
- A broadly diversified portfolio, both across and within asset classes, improves the risk and expected return characteristics of the portfolio.
- The Meat Board seeks to minimise overall investment costs.

4.4 Risk Tolerance

The Board recognises and acknowledges that some risk must be assumed in order to achieve the long term investment objectives.

Risk tolerance is affected by three factors:

- Capacity to accept risk,
- Willingness to accept risk, and
- Required rate of return.

4.4.1 Capacity to Accept Risk

The Meat Board's capacity to accept risk is a function of its investment time horizon, prospective replenishment of Contingency Fund and Quota Management Contingency, current financial condition, level and nature of funding requirements and reserve facilities.

4.4.2 Time Horizon

The Meat Board is expected to exist in perpetuity. The investment time horizon of the Meat Board is therefore long term. This increases capacity to accept risk.

4.4.3 Financial Capacity

The Meat Board's current financial condition and level of funding requirements imply reasonable capacity to tolerate short to medium term volatility in the value of its investments. This increases capacity to accept risk.

However, in the event of a worst case industry crisis it is possible that the Contingency Fund, Quota Management Contingency and reserves could be depleted to zero. Therefore, liquidity is of high importance. This decreases capacity to accept risk.

Based on the combination of time horizon and financial circumstances, the Meat Board's overall capacity to accept risk is assessed as Medium.

4.4.4 Willingness to Accept Risk

The Meat Board is a risk averse entity. The Board seeks, where possible, to minimise volatility or risk. Notwithstanding this risk aversion, the Board and Investment Committee, acknowledge that investing solely in capital stable investments exposes the Board's asset base to the risk of inflation and is willing to accept some risk in order to increase expected return, subject to the Meat Board's capacity to accept risk identified in 4.4.3.

4.4.5 Required Rate of Return

In order to provide contributions for industry good funding, while maintaining the real value of the Meat Board's capital over time, the real (i.e. inflation adjusted) required return for the Meat Board must be greater than interest and dividend returns.

Based on budgeted net distributions, a real return (after all investment, funds management and custodial costs, inflation and any tax drag) from the portfolio of **4.00%** per annum may be sufficient to meet the Meat Board's objectives.

4.5 Performance Expectations

The Meat Board aims to earn a **real** return on the portfolio of **4.00%** per annum after all investment, funds management and custodial costs and inflation.

The Board recognises that the target rate of return is a long term one and will not be achieved in every measurement period.

It is understood this will require targeted risk exposure to:

- Retain the real (purchasing power) value of the Meat Board's capital, and
- Contribute to industry good.

4.6 RISK SUMMARY AND SELECTION OF ASSET ALLOCATION

The table below summarises the Board's level of risk tolerance as measured by the three risk factors:

risk measure	level of risk
Capacity to accept risk	Medium
Willingness to accept risk	Low to Medium
Required rate of return	Medium

Based on the Meat Board's required return, capacity and willingness to accept risk, it is recommended that a **50/50** portfolio is adopted which is suitable for a **Medium** level of risk.

5. DUTIES AND RESPONSIBILITIES

This section sets out the duties and responsibilities of the Board, Meat Board executives, Investment Advisor, Investment Managers, Fund Managers and the Custodian.

5.1 BOARD

As fiduciaries the primary responsibilities of the Board are:

PLANNING, POLICY AND GOVERNANCE

- To ensure that members of the Board are conversant with their fiduciary responsibilities when exercising their duties on behalf of the Meat Board.
- To ensure that the roles and responsibilities of all parties are documented and clearly defined.
- Reviewing all matters concerning the SIPO and Investment Policy Statement (IPS), considering any changes or amendments to the SIPO and IPS and approving the adoption of the SIPO.
- Approve any transactions that fall outside the guidelines of the SIPO.
- Regularly reviewing Investment Manager reports, and reporting exceptions.
- To manage, monitor and review Investment Managers and to appoint and remove Investment Managers and/or Investment Advisors as appropriate.
- To approve the most appropriate investment style and strategy to achieve the investment objectives.
- Ensuring that all parties overseeing, advising and managing the Meat Board's investments disclose any potential conflicts of interest. In the event that conflicts of interest arise, the policies and procedures for managing these are to be clearly defined, although, in principle, such conflicts should be avoided.

STATEMENT OF INVESTMENT POLICY AND OBJECTIVES (SIPO)

The Board shall ensure that an appropriate SIPO is developed and reviewed no later than three yearly intervals to:

- Confirm the management of investments complies with all applicable laws, the Meat Board's policies, risk tolerance and other supporting documents.
- Set out the duties and responsibilities of all parties involved with respect to decision making, planning, investment management, reporting and review.
- Ensure that contracts for investment advisory/management, custodial and consultancy services are reviewed at least every three years.

PORTFOLIO MANAGEMENT

The Board will provide oversight and review of all portfolio management matters to:

- Consider the appointment and/or removal of Investment Managers as appropriate.

- Ensure that each investment portfolio has its own Investment Policy Statement (IPS) which is a document, between an investor and an investment manager, recording how the investor's money is to be managed. Specific information on matters such as asset allocation, risk tolerance, investment securities and liquidity requirements are included in an IPS. The IPS must meet the minimum standards outlined in the SIPO.
- Ensure appropriate risk management standards and procedures are developed and maintained.
- Ensure the overall investment portfolio is prudently diversified to meet the agreed risk/return profile.

REVIEW AND CONTROL

The Board shall maintain appropriate review and control procedures to:

- Ensure that the practices and policies set out in the SIPO and IPS are adhered to.
- Follow formal criteria to monitor, evaluate and compare the investment performance results achieved against relevant IPS benchmarks and objectives on a regular basis.
- Review contracts and service agreements at least every three years.
- Ensure that all service agreements and contracts are in writing and are consistent with fiduciary standards of care.

5.3 MEAT BOARD EXECUTIVE

For the purposes of this SIPO, the Meat Board executives involved in the investment management process are the Chief Executive and Chief Operating Officer of B+LNZ. It is recognised that the management of the day to day relationship with the Investment Advisor and Investment Managers and administration of the investment portfolio is the responsibility of the COO. The CEO will provide oversight and guidance where appropriate.

The Meat Board executives have specific responsibilities in relation to the management of the investment portfolios include the following:

- Administering and attending to the day-to-day financial matters associated with the management of investment portfolios, including serving as the primary point of contact for the Investment Advisor and Investment Manager(s).
- Preparing forecast cash flows and budgets in association with the planning process.
- Confirm that actual cash flow from investments aligns with projected cash flow.
- To control and account for all investment, recordkeeping and administrative expenses associated with management of the funds.

5.4 Investment Advisor

The Board will retain an independent third party Investment Advisor to assist in managing the overall investment process. The Investment Advisor is responsible for guiding the Board through a disciplined and rigorous process, assisting in the maintenance of the SIPO and ongoing review of the appointed Investment Manager. Specific responsibilities include the following:

Statement of Investment Policy and Objectives (SIPO)

- Assisting in the maintenance and upkeep of an appropriate SIPO and any other governance documents as requested.
- Assisting, and advising on, matters and/or outcomes relating to the investment strategy and methodologies and the likelihood of achieving objectives set.
- Provision of ongoing education and review on an as required basis, covering current investment research, portfolio construction and fiduciary practices.
- Using the care, skill, prudence and due diligence that an experienced investment professional, acting in a like capacity, would use and comply with all applicable laws, rules and regulations.

Investment Strategy and Implementation

- Review of IPS drafted by Investment Manager to ensure it complies with the SIPO.
- Assisting the Board to monitor and review the performance of the Investment Manager, Fund Managers and Custodian.
- Making recommendations on any matters of performance and compliance not adequately covered by the Investment Manager.

Ongoing Portfolio Management and Reporting

- Review of, and reporting on, the Investment Manager's quarterly and annual investment and compliance reports.
- Annual benchmarking of Investment Manager performance to relevant peers.
- Making available appropriate personnel to attend meetings, as agreed.
- Communicate all significant changes pertaining to the Investment Advisor and/or the firm itself. Changes in ownership, organisational structure, financial condition, professional staff and reputation are examples of changes to the firm that are material.

5.5 Investment Manager(s)

The Investment Manager(s) is/are responsible for preparing and maintaining a written IPS in a format consistent with, and adhering to, the SIPO. Specific responsibilities include the following:

Investment Strategy and Implementation

- Manage investments in accordance with the guidelines and objectives as outlined in the IPS and respective agreements.
- Ensure investment assets are appropriately diversified and conform with the time horizon and agreed risk/return profile and outline expected returns and risk, or volatility, within the selected strategies.
- Ensure that "expected" and "modelled" returns for asset classes are based on sound return and risk premium assumptions.
- Provide advice on, and implementation of, the SAA and where appropriate Fund Manager selection.
- Specify, and advise on, asset and sub-asset class allocation strategies.
- Recommend a Custodian to hold and report on investment assets.
- Use the care, skill, prudence and due diligence that an experienced investment professional, acting in a like capacity, would use and comply with all applicable laws, rules and regulations.
- To confirm on an annual basis that best practice with respect to execution, brokerage, money sweep facilities, foreign currency spreads, transaction costs and management fees is being applied.

Ongoing Portfolio Management and Reporting

- Manage the portfolio on a day-to-day basis.
- Provide instructions to each Fund Manager (or broker) to lodge or withdraw funds.
- Rebalance individual investments and asset class groups to within agreed benchmarks as described in the rebalancing policy contained in the IPS.
- To effect all transactions for the portfolio at the best price.
- To compile and account for all investment, record keeping and administrative expenses associated with the management of the funds.
- Deliver quarterly reports including:
    - Portfolio valuation,
    - Portfolio duration,
    - Compliance reporting,
    - Portfolio Performance Summary for the portfolio and by asset class,
    - Performance against benchmarks,
    - Portfolio Income,
    - Asset transactions summary, and

  - Cash transactions.

- Make available appropriate personnel to attend meetings, as agreed.
- Periodically review custodial arrangements and make recommendations.
- Regularly report on compliance exceptions.
- Disclose any potential conflicts of interest and steps taken to mitigate such conflicts.
- To report quarterly to the Board 'Total cost of Delivery' being the sum of:
  - Investment Management Fees,
  - Custodial Fees,
  - Administration Fees,
  - Total Fund Fees – made up of; annual management fees (including annual management fees of underlying investments), performance based fees (including performance based fees of underlying investments), and any other fees and costs, and

FINANCIAL REPORTING

- Provide financial information, including income and/or returns projections, as required for forecast budgeting purposes.
- Communicate all significant changes pertaining to the Investment Managers and/or the firm itself. Changes in ownership, organisational structure, financial condition, professional staff and reputation are examples of changes to the firm that are material.

5.6 FUND MANAGERS

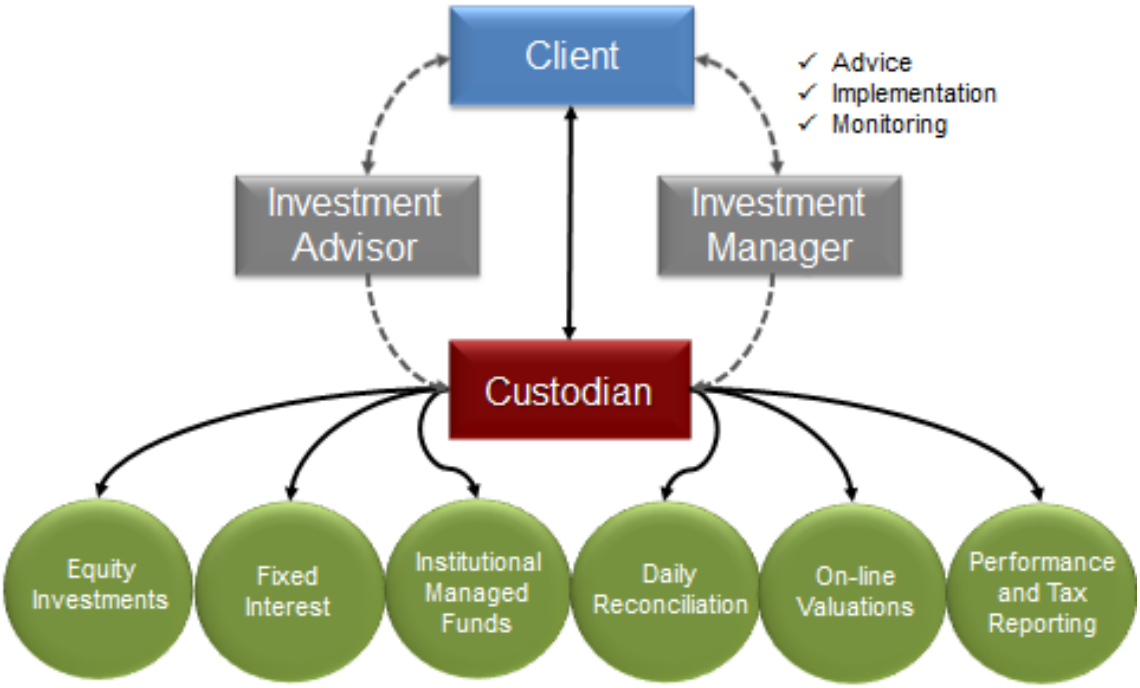
- To manage an allocated part of the portfolio on terms and conditions consistent with their mandate.

5.7 CUSTODIAN

The Custodian holds investments as bare trustee on behalf of the Meat Board and is responsible for the safe-keeping of those investments. The specific duties and responsibilities of the Custodian are:

- Maintaining separate accounts.
- Valuation of all investment assets.
- Collection of income.
- Settlement of transactions (buy/sell orders) initiated by the Investment Manager.
- Provision of regular reports detailing transactions, cash flows, securities held and their current values, changes in value and returns.

The Client, Custodian, Investment Advisor and Investment Manager relationships are depicted as follows:



6. INVESTMENT PARAMETERS AND GUIDELINES

6.1 ASSET ALLOCATION

Academic research offers considerable evidence that asset allocation far outweighs security selection and market timing in its impact on portfolio variability and performance. On this basis the Meat Board has adopted a SAA model.

The SAA and rebalancing limits appropriate for the Meat Board's portfolio given its risk tolerance and income expectations (see rebalancing procedures below) are as follows:

Asset Class	Minimum Allowable Exposure %	Strategic Asset Allocation %	Maximum Allowable Exposure %
Australian and New Zealand Equities	12.0%	16.0%	20.0%
International Equities (includes Emerging Markets)	29.0%	34.0%	39.0%
Total Growth	**45.0%**	**50.0%**	**55.0%**
New Zealand Fixed Interest	31.0%	36.0%	41.0%
International Fixed Interest	9.0%	12.0%	15.0%
New Zealand Cash	0.5%	2.0%	4.0%
Total Income	**45.0%**	**50.0%**	**55.0%**
Total		**100%**	

6.2 REBALANCING PROCEDURES

The percentage allocation to each asset class may vary depending upon market conditions.

The SAA has upper and lower limits for each asset class as set out in the table above. The limits are based on the following guidelines:

- Plus or minus 5% for an asset class comprising 20% or more of the SAA,
- Plus or minus 25% of the allocation to a single asset class, where that asset class comprises more than 5% and less than 20% of the SAA (e.g. an asset class comprising 4% of the SAA would have limits of plus or minus 1%).
- Cash exposure limits set from 0.5% to 4.0%.

To remain consistent with asset allocation guidelines, the Investment Manager(s) will periodically review the portfolio and each asset class. If the actual weighting has moved outside the tolerances described above, the Investment Manager(s) shall rebalance the portfolio back towards the recommended weighting. This rebalancing is to be completed as required, at least annually, and reported to the Board.

Rebalancing tends to involve buying underperforming assets at relatively lower prices, and selling relatively higher priced assets. Cost effective rebalancing can be achieved by reinvesting cash accrued from distributions and maturities.

6.3 Authorised Investments

The following investments, within New Zealand and internationally, are authorised by the Board:

- Cash, cash equivalents, term deposits, and registered certificates of deposit with New Zealand Registered Banks with a Standard and Poor's (or the Moody's or Fitch equivalents) short term credit rating of 'A-1' or better.
- Commercial Paper and Promissory Notes.
- New Zealand dollar denominated bonds (domestic and foreign issuers), including sovereign and non-sovereign issuers, either directly or via Collective Investment Vehicles ("CIVs").
- Shares in publicly listed companies, domestic and foreign, either directly or via CIVs.
- Listed property entities or real estate investment trusts either directly or via CIVs.
- Derivatives for hedging non-New Zealand domiciled investments back to the New Zealand dollar and for risk management purposes. Derivatives cannot be used for speculative purposes or to introduce leverage into the portfolio.

6.4 Excluded Investments and Prohibited Transactions

Where practical, the Meat Board will prefer its Investment Manager utilise Collective Investment Vehicles (CIVs) which incorporate ESG considerations into its investment activities. However, the Meat Board expects its Investment Manager to take a pragmatic approach to investment decisions such that if a CIV which incorporates ESG considerations into its investment activities does not satisfy other investment criteria (for example, being insufficiently diversified, illiquid, or unreasonably expensive) the Investment Manager may implement utilising a non-ESG screened CIV instead.

Directly held securities that are significantly exposed to or derive a non-incidental proportion of revenue from activities listed in Section 6.4 of the SIPO are excluded.

Direct investment in the following investments are not permitted:

The Meat Board have excluded from consideration a number of different assets. A non-exhaustive list of exclusions is summarised below, covering some of the more common asset groups. These are either not separate asset classes requiring an allocation over and above a normal market weight allocation, or they fail some other asset filtering test with respect to quality, liquidity etc.

Reason assets are excluded are as follows:

Asset(s)	Reason for exclusion
Companies that are directly involved in the manufacture of; cluster munitions, nuclear	The Meat Board seeks to invest in a manner that will not harm New Zealand's reputation in the global marketplace. This includes investing in a manner consistent with the Cluster Munitions Prohibition Act 2009 and the Nuclear

explosive devices (NEDs) or anti-personnel mines	Free Zone, Disarmament and Arms Control Act 1987 and the Convention on the Prohibition of the Use, Stockpiling, Production and Transfer of Anti-Personnel Mines, 1997.
Responsible Investment Exclusion	The Meat Board will reference the New Zealand Super Fund (NZSF) Responsible Investment Exclusion List which details specific companies. Refer here for New Zealand Super Fund Exclusions.
Commodities	Commodities fail the asset class test. They comprise securities that have dissimilar financial characteristics and may behave differently in similar markets. Commodities do not produce any income stream, inhibiting common valuation metrics. The investment rationale is largely limited to future price speculation without any clear evidence of the existence of an expected long term commodity risk premium.
High yield/junk bonds	Rejected due to the quality of the securities being below investment grade.
Hedge funds	Dissimilar securities, high cost, opaque structures, often illiquid.
Private equity, including venture capital	Usually highly concentrated, typically illiquid, long minimum holding period, generally opaque, often high cost.
Structured debt securities	Opaque structures, typically behave like equity securities in the event of market dislocation, often illiquid.
Preference shares	Inappropriate for tax reasons.
Leveraged investments	Amplify risk, opaque structures, typically speculative in nature.
Derivatives – Options, Futures, Commodities contracts, contracts for difference	Can be used to leverage positions, amplify risk, speculative in nature.
Unlisted equity securities	Illiquid.
Limited partnerships	Illiquid.

The following transactions are prohibited:

- Short selling.
- Margin trading transactions.

6.5 Foreign Currency Management

The fluctuation in the value of the New Zealand dollar relative to other major currencies can result in additional volatility of investment returns. Due to the likelihood of a contingency event coinciding with a negative currency event, it is the policy of the Board (approved May 2023) to invest all funds invested in international equities and international fixed interest in an unhedged fashion.

- When investing in international equities, a currency position of 100% unhedged to the New Zealand dollar is the base position.

- When investing in international fixed interest, a currency position of 100% unhedged to the New Zealand dollar is the base position.

Any changes to this policy must be approved by the Board.

6.6 Cash & Term Deposit Investments

The primary objective of cash investments is the retention of capital. Accordingly, only creditworthy counterparties are acceptable. Creditworthy counterparties (other than Government) are selected on the basis of their current Standard and Poor's (S&P) or equivalent rating, which must have a strong or better short term credit rating.

The Meat Board may invest cash on call or deposit. Where it does so it may invest in the following:

- New Zealand Government Treasury Bills and short term (less than 12 months to maturity) New Zealand Government Bonds.
- Call and term deposits with New Zealand Registered Banks with a Standard and Poor's (or the Moody's or Fitch equivalents) short term credit rating of 'A-1' or better.
- Commercial Paper with a Standard and Poor's (or the Moody's or Fitch equivalents) short term credit rating of 'A-1' or better.

6.7 International Cash & Term Deposit and Fixed Interest Investments

The Meat Board may invest cash on call or deposit in international cash and term deposits. Where it does so it may invest in the following:

- Foreign currency denominated call and term deposits with New Zealand Registered Banks with a Standard and Poor's (or the Moody's or Fitch equivalents) short term credit rating of 'A-1' or better.
- International cash and term deposit investments must be unhedged, in accordance with the requirements contained in Section 6.5.

For international fixed interest investments the following rules shall apply:

- Investment in international fixed interest will be through one or more CIVs.
- International fixed interest investments must be unhedged, in accordance with the requirements contained in Section 6.5.
- Ensure that any investment made is in widely held securities where sufficient liquidity exists to enable exit from the investment at any time.
- The duration (weighted average time to maturity index) of the international fixed interest portfolio must be that of the appropriate benchmark index (see 8.1), +/- 25%.

6.8 Direct New Zealand Money market and Fixed Interest Investments

The Meat Board may invest in direct New Zealand money market investments. Where it does so, the following rules shall apply:

- Ensure that any portfolio of money market and fixed interest investments is broadly diversified.
- Limit investments in money market and fixed interest securities as per Appendix 6.
- Ensure that any investment made is in widely held issues where sufficient liquidity exists to enable exit from the investment at any time.
- The duration (weighted average time to maturity index) of the fixed interest portfolio must be that of the appropriate benchmark index (see 8.1), +/- 25%.

6.9 Direct New Zealand Equity Investments

The Meat Board may invest in direct New Zealand equity investments. Where it does so, the following rules shall apply

- Investment in companies that are listed on the New Zealand Stock Exchange.
- Investments in partly paid shares in respect of shares of the type referred to above.
- Exposure limits for direct New Zealand equity investments (based on the dollar value of the portfolio) and benchmarks (refer sections 8.1) are set out in the following table:

Security Type	Minimum percentage of NZ equities	Maximum percentage of NZ equities
Companies not represented in the appropriate Benchmark	0%	20%
Individual company in the appropriate Benchmark	0%	Benchmark weight + 8%
Individual company not in the appropriate Benchmark with market capitalisation greater than NZ$500m	0%	6%
Individual company not in the appropriate Benchmark with market capitalisation less than NZ$500m	0%	3%

6.10 Direct Australian Equity Investments

The Meat Board may invest in direct Australian equity investments. Where it does so, the following rules shall apply:

- Investment in companies that are listed on the Australian Stock Exchange.
- Investments in partly paid shares in respect of shares of the type referred to above.

- Australian equity investments must be unhedged, in accordance with the requirements contained in Section 6.5.
- Exposure limits for direct Australian equity investments (based on the dollar value of the portfolio) and benchmarks (refer sections 8.1) are set out in the following table:

Security Type	Minimum percentage of Australian equities	Maximum percentage of Australian equities
Companies not represented in the appropriate Benchmark	0%	20%
Individual company in the appropriate Benchmark	0%	Benchmark weight + 8%
Individual company not in the appropriate Benchmark with market capitalisation greater than A$500m	0%	6%
Individual company not in the appropriate Benchmark with market capitalisation less than A$500m	0%	3%

6.11 International Equity Investments

The Meat Board may invest in direct International investments. Where it does so, the following rules shall apply:

- Investment in international equities will be through one or more CIVs.
- International equity investments must be unhedged, in accordance with the requirements contained in Section 6.5.
- CIVs in international equities must hold a broadly diversified portfolio of equity securities, be consistent with underlying appropriate benchmarks, be managed according to appropriate policies and procedures and impose reasonable exposure limits.
- Ensure that any investment is sufficiently liquid to enable exit from the investment at any time.

6.12 Direct New Zealand Property Investments

The Meat Board may invest in direct New Zealand property investments. Where it does so, the following rules shall apply:

- Investment in property entities that are listed on the New Zealand Stock Exchange.
- Investments in partly paid shares in respect of shares of the type referred to above.
- Exposure limits for direct New Zealand property investments (based on the dollar value of the portfolio) and benchmarks (refer sections 8.1) are set out in the following table:

Security Type	Minimum percentage of NZ property	Maximum percentage of NZ property
Companies not represented in the appropriate Benchmark	0%	10%
Individual entity in the appropriate Benchmark	0%	25%

6.13 International Property Investments

The Meat Board may invest in direct International property investments. Where it does so, the following rules shall apply:

- Investment in international property will be through one or more CIVs.
- International property investments must be unhedged, in accordance with the requirements contained in Section 6.5.
- CIVs in international property must hold a broadly diversified portfolio of property securities, be benchmark aware, have appropriate policies and procedures and impose reasonable exposure limits.
- Ensure that any investment is sufficiently liquid to enable exit from the investment at any time.

6.14 Selection of Fund Managers

Selection of Fund Managers by Investment Managers must take into account, among other criteria specific to the role:

- The skills and experience the Fund Manager brings to the role,
- The substance and viability of the Fund Manager,
- The costs that can be expected to be incurred,
- The existence of appropriate risk management structures, and
- Whether there are any organisational or reputational issues.

Investment mandates shall include rules setting out authorised investments, performance measurements, constraints and exposure limits, use of derivatives, and reporting requirements.

Fund Managers should be reviewed against the preceding criteria, by the Investment Manager, to determine their ongoing suitability for their role.

7. RISK MANAGEMENT

The Board and the Meat Board executives have the responsibility to develop appropriate internal controls, policies and risk management strategies. These internal controls, policies and risk management strategies are described in this SIPO.

7.1 RISKS

MARKET RISK

Market risk is the risk of adverse movements in investment markets (including asset prices, volatility, changes in yield curves or other market related variables) that affect the value or income of the portfolio. The volatility of investment markets means that returns are uncertain.

FUND MANAGER RISK

Fund Managers' returns may vary from expected levels.

CREDIT RISK

Credit (or counterparty) risk is the risk of default by a counterparty to a particular transaction or an issuer of a security held in the portfolio.

LIQUIDITY RISK

Liquidity risk is the risk that a security cannot be sold when required or that the price achieved is significantly different from the quoted price.

OPERATIONAL RISK

Operational risk is the risk of financial loss due to mismanagement, error, fraud or unauthorised transactions.

CURRENCY RISK

Currency risk is the risk that foreign currency denominated assets will lose value due to the effect of an adverse exchange rate movement.

7.2 PROCEDURES

MARKET RISK

Managed by:

- Diversifying portfolio investments,
- Seeking professional advice, and
- Requiring Fund Managers to manage their portfolios within prescribed mandates.

FUND MANAGER RISK

Managed by:

- Robust selection process for Fund Managers,
- Appointing Fund Managers with mandates that prescribe acceptable risk limits, and
- Regular assessment and review of performance against benchmark and peers.

Credit Risk

Managed by:

- Measuring and maintaining the credit quality of portfolios within prescribed guidelines,
- Limiting exposure to individual issuers,
- Maintaining appropriate policies and procedures relating to counterparties, and
- Appointing Fund Managers with mandates consistent with prescribed risk limits.

Liquidity Risk

Managed by:

- Requiring Fund Managers to invest only in liquid securities,
- Requiring Fund Managers to hold diversified portfolios, and
- Limiting the credit rating of the fixed interest and cash investments to approved levels.

Operational Risk

Managed by:

- Having in place a robust system of internal controls and regularly monitoring portfolios,
- Requiring an independent custodian to hold assets as bare trustee, record transactions and report on performance,
- Having a specific mandate for each Fund Manager, and
- Having clear separation of investment management, custodial and overall supervisory functions.

Currency Risk

Managed by:

- Maintaining a hedging policy for the portfolio and individual asset classes.

8. INVESTMENT PERFORMANCE OBJECTIVES

The Meat Board's primary objective is for the portfolio's total real investment return (i.e. income plus capital return) of **4.00%** per annum over any rolling five year period, net of tax, inflation, Investment Advisory services, investment management, funds management and custodian fees.

The Board acknowledge that return is a function of the level of risk in the portfolio. The Board acknowledge that fluctuating rates of return characterise securities markets, particularly during short-term time periods. Recognising that short-term fluctuations cause variations in performance, the Board intend to evaluate investment performance from a long-term perspective. The Board also acknowledge that there is potential for wide variation from this objective on a year to year basis.

8.1 PORTFOLIO BENCHMARKS

The following benchmark indices are to be used for the measurement of investment sector performance.

Asset Class	Benchmark	Weight
New Zealand Equity	S&P/NZX 50 Index (Gross)	8.0%
Australian Equity	S&P/ASX 200 Total Return Index	8.0%
International Equity	MSCI World ex Australia Index (Unhedged)	27.0%
Emerging Markets Equity	MSCI Emerging Markets Index	5.0%
New Zealand Property	S&P/NZX All Real Estate Index (Gross)	1.5%
International Property	S&P Developed REIT Index	0.5%
New Zealand Fixed Interest	S&P/NZX Corporate A Bond Index	36.0%
International Fixed Interest	Bloomberg Barclays Global Aggregate Bond Index (Unhedged)	12.0%
New Zealand Cash	One Month Bank Bill Index	2.0%
Total		**100%**

8.2 MONITORING AND EVALUATION

The Board are aware that the ongoing review and analysis of investments is just as important as the due diligence process. Performance will be monitored on an ongoing basis and it is at the Board's discretion to take corrective action by replacing an Investment Manager if they deem it appropriate at any time provided that it complies with the terms of appointment. The Board may take such action if it deems this is required.

Specifically the following will be confirmed and reported to the Board:

- Performance reporting as described in roles and responsibilities above,

- Adherence to the SAA and rebalancing within approved limits occurring in a timely fashion,
- Adherence to agreed investment philosophy and constraints,
- Adherence to investment guidelines,
- Material changes in the investment organisation, investment philosophy and/or personnel, and
- Any legal or other regulatory proceedings affecting the Investment Manager's organisation and/or reputation.

9. INVESTMENT MANAGER SELECTION

The Board will be responsible for the appointment of Investment Manager(s) to assist with the management of the Meat Board's investment portfolio. The Board is responsible for applying the following due diligence criteria in selecting Investment Manager(s).

9.1 REQUEST FOR PROPOSAL PROCESS

Investment management roles should be tendered through a Request for Proposal (RFP) process. The Board should seek tenders. Relevant considerations for tenderers include:

- *Track record:* Each investment management firm should have a minimum track record of at least five years. Firms should have at least $500 million under management.
- *Service:* Each investment management firm must confirm that it will report quarterly and make relevant staff available to attend meetings.
- *Compliance:* Investment management firms who are, or have been within the last five years, the subject of material adverse regulatory or professional association findings will be excluded from consideration.
- *Governance:* Investment management firms must submit and manage to an IPS which conforms with the SIPO.
- *Fee only:* Investment management firms should offer a fee only service.
- *Conflicts of Interest:* Must be adequately disclosed and avoided where possible.
- *Investment Philosophy and Process:* Each investment management firm should have an investment philosophy which it can articulate to the Board (if required). Each investment advisory firm should follow modern portfolio theory.
- *Stability of the organisation:* There should be no perceived organisational problems, the majority of the management team should have been in place for more than three years.

- Membership of the *Responsible Investment Association Australasia (RIAA),* which champions responsible investment and sustainable financial system in Australia and New Zealand, is a relevant consideration.

9.2 PORTFOLIO EXPENSES

Total portfolio costs should be fair and reasonable. The Investment Manager(s) must offer a fee only service with all commissions returned to the portfolio and reported to the Board.

The Investment Manager(s) is to report to the Board quarterly the breakdown of the total cost of delivery including:

- Investment Management fees,

- Custodial fees,
- Individual and weighted average Funds Management fees, and
- Brokerage and other transaction costs.

The Board acknowledge that cost reductions can be achieved through scale. The Meat Board's objective is to minimise total cost of delivery.

10.APPENDICES

APPENDIX 1

Glossary.

APPENDIX 2

References.

APPENDIX 3

Meat Board Policy Papers.

- Quota Jeopardy Reserve (Reviewed 2023)
- Contingency fund projected drawdown (Review Due 2024)

APPENDIX 4

Strategic Asset Allocation.

APPENDIX 5

Portfolio Expenses.

APPENDIX 6

Authorised Investment Criteria – New Zealand Fixed Interest.

APPENDIX 1: GLOSSARY OF INVESTMENT MANAGEMENT TERMINOLOGY

Asset Allocation	An investment strategy that aims to balance risk and reward by apportioning portfolio assets according to required return, risk tolerance and time horizon. The three main asset classes - equities, fixed-income, and cash - have different levels of risk and return, so each will behave differently over time. Also, the process of allocating assets to minimise risk for a targeted level of return.
Asset Class	A group of securities that exhibit similar characteristics, behave similarly, and are subject to the same laws and regulations. The three main asset classes are equities (shares), fixed-income (bonds) and cash.
Benchmark	A standard against which the performance of a fund or investment manager can be measured. Generally, broad market indices are used for this purpose.
Bloomberg Barclays Global Aggregate Bond Index (100% Hedged to NZD)	The Bloomberg Barclays Global Aggregate Bond Index (100% Hedged to NZD) is a market capitalisation-weighted index including most US traded investment grade bonds which include corporate bonds, government bonds and longer duration bonds.
Call option	A contract that gives the holder the right to buy a certain quantity of an underlying security from the writer of the option, at a specified price (the strike price) up to a specified date (the expiration date).
Collective Investment Vehicle (CIV)	An entity that pools investor funds and invests the pooled funds, rather than individuals buying the securities directly, usually managed by a fund manager. By pooling with other investors, investors in CIVs can access a greater number of underlying investments than they could on their own account, achieving greater diversification and economies of scale.
Currency Swap	A currency swap is the simultaneous purchase and sale of equal amounts of one currency against another currency for different maturities.
Credit Default Swap	A default swap is a bilateral contract that enables an investor, say the Meat Board to buy protection against the risk of default of an asset issued by a particular entity. Following a defined credit event the buyer of protection receives a payment to compensate against the loss on the investment. In return the buyer of protection pays a fee.
Cross Currency Interest Rate Swap	A cross currency interest rate swap is an agreement between the Meat Board and a counterparty (usually a bank) to physically exchange currencies on deal date and re-exchange the currencies (using the deal date exchange rate) on maturity. At pre-agreed times between the deal dates and the maturity date, respective currency interest rate payments are made and received between the parties. This product is used for the hedging of translation type exposures. It essentially creates an off balance sheet liability, immunising exchange gains and losses arising on the foreign currency denominated asset.
Custodian	A financial institution that holds investments on behalf of the underlying investor for safekeeping in order to minimise the risk of their theft or loss and provide reporting on those investments. A custodian holds securities and other assets in electronic or physical form.
Defensive asset	An investment asset that has low risk of losing capital. These types of assets (typically cash and highly rated bonds) tend to deliver the bulk of their returns through regular income distributions as opposed to capital gains.

Derivative contracts	Contracts based on (derived from), but independent of, another security and involving a party not associated with the original (underlying) contract. Derivatives are financial products, such as futures contracts, options, and mortgage-backed securities. Most of derivatives' value is based on the value of an underlying security, commodity, or other financial instrument.
Diversification	Blending of a variety of investments within a portfolio. The rationale behind this risk management technique is that a portfolio of different kinds of investments will, on average, yield higher returns and pose a lower overall risk than any individual investment held on its own.
Duration	A weighted average of the time to maturity of a portfolio of bonds. A measure of the sensitivity of the price (the value of principal) of a bond investment to a change in interest rates. Duration is expressed as a number of years. Rising interest rates mean falling bond prices, while declining interest rates mean rising bond prices.
Equity	Equity (a share) is one of the principal asset classes. A share represents an ownership interest (i.e. a share of equity) in the underlying company.
Fixed Interest	Money invested in bonds, certificates of deposit, preferred stock, etc. which regularly generates a fixed amount of income.
Foreign Exchange Collar Strategy	The combined purchase (or sale) of a call or put option with the sale (or purchase) of another put or call option. This can be a zero premium cost strategy. See foreign exchange options for further details. From an importer's perspective, this product is transacted to provide a limited amount of participation in an upward movement in exchange rates to an agreed strike rate. If the exchange rate continues to move upwards, the Meat Board cannot participate in any favourable movement beyond the strike rate. If exchange rates move in an unfavourable direction (downwards), the predetermined strike rate provides certainty through a known worst case rate. This product outperforms the forward foreign exchange contract if rates rise but will underperform should exchange rates fall. This product would be used for known exposures where the exchange rate is expected to rise moderately from current levels
Foreign Exchange Swap	An agreement between the Meat Board and a counterparty (usually a bank) to exchange equal amounts of one currency for another currency at spot date and then to re-exchange each currency, at an agreed future date, at an agreed forward exchange rate. This product protects the foreign currency exposures arising on both costs and sales protecting the Meat Board from adverse movements in exchange rates as a result of the timing differences between booking and paying offshore offices and receiving any foreign currency income.
Forward Foreign Exchange Contract	An agreement between the Meat Board and a counterparty (usually a bank) to exchange one currency for another currency at an agreed future date (other than spot) at an agreed rate. From an importer's point of view, this product forms the foundation of hedging for known exposures and is particularly useful where the Meat Board's dominant view is that exchange rates will decline below current levels. the Meat Board typically buys foreign currency and sells the NZD forward.

Fund Manager	An investment professional who is appointed to manage a pool of investment funds.
Funds Management Fee	The fee charged by a fund manager to manage a pool of investments in a Collective Investment Vehicle, usually expressed as a percentage.
Growth asset	An investment which is expected to increase in value over time (i.e. generate capital gain). These types of investments (principally shares) tend to deliver the bulk of their returns through changes in value. These fluctuations can be negative leading to temporary investment losses.
Hedging	Implementing a strategy to protect against adverse foreign currency movements eroding the New Zealand dollar value of returns from foreign-denominated assets.
Illiquid	Cannot be quickly converted into cash, such as property, collectibles and thinly traded securities.
Index	A statistical measure of value in an economy or a securities market. In the case of share markets, an index is a defined portfolio of securities that represents that market or a portion of it. Each index has its own calculation methodology and is usually expressed in terms of a change from a base value. Thus, the percentage change is more important than the actual numeric value. Share and bond market indices are used to construct exchange-traded funds (ETFs) whose portfolios mirror the index.
Interest Rate Option	The purchase of an interest rate option gives the holder (in return for the payment of a premium) the right but not the obligation to invest (described as a floor) at a future date for a specified period. The Meat Board and the counterparty agree to a notional future principal amount, the future interest rate, the benchmark dates and the benchmark rate (usually BKBM). Interest rate option products include caps and floors
Interest Rate Collar Strategy	Two option contracts linked together into one transaction or contract. Over the term of the collar contract, if rates below the floor level the Meat Board is protected and receives interest at no more than the floor rate. Likewise if the market rises above the cap level the Meat Board will only receive interest at the cap level.
Interest Rate Swap	An Interest Rate Swap is an agreement between the Meat Board and a counterparty (usually a bank) whereby the Meat Board receives a fixed interest rate and pays a floating interest rate. The parties to the contract agree notional principal, start date of the contract, duration of the contract, fixed interest rate and the bench mark rates (usually BKBM). A forward start swap is a swap contract that commences at a future specified date. The rate or the forward starting swap will differ from the current market rate by the shape and slope of the yield curve
Interest Rate Risk	Interest rate risk is the risk that an investment's value will change due to a change in the absolute level of interest rates, in the spread between two rates, in the shape of the yield curve, or in any other interest rate relationship.
Investment Advisor	An Investment Advisor is the professional responsible for the management of various investments (shares, bonds and cash) in order to meet specified investment goals for the benefit of the investors.
Investment Policy Statement (IPS)	An IPS is a document, between an investor and an investment manager, recording how the investor's money is to be managed. Specific information on matters such as asset allocation, risk tolerance, investment securities and liquidity requirements are included in an IPS.

Investments	Money not required to meet working capital requirements and invested for longer term period.
Liquidity	Liquidity is the ability to sell an investment when you want to, at or close to the prevailing market price.
Money weighted return	A measure of the rate of return for an asset or portfolio of assets. The money-weighted return is equivalent to the internal rate of return (IRR).
MSCI Emerging Markets Index	The MSCI Emerging Markets Index is a market capitalisation weighted index comprising 21 emerging market countries. It measures the return of Emerging Markets Sharemarkets with dividends reinvested.
MSCI World Accumulation ex-Australia Index (50% hedged to NZD)	The MSCI ex Australia Index is a market capitalisation weighted index comprising 23 developed market countries in North America, Europe and the Asia/Pacific region it measures the return of developed market Sharemarkets with dividends reinvested.
Non Deliverable Forward	An agreement between the Meat Board and a counterparty (usually a bank) to notionally exchange one currency for another currency at an agreed future date (other than spot) at an agreed rate. These instruments operate on a similar basis to the forward foreign exchange contract but rather than a physical exchange of currency between the parties a NZD revaluation exchange rate gain or loss to paid or received
NZX	New Zealand Stock Exchange
One Month Bank Bill Index	The ANZ 30 Day Bank Bills Index measures the return from New Zealand 30 day bank bills. This is a Cash equivalent index.
Overweight	An excess amount relative to the weight in the underlying benchmark portfolio. The size of the overweight position is the absolute different between portfolio and benchmark weight.
Over the Counter (OTC)	A security which is not traded on a recognised stock exchange, usually due to an inability to meet listing requirements. OTC equities are usually very risky since they are the stocks not considered large or stable enough to trade on a major exchange.
Perpetual	Fixed income security with no maturity date that is not redeemable; also called annuity bond.
Portfolio	A collection of investments.
Preference shares	Shares that pay a specified dividend that is paid before any dividends paid to common shareholders and takes preference over common shares in the event of liquidation.
Private equity	Equity securities in companies that are not publicly traded. Investments in private equity most often involve either an investment of capital into an operating company or the acquisition of an operating company.
Put Option	A contract that gives the holder the right to sell a certain quantity of an underlying security to the writer of the option, at a specified price (the strike price) up to a specified date (the expiration date).
Reinvestment risk	Reinvestment risk is the risk that future coupon payments cannot be reinvested at a comparable interest rate to the coupon rate.
Reserves	Portion of earnings set aside to account for possible future losses or for specified purposes. Funds not required for day-to-day operations and working capital requirement.
Risk Averse	Risk averse is a description of an investor who, when faced with two investments with a similar expected return (but different risks), will prefer the one with the lower risk.
Risk Profile	The type and level of risk the investment portfolio is able and willing to take. Made up of risk tolerance and preference.
Risk Tolerance	The ability to tolerate volatility in investment returns.

Spot Exchange Rate	An agreement between the Meat Board and a counterparty (usually a bank) to exchange one currency for another currency in two working days' time at an agreed rate. From an importer's perspective, this product is used within the 'floating' discretion in the policy where there is a strong view that the currency will appreciate over the period.
Statement of Investment Policy and Objectives (SIPO)	Statement of Investment Policy and Objectives. The SIPO defines the objectives, performance expectations, asset diversification and risk parameters the investment portfolio will operate within.
Standard and Poor's	A credit ratings agency that publishes financial research and analysis on stocks and bonds.
Strategic Asset Allocation	A strategic asset allocation is both a portfolio strategy that involves setting target allocations for various asset classes, then periodically rebalancing the portfolio back to the original allocations, and the target allocation for underlying asset classes.
Subordinated debt	Debt that is either unsecured or has lower priority than that of another claim on the same asset or property.
Swaption	The purchase of a swaption gives the Meat Board the right but not the obligation to enter into an investor interest rate swap, at a future date, at a specific interest rate
S&P Developed REIT Index	The S&P Developed REIT Index is a market capitalisation weighted index comprising property securities listed in 24 developed market countries. It measures the return of property securities listed in developed markets Sharemarkets with dividends reinvested.
S&P/ASX 200 Index (Total Return)	The S&P/ASX 200 Index (Total Return) measures the total return from the top 200 companies by market capitalisation listed on the Australian Stock Exchange. The index assumes the total return with dividends reinvested.
S&P/NZX All Real Estate Index (Gross)	The S&P/NZX All Real Estate Index (Gross) measures the total return from the property securities by market capitalisation listed on the New Zealand Stock Exchange. The index shows the total return with dividends reinvested.
S&P/NZX Corporate A Bond Index	S&P/NZX Corporate A Bond Index measures the total return from corporate bonds where the underlying credit rating of the issuer, or security issued, must be A- (Standard and Poor's) or A3 (Moody's) or better.
S&P/NZX 50 Index (Gross)	The S&P/NZX 50 Gross Index measures the total return from the top 50 companies by market capitalisation listed on the New Zealand Stock Exchange. The index shows the total return with dividends reinvested.
Total Cost of Delivery	Total Cost of Delivery is the total overall annual cost of investment management including; investment advisory fees, custodial fees, weighted funds management fees, brokerages and transaction costs and any other costs of investment or portfolio management. Usually expressed as a percentage.
Underweight	A deficient amount relative to the weight in the underlying benchmark portfolio. The size of the underweight is the absolute different between the benchmark weight and the portfolio weight.
Unrated securities	Investments that have not been rated by a company such as Standard and Poor's.
Vanilla Foreign Exchange Option	The purchase of a foreign exchange option gives the holder (in return for the payment of a premium) the right, but not the obligation to buy (described as a call) or sell (described as a put) one currency for another currency at a future date at an agreed rate.

	The Meat Board would typically purchase NZD put options to protect future foreign currency expenditure and sell NZD call options as part of a collar structure only. From an importer's perspective, the put option provides the Meat Board with maximum flexibility, protecting the Meat Board from a downward movement in exchange rates but allowing full participation in a rise in exchange rates. This product is used where: * The underlying exposure is less certain e.g. expenses projected beyond the current financial year; * The outlook for exchange rates is favourable but the policy requires some protection; the Meat Board seeks maximum flexibility in its hedging strategy.
Volatility	The rate at which the price of a security moves up and down. If the price of a share moves up and down rapidly over short time periods, it has high volatility. If the price almost never changes, it has low volatility.

APPENDIX 2: REFERENCES

(1) Brinson, Gary P., L. Randolph Hood, and Gilbert L. Beebower, 1986. Determinants of Portfolio Performance. Financial Analysts Journal 42(4): 39–44.

Abstract

In order to delineate investment responsibility and measure performance contribution, pension plan sponsors and investment managers need a clear and relevant method of attributing returns to those activities that compose the investment management process—investment policy, market timing, and security selection. The authors provide a simple framework based on a passive, benchmark portfolio representing the plan's long-term asset classes, weighted by their long-term allocations. Returns on this "investment policy" portfolio are compared with the actual returns resulting from the combination of investment policy plus market timing (over- or underweighting within an asset class). Data from 91 large U.S. pension plans over the 1974-83 period indicate that investment policy dominates investment strategy (market timing and security selection), explaining on average 95.6 percent of the variation in total plan return. The actual mean average total return on the portfolio over the period was 9.01 percent, versus 10.11 percent for the benchmark portfolio. Active management cost the average plan 1.10 percent per year, although its effects on individual plans varied greatly, adding as much as 3.69 percent per year. Although investment strategy can result in significant returns, these are dwarfed by the return contribution from investment policy—the selection of asset classes and their normal weights.

Brinson, Gary P., Brian D. Singer, and Gilbert L. Beebower, 1991. Determinants of Portfolio Performance II: An Update. Financial Analysts Journal 47(3): 40–48.

Abstract

For our sample of pension plans, active investment decisions by plan sponsors and managers, both in terms of selection and timing, did little to improve performance over the 10-year period from December 1977 to December 1987. Although individual results
varied widely, in general it was difficult to find positive explanatory relations between performance and investment behavior. For example, extra returns seemed to be unrelated to the level of active management. Moreover, it seemed to be harder for managers to outperform equity benchmarks than bond and cash benchmarks; many more plans had positive contributions from the bond and cash portions of their portfolios.

(2) Hoffmann, Arvid O. I., Shefrin, Hersh M. and Pennings, Joost M. E., Behavioral Portfolio Analysis of Individual Investors (June 24, 2010).

Abstract

Existing studies on individual investors' decision-making often rely on observable socio-demographic variables to proxy for underlying psychological processes that drive investment choices. Doing so implicitly ignores the latent heterogeneity amongst investors in terms of their preferences and beliefs that form the underlying drivers of their behavior. To gain a better understanding of the relations among individual investors' decision-making, the processes leading to these decisions, and investment performance, this paper analyzes how systematic differences in investors' investment objectives and strategies impact the portfolios they select and the returns they earn. Based on recent findings from behavioral finance we develop hypotheses which are tested using a combination of transaction and survey data involving a large sample of online brokerage clients. In line with our expectations, we find that investors driven by objectives related to speculation have higher aspirations and turnover, take more risk, judge themselves to be more advanced, and underperform relative to investors driven by the need to build a financial buffer or save for retirement. Somewhat to our surprise, we find that investors who rely on fundamental analysis have higher aspirations and turnover, take more risks, are more overconfident, and outperform investors who rely on technical analysis. Our findings provide support for the behavioral approach to portfolio theory and shed new light on the traditional approach to portfolio theory.

(3) Jaconetti, Colleen M., Francis M. Kinniry Jr., and Yan Zilbering, 2010. *Best Practices for Portfolio Rebalancing*. Valley Forge, Pa.: The Vanguard Group.

Abstract

The primary goal of a rebalancing strategy is to minimize risk relative to a target asset allocation, rather than to maximize returns. A portfolio's asset allocation is the major determinant of a portfolio's risk-and-return characteristics. Yet, over time, asset classes produce different returns, so the portfolio's asset allocation changes. Therefore, to recapture the portfolio's original risk-and-return characteristics, the portfolio should be rebalanced.

In theory, investors select a rebalancing strategy that weighs their willingness to assume risk against expected returns net of the cost of rebalancing. Our findings indicate that there is no optimal frequency or threshold when selecting a rebalancing strategy. This paper demonstrates that the risk-adjusted returns are not meaningfully different whether a portfolio is rebalanced monthly, quarterly, or annually; however, the number of rebalancing events and resulting costs (taxes, time, and labour) increase significantly. (For instance, monthly rebalancing with no threshold would require 1,008 rebalancing events, while annual rebalancing with a 10% threshold would require only 15 rebalancing events.) As a result, we conclude that for most broadly diversified stock and bond fund portfolios (assuming reasonable expectations regarding return patterns, average returns, and risk), annual or semi-annual monitoring, with rebalancing at 5% thresholds, is likely to produce a reasonable balance between risk control and cost minimization for most investors. Annual rebalancing is likely to be preferred when taxes or substantial time/costs are involved.

(4) Milonas, Nikolaos & Rompotis, Gerasimos & Moutzouris, Christos. (2022). The Performance of ESG Funds vis-à-vis Non-ESG Funds. The Journal of Impact and ESG Investing. 2. 96-115. 10.3905/jesg.2022.1.041.

Abstract: This article studies the returns of 80 European and 64 US funds and attempts to identify whether those funds that invest in companies following environmental, social, and governance (ESG) principles differ from conventional funds in terms of performance. The empirical findings do not reveal any statistically significant difference between ESG and non-ESG funds although the former have slightly higher returns than the latter.

APPENDIX 3: NZ MEAT BOARD POLICY PAPERS

QUOTA JEOPARDY RESERVE
AUGUST 2023

BACKGROUND

The Meat Board Act 2004 requires that the Meat Board maintain 'a prudent level of net assets to avoid jeopardising quota markets and the integrity of quota management systems'.

The quota jeopardy reserve provision currently totals $3.4 million and is contained within livestock farmer reserves. Specific reserve provisions have been made for contingency fund reserves, general farmer reserves and accumulated surpluses from quota administration activities which are funded by quota holders and applicants held by the Board.

At 30 September 2022 the capital base available to the Board was

Contingency Fund:	$62.77 million
Quota Jeopardy Reserve:	$ 3.4 million
General Reserve*:	$12.03 million
Total	**$77.84 million**

*The general reserve is net after the investment fluctuation Reserve

The Board has discretion in determining when or how to utilise the quota jeopardy reserve. The constraints set out in section 12 of the Act in relation to consultation are relevant for industry good funding rather than consulting prior to a Board decision to access funding from the Quota Jeopardy Reserve.

The Board reviewed the requirements of the quota jeopardy reserve in August 2023 and concluded a value of $3.4 million ($2.5 million before inflation adjusting) is adequate provisioning. The quota jeopardy reserve is inflation adjusted each year.

The Meat Board Reserves Policy currently provides that:

> *Having regard to past experience (particularly concerning litigation), and risk management activity subsequently undertaken, the Board has retained $2.5 million to [address quota jeopardy situations], however this will be reassessed from time to time but no later than three yearly intervals. Relevant to this consideration will be the extent to which the Board's risks in relation to quota can continue to be mitigated by other means.)*.

POLICY STATEMENT

The Board may draw upon the quota jeopardy reserve up to $ 3.4 million without consultation if it is deemed necessary within in a twelve-month time frame to take any action required to maintain the integrity of New Zealand's quota administration systems.

If the Quota Jeopardy reserve is required to be drawn upon, it will be replenished from future fees charged to quota holders and applicants for the relevant quota administration system that has required the reserves expenditure.

POLICY EXAMPLE

Situations of potential quota jeopardy that may require funding at short notice from the Board include,

- where the quota market authorities effect changes to the current quota arrangements that jeopardise a quota market and the furthering of the Meat Board's object of maximizing the value of returns from that market and these changes need to be implemented, and
- where some act or omission of a quota holder undermines the integrity of our quota verification systems and requires urgent remedial action to redress the situation and provide the requisite assurances to the NZ Government and,
- Cyber risk mitigation to prevent or mitigate known or potential threats.

CONTINGENCY FUND PROJECTED DRAWDOWN

Due for Review 2024

EXECUTIVE SUMMARY

This paper follows on from a paper reviewed by the Meat Board Investment Committee at its November 2017 meeting and a previous paper "Crises that may require use of the New Zealand Meat Board Contingency Fund" presented to the Meat Board Investment Committee in August 2017.

The projected annual cash flows have been based upon that paper with projected funding required based on current activities and learnings from the new market development programme. The projections assume B+LNZ reserves will be minimal and funding for core access and development activities will be required until any levy collection function resumes.

Table 1 below projects the total cash drawdown over a three-year period by foreign currency and compares this requirement to the existing offshore investments.

Table 1. Total projected cash drawdown over three-year period

		Year One		Year Two	Year Three	FX Deposits held	% Of Projected Funding
	Total	1st Six Months	2nd Six Months				
NZD Equivalent	**$,000**					**$NZ,000**	
NZD	8,000	4,000	4,000	-	-		
Euro	7,319	982	1,196	2,434	2,707	3,640	50%
GBP	10,532	-	715	4,146	5,671	4,867	46%
USD (Includes Asia)	6,144	145	1,525	2,273	2,200	10,074	164%
Yen	1,428	-	-	714	714	2,989	209%
	33,423	5,127	7,435	9,567	11,293		

The overweighting in USD reflects a decision made at the time to ensure higher USD was held which provided flexibility for investment across markets rather than being market specific. The projected funding requirement that is Yen denominated has reduced and there is some merit in rebalancing this currency as investments mature.

As the SIPO is developed and the allocation to international equities and fixed interest are considered, the contingency funding requirements identified will be balanced against those investment allocations. Where any significant difference arises, a recommendation will be made back to the Board as to the options available.

APPENDIX 4: STRATEGIC ASSET ALLOCATION PAPER

NZ Meat Board: Strategic Asset Allocation Review Version 1.1
August 2023

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1 Executive Summary

Entity:	The New Zealand Meat Board (Meat Board)
Tax Status:	Consolidated tax losses of $72.2 million make the Meat Board effectively tax exempt
Current Investment Assets:	$77,800,000 as at 30 September 2022
Time Horizon:	Long term, greater than five years
Modelled Return:	7.2% gross (before inflation and fees)
Volatility:	6.5% standard deviation

Asset Allocation:

Asset Class	Minimum Allowable Exposure %	Strategic Asset Allocation %	Maximum Allowable Exposure %
Australian and New Zealand Equities	12.0%	16.0%	20.0%
International Equities (includes Emerging Markets)	29.0%	34.0%	39.0%
Total Growth	**45.0%**	**50.0%**	**55.0%**
New Zealand Fixed Interest	31.0%	36.0%	41.0%
International Fixed Interest	9.0%	12.0%	15.0%
New Zealand Cash	0.5%	2.0%	4.0%
Total Income	**45.0%**	**50.0%**	**55.0%**
Total		**100%**	

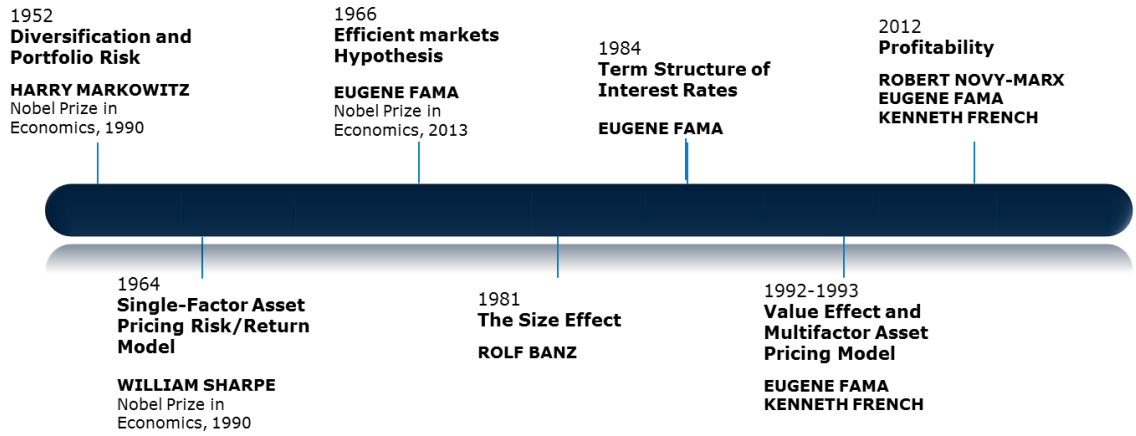
Benchmarks:

Asset Class	**Benchmark**	
New Zealand Equity	S&P/NZX 50 Index (Gross)	
Australian Equity	S&P/ASX 200 Total Return Index (Gross)	
International Equity	MSCI World ex Australia Index (Unhedged)	
Emerging Markets Equity	MSCI Emerging Markets Index (Gross)	
New Zealand Property	S&P/NZX All Real Estate Index (Gross)	
International Property	FTSE EPRA Nareit Global REITS Net Total Return Index	
International Fixed Interest	Bloomberg Global-Aggregate Total Return Index (Unhedged)	12.0%
New Zealand Fixed Interest	S&P/NZX A-Grade Corporate Bond Index	36.0%
New Zealand Cash	One Month Bank Bill Index	2.0%
Total		

Note:
Benchmarks may not all be used.

Investment Philosophy

The NZ Meat Board uses an evidence based approach to investing, rooted in academia, which offers insight into how markets work and the sources of expected returns. The timeline below offers some of the high points in the evolution of modern finance.



Incorporating decades' worth of academic research on financial markets, this investment philosophy incorporates the following five key principles:

1. **Markets work.** Capital markets do a good job of pricing all available information and investors' expectations about publicly traded securities (Fama, The Behaviour of Stock Market Prices, 1965).
   Implication – The market has already done most of the work, it is unwise to second guess it.
2. **Diversification is essential.** Comprehensive diversification can neutralise the risks specific to individual securities (Source: Markowitz, Portfolio Selection 1952).
   Implication – Most investors are neither diversified enough nor properly diversified.
3. **Risk and return are related.** The compensation for taking on increased levels of risk is a potential to earn greater returns (Sharpe, Capital Asset Prices – A Theory of Market Equilibrium Under Conditions of Risk, 1964).
   Implication – There are no free lunches in investing, seeking higher returns means taking on more risk.
4. **Portfolio structure explains performance.** The asset classes that comprise a portfolio and the risk levels of those asset classes are responsible for most of the variability of portfolio returns (Brinson et al, Determinants of Portfolio Performance, 1986).
   Implication – Share picking and market timing do not work. Instead, time is much better spent ensuring you have the Asset Allocation correct.
5. **Costs matter.** One of the few things that investors can have some control over is cost. Every percentage basis point in fees is a basis point that comes off returns (Sharpe, The Arithmetic of Active Management, 1991).
   Implication – In investments, lower costs beat higher costs.

Passive vs Active

The broad debate between passive and active is the wrong way to frame the discussion.

Using an index fund does not prevent an investor from being active, just as using active management does not mean an investor cannot invest passively. Even investors that rarely, if ever, make any changes have to make some decisions upfront such as; Strategic Asset Allocation, fund type, rebalancing intervals etc. Even the act of not making a decision is a decision.

The debate should be low cost vs high cost, low turnover vs high turnover, systematic vs haphazard, evidence based vs prediction based, disciplined vs undisciplined, transparent vs opaque etc. Traditional active managers are on the wrong side of these comparisons, and

there is a plethora of academic research documenting the failure of traditional active management.

That is not to say that active managers do not serve a purpose. Active managers play a crucial role in setting prices in the market. The high level of skill and competition among active managers enhances the collective knowledge of financial markets, but it also means that luck plays a larger role in the relative performance of active managers than skill (Fama & French, Luck versus Skill in the Cross-Section of Mutual Fund Returns, 2010).

There will always be active managers that outperform the overall market but it is extremely unlikely that any one person or body can identify managers that will outperform in advance. Further, consistently picking the best active manager for any given asset class is also extremely unlikely (source: S&P Persistence Report, May 2023).

Additionally, the odds of portfolios outperforming get progressively smaller as the number of funds in the portfolio increase. The collective knowledge of financial markets is one of the reasons that market prices are highly efficient, even if not perfectly so (Fama, The Behaviour of Stock Market returns, 1965).

Index funds are one of the greatest financial innovations for investors but they are far from perfect. Index funds have shortcomings primarily related to price inefficiencies associated with index reconstitution, trading at discount or premia, as well as, style and size drift intra reconstitution period.

The Meat Board wishes to use an investment approach that is low-cost, low turnover, systematic, evidence based, disciplined and transparent.

Exposure to return premiums

Investors can target different levels of expected return by tilting portfolios towards areas of the share and fixed income markets that are shown by empirical evidence to lead to higher average returns over time (Fama & French, The Cross-Section of Expected Stock Returns, 1992).

In share markets these include companies with lower market capitalisation, lower relative price and high relative profitability. In fixed income, the level of risk and return can be increased through exposure to term and credit premia (Fama & French, Common Risk Factors in the Returns on Stocks and Bonds, 1993 and Novy-Marx, The other side of value: The gross profitability premium, 2013).

Global diversification vs home bias

Market frictions associated with investing internationally, and domestic income and inflation requirements, mean that some level of home country bias may make sense.

Sub Asset Class Risk placement

Empirical evidence suggests that risk is rewarded more efficiently in equities than fixed interest. Therefore, the Meat Board prefers taking risk in equities rather than fixed interest. The expected returns from targeting risk premiums in shares are much higher than from risk premiums in fixed interest. In other words, investors are better compensated for taking risk in equities than in bonds.

The primary purpose of bond allocations is managing the volatility of the overall portfolio. When share markets experience a sharp fall, bonds act as a diversifier and reduce overall volatility. This relative lack of volatility is the primary reason investors have fixed income exposure in portfolios.

In accordance with this philosophy, the framework for strategic asset allocation decisions is to:

- Identify asset classes for investment
- Identify the prevailing market weight allocation within each asset class
- Consider deviations away from the market weight allocation based on the collective substance of academic research and empirical evidence
- Seek to obtain targeted investment exposures as cost-effectively as possible
- Avoid allocating based on tactical forecasting

Portfolio Objectives

- The ultimate outcome of the asset allocation is to construct a portfolio with the appropriate risk/return profile which will deliver:

- **Investment outcomes**
- Broad asset class diversification
- A targeted exposure to specific identified risk factors
- Efficient risk-adjusted returns
- Broad (investment) tax efficiency
- Investment grade securities only

- **Additional portfolio attributes**
- Low cost (both management and trading)
- High transparency
- High liquidity
- All underlying securities listed on accepted markets

Analytical approach

The appropriate approach requires some focus on backward looking returns and volatility data and forward looking expected returns analysis based on accepted academic practise.

Because the broad asset allocation must be implemented by a third party, a key part of the analysis involves estimating various broad risk factor premia (e.g. market, term and credit risk premia) which can be applied to construct estimates of expected future returns.

By combining expected returns with known asset volatilities and historical correlation data, we are able to construct expected portfolio and return characteristics which are both broad enough to be implementable and specific enough that the Meat Board can have confidence in the recommended Strategic Asset Allocation being likely to achieve the objectives.

Constraints

Given the nature of the Meat Board's objectives (the generation of income to fund industry good, and capital growth to protect the Meat Board's ability to make a meaningful contribution to the cost of recovering from an industry crisis in real terms), there are a number of constraints that must be applied to portfolio construction (such as currency hedging).

Unconstrained portfolio optimisation will (as determined by the nature of the inputs) always seek to 'push' portfolio asset allocations towards the highest expected risk-adjusted return asset combinations. Whilst mathematically desirable, this can often result in the selection of higher risk/return asset classes at the expense of lower risk/return asset classes and result in extreme asset combinations and portfolios that can deviate significantly from investor expectations. Portfolios with these characteristics are problematic to implement and challenging to hold.

In this regard, it is appropriate to consider constraints in relation to minimum home bias allocation, developed versus Emerging Market equity allocation, only liquid securities and a strategic currency hedging ratio (as noted above).

Investable asset classes

- New Zealand Equities
- Australian Equities
- International Equities (Developed Markets)
- International Equities (Emerging Markets)
- New Zealand Property
- International Property
- New Zealand Fixed Interest
- International Fixed Interest
- Cash

Exclusions

Where practical, the Meat Board will prefer its Investment Manager utilise Collective Investment Vehicles (CIVs) which incorporate ESG considerations into its investment activities. However, the Meat Board expects its Investment Manager to take a pragmatic approach to investment decisions such that if a CIV which incorporates ESG considerations into its investment activities does not satisfy other investment criteria (for example, being insufficiently diversified, illiquid, or unreasonably expensive) the Investment Manager may implement utilising a non-ESG screened CIV instead.

Directly held securities that are significantly exposed to or derive a non-incidental proportion of revenue from activities listed in Section 6.4 of the SIPO are excluded.

The Meat Board have excluded from consideration a number of different assets. A non-exhaustive list of exclusions is summarised below, covering some of the more common asset groups. These are either not separate asset classes requiring an allocation over and above a normal market weight allocation, or they fail some other asset filtering test with respect to quality, liquidity etc.

Reason assets are excluded are as follows:

Asset(s)	Reason for exclusion
Companies that are directly involved in the manufacture of; cluster munitions, nuclear explosive devices (NEDs) or anti-personnel mines	The Meat Board seeks to invest in a manner that will not harm New Zealand's reputation in the global marketplace. This includes investing in a manner consistent with the Cluster Munitions Prohibition Act 2009 and the Nuclear Free Zone, Disarmament and Arms Control Act 1987 and the Convention on the Prohibition of the Use, Stockpiling, Production and Transfer of Anti-Personnel Mines, 1997.
Responsible Investment Exclusion	The Meat Board will reference the New Zealand Super Fund (NZSF) Responsible Investment Exclusion List which details specific companies. Refer here for New Zealand Super Fund Exclusions.
Commodities	Commodities fail the asset class test. They comprise securities that have dissimilar financial characteristics and may behave differently in similar markets. Commodities do not produce any income stream, inhibiting common valuation metrics. The investment rationale is largely limited to future price speculation without any clear evidence of the existence of an expected long term commodity risk premium.
High yield/junk bonds	Rejected due to the quality of the securities being below investment grade.

Hedge funds	Dissimilar securities, high cost, opaque structures, often illiquid.
Private equity, including venture capital	Usually highly concentrated, typically illiquid, long minimum holding period, generally opaque, often high cost.
Structured debt securities	Opaque structures, typically behave like equity securities in the event of market dislocation, often illiquid.
Preference shares	Inappropriate for tax reasons.
Leveraged investments	Amplify risk, opaque structures, typically speculative in nature.
Derivatives – Options, Futures, Commodities contracts, contracts for difference	Can be used to leverage positions, amplify risk, speculative in nature.
Unlisted equity securities	Illiquid.
Limited partnerships	Illiquid.

The following transactions are prohibited:

- Short selling.
- Margin trading transactions.
-
- **3 Risk Premiums and Expected Returns**

Introduction

The process utilised to calculate expected returns is a build-up method which starts with the risk free rate of return and market risk premia.

The significant benefit of this approach is that it provides a mechanism by which we can form reasonable estimates of the potential future premia of each of the broad market risk factors.

We begin with the Capital Asset Pricing Model (CAPM) formulated by Bill Sharpe, which states the expected return of an investment is a function of its sensitivity to the market return and the risk free rate (Source: Sharpe Capital Asset Prices – A Theory of Market Equilibrium Under Conditions of Risk, 1964). The formula for the CAPM is as follows:

$$E(R_j) = R_f + \beta_j\,[E(R_m) - R_f] \qquad \text{(CAPM)}$$

From this equation we conclude that investors are compensated for taking on market risk by earning the equity risk premium [E(Rm)−Rf], defined as the market return less the risk free rate. The risk free rate in this model is the return of US Treasury Bonds, long term US Government Bonds.

Sharpe's model was expanded by Fama, French, Novy-Marx and others who added additional risk factors that are also compensated by markets with additional expected return (Source: Fama, French The Cross-Section of Expected Stock Returns, June 1992, Novy-Marx, The other side of value: The gross profitability premium, 2013).

The additional risk factors include company size, relative company value, profitability, investment and fixed income risk factors, term and credit.

As equity investments take on greater market, value and size risk, their expected returns increase. As fixed income investments take on greater term and credit risk, their expected returns increase (Source: Fama, French A Five-Factor Asset Pricing Model, March 2014).

To form an expected return we need to determine the expected risk premium of those risk factors over the long-term.

Accordingly, in this section we develop estimates of the applicable:
- risk free rate
- market risk premium
- term risk premium
- quality (credit) risk premium

Global risk free rate

In previous Strategic Asset Allocation reviews we have begun with central bank reference rates, added inflation and then adjusted for the term structure of interest rates (Source: Malkiel, Finance, 1989) to create long-term risk free rate estimates. This bootstrapping process introduces several opportunities for estimation error.

Recent experience, including a global inflation event that resulted in slow and lacklustre responses from central banks, heightened awareness of the imprecision of attempting to build up a long-term assumption from short term data.

Given the objective is to develop an estimate of the long-term risk free rate, a superior strategy can avoid the bootstrapping process and the necessary estimation errors above by selecting a long-term estimate as a starting point. In this iteration of the expected returns analysis, we begin by adopting the US 10-year Treasury Bond as the global risk free rate benchmark.

Rationale for selecting the US 10-year Treasury Bond:
- The US 10-year Treasury Bond is commonly assumed to be the risk free rate in analyses of the equity market premium
- The USD is still regarded as the global reserve currency and US Treasury Bonds remain highly sought after when markets become risk averse
- 10-year yields are more stable than short term interest rates whose movements are driven primarily by monetary policy
- In a globally diversified portfolio, even allowing for an Australasian home bias, the largest single country allocation is to the USA
- The global emphasis on inflation control implemented via monetary policy
- The low and relatively stable US 10 year Treasury Bond yield (along with other 10 year sovereign bond yields) that have resulted from these policies
- The prevailing level of central bank interest rates and interest rate forecasts

We have selected a long-term weighted average of 3.50%.

Whilst the current US 10 year Treasury Bond yield is currently above this level (3.81%), the 10, 20 and 25 year averages are significantly below this level (2.28%, 2.89% and 3.33%[i]). We have assumed that on average the current yield will gradually move lower as it begins to move towards our convergence target, and that the long term weighted average (for long term expected return purposes) will be 3.50%.

For more detail, view:
Appendix 1: Global risk free rate benchmark

Calculation of Equity Market Risk Premium

We engaged with expert independent research and analysis undertaken by the leading authority in equity risk premium (ERP), Dr Aswath Damodaran of the New York Stern School of Business.

In essence, Damodaran's findings are that an implied equity risk premia – calculated based on current market and securities pricing information – generally provides a higher correlation to the *actual future premia* observed over the subsequent five and ten year windows, than any other calculation method (such as premia calculated via surveys or based on historical data).

Based on Damodaran's updated calculations in relation to the implied equity risk premia for the USA over a number of years, we estimate a current developed market equity risk premium for all regions of 4.50%.

We cross checked Damodaran's findings through review of historical empirical data for 90 countries with start dates ranging from 1900 (core Developed Markets) to as recently as 2011 (Emerging and frontier markets). Historic data indicated an equity risk premium of approximately 5.10% per annum over 151 years in the US with the annualised equity risk premium from futures 4.40% per annum (i.e. the market's estimation of the future equity risk premium) (Source: Elroy Dimson, Paul Marsh and Mike Staunton, DMS Database 2023).

For more detail, view:
Appendix 2: Implied developed market ERP.

Additional sovereign risk premia

Damodaran's research highlights that deviations in sovereign ratings and/or variability in credit default swaps pricing can indicate additional country specific (or region specific) risk that may also need to be accounted for.

Given the broad asset allocation approach of the Meat Board's portfolio, we considered whether the Developed Markets ex USA, the Emerging Markets, New Zealand and Australia warranted any additional sovereign risk premia (SRP). Our conclusions were as follows:

Table 1: Additional country/region risk premia above the global risk free rate

Country/region	Additional SRP	Rationale
Non-USA Developed Markets	0.00%	Consists primarily of comparably rated (AA+/AAA) sovereigns, aggregate risk differentials negligible
Emerging Markets	1.25%	Consistent with historical observations of a sizable risk differential. Also consistent with default spread based calculations and aggregate sovereign bond differentials
New Zealand	0.75%	Based on long term 10-year bond differentials between New Zealand and USA. Historically the New Zealand 10-year bond differential has been much higher than the current estimates (in higher nominal yield environments), but lower nominal rates imply a lower differential in future. A 20-year autoregressive model was used to assist with this estimate.
Australia	0.20%	Based on long term 10-year bond differentials between Australia and USA. Historically the Australian 10-year bond differential has been higher (in higher nominal yield environments), but lower nominal rates imply a lower differential in future. A 20 year autoregressive model was used to assist with this estimate.

For strategic asset allocation purposes we allowed different sovereign risk adjustments for Australasia (0.75% in New Zealand, and 0.20% in Australia) in recognition of the sovereign interest rate differential we can currently observe as well as our projections about the rate of convergence in these differentials over the near term.

For more detail, view:
Appendix 3: Additional sovereign risk premium (generic)
Appendix 4: Additional sovereign risk premium (New Zealand)

Appendix 5: Additional sovereign risk premium (Australia)
Appendix 6: Additional region risk premium (Emerging Markets)

Total expected equity market returns

When we consolidate our various estimates we begin with the global risk free rate estimate for each jurisdiction. To this we add an additional sovereign risk adjustment as required, and our ERP estimate. The collation of these various estimates is summarised as follows:

Table 2: Summary of total expected equity market returns (for long term returns)

Component	Developed markets	Emerging markets	New Zealand	Australia
Global RFR	3.50%	3.50%	3.50%	3.50%
Additional SRP	-	1.25%	0.75%	0.20%
Equity Risk Premium	4.50%	4.50%	4.50%	4.50%
Total market estimate	*8.00%*	*9.25%*	*8.75%*	*8.20%*

Note: these represent long term expected returns of broad equity markets on an *unhedged* basis.

The additional country risk premium with respect to New Zealand, Australia and the Emerging Markets are best thought of as sovereign risk free rate adjustments.

With respect to the Emerging Markets, we are open to Damodaran's view which was to regard the additional Emerging Markets premium as an additional source of *equity* risk premium. However, this distinction is not material as it does nothing to improve the explanatory power of our expected returns calculations.

Based on regression analysis, our expected return calculations allow a 1x implied ERP to be added to the risk free rate starting point. Therefore, whether we included the 1.25% Emerging Market adjustment as an additional sovereign risk free rate adjustment *or* as an implied ERP adjustment, we end up with exactly the same answer. The same logic applies to both the New Zealand and Australian expected returns calculations.

New Zealand and International listed property

Listed real estate presents something of a challenge to accurately estimate expected returns. Several different methods can be used to help inform expectations, but there is no single standard methodology that is generally accepted as the best.

The dividend growth model and capital market evaluation methods that have been used previously have not always provided reliable outputs due to a lack of robustness in the underlying data.

The only method that has delivered consistent results has been a multi-factor regression analysis which highlights relatively stable market betas for listed property, with no additional explanatory power coming from other risk factor exposures.

We are realistic about the challenges of accurately forming an expected returns projection for this asset class and based on regression analysis accept a market beta of 0.80 for global listed property and 0.725 for New Zealand listed property.

For more detail, view:
Appendix 7: New Zealand property
Appendix 8: International property

International fixed interest

To evaluate the expected return of international fixed interest we also used a factor sensitivity model approach. However, unlike when we assess equity and credit premia, where past factor magnitudes can tell us a significant amount about likely future magnitudes, we believe the best information we can access in relation to term premia for the foreseeable future is contained within current yield curves.

For term premia we assessed the expected returns currently available in developed market yield curves, recognising these were more relevant to effective asset allocation horizon spanning the next three years.

Consistent with generally upward sloping yield curves, we accepted the current identified international sovereign term premia of 0.40% for 0 to 3 years duration; 0.80% for 3 to 5 years duration and 0.65% for 5 years+ duration.

Although lower than historical averages, we accepted these estimates which reflect the generally lower and flatter yield curves prevailing internationally.

For the credit premia we assessed historical relationships focusing on corporate credit differentials for 1 to 3 years duration and for the full term duration of the Bloomberg Global Aggregate Corporate Bond Index. In these segments we accepted the identified historical credit premia of 0.70%.

For more detail, view:
Appendix 10: International fixed interest

New Zealand fixed interest

We followed a similar process to the global bonds but, given the idiosyncratic nature of the small New Zealand bond market, we utilised domestic indices to construct our term and credit risk factors.

For the term premia we calculated the segmented premia currently available in New Zealand by assessing term differentials between New Zealand Government Bonds of varying maturity.

Consistent with generally upward sloping yield curve in New Zealand, we adopted the current identified term premia of 0.40% for 0 to 3 years duration; 1.00% for 3 to 7 years duration and 0.45% for 7 years+ duration.

For the New Zealand credit premia we assessed historical relationships focusing on corporate credit differentials to isolate an A-Grade credit premia and an incremental premia for accepting BBB risk. Both analyses measured credit risk at approximately 4.5 years duration.

In these segments we accepted the identified historical credit premia of 0.70% for A-Grade credit risk and an incremental, additional premia of 0.10% for extending this universe to include BBB credits.

For more detail, view:
Appendix 11: New Zealand fixed interest

Risk premia Summary

The various risk factor premia that we selected are summarised below.

Table 3: Various risk factor premia for selected markets

Risk factor	New Zealand	Australia	Developed Markets	Emerging Markets
Nominal risk free	4.00%	3.50%	3.50%	3.50%

Sovereign risk factor	0.75%	0.20%	Nil	1.25%
Market factor	4.50%	4.50%	4.50%	4.50%
Term + Credit	2.20%		2.55%	

- **4 Major portfolio construction decisions**

Introduction

Specific objectives (such as hedging and home bias) effectively act as constraints on asset allocation decisions.

Where they occur, constraints are generally included to enhance balance and diversification. Or, in the case of the hedging ratio and home bias allocations, to ensure that the final recommendation reflects the Meat Board's objectives and that the Strategic Asset Allocation does not reflect an extreme "all or nothing" allocation which could lead to impractical portfolios.

The major constraints considered are:

- Home bias – Australasia vs international
- Domestic equity mix – New Zealand vs Australia
- International equity mix – Developed vs Emerging Markets
- Property weights – domestic and international
- Hedging strategy – international equities and fixed interest

In any allocation process, it is important to establish relevant constraints or guidelines to assist with the ultimate asset allocation decision.

Home bias – Australasia vs international

Investors around the world generally display a persistent and significant home bias, regardless of domicile, which often conflicts with the tenets of broad global diversification (Source: Vanguard, The role of home bias in global asset allocation decisions, 2012). This bias is usually conscious and intentional, with investors actively overweighting domestic holdings at the expense of foreign securities.

The main reasons cited for this usually comprise some combination of the following:

- ***A preference for the familiar*** – investors generally feel more comfortable with their home market and allocate accordingly, even if it results in a poorer risk/return trade off.
- ***Cost*** – a higher cost to access foreign securities.
- ***Expectations*** – specifically expectations about future returns in their home market.
- ***Liability hedging*** – the need to hedge certain liabilities may lead to a home country bias (especially in fixed income, but possibly also in equities).
- ***Domestic inflation hedging*** – investor spending is, typically, influenced more by domestic inflation and interest rates. In these cases, the diversification benefits of foreign assets may decrease the portfolio's ability to meet its objectives.
- ***Currency exposure*** – many investors perceive foreign investments to be inherently riskier than domestic investments. At least some of this perception may be attributable to exchange rate fluctuations. Minimising exposure to foreign currency assets could be an additional reason why investors typically allocate a greater percentage of their portfolio to local securities.

A 2010 analysis supplied by consulting actuaries Melville Jessup Weaver (MJW) remains applicable to the prevailing environment.

The main highlights from the MJW research papers were:

1. Regardless of an individual investor's tax rate, the **minimum risk** allocation to Australasian equities was approximately 50%.

2. The slope characteristics of all the risk/return curves analysed confirmed that an allocation to Australasian shares in excess of 50% is inefficient.
3. A movement from 50% Australasian shares to 25% Australasian shares will generally lead to a higher expected return for an increase in volatility.
4. Further reducing the Australasian shares allocation below 25% will generally lead to diminishing returns, as the effect of the ever-increasing volatility reduces the expected return.
5. The indicative optimal mix of International versus Australasian shares was considered to be 50-75% international equities and 25-50% Australasian equities.

Analysis of the average Australasian versus International equity allocations across approximately $80 billion of KiwiSaver funds revealed that the "average" KiwiSaver portfolio comprised an approximate 35% allocation to Australasian equities and approximately 65% to international equities.

Table 4: KiwiSaver Australasian/International Split by Portfolio type

	KiwiSaver analysis 2018 ($40.7b assets analysed)		**KiwiSaver analysis 2021 ($80b assets analysed)**	
Portfolio type	Australasian Equity (%)	International Equity (%)	**Australasian Equity (%)**	**International Equity (%)**
Conservative	36.5	63.5	**43.1**	**56.9**
Moderate	42.0	58.0	**40.7**	**59.3**
Balanced	31.2	68.8	**31.3**	**68.7**
Growth	36.9	63.1	**34.5**	**65.5**
Aggressive	12.1	87.9	**21.1**	**79.9**
Weighted Avg	34.8	65.2	**35.0**	**65.0**

It is appropriate to maintain relativity with this aggregate industry reference point in constructing a Strategic Asset Allocation, we note this is consistent with the MJW paper. Home equity biases have been trending downwards in major overseas markets such as USA, UK, Australia and Canada (The role of home bias in global asset allocation decisions, Vanguard research, June 2012).

We recommend a 32%/68% Australasian/International equities split.

Domestic equity mix – New Zealand vs Australia

The NZ market contains approximately 50 listed companies that are investable. By comparison the Australian market contains more than 500 companies that are investable.

Reasons for an overweight allocation

To New Zealand	true "domestic" market no currency risk direct hedge against domestic inflation
To Australia	more diversified market (companies and sectors) superior market depth and liquidity better access to risk factors and managers to target risk the dominant market within Australasia

A twenty year returns analysis demonstrated that a 60% New Zealand and 40% Australian allocation was virtually indistinguishable from a 50% New Zealand and 50% Australian allocation. A 50/50 allocation achieved a marginally higher Sharpe ratio (more efficient return) over the analysis period.

If a different (to 50/50) split of New Zealand and Australian equities was to be considered, then a tilt towards New Zealand equities at the expense of Australian equities may be

preferable. A tilt towards New Zealand equities is consistent with the investment prioritisation preferences of an unconstrained optimiser and, on average, also what we see in KiwiSaver.

Based on the risk and expected return characteristics of these asset classes, an unconstrained optimiser generally prefers New Zealand equities due to their superior risk-adjusted expected returns. As a consequence the optimiser seeks to increase allocations to New Zealand equities at the expense of Australian equities.

However, the data also shows that the expected returns from a 50:50 split are not materially different from a 60:40 split.

In examining allocations, we reviewed the home bias allocation observable within KiwiSaver (currently approximately 66% to New Zealand shares and 34% to Australian shares with a wide range).

Noting the side range, and capacity for an Investment Manager to add value in this decision, we recommend an Australasian/International split in lieu of specific direction on New Zealand/Australian split.

For benchmark and reporting purposes, we recommend retention of a 50/50 split.

International mix – Developed Markets vs Emerging Markets

We begin by considering the investible universe of Developed and Emerging Market companies as the starting point for global equity allocation decisions. This universe is best represented by the MSCI ACWI Investable Market Index (MSCI ACWI IMI), which is a free float-adjusted market capitalisation weighted index designed to measure the investible market universe of 99% of Developed and Emerging Market equities.

As at June 2023, the MSCI ACWI IMI covered 9,181 large, mid and small cap securities in 46 countries (23 Developed Markets and 24 Emerging Markets). The aggregate weight of the Emerging Markets within the MSCI ACWI IMI was approximately 11%, versus the Developed Markets' weight of approximately 89%[ii].

In Capital Asset Pricing Model (CAPM) world, an appropriate allocation to Emerging Markets would be their observed weight within global equity markets. However, a risk factor view of the world embraces the idea that where we find sufficient evidence of long term higher expected returns from certain segments of the market, we will consider higher strategic allocations to those segments.

When reviewing Emerging Markets we find a growing body of academic evidence that small company risk and value company risks appear to be better compensated than in Developed Markets (Source: Lischewsk & Voronkovo, Size, value and liquidity. Do They Really Matter on an Emerging Stock Market? Emerging Markets Review, 2012). For investors that seek exposure to these risks this results in a relatively high expected return per unit of volatility in Emerging Markets compared to Developed Markets.

Accordingly, all unconstrained optimisations seek to maximise allocations to Emerging Market equities at the expense of Developed Markets.

Based on a CAPM approach, we would end up allocating less to Emerging Markets after a period of relative underperformance and more after a period of relative outperformance. As behavioural economists would confirm, this is usually a sub optimal approach to asset allocation.

In fact, one of the main reasons for forming expected returns based on market and other risk factors and to increasingly utilise portfolio optimisation techniques in asset allocation decision making is to avoid such an outcome (Hoffman et al, Behavioral Portfolio Analysis of Individual Investors, 2010).

Again, noting the relatively wide range of exposure to Emerging Markets equities within KiwiSaver we acknowledge that Investment Managers may add value in this decision. Therefore, we do not recommend a specific allocation to Emerging Markets be a requirement of the Strategic Asset Allocation. We do note that market capitalisation weighting should be the starting point.

Currency Hedging

Due to the likelihood of a contingency event coinciding with a negative currency event, it is the policy of the Board to invest all funds invested in international equities and international fixed interest in an unhedged fashion.

Based on the policy paper on crises that may require use of the NZ Meat Board Contingency Fund and the projected drawdown thereof (approved May 2023, see Appendix of SIPO) the Meat Board faces a year one exposure of NZD$4,500,000 equivalent of foreign currency spending. In years two and three this total foreign currency spend amounts to a further NZD$21,000,000 equivalent.

In order to protect against equity price volatility it is recommended that the Meat Board holds international fixed interest reserves of NZD$9,000,000 equivalent (approximately 25% of total fixed interest exposure) in unhedged international fixed interest.

Calculating expected returns

The combination of the risk premia estimates now gives us the important information we need to calculate expected returns.

$$E(R_j) = R_f + \beta_j \, [E(R_m) - R_f] \qquad \text{(CAPM)}$$

Expected returns and standard deviations for each asset class

	Expected return (% per annum)	Expected standard deviation (%)
New Zealand Cash	5.00	0.8
NZ Fixed Interest	6.20	2.3
International Fixed Interest Unhedged	6.05	11.6
NZ Property	6.35	9.6
International Property	6.40	17.6
New Zealand Equities	8.75	12.8
Australian Equities	8.20	15.2
International Equities	8.00	13.2
Emerging Markets Equities	9.25	17.8

Recommended Strategic Asset Allocation

The impact of constraining Strategic Asset Allocation is borne out in two ways;

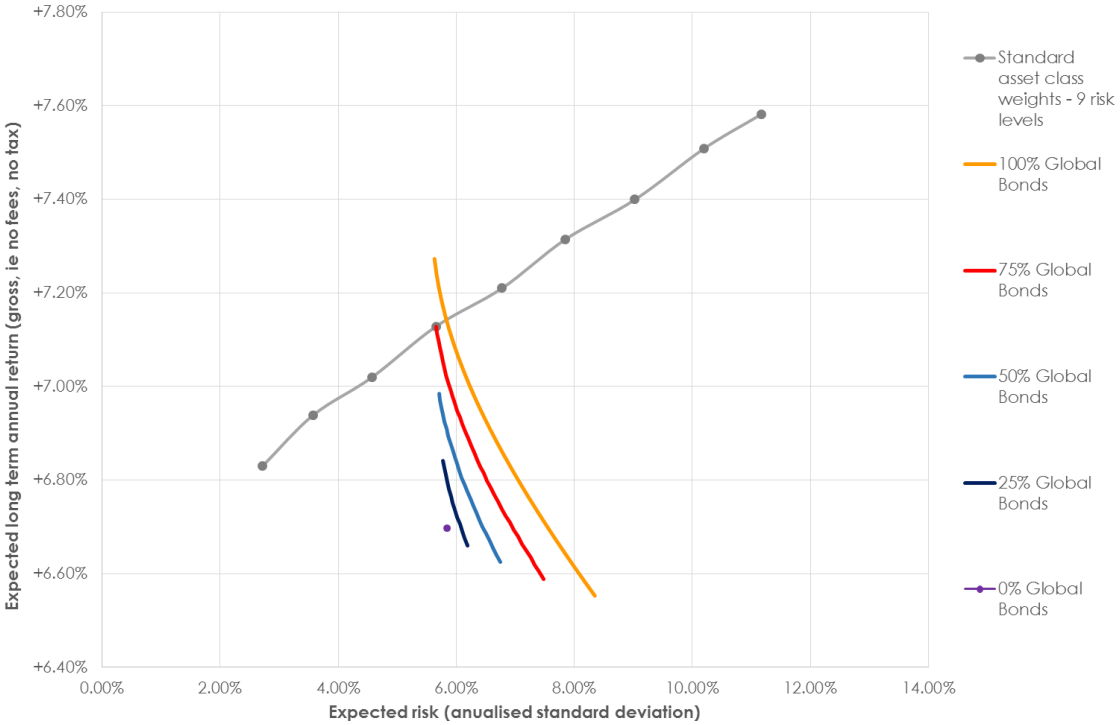
1. Expected return – as we increase the exposure to unhedged international fixed interest we forego currency hedging pick up which decreases expected return, and
2. Risk – again, as we increase the exposure to unhedged international fixed interest we introduce additional currency volatility which increases portfolio risk.

The best way to illustrate this is by graphing the difference that hedging makes to risk and return.

Figure 1 shows an efficient frontier of different Strategic Asset Allocations, **the grey line**, plotted in risk (x axis) and return (y axis) dimensions with different exposures to international fixed interest (global bonds).

The Global Bond lines show the impact of both increasing the exposure to international fixed interest (as exposure to international fixed interest increases, expected return increases) and changing the proportion of international fixed interest hedged (the point on the coloured lines with the highest expected return is 100% hedged, the point with the lowest expected return is 0% hedged).

Figure 1: Risk/Return trade-off with Global Bonds constraint

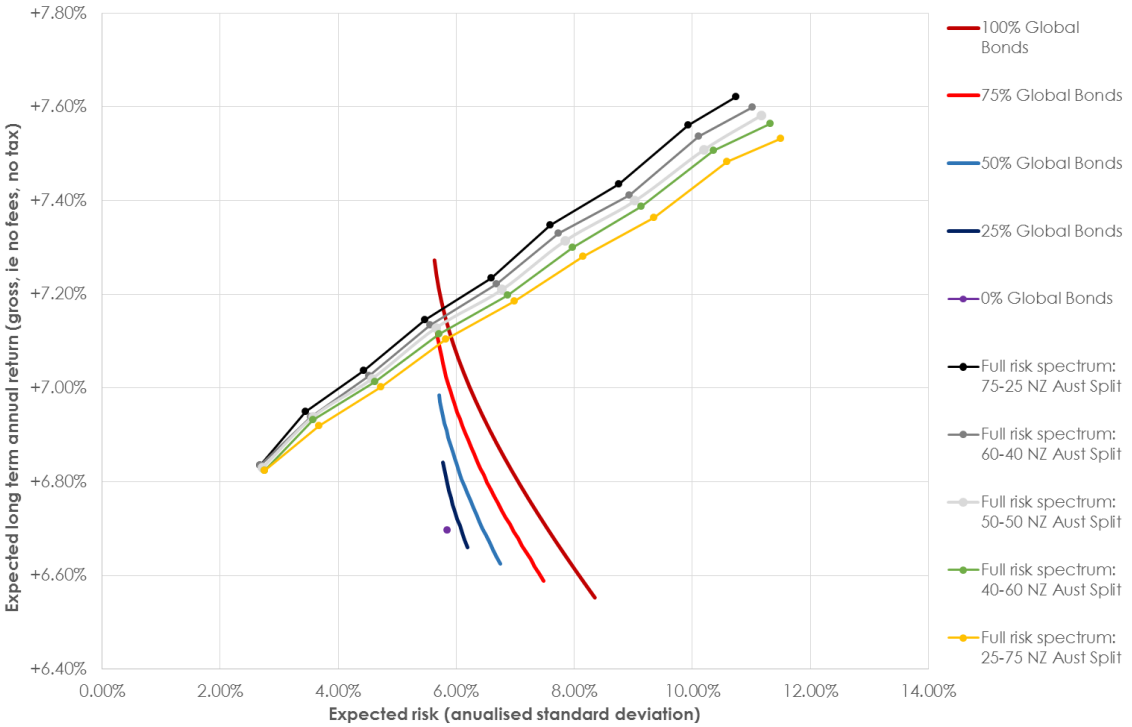


These relationships are not unexpected (see Expected Returns). Given the constraint requiring foreign currency exposure in international fixed interest, the optimal exposure to international fixed interest is 25% of total fixed interest exposure.

As indicated above, the difference in expected return by varying the domestic exposure between New Zealand and Australian equities is not sufficiently pronounced enough to warrant a hard and fast percentage exposure to either.

Figure 2 illustrates this. The dotted lines show various efficient frontiers with differing NZ/Australian equity splits. While NZ higher exposure dominates higher Australian exposure, the quantum of difference in expected returns is not disproportionately high. This is important as it can allow an implementer to largely make this decision.

Figure 2: Risk/Return trade-off with Global Bonds constraint varying NZ/Australia split



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- **Strategic Asset Allocation**

Asset Class	Minimum Allowable Exposure %	Strategic Asset Allocation %	Maximum Allowable Exposure %
Australian and New Zealand Equities	12.0%	16.0%	20.0%
International Equities (includes Emerging Markets)	29.0%	34.0%	39.0%
Total Growth	**40.0%**	**50.0%**	**60.0%**
New Zealand Fixed Interest	31.0%	36.0%	41.0%
International Fixed Interest	9.0%	12.0%	15.0%
New Zealand Cash	0.5%	2.0%	4.0%
Total Income	**40.0%**	**50.0%**	**60.0%**
Total		**100%**	

- **Rebalancing Limits**

The percentage allocation to each asset class may vary depending upon market conditions.

The SAA has upper and lower limits for each asset class as set out in the table above. The limits are based on the following guidelines:

- Plus or minus 5% for an asset class comprising 20% or more of the SAA,
- Plus or minus 25% (of the allocation to a single asset class), where that asset class comprises less than 25% of the SAA (e.g. an asset class comprising 4% of the SAA would have limits of plus or minus 1%).
- Cash exposure limits set from 0.5% to 4.0%.

- **Appendix – Data and Analysis**
- **Appendix 1 – Global risk free rate benchmark**

The concept of a global risk free rate benchmark holds intuitive appeal. In today's market environment, information and market access has become increasingly globalised and a growing number of international companies operate in multiple jurisdictions and trade on multiple markets. One benefit of applying a global risk free rate as the starting point for our analysis, is that every country or region can be benchmarked to the same global standard and, from there, adjustments can be made as required to reflect varying additional levels of country specific risk. In line with convention, we have elected the 10 year US Treasury Bond as our proxy for the risk free rate.

One tangible benefit of adopting the 10 year US Treasury Bond as the global risk free rate benchmark is that we are developing an estimate that is directly linked to a third of the underlying investments within our globally diversified models, as US securities (equities and bonds) represent the largest single country exposure within portfolios.

Figure 3: 10 year US Treasury Bond yield since 1987

Source: Macro Trends

As Figure 3 demonstrates, the 10 year US Treasury Bond yield has been steadily declining since the late 1980s. Many central banks, including the US Federal Reserve, were focused on reining in high inflation in the 1970s and 1980s. However, they learned that attempting to control inflation by targeting the growth rate of the monetary supply was highly challenging because the relationship between inflation, economic activity, and measures of monetary growth were quite unstable. The difficulties with the various methods employed during that time led eventually to monetary policy targeting the average change in prices (i.e. inflation) which has become a widely accepted approach internationally.

Today, the dual mandate of the Federal Open Market Committee (FOMC) is to maintain a federal funds rate consistent with maximum employment and price stability over the long run, with these policy objectives generally seen as being complimentary. Within this context, the FOMC also reaffirmed its judgment that consumer price index inflation at a long term rate of 2 percent, is most consistent with this. They believe that longer term inflation expectations

that are well anchored at 2 percent help foster price stability, serve to moderate long-term interest rates, and enhance the Committee's ability to promote maximum employment. In order to drive inflation to 2% over time, the FOMC take the same approach adopted by many other central banks around the world, which is to influence the interest rates that US banks and other lenders charge on short term loans. Longer term interest rates incorporate these short term levels as well as expectations about how monetary policy and broader economic conditions will evolve over longer durations.

In terms of inflation mandates, other major central banks around the world all have very similar targets:

Table 5: Major central bank inflation targets

Country	Inflation policy target
USA	2% on average over time
New Zealand	1-3% on average over the medium term
Australia	2-3% on average over the medium term
European Central Bank	2% over the medium term

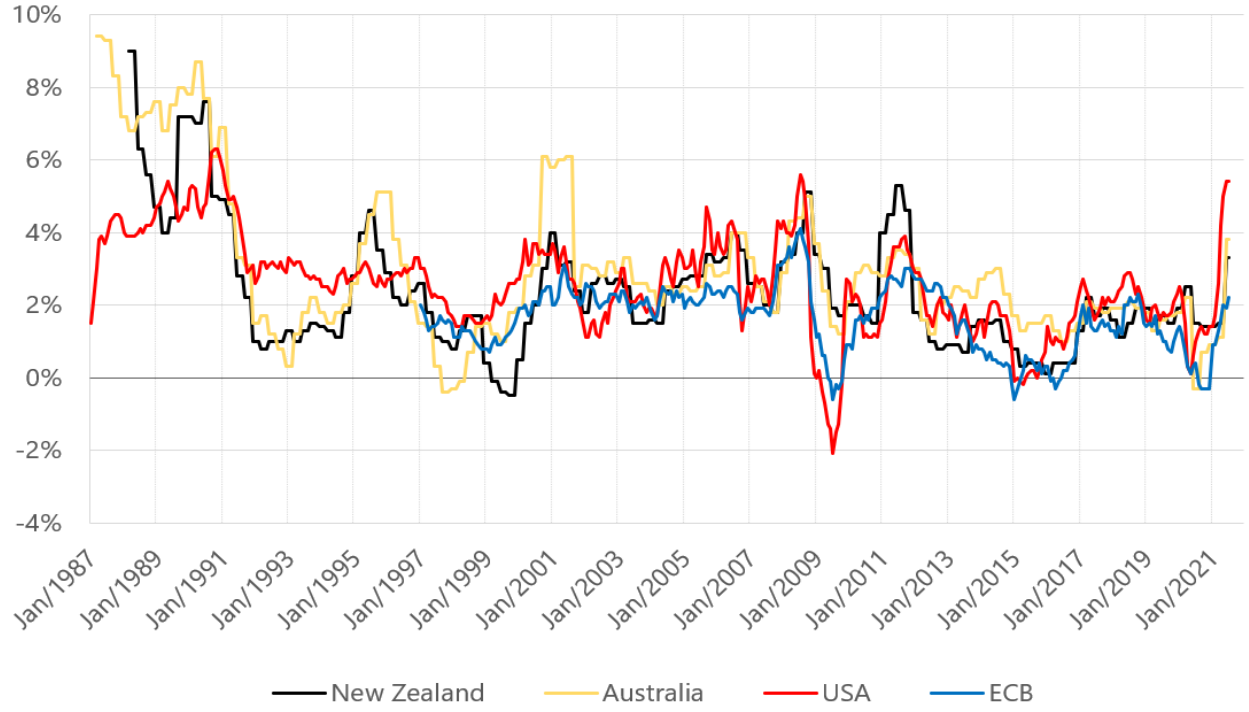
With this co-ordinated global approach to tackling inflation we have also, over time, been able to observe two clear trends. The first has been the overall success of these regimes in constraining inflation.

The following chart highlights the inflation trends (since 1987) across USA, New Zealand, Australia and the European Central Bank and, although each of the series have exhibited some variability over time, we see an overall convergence towards a universal developed markets inflation rate of around 2.0% p.a.

The very recent 2021 inflation readings do tell a different story, although there is considerable conjecture about whether these spikes represent the dawning of a new, higher inflationary age, or whether they are mainly a transitory outcome of a world beset with supply chain issues and awash with cash that suddenly finds itself facing widespread supply and demand imbalances.

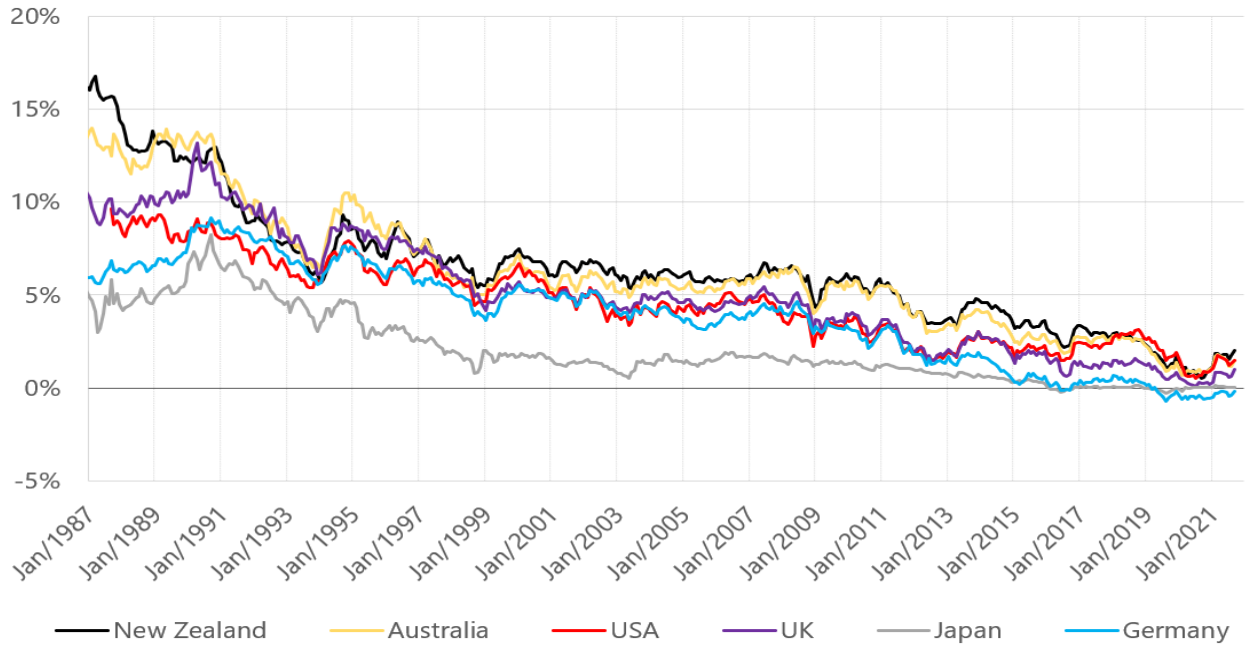
For now at least, the major central banks around the world remain of the view that while these post-Covid imbalances may push inflation higher in the short term, this is unlikely to result in increased inflation in the longer term.

Figure 4: Rolling annual inflation



Covid aside, with inflation expectations (and inflation itself) having been successfully marshalled for an extended period of time, we have also seen all major sovereign 10 year bond yields consistently declining over time.

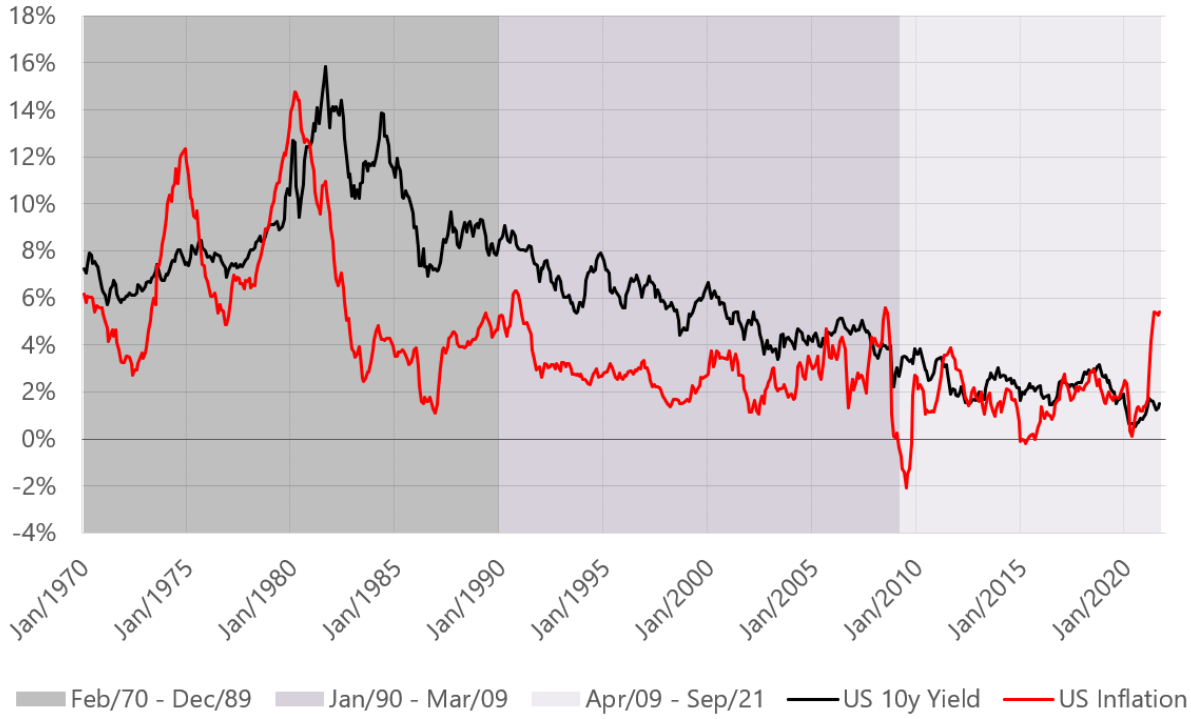
Figure 5: Various developed market 10 year sovereign bond yields



We are relatively comfortable that within this broad macro setting – which typically includes very low and generally stable inflation – 10 year sovereign bond yields are likely to stay much lower than they have (on average) in recent decades. However, we still need to establish a good estimate or projection for this rate over the longer term as it is an important building block for our expected returns framework.

We started with a review of the 10 year US Treasury Bond yield adjusted for inflation. This difference in the yield and the rolling 1 year inflation level is illustrated below:

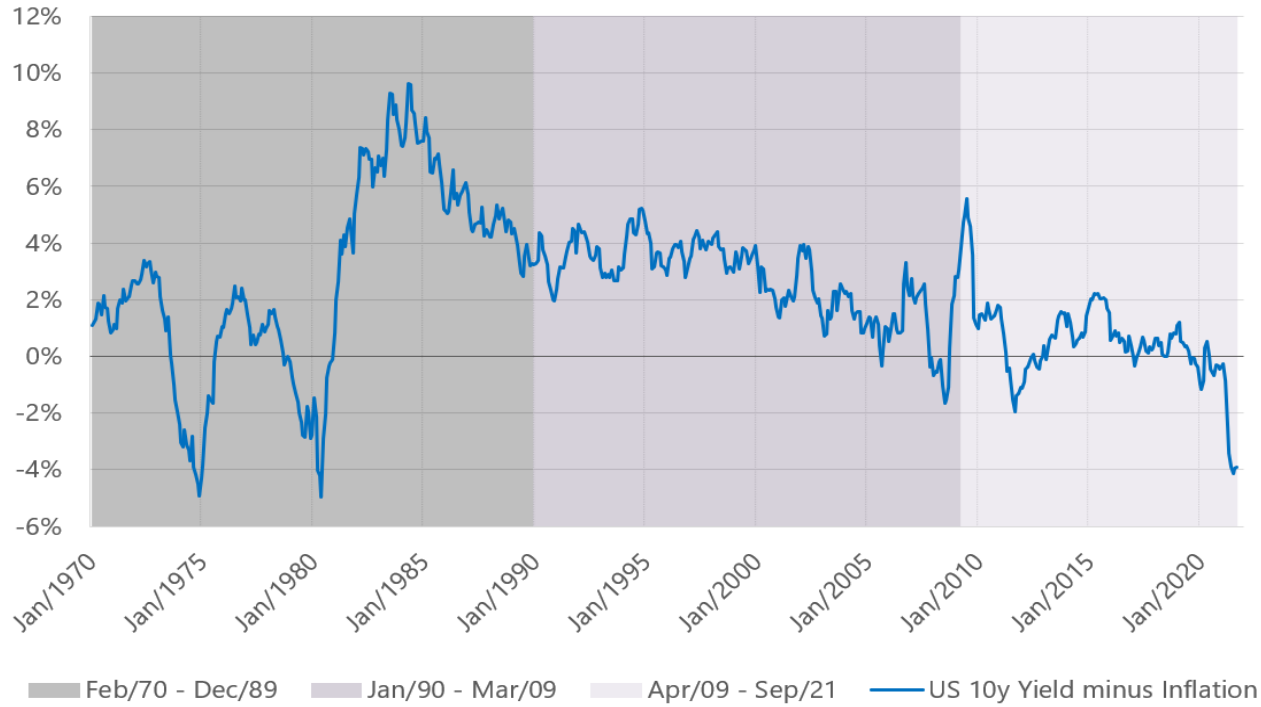
Figure 6: Historical US inflation and 10 year US Treasury Bond yield



We have highlighted three different time periods. The first period, up until 1990, monetary policy was focused on targeting the growth rate of the monetary supply which had mixed success, and a typically wider range of both yields and inflation. The next two decades saw the establishment of modern monetary policy which focused on the use of central bank interest rates to suppress inflation, or alternatively, stimulate growth. This period saw reduced volatility and a broad decline in interest rates. Finally, we highlight the era post the Global Financial Crisis of 2008/09 where interest rates have remained low amidst an environment with high levels of quantitative easing. Again, we see compressed yields and low, relatively less volatile inflation.

The difference in these measurements shows us the real return on the 10 year US Treasury Bond. This is the figure we want to estimate to project long term risk free rate.

Figure 7: Historical real yield on 10 year US Treasury Bonds



The long term real return of the 10 year US Treasury Bond (i.e. its average return above inflation) since 1970 has been greater than 2.0% p.a. However, as the above chart reveals, the average size of the real return has gradually been declining as interest rates have fallen. In the modern era, since the implementation of the existing monetary policy framework in the early 1990s, the real return has averaged 1.8%.

Whilst trying to avoid succumbing to recency bias in relation to the current inflation spike, and recognising that US interest rates have risen over the last 12 months, we concluded that a long term real return expectation for the 10 year US Treasury Bond could reasonably be set at 1.50%. Based on the 2% long term inflation target of the Federal Reserve, this implies a long term nominal yield of 3.50%.

We then reviewed a range of other information available to us and consulted with experts in the field to help influence or clarify our thinking. This information included:

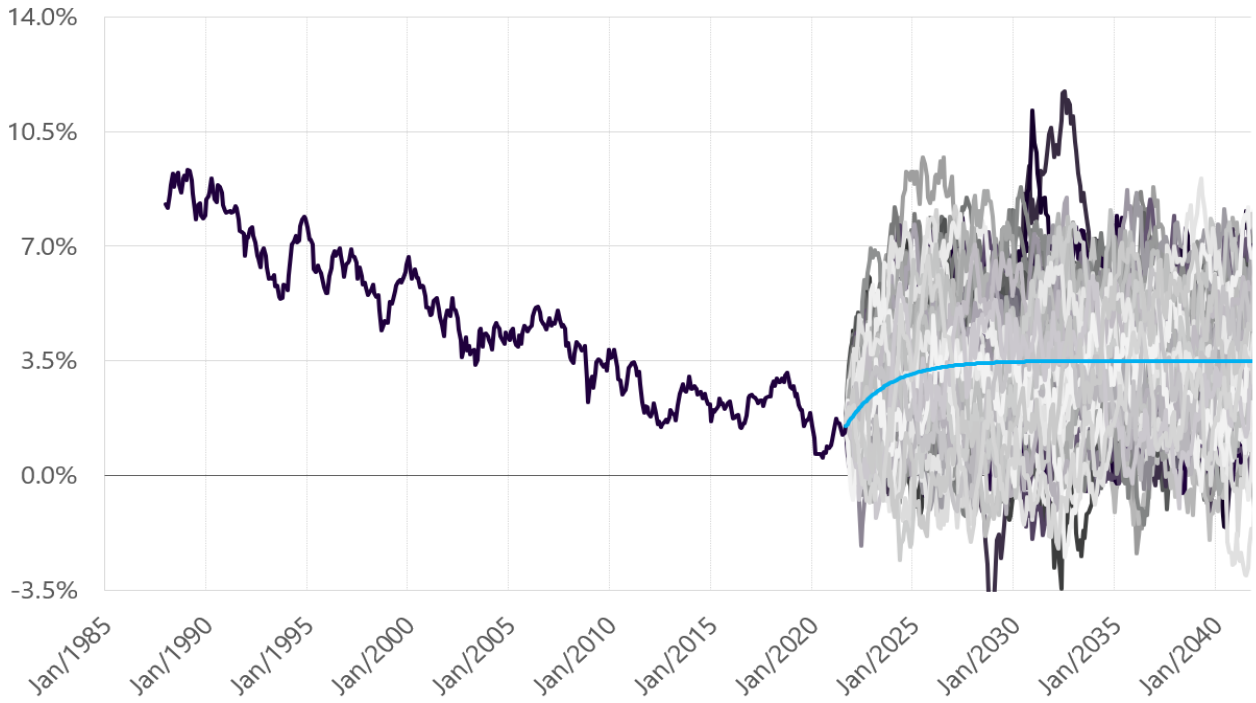
- US Federal Reserve projections – The Fed do not directly project the 10 year US Treasury yield, but they do provide a dot-plot of individual FOMC members' estimates of where they believe the Federal Funds rate will be over the coming years. Consensus dot-plot estimates of 2% to 3%, plus an "average" ten year term premium of 1.5%, imply a peak 10 year Treasury Bond yield of 3.5% to 4.5%.
- US inflation linked bonds show a long term breakeven inflation of 2% (generally in line with the Treasury target), although this too has spiked higher in the short term.
- US business economist consensus projections – Blue Chip economic indicators are forecasting the average 10 year US Treasury Bond yield to hit 3.1% by 2027 to 2031 (implying a nominal yield of around 3.50% by 2031.

In aggregate, these alternative views and expectations were generally supportive of the projection that the 10 year US Treasury Bond yield can, over the long term, converge towards 3.50%.

Whilst convergence towards a 10 year US Treasury Bond yield of 3.50% appears reasonable, the pathway to achieving this is still highly uncertain. Using an autoregressive modelling approach, we can project a mid-point pathway from a multitude of potential pathways. Given

the historical volatility of the 10 year US Treasury Bond, a 95% confidence interval on future bond yields suggests a range of anywhere between -3.5% and 11.0% is possible. For a visual representation of this wide range of potential outcomes, please see the clouded portion of the chart below.

Figure 8: Historical yield of US 10-year treasury with 100 randomised paths and average



For the purposes of this analysis, we have selected that on average there is a 20 year convergence whereby the bulk of this convergence has effectively occurred after 10 years.

Table 6: Outputs of 10 year US Treasury Bond convergence analysis

Measurement period	10 year US Treasury Bond yield
Spot reading 30 June 2023	3.81%
20 year convergence target	3.50%
Weighted average 20 year yield	3.30% (for L/T expected returns)
Weighted average 3 year yield	2.45% (for current asset allocation)

With this global risk free rate benchmark in place, we have an important building block towards the construction of long term expected global equity market returns. It also gives us a benchmark against which all other individual developed and Emerging Market sovereign risks can be measured, enabling us to make an appropriate allowance, where necessary, for any long term sovereign risk differentials.

Whilst these assumptions will help guide our long term portfolio return estimates, every asset class has its expected return built upon the same risk free rate assumption. Accordingly, the magnitude of this estimate will have no bearing on portfolio optimisation. Asset allocation decisions will be more directly influenced by key interest rate differentials, expected sovereign risk premia and the range of expected risk premia tilted towards (i.e. equity, value, credit, etc).

▪ Appendix 2 – Equity Risk Premium

We leant heavily on the expertise of Dr Aswath Damodaran of the New York Stern School of Business. Damodaran's particular specialty is his considerable body of work on explaining and estimating the equity risk premium (ERP). His detailed analysis on equity risk premia is summarised and updated annually in his paper 'Equity Risk Premiums (ERP): Determinants, Estimation and Implications – The 2023 Edition, updated: March 2023'.

In this paper, Damodaran outlines three broad approaches that may be taken to determining the ERP. In summary they are:
Survey premiums: Based on the surveyed expectations of a subset of investors.
Historical premiums: Take the average premium that markets have historically delivered and use that as a basis for forward looking estimates.
Implied premiums: Estimate future premiums based on the prices and aggregate earnings characteristics of securities/markets today.
To highlight how each of these approaches vary, Damodaran analysed a range of estimates of the USA equity risk premium in January 2023.

Table 7: Outputs from various methods of calculating the equity risk premium (Jan 2023)

Approach used	ERP	Additional information
Survey: CFOs	4.42%	Campbell and Harvey survey of CFOs (2018); Average estimate. Median 3.63%.
Survey: Global Fund Managers	4.60%	Merrill Lynch (January 2020) survey of global managers
Historical: US	5.06%	Geometric average - Stocks over Treasury Bonds: 1928-2022
Historical: Multiple Equity Markets	5.00%	Average premium across 20 markets from 1900-2022: Dimson, Marsh & Staunton (2022)
Implied: Current premium	5.94%	From S&P 500 – January 1, 2023
Implied: Average premium	4.21%	Average implied equity risk premium: 1960-2022
Implied: Default spread based	4.24%	Baa Default Spread * Median value of (ERP/ Default Spread) on 1/1/23

With the range of returns in this example being 1.73% from highest to lowest, we can immediately see that the decision about which method we might use to estimate ERP could have a significant impact on our overall expected returns from equities (as well as the overall expected return from model portfolios).

Why is there such a difference in the estimates? There are several reasons:

1. When share prices enter an extended phase of upward movement, the historical premium will climb to reflect past returns. Implied premiums will tend to move in the opposite direction, since higher share prices generally translate into lower premiums. The opposite is true in periods of downward movements; historical premia drop, and implied premia rise.
2. Survey premiums reflect historical data more than expectations. When shares are going up, investors tend to become more optimistic about future returns and survey premiums reflect this optimism. In fact, survey premiums have been known to overshoot historical premiums in both good and bad times.
3. When the fundamentals of a market change, either because the economy becomes more volatile or investors get more risk averse, historical risk premiums will not change but implied premiums will.

Damodaran suggests that any decision about what could be considered the best method for estimating ERP should include consideration of a combination of factors:

i) Predictive Power
The best approach should provide forecasts that are closest to the realised future premiums. Unfortunately, there is not a sufficient history of survey data to adequately test the efficacy of that method, but Damodaran was able to compare the historical method with the implied method from 1960 to 2022. He additionally evaluated the predictive power of two other variants sometimes suggested as possible proxies for ERP estimation – one being the aggregate earnings yield of a country's equity market (net of the risk free rate) and the other related to the default spread on a country's corporate bonds, as it is widely accessible data.

Damodaran's findings are summarised below:
Table 8: Effectiveness of different ERP methodologies

Predictor	Correlation with implied premium next year	Correlation with actual return – next 5 years	Correlation with actual return – next 10 years
Earnings yield	0.133	-0.015	-0.066
Dividend yield	0.142	0.005	-0.008
Current implied ERP	0.071	0.354**	0.386**
Average implied ERP: Last 5 years	0.150	0.221*	0.247*
Historical ERP	-0.111	-0.338**	-0.405**
Default spread based premium	0.280**	0.049	0.059

** statistically significant at the 95% level

From all of the above, Damodaran concluded:
"*If predictive power is critical or if market neutrality is a pre-requisite, the current implied equity risk premium is the best choice. For those more skeptical about markets, the choices are broader, with the average implied equity risk premium over a long time period having the strongest predictive power. Historical risk premiums are very poor predictors of both short-term movements in implied premiums or long-term returns on stocks*."

ii) Belief about markets
Given our overall investment philosophy, this factor resonated. When it comes to beliefs, Damodaran says:
"*Implicit in the use of each approach are assumptions about market efficiency or lack thereof. If you believe that markets are efficient in the aggregate, or at least that you cannot forecast the direction of overall market movements, the current implied equity premium is the most logical choice, since it is estimated from the current level of the index. If you believe that markets, in the aggregate, can be significantly overvalued or undervalued, the historical risk premium or the average implied equity risk premium over long periods becomes a better choice. If you have absolutely no faith in markets, survey premiums will be the choice*."

We considered Damodaran's updated analysis and conclusions in relation to an implied ERP approach to be persuasive. From a predictive accuracy and philosophical alignment perspective, the implied ERP method appeals as the most logical and consistent choice for our current strategic review.

How do we apply this?

Damodaran's analysis is exclusively from the perspective of a US investor. As a result, he benchmarks all of his ERP calculations to the global risk free rate, which for the purposes of this analysis is the 10 year US Treasury Bond yield[1].

From this starting point Damodaran calculates the implied ERP for the USA based on current market pricing. On the basis that credit rating differences between the USA and other developed nations represent a good proxy for any additional developed country specific risk, Damodaran calculates individual developed country risk premia on a case by case basis and publishes his results at least annually.

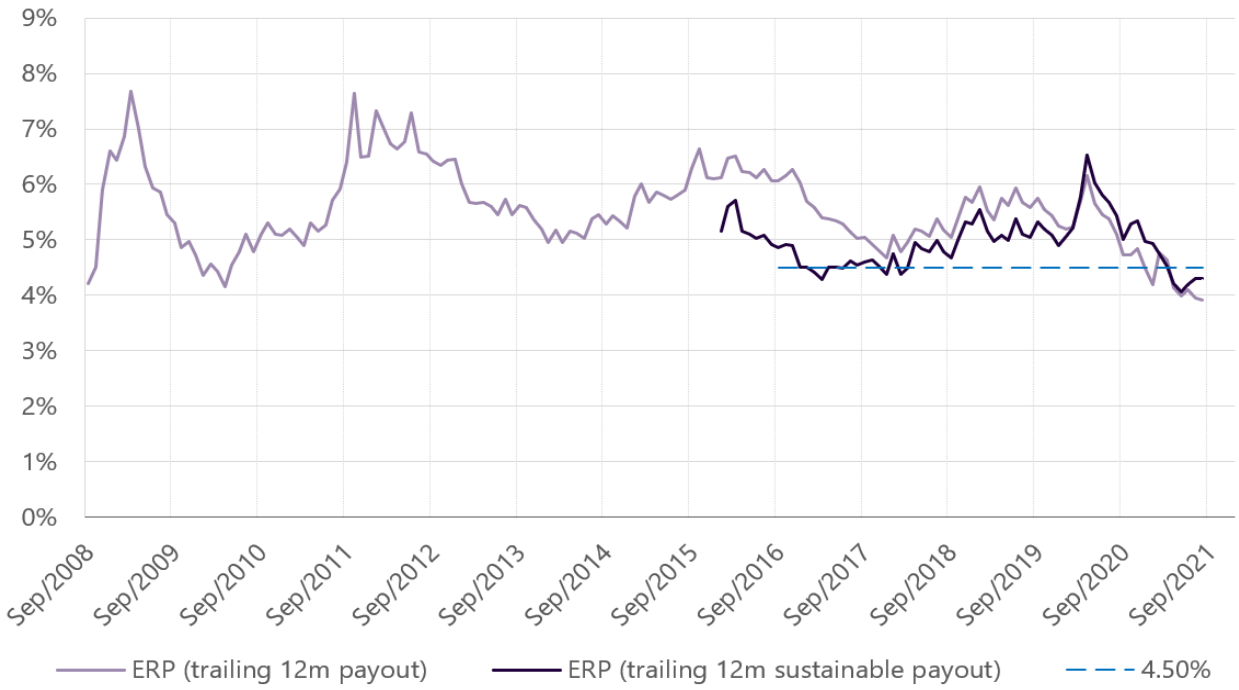
With respect to Emerging Markets, Damodaran calculates individual country risk premiums by calculating a sovereign ratings based default spread (compared with the USA) and adjusting it by the additional volatility of Emerging Markets equities versus Emerging Markets sovereign bonds.

In considering the available options, we adopt Damodaran's general approach to ERP estimation and the global risk free rate starting point of the US 10 year Treasury Bond.
By analysing other countries and regions against the USA, we can then develop our estimates of sovereign risk premia and anticipated currency premia to enable us to construct expected returns from the perspective of a New Zealand investor.

Damodaran's implied equity risk premia (ERP) methodology utilises the prices and aggregate earnings characteristics of securities and markets today to make more informed estimates of the future equity premia.

Figure 9 shows Damodaran's implied ERP for the USA since 2008 based on trailing 12 month earnings (light solid line) and since early 2016 based on a sustainable payout ratio (dark solid line).

Figure 9: Implied ERP for the USA since 2008



We see some variability in the longer run data with the implied ERP ranging from 4% to just under 8%. However, we also see greater consistency over the last seven to eight years with the numbers ranging from around 4.0% to 6.5%. When we take the implied ERP based on a *sustainable* payout ratio into account we see a similar trend, with a range of 4.0% to 6.0% (excluding the immediate post-Covid peak in April 2020) and an average of 4.95%.

We acknowledge that a relatively wide band of premia projections were possible from this data. An estimate anywhere in the range of 4.00% to 5.50% could legitimately be argued regardless of whether trailing or sustainable payout ratios were preferred. Interestingly, the upheaval caused by the arrival of Covid-19 added volatility into month-on-month measurements, but otherwise did not materially change this overall picture.

Whilst a range of estimates may be defendable, we can only have a single estimate. Having adopted Damodaran's general ERP approach, we did not want to undo the merits of choosing this methodology by simply selecting the most conservative estimate within the range. Equally, we are cognisant of the fact that international shares have, on average, become more expensive since our previous review.

For example, the price to earnings (PE) ratio of the S&P500 has increased from around 20x at the beginning of 2019 (based on trailing 12 month "as reported" earnings) to around 25.4x in June 2023 (estimated from latest reported earnings and current market prices).

There is a very strong correlation between high current PEs and lower future share returns, and we discussed whether this change in relative price warranted additional consideration in respect of our ERP estimate.

While we are mindful not to overstate the potential impact of higher interest rates constraining the returns from high PE markets, neither were we inclined to ignore them entirely. Of course, in ERP valuation models like Damodaran's, this significant PE expansion is already having an effect. With reference to Figure 8, it should be noted the implied ERP based on sustainable payouts has been steadily declining since its peak in March 2020. This visually reinforces the relationship stated earlier, that as shares get increasingly expensive on a relative basis, their future expected returns are more likely to decline.

Damodaran's current estimate for the future ERP for the USA is 4.59%[iii].

We deliberated briefly about whether we should recommend a single ERP estimate for the entire developed markets region (as above) or whether separate estimates for USA and non-USA regions should be considered. Ultimately it was decided that splitting this aggregate ERP into two could potentially lead to unintended consequences in the portfolio optimisation phase. By adding an ERP differential to markets that otherwise express demonstrably similar risk characteristics then, all else equal, European and other non-USA allocations would be more likely to be preferred by the optimiser, and the globally significant USA market would be more likely to be underweighted. This may have been a moot point depending on the investment choices available but was nevertheless a potential scenario we sought to avoid.

Accordingly, we selected an implied ERP for the entire developed markets region of 4.50%.

▪ Appendix 3 – Additional sovereign risk premium (generic)

An additional sovereign risk premium seeks to capture the unique risk characteristics above the global risk free rate benchmark that individual countries or selected regions tend to demonstrate over time.

In order to quantify these sovereign risk differentials, we have maintained the approach we advocated by Damodaran. In essence, this approach endeavours to assess long term sovereign risk differentials by comparing the risk attributes of different countries or regions against our nominated global risk free rate benchmark which, in accordance with Damodaran's significant body of work, remains the 10 year US Treasury Bond yield. Other measures that can alternatively be considered include a comparison of sovereign credit default swap rates and/or credit ratings differences.

Our preference is to assess existing and projected future differentials in relevant sovereign 10 year bond yields. We believe these differentials, where we can reasonably expect them to persist, tell us something about how the market prices different sovereign risk attributes. The outputs from this analysis then form the basis for how we assign specific country or region sovereign risk premiums.

However, as with all market data, even where a relationship may exist between two series (for example the 10 year US Treasury Bond yield and the 10 year New Zealand Government Bond yield), the relationship is invariably quite 'noisy' and, at any point in time, the current spot value may be some way away from an average level we might reasonably expect to see over the longer term. While this will often widen the confidence intervals we can place around our eventual projections, it doesn't negate the need for us to conduct the most reasoned evaluation we can of this noisy dataset.

Our analysis of sovereign 10 year yield differentials is centred on determining the following key outputs:

1. What has been the historical relationship and can we reasonably expect this same relationship (or a different relationship) to persist in the future?
2. What is the current spot value of the relationship?
3. What is the 20 year convergence expectation (i.e. how do we expect the current spot value to move towards a projected future value)?
   Note - the weighted average differential over this 20 year period will form part of our long term returns projections.
4. What is the relationship expected to be over the first three years of this convergence?
   Note - the weighted average differential over the next three years will contribute to our asset allocation decisions for the coming three year cycle.

We considered whether 10 year interest rate differentials between the US and the remaining non-US countries within the developed markets would warrant any additional sovereign risk adjustment. In general, we believe the answer on an aggregate basis is no. Most of these nations have comparable sovereign credit ratings in the AA+/AAA range, so any aggregate risk differentials are, at most, extremely negligible.

Some countries, such as Japan, have had structurally lower 10 year bond rates for some time, while others such as the UK and Germany more commonly have rates slightly above prevailing US rates although, in recent years, these (and several other developed nations) have had consistently lower, and in some cases negative yields.

One of the challenging aspects of attempting to establish a consistent relationship amongst so many differing sovereign yield curves simultaneously is that rate relativities change over time and yield curves do not all move in unison. The Fed commenced raising interest rates in 2022. Conversely, the European Central Bank has projected a more apprehensive stance in

removing economic support. On these matters, it would seem the Federal Reserve is ahead of its major developed market peers.

At any point in time, these differing rate cycles can add considerable 'noise' to a calculation of aggregate yield differentials, and we believe that it was reasonable and preferable to simply look through this noise and accept – based on their aggregate AA+/AAA credit ratings – a net nil sovereign risk adjustment for the remaining non-US developed markets.

▪ Appendix 4 – Additional sovereign risk premium (New Zealand)

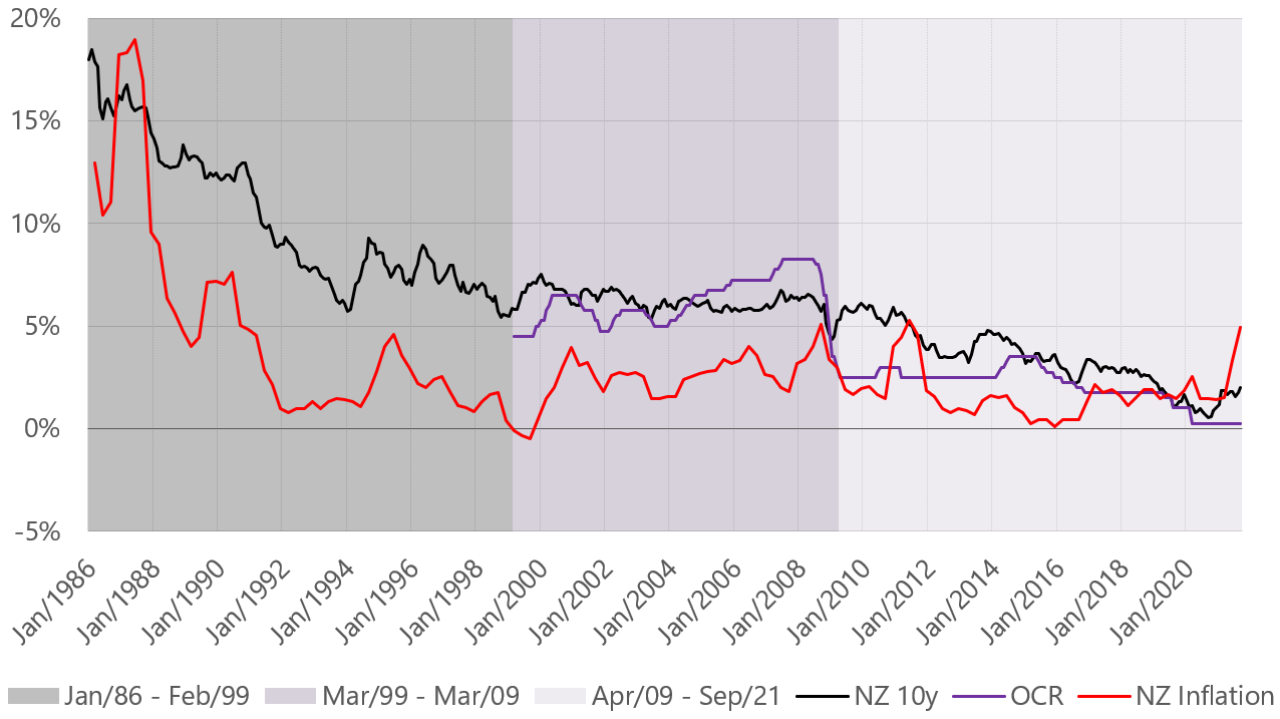
In order to project a sovereign risk premium for New Zealand we adopted a similar approach to that outlined in Appendix 1 where we projected the convergence of the 10 year US Treasury Bond yield towards 3.50%. In this case, we needed to extend that analysis by:

1. Undertaking a forward projection of the 10 year New Zealand Government Bond yield, and
2. Determining an expected long term differential between the 10 year New Zealand Government Bond yield and the 10 year US Treasury Bond yield.

If the long term differential is projected to be positive (i.e. if the 10 year New Zealand Government Bond yield is expected to be persistently *higher* than the 10 year US Treasury Bond yield), then we would regard this as being reflective of the long term additional sovereign risk premium applicable to investments in New Zealand assets.

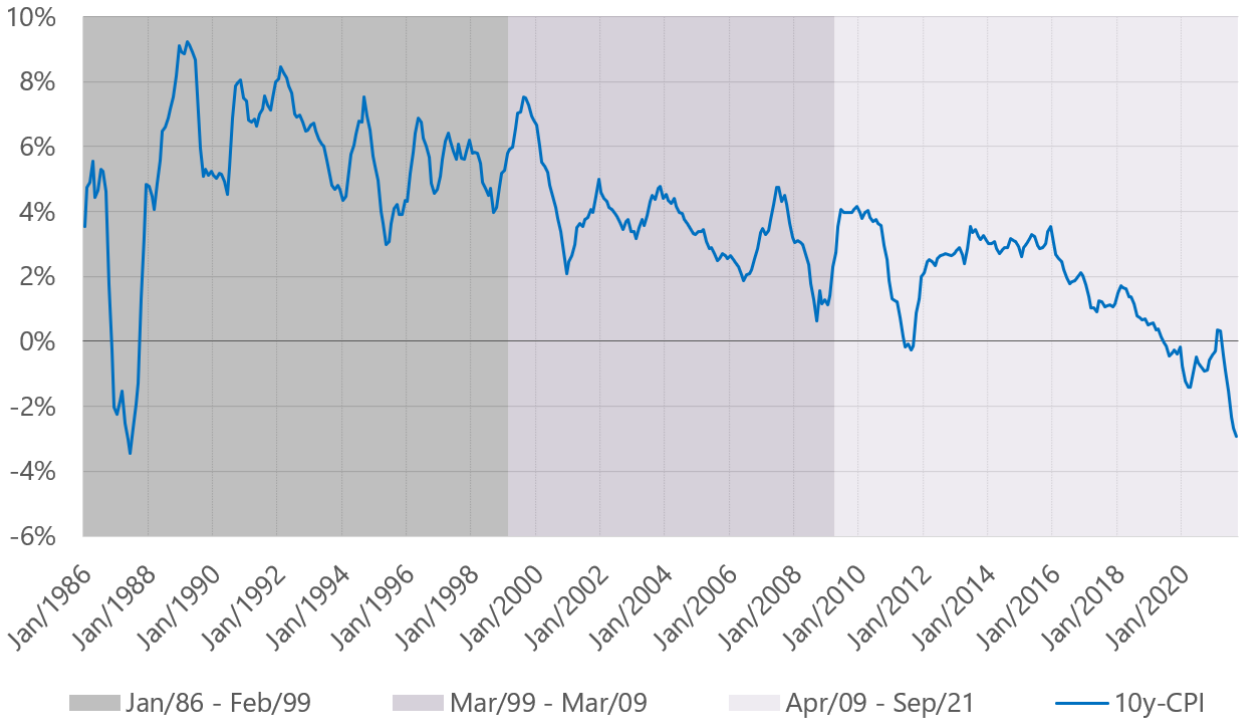
A review of the 10 year New Zealand Government Bond yield adjusted for inflation is summarised below:

Figure 10: Historical 10 year New Zealand Government Bond yield, inflation and official cash rate for New Zealand



As was the case in the US analysis we have highlighted three periods. The early observations up until the establishment of the official cash rate (OCR) by the RBNZ in 1999, the next decade including the GFC, and the most recent 13 years since the GFC.

Figure 1: Historical 10 year New Zealand Government Bond yield less NZ inflation



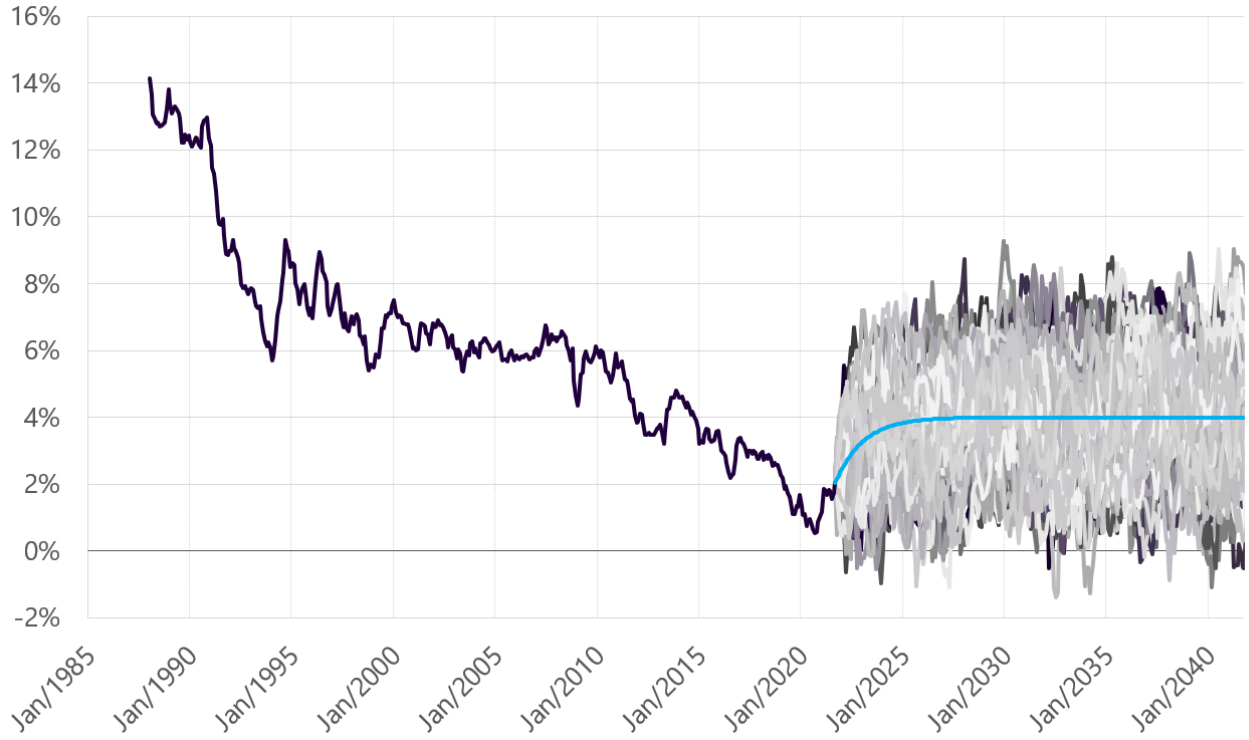
The long term real return of the 10 year New Zealand Government Bond has generally been significantly greater than 2.0% p.a., in particular in the first, pre-OCR, period. However, similar to the scenario with the 10 year US Treasury Bond, the average size of this real return has gradually been declining as interest rates have fallen. In the era of the OCR, the real return on the 10 year New Zealand Government Bond has averaged 1.7%.

If we remove recency bias from our thinking, a long term real return expectation for the 10 year New Zealand Government Bond could comfortably be set at 2.00%. Based on the mid-point of the RBNZ's long term inflation target being 2.00%, this would imply a long term nominal yield on the 10 year New Zealand Government Bond of 4.00%.

Since the GFC, the New Zealand 10 year term premium above the OCR has ranged between -0.3% (briefly) and 3.6% and was at a current reading of around 1.8% as at 30 September, on the back of an upward trend. While the data is relatively noisy, we were ultimately comfortable selecting an average New Zealand 10 year term premium of 2.00% into the future.

Whilst convergence towards a 10 year New Zealand Government Bond yield of 4.50% may be reasonable, the pathway to achieving it is still highly uncertain. Using an autoregressive modelling approach, we can project a mid-point pathway from a multitude of potential pathways. Given the historical volatility of the 10 year New Zealand Government Bond, a 95% confidence interval on future bond yields suggests a range of yields anywhere between -1.0% and 9.0% is possible. A visual representation of this is contained in the clouded portion of the chart below.

Figure 12: Historical yield of 10 year New Zealand Government Bond with 100 randomised paths and average convergence



For the purposes of this analysis, we have selected a 20 year convergence period whereby the bulk of this convergence has effectively occurred after 10 years.

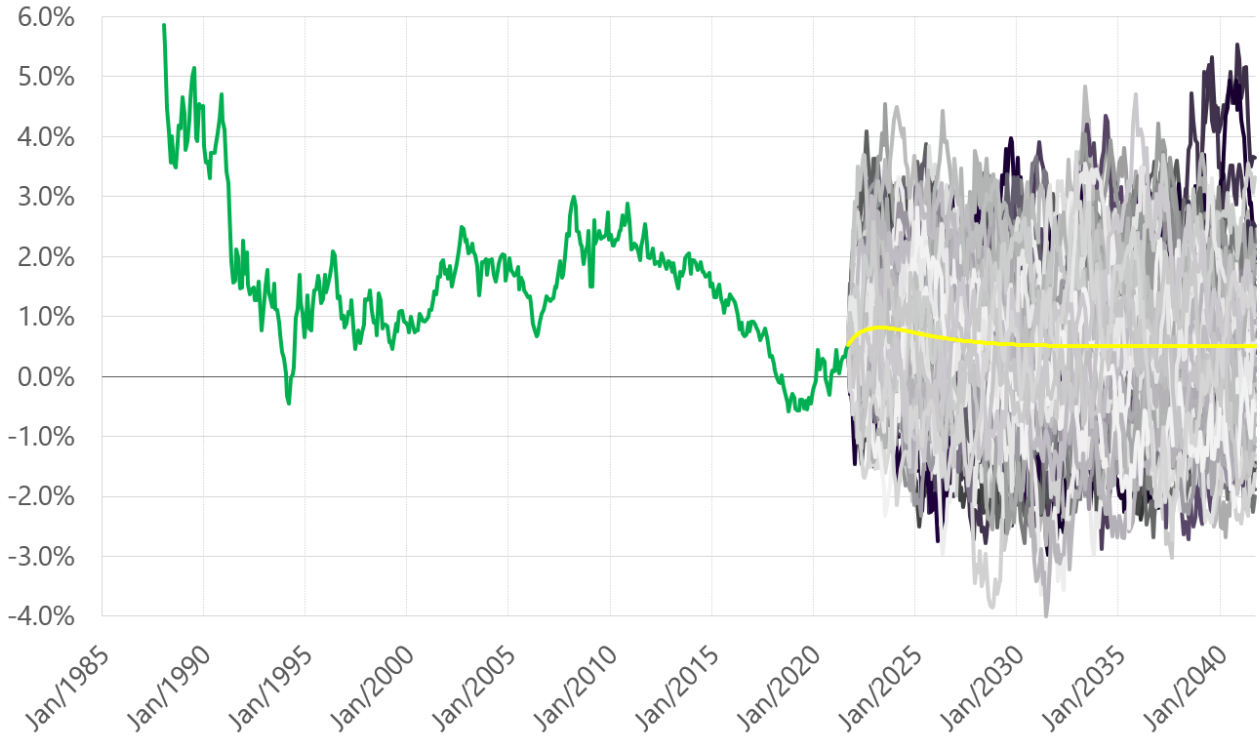
Table 10: Outputs of 10 year NZ Government Bond convergence analysis

Measurement period	10 year NZ Government Bond yield
Spot reading 30 June 2023	4.26%
20 year convergence target	4.00%
Weighted average 20 year yield	3.85% (for L/T expected returns)
Weighted average 3 year yield	3.25% (for current asset allocation)

Combining the projections and uncertainty from our Appendix 1 analysis on the 10 year US Treasury Bond and the above analysis on the 10 year New Zealand Government Bond, we are able to project a range of outcomes for the long term differential between the two. This differential forms the basis for our estimate of the additional sovereign risk premium to apply to New Zealand.

Having independently projected the long term convergence of each bond, all that remains is for us to plot the observed differential up to 30 June (0.45%) and add the projected future differential implied by the separate bond convergence pathways. Note the range of outcomes that have been randomly generated has considered that these two series are not independent, and we have made a provision for the high correlation between changes in USA and New Zealand yields.

Figure 2: Historical additional yield of the 10 year New Zealand Government Bond (versus US 10 year Treasury Bond) with 100 randomised paths and average convergence



In keeping with our earlier projections, we have again selected a 20 year convergence whereby the bulk of this convergence has effectively occurred after 10 years.

Table 11: Outputs of 10 year NZ Government Bond minus 10 year US Treasury Bond convergence analysis

Measurement period	NZ 10 year *minus* US 10 year
Spot reading 30 June 2023	0.45%
20 year convergence target	0.50%
Weighted average differential (20 years)	0.55% (for L/T expected returns)
Weighted average differential (3 years)	0.75% (for current asset allocation)

The convergence of the 10 year New Zealand Government Bond yield is projected to occur a little faster than the 10 year US Treasury Bond as interest rates are already on the rise in New Zealand. This is likely to have the effect of increasing the differential between the New Zealand and US bonds in the short term before eventually settling down towards a longer term target differential of 0.50%.

As a coherence check, we noted that the observed differential between these two bond yields has been 0.86% over the last decade and 0.50% over the last 7½ years. The outputs above are well aligned with this data and we were content to adopt these 3 and 20 year weighted average differentials as our short and long term New Zealand sovereign risk premium estimates.

- **Appendix 5 – Additional sovereign risk premium (Australia)**

To determine the additional sovereign risk premium estimate for Australia, we followed the same process as we did for New Zealand. A review of the 10 year Australian Government Bond yield adjusted for inflation is summarised below:

Figure 3: Historical 10 year Australian Government bond yield, inflation and official cash rate for Australia

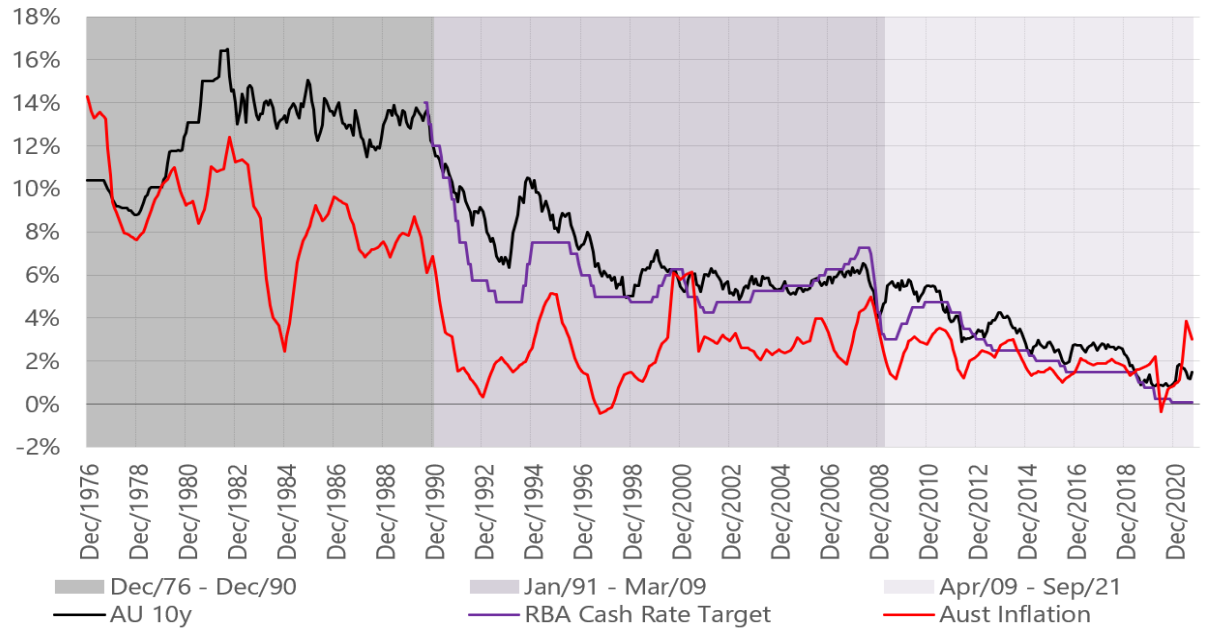
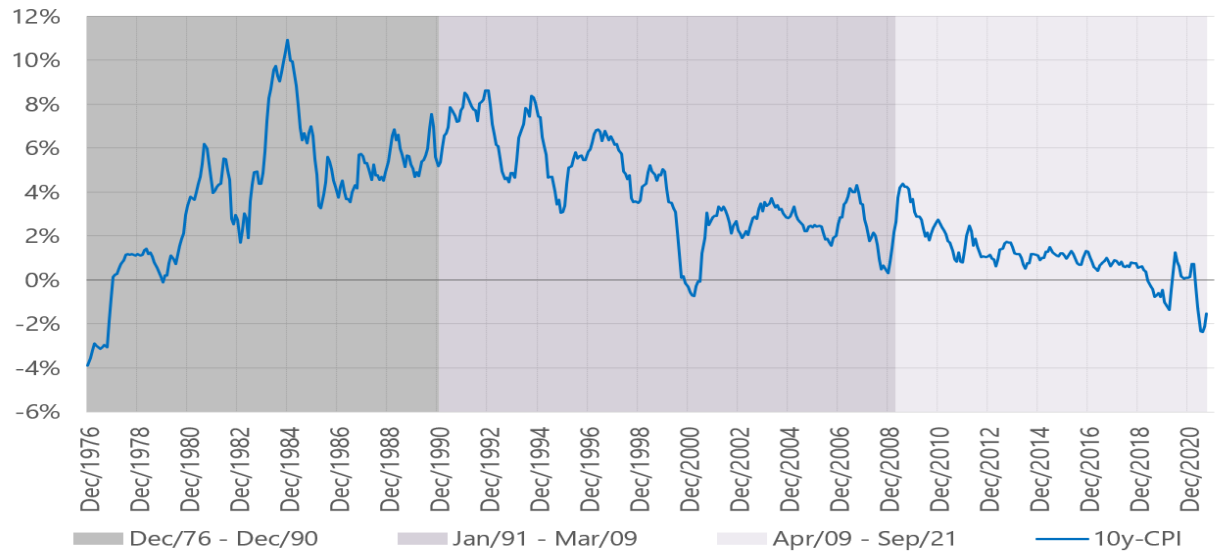


Figure 4: Historical 10 year Australian Government Bond yield less Australian inflation



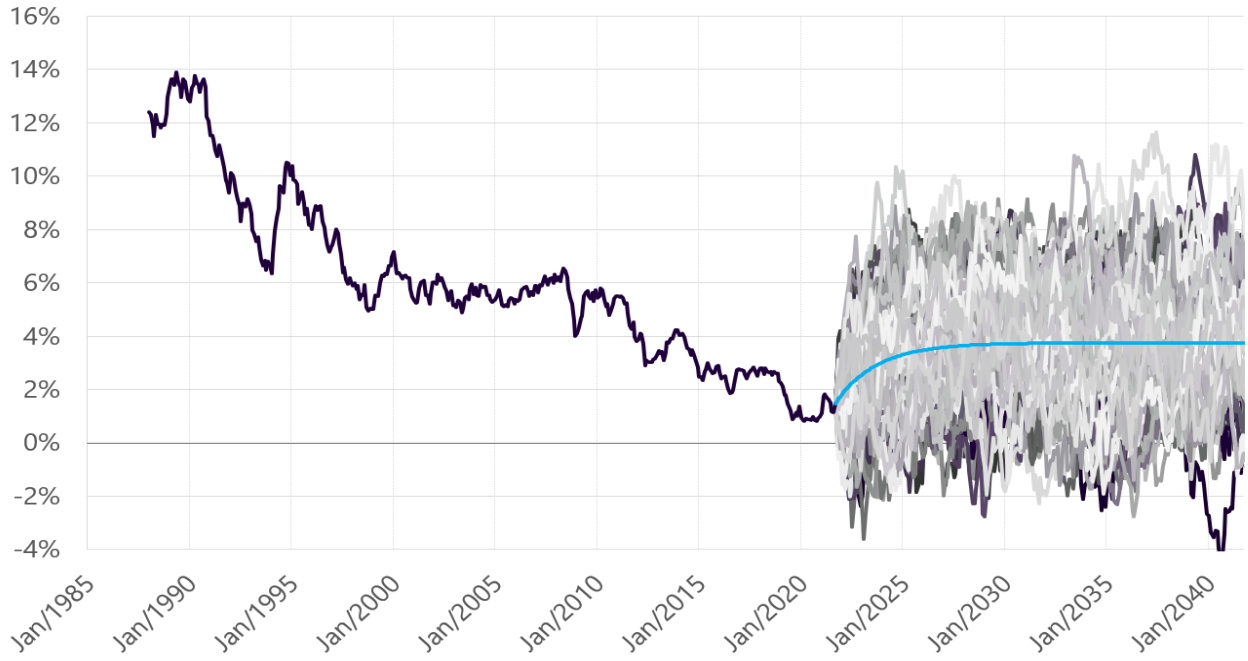
For many years, the long term real return of the 10 year Australian Government Bond was greater than 3.0% p.a. However, similar to the scenario with previous analyses in respect of the 10 year US Treasury Bond and the 10 year New Zealand Government Bond, the average size of this real return has gradually been declining as interest rates have fallen. Since the end of the GFC, the real return on the 10 year Australian Government Bond has averaged 1.1%, but this average was much closer to 2.0% before the emergence of Covid-19 in early 2020.

Accordingly, if we limit the extent to which recent data points might influence our thinking, a long term real return expectation for the 10 year Australian Government Bond could comfortably be set at 1.75%. Based on a long term inflation expectation of around 2% (within the RBA's inflation range), this would imply a long term nominal yield on the 10 year Australian Government Bond of 3.75%. This long term convergence estimate would also be coherent with our prior analyses into the 10 year US Treasury Bond and the 10 year New Zealand Government Bond as the convergence point of 3.75% would sit between the

estimates for the comparable US and New Zealand Bonds. Over time, this relative ranking between the three named bonds has also been the most common observation.

Whilst convergence towards a 10 year Australian Government Bond yield of 3.75% may be reasonable, the pathway to achieving this is still highly uncertain. Using an autoregressive modelling approach, we can project a mid-point pathway from a multitude of potential pathways. Given the historical volatility of the 10 year Australian Government Bond, a 95% confidence interval on future bond yields suggests a range outcomes of anywhere between -2% and 10% is possible. For a visual representation of this, please see the clouded portion of the chart below.

Figure 5: Historical yield of 10 year Australian Government Bond with 100 randomised paths and average convergence



For the purposes of this analysis, we have selected a 20 year convergence whereby the bulk of this convergence has effectively occurred after 10 years.

Table 3: Outputs of 10 year Australian Government Bond convergence analysis

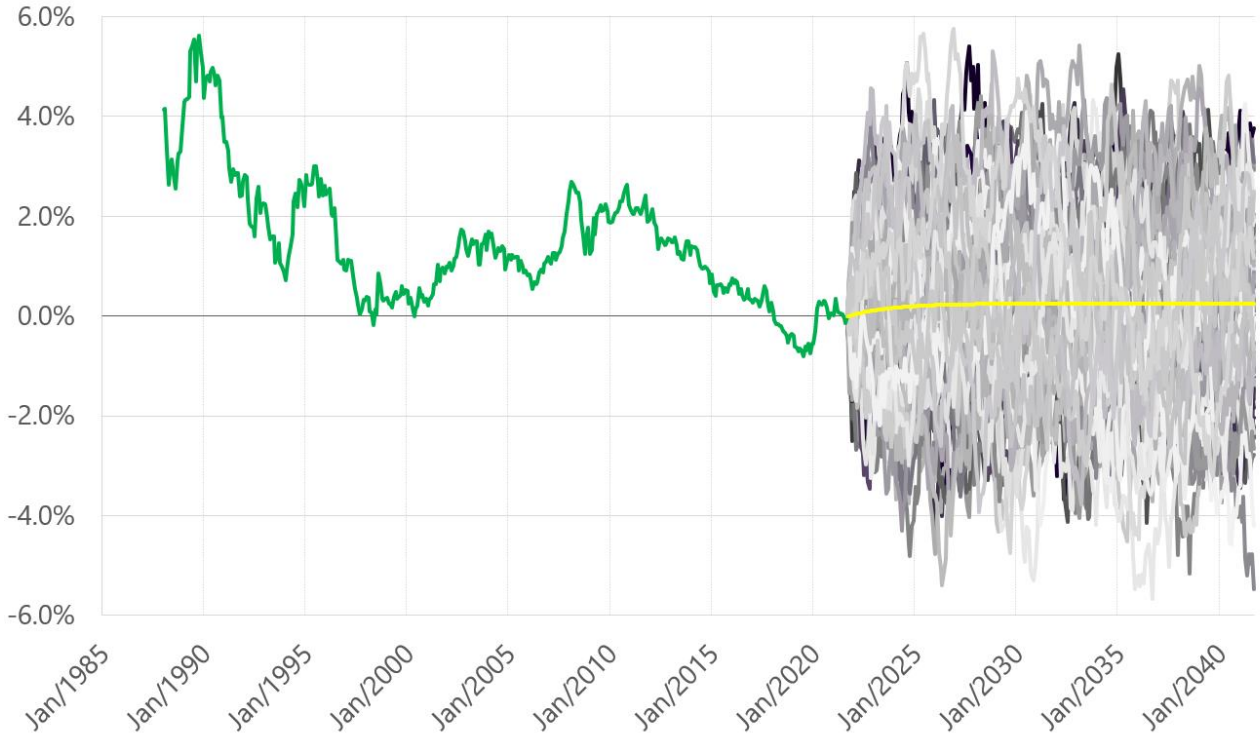
The important outputs of this analysis are:

Measurement period	10 year Australian Government Bond yield
Spot reading 30 June 2023	3.44%
20 year convergence target	3.75%
Weighted average 20 year yield	3.50% (for L/T expected returns)
Weighted average 3 year yield	2.60% (for current asset allocation)

Combining the projections and uncertainty from our Appendix 1 analysis on the 10 year US Treasury Bond and the above analysis on the 10 year Australian Government Bond, we can project a range of outcomes for the long term differential between the two. This differential forms the basis for our estimate of the additional sovereign risk premium to apply to Australia.

Having independently projected the long term convergence of each bond, all that remains is for us to plot the observed differential up to 30 June (-0.37%) and add the projected future differential implied by the separate bond convergence pathways.

Figure 6: Historical additional yield of the 10 year Australian Government Bond (versus US 10 year Treasury Bond) with 100 randomised paths and average convergence



In keeping with our earlier projections, we have again selected a 20 year convergence whereby the bulk of this convergence has effectively occurred after 10 years.

Table 4: Outputs of 10 year Australian Government Bond minus 10 year US Treasury Bond convergence analysis

Measurement period	Australia 10 year *minus* US 10 year
Spot reading 30 June 2023	-0.37%
20 year convergence target	0.25%
Weighted average differential (20 years)	0.20% (for L/T expected returns)
Weighted average differential (3 years)	0.10% (for current asset allocation)

As a coherence check, we noted that the observed differential between these bonds has been 0.52% over the last decade and -0.07% over the last 5 years. The outputs above are broadly aligned with these observations and we were prepared to accept these 3 and 20 year weighted average differentials as our short and long term Australian sovereign risk premium estimates.

- **Appendix 6 – Additional sovereign risk premium (Emerging Markets)**

In the 2021 edition of his ERP study, Damodaran identified that over the 17 years to 2020 the ERP differential between the developed markets (using USA as a proxy) and the Emerging Markets had been trending lower and had averaged 1.24% over the last decade.

This trend is also consistent with the view that increased integration of the Emerging Markets into the global capital markets is slowly eroding some of the sizeable additional risk attributes that previously contributed to an historically large Emerging Markets risk premium. In many areas we are witnessing improvements in Emerging Market access, liquidity, transaction costs, regulatory oversight etc, and all of these are contributing to a gradual reduction in relative risk.

To help illustrate the trend from an aggregate risk perspective, the following table (an abridged version of table 22 taken directly from Damodaran's 2021 edition paper), demonstrates this quite clearly.

Table 5: Developed versus Emerging Markets ERP differential

Start of year	US T.Bond rate	Growth Rate Developed	Growth Rate Emerging	Cost of Equity (Developed)	Cost of Equity (Emerging)	Differential (Emerging) ERP
2004	4.25%	3.75%	5.25%	7.28%	10.55%	3.27%
2005	4.22%	3.72%	5.22%	7.26%	10.40%	3.14%
2006	4.39%	3.89%	5.39%	7.55%	9.95%	2.40%
2007	4.70%	4.20%	5.70%	8.19%	9.80%	1.61%
2008	4.02%	3.52%	5.02%	10.30%	12.47%	2.17%
2009	2.21%	1.71%	3.21%	7.35%	8.91%	1.56%
2010	3.84%	3.34%	4.84%	7.51%	9.15%	1.64%
2011	3.29%	2.79%	4.29%	8.52%	9.58%	1.06%
2012	1.88%	1.26%	2.88%	7.98%	8.27%	0.29%
2013	1.76%	1.38%	2.76%	6.02%	7.30%	1.28%
2014	3.04%	2.54%	4.04%	6.00%	7.61%	1.61%
2015	2.17%	1.67%	3.17%	5.94%	7.21%	1.27%
2016	2.27%	1.77%	3.27%	5.72%	7.42%	1.70%
2017	2.68%	2.18%	3.18%	5.89%	7.47%	1.58%
2018	2.68%	2.18%	3.18%	6.75%	8.11%	1.36%
2019	2.68%	2.18%	3.18%	8.22%	9.42%	1.20%
2020	1.92%	1.42%	2.42%	5.40%	6.49%	1.09%

Whilst we accepted this relationship is intuitive, it still sought to test its robustness using alternative specifications.

First, we utilised the individual Emerging Market country risk premia (CRP) calculated by Damodaran in July 2021. We multiplied these individual country premiums by their constituent weight in the Emerging Markets IMI Equity Index. These calculations are summarised in the following table. By summing each country's weighted contribution, we derived a weighted average Emerging Markets premium (i.e. an *additional* risk premium above the developed market ERP) of 1.03%.

Table 6: Calculation of aggregate Emerging Markets CRP (using Damodaran country estimates)

	Emerging Market IMI Equity Index Weight	Individual CRP ex Damodaran 2021	Contribution to overall EM CRP
Argentina	0.22%	10.07%	0.02%
Brazil	4.76%	2.52%	0.12%
Chile	0.44%	0.59%	0.00%
China	32.84%	0.59%	0.19%
Colombia	0.17%	1.60%	0.00%
Czech Republic	0.10%	0.51%	0.00%
Egypt	0.09%	4.62%	0.00%
Greece	0.27%	3.02%	0.01%
Hungary	0.24%	1.85%	0.00%
India	12.46%	1.85%	0.23%
Indonesia	1.21%	1.60%	0.02%
Korea (South)	13.10%	0.42%	0.06%
Kuwait	0.61%	0.59%	0.00%
Malaysia	1.49%	1.01%	0.02%
Mexico	1.84%	1.34%	0.02%
Pakistan	0.03%	5.46%	0.00%
Peru	0.15%	1.01%	0.00%
Philippines	0.67%	1.60%	0.01%
Poland	0.85%	0.71%	0.01%
Qatar	0.69%	0.51%	0.00%
Russia	3.28%	1.85%	0.06%
Saudi Arabia	3.02%	1.03%	0.03%
South Africa	3.25%	2.52%	0.08%
Taiwan	15.29%	0.51%	0.08%
Thailand	1.83%	1.34%	0.02%
Turkey	0.34%	4.62%	0.02%
UAE	0.76%	0.42%	0.00%
	100.00%		1.03%

Overall, this analysis supported Damodaran's generic analysis summarised earlier.
We also compared aggregate 10 year sovereign bond differentials, to attempt to identify the extent to which the weighted average yield of 10 year Emerging Market sovereign bonds exceeded the yields on US 10 year Treasury Bonds.

At the best of times this is a "noisy" data series as Emerging Market interest rates do not always move in lock-step with developed markets. This has certainly been the case in the last three years. The emergence of Covid-19 saw many developed markets not only reduce their short term interest rates significantly, but also implement additional measures (i.e. extraordinary quantitative easing programmes) with the aim of supporting market liquidity by suppressing longer term interest rates.

In the Emerging Market regions, these tools were not able to be deployed quite so readily. Short term interest rates did decline, but by considerably less than in developed markets, and additional quantitative measures were largely unavailable. As a result, the yield differentials between US 10 year Treasury Bonds and aggregate Emerging Market 10 year sovereign bonds have widened. This stands in contrast to the Damodaran valuation metrics which consistently lean towards a reducing Emerging Markets risk differential.
On balance, we were inclined towards the argument that in the near term the extraordinary policy initiatives of many developed market nations has contributed to a distortion in the

trend of sovereign yield differentials between USA and the Emerging Markets group. As many of these developed market nations are now in the process of considering or beginning a gradual 'winding back' in these policy initiatives, we felt comfortable placing a much higher weight on the implied ERP calculations supplied by Damodaran than on the very noisy sovereign interest rate differentials that appear to have been impacted by additional (and likely transitory) fiscal policy.

Given this, we are comfortable in assessing an additional Emerging Markets risk premium in line with recent observations and settled on a current estimate of 1.25%.

▪ Appendix 7 – New Zealand property

There is no single, generally accepted risk based pricing model for calculating an expected return for REITs. This is due to the somewhat hybrid characteristics of the securities (i.e. they are partially a yield delivering instrument like a bond while also offering the share-like characteristics of significant potential capital gain).

Overall, the property sector displays more defensive investment characteristics than broad equity markets and securities within the sector typically have a market beta of less than one.

In the past we have attempted to apply two valuation methods with varying levels of success.

The first approach was to use the classic dividend discount model approach:

$$K_e = \frac{D_1}{P_0} + g$$

Where the expected return, K_e, is a function of:
D_1 : the next period's dividend
P_0 : the current price
g : the dividend growth rate.

Unfortunately, this method suffers from a lack of robustness in the underlying data.

The observed gross dividend yield (D_1 / P_0) has been relatively stable in New Zealand, albeit steadily declining from around 7.5% a decade ago to approximately 5.4% as at 30 June 2023[iv].

However, the biggest problem we have had has been calculating a stable estimate of the dividend growth rate. Since 2007 this has fluctuated between +15% and -10%, making the task of selecting a stable (or accurate) projected dividend growth rate little more than guesswork, dramatically reducing the reliability and effectiveness of this valuation approach.

The second approach is to determine an expected return for REITs based on a modified capital market line approach. This approach allowed us to determine an expected return for REITs that was based on the asset class's long term expected volatility characteristics. This method, although very simplistic, supplied results that were coherent with the projections we were separately generating by running the New Zealand listed property returns through our factor regression models.

In the case of New Zealand listed property, over the last two strategic reviews we have tended to see the asset class display reasonably consistent betas to the New Zealand equity market (of around 0.725x).

When we checked this for coherence, we found that while we have quite long term data on the performance of the S&P/NZX 50 Index (gross with imputation), we only have official data on the performance of the S&P/NZX All Real Estate Index (gross with imputation) going back to July 2015. Over this six year, four month period (to November 2021), the S&P/NZX 50 has

delivered an annualised return of 14.35% versus 10.85% on the S&P/NZX All Real Estate Index. Admittedly this does not constitute a long term comparison, but the ratio of these returns is approximately 75.6% which is extremely close to the 0.725 market beta our sensitivity models are highlighting.

Accordingly, we are comfortable accepting a market beta of 0.725 for the New Zealand listed property sector.

- **Appendix 8 – International property**

For international property we employed a similar approach to developing an expected return estimate as we did for New Zealand property. In this case the underlying securities with broad market diversification tend have a slightly higher market beta to the global equity market typically in the region of 0.80.

In prior reviews we have also compared this with a modified capital market line evaluation, but this has never been an entirely satisfactory approach. In fact, to achieve a coherent result with this approach, we have had to manually adjust the historical volatility of the asset class downwards. Initially we were motivated in this approach due to the significant impact the GFC had on the volatility of global listed property assets.

When we looked at rolling volatilities outside the GFC period, the GFC itself appeared to be a sizable outlier, so we sought to provide a volatility estimate more consistent with longer term observations. However, we have since seen a repeat of this situation during the Covid market crash, where international property volatility again spiked to similar or higher levels than those seen in equity markets. Whilst we can rationalise lessening the impact of one seemingly anomalous event (the GFC), it is much harder to close our eyes to these volatility spikes when we have two similar events within a dozen years.

The conundrum here is that the property asset class is generally viewed as a more defensive asset class. Internationally, over the last 15 years we've observed an overall level of return compared to global equities that reinforces this lower beta characteristic. Over this period, the Dow Jones Global Select Real Estate Securities Index Total Return in USD has delivered 4.2% versus the MSCI All Country World Index Gross Div in USD which delivered 7.5%. What is more noteworthy is the relative volatilities of these two series over this same period – the DJ Real Estate Index exhibited a standard deviation of 20.2% vs the MSCI ACWI Index's standard deviation of 16.3%.

We did not have a specific rationale for why international property was *more* volatile than equities over such a long period of time, other than:

1. As a concentrated sector within the wider international equities asset class it can be subject to specific events that significantly impact the entire sector (the GFC and Covid are two recent examples), as opposed to a broader market index which may only be similarly impacted within certain sub-sectors.
2. The other idea discussed was the potential for listed property assets to, on average, be more leveraged than wider equity market, contributing to higher volatility risk in times of market stress.

Regardless of the rationale, the evidence over a long period of time is that this asset class exhibits a higher volatility versus equities than we have previously been inclined to assign to it, and we agreed there was no basis for us to continue to artificially reduce the volatility of this asset class in the current review.

As was the case with New Zealand property, we are comfortable accepting the output of the regression modelling and assigning a market beta of 0.80 for the global listed property sector and assigning the unadjusted observed volatility levels.

▪ Appendix 9 – Standard deviation and correlation assumptions

While understanding the underlying asset classes' expected returns is very important, it is still only half the story. If maximising expected return was the only consideration, we would choose a 100% allocation to Emerging Markets small value. However, this would obviously be extremely risky. In order to compare the merits of different portfolios we need to be able to assess both the expected return and the expected risk of different combinations of assets.

First, we need to consider the market risk of each asset class. Market risk is the risk associated with the actual fluctuations in market prices. Understanding and measuring this risk gives us a more comprehensive mechanism to compare the *range* of expected returns of different portfolios. The most common way to quantify market risk is the annualised standard deviation of an investment's returns. We have elected to use this metric as the primary measure of risk when evaluating and comparing potential portfolios. Hereafter we will refer to an investment's annualised standard deviation as its volatility.

A portfolio's volatility can be calculated in a similar fashion to its expected return (which is simply the weighted average). Portfolio volatility is calculated by summing the products of the asset weights multiplied by the covariances between the assets. The mathematical equation for this is as follows:

Figure 7: Formula for portfolio volatility

$$\sigma = \sqrt{\sum_{i=1}^{N} w_i^{\,2}\,\sigma_i^{\,2} + \sum_{i=1}^{N-1}\left(\sum_{j=i+1}^{N} 2\; w_i w_j \mathrm{COV}_{ij}\right)}$$

Where,
σ = portfolio standard deviation
w_i = weight of asset *i*
σ_i = standard deviation of asset *i*
cov_{ij} = the covariance between asset *i* and asset *j*

The covariance of two assets is the product of the two assets' volatilities, and the correlation between them.

In order to evaluate any portfolio's volatility, we need an expectation of each underlying asset class' volatilities and also the cross correlation of each asset class with every other asset class.

Assigning a meaningful measure of volatility to an asset class requires some thought. Markets exhibit varying degrees of volatility over different time periods. When choosing a time period to calculate standard deviations, we need to consider several factors:

1. *Availability of data* – not all funds have long actual track records. In these cases we need to estimate how a fund *would* have performed prior to its launch. One way to do this is to use earlier published index returns adjusted for the relationship we have observed between the fund and the index since inception (i.e. remove the average costs and/or make adjustments for higher or lower than index risk levels). As the funds we typically consider allocating to generally operate with a high degree of mandate consistency, these observed relationships are often very strong which strengthens the predictive power of any "back fill". Index returns of course also have varying inception dates, which tends to set the lower limit on how far we can backfill data. The asset class which presents the greatest challenge for us is New Zealand property. This asset class was very thinly represented until the mid-1990s. For this reason, we have selected January 1995 as the most suitable start date for this index data.

2. *Cross section of market environments* - in order to get a fair representation of the potential outcomes of a market (and, by extension, the fund and portfolios), we need to include periods of both good and bad performance. As the most extreme conditions are often the most interesting, it is important that any analysis at least includes the Global Financial Crisis of 2008, and the recovery period that followed as well as the recent Covid crisis. Of course, the more frequent periods of 'normal' market conditions are important to include as well.
3. *Markets change* – in recent times, with information being assimilated and priced by markets at an ever-increasing rate, we have witnessed increased short term volatility. Although longer term data is still relevant, we expect the immediate foreseeable future to behave more like the recent past than the distant past.

Ultimately the choice of a time period to base fund volatility assumptions on needs to strike the right balance between choosing a period short enough to be current, yet long enough to be meaningful. To help us we looked at returns from some long standing indices in the S&P 500 and returns from US 5 year Treasury notes. The observed volatilities over varying rolling windows is summarised as follows:

Figure 8: Rolling Volatility of US Stocks (S&P 500)

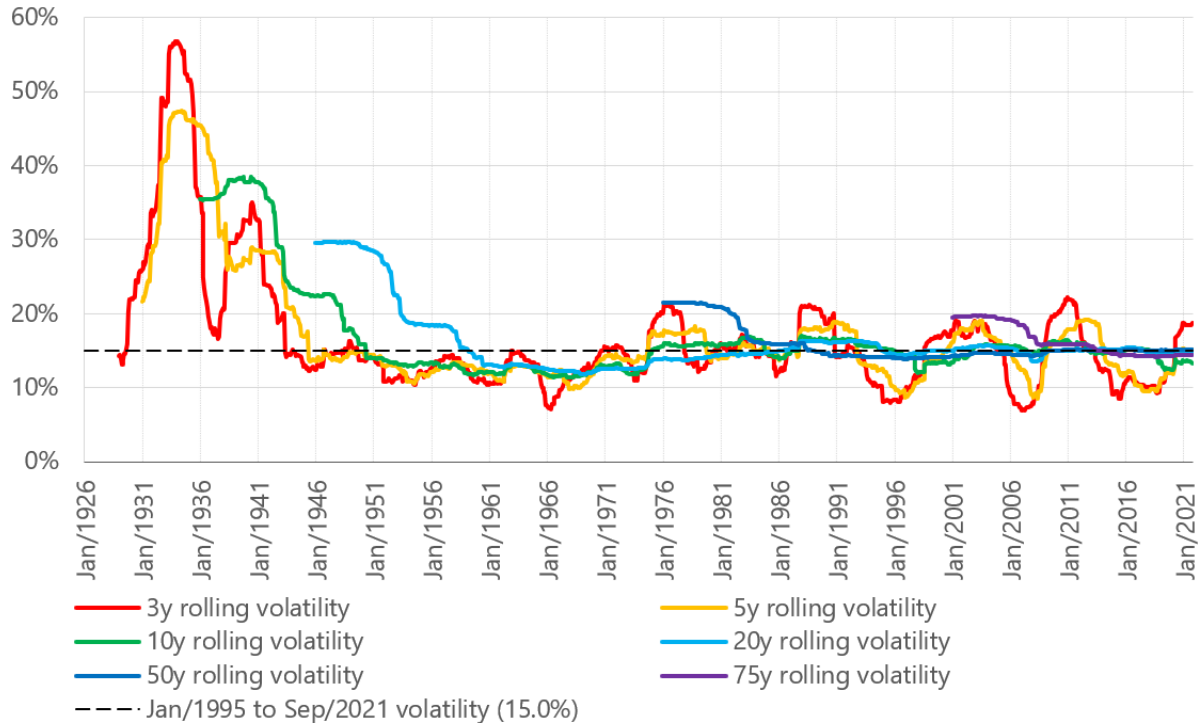
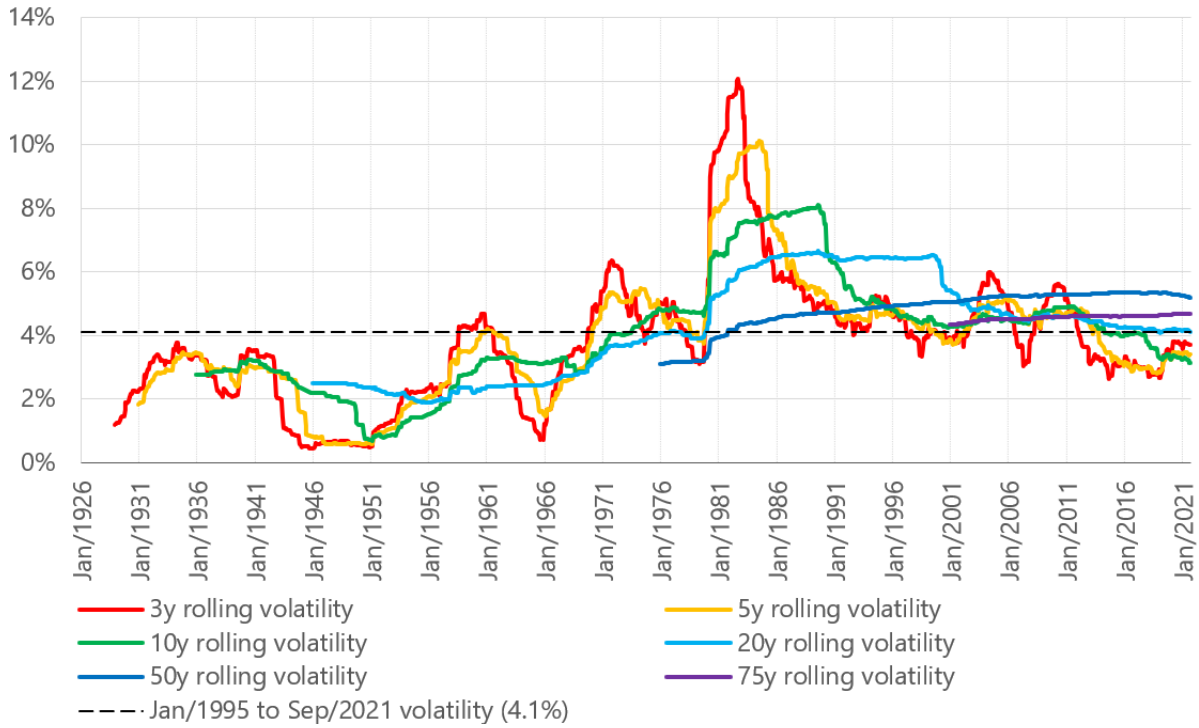


Figure 20: Rolling Volatility of US 5-Year Treasury Notes



As these charts indicate, depending on the period you choose there can be a wide range of observed volatilities for both shares and bonds. In particular there has been a significant change between the observed volatilities during the early and mid-20th century and those observed at the end of that century, and the beginning of the 21st century. The volatility of shares has decreased while bonds have been exhibiting a gradual increase in volatility.

In order to address the points mentioned above, we discussed and agreed a starting point somewhere late in the 20th century would provide an adequate cross section of market environments. Importantly, this would include the significant recent changes in financial markets resulting from continuous access to company and market information and the relentless movement towards increased global market integration. Given that the biggest limitation was the New Zealand property asset class in the early 1990s, we selected the starting point for our analysis of January 1995.

This 26 ¾ year period has included numerous periods of heightened volatility such as:

- the Asian financial crisis and Russian debt crisis of the late 1990s,
- the "tech wreck" following the burst of the dot-com bubble and the heightened volatility around 9/11 in the early 2000s,
- the Global Financial Crisis and subsequent US credit downgrade in the late 2000s, and
- the Covid-19 market crash and subsequent strong rebound.

Although these periods are each highly memorable, equal importantly our analysis period includes some significant periods of market stability interspersed between these periods of volatility.

One final interesting observation is the general convergence of the rolling 5, 10, 20, 50, and 75 year windows. All of these measures to September 2021 are recording overall share volatility of between 13% and 16%, further supporting a "normal" projection of around 15%.

Correlation

Correlation measures the extent to which two different assets move in response to the same market conditions. The correlation measurements (correlation coefficients) range from -1 to +1, with the coefficient indicating the strength of the relationship between the assets and

whether the relationship is negative or positive. In general, two assets with a correlation coefficient that is negative or near zero provide the best diversification benefits when combined in portfolios as these assets will be expected to perform differently in the same market conditions.

The January 1995 to September 2021 analysis period was again selected to measure of the assets' cross correlations.

Market risk is the risk associated with the actual fluctuations of market prices. Understanding and measuring this risk gives us a more comprehensive mechanism to compare the range of expected returns of different portfolios.

Estimation of market risk

To evaluate market risk we utilise volatility as measured by annualised standard deviation. Assuming that the returns are normally distributed, when we combine standard deviation with expected returns, we can begin to build a more complete expectation of future returns. These are not just based on average return expectations, but on the probabilities associated with a range of different returns that a fund or portfolio can deliver.

Markets exhibit varying degrees of volatility over different time periods. When choosing a time period to calculate standard deviations, we need to consider several factors:

1. *Availability of data* – not all indices have long actual track records. Index returns have varying inception dates.
2. *Cross section of market environments* - in order to get a fair representation of the potential outcomes of a market, we need to include periods of both good and bad performance. As the most extreme conditions are often the most interesting, it is important that any analysis at least includes the Global Financial Crisis of 2008, and the recovery period that followed. Of course the more frequent "quiet" periods are also very important.
3. *Markets change* – in recent times, with information being assimilated and priced by markets at an ever increasing rate, we have witnessed increased short term volatility. Although longer term data is still relevant, we expect the immediate foreseeable future to behave more like the recent past than the distant past.

Ultimately the choice of a time period to base the volatility assumption on needs to strike the right balance between choosing a period short enough to be current, yet long enough to be meaningful.

Figure 21: Rolling Volatility of US Stocks and Bonds since the Great Depression

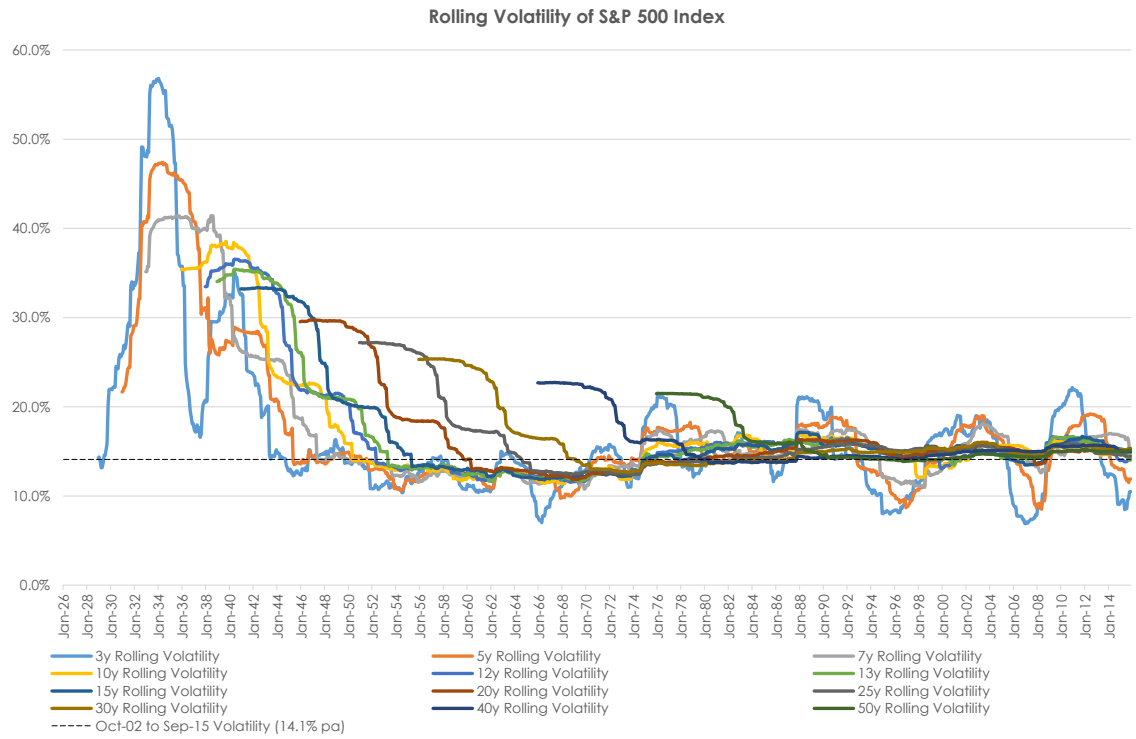
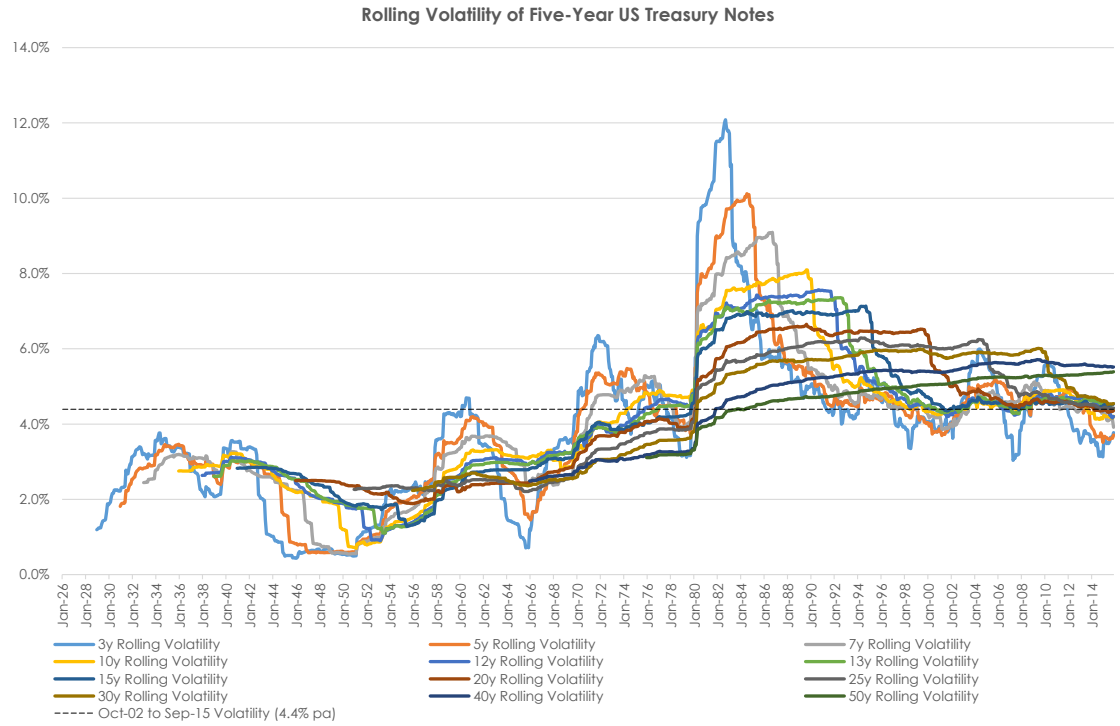


Figure 22: Rolling Volatility of US 5-Year Treasury Notes and Bonds since the Great Depression



As these charts indicate, depending on the period there can be a wide range of observed volatilities for both shares and bonds. In particular there has been a significant change between the observed volatilities during the early and mid-20th century and those observed at the end of that century, and the beginning of the 21st century. Volatility of shares has decreased while bonds have been exhibiting a gradual increase in volatility.

Given the trends indicated above, the availability of data, and the desire to include various market shocks in the analysis, early in the 21st century provides an appropriate starting point.

The very early 2000s included some large market swings in both directions. To begin analysis here would effectively mean that more volatile periods were over represented in the data. Therefore, we selected a starting point for our analysis of October 2002.

- **Appendix 10 – International Fixed Interest**

To evaluate the expected return of international fixed interest we use a factor sensitivity model approach. However, unlike when we assess equity and credit premia, where past factor magnitudes can tell us a significant amount about likely future magnitudes, we believe the best information we can access in relation to term premia for the foreseeable future is contained within current yield curves.

Whilst this may not hold over the long term, our effective asset allocation timeframe is for the next three years and, over this time period, the current yield curve already reflects all known and projected information about inflation, GDP growth rates and projected central bank actions.

International term premia

In order to assess current sovereign term premia within different duration segments, we analysed the relativities between various international sovereign bond indices.

Whilst the committee were interested in understanding the historical term premia within different segments of the market – in particular in assessing the exposures to these sources of risk - we were looking to the identify *current* premia estimates on which to base our fixed interest allocation decisions today. And for that, we looked to the information available in current yield curves.

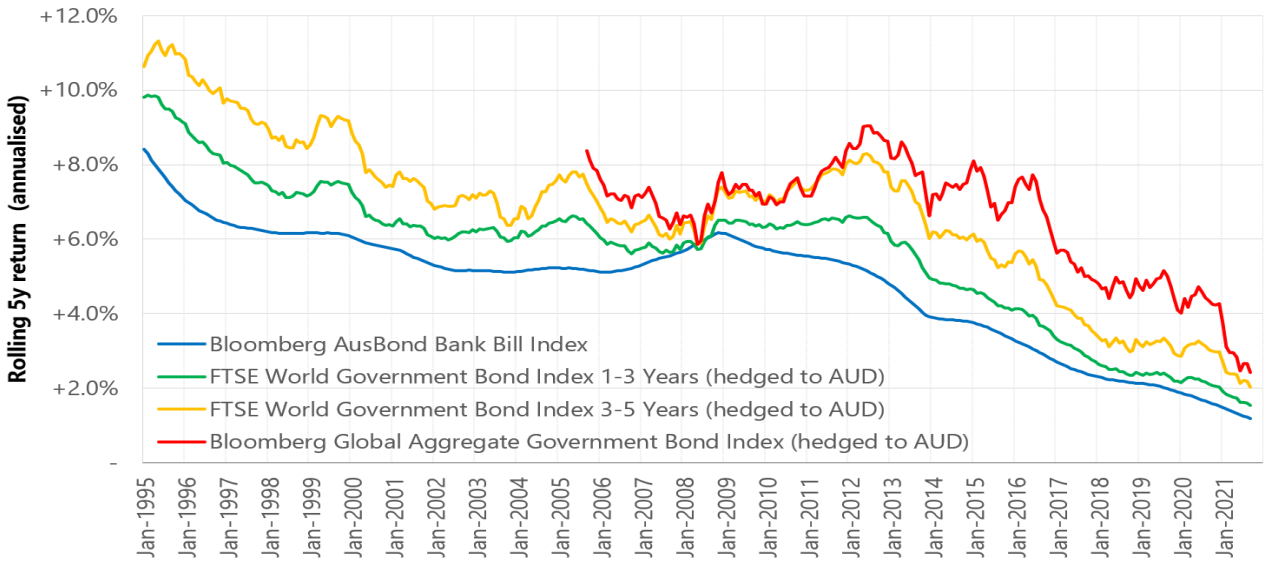
Consistent with our segmented premia approach in equity markets, we sought to identify three different duration segments (0-3 years, 3-5 years, and 5+ years) within fixed interest markets, and used the following standard global bond data/indices to help inform our expectations:

- One month global developed market aggregate bond yield
- FTSE World Government Bond Index 1-3 Years Index
- FTSE World Government Bond Index 3-5 Years Index
- Bloomberg Global Aggregate Government Bond Index

The chart below highlights the historical returns information for these indices over rolling 5 year periods.

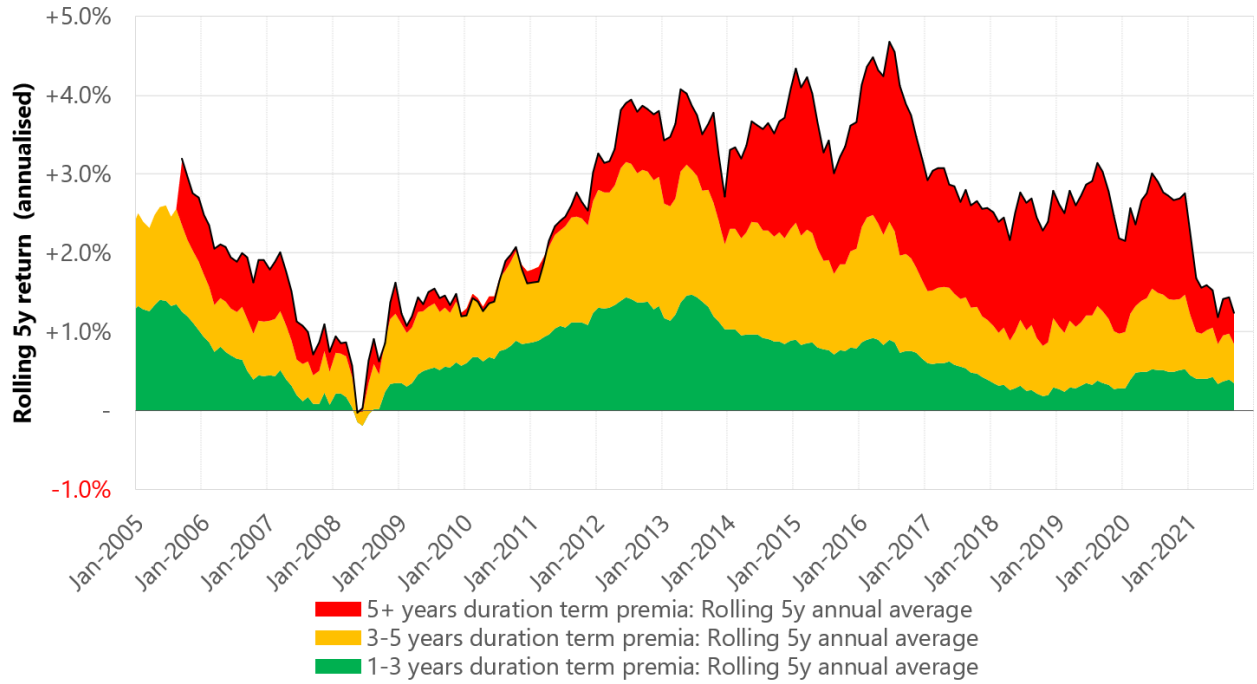
Please note Australian dollar hedged indices were used as availability of data hedged to the currency was the most broadly covered option. By taking differentials, the premia can be added to any local risk free rate and can be used to measure sensitivity for any hedged fixed income strategy.

Figure 23: Historical sovereign bond index returns hedged to AUD, rolling 5 years



This data also enabled us to calculate the rolling 5 year duration premiums for each segment, by taking the difference between the returns of each index and its duration neighbour. These historical credit premiums are commonly positive over rolling 5 year periods, although they do exhibit some considerable variability over time. It is also important to note that this sample period includes a significant compression of yields which has enhanced the observed term premia. This tailwind has led to outperformance by higher duration bonds that is unlikely to be repeated unless we see interest rates moving to significantly negative levels.

Figure 24: Historical sovereign term premia by duration segment



The average return since the turn of the century for the first 3 years of duration (the green area) is 0.80%, while for the next 2 years (the yellow area) is 1.0% and for risk premia beyond 5 years (the red area) an additional 0.9%. This gives a total outperformance by the Bloomberg Global Aggregate Government Bond Index above cash of 2.7%.

When allocating to strategies that take term exposure, we are seeking returns from higher yields and the rolldown return associated with an upward sloping yield curve. The third source of returns is the unpredictable change in yield curves, and over these historical observations the unexpected changes have been a reduction in yields which have a positive price impact.

We can account for these unexpected changes and remove them from our measurements. Once we have 'backed out' the additional premia attributable to yield compression. we identified long term segmented term premia averaging 0.40% pa for 0 to 3 years; 0.80% pa for 3 to 5 years; and 0.65% pa for 5 years+. These are our estimates for the long term average payoff attributable to term risk.

We also need to evaluate the immediate expectation, and these can be extracted from today's yield curves. To compare this historical term data to the current term differentials, we calculated a current expected return for each index which comprised a current yield component (by adding together each sovereign weight within the index multiplied by its current yield) *plus* a projected 'roll down' yield applicable to the current slope of each curve.

We then used this information to isolate the premium within each term segment taking the difference between the expected return of each index and its neighbour, as follows:

Table 7: International term premia construction methodology

Term segment	Construction methodology
0 to 3 years	Expected return of the FTSE World Government Bond Index 1-3 Years *minus* the expected return of one month developed market bonds
3 to 5 years	Expected return of the FTSE World Government Bond Index 3-5 Years *minus* the expected return of the FTSE World Government Bond Index 1-3 Years
5 years+	Expected return of the Bloomberg Global Aggregate Government Bond Index *minus* the expected return of the FTSE World Government Bond Index 3-5 Years

Table 8: Outputs of segmented term premia analysis on current global bond yield curves

Term segment	Current segment premia
0 to 3 years	0.40% pa
3 to 5 years	0.80% pa
5 years+	0.65% pa

These results were encouraging and largely intuitive. Particularly interesting to note was the higher premium for the 3 to 5 year term segment which often corresponds to the 'steepest' part of the yield curve (thereby contributing to the greatest potential 'roll down' benefit). These relativities were at least consistent with expectations.

The lower term premia estimates observable today reflect the generally flatter and lower yield curves that have been in existence since just before, and certainly after, the Covid-crisis of 2020.

International credit premia

With respect to the credit premium we looked at the level of premia observed over time and across two different duration segments.

To construct monthly return series for these credit segments we used the following standard global bond indices:

- Bloomberg Barclays Global Aggregate Bond Index 1-3 Years (hedged to AUD)
- FTSE World Government Bond Index 1-3 Years (hedged to AUD)
- Bloomberg Global Aggregate Corporate Bond Index (hedged to AUD)
- Bloomberg Global Aggregate Government Bond Index (hedged to AUD)

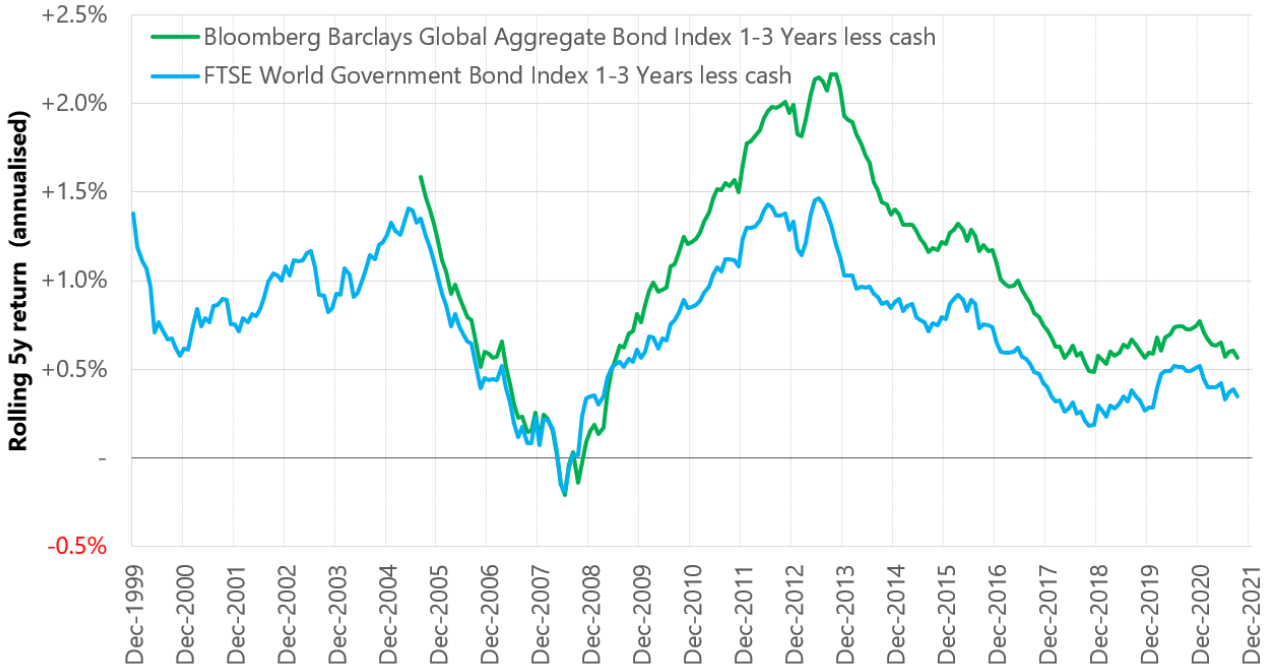
In this analysis, as in the term analysis, we used AUD denominated series for the constructions because this provided us with the broadest data access. The fact that they were AUD indices and not NZD indices (which were not available to us) is of no concern because it is only the differential between the series we are interested in, and as long as both series are denominated in the same currency the differential will be unaffected:

Table 9: International credit premia construction methodology

Credit segment	Construction methodology
1 to 3 years	Bloomberg Barclays Global Aggregate Bond Index 1-3 Years (hedged to AUD) *minus* FTSE World Government Bond Index 1-3 Years (hedged to AUD)
Global Aggregate, full term	Bloomberg Global Aggregate Corporate Bond Index (hedged to AUD) *minus* Bloomberg Global Aggregate Government Bond Index (hedged to AUD)

Over the 1-3 year segment, the chart below shows the 5 year rolling returns of the two comparison indices.

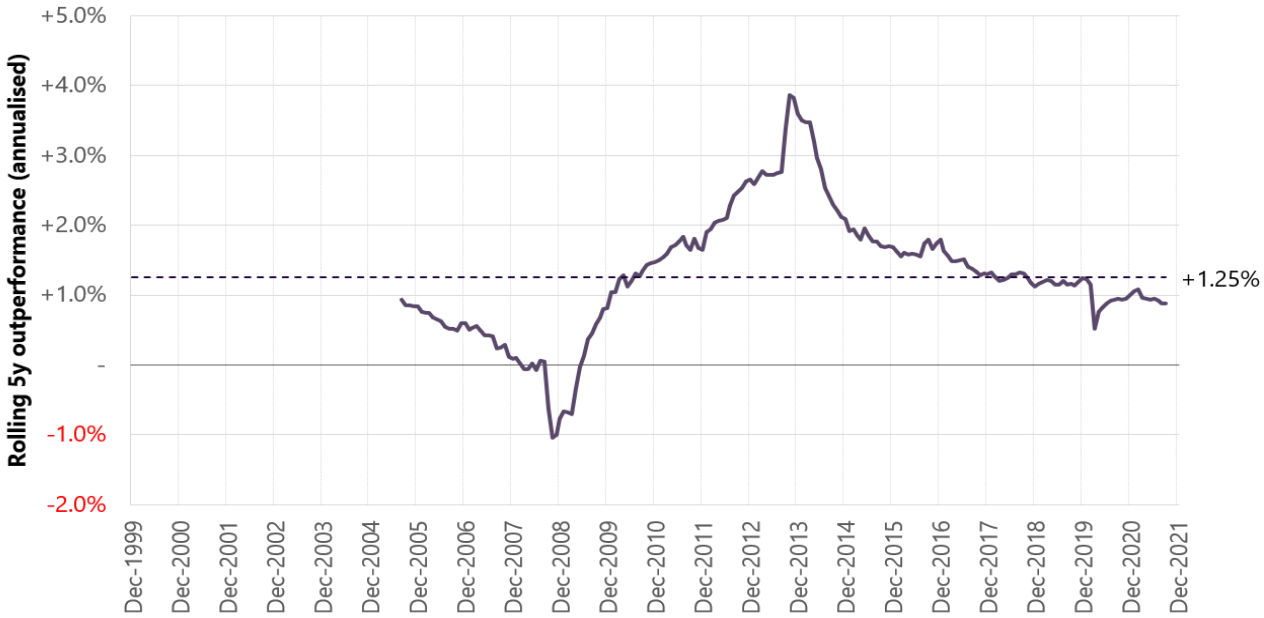
Figure 25: Return above cash for 1-3 year international bonds



Since January 2001, the Bloomberg Barclays Aggregate Index has outperformed the FTSE World Government Bond Index by an average of 0.31% per year.

Multiplying this differential by four (to account for the 75% weight of Government Bonds in the Aggregate Index) gives an observed magnitude of 1.24% for this 1 to 3 year credit factor, which, as per the chart below, is the current rolling 5 year reading coming out of our factor premia analysis tool.

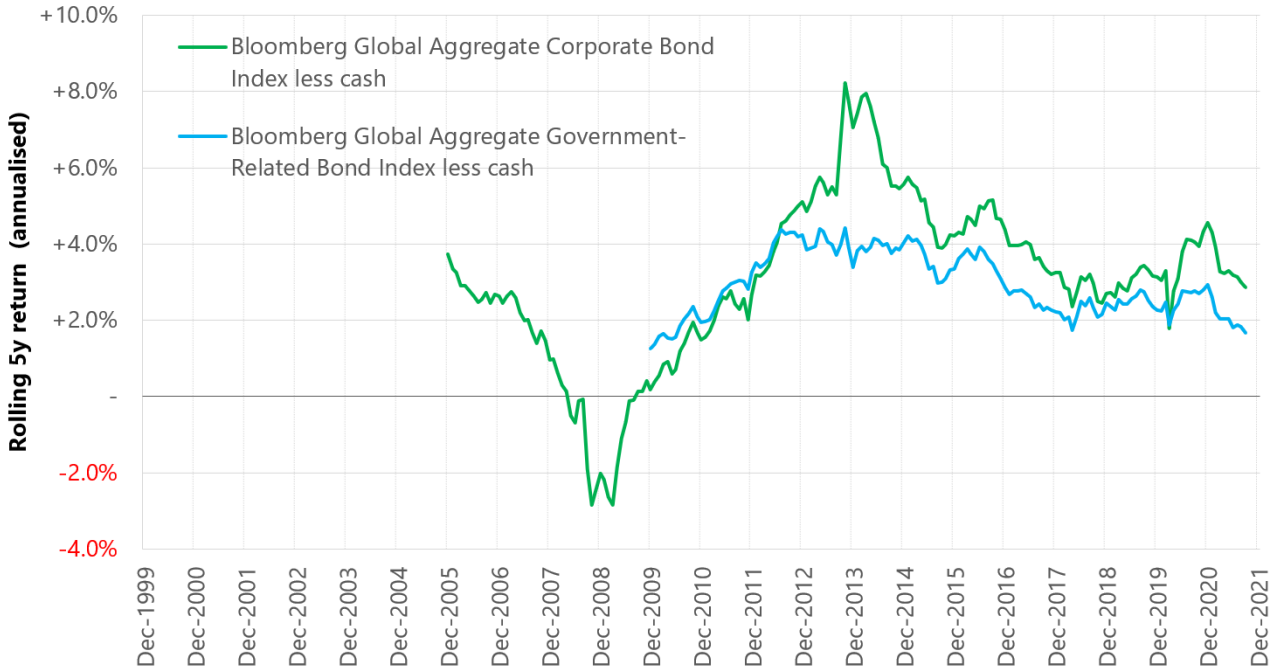
Figure 9: Rolling 5 year credit premia: developed markets, 1-3 years



While this 1 to 3 year credit premia is generally positive, we note it's delivery can be subject to heightened volatility at times (and can be sharply negative), particularly during periods of market stress.
As the expected return from taking credit risk should largely be unaffected by the overall level of interest rates, we are comfortable selecting a 1 to 3 year credit premia of 1.25% in accordance with the average of our dataset.

For longer term credit we assessed the factor over the full term of the Global Aggregate Index. The chart below shows the 5 year rolling returns of the two comparison indices, the Bloomberg Global Aggregate Corporate Bond Index and the Bloomberg Global Aggregate Government Bond Index.

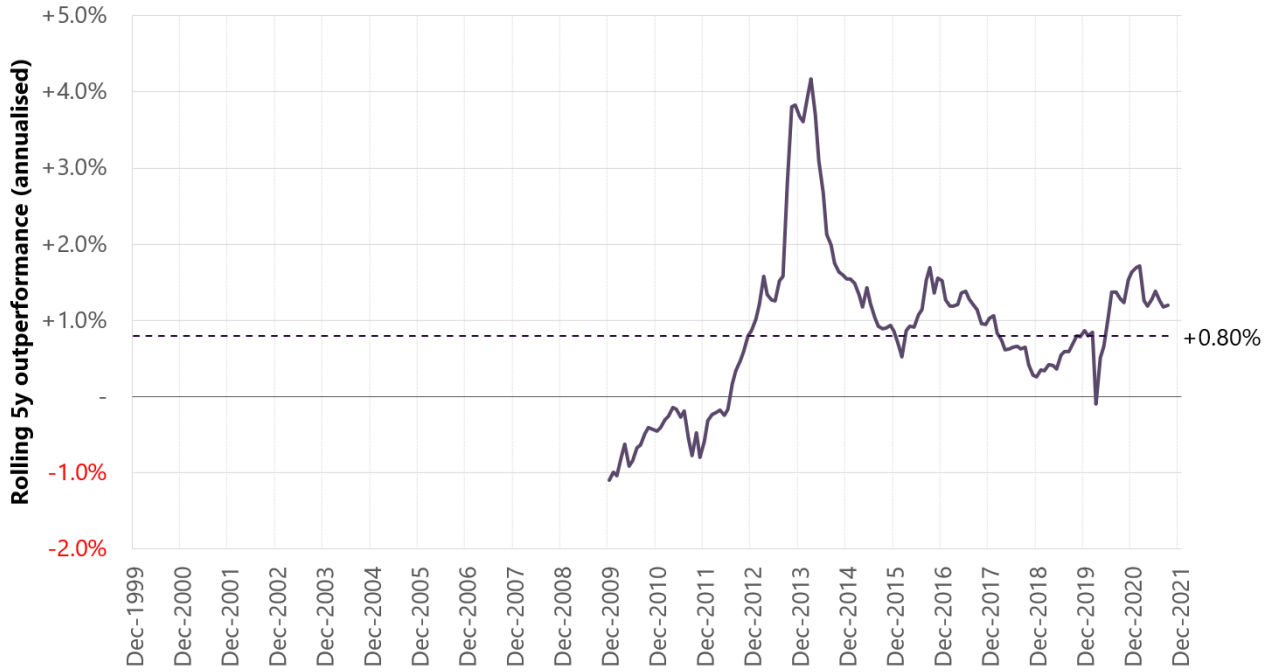
Figure 10: Rolling 5 year returns of Corporate and Government bond indices above cash



Since December 2009, the Bloomberg Global Aggregate Corporate Bond Index has outperformed the Bloomberg Global Aggregate Government Bond Index by an average of

0.82% per year. As the chart below shows, this full term credit premia is more volatile than in the 1 to 3 year segment and in particular we note the significant underperformance of the full term credit during and after the GFC, and fleetingly again during the Covid crisis in 2020.

Figure 11: Rolling 5 year credit premia: developed markets, Barclays global aggregate index



However, as was the case with the shorter duration credit premia, the committee were comfortable selecting a full term credit premia of 0.80% in accordance with the average of our dataset.

▪ Appendix 11 – New Zealand fixed interest

We followed a similar process to the global bonds but, given the idiosyncratic nature of the small New Zealand bond market, we needed to utilise domestic indices to construct our term and credit risk factors.

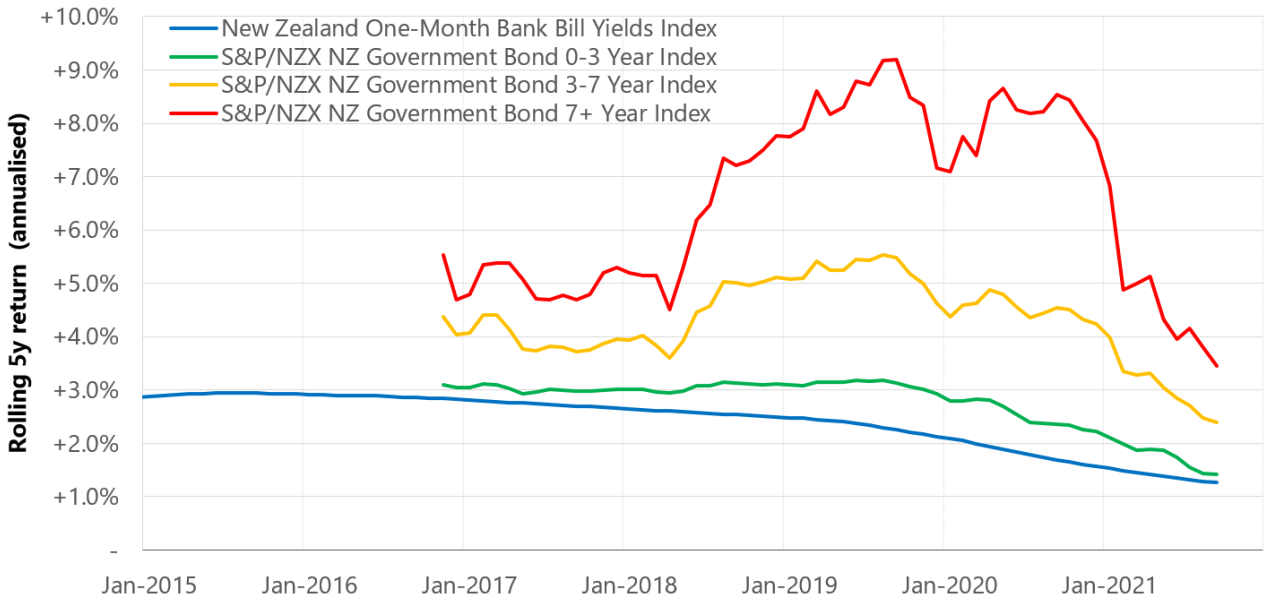
New Zealand term premia

We analysed the term premium across three duration segments (0-3 years, 3-7 years, and 7+ years) and used the following standard bond indices to help inform our calculations.

- New Zealand One-Month Bank Bill Yields Index
- S&P/NZX NZ Government Bond 0-3 Year Index
- S&P/NZX NZ Government Bond 3-7 Year Index
- S&P/NZX NZ Government Bond 7+ Year Index

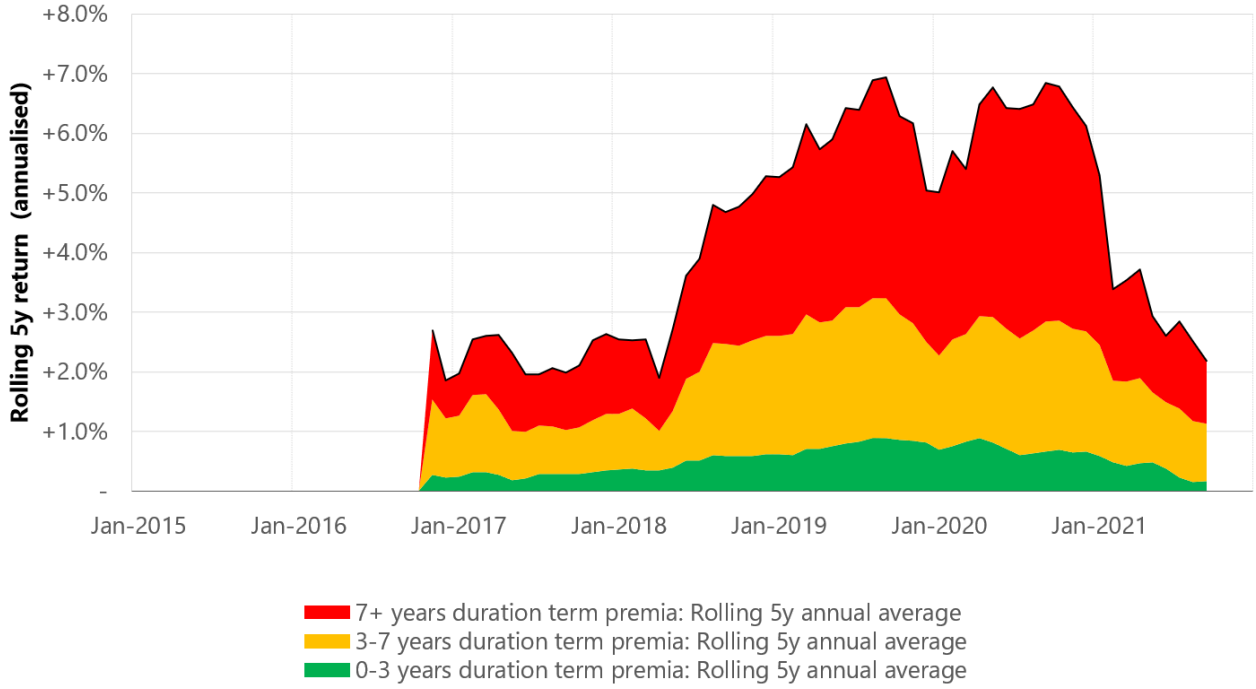
The chart below highlights the historical returns information for these indices over rolling 5 year periods.

Figure 12: Historical New Zealand Government bond index returns, rolling 5 years



This data enabled us to calculate the rolling 5 year duration premiums for each segment, by taking the difference between the returns of each index and its duration neighbour. As in the international fixed interest sector, these rolling 5 year premiums can exhibit some considerable variability over time.

Figure 30: Historical New Zealand term premia by duration segment



To compare this historical term data to the current term differentials, we calculated a current expected index return which comprised a current yield component plus a projected 'roll down' yield applicable to the slope of each curve.

We then used this information to isolate the premium within each term segment by deducting the expected return of each index from its neighbour, as follows:

Table 10: New Zealand term premia construction methodology

Term segment	Construction methodology
0 to 3 years	S&P/NZX NZ Government Bond 0-3 Year Index *minus* New Zealand One-Month Bank Bill Yields Index
3 to 7 years	S&P/NZX NZ Government Bond 3-7 Year Index *minus* S&P/NZX NZ Government Bond 0-3 Year Index
7 years+	S&P/NZX NZ Government Bond 7+ Year Index *minus* S&P/NZX NZ Government Bond 3-7 Year Index

Table 11: Outputs of segmented term premia analysis on New Zealand yield curves

The outputs of this segmented term premia analysis on current New Zealand yield curves were as follows:

Term segment	Current segment premia
0 to 3 years	0.40%
3 to 7 years	1.00%
7 years+	0.45%

Our premia analysis was only able to extend back to 2011 on the New Zealand Government Bond indices. While it would be preferable to have more data, this is the period that would certainly have the greatest influence on our thinking, even within a longer data set.

For the purposes of the current asset allocation review, we were comfortable accepting the New Zealand term segment estimates summarised in Table 20.

As this evaluation seeking to articulate a 20 year average for modelling purposes we use long term averages more in line with developed markets, namely 0.40% for 0-3 years, 1.00% for 3-7 years and 0.45% for 7+ years.

New Zealand credit premium

With respect to the New Zealand credit premium we looked at the level of premia observed over time and across two different credit specifications.

To construct monthly return series for these credit segments we used the following standard indices:

- S&P/NZX A-Grade Corporate Bond Index
- S&P/NZX NZ Government Bond 3-7 Year Index
- S&P/NZX Investment Grade Corporate Bond Index
- S&P/NZX A-Grade Corporate Bond Index

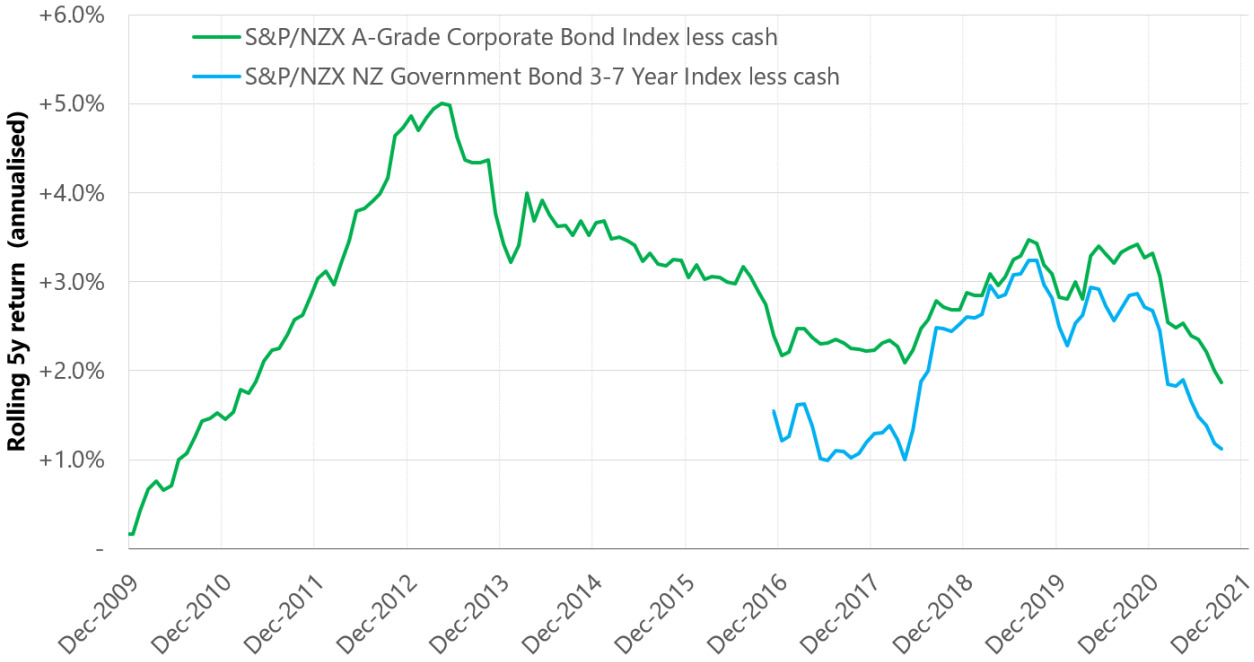
From these indices we looked to determine two different specifications of credit risk. First, the credit risk between Government Bonds and A-Grade Corporate Bonds. Second, the marginal credit risk taken beneath A-Grade Bonds but still within Investment Grade (i.e. the BBB credit segment). Both analyses are measuring credit risk at around 4.5 years duration.

Table 12: New Zealand credit premia construction methodology

Credit segment	Construction methodology
A-Grade credit	S&P/NZX A-Grade Corporate Bond Index *minus* S&P/NZX NZ Government Bond 3-7 Year Index
BBB credit	S&P/NZX Investment Grade Corporate Bond Index *minus* S&P/NZX A-Grade Corporate Bond Index

The A-Grade Corporate credit premium over New Zealand Government Bonds can be inferred from the relationship between the A-Grade Corporate Bond Index less cash and the New Zealand Government Bond 3-7 Year Index less cash.

Figure 31: Return above cash the A-Grade Corporate Bond Index and the New Zealand Government Bond 3-7 Year Index



Although we do not have long data series to work with, the A-Grade credit premium has exhibited a full term premium above the New Zealand Government Bond 3-7 Year Index of 0.72% since December 2016. Whilst this premium has delivered considerable volatility ranging from 0.2% to 1.3%, it has nevertheless always been positive as per the summary below coming out of our factor premia analysis tool.

Figure 32: Rolling 5 year New Zealand A-Grade credit premia

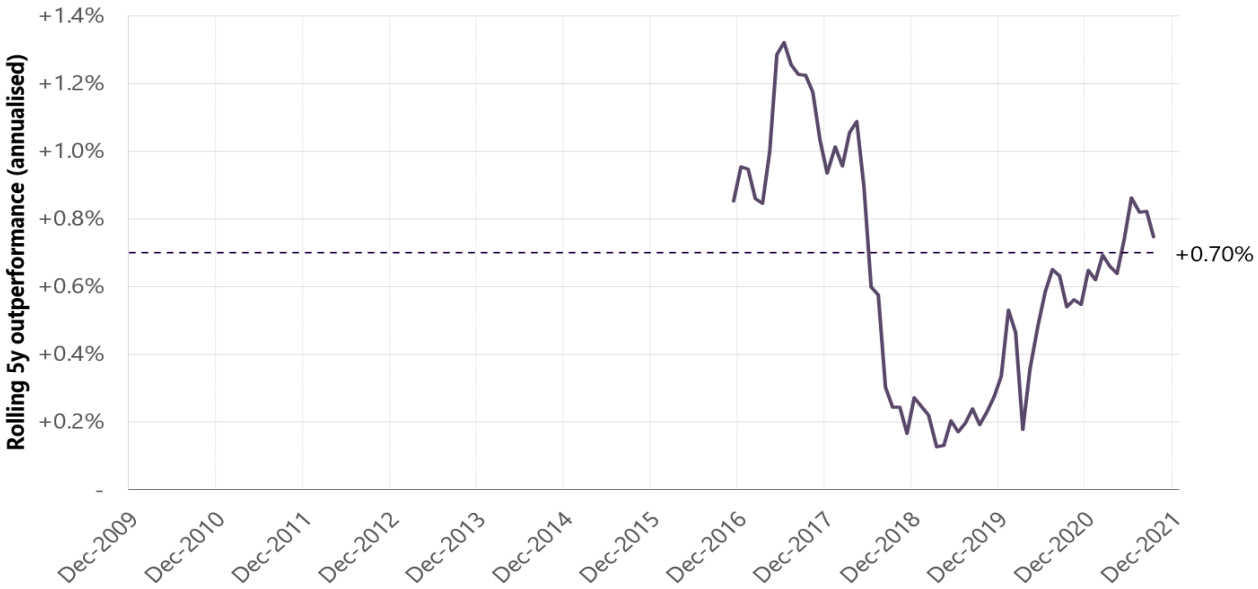
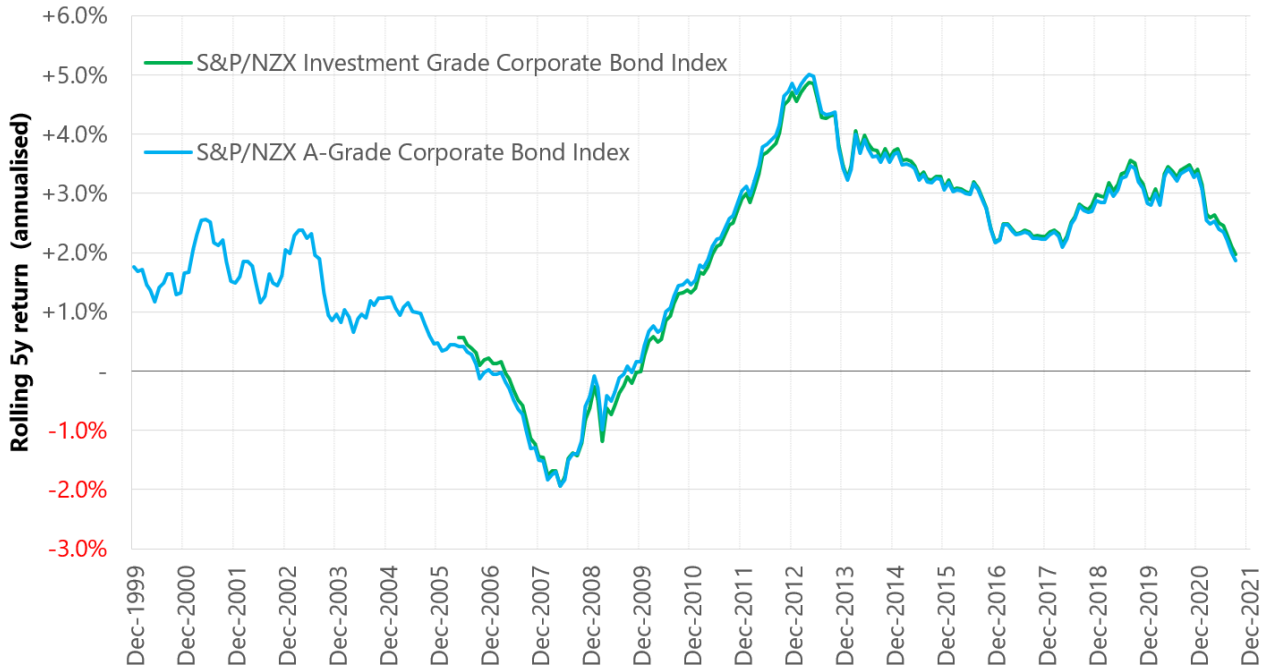
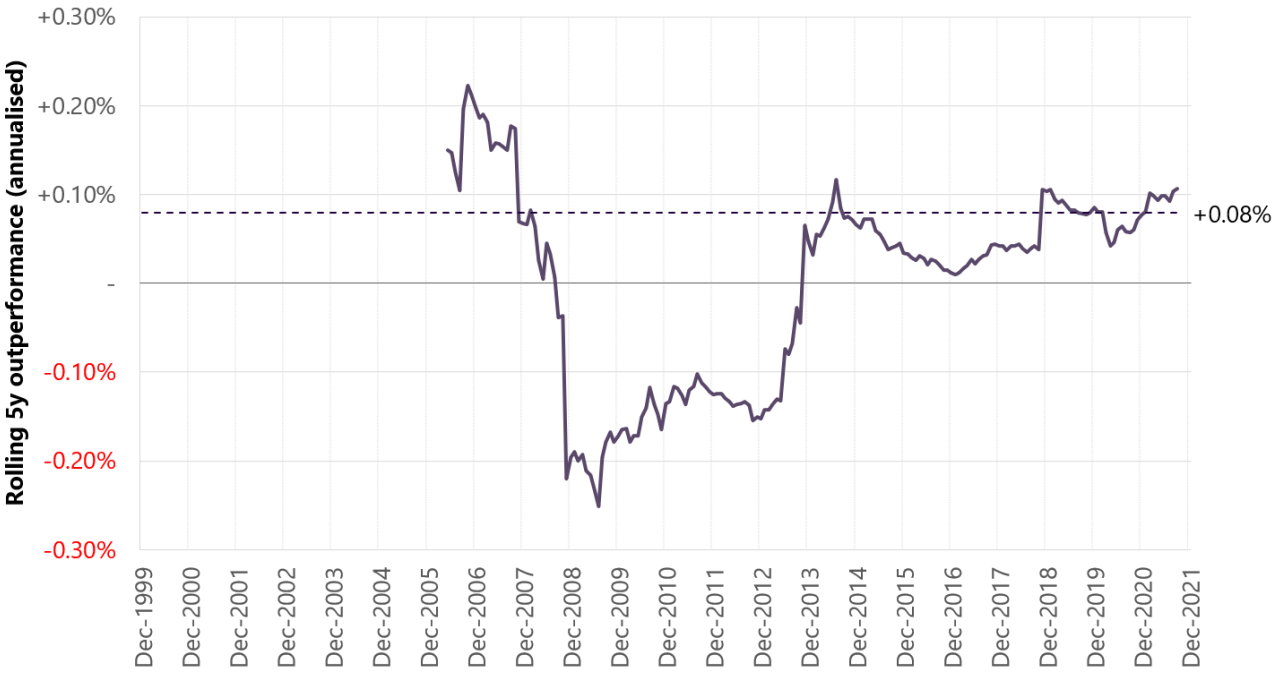


Figure 33: Rolling 5 year returns of A-Grade and Investment Grade Corporate bond indices



The incremental BBB credit premium over rolling 5 year periods coming out of our factor premia analysis tool reveals a full term average of 0.08%.

Figure 34: Rolling 5 year credit premia: incremental premia for adding BBB to A-Grade universe



While longer data sets would always be preferable, we are nevertheless comfortable enough to select an A-Grade credit premia of 0.70% and an incremental BBB credit premia of 0.10% in keeping with these findings.

▪ Bibliography

Barry, C., Goldreyer, E., Lockwood, L. & Rodriguez, M. (2002) Robustness of size and value effects in emerging equity markets, 1985-2000. Emerging Markets Review, 3, 1-30.

Abstract

We examine the robustness of size and book-to-market effects in 35 emerging equity markets during 1985–2000. Mean returns for high book-to-market firms significantly exceed mean returns for low book-to-market firms. These findings are robust to tests that control for size effects and that remove extreme returns. Similarly, mean returns for small firms exceed mean returns for large firms. But, the firm size results lack robustness to the removal of extreme returns. Moreover, significant size effects are found in tests that define firm size relative to the local market average, but generally are not found in tests that use absolute firm size. Our findings are confirmed by cross-sectional regressions that control for systematic risk at the global and local levels.

Banz, Rolf W. 1981. The Relationship Between Return and Market Value of Common Stocks, Journal of Financial Economics, 9, 3-18.

Abstract

This study examines the empirical relationship between the return and the total market value of NYSE common stocks. It is found that smaller firms have had higher risk adjusted returns, on average, than larger firms. This 'size effect' has been in existence for at least forty years and is evidence that the capital asset pricing model is misspecified. The size effect is not linear in the market value; the main effect occurs for very small firms while there is little difference in return between average sized and large firms. It is not known whether size *per se* is responsible for the effect or whether size is just a proxy for one or more true unknown factors correlated with size.

Brinson, Gary P., L. Randolph Hood, and Gilbert L. Beebower, 1986. Determinants of Portfolio Performance. Financial Analysts Journal 42(4): 39–44.

Abstract

In order to delineate investment responsibility and measure performance contribution, pension plan sponsors and investment managers need a clear and relevant method of attributing returns to those activities that compose the investment management process—investment policy, market timing, and security selection. The authors provide a simple framework based on a passive, benchmark portfolio representing the plan's long-term asset classes, weighted by their long-term allocations. Returns on this "investment policy" portfolio are compared with the actual returns resulting from the combination of investment policy plus market timing (over- or underweighting within an asset class). Data from 91 large U.S. pension plans over the 1974-83 period indicate that investment policy dominates investment strategy (market timing and security selection), explaining on average 95.6 percent of the variation in total plan return. The actual mean average total return on the portfolio over the period was 9.01 percent, versus 10.11 percent for the benchmark portfolio. Active management cost the average plan 1.10 percent per year, although its effects on individual plans varied greatly, adding as much as 3.69 percent per year. Although investment strategy can result in significant returns, these are dwarfed by the return contribution from investment policy—the selection of asset classes and their normal weights.

Brinson, Gary P., Brian D. Singer, and Gilbert L. Beebower, 1991. Determinants of Portfolio Performance II: An Update. Financial Analysts Journal 47(3): 40–48.

Abstract

For our sample of pension plans, active investment decisions by plan sponsors and managers, both in terms of selection and timing, did little to improve performance over the 10-year period from December 1977 to December 1987. Although individual results
varied widely, in general it was difficult to find positive explanatory relations between performance and investment behavior. For example, extra returns seemed to be unrelated to the level of active management. Moreover, it seemed to be harder for managers to

outperform equity benchmarks than bond and cash benchmarks; many more plans had positive contributions from the bond and cash portions of their portfolios.

Brounen, D. & de Koning, S. (2012). 50 Years of Real Estate Investment Trusts: An International Examination of the Rise and Performance of REITs. Journal of Real Estate Literature, 20(2), 195-223.

Abstract
In 1960, the U.S. Congress passed the Real Estate Investment Trust (REIT) Act to expand the investment universe beyond securities such as stocks and bonds. The REIT standard has been adopted in 34 countries. In this paper, we examine the evolution and performance of this international REIT market. As REIT markets mature, we find that standard asset pricing models become better suited to explain the stock price movements of REITs. Our results show that over the past decade REIT stock outperformance was highest in Europe, and related positively to firm size, the level of property type specialization, and geographic portfolio focus. Systematic REIT risk is highest among Asian REITs and is mainly a reflection of firm leverage, especially in recent years.

Cakici, N. (2015) The Five-Factor Fama-French Model: International Evidence. Gabelli School of Business; Fordham University.

Abstract
In this paper, I examine the five-factor model in 23 developed stock markets. Using the firm level data from July 1992 to December 2014, I form the 25 size-book to market, the 25 size-gross profitability (GP), and the 25 size-investment (Inv) portfolios. I use three factor, four factor and five factor models to explain the returns on these portfolios using regional as well as global factors. I find that the results for the five-factor model in North America, Europe, and Global markets are similar to the results for the U.S. stock market. But the results for gross profitability (GP) and investment (Inv.) suggest that these two new factors either do not add any explanatory power or are much weaker in Japan and Asia Pacific portfolios. The results also suggest that regional models perform much better than global models. This may imply that markets are still not fully integrated. With inclusion of the two new factors, the value factor still remains significant in all regions in contrast to the US market results.

Cakici, N., Fabozzi, F. & Tan, S. (2013). Size, value and momentum in Emerging Market stock returns. Emerging Markets Review, 16, 46-65.

Abstract
In this paper, we examine value and momentum effects in 18 emerging stock markets. Using stock level data from January 1990 to December 2011, we find strong evidence for the value effect in all Emerging Markets and the momentum effect for all but Eastern Europe. We investigate size patterns in value and momentum. After forming portfolios sorted on size and book-to-market ratio, as well as size and lagged momentum, we use three well-known factor models to explain the returns for these portfolios based on factors constructed using local, U.S., and aggregate global developed stock markets data. Local factors perform much better, suggesting Emerging Market segmentation.

Chan, K., Corvig, V. & Ng, L. (2005) What Determines the Domestic Bias and Foreign Bias? Evidence from Mutual Fund Equity Allocations Worldwide. The Journal of Finance, 60(3), 1495-1534.

Abstract
This study analyzes the detailed equity holdings of over 20,000 mutual funds from 26 developed and developing countries. Of particular interest is that we examine how this huge number of funds allocates their investment between domestic and foreign equity markets and what factors determine the distribution of their asset allocations worldwide. We find robust evidence that mutual funds, in aggregate, allocate a disproportionately larger fraction of investment to domestic stocks. Results indicate that the stock-market development and familiarity variables have significant, but asymmetric, effects on the domestic bias (domestic investors over-weighting their local markets) and the foreign bias (foreign investors under- or over-weighting the overseas markets). When a country is more developed, or is closer to the rest of the world in terms of physical distance or common language, foreign investors are

attracted to that country (less foreign bias) and, in turn, proportionately fewer domestic investors are found to hold local equities (less domestic bias). Furthermore, we find that variables such as economic development, capital control, and withholding taxes also have significant, but smaller, effects on the investment decisions of foreign investors and not of domestic investors.

Chen, H., Ho, K., Lu, C. & Wu, C. (2005) Real Estate Investment Trusts. The Journal of Portfolio Management, Special Issue, 46-54.

Chui, A. & Wei, K. (1998) Book-to-market, firm size, and the turn-of-the-year effect: Evidence from Pacific-Basin Emerging Markets. Pacific-Basin Finance Journal, 6, 275-293.

Abstract

This paper investigates the relationship between expected stock returns and market beta, book-to-market equity, and size in five Pacific-Basin Emerging Markets: Hong Kong, Korea, Malaysia, Taiwan, and Thailand. In all the markets examined, the relationship between average stock return and market beta is weak. On the other hand, the book-to-market equity can explain the cross-sectional variation of expected stock returns in Hong Kong, Korea, and Malaysia, while the size effect is significant in all markets except Taiwan. Interestingly, the degree of the relation between average return and book-to-market equity coincides with the magnitude of the average book-to-market ratio in a country. We also find that large firms in Hong Kong and small firms in Korea have experienced higher returns in January. We argue that the different pattern of the `turn-of-the-year' effect between Hong Kong and Korea may be attributed to a different composition of investors. The majority of investors in Hong Kong are foreign institutional investors, while investors in Korea are mainly individuals.

Damodaran, Aswath, Equity Risk Premiums (ERP): Determinants, Estimation and Implications – The 2023 Edition (March 3, 2023).

Abstract

The equity risk premium is the price of risk in equity markets, and it is not just a key input in estimating costs of equity and capital in both corporate finance and valuation, but it is also a key metric in assessing the overall market. Given its importance, it is surprising how haphazard the estimation of equity risk premiums remains in practice. We begin this paper by looking at the economic determinants of equity risk premiums, including investor risk aversion, information uncertainty and perceptions of macroeconomic risk. In the standard approach to estimating the equity risk premium, historical returns are used, with the difference in annual returns on stocks versus bonds, over a long period, comprising the expected risk premium. We note the limitations of this approach, even in markets with an abundance of data, like the United States, and its complete failure in Emerging Markets, where the historical data tends to be limited and volatile. We look at two other approaches to estimating equity risk premiums – the survey approach, where investors and managers are asked to assess the risk premium and the implied premium approach, where a forward-looking estimate of the premium is estimated using either current equity prices or risk premiums in other markets. In the next section, we look at the relationship between the equity risk premium and risk premiums in the bond market (default spreads) and in real estate (cap rates) and how that relationship can be mined to generate expected equity risk premiums. We close the paper by examining why different approaches yield different values for the equity risk premium, and how to choose the "right" number to use in analysis.

Davis, Joseph, Francis M. Kinniry Jr., and Glenn Sheay, 2007. The Asset Allocation Debate: Provocative Questions, Enduring Realities. Valley Forge, Pa.: The Vanguard Group. https://www.vanguard.com/pdf/icradd.pdf

De Groot, W., Pang, J. & Swinkels, L. (2012) The cross-section of stock returns in frontier Emerging Markets, Journal of Empirical Finance, 19, 796-818.

Abstract

We are the first to investigate the cross-section of stock returns in the new emerging equity markets, the so-called frontier Emerging Markets. Our unique survivorship-bias free data set consists of more than 1400 stocks over the period 1997 to 2008 and covers 24 of the most liquid frontier Emerging Markets. The major benefit of using individual stock characteristics is that it allows us to investigate whether return factors that have been documented in developed countries also exist in these markets. We document the presence of economically and statistically significant value and momentum effects, and a local size effect. Our results indicate that the value and momentum effects still exist when incorporating conservative assumptions of transaction costs. Additionally, we show that value, momentum, and local size returns in frontier markets cannot be explained by global risk factors.

Fama, Eugene F. (1965), Random Walks in Share Market Prices, Financial Analysts Journal, 55-59.

Fama, Eugene (1965), The Behavior of Stock Market Prices. Journal of Business. 38, 34–105.

Fama, Eugene F., The information in the Term Structure, Journal of Financial Economics (1984): 509-28.

Abstract

This paper presents a regression approach to measuring the information in forward interest rates about time varying premiums and future spot interest rates. Like earlier work, the regressions identify variation in the expected premiums on longer-maturity Treasury bills. The more novel evidence concerns the forecasts of future spot rates in forward rates. The regressions provide evidence that the one-month forward rate has power to predict the spot rate one month ahead. During periods preceding 1974, forward rates have reliable forecast power for one-month spot rates up to five months in the future.

Fama, Eugene F., Term Premiums in Bond Returns, Journal of Financial Economics (1984): 529-46.

Abstract

This paper examines expected returns on U.S. Treasury bills and on U.S. Government bond portfolios. Expected bill returns are estimated from forward rates and from sample average returns. Both estimation methods indicate that expected returns on bills tend to peak at eight or nine months and never increase monotonically out to twelve months. Reliable inferences are limited to Treasury bills and thus to maturities up to a year. The variability of longer-term bond returns preempts precise conclusions about their expected returns.

Fama, E., & French, K. (1992) The Cross-Section of Expected Stock Returns. The Journal of Finance, 47, 427-465.

Abstract

Two easily measured variables, size and book-to-market equity, combine to capture the cross-sectional variation in average stock returns associated with market β, size, leverage, book-to-market equity, and earnings-price ratios. Moreover, when the tests allow for variation in β that is unrelated to size, the relation between market β and average return is flat, even when β is the only explanatory variable.

Fama, Eugene, and Kenneth French, 1993. Common Risk Factors in the Returns on Stocks and Bonds. Journal of Financial Economics 33(1): 5–56.

Abstract

This paper identifies five common risk factors in the returns on stocks and bonds. There are three stock-market factors: an overall market factor and factors related to firm size and book-to-market equity. There are two bond-market factors, related to maturity and default risks. Stock returns have shared variation due to the stock-market factors, and they are linked to bond returns through shared variation in the bond-market factors. Except for low-grade corporates, the bond-market factors capture the common variation in bond returns. Most important, the five factors seem to explain average returns on stocks and bonds.

Fama, Eugene F. and French, Kenneth R. (2002), The Equity Premium, The Journal of Finance, 57, 637-659.

Abstract

We estimate the equity premium using dividend and earnings growth rates to measure the expected rate of capital gain. Our estimates for 1951 to 2000, 2.55 percent and 4.32 percent, are much lower than the equity premium produced by the average stock return, 7.43 percent. Our evidence suggests that the high average return for 1951 to 2000 is due to a decline in discount rates that produces a large unexpected capital gain. Our main conclusion is that the average stock return of the last half-century is a lot higher than expected.

Fama, Eugene F. and French, Kenneth R. (2010), Luck Versus Skill in the Cross Section of Mutual Fund Returns, The Journal of Finance, 65, 1915-1947.

Abstract

The aggregate portfolio of actively managed U.S. equity mutual funds is close to the market portfolio, but the high costs of active management show up intact as lower returns to investors. Bootstrap simulations suggest that few funds produce benchmark-adjusted expected returns sufficient to cover their costs. If we add back the costs in fund expense ratios, there is evidence of inferior and superior performance (nonzero true *a*) in the extreme tails of the cross-section of mutual fund *a* estimates.

Fama, E., & French, K. (2015) International Tests of a Five-Factor Asset Pricing Model. Tuck School of Business Working Paper No. 2622782.

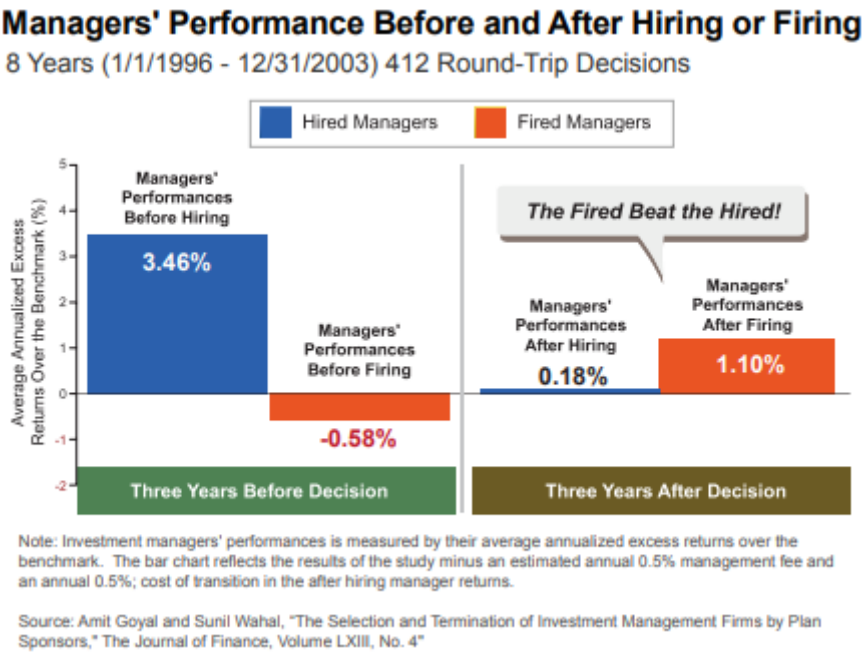
Abstract

Average stock returns for North America, Europe, and Asia Pacific increase with the book-to-market ratio (*B/M*) and profitability and are negatively related to investment. For Japan, the relation between average returns and *B/M* is strong, but average returns show little relation to profitability or investment. A five-factor model that adds profitability and investment factors to the three-factor model of Fama and French (1993) largely absorbs the patterns in average returns. As in Fama and French (2015, 2016), the model's prime problem is failure to capture fully the low average returns of small stocks whose returns behave like those of low profitability firms that invest aggressively.

Goyal, Amit, and Sunil Wahal, 2008. The Selection and Termination of Investment Management Firms by Plan Sponsors. Journal of Finance 63(4): 1841, Table 10.

Abstract

We examine the selection and termination of investment management firms by 3,400 plan sponsors between 1994 and 2003. Plan sponsors hire investment managers after large positive excess returns but this return-chasing behavior does not deliver positive excess returns thereafter. Investment managers are terminated for a variety of reasons, including but not limited to underperformance. Excess returns after terminations are typically indistinguishable from zero but in some cases positive. In a sample of round-trip firing and hiring decisions, we find that if plan sponsors had stayed with fired investment managers, their excess returns would be no different from those delivered by newly hired managers. We uncover significant variation in pre- and post-hiring and firing returns that is related to plan sponsor characteristics.



Note: Investment managers' performances is measured by their average annualized excess returns over the benchmark. The bar chart reflects the results of the study minus an estimated annual 0.5% management fee and an annual 0.5%; cost of transition in the after hiring manager returns.

Source: Amit Goyal and Sunil Wahal, "The Selection and Termination of Investment Management Firms by Plan Sponsors," The Journal of Finance, Volume LXIII, No. 4"

Hanauer, M. & Linhart, M. (2015). Size, Value, and Momentum in Emerging Market Stock Returns: Integrated or Segmented Pricing. Asia-Pacific Journal of Financial Studies, Forthcoming.

Abstract

In this paper, we examine size, value, and momentum patterns in the stock returns of four Emerging Market regions - Latin America, EMEA, Asia, and BRIC. We document a strong and highly significant value effect, and a strong but less significant momentum effect. Substantial value and momentum premiums are also present for big stocks and the overall premiums are not mainly driven by small stocks. Furthermore, the value patterns in Emerging Markets are more pronounced than in Developed Markets. In order to examine integrated global pricing across these regions, we test whether empirical asset pricing models with global factors explain the variation in average stock returns and, in particular, we assess their ability to capture the value and momentum patterns. Since the global models perform poorly for Emerging Markets, we examine the performance of local factor models, and find evidence in favor of the local four-factor model with local market, size, value, and momentum factors. On the basis of our results, pricing in Emerging Markets does not seem to be globally integrated.

Hoffmann, Arvid O. I., Shefrin, Hersh M. and Pennings, Joost M. E., Behavioral Portfolio Analysis of Individual Investors (June 24, 2010).

Abstract

Existing studies on individual investors' decision-making often rely on observable socio-demographic variables to proxy for underlying psychological processes that drive investment choices. Doing so implicitly ignores the latent heterogeneity amongst investors in terms of their preferences and beliefs that form the underlying drivers of their behavior. To gain a better understanding of the relations among individual investors' decision-making, the processes leading to these decisions, and investment performance, this paper analyzes how systematic differences in investors' investment objectives and strategies impact the portfolios they select and the returns they earn. Based on recent findings from behavioral finance we develop hypotheses which are tested using a combination of transaction and survey data involving a large sample of online brokerage clients. In line with our expectations, we find that investors driven by objectives related to speculation have higher aspirations and turnover, take more risk, judge themselves to be more advanced, and underperform relative to investors driven by the need to build a financial buffer or save for retirement. Somewhat to our surprise, we find that investors who rely on fundamental analysis have higher aspirations and turnover, take more risks, are more overconfident, and outperform investors

who rely on technical analysis. Our findings provide support for the behavioral approach to portfolio theory and shed new light on the traditional approach to portfolio theory.

Huynh, T. (2015) Explaining anomalies in Australia with a five-factor asset pricing model. Auckland University of Technology; New Zealand.

Abstract

This paper compares the ability of three- and five-factor asset-pricing models to explain the apparent profitability of a broad selection of anomalies in Australian equity returns. Rather than examining the fit of each model to common test portfolios, our focus is on the spread return to long-short trading strategies designed around so-called anomalies. After documenting significant spread returns to 16 anomalies (including several not previously studied in Australia), the empirical analysis provides cautious support that the recently-proposed investment and profitability factors have a role to play. The number of anomalies that remain after risk adjustment decreases under the five-factor model. Further, while the magnitude of reduction in alpha is modest, our testing shows that it is statistically significant in many cases. However, both three- and five-factor models repeatedly fail the GRS test, suggesting that the quest for a better asset-pricing model is not yet complete.

Kostovetsky, L., & Warner, J. B. (2015). You're Fired! New Evidence on Portfolio Manager Turnover and Performance. *The Journal of Financial and Quantitative Analysis*, *50*(4), 729–755.

Abstract

We study managerial turnover for both internally managed mutual funds and those managed externally by subadvisors. We argue that turnover of subadvisors provides sharper tests and helps address several unresolved issues and puzzles from the previous literature. We find dramatically stronger inverse relations between subadvisor departures and lagged returns, and new evidence on how past flow predicts turnover. We find no evidence of improvements in return performance related to departures, but flow improvements are associated with departures of poor past performers. Our findings represent new evidence on how investors, sponsors, and boards learn about and evaluate mutual fund management performance.

Lischewski, J. & Voronkovo, S. (2012) Size, value and liquidity. Do They Really Matter on an Emerging Stock Market? Emerging Markets Review, 13, 8-25.

Abstract

The paper extends the evidence on factors determining stock prices on Emerging Markets by focusing on the most advanced stock market in Central and Eastern Europe, the Polish market. Besides market, size and value factors, we investigate whether liquidity is a priced risk factor, addressing the hypothesis of its particular relevance in Emerging Markets. Our results support existing evidence for Developed Markets regarding market, size, and value factors. Contrary to the expectation that liquidity is a priced factor on Emerging Markets, we do not find evidence supporting this hypothesis. Analyzing specific market characteristics, we consider possible explanations behind these findings.

Malkiel, B.G. (1989). Term Structure of Interest Rates, Finance: 265-270.

Abstract

The term structure of interest rates concerns the relationship among the yields of default-free securities that differ only with respect to their term to maturity. The relationship is more popularly known as the shape of the yield curve and has been the subject of intense examination by economists for over fifty years. Historically, three competing theories have attracted the widest attention. These are known as the expectations, liquidity preference and hedging-pressure or preferred habitat theories of the term structure.

Markowitz, H.M. (March 1952). Portfolio Selection. The Journal of Finance. 7 (1): 77–91.

Markowitz, Harry. Portfolio Selection: Efficient Diversification of Investment. New York: John Wiley and Sons, 1959.

McCulloch, B., and Leonova, D., The Market Equity Risk Premium, Treasury Paper, (2005).

Milonas, N., Rompotis, G., Moutzouris, C., The Performance of ESG Funds vis-à-vis Non-ESG Funds. The Journal of Impact and ESG Investing Summer 2022, jesg.2022.1.041

Nartea, Gilbert V., Bert D. Ward, Hardian G. Djajadikerta, Size, BM, and momentum effects and the robustness of the Fama-French three factor model, Evidence from New Zealand, International Journal of Managerial Finance Vol. 5 No. 2 (2009): 179-200.
Abstract
This paper aims to confirm the existence of size, book to market (BM) and momentum effects in the New Zealand (NZ) stock market. It also aims to compare the performance of the CAPM, the Fama-French (FF) model, and Carhart's model in explaining the variation of stock returns. The paper documents significant BM and momentum effects but a relatively weaker size effect. The paper finds some improvement in explanatory power provided by the FF model relative to the CAPM but it still leaves a large part of the variation in stock returns unexplained. The FF model is also unable to explain the strong momentum effect in New Zealand.

Novy-Marx, Robert, The other side of value: The gross profitability premium, Journal of Financial Economics Vol. 108 No. 1 (2013): 1-28.
Abstract
Profitability, measured by gross profits-to-assets, has roughly the same power as book-to-market predicting the cross section of average returns. Profitable firms generate significantly higher returns than unprofitable firms, despite having significantly higher valuation ratios. Controlling for profitability also dramatically increases the performance of value strategies, especially among the largest, most liquid stocks. These results are difficult to reconcile with popular explanations of the value premium, as profitable firms are less prone to distress, have longer cash flow durations, and have lower levels of operating leverage. Controlling for gross profitability explains most earnings related anomalies and a wide range of seemingly unrelated profitable trading strategies.

Pinfold, J.F., Wilson, W.R. and Li, Q., Book-to-market and size as determinants of returns in small illiquid markets: the New Zealand case, Financial Services Review, Vol. 10, (2001) 291-302.
Abstract
The paper highlights the difficulties in adopting investment strategies designed to exploit book-to-market and size effects on the New Zealand share market, which is small and illiquid by world standards. The small number of suitable companies listed on the market, and the high return volatility of individual equities make it difficult to reliably achieve superior returns. Excess returns due to size and book-to-market are highly volatile on a period-by-period basis due to the high volatility of individual shares combined with small portfolio size, which limits diversification.

Rouwenhorst, K. G. (1999) Local Return Factors and Turnover in Emerging Stock Markets. The Journal of Finance, 50(4), 1439-1464.
Abstract
The paper shows that the factors that drive cross-sectional differences in expected stock returns in emerging equity markets are qualitatively similar to those that have been found in developed equity markets. In a sample of more than 1700 firms from 20 countries, I find that Emerging Market stocks exhibit momentum, small stocks outperform large stocks, and value stocks outperform growth stocks. There is no evidence that high beta stocks outperform low beta stocks. A Bayesian analysis of the return premiums shows that the combined evidence of developed and Emerging Markets strongly favors the hypothesis that similar return factors are present in markets around the world. Finally, the paper documents a strong cross-sectional correlation between the return factors and share turnover. Yet, it is unlikely that liquidity can explain the Emerging Market return premiums.

Sharpe, William F. (1964). Capital Asset Prices – A Theory of Market Equilibrium Under Conditions of Risk. Journal of Finance. XIX (3): 425–442.

Sharpe, William F., The Arithmetic of Active Management, The Financial Analysts' Journal Vol. 47, No. 1, January/February 1991. pp. 7-9.

Abstract

If "active" and "passive" management styles are defined in sensible ways, it *must* be the case that:
(1) before costs, the return on the average actively managed dollar will equal the return on the average passively managed dollar, and
(2) after costs, the return on the average actively managed dollar will be less than the return on the average passively managed dollar.
These assertions will hold for *any* time period. Moreover, they depend *only* on the laws of addition, subtraction, multiplication and division. Nothing else is required.
Each passive manager will obtain precisely the market return, before costs[4]. From this, it follows (as the night from the day) that the return on the average actively managed dollar *must* equal the market return. Why? Because the market return must equal a weighted average of the returns on the passive and active segments of the market. If the first two returns are the same, the third must be also.
Because active and passive returns are equal before cost, and because active managers bear greater costs, it follows that the after-cost return from active management *must* be lower than that from passive management.

Vanguard Research (Donaldson, S., Bruno, M., Walker, D., Schlanger, T. & Kinniry, F. (2013) Vanguard's framework for constructing diversified portfolios. Retrieved from: https://advisors.vanguard.com/iwe/pdf/ICRPC.pdf

Vanguard Research (Philips, C., Kinniry, F. & Dinaldson, S.) (2012) The role of home bias in global asset allocation decisions. Retrieved from: https://pressroom.vanguard.com/content/nonindexed/6.26.2012_The_Role_of_Home_Bias.pdf

APPENDIX 5: PORTFOLIO EXPENSES

Total portfolio costs should be fair and reasonable. The Investment Manager(s) must offer a fee only service with all commissions returned to the portfolio and reported to the Investment Committee.

The Investment Manager(s) is to report to the Investment Committee quarterly the breakdown of the total cost of delivery including:

- Investment Management fees,
- Custodial fees,
- Individual and weighted average Funds Management fees, and
- Brokerage and other transaction costs.

The Board acknowledge that cost reductions can be achieved through scale. The total cost of delivery objective is less than 0.75% per annum, as a percentage of total portfolio assets.

Fee	Recommended Maximums
Investment Management Fees	0.35% p.a.
Custodian Fees	0.05% p.a.
Total Weighted Funds Fees (including all funds management, trading costs and expenses)	0.40% p.a.
Brokerage – per transaction	0.20%

APPENDIX 6: AUTHORISED INVESTMENT CRITERIA – NZ FIXED INTEREST

Authorised Asset Classes	Overall Limit as a Percentage of the Total Portfolio	Approved Financial Market Investment Instruments (must be denominated in NZ dollars)	Credit Rating Criteria – Standard and Poor's (or Moody's or Fitch equivalents)	Limit for each issuer subject to overall portfolio limit for issuer class
New Zealand Government	100%	* Government Stock * Treasury Bills	Not Applicable	Unlimited
Rated Local Authorities	70%	* Commercial Paper * Bonds/MTNs/FRNs	Short term S&P rating of A1 or better Long term S&P rating of BBB or better Long term S&P rating of A- or better Long term S&P rating of A+ or better Long term S&P rating of AA- or better	$3.0 million $1.0 million $2.0 million $3.0 million $4.0 million
Local Authorities where rates are used as security	60%	* Commercial Paper * Bonds/MTNs/FRNs	Not Applicable	$2.0 million $2.0 million
New Zealand Registered Banks	100%	* Call/Deposits/Bank Bills/Commercial Paper * Bonds/MTNs/FRNs	Short term S&P rating of A1 or better Long term S&P rating of BBB or better Long term S&P rating of A- or better Long term S&P rating of A+ or better Long term S&P rating of AA – or better	$10.0 million $1.0 million $2.0 million $3.0 million $4.0 million
State Owned Enterprises	70%	* Commercial Paper * Bonds/MTNs/FRNs	Short term S&P rating of A1 or better Long term S&P rating of BBB or better Long term S&P rating of A- or better Long term S&P rating of A+ or better	$3.0 million $1.0 million $2.0 million $3.0 million $4.0 million

			Long term S&P rating of AA- or better	
Corporates	60%	* Commercial Paper * Bonds/MTNs/FRNs	Short term S&P rating of A1 or better Long term S&P rating of BBB or better Long term S&P rating of A- or better Long term S&P rating of A+ or better Long term S&P rating of AA -or better	$3.0 million $1.0 million $2.0 million $3.0 million $4.0 million
Financials	30%	* Commercial Paper * Bonds/MTNs/FRNs	Short term S&P rating of A1 or better Long term S&P rating of BBB or better Long term S&P rating of A- or better Long term S&P rating of A+ or better Long term S&P rating of AA- or better	$3.0 million $1.0 million $2.0 million $3.0 million $4.0 million

The combined holdings of corporates and financials shall not exceed 70% of the portfolio. The combined holdings of entities rated BBB and/or BBB+ shall not exceed 25% of the portfolio.

[i] 10 Year Treasury Rate - 54 Year Historical Chart | MacroTrends
[ii] MSCI ACWI IMI Index
[iii] Damodaran Online: Home Page for Aswath Damodaran (nyu.edu)
[iv] Kernel Wealth | NZ Commercial Property