STATEMENT OF INVESTMENT POLICY AND OBJECTIVES

VERSION 1.5

Approved: February 2018

CONTENTS

DOCUMENT OVERVIEW

REVISION HISTORY

Name	Date	Change	Version
Cambridge Partners and Cros Spooner	26 October 2017	Initial Draft	1.0
Cambridge Partners and NZ Meat Board	31 October 2017	Initial Draft – edits	1.1
Cambridge Partners and NZ Meat Board	13 November 2017	Edits	1.2
Cambridge Partners and NZ Meat Board	20 November 2017	Edits	1.3
Cambridge Partners and NZ Meat Board	14 December 2017	Edits	1.4
NZ Meat Board	24 January 2018	Edits	1.5

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 recovering from 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 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 $70.7 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 at 30 September 2017, the following capital base was available to provide funding for industry good:

Contingency Fund:	$57,500,000
General Reserve*:	$12,800,000
Total	$70,300,000

* General Reserve has been adjusted downwards to reflect the remaining committed funding for Red Meat Partnership ($6,700,000 maximum) and Investment Fluctuation Reserve ($2,500,000).

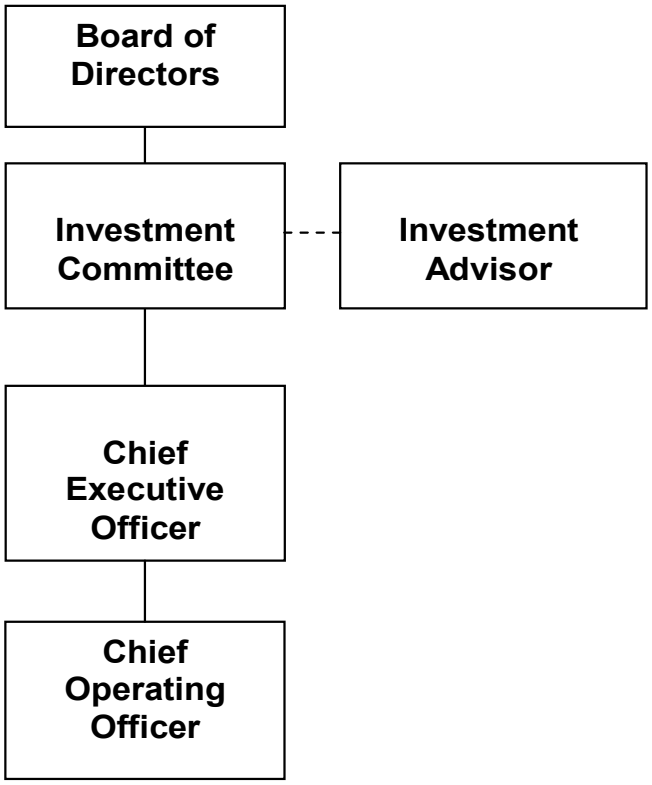
Over the long term the Board expects the capital base, (made up of the Contingency Fund and General Reserves) available for long term investment, to be approximately $70,000,000, in 2017 dollar terms and at current exchange rates.

In 2017-2022 planning, the Board has budgeted on net distributions of income (interest and dividends) of $1,900,000 per annum to Beef + Lamb New Zealand Limited. Governance, reserves management and investment management costs will require an additional $500,000 of investment income

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, the Investment Committee, 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, Investment Committee, 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 long term, i.e. greater than 15 years, 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.

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.

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

Careful consideration of cash flow requirements is essential to determine the required rate of return. In order to achieve the desired level of contributions to industry, 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 the spending rate.

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 **3.30%** 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 **3.30%** 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

Over the long term, the average rate of investment return is related to the level of risk within the portfolio, as illustrated in the table below:

ESTIMATED RATE OF RETURN P.A. (NET OF TAX AND FEES)	GROSS ESTIMATED RETURN P.A.	LEVEL OF INVESTMENT RISK	SUITABLE STRATEGIES
Inflation plus 2.5%	5.5%	Low	20% growth assets
Inflation plus 2.9%	5.9%	Low	30% growth assets
Inflation plus 3.3%	6.3%	Low to medium	40% growth assets
Inflation plus 3.6%	**6.6%**	**Medium**	**50% growth assets**

Inflation plus 3.9%	6.9%	Medium	60% growth assets
Inflation plus 4.3%	7.3%	Medium to high	70% growth assets
Inflation plus 5.6%	7.6%	High	80% growth assets
Inflation plus 6.0%	8.0%	High	90% growth assets

The table comprises estimates based on assumed portfolio and custodial fees and a tax rate of 0%. Inflation is assumed to be 2.0% per annum, based on the mid-point of the RBNZ target. Estimated gross returns increase as the portfolio allocation to growth assets increases. Actual returns may be higher or lower than those detailed above.

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, Investment Committee, 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 encourage the appointment of Investment Committee members with the relevant experience and competencies to achieve the stated objectives.
- To ensure that the Investment Committee, and members, 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.
- To approve the adoption of the SIPO.
- Approve any transactions that fall outside the guidelines of the SIPO.
- 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.

5.2 INVESTMENT COMMITTEE

The Board has established an Investment Committee and has delegated to the Investment Committee such powers and duties as the Board sees fit. The Investment Committee operates as per the Investment Committee Charter, as approved by the Board, and the Board's constitution. The Investment Committee provides the first point of reference for all matters pertaining to the management of the Meat Board's portfolio. Members serving on the Investment Committee are appointed by the Board.

The Investment Committee's roles include:

- To provide guidance and leadership on the appointment, management, monitoring and review of appropriate Investment Managers.
- To recommend a SIPO for adoption by the Board.
- Reviewing all matters concerning the SIPO and Investment Policy Statement (IPS), considering any changes or amendments to the SIPO and IPS and making appropriate recommendations.
- Regularly reviewing Investment Manager reports, and reporting exceptions.
- 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 Investment Committee shall ensure that an appropriate SIPO is developed and regularly reviewed 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 Investment Committee shall provide oversight and review of all portfolio management matters to:

- Make recommendations to the Board on 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 Investment Committee 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.
- Periodically review the Investment Committee's effectiveness in meeting its fiduciary responsibilities.

- 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 Investment Committee 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 and Investment Committee 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 at least annually to the Investment Committee '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

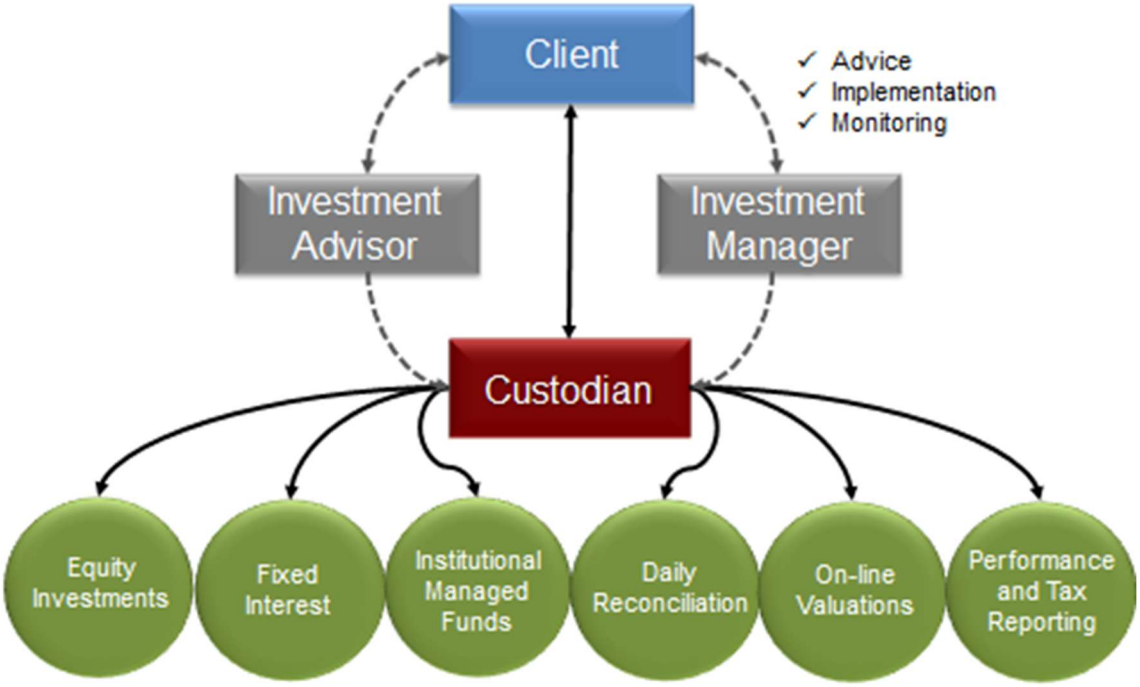
- To manage an allocated part of the portfolio on terms and conditions consistent with their mandate.

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:


Client
✓ Advice
✓ Implementation
✓ Monitoring
Investment Advisor
Investment Manager
Custodian
Equity Investments
Fixed Interest
Institutional Managed Funds
Daily Reconciliation
On-line Valuations
Performance and Tax Reporting

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 %
New Zealand Equities	6.0%	8.0%	10.0%
Australian Equities	6.0%	8.0%	10.0%
International Equities	22.0%	27.0%	32.0%
Emerging Market Equities	3.8%	5.0%	6.3%
New Zealand Property	1.0%	1.5%	2.0%
International Property	0.0%	0.5%	1.0%
New Zealand Fixed Interest	31.0%	36.0%	41.0%
International Fixed Interest	9.0%	12.0%	15.0%
New Zealand Cash	1.5%	2.0%	2.5%
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%).
- Plus or minus 0.5% percentage points of the allocation to a single asset class, where that asset class comprises less than 5% of the SAA.

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 Investment Committee.

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 Investment Committee:

- 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

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 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.
Infrastructure/utilities	The returns from infrastructure/utilities companies can commonly be explained by traditional market, value and size factors. These assets are contained within broad indices and there is no compelling rationale to allocate to these sectors as a separate asset class.
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 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 4.
- 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 Investment Committee 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, [Fund Management, GR] 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 **3.30%** per annum over any rolling five year period, net of tax, inflation, Investment Advisory services, investment management, funds management and custodian fees.

The Board and Investment Committee acknowledge that return is a function of the level of risk in the portfolio. The Board and Investment Committee 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 and Investment Committee intend to evaluate investment performance from a long-term perspective. The Board and Investment Committee 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 and Investment Committee 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 direct the Investment Committee to take such action if it deems this is required.

Specifically the following will be confirmed and reported to the Investment Committee:

- 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 Investment Committee will be responsible for recommending the appointment of Investment Manager(s) to assist with the management of the Meat Board's investment portfolio. The Investment Committee 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 Investment Committee 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 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 and Investment Committee (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.

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 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 Investment Committee 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

Strategic Asset Allocation.

APPENDIX 4

Authorised Investment Criteria – New Zealand Fixed Interest.

APPENDIX 5

Authorised Investment Criteria – International 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.

APPENDIX 3: STRATEGIC ASSET ALLOCATION PAPER

NZ Meat Board: Strategic Asset Allocation Review
Version 1.1 December 2017

CAMBRIDGE
PARTNERS

FINANCIAL STEWARDS | INVESTMENT FIDUCIARIES

Contents

1. Executive Summary

Entity:	The New Zealand Meat Board (Meat Board)
Tax Status:	Consolidated tax losses of $70.7 million make the Meat Board effectively tax exempt
Current Investment Assets:	$70,300,000 as at 1 December 2017
Time Horizon:	Long term, greater than fifteen years
Modelled Return:	6.6% gross (before inflation and fees)
Volatility:	6.1% standard deviation

Asset Allocation:

Asset Class	Minimum Allowable Exposure %	Strategic Asset Allocation %	Maximum Allowable Exposure %
New Zealand Equities	6.0%	8.0%	10.0%
Australian Equities	6.0%	8.0%	10.0%
International Equities	22.0%	27.0%	32.0%
Emerging Markets Equities	3.7%	5.0%	6.3%
New Zealand Property	1.0%	1.5%	2.0%
International Property	0.0%	0.5%	1.0%
New Zealand Fixed Interest	31.0%	36.0%	41.0%
International Fixed Interest	9.0%	12.0%	15.0%
New Zealand Cash	1.5%	2.0%	2.5%
Total		**100%**	

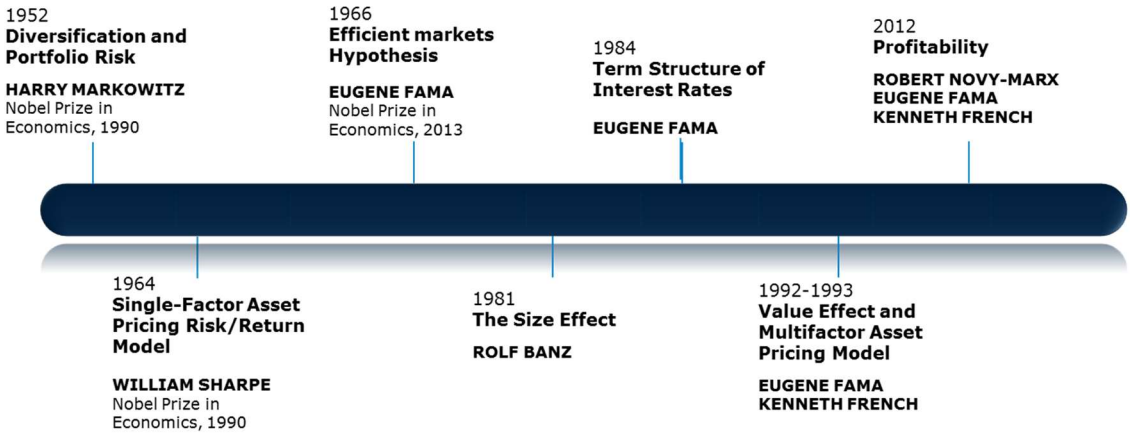
Benchmarks:

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		

2. Background

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 SAA Appendix 4 (1)).

   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 (Markowitz, Portfolio Selection 1952 SAA Appendix 4 (2)).

   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 SAA Appendix 4 (3)).

   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 I and II, 1986 and 1991 SAA Appendix 4 (4)).

   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 SAA Appendix 4 (5)).

   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 judgemental, 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 and empirical evidence 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 SAA Appendix 4 (6)).

There will always be active managers that outperform the overall market but it is extremely unlikely that any one person or body consistently over time can identify in advance, under-priced securities that will outperform. Further, consistently picking the best active manager for any given asset class is also extremely unlikely (S&P Persistence Report, January 2017 SAA Appendix 4 (7)).

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 SAA Appendix 4 (1)).

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 SAA Appendix 4 (8)).

In share markets these include companies with lower market capitalisation, lower relative price and higher 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 SAA Appendix 4 (9)).

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 reasons 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 process 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

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 various assets were excluded as asset classes

Asset(s)	Reason for exclusion
Infrastructure/utilities	The returns from infrastructure/utilities companies can commonly be explained by traditional market, value and size factors. These assets are contained within broad indices and there is no compelling rationale to allocate to these sectors as a separate asset class.
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.

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, inflation and market risk premium.

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 (Sharpe Capital Asset Prices – A Theory of Market Equilibrium Under Conditions of Risk, 1964 SAA Appendix 4 (3)). 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 Bills, or very short term US Government Bonds.

Sharpe's model was expanded by Fama, French and others who added additional risk factors that are also compensated by markets with additional expected return (Fama, French The Cross-Section of Expected Stock Returns, June 1992 SAA Appendix 4 (8)).

The additional risk factors include; company size, relative price 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 (Fama, French A Five-Factor Asset Pricing Model, March 2014 SAA Appendix 4 (10)).

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

Inflation Estimates

The published inflation target of the RBNZ is 0-3%[i]. Below we show actual inflation over the past 1, 3, 5, 10, 15, 20, and 25 year periods.

Historical New Zealand Inflation Values, as at 30 Sep 2015[ii]

Time period	Inflation rate
1 Year	1.90%
3 Years	0.90%
5 Years	1.00%
10 Years	1.90%
15 Years	2.10%
20 Years	2.00%
25 Years	2.00%

Source: RBNZ

Inflation in New Zealand had fallen substantially by 1994. Since then it has approximated 2.0%. Recently it has been lower in line with low global inflation. However, the long-term historical average is a more reasonable forward estimate.

NZ Risk Free Rate Estimates

The real risk free rate in New Zealand can be approximated by looking at the difference between the Official Cash Rate (OCR) and the rate of inflation. This approximates the return available to an investor holding short term cash only.

Comparison of NZ CPI Inflation and OCR over various historical time periods, as at December 2015

Time period	Inflation rate	OCR	Difference
1 Year	0.47%	3.45%	2.98%
3 Years	0.95%	3.07%	2.12%
5 Years	1.73%	2.94%	1.21%
10 Years	2.24%	4.54%	2.30%
15 Years	2.33%	5.01%	2.68%
20 Years	2.19%	5.54%	3.35%
25 Years	2.22%	6.02%	3.80%

Source: RBNZ

The more recent five to ten year data is the most reasonable estimate going forward. As at December 2015 the OCR was at 2.5% whilst annual inflation was 0.40%. Based on this data, a risk free rate 2.0% above the rate of inflation is a reasonable long-term estimate.

Australian Risk Free Rate Estimates

The table below shows the Australian risk free rates over the rate of inflation over various time periods.

Australian risk free rates over the rate of inflation, as at December 2015

Time period	Risk free rate above inflation
1 Year	0.95%
3 Years	0.72%
5 Years	1.20%
10 Years	1.93%
15 Years	2.11%
20 Years	2.50%
25 Years	2.96%

Source: RBA

The more recent five to ten year data is the most reasonable estimate going forward Based on this data, a risk free rate 1.50% above the rate of inflation is a reasonable long-term estimate.

Developed Market Risk Free Rate Estimates

The table below shows the Developed Markets risk free rates over the rate of inflation over various time periods.

Developed Markets risk free rates over the rate of inflation, as at December 2015

Time period	Risk free rate above inflation
1 Year	0.04%
3 Years	-0.91%
5 Years	-1.68%
10 Years	-0.60%
15 Years	-0.55%
20 Years	0.21%
25 Years	0.45%
30 Years	0.80%

Source: Dimensional Returns Programme

Risk free rates below the rate of inflation appear to be a short term anomaly and unlikely to persist, as investors will ultimately demand real compensation from institutions to hold their on-call assets. However, this may take time to correct.

Accordingly, we favour the use of long term historical data for guidance. As shown above, 25 year returns above inflation have been 0.45%. Over the last 30 years this increases to 0.80%. An estimate of 0.50% above inflation is a reasonable long term expectation.

Emerging Markets Risk Free Rate Estimates

To develop an Emerging Markets risk free rate we took a weighted average of the official overnight interest rates from China, South Korea, Taiwan, India, South Africa, Brazil, Mexico, Russia and Malaysia. Together they represent over 70% of the Emerging Markets cap-weighted index. We utilised data available from January 2000.

Weighted average of the official overnight interest rates from nine largest Emerging Markets by market cap, as at December 2015

Time period	Risk free rate above inflation
1 Year	5.17%
3 Years	5.02%
5 Years	5.22%
10 Years	5.70%
15 Years	6.11%

Source: International Monetary Fund Estimates

As Emerging Markets develop, their borrowing costs tend to fall. This is confirmed in the data as the most developed of the Emerging Markets, including South Korea and Taiwan, comfortably have the lowest risk free rates. This favours overweighting more recent time periods, rather than the full historical data set. A nominal risk free rate of 5.00% is a reasonable estimate.

Calculation of Equity Market Risk Premium

The real (after inflation) equity market risk premiums from 1900 – 2014 (Dimson, Marsh and Staunton SAA Appendix 4 (11)) were.

Real returns of equities compiled by Dimson, Marsh and Staunton

Time period	Equity Market Risk Premium
• Australia	• 8.1%
• Austria	• 10.4%
• Belgium	• 5.4%
• Canada	• 5.6%
• Denmark	• 5.0%
• Finland	• 9.5%
• France	• 8.7%
• Germany	• 9.9%
• Ireland	• 5.8%
• Italy	• 9.5%
• Japan	• 9.3%
• Netherlands	• 6.5%
• New Zealand	• 5.9%
• Norway	• 5.9%
• South Africa	• 8.4%
• Spain	• 5.5%
• Sweden	• 5.9%
• Switzerland	• 5.3%
• U.K.	• 6.1%
• U.S.	• 7.5%
• Europe	• 5.2%

- World-ex U.S. • 5.2%

Source: Damodaran, Aswath, Equity Risk Premiums (ERP): Determinants, Estimation and Implications – The 2015 Edition (March 14, 2015) SAA Appendix 4 (12).

Real returns from these markets have ranged between a high of 10.4% (Austria) and a low of 5% (Denmark). The simple average of all Developed Markets across this time period was 5.7%.

A paper by Nusret Cakici in October 2014 titled "The Five Factor Fama French Model: International Evidence" found global market premiums between July 1992 and Dec 2014 of 6.72% and regional premiums between 8.88% (Asia Pacific) and 1.68% (Japan) SAA Appendix 4 (13).

A June 2015 Paper by Fama and French titled "International Tests of a Five-Factor Asset Pricing Model" found regional premiums between July 1990 and Sept 2014 of between 9.24% (Asia Pacific) and -0.36% (Japan) SAA Appendix 4 (10).

In "The Equity Premium" (Eugene Fama and Kenneth French, Journal of Finance, April 2002), the authors concluded that some of the high real return over the last half of the 20th century (nearly 8%) was due to a declining discount rate. SAA Appendix 4 (14)

New Zealand Treasury concurs, in "The Market Equity Risk Premium" (Treasury Paper, May 2005), they concluded:

> *Over the past seventy five years, US capital markets have provided an equity risk premium over long term bonds in the region of 7%. The traditional view has been that these historical results provide an unbiased estimate of the expected future long term equity risk premium.*
>
> *This view has given way over the past few years to a consensus that the future expected risk premium is actually somewhat lower. This consensus rests on a range of recent empirical evidence and theoretical analysis. It draws on both the historical records of market returns, dividends and reported earnings, and on forward-looking information through surveys of market experts and from the expectations implicit in analysts' earnings forecasts.*
>
> *On the basis of this analysis, we believe that the long term annual (arithmetic) expected equity risk premium sits in the range of 3% to 5%. For the purpose of calculating the required capital contribution to the New Zealand Superannuation Fund, the Treasury is adopting the assumption of a long-term expected future equity risk premium of 4%.*

On a forward looking basis Damodaran published results from a survey of global fund managers who estimated the US equity risk premium at 4.6%. Based on dividends, stock-buy backs and prices for the S&P 500 he calculated that the implied premium was 5.78% as of January 1 2015[iii].

According to the 2005 Treasury paper, the equity risk premium is defined as "the forward-looking, long term difference between expected annual aggregate nominal equity market returns and expected annual nominal returns on long term government bonds."

In this paper we define the equity risk premium with respect to the OCR (or short term government securities) not long term government bonds and we do so in a forward looking rather than a backward looking fashion.

We compare below the average OCR since inception versus the average 10 year Government Bond Yield.

Comparison of OCR to 10 Year NZ Government Bond, Jan 2000 – Nov 2015

Investment	Rate
OCR	4.84%
10 Year Government Bond Yield	5.46%
Difference	0.62%

Source: RBNZ

Based on the 2005 Treasury paper and the historical averages above, an equity risk premium of 4.5% (4% estimated by the Treasury plus an additional 0.50% to account for using of the OCR as an estimate of the risk free rate) is appropriate. We apply this equity risk premium to all Developed equity markets including Australia and New Zealand.

Property

On an asset pricing basis there are no generally accepted risk based pricing models for listed property. 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 potential capital gain).

New Zealand Property exhibits less volatility than the S&P/NZX 50, and has done for the index's whole life, although data does suggest they are converging.

There are two methods we might employ to calculate expected return. One is the dividend discount model. This suggests that the expected return is derived by the following equation.

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

Where the expected return, Ke, is a function of:
*D*1 : the next period's dividend
*P*0 : the current price
g : the dividend growth rate.

The long term average dividend yield on New Zealand property as at November 30th 2015 is 6.9%.

Looking at the eight companies that make up over 95% of the New Zealand property index we can determine dividend growth per share. Doing so we find that per share growth increased until the Global Financial Crisis (GFC). It fell sharply during the crisis and has risen consistently since then. Overall average growth has been negative at -0.4%. However, the GFC is an anomaly. Average growth of 0.5% to 1.0% is more reasonable.

Over this time period of 2006 through 2015 the dividend growth model would have predicted returns around 6.9% - 0.4% = 6.5%.

Based on historical data, we can interpolate a suitable risk premium for NZ Property. With volatility of 9.63% we would derive an expected return in excess of the risk free rate +3.75%. Overall that would lead to an expected return of 7.75%. This is a reasonable estimate of the expected return for New Zealand property.

International Property

Developed Markets volatility does a reasonable job of explaining the returns of Developed Markets property. When we regress developed market property against a developed market risk factor we get a fit (R2) of 72% and beta of 1.23 which tells us that developed market property is more volatile that the market.

We therefore use the market risk factor, with a premium of 4.5%, to explain the expected return of international property.

Fixed Interest

Because of the yield curve and its relationship to the risk free rate, we have a definitive view regarding how much expected return markets are willing to give to hold the combination of term and credit risk international fixed interest benchmarks take (Fama, Term Premiums in Bond Returns, 1984 SAA Appendix 4 (15)).

The table below shows the yield to maturity for four fixed benchmarks on November 30th 2015 relative to the New Zealand risk free rate on that date. Note that the New Zealand risk free rate is the relevant rate for these funds as all are either in or hedged to New Zealand dollars.

Risk premiums and expected return of Fixed Interest, as at December 2015

Investment	Duration	Yield	Risk premium	Expected Return
OCR	0	2.75%	0%	4.00%
S&P/NZX Corporate A Grade Index	3.04	3.58%	0.83%	4.83%
S&P/NZX Government Bond Index	4.91	3.30%	0.55%	4.55%
Citi World Government Bond Index 1-5 years (Hedged to NZD)	3.69	4.51%	1.76%	5.76%
Bloomberg Barclays Global Aggregate Bond Index (Hedged to NZD)	6.45	5.29%	2.64%	6.64%

Source: Dimensional Returns Programme

Within International Fixed Interest we have greater expected returns. However, that additional expected return does not necessarily come from greater volatility.

Risk premia Summary

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

Figure 1: Various risk factor premia for selected markets

Risk factor	New Zealand	Australia	Developed Markets	Emerging Markets
Nominal risk free	4.00%	3.50%	2.50%	5.00%
Market factor	4.50%	4.50%	4.50%	4.50%
Term + Credit	0.80%		2.00%	

[FOR SCOTT _ IWOULD LIKE TO GET A BETTER UDERSTANDING OF THIS TABLE AT SOME LATER DATE GR]

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 (Vanguard, The role of home bias in global asset allocation decisions, 2012 SAA Appendix 4 (16)). 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*** –higher cost to access foreign securities may encourage greater domestic investment.
- ***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 influenced more by domestic inflation and interest rates. In these cases, the diversification benefits attained through adding 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 in 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 $24.8 billion of KiwiSaver funds revealed that the "average" KiwiSaver portfolio comprised an approximate 31% allocation to Australasian equities and approximately 69% to International equities.

KiwiSaver 2015 home bias estimates

	KiwiSaver analysis 2015 ($24.8b assets analysed)	
Portfolio type	Australasian Equity (%)	International Equity (%)
Conservative	35.2	64.8
Moderate	38.6	61.4
Balanced	26.3	73.7
Growth	29.1	70.9
Aggressive	24.1	75.9
Weighted Average	31.4	68.6

For a more detailed summary of KiwiSaver industry allocations, please refer to table in SAA Appendix 1.

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 SAA Appendix 4 (16)).

We recommend a 30%/70% Australasia/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

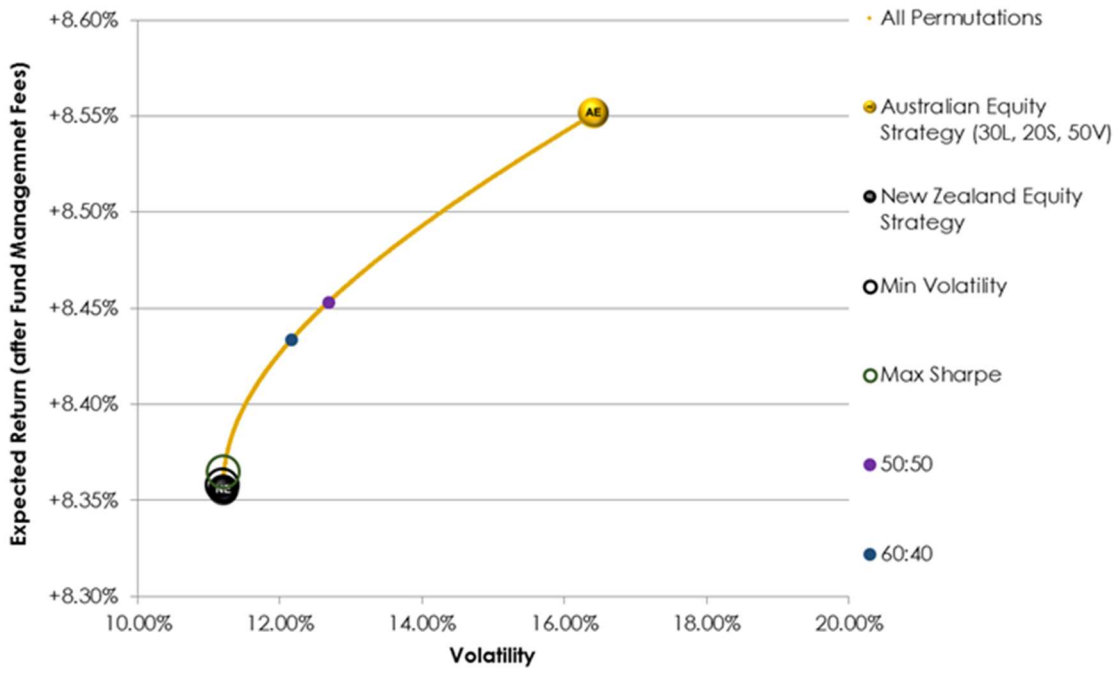
To New Zealand	true "domestic" market no currency risk direct hedge against domestic inflation
To Australia	more diversified market (companies and sectors) superior market depth and liquidity better access to risk factors and managers to target risk the dominant market within Australasia

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 would 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.

The chart below highlights the expected risk and return trade off between our recommended New Zealand and Australian equities strategies.

The expected risk and return trade off of between our New Zealand and Australian strategies



The above shows that the expected returns for Australian equities are generally slightly higher than New Zealand equities but at substantially greater volatility, or risk.

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. Conscious, as we are, of not overly constraining any implementer we recommend a base split of 50/50.

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 November 2015, the MSCI ACWI IMI covered 8,716 large, mid and small cap securities in 46 countries (23 Developed Markets and 23 Emerging Markets). The aggregate weight of the Emerging Markets within the MSCI ACWI IMI was approximately 10%, versus the Developed Markets' weight of approximately 90%.

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 (Lischewski & Voronkovo, Size, value and liquidity. Do They Really Matter on an Emerging Stock Market? Emerging Markets Review, 2012 SAA Appendix 4 (17)). 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, Behavioural Portfolio Analysis of Individual Investors, 2010 SAA Appendix 4 (18)).

Based on its expected return analysis and in line with evidence of higher risk based compensation in Emerging Markets, we recommend a split of 84% Developed Markets and 16% Emerging Markets, which reflects the relatively higher growth rate of Emerging Markets.

Currency Hedging

Due to the [high GR] likelihood of a contingency event coinciding with a negative currency event, it is the policy of the Board to invest all those funds invested in international equities 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 (prepared August 2017, see Appendix 3 of SIPO)

the Meat Board faces a year one exposure of NZD$4,000,000 equivalent of foreign currency spending. In years two and three this total foreign currency spend amounts to a further NZD$20,000,000 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 gross returns before fees and standard deviations for each asset class

	Expected return (% per annum)	Expected standard deviation (%)
New Zealand Cash	4.00	0.59
NZ Fixed Interest	5.80	2.21
International Fixed Interest Hedged to NZD	7.00	2.76
International Fixed Interest Unhedged	5.50	11.57
NZ Property	7.75	9.63
International Property	7.90	17.61
New Zealand Equities	8.50	11.48
Australian Equities	8.00	15.44
International Equities	7.00	12.64
Emerging Markets Equities	9.50	17.03

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.

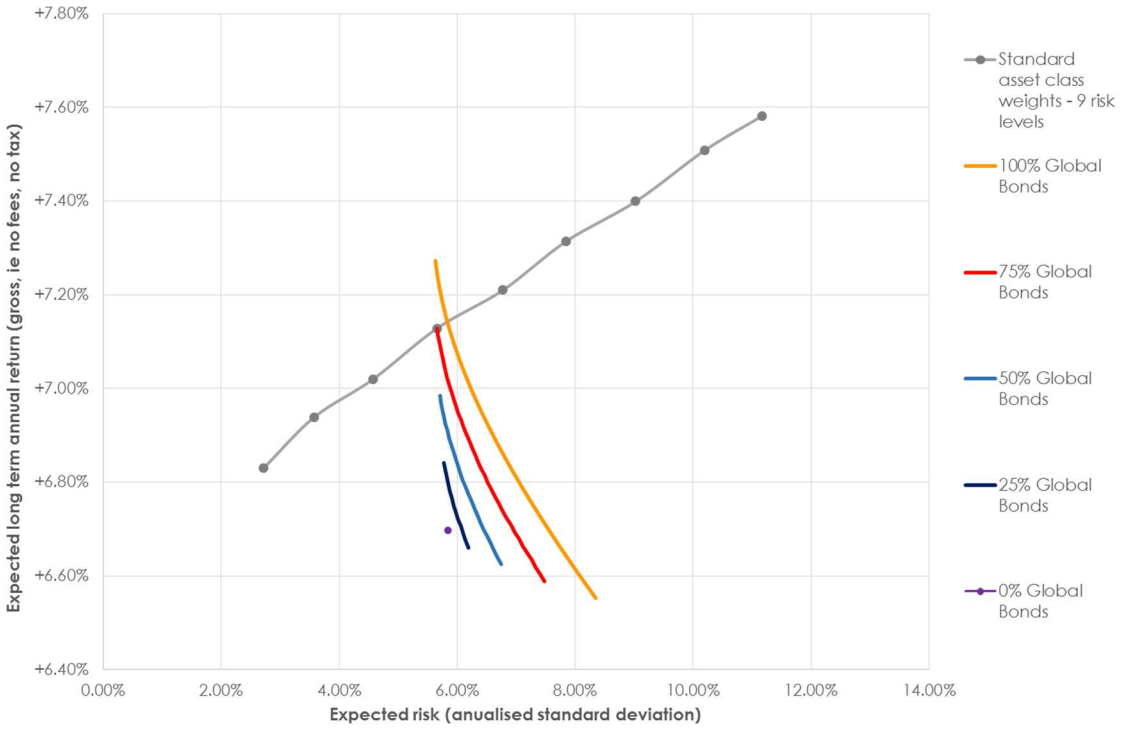
Due to the likelihood of a contingency event coinciding with a negative currency event, it is the policy of the Meat Board to invest all funds invested in international equities and international fixed interest in an unhedged fashion.

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

The chart below 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

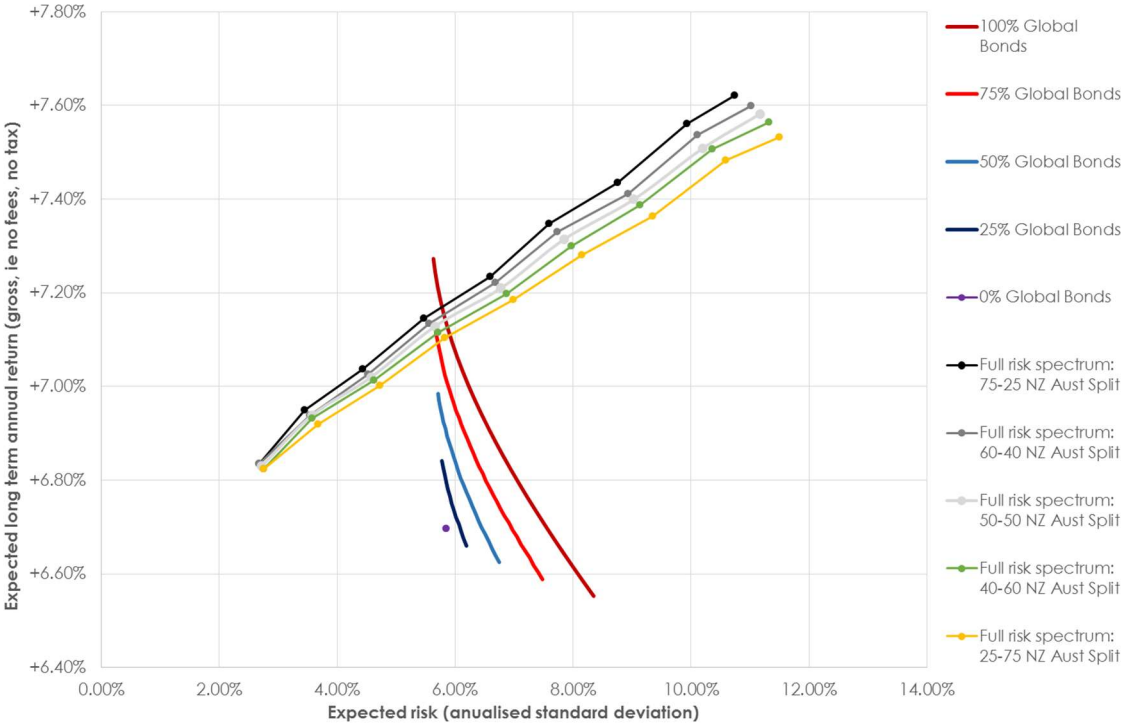
changing the proportion of international fixed interest hedged (the point on the coloured lines with the highest expected return is 100% hedged, the point with the lowest expected return is 0% hedged).



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.

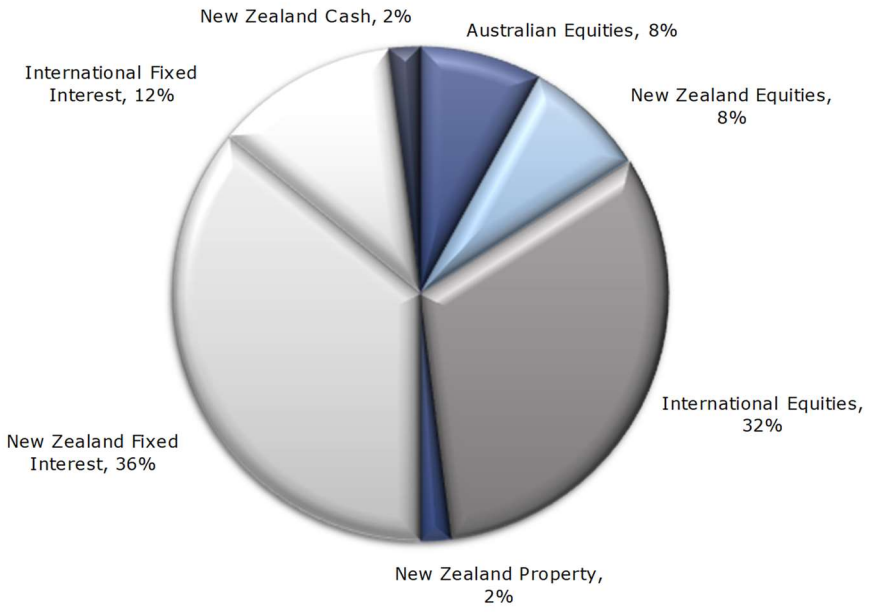
The chart below illustrates this. The dotted lines show various efficient frontiers with differing NZ/Australian equity splits. While NZ higher exposure dominates higher Australian exposure, the quantum of difference in expected returns is not disproportionately high. This is important as it can allow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


+7.80%
+7.60%
+7.40%
+7.20%
+7.00%
+6.80%
+6.60%
+6.40%
Expected long term annual return (gross, ie no fees, no tax)
0.00%
2.00%
4.00%
6.00%
8.00%
10.00%
12.00%
14.00%
Expected risk (anualised standard deviation)
100% Global Bonds
75% Global Bonds
50% Global Bonds
25% Global Bonds
0% Global Bonds
Full risk spectrum: 75-25 NZ Aust Split
Full risk spectrum: 60-40 NZ Aust Split
Full risk spectrum: 50-50 NZ Aust Split
Full risk spectrum: 40-60 NZ Aust Split
Full risk spectrum: 25-75 NZ Aust Split

Strategic Asset Allocation

Target Long Term Asset Allocation 50/50

CATEGORY	TARGET	ASSET CLASSES	TARGET
Australian Equities	8.00%		
		Australian Companies	8.00%
New Zealand Equities	8.00%		
		Listed NZ Companies	8.00%
International Equities	32.00%		
		Global Companies - Large, Value, Small	27.00%
		Emerging Market Companies	5.00%
Property	2.00%		
		Listed Property Companies	2.00%
Fixed Interest	48.00%		
		New Zealand Bonds & Debt Securities	36.00%
		International Bonds (hedged to NZ$)	12.00%
New Zealand Cash	2.00%		
		Cash	2.00%
			100.00%



Rebalancing Limits

Asset Class	Minimum Allowable	Strategic Asset	Maximum Allowable

	Exposure %	Allocation %	Exposure %
New Zealand Equities	6.0%	8.0%	10.0%
Australian Equities	6.0%	8.0%	10.0%
International Equities	22.0%	27.0%	32.0%
Emerging Markets Equities	3.7%	5.0%	6.3%
New Zealand Property	1.0%	1.5%	2.0%
International Property	0.0%	0.5%	1.0%
New Zealand Fixed Interest	31.0%	36.0%	41.0%
International Fixed Interest	9.0%	12.0%	15.0%
New Zealand Cash	1.5%	2.0%	2.5%
Total		**100%**	

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%).

Appendix – Data and Analysis

Appendix 1 – KiwiSaver data

Balanced KiwiSaver Fund Analysis, June 2015

Top 9 Funds (accounting for 94.1% of all Balanced Kiwisaver investments surveyed)

	AMP Balanced	AMP Moderate Balanced	ANZ Balanced	ASB Balanced	Fisher TWO Balanced	Grosvenor Balanced	KiwiWealth Balanced	OneAnswer Balanced	Westpac Balanced	Average $ weighted Allocation	Ratio Australasian to International
New Zealand Shares	7.6%	6.1%	5.2%	9.9%	12.7%	7.6%	0.0%	5.2%	17.3%	7.7%	26.3%
Australian Shares	7.6%	6.1%	5.9%	10.0%	5.4%	8.1%	0.0%	5.9%	1.4%	5.0%	
International Equities	39.8%	33.1%	32.4%	32.9%	25.2%	35.7%	49.4%	32.4%	28.9%	35.4%	73.7%
NZ Listed Property	1.5%	1.5%	3.9%	0.0%	0.0%	2.2%	0.0%	3.9%	3.7%	1.9%	
International Listed Property	4.3%	4.3%	3.9%	7.0%	0.0%	2.2%	0.0%	3.9%	0.0%	2.7%	
Unlisted Property	1.4%	1.4%	0.0%	0.0%	9.9%	0.0%	0.0%	0.0%	0.0%	1.1%	
New Zealand Fixed Interest	12.1%	14.8%	9.6%	16.9%	21.8%	13.2%	15.2%	9.6%	14.3%	13.9%	43.1%
International Fixed Interest	12.0%	14.8%	23.2%	16.0%	13.1%	22.2%	18.9%	23.2%	19.3%	18.3%	56.9%
Cash	13.7%	17.8%	16.0%	7.4%	12.0%	8.9%	13.7%	16.0%	7.8%	12.6%	
Other	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2.8%	0.0%	7.3%	1.5%	
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	
Total Balanced Kiwisaver AUM June 2015										6028	
Fund AUM June 2012 ($m)	626.8	404.7	1070.8	664.7	460.9	289.6	986.3	347.3	819.1	5670.2	
Share of Total Balanced Assets	10.4%	6.7%	17.8%	11.0%	7.6%	4.8%	16.4%	5.8%	13.6%	94.1%	

Appendix 2 – Risk Premia Sensitivity Analysis

Market, and other, risk premia are subject to uncertainty and variability.

However, the variability of risk premia is embedded in the standard deviations of the indices (observed). We should expect the premia to vary from year to year and standard deviations reflect that. As portfolio volatility is a function of underlying fund volatility, the variability in the premia has already been captured when estimating portfolio volatility.

Returns are delivered in a dynamic global marketplace where we expect certain risk premia will beat expectations at the same time as other risk premia fall short. We would also expect that, over time, these "overs and unders" will be likely to at least partially offset each other.

As we have return series for each premia we can evaluate the respective volatilities of each premia. The October 2002 to September 2015 annualised volatility for each premia is summarised below:

Standard deviation of risk premia for selected markets for one-year periods

	Risk Free Rate	Market Factor
New Zealand	0.64%	11.59%
Australia	0.36%	13.12%
Developed Markets	0.49%	15.42%
Emerging Markets	0.24%	22.27%

This level of single year volatility is to be broadly expected. However, as we are investing for the long term, a more relevant analysis should consider the potential premia volatility over the long term.

The following table summarises the annualised volatility of a 20 year return period.

Standard deviation of risk premia for selected markets for 20-year periods

	Risk Free Rate	Market Factor
New Zealand	0.14%	2.59%
Australia	0.08%	2.93%
Developed Markets	0.11%	3.45%
Emerging Markets	0.05%	4.98%

These volatilities can now be considered in conjunction with the expected premiums, to establish a confidence interval for the long term variability in our estimated premia.

Appendix 3 – Standard deviation and correlation assumptions

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

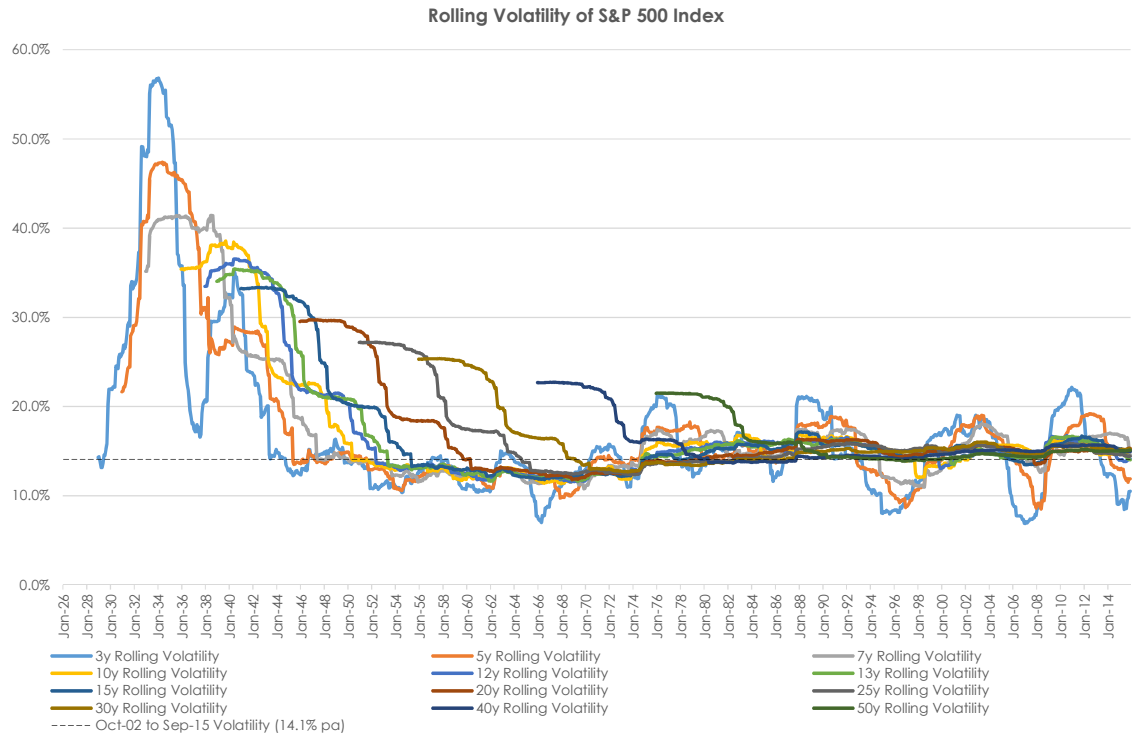
To evaluate market risk we utilise volatility as measured by annualised standard deviation. Assuming that the returns are normally distributed, when we combine standard deviation with expected returns, we can begin to build a more complete expectation of future returns. These are not just based on average 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:

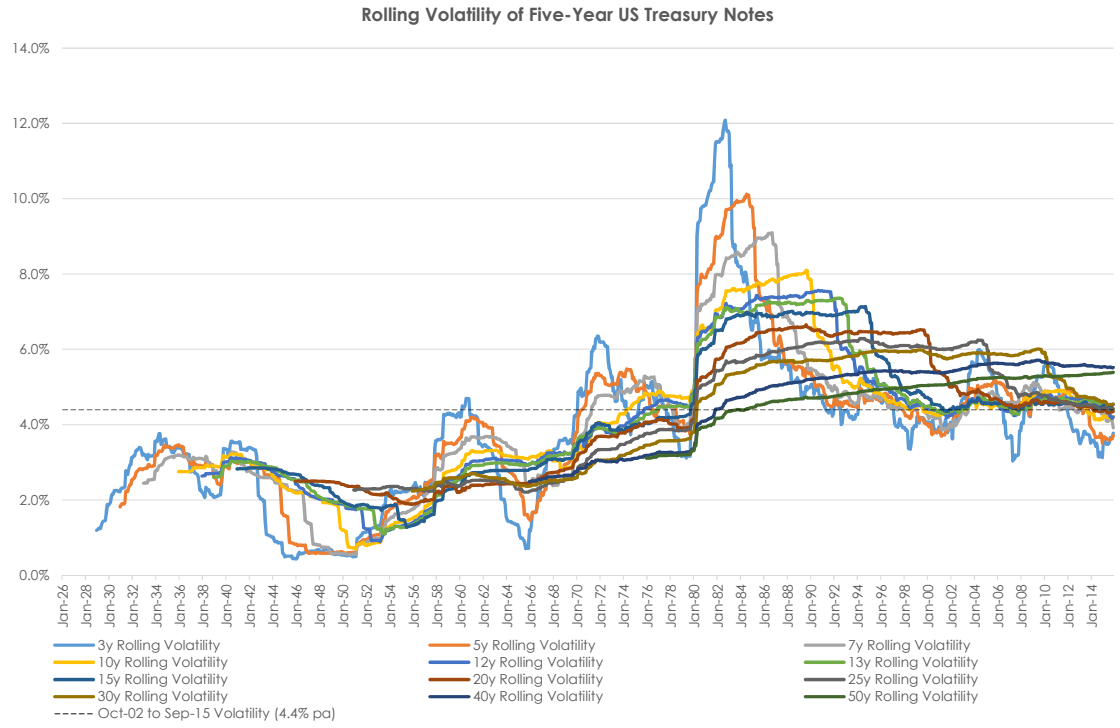
1) *Availability of data* – not all indices have long actual track records. Index returns have varying inception dates.
2) *Cross section of market environments* - in order to get a fair representation of the potential outcomes of a market, we need to include periods of both good and bad performance. 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.

Rolling Volatility of US Stocks and Bonds since the Great Depression



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.

Calculation of portfolio market risk

The expected return of portfolios is relatively simple to calculate. It is the expected return multiplied by weight in the portfolio.

Volatility is similar, but somewhat more complicated. Portfolio volatility is calculated by summing the products of asset weights multiplied by the covariances between the assets. The mathematical equation for this is as follows:

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

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.

We have asset volatilities but also need a measure of the assets' cross correlations.

For consistency we again use the October 2002 to September 2015 analysis period.

Correlation measures the extent to which two different assets (funds) move in response to the same market conditions. 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 a low positive provide the best diversification benefits when combined in portfolios as these assets will be expected to perform differently in the same market conditions.

SAA Appendix 4: References]

Abstracts Listed where available

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

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

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

(4) 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.

(5) 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.

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.

(6) 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.

(7) S & P Persistence Report January 2016

https://us.spindices.com/documents/spiva/persistence-scorecard-december-2017.pdf?force_download=true

(8) 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.

(9) 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.

(10) 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.

(11) **Dimson, Marsh and Staunton** missing Pg 65 SAA

(12) Damodaran, Aswath, Equity Risk Premiums (ERP): Determinants, Estimation and Implications – The 2015 Edition (March 14, 2015).

(13) 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.

(14) 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.

(15) 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.

(16) 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

(17) 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.

(18) 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.

APPENDIX 4: 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.

APPENDIX 5: AUTHORISED INVESTMENT CRITERIA – INTERNATIONAL FIXED INTEREST

Authorised Asset Classes	Overall Limit as a Percentage of the Total Portfolio	Approved Financial Market Investment Instruments	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 NZD$ equivalent
Government Stock	100%	* Government Stock * Treasury Bills	Long term S&P rating of AA or better	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
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] http://www.rbnz.govt.nz/research_and_publications/speeches/1996/0041771.html
[ii] https://www.rbnz.govt.nz/monetary-policy/inflation-calculator
[iii] Damodaran, Aswath, Equity Risk Premiums (ERP): Determinants, Estimation and Implications – The 2015 Edition (March 14, 2015)