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Bachelor of Commerce (B2001) | Level 3 • Part B Major | Monash University

Investments

Course Code: BFC3241 • Module 4 Notes

Module 4: Market Efficiency, Behavioural Finance, Portfolio Performance Evaluation & Superannuation Funds

4.1 The Efficient Market Hypothesis (EMH) and Event Studies

In an **informationally efficient market**, security prices rapidly, fully, and unbiasedly reflect all relevant available information. Eugene Fama (1970) formalised the **Efficient Market Hypothesis (EMH)** around the principle that security prices respond immediately only to *unexpected* new information—because news, by definition, is unpredictable, successive price changes must be statistically independent and follow a **random walk** (or a submartingale with positive expected drift reflecting the risk premium). Paul Samuelson (1965) proved mathematically that in competitive markets populated by rational profit-maximisers, properly anticipated prices fluctuate randomly.

Sanford Grossman and Joseph Stiglitz (1980), however, identified an important equilibrium boundary—the **Grossman-Stiglitz Paradox**: if market prices reflected all information costlessly and instantaneously, no investor would incur research expenses to gather and analyse fundamental data; yet if nobody conducts research, prices cannot become informative. Consequently, markets in real-world equilibrium exhibit an efficient degree of informational friction: informed active analysts must earn just enough gross alpha to cover the marginal cost of information acquisition and trading.

Three Forms of Market Efficiency and Australian Regulation

Fama classified market efficiency into three nested information sets, each carrying testable predictions and distinct implications for Australian equity markets:

EMH Form	Information Set Reflected in Prices	Implications for Trading Strategies	Australian Empirical & Institutional Evidence
Weak Form	All past market trading data (historical prices, trading volume, short interest)	Technical analysis, chart patterns, and filter rules cannot earn positive risk-adjusted excess returns net of costs	Daily ASX 200 serial correlations are near zero; medium-term momentum anomalies remain small after brokerage & bid-ask spreads
Semi-Strong Form	All publicly available information (past prices plus financial reports, RBA decisions, ASX announcements)	Fundamental analysis of public filings cannot systematically beat the market once risk is priced	ASX Listing Rule 3.1 continuous disclosure triggers immediate price adjustments within minutes; minor post-earnings drift exists in small caps
Strong Form	All public and private (non-public insider) information	Even corporate insiders with privileged access cannot earn abnormal profits	Rejected empirically where insiders trade; strictly illegal in Australia under *Corporations Act 2001 (Cth)* s 1043A

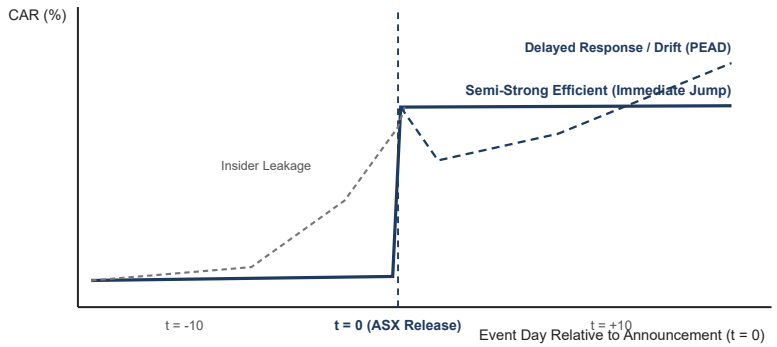
Event Study Methodology

Empirical tests of semi-strong efficiency rely heavily on **event studies**, which measure how rapidly and accurately share prices incorporate discrete corporate announcements (earnings surprises, dividend changes, M&A bids, or capital raisings). Over an estimation window prior to the event (e.g., trading days $t = -180$ to $t = -31$), the analyst estimates a stock's normal return benchmark via the Market Model: $R_{it} = \hat{\alpha}_i + \hat{\beta}_i R_{mt}$. Across the event window surrounding announcement day $t = 0$, daily **Abnormal Returns (AR_{it})** and **Cumulative Abnormal Returns (CAR_i)** are computed as:

$$AR_{it} = R_{it} - (\hat{\alpha}_i + \hat{\beta}_i R_{mt}), \qquad \mathrm{CAR}_i(t_1, t_2) = \sum_{t=t_1}^{t_2} AR_{it}$$

Where: R_{it} is stock i's realised return on event day t; R_{mt} is the S&P/ASX 200 benchmark return on day t; $\hat{\alpha}_i$ and $\hat{\beta}_i$ are pre-event market model parameters; and $\mathrm{CAR}_i(t_1, t_2)$ sums abnormal returns from day t_1 through day t_2.

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Worked Example 1: Event Study Abnormal Returns on an ASX Earnings Surprise

An ASX 100 retailer has pre-event market model parameters $\hat{\alpha} = 0.02\%$ per day and $\hat{\beta} = 1.10$. On trading day $t = 0$, management releases an unscheduled ASX Listing Rule 3.1 earnings upgrade. Realised daily returns for the stock and the S&P/ASX 200 across days $t = -1, 0, +1, +2$ are tabulated below. Compute daily abnormal returns and the 4-day Cumulative Abnormal Return $\text{CAR}(-1, +2)$.

Event Day (t)	Stock Return (R_{it})	ASX 200 Return (R_{mt})	Expected Normal Return ($\hat{\alpha} + \hat{\beta}R_{mt}$)	Abnormal Return (AR_{it})	Cumulative AR (CAR)
$t = -1$	+0.45%	+0.30%	$0.02\% + 1.10(0.30\%) = +0.35\%$	+0.10%	+0.10%
$t = 0$ (Announcement)	+7.82%	+0.50%	$0.02\% + 1.10(0.50\%) = +0.57\%$	+7.25%	+7.35%
$t = +1$	-0.25%	-0.20%	$0.02\% + 1.10(-0.20\%) = -0.20\%$	-0.05%	+7.30%
$t = +2$	+0.52%	+0.40%	$0.02\% + 1.10(0.40\%) = +0.46\%$	+0.06%	+7.36%

The abnormal return is concentrated almost entirely on day $t = 0$ (+7.25%), with negligible drift on days $t = +1$ and $t = +2$ (+0.01% combined), demonstrating rapid semi-strong price adjustment under ASX continuous disclosure rules.

The Joint Hypothesis Problem and Mutual Fund Performance Persistence

Testing semi-strong market efficiency confronts a fundamental methodological obstacle identified by Eugene Fama (1991) as the **Joint Hypothesis Problem**: any test of abnormal returns simultaneously tests (1) whether the market incorporates public information efficiently, and (2) whether the researcher's chosen equilibrium pricing model (such as CAPM or Fama-French 5-Factor) correctly specifies normal expected returns. Apparent "abnormal returns" following an announcement or strategy may therefore reflect omitted risk factors—such as illiquidity, distress, or crash risk—rather than true market inefficiency.

A complementary, model-free test of semi-strong efficiency examines whether professional active fund managers consistently outperform passive index benchmarks net of fees. Across global and Australian studies, the average active equity fund underperforms passive benchmarks roughly by the magnitude of its management and trading fees. While top-decile managers sometimes exhibit short-term persistence over 1-year horizons, Mark Carhart (1997) demonstrated that this persistence is largely explained by momentum exposure and low expense ratios rather than repeatable stock-picking skill—reinforcing Jonathan Berk and Richard Green's (2004) equilibrium insight that investor capital flows into outperforming funds until diseconomies of scale erode net alpha back to zero.

4.2 Behavioural Finance, Prospect Theory, and Limits to Arbitrage

Traditional finance assumes investors update beliefs according to Bayes' rule and evaluate gambles via expected utility of terminal wealth. **Behavioural finance** relaxes both assumptions, documenting systematic psychological patterns that distort asset prices when arbitrage is constrained.

Information-Processing Errors and Behavioural Biases

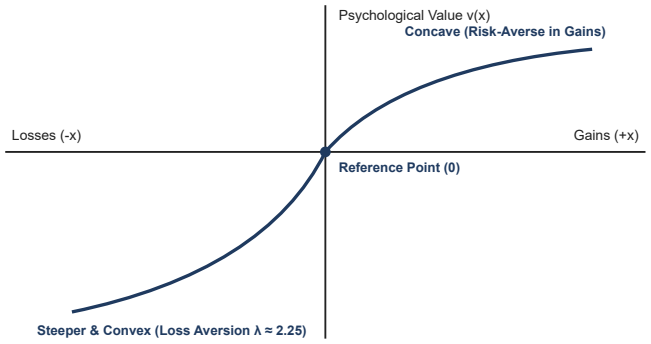
- **Overconfidence and Self-Attribution Bias:** Investors overestimate the precision of their private forecasts and attribute past successes to skill while blaming bad luck for losses, generating excessive portfolio turnover and under-diversification.

- **Representativeness and Sample-Size Neglect:** Investors extrapolate short streaks of strong corporate earnings or recent fund outperformance too far into the future, overpricing glamour growth shares and ignoring regression to the mean.
- **Conservatism Bias:** Conversely, when confronted with unfamiliar structural shifts (such as sudden earnings turnarounds), analysts update priors too slowly, producing *Post-Earnings Announcement Drift (PEAD)*.
- **Disposition Effect and Mental Accounting:** Investors segregate positions into separate "mental accounts" and exhibit a strong tendency to sell winning stocks too early (to lock in pride) while holding losing stocks too long (to avoid realising regret), directly contradicting tax-loss harvesting optimality.
- **Home Bias:** Australian retail and superannuation investors historically allocate 35%–50% of their equity portfolios to domestic ASX shares despite Australia representing roughly 2% of global equity market capitalisation—driven by familiarity, currency comfort, and domestic franking credit tax incentives.

Prospect Theory (Kahneman and Tversky, 1979)

Daniel Kahneman and Amos Tversky demonstrated through experimental choices that individuals evaluate outcomes not by final wealth levels, but as *gains and losses relative to a reference point* (typically purchase price), governed by an S-shaped **value function** $v(x)$:

- **Concave Over Gains ($x > 0$):** Reflects risk aversion in the domain of gains (investors prefer a sure \$5,000 gain over a 50/50 gamble for \$10,000 or \$0).
- **Convex Over Losses ($x < 0$):** Reflects risk-seeking behaviour in the domain of losses (investors gamble to avoid locking in a sure loss).
- **Loss Aversion ($\lambda \approx 2.25$):** The value curve is roughly twice as steep for losses as for equivalent-sized gains—meaning a \$1,000 loss inflicts roughly 2.25 times the psychological pain that a \$1,000 gain provides in pleasure, helping explain the high historical *equity premium puzzle* and myopic loss aversion.



Worked Example 1A: Prospect Theory Loss Aversion and Myopic Portfolio Choice

Kahneman and Tversky parameterised the S-shaped Prospect Theory value function as $v(x) = x^{0.88}$ for gains ($x \geq 0$) and $v(x) = -\lambda(-x)^{0.88}$ for losses ($x < 0$) with loss-aversion coefficient $\lambda = 2.25$. Suppose an investor is offered a 50/50 investment opportunity that either gains \$10,000 or loses \$6,000.

1. **Evaluate the expected monetary payoff:**

$$E(\text{Payoff}) = 0.50(+\$10,000) + 0.50(-\$6,000) = +\$2,000$$

2. **Evaluate the Prospect Theory psychological value (assuming linear 0.50 decision weights):**

$$v(+10,000) = (10,000)^{0.88} = 3,311.31, \qquad v(-6,000) = -2.25 \times (6,000)^{0.88} = -2.25(2,112.39) = -4,752.88$$

$$V(\text{Gamble}) = 0.50(3,311.31) + 0.50(-4,752.88) = 1,655.66 - 2,376.44 = -720.78 < 0$$

Despite an expected profit of +\$2,000, the loss-averse investor rejects the opportunity. When investors evaluate equity portfolios too frequently (**myopic loss aversion**), routine short-term drawdowns appear psychologically painful, explaining why long-horizon investors excessively favour cash over equities.

Limits to Arbitrage

Even when behavioural biases push prices away from fundamental value, rational arbitrageurs cannot always eliminate mispricing immediately because real-world arbitrage is risky and capital-constrained:

- **Fundamental Risk:** No perfect substitute exists for most mispriced equities; shorting an overvalued ASX tech stock while buying a peer exposes the arbitrageur to firm-specific earnings shocks.
- **Implementation and Short-Sale Costs:** Borrow fees, dividend reimbursement, recall risk, and bid-ask spreads can exceed small valuation gaps, especially in illiquid small-cap shares.
- **Noise Trader Risk (De Long et al., 1990):** Irrational sentiment can worsen before converging to fundamental value. Because institutional arbitrageurs manage redeemable client capital and face margin calls, widening temporary losses can force liquidation at the exact peak of mispricing.
- **Twin-Share / Dual-Listed Company (DLC) Anomalies:** Prior to corporate unification (such as BHP's DLC unification in 2022 and Rio Tinto's persistent Ltd/Plc spread), legally identical claims to the same underlying cash flows traded in Sydney and London at persistent 10%–20% spreads—demonstrating how segmented investor clienteles, franking-credit tax asymmetries, and index inclusion rules impede textbook arbitrage.

4.3 Portfolio Performance Evaluation and Attribution Analysis

Evaluating whether an active fund manager added value beyond passive market exposure requires adjusting returns for systematic risk, total volatility, and active tracking error. Five canonical performance ratios serve distinct analytical roles:

$$S_P = \frac{\bar{r}_P - \bar{r}_f}{\sigma_P}, \qquad T_P = \frac{\bar{r}_P - \bar{r}_f}{\beta_P}, \qquad \alpha_P = \bar{r}_P - [\bar{r}_f + \beta_P(\bar{r}_M - \bar{r}_f)]$$

$$M^2 = (\bar{r}_f + S_P\sigma_M) - \bar{r}_M = (S_P - S_M)\sigma_M, \qquad IR_P = \frac{\alpha_P}{\sigma(e_P)}$$

Where: $\bar{r}_P$, $\bar{r}_M$, and $\bar{r}_f$ are average portfolio, market benchmark, and risk-free returns; σ_P and σ_M are total standard deviations; β_P is portfolio beta; α_P is Jensen's alpha; M^2 (Modigliani-squared) expresses risk-adjusted excess return in basis points or percent by levering/delevering P to match σ_M; and IR_P is the Information Ratio dividing active alpha by tracking error $\sigma(e_P)$.

Metric	Risk Denominator	Appropriate Evaluation Context
Sharpe Ratio (S_P) & M^2	Total volatility (σ_P)	Evaluating a standalone or complete risky portfolio (entire risky allocation)
Treynor Ratio (T_P) & Jensen's α_P	Systematic beta (β_P)	Evaluating an individual sub-portfolio or sleeve combined inside a well-diversified multi-manager fund
Information Ratio (IR_P)	Unsystematic tracking error ($\sigma(e_P)$)	Evaluating an active satellite manager blended alongside a passive core benchmark under Treynor-Black

Market Timing Models

Skillful managers may add value either through *security selection* ($\alpha_P > 0$) or through *market timing*—increasing portfolio beta before bull markets and cutting beta before downturns. Because simple linear regression estimates a constant average beta, timing ability creates convexity in the characteristic line. Two econometric regressions detect timing skill:

- **Treynor-Mazuy (1966) Quadratic Model:** $R_{P,t} = \alpha_P + \beta_P R_{M,t} + \gamma_P R_{M,t}^2 + e_{P,t}$. A statistically significant positive $\gamma_P > 0$ indicates upward curvature and successful market timing.
- **Henriksson-Merton (1981) Option-Like Model:** $R_{P,t} = \alpha_P + \beta_P R_{M,t} + \gamma_P \max(0, R_{M,t}) + e_{P,t}$, modelling timing as holding a free call option on the market index. Under this specification, the manager operates at a lower defensive beta β_P during down markets ($R_{M,t} \leq 0$) and steps up to a higher bullish beta $\beta_P + \gamma_P$ during up markets ($R_{M,t} > 0$).

Worked Example 2A: Interpreting Henriksson-Merton Timing Regression

Suppose a dynamic Australian tactical asset allocation fund is regressed over 60 months against S&P/ASX 200 excess returns using the Henriksson-Merton specification, yielding $\hat{\alpha} = +0.12\%$ per month ($t = 1.15$), $\hat{\beta} = 0.72$, and $\hat{\gamma} = +0.38$ ($t = 2.65$). In down-market months ($R_{M,t} = -5.00\%$), the fund's expected excess return is $0.12\% + 0.72(-5.00\%) = -3.48\%$ (defensive 0.72 beta),

whereas in up-market months ($R_{M,t} = +5.00\%$), its beta expands to $0.72 + 0.38 = 1.10$, delivering $0.12\% + 1.10(5.00\%) = +5.62\%$. Because $\hat{\gamma} = +0.38$ is statistically significant ($t > 2.0$), the manager demonstrates genuine tactical market-timing skill rather than pure stock-picking alpha ($\hat{\alpha}$ is statistically insignificant).

Return-Based Style Analysis and GIPS Compliance

To detect covert *style drift*—such as an Australian large-cap value manager quietly loading up on small-cap growth stocks to chase recent returns—asset consultants apply **William Sharpe's (1992) Return-Based Style Analysis (RBSA)**. RBSA regresses a fund's historical returns against passive style indices (e.g., ASX 100 Value, ASX 100 Growth, ASX Small Ordinaries, and Cash) with weights constrained to be non-negative and sum to 100%, isolating the fraction of variance driven by passive style exposure (R^2) versus active security selection ($1 - R^2$). Furthermore, institutional mandates require compliance with the **Global Investment Performance Standards (GIPS)**, which mandate asset-weighted composite reporting of all fee-paying discretionary accounts, Time-Weighted Rates of Return (TWRR), and full inclusion of terminated accounts to eliminate survivorship distortion.

Worked Example 2: Multi-Metric Evaluation of Three Australian Equity Managers

Over a 5-year period, the S&P/ASX 200 index earned $\bar{r}_M = 10.00\%$ p.a. with $\sigma_M = 15.00\%$ ($\beta_M = 1.00$), and the risk-free rate averaged $\bar{r}_f = 3.50\%$ p.a. (Market Sharpe $S_M = (10.00\% - 3.50\%)/15.00\% = 0.4333$). Three active Australian equity managers achieved the statistics below. Evaluate their risk-adjusted performance.

Manager	$\bar{r}_P$	σ_P	β_P	$\sigma(e_P)$	Sharpe (S_P)	Treynor (T_P)	Jensen's α_P	M^2	Info Ratio (IR_P)
Manager A (Core)	11.90%	16.00%	1.05	3.50%	0.5250	8.00%	+1.575%	+1.375%	0.450
Manager B (Concentrated)	13.60%	22.00%	1.25	9.00%	0.4591	8.08%	+1.975%	+0.386%	0.219
Manager C (Defensive)	9.20%	12.00%	0.75	4.00%	0.4750	7.60%	+0.825%	+0.625%	0.206

Verification for Manager A: $S_A = \frac{11.90-3.50}{16.00} = 0.5250$; $T_A = \frac{8.40\%}{1.05} = 8.00\%$; $\alpha_A = 11.90\% - [3.50\% + 1.05(6.50\%)] = 11.90\% - 10.325\% = +1.575\%$; $M^2_A = (0.5250 - 0.4333) \times 15.00\% = +1.375\%$; $IR_A = 1.575\%/3.50\% = 0.450$. Notice that if selected as the *sole* risky portfolio or active satellite alongside an index core, Manager A dominates due to the highest Sharpe ratio (0.5250), M^2 (+1.375%), and Information Ratio (0.450). Manager B generated the highest raw alpha (+1.975%) and Treynor ratio (8.08%), making B attractive only as one small Diversified sub-sleeve where idiosyncratic risk $\sigma(e_B) = 9.00\%$ is diluted away.

Brinson-Fachler Performance Attribution Analysis

Superannuation investment committees decompose active portfolio return relative to the benchmark ($R_P - R_B$) into sector allocation decisions versus security selection skill using the **Brinson-Hood-Beebower (BHB)** and **Brinson-Fachler** attribution framework across asset classes or GICS equity sectors $i = 1, \ldots, N$:

$$R_P - R_B = \underbrace{\sum_{i=1}^{N} (w_{P,i} - w_{B,i})(r_{B,i} - R_B)}_{\text{Allocation Effect } (A_i)} + \underbrace{\sum_{i=1}^{N} w_{B,i}(r_{P,i} - r_{B,i})}_{\text{Selection Effect } (S_i)} + \underbrace{\sum_{i=1}^{N} (w_{P,i} - w_{B,i})(r_{P,i} - r_{B,i})}_{\text{Interaction Effect } (I_i)}$$

Where: $w_{P,i}$ and $w_{B,i}$ are portfolio and benchmark weights in sector i; $r_{P,i}$ and $r_{B,i}$ are portfolio and benchmark returns within sector i; and $R_B = \sum w_{B,i} r_{B,i}$ is the total benchmark return. In Brinson-Fachler allocation, overweighting a sector adds positive value only if that sector outperforms the overall benchmark ($r_{B,i} > R_B$), and underweighting adds value if $r_{B,i} < R_B$.

Worked Example 3: 3-Sector Brinson-Fachler Attribution Against S&P/ASX 200

An active Australian equity fund reports an annual return of $R_P = 11.75\%$ versus $R_B = 9.90\%$ for a 3-sector S&P/ASX 200 benchmark—an active outperformance of +1.85% (+185 bps). Decompose this active return using the sector weights and returns below.

ASX Sector	$w_{P,i}$	$w_{B,i}$	$r_{P,i}$	$r_{B,i}$	Allocation A_i	Selection S_i	Interaction I_i	Total Active
Financials	20.0%	30.0%	9.50%	8.00%	$(-0.10)(-1.90\%) = +0.19\%$	$0.30(+1.50\%) = +0.45\%$	$(-0.10)(+1.50\%) = -0.15\%$	+0.49%

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ASX Sector	$w_{P,i}$	$w_{B,i}$	$r_{P,i}$	$r_{B,i}$	Allocation A_i	Selection S_i	Interaction I_i	Total Active
Materials	35.0%	25.0%	14.00%	12.00%	$(+0.10)(+2.10\%) = +0.21\%$	$0.25(+2.00\%) = +0.50\%$	$(+0.10)(+2.00\%) = +0.20\%$	+0.91%
Healthcare & Other	45.0%	45.0%	11.00%	10.00%	$(0.00)(+0.10\%) = 0.00\%$	$0.45(+1.00\%) = +0.45\%$	$(0.00)(+1.00\%) = 0.00\%$	+0.45%
Total	**100%**	**100%**	**11.75%**	**9.90%**	**+0.40%**	**+1.40%**	**+0.05%**	**+1.85%**

The manager added +40 bps from top-down sector allocation (underweighting lagging Financials and overweighting outperforming Materials), +140 bps from bottom-up stock picking across all three sectors, and +5 bps from positive interaction (overweighting Materials where stock-picking alpha was highest at +2.00%).

4.4 Hedge Funds and the CFA Institute Code of Ethics & Standards

Hedge funds are lightly regulated private investment partnerships available primarily to wholesale, institutional, and sophisticated investors (as defined under s 708 of the *Corporations Act 2001 (Cth)*). Unlike traditional long-only managed funds, hedge funds deploy short selling, financial leverage, derivatives, and illiquid credit to target absolute returns with low correlation to broad equity indices. Core strategies include *long/short equity*, *equity market neutral*, *merger (risk) arbitrage*, *convertible bond arbitrage*, *global macro*, and *managed futures (CTAs)*.

Hedge fund performance databases suffer from severe statistical biases that inflate apparent historical returns: **survivorship bias** (failed funds stop reporting and drop out of databases), **backfill (instant-history) bias** (managers report historical track records only after an initial incubation period succeeds), and **stale-price smoothing** in illiquid holdings, which artificially depresses measured volatility and inflates Sharpe ratios. Moreover, investors face redemption lock-up periods and withdrawal "gates" during market stress.

Hedge Fund Strategy	Core Trade Construction	Primary Risk & Factor Exposures
Long / Short Equity	Buy undervalued equities and short-sell overvalued peers; typically net long bias ($\beta \approx 0.3$–0.6)	Equity market beta, factor tilts (value/momentum), short-squeeze risk
Equity Market Neutral	Dollar- and beta-matched long/short pairs within sectors targeting zero net market exposure ($\beta \approx 0$)	Idiosyncratic stock risk, leverage amplification, liquidity crunches
Merger (Risk) Arbitrage	Buy target company shares and short-sell acquirer shares after an announced M&A bid	Deal-break / regulatory (ACCC/FIRB) risk; asymmetric negative skewness
Convertible Arbitrage	Buy underpriced convertible bonds while delta-hedging by shorting the underlying equity	Credit spread widening, equity borrow recalls, volatility shifts
Global Macro & CTAs	Directional positions in sovereign bonds, FX (AUD/USD), commodities, and equity index futures	Macro policy surprises, trend-reversal whipsaws, high margin leverage

Hedge Fund Fee Mechanics: "2 and 20", High-Water Marks, and Hurdle Rates

Hedge funds typically charge an asymmetric fee structure combining an asset-based management fee (historically 1.5%–2.0% of AUM) with an incentive (performance) fee (15%–20% of profits). To align incentives and prevent investors from paying performance fees twice on the same recovered capital, institutional mandates incorporate two protective clauses:

- **High-Water Mark (HWM):** The highest historical net asset value (NAV) per unit previously achieved by the fund; performance fees apply solely to net gains exceeding the prior HWM.
- **Hurdle Rate:** A minimum return threshold (e.g., RBA cash rate or 5.0% p.a.) that must be exceeded before incentive fees accrue. Under a *hard hurdle*, the incentive fee applies only to gains *above* the hurdle, whereas under a *soft hurdle*, once return exceeds the hurdle, the fee applies to the entire gain above the HWM.

Worked Example 4: Hedge Fund Incentive Fee with High-Water Mark

An Australian long/short equity hedge fund launches with a High-Water Mark of $104.0 million after a prior drawdown, and currently manages $100.0 million at the start of Year 1. The fund charges a 2.0% annual management fee (assessed on beginning-of-year AUM) and a 20.0% incentive fee on net gains above the HWM. During Year 1, the fund generates a gross return of +12.0%, lifting pre-fee AUM to $112.0 million.

1. **Deduct the 2.0% management fee:** $\$100.0\text{M} \times 2.0\% = \$2.0\text{M}$, leaving post-management AUM of $\$112.0\text{M} - \$2.0\text{M} = \$110.0\text{M}$.
2. **Calculate the 20.0% incentive fee above the $104.0 million HWM:**

$$\text{Fee-Eligible Gain} = \$110.0\text{M} - \$104.0\text{M} = \$6.0\text{M}, \qquad \text{Incentive Fee} = 0.20 \times \$6.0\text{M} = \$1.2\text{M}$$

3. **Determine ending net AUM, total fees, and investor net return:**

$$\text{Ending Net AUM} = \$110.0\text{M} - \$1.2\text{M} = \$108.8\text{M}, \qquad r_{\text{net}} = \frac{\$108.8\text{M} - \$100.0\text{M}}{\$100.0\text{M}} = +8.80\%$$

Total fees equal $3.2 million (3.20% drag on beginning AUM), and the fund's new High-Water Mark resets to $108.8 million entering Year 2.

CFA Institute Code of Ethics and Standards of Professional Conduct

Because asymmetric fees, confidential corporate access, and complex financial products create acute agency temptations, global and Australian investment professionals adhere to the **CFA Institute Code of Ethics and Standards of Professional Conduct** alongside statutory obligations under Australia's Financial Planners and Advisers Code of Ethics (Corporations Act s 921E). The CFA Code of Ethics requires members and candidates to act with integrity, competence, diligence, and respect; place the integrity of the investment profession and the interests of clients above personal interests; use reasonable care and exercise independent professional judgment; practice and encourage ethical conduct; promote the integrity and viability of global capital markets; and maintain and improve professional competence.

CFA Standard	Core Obligations	Practical Australian Investment Application
I. Professionalism	Knowledge of the law; independence and objectivity; misrepresentation; misconduct	Comply with stricter of local Australian law (ASIC/*Corporations Act*) or CFA Code; reject corporate issuer gifts/hospitality that compromise analyst independence
II. Integrity of Capital Markets	Material Nonpublic Information (MNPI); market manipulation	Never trade or cause others to trade on non-public ASX price-sensitive news (*Corporations Act* s 1043A); prohibit wash trades, spoofing, or false rumour dissemination
III. Duties to Clients	Loyalty, prudence, and care; fair dealing; suitability; performance presentation; confidentiality	Allocate oversubscribed ASX IPOs or placements pro-rata across client mandates; ensure recommendations fit client Investment Policy Statement (IPS); present GIPS-compliant returns
IV. Duties to Employers	Loyalty; additional compensation arrangements; responsibilities of supervisors	Obtain written employer consent before external paid consulting; maintain robust compliance surveillance over junior analysts and traders
V. Investment Analysis & Actions	Diligence and reasonable basis; communication with clients; record retention	Document quantitative valuation assumptions, distinguish fact from opinion in research reports, and disclose changes in investment process
VI. Conflicts of Interest	Disclosure of conflicts; priority of transactions; referral fees	Execute client orders ahead of personal or proprietary trades (prohibit front-running); disclose equity ownership, investment banking ties, and soft-dollar arrangements
VII. CFA Institute Responsibilities	Conduct as participants; reference to CFA Institute and designations	Protect exam confidentiality and never exaggerate the meaning of the CFA charter (e.g., never claim it guarantees superior returns)

4.5 Australian Superannuation Funds and APRA Investment Governance

Australia's retirement income system rests on three pillars: a means-tested Age Pension, compulsory employer contributions under the **Superannuation Guarantee (SG)**, and voluntary tax-advantaged personal contributions. Holding over A$3.9 trillion in assets, the Australian superannuation sector is one of the largest institutional capital pools globally and dominates domestic equity, fixed-income, and infrastructure ownership. Funds operate across five institutional categories: *Industry funds* (profit-to-member funds historically linked to industry sectors), *Retail funds* (for-profit master trusts operated by wealth institutions and banks), *Public Sector funds*, *Corporate funds*, and *Self-Managed Super Funds (SMSFs)* (regulated by the ATO with up to six members).

Superannuation Segment	Primary Regulator & Governance Model	Typical Portfolio & Fee Structure
Industry Super Funds	APRA; profit-to-member equal-representation or independent trustee boards	Large scale; 20%–35% unlisted infrastructure/property/PE; low-to-moderate MySuper fees
Retail Funds	APRA & ASIC; for-profit corporate trustee owned by banks or wealth platforms	Broad Choice menus of external managed funds and ETFs; platform + investment fees
Public Sector Funds	APRA / state statutory oversight; government employee schemes	Legacy defined-benefit pools alongside modern accumulation options; long investment horizons
Corporate Funds	APRA; employer-sponsored trustee boards (declining share via mergers)	Tailored institutional mandates; many transitioning into large industry/retail master trusts
Self-Managed Super Funds (SMSFs)	ATO (up to 6 members, all members act as trustees/directors)	Direct ASX equities (franked banks/miners), cash, term deposits, and direct property

APRA Prudential Standard SPS 530 and Fiduciary Governance

Registrable Superannuation Entity (RSE) trustees are regulated by APRA under the *Superannuation Industry (Supervision) Act 1993 (Cth)* (SIS Act). Section 52 imposes strict statutory covenants—most notably the **Best Financial Interests Duty (BFID)**, requiring trustees to formulate investment strategies exclusively to maximise members' financial retirement outcomes while managing risk, diversification, liquidity, and tax consequences.

APRA Prudential Standard SPS 530 (Investment Governance) establishes binding operational requirements for RSE boards and investment committees:

- **Strategic Asset Allocation (SAA) vs Tactical Asset Allocation (TAA):** Trustees must establish rigorous, evidence-based investment objectives (typically CPI + target real return over rolling 10-year horizons), construct diversified SAAs across growth and defensive assets, and set tight governance risk budgets around short-term TAA tilts.
- **Liquidity Management and Stress Testing:** Trustees must maintain comprehensive Liquidity Management Plans capable of meeting daily member switching, pension drawdowns, FX derivative margin calls (during AUD depreciation), and emergency capital outflows without forced fire-sales of illiquid holdings—a core lesson reinforced by Australia's 2020 COVID-19 Early Release Scheme.
- **Unlisted Asset Valuation Governance:** Large industry superannuation funds hold substantial allocations (20%–35%) to unlisted infrastructure, private equity, and direct commercial property. SPS 530 mandates independent valuation policies, timely out-of-cycle revaluations during macro shocks, and clear board accountability to prevent "stale pricing" from distorting daily unit pricing equity between entering, switching, and exiting members.
- **Your Future, Your Super (YFYS) Annual Performance Test:** Administered by APRA under the SIS Act, the annual YFYS test compares each MySuper (and designated Trustee-Directed Choice) option's actual 8-year (extending to 10-year) net investment return and administration fees against a tailored passive benchmark portfolio constructed from the fund's own SAA weights using liquid market indices (e.g., S&P/ASX 300, MSCI World ex-Australia, Bloomberg AusBond Composite). Any product underperforming its benchmark by more than **50 basis points (-0.50% p.a.)** fails the test, must notify members in writing, and—if it fails in **two consecutive years**—is legally prohibited from accepting new members.

Worked Example 5: Evaluating a MySuper Balanced Option Under the APRA YFYS Test

An APRA-regulated MySuper Balanced option reports an annualised 8-year actual net investment return (net of investment fees and tax) of 7.15% p.a. and an annual administration fee of 0.35% p.a. Its benchmark Strategic Asset Allocation comprises 30% Australian equities (benchmark return 8.80%), 35% international equities (benchmark return 10.40%), 15% unlisted infrastructure/property (benchmark return 7.60%), and 20% Australian/global fixed income (benchmark return 3.20%). The median MySuper administration fee benchmark is 0.25% p.a. Assess whether the fund passes the APRA YFYS performance test.

1. **Compute the fund's SAA-weighted Benchmark Return (BR):**

$$\text{BR} = 0.30(8.80\%) + 0.35(10.40\%) + 0.15(7.60\%) + 0.20(3.20\%)$$

$$= 2.64\% + 3.64\% + 1.14\% + 0.64\% = 8.06\% \text{ p.a.}$$

2. **Adjust for excess administration fees relative to the representative median fee:**

$$\text{Fee Differential} = \text{Actual Admin Fee} - \text{Benchmark Fee} = 0.35\% - 0.25\% = +0.10\% \text{ p.a.}$$

$$\text{Net Performance Measure} = (7.15\% - 8.06\%) - 0.10\% = -0.91\% - 0.10\% = -1.01\% \text{ p.a. (-101 bps)}$$

3. **Apply the APRA -0.50% (-50 bps) statutory threshold:** Because $-1.01\% < -0.50\%$, the MySuper option **fails** the annual YFYS performance test by 51 basis points beyond the threshold. The trustee must issue mandatory statutory notice to all members within 28 days, conduct a forensic SAA and active-manager review under SPS 530, and rectify net performance and fee drag—because a second consecutive failure would trigger an immediate prohibition on accepting new default members.

4.6 Advanced Performance Attribution: The Brinson-Fachler Multi-Period Model and Risk Attribution

While single-period Brinson models provide an essential snapshot of active management performance, institutional investment mandates (such as Australian superannuation default MySuper funds and defined benefit schemes) evaluate managers across multi-year cycles. Over multi-period horizons, portfolio compounding generates non-linear cross-product interaction terms that require geometric linked attribution to ensure that periodic allocation and selection effects reconcile exactly to multi-year compound excess returns.

The Brinson-Fachler Multi-Period Linked Attribution Framework

The Brinson-Fachler decomposition refines the benchmark interaction term by measuring allocation effect relative to the total benchmark return R_B, rather than zero:

$$\text{Allocation Effect (BF)}_i = (w_{P,i} - w_{B,i})(R_{B,i} - R_B)$$

Where: $w_{P,i}$ is the portfolio weight in asset class i, $w_{B,i}$ is the benchmark weight in asset class i, $R_{B,i}$ is the benchmark return of asset class i, and R_B is the overall benchmark portfolio return.

When compounding over T periods, multi-period attribution calculates the compound portfolio return $R_P = \prod_{t=1}^{T}(1 + R_{P,t}) - 1$ and compound benchmark return $R_B = \prod_{t=1}^{T}(1 + R_{B,t}) - 1$. Linking models (such as the GRAP method or Menchero linking coefficients) scale each single-period attribution component by an intertemporal coefficient L_t such that:

$$R_P - R_B = \sum_{t=1}^{T} L_t \cdot \text{Active Return}_t$$

Where: L_t is the linking coefficient defined as $L_t = \frac{R_P - R_B}{\ln(1+R_P) - \ln(1+R_B)} \cdot \frac{\ln(1+R_{P,t}) - \ln(1+R_{B,t})}{R_{P,t} - R_{B,t}}$.

Attribution Dimension	Mathematical Specification	Economic Interpretation	Institutional Governance Objective
Pure Sector Allocation	$\sum_i (w_{P,i} - w_{B,i})(R_{B,i} - R_B)$	Impact of strategic overweighting outperforming sectors and underweighting laggards.	Evaluates asset allocation committee skill and tactical macroeconomic tilting.
Within-Sector Selection	$\sum_i w_{B,i}(R_{P,i} - R_{B,i})$	Value created through bottom-up security analysis within each industry sector.	Evaluates equity analyst accuracy, stock picking, and firm fundamental analysis.
Allocation-Selection Interaction	$\sum_i (w_{P,i} - w_{B,i})(R_{P,i} - R_{B,i})$	Cross-product dynamic of holding larger active bets in sectors with superior stock picks.	Identifies high-conviction synergy versus unintended compounding errors.
Total Active Alpha	$R_P - R_B$	Comprehensive value added net of asset allocation and security selection.	Benchmark hurdle for performance fee justification and APRA YFYS compliance.

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Worked Numerical Example: Two-Period Superannuation Attribution

Consider an institutional Australian equity portfolio with $500 million invested across Resources, Financials, and Industrials over two half-year periods:

- Period 1 portfolio return: $R_{P,1} = 6.40\%$; benchmark return: $R_{B,1} = 5.00\%$ (excess return $+1.40\%$).
- Period 2 portfolio return: $R_{P,2} = 4.20\%$; benchmark return: $R_{B,2} = 4.80\%$ (excess return -0.60%).

Calculating compound two-period performance:

$$R_P = (1 + 0.0640)(1 + 0.0420) - 1 = (1.0640)(1.0420) - 1 = 1.108688 - 1 = 10.87\%$$

$$R_B = (1 + 0.0500)(1 + 0.0480) - 1 = (1.0500)(1.0480) - 1 = 1.100400 - 1 = 10.04\%$$

$$\text{Cumulative Compound Excess Return} = R_P - R_B = 10.8688\% - 10.0400\% = +0.8288\% \ (+82.88 \text{ bps})$$

Applying the Menchero logarithmic linking factor to isolate the exact value contributed by each period:

$$\text{Period 1 Log Factor} = \ln(1.0640) - \ln(1.0500) = 0.062035 - 0.048790 = 0.013245$$

$$\text{Period 2 Log Factor} = \ln(1.0420) - \ln(1.0480) = 0.041142 - 0.046884 = -0.005742$$

$$\text{Cumulative Log Return Difference} = \ln(1.108688) - \ln(1.100400) = 0.103177 - 0.095674 = 0.007503$$

The proportional weight assigned to Period 1 is $0.013245/0.007503 = 1.7653$, scaling Period 1's excess return to explain the full multi-period compounded alpha. This analytical reconciliation ensures that superannuation trustees, investment consultants, and fiduciary boards can precisely audit the source of outperformance without residual mathematical discrepancies.

4.7 Institutional Fiduciary Governance: Liquidity Stress Testing and APRA Mandate Surveillance

In addition to active performance attribution and regulatory benchmark testing, superannuation trustees and investment managers in Australia operate under strict statutory fiduciary standards established by the *Superannuation Industry (Supervision) Act 1993 (Cth)* (SIS Act) and prudential standards administered by APRA. Prudential Standard **SPS 530 (Investment Governance)** mandates that registrable superannuation entities (RSEs) formulate comprehensive liquidity management plans and execute rigorous forward-looking stress tests to ensure liquidity sufficiency during systemic financial dislocations.

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Liquidity Profiling and Unlisted Asset Valuation

The Australian superannuation system maintains substantial strategic allocations to unlisted, illiquid asset classes—including direct commercial infrastructure, private equity, and unlisted real estate—often exceeding 20% to 30% of total assets under management. While illiquidity premia enhance long-run risk-adjusted returns, they introduce significant liquidity transformation risks during economic contractions, when member investment switches or sudden demographic drawdowns occur.

Asset Class Classification	Liquidity Tier	Expected Time to Liquidate	Valuation Methodology & Governance Frequency
ASX 200 Equities & Sovereign Bonds	Tier 1 (High Liquidity)	T + 2 Settlement	Continuous real-time exchange order book pricing.
Investment Grade Corporate Credit	Tier 2 (Moderate Liquidity)	1 to 5 Business Days	Daily dealer composite spreads and matrix pricing.
Unlisted Infrastructure & Private Equity	Tier 3 (Illiquid / Static)	6 to 18 Months	Quarterly or semi-annual independent discounted cash flow (DCF) appraisals under APRA SPG 531.

Worked Application: Fund Liquidity Coverage Ratio Under Macroeconomic Stress

An institutional fund models an adverse market shock scenario involving a 25% drop in liquid equity markets, accompanied by member switching of 8% of fund assets into cash options over a 30-day liquidation horizon.

Let total initial fund assets be $\$2{,}000$ million, with Tier 1 liquid assets of $\$1{,}200$ million (60%), Tier 2 assets of $\$400$ million (20%), and Tier 3 illiquid infrastructure of $\$400$ million (20%).

Calculating the post-shock liquidity coverage ratio:

1. **Market Revaluation:** Liquid assets experience a 25% drawdown: $\$1{,}200 \times (1 - 0.25) = \$900$ million. Tier 2 assets contract by 10%: $\$400 \times (1 - 0.10) = \$360$ million. Total fund assets decline to $\$900 + \$360 + \$400 = \$1{,}660$ million.
2. **Member Cash Outflow:** Net redemption and switching demand equals 8% of original fund assets: $\$2{,}000 \times 0.08 = \$160$ million.
3. **Residual Tier 1 Buffer:** Deducting outflows from available Tier 1 liquid assets: $\$900 - \$160 = \$740$ million.
4. **Post-Stress Liquidity Ratio:** The residual Tier 1 liquid asset ratio is $\$740/(\$1{,}660 - \$160) = \$740/\$1{,}500 = 49.33\%$.

Because the post-stress liquid ratio (49.33%) comfortably exceeds the board-approved minimum operational tolerance of 35%, the fund satisfies APRA's capital preservation and liquidity continuity requirements without being forced to execute fire-sales of illiquid infrastructure assets at distressed valuations.

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