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Strategy, Structure and Selection

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Motivation

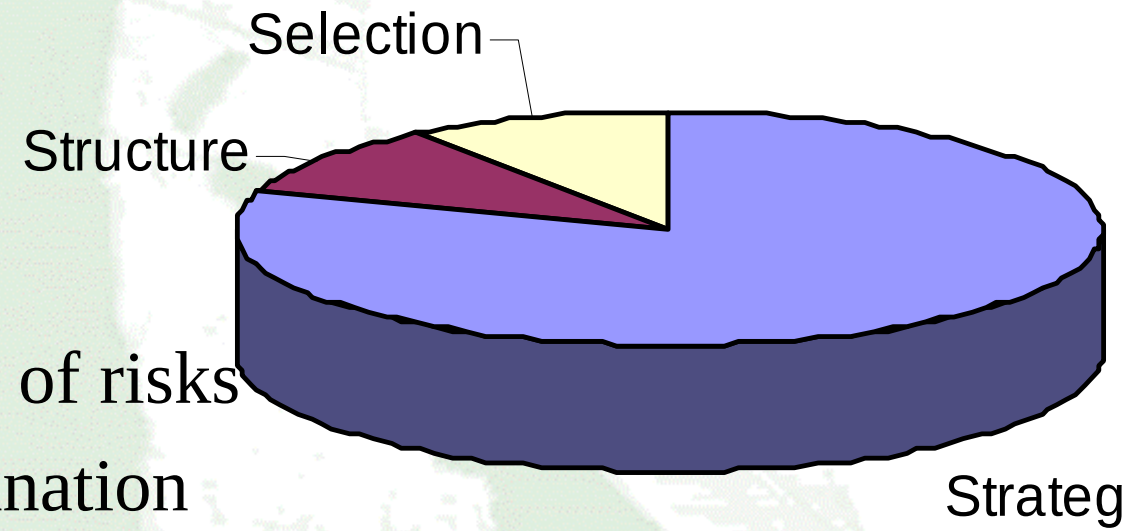
- Investment advice
  - Risk and reward
  - Implementation
- Optimal vs. practical?

Conventional Advice

- Hierarchical approach
  - Strategy: benchmark vs. liabilities
  - Structure: nature and number of managers
  - Selection: individual portfolios

Risk budgeting

- Risk Budget
  - Magnitude
  - Attribution
- Motivated by
  - ‘importance’ of risks
  - ease of explanation



Model

- Model:
  - Strategy: k
  - Structure: φ
  - Selection: R_{active}

$$R_{fund} = k\left[\varphi R_{passive} + (1-\varphi) R_{active}\right] + (1-k) r_f$$

Model

- Investors maximise (approximate) expected utility function

- $E[U(R_{fund})] = E[R_{fund}] - \tau/2 \, Var[R_{fund}]$

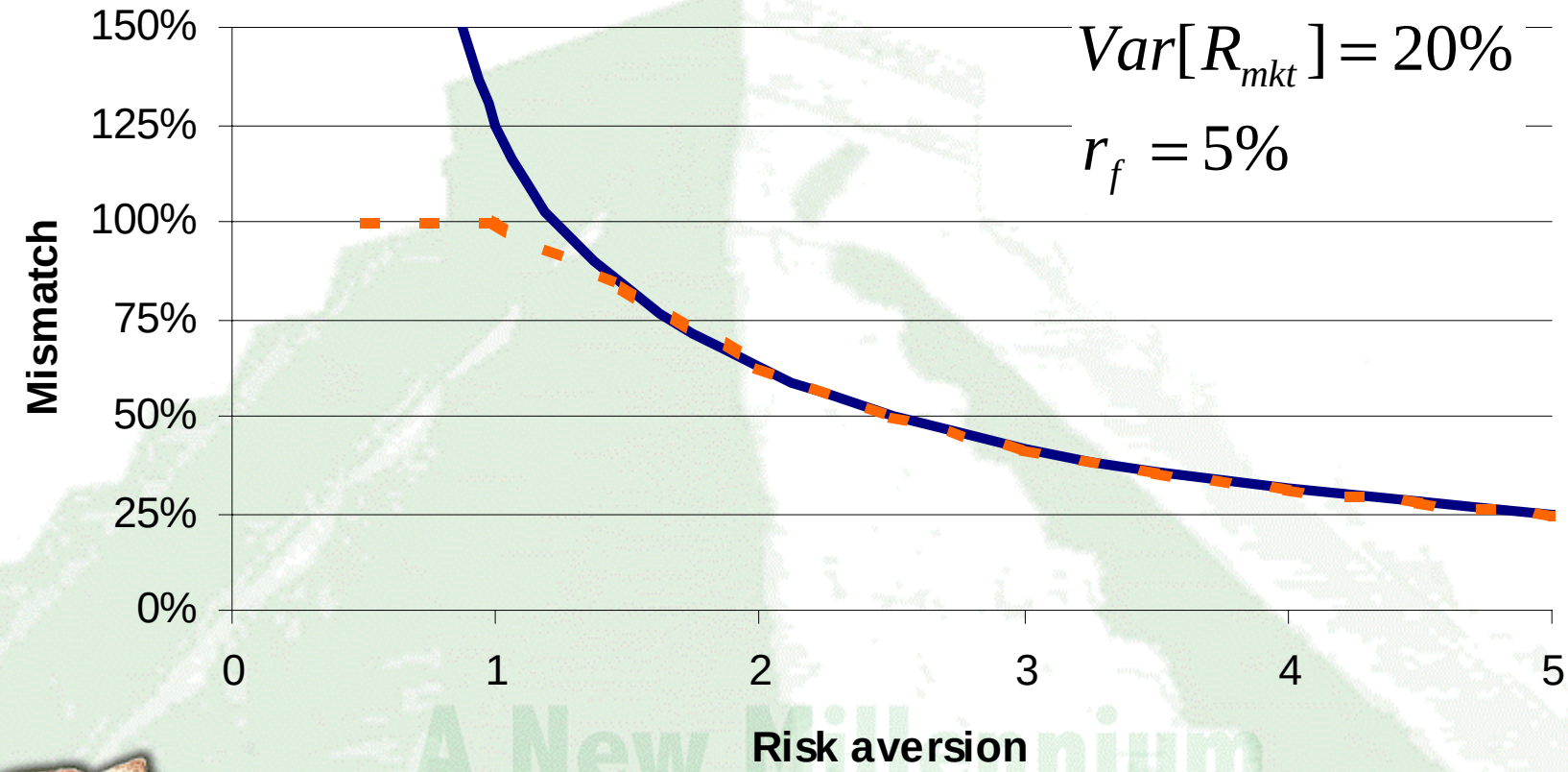
Hierarchical: strategy

- Determine systematic risk, *k*
- Assume +ve active contribution
- Depends on:
  - risk tolerance
  - market return and risk

$$k = \frac{\overline{R_{mkt} - r_f}}{\sigma_{mkt}^2} \tau^{-1}$$

Strategy and risk aversion

$$E[R_{mkt}] = 10\%$$
$$Var[R_{mkt}] = 20\%$$
$$r_f = 5\%$$



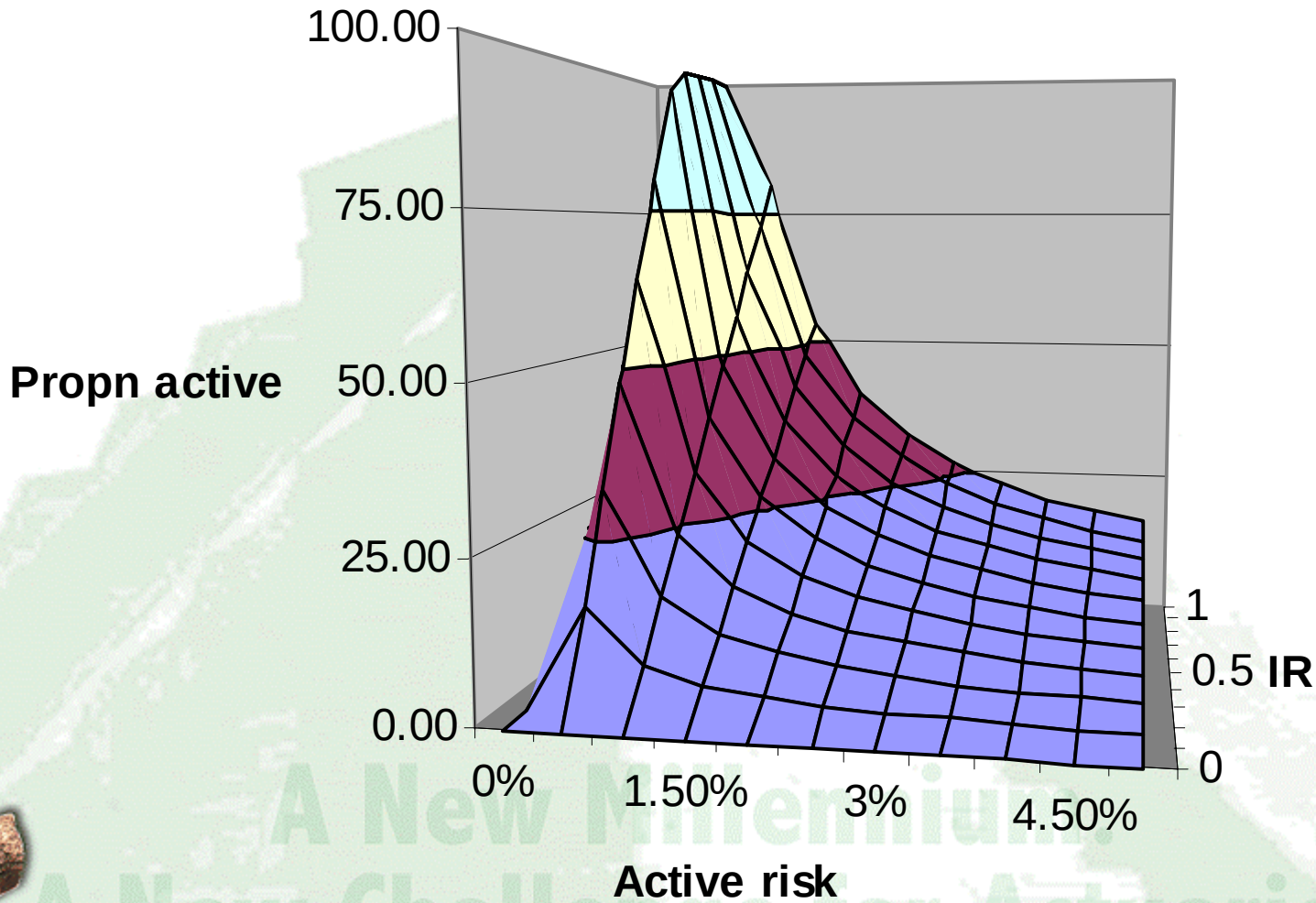
Hierarchical: structure

- For optimal *k*, choose proportion active to maximise utility

$$1-\varphi = \frac{\alpha_{active}}{\sigma^2_{active}}\left[\frac{\overline{R_{mkt}} - r_f}{\sigma^2_{mkt}}\right]$$

- Inevitable overlap with selection …

Structure and selection



Hierarchical: structure

- Structure then selection
  - House structures
- Selection then structure
  - Often preferred in practice
- Require ‘style neutrality’ ($\beta = 1$)
  - But permit matching asset (cash)

Portfolio structure

Strategic matching assets
Risky assets: •Passive •Active •**Matching assets**

Sufficient degrees of freedom

Hierarchical: structure first

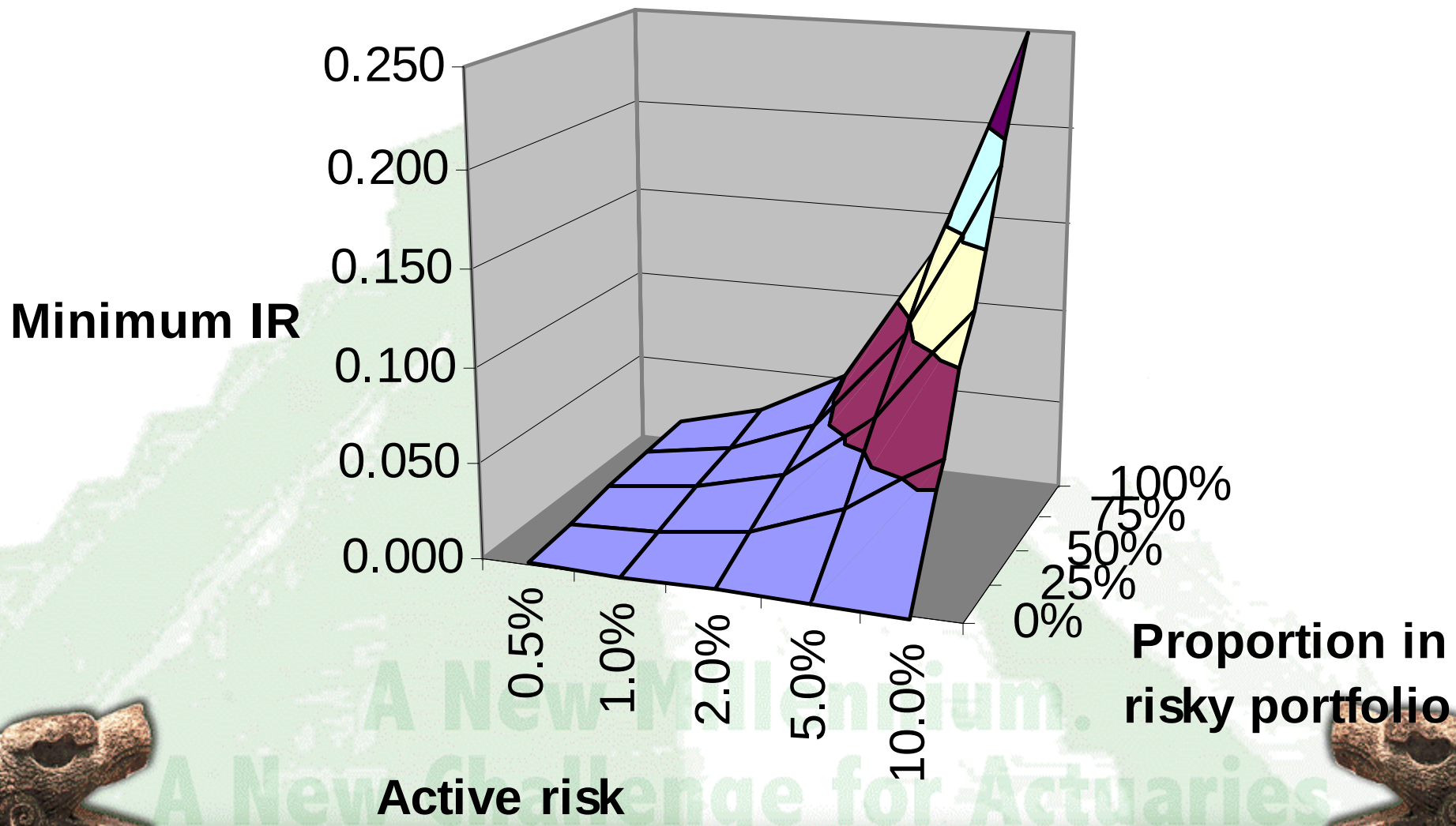
- Effectively extra constraint
- Risky assets ~ appraisal ratios and systematic risk(s)

$$x_i = \pi\left(\frac{1}{\sigma_i}\right)\left(\frac{\alpha_i}{\sigma_i}\right) + \nu\left(\frac{1}{\sigma_i}\right)\left(\frac{\beta_i}{\sigma_i}\right)$$

Example

	α	β	σ	**IR**	**AR**	x_i
A	0.15	0.8	3.0	0.05	1.7	13%
B	0.25	1.1	4.0	0.06	1.6	40%
C	0.25	1.0	4.0	0.06	1.6	47%

IR hurdle



Hierarchical: selection first

- Well-known result (Black & Treynor)
- Risky assets ~ appraisal ratios,

  i.e. IR/active risk

$$x_i = \pi \left(\frac{1}{\sigma_i} \right) \left(\frac{\alpha_i}{\sigma_i} \right)$$

Example

	α	β	σ	**IR**	**AR**	x_i
A	0.15	0.8	3.0	0.05	1.7	35%
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Insights

- Strategy, selection, structure
  - Sufficient degrees of freedom
- Strategy:
  - determines level of matching
- Selection:
  - Appraisal ratios
  - Independent of risk tolerance
- Structure:
  - A consequence
  - Independent of risk tolerance