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Machine Learning for Hedge Fund Selection

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Goals of Hedge Fund Portfolio Construction

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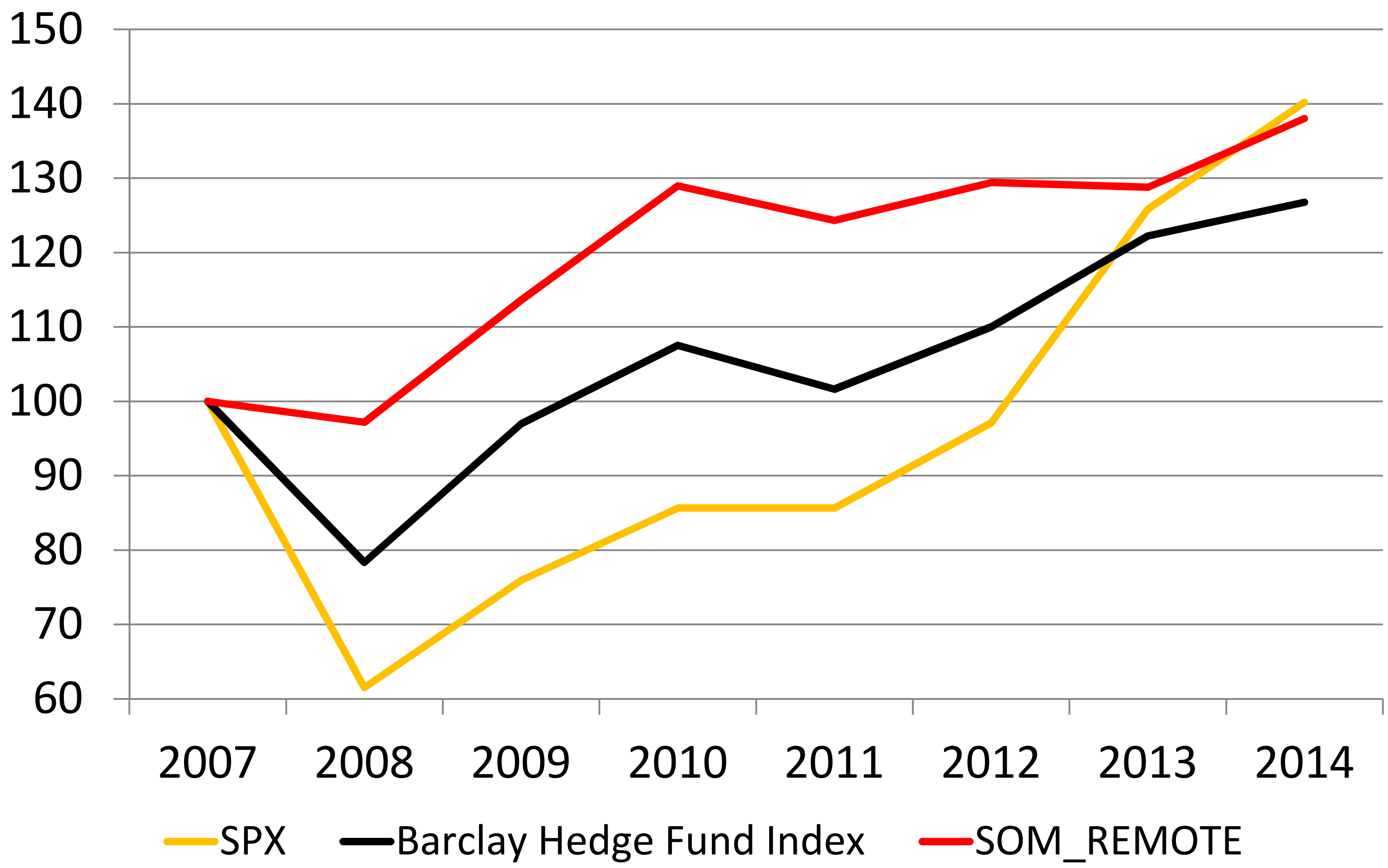
- Achieve stable long-term performance, avoid large drawdowns
- Feasibility study to investigate if ML can add value to investment process



Identifying Similarities of Hedge Fund Managers

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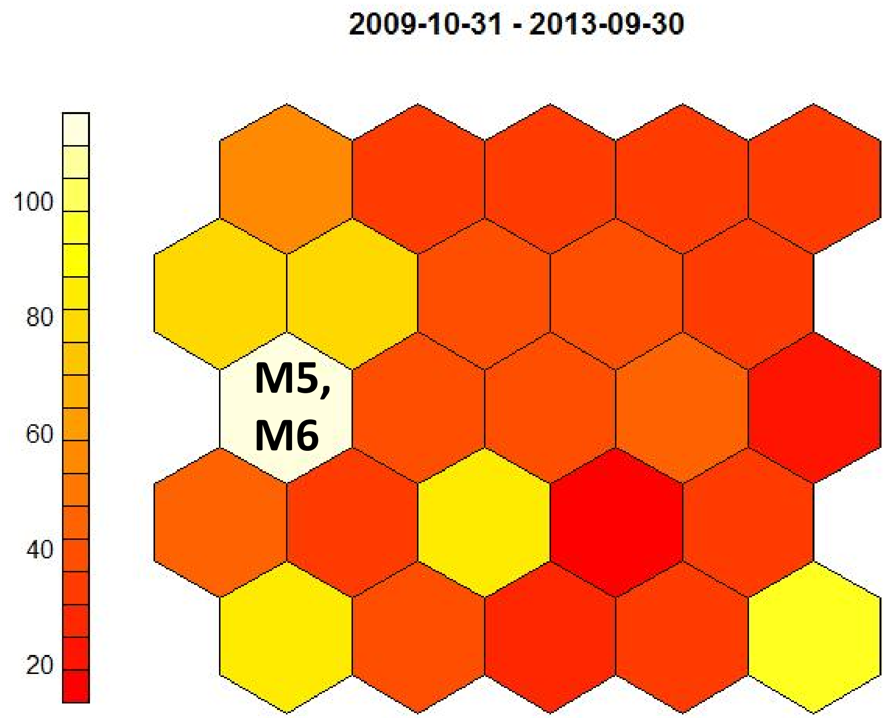
- **Diversify → Avoid concentrations**
- Self-Organising Maps (SOM): project objects on a map
- Inputs are managers' returns of the last 48 months
- Similar objects are being projected closely together



- Managers with similar return profiles appear on the same unit: Managers M5 and M6 on the same unit

Portfolio Construction: Method SOM_REMOTE

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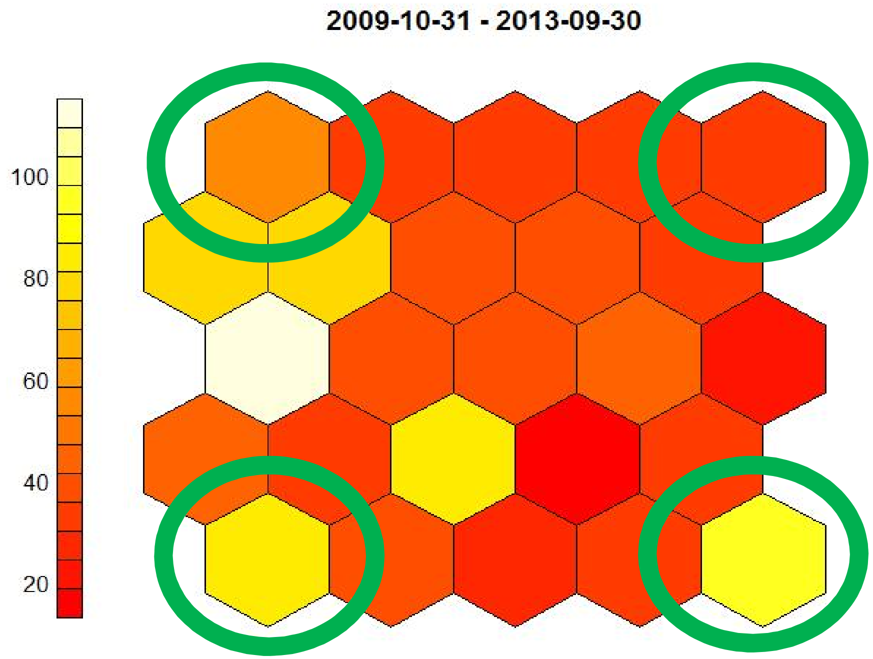
- Pick hedge funds from remote units of the SOM, e.g., from the 4 units in the bottom left, bottom right, upper left and upper right corners



SOM_DISPERSION: Focus on Return Dispersion

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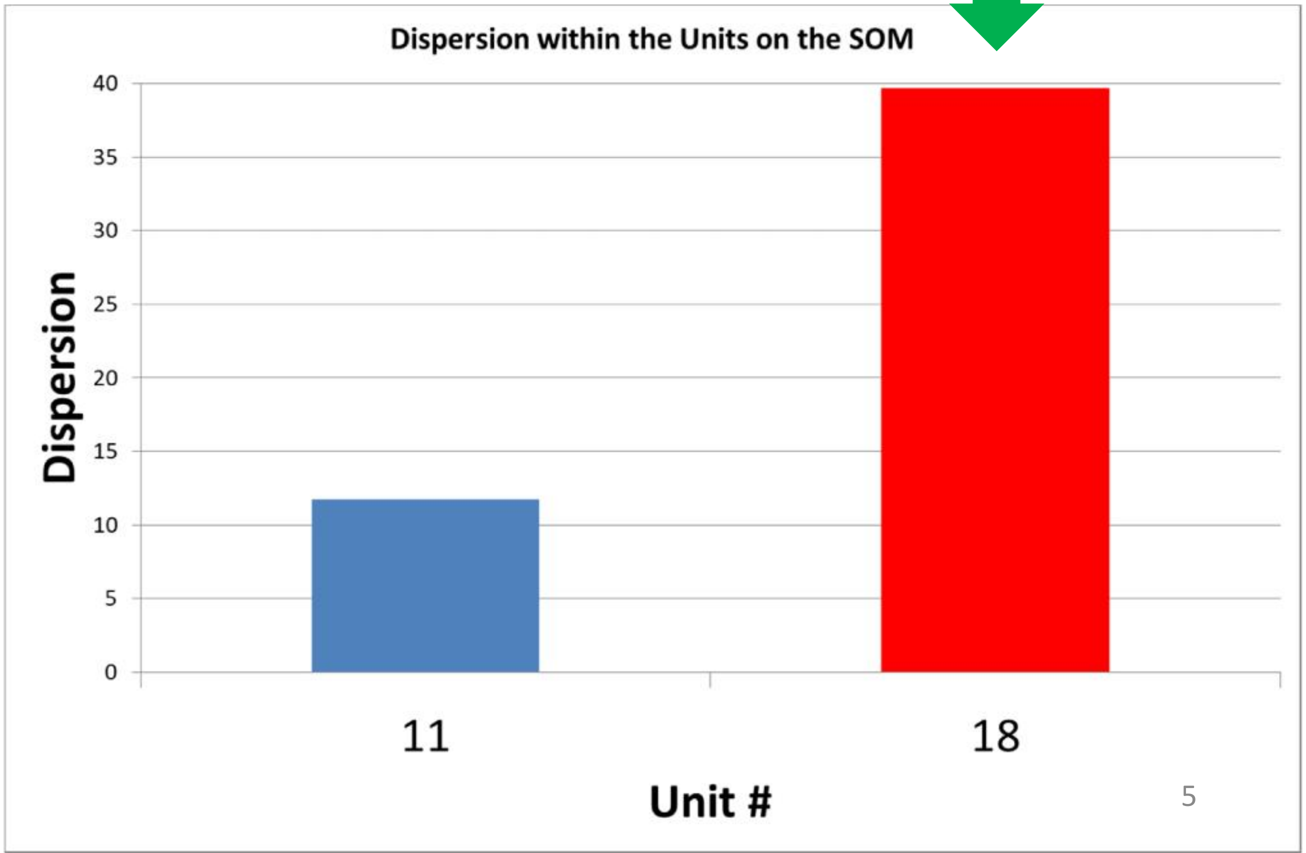
Diversification

Unique Hedge Fund Strategies

Heterogeneity of Managers

High Return Dispersion

Pick managers from this unit!!



Empirical Dispersion

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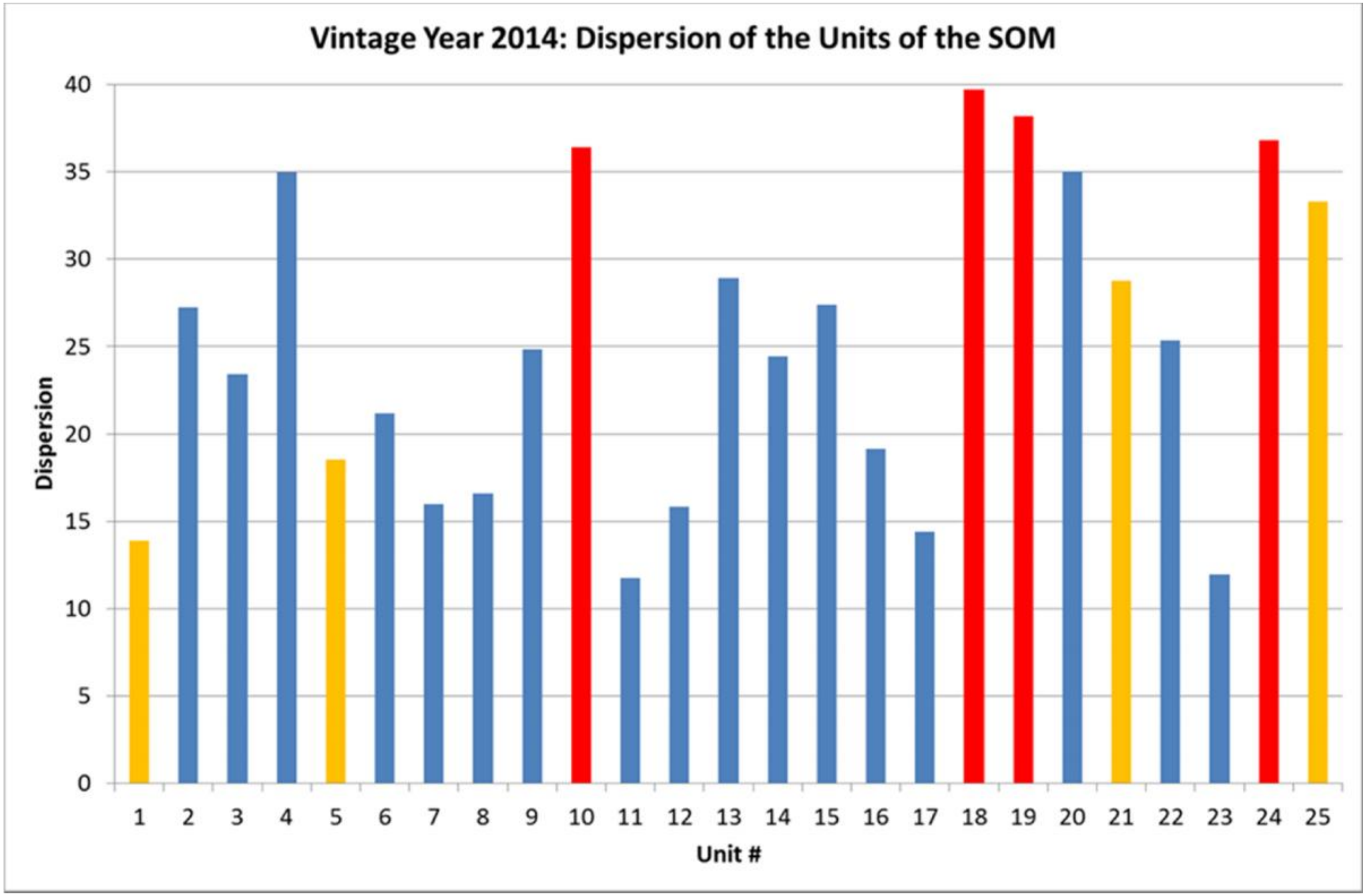
- Orange: SOM_REMOTE, red: SOM_DISPERSION



Simulation Study: 4 Ways to Construct Portfolios

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- **SOM_REMOTE**: Randomly pick 3 managers each from the 4 most remote units of the SOM, i.e., from the 4 units in the bottom left, bottom right, upper left and upper right corners, together 12 managers

- **SOM_DISPERSION**: Randomly pick 3 managers from the 4 units with highest dispersion, together 12 managers

- **Free**: Randomly pick 12 managers from the universe. No constraints

- **Style**: Each of the 12 managers needs to come from a different style. The styles are taken from Barclay Hedge [e.g., Equity Long/Short, Macro, Event Driven etc.]

Simulation Study

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- Barclay Hedge Database
- Filter managers by size, age, etc.: ca. 1,000 remain for analysis each year
- We assume a 3 month implementation gap
- For Vintage Year 2008, we estimate [5 x 5] SOM with data from 10/03 to 9/07 [48 months]

1) Pick 12 managers according to the 4 construction methods (Free, Style, SOM_REMOTE, SOM_DISPERSION)
2) Invest in 1/08 and hold the hedge fund investments until 12/08. No rebalancing, just buy & hold
3) Measure out-of-sample performance: 1/08 to 12/08

- Repeat 10,000 times from step 1), then move time window 1 year ahead and do this again

Simulation Study: Rolling Windows

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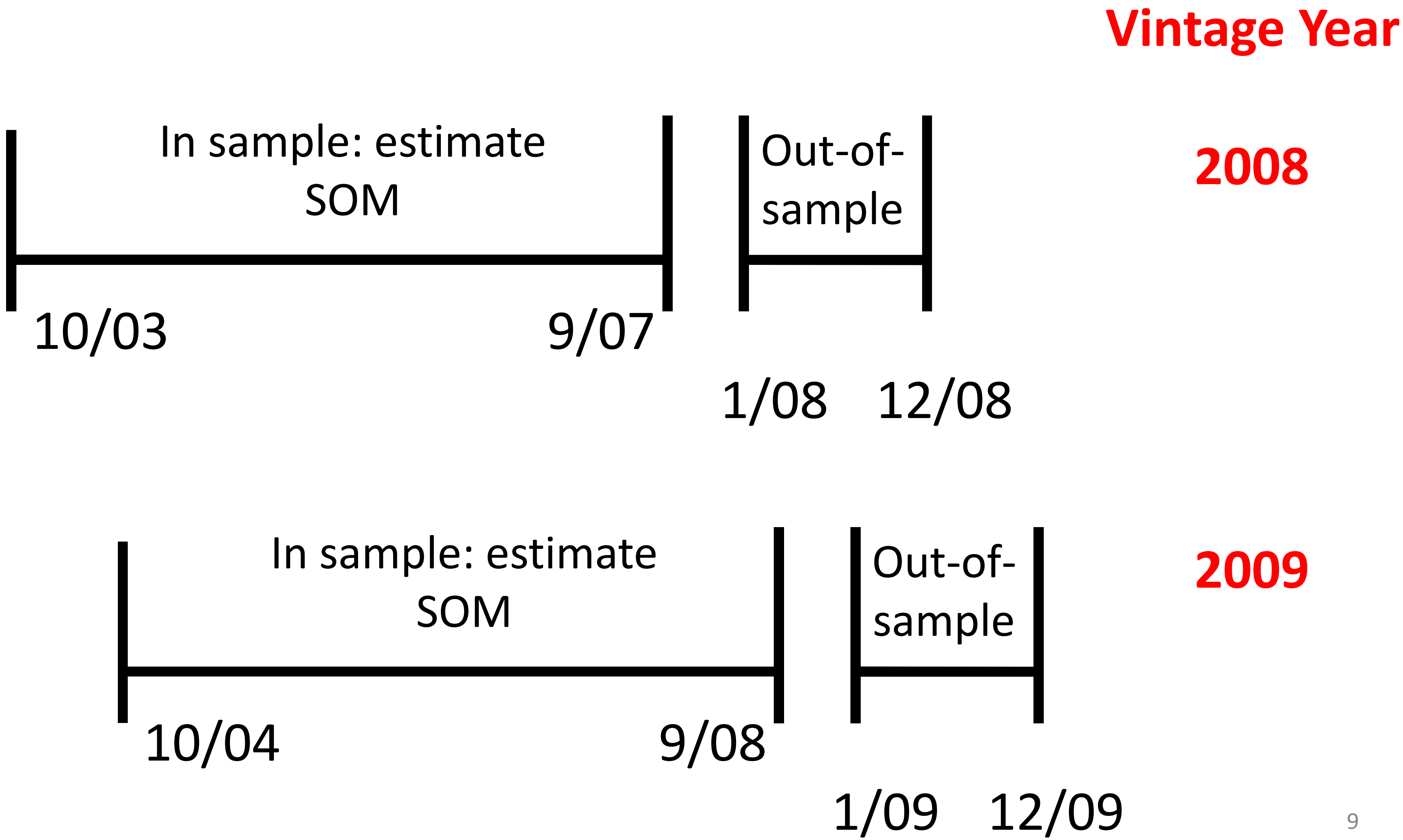

Results: Out-Of-Sample Equity Lines

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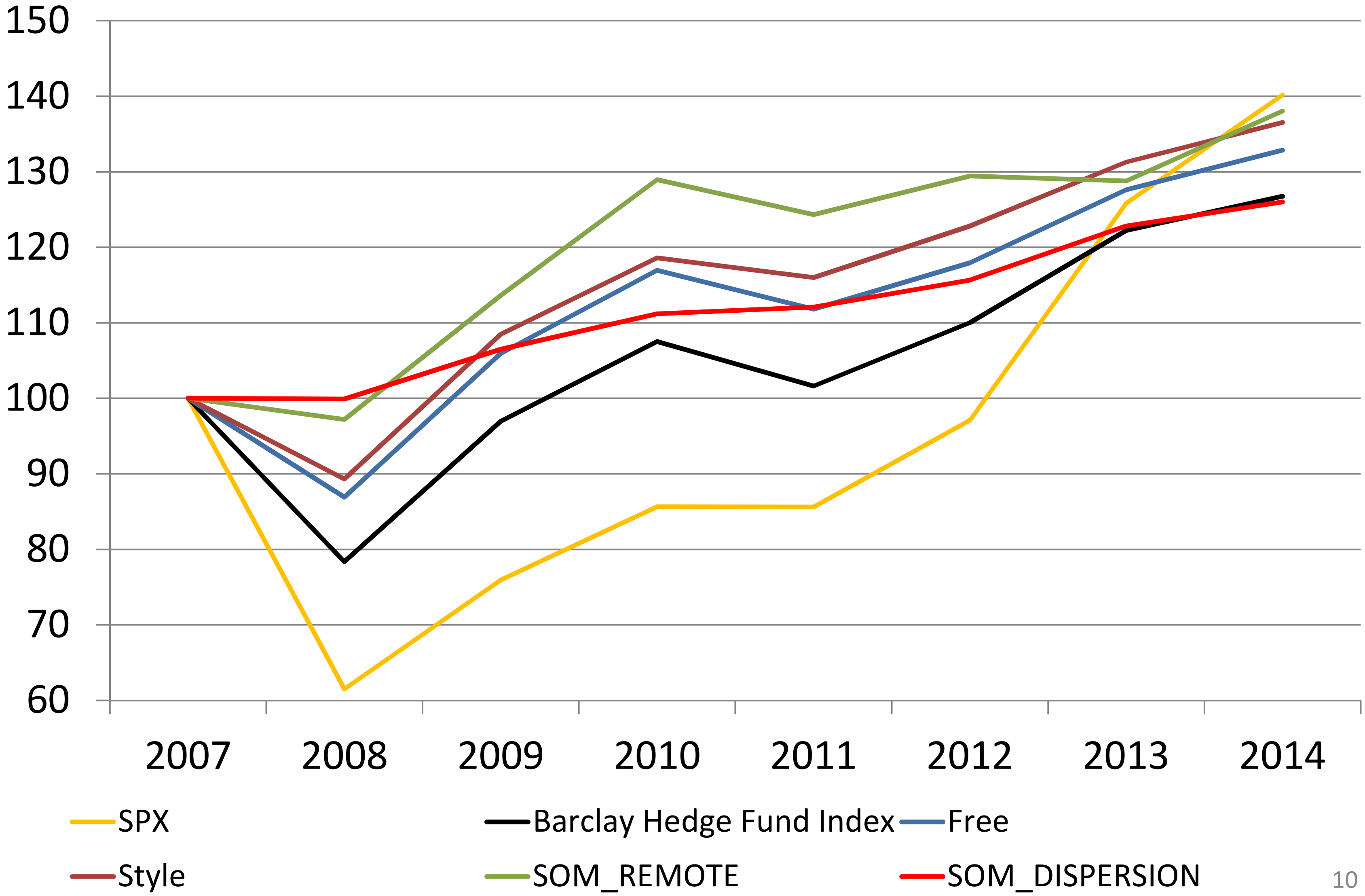

Results: Out-Of-Sample Percentiles

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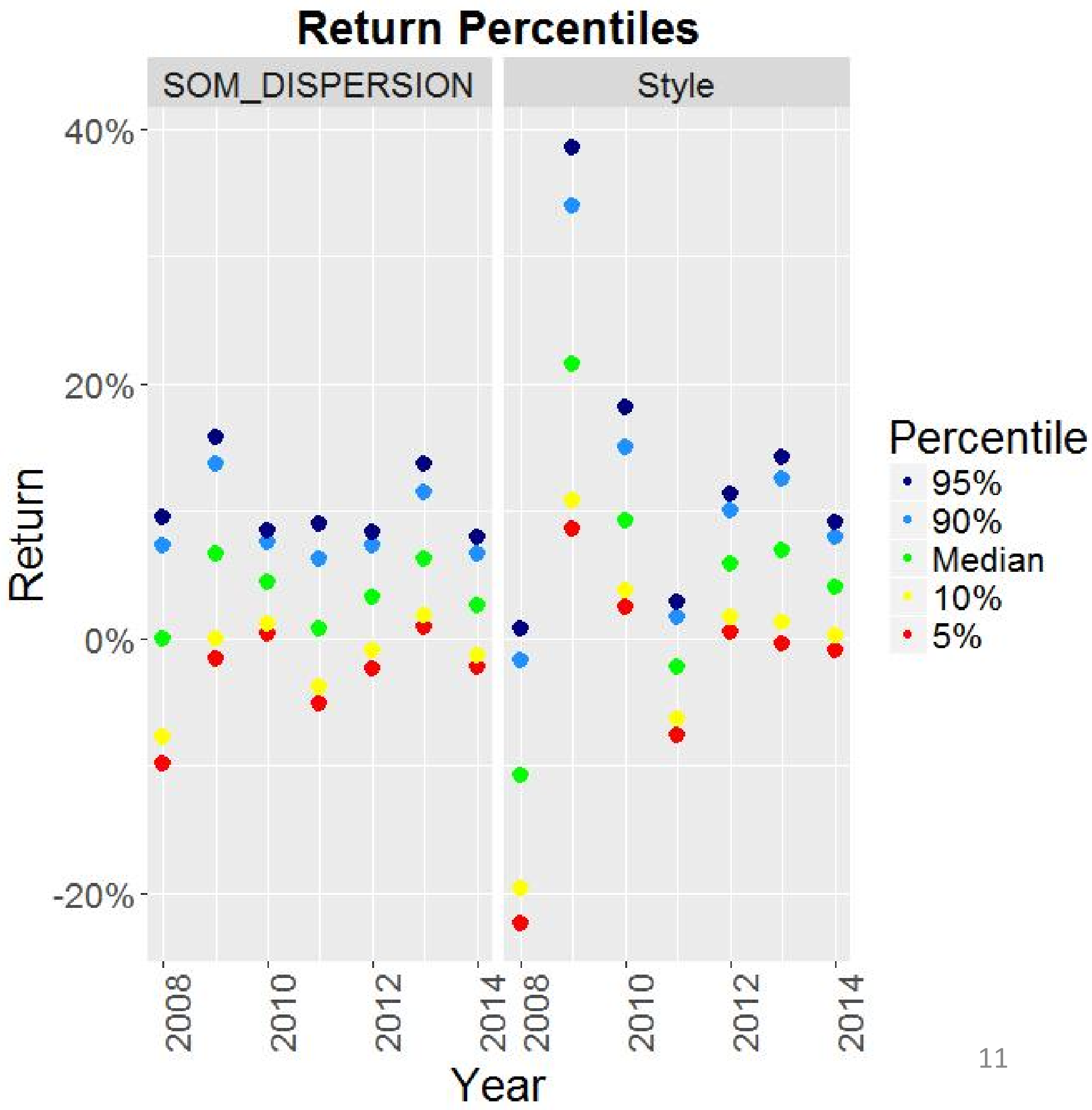
- Percentiles measured over 10,000 simulation runs for each year
- SOM:
- Reduce negative returns (2008, 2011)
- But: upside in times of rising equity markets reduced
- In total: more even performance



Results: Out-Of-Sample Return / Risk

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- Risk measures enhanced: lower vol and drawdowns
- However, also returns reduced

	Style	SOM_DISPERSION
Mean Return	4.4%	3.3%
Vol	6.5%	3.8%
Return / Vol	0.69	0.86

Summary & Outlook: ML / SOM Add Value

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- SOM methods reduce drawdowns → enhanced risk/return

- In our simulation experiment, managers were picked randomly

- More intelligence can be applied → focus on managers with the capability to generate alpha over a set of risk factors

- Run SOM as an initial step to identify managers with unique strategies
  - purchase in a stand-alone portfolio
  - add as a sub-portfolio to an existing portfolio

Summary & Outlook: ML / SOM Add Value

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- SOM can be applied to many problems to identify similarities in data, e.g., fraud detection, benchmarking
- SOM can deal with non-linear & noisy data
- SOM for risk analysis: If managers of an existing portfolio come all from the same part of the SOM, there is little diversification to expect in times of crisis
- Commercial product received seed commitment \$ 100 mln

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