# Discussion of "Assessing the Performance of AI-Labelled Portfolios" by Praxmarer and Simon

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<sup>1</sup>The views expressed in this discussion are solely those of the author and do not represent the views of the Federal Reserve Bank of New York, the Federal Reserve Board, or the Federal Reserve System.

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#### The Paper

- **Research Question**: Do Al-labeled mutual funds outperform traditional funds or the market benchmark?
- **Context**: Al in fund management is growing, with funds like AIEQ (2017) leading the trend.
- Key Findings:
  - Al funds perform similarly to matched non-Al funds.
  - Fail to outperform the market benchmark.
  - Show better market timing but worse stock-picking.
  - No significant fund flow advantages from AI labeling.

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## Related Literature

#### • AI in Portfolio Management:

- Gu et al. (2020): Machine learning improves return predictions.
- Chen et al. (2024): Deep learning enhances asset pricing models.

#### • Fund Performance and Skill:

• Kacperczyk et al. (2014): Decomposes skill into timing and picking.

#### • Market Efficiency and Technology:

• Chen and Velikov (2023): Transaction costs erode anomaly profits.

#### • Investor Behavior:

• Sirri and Tufano (1998): Fund flows driven by past performance, not labels.

## Sample Size and Data Limitations

- Small sample of 67 AI funds limits statistical power and generalizability.
- Young funds may suffer from incubation bias.
- Expand sample with international AI funds (e.g., Europe, Asia).

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## Identification of AI Funds

- Relies on self-reported SEC filings, prone to "Al-washing."
- Lacks a clear definition of "AI fund."
- Cross-verify with prospectuses or manager interviews.

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# Matching Methodology

- Matches on size, momentum, dividend yield; misses key traits.
- Is this building too-good of a match?
- How do we know the matching funds aren't quietly using AI

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## AI Diffusion?

- AI Funds tend to perform well until 2022 including AIEQ.
- Then the rest of the market catches up to them.
- Maybe AI became easier to deploy over time?

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## Model of AI Adoption in Fund Management

- **Objective**: Explain why AI funds outperform when rare but not when common.
- Key Idea: Al gives an edge, but widespread adoption increases market efficiency, reducing alpha.
- Overview:
  - One risky asset with uncertain payoff.
  - Fraction  $\lambda$  of funds use AI with a noisy signal.
  - Price adjusts to AI adoption, impacting performance.

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## Model Setup

- Assets:
  - Risk-free asset, return r<sub>f</sub>.
  - Risky asset, payoff  $\tilde{v} \sim N(\mu, \sigma^2)$ .
- Funds:
  - Al funds (fraction  $\lambda$ ): Signal  $s = \tilde{v} + \epsilon$ ,  $\epsilon \sim N(0, \sigma_{\epsilon}^2)$ .
  - Non-AI funds: Use prior  $\tilde{v} \sim N(\mu, \sigma^2)$ .
- Investors: CARA utility  $u(w) = -\exp(-\gamma w)$ .

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#### Demand and Market Clearing

- AI Funds:
  - Beliefs:  $\tilde{v}|s \sim N\left(\hat{\mu}(s), \hat{\sigma}^2\right), \ \hat{\mu}(s) = \frac{\sigma^2 s + \sigma_e^2 \mu}{\sigma^2 + \sigma_e^2}.$

• Demand: 
$$x_{AI} = \frac{\hat{\mu}(s) - p}{\gamma \hat{\sigma}^2}$$

- Non-Al Funds:  $x_{non-Al} = \frac{\mu-p}{\gamma\sigma^2}$ .
- Market Clearing:  $\lambda x_{AI} + (1 \lambda) x_{non-AI} = 1$ .

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#### Equilibrium Price

- **Price**: Assume p = a + bs (linear form).
- Solution: Solve a and b via market clearing.
- Insight:
  - Low  $\lambda$ : *p* reflects little of  $s \rightarrow$  mispricing.
  - High  $\lambda$ : *p* incorporates  $s \rightarrow$  efficient pricing.
- Price efficiency rises with  $\lambda$ .

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### Fund Performance and Alpha

- **Return**:  $r = \tilde{v} p$ .
- Alpha (AI):  $\alpha_{AI} \approx \hat{\mu}(s) p (\mu p)$ .
- Effect of λ:

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$$\lambda \rightarrow 0$$
:  $p \approx \mu$ ,  $\alpha_{AI} > 0$ .

- $\lambda \to 1$ :  $p \approx \hat{\mu}(s), \ \alpha_{AI} \to 0.$
- Conclusion: Al's edge fades as adoption grows.

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