Lecture 10 : Hedge Funds

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Hedge Funds vs. Mutual Funds

Hedge Fund

- Transparency: Limited Liability Partnerships that provide only minimal

  disclosure of strategy and portfolio composition
- Less than 100 investors unless "qualified"

Mutual Fund

- Transparency: Regulations require public disclosure of strategy and portfolio composition
- Number of investors is not limited

Hedge Funds vs. Mutual Funds

Hedge Fund

- Investment strategy: Very flexible, funds can act opportunistically and make a wide range of investments
- Often use shorting, leverage, options

Mutual Fund

- Investment strategy: Predictable, stable strategies, stated in prospectus
- Limited use of shorting, leverage, options

Hedge Funds vs. Mutual Funds

Hedge Fund

- Compensation structure: Typically charge a management fee of 1-2% of assets and an incentive fee of 20% of profits
- Liquidity: Often have lock– up periods, require advance redemption notices, or may be gated

Mutual Fund

- Compensation structure: Fees are usually a fixed percentage of assets
- Liquidity: Can move more easily into and out of a mutual fund

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Hedge Fund Strategies

- Directional
  - Bets that one sector or another will outperform other sectors
- Non–directional
  - Exploit temporary misalignments in relative valuation across securities
  - By one type of security and sell another
  - Market neutral
- Implications for Beta of each strategy?

Directional Trading

- In contrast to non–directional, market-neutral strategies, directional funds make large sectoral bets
- Examples: Global Macro funds (e.g. Soros' Quantum Hedge Fund) make large macro bets on currencies, commodities, sectors.

Non-Directional Trading

- Relative value identifies rich vs. cheap based on a model of what prices "should be"
  - Sometimes, economic models (e.g. Royal Dutch/Shell)
  - Often, statistical models
- Statistical Arbitrage
  - Use data mining techniques to uncover systematic pricing patterns
  - Trade on divergence from normal
  - Can involve high frequency trading over short holding periods

Statistical Arbitrage Example: Pairs Trading

- Find stocks which move together
  - For a given pair, the relative value (p_1/p_2) provide a buy/sell signal
  - High p_1/p_2 implies buy stock 2 and short stock 1

- David Shaw (D.E. Shaw) argues "…human beings don't like to trade against human nature, which wants to buy stocks after they go up, not down."
- Long-short strategy is self-financing and market neutral

Pairs Trading Cookbook

Step A: find stocks which move together

1. For each stock, subtract off mean price, divide by standard deviation (normalized prices),

$$\tilde{p} = \frac{p - \bar{p}}{\sigma_p}$$

2. Calculate sum of squared deviations of normalized prices $(({1} - {2})^{2}) across all possible pairs of stocks (N (N-1)/2)

3. Each stock is paired with the stock for which the sum of squared errors is smallest

What is implication for paired stocks β?

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Pairs Trading Cookbook

- Limit focus to "top pairs"
  - Chose top 5% pairs based on minimum sum of squared deviations
- Devise trading rule

1. Define daily distance as $d = (\widetilde{p}_1 - \widetilde{p}_2)^2$ and calculate historical standard deviation of price differences
2. "Open" pair when $d > 2\sigma(d)$
3. "Close" pair when $d = 0$

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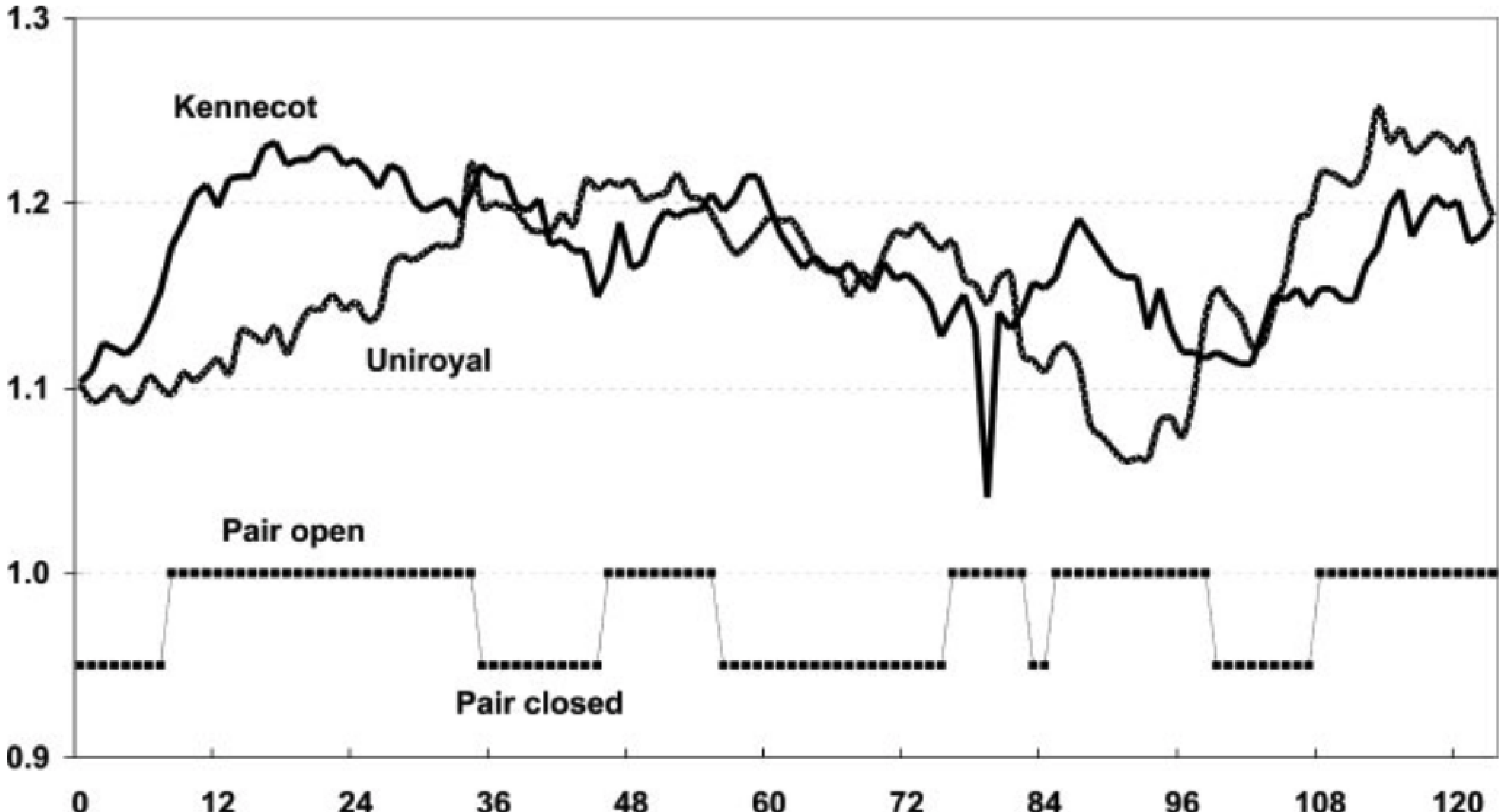
Pairs Trading Cookbook

Goetzmann, Gatev and Rouwenhorst (2006)



Pairs Trading Results

Excess returns of unrestricted pairs trading strategies

Pairs portfolio	Top 5	Top 20
A. Excess return distribution (no waiting)		
Average excess return (fully invested)	0.01308	0.01436
Standard error (Newey-West)	0.00148	0.00124
t-Statistic	8.84	11.56
Excess return distribution		
Median	0.01194	0.01235
Standard deviation	0.02280	0.01688
Skewness	0.62	1.39
Kurtosis	7.81	10.54
Minimum	–0.10573	–0.06629
Maximum	0.14716	0.13295
Observations with excess return < 0	26%	15%
Average excess return on committed capital	0.00784	0.00805

Pairs Trading Results

- Does pairs trading expose trade to risk factors?
- Market neutrality suggests CAPM alpha, but what about other risks?

Factor model: Fama–French, Momentum, Reversal	
Intercept	0.00545 (3.81)
Market	–0.06661 (–1.03)
SMB	–0.04233 (–0.71)
HML	0.05740 (1.37)
Momentum	–0.02804 (–0.94)
Reversal	0.10192 (1.50)
R^2	0.05

- Coefficients and t-statistics from a five-factor model

Merger Arbitrage

- Often a long-short strategy strategy which buys target and sells acquirer in announced mergers
- Hedge fund holds event risk
  - Terms not reached
  - Alternate bidders
  - Regulatory approval not granted

Merger Arbitrage Example

- Tellabs and Ciena merger
  - Both companies involved in fiber–optic/telecom networks
  - Merged company would be able to compete with larger firms such as Lucent by sharing customer bases, exploiting size

- 1–for–1 stock swap announced June 3, 1998
  - Tellabs $64/share
  - Ciena $60/share
  - Upon merger, prices must be equal

Merger Arbitrage Example

- Another infamous LTCM trade
  - Commit $30M own capital, Borrow $30M @ 6% prime rate
  - Buy 1M Ciena @ $60
  - Sell 1M Tellabs @ $64
  - Earn 4.5% short rebate (interest) on proceeds from short
- What happens?
  - Ciena loses two key customers, shares fall to $15 dollars, deal is abandoned
  - Tellabs shares also decline before position is closed

Merger Arbitrage Example

- Profits and losses from trade:
  - $30M @ 6% prime rate X (110/360) = –$550K
  - $64M short rebate @ 4.5% X (110/360) = $880K
  - Loss on Ciena 1M X ($15–$60) = –$45M
  - Gain on Tellabs –1M X ($64–$42) = $22M
  - TOTAL =–$22.7M

Total return on committed capital: -75.57%

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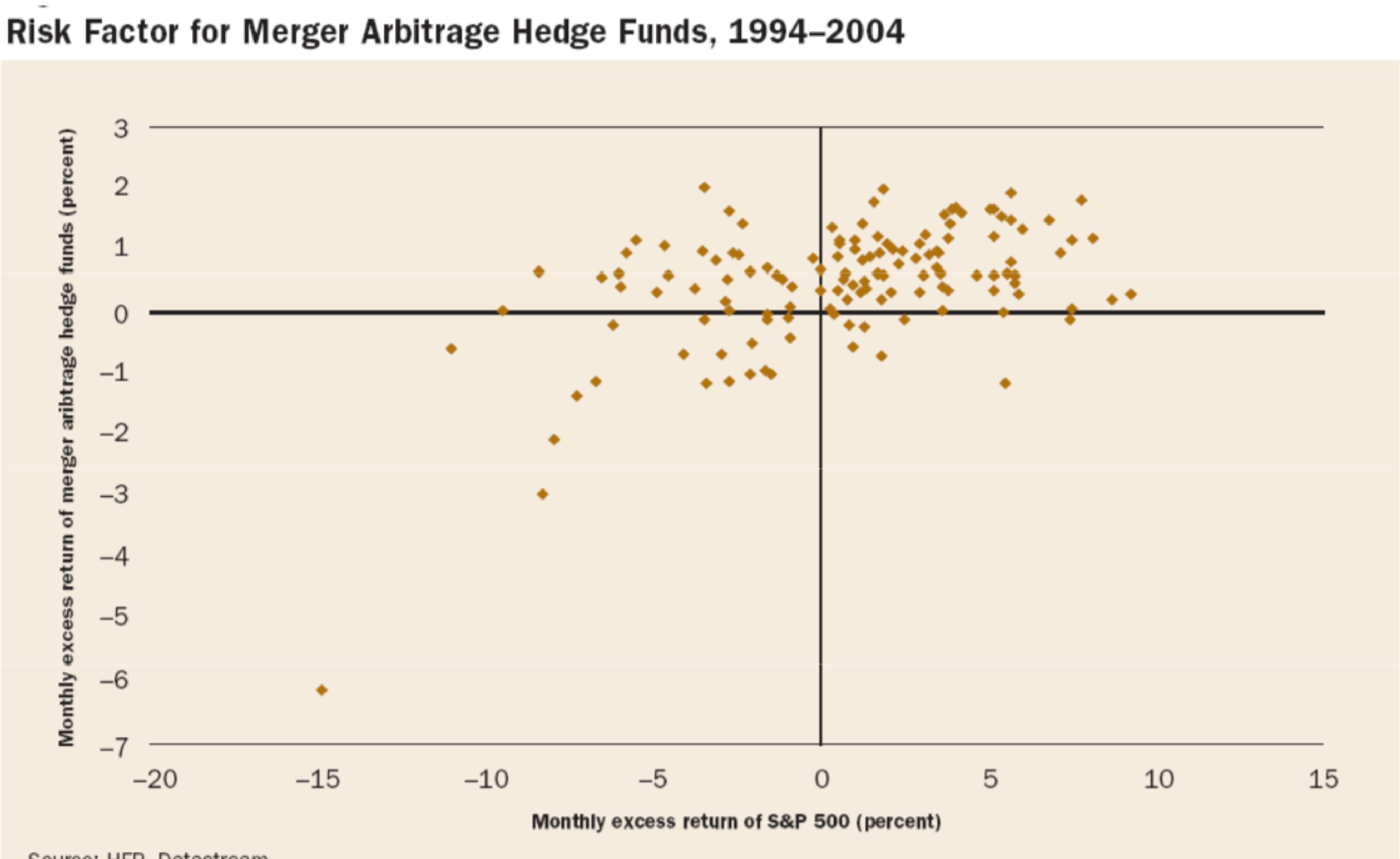
Merger Arbitrage: large sample evidence



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Merger Arbitrage: large sample evidence

- Merger arb is profitable on average
  - Theory: hedge funds earn premium for insuring shareholders against completion risk

			Intercept		$R_{Mt} - R_f$		*SMB*		*HML*	
	N	R^2	a	p-value	b	p-value	s	p-value	h	p-value
Panel B: First offers										
Value-weighted										
Market model	192	0.15	0.86	(0.00)	0.32	(0.04)				
Fama-French three-factor	192	0.20	0.72	(0.02)	0.37	(0.02)	0.31	(0.04)	0.25	(0.07)
Equal-weighted										
Market model	192	0.12	0.80	(0.00)	0.22	(0.00)				
Fama-French three-factor	192	0.16	0.73	(0.00)	0.24	(0.00)	0.23	(0.01)	0.15	(0.11)

- 72–86 bps in monthly alpha!

Hedge Fund Performance Evaluation

- Recall our CAPM-based single factor model

$$r_{i,t} - r_f = \alpha_i + \beta_i(r_{m,t} - r_f) + e_{i,t}$$

- Note that for hedge funds, factor loadings are *dynamic*
  - Consider market loading for a long-only market timer
  - If successfull, β is only postiive when market returns are high
  - Implies non-linear factor loadings

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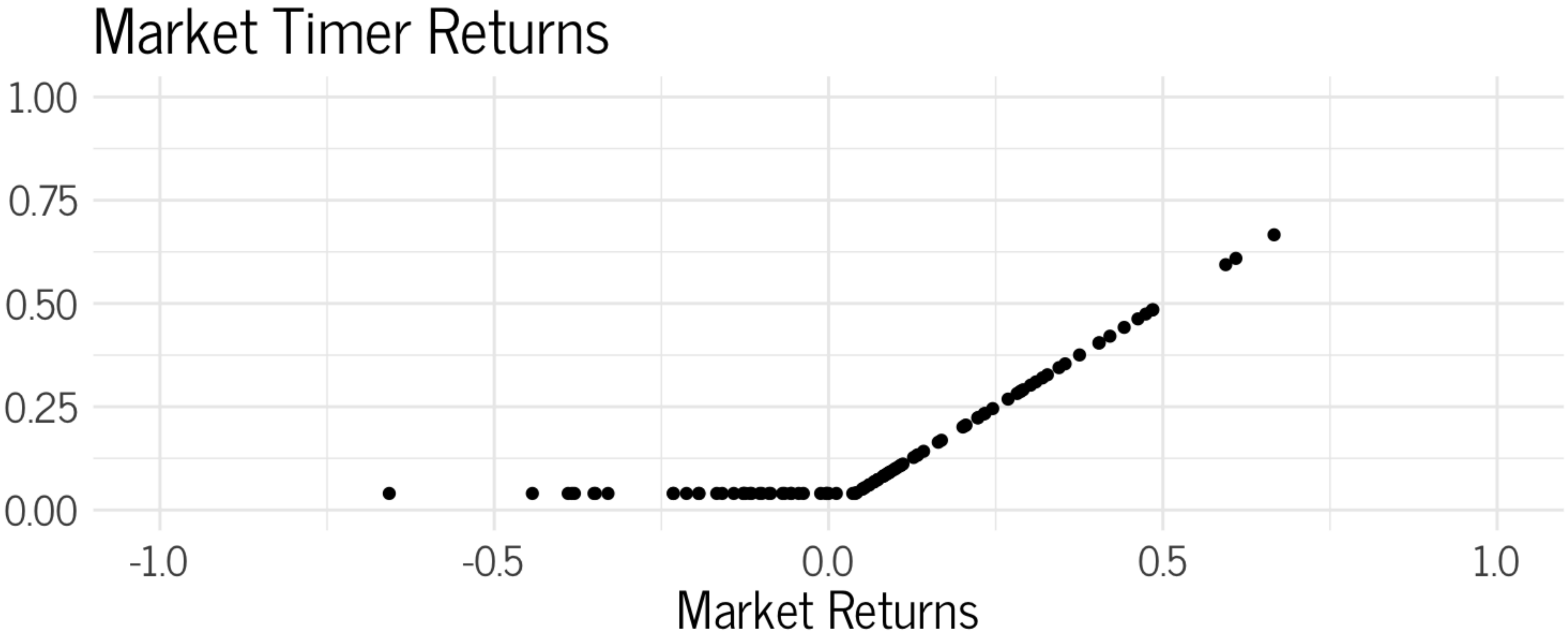
Dynamic Performance Evaluation

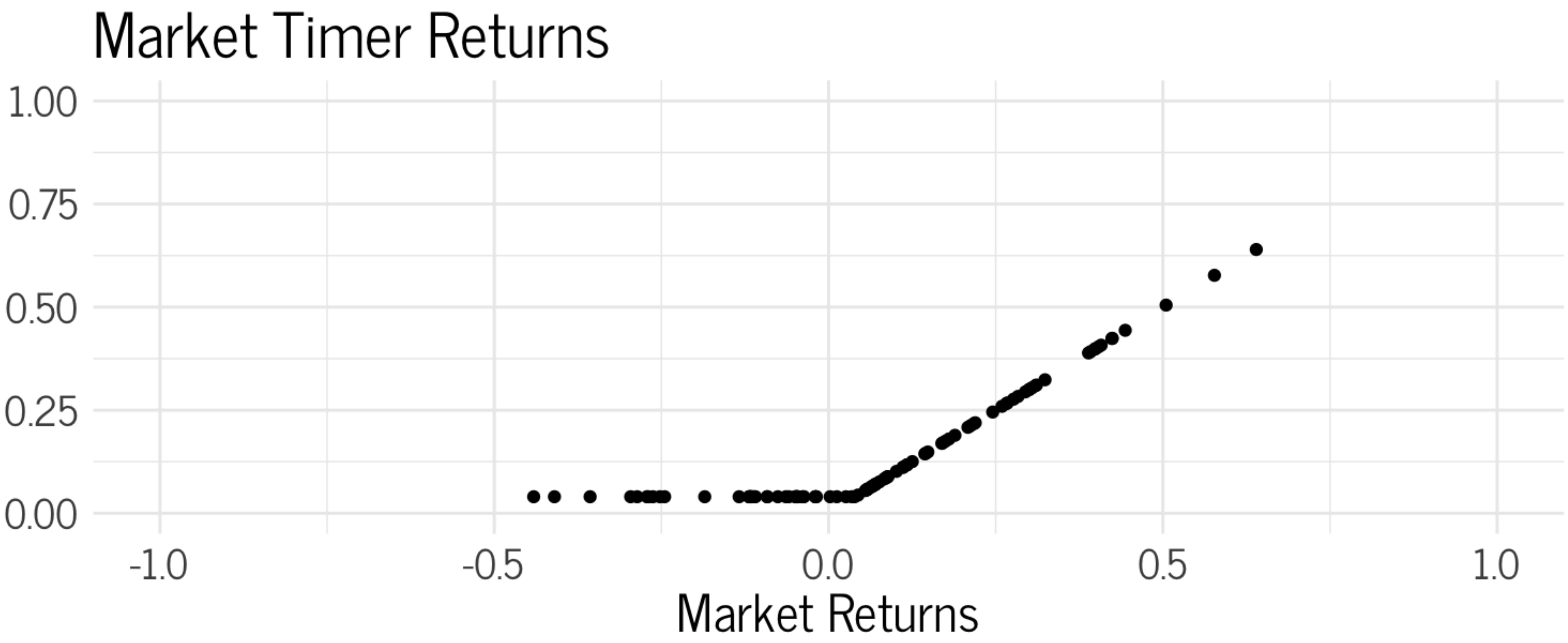
- Suppose with perfect foresight, we can
  1. Buy market when above risk-free rate of 4%
  2. Hold t-bills when market returns below r_f



Dynamic Performance Evaluation

$$r_p = \alpha + r_f + \beta_1(r_m - r_f) + \beta_2(r_m - r_f)^2 + \epsilon_p$$

- $\beta_2 > 0$ implies market timing ability



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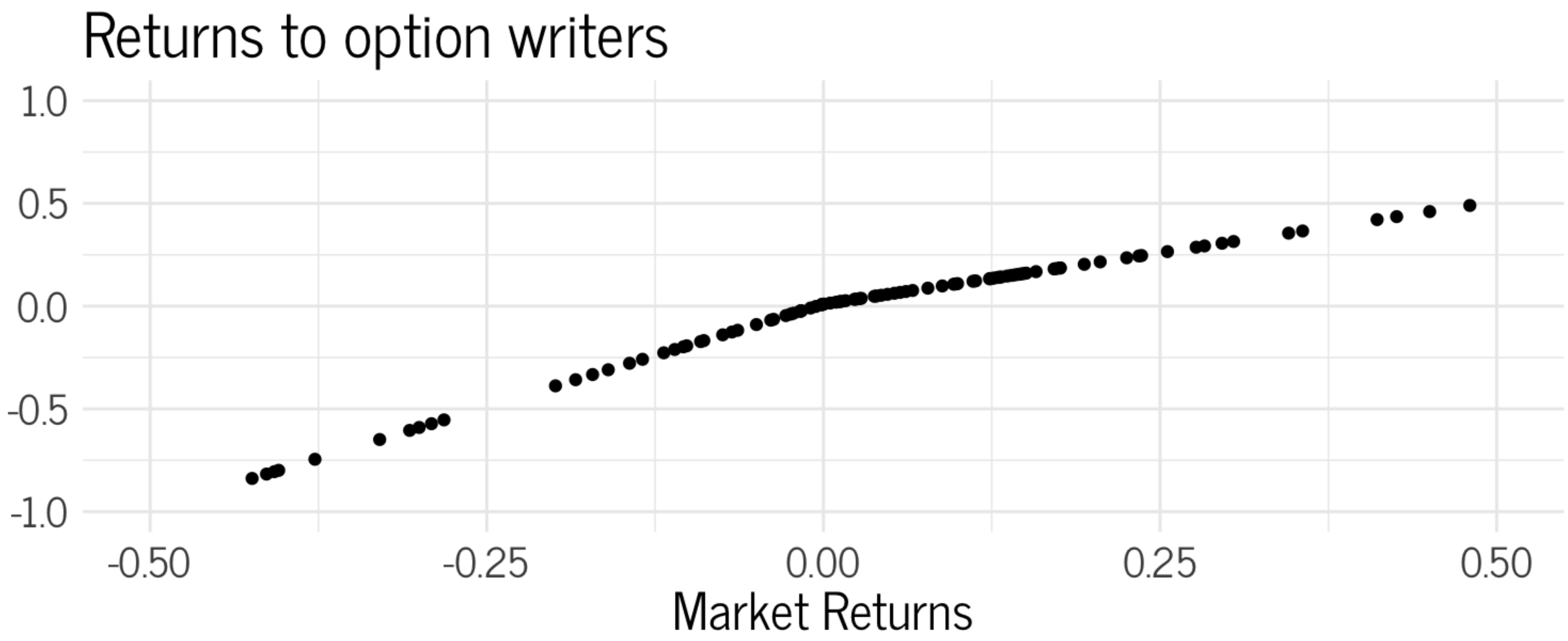
Dynamic Performance Evaluation

- Alternatively, hedge funds may write out of the money put options that exacerbate downturns



Dynamic Performance Evaluation

$$r_p = \alpha + r_f + \beta_1(r_m - r_f) + \beta_2(r_m - r_f)^2 + \epsilon_p$$

- $\beta_2 < 0$ may imply option writing

Non-linear loadings across asset classes

$$\widetilde{r}^{e}_{p,t} = \alpha_p + \beta^{+} \max\{\widetilde{r}^{e}_{m,t}, 0\} + \beta^{-} \min\{\widetilde{r}^{e}_{m,t}, 0\} + \epsilon_{p,t}$$