Prospect Theory and Stock Market Anomalies

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Discussion:

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Outline

1. Setting

2. Estimation & Results

The Question

Can prospect theory help us understand the cross section of returns?

- Authors rightly point out we don't even know what prospect theory robustly *predicts* about the cross section

What does prospect theory predict about the cross section of returns?

- Starting point for analysis: A world where the CAPM would hold, but investors have prospect theory preferences
- Create 22 copies of this world; in each copy, consider a separate anomaly

The Approach

The paper's thought experiment:

- You're born at date -1 with a grim future:
  1. you have two years to live. . . ☹
  2. during which time your only activity will be to trade stocks. . . ☹☹
  3. and you're loss averse, very sensitive to the tails of the return distribution, and engage in narrow framing 😞😞😞
- The good news:
  4. you have a year to figure out what the stock market is
  5. you have some initial wealth, which will be invested in each stock in proportion to its share of the overall market
- Your problem:

$$\max_{\text{port. shares}} \mathrm{E}_0[W_1] - \frac{\gamma}{2}\mathrm{Var}_0(W_1) + b\sum_{i=1}^{N} V(\underbrace{\text{gain in asset } i}_{\text{from birth to death}})$$

The Approach

Some questions such an investor might have at this point:

- What are my investment options?
  - 1000 stocks, whose returns follow a "generalized hyperbolic skewed t"
  - . . . but really actually 10 stocks, as groups of 100 are ex ante identical
  - Each group has variance, skewness, and reference point ("gain overhang") set to match empirical values for the corresponding anomaly decile

    [e.g., in the "small anomaly" copy of the world, "small" firms (size decile 1) are just stocks with SD 76%, skewness 4.3, and gain overhang −15%]
- Who am I trading with at date 0?
  - A continuum of prospect theory investors with identical preferences, calibrated from lab evidence and to match some aggregate moments

Price (or mean of return distribution) then determined in GE, and can see whether implied alphas line up with anomaly alphas.

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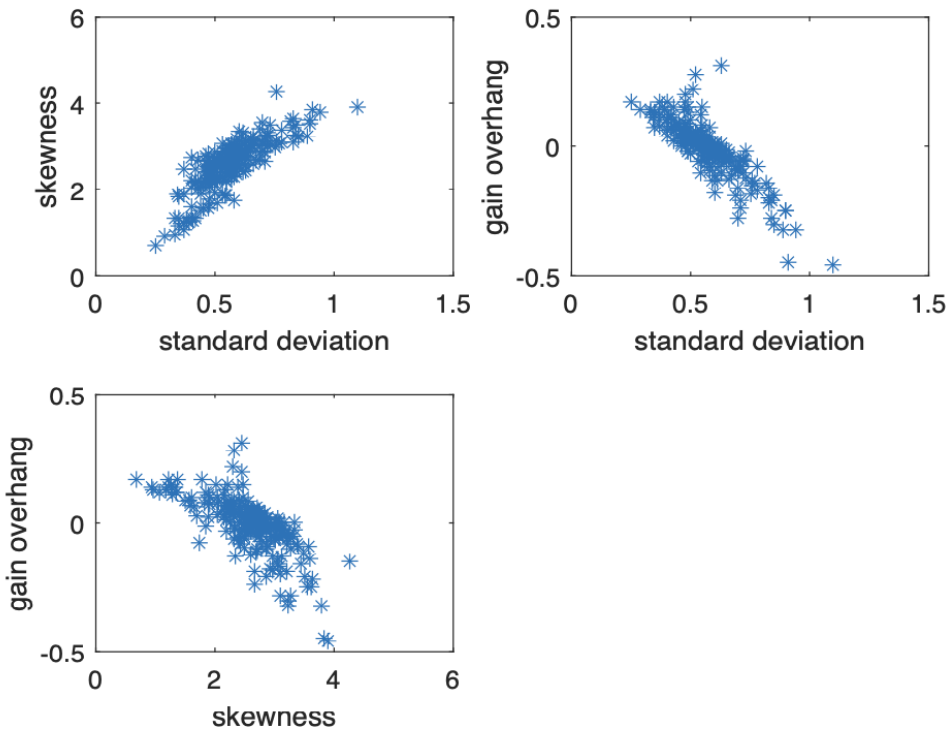
Empirical Inputs

Some questions *we* might have at this point:

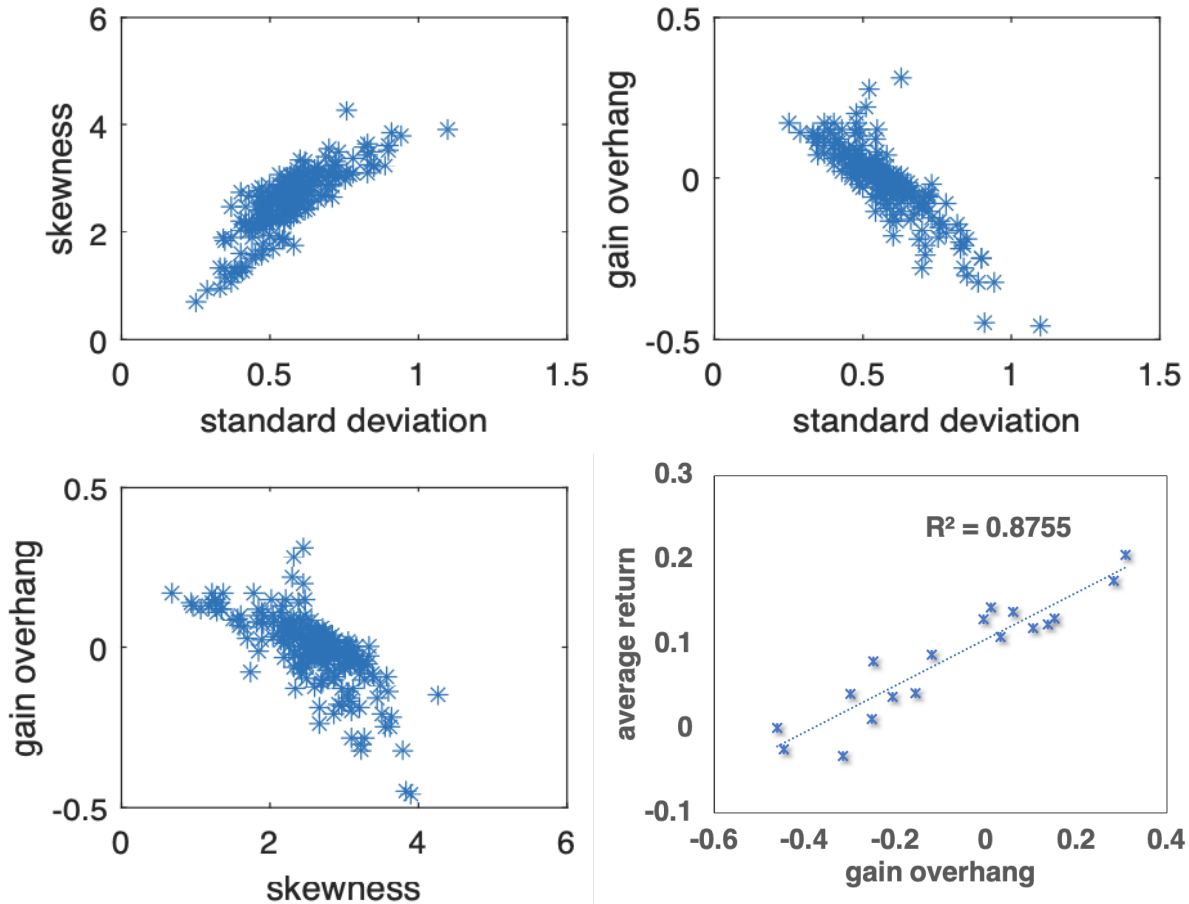
1. Why do anomalies emerge in this framework?
   - This is still a risk-based world. . .
   - . . . but because of narrow framing and loss aversion, the main source of risk is at the security level, rather than w.r.t. the market ⇒ flat SML
2. With risk at the security level, is there any hope of making sense of the data?
   - Yes! Very strong single-factor structure to the characteristics relevant for PT:



Model Predictions

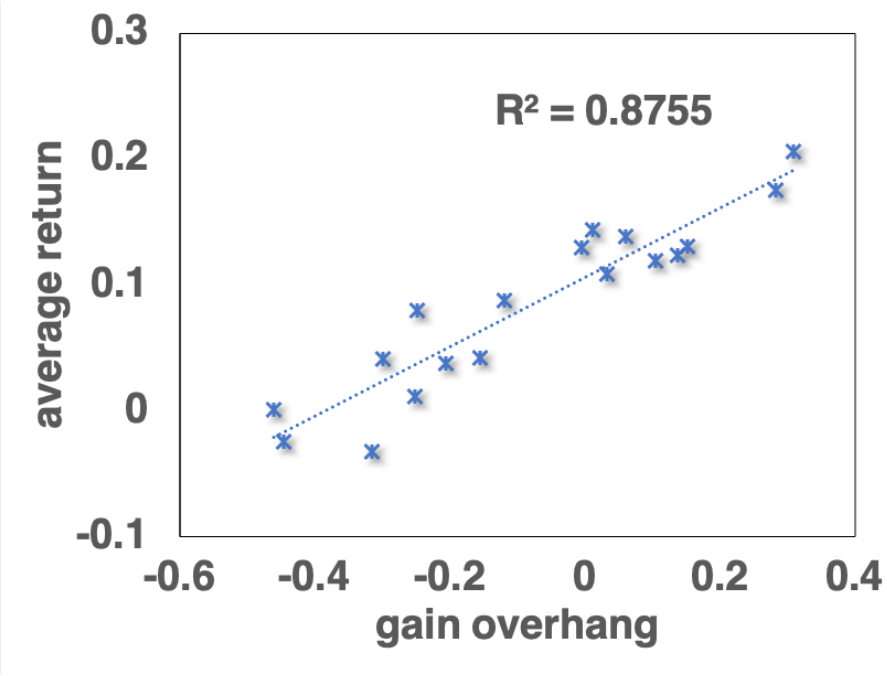
What do anomaly returns look like?

- Procedure works remarkably well for momentum. . . but less so for anything that doesn't look like momentum
- In fact obtain single-factor structure in anomaly returns. Empirical returns for extreme decile portfolios that the model explains well (≈ model predicted returns):



Model Predictions

What's going on here?



- The data says that losses predict more volatile returns but greater skewness
- What does this imply about model-generated return variation?

$$r_{t+1} - \mathrm{E}_t r_{t+1} = (\mathrm{E}_{t+1} - \mathrm{E}_t) \sum_j \rho^j \Delta d_{t+1+j} - (\mathrm{E}_{t+1} - \mathrm{E}_t) \sum_j \rho^j r_{t+1+j}$$

Model Predictions

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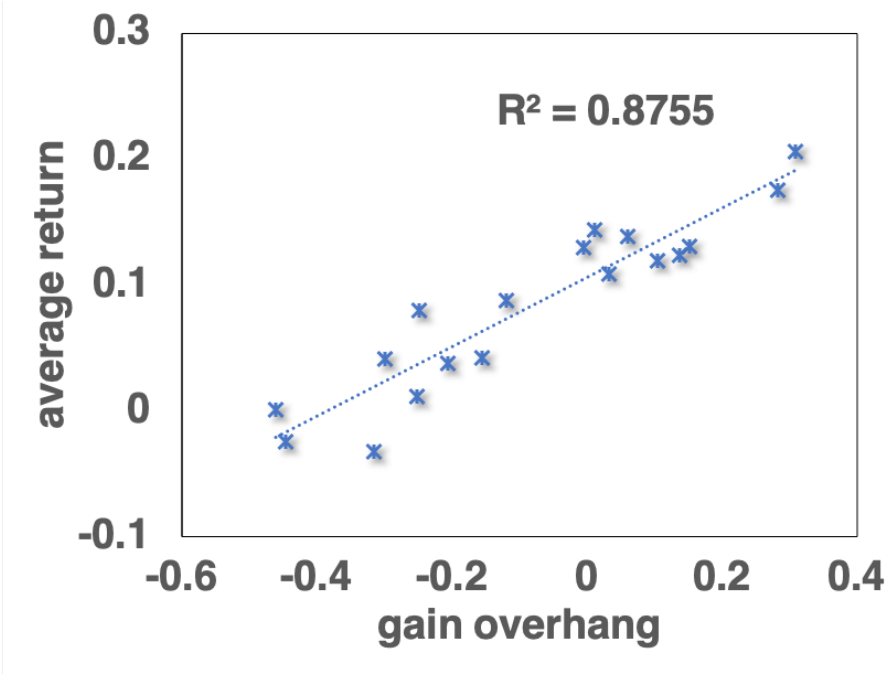

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$$\text{Corr}(\text{cash flow news}, \text{discount rate news}) \approx 1$$

- Expected returns are always higher after *good* news. Looks like momentum!

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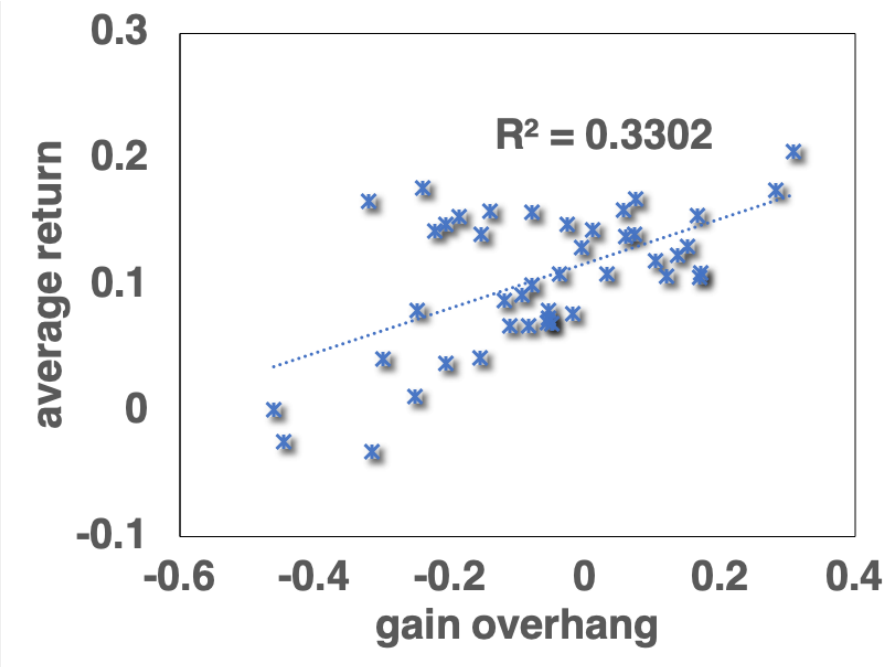

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- Expected returns are always higher after *good* news. Looks like momentum!
- This isn't a horrible approximation to the data at a high frequency, but won't be able to account for value premium [Vuolteenaho (2002): Corr(N_{CF}, N_{DR}) $= 0.4$ monthly; plot above now includes all extreme decile returns for 22 anomalies]

Model Predictions

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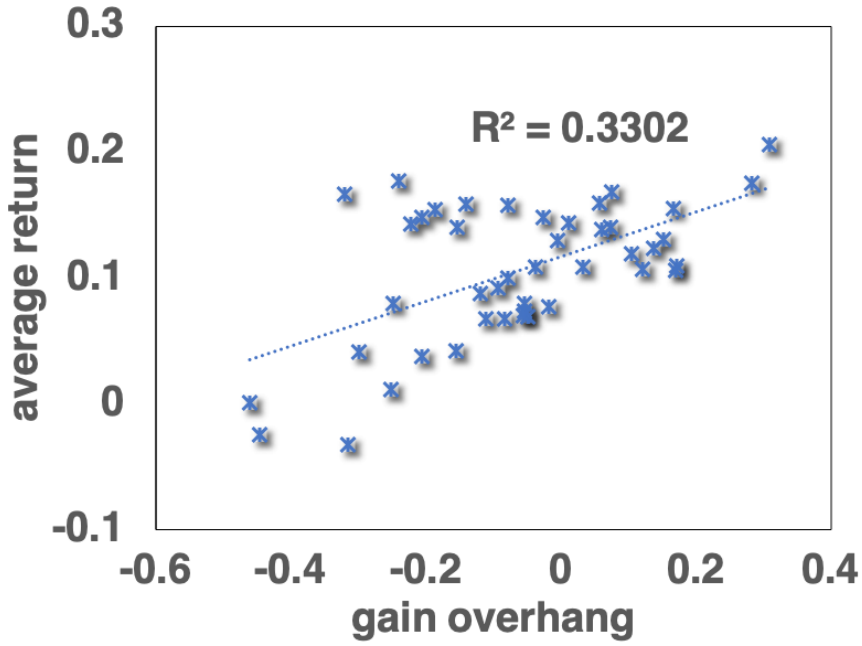

- What's the framework missing?
- Within the static (3-period) framework, allowing for some reference point updating would attenuate the losses ⇒ lower risk aversion channel
  - Barberis, Huang, Santos (2001): *"integration of sequential outcomes is an implausible way to implement prospect theory in a multiperiod context"*
  - Not necessarily a bad thing to be "contradictory" (c.f. Walt Whitman); just tells us that plausible specifications yield complementary predictions

Model Predictions

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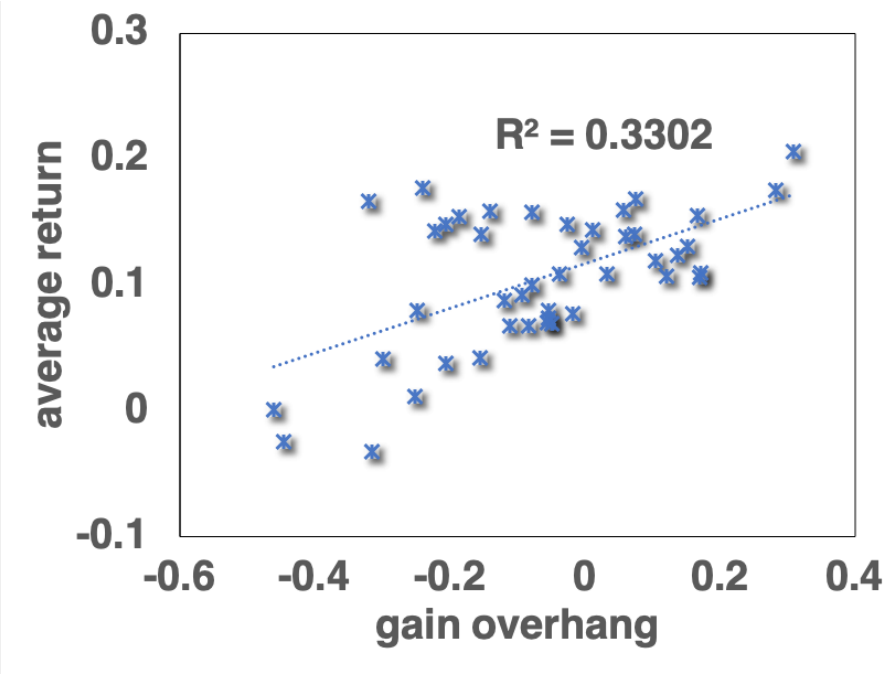

- What's the framework missing?
- Within a dynamic context, may be useful to think of growth stocks as long-horizon gambles
  - Provides a good hedge against itself intertemporally, since over the long horizon bad cash flow news predicts higher returns

Final Notes

- Very nicely done and thought-provoking paper
- Remaining question: Are anomalies just characteristics of return distributions, or do firm characteristics matter too?