

# Prospect Theory and Stock Markets Anomalies

*Barberis, Jin, and Wang*

Discussion – SFS Cavalcades – May 2020

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# Disclosure

**I am not a Behavioral Finance Specialist**

# This Paper

## Cutting-edge of behavioral finance

- Sophisticated model that incorporates all the elements of prospect theory
  - ▶ Narrow-framing
  - ▶ Probability-weighting
  - ▶ Convex preferences over negative payoffs
  - ▶ Loss-aversion (“kinky” preferences)
- How does it price assets in equilibrium
  - ▶ Beyond mean-variance preferences
  - ▶ Role of higher-order moments: idiosyncratic-volatility, skewness, and kurtosis

## Empirical Applications in the Cross-section

- Accounting for stock market anomalies
- Only miss a few of them (e.g. value, but explained elsewhere...)

# This Discussion

A lot to cover ...

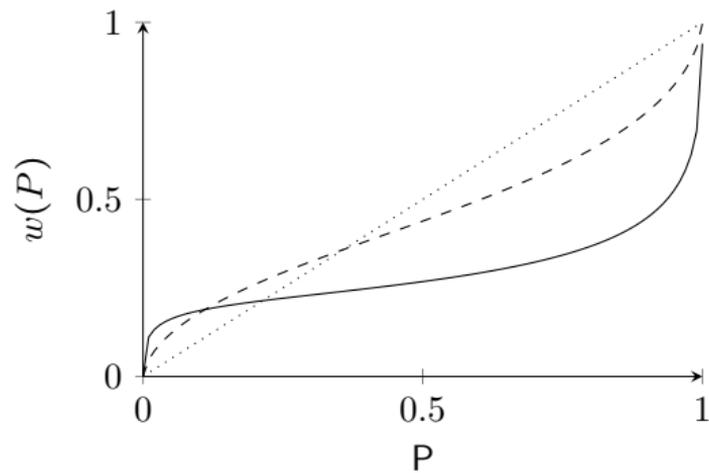
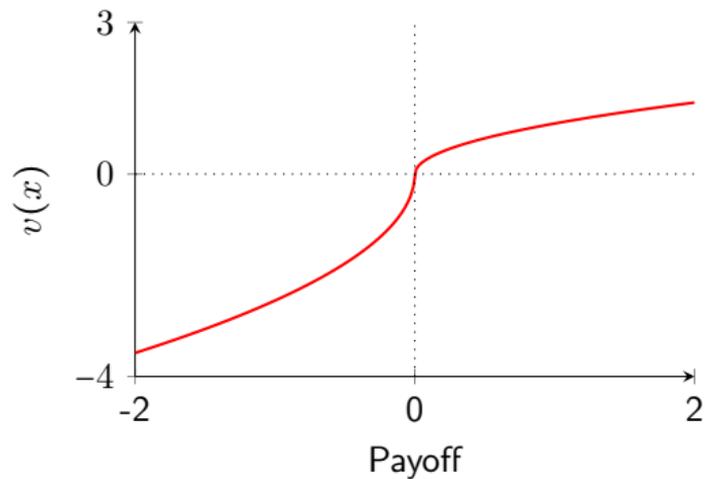
- Present framework and insist on key mechanism of pricing
- Discuss articulation between theory and testing
- Results

# Plan

**1** Framework: Prospect Theory

**2** Bringing Prospect Theory to the Cross-Section

# Prospect Theory in People



# Prospect Theory in Theory

## How to write a portfolio choice problem?

- Authors' constraints: exhaustivity, this is about performance, not about showing how behavioral mechanism should affect investors' preferences.
- Maximize future wealth  $W_1 = W_0 (R_f + \Theta'(R - R_f))$  choosing portfolio  $\Theta$

$$\max_{\Theta} \underbrace{E(W_1) - \frac{\gamma}{2} \text{Var}(W_1)}_{\text{MV}} + b_0 \sum_i V(G_i)$$

- $G_i$  is the potential gain on the asset  $i$  position  $G_i = W_0 \Theta_i (R_i - R_f) + W_{-1} \Theta_{i,-1} g_i$ 
  - ▶ Narrow framing: prospect theory component evaluated independently across assets
  - ▶ Include past gains  $g_i$  in total gain payoff

## Distribution of returns

- Beyond mean-variance distribution: skewness matters here
- **Four**-parameter distribution for first **four** moments
- Only one free-parameter (mean) to clear markets: this is the testable implication

# Prospect Theory in Practice

## How to solve a portfolio choice problem?

- Symmetric equilibrium: does not always have a solution because of utility kink
- Heterogeneous holdings: curse of dimensionality
- Restrict the problem: each choice is marginal to holding the market in other assets

## Insight from the non-symmetric equilibrium

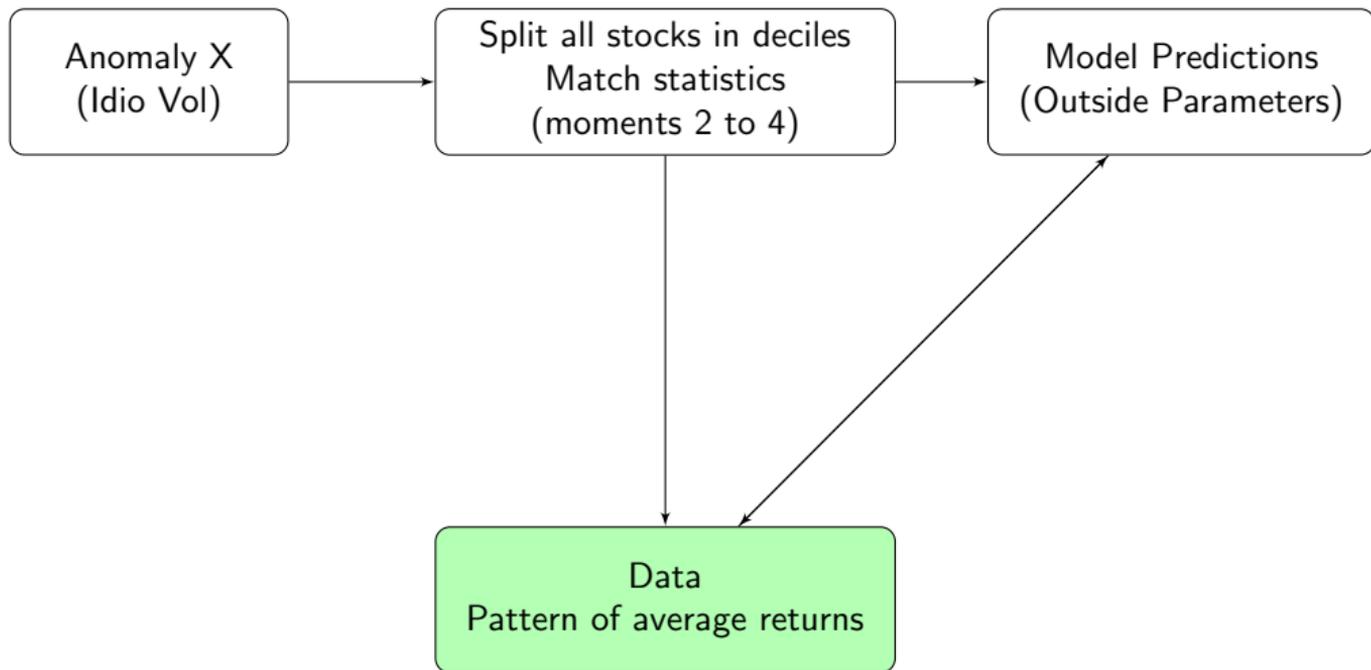
- Some investors have high demand for the asset: positive gain overhang
- Some investors want to divest asset: lock in prior gains

# Plan

1 Framework: Prospect Theory

2 Bringing Prospect Theory to the Cross-Section

# Pricing anomalies



# Pricing Anomalies

## Anchoring

- Use experiment parameters for preferences
  - ▶ Begg's questions about aggregation in the model
  - ▶ What exactly is driving the pricing: skewness/volatility?
- Model: we know what drives demand for assets
  - ▶ examples: skewness (weighting) and volatility (narrow-framing)
- What about splitting stocks along the characteristics that matter
  - ▶ Calibrate model on these few dimensions (again e.g. ivol or iskew)
  - ▶ Benefit: focus on which of the model parameters actually drive the pricing
  - ▶ Is it  $b_0$ ,  $\lambda$ ,  $\delta$ ,  $\alpha$  etc... (and then eventually confront it to experiments)

## Why this matters?

- How does the model price all the anomalies together?
- Understand the few dimensions of heterogeneity and what is behind them
- Model prices 13 anomalies out of 22. Why?
  - ▶ If we know the dimensions of variation, "of course we were never gonna get investment, it loads on some other dimensions we do not capture"

# Pricing Anomalies

## Is narrow framing too narrow

- Narrow framing implies demand for stocks driven by individual statistical characteristics
  - ▶ See suggestion above
  - ▶ Give me individual characteristics, I will give you the price
  - ▶ Strong departure from Markovitz portfolio theory
- Rise of low costs ETFs: easy to consider stocks / style portfolios together
- Reduce dimension of stocks and consider co-statistical properties:
  - ▶ How does stock A contribute to skewness of my portfolio...

# Pricing Anomalies over Time

## Why Estimation Matters

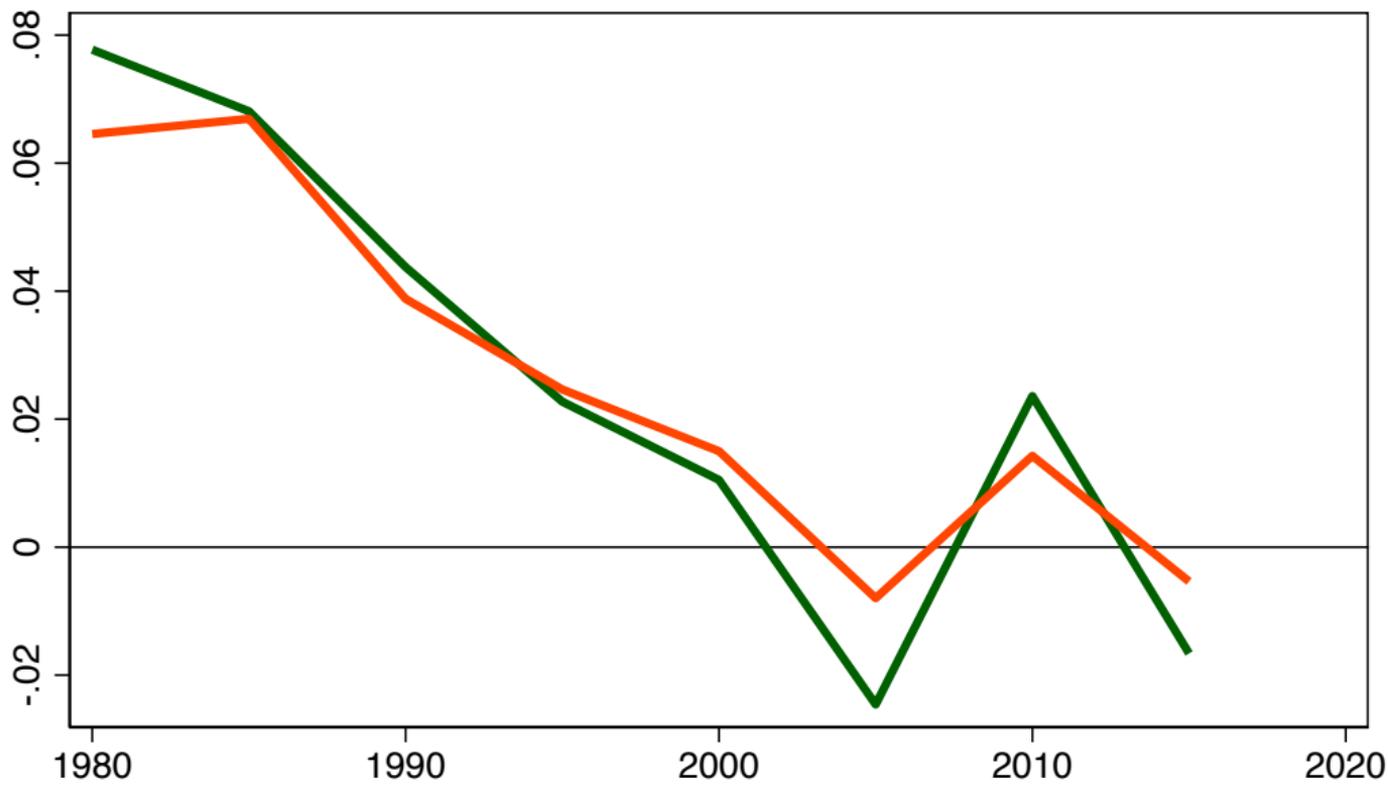
- McLean and Pontiff (2016)
- How do we deal with with variation over time of anomalies?
- Reestimate? Which parameter are stable? Should we require constant preference parameters?

## Skewness

- Gomez, Haddad, and Loualiche (2020)
- Idiosyncratic skewness disappears in the last 30 years: returns are symmetric
- Should prices be lower now? Since investors like skewness.

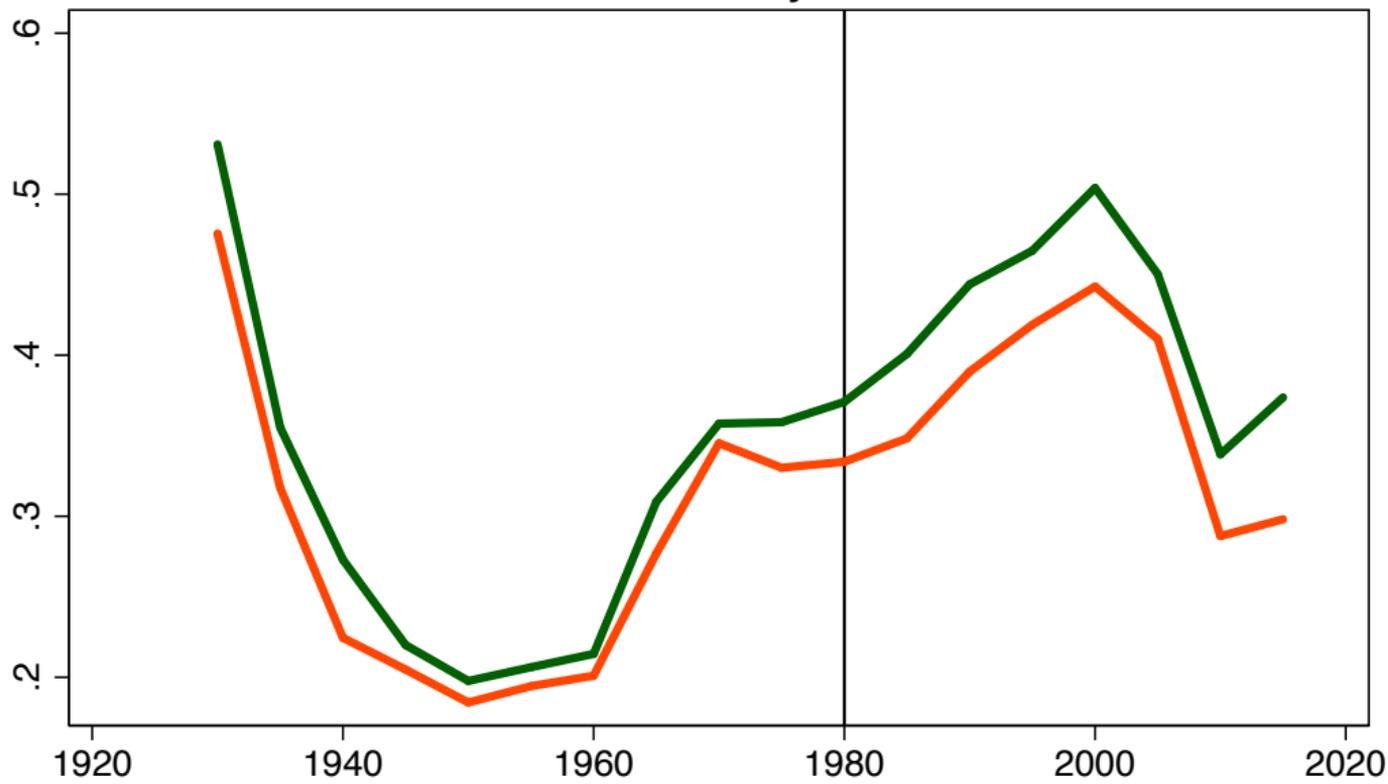
# Pricing Anomalies over Time

## Skewness



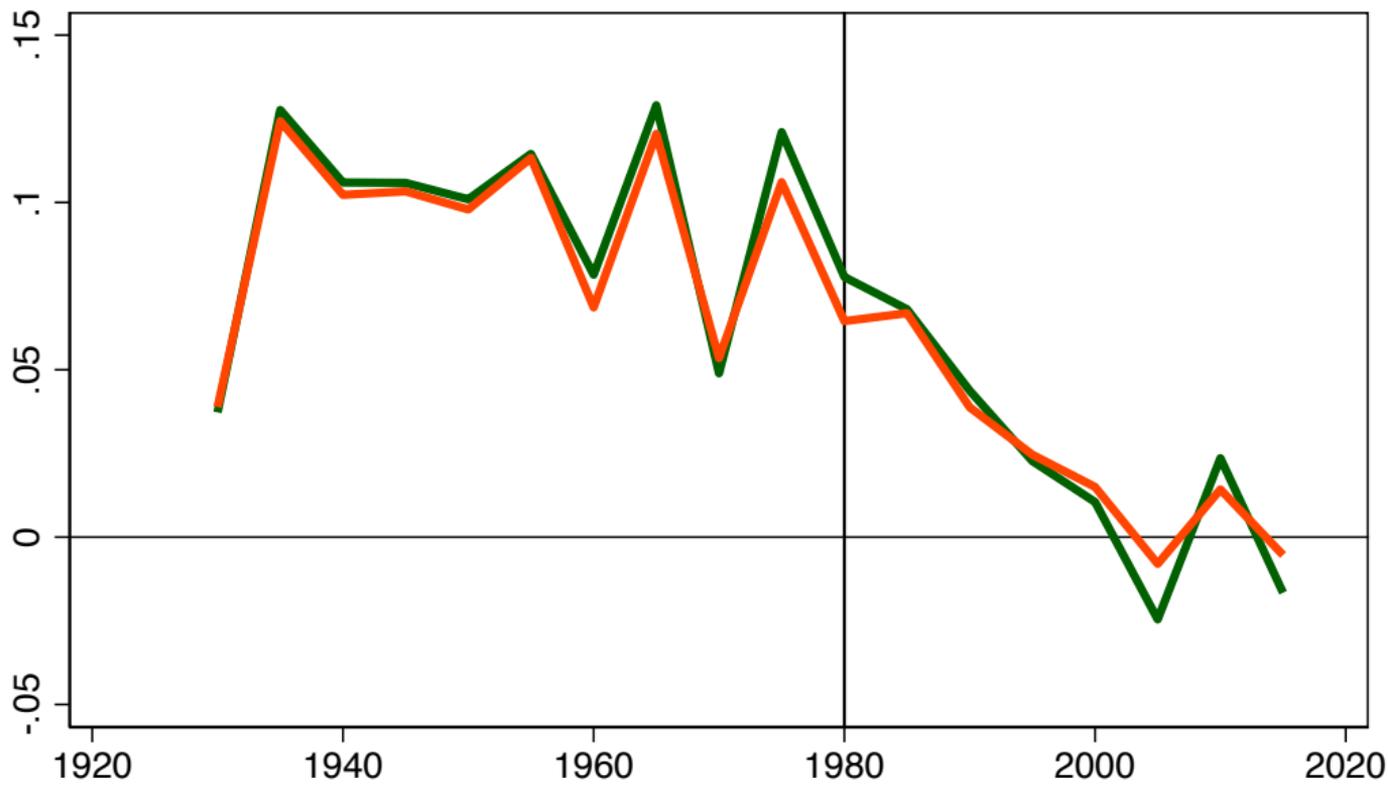
# Pricing Anomalies over Time

Volatility



# Pricing Anomalies over Time

## Skewness



# Final Thoughts

**Very interesting Paper!**

**Take away**

- New exhaustive approach to bring cumulative prospect theory to price anomalies
- Sheds light on host of yet unexplained anomalies (ivol for example)

**Great Paper!**