The Perception of Dependence, Investment Decisions, and Stock Prices

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Introduction

Motivation

- **Theory:** Diversify more at lower correlation (Markowitz, 1952)
  ...so that correlation should be priced (Sharpe, 1964)
- **Empirical Findings:** Inconsistent with theory. Correlation neglect...
  - ▷ ...in the lab, e.g., Kroll/Levy/Rapoport (1988): no diversification
  - ▷ ...in the field, e.g., Benartzi/Thaler (2001): naive $\frac{1}{N}$ diversification
  - ▷ ...and in asset pricing, e.g., Fama/French (2004): β is not priced
- → **Does dependence really not matter?**
- → **Idea:** Maybe investors perceive dependence not as correlation or β, but as comovement of frequent returns, or salient extreme returns?

Research Questions

Q1 **Beliefs:** How do investors perceive dependence?
Q2 **Choice:** How does perception of dependence affect investment decisions?
Q3 **Market:** Does perceived dependence influence stock returns?

Contribution

- Realistic, graphical presentation of information
- Keeping marginal distributions equal
- Varying dependence in extreme, infrequent vs. frequent, moderate returns
- Linking lab findings to historical returns

Experiments

Four Experiments Show...

- With realistic presentation of information, participants understand linear dependence and diversify more at low correlation.
- When comovement in frequent, moderate returns and extreme, infrequent returns varies separately, participants understand dependence in frequent returns and diversify more when it decreases, even if correlation increases.
- → We report only one, representative experiment out of the four.

Experimental Design

- **Task:** Allocation decision for an endowment of $10,000 between assets 1 and 2.
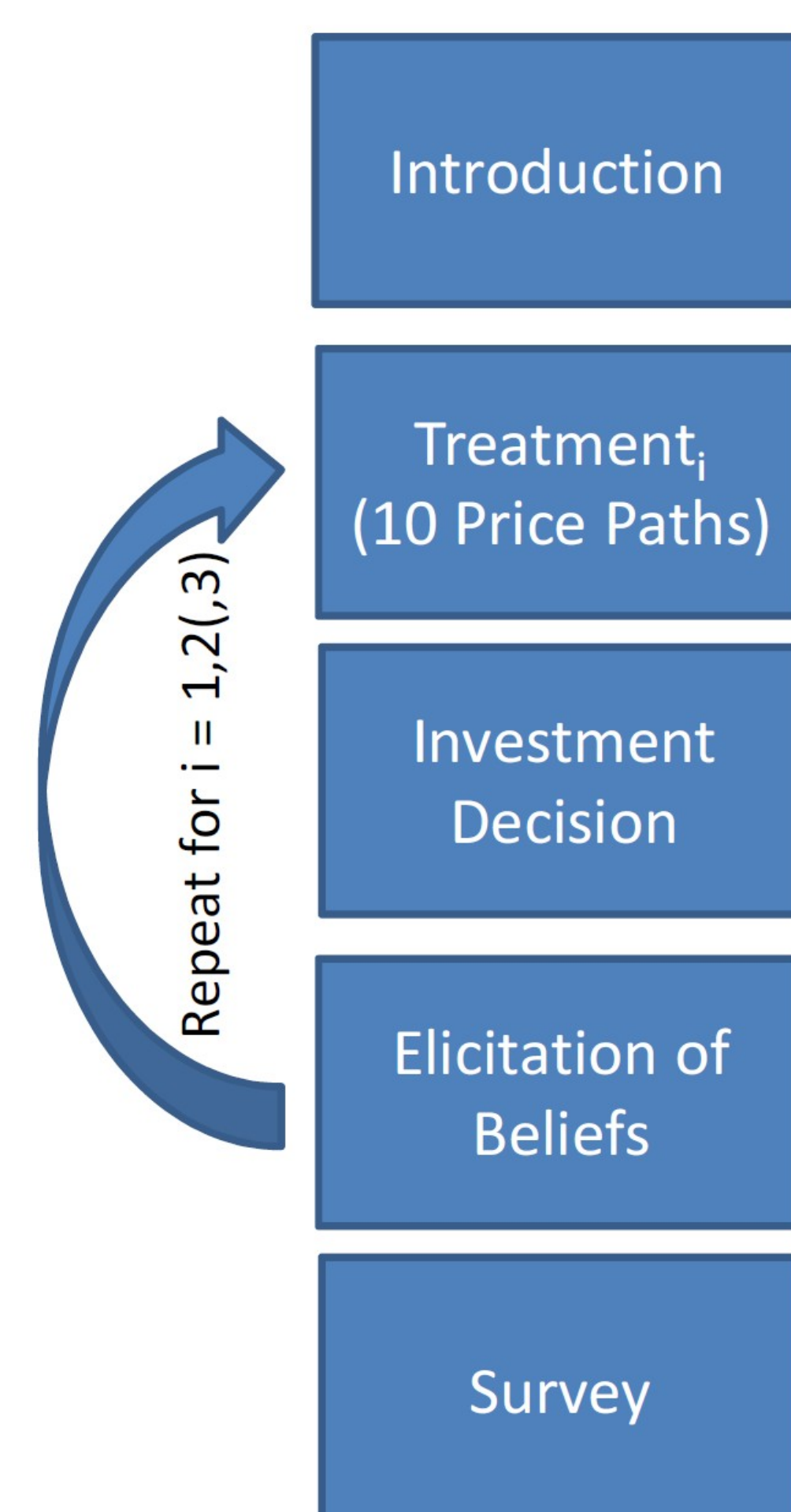- **Treatments:** Varying dependence between assets 1 and 2 within subjects (two rounds).

  Assets 1 and 2 have...
- expected returns of 5% and 4%.
- equal higher moments (e.g. volatility)
- → Asset 2 is only attractive because it provides diversification benefits.

- **Treatment 1:** Dependence in frequent, moderate (extreme, infrequent) returns positive (negative), correlation -0.21.
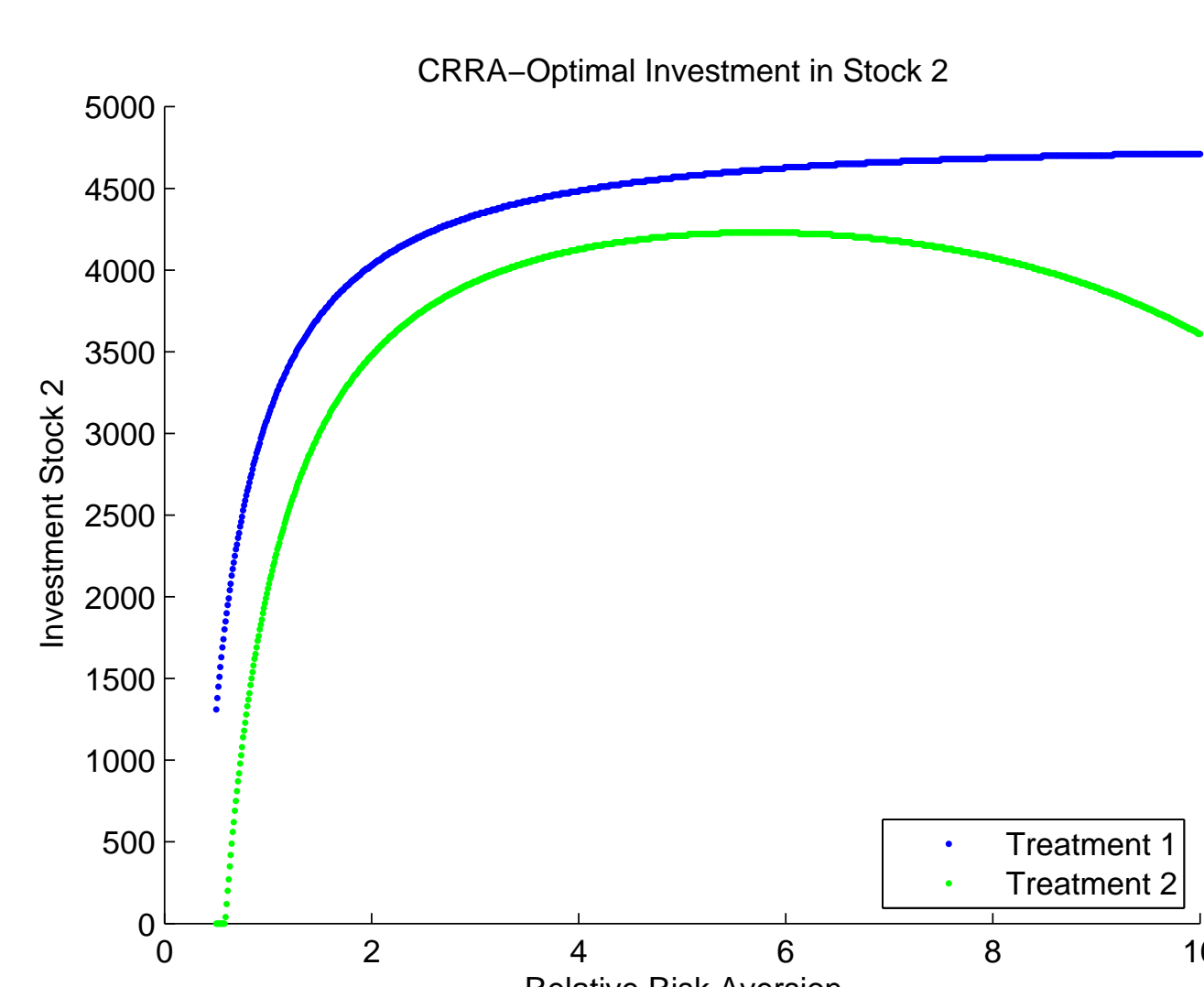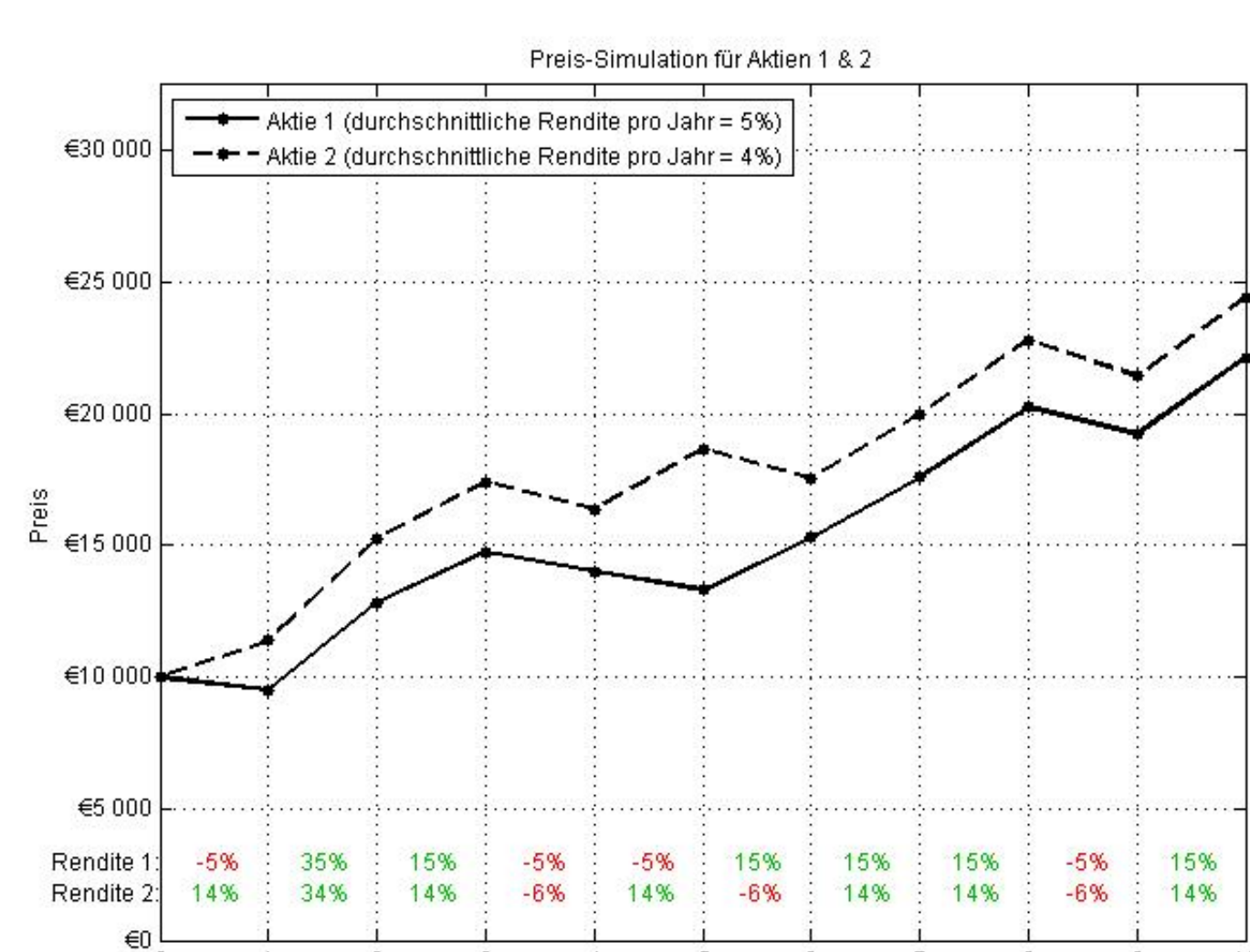- **Treatment 2:** Dependence in frequent, moderate (extreme, infrequent) returns negative (positive), correlation +0.21.
- → Rational Markowitz (1952) investor should diversify more in treatment 1.

Introduction

Treatment_i (10 Price Paths)

Repeat for i = 1,2,(3)

Investment Decision

Elicitation of Beliefs

Survey

Stimulus & Optimal Investment

Subjects sample 10 ten-year price paths. CRRA investor diversifies more in treatment 1.

Outcome Beliefs: Perceived Dependence

Given that stock 1's price increases moderately,
I expect stock 2's price to...

		−0.21	+0.21	Difference
decrease	1	10	**52**	42
	2	43	47	4
increase	3	**54**	8	−46
mean		2.41	1.59	−0.82***
				(0.09)

Investors understand that comovement in frequent, moderate returns is
... positive in treatment 1 (at correlation -0.21)
... negative in treatment 2 (at correlation +0.21)
→ **They understand frequent, moderate comovement.**

Given that stock 1's price increases strongly,
I expect stock 2's price to...

		−0.21	+0.21	Difference
decrease	1	**48**	41	−7
	2	28	28	0
increase	3	31	**38**	+7
mean		1.84	1.97	0.13
				(0.12)

Investors don't understand that comovement in infrequent, extreme returns is
... negative in treatment 1 (at correlation -0.21)
... positive in treatment 2 (at correlation +0.21)
→ **They don't understand infrequent, extreme comovement.**

Outcome Choice: Investment Decision

- Invest 10.000 € for one year. How much do you invest in stock 2?
- Random effects regression of $investment_2$ on $I_{+0.21}$:

	(1)	(2)	(3)
$investment_{2,-0.21}$	3173.18***	3173.18***	3173.18***
	(171.87)	(171.87)	(171.87)
$I_{+0.21}$	928.79***	928.79***	928.79**
	(231.47)	(231.47)	(231.47)
Risk Aversion		260.95**	211.99*
		(125.41)	(128.61)
Financial Literacy			−75.79
			(155.15)
Numeracy			−183.29
			(152.42)
N	214	214	214

- Subjects diversify more by >900 € when moderate dependence goes down, although correlation increases.
- This goes against predictions under common utility functions
- ...but it is **consistent with perceived dependence**.
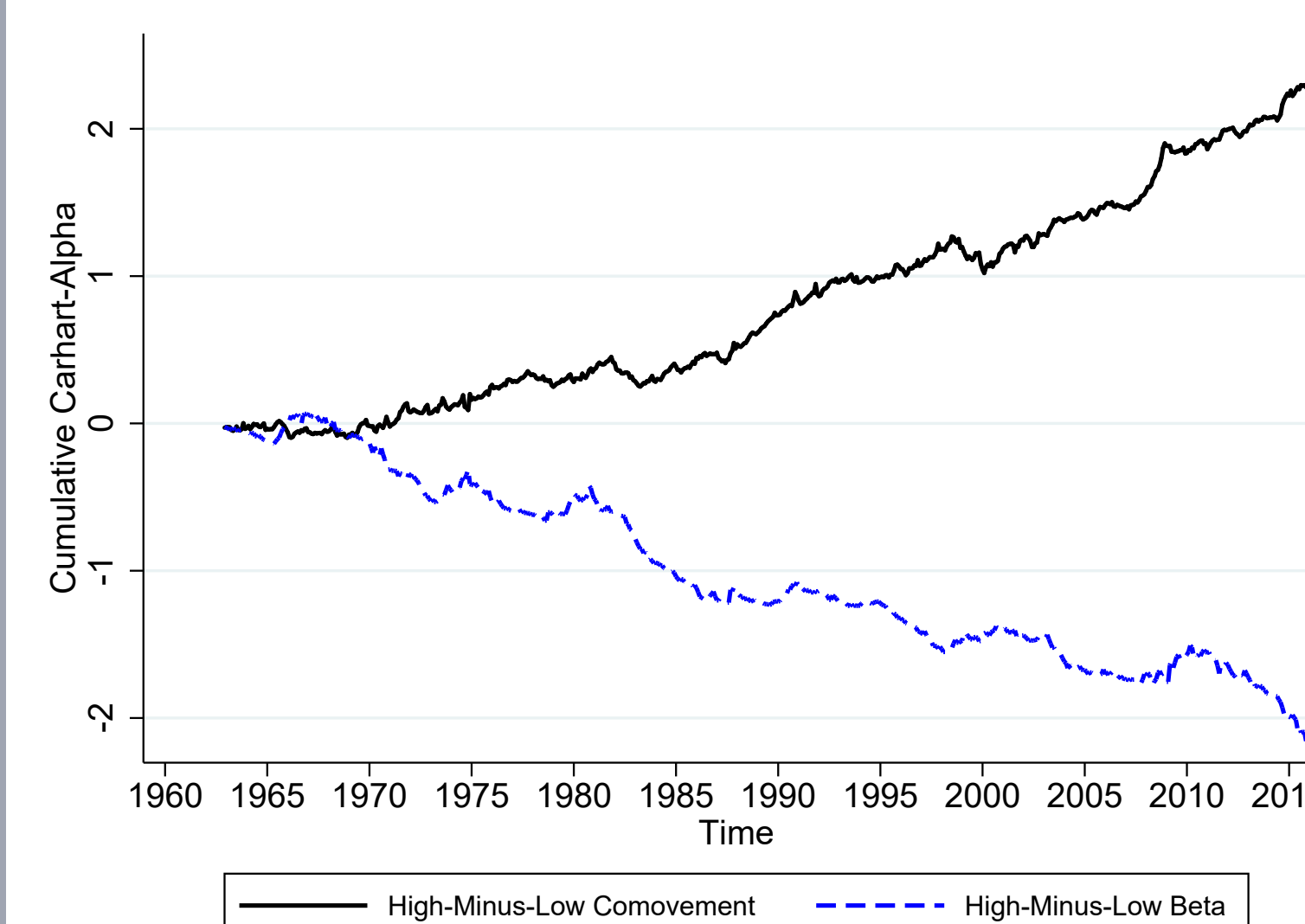- Diversification into asset 2 increases in risk aversion.

From the Lab to Reality

Outcome Market: Return Premium for Perceived Dependence

Investors use frequency of comovement as a risk measure in the lab.
→ Is it priced in historical data? Strategy:
- Analyze standard 1963-2015 US stock market data
- CoMove Measure: Fraction of equally-signed stock and S&P 500 returns over last 36 months
- ...test whether stocks with high CoMove have higher returns
- ...controlling for β

- **High CoMove exhibit significant return premium over low CoMove stocks**.
- Robust to controlling for factor models and firm characteristics.
- Robust to CoMove based on 52 weeks or 260 days.
- Premium has increased over time, consistent with increasing public attention towards diversification since 1963.

Conclusion

Summary and Link to Paper

- **Beliefs:** The frequency of comovement between returns drives beliefs about dependence, whereas infrequent extreme returns are not understood.
- **Choice:** Participants diversify more at high perceived dependence.
- **Market:** Historical US return premium for stocks with more frequent comovement with S&P 500.
- **Bottom line:** Perceived dependence matters for diversification decisions and stock prices (whereas correlation or β does not).

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