Beta and Biased Beliefs

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4th SUERF/UniCredit & Universities Foundation Workshop

The empirical record of the CAPM

Theory: $E(R_i) = R_f + \beta_{iM} * [E(R) - R_f]$

Empirical finding:

Average Annualized Monthly Return versus Beta for Value Weight Portfolios Formed on Prior Beta, 1928–2003

Fama/French (2004, JEP)
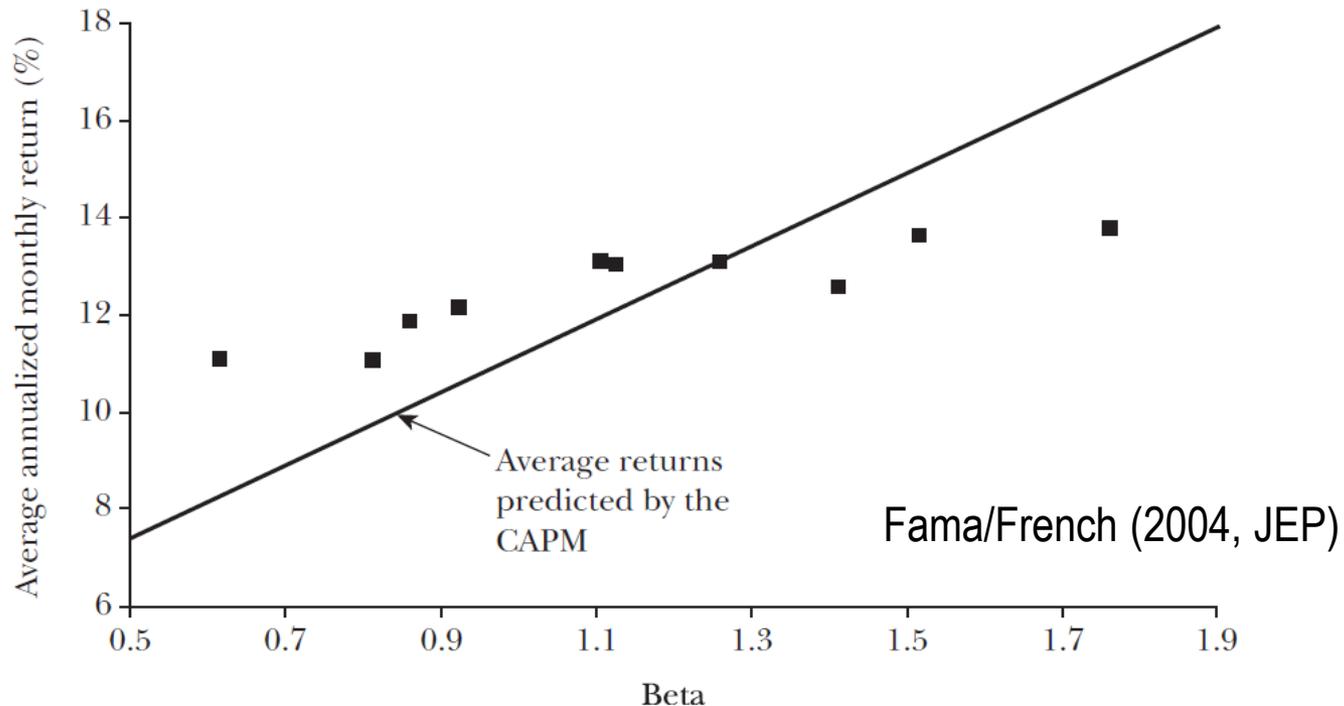
Effect even stronger in most recent 50 years: SML flat or slightly downward sloping!

D. Top 1,000 Stocks, Beta Quintiles

Value of $1 Invested in 1968
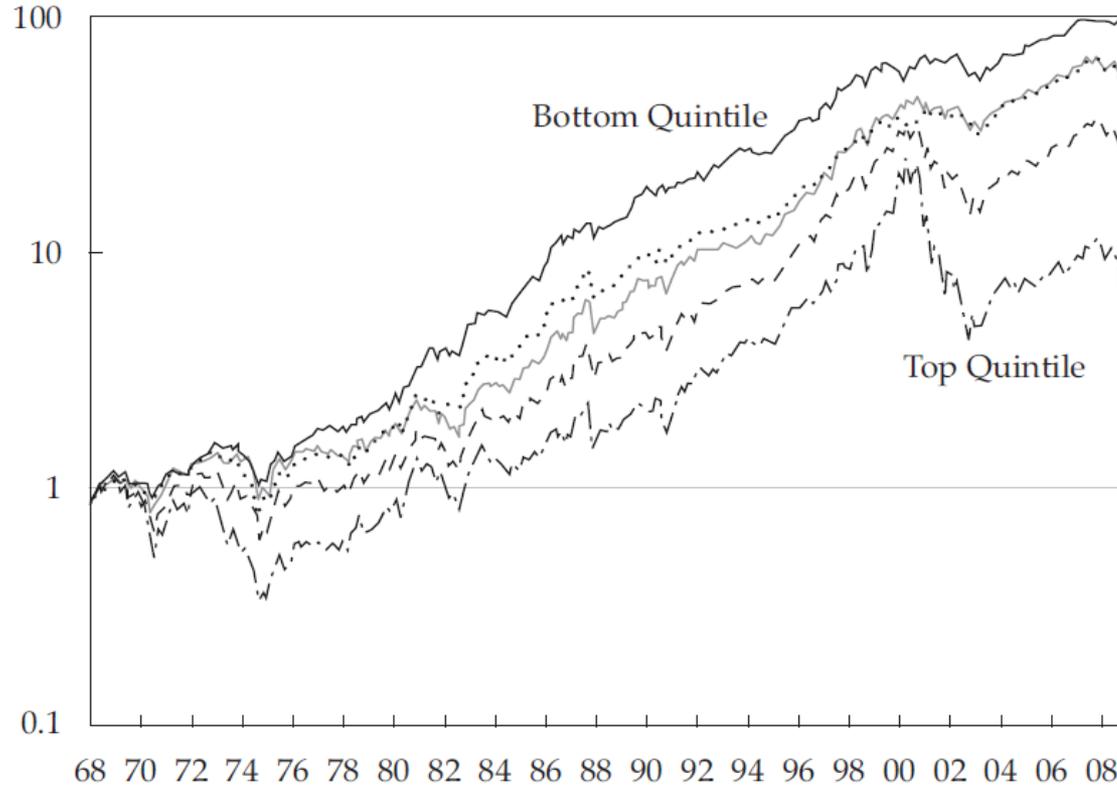
Baker/Bradley/Wurgler (2011): Beta anomaly is

"a particularly compelling" candidate for **"the greatest anomaly in finance"**

Selected existing explanations of the beta anomaly

- Frazzini and Pedersen (2014) (and others): leverage/funding constraints

- Baker et al. (2011) (and others): agency issues + other consequences of delegated portfolio management

- Novy-Marx (2014), Fama and French (2016): Profitability

- Schneider et al. (2016): Downside risk / Coskewness

- Bali et al. (2017): Preference for lottery-like stocks

- Antoniou et al. (2016): Investor sentiment

- Hong and Sraer (2016): Macro disagreement + short-selling constraints

- ...more!

This study:

- **Most support for behavioral explanations**

- **Enhance understanding of the underlying mechanisms**

State of the literature: Beta anomaly is major cross-sectional return puzzle

1 **Many competing explanations**

➤ **Blurry picture on underlying causes**

2 **U.S. stock market only, but global phenomenon**

➤ **Generalizability of proposed return predictive mechanisms?**

- Harvey/Liu/Zhu (2016): "We argue that most claimed research findings in financial economics are likely false."

- Karolyi (2016): "large and persistent US (home) bias in academic research in Finance."

➤ **This paper:**

- Beta anomaly primarily represents mispricing driven by behavioral biases

- Synthesize information from 50 stock markets

Beta and Behavioral Biases

1

Overconfidence

- Daniel/Hirshleifer (2015): „overconfidence provides a natural explanation for (...) betting-against-beta effects" due to overconfident disagreement + market frictions

- Separately: High beta stocks natural habitat for overconfident investors

2

Representativeness heuristic

- Ex post, many „successful stock picks" will be high risk / high beta stocks

- Asymmetric social communication (e.g., Hirshleifer/Han (2015))

3

Mental accounting   (e.g., Shefrin/Statman (2000))

4

Attention-driven buying (e.g., Barber/Odean (2008))

**Intuitive + well theorized**

Data

- Stock market data

    - U.S.: CRSP, Compustat

    - International: Datastream (extensive screens), Worldscope

    - Exclude stocks < 10 Mio USD, countries <25 eligible firms or <60 eligible months

- (Baseline) Sample period: 1/1990-12/2013

- Baseline Sample:

    - 50 countries

    - ~ 50,000 firms

    - ~ 116,000,000 firm days

Empirical approach

- Beta computation (baseline):

    - Dimson (1979) betas

    - Daily data over previous 12 months

    - Quintile-based long/short portfolios

- Asset pricing approach

    - Local Fama and French (1993) three factor models

- Return weighting

    - Both equally weighted and value-weighted

Betting against beta across the globe: Baseline

Long/short quintiles, average monthly local three-factor alpha, equally weighted returns
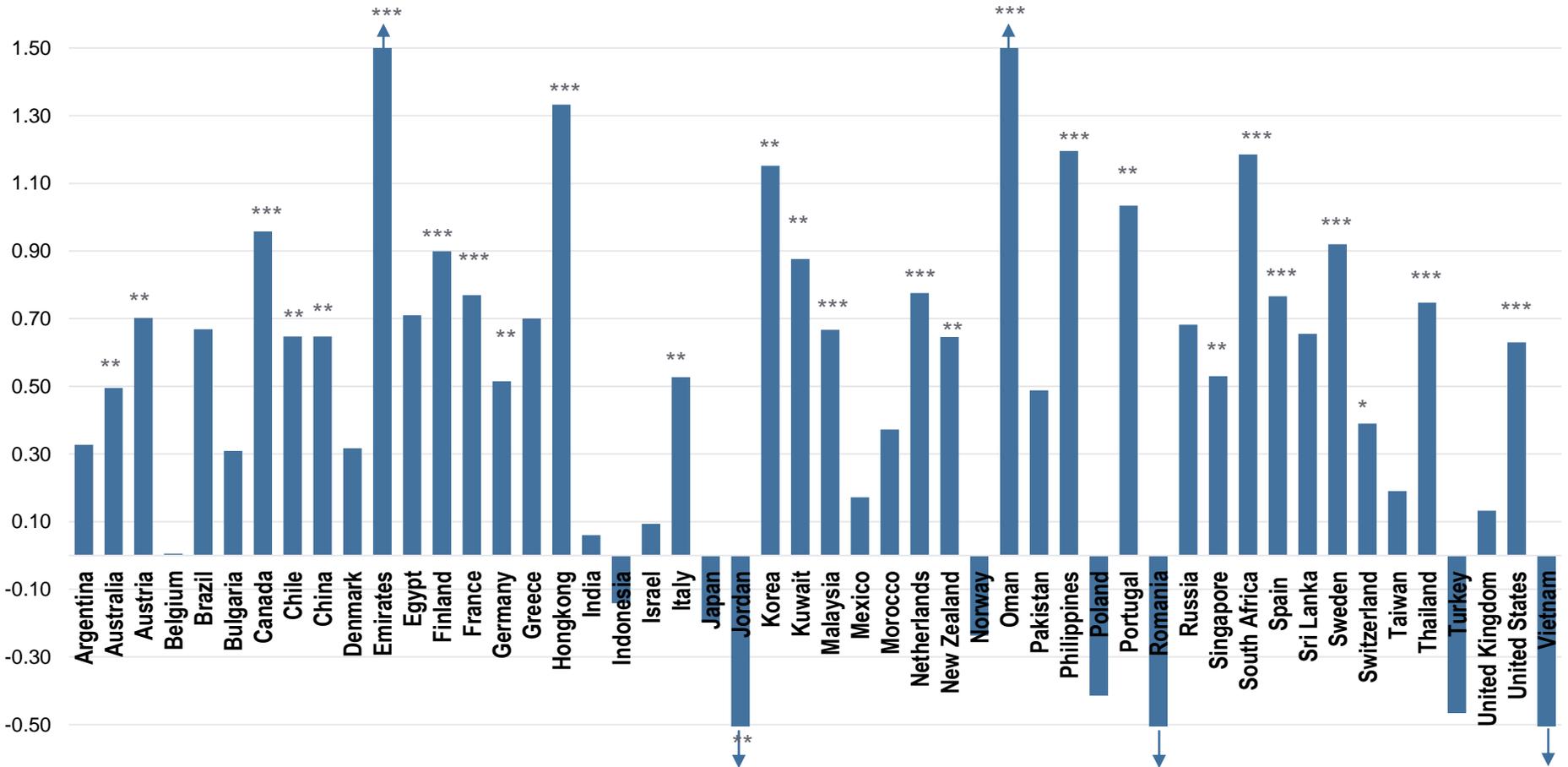
Betting against beta across the globe: Baseline

Average three-factor alpha (in bp per month)

Equally weighted returns

Value-weighted returns
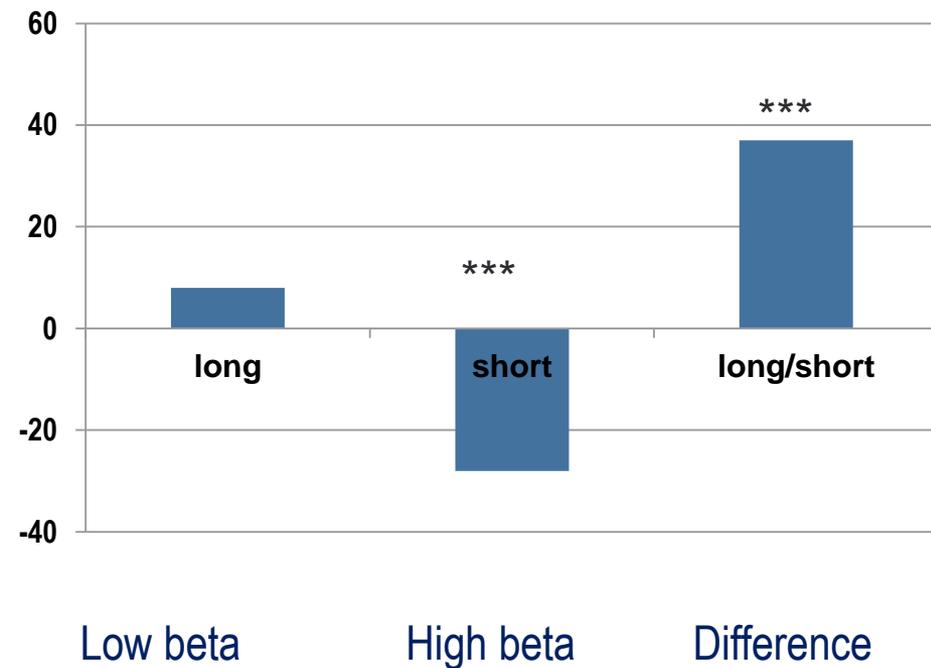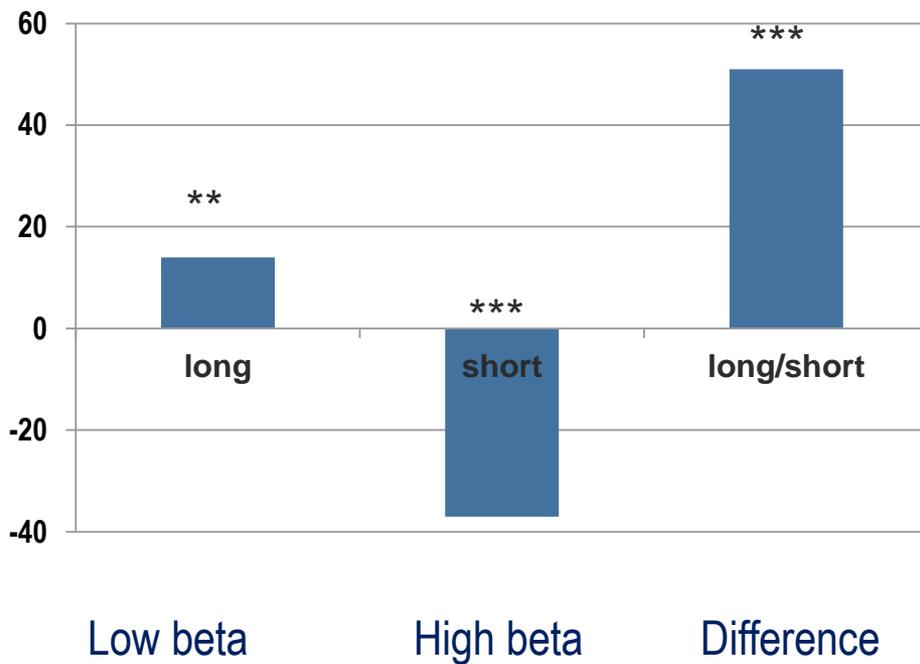
Moreover: Return pattern is robust

# Test 1: Beta and predictable market reaction to firm-level news

- Rational expectations vs. biased expectation framework:

  Random news vs predictable returns around firm-specific news days (e.g., Engelberg et al. (2016))

- 1.088 million earnings announcements: Cumulative abnormal return over days (-1,0,1)

**Earnings announcements**
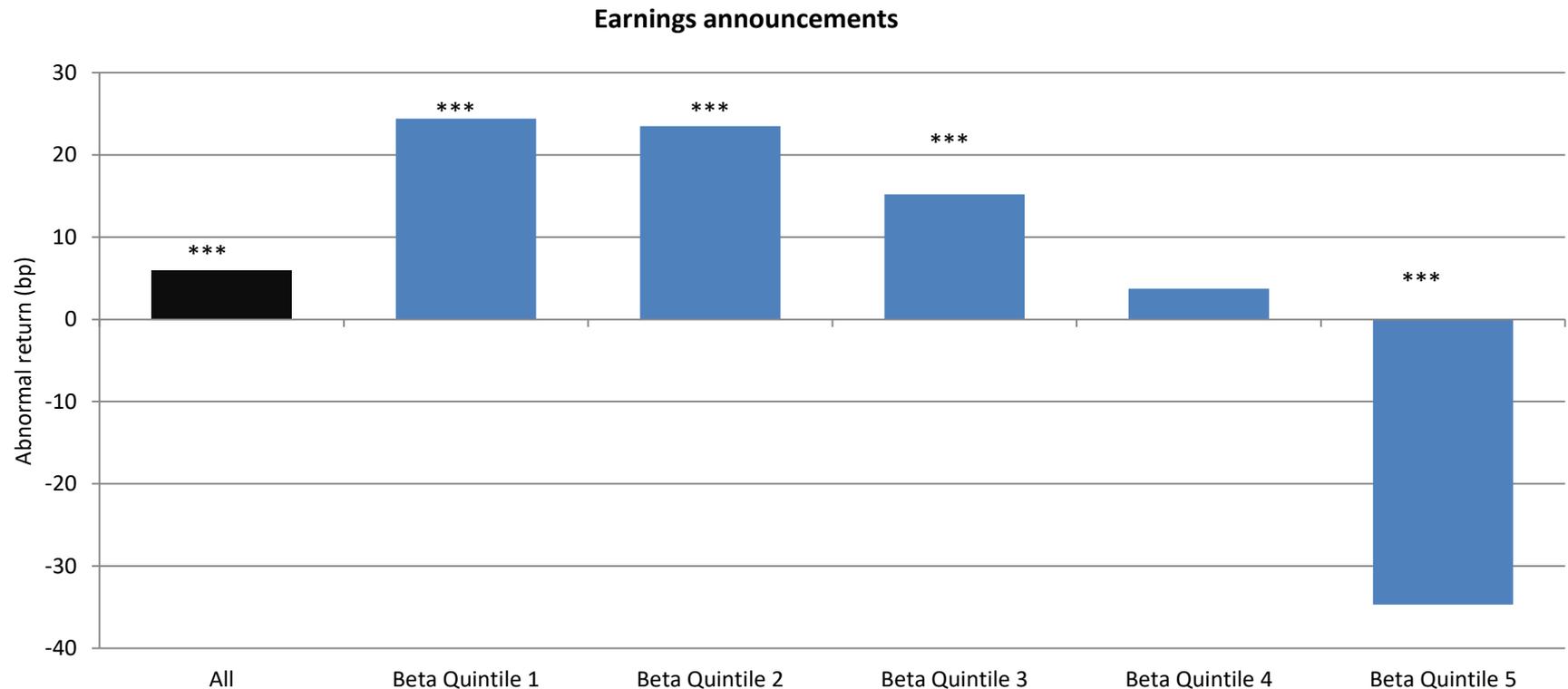
Test 1: Beta and predictable market reaction to firm-level news

- 1.71 million further events in the U.S. stock market
  - 10-K filings, 8-K filings, newspaper articles, newswire stories

**Further firm-level news in U.S. stock market**
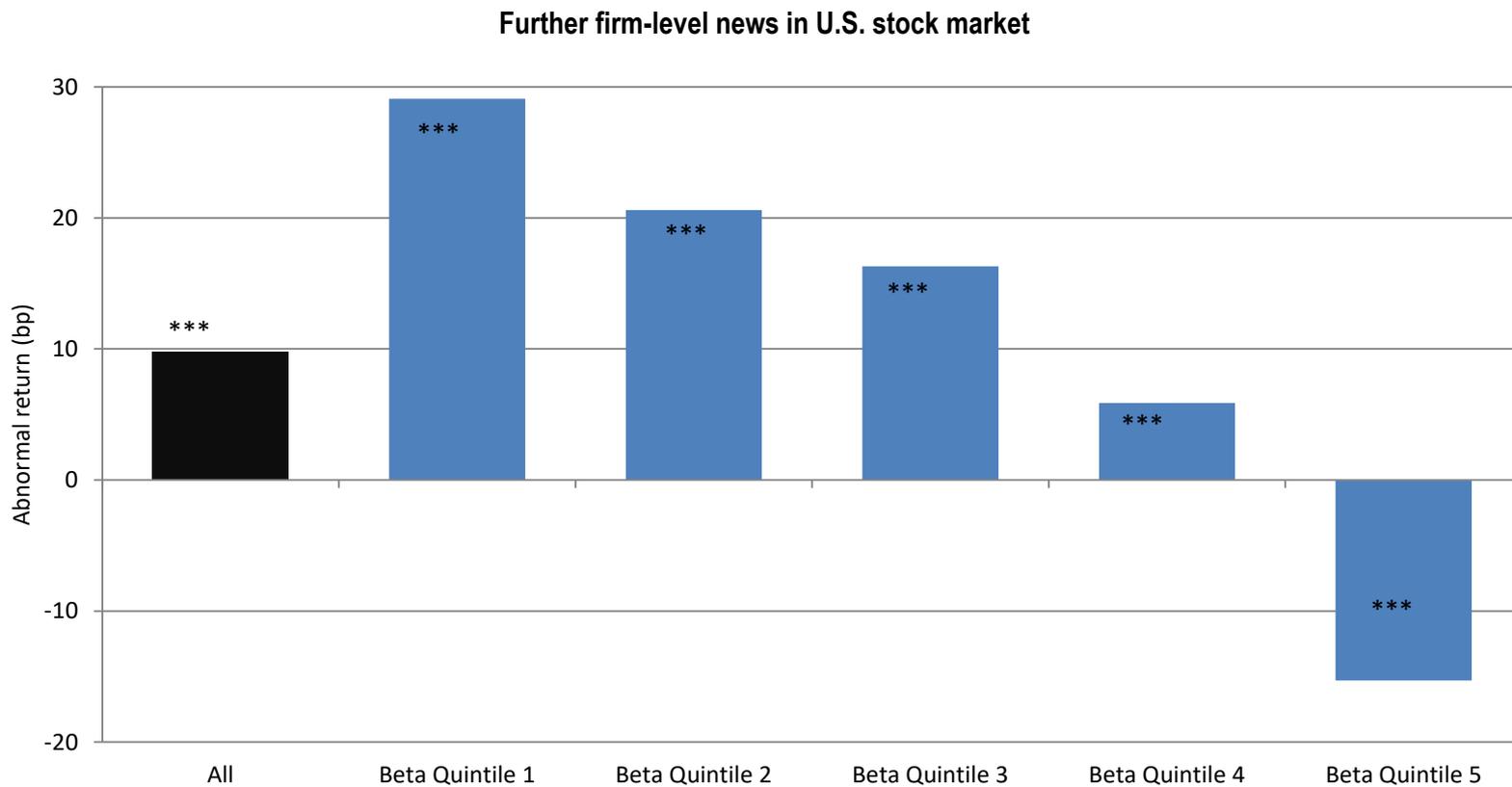
Test 2: Beta and composite Stambaugh (2015, JF) local mispricing factor

- State-of-the-art approach to measure cross-sectional mispricing at the level of a firm month

- Bottom-up metric between 0 and

Financial Distress	
O-Score	
Net stock issues	
Composity equity issues	
Accruals	
Net operating assets	
Momentum	
Gross profitability	
Asset growth	
Return on assets	
Investment to assets	
Composite score	

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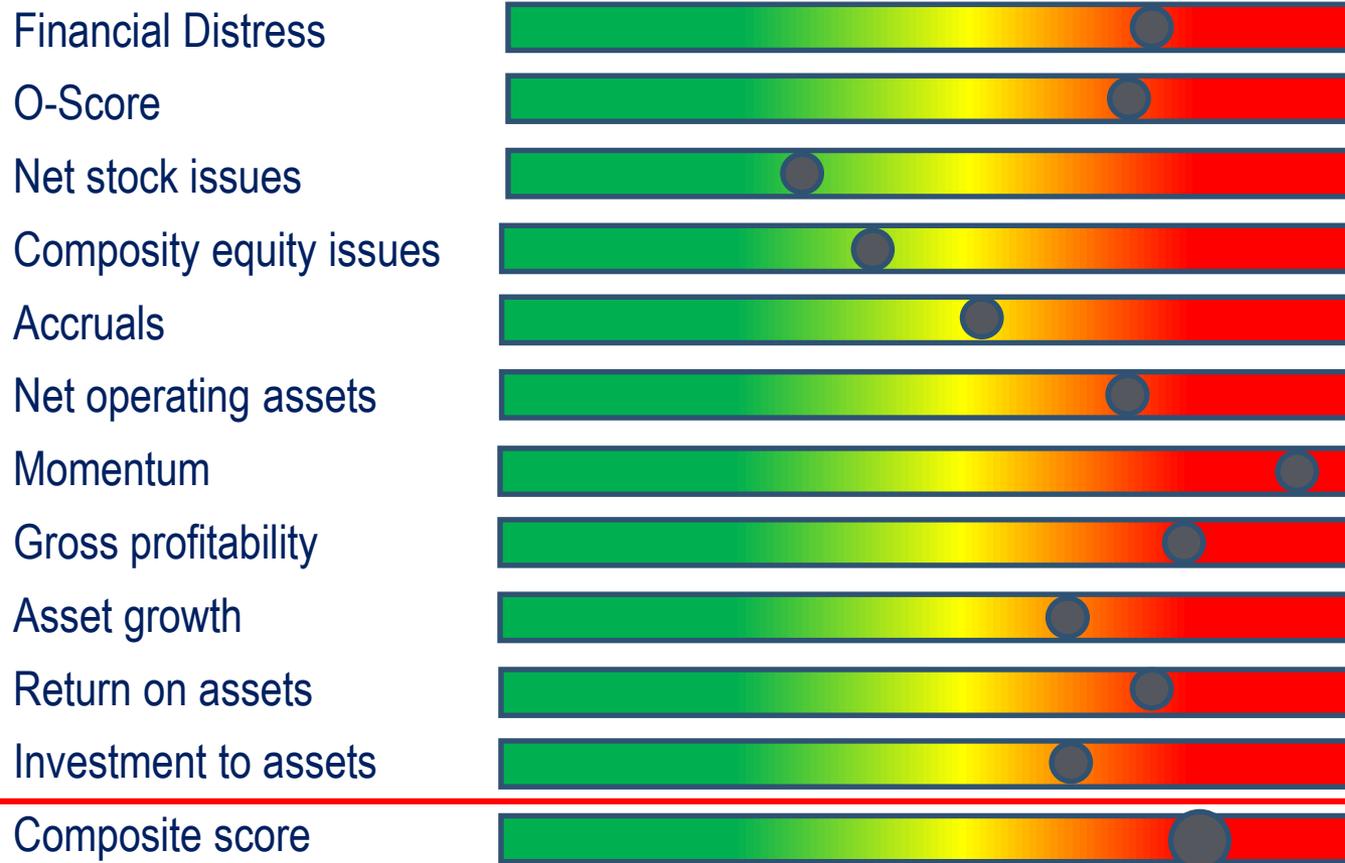
Test 2: Beta and composite local mispricing factor

Alpha Fama/French local three-factor model — Mean: 54 bp***

Alpha Fama/French local three-factor model + local mispricing factor — Mean: 13 bp

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Further tests: Market states
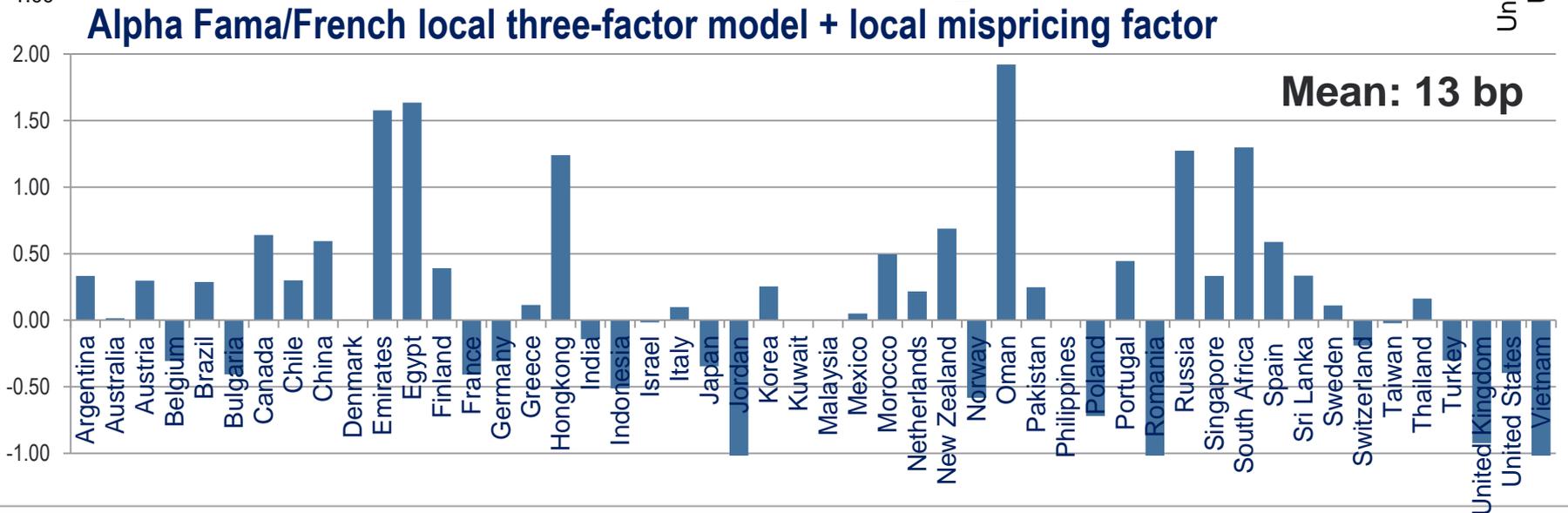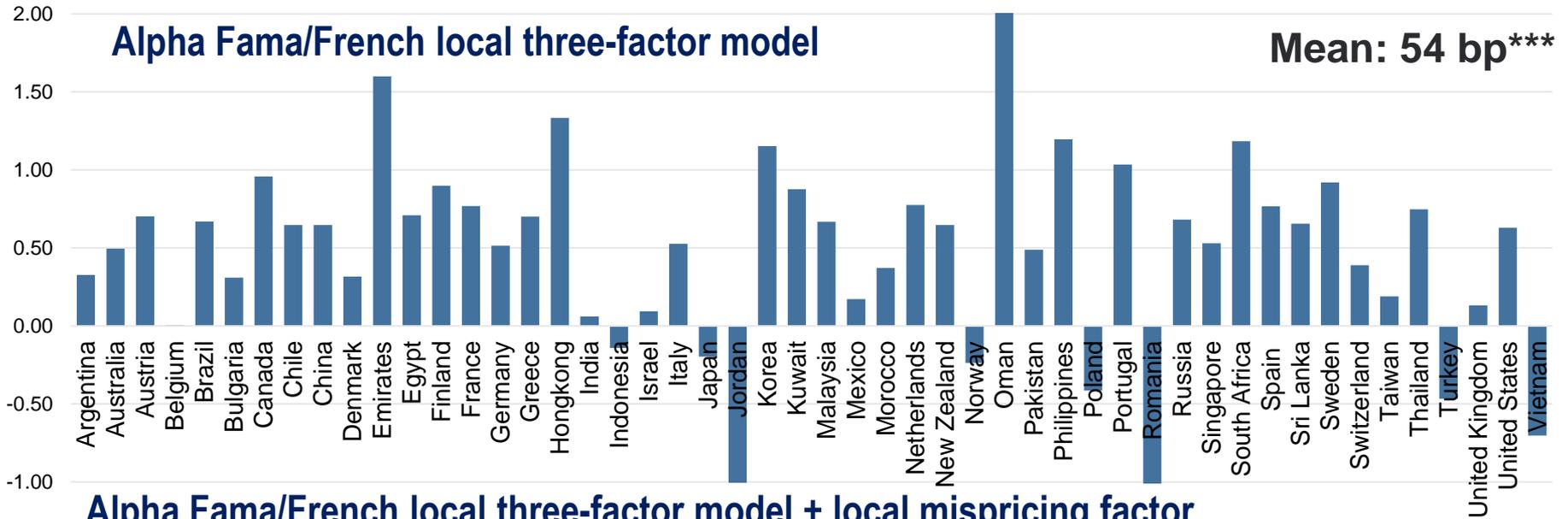
3   **Time-series: Local market states** (Past three year market return positive?)

➡️   **Aforementioned biases should be much stronger following market gains**

- ➤ Overconfidence + self-attribution bias rise (e.g,. Gervais/Odean (2004), Cooper et al. (2004))

- ➤ High past market returns attract attention… (e.g., Kalsson et al. (2009), Yuan (2015), Sicherman (2016)

- ➤ …in particular among less sophisticated investors (e.g., Lamont/Thaler (2003), Grinblatt et al. (2011))

- ➤ Use of representativness heuristic more troublesome

- ➤ Procyclical risk-adjusted return expectations (e.g., Greenwood/Shleifer (2014, Amormin, Sharpe (2009))

3 **Time-series: Local market states** (Past three year market return positive?)

Global results,

three factor alpha,

equally weighted returns,

controlling for other determinants

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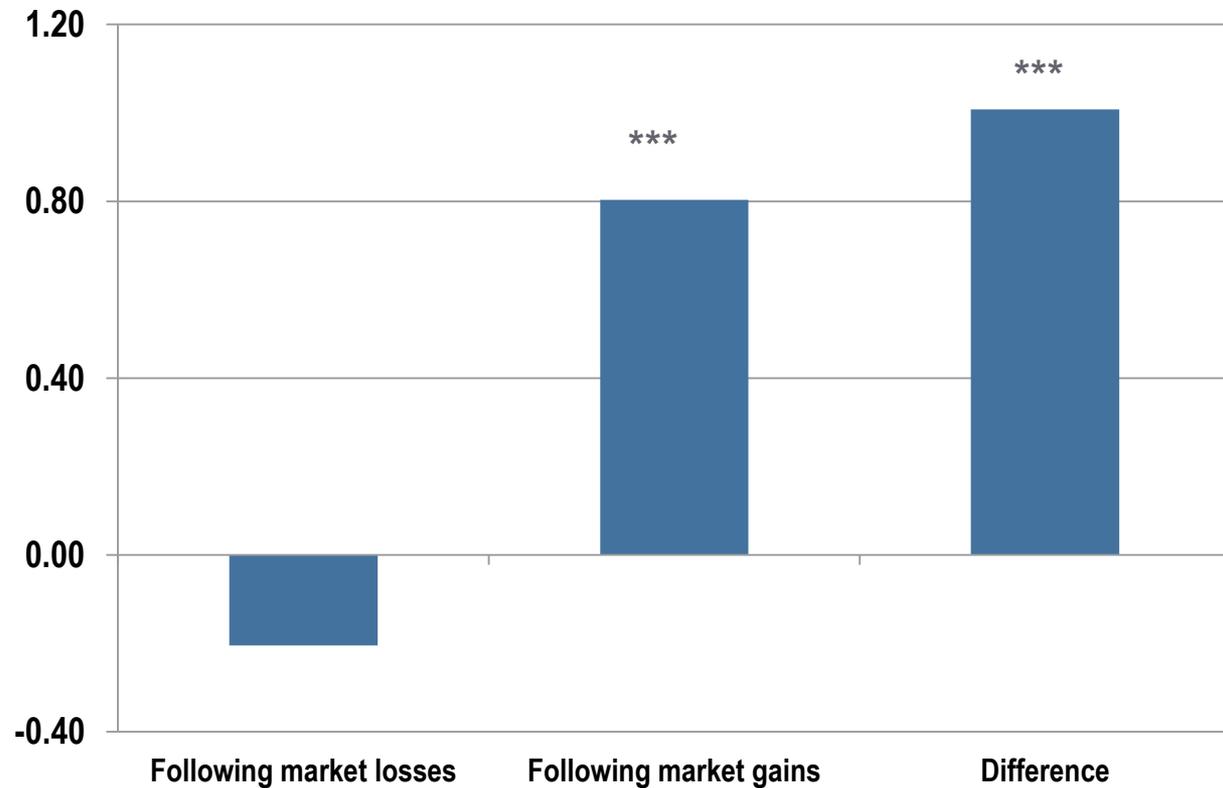
# Further tests: Sentiment and turnover

4 **Time-series: Local consumer confidence**

Global results,

three factor alpha,

equally weighted returns,

controlling for other determinants
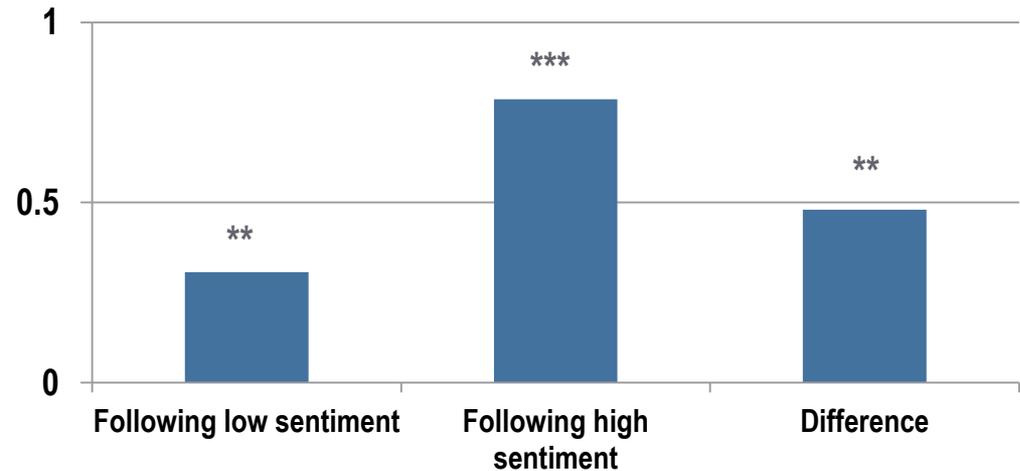
5 **Cross-section: Turnover**

Global results,

three factor alpha,

equally weighted returns,

controlling for other determinants

Conclusion
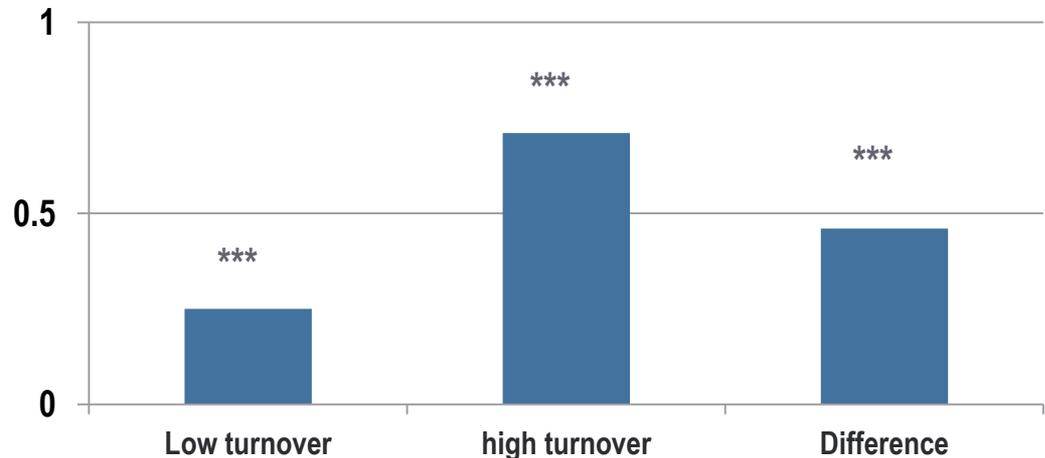
1 **Beta anomaly pervasive empirical puzzle, but drivers unclear**

- Low beta stocks outperform high beta stocks by 6% p.a. around the globe

2 **New insights based on 50 stock markets + conceptually diverse tests**

- Beta anomaly can be traced back to behavioral biases

Beta anomaly may be mainly attributable to mispricing