

# Correlated Demand Shocks and Asset Pricing

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# Summary

Introduction

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Asset Pricing Implications

Takeaways

# Introduction

# Article in a Nutshell

- ▶ Institutional investors' to outperform a similar market index generates **correlated demand shocks** that provide a source of **risk** in asset pricing brazil
  - ▶ Stocks with high exposure to **correlated demand** exhibit elevated market  $\beta$ 's
  - ▶ This endogenous **risk** commands an 8.5% annual return premium in decile portfolios
    - ▶ *Do high-beta stocks earn abnormally low returns?*  
Frazzini and Pedersen (2014)
  - ▶ **Correlated demand** by **active management with broad-market benchmarks** and **discretionary trades**
  - ▶ **Procyclical behavior** could explain the cross-sectional variance of stock returns  
Basak and Pavlova (2013), Koijen and Yogo (2019)

# Questions

- ▶ What are the economic determinants of correlated demand shocks?
  - ▶ **Size**  
Gabaix (2011), Ben-David et al. (2021), Gabaix and Koijen (2023)
  - ▶ **Inelastic behavior**  
Koijen and Yogo (2019), Gabaix and Koijen (2022)
  - ▶ **Behavioral**  
Barberis, Shleifer, and Wurgler (2005)
- ▶ What are the economic implications?
  - ▶ **Efficient Market Hypothesis**  
Rostek and Yoon (2023)
  - ▶ **Stock market volatility and risk management**  
Haddad and Muir (2021)

# Behavioral Hypothesis

## Pro-cyclical risk-taking behavior

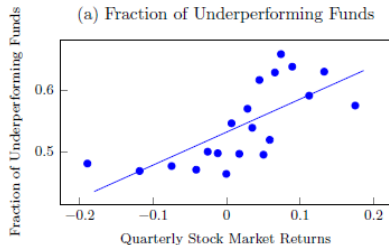
- ▶ Mandate to outperform a given market index
  - ▶ Pronounced among underperforming funds and those with broad-market benchmarks
- ▶ Incentives of fund managers
  - ▶ Compensation structure tends to exhibit convexity during up the markets

# Data from 1980 Q2 to 2020 Q2

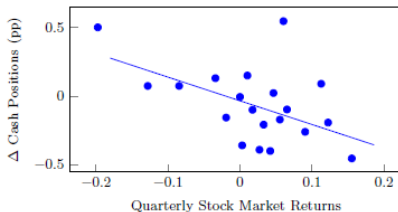
| Variable                             | Definition                                                                                                                                                                                                   | Source                 |
|--------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|
| Number of institutional owners (NIO) | The number of 13F institutional owners for stock in each quarter.                                                                                                                                            | Thomson Reuters        |
| 13F ownership                        | The total 13F institutional ownership for stock in each quarter.                                                                                                                                             | Thomson Reuters        |
| HHI                                  | The Herfindahl-Hirschman index of 13F institutional ownership in each quarter.                                                                                                                               | Thomson Reuters        |
| Number of active funds               | The number of active fund owners for stock in each quarter based on the owner orientation code.                                                                                                              | Thomson Reuters Global |
| Active fund ownership                | The total active fund ownership for stock in each quarter.                                                                                                                                                   | Thomson Reuters Global |
| Number of passive funds              | The number of passive fund owners for stock in each quarter based on the owner orientation code.                                                                                                             | Thomson Reuters Global |
| Passive fund ownership               | The total passive fund ownership for stock in each quarter.                                                                                                                                                  | Thomson Reuters Global |
| Cash positions                       | The total holdings of the fund minus the total value of equity positions (equity positions, including common stocks, preferred stocks, and other equity) scaled by the fund's assets under management (AUM). | CRSP Mutual Fund       |
| Flow <sub>q</sub>                    | $(AUM_q - AUM_{q-1} \times \text{Return}_q) / AUM_{q-1}$                                                                                                                                                     | CRSP Mutual Fund       |
| Beta                                 | The sum of stocks' coefficients on contemporaneous and lagged CRSP value-weighted returns using daily returns within each quarter.                                                                           | CRSP                   |
| Idiosyncratic volatility             | The standard deviation of the residuals from the CAPM model using daily returns within each quarter.                                                                                                         | CRSP                   |
| Mktcap                               | The quarter-end stock market capitalization.                                                                                                                                                                 | CRSP                   |
| Price                                | The quarter-end stock price.                                                                                                                                                                                 | CRSP                   |
| Past-6-month return                  | The cumulative past-6-month returns excluding the most recent month return.                                                                                                                                  | CRSP                   |
| Amihud ratio                         | The quarterly average of absolute daily returns scaled by the daily dollar volume in \$ million.                                                                                                             | CRSP                   |
| Book-to-market                       | The quarterly book-to-market ratio, computed as book equity divided by market equity.                                                                                                                        | CRSP, Compustat        |
| Assets growth                        | Changes in total assets scaled by lagged total assets.                                                                                                                                                       | Compustat              |
| Profitability                        | Revenue minus the cost of goods sold, scaled by total assets.                                                                                                                                                | Compustat              |

# Facts

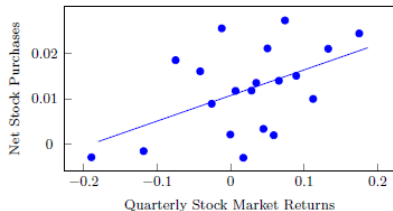
(a) Fraction of Underperforming Funds



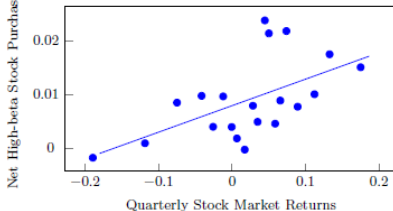
(b) Change in Cash Positions



(c) Net Stock Purchases  
Scaled by Lagged Fund AUM



(d) Net High-beta Stock Purchases  
Scaled by Lagged Fund AUM



## Model discussion

# Comments (I)

## (1) Demand shocks are exogenous

- ▶ The return is affected by demand shocks only if a significant fraction of investors trade in the same direction

$$r_{k,t} = r_{k,t}^F + \sum_i r_{i,k,t}^D$$

- ▶ What are the properties of the observable demand  $(\omega_{i,k,t} - \omega_k^*)$ ?
  - ▶ Given a stock  $k$ , the panel  $\omega_{i,k,t} - \omega_k^*$  is a **dense** or **sparse** environment?

Do not take out null choices

# Comments (II)

## (2) Same factor model to fundamentals and flows

- Fundamental shock  $r_{k,t}^F$

$$r_{k,t}^F = \phi_k f_t + \epsilon_{k,t}^F$$

- Demand shock  $\Delta A_{i,t}$

$$r_{i,k,t}^D = M \frac{\Delta A_{i,t} \pi_{i,k,t-1}}{\nu_{k,t-1}}$$

$$\frac{\Delta A_{i,t}}{A_{i,t-1}} = \theta_i f_t + \epsilon_{i,t}^D$$

# Comments (III)

## (3) Weight function

- flow-induced trades

$$\pi_{i,k,t-1} = \omega_{i,k,t-1} (1 - \lambda_i s_{i,k,t-1}) + \psi_{i,t-1}$$

$$\sum_{k \in K_{i,t-1}} \pi_{i,k,t-1} = 1$$

- special case  $\lambda_i = 0$

$$\pi_{i,k,t-1} = \omega_{i,k,t-1}$$

- Large investors decrease trade sizes as larger their prior sensibility ownership  $\lambda_i > 0$

*Institutional investors are cautious in trading*

# Comments (IV)

## Ownership structure

- ▶ High numbers of owners imply a large and widely dispersed ownership structure
  - ▶ Network effects example
  - ▶ *The number of institutional owners is not a good proxy to correlated demand because of the network's leverage*

# Model I

- ▶ Parameters  $\phi$ ,  $\xi$ ,  $\lambda$ ,  $\psi_{i,t}$
- ▶ Observables  $r_{k,t+1}$ ,  $f_{t+1}$ ,  $A_{i,t}$ ,  $\omega_{i,k,t}$ ,  $s_{i,k,t}$ ,  $\nu_{k,t}$
- ▶ Solved by non-linear LS

$$\mathbb{E}[r_{k,t}] = \left\{ \underbrace{\phi + \frac{\xi}{\nu_{k,t}} \sum_i A_{i,t} (\omega_{i,k,t} (1 - \lambda s_{i,k,t}) + \psi_{i,t})}_{\beta_{k,t}} \right\} \mathbb{E}[f_{t+1}]$$

## Critical assumption

- ▶ Same factor to fundamental returns and demand shocks

# Model II

- *Model without price impact concerns*  
Edmans, Goldstein, and Jiang (2012)

$$\mathbb{E}[r_{k,t+1}] = \left\{ \phi + \xi \sum_i s_{i,k,t} \right\} \mathbb{E}[f_{t+1}]$$

# First Results

|                  | Model I          | Model II         |
|------------------|------------------|------------------|
| $\phi$           | 1.087<br>[0.046] | 1.024<br>[0.031] |
| $\xi$            | 0.116<br>[0.033] | 0.065<br>[0.027] |
| $\lambda$        | 0.442<br>[0.139] | —<br>—           |
| Likelihood ratio | 763              | —                |
| p-value          | 0.000            | —                |

# Model-implied Exposure

$$\frac{1}{\nu_{k,t}} \left\{ \underbrace{\sum_i A_{i,t} (\omega_{i,k,t} (1 - \lambda s_{i,k,t}) + \psi_{i,t})}_{\Sigma_{k,t}} \right\}$$

- ▶  $\frac{\Sigma_{k,t}}{\nu_{k,t}}$  measure stock's endogenous market exposure due to correlated demand shocks
  - ▶ Map of characteristics to endogenous  $\beta$
  - ▶ Stock price is potentially affected by this measure
- ▶ A proxy to correlated demand: The number of institutional investors  $NIO$

# Discretionary trades

| Panel A: Discretionary Trades     |                                                              |                      |                      |                      |                      |                     |
|-----------------------------------|--------------------------------------------------------------|----------------------|----------------------|----------------------|----------------------|---------------------|
| Dependent variable:               | Signed discretionary trades $_{q+1}$ /Mktcap $_q \times 100$ |                      |                      |                      |                      |                     |
| Sample period:                    | 1980-2020                                                    | 1980-2020            | 1980-2020            | 1980-2020            | 2010-2020            | 2010-2020           |
| log(Model-implied exposure $_q$ ) | 0.077***<br>(4.85)                                           |                      |                      |                      |                      |                     |
| log(NIO $_q$ )                    |                                                              | 0.089***<br>(4.92)   |                      |                      |                      |                     |
| Rank: Model-implied exposure $_q$ |                                                              |                      | 0.778***<br>(4.89)   |                      | 1.217***<br>(4.33)   |                     |
| Rank: NIO $_q$                    |                                                              |                      |                      | 0.510***<br>(5.08)   |                      | 0.732***<br>(4.43)  |
| log(Mktcap $_q$ )                 | -0.046***<br>(-4.21)                                         | -0.020***<br>(-3.14) | -0.070***<br>(-4.85) | -0.033***<br>(-4.42) | -0.096***<br>(-3.78) | -0.031**<br>(-2.52) |
| Observations                      | 627,354                                                      | 627,354              | 627,354              | 627,354              | 134,558              | 134,558             |
| R-squared                         | 0.026                                                        | 0.024                | 0.032                | 0.028                | 0.036                | 0.029               |

# Flow induced trades

Panel B: Flow-induced Trades

| Dependent variable:                     | Signed flow-induced trades $_{q+1}/\text{Mktcap}_q \times 100$ |                   |                     |                   |                      |                      |
|-----------------------------------------|----------------------------------------------------------------|-------------------|---------------------|-------------------|----------------------|----------------------|
| Sample period:                          | 1980-2020                                                      | 1980-2020         | 1980-2020           | 1980-2020         | 2010-2020            | 2010-2020            |
| $\log(\text{Model-implied exposure}_q)$ | 0.014**<br>(2.22)                                              |                   |                     |                   |                      |                      |
| $\log(\text{NIO}_q)$                    |                                                                | 0.010<br>(1.35)   |                     |                   |                      |                      |
| Rank: Model-implied exposure $_q$       |                                                                |                   | 0.093*<br>(1.73)    |                   | -0.325***<br>(-3.29) |                      |
| Rank: NIO $_q$                          |                                                                |                   |                     | 0.044<br>(1.21)   |                      | -0.238***<br>(-3.63) |
| $\log(\text{Mktcap}_q)$                 | -0.015***<br>(-2.71)                                           | -0.005<br>(-1.46) | -0.012**<br>(-2.09) | -0.005<br>(-1.45) | 0.024**<br>(2.59)    | 0.012**<br>(2.34)    |
| Observations                            | 627,354                                                        | 627,354           | 627,354             | 627,354           | 134,558              | 134,558              |
| R-squared                               | 0.032                                                          | 0.027             | 0.037               | 0.031             | 0.055                | 0.047                |

# Methodology

## Fama and McBeth regressions

$$y_{k,t+1} = \alpha + \beta \log \left( \sum_{k,t} \right) + (\gamma - \beta) \log (\nu_{k,t}) + \dots + \epsilon_{k,t+1}$$

$$y_{k,t+1} = \begin{cases} r_{k,t+1} \\ \beta_{k,t+1} \end{cases}$$

- ▶ The rank correlation between  $\sum_{k,t}$  and  $NIO$  is (97%)
- ▶ Residual  $NIO$  to sorting in portfolio analysis

$$\log (NIO_{k,t}) = a + b \log (\nu_{k,t}) + \epsilon_{k,t}$$

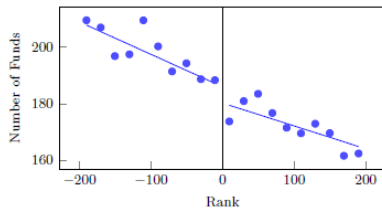
## The price impact of correlated demand shocks

# Amplification of Systematic Risk

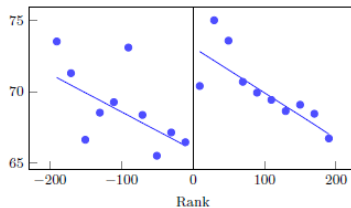
| Dependent variable:                       | Beta <sub>q+1</sub>   |                       |                       |                      |                       |                       |
|-------------------------------------------|-----------------------|-----------------------|-----------------------|----------------------|-----------------------|-----------------------|
|                                           | (1)                   | (2)                   | (3)                   | (4)                  | (5)                   | (6)                   |
| Sample period:                            | 1980-2020             | 1980-2020             | 1980-2020             | 1997-2020            | 1980-2020             | 1997-2020             |
| log(Model-implied exposure <sub>q</sub> ) | 0.100***<br>(14.34)   |                       |                       |                      |                       |                       |
| log(NIO <sub>q</sub> )                    |                       | 0.187***<br>(17.25)   |                       |                      |                       |                       |
| Rank: Model-implied exposure <sub>q</sub> |                       |                       | 0.794***<br>(16.87)   | 0.784***<br>(12.22)  |                       |                       |
| Rank: NIO <sub>q</sub>                    |                       |                       |                       |                      | 0.768***<br>(17.45)   |                       |
| Rank: NIO <sub>q</sub> (active)           |                       |                       |                       |                      |                       | 0.622***<br>(14.90)   |
| Rank: NIO <sub>q</sub> (passive)          |                       |                       |                       |                      |                       | 0.255***<br>(4.75)    |
| log(Mktcap <sub>q</sub> )                 | -0.058***<br>(-8.10)  | -0.069***<br>(-10.11) | -0.060***<br>(-9.15)  | -0.069***<br>(-8.06) | -0.055***<br>(-8.48)  | -0.081***<br>(-10.55) |
| 1/Price <sub>q</sub>                      | 0.047***<br>(3.64)    | 0.027**<br>(2.09)     | 0.040***<br>(3.11)    | 0.066***<br>(3.20)   | 0.030**<br>(2.31)     | 0.059***<br>(2.87)    |
| log(Book-to-market <sub>q</sub> )         | -0.078***<br>(-11.00) | -0.082***<br>(-11.74) | -0.077***<br>(-10.84) | -0.048***<br>(-5.33) | -0.081***<br>(-11.59) | -0.058***<br>(-6.76)  |
| Assets growth <sub>q</sub>                | 0.096***<br>(7.68)    | 0.113***<br>(9.30)    | 0.090***<br>(7.20)    | 0.071***<br>(3.99)   | 0.104***<br>(8.55)    | 0.091***<br>(5.18)    |
| Profitability <sub>q</sub>                | -0.013<br>(-1.31)     | -0.023**<br>(-2.38)   | -0.014<br>(-1.39)     | -0.043***<br>(-2.98) | -0.021**<br>(-2.13)   | -0.068***<br>(-4.89)  |
| Past 6-month return <sub>q</sub>          | -0.015<br>(-0.96)     | 0.006<br>(0.38)       | -0.016<br>(-1.08)     | -0.036*<br>(-1.75)   | 0.000<br>(0.02)       | -0.022<br>(-1.06)     |
| Amihud ratio <sub>q</sub>                 | -0.051***<br>(-6.76)  | -0.049***<br>(-6.72)  | -0.056***<br>(-7.01)  | -0.094***<br>(-7.61) | -0.053***<br>(-6.84)  | -0.091***<br>(-7.60)  |
| Beta <sub>q</sub>                         | 0.231***<br>(20.70)   | 0.224***<br>(20.69)   | 0.229***<br>(20.79)   | 0.282***<br>(19.42)  | 0.224***<br>(20.77)   | 0.274***<br>(19.47)   |
| Observations                              | 627,354               | 627,354               | 627,354               | 358,632              | 627,354               | 358,632               |
| R-squared                                 | 0.173                 | 0.176                 | 0.174                 | 0.210                | 0.176                 | 0.215                 |

# Fuzzy RDD

(a) Number of Active Funds



(b) Number of Passive Funds



# Fuzzy RDD

| Panel A: First Stage        |                        |                    |                   |                    |
|-----------------------------|------------------------|--------------------|-------------------|--------------------|
| Dependent variable:         | Number of active funds |                    |                   |                    |
| Treatment                   | 69.21***<br>(2.85)     | 57.85***<br>(2.74) | 47.13**<br>(2.51) | 50.64***<br>(3.29) |
| RD bandwidth                | 50                     | 75                 | 100               | 125                |
| RD controls                 | Cubic                  | Cubic              | Cubic             | Cubic              |
| Time FE                     | Yes                    | Yes                | Yes               | Yes                |
| Observations                | 2,406                  | 3,583              | 4,737             | 5,932              |
| R-squared                   | 0.303                  | 0.308              | 0.307             | 0.314              |
| Panel B: Second Stage       |                        |                    |                   |                    |
| Dependent variable:         | Beta                   |                    |                   |                    |
| Number of active funds (IV) | 0.011**<br>(2.21)      | 0.009**<br>(2.18)  | 0.010**<br>(2.06) | 0.010**<br>(2.05)  |
| RD bandwidth                | 50                     | 75                 | 100               | 125                |
| RD controls                 | Cubic                  | Cubic              | Cubic             | Cubic              |
| Control variables           | Yes                    | Yes                | Yes               | Yes                |
| Time FE                     | Yes                    | Yes                | Yes               | Yes                |
| Observations                | 2,406                  | 3,583              | 4,737             | 5,932              |

## Asset Pricing Implications

# Return Predictability

| Dependent variable:                       | Return <sub>q+1</sub> |                      |                      |                      |                      |                      |
|-------------------------------------------|-----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
|                                           | (1)                   | (2)                  | (3)                  | (4)                  | (5)                  | (6)                  |
| Sample period:                            | 1980-2020             | 1980-2020            | 1980-2020            | 1997-2020            | 1980-2020            | 1997-2020            |
| log(Model-implied exposure <sub>q</sub> ) | 0.010***<br>(3.45)    |                      |                      |                      |                      |                      |
| log(NIO <sub>q</sub> )                    |                       | 0.017***<br>(5.22)   |                      |                      |                      |                      |
| Rank: Model-implied exposure <sub>q</sub> |                       |                      | 0.091***<br>(5.05)   | 0.103***<br>(3.50)   |                      |                      |
| Rank: NIO <sub>q</sub>                    |                       |                      |                      |                      | 0.063***<br>(4.54)   |                      |
| Rank: NIO <sub>q</sub> (active)           |                       |                      |                      |                      |                      | 0.076***<br>(3.35)   |
| Rank: NIO <sub>q</sub> (passive)          |                       |                      |                      |                      |                      | -0.025*<br>(-1.77)   |
| Rank: ΔNIO <sub>q</sub>                   |                       |                      | 0.007***<br>(3.10)   | 0.006*<br>(1.71)     | 0.007***<br>(2.77)   |                      |
| Rank: ΔNIO <sub>q</sub> (active)          |                       |                      |                      |                      |                      | 0.006<br>(1.43)      |
| Rank: ΔNIO <sub>q</sub> (passive)         |                       |                      |                      |                      |                      | -0.003<br>(-1.06)    |
| log(Mktcap)                               | -0.013***<br>(-3.79)  | -0.013***<br>(-4.77) | -0.015***<br>(-5.22) | -0.016***<br>(-3.78) | -0.011***<br>(-4.40) | -0.010***<br>(-3.18) |
| log(Book-to-market)                       | 0.006**<br>(2.57)     | 0.006**<br>(2.34)    | 0.007***<br>(2.68)   | 0.002<br>(0.65)      | 0.006***<br>(2.64)   | 0.002<br>(0.55)      |
| Assets growth                             | -0.029***<br>(-6.75)  | -0.027***<br>(-6.52) | -0.030***<br>(-6.85) | -0.032***<br>(-4.95) | -0.029***<br>(-6.72) | -0.031***<br>(-4.96) |
| Profitability                             | 0.021***<br>(5.56)    | 0.020***<br>(5.33)   | 0.020***<br>(5.48)   | 0.019***<br>(3.40)   | 0.020***<br>(5.53)   | 0.019***<br>(3.52)   |
| Past 6-month return                       | 0.018***<br>(3.90)    | 0.021***<br>(4.88)   | 0.018***<br>(3.85)   | 0.003<br>(0.37)      | 0.019***<br>(4.53)   | 0.004<br>(0.56)      |
| Observations                              | 621,172               | 621,172              | 621,172              | 341,014              | 621,172              | 341,014              |
| R-squared                                 | 0.047                 | 0.047                | 0.047                | 0.044                | 0.047                | 0.045                |

# Portfolio Analysis

| Panel A: Portfolios Sorted by Model-implied Exposure |       |       |       |       |       |       |       |      |      |      |      |
|------------------------------------------------------|-------|-------|-------|-------|-------|-------|-------|------|------|------|------|
| Deciles                                              | L     | 2     | 3     | 4     | 5     | 6     | 7     | 8    | 9    | H    | H-L  |
| Return                                               | 0.38  | 0.64  | 0.47  | 0.77  | 0.82  | 0.93  | 1.03  | 1.10 | 1.19 | 1.36 | 0.98 |
| t(Return)                                            | 1.37  | 2.30  | 1.60  | 2.72  | 2.90  | 3.63  | 3.94  | 4.04 | 3.94 | 3.57 | 3.00 |
| CAPM $\alpha$                                        | -0.48 | -0.28 | -0.54 | -0.28 | -0.22 | -0.11 | -0.01 | 0.03 | 0.06 | 0.07 | 0.56 |
| t(CAPM $\alpha$ )                                    | -2.38 | -1.48 | -3.12 | -1.85 | -1.55 | -1.10 | -0.06 | 0.30 | 0.43 | 0.36 | 1.74 |
| CAPM $\beta$                                         | 0.86  | 0.93  | 1.06  | 1.13  | 1.11  | 1.10  | 1.10  | 1.15 | 1.24 | 1.47 | 0.60 |

| Panel B: Portfolios Sorted by Residual NIO |       |       |      |      |      |      |      |      |      |      |      |
|--------------------------------------------|-------|-------|------|------|------|------|------|------|------|------|------|
| Deciles                                    | L     | 2     | 3    | 4    | 5    | 6    | 7    | 8    | 9    | H    | H-L  |
| Return                                     | 0.89  | 0.99  | 1.00 | 1.18 | 1.04 | 1.13 | 1.09 | 1.18 | 1.34 | 1.60 | 0.71 |
| t(Return)                                  | 3.51  | 4.15  | 4.67 | 5.29 | 5.01 | 5.36 | 5.10 | 5.30 | 5.22 | 4.84 | 2.09 |
| CAPM $\alpha$                              | -0.09 | 0.00  | 0.01 | 0.16 | 0.01 | 0.08 | 0.02 | 0.05 | 0.13 | 0.27 | 0.35 |
| t(CAPM $\alpha$ )                          | -0.69 | -0.01 | 0.19 | 2.64 | 0.18 | 0.98 | 0.24 | 0.46 | 0.80 | 1.02 | 1.04 |
| CAPM $\beta$                               | 0.93  | 0.94  | 0.94 | 0.99 | 0.99 | 1.01 | 1.04 | 1.14 | 1.25 | 1.44 | 0.52 |

# Characteristics are Covariances

$\alpha$  or  $\beta$ ?

- Does the predictability of returns stem from covariance or does it suggest anomalies?

Kelly, Pruitt, and Su (2019)

$$r_{k,t+1} = \underbrace{z'_{k,t} \Gamma_{\alpha}}_{\alpha_{k,t}} + \underbrace{z'_{k,t} \Gamma_{\beta}}_{\beta_{k,t}} f_{t+1} + \epsilon_{k,t+1}$$

# Covariance Channel

| Panel A: Estimation Results (Model-implied Exposure) |                |       |                                        |                                       |
|------------------------------------------------------|----------------|-------|----------------------------------------|---------------------------------------|
| $\Gamma_\alpha$                                      | $\Gamma_\beta$ | $R^2$ | $H_0 : \Gamma_\alpha = 0$<br>(p-value) | $H_0 : \Gamma_\beta = 0$<br>(p-value) |
| 0.002                                                | 0.251          | 0.754 | 0.254                                  | 0.006                                 |

| Panel B: Estimation Results (Residual NIO) |                |       |                                        |                                       |
|--------------------------------------------|----------------|-------|----------------------------------------|---------------------------------------|
| $\Gamma_\alpha$                            | $\Gamma_\beta$ | $R^2$ | $H_0 : \Gamma_\alpha = 0$<br>(p-value) | $H_0 : \Gamma_\beta = 0$<br>(p-value) |
| 0.001                                      | 0.189          | 0.803 | 0.574                                  | 0.003                                 |

| Panel C: Price Crashes in Bad Times (Model-implied Exposure) |       |       |       |       |       |       |       |       |       |       |       |
|--------------------------------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Deciles                                                      | L     | 2     | 3     | 4     | 5     | 6     | 7     | 8     | 9     | H     | H-L   |
| Ret-Mkt                                                      | -0.20 | -0.22 | -1.93 | -1.55 | -1.50 | -1.28 | -0.94 | -1.15 | -1.63 | -3.21 | -3.01 |
| t(Ret-Mkt)                                                   | -0.31 | -0.33 | -2.81 | -2.45 | -2.25 | -2.84 | -1.96 | -2.18 | -2.38 | -3.52 | -2.26 |
| CAPM $\alpha$                                                | -0.80 | -0.64 | -1.49 | -0.46 | -0.67 | -0.53 | -0.18 | -0.11 | 0.02  | -0.22 | 0.58  |
| t(CAPM $\alpha$ )                                            | -1.14 | -0.94 | -2.24 | -0.74 | -1.02 | -1.31 | -0.47 | -0.24 | 0.03  | -0.26 | 0.45  |
| CAPM $\beta$                                                 | 0.93  | 0.95  | 1.06  | 1.14  | 1.10  | 1.09  | 1.09  | 1.13  | 1.21  | 1.38  | 0.45  |

| Panel D: Price Crashes in Bad Times (Residual NIO) |      |      |       |      |      |      |       |       |       |       |       |
|----------------------------------------------------|------|------|-------|------|------|------|-------|-------|-------|-------|-------|
| Deciles                                            | L    | 2    | 3     | 4    | 5    | 6    | 7     | 8     | 9     | H     | H-L   |
| Ret-Mkt                                            | 0.42 | 0.48 | 0.67  | 0.27 | 0.41 | 0.07 | -0.02 | -0.84 | -1.68 | -3.08 | -3.50 |
| t(Ret-Mkt)                                         | 0.78 | 1.39 | 2.63  | 0.92 | 1.32 | 0.23 | -0.06 | -1.81 | -3.05 | -4.63 | -3.33 |
| CAPM $\alpha$                                      | 0.08 | 0.28 | -0.08 | 0.16 | 0.30 | 0.18 | 0.25  | 0.26  | 0.20  | -0.03 | -0.11 |
| t(CAPM $\alpha$ )                                  | 0.13 | 0.83 | -0.26 | 0.53 | 1.03 | 0.63 | 0.68  | 0.55  | 0.36  | -0.04 | -0.10 |
| CAPM $\beta$                                       | 0.97 | 0.98 | 0.91  | 0.98 | 0.99 | 1.01 | 1.04  | 1.14  | 1.24  | 1.39  | 0.43  |

## Takeaways

# Takeaways

- ▶ Institutional investors' procyclical risk-taking behavior can lead to low price elasticity of demand in the overall stock market, which has significant implications for risk management
- ▶ Institutional investors could potentially influence firms' investment decisions through the cost of capital
- ▶ The stock market is becoming more inelastic over time due to passive investing. Demand shocks may lead to more significant price impacts, which have implications for the efficient market hypothesis

Thank you

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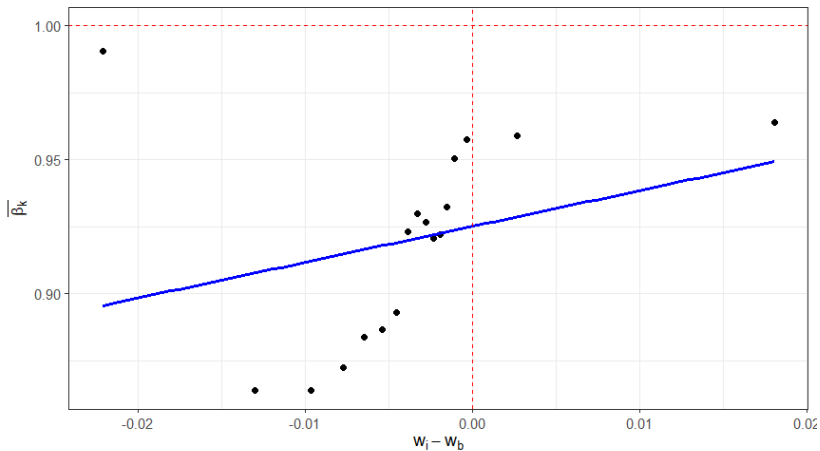
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# Brazilian Data

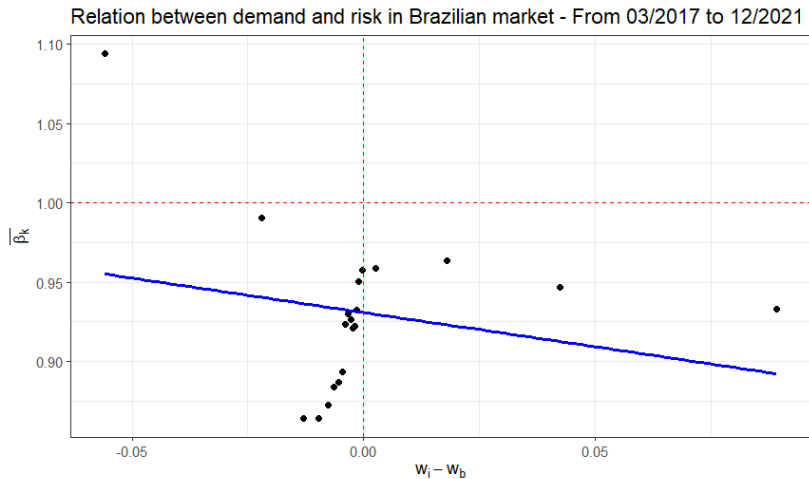
- ▶ The Brazilian market's top 42 institutions offered 3080 investment funds to retail investors from January 2016 to December 2021, across 10 ANBIMA categories
- ▶ Consider all stocks in IBRX-100 as the market
- ▶ There are almost 20 million observations of stock portfolio holdings
  - ▶ Correlated demand as active management  $\omega_{i,k,t} - \omega_{b,k,t}$
  - ▶ Risk as stocks' factor loading  $\beta_{k,t}$

Relation between demand and risk in Brazilian market - From 03/2017 to 12/2021



Source: Own elaboration

# Difficult Question



Source: Own elaboration

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# MAUSER FIC MULTIMERCADO

| Nome do Ativo                                                          | Valor do Ativo (mil) | Participação do Ativo |
|------------------------------------------------------------------------|----------------------|-----------------------|
| Cotas de VÉRTICE FOF MACRO FIC MULTIMERCADO                            | 3,792.20             | 24.46%                |
| Cotas de ITAÚ PRIVATE ACTIVE FIX PLUS FIC MULTIMERCADO CRÉDITO PRIVADO | 3,019.42             | 19.48%                |
| Cotas de ITAÚ VÉRTICE FIC RENDA FIXA REFERENCIADO DI                   | 2,868.90             | 18.51%                |
| Cotas de ITAÚ VÉRTICE FOF INFLAÇÃO FIC RENDA FIXA                      | 1,099.25             | 7.09%                 |
| Cotas de VÉRTICE FOF LONG AND SHORT ALOCAÇÃO 25 RESP LIMITADA FIF CIO  | 945.70               | 6.10%                 |
| Cotas de VÉRTICE VERDE AM JADE FIC MULTIMERCADO                        | 924.19               | 5.96%                 |
| Cotas de ITAÚ FUND OF FUNDS MULTIGESTOR X FIC MULTIMERCADO             | 698.87               | 4.51%                 |
| Cotas de BOGARI VALUE A FIC AÇÕES                                      | 485.28               | 3.13%                 |
| Cotas de ITAÚ FOF MASTER LONG BIAS RESP LIMITADA FIF AÇÕES             | 380.92               | 2.46%                 |
| Cotas de ABSOLUTO PARTNERS I.1 FIC AÇÕES                               | 349.01               | 2.25%                 |
| Cotas de ITAÚ PRIVATE DURATION PRÉ 3X FIC RENDA FIXA                   | 321.97               | 2.08%                 |
| Cotas de ITAÚ FUND OF FUNDS MULTIGESTOR X FI AÇÕES                     | 233.52               | 1.51%                 |
| Cotas de ITAÚ VÉRTICE IBOVESPA EQUITIES FI AÇÕES                       | 198.83               | 1.28%                 |
| Cotas de DYNAMO COUGAR FIC AÇÕES                                       | 146.30               | 0.94%                 |
| Outras Disponibilidades                                                | 44.18                | 0.29%                 |
| Cotas de ITAÚ SOBERANO FIC RENDA FIXA SIMPLES                          | 6.18                 | 0.04%                 |
| Outros Valores a receber                                               | 0.33                 | 0.00%                 |
| Outros Valores a pagar                                                 | -14.54               | -0.09%                |
|                                                                        |                      |                       |
| Patrimônio Líquido (R\$ mil)                                           | 15,500.51            |                       |
|                                                                        |                      |                       |
| Data da carteira: 30/09/2021                                           |                      |                       |

# Portfolio Consolidated



|                                |        |
|--------------------------------|--------|
| Títulos Federais               | 32.94% |
| Ações                          | 19.21% |
| Operação compromissada         | 16.59% |
| Debêntures                     | 13.26% |
| Títulos Privados               | 8.85%  |
| Investimento no Exterior       | 7.36%  |
| Direito Creditório             | 3.94%  |
| Fundos de Investimento         | 1.05%  |
| Brazilian Depositary Receipts  | 0.34%  |
| Títulos ligados ao Agronegócio | 0.03%  |
| Nota Promissória               | 0.00%  |
| Outros                         | -0.01% |
| Derivativos                    | -0.15% |
| Valores a pagar/receber        | -3.42% |



|                  |        |
|------------------|--------|
| Rating AAA       | 60.50% |
| Risco de mercado | 19.95% |
| Outros           | 11.49% |
| Rating AA        | 4.91%  |
| Cotas de fundos  | 1.50%  |
| Rating A         | 0.82%  |
| Rating BBB       | 0.73%  |
| Rating D         | 0.07%  |
| Rating BB        | 0.02%  |



|                                         |        |
|-----------------------------------------|--------|
| Governo Federal                         | 49.22% |
| Outros                                  | 10.45% |
| Bancos                                  | 8.40%  |
| Não Classificado                        | 8.25%  |
| Comércio                                | 4.86%  |
| Transporte                              | 4.23%  |
| Energia                                 | 3.81%  |
| Petróleo, Gás e Biocombustíveis         | 2.43%  |
| Investimentos                           | 1.46%  |
| Mineração                               | 1.03%  |
| Construtoras                            | 0.79%  |
| Seguradoras                             | 0.75%  |
| Tecnologia da Informação                | 0.73%  |
| Papel e Celulose                        | 0.67%  |
| Têxtil                                  | 0.62%  |
| Alimentos                               | 0.61%  |
| Indústria Mecânica                      | 0.58%  |
| Telecomunicações                        | 0.56%  |
| Imobiliário                             | 0.42%  |
| Lançamentos positivos menores que 0,42% | 0.13%  |



|                          |        |
|--------------------------|--------|
| Inflação                 | 25.73% |
| Ações                    | 19.71% |
| CDI                      | 17.87% |
| Prefixado                | 14.62% |
| Investimento no Exterior | 8.28%  |
| Selic                    | 8.04%  |
| Outros                   | 5.69%  |
| TR                       | 0.12%  |
| Imóveis                  | 0.07%  |
| Commodities              | 0.00%  |
| TJLP                     | -0.03% |
| Sem indexador            | -0.04% |
| Cambial                  | -0.07% |

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