Discussion of: Which Investors Matter for Equity Valuations and Expected Returns?

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Basic Idea

- Goal:
  - Estimate a characteristic-based asset-demand system designed to explain variation in asset prices.
  - Using disaggregated holdings data, estimate heterogeneity in trading impact
- Use this estimation to answer two key questions:
  1. Has the rise of passive investing and the resulting reallocation of capital affected prices? Has it affected price informativeness?
  2. How has climate risk affected prices and holdings?
     - Are some asset holders more exposed to climate risk?

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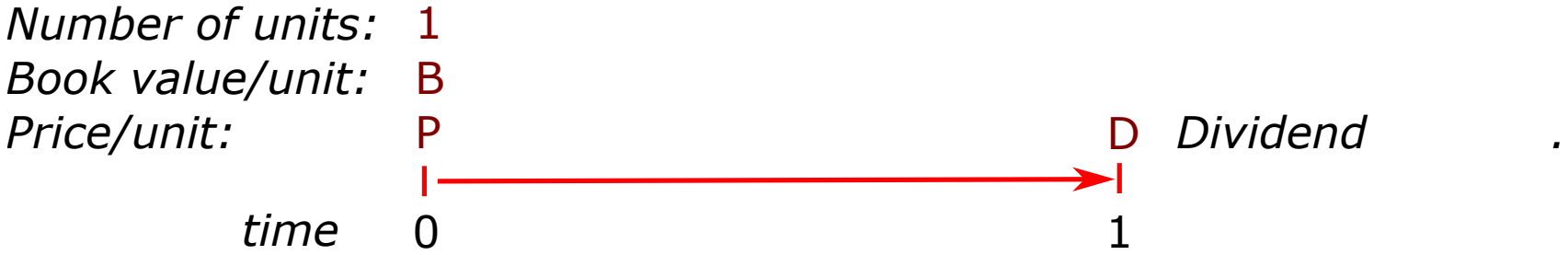
The Model

- Two Period model
- CARA-Normal setting.
- Risky Firms/Assets $n = 1, \ldots, N$; each is unit supply.
- Riskfree asset with perfectly elastic supply at $r_f = 0$
- Investors $i = 1, \ldots, I$, with initial wealth $A_{i,0}$, disagree about firm prospects
  - $\gamma_i = \left(\frac{1}{\tau_i A_{i,0}}\right)$ makes model "CRRA-like."

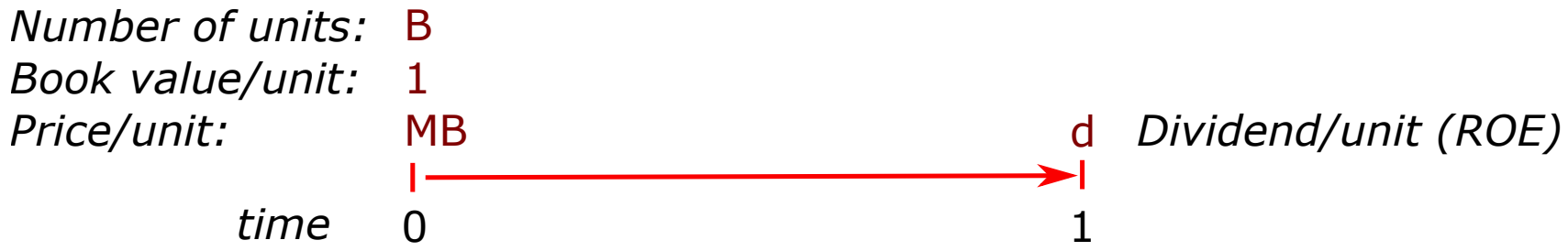
Investor Optimization



- There are N assets, each with 1 share and book-value B
- Investor i chooses an N-vector $\mathbf{q}_i$ of shares.
- This leads to a final period wealth of:

$$A_{i,1} = A_{i,0} + (\mathbf{D} - \mathbf{P})'\mathbf{q}_i$$

Investor Optimization



- Alternatively, defining $\mathbf{Q}_i (= \mathbf{q}_i \circ \mathbf{B})$ as the N-vector of units of book-value held by investor i:

$$A_{i,1} = A_{i,0} + (\mathbf{d} - \mathbf{MB})' \mathbf{Q_i}$$

  where $\mathbf{d} = \mathbf{D}/\mathbf{B}$ is the ROE and $\mathbf{MB} (= \mathbf{P}/\mathbf{B})$ is the market-to-book ratio.

- Agent i then chooses $\mathbf{Q}_i$ so as to maximize their expected utility, that is:

$$\max_{\mathbf{Q}_i} \mathbb{E}_i \left[-\exp(-\gamma_i A_{i,1}) \right]$$

Firms & Beliefs

- $\mathbf{d}$—the vector of firm ROEs—is governed by a single-factor structure:

$$\mathbf{d} = \boldsymbol{\mu}_\mathbf{i} + \boldsymbol{\rho}_\mathbf{i}\mathrm{F} + \boldsymbol{\eta}$$

where:

$$\mathrm{F} \sim \mathcal{N}(0,1), \quad \boldsymbol{\eta} \sim \mathcal{N}\left(\mathbf{0}, \sigma^{\mathbf{2}}\mathbf{I}\right), \text{ and } \mathbb{E}[\mathrm{F}, \boldsymbol{\eta}] = \mathbf{0}$$

- Agents disagree about $\boldsymbol{\mu}_i$ and $\boldsymbol{\rho}_i$; their beliefs are linear functions of firm characteristics $\mathbf{X}$ (N×K).

$$\begin{aligned} \boldsymbol{\mu}_i(n) &= \boldsymbol{\Phi}_i^{\mu}\mathbf{x}(n) + \boldsymbol{\phi}_i^{\mu}(n) \\ \boldsymbol{\rho}_i(n) &= \boldsymbol{\Phi}_i^{\rho}\mathbf{x}(n) + \boldsymbol{\phi}_i^{\rho}(n) \end{aligned}$$

  - where the $\boldsymbol{\Phi}_i$s are the same for each asset, but are specific to each investor.
- The $\boldsymbol{\phi}_i^{\mu}(n)$ and $\boldsymbol{\phi}_i^{\rho}(n)$ capture the components of investor i's demand not explained by characteristics.

Portfolio Choice

- In this CARA-normal setting, investor i's optimal holdings, given their beliefs, are:

$$\begin{aligned}
\mathbf{Q}_i(n) &= \frac{1}{\gamma_i \sigma^2}\left(\underbrace{\boldsymbol{\mu}_i(n) - c_i \boldsymbol{\rho}_i(n)}_{\text{RA Payoff}(n)} - \underbrace{\mathbf{MB}(n)}_{\text{Price}(n)}\right) \\
&= \frac{1}{\gamma_i \sigma^2}\left(\boldsymbol{\Phi}_i^{\mu}\mathbf{x}(n) + \boldsymbol{\phi}_i^{\mu}(n) - c_i\left(\boldsymbol{\Phi}_i^{\rho}\mathbf{x}(n) + \boldsymbol{\phi}_i^{\rho}(n)\right) - \mathbf{MB}(n)\right) \\
&= \frac{1}{\gamma_i \sigma^2}\left(\underbrace{\left(\boldsymbol{\Phi}_i^{\mu} - c_i\boldsymbol{\Phi}_i^{\rho}\right)}_{\boldsymbol{\beta}_i}\mathbf{x}(n) + \underbrace{\boldsymbol{\phi}_i^{\mu}(n) - c_i\boldsymbol{\phi}_i^{\rho}(n)}_{\boldsymbol{\epsilon}_i(n)} - \mathbf{MB}(n)\right)
\end{aligned}$$

- That is, demand is linear in the the asset's observable characteristics $\mathbf{x}(n)$, with coefficient $\boldsymbol{\beta}_i$; "residual" demand is $\boldsymbol{\epsilon}_i(n)$.

Equilibrium

- Imposing market clearing . . .

$$\mathbf{B} = \sum_{i=1}^{I} \mathbf{Q}_i$$

gives:

$$\mathbf{MB}(n) = \bar{\boldsymbol{\beta}}\mathbf{x}(n) + \bar{\boldsymbol{\epsilon}}(n)$$

where:

$$\overline{\boldsymbol{\beta}} = \sum_{i=1}^{I} a_i \boldsymbol{\beta}_i - \frac{\sigma^2 \boldsymbol{e}_1}{\sum_{i=1}^{I} \tau_i A_{i,0}},$$

$$\bar{\epsilon}(n) = \sum_{i=1}^{I} a_i \epsilon_i(n),$$

$$a_i = \frac{\tau_i A_{i,0}}{\sum_{j=1}^{I} \tau_j A_{j,0}}.$$

- a_i—the agent's relative influence on prices—is a function of the agent's risk-tolerance and wealth.

Assets and Agents

- Assets are the set of the largest US common stocks which, in aggregate, comprise 90% of the total US equity market capitalization.
- Agents, based on 13-F filings, are grouped into:
  1. investment advisors, grouped by:
     - Large/Small
     - Active/Passive (using active-share (Cremers and Petajisto, 2009))
  2. hedge-funds
  3. long-term investors
  4. private banking
  5. brokers
  6. foreign
  7. residual (assumed to be household sector)
- The usual caveats about 13-F filings apply—no coverage of small investors; no reporting of short positions.

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Asset Characteristics

- Asset characteristics:
  1. Environmental Scores (Sustainalytics)
  2. Governance (Bebchuk et. al.)
  3. Log book-equity
  4. Foreign sales share
     - correlated with profitability
  5. Lerner measure
     - (Operating-Income − Depreciation)/Sales
  6. Sales/book
  7. Dividends/book.
  8. Market beta
- These characteristics explain 65% (57%) of the x-s variance in M/B ratios . . .
  - and 45% (37%) of the x-s variance in 5-year profitability.
- More importantly, there is a striking level of heterogeneity across agents in the βs on these characteristics.

β heterogeneity

- There is fairly dramatic variation in the time-series average of the characteristic-βs across investor types
  - How much does allowing this variation improve the R^2 in explaining the cross section of MBs?
  - Does the time-series variation make sense?

Panel A: Investor type

Investor characteristic	Environment	Governance	Log market-to-book	Log book equity	Foreign sales	Lerner	Sales to book	Dividends to book	Market beta
Hedge funds	−1.25	0.96	0.48	55.42	−2.51	0.21	1.87	−14.01	1.17
	(−3.03)	(2.64)	(50.71)	(46.89)	(−8.22)	(0.63)	(4.65)	(−21.94)	(2.82)
Investment advisors:									
Large-passive	2.18	1.89	0.97	137.53	3.67	0.53	5.04	−0.11	1.45
	(11.03)	(10.89)	(232.35)	(260.12)	(26.85)	(3.53)	(28.01)	(−0.38)	(7.80)
Small-passive	3.07	1.09	0.84	116.14	3.09	3.76	1.76	−2.31	−3.41
	(16.48)	(6.66)	(216.88)	(238.53)	(24.54)	(27.30)	(10.61)	(−8.78)	(−19.97)
Small-active	−2.65	−2.68	0.52	64.03	2.76	7.68	−1.53	−8.48	−4.07
	(−11.76)	(−13.49)	(103.70)	(102.26)	(17.04)	(43.40)	(−7.16)	(−25.06)	(−18.51)
Large-active	0.65	3.79	0.95	125.32	3.63	0.07	2.02	−13.09	3.31
	(2.66)	(17.71)	(204.72)	(213.67)	(23.94)	(0.41)	(10.11)	(−41.29)	(16.08)
Long-term	1.05	−0.18	0.87	124.63	2.50	3.82	3.51	−2.08	−1.21
	(2.25)	(−0.44)	(83.07)	(94.53)	(7.35)	(10.23)	(7.82)	(−2.92)	(−2.61)
Private banking	−4.10	0.53	0.76	102.02	4.56	4.83	0.46	4.32	−8.61
	(−8.11)	(1.19)	(69.21)	(74.08)	(12.83)	(12.40)	(0.98)	(5.81)	(−17.83)
Brokers	4.22	−2.24	0.92	131.12	0.61	−1.12	3.51	−1.64	4.72
	(5.08)	(−3.06)	(52.01)	(58.90)	(1.07)	(−1.78)	(4.64)	(−1.36)	(6.05)
Adjusted R^2	0.08	0.08	0.48	0.59	0.05	0.15	0.07	0.16	0.14
Observations	6560	6560	7959	7959	7959	7959	7959	7959	7959

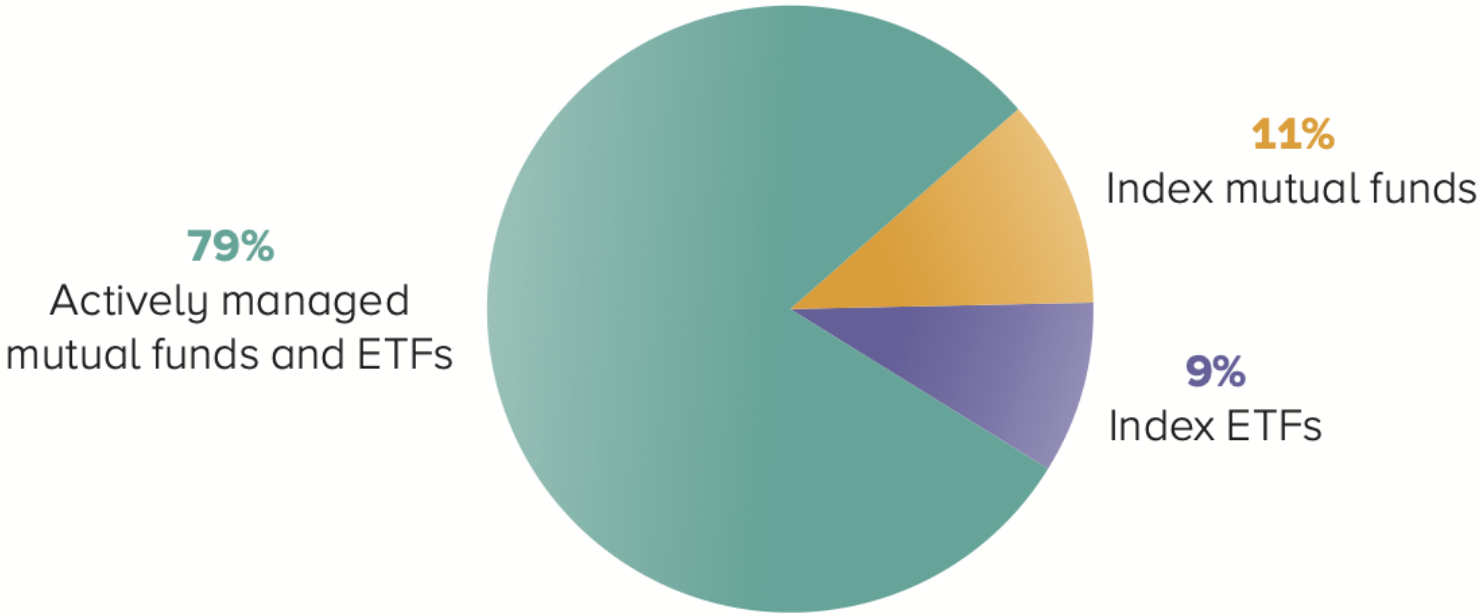
Repricing/AUM heterogeneity

- Do hedge funds move prices more because . . .
  1. . . . they lever up their trades more?
  2. . . . they trade less liquid assets?
  3. . . . other investors "pile on" to the HF trades?
  4. (some other reason)

Investor type	Wealth share (%)	Repricing	Repricing per dollar wealth
Investment advisors:			
Large-passive	17.7	15.9	0.90
Small-passive	16.4	17.2	1.05
Small-active	11.7	26.7	2.28
Large-active	11.1	18.4	1.65
Hedge funds	3.2	11.5	3.58
Long-term	3.9	3.9	1.01
Private banking	2.9	5.3	1.81
Brokers	1.1	1.8	1.56
Foreign	6.1	8.0	1.31

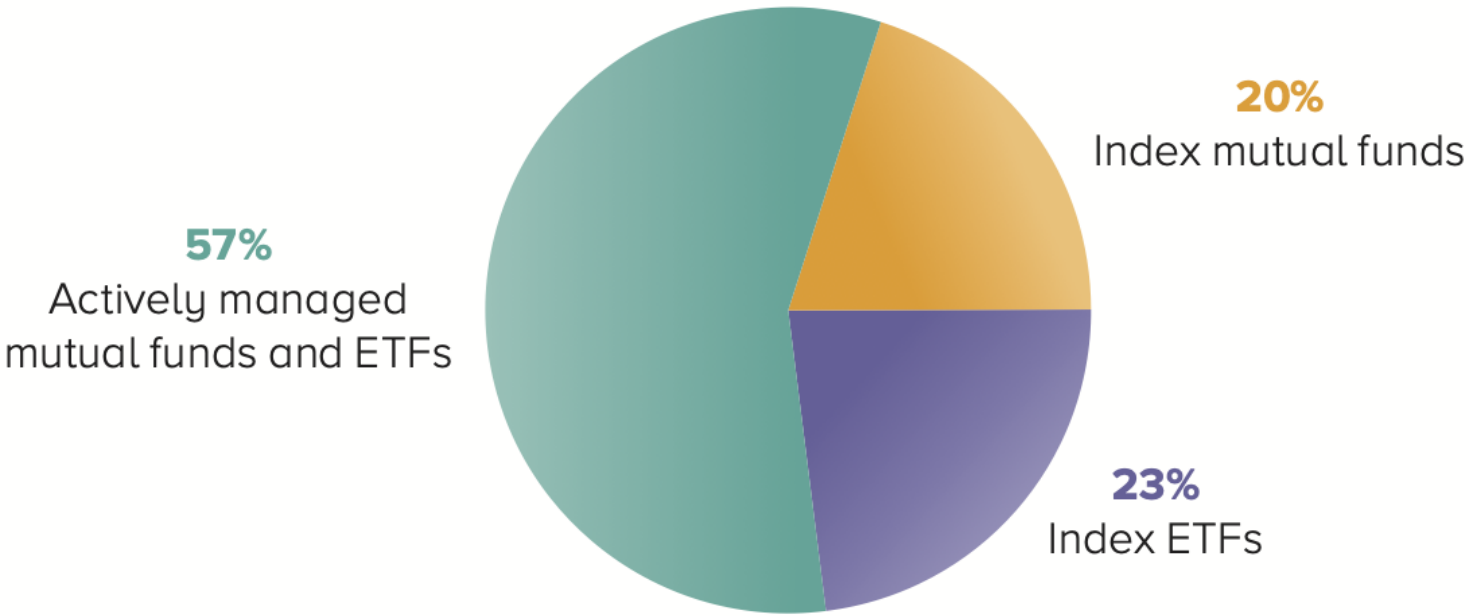
Active vs. Passive – 2011

Percentage of total net assets, year-end



2011 total net assets: $9.9 trillion

Active vs. Passive – 2021



2021 total net assets: $29.3 trillion

Active vs. Passive and Market Efficiency

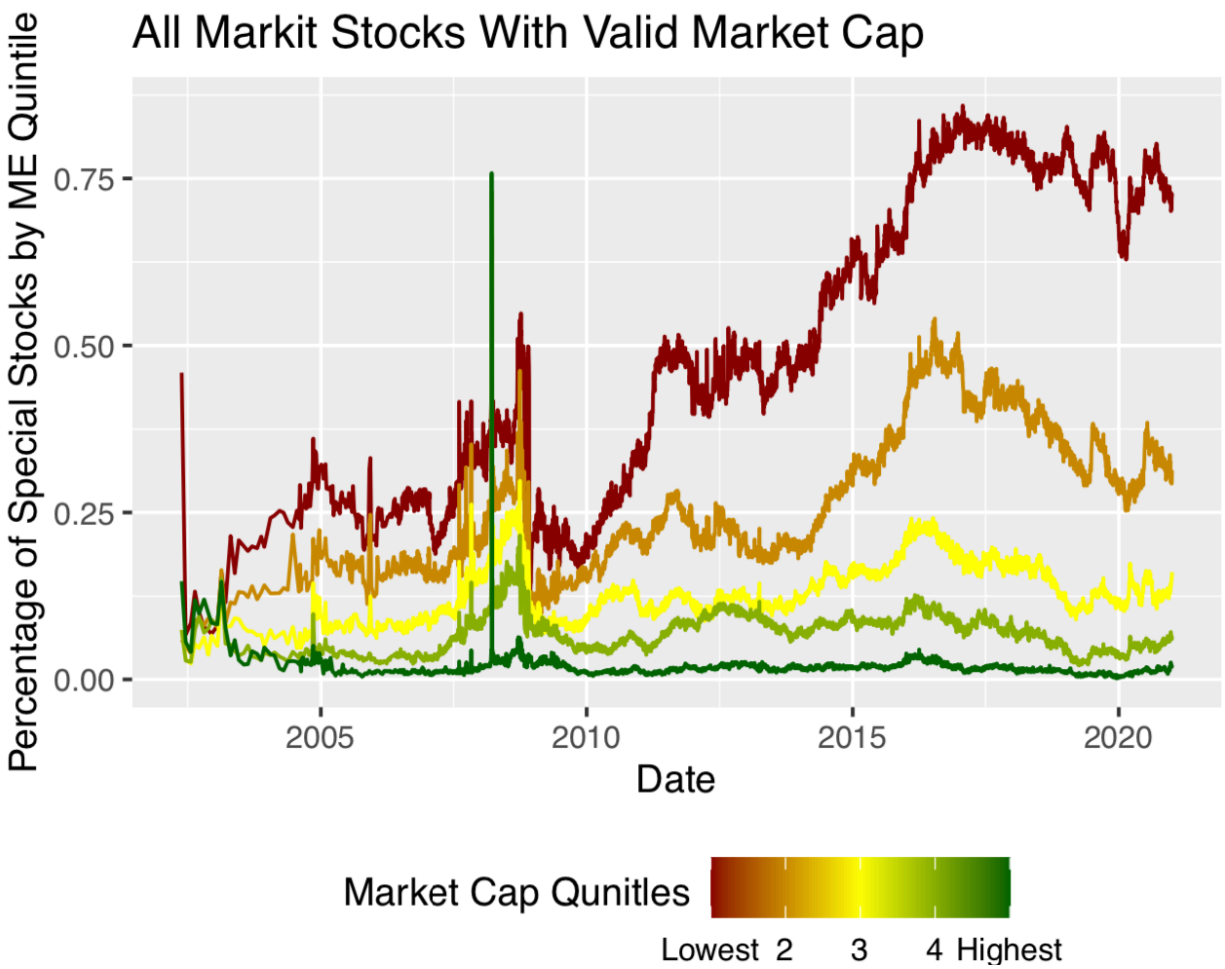
- This paper finds that "...the capital reallocation from active to passive investors had a small impact on price informativeness"
- They find that "...capital did not flow from more to less informed investors on average."
- The price-informativeness analysis is based on the Bai, Philippon and Savov (2016) measure:

$$\frac{E_{t+3}(n)}{A_t(n)} = \alpha + \pi_i \log\left(\frac{\exp(\boldsymbol{\beta}'_{1,i,t}\boldsymbol{x}_t(n))\epsilon_{i,t}(n)}{A_t(n)}\right) + \rho\left(\frac{E_t(n)}{A_t(n)}\right) + \nu_t(n)$$

- I like this analysis, and the findings seem right ...
  - We know (?) that there a lot of money managers who don't add value.
- However, it would be nice to see more evidence consistent with this hypothesis.

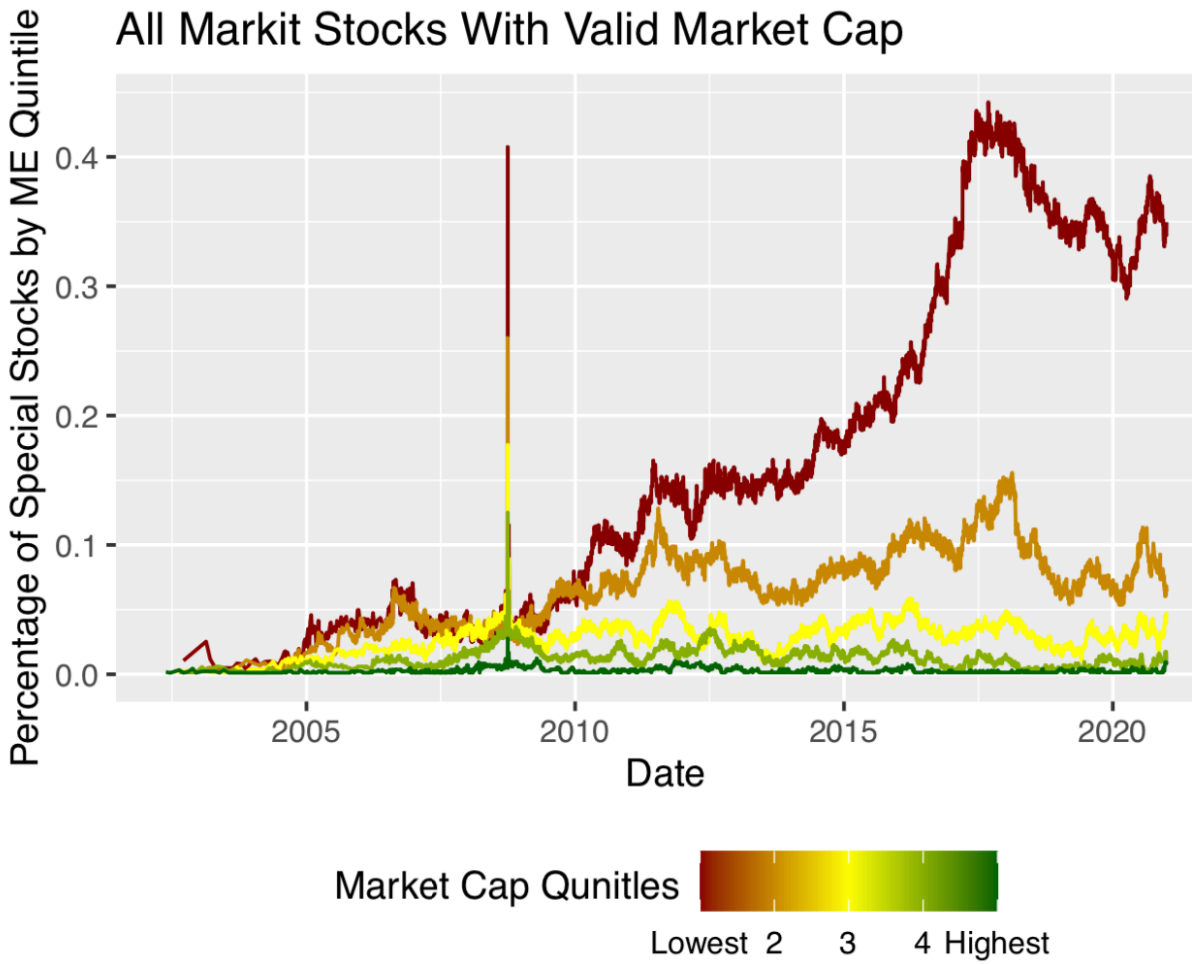
Changing patterns in Short Interest

- D'Avolio (2002) finds that 1-2% of firms are "special", meaning that they have annualized borrow costs that exceed 1%.



Changing patterns in Short Interest

- This shows the fraction of shares, by size quintile, that have annualized borrow costs $> 10\%$.



Intermediary Asset Pricing

- There is a really interesting evolving literature on intermediary asset pricing:
  - e.g., He and Krishnamurthy (2013), Adrian, Etula, and Muir (2014), He, Kelly, and Manela (2017), Haddad and Muir (2018).
- The main idea behind this literature is that if intermediary cost of capital is stochastic, an estimate of that (stochastic) cost of capital can serve as a stochastic discount factor/pricing kernel.
  - e.g., intermediaries will invest less in any given asset, ceteris paribus, if that asset's returns negatively covary with the broker-dealer's leverage.
- The framework here seems ideally suited to provide a better estimation of these effects.

Conclusions

- The small set of characteristics used here do explain a lot of the cross-sectional variation in bm ratios and in future ROEs.
  - However, there is a considerable amount that remains unexplained.
- The relation between characteristics and holdings, and price impact is strikingly different across asset-holder types.
  - It would be nice dig deeper into the source of this variation.
- The results on informational efficiency make sense
  - Again, it would be nice to see both some robustness checks.
- The climate-risk results are intriguing.
  - Is this different than what we would expect to see?
    - All these are pass-through instruments; What is it about the investor base that leads to the differences in climate exposure?
  - Policy implications?

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