

How Competitive is the Stock Market?

Theory, Evidence from Portfolios, and Implications for the Rise of
Passive Investing

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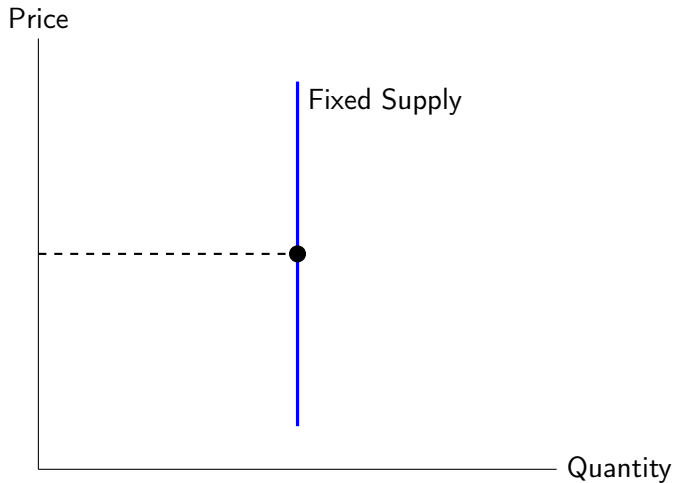
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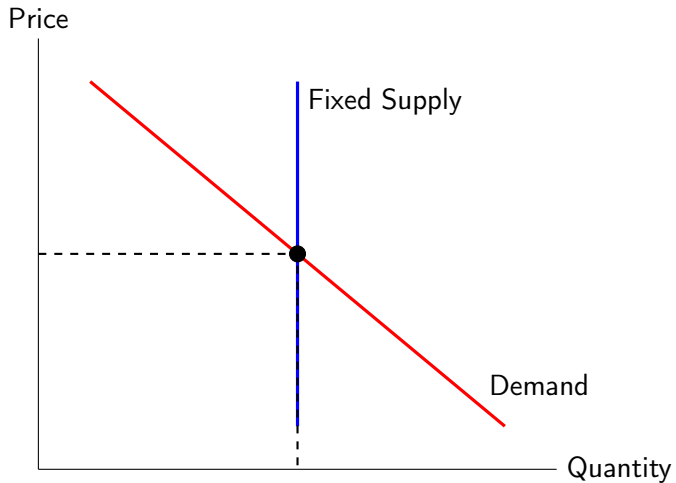
Finance Advisory Board Meeting

March 2025

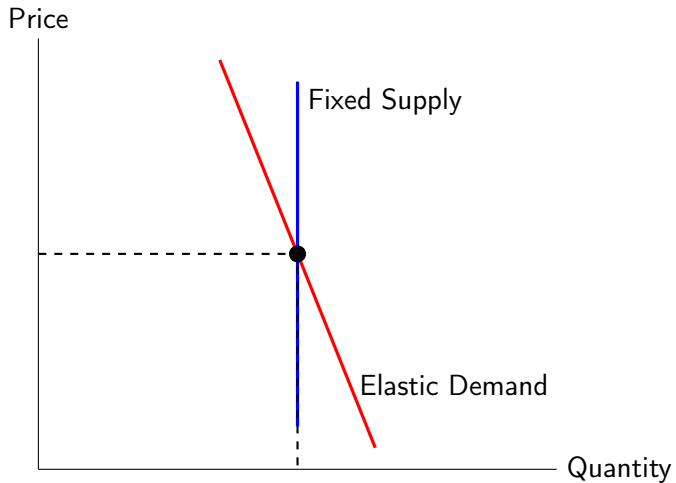
The Inelastic Market Hypothesis



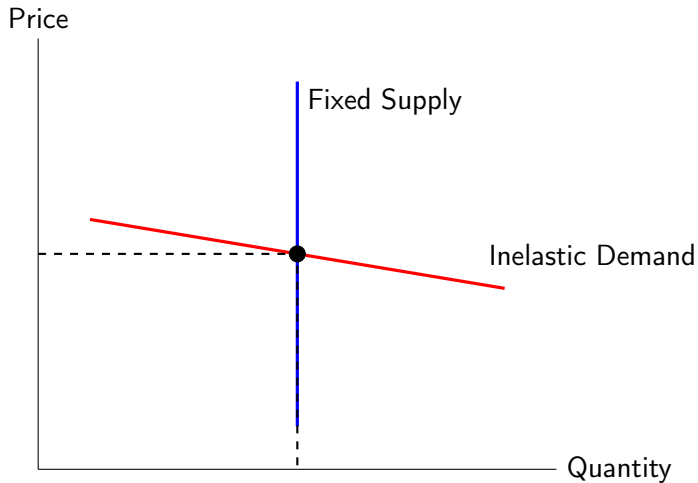
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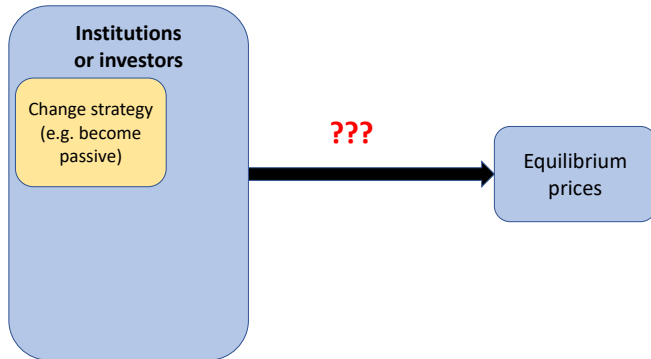
The Inelastic Market Hypothesis



What is the effect of changes in the trading strategy of **some** institutions on the **equilibrium** behavior of asset prices?

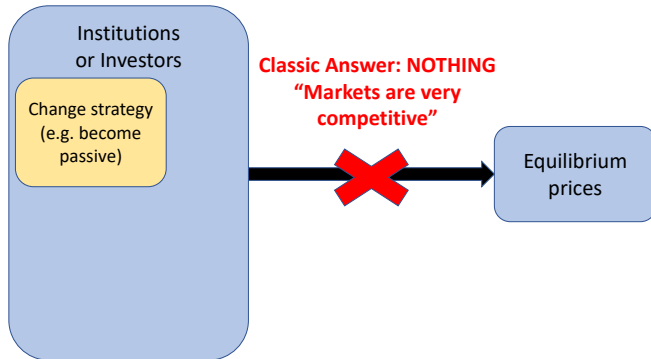
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- The rise of passive investing



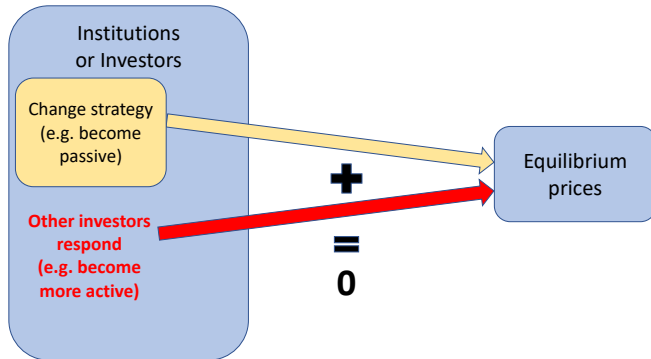
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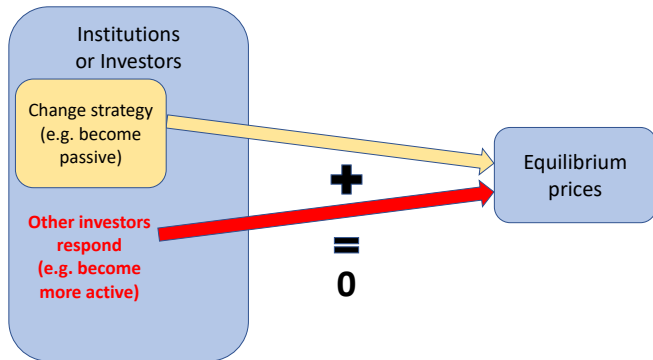
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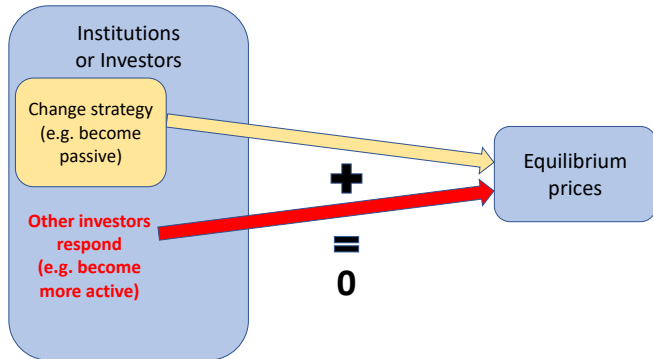
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→ How large is the strategic response?

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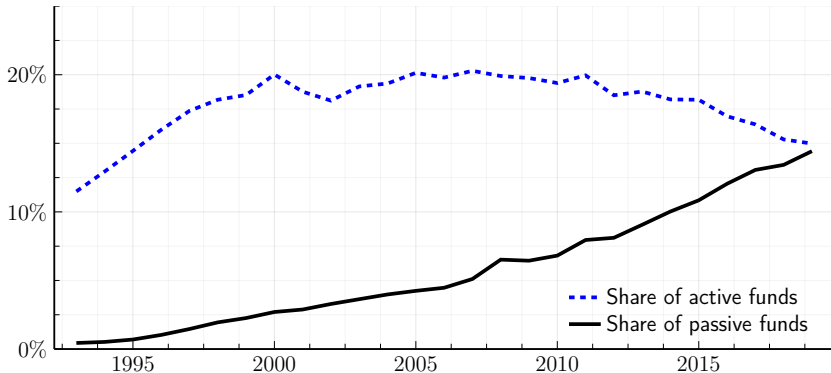
- The rise of passive investing
- Regulated financial intermediaries trading more conservatively
- An “arbitrageur” (e.g. Melvin Capital) going bust



→ How large is the strategic response?

The Rise of Passive Investing

Active and passive (+ ETF) mutual funds as fraction of US total market cap. (source: ICI)



→ *How does this change prices and investment opportunities?*

Framework: how to estimate the strategic response of investors?

- Simple statistic, **degree of strategic response χ** :

how much does my demand elasticity respond to the aggregate demand elasticity?

- If someone stops looking for \$20 bills on the floor, how much harder do you look?

Measurement: quantify the degree of strategic respo

- Demand system of investors' portfolio
 - ▶ Understand and account for large heterogeneity across stocks and investors
- Two-step equilibrium
 - ▶ Competition for the asset: *Prices so that investor demands clear market*
 - ▶ **Competition in strategies:** *Investor interactions in choosing their demand elasticities*

Results: strategic responses in the US stock market

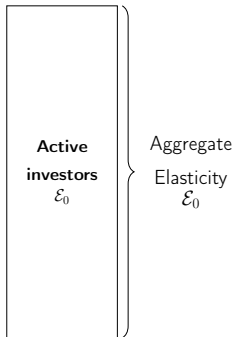
On the strategic response ...

- Strategic response much weaker than standard finance
- Direct effect of changes in individual behavior reduced by 60%

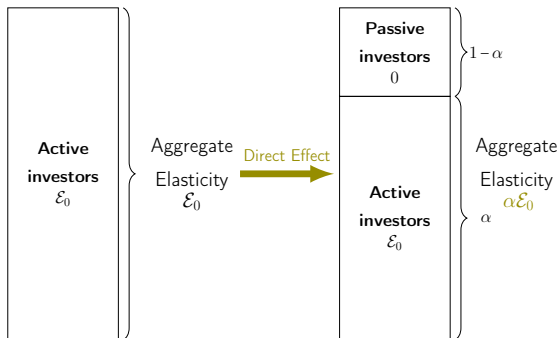
On the rise of passive investing ...

- Rise of passive investing leads to 15% more inelastic aggregate demand curves for individual stocks
 - ▶ If buying \$1 of a stock used to raise its price by \$2.5, now the response is \$3
 - ▶ More volatility, less liquidity

Impact of the Rise in Passive Investing

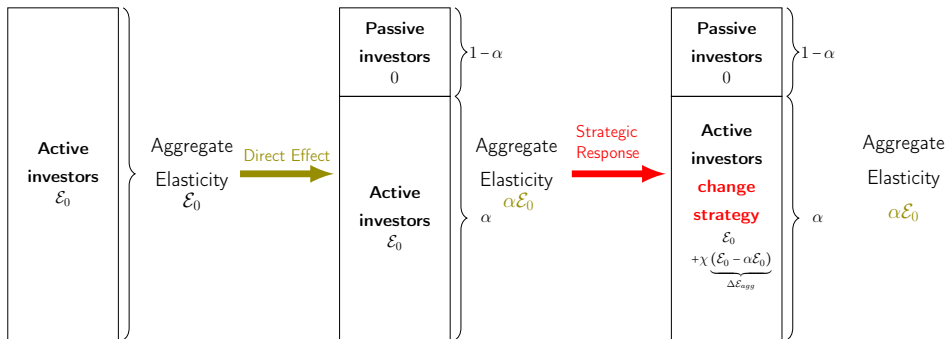


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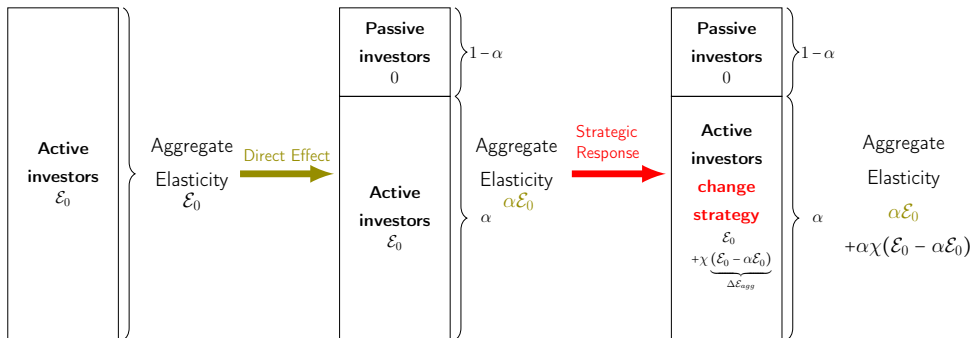
- Empirical increase in fraction of passive investors: $\alpha = 70\%$
 - No strategic response ($\chi = 0$): proportional reduction, $\mathcal{E}_{NEW} = \alpha \mathcal{E}_0 = 70\% \times \mathcal{E}_0$

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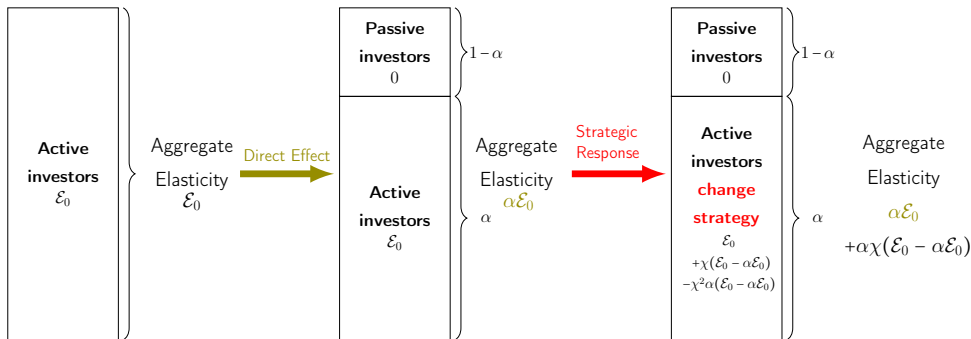
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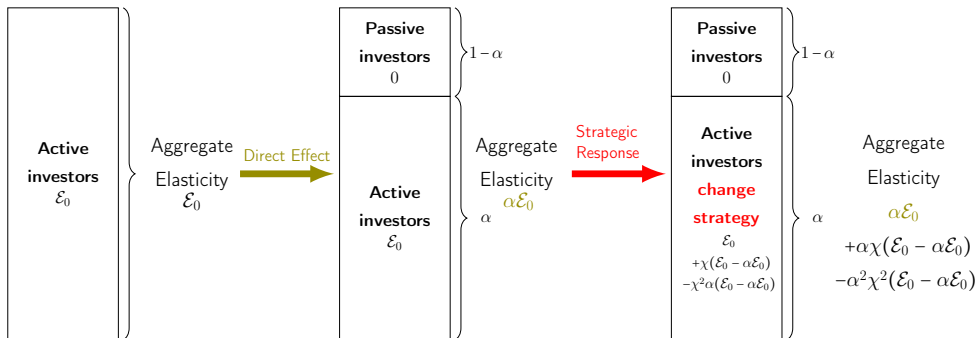
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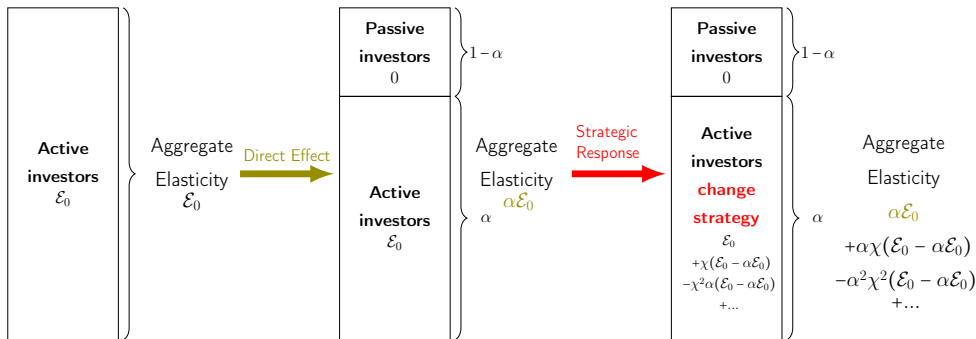
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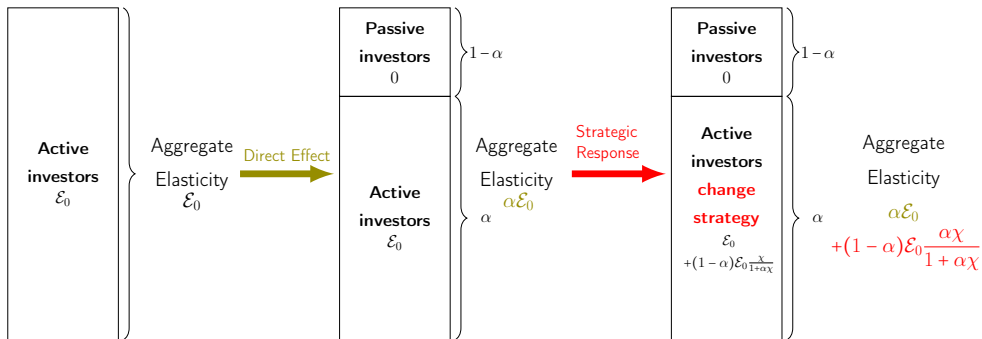
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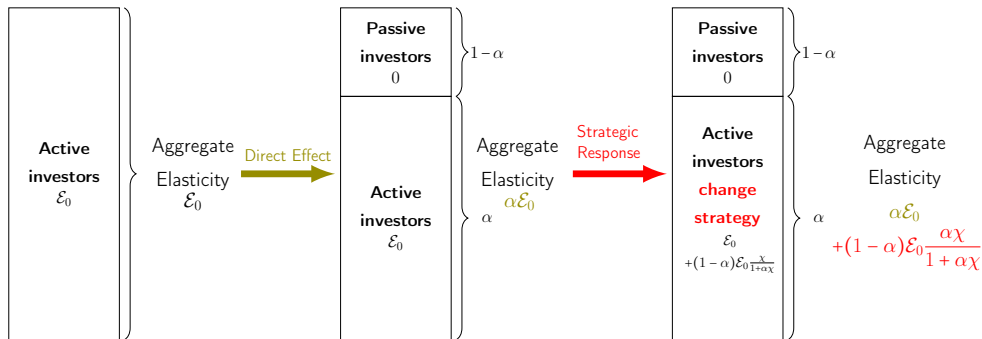
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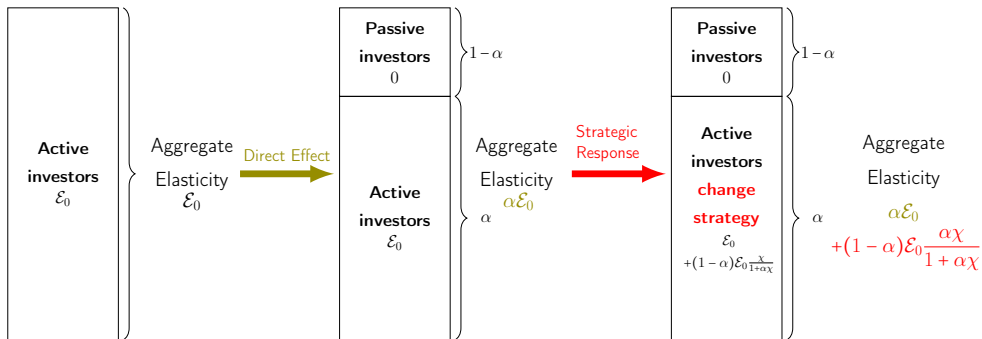


■ Empirical increase in fraction of passive investors: $\alpha = 70\%$

- ▶ No strategic response ($\chi = 0$): proportional reduction, $\mathcal{E}_{NEW} = \alpha\mathcal{E}_0 = 70\% \times \mathcal{E}_0$
- ▶ "Perfectly competitive financial markets" ($\chi \rightarrow \infty$): nothing happens,

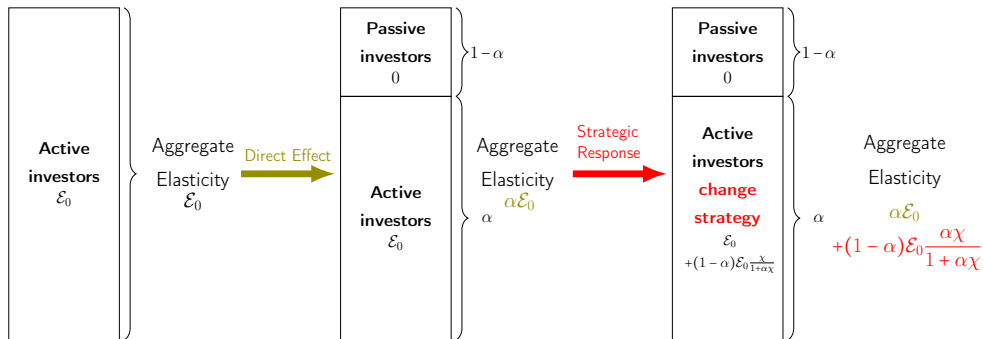
$$\mathcal{E}_{NEW} = \alpha\mathcal{E}_0 + (1 - \alpha)\mathcal{E}_0 = \mathcal{E}_0$$

Impact of the Rise in Passive Investing



- Empirical increase in fraction of passive investors: $\alpha = 70\%$
 - Identify the *constant* degree of strategic response using the cross-section $\rightarrow \chi = 2$

Impact of the Rise in Passive Investing



- Empirical increase in fraction of passive investors: $\alpha = 70\%$
 - Identify the *constant* degree of strategic response using the cross-section $\rightarrow \chi = 2$
- $\Rightarrow \mathcal{E}_{NEW} = 87.5\% \times \mathcal{E}_0$ (vs 100% with full response and 70% without strategic response)

Data

■ Stock level data

- ▶ CRSP and COMPUSTAT
- ▶ Price and characteristics: book equity, dividends, profitability, investment

■ Portfolio data

- ▶ 13F filings from SEC, 2000–2020 (Backus, Conlon and Sinkinson, 2020)
- ▶ Every institution with AUM over \$100m reports stock positions quarterly
- ▶ Includes 80% of total ownership in U.S. stock market (2008)
- ▶ Residual for market clearing collected as “households”
- ▶ **Each quarter: keep track of 1300 investors and 2800 stocks**

Quantitative Model

- Portfolio choice represented by a logit in portfolio shares w_{ik} (Kojien Yogo 2019)

$$\underbrace{\log \frac{w_{ik}}{w_{i0}}}_{\text{relative demand}} - p_k = \underbrace{-\mathcal{E}_{ik} p_k}_{\text{price elasticity}} + \underbrace{\underline{d}_{0i} + \underline{d}'_{1i} X_k + \epsilon_{ik}}_{\text{baseline demand}}$$

$$\mathcal{E}_{ik} = \underbrace{\underline{\mathcal{E}}_{0i} + \underline{\mathcal{E}}'_{1i} X_k}_{\text{baseline elasticity}} - \underbrace{\chi \mathcal{E}_{agg,k}}_{\text{strategic response}}$$

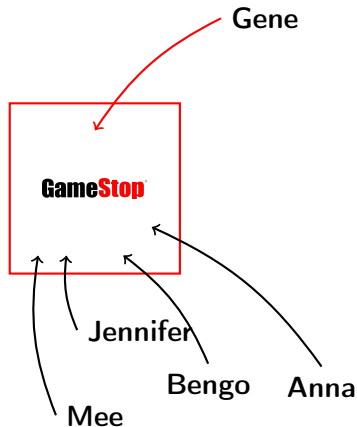
- Baseline demand \underline{d}_i
- Baseline elasticity $\underline{\mathcal{E}}_i$
 - Embeds Kojien Yogo 2019, who assume no competition: $\chi = 0$
- **Passive investors:** $\mathcal{E}_i = 0$ (includes index investing, identified using KY elasticity)

Three Challenges for Estimation

- *Reflection problem* (Manski 1993)
- *Endogeneity in demand estimation*
 - ▶ Koijen-Yogo (2019) price instrument + model-based instruments for aggregate elasticity
- *Implementation*
 - ▶ An efficient algorithm to run large dimensional regressions and solve all the equilibria simultaneously: **process each quarter of data in about 2 minutes**

The Reflection Problem

- Does Gene trade GameStop aggressively because
 - ▶ he is an aggressive trader: high $\underline{\mathcal{E}}_i$
 - ▶ of the influence of other traders

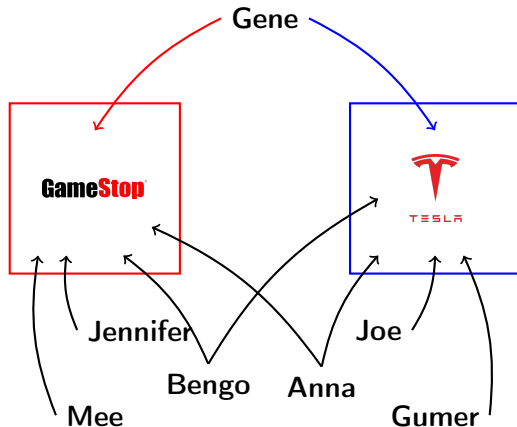


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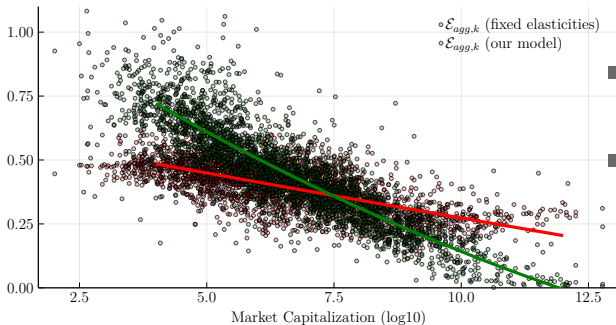
→ Genefaces a *different* mix of other investors for different stocks



Estimates of Strategic Response χ

- Degree of strategic response
estimate stable over time, $\chi = 2.15$
- Substantial individual response: The same investor responds less to price movements for assets with more aggressive investors than assets with less aggressive investors
 - ▶ If all other investors are more elastic by 1, lower my elasticity by 2.15
- Far from “competitive financial markets”, $\chi \ll \infty$
 - ▶ In simple calculation, needed $\chi > 18$ to compensate 90% of direct effect

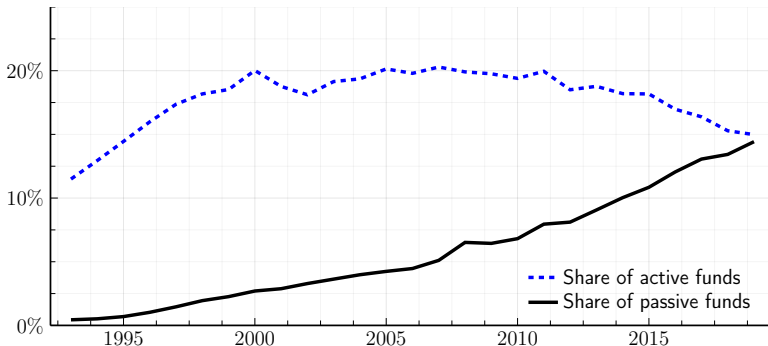
Estimates of Aggregate Elasticity by Stock



- **Elasticities are low ≈ 0.4 :** consistent with previous studies
- **Size effect:** less willing to adjust positions with large weights
- **Less cross-sectional variation:** important to account for the elasticity equilibrium
 - If an active investor shows up in one stock, others become more passive

The Rise of Passive Investing

Active and passive (+ ETF) mutual funds as fraction of US total market cap. (source: ICI)



■ In our estimation, fraction of active investors down from 81% to 59% from 2001 to 2019

The Rise of Passive Investing

What does the model predict about the effect of this trend?

- Aggregate elasticity equilibrium:

$$\mathcal{E}_{agg,k} = \underbrace{|A_k|}_{\text{fraction active}} \times \underbrace{\mathbf{E}(\mathcal{E}_{ik} | i \in A_k)}_{\text{avg. active elasticity}} \times \underbrace{\frac{1}{1 + \chi |A_k|}}_{\text{general equilibrium}}$$

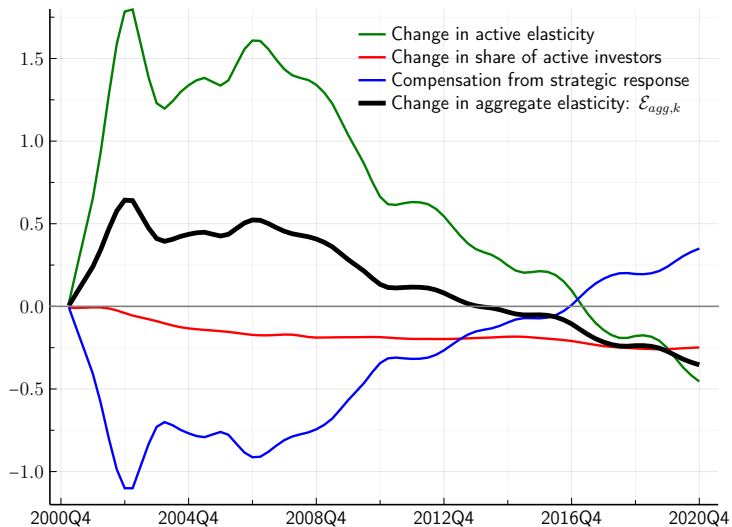
- Effect of change in active share:

- ▶ Assuming random investors switch:

$$\frac{d \log \mathcal{E}_{agg}}{d \log |A|} = \frac{1}{1 + \underbrace{\chi}_{2.15} \underbrace{|A|}_{68\%}} = 40.6\%$$

Elasticities drop by $40.6\% \times 32\% = 13\%$

Decomposing Actual Changes in Elasticity



Implications for Price Dynamics

The rise of passive investing decreased elasticities by 13%

elasticity $\downarrow \Rightarrow$ volatility \uparrow , price informativeness \uparrow , liquidity \downarrow

Beyond Passive Investing

Lack of strategic response implies that:

- There are profitable trading opportunities where others haven't stepped in yet
- There are crowded trades that many take even if unprofitable
- **Key source of information:** follow where different investors are going, analyze holdings data

Conclusion

- **Degree of strategic response χ :** useful statistic to understand the equilibrium effect of changes in specific investors' behavior
- **Stock market far from the "perfectly competitive ideal", $\chi = 2 \ll \infty$**
 - Dampen direct effects by 60%
- **Rise of passive investing leads to 13% more inelastic markets**
 - Effect on cross-section of stocks in the paper
- **More applications:**
 - Financial health and regulation of intermediaries
 - Role of big data
 - International finance: what if China stops buying treasuries?