

# The Present Value of Future Market Power

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# Motivation

- In recent decades, there has been a notable increase in firms' **market power**, and **stock valuations**, accompanied by a decline in investors' **required returns**, **output growth** and **corporate investments**
- Debate arranged around a few interrelated themes
  - Technology: superstar firms, investment shifts to intangibles
  - Market power: rents, antitrust policy
  - Secular stagnation: low growth and interest rates
- Importantly, the increase in stock valuations reflect firms' fundamentals that (may) materialize with a significant delay
- We show that all five trends naturally combine into a present-value identity that harnesses the forward-looking nature of asset prices rather than backward-looking accounting information, and does not rely on structural assumptions.

# The Present Value of Future Market Power

- Key Contributions:

1. A novel log-linear present-value relationship decomposing firm value into expected future output growth ( $\Delta y$ ), markups ( $\mu$ ), fixed costs and investments ( $fci$ ), and returns ( $r$ ).

$$m_{i,t} \approx k + \sum_{\tau=1}^{\infty} \rho^{\tau-1} \mathbb{E}_t \Delta y_{i,t+\tau} + \underbrace{\phi_1 \sum_{\tau=1}^{\infty} \rho^{\tau-1} \mathbb{E}_t \mu_{i,t+\tau}}_{\text{present value of markups}} - \phi_2 \sum_{\tau=1}^{\infty} \rho^{\tau-1} \mathbb{E}_t fci_{i,t+\tau} - \sum_{\tau=1}^{\infty} \rho^{\tau-1} \mathbb{E}_t r_{i,t+\tau},$$

2. Novel empirical findings:

- One-third of the increase in aggregate market value is due to expected future markups, net of fixed costs and investments.
- Expected markups rise due to both market share reallocation to high-markup firms and within-firm increases, partially driven by mergers and acquisitions.
- Current markups and market-value-to-output ratios explain similar shares—close to 50% each—of the variation in expected future markups.
- In the time series, positive shocks to expected markups are associated to negative shocks to discount rates but in the cross-section, firms with higher expected future markups earn higher abnormal returns

# Structure of the talk

1. Framework
2. Firm-level results
3. Aggregate time series
4. Markups and discount rates

# Framework

# Present-value framework for firm's asset

- Time- $t$  return on a firm (equity + debt):

$$1 + R_t = \frac{M_t - ISS_t + D_t}{M_{t-1}}$$

where  $M$  = market value of the firm,  $ISS$  = net issuance/repurchases,  $D$  = distributions (dividends + coupons).

- Linking  $D - ISS$  to firm profits and investment:

$$D_t - ISS_t = Y_t - VC_t - FC_t - I_t$$

where  $Y$  = output,  $VC$  = variable cost,  $FC$  = fixed cost,  $I$  = invest.

- Plugging the second eq. into the first eq.,

$$1 + R_t = \frac{M_t + Y_t - VC_t - FCI_t}{M_{t-1}}$$

where  $FCI = FC + I$  denotes fixed cost and investment.

# Markup in a present-value framework

- Firm's cost minimization implies (De Loecker and Warzynski (2012) and De Loecker, Eeckhout, and Unger (2020)):

$$\mu_t = \log \left( \theta_V \times \frac{Y_t}{VC_t} \right)$$

where  $\mu = \log$  markup,  $\theta_V =$  elasticity of output to variable input.

- Plugging it into the firm-level return equation and rearranging and taking the log,

$$m_t \approx -r_{t+1} + \Delta y_{t+1} + \phi_1 \mu_{t+1} - \phi_2 fci_{t+1} + \rho m_{t+1}$$

# A loglinear present-value identity

- Iterating forward and imposing transversality condition,

$$m_t \approx k + \underbrace{\sum_{j=1}^{\infty} \rho^{j-1} \Delta y_{t+j}}_{\text{output growth}} + \underbrace{\sum_{j=1}^{\infty} \rho^{j-1} \phi_1 \mu_{t+j}}_{\text{markups}} - \underbrace{\sum_{j=1}^{\infty} \rho^{j-1} \phi_2 fci_{t+j}}_{\text{investments}} - \underbrace{\sum_{j=1}^{\infty} \rho^{j-1} r_{t+j}}_{\text{discount rates}}.$$

$fci$ : Broad notion of “investment” incl. intangibles, via SG&A and R&D.

- Estimate  $\rho \approx 0.98$ ,  $\phi_1 \approx 0.05$ , and  $\phi_2 \approx 0.04$  via panel regression

$$m_{i,t-1} - \Delta y_{i,t} + r_{i,t} = \phi_0 + \rho m_{i,t} + \phi_1 \mu_{i,t} - \phi_2 fci_{i,t} + \epsilon_{i,t}.$$



# VAR estimation

Estimate a panel VAR

- Identity variables:  $m, r, \mu, \Delta y, fci$
- We include other state vars (leverage, net capex, asset growth, market share), but show robustness to the non-inclusion

allowing us to

1. decompose variation in firm-level valuations
2. aggregate them up to analyse time-series trends

## **Firm-level results**

# Decomposition of market-value-to-output variation

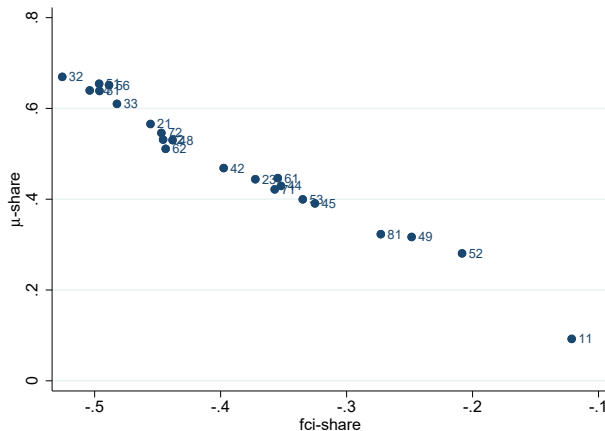
VAR estimates the discounted infinite-horizon sums of expected returns, output growth, markups, and fixed costs/investment

$$1 = \frac{\text{cov} \left( \sum_{\tau=1}^{\infty} \rho^{\tau-1} \mathbb{E}_t \Delta y_{i,t+\tau}, m_{i,t} \right)}{\text{var} (m_{i,t})} + \frac{\text{cov} \left( \phi_1 \sum_{\tau=1}^{\infty} \rho^{\tau-1} \mathbb{E}_t \mu_{i,t+\tau}, m_{i,t} \right)}{\text{var} (m_{i,t})} \\ - \frac{\text{cov} \left( \phi_2 \sum_{\tau=1}^{\infty} \rho^{\tau-1} \mathbb{E}_t fci_{i,t+\tau}, m_{i,t} \right)}{\text{var} (m_{i,t})} - \frac{\text{cov} \left( \sum_{\tau=1}^{\infty} \rho^{\tau-1} \mathbb{E}_t r_{i,t+\tau}, m_{i,t} \right)}{\text{var} (m_{i,t})}.$$

- Variation in expected markups accounts for around 63% of market-value-to-output variation
- Fixed-cost and investment account for 49% but in the opposite direction
- Output growth accounts for 51% of the market-value-to-output variation
- Discount rates account for 25% of the market-value-to-output variation

# Decomposition by industry (2-digit NAICS)

The shares of VAR-implied, long-run  $fci$ - and  $\mu$ -expectations in intra-industry market-value-to-output ratio variation across industries.



# Markup predictions: current markups vs asset prices

We can also decompose expected future markups for firm  $i$  at time  $t$  as a function of current markups and asset prices:

- markups and market-value-to-output ratios explain similar shares—close to 50% each—of the variation.
- Markups are persistent: current markups account for 93% of the variation in future markups for  $t+1$  to  $t+5$
- Asset prices account for the **majority** of variation beyond  $t+5$ , and  $> 60\%$  beyond  $t+15$

Asset prices are particularly helpful in assessing market expectations of longer-term markup and market-power trajectories

# Anecdotal application: concentration in the retail sector

Crouzet and Eberly (2018, AEA P&P) study the retail sector between 1989 and 2015

- Concentration up, investment in intangibles up, productivity up
- But markups basically flat
- Does this mean that concentration in the retail sector
  - is efficient, not associated with market power? *or*
  - generates market power that is “harvested” with a delay?

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- Asset-price based expected retail markups rise steadily since 90s
- Since 2015, avg *realized* markups for retail sample almost doubled

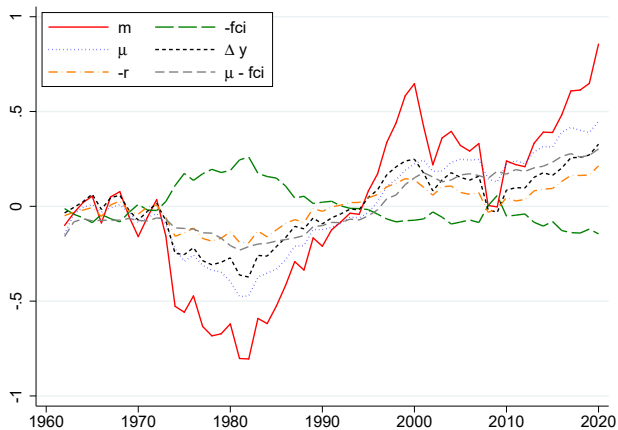


# **Aggregate time series**

# An aggregate decomposition of valuations over time

- We now translate the firm-level results into a decomposition of the aggregate time series
- We decompose the aggregate market-value-to-output ratio into expected markups, expected output growth, expected  $fci$ , and expected discount rates
- The aggregate market-value-to-output has risen sharply between 1982 and 2000, and then again between 2010 and 2020

# An aggregate decomposition of valuations over time



# An aggregate decomposition of valuations over time

- The concurrent fall in discount rates accounts for around one-quarter of the 1982-2020 rise
- The increase in expected output growth contributes around 43%
- Expected markups account for 57% of the increase in aggregate valuations. This is partially offset by rising expected fixed costs and investments

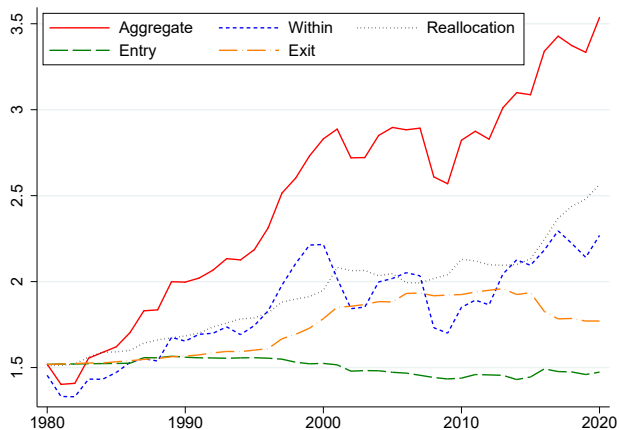
# What's driving aggregate markup expectations?

We provide a time-series decomposition of the output-weighted long-run markup expectations. Let  $X = \sum_{\tau=1}^{\infty} \rho^{\tau-1} E_t \mu_{i,t+\tau}$ ,

$$\begin{aligned} \Delta X_t = & \underbrace{\sum_i w_{i,t-1} \Delta X_{i,t}}_{\Delta \text{within}} + \underbrace{\sum_i \Delta w_{i,t} \tilde{X}_{i,t}}_{\Delta \text{market share}} + \underbrace{\sum_i \Delta w_{i,t} \Delta X_{i,t}}_{\Delta \text{cross term}} \\ & \underbrace{\phantom{\sum_i \Delta w_{i,t} \tilde{X}_{i,t}}}_{\Delta \text{reallocation}} \\ & + \underbrace{\sum_{i \in \text{Entry}} w_{i,t} \tilde{X}_{i,t} - \sum_{i \in \text{Exit}} w_{i,t-1} \tilde{X}_{i,t-1}}_{\text{net entry}} \end{aligned}$$

where  $\tilde{X}_{i,t} = X_{i,t} - X_{t-1}$  and  $\tilde{X}_{i,t-1} = X_{i,t-1} - X_{t-1}$ .

# Present value of future markups



↑ within-firm markup exp. & reallocation towards high-markup firms

# Mergers and markups

- We explore the impact of M&A on within-firm markup expectations
- For the five years preceding the merger, we compute the pre-merger output-weighted current markups and VAR-implied markup expectations for target(s) and acquirer.
- We compare these observations with post-merger (current and expected) markups for the combined firm in t+1 through t+5.
- In a difference-in-differences setting, we compare changes in markups between merging and non-merging

$$x_{i,t} = a_i + a_t + b \mathbb{1}_i^{\text{merger}} \times \mathbb{1}_t^{\text{post}} + \epsilon_{i,t}$$

# Mergers and markups

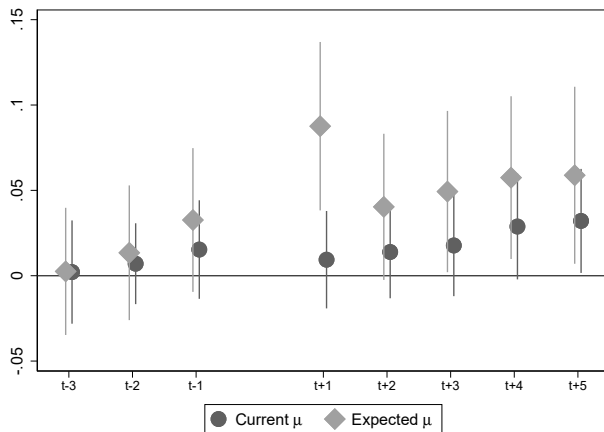
	$\mu_t$	$\sum_{j=1}^{\infty} \rho^j \hat{\phi}_1 \hat{\mathbb{E}}_t [\mu_{t+j}]$
Treated $\times$ Post	0.014 (0.010)	0.061 (0.015)
Observations	83482	83482

Long-run markup expectations exhibit a significant rise post-merger, but realized current markups do not.



# Mergers and markups

We can disaggregate the post-merger effect by year-since-merger



Long-run markups rise (too much?) relative to Sum-of-the-Parts / non-merging firms  
Effect undetectable in markup realizations until  $t + 5$ .

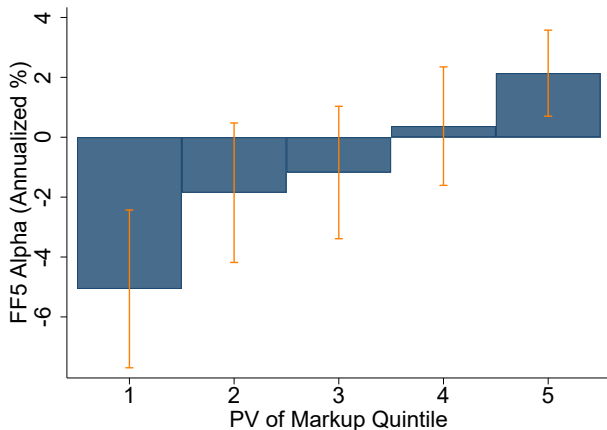
# **Markups and discount rates**

# Markups and discount rates: cross section (I)

- Estimate VAR until 1990, and compute  $\mathbb{E}_t \left( \sum_{j=1}^{\infty} \rho^{j-1} \mu_{t+j} \right)$  for 1990-2020
- Form quintile portfolios on *expected future* markups, compute FF5  $\alpha$ 's

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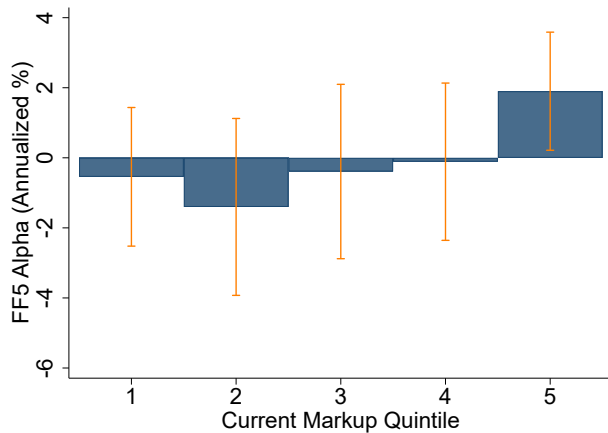


# Markups and discount rates: cross section

- High-markup firms earn higher returns controlling for other factors
- Long-short portfolio loads slightly negatively on RMW
- Current markups mask variation in predictable market power

# Cross section: realized markups

- Form quintile portfolios on *current* markups, compute FF5  $\alpha$ 's



# Conclusion

- We introduce a novel present-value identity that linearly decomposes firm-level market value into expectations about future output growth, markups, fixed costs and investments, and discount rates.
- Our model-free approach allows us to study the empirical relationships of secular trends in these variables in a holistic way.
- Key Findings:
  - About 1/3 of the increase in U.S. public companies' market value from 1982 to 2020 is due to rising expected future markups, net of fixed costs and investments.
  - The upward trend in average markup expectations is driven by both a reallocation of market share towards firms with higher expected markups, and a within-firm rise in expected markups, notably through M&A.
  - In the time series, shocks to expected markups are negatively related with discount rate shocks. Cross-sectionally, firms with higher expected markups exhibit higher abnormal returns.

# Markups and discount rates: time-series

Negative time-series correlation of shocks to expected markups with discount-rate news.  
Consistent with various equilibrium mechanisms.

- Market power  $\implies$  low investment  $\implies$  low interest rate (Gutiérrez-Jones-Philippon, 2022)
- Low interest rate  $\implies$  asymmetric investment  $\implies$  market power (Liu-Mian-Sufi, 2022)
- Low interest rate  $\implies$  stable collusion  $\implies$  market power (Dou-Ji-Wu, 2021)

VAR-based framework ill-suited to pin down direction of causality.

*Does not separate risk-free rate from risk premia. Not clear that (i) the aggregate trend nor (ii) the relationship with markups has the same sign.*