Industry Concentration, Sticky Profits, and Return Dynamics

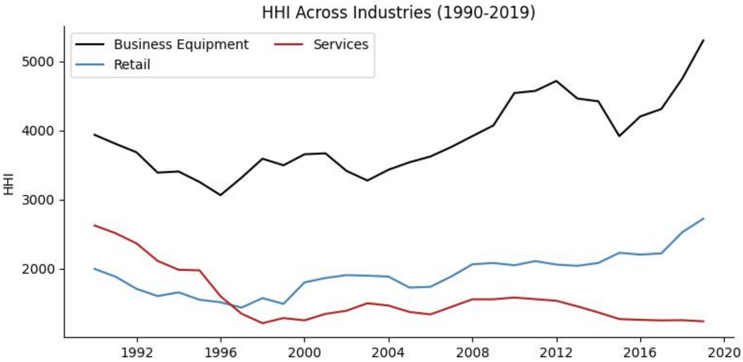
S. Yanki Kalfa
Rady School of Management - UCSD

March 20, 2025

UC San Diego

Industry Concentration is Rising

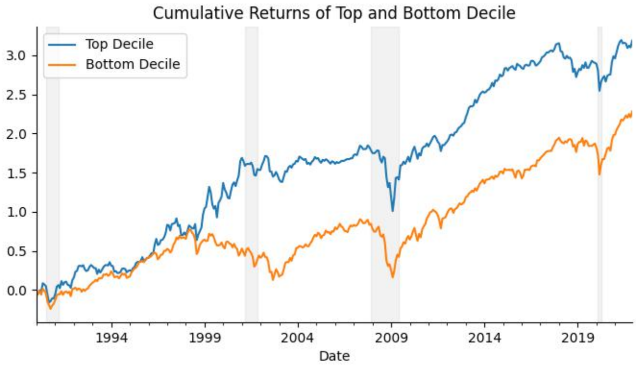
Industry concentration is increasing for almost all industries



UC San Diego

Highly Concentrated Industries Offer High Returns

Portfolio of concentrated industries earn 3.5%/year more than competitive industries



UC San Diego

Literature

Increasing Concentration:

- Liu et. al. (2022) & Akcigit and Ates (2023): Low interest rates and low knowledge diffusion increases concentration and increases profit growth.

What are some implications?:

- Barkai (2019) & Corhay et.al. (2020): Increased and sustained profits for concentrated industries, and high markups.
- Grullon et. al. (2019): Positive correlation between returns and industry concentration.

Findings / Contribution

Findings:

- Expected profit growth **persistence** is larger in concentrated industries
- Dual Effect:
  - Higher sensitivity of profits to economic cycles
  - Higher Cash Flow News contribution in returns
- Implications:
  - Higher risk premium
  - Higher sensitivity of expected returns and conditional volatility to economic downturns

Take Home Message:

- Firms in concentrated industries offer higher risk premium but face higher volatility during economic downturns

Present Value Model with Profits

Log-Linear PV Relationship with Profits:

$$(p_{j,t+1} - \pi_{j,t+1}) \approx \frac{\kappa_j}{1 - \rho_{1,j}} + \sum_{h=0}^{\infty} \rho_{1,j}^{h} \left(\Delta\pi_{j,t+1+h} - r_{j,t+1+h}\right)$$

Where:

- $p_{j,t+1}$: log price of industry j at time $t + 1$
- $\pi_{j,t+1}$: log profits of industry j at time $t + 1$
- $\Delta\pi_{j,t+1}$: profit growth of industry j at time $t + 1$
- $r_{j,t+1}$: returns of industry j at time $t + 1$

UC San Diego

Data and Latent Variables

Data:

- Quarterly 1976Q2 – 2021Q2
- Fama-French 30 Industry - excluding Finance and Insurance
- Value Weighted Prices
- Value Weighted Gross Profits: $\text{Revenue}_t - \text{COGS}_t$

Why Latent Variables?

- Vast majority of papers use VARs
- Model observables: Market returns and dividends
- We are interested in **expectations** at the industry level
- van Binsbergen and Koijen (2010) is a special case

Assumptions

Industry Level:

- Expected Returns: $\mu_{j,t} \equiv \mathbb{E}_t[r_{j,t+1}]$
- Expected Profit Growth: $g_{j,t} \equiv \mathbb{E}_t[\Delta\pi_{j,t+1}]$

Systematic:

- Discount Rates: $\tilde{F}^{DR}_{j,t}$
- Cash Flows: $\tilde{F}^{CF}_{j,t}$

$$\tilde{\mu}_{j,t+1} = (\mu_{j,t+1} - \delta_{0,j}) = \delta_{1,j}\tilde{\mu}_{j,t} + \delta_{2,j}\tilde{F}^{DR}_{t+1} + \varepsilon^{\mu}_{j,t+1}$$

$$\tilde{g}_{j,t+1} = (g_{j,t+1} - \omega_{0,j}) = \omega_{1,j}\tilde{g}_{j,t} + \omega_{2,j}\tilde{F}^{CF}_{t+1} + \varepsilon^{g}_{j,t+1}$$

$$\tilde{F}^{DR}_{t+1} = (F^{DR}_{t+1} - \gamma_0) = \gamma_1\tilde{F}^{DR}_{t} + \varepsilon^{F^{DR}}_{t+1}$$

$$\tilde{F}^{CF}_{t+1} = (F^{CF}_{t+1} - \phi_0) = \phi_1\tilde{F}^{CF}_{t} + \varepsilon^{F^{CF}}_{t+1},$$

UC San Diego

Assumptions- Covariance Matrix

Extension of van Binsbergen and Koijen (2010):

$$\Sigma_j \equiv \text{var}\left(\begin{bmatrix} \varepsilon^{\tilde{\mu}}_{j,t+1} \\ \varepsilon^{\tilde{g}}_{j,t+1} \\ \varepsilon^{\Delta\pi}_{j,t+1} \\ \varepsilon^{F^{DR}}_{t+1} \\ \varepsilon^{F^{CF}}_{t+1} \end{bmatrix}\right) = \begin{bmatrix} \sigma^2_{j,\mu} & \sigma_{j,\mu g} & 0 & 0 & 0 \\ \sigma_{j,\mu g} & \sigma^2_{j,g} & 0 & 0 & 0 \\ 0 & 0 & \sigma^2_{j,\Delta\pi} & 0 & 0 \\ 0 & 0 & 0 & \sigma^2_{F^{DR}} & \sigma_{F^{DR}F^{CF}} \\ 0 & 0 & 0 & \sigma_{F^{DR}F^{CF}} & \sigma^2_{F^{CF}} \end{bmatrix}$$

UC San Diego

PV Model Cont'd

Taking expectations of the PV relationship results in:

$$pe_{j,t} = \mathcal{A}_j + \mathcal{B}_{1,j}\tilde{g}_{j,t} - \mathcal{B}_{3,j}\tilde{\mu}_{j,t},$$

where:

$$\mathcal{A}_j = \frac{\kappa_j + \omega_{0,j} - \delta_{0,j}}{1 - \rho_{1,j}}$$

$$\mathcal{B}_{1,j} = \frac{1}{1 - \rho_{1,j}\omega_{1,j}}$$

$$\mathcal{B}_{3,j} = \frac{1}{1 - \rho_{1,j}\delta_{1,j}}$$

UC San Diego

Dynamic Factor Model

2J Observation Equations:

$$pe_{j,t+1} = (1-\delta_{1,j})\mathcal{A}_j + \delta_{1,j} pe_{j,t} - (\delta_{1,j} - \omega_{1,j})\mathcal{B}_{1,j}\tilde{g}_{j,t} + \mathcal{B}_{1,j}\omega_{2,j}\tilde{F}^{CF}_{t+1} - \mathcal{B}_{3,j}\delta_{2,j}\tilde{F}^{DR}_{t+1}$$
$$+ \mathcal{B}_{1,j}\varepsilon^{\tilde{g}}_{j,t+1} - \mathcal{B}_{3,j}\varepsilon^{\tilde{\mu}}_{j,t+1}$$
$$\Delta\pi_{j,t+1} = \omega_{0,j} + \tilde{g}_{j,t} + \varepsilon^{\Delta\pi}_{j,t+1}$$

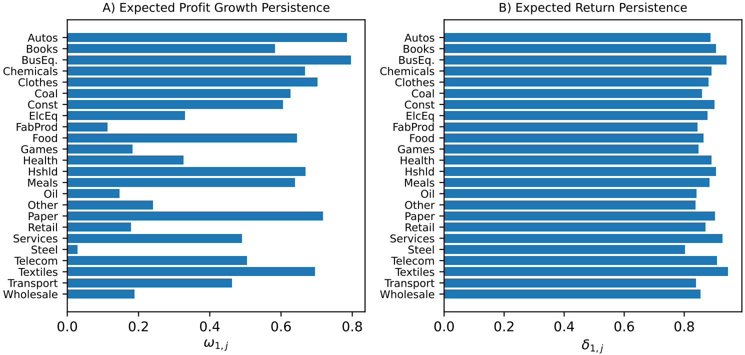
J+2 State Equations:

$$\tilde{g}_{j,t+1} = \omega_{1,j}\tilde{g}_{j,t} + \omega_{2,j}\tilde{F}^{CF}_{t+1} + \varepsilon^{\tilde{g}}_{j,t+1}$$
$$\tilde{F}^{DR}_{t+1} = \gamma_1 \tilde{F}^{DR}_t + \varepsilon^{F^{DR}}_{t+1}$$
$$\tilde{F}^{CF}_{t+1} = \phi_1 \tilde{F}^{CF}_t + \varepsilon^{F^{CF}}_{t+1}$$

UC San Diego

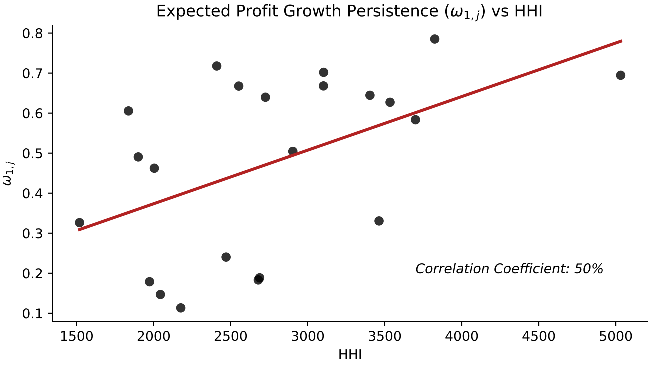
Parameter Estimates

Expected profit growth persistence shows more variability in the cross section



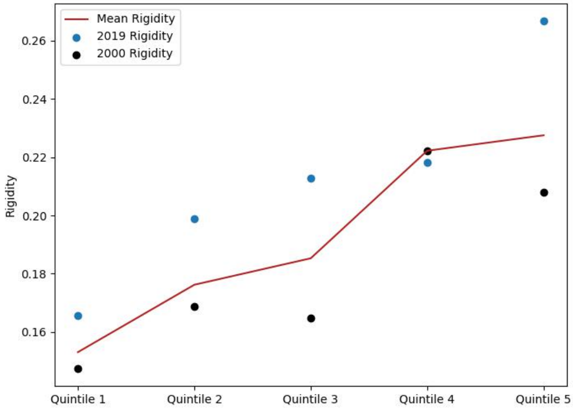
Persistence is Larger in Concentrated Industries

Positive correlation between expected profit growth persistence ($\omega_{1,j}$) and HHI



Concentrated Industries Have Rigid Products

MR Test: Increasing monotonic relationship between product rigidity and concentration



Cyclically Sensitive Profits

- High Profit Growth Persistence Leads to Cyclically Sensitive Profits

Eqn.	$\Delta\pi_{j,t} = \alpha + \beta D_t^{Reces.} + \varepsilon_{j,t}$		
Quintiles	β	SE	P-Value
Q1	-1.96	1.03	0.06
Q3	-2.12	1.49	0.16
Q5	-4.01	1.58	0.01

What Does AP Theory Say?

- **Concentrated Industries Offer Higher Risk Premium**
- Production-Based AP Model (Liu et. al. (2009)):
- $\uparrow$ Correlation between SDF and Profits $\rightarrow$ Risk Premium $\uparrow$
  - Define profits: $\Pi(K_{i,t}, X_{i,t})$ with:
  - Aggregate Shocks: $X_{i,t}$; Capital $K_{i,t}$
  - Payout: $CP_{i,t} = \Pi(K_{i,t}, X_{i,t}) - \Phi(K_{i,t}, I_{i,t})$

$$V_{i,t} = \max_{K_{i,t}, I_{i,t}} \mathbb{E}_t \left[\sum_{s=0}^{\infty} M_{t+s} CP_{i,t+s} \right]$$

What Does DFM Say?

- High profit growth persistence leads to higher loading on systematic cash flows
- $\uparrow \omega_{1,j} \;\Rightarrow \uparrow \frac{\mathcal{B}_{1,j}}{\mathcal{B}_{3,j}}$
  $\downarrow \tilde{F}^{CF}_{t|t} \;\Rightarrow\; \mathbb{E}_t[r_{j,t+1}] \Uparrow$
- Expected returns of concentrated industries increase more than competitive industries

$$\mathbb{E}_t[r_{j,t+1}] = \mathcal{B}_{3,j}^{-1}\left[\frac{\mathbb{E}_t[pe_{j,t+1}]}{\delta_{1,j}} - \left(\frac{1+\delta_{1,j}}{\delta_{1,j}}\right)\mathcal{A}_j\right] + \frac{\delta_{2,j}\gamma_1}{\delta_{1,j}}\tilde{F}^{DR}_{t|t} - \frac{\mathcal{B}_{1,j}}{\mathcal{B}_{3,j}}\left[\frac{\omega_{2,j}\phi_1}{\delta_{1,j}}\tilde{F}^{CF}_{t|t} + \left(1 - \frac{\delta_{1,j}-\omega_{1,j}}{\delta_{1,j}}\right)\tilde{g}_{j,t|t}\right]$$

UC San Diego

Bad Beta, Good Beta

- High persistence leads to high loading on Cash Flow News
- Concentrated industries offer higher risk premium
- $\uparrow \omega_{1,j} \;\Rightarrow \uparrow \mathcal{B}_{1,j} \;\Rightarrow \uparrow (r_{j,t+1} - \mathbb{E}_t[r_{j,t+1}])$

$$r_{j,t+1} - \mathbb{E}_t[r_{j,t+1}] = \underbrace{\rho_{1,j}\mathcal{B}_{1,j}\left(\varepsilon^{g}_{j,t+1} + \omega_{2,j}\varepsilon^{F^{CF}}_{t+1}\right)}_{Cash\ \ Flow\ \ News} - \underbrace{\rho_{1,j}\mathcal{B}_{3,j}\left(\varepsilon^{\mu}_{j,t+1} + \delta_{2,j}\varepsilon^{F^{DR}}_{t+1}\right)}_{Discount\ \ Rate\ \ News}$$

High Persistence Leads to High CFN Contribution

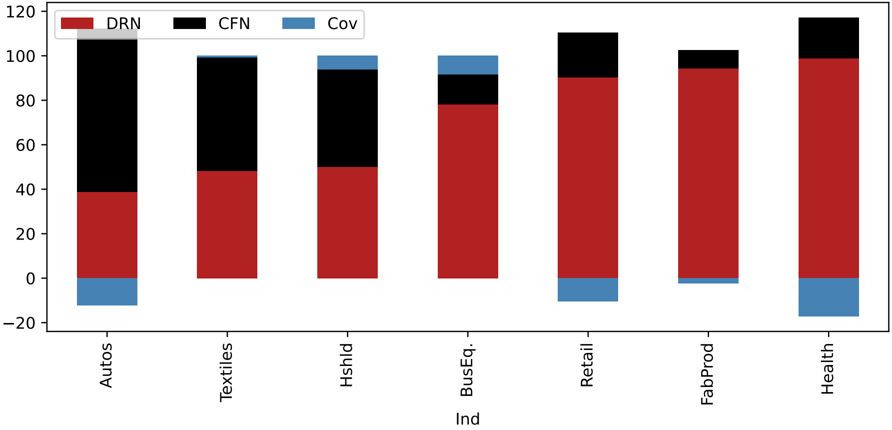
- Return Movements of Concentrated Industries are more susceptible to CF Shocks
- Leads to Cyclical Returns in Concentrated Industries
- $\uparrow \omega_{1,j} \;\Rightarrow \downarrow (\delta_{1,j} - \omega_{1,j}) \;\Rightarrow \uparrow$ CFN Share

Cash Flow News Share:

$$Var(CFN_j)/Var(r_{j_t+1} - \mathbb{E}_t[r_{j,t+1}]) \propto \left[1 - \frac{\rho_{1,j}(\delta_{1,j} - \omega_{1,j})}{1 - \rho_{1,j}\omega_{1,j}}\right]^{-1}$$

UC San Diego

Variance Decomposition: High vs Low Concentration



High Concentration Means Higher Volatility

Because of cyclical profits, high CFN Share means high volatility during downturns

- Need to model conditional volatility:

$$r_{j,t+1} - \mathbb{E}_t[r_{j,t+1}] = \underbrace{\rho_{1,j}\mathcal{B}_{1,j}\left(\varepsilon^{g}_{j,t+1} + \omega_{2,j}\varepsilon^{F^{CF}}_{t+1}\right)}_{Cash\ \ Flow\ \ News} - \underbrace{\rho_{1,j}\mathcal{B}_{3,j}\left(\varepsilon^{\mu}_{j,t+1} + \delta_{2,j}\varepsilon^{F^{DR}}_{t+1}\right)}_{Discount\ \ Rate\ \ News}$$

- Time variation in volatility must come from TV in CFN, DRN or both
- Jointly Model CFN and DRN using MGARCH(1,1)
- Compute return volatility

UC San Diego

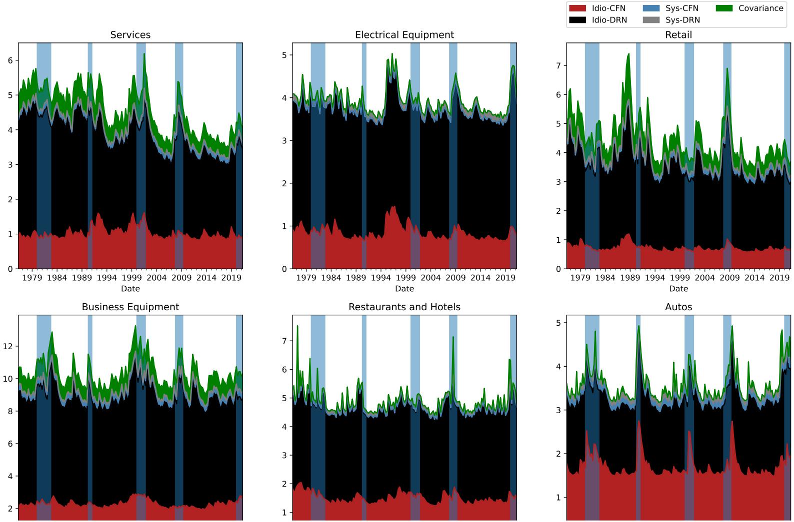
DCC-GARCH(1,1)

MGARCH allows for the estimation of:

1. Industry Specific and Systematic Components
2. TV coming from Cash Flows and Discount Rate News

$$
\begin{aligned}
r_{j,t+1} - \mathbb{E}_t[r_{j,t+1}] &= \sigma^r_{j,t+1}\epsilon^r_{j,t+1} \mid \epsilon^r_{j,t+1} \sim N(0,1) \; i.i.d. \\
\sigma^r_{j,t+1} &= (\gamma_{j,CF}\sigma^g_{j,t+1} + \gamma_{j,CF}\omega_{2,j}\sigma^{F^{(2)}}_{t+1} - \gamma_{j,DR}\sigma^{\mu}_{j,t+1} - \gamma_{j,DR}\delta_{2,j}\sigma^{F^{(1)}}_{t+1}) \\
\mathbf{\Sigma}_{j,t+1} &= \begin{bmatrix} \mathcal{J}_{j,t+1} & \mathbf{0} \\ \mathbf{0} & \mathcal{L}_j \mathcal{S}_{t+1} \mathcal{L}_j \end{bmatrix}
\end{aligned}
$$

Conditional Volatility



Higher Volatility and Lower Sharpe Ratios in Recessions

Eqn.	$\text{Vol}_{j,t} = \alpha_j + \beta D_t^{Reces.} + \varepsilon_{j,t}$			$\text{SR}_{j,t} = \alpha_j + \beta D_t^{Reces.} + \varepsilon_{j,t}$		
Quintiles	β	SE	P-Value	β	SE	P-Value
Q1	0.14	0.08	0.09	-0.02	0.01	0.22
Q3	0.20	0.07	0.00	-0.01	0.02	0.56
Q5	0.28	0.05	0.00	-0.09	0.04	0.02

UC San Diego

Conclusion

- Concentrated industries have:
  - Rigid products
  - Highly persistent profit growth
  - Cyclical profits
- This leads to:
  - Higher Risk Premium
  - Higher Contribution of CFN to returns and volatility
- During Recessions:
  - Higher Expected Returns
  - Higher Conditional Volatility
  - Lower Sharpe Ratios