Betermier et al. (2023); Harris (2022) "Pricing Investor Impact"

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Overview

- Betermier et al. (2023) develops a general equilibrium model of supply and demand in the capital market.
  - Relation between risk and return is determined by which shock dominates.
  - Data shows inelastic demand and elastic supply: a supply shock will not affect firm's capital.

- Harris (2022) study the impact of investor demand on firm's capital
  - Investor impact is determined by the relative elasticities of supply and demand.
  - $1 increase in sustainability investment generates $0.03 in productive assets.

Model

Definitions

- Financial capital as the product
- Demand side: N firms $n \in \{1, 2, ..., N\}$
- Supply side: investors supply capital via competitive capital markets
- Firm n's market value $V_n \to (1 + r_n)V_n$, where $r_n \sim \cdot(\mu_n, \sigma_n^2)$
  - Risk capital is the quantity of risk: $Q_n = \sigma_n V_n$
  - Sharp ratio is the price of risk: $\lambda_n = \frac{\mu_n - r_f}{\sigma_n} = (\mu_n - r_f)\frac{V_n}{Q_n}$
- The whole market value $\sum_{n=1}^{N} V_n \to \sum_{n=1}^{N}(1 + r_n)V_n$
  - Market risk capital: $Q_M = \sigma_n V_M = \sqrt{\sum_{i=1}^{N}\sum_{j=1}^{N}\rho_{i,j}Q_iQ_j}$

Model

Supply and demand system

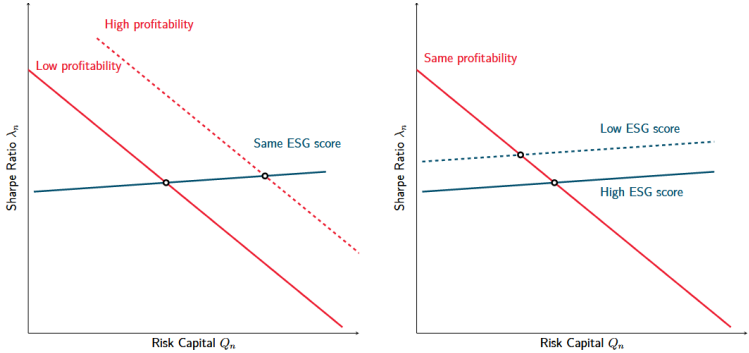
- Demand by firm n: $\lambda_n = \beta_{\mathrm{D}}' \boldsymbol{x}_{\mathrm{D},n} + \Delta_{\mathrm{D}} \frac{Q_n}{Q_{\mathrm{M}}}$
  - $\boldsymbol{x}_{\mathrm{D},n}$: demand shifters such as profitability, cash flow volatility, asset tangibility
- Supply by investors: $\lambda_n = \boldsymbol{\beta}_{\mathrm{s}}' \boldsymbol{x}_{\mathrm{S},n} + \Delta_{\mathrm{S}} \rho_{\mathrm{M},n} = \boldsymbol{\beta}_{\mathrm{s}}' \boldsymbol{x}_{\mathrm{S},n} + \Delta_{\mathrm{S}} \frac{\sum_i \rho_{n,i} Q_i}{Q_M}$
  - $\boldsymbol{x}_{\mathrm{S},n}$: supply shifters such as firm's ESG score, wealth, other drivers of port. tilt

Alternative format of supply and demand system

$$\begin{aligned} \lambda_n &= \beta_{\mathrm{S}}' \boldsymbol{x}_{\mathrm{S},n} + \Delta_{\mathrm{S}} \rho_{\mathrm{M},n}, \\ \lambda_n &= \boldsymbol{\beta}_{\mathrm{D}}' \boldsymbol{x}_{\mathrm{D},n} + \Delta_{\mathrm{D}} \left(\rho_{\mathrm{M},n} - \rho_{\mathrm{M},n}^{\mathrm{ext}} \right). \end{aligned} \tag{1}$$

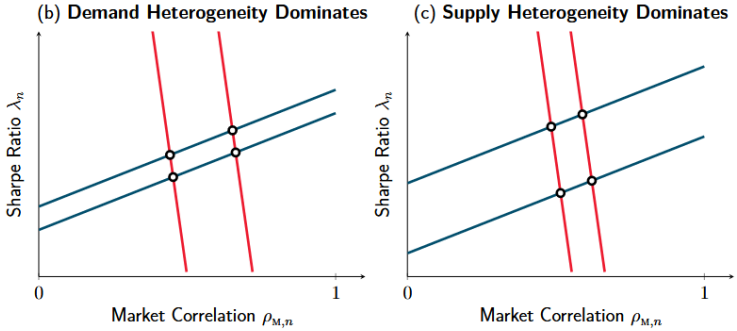
where $\rho_{M,n} = \frac{\sum_i \rho_{n,i} Q_i}{Q_M} = \frac{\rho_{n,n} Q_n}{Q_M} + \frac{\sum_{i \neq n} \rho_{n,i} Q_i}{Q_M} = \frac{Q_n}{Q_M} + \rho_{M,n}^{ext}$.

Empirical Implications



1. The high-demand firm, HD, has higher risk capital and a higher Sharpe ratio than the low-demand firm LD, in general equilibrium.
2. The high-supply firm, HS, has higher risk capital and a lower Sharpe ratio than low-supply firm LS, in general equilibrium.

Empirical Implications: Cross Section



1. Demand dominates: The high-demand firm, HD, has higher market correlation and a higher Sharpe ratio than firm LD.
2. Supply dominates: The high-supply firm, HS, has higher market correlation and a lower Sharpe ratio than firm LS.

Econometric Strategy

$$\begin{aligned}\lambda_{n,t} &= \boldsymbol{\beta}_{\mathrm{s}}' \boldsymbol{x}_{\mathrm{s},n,t} + \Delta_{\mathrm{s}} \rho_{\mathrm{M},n,t} + u_{\mathrm{s},n,t} \\ \lambda_{n,t} &= \boldsymbol{\beta}_{\mathrm{D}}' \boldsymbol{x}_{\mathrm{D},n,t} + \Delta_{\mathrm{D}} \left(\rho_{\mathrm{M},n,t} - \rho_{\mathrm{M},n,t}^{\mathrm{ext}} \right) + u_{\mathrm{D},n,t}\end{aligned} \tag{2}$$

- To estimate supply function, we need shocks to demand.
  - $\boldsymbol{x}_{D,n,t} \perp u_{S,n,t}$
- To estimate demand function, we need shocks to supply.
  - $\boldsymbol{x}_{S,n,t} \perp u_{D,n,t}$

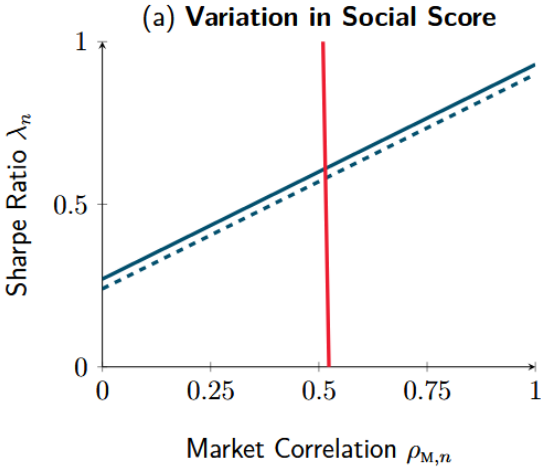
Econometric Strategy

- Demand shifters
  - profitability shifter: ROA
  - cash flow volatility shifter: volatility of ROA
  - asset tangibility shifter: tangible capital to total capital
- Supply shifters
  - ESG shifter: MSCI ESG ratings
  - business equity correlation shifter: correlation of firm's equity with stock return

Results

	OLS		2SLS			
	Supply	Demand	Supply		Demand	
	Sharpe Ratio (1)	Sharpe Ratio (2)	Market Corr. (3)	Sharpe Ratio (4)	Risk Capital (5)	Sharpe Ratio (6)
Supply						
Market correlation	0.175***			0.657***		
	(0.061)			(0.146)		
Social score	−0.006		0.020***	−0.018**	1.584*	
	(0.007)		(0.002)	(0.008)	(0.931)	
Business equity correlation	0.119***		0.006	0.105**	−10.098*	
	(0.043)		(0.014)	(0.044)	(5.399)	
Demand						
Internal market correlation		0.664				−71.937*
		(1.686)				(43.543)
Profitability		0.011***	0.010***		2.268***	0.027***
		(0.003)	(0.001)		(0.362)	(0.010)
Cash flow volatility		−0.130	−0.384***		62.078***	0.306
		(0.163)	(0.052)		(20.730)	(0.343)
Tangible intensity		−0.000	0.001***		0.124	0.001
		(0.001)	(0.000)		(0.078)	(0.001)
Number of observations	2218	2218	2218	2218	2218	2218
F statistic	35.744***	34.006***	87.258***	35.709***	11.226***	18.655***
2SLS Diagnostics						
Exogenous instruments (Sargan)				3.435		0.972
Exogenous OLS errors (Wu-Hausman)				13.782***		5.143**

Results



- Demand is inelastic, supply is more elastic.
- A supply shock, e.g. ESG investing, will not affect firm's capital.

Results

Invester Impact: Harris (2022)

In the equilibrium, the change in sustainability production to the change in sustainability investment by investor i is

$$\Delta G = \frac{\partial G}{\partial K} \frac{\zeta_D}{\zeta_D + \zeta_S} \Delta K \tag{3}$$

- \$1 increase in sustainability investment generates \$0.03 in productive assets.

Conclusion

- A general equilibrium of supply and demand in the capital market.
  - If demand dominates, high-demand firm has higher systemic risk and a higher Sharpe ratio $\Rightarrow$ positive relation
  - If supply dominates, high-supply firm has higher systemic risk and a lower Sharpe ratio $\Rightarrow$ negative relation
  - Inelastic demand and elastic supply: a supply shock will not affect firm's capital
- Investor impact is determined by the relative elasticities of supply and demand.
  - A \$1 increase in sustainability investment generates \$0.03 in productive assets.

References

Betermier, S., L. E. Calvet, and E. Jo (2023). A supply and demand approach to capital markets. In *Proceedings of Paris December 2021 Finance Meeting EUROFIDAI-ESSEC*.

Harris, J. (2022). Pricing investor impact. In *Pricing Investor Impact: Harris, Jonathan*. [SI]: SSRN.