Koijen et al. (2023)
Which investors matter for equity valuations and expected returns?

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Overview

Introduction

- This paper develops the demand system asset pricing model
  - Financial assets are products as in EIO
  - Demand functions are derived from optimal portfolio choice, exp function of characteristics
- The model is used to study the impact of market trends and regulation changes on asset prices

- Applied to sustainable investing of climate risk
  - Regulatory risk vs. shareholder risk
  - Quantify the impact on equity prices and wealth distribution

Model

- N financial assets: $n = 1, ..., N$
- I investors: $i = 1, ..., I$
- $p_t(n) = \log(P_t(n))$ endogenous
- $x_t(n)$ all exogenous

Optimal Portfolio Choice

The investor chooses port. weights $w_{i,t}(n)$ at each date to maximize expected log utility at terminal T.

$$\max_{w_{i,t}} \mathbb{E}_{i,t}[\log(A_{i,T})] \text{ s.t. } A_{i,t+1} = A_{i,t}\{R_{t+1}(0) + w_{i,t}^{'}[R_{t+1} - R_{t+1}(0)]\}; w_{i,t} \geq 0; 1^{'} w_{i,t} < 1$$

Model

Optimal Portfolio Choice: Lemma 1

The first order condition is the constrained Euler equation:

$$\mathbb{E}_{i,t}[(\frac{A_{i,t+1}}{A_{i,t}})^{-1}R_{t+1}] = 1 - (I - 1w_{i,t}^{'})(\Lambda_{i,t} - \lambda_{i,t}1)$$

The portfolio choice is

$$w_{i,t}^{(1)} \approx [\Sigma_{i,t}^{(1,1)}]^{-1}[\mu_{i,t}^{(1)} - \lambda_{i,t}1]$$

When the investor is unconstrained, the Euler equation and portfolio choice are normal.

Model

Various micro foundations for R_{t+1}:

1. Quant
   - Mean-variance portfolio choice
   - Portfolio choice with hedging demand
2. Fundamental
   - Heterogeneous beliefs
   - Direct preferences for characteristics such as ESG

$\Rightarrow$ Can be expressed as the same portfolio demand function

Model

Quant investors:

- One factor model: $R_{t+1}(n) = \mu_{t+1}(n) + \beta(n) f_{t+1} + \epsilon_{t+1}(n)$

$$\mu_{i,t+1}(n) = y_{i,t+1}(n)' \Phi_{i,t+1} + \phi_{i,t+1} \tag{1}$$
$$\Gamma_{i,t+1}(n) = y_{i,t+1}(n)' \Psi_{i,t+1} + \psi_{i,t+1} \tag{2}$$

Fundamental investors:

- One factor model: $D_{t+1}(n) = g_{t+1}(n) + \beta(n) f_{t+1} + \epsilon_{t+1}(n)$

$$g_{i,t+1}(n) = y_{i,t+1}(n)' \Phi_{i,t+1} + \phi_{i,t+1} \tag{3}$$
$$\Gamma_{i,t+1}(n) = y_{i,t+1}(n)' \Psi_{i,t+1} + \psi_{i,t+1} \tag{4}$$

Model

Characteristics-base demand

$$\frac{w_{i,t}(n)}{w_{i,t}(0)} = \delta_{i,t}(n) = \exp\left[\alpha_{i,t} + \beta_{0,i,t} me_t(n) + \beta_{1,i,t} x_t(n)\right] \cdot \epsilon_{i,t}(n)$$

where $\epsilon_{i,t}(n)$ is the **latent demand**, and

$$w_{i,t}(n) = \frac{\delta_{i,t}(n)}{1 + \sum_{m \in N_{i,t}} \delta_{i,t}(m)}$$

$$w_{i,t}(0) = \frac{1}{1 + \sum_{m \in N_{i,t}} \delta_{i,t}(m)}$$

Model

- Assumption: $\beta_{0,i,t} < 1$ demand is downward sloping.
- $ME_t(n) = \sum_{i=1}^{I} A_{i,t} w_{i,t}(n)$
- $p = f(p) = \log\left(\sum_{i=1}^{I} A_i w_i(p)\right) - s$

Unique Equilibrium

$f(p)$ has a unique fixed point in $\mathbb{R}^N$ if all assets have ≥ 1 investor with $-1 < \beta_{0,i,t} < 1$.

Sustainable Investing: Climate Risk

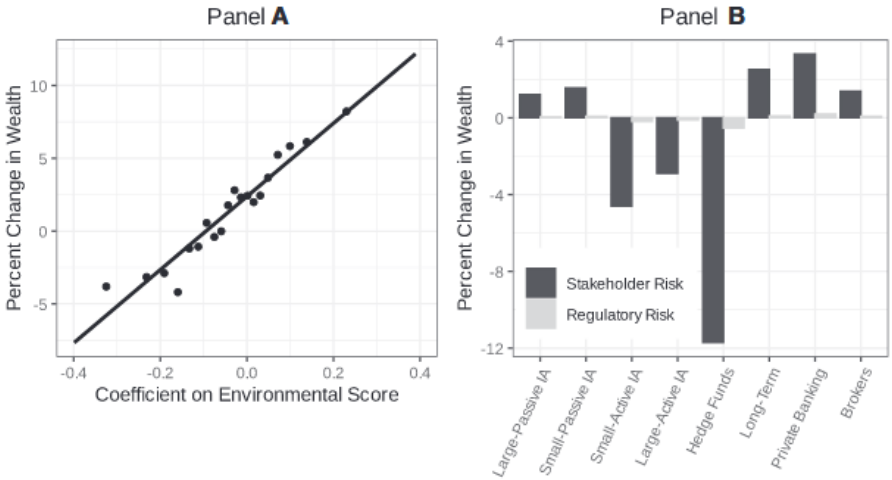
This paper focuses on short term climate Risk

- Regulatory Risk: constraints on portfolio choice of long-term investors
  - coefficients on E score for long-term investors $\Uparrow$ 0.1
- Shareholder Risk: changing preferences of customers and employees
  - coefficients on E score for all investors $\Uparrow$ 0.1

Sustainable Investing: Impact on Equity Price

		Counterfactual	
Characteristic	Actual	Stakeholder	Regulatory
Environment	0.23	0.57	0.03
	(4.19)	(47.06)	(30.26)
Governance	−0.14	−0.01	−0.00
	(−2.24)	(−0.43)	(−1.83)
Log book equity	−0.74	−0.01	−0.00
	(−16.39)	(−1.02)	(−1.77)
Foreign sales	0.11	0.00	−0.00
	(3.31)	(0.31)	(−0.40)
Lerner	0.11	0.02	−0.00
	(2.68)	(1.54)	(−0.34)
Sales to book	0.22	−0.00	−0.00
	(4.63)	(−0.41)	(−2.03)
Dividends to book	0.16	0.01	0.00
	(4.17)	(1.03)	(2.11)
Market beta	−0.04	0.00	0.00
	(−1.26)	(0.67)	(1.81)
Adjusted R^2	0.65	0.92	0.81
Observations	540	540	540

Sustainable Investing: Impact on Wealth Distribution



Conclusion

The paper develops the DSAP model to study the impact of changing asset demand

- DSAP can start from many micro foundations
- DSAP allows widespread hetergeneity in asset demand

Sustainable investing has large impact on equity prices and wealth distribution

- Shareholder risk induce large price changes, while regulatory risk does not.
- Who holds green stocks before benefits from sustainable investing.
  - Wealth shifts from hedge funds and active investment advisors to long-term investors, passive investors, and private banking.

References

Koijen, R. S., R. J. Richmond, and M. Yogo (2023). Which investors matter for equity valuations and expected returns? *Review of Economic Studies*, rdad083.