Van der Beck (2021)
"Flow-Driven ESG Returns"

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Overview

- This paper estimates a demand system to answer how much ESG funds flow leads to returns on ESG stocks
  - Flows to ESG funds drive positive returns of ESG stocks of 2% annually
  - Because elasticity of substitution between ESG and non-ESG stocks are limited

Model

The model is from Koijen and Yogo (2019).

- $N+1$ financial assets: $n = 0, 1, ..., N$
- I investors: $i = 1, ..., I$
- $p_t(n) = \log(P_t(n))$ endogenous
- $x_t(n)$ exogenous characteristics

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

- Take Log: $\log w_{i,t}(n) = \alpha_{i,t} + \beta_{0,i,t} me_t(n) + \beta_{1,i,t} x_t(n) + \log \epsilon_{i,t}(n)$
- Take the first difference:
  $\Delta \log w_{i,t}(n) = \Delta\alpha_{i,t} + \beta_{0,i,t} \Delta me_t(n) + \beta_{1,i,t} \Delta x_t(n) + \Delta \log \epsilon_{i,t}(n)$

$\Rightarrow$ Thus, it's possible to use trades to calculate the asset demand system!

Trade-Based Demand System

The equilibrium change in log prices Δp due to the demand shock Δd is given by

$$\Delta p_t = \mathcal{M}_t \cdot \Delta d_t + \varepsilon_t$$

where $\mathcal{M}_t \in \Re^{N \times N}$ and Δd_t is the log of dollar trade.

Estimation

If elasticity for ESG stocks has no difference from that for Non-ESG stocks, we estimate

$$\Delta p_{i,t}(n) = \mathcal{M}_{i,t} \cdot \Delta d_{i,t}(n) + \varepsilon_{i,t}(n)$$

If there are differences between these elasticity, we estimate

$$\Delta p_{i,t}(n) = \underbrace{\mathcal{M}_{i,t}^{NonESG} \cdot \Delta d_{i,t}(n) + \mathcal{M}_{i,t}^{ESG} \cdot \mathbb{I}_{t}^{ESG}(n) \Delta d_{i,t}(n)}_{=\mathcal{M}_{i,t} \cdot \Delta d_{i,t}(n)} + \varepsilon_{i,t}(n)$$

Estimation

Several issues must be resolved to estimate the above equation,

1. Classify ESG and Non-ESG stocks
2. Dollar trades $\Delta d_{i,t}(n)$ are endogenous

Classify ESG Stocks

The method needs to classify all stocks in the market, and thus ratings or emissions are not satisfied.

1. Identify ESG mutual funds
   - match fund names with sustainability keywords
2. Identify over-weighted stocks by these ESG mutual funds
   - $\tau_t(n) = w_t^{ESG}(n) - w_t^{MF}(n)$
3. Denote ESG stocks as those $\tau_t(n) > 0$

IV for endogenous $\Delta d_{i,t}(n)$

Exogenous trade introduced by dividend payment

- $D_t(n)$: stock n's dividends per share in quarter t
- $df_{i,t}$: investor i's dividend flow from all stocks of holdings, relative to AUM

$$df_{i,t} = \frac{\sum_{n \in N_{i,t-1}} D_t(n) Q_{i,t-1}(n)}{A_{i,t-1}}$$

- Investor i allocate this dividend flow to stocks following his previous weight
- $DIT_{i,t}(n)$: dividend induced trade by investor i

$$DIT_{i,t}(n) = \frac{\sum_{n \in N_{i,t-1}} D_t(n) Q_{i,t-1}(n)}{A_{i,t-1}} Q_{i,t-1}(n)$$

- IV for $DIT_{i,t}(n)$: use DIT for all other investors

$$DIT_{-i,t}(n) = \sum_{j \neq i} DIT_{j,t}(n)$$

Data

- Measure of sustainability
  - Mutual fund's perceived ESG
- Portfolio holdings: S34 for all institutions and S12 for mutual funds
- Asset prices: CRSP
- Asset characteristics: Compustat

Fund Flows to ESG Stocks

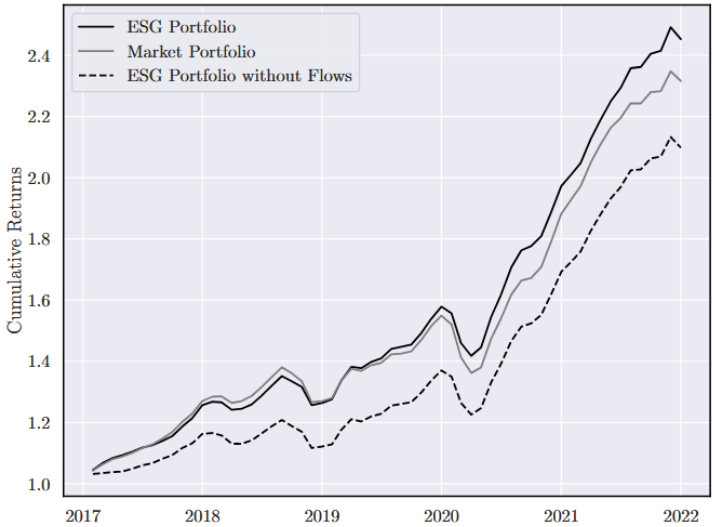
- For the identified ESG mutual funds, the inflows are $350 billion, less than 1% of total AUM of all mutual funds
- But other institutions may also flow into ESG stocks, their degree of flow to ESG can be estimated

$$w_{i,t}(n) = \theta_{i,t}^{ESG} w_t^{ESG}(n) + \sum_{s \in S} \theta_{i,t}^{s} w_t^{s}(n) + \eta_{i,t}(n)$$

- Investor i's inflow to ESG stocks is $\theta_{i,t}^{ESG} A_{i,t} - \theta_{i,t-1}^{ESG} A_{i,t-1}(1 + R_{t+1}^{ESG})$
- All investors inflow to ESG is $2.5 trillion

$$\sum_{i} \left[\theta_{i,t}^{ESG} A_{i,t} - \theta_{i,t-1}^{ESG} A_{i,t-1}(1 + R_{t+1}^{ESG})\right]$$

Flow-induced ESG Returns



Conclusion

- Inflows to ESG stocks drive the positive returns
  - \$1 from market to ESG stocks increases ESG value by \$0.7
  - Flow-driven ESG returns are 2.07% per year

References

Koijen, R. S. and M. Yogo (2019). A demand system approach to asset pricing. *Journal of Political Economy 127*(4), 1475–1515.

Van der Beck, P. (2021). Flow-driven ESG returns. *Swiss Finance Institute Research Paper* (21-71).