Information Immobility and the Home Bias

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Discussed by Urban Jermann

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- Contribution: Model with endogenous information asymmetry to study portfolio home bias
- Key model features:
  - CARA-normal (mean-variance) portfolio choice
  - Private signals about asset payoffs
  - Information acquisition subject to capacity constraint (Sims 2003)
  - Noisy rational expectations equilibrium (Admati 1985)

- Main findings:
  - Learning amplifies initial information asymmetry
  - With enough learning capacity can explain US home bias

Portfolio Choice with Asymmetric Information

- With information advantage, optimal share holdings are given by

$$q^* = \left(\frac{1}{\rho}\right) \widehat{\Sigma}^{-1} \left(\widehat{\mu} - pr\right)$$

- Without information advantage

$$q^{\text{no adv}} = \left(\frac{1}{\rho}\right) \Sigma^{-1} \left(\mu - pr\right)$$

- For uncorrelated assets, for asset i

$$q_i^* = \left(\frac{1}{\rho}\right) \frac{\widehat{\mu}_i - p_i r}{\widehat{\sigma}_i^2}$$

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$$E\left[q_i^*\right] = \left(\frac{1}{\rho}\right)\frac{E\left[\widehat{\mu}_i - p_i r\right]}{\widehat{\sigma}_i^2} = \left(\frac{1}{\rho}\right)\frac{\mu_i - p_i r}{\widehat{\sigma}_i^2}$$

clearly

$$\text{with } \widehat{\sigma}_i^2 < \sigma_i^2 \text{ then } \left|E\left(q_i^*\right)\right| > \left|E\left(q_i^{\text{no adv}}\right)\right| : \; \rightarrow \text{Home Bias}$$

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  - Actual holding

$$q_i^* - Eq_i^* = \left(\frac{1}{\rho}\right)\frac{\left(\widehat{\mu}_i - p_i r\right) - E\left(\widehat{\mu}_i - p_i r\right)}{\widehat{\sigma}_i^2} \begin{matrix} \leq \\ \geq \end{matrix} 0$$

Portfolio Choice with Asymmetric Information

- Informed agent has higher expected returns

$$Eq_i^* \left(f_i - p_i r\right) = \left(\frac{1}{\rho}\right) \frac{\left[E\left(\mu_i - p_i r\right)\right]^2 + cov\left(\widehat{\mu}_i, f_i\right)}{\widehat{\sigma}_i^2}$$

than non-informed agent

$$\left(\frac{1}{\rho}\right) \frac{\left[E\left(\mu_i - p_i r\right)\right]^2}{\sigma_i^2}$$

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- Define domestic portfolio share

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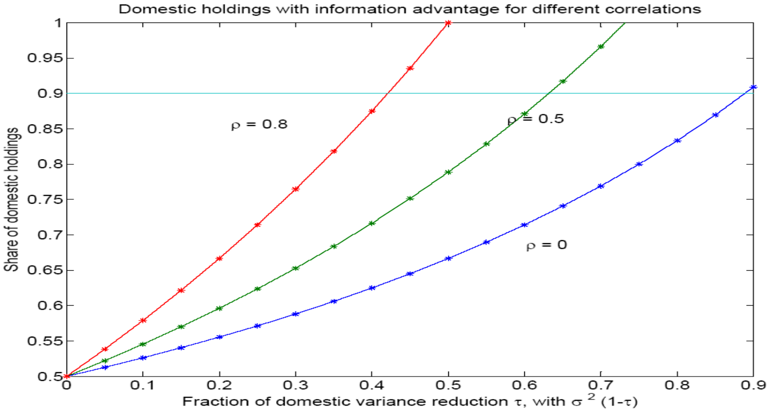
- $w_h = .9$ requires

$$\tau = .89$$

Information asymmetry with correlated assets

-



(with $\mu_i - p_i r = 0.08$, $\sigma_i^2 = 0.2^2$)

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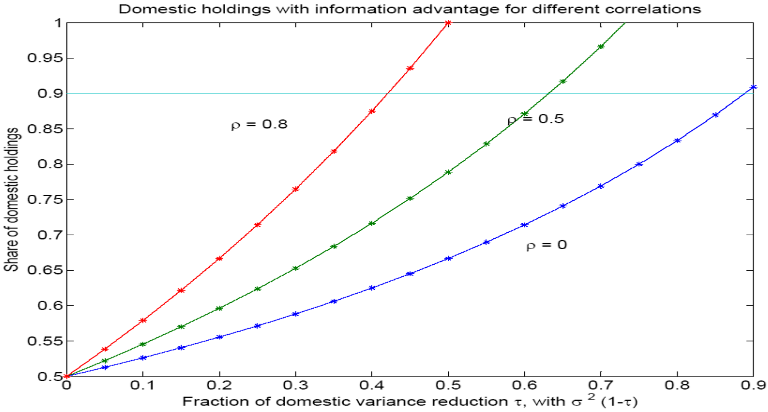
- 

(with $\mu_i - p_i r = 0.08$, $\sigma_i^2 = 0.2^2$)

- Is Home Bias still a Puzzle with a 0.8 correlation?

Actual positions with information advantage

- Actual position depends on additional information

$$q^* = \left(\frac{1}{\rho}\right) \widehat{\Sigma}^{-1} \left(\widehat{\mu} - pr\right), \text{ with } Var\left(\widehat{\mu}\right) = \Sigma - \widehat{\Sigma}$$

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- How likely is a short position in domestic holdings?
  - With $\rho = .8$ and $\tau = .42$, we have $\widehat{\mu} \sim N\left(1.36, 4.2\right)$

Probability of negative position is 37%

Endogenous Information Acquisition

Having substituted optimal share holdings, the learning problem with 2 uncorrelated assets can be written as

$$\max_{\{\widehat{\sigma}_1,\widehat{\sigma}_2\}} \frac{\left(1+\theta_1^2\right)\sigma_1}{\widehat{\sigma}_1^2} + \frac{\left(1+\theta_2^2\right)\sigma_2}{\widehat{\sigma}_2^2}, \text{ with } \theta_i^2 \equiv \frac{\left(\mu_i - pr\right)^2}{\sigma_i^2}$$

s.t.

$$\widehat{\sigma}_1\widehat{\sigma}_2 \geq \sigma_1\sigma_2 \exp\left(-K\right): \quad \text{capacity constraint}$$

$$\begin{aligned} \widehat{\sigma}_1 &\leq \sigma_1 : \text{no negative learning} \\ \widehat{\sigma}_2 &\leq \sigma_2 \end{aligned}$$

Main result of paper

- Rewrite problem

$$\max_{\{S_1,S_2\}} L_1 \cdot S_1 + L_2 \cdot S_2$$

$$\text{with } S_i = \frac{1}{\widehat{\sigma}_i^2}, \text{"precision"}$$

s.t.

$$S_1 S_2 \leq \frac{\exp(2K)}{\sigma_1 \sigma_2} : \text{"production possibility set"}$$

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- Linear indifference curves + convex production possibilities frontier → multiple/corner solutions

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    - Limited capacity for processing (freely available) information (Sims)
    - Costly Investigation
- Exact functional form is crucial here
- Useful for quantitative analysis

Another capacity constraint: Un-Learnable Risk

- Consider the following capacity constraint from VNV (2005)

$$\left(\widehat{\sigma}_1^2 - \alpha\sigma_1^2\right)\left(\widehat{\sigma}_2^2 - \alpha\sigma_2^2\right) \geq (1-\alpha)^2\left(\sigma_1^2\right)\left(\sigma_1^2\right)\exp\left(-2K\right)$$

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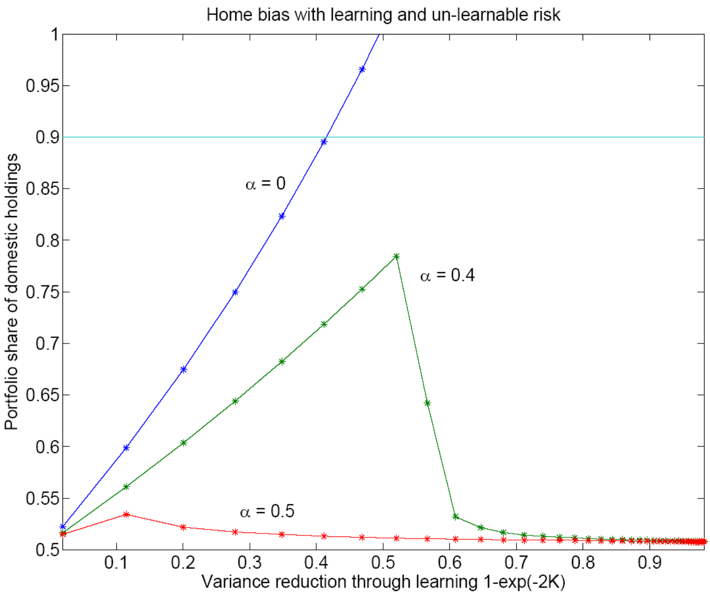
- $\alpha\sigma_i^2 \equiv$ un-learnable risk, $0 \leq \alpha \leq 1$
- Eliminating all learnable risk, $\left(\widehat{\sigma}_i^2 - \alpha\sigma_i^2\right) \rightarrow 0$, requires infinite capacity


Home bias with learning and un-learnable risk
Portfolio share of domestic holdings
Variance reduction through learning 1-exp(-2K)
α = 0
α = 0.4
α = 0.5
1
0.95
0.9
0.85
0.8
0.75
0.7
0.65
0.6
0.55
0.5
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9

Overall

- Very nice model, very nice analysis!
- I would like
  - more concreteness on the capacity constraint
  - more detailed quantitative analysis