International Capital Flows under Dispersed Information: Theory and Evidence

Cédric Tille and Eric van Wincoop

discussion by
Bernard Dumas

Swiss Finance Institute

Université de Lausanne

NBER, CEPR

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The components of the model

- Four groups of households ("young" and "old", "home" and "foreign") with identical tastes, each of which consumes at two points in time only
- Single consumption good with two locations of production
  - constant-return to scale technology with stochastic productivity shocks

$$a_{i,t+1} = \rho \times a_{i,t} + \varepsilon_{i,t+1}; i = H, F$$

- Capital good is supplied by deterministic installation technology
- Private information about productivity: home bias in information
- Cost of financial investment abroad: a holding cost paid by foreigners

$$\tau_{H,t} = \tau \times (1 + \epsilon_t^{\tau}); \tau_{F,t} = \tau \times (1 - \epsilon_t^{\tau})$$

- This cost is stochastic, which introduces noise causing the price not to be fully revealing
- The goal is to calculate the equilibrium portfolios and capital flows

What has been sacrificed

- The households consume at two dates only and trade financially at one
  - simplifies the "dynamic" program
  - only "first-degree" beliefs are needed: no need to estimate the estimates of others, which in this case would lead to "infinite regress"
- Fixed labor supply
- The holding costs are stochastic
  - and perfectly negatively correlated
  - they are deadweigh costs (consumed by brokers who are not households/portfolio investors)
- Similarly, installation costs are consumed by people who are not portfolio investors
- As in all NRE models: innovations are drawn at the beginning of a period; the realizations affect the securities prices

What is observed and what is unobserved

- Observed by households/investors: $S = \left(a_t^D, a_t^A, k_t^D, k_t^A\right)$
  - difference and average in current productivity shocks of the two places of production
  - difference and average in accumulated capital stock
- Unobserved by them: $x_t^D = \varepsilon_{t+1}^D + \lambda \times \frac{\tau_t^D}{\tau}$
  - a compound of
    - unanticipated future productivity shocks
    - and current holding cost

Results

- Equations (36) and (37): portfolio investment inflows and outflows into a country
- Determined by:
  - portfolio growth at the steady-state portfolio composition
  - changes over time in average variance in excess returns
  - changes over time in average expected excess returns
  - changes in difference in expected excess returns; the result of asymmetric information
    - "inflows and outflows drop together when there is a positive future world productivity innovation and investors have better quality information about domestic productivity innovations. Investors from both countries then believe that their own relative productivity will rise as they have better information on that, leading to a retrenchment towards domestic assets."
- In the empirical analysis, these two equations are not literally tested, because the driving variables are not observable

The nature of the approximation

- Steady-state with zero shock and zero risk is calculated: $a(0), k(0)$
- A Taylor expansion of all endogenous variables is taken around that point, against the four state variables $S = \left(a_t^D, a_t^A, k_t^D, k_t^A\right)$
- For some of the endogenous variables, zeroth-order and even first-order and sometimes odd-order terms cancel off.
  - e.g., portfolio choice is indeterminate to the first order
  - must keep track of needed order for each variable
- I would hesitate to call this a "new technique" since Kenneth L. Judd and Sy-Ming Guu proposed it in 1992
  - they did so, however, for a small-size model (one state variable)
  - *the application here represents a quantum leap in size, a very ambitious undertaking in symbolic calculus, which allows real-size applied work to be performed*

Limitations of the approximation

- It is necessary for a deterministic steady state to exist, around which to take the Taylor expansion
  - Here there exists one here because of fixed labor supply
  - and identical risk aversions and rates of impatience
    - under different taste parameters, distribution of wealth typically drifts forever
  - Is the approximation less good when taken around an arbitrary point?
- "Local" vs. "global" approximation:
  - of course, only valid around a neigborhood of the deterministic steady state
  - *what if the stochastic system does not spend much time around the deterministic steady state?*
    - behavior of volatility can easily counteract and overcome effect of drifts
    - not enough is known about that to allow us to rely on this approximation
    - it would be better to connect pieces of local approximations in order to span the entire domain
- Clarification: why is filtering linear?

Conclusion

Formidable achievement

- DSGE (OLG: not "very" dynamic since each household solves a static problem)
- plus NRE with
  - isoelastic utility (see also C. Zhou, JFQA, 1999)
  - endogenous interest rate
- massive symbolic exercise
- the empirical results are not strictly tests of the equations that constitute the results of the model.