Explaining the Persistence of (International) Portfolio Flows

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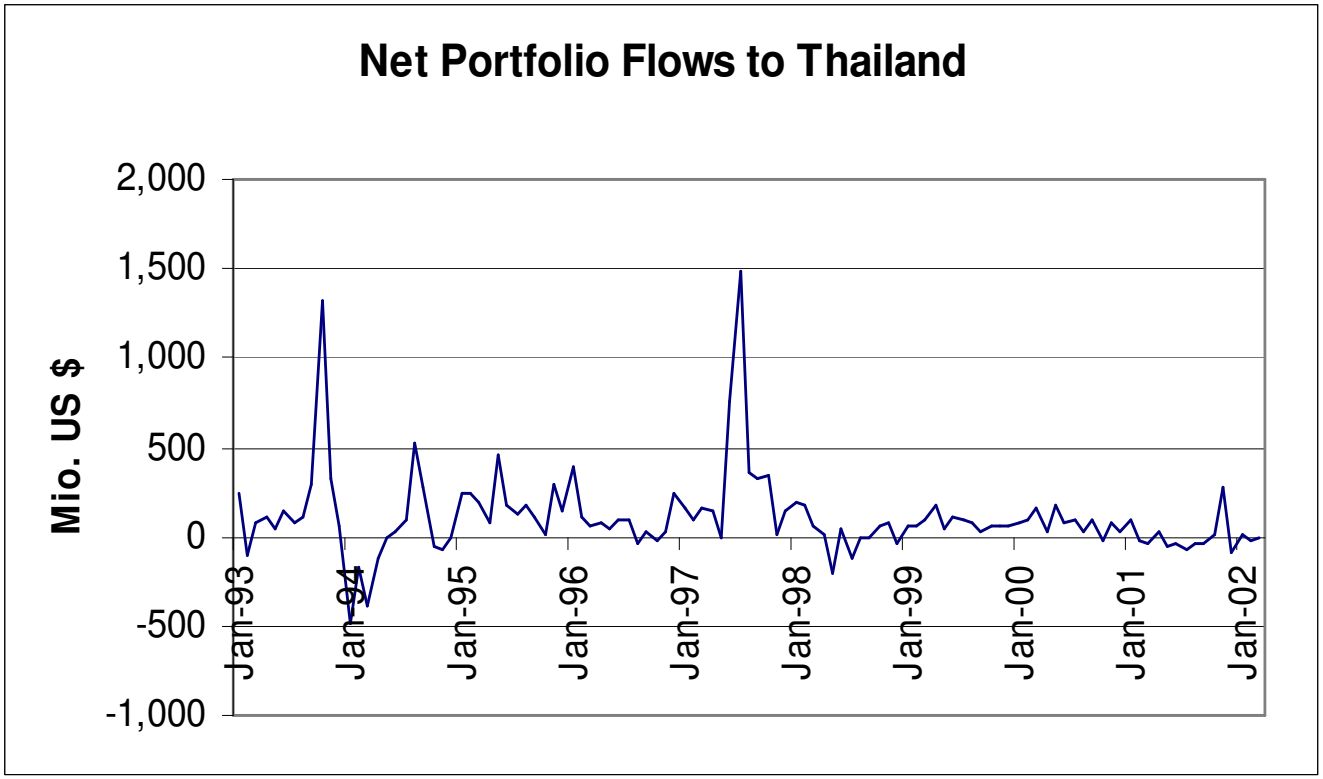
Explaining the Persistence of Portfolio Flows



Explaining the Persistence of Portfolio Flows

- Empirical facts about (daily) international portfolio flows:
  - Positive contemporaneous correlation between flows and returns.
  - Both flows and returns exhibit autocorrelation.
  - Returns predict flows (Trend chasing → "Irrational" international investors).

Froot, O'Connell and Seasholes (2001).

Griffin, Nardari and Stulz (2003).

Explaining the Persistence of Portfolio Flows

- Horse race between 4 dynamic economies:
  - Heterogeneity in risk aversion.
  - Heterogeneous and incomplete information.
  - Heterogeneity in risk aversion and incomplete information (The Grand Model).
  - “Irrational” model with trend chasers.

Explaining the Persistence of Portfolio Flows

- Standard economy:
  - Two countries.
  - Representative investor or homogeneous country investors.
  - Volume is zero.

Explaining the Persistence of Portfolio Flows

- Outline:
  - Results.
  - Literature.
  - Fundamentals.
  - Portfolio flows driven by heterogeneity in preferences.
  - Portfolio flows driven by heterogeneous beliefs.
  - Portfolio flows driven by heterogeneity in beliefs and preferences.
  - Portfolio flows driven by trend chasing.
  - Calibration of the model(s).
  - Conclusion.

Explaining the Persistence of Portfolio Flows

- Results
  - Positive contemporaneous correlation between flows and foreign returns for small domestic countries.
  - Both flows and returns exhibit autocorrelation.
  - Returns predict flows.
  - Thus irrationality is not needed.
  - The Grand model wins the horse race.

Explaining the Persistence of Portfolio Flows

- Theoretical Literature
  - Brennan and Cao (1997).
  - Griffin, Nardari and Stulz (2003).
  - Epstein and Miao (2003).

Explaining the Persistence of Portfolio Flows

- The fundamentals
  - Two countries, one good.
  - Complete markets.
  - Trade takes place continuously between 0 and T.
  - Exchange risk, interest rate risk and political risk is ignored.
  - Representative agents are heterogeneous (across countries).
  - Power utility of terminal wealth:

$$U\left(X_j(T)\right) = \frac{1}{1-\rho_j} X_j(T)^{1-\rho_j}.$$

  - Agents are endowed with their home stock.

Explaining the Persistence of Portfolio Flows

- Asset markets
  - 1 Bond, with price one, i.e. interest rates are zero.
  - Two stocks.
  - Terminal payoffs are lognormal distributed (coefficients are constant):

$$\delta_i(T) = \exp(\gamma_i \times T + \lambda_i \times W(T)).$$

Explaining the Persistence of Portfolio Flows

- Investors optimization problem:

$$\underset{X_j(T)}{Max} E_j U\left(X_j(T)\right)$$

  - s.t.

$$X_j(0) = E_j \eta_j(T) X_j(T).$$

  - FOC(s):

$$X_j(T) = \left[y^{1/\rho_j} \eta_j(T)^{1/\rho_j} \right]^{-1}.$$

Explaining the Persistence of Portfolio Flows

- Equilibrium
  - Representative (aggregate) investor:

$$U(\delta(T)) = \max_{X_D(T)+X_F(T)=\delta(T)} E_j\left[a\frac{X_D(T)^{1-\rho_D}}{1-\rho_D} + \xi(T)(1-a)\frac{X_F(T)^{1-\rho_F}}{1-\rho_F} \right].$$

  - FOC:

$$\delta(T) = X_D(T) + \left(\xi(T)\frac{(1-a)}{a} \right)^{1/\rho_F} X_D(T)^{\rho_D/\rho_F}.$$

Explaining the Persistence of Portfolio Flows

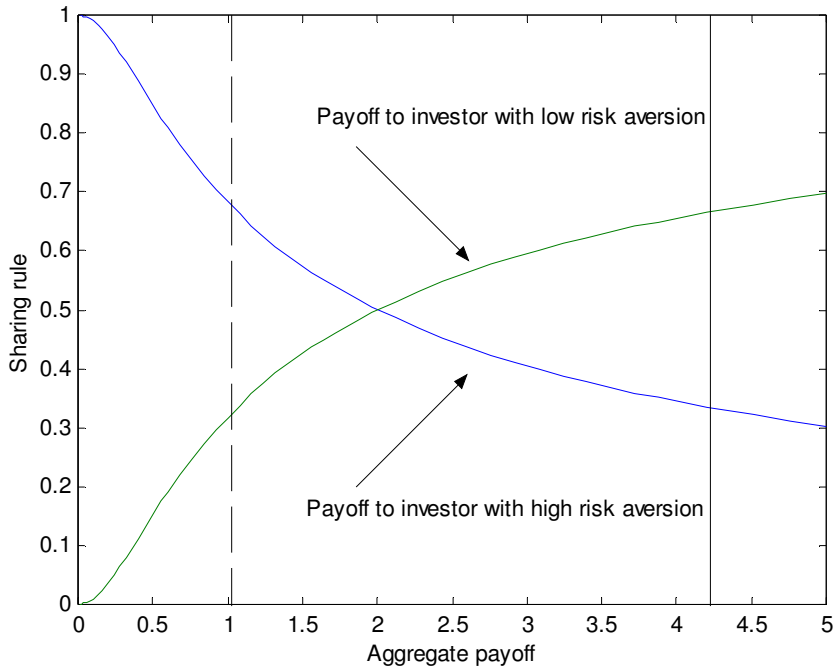
- Equilibrium
  - Pick: $$\frac{1-a}{a}=\frac{y_D}{y_F}.$$
  - Price processes are:

$$dS_i(t)/S_i(t)=\mu_i\times dt+\sigma_i' dW(t).$$

  - Coefficients are stochastic!
  - Exogenous process: $\xi.$

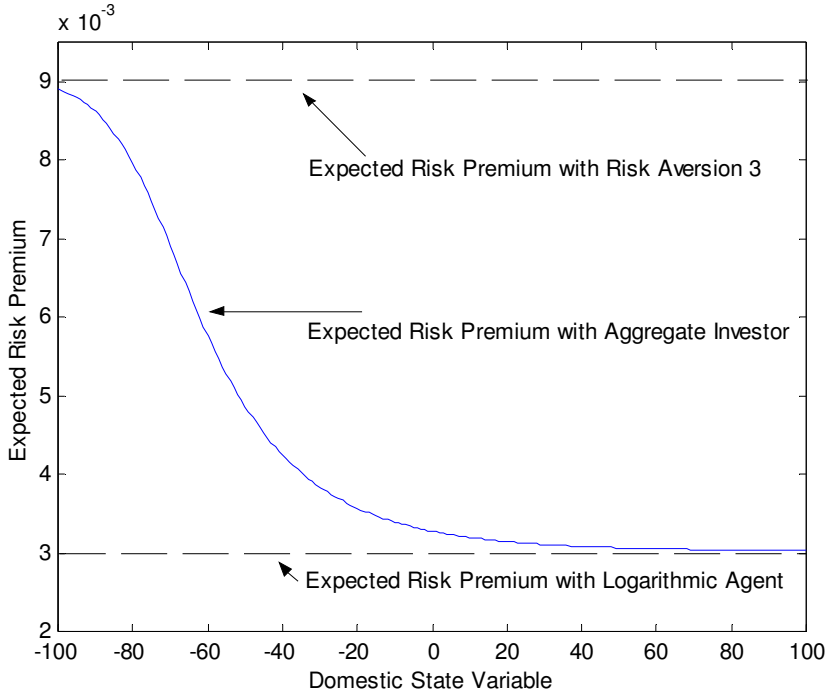
Explaining the Persistence of Portfolio Flows

Portfolio flows with heterogeneity in risk aversion.



Explaining the Persistence of Portfolio Flows

Return predictability with heterogeneity in risk aversion.



Explaining the Persistence of Portfolio Flows

Flow predictability (with heterogeneity in risk aversion).

$$\phi_j(t) = X_j(t)(\sigma(t)')^{-1}\theta(t) + \text{Hedging Terms}$$

Explaining the Persistence of Portfolio Flows

- Calibration/Simulation
  - Historical GDP growth rates and stock returns.
  - T=40.
  - Simulation of daily data for 4 years.
  - Stock prices.
  - Portfolio policies.

Explaining the Persistence of Portfolio Flows

- Calibration/Simulation

		Corr.	Lag 1	Lag 2	Lag 3	Lag 4	Lag 5
Thailand	Returns	0.441**	0.10**	0.05**	-0.01**	-0.04**	-0.01**
	Flows		0.48**	0.34**	0.28**	0.27**	0.27**
Asian	Returns	0.283	0.10	0.03	0.00	-0.03	0.00
Average	Flows		0.37	0.26	0.21	0.17	0.17

Explaining the Persistence of Portfolio Flows

- Calibration/Simulation

		Risk aversion pair				
Weight on domestic investor		Log-3	SR-Log	Log-Log	Log-SR	3-Log
0.01		**-0.040**	**-0.487**	**0.000**	**0.332**	**0.148**
	(Stdev.)	***(0.042)***	***(0.066)***	***(0.000)***	***(0.112)***	***(0.068)***
0.05		-0.365	-0.367	0.000	0.215	0.275
	(Stdev.)	*(0.185)*	*(0.177)*	*(0.000)*	*(0.293)*	*(0.209)*
0.5		-0.886	-0.959	0.000	0.947	0.839
	(Stdev.)	*(0.145)*	*(0.019)*	*(0.000)*	*(0.018)*	*(0.284)*

Explaining the Persistence of Portfolio Flows

Weight on domestic investor	Lag length	Risk aversion pair: Log-3 Returns	Log-3 Flows	SR-Log Returns	SR-Log Flows	Log-Log Returns	Log-Log Flows	Log-SR Returns	Log-SR Flows	3-Log Returns	3-Log Flows
0.01	Lag 1	**0.007**	**0.012**	**0.007**	**0.010**	**0.007**	**0.000**	**0.007**	**0.030**	**0.007**	**0.025**
	Lag 2	**0.000**	**0.000**	**0.000**	**0.003**	**0.000**	**0.000**	**0.000**	**0.009**	**0.000**	**0.010**
	Lag 3	**0.000**	**-0.028**	**0.000**	**0.001**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**-0.025**
	Lag 4	**-0.002**	**0.006**	**-0.002**	**0.000**	**-0.002**	**0.000**	**-0.002**	**-0.003**	**-0.002**	**-0.007**
	Lag 5	**-0.018**	**0.008**	**-0.018**	**0.017**	**-0.018**	**0.000**	**-0.018**	**-0.009**	**-0.018**	**-0.009**
0.05	Lag 1	0.007	0.013	0.007	0.008	0.007	0.000	0.007	0.028	0.007	-0.029
	Lag 2	0.001	0.014	0.000	0.014	0.000	0.000	0.000	0.007	0.000	0.006
	Lag 3	0.000	-0.029	0.000	-0.028	0.000	0.000	0.000	-0.021	0.000	-0.029
	Lag 4	-0.002	0.003	-0.002	0.011	-0.002	0.000	-0.002	-0.008	-0.002	-0.008
	Lag 5	-0.018	0.003	-0.018	0.001	-0.018	0.000	-0.018	0.001	-0.018	-0.007
0.5	Lag 1	0.007	0.005	0.007	0.003	0.007	0.000	0.007	0.004	0.007	0.005
	Lag 2	0.000	-0.014	0.000	-0.004	0.000	0.000	0.000	-0.002	0.000	-0.014
	Lag 3	0.000	0.008	0.000	0.002	0.000	0.000	0.000	-0.003	0.000	-0.008
	Lag 4	-0.002	0.002	-0.002	0.005	-0.002	0.000	-0.002	0.003	-0.002	0.002
	Lag 5	-0.018	0.008	-0.018	0.010	-0.018	0.000	-0.018	-0.012	-0.018	-0.008

Explaining the Persistence of Portfolio Flows

- Incomplete information with heterogeneous beliefs
  - Agents do not observe the shocks (Brownian motions) to the economy.
  - Investors know only the current value of the state variables (terminal payoffs).
  - Agents have priors on the mean of the processes and a prior on the volatility of the means.
  - Agents learn over time the true mean by improving their estimate about the mean (filtering).

Explaining the Persistence of Portfolio Flows

- Incomplete information with heterogeneous beliefs
  - Private (Country) Brownian motion:

$$dW_j(t) = dW(t) + \left(\lambda^{-1}\right)'\left(\gamma - \gamma_j\right).$$

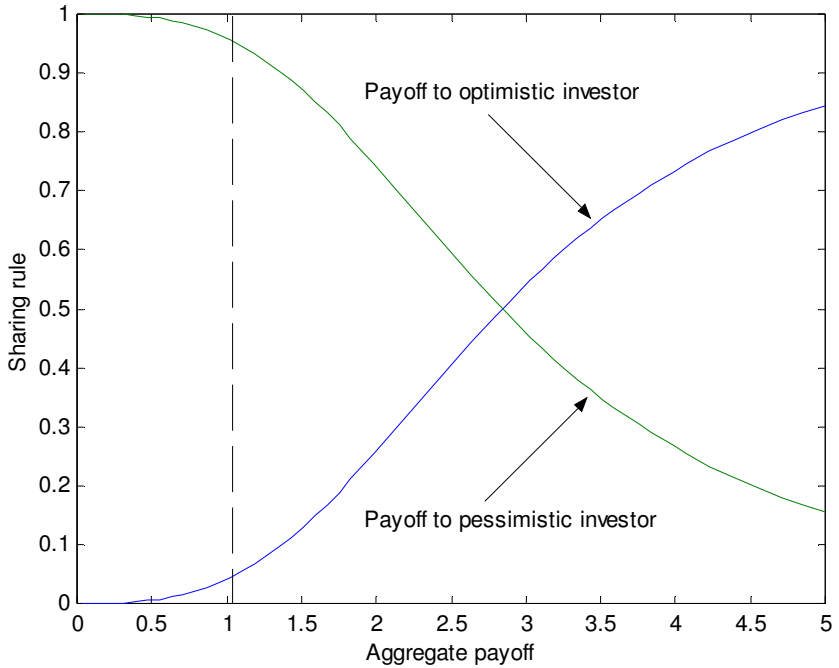
  - Brennan and Cao (1997) setting.
  - Equilibrium:

$$\Delta = \gamma_D - \gamma_F.$$

$$\xi = f(\Delta).$$

Explaining the Persistence of Portfolio Flows

Portfolio flows with incomplete information.



Explaining the Persistence of Portfolio Flows

Parameters	Base	(1)	(2)
$m_{DD}(0)$	$\gamma_D \times 1.2$	$\gamma_D \times 1.3$	$\gamma_D \times 1.2$
$m_{DF}(0)$	$\gamma_F \times 0.8$	$\gamma_F \times 0.7$	$\gamma_F \times 0.8$
$m_{FF}(0)$	$\gamma_F \times 1.2$	$\gamma_F \times 1.2$	$\gamma_F \times 1.2$
$m_{FD}(0)$	$\gamma_D \times 0.8$	$\gamma_D \times 0.8$	$\gamma_D \times 0.8$
$v_{DD}(0)$	0.1	0.1	0.05
$v_{FF}(0)$	0.1	0.1	0.1

Explaining the Persistence of Portfolio Flows

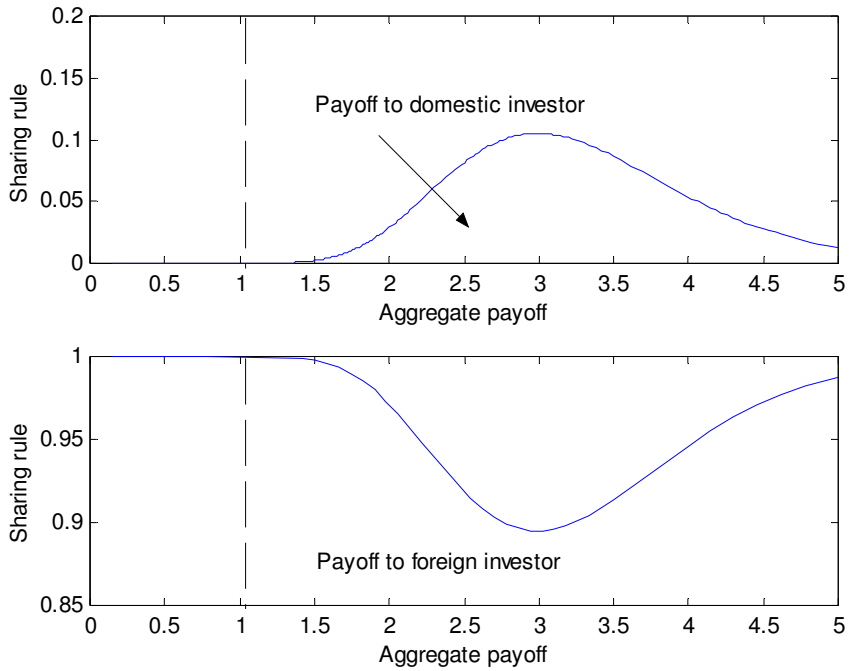
		Priors		
Weight on domestic investor		Base	(1)	(2)
0.01		**0.083**	0.082	0.103
	(Stdev.)	***(0.044)***	*(0.040)*	*(0.034)*
0.05		-0.096	-0.093	0.096
	(Stdev.)	*(0.085)*	*(0.097)*	*(0.112)*
0.5		-0.186	-0.151	-0.033
	(Stdev.)	*(0.054)*	*(0.069)*	*(0.018)*

Explaining the Persistence of Portfolio Flows

		Priors					
		Base		(1)		(2)	
Weight on domestic investor	Lag length	Returns	Flows	Returns	Flows	Returns	Flows
0.01	Lag 1	**0.077**	**0.064**	0.075	0.063	0.012	0.009
	Lag 2	**0.083**	**-0.048**	0.085	-0.058	0.017	-0.008
	Lag 3	**0.010**	**0.013**	0.012	0.011	-0.021	0.010
	Lag 4	**-0.090**	**-0.006**	-0.093	-0.002	-0.003	0.009
	Lag 5	**0.039**	**-0.003**	0.039	-0.001	0.001	-0.011
0.05	Lag 1	0.052	0.043	0.041	0.043	0.014	0.007
	Lag 2	0.067	-0.044	0.076	-0.044	0.012	-0.008
	Lag 3	0.011	-0.043	0.008	-0.043	0.003	0.002
	Lag 4	-0.090	0.013	-0.091	0.013	-0.002	0.020
	Lag 5	0.038	-0.003	0.027	-0.003	0.003	-0.002
0.5	Lag 1	0.024	0.019	0.014	0.011	0.003	0.001
	Lag 2	0.040	-0.014	0.061	-0.013	0.016	-0.000
	Lag 3	0.011	0.032	0.009	-0.033	0.001	0.002
	Lag 4	-0.021	-0.008	-0.031	0.003	-0.013	0.002
	Lag 5	0.002	-0.004	0.000	-0.004	0.001	-0.002

Explaining the Persistence of Portfolio Flows

Portfolio flows with heterogeneity in risk aversion and incomplete information.



Explaining the Persistence of Portfolio Flows

		Scenarios		
Weight on domestic investor		Base	(1)	(2)
0.01		**0.190**	0.188	0.168
	(Stdev.)	***(0.091)***	*(0.122)*	*(0.073)*
0.05		0.222	0.194	0.175
	(Stdev.)	*(0.182)*	*(0.200)*	*(0.209)*
0.5		0.727	0.682	0.839
	(Stdev.)	*(0.242)*	*(0.213)*	*(0.284)*

Explaining the Persistence of Portfolio Flows

		Scenarios					
		Base		(1)		(2)	
Weight on domestic investor	Lag length	Returns	Flows	Returns	Flows	Returns	Flows
0.01	Lag 1	**-0.116**	**0.103**	-0.108	0.091	-0.059	0.034
	Lag 2	**0.025**	**0.027**	0.021	0.037	0.021	0.041
	Lag 3	**0.037**	**0.037**	0.038	-0.013	-0.001	-0.008
	Lag 4	**0.079**	**-0.004**	0.082	0.002	0.002	-0.002
	Lag 5	**-0.000**	**-0.006**	-0.001	-0.001	0.000	-0.000
0.05	Lag 1	-0.089	0.077	-0.073	0.083	0.037	-0.002
	Lag 2	0.031	0.029	0.034	0.037	0.012	0.010
	Lag 3	-0.041	0.014	0.009	-0.011	0.000	0.009
	Lag 4	0.007	-0.000	-0.003	0.008	0.001	0.008
	Lag 5	-0.008	0.000	-0.003	0.001	0.001	0.007
0.5	Lag 1	-0.012	0.031	0.067	0.044	0.009	0.007
	Lag 2	0.021	0.001	0.004	0.021	0.002	0.013
	Lag 3	-0.011	0.025	0.011	-0.003	0.000	-0.009
	Lag 4	0.006	-0.001	-0.003	0.003	-0.004	0.002
	Lag 5	-0.003	-0.003	-0.008	-0.002	-0.008	-0.002

Explaining the Persistence of Portfolio Flows

- "Irrational" model
  - Walrasian scenario.
  - Investors trend chase foreign markets.
  - Myopic behavior on home markets.
  - Pessimistic behavior on the foreign market.

Explaining the Persistence of Portfolio Flows

- "Irrational" model
  - Expectations:

$$E_D r_F(t+1) = c_D \overline{r_F} + \beta_D \rho_D$$

$$\rho_D = \frac{1}{L} \sum_{l}^{L} r_F(t-l).$$

  - Market clearing price:

$$S(t) = \sum_j \phi_j(t) X_j(t).$$

Explaining the Persistence of Portfolio Flows

Parameters	Base	(1)	(2)
c_D	0.80	0.80	0.80
c_F	0.80	0.80	0.80
β_D	0.50	0.50	0.50
β_F	0.50	0.50	0.50
L_D	20	40	20
L_F	20	20	40

Explaining the Persistence of Portfolio Flows

		Scenarios		
Weight on domestic investor		Base	(1)	(2)
0.01		**0.043**	0.622	0.418
	(Stdev.)	***(0.395)***	*(0.380)*	*(0.543)*
0.05		-0.086	0.562	0.433
	(Stdev.)	*(0.300)*	*(0.109)*	*(0.258)*
0.5		-0.609	0.315	0.333
	(Stdev.)	*(0.001)*	*(0.133)*	*(0.281)*

Explaining the Persistence of Portfolio Flows

		Scenarios					
		Base		(1)		(2)	
Weight on domestic investor	Lag length	Returns	Flows	Returns	Flows	Returns	Flows
0.01	Lag 1	-0.544	-0.378	-0.480	-0.450	-0.538	-0.436
	Lag 2	0.070	-0.122	0.026	-0.019	0.072	0.041
	Lag 3	0.020	0.043	0.058	0.045	-0.011	-0.038
	Lag 4	-0.124	-0.020	-0.136	-0.090	-0.004	0.008
	Lag 5	0.165	0.006	0.202	-0.059	0.098	-0.092
0.05	Lag 1	-0.537	-0.427	-0.435	-0.450	-0.529	-0.420
	Lag 2	0.068	-0.021	-0.036	-0.012	0.053	0.062
	Lag 3	-0.032	0.043	0.068	0.024	0.025	-0.117
	Lag 4	-0.016	-0.106	-0.167	-0.051	-0.095	0.042
	Lag 5	0.055	0.024	0.349	-0.074	0.233	-0.070
0.5	Lag 1	-0.505	-0.383	-0.306	-0.431	-0.425	-0.357
	Lag 2	0.615	0.275	-0.034	-0.038	0.040	-0.082
	Lag 3	-0.421	-0.030	0.000	0.038	-0.037	-0.003
	Lag 4	0.353	0.003	-0.099	-0.060	-0.027	-0.027
	Lag 5	-0.281	0.087	0.320	-0.086	0.206	-0.062

Explaining the Persistence of Portfolio Flows

- Results
  - For small countries the contemporaneous correlation coefficient is positive and stable.
  - All models exhibit autocorrelation with sizable variations.
  - All models show joint dynamics in the VAR.
  - Thus irrationality is not needed.
  - The winner is the economy with heterogeneity in risk aversion and incomplete information.
  - What are the fundamentals?
  - Autocorrelation structure of flows!

Explaining the Persistence of Portfolio Flows

- Contributions
  - Portfolio flows need dynamic and equilibrium analysis.
  - Wealth effects.
  - Comparing rational and “irrational” models.
  - Generating volatility.
  - Combining heterogeneity in risk aversion with heterogeneous priors.
  - “Testing” the empirical analysis.

Explaining the Persistence of Portfolio Flows

"A model with perfect financial markets and investors who know the true distribution of returns cannot explain the existing evidence on flows.“

(see GNS (2003) page 1)