

International Portfolios with Demand, Supply and Redistributive Shocks

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■ Facts:

Expansion of international capital flows, during past 20 years: gross external positions exceed 100% for several industrialized countries.

1) Yet, equity home bias remains sizable, See Table 1.

2) Countries go short in domestic currency and long in foreign currency

3) *Exchange rate depreciation generates external capital gain i.e. wealth transfer from rest of world*

(Lane & Milesi-Ferretti, Tille, Gourinchas & Rey)

Models driven by supply shocks cannot explain portfolio & valuation facts

When a country's (relative) output rises:

1) real exchange rate depreciates

2) risk sharing requires: rise in net exports, i.e. wealth transfer to rest of world

Inconsistent with observed valuation effects

**To support risk sharing (supply shocks):
need portfolio that generates drop in
net external financial income when local
output rises**

**⇒ FOREIGN equity bias efficient,
when supply shocks dominant**

**This paper:
what set of shocks is consistent
with portfolio facts?**

**REDISTRIBUTIVE SHOCK
(shock to share of output
distributed as dividend)**

**RELATIVE DEMAND SHIFT
(Home vs. Foreign goods)**

Model:

World with two countries, two goods.

Each country receives endowment of 1 good, but consumes both goods (Consumption home bias).

Trade in stocks (shares in endowments) **and bonds**
(denominated in domestic & foreign goods)

**Discuss complete and incomplete markets
(when more shocks than assets)**

RESULTS:

1) Redistributive shocks create strong tendency to hold domestic equity.

In world with just shocks to Y (output) and capital share:

**100% local equity ownership optimal—
neutralizes effect of capital share
shocks on consumption**

**NB about 80%-90% of equity locally held,
in large OECD countries.**

International sharing of output risk achieved using bonds

Overturms Baxter & Jermann (1997) who claim that non-tradable labor income creates incentive to hold foreign equity: their results do not go through in multiple good world.

But: model with just Y and capital share shocks still generates counterfactual valuation effect.

Optimal to borrow in foreign good & lend in domestic good.

$$Y^{Home} \uparrow \Rightarrow tot^{Home} \downarrow$$

efficient risk sharing requires: rise in Home net exports, triggered by drop in Home net foreign income.

**Empirically: countries go short
in domestic currency, long in
foreign currency**

WHAT shock can deliver this:
Shock that alters relative demand
for Home vs. Foreign good
(iPod shock)

Effect of rise in relative World demand for Home good:

- **Home tot improve;**
- **Efficiency requires: rise in Home (net) exports**
- **Efficient portfolio needs to yield Home external capital loss when tot improve**
⇒ **Home borrows in H good & lends in F good.**

**With simultaneous Y , capital share and
'iPod' shocks:
realistic equity home bias;
short position in local good claims;
realistic valuation effects**

**NB: three types of shocks: financial
market is incomplete. Solve model using
Devereux-Sutherland (2006) approach.**

The model

Two periods.

World with two countries, Home and Foreign $i=H,F$;

two tradable goods, $i=H,F$.

Country i receives endowment of good i , Y_i . Normalize: $E_0 Y_i = 1$.

Preferences:
$$U^i = \frac{1}{1-\sigma} \{ (C^i)^{1-\sigma} - 1 \}$$

$$C^i = [\alpha_i^{1/\phi} (\Psi_i c_i^i)^{(\phi-1)/\phi} + (1-\alpha_i)^{1/\phi} (\Psi_j c_j^i)^{(\phi-1)/\phi}]^{\phi/(\phi-1)}, \quad j \neq i$$

$0.5 < \alpha_i < 1$ (home bias).

$c_{j,t}^i$: good j purchases by country i .

Ψ_i : exogenous taste shock, $E\Psi_i = 1$.

Assets: 2 stocks (Lucas trees) = shares in endowments;
2 bonds denominated in good H or F.

Asset trade occurs in initial period. In second period, exogenous variables are realized, goods are traded & consumed.

Budget constraint:

$$e^i = (1 - k_i) p_i k_i Y_i + \sum_{j=H,F} [S_j^i p_j k_j Y_j + A_j^i p_j], \quad e^i \equiv \sum_{j=H,F} p_j c_j^i.$$

S_j^i [A_j^i]: share of stock j [good j bond] held by country i .

p_j : price of good j . $p_H \equiv 1$ (good H: numeraire).

k_i : **capital share (fraction of output paid as dividend)**

Market clearing: .

$$c_j^F + c_j^H = Y_j; \quad S_j^H + S_j^F = 1; \quad A_j^H + A_j^F = 0 \quad \text{for } j=H,F.$$

Countries are ex ante symmetric

⇒ equilibrium portfolio are symmetric: $S \equiv S_H^H = S_F^F$, $A \equiv A_H^H = A_F^F$.

S: locally equity share

A: lending denominated in local good

Country H budget constraint:

$$e^H = (1 - k_H)Y_H + Sk_H Y_H + (1 - S)p_F k_F Y_F + A(1 - p_F)$$

$$e^H - Y_H = (1 - S)[p_F k_F Y_F - k_H Y_H] + A(1 - p_F)$$

Net imports = net financial income

Complete markets

First consider economies with just 2 types of shocks
⇒ complete markets

Then equilibrium is Pareto efficient: $\partial U(C^2)/\partial c_1^2 = \partial U(C^1)/\partial c_1^1$

1. Just Y and capital share (k) shocks.

**Efficient allocation does not depend on k_i , only on Y_H, Y_F .
Denote efficient quantities (and associated prices) by star.**

For asset structure to support efficient allocation:

$$e^{H,*} = (1 - k_H)Y_H + Sk_H Y_H + (1 - S)p_F^* k_F Y_F + A(1 - p_F^*)$$

has to hold for arbitrary realizations k_H, k_F, Y_H, Y_F .

When $S = 1$: $e^{H,*} - Y_H = A(1 - p_F^*)$.

This holds (up to first order) when: $A = (\partial[Y_H - e^{H,*}]/\partial Y_H) / (\partial p_F^* / \partial Y_H)$

Risk sharing achieved using bonds.

**Optimal net exports are procyclical: $\partial[Y_H - e^{H,*}]/\partial Y_H > 0$
(if substitution elasticity H vs. F good, $\phi > 1$: empirically plausible)**

Of course: $\partial p_F^*/\partial Y_H > 0$.

Hence, optimal bond position: $A > 0$.

Country lends in the domestic goods (and borrows in foreign good).

Conclusion:

with just Y and capital share shocks, 100% equity Home bias optimal.

Country long in Home-good bonds, short in Foreign-good bonds.

2. Just k (capital share) and Ψ (iPod) shocks:

$$S = 1, \quad A < 0$$

Again 100% equity home bias (to hedge k -shocks)
Bonds used to hedge iPod shocks

Intuition:

When preference for Foreign goods rises,

Home tot worsen;

Pareto efficient for Home to import more Foreign goods;

to finance rise in Home net imports, external capital gain:

⇒ Home borrows in H good & lends in F good.

Incomplete markets

Y, k (capital share) and taste shocks

Solution method: Devereux & Sutherland (2006)

Solve for portfolios that satisfy second-order approximation of Euler equations

Calibration (based on G7 data)

Assume $\text{std}(\log(Y))=1.59\%$, $\text{std}(\log(k))=2.39\%$

$E_0 k = 0.4$; $\alpha = 0.8$

ϕ : substitution elasticity (H vs. F goods);

σ : risk aversion coefficient

| $std(\Psi_i)$ | ϕ | σ | S | A | Foreign good claim, $(1-S)E(k)-A$ |
|---------------|--------|----------|------|-------|--------------------------------------|
| 0 | 1.5 | 1 | 1 | 0.16 | -0.16 |
| 1% | 1.5 | 1 | 0.95 | 0.09 | -0.07 |
| 2% | 1.5 | 1 | 0.85 | -0.02 | 0.08 |
| 0 | 1.5 | 2 | 1 | 0.22 | -0.22 |
| 1% | 1.5 | 2 | 0.92 | 0.14 | -0.11 |
| 2% | 1.5 | 2 | 0.75 | -0.04 | 0.14 |

| std iPod σ_Ψ | elasticity subs ϕ | Home bias stocks S | Position bonds b | Foreign currency pos. FCP | Corr. equity returns | $\frac{\text{cov}(\widehat{R}_H - \widehat{R}_F, \text{RER})}{\text{var}(\widehat{R}_H - \widehat{R}_F)}$ | Corr. (Cons., RER) |
|------------------------------|------------------------------|----------------------------|--------------------------|-----------------------------------|----------------------------|---|-----------------------|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| 0 | 0.6 | 1.00 | -0.08 | 0.06 | 0.67 | 0.28 | -1.00 |
| 1% | 0.6 | 0.98 | -0.07 | 0.08 | 0.66 | 0.30 | -0.79 |
| 2% | 0.6 | 0.95 | -0.08 | 0.10 | 0.62 | 0.35 | -0.53 |
| | | | | | | | |
| 0 | 0.9 | 1.00 | 0.03 | -0.03 | 0.69 | 0.10 | -1.00 |
| 1% | 0.9 | 1.00 | 0.03 | -0.03 | 0.69 | 0.11 | -0.96 |
| 2% | 0.9 | 1.01 | 0.03 | -0.03 | 0.68 | 0.13 | -0.85 |
| | | | | | | | |
| 0 | 1.5 | 1.00 | 0.22 | -0.22 | 0.69 | 0.07 | -1.00 |
| 1% | 1.5 | 0.92 | 0.14 | -0.11 | 0.69 | 0.07 | -0.60 |
| 2% | 1.5 | 0.75 | -0.05 | 0.14 | 0.69 | 0.07 | -0.56 |
| | | | | | | | |
| 0 | 2 | 1.00 | 0.38 | -0.38 | 0.68 | -0.02 | -1.00 |
| 1% | 2 | 0.81 | 0.10 | -0.02 | 0.69 | -0.02 | -0.43 |
| 2% | 2 | 0.60 | -0.21 | 0.37 | 0.70 | -0.08 | -0.53 |

Table 1. Data: external equity holdings and trade shares

| | (Foreign equity liabilities)/ (capital stock) 1997 | (Foreign equity assets)/GDP | | (Foreign equity liabilities)/GDP | | Imports/ (C+I+G+X) 2003 |
|--|--|--------------------------------|------|-------------------------------------|------|-------------------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| US | 0.05 | 0.35 | 0.42 | 0.31 | 0.37 | 0.12 |
| G15: | | | | | | |
| Australia | 0.11 | 0.39 | 0.37 | 0.45 | 0.56 | 0.17 |
| Austria | 0.05 | 0.13 | 0.36 | 0.17 | 0.30 | 0.34 |
| Canada | 0.06 | 0.36 | 0.48 | 0.27 | 0.35 | 0.25 |
| Switzerland | 0.14 | 1.26 | 1.81 | 1.23 | 1.63 | 0.26 |
| Germany | 0.03 | 0.26 | 0.48 | 0.18 | 0.38 | 0.23 |
| Denmark | 0.09 | 0.30 | 0.74 | 0.26 | 0.56 | 0.26 |
| Spain | 0.07 | 0.11 | 0.38 | 0.27 | 0.53 | 0.22 |
| Finland | 0.06 | 0.20 | 0.62 | 0.32 | 0.80 | 0.23 |
| France | 0.07 | 0.50 | 0.74 | 0.44 | 0.63 | 0.19 |
| Italy | 0.03 | 0.13 | 0.34 | 0.10 | 0.12 | 0.19 |
| Netherlands | 0.12 | 0.88 | 1.51 | 0.95 | 1.21 | 0.35 |
| New Zealand | 0.11 | 0.19 | 0.25 | 0.65 | 0.57 | 0.22 |
| Portugal | 0.09 | 0.11 | 0.30 | 0.32 | 0.53 | 0.26 |
| Sweden | 0.13 | 0.54 | 0.89 | 0.50 | 0.64 | 0.27 |
| UK | 0.14 | 0.61 | 0.95 | 0.58 | 0.78 | 0.21 |
| <i>Summary statistics for 16 countries</i> | | | | | | |
| Median | 0.08 | 0.32 | 0.48 | 0.32 | 0.56 | 0.22 |
| Mean | 0.08 | 0.39 | 0.66 | 0.43 | 0.62 | 0.22 |