

The Role of Nonseparable Utility and Nontradables in
International Business Cycle and Portfolio Choice

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Introduction

- This is an extremely interesting paper that contributes to a vast (and fast growing) literature on international portfolios, business cycles, and risk sharing.
- Akito significantly expands our understanding of international portfolio determination and business cycle transmission by solving analytically a model that features non-traded goods and a more general, non-separable preference specification than in the pre-existing literature.
 - The analytical solution allows us to understand the role of structural parameters in determining portfolios and the properties of business cycles.
- Since my time is limited, I will jump to the meat of my discussion rather than summarizing the paper in more detail.

Akito's Solution Strategy

- Akito solves the model by log-linearizing it around the deterministic steady state.
- The solution procedure assumes efficient risk sharing – *i.e.*, the allocation of equities that would be chosen by a worldwide social planner.
- Note: This is an incomplete markets economy (there are no Arrow-Debreu contingent claims to consumption or Arrow securities).
- However, the number of available assets is sufficient to span all uncertainty and deliver the complete markets allocation.
- This is the equity portfolio that Akito focuses on: the equity portfolio that a planner would choose.

Steady-State Portfolios: Planners and Markets

- However, if we solve for the deterministic steady state of the decentralized market economy we face a familiar issue:
- The steady-state equity allocation that the planner would choose is only one in a continuum of possible steady-state equity allocations.
 - In other words, the decentralized steady-state equity allocation is indeterminate.
- This happens because the Euler equations for equity holdings provide no restriction that pins down the steady-state equity allocation.
 - Expected growth in the marginal utility of consumption depends on expected equity returns but not on the stocks of equities.

Log-Linearizing around Alternative Steady States

- If there is no mechanism in the model that pins down decentralized steady-state equity holdings to the planner's allocation, nothing prevents us from log-linearizing the model around a different steady-state position.
- This has interesting consequences for equilibrium portfolios and risk sharing:
 - The equilibrium portfolio is no longer constant over time and across states, but it displays history dependence.
 - The equilibrium allocation of consumption no longer features efficient risk sharing and is similarly history-dependent.
 - The risk sharing properties of the equilibrium portfolio become a function of the structural characteristics of the economy.

An Illustration

- Consider a stripped-down version of Akito's model in which we assume:
 - Inelastic labor supply – CRRA utility, function only of consumption: $C^{1-1/\sigma} / (1 - 1/\sigma)$, $\sigma > 0$.
 - C.E.S. consumption basket that aggregates home and foreign sub-baskets symmetrically across countries.
 - Elasticity of substitution across sub-baskets (individual goods) = $\omega > 0$ ($\theta > 1$).
 - All goods are traded frictionlessly: PPP holds.
 - Agents trade shares in the profits of monopolistically competitive producers of individual goods.
 - Production is a linear function of labor only, subject to aggregate productivity shocks in each country.
 - Labor is immobile across countries.
- This is the setup in Ghironi, Lee, and Rebucci (GLR, 2007 NBER WP).

Portfolio Holdings and Risk Sharing around a Symmetric Steady State

- Suppose that:
 - agents trade shares frictionlessly,
 - countries have equal size,
 - and we log-linearize the model around a symmetric steady-state equity allocation in which each country owns half of its own equity and half of the other country's equity.
- Let:
 - \hat{x}_{t+1}^D = net cross-border equity holdings (home holdings of foreign equity – foreign holdings of home equity),
 - \hat{C}_t^D = consumption differential,
 - and \hat{Z}_t^D = productivity differential (all in percent deviation from steady state).

Portfolio Holdings and Risk Sharing around a Symmetric Steady State, Continued

- The solution of the decentralized economy implies:

$$\begin{aligned}\hat{x}_{t+1}^D &= \hat{x}_t^D + \eta_{x^D Z^D} \hat{Z}_t^D, \\ \hat{C}_t^D &= \eta_{C^D x^D} \hat{x}_t^D + \eta_{C^D Z^D} \hat{Z}_t^D,\end{aligned}$$

with:

$$\eta_{C^D x^D} = \frac{1}{\theta}, \quad \eta_{x^D Z^D} = \frac{(\theta - 1)(1 - \beta)(1 - \phi)}{1 - \beta\phi} \left(\frac{\omega - 1}{\omega} \right), \quad \eta_{C^D Z^D} = \frac{(\theta - 1)(1 - \beta)}{\theta(1 - \beta\phi)} \left(\frac{\omega - 1}{\omega} \right),$$

$\beta =$ discount factor, $\phi =$ productivity persistence.

1. The equilibrium portfolio displays history dependence.
 2. In general, the solution does not coincide with the full insurance outcome in which $\hat{C}_t^D = 0$.
- Relative productivity shocks cause a consumption differential on impact, and there is a long-run consumption differential as a consequence of the unit root in net cross-border equity holdings.

Intuition

- Equity provides claims to profits, with the rest of a country's income going to wages.
- Even with symmetric equity holdings, only part of GDP is shared between home and foreign residents:
 - The wage portion is kept wholly by the residents of each country.
- As a result, decentralized equity trading starting from the symmetric steady-state allocation does not yield complete risk sharing, and the equilibrium portfolio and consumption display (extreme) history dependence.

Risk Sharing and Monopoly Power

- If we are not on the “Cole and Obstfeld (1991, *JME*) knife edge” (*i.e.*, if $\omega \neq 1$), decentralized, frictionless equity trading around the symmetric steady state results in full insurance only if all of each country’s income is distributed as profit, leaving nothing for wages, *i.e.*, if $\theta = 1$.
 - Extreme firm-level monopoly power has no consequence for equilibrium output under the assumption that labor supply is inelastic and the labor market clears.
- Of course, the risk sharing implications of such extreme firm-level monopoly power are conditional on the assumption of a symmetric steady state in which each country owns 50 percent of the other country’s equity.
- A different distribution of income, associated with less-than-extreme monopoly power, is required for equity trade to deliver full insurance when the steady-state asset position is different.
 - For instance, full risk sharing happens when half of income is distributed as profit ($\theta = 2$) if the initial steady state is one in which each country owns 100 percent of the other country’s equity.
- As long as we linearize the model around a steady state that differs from the planner’s allocation of equity, the risk sharing properties of equity trading (and the characteristics of the equilibrium portfolio) crucially depend on the distribution of income between labor and profits in each country.

The Planner's Optimum vs. Decentralized Markets

- In GLR, a world social planner would choose the equity allocation that equates home and foreign consumption to world consumption in all periods.
- Indeed, there exists a (constant) allocation of share holdings such that the consumption differential is zero at all points in time regardless of Z_t and Z_t^* .

- This is given by

$$x_{t+1} = x_t = x^P = a - (1 - a)(\theta - 1) \quad \text{and} \quad x_{t+1}^* = x_t^* = x^{P*} = (1 - a)\theta,$$

$a \in (0, 1) = \text{country size.}$

- In the planning optimum, constant equity holdings reflect income distribution in order to deliver perfect risk sharing:
 - The smaller the share of income distributed as profit (the higher θ), the smaller (larger) the share of home (foreign) equity that home households should hold.
 - If $a = 1/2$, the planner's allocation implies going short in domestic equity if $\theta > 2$ (i.e., if less than half of income is distributed as profit).
 - The planner's allocation always requires holding a positive amount of foreign equity ($\theta/2$ if $a = 1/2$).

The Planner's Optimum vs. Decentralized Markets, Continued

- Akito solves for the planner's allocation of equity in a more general model.
- However, as the example above illustrates, the properties of decentralized equilibrium portfolios and shock transmission are importantly affected by the choice of the steady state around which we approximate the market economy, and nothing in the model constrains the steady-state equity allocation to coincide with the planner's optimum.

Decentralizing the Planner's Portfolio

- Is it possible to design a system of taxes and transfers that decentralizes the planner's equity allocation?
- Yes: Suppose that agents in the GLR model must pay convex (for simplicity, quadratic) fees to a domestic financial intermediary each time they engage in an equity purchase and that these fees are centered around the planner's optimum.
 - For instance, the home household pays the fee $\frac{\gamma}{2}V_t^z (x_{t+1}^z - x^{Pz})^2$ when buying shares x_{t+1}^z in the home firm z at time t (where V_t^z is the price of shares and $\gamma > 0$), and similar fees are imposed on foreign equity purchases and transactions by foreign households.
- Suppose that the intermediary (or government agency) rebates the fees to agents in lump-sum fashion in equilibrium.
- The fees and their lump-sum rebates operate as a system of distortionary taxes and lump-sum transfers in decentralizing the planner's equity allocation (in and off the steady state) and delivering perfect risk sharing in the decentralized market economy.
 - See GLR for details.

Financial Frictions, Equilibrium Portfolios, and Consumption Dynamics

- If they are not used as a device for decentralizing the planner's outcome, but rather as a (reduced-form) characterization of financial market frictions, quadratic fees that are not centered on the planner's equity allocation will pin down a unique deterministic steady state for the decentralized market economy that does not coincide with the planning optimum.
- Suppose the parametrization of the fees is such that the unique steady state features symmetric, 50-50 equity holdings across countries.

Financial Frictions, Equilibrium Portfolios, and Consumption Dynamics, Continued

- The solutions for \hat{x}_{t+1}^D and \hat{C}_t^D will be:

$$\begin{aligned}\hat{x}_{t+1}^D &= \eta_{x^D x^D} \hat{x}_t^D + \eta_{x^D Z^D} \hat{Z}_t^D, \\ \hat{C}_t^D &= \eta_{C^D x^D} \hat{x}_t^D + \eta_{C^D Z^D} \hat{Z}_t^D,\end{aligned}$$

with:

$$\begin{aligned}1 &> \eta_{x^D x^D} > 0, \\ \eta_{C^D x^D} &= \frac{\sigma\gamma/2}{(1 + \gamma/2)(1 - \eta_{x^D x^D})} \eta_{x^D x^D} > 0, \\ \eta_{x^D Z^D} &= \frac{(\theta - 1)(1 - \beta + \gamma)}{\beta} \left(\frac{\omega - 1}{\omega}\right) \left[1 + \frac{\theta(1 - \beta + \gamma)}{\beta(1 - \phi)} \left(\eta_{C^D x^D} + \frac{\sigma\gamma/2}{1 + \gamma/2}\right)\right]^{-1} \geq 0, \\ \eta_{C^D Z^D} &= \frac{1}{1 - \phi} \left(\eta_{C^D x^D} + \frac{\sigma\gamma/2}{1 + \gamma/2}\right) \eta_{x^D Z^D} \geq 0.\end{aligned}$$

- Note: The equilibrium portfolio and consumption still display history dependence (and risk sharing is not perfect), but the financial frictions remove the unit root from the dynamics of cross-border equity holdings.

Conclusions

- Akito's paper is extremely valuable: It provides a clear analysis of the importance of substitutability parameters, non-separability in preferences, and the presence of non-traded goods in determining the characteristics of the equity portfolio that replicates the complete markets allocation and its implications for international business cycles.
- As Akito mentions, it will be interesting to depart from the planner's allocation of equity, possibly by introducing financial frictions in the model.
- Moving away from the planner's optimum can be interesting on theoretical grounds and may be important to explain stylized facts.
 - For instance, in GLR's model, it is necessary for portfolio rebalancing to play a role in net foreign asset dynamics in addition to valuation changes.
- This discussion has highlighted some initial results in this direction.
- I look forward to seeing the richer results that will be generated by moving away from the planner's equity allocation in Akito's model.