Discussion of

“Demography and International Capital Flows”

by David Backus, Thomas Cooley & Espen Henriksen

Dirk Krueger

University of Pennsylvania, CEPR, and NBER

NY/Philadelphia Workshop on Quantitative Macroeconomics
April 29, 2011
Objective of this Paper

- Large and persistent movements in international capital flows.

- Populations are aging around the world (longevity ↑, fertility ↓), but at very different pace.

- This paper: quantify the importance of cross-country differences in demographics for international capital flows.
Figure 1
As these data suggest, there are substantial differences across regions in population structure even in 1950, when the EU countries, Japan, and North America were on average older than today’s less-developed regions. This link between economic development and demographics suggests that the global transition to lower fertility and mortality predates 1950, though it is hard to access comprehensive and accurate data for this period. Figure 3 depicts the ratio of youth dependency for several industrial countries with available age distribution data in the period 1850 to 2150. It confirms that Canada, the United States, and much of Europe were transitioning to lower fertility long before 1950. Youth dependency in the United States, for example, declined from 74 percent in 1850 to 36 percent in 1945, a decline similar to that in other countries. In fact, the degree of comovement across countries is striking, suggesting that long-run fertility trends have been dominated by global events such as world wars and the Great Depression. The one exception to the global fertility decline prior to 1950 is Japan, where youth dependency remained above 60 percent until that year. Unlike the rest of the world, Japan was in a high-fertility equilibrium until the end of World War II, which explains the severity of population aging in Japan today.

II. The Model

This section describes the open economy OLG model, which is used to simulate the effects of population change on international capital flows. It initially outlines the life cycle problem for the representative agent in economy $j$, which provides the
Some Basic Accounting

- Net foreign asset position of country $i$ at time $t$

$$F_{i,t} = A_{i,t} - K_{i,t}$$
$$\sum F_{i,t} = \sum (A_{i,t} - K_{i,t}) = 0$$

- Current account

$$CA_{i,t} = F_{t+1,i} - F_{i,t} = (A_{t+1,i} - A_{i,t}) - (K_{t+1,i} - K_{i,t})$$
$$= S_{i,t} - I_{i,t}$$
$$ca_{i,t} = s_{i,t} - i_{i,t}$$
Demand for Capital (Investment)

• Technology

\[ Y_{i,t} = \theta_{i,t} K_{i,t}^\alpha N_{i,t}^{1-\alpha} \]
\[ r_t = \alpha \theta_{i,t} \left( \frac{K_{i,t}}{N_{i,t}} \right)^{\alpha-1} \]

• Let \( g_{i,t+1}^X = \log(X_{i,t+1}) - \log(X_{i,t}) \). Then

\[ g_{i,t+1}^K - g_{j,t+1}^K = \frac{1}{1-\alpha} \left( g_{i,t+1}^\theta - g_{j,t+1}^\theta \right) + \left( g_{i,t+1}^N - g_{j,t+1}^N \right) \]
Demand for Capital (Investment)

\[ g^K_{i,t+1} - g^K_{j,t+1} = \frac{1}{1 - \alpha} \left( g^\theta_{i,t+1} - g^\theta_{j,t+1} \right) + \left( g^N_{i,t+1} - g^N_{j,t+1} \right) \]

- For a given world capital stock, capital flows to countries with
  - Rapid technological progress (perhaps broadly defined)
  - Fast growth of labor force \( \implies \) demographics
Supply of Capital (Saving)

- Preferences over life cycle consumption streams \( \{c_T\} \)

\[
\sum_{\tau=0}^{T} \beta^\tau s(\tau) \left( \frac{c^\tau_1}{1-\sigma} \right)
\]

- Endowments: labor efficiency units \( \{\varepsilon_j\}_{j=0}^{J} \) and accidental (lump-sum redistributed) bequests \( h \)

- Access to risk-free asset (capital), natural borrowing constraint. Budget constraint:

\[
a_{T+1} - a_T = w\varepsilon_T + ra_T + h - c_T
\]
Supply of Capital (Saving)

- Individual saving $a_{\tau+1} - a_\tau$ determined by
  - pure life cycle motives (dis-save early, save in middle ages, dis-save in retirement)
  - self-insurance against idiosyncratic survival risk
Supply of Capital (Saving)

- Individual saving NOT determined (in the model) by
  - idiosyncratic income or health expenditure risk
  - public policies, especially social security
  - household size and composition

- How well does the model match empirically observed life cycle consumption & saving profiles (see e.g. Attanasio et al. 1999, Gourinchas and Parker)?
Supply of Capital (Saving)

- Aggregate saving of country $i$

$$S_{i,t} = \sum_{\tau} x_{\tau,i,t} \left( a_{\tau+1,i,t+1} - a_{\tau,i,t} \right)$$

where $x_{\tau,i,t}$ is number of households of age $\tau$ in country $i$ at time $t$.

- Effect of demographics unclear:
  
  - Higher longevity increases individual saving in working ages
  
  - Older populations tend to have larger elderly cohorts with low saving rates (but also less low-savings youngsters).
Summarizing the Effects of Demographics

- Countries with faster aging populations should have lower $I_{i,t}$. Countries with older populations might have lower $S_{i,t}$.

- Capital should flow to slow aging countries (with low savings rates) $CA_{i,t} < 0$ such as the U.S. Capital should flow from fast aging countries (with high savings rates) $CA_{i,t} > 0$ such as Germany, Japan.

- But: not clear (based on demographics) why savings rates in U.S. should be lower in U.S. than in Germany, Japan.
Final Remarks/Questions

- What about the rest of the world?
- What about the future?
As these data suggest, there are substantial differences across regions in population structure even in 1950, when the EU countries, Japan, and North America were on average older than today’s less-developed regions. This link between economic development and demographics suggests that the global transition to lower fertility and mortality predates 1950, though it is hard to access comprehensive and accurate data for this period. Figure 3 depicts the ratio of youth dependency for several industrial countries with available age distribution data in the period 1850 to 2150. It confirms that Canada, the United States, and much of Europe were transitioning to lower fertility long before 1950. Youth dependency in the United States, for example, declined from 74 percent in 1850 to 36 percent in 1945, a decline similar to that in other countries. In fact, the degree of comovement across countries is striking, suggesting that long-run fertility trends have been dominated by global events such as world wars and the Great Depression. The one exception to the global fertility decline prior to 1950 is Japan, where youth dependency remained above 60 percent until that year. Unlike the rest of the world, Japan was in a high-fertility equilibrium until the end of World War II, which explains the severity of population aging in Japan today.

II. The Model
This section describes the open economy OLG model, which is used to simulate the effects of population change on international capital flows. It initially outlines the life cycle problem for the representative agent in economy \( j \), which provides the