Discussion of 'Demographic Structure and Macroeconomic Trends' by Yunus Aksoy, Henrique Basso, Ron Smith, Tobias Grasl

Christian Siegel

University of Kent

12/10/2017

BoF/CEPR Conference on Demographics and the Macroeconomy

Overview

- How does demographic structure affect the macroeconomy?
- Import question as there is large demographic change
  - over recent decades: ageing
  - in the future: when baby boomers retire rejuvenating of the *workforce*, but for some time further ageing of *population*
- potentially supply and demand effects

This paper:

- Empirical analysis finds demographics matter
- Economic model to investigate potential channels

The Empirical Analysis

- Panel VAR of 21 OECD countries over 1970–2014 (unbalanced)
- endogenous variables:
  - real GDP growth (in baseline specification *not* per capita)
  - investment rate
  - savings rate
  - (log hours) worked per capita
  - (short-term) real interest rate
  - inflation rate
  - extension: + (log) residential patent applications per capita
- whole range of controls, incl. fixed effects
- whole range of robustness checks

Empirical Specification

Panel VAR at yearly frequency

$$Y_{i,t} = a_i + A_1 Y_{i,t-1} + DW_{i,t} + controls_{i,t} + u_{i,t}$$

- can look at short-term (D) and long-term effects $(I - A_1)^{-1} D$
- demographics change slowly, so main interest is in LR

Some results

with 3 age groups:

	β_1	β_2	β_3
g	0.09	0.03	-0.11
I	0.02	0.00	-0.02
S	0.08	0.04	-0.12
H	-0.07	0.11	-0.03
rr	-0.14	0.28	-0.14
π	0.24	-0.28	0.04

Short-Run Demographic Impact - Matrix D

	β_1	β_2	β_3
g	0.04	0.06	-0.10**
I	0.13***	0.08	-0.22**
S	0.24***	0.16	-0.40**
H	-0.54***	1.08**	-0.54**
rr	-0.05	0.46	-0.42*
π	0.70***	-0.75***	0.05

Note: $*$ = 10%, $**$ = 5%, $***$ = 1% levels of significance.

Table: Long-Run Demographic Impact - D_{LR}

or with 8 age groups (quite demanding specification):

	δ_1	δ_2	δ_3	δ_4	δ_5	δ_6	δ_7	δ_8
g	-0.040	0.118	0.093	0.046	0.108	-0.021	-0.304*	0.000
I	-0.506	0.195	0.251	0.228	0.023	0.241	0.399	-0.832
S	0.039	0.539**	-0.371	0.275	0.381	0.645**	-0.126	-1.382*
H	-2.024**	0.053	0.498	2.654*	0.295	1.217	-1.567	-1.126
rr	-0.895	-0.328	0.507	0.847	0.375	0.149	0.255	-0.910
π	1.117*	0.656**	-0.328	-0.979*	-0.749*	0.016	-0.073	0.339

Note: $\bullet\bullet$ = 10%, $\bullet$ = 5% levels of significance.

Table 3: Long-Run Demographic Impact - D_{LR}

Determinants of the age structure

Where is the variation in the demographic structure coming from?

- historical fertility rates, (age-specific) mortality rates
- but also migration across countries
  - migrants tend to be younger
  - migrants tend to move to countries that are doing well
  - potential endogeneity concern
- could the finding that 'younger' countries grow faster be spurious?

- same for population growth; differences in results b/w GDP growth and GDP per capita growth?

Functional Form

$$Y_{i,t} = a_i + A_1 Y_{i,t-1} + DW_{i,t} + controls_{i,t} + u_{i,t}$$

- baseline specification: no time fixed effect
- slope homogeneity
  - assumes being 60 in 1970 is the same as in 2010
  - does not allow for cross-country differences, but labour market institutions and retirement policies differ a lot

Further outcomes might be of interest

Supply side:

- heterogeneity within the workforce: imperfect substitutability between experience groups
- Katz-Murphy (1992); Jeong, Kim, Manovskii (2015): relative supply affects relative wages
- Caselli (2015): experienced biased technological change
- Boehm and Siegel (2017) find the above, but also effect on employment rates (using LLM variation and IV strategy)

Demand side:

- not just total consumption but also composition might matter
  - demand for services (e.g. health and social care) vs. goods

The Economic Model

A relatively rich stylized model

- Blanchard-Yaari style households (young/workers/old)
- Endogenous technology, adaptation of Comin and Gertler (2006)

R&D and Adoption are Endogenous

- R&D and adoption respond to rate of return
- stock of invented products is endogenous due to R&D which has productivity

$$\frac{\chi Z_t}{\Psi_t^{\rho} S_t^{1-\rho}} \left(\Gamma_t^{yw}\right)^{\rho_{yw}}$$

  - novelty is introducing $\Gamma_t^{yw} = (1-\omega^y)\frac{N_t^y}{N_t} + (1-\lambda^{yw})\Gamma_{t-1}^{yw}$
  - for $0 < \lambda^{yw} < 1$, innovation productivity depends on when workers entered $\rightarrow$ a *supply* effect.
- adoption decision depends positively on total consumption $\rightarrow$ *demand* effect.

Other Model Ingredients

- what do endogenous mark-ups, capital utilization, etc. do?
  - Comin and Gertler (2006) use these to generate fluctuations at *medium* frequency from a *high* frequency shock.
  - but your driver is demographic change - a *low* frequency shock.
- what role does human capital have?
  - reduction in fertility increases efficiency units of the young
  - seems to be very similar to intergenerational transfers

Empirical Analysis vs. Model

- quantitatively, how much did endogenous innovation, life-cycle consumption effects, human capital, etc. matter in the past?
- theoretical model has predictions beyond what is in the VAR (e.g. mark-ups) – and vice versa (e.g. inflation)
- in general difficult to apply a closed-economy model to cross-country data
  - global diffusion of technology
  - rate of return equality
  - migration
- but growth slowed down globally – model might also apply at world level

Very interesting paper

- document a set of empirical facts
- empirical results consistent with theory
- perhaps the empirics and the model could be linked better

Minor Comments

- how well does the VAR in sample?
- how large are the effects identified?
- when forecasting, what do assume about future fertility and mortality rates?