Population Growth and Economic Development
Lecture 19 and 20

1,3 April 2014
Introduction

Population: Some basic concepts
  Birth and death rates
  Age distributions

From economic development to population growth
  Demographic transition
  Historical trends in developing and developed countries
  The adjustment of birth rates
  Is fertility too high?

From population growth to economic development
  Some negative effects
  Some positive effects
Micro–inertia Models of fertility

Now consider micro–inertia as household level. Several mechanisms to consider:

- Fertility Choice and missing markets
- Relationship between mortality and fertility
- Gender bias
- Information, income, and fertility
- Hoarding versus Targeting
- The cost of Children
Gender (Son) Bias

What if old age support provided by a son.

- Then $n$ may refer to the number of birth of boys.
- So instead of four births, now need eight births.
- Explains consequence of preferences, not reason for gender preferences. Son preference sometimes supported by legal rights and land ownership. E.g., only males can hold property. Widow needs to have a son.
- Fertility decline slower in societies with son preference (East Asia, Latin America).
Information, income and fertility

Fertility response to mortality decline likely to be slow:

- Takes time to recognize mortality has fallen. Ray: likely across generations.
- Offspring needs to earn sufficient income to support parents when old. Likely related to mortality decline.
- Separation of offspring and parents (e.g., emigration) not related to mortality rates.
- Gender bias. And intrinsic low valuation of women compounds gender bias.
Hoardings versus Targeting

- Assumed a static framework: parents (HH) make one decision on childbearing.
- Yet, may not realize child’s income or willingness to support parents until relatively late. If so “inventory” children; hoarding.

Sequential decision-making more efficient (minimal holding costs).
Implication on Childbearing

A change from a strategy of hoarding to targeting can lead to a substantial decline in fertility.

Last discussed that with survival probability of $p = 0.5$ and risk aversion such that desire $q = .95$ chance of having at least one child survive to adulthood. Requires $n = 5$ births.

Consider an extreme situation where the uncertainty $p = 0.5$ determined completely by infant mortality. So if child survives one year, will survive to adulthood. And will support parents in old age.

Now, expected number of births is 2. Why?

Half HH first child survives, done. The remaining half have a second children, of which one–half survive.
Manipulation

\[ E[N] = 1p + 2(1 - p)p + 3(1 - p)^2p + 4(1 - p)^3p + \ldots \]
\[ = p[1 + 2(1 - p) + 3(1 - p)^2 + 4(1 - p)^3 + \ldots] \]
\[ = p \sum_{k=1}^{\infty} k(1 - p)^{k-1} \]

Recognize that

\[ k(1 - p)^{k-1} = - \frac{d}{dp} (1 - p)^k. \]
Manipulation . . .

Substitute for \( k(1 - p)^{k-1} \)

\[
E[N] = -p \left[ \sum_{k=1}^{\infty} \frac{d}{dp} (1 - p)^k \right]
\]

\[
= -p \left[ \frac{d}{dp} \sum_{k=1}^{\infty} (1 - p)^k \right]
\]

\[
= -p \left[ \frac{-1}{p^2} \right] = \frac{1}{p}, \quad p = 1/2
\]

\[
= 2.
\]

Note in line 2, summation is bounded so can interchange sum and derivative.
Cost of Children

Must also recognize that children are costly.

- Direct costs: food, clothing, housing, schooled, watched, . . .
- Indirect costs: Opportunity cost, foregone income of child raising.

Time spent at home with kid is time spent not earning income, so

\[ \text{indirect cost} \propto w \cdot \text{hours in childcare} \]

Societies in which the opportunity cost of time is low, fertility rates tend to be high.
Cost Benefit of Childbearing

Cost–Benefit Approach. But to be meaningful, must make benefits and costs specific and tied to the connect.

Presumption: Benefit of child — old age support.

So with costs, must recognize implications of different kinds of cost on fertility.
Increase in Household Income

Children presumed to be normal goods. So, expect $Y \uparrow \implies N^d \uparrow$. See Figure 9-1a.
Figure 9-1a: Increase HH Income
Outline
Introduction
Population: Some basic concepts
From economic development to population growth
From population growth to economic development

The adjustment of birth rates
Is fertility too high?

Figure 9-1b: Increase in Wage
Interpretation

- Assume woman does all childrearing.
- Then an increase in HH income (say due to land rents) shifts budget set from AB to CD.
- Increased demand for children (and other goods).
Interpretation

- Increase wife’s wage. Has two effects: increase income and increases opportunity cost of time.
- **As drawn:** Increased opportunity cost of time dominates income effect. Net effect is to reduce fertility.
Is Fertility too high?

High fertility does not imply that behavior is suboptimal.

At individual level, if freely chosen, then private welfare optimal. What about social level? Maybe not optimal:

- Incomplete information and uncertainty.
- Ex ante versus ex post perspectives.
- Externalities.
Information and Uncertainty

Risk aversion and uncertainty may lead a couple to more children than otherwise.

While households learn and *internalize* new (lower) mortality regime. Fertility too high.

May obtain a discrepancy between *ex ante* (before) beliefs and *ex post* (after) consequences. “Unwanted pregnancies” but no “unwanted births.”
Externalities

- Largest wedge between private and social value due to externalities.
- Childbearing may have consequences (costs) on others within family or upon other families.
- Externality need not be negative (e.g., grandparents), but negative externalities lead to excess fertility.

Example: Public subsidies that lower the direct cost of fertility (e.g., public education).
Example: Subsidized housing or health service not valued (by HH) at true marginal cost.
Marginal Private and Social Costs

- People may not recognize or internalize the costs imposed on others.
- Wedge between social and private cost.
- Efficiency requires that $MB = MC$ (full MC).
Figure 9–2: Private, Social Costs and Fertility

- Private costs
- Social costs
- Benefits

Number of Children

Costs and Benefits

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Extensions

Basic framework.

- Discrepancy may be between private and social benefits. Example, of over supply for high paying jobs.
- Externalities can occur within families. When there are family members in the household in addition to couple making fertility decisions.

In latter case, couple gets the full benefit of an additional child, and may pay only a fraction of the childbearing costs. E.g., grandparents provide (most) child care.
Social Norms

- Social norms: informal institutions that assure stability; social glue
- Strength of social norms likely inhibit adjustment to new environment.
- Norms may be supported by religious or cultural practice.
- In new environment, must coordinate on new norm. Takes time (if occurs at all).
- Example of Family Planning intervention. Pgms can serve as social legitimization. Tipping point as women adopt contraceptives.
- Changed by mass media.
Matlab — Bangladesh

- Most studied family planning intervention in 1977.
- Treatment and control villages.
- Within three years, fertility within treatment villages declined to 2/3 that of controls.
- Mechanism: people constrained pre-program? Perhaps. More likely, pgm signaled that lower desired fertility is a good thing; tolerated and indeed encouraged.
Some Negative Effects

Two primary sources:

- Malthusian view. Not bizarre, but not useful in developing countries. Fertility behavior largely unrelated (exogenous) to per capita income. In most developing and developed countries relationship between income per capita and fertility is endogenous but negative, and not positive as Malthus concluded.

- Population growth on Economic Development.
Population Growth to Economic Development

Can be brief, we covered this in our discussion of the Harrod–Domar and Solow models.

Key points:

- In Harrod–Domar population growth reduces the growth rate, as there is no substitution between labor and capita. More labor requires capital be spread more thinly.

- In Solow, population growth reduces the capital per capita and hence the level of income, but not the growth rate of output or income.

- Population and Savings. Faster population growth makes population younger, lower savings rate. Increase dependency ratio in families.
Pop Growth and Ec Dev . . .

- Population, inequality, and poverty. Faster population growth will exacerbate poverty and will increase inequality. For a number of reasons, the poor more likely to have more children.

- Population growth and environment. Over-population puts pressure on renewal resources (grazing, land, fish stocks, ground-water). More people do not “produce” more forests, fish, etc. Thus expect effects on renewal resources to be immediate.
Some Positive Effects

- Increased population density may give incentive to innovate. May increase growth rate of productivity.

- Population growth concomitant with increase in share of urban population. Take advantage of agglomeration economics that reduce cost. E.g., Cities attract skilled labor, large pool of skilled labor attract firms.

- Order statistics Large population has a larger pool of potential innovators, larger stock of ideas and innovations that can be put to use. China has 4 times the population of USA so 4 times the number of geniuses. Top 1% is 12–13m China versus 3–4m USA.