Development Economics

Development Microeconomics

(by) Bardhan and Udry

Chapter 3

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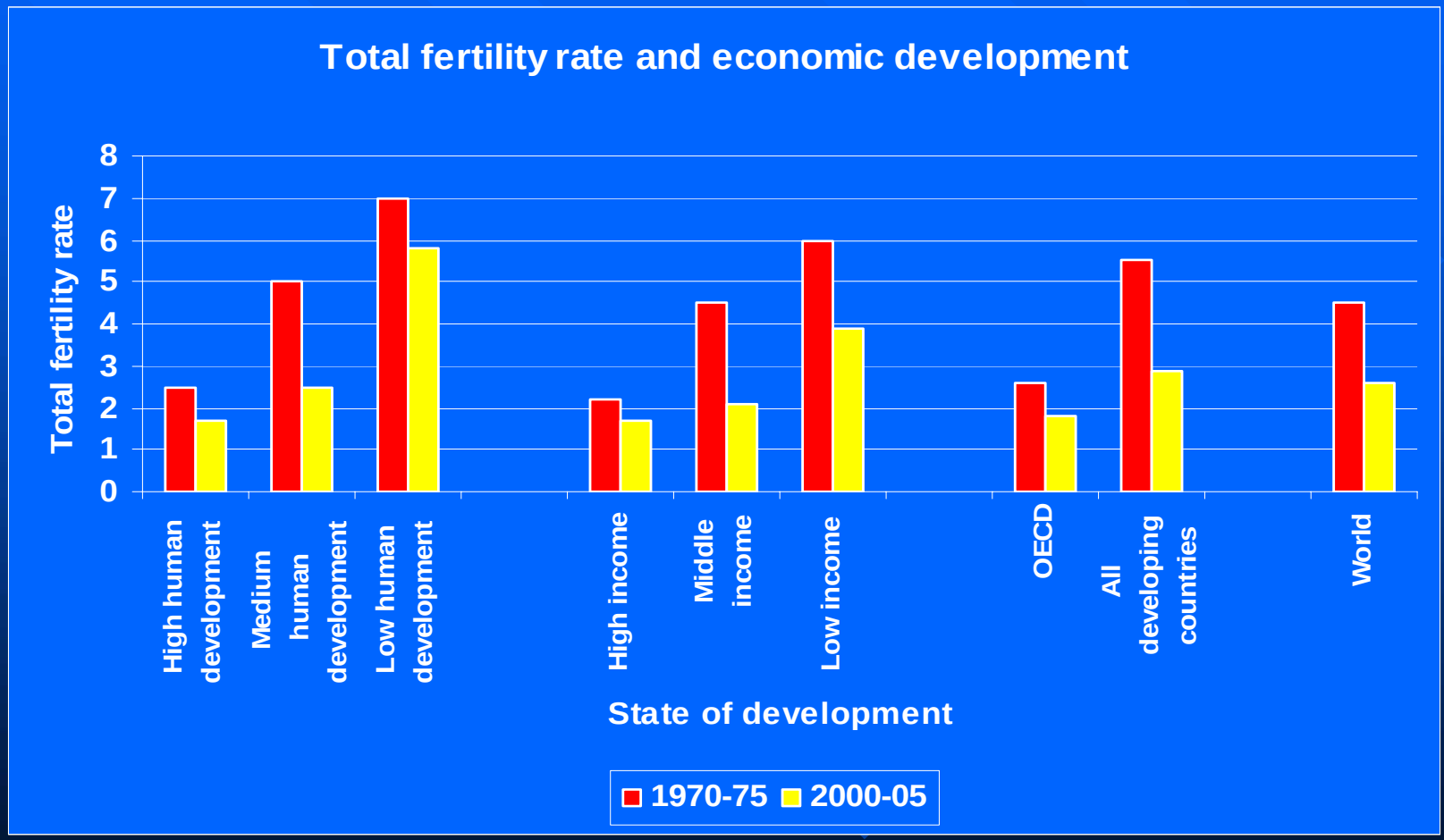
Development and fertility



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Population growth

- Driven by a rapid decline in mortality rates in developing countries, accompanied by a more modest drop in the fertility rates

- Has not resulted in a Malthusian crisis
  - Per capita income in most developing countries continue to rise, and mortality rates in these countries continue to decline

- Is population growth good or bad for income growth:
  - Factors of production exhibit diminishing returns → bad
  - Factors of production exhibit increasing returns → good

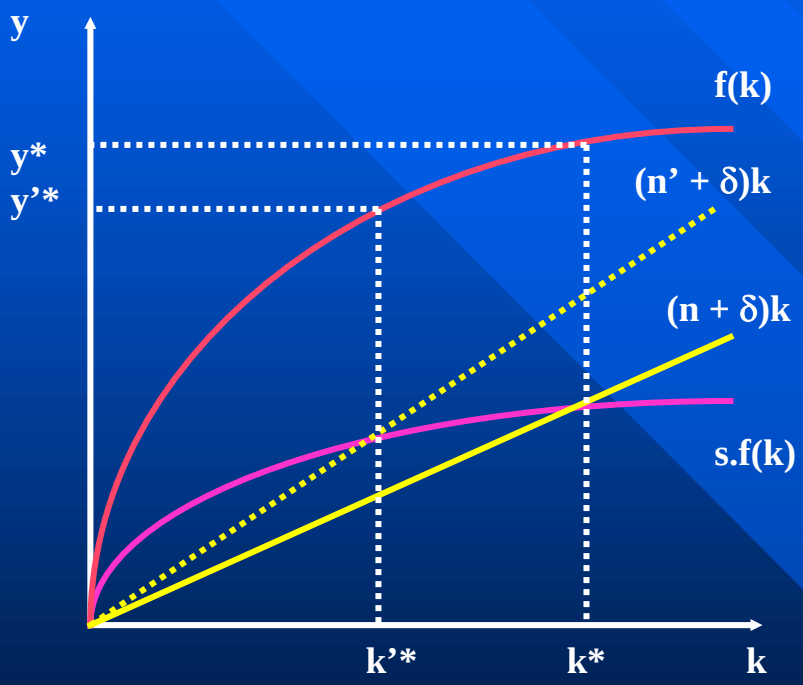
Solow growth model

- Output of a country is determined by the amount of capital available to each worker, and on technology
  - Production function: $Y = A.f(K, L)$
  - Constant returns to scale $\Rightarrow Y/L = A.f(K/L) \Rightarrow y = A.f(k)$

- Capital per labourer increases if there is an increase in the aggregate level of savings in the economy, and decreases with the depreciation rate and with addition to the labour force
  - $\Delta k = s.f(k) - (\delta + n)k$

- Steady state
  - Capital per worker (and hence output per worker) increases at a constant rate (assumed to be zero)
    - » $\Delta k = 0 \Rightarrow s.f(k) = (\delta + n)k$

Impact of population growth



- Production function: f(k)
- Accumulation of capital: s.f(k)
- Use of capital: (n + δ)k
- Steady state:
  - s.f(k) = (n + δ)k
- Population growth rate increases: n' > n
- Capital per worker and output per worker decline (k'* < k*; y'* < y*)

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Unitary household model of fertility [1]

- Parents' utility
  - $U = U(x, n, z; \alpha)$
    - » $x \equiv$ parents' consumption of goods and services
    - » $n \equiv$ number of children
    - » $z \equiv$ average quality of children
    - » $\alpha \equiv$ exogenous factors
- Human capital of children
  - $z = Z(c, t; \beta)/n$
    - » $c \equiv$ children's consumption of goods and services
    - » $t \equiv$ proportion of endowed time parents spend on children
    - » $\beta \equiv$ exogenous factors

Unitary household model of fertility [2]

- Assumption
  - Total endowment of time per set of parents is 1
- Optimisation problem of parents
  - Max $U(x, n, z; \alpha)$

    Sub to

    $z = Z(c, t; \beta)$

    $w(1 - t) = p_x x + p_c c$
- Trade off
  - Between greater consumption of goods and services, the number of children they raise, and the human capital (or quality) of these children

Unitary household model of fertility [3]

- Impact of economic growth
  - Increase in wage rate (w)
  - Increase in (relative) returns to skilled labour (α)
  - Greater provision of public goods like education (β)
- Implication for empirical research
  - Household income is endogenous to the choice of number (and quality) of children
- Shortcomings
  - Does not take into consideration impact of inter-gender differences in fertility preferences
  - Does not take into consideration impact of social norms

Women's fertility preference

- Women bear the entire physical risk of bearing children
  - In Africa, 1 in 100 births result in the death of the mother
- Women have very different preferences both with respect to number of children, and about the proportion of household resources spent on children
  - Additional income in the hands of mothers result in larger increases in child health and education than similar increase in the incomes of the fathers
- Women's observed fertility rates declines strongly with their level of educational attainment, and the quality of children of educated women is higher
  - Higher opportunity cost of time
  - Greater preference for education, and greater efficiency in passing on education to children
  - Greater bargaining power vis-à-vis others in the household

Impact of social norms [1]

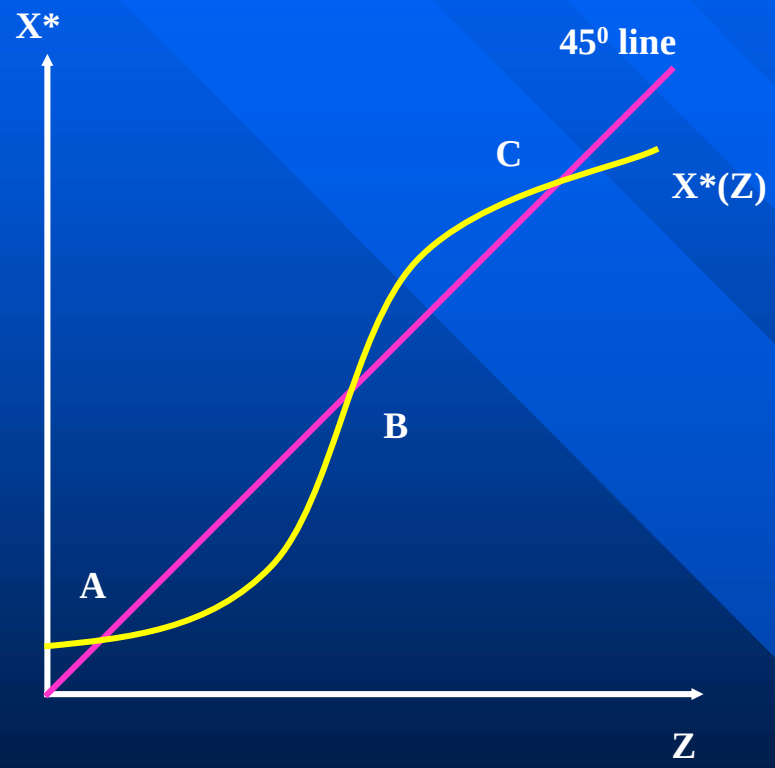
- Social norms
  - Household *i*'s utility from children would depend on the number of children of other households in the peer group, or the society in which they live
    - » There are externalities associated with having children
    - » Fertility decisions of household involve "strategic complementarities"

- Characterisation of strategic complementarity
  - Number of households = M
  - Vector of children of households ≡ $\mathbf{X} = (X_1, X_2, \ldots, X_M)$
  - Household utility function = $U_i(\mathbf{X})$
  - Externality $\Rightarrow \partial^2 U(.)/\partial X_i \partial X_j > 0$, for $i \neq j$

Impact of social norms [2]

- Optimisation problem for household *i*
  - Max $U_i(X)$
  - Utility of a household is subject to diminishing marginal utility with respect to the number of its own children.
- Definition
  - $X_{-i} \equiv (X_1, \ldots, X_{i-1}, X_{i+1}, \ldots, X_M)$
- Implication
  - For each X_{-i}, the household *i* will have an unique value for the optimal number of children
    - » $X^*(X_{-i})$ is household *i*'s reaction function
    - » $\partial X^*(.)/\partial X_j > 0$

Impact of social norms [3]



- Assumption
  - All households have identical preferences
- Symmetric Nash equilibrium
  - Each household will have the same number of children
  - $X_i^* = X_j^* = Z$
- Multiple equilibria
  - The actual outcome will depend on expectations which, in turn, are driven by cultural norms

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Other impact of social environment [1]

- Economy
  - Small families
  - Labour is relatively scarce
  - Adult wages are high
    - » Adults can afford to keep children outside the labour force
    - » Adults have a preference for small families

- Assumptions
  - Adults will send children to work only if adult income is very low; i.e., child leisure is a luxury good
  - Adult and child labour are substitutes for each other
  - Working children are net contributors to the economic benefit of the families

Other impact of social environment [2]

- Model characterisation
  - N families
  - Each family has 1 adult and *m* children
  - Adult consumes *c*, each child consumes βc, $\beta < 1$
  - Adult labour supply is inelastic; household chooses child labour $e \in \{0, 1\}$

- Household preferences
  - $(c + \delta, e) > (c, e)$
    - » Higher consumption is preferred to lower consumption
  - $(c + \delta, 1) > (c, 0)$ if $c < s$
  - $(c + \delta, 1) < (c, 0)$ if $c \geq s$
    - » Child labour is preferred only if the consumption of the household falls below some low threshold

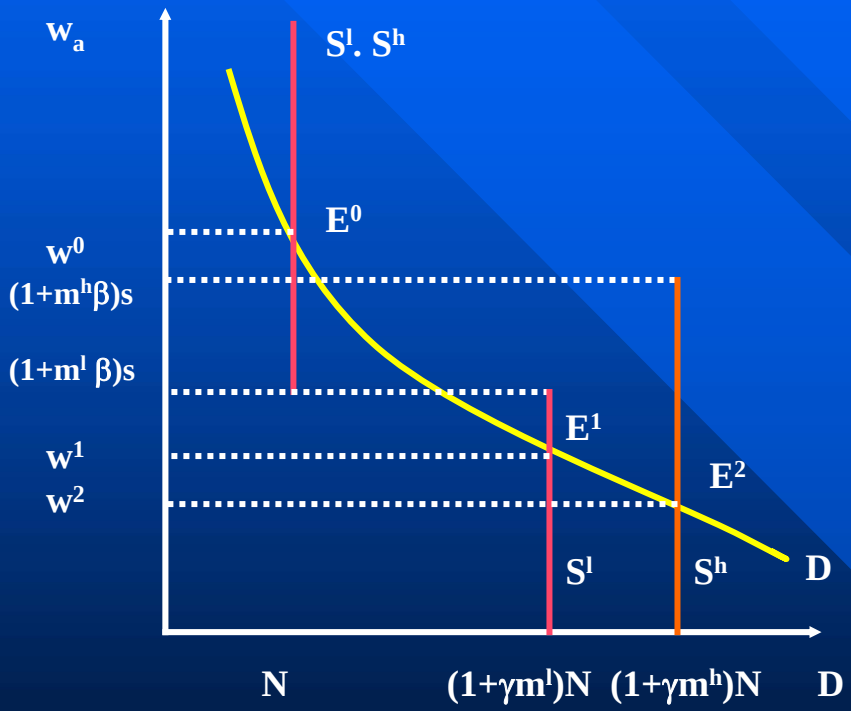
Other impact of social environment [3]

- Household budget constraint
  - $c + m.\beta.c = m.e.w_c + w_a$
- Children work only if adult consumption falls below a threshold *s*
  - If $w_a \geq (1 + m\beta)s$
    - » $c = w_a/(1 + m\beta)$
    - » $e = 0 \Rightarrow$ Adult labour supply = *N*; Child labour supply = *0*
  - If $w_a < (1 + m\beta)s$
    - » $c = (w_a + mw_c)/(1 + m\beta)$
    - » $e = 1 \Rightarrow$ Adult labour supply = *N*; Child labour supply = *mN*

Other impact of social environment [4]

- Production in Firm *i*
  - $f(A_i + \gamma C_i)$, $\gamma < 1$
    - » $A_i \equiv$ adult labour; $C_i \equiv$ child labour
    - » $1/\gamma$ children can do the same amount of work as an adult
- Firms are price taking
  - $\gamma w_a < w_c \Rightarrow$ adult labour is cheaper $\Rightarrow$ there is no demand for child labour
  - $\gamma w_a > w_c \Rightarrow$ child labour is cheaper $\Rightarrow$ there is no demand for adult labour
  - $\gamma w_a = w_c \Rightarrow$ the firm is indifferent between adult labour and child labour
- Market clearing condition
  - Demand for adult labour equals supply of adult labour
  - Demand for child labour equals supply of child labour

Other impact of social environment [5]



- Assumption
  - $\gamma w_a = w_c$
- Fertility level = m^l
- Labour supply
  - If $w_a \geq (1 + m^l\beta)s$, only adult labour
    - » Equilibrium at E^0
  - If $w_a < (1 + m^l\beta)s$, both adult and child labour
    - » Equilibrium at E^1
- Fertility level increases to m^h
  - Multiple equilibria at E^0 and E^2

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Other impact of social environment [6]

- Equilibrium E^0
  - Wage = w^0
  - $c(m^l) = w^0/(1 + m^l\beta) > w^0/(1 + m^h\beta) = c(m^h)$
  - Only low fertility equilibrium is possible

- Equilibrium E^1
  - Adult wage = w^1; Child's wage = γw^1
  - $c(m^l) = w^1(1 + m^l\gamma)/(1 + m^l\beta) < w^1(1 + m^h\gamma)/(1 + m^h\beta) = c(m^h)$
    - » A child is a net contributor to the family's welfare: $\gamma > \beta$
  - Low fertility equilibrium is not possible

- Equilibrium E^2
  - Adult wage = w^2; Child's wage = γw^2
  - $c(m^l) = w^1(1 + m^l\gamma)/(1 + m^l\beta) < w^2(1 + m^h\gamma)/(1 + m^h\beta) = c(m^h)$
  - Only high fertility equilibrium is possible