

THEMES IN DEVELOPMENT ECONOMICS

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2 MEASUREMENT

2.1 DEVELOPMENT

- Needed to compare countries and evaluate policy

2.1.1 *DEFINING ECONOMIC DEVELOPMENT*

- Todaro & Smith (2009) say “process of improving the quality of all human lives and capabilities”
 - Stronger than economic growth as needs to benefit *all* (i.e. reduce poverty; distribute)
 - (Sen, 1999) *Capabilities* need income and also social/political freedoms of opportunity
 - Weaker than human development as material benefit is viewed as a distinct prerequisite: universal features of economic development follow in some natural way from GNP/capita
- Expanding definition (narrow vs. broad) makes it harder to measure
- When a country is “developed” is a normative judgement. Thus see it as a process, not a transition

2.1.2 *PROBLEMS WITH GNP*

- Sen (1988) notes five fundamental limitations
 1. Does not consider distribution
 - Stiglitz et al. (2009): “if inequality increases enough relative to the increase in the average of per capita GDP, then most people can be worse off even though average income is increasing”
 2. Does not consider externality and non-marketability (e.g. public transport, healthcare)
 - Self-consumed income in LDCs is high: 2/3 of women’s and 1/4 of men’s work
 - Deaton (2000): “any program that eliminated government services and shared the money amongst the population would reduce the poverty count”
 3. Valuation of commodities in GNP reflects biases that markets may have: see PPP
 4. Only captures snap-shot of individuals, not wellbeing across time lifetime
 5. Income is a means to an end but do not know if people get to these ends: see Easterlin
- Moreover...
 - Bauer: “whilst the birth of a pig raises national income, the birth of a child reduced it”
 - Sri Lanka life expectancy of 74y corresponds to \$50,000+ but in real life <\$3,500 PPP
- And general data issues
 - Hard to collect: Population size can be distorted by up to 20% in LDCs
 - Underreporting of income via national accounts due to tax evasion e.g. self-report crop yield
- PPP works by constructing typical consumption basket (e.g. rice vs. wheat), obtaining value in local prices, then converting into dollars. Necessary for international comparison but...
 - 400-700 goods/services composition and price change a lot: When Chen & Ravallion (2000) updated PPP tables to find poverty rate in SS-Africa leaped 11%-points in 1993
 - Complexity can lead to human errors e.g. e.g. cotton shirt mistook for Brooks Brothers

2.1.3 *ALTERNATIVE MEASURES*

- Human Development Index, the “fraction of ultimate development”, is geometric mean of *normalized* GDP/capita, life expectancy at birth, and composite education
 - Does not consider ‘full-range’ e.g. political development (think China vs. India experience)
 - Weights are arbitrary and only relative rank matters, with cardinal values being irrelevant

- In 2010 switched from $\frac{x-\min}{\max-\min}$ to 'sensible' normalisation as if min improved all others lose
- Aitken & Weale (2018) propose "A Democratic Measure of Income Growth" to account for inequality aversion
- Nordhaus & Tobin (1972) propose MEW to account for leisure time, unpaid work and eco damages
- Dasgupta & Weales (1992) take Borda Rank of six variables (HDI + infant mortality + pol freedom + civil liberties). Rank correlation means insensitive precise transformations and mistakes

2.2 POVERTY LINE

- Binary state if individual or family to command sufficient resources to satisfy basic needs

2.2.1 \$1-A-DAY

- Constructed as follows:
 1. Construct basket that enables the minimum of "acceptable" economic participation. Vary according to differences in diets and general consumption
 2. Obtain value in local prices and converted to dollars using PPP so can compare internationally (e.g. the price of sticky rice in Northern Thailand versus the United States)
 3. Survey to see if households can afford basket
- Simple and allows for global comparisons. But...
 - PPP is problematic (see Problems with GNP)
 - Poverty measured from survey data but growth from National accounts
 - General data issues (see Problems with GNP)

2.2.2 CONSUMPTION

- Ravallion (1998) defines as "nutritional requirements for good health" as 2,000 calories. Plot food energy intake against consumption expenditure to work out necessary income
 - Benefit of comparing internationally without PPP
 - But... arbitrarily different for different tastes/activity/relative-prices/migration. E.g. urban spend less on food (Engel's Law), buy more expensive calories and consume fewer of them.

2.2.3 SELF-ASSESSMENT

- Supported by Ravallion (1998) for simplicity and 'general' accuracy once remove obvious outliers
- But... does not control for expectations adaptation e.g. Easterlin (1995) happiness did not increase among Japanese consumers 1958-87 in spite of fivefold income/capita increase

2.3 POVERTY

2.3.1 POVERTY LINE IS NOT A SWF

- 'Good' SWF requires following conditions
 - Pareto condition: increasing in its arguments
 - Symmetric in treatment of individuals
 - Quasi-concave: more equal society preferred to less ceteris paribus
 - Dalton principles: weighted average of two equally desirable allocations is superior
- Does not satisfy Pareto condition since marginal benefits of non-poor do not raise welfare

2.3.2 POVERTY MEASURES

- Head Count Ratio (HCR): Ratio of people that fall below it to the total population

- $HCR = \frac{1}{N} \sum I(y_i \leq p)$ where $I = 1$ if $y_i \leq p$ and 0 otherwise.
 - But... does not account for intensity of poverty; optimize by helping 'just' poor not worst off
- Weighted HCR
 - $WHCR = \frac{\sum p - y_i}{n\bar{y}}$.
 - But... favours more unequal societies as it does not account for inequality amongst the poor
- Income Gap Ratio (IGR): Acuteness of poverty relative to total poverty gap
 - $IGR = \frac{\sum p - y_i}{pHC}$
 - But... only captures "per capita intensity" not fraction of poor; lack data in practice
- Average Poverty Gap (APG): Total poverty gap divided by the total population
 - $APG = \frac{\sum p - y_i}{N}$
 - But... only captures "per capita intensity" not fraction of poor; lack data in practice
- The more
- Morduch (1994) says all fail to distinguish between chronic and temporary poverty (e.g. harvests)

3 GROWTH

- Robert Lucas: "once one starts to think about them, it is hard to think about anything else"

3.1 DOES IT MATTER?

3.1.1 GROWTH AND HAPPINESS

- "Easterlin Paradox" (1974) states happiness and growth aren't linked across countries, only within, and only up to a threshold. This has been refuted:
 - Stevenson & Wolfers (2008) criticise sample (US and Japan) and changing questions
 - World Happiness Report (2017) finds income and happiness correlate cross-country
 - Ortiz-Ospina & Roser (2013) find income and happiness correlate within and cross-time
 - Dasgupta & Weale (1992) find strong correlation [0.84] to Borda Index (sum of ranks)

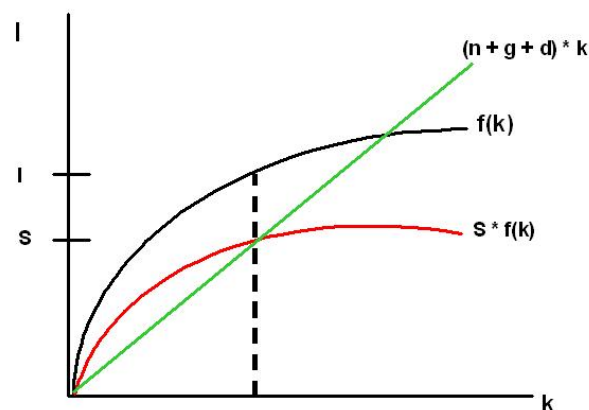
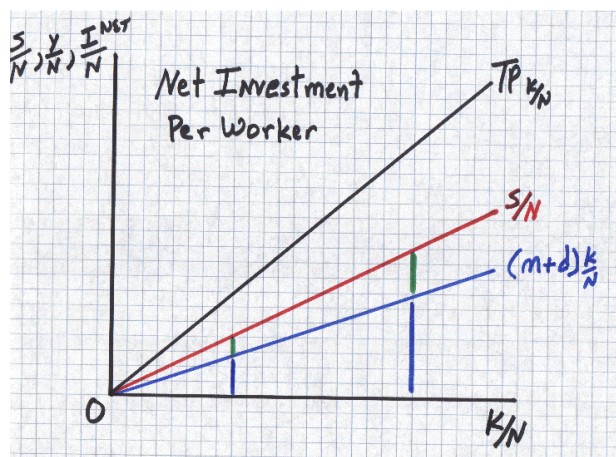
3.1.2 GROWTH AND POVERTY

- East-Asia/China seen huge declines but SS-Africa stagnant; relative poverty fallen but absolute risen
- Besley and Burgess (2003): Investigate elasticity of poverty with respect to income per capita:
 - Need 91% total growth to halve world poverty, 1990-2015
 - η is 0.76 overall but 0.49 SS-Africa, yet this is area of interest (low growth, high poverty)
 - But... comparability across, coverage within, do not control for inequality/population

3.2 MODELS OF GROWTH

3.2.1 HARROD-DOMAR MODEL

- Constant marginal returns to capital $y = Ak$. Solving, $g \approx sA - n - \delta$ so $g \approx sA - n - \delta$
- If $sA > n + \delta$ long-run per capita growth is feasible.
- High s and low n are critical! Indeed, first Soviet Five Year Plan raised savings 14%-points
- There is little supporting evidence. Solow (1956) notes we do not observe CMR and economies do not grow at a constant rate once we control for savings and population growth



3.2.2 SOLOW-SWAN MODEL

- Capital-output ratio is no longer exogenously given but rises with per capita stock. Diminishing marginal returns $y = Ak^\alpha$ where $\alpha < 1$. Solving, $k_{t+1} - k_t \approx sy_t - (\delta + n + \pi)k_t$ so $g = \pi$
- s and n can affect level of steady-state (i.e. short-run/transition) but long-run growth depends entirely on technological progress
- Social planner is more interested in R&D than savings and in SR does not need to do anything as it will always transition to steady state
- Mankiw, Romer and Weil (1992): 59% of global variation in income growth can be explained by s and n using the SS model (i.e. conditional convergence. But coefficients of regression are too large

3.2.3 LIMITATIONS OF BOTH

- Savings: IRL are S-shaped (see Inequality Channels)
- Population: IRL follows U-shape in line with "demographic transition"
- Technology: exogenously given as "manna from heaven" even though it is so important. Criticized by New Growth Theory
- Also:
 - Closed economy (where $S = I$) and no government
 - Capital stock depreciates according to $K_{t+1} = (1 - \delta)K_t + I_t$
 - Both assume CRTS

4 INEQUALITY

4.1 MEASURING

- There are many potential measures:
 - Kuznets Ratio: Share of income of the richest $x\%$ to the poorest $y\%$
 - Lorenz Curve: % of a country's income received by poorest $x\%$ of households against x
 - If an entire curve lies below another we expect it to have greater inequality. If they cross we require a normative judgement
 - Gini Coefficient: Ratio of the area of inequality to the total area under the line of equality
 - Sums pairwise comparisons of two-person inequalities $G = \frac{1}{2n^2\mu} \sum \sum n_j n_k |y_j - y_k|$.
- Weisskoff (1970) notes that ranking Puerto Rico, Argentina and Mexico during the 1950s depends entirely on our measure of inequality

4.2 INEQUALITY AND GROWTH

- Might care about inequality at the functional level or intrinsically

4.2.1 INEQUALITY IS A NATURAL BY-PRODUCT

- Kuznets (1955): Proposes inverted u-hypothesis due to dual growth using US example:
 - Early development driven by physical capital; many investment opportunities and influx of cheap rural labour holds down worker wages.
 - Mature development driven by human capital; democratization and the rise of the welfare state see benefits trickle down
- Some empirical support:
 - Kuznets (1963): Cross-country of 18 found higher income shares of rich in LDCs than MDCs
 - Ahluwalia (1976): Finds same with cross-country of 60 using quintiles and socialist dummy

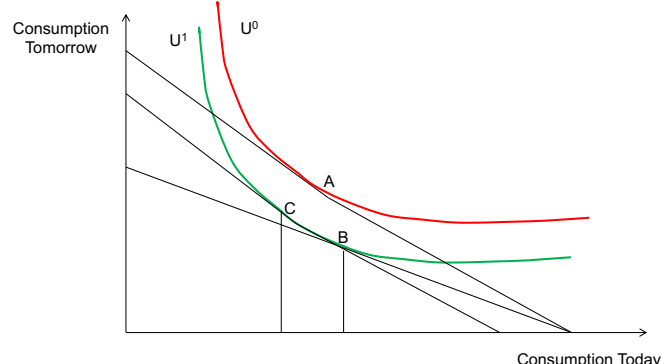
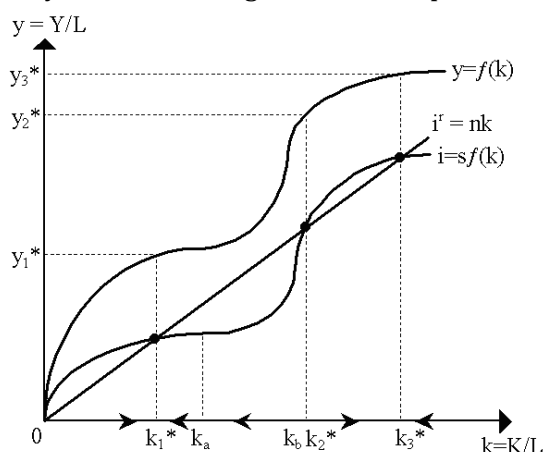
4.2.2 INEQUALITY HARMS GROWTH

- But has since been refuted by national characteristics:
 - Paukert (1973): Cross-country of 56 find trend only when we aggregate income into categories. Variation within these is too large to be “iron law”
 - Income explains less than half of the observed variations in inequality across countries
 - Deininger & Squire (1998): If control for Latin America Kuznets’s effect only holds for 9/58. This highlights importance of national characteristics.
 - Fields (1980): Artefact of how we measure inequality as people move from agriculture (payment in kind) to industry (wage labour)
- Instead inequality appears bad for growth:
 - Stiglitz (1996): Contradicted by East Asian economic development enabled by land reform (increasing rural productivity) and universal education (“intellectual infrastructure”)
 - Quah (1993): No evidence that poor countries are doomed to eternal poverty but low incomes are sticky, with middle income countries having greatest mobility

4.3 INEQUALITY CHANNELS

4.3.1 SAVINGS

- Three components generates s-shaped curve
 - Subsistence consumption: Needs of the present prevent savings
 - Aspirational savings: Desire to imitate and attain high consumption levels
 - Conspicuous consumption: Rich's consumption is pushed to high levels
- Hence in poor country redistribution may lower savings rate, but in medium income countries it may increase savings rate. Build up middle class then redistribute!



4.3.2 POLITICS

- Hirshman & Rothschild (1973): "Tunnel Effect" where tolerance for inequality has limit and welfare depends on present and expected future contentment
 - If peers improve then this first brighter prospect but if persists results in violence (e.g. Tlatelolco massacre in Mexico)
- Alesina & Rodrik (1994): Distributive struggles harmful to growth are more likely to take place with high inequality (e.g. income tax vs. lump sum; tariffs; direct intervention)
 - Look at income/capita growth 1960-85. Increase in land Gini coefficient by 1-s.d. decreases growth 0.8%-points per year; correlation is 0.35
 - Robust for democracy dummy. Pressure of redistribution is felt everywhere! But...
- Persson & Tabellini (1994): Income equality at start has positive effect on growth but only democracies
 - Increase top quintile income share by 1-s.d. lowers growth by 0.5%-points and explains 1/5 of variance in growth rate across countries and time
 - 0.401 for democracies and -0.309 for nondemocracies; a structural difference

4.3.3 DEMAND COMPOSITION

- De Janvry & Sadoulet (1983) and Baland & Ray (1991):
 - Personal distribution of income influences demand composition (e.g. tech vs food)
 - This influences functional distribution of income (capital, land labour of different skills)
 - This influences new personal distribution of income. Inequality begets inequality!

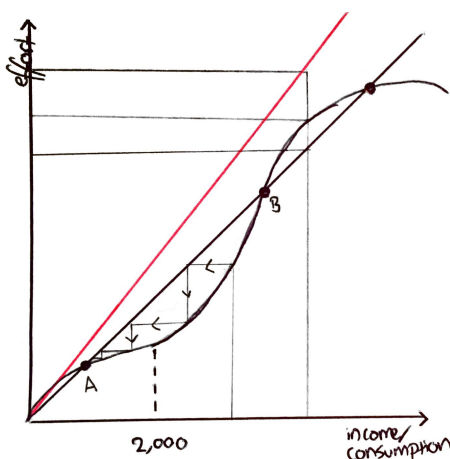
4.3.4 HUMAN CAPITAL

- Poor are unable to be entrepreneurs because do not have collateral to access credit market
 - Lourt (1981): Constrains early childhood interments in nutrition and preschool education
 - Okun (1975): One of the most serious inefficiencies of the American economy today

5 POVERTY TRAPS

- Path dependence where multiple equilibria lead to coordination failures in vicious cycle

5.1 NUTRITIONAL



5.1.1 MODEL

- Mazumdar (1958) assumes piece rate wage and s-shaped capacity Curve (CC)
 - After 2,000 cal switch from subsistence to increasing work capacity (i.e. concave to convex)
 - After certain point cal effect diminishes (concave) and contributes to obesity (decreasing)

- [Primary] Consider feasibility set:
 - Piece rate shows effort required to earn income; contra curve shows effort that is feasible
 - To earn I^A need E_i^A . Feasible under $i = \text{black}$ ($E_{\max}^A > E_b^A$) but not $i = \text{red}$ ($E_{\max}^A < E_r^A$)
 - There may not exist a “good” equilibrium
 - Dasgupta and Ray (1986): should keep labour markets tight and thus piece rate line flat
- [Secondary] Consider transitional dynamics:
 - When curve is convex poor nutrition leads to lower capacity, leads to lower nutrition etc.
 - Poverty can be self-reinforcing and households stuck at A
 - A “good” equilibrium may not be attainable
 - Government should intervene through “great push” (i.e. bring to B) and households should have “lifeboat ethic” (Hardin, 1974), which is worrying

5.1.2 EVIDENCE

- For (indirect):
 - A study of Philippines workers noted that people ate 25% more on piece rate days (as opposed to flat rate)
 - Kochar (1996): medical expenditure on elderly vary systematically with measures of their earnings ability and the presence of children (who can work)
 - Garg and Morduch (1997): children aged 12-23 with three siblings are over 50% more likely to attend middle or secondary school when all three of siblings are sisters (vs. brothers)
- Against (direct):
 - Banerjee and Duflo (2008): poor households in Udaipur could spend up to 30% more on food if it completely cut expenditures on alcohol, tobacco, and festivals
 - Deaton and Subramanian (1996): In Maharashtra only 35% of new income was spent on acquiring new calories, a figure far too low to suggest there is a limiting poverty trap.
 - Strauss (1986): capacity curve is an entirely concave rather than S shape: +10% calories amongst self-employed farmers in Sierra Leone resulted in <+4% productivity. No cycles!
 - Ray (1998) even if s-shaped would expect to observe (i) poor people borrowing out of vicious circle or (ii) employers offering long-run contracts
- Barker (1990) proposed a poverty trap based on how conditions in uterus and early childhood have long-term impact on a people’s life chances and thus can result in a generational poverty trap.

5.2 PSYCHOLOGY TRAP

- Poverty causes stress, hence risk-averse decision making
- Haushofer and Fehr (2014) argue poverty causes decision makers to be more risk averse and have higher discounting of future utility. This behaviour re-enforces their poverty
 - Stress is “reaction to environmental demands exceeding its regulatory capacity”

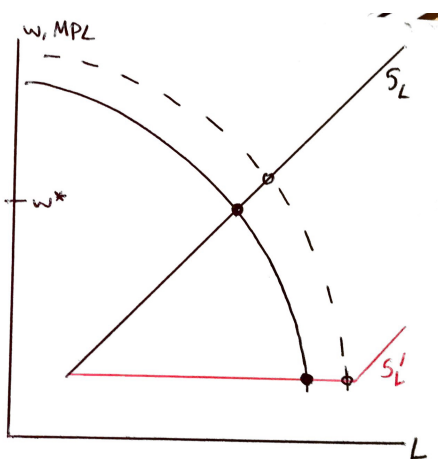
5.2.1 DISCOUNT RATE

- Much evidence that poor have higher discount rates: Lawrance (1991) in US, Yusuf et al (2008) in Ethiopia and Pender (1996) South India
- Tanaka et al (2010) establishes causality by using rainfall as IV for Vietnamese farmers
- Schunk and Fehr (2013) establish causality using lab experiment where negative income shock causes more present-bias but positive shock has no effect
- Banerjee (2003): Believes not due to inherent taste but because negative income shocks are common (e.g. crop failures) and poor are vulnerable due to limited access to credit markets

5.2.2 STRESS

- World Health Report (2003) find depression and anxiety 1.5-2x as much amongst poorest than richest quintiles in rich countries
- Lund et al (2010) shows 79% studies in literature review show negative association between mental health and poverty in low/middle income countries
- Haushofer and Shapiro (2013): Use RCT of unconditional cash transfers in Kenya to show it improves many mental health symptoms but stress only responsive to \$1500 not \$400
- Chemin et al (2013) use random weather shocks to find Kenyan farmers have higher cortisol levels after drought, being worst for farmers with no other source of income
- Main et al (2013) found poor perform worse on tasks that measure IQ and self-control after asked to think about their farmers; likewise farmers after asked about harvest

6 LEWIS MODEL



6.1 ASSUMPTIONS

- Outlined by Lewis (1954) and formalised by Fei & Ranis (1964). Note agriculture-industry framework is only one way we can divide economy into dual components
- Two sectors (large T , small M) with two critical asymmetries:
 - Production Asymmetry: T requires Labour and Land; M requires Labour and Kapital
 - There is no migration of Kapital or Land but Labour can move freely
 - Land is fixed in quantity quasi-Leontieff production function, creating surplus labour
 - Organisational Asymmetry: M maximizes profit so $w_M = MPL_M$. T does not so $w_T > MPL_T \approx 0$, creating market imperfections. Many explanations for this:
 - Lewis 'familial altruism' or Georgescu-Roegen max family output: pay $APL_T = \frac{\text{prod.}}{\text{pop.}}$ so must assume that, as labour migrates and $\uparrow APL_T$, landlords extract any gains
 - Customs e.g. "grand seigneur may have to keep a whole army of retainers"

6.2 DYNAMICS

- Normally have convergence of wages in both sectors at w^* . But here asymmetries prevent labour market from clearing. Flat S_L since surplus labour means outside option (i.e. w_T) is low and fixed.
- Surplus labour exists move from T to M without affecting Q_T or w_T . Hence Lewis Model sees accelerated growth in virtuous cycle [$\uparrow \pi$, $\uparrow K$, $\uparrow MPL$, $\uparrow L^D$, ... repeat]. This is a "very cheap" lunch

- Sen (1966) notes can also hold for $MPL \neq 0$ if remaining labourers in T adjust labour input once some labourers are removed so that output does not fall (e.g. from part- to full-time)
- Once surplus labour has been absorbed outside option becomes competitive and we return to normal world where $w^* = w_T = w_M$

6.3 CRITICISMS

- Schultz (1955): Influenza pandemic in India 1918/19 killed 8% of agricultural population but area sown did decline by 4%
 - But... Sen (1967): Not natural experiment since killed entire households. If labour removal not followed by land redistribution we will have land left uncultivated
- Kao et al (1964): Survey literature to find “there is little reliable empirical evidence” of more than token 5% disguised unemployment in underdeveloped countries.
- Tackling assumptions:
 - Trade Unions frequently prevent competitive wages in M
 - Successful LDCs are not distinguished by segmented labour markets in rural surplus labour
 - Peasants respond to market mechanism e.g. cared about productivity in Green Revolution

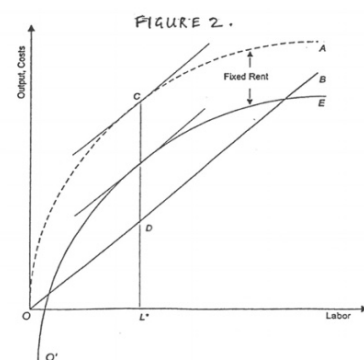
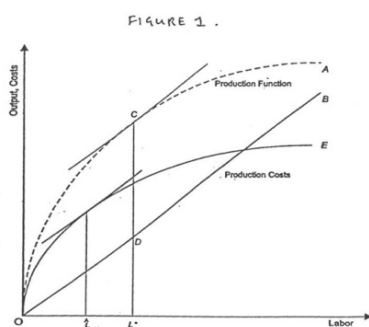
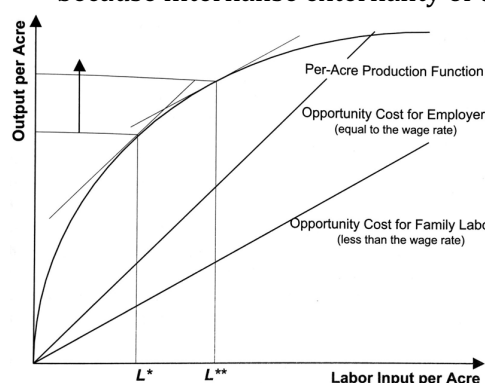
7 LAND REFORM

- Land reform is defined as “transfer of ownership or control of land to those who actually work it”
- Otsuka et al. (1992) cross-country data show 'land' Gini is incredibly high: 0.8-0.9 in Latin America
- But... consider Green Revolution shows tech, not distribution, has major effect

7.1 SMALL VERSUS BIG FARMS

7.1.1 THEORY

- Small peasant farms can hire family labour at a sub-wage rate and have lower opportunity cost because internalise externality of unemployment. Hence optimise by hiring more labour per acre



- Also may have lower costs because better monitoring and easier to compensate family for wage and risk than through contracts
- But... Large farms may have IRTS due to being better suited for capital-intensive methods of mechanization, which have fixed costs
 - But... small farms could pool together to afford these factors (e.g. shared renting of tractor)

7.1.2 EVIDENCE

- Sen (1981): West Bengal shows clear and robust negative relationship between productivity and size of owner-cultivated farms.
- Berry and Cline (1979) Small farms in northern Brazil are five times as productive as largest
 - But... could be because smaller farms are simply able to be on more fertile land

7.2 LAND CONTRACTS

- Three possible cases described by $R = \alpha Y + F$, all of which have some associated inefficiency
 - Fixed-wage ($F < 0, \alpha = 0$): Tenant gets fixed payment and landlord depends on output
 - Sharecropping ($F = 0, \alpha \in [0,1]$): Both depends on output and agree on set fraction
 - Fixed-rent ($F > 0, \alpha = 0$): Landlord gets a fixed payment and tenant depends on output

7.2.1 PROBLEMS WITH SHARECROPPING

- Sharecropping and Fixed-wage fail to fulfil Marshallian efficiency in Principal-Agent framework:
 - If tenant does not receive the full share of output their effective return is lower than social
 - Hence if not monitored they will under-supply effort, resulting in lower output
 - Fixed rent avoids this since does not change incentives at margins but shifts down curve
- Empirical evidence:
 - Banerjee & Iyer (2005): Compare Indian districts that were placed under different land revenue systems by British colonial rulers due to historical accidents
 - Wheat yield is 23% higher and infant mortality 40% lower in non-landlord districts.
 - Remains significant when only looking at bordering districts
 - Independence saw much convergence as landlord-dominated enacted more reforms
 - Shaban (1987) uses ICRISAT data to show that output is 33% higher for land plots owned by individuals as opposed to sharecrops.
 - Sen (1981) notes that for every size class, productivity is lower on sharecropped land than fixed-rent by ~50%.

7.2.2 PROBLEMS WITH FIXED-RENT

- Fixed-rent is suboptimal with risk averse tenants (more labour input but less utility output). Intuitively, tenants are less well-equipped to deal with variability of harvest than landlords
 - Consider two possible outcomes: Good with probability p and Bad with $1 - p$ where $G > B$
 - Tenant get in fixed rent $\alpha Y - R$ and in sharecropping: $p(1 - s)G + (1 - p)(1 - s)B$
 - Set $s = \frac{R}{pG + (1-p)B}$ so both contracts give same expected value to make them comparable
 - Sharecropping has relatively lower return in good state and higher in bad state:
 - Good state: $(1 - s)G - (G - R) = R - sG = R - \frac{GR}{pG + (1-p)B} < 0$
 - Bad state: $(1 - s)B - (B - R) = R - sB = R - \frac{BR}{pG + (1-p)B} > 0$
 - Since tenant is risk-averse and sharecropping has a narrower spread of returns, we can say that sharecropping second-order stochastically dominates fixed-rent
- Basu (1992): With limited liability, poor tenants can default in bad states. Under fixed-rent tenants are hence incentivised to over-invest in risky methods since this has unlimited upside and limited downside, possibly even if they are risk averse.
- Eswaran & Kotwal (1985): Landlords also need apply effort (e.g. irrigating land). Thus have double incentives problem and fixed-rent will be Marshallian inefficient as per above

7.3 LAND-REFORM EXAMPLES

- Rodrik (1995), who argued that early redistributions of land, leading to relatively egalitarian access, was an important precondition for high growth in the East Asian context.
- Besley & Burges (2000) consider the effects of legislation in India between 1958-92, which "change[d] the terms of land contracts rather than actually redistributing land"
 - E.g. limit size of estates and giving tenants more responsibility over land improvements
 - Accounted for 10% of overall reduction in poverty in India
 - Only had a minor effect on equity more generally.
- Zimbabwe 1990s resulted in violence, foreign embargoes, and 33% reduction in agricultural output between 2000-05, especially amongst the cash-crops that had been grown by white landowners
- Powelson & Stock (1987): Land reform in Mexico suffered because unpredictable expropriation and ill-defined property rights. Output per capita fell 13% between 1966-75.

8 HUMAN CAPITAL

- Defined as “capacity of human beings as productive agents to promote increases in income through the acquisition of skills and the accumulation of knowledge”
 - Lucas (1993) sees HK as main engine of growth; Romer (1990) stresses idea generation
 - Education and health are basic to development and valuable in their own right

8.1 EDUCATION

- Duflo (2000): Indonesian policy experiment shows +0.12y education raises wage by 3.8%
- But... Benhabib & Spiegel (1992): find little relationship HK and income 1965-85. Quality matters!
 - Banerjee et al (2007): RCT shows need “teaching at the right level”
 - Bedi & Edward (2003): In Honduras high quality municipalities have higher RoR

8.2 HEALTH

- See Poverty Trap above
- Has many benefits:
 - Bleakley (2010): A malaria-free child in Latin America earns 50% more throughout life
 - World Bank (1993): In Nepal nutritionally stunted are <1/5 as likely to attend school
- Can be measured through height, with poverty causing stunting and retarding growth:
 - Steckel (1995) says height measures consumption with genes effect cancelling out
 - Malcolm (1974) looks at Europe, New Guinea, and Mexico; non-linear at individual level
 - Need to be cautious e.g. controlling infectious diseases not picked up by stature
- Can be measured through biological standard of living index
 - $j \left(i_{bsi}^j = \sum_i Q_{ij}(x_1^j, x_2^j, \dots, x_k^j) \right)$
 - Where i =year of life and Q is function of various aspects of the biological quality of life

9 INTRA-HOUSEHOLD ALLOCATION

9.1 MODEL

- Household is not a single unit that pools resources and maximizes welfare of members, even if there is ‘familial altruism’. Instead parents have different tastes and bargain
- $U_i(q^i, z)$ a.s.t. $p^i q = \theta^w(p, p^z, y)$ where i is parent; q private good; z public good; y effective income; θ^i sharing rule. Assume allocation is Pareto efficient
- Parents live for two period; 1st earn and choose between consuming or invest in educating children; 2nd live from transfer from children
- Returns are concave function and higher for than girls at all levels $R(E_m) > R(E_f)$. Could be due to discrimination or interruption of careers (i.e. childbirth)

9.2 EVIDENCE

- Girls receive less investment:
 - PROBE Report (1999): parents think education is important (90%+) but less so for girls (28% for girls past secondary)
 - Decron et al (2000): Ethiopia nutrition of women and children fluctuates more across seasons than men
 - Aurino (2016): Girls 12-15yo are shorter (-6.5cm), work jobs as much boys plus 1.5h of domestic tasks 1.5h; spend 1h less studying

- But... Deaton (1994): Analysis of expenditure patterns (e.g. tobacco) consistently fail to show strong gender effects even they are known to exist
- Mothers have positive externality:
 - Hoddinott & Haddad (1994) In Cote d'Ivoire higher mother's share of income significantly raises budget share of food
 - Thomas (1991): In Brazil increase in mother's unearned income has stronger impact on child health than fathers
 - Two explanations for why education has stronger impact on child human capital:
 - Mothers increase bargaining power and have preference for this
 - Increases productivity and hence expands budget

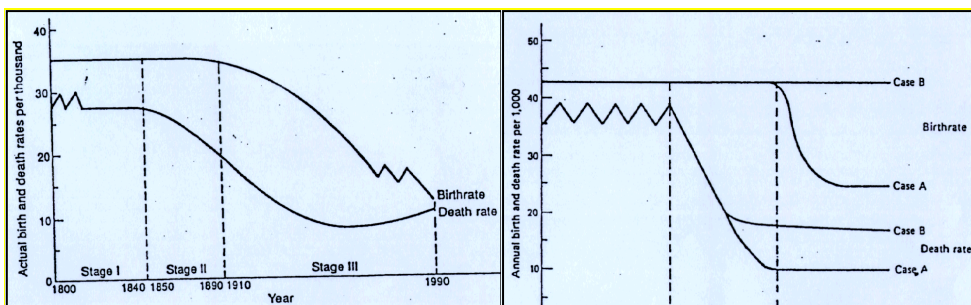
10 FERTILITY

10.1 POPULATION EFFECTS

- Positive externalities:
 - Smith/North: increased density => democracy => property rights (Coase)
 - Boserup: increased density enables projects to become profitable
 - Kremer: "genius effect" (more young Einstein) but... won't be of use if poor
 - Also: Lewis Dualistic Growth; Say's Law (create demand)
- Negative externalities:
 - Environmental damages: Tragedy of Commons easier to overcome if smaller (Olson)
 - Fixed resources: see Solow model
 - Hajnal 1965 emphasize EMP small nuclear families. De Moor & Van Zanden (2010) say:
 - Fewer children meant could invest more in each
 - Also: Have to save for retirement; more flexible labour force; Craft guilds and "capitalist spirit" motivated by want to start a household

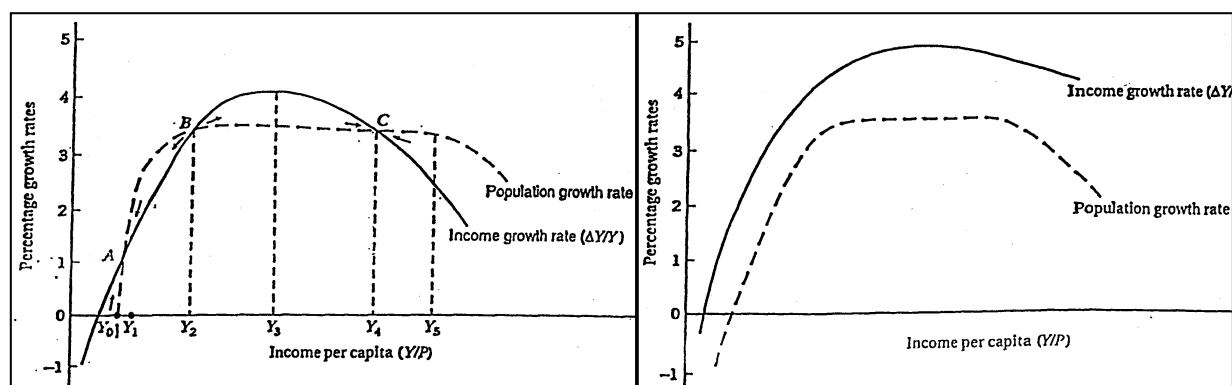
10.2 DEMOGRAPHIC TRANSITION THEORY

- Note inverse relationship between income and fertility e.g. SS-Africa (4-6) vs. East Asia (2-3)
 - But... in time series output and population explosion are linked
- Purely descriptive: Stage I has high BR and DR; Stage II 'modernization' sees DR fall; Stage III 'further modernization' sees BR fall
 - Difference between Western European and LDC experience
 - Stage I LDC have higher BR and DR
 - Stage II LDC DR fell much faster (grew 2.5%pa not 1.5%)
 - Stage III LDC BR has not fallen because persistent poverty
- Mortality Trends: ½ u5 deaths due to HIV/AIDS epidemic; 19/20 worst performing countries are from Africa; child mortality higher amongst males, except China, India, Nepal and Pakistan



10.3 MALTHUS

- Population grows at geometric rate but food supply at arithmetic. Hence "very striking consequence" that /capita incomes falls to subsistence unless we enact 'moral restraint'
- Assumes
 - Diminishing returns to scale in production: but... if anything IRTS in last 300y
 - Positive income effect on fertility: but... DR doesn't respond much to income
 - Reproductive behaviour homogenous across economy
- In modern interpretation:
 - Income initially raises fertility, hit biological max, then has negative effect
 - A and C are stable; B is not
 - Hence need big push to get to B by shifting P (preventive checks) or Y curve (modernize)



10.4 SUPPLY VS. DEMAND

- Robey et al (1993): Differences in contraception prevalence explain 90% of variation in fertility
- Becker (1991): "improvements in birth control methods are mainly an induced response to other decreases in the demand for children"
- Pritchett (1994): 90% differences due to differences in desired fertility, contraceptive at most 2%
 - Fraction of women with 4 children who want more 3% in Cameroon but 89% Colombia
 - In Kenya 1989 fertility is 6.4 but 91% knew of a modern contraception method
 - A 100% pill price increase would only reduce use 2%
 - For poorest households (\$1,500) a child costs \$5,000: cannot leave it up to chance
 - To account for ex-post rationalization (women don't admit they have unwanted children) also use non-retrospective (i.e. future) survey
- Schultz (1993): Making oral contraception free would decrease fertility by less than 5%
- But... still worth considering family planning e.g. Media needed for coordinated change: Indonesia family planning through Information Education Communication

11 HOUSEHOLD DEMAND

11.1 SET UP

- Children are treated as a normal consumption good, which households optimise for
- $U(N, Q, Z)$: the number of children N , quality per child Q , and catch all Z
- $C = NQ = f(t_C, x_C)$: 'child services' C are product NQ , requiring parents time and goods
- $I = NQ\pi_C + NP_N + QP_Q + Z\pi_Z$: Budget constraint consisting of time, money, and (shadow) prices
- Thus optimise $\max U(N, Q, Z) \text{ s.t. } I = NQ\pi_C + NP_N + QP_Q + Z\pi_Z$
 - Get $N^*(I, \pi_C, \pi_Z, P_N, P_Q)$, $Q^*(I, \pi_C, \pi_Z, P_N, P_Q)$, $Z^*(I, \pi_C, \pi_Z, P_N, P_Q)$

11.2 RESULTS

11.2.1 EFFECTS

- Income Effect: Child services are normal good so $\frac{dC}{dI} > 0$
- Price effect: If rise in I is due to wage then opportunity cost (i.e. π_C) of children raising increases
 - Raising children takes up 1/3 of females adult lives in sub-Saharan Africa
- Becker and Barro (1988) argue these two effects explain US fertility trends in the 20th Century
 - Great Depression $\downarrow I$ but not female wages as not in workforce (i.e. income effect) Hence $\downarrow C$
 - WWII: \uparrow female employment (i.e. price effect). Hence $\downarrow C$
 - Baby-boom was just post-war correction of these

11.2.2 QUANTITY-QUALITY TRADE-OFF

- Two causes
 - Different income elasticities for N^* and Q^* ; most economist's believe Q^* more responsive like other consumer goods (e.g. cars). Hence rise in average quality of children with income
 - Becker and Lewis (1973): Direct interaction effect as $C = NQ$. If households treat children same, need to improve all their quality: relative cost of Q depends on N so $\downarrow P_Q$ causes $\uparrow N^*$
- Kanbargi & Kulkarni (1986): find time spent by children in school (proxy for Q) has a significant negative effect on family size in South India N
- But... Parents 'bet' on one child (see son-preference):
 - Barrera et al (2008): Families that entered two children in Colombian cash transfer and one won were less likely to enrol the other than families where both lost

11.2.3 INCOME BENEFITS

- Willis (1973): Children provide direct satisfaction and indirect by working; a couple may only influence monthly probability of having child, not directly
- Provide direct gains (e.g. child labour, domestic chores)
 - Cain (1977): In Bangladesh boys become net producers at 12, and compensate for cumulative consumption at 15
 - But... assumes zero interest rate and highly sensitive: 28 BE in Sri Lanka
 - Iyer (2002) found that in Ramanagaram households that used gas or kerosene (and thus had less income benefits from \$N\$) had significantly lower rates of fertility.
- Provide means for old-age support (Cain, 1981). If lack savings can thereby smooth consumption when their productive potential is likely to be low (Friedman PIH)
 - May & Heer (1965): occurs with lexicographic safety-first decision-rules whereby parents optimise for the probability of having son who will provide for them
 - Nugent & Gillaspay (1983): Sugar cropping dependence, which is covered under social security system, explains a significant amount of fertility declines in Mexico
 - Ridker (1980): Decline in Indonesian fertility in 70s amongst female workers with pensions
 - Iyer (2006): Need to consider uncertainty e.g. crop fluctuation

11.3 FACTORS

11.3.1 CHILD MORTALITY

- Two theories that say reduces number of birth necessary and hence cost (i.e. risk) of investment
 - 'Child survival hypothesis': parents expect to lose a large percentage, hence have more
 - 'Child replacement hypothesis': parents replace lost child as soon as possible

- But not much evidence:
 - Murthi et al. (1995): Reduces child mortality but has no significant effect on fertility
 - Becker and Barro (1988): Rate of decline in child mortality slows down as approaches zero

11.3.2 EMPLOYMENT

- Higher opportunity cost of child rearing (for Income/Price see above)
- But... only true if women work in jobs incompatible with child rearing (Standing, 1983)
 - Iyer (2002) found that in Ramanagaram female occupation had no effect because most women worked in silk industry where there is no trade-off

11.3.3 SON PREFERENCE

- Rajan et al (1996): Family increases fertility to obtain desired quantity of sons
- Dreze & Murthi (2001) find significant for fertility in cross-country study but not development

11.3.4 RELIGION AND NORMS

- Two approaches by Iyer interviews
 - "Pure religion effect" or "Particularised Theology Hypothesis": It's god will to have children
 - "Characteristics Effect": God's will is all very well, but who is to support the larger family
- Challenge basic economic assumption of 'new household economics':
 - Iyer (2002): Religion determines contraception, children to continue lineage, female status
 - Caldwell (1976): Modernization means 'Westernization' as re-orientate to nuclear family
- But... Culture itself is endogenous
 - Obermeyer (1994): Islam legitimises both positions on contraception (Tunisia vs. Iran)
 - Kahren: Indian Muslims fertility is much lower than Middle East Muslims

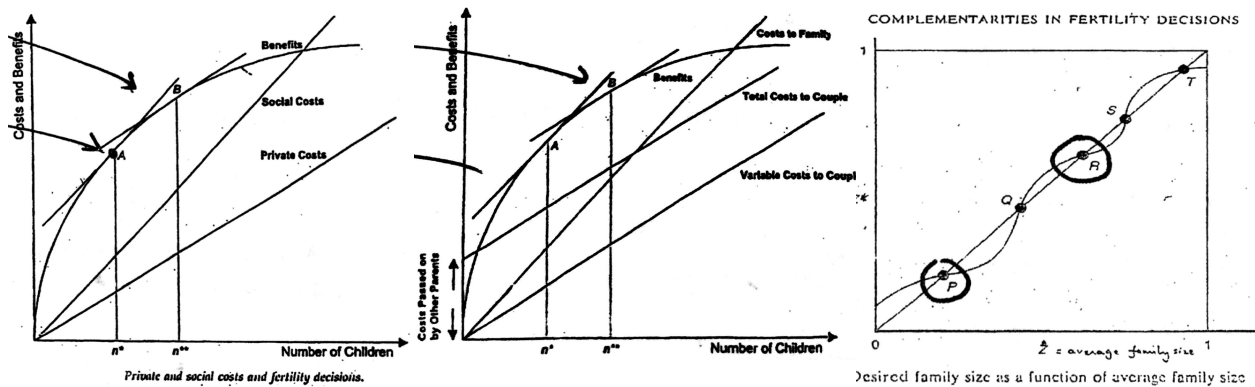
11.3.5 FEMALE EDUCATION

- Schultz (1973): Female education will reduce fertility more than male
 - i. Attending school delays marriage
 - ii. Better knowledge of contraception
 - iii. Healthier babies
 - iv. More likely to work, hence greater opportunity cost
 - v. Greater power in household
 - vi. Able to produce higher 'quality' children
- Ajayi & Kekovole (1998): success of Kenya's population policy is largely due to success of increasing school enrolment, especially for girls
- Dreze & Murthi look at cross-country in 1981: female literacy and son-preference matter. But no significant relation for general indicators of development

11.4 EXTERNALITY

11.4.1 MICRO EXTERNALITIES

- Externality if DM faces different relative costs and benefits as 'society' so $MB = MC$ at other point
- Inter: 'Child services' may not be only produced by parents
 - Oppong (1983): outside of West, extended family often helps
- Intra: May not have a single-person utility function with commonality of interests
 - Caldwell (1978): mothers bear childcare costs of children and fathers get benefit
 - Fosterage: In SS-Africa polyamorous men are part of many household so mums/aunt



11.4.2 MACRO EXTERNALITIES

- Children dilute collective wealth of average citizen but may increase share of family
 - Lee & Miller (1990): natural resources e.g. India coal reserves worth \$13,000 per citizen
 - Dasgupta (2000): "environmental wealth" and tragedy of the commons e.g. soil-erosion
- Intergenerational transfer of a macro-economy: Will children be net-benefactors of pension system?
 - Lee & Miller (1990) effect is small in developing countries (e.g. Kenya 0.04) because old age support is mainly provided by extended family
- Boserup (1965): Larger populations can spread out fixed costs
 - Lee & Miller (1990): Worth 4.4 times per capita income in Bangladesh, especially due to national defence
- Kremer (1993) says more children breeds more ideas and Lewis (1954) says create 'surplus labour'. Both have limited empirical evidence.

11.4.3 SOCIAL INTERACTIONS

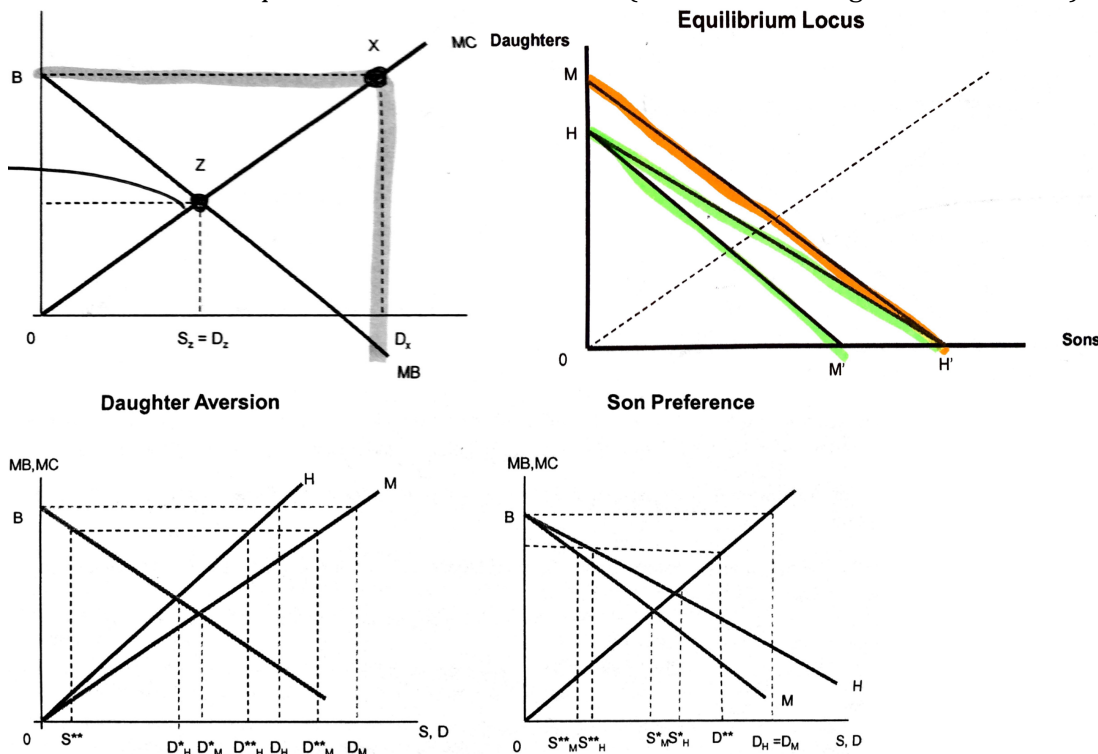
- Dasgupta (1995): Couple may be punished from deviating from social norms (i.e. average fertility), known as a Marshallian atmospheric externality
 - $V_i = U_i(n_i, z_i, x_i) + S_i(n_i, n_{-i}^j) + \epsilon_i$
 - Social curve: non-linear deviation trade-off between private benefit and social punishment
 - Couple curve: 45-degree line because everyone acts same hence get movement
 - If intersecting from (below) above minute increase in \hat{z} means still want \hat{z} so (un-)stable
 - Results in multiple equilibria and may lead to coordination failure
- Krugman (1990): Important role of expectations/history as couples assume normative pressures
- Iyer & Weeks (2009): Social interactions effects (local and global) more important than individual's characteristics in explaining Kenya's fertility variations, explaining ethnic group differences
 - All ethnicity effects are significant; higher education reduces fertility by 0.831
 - Existence of social interaction may lead to multiple equilibria and coordination failure
 - Shown by high level of volatility in outcomes for a given set of fundamentals
- Coale & Watkins (1986): Use provincial-level data from European countries from 1870-1960 to show socio-economic conditions alone are only weakly predictive of fertility declines
 - Once region begun a decline, neighbouring regions with same language/culture followed
- Bongaarts & Watkins (1996): Anthropological evidence from Kenya shows frequent chat about family size and modern contraception via Hammel's "evaluative clouds of commentary"
- China one child policy effect persists due to new quantity vs. quality trade off

12 HOUSEHOLD TRENDS

12.1 SON PREFERENCE

12.1.1 MODEL

- Children composed of sons and daughters $N = S + D$, with different benefits and costs $B(i)$; $C(i)$
 - $\frac{dB}{dS} > 0$; $\frac{dC}{dD} > 0$; $\frac{d^2B}{dS^2} < 0$; $\frac{d^2C}{dD^2} > 0$
- Parents maximize expected utility: $E[U] = \pi B'(S) + (1 - \pi)C'(D)$ where $\pi = \text{prob. of son} = \frac{1}{2}$
- Family will have another child iff $B'(S) > C'(D)$
- Results in two equilibria: 'mixed' and 'no son' (where MC of daughter > MB of son)



12.1.2 EVIDENCE

- 37m missing women in India (Dreze and Sen 1966) and sex ratio of 933 (2001 Survey)
- 36% reported growth in Indian Muslim fertility (2001 Survey) resulting in political controversy
- Borooah and Iyer (2004): Using Poisson Regression Models find Muslims have lower daughter aversion, resulting in larger families
 - Sex ratio for 976 Hindus and 1026 Muslims
 - Difference in son preference not statistically significant (0.95 H vs. 0.95 M) but daughter aversion was (0.20 H vs 0.13 M)
 - Hindu women increases likelihood of terminating fertility after birth of a son was nearly 3x after birth of a daughter. Much lower for Muslims
 - Overall infant mortality not statistically different (4.5% H, 4.7% M), amongst females it was (6.3% H, 4.6% M)

12.2 MARRIAGE

12.2.1 TRENDS

- Total share is decreasing and age of marriage is rising: Women 22 to 26.5 1890-2011

- Divorce rate rose sharply mid-60s following women's liberation, abolition of laws on inter-racial marriages, and rise in female employment
- Greater life expectancy contributes to larger 'remarriage market' – love starts at 65

12.2.2 MEASURES

- Crude Marriage Rate: $\frac{\text{Marriage}}{\text{Population}} \times 100$
- Crude Remarriage Rate: $\frac{\text{Marriage}}{\text{Divorced and Widowed}} \times 100$
- Age-Specific Marriage Rate: $\frac{\text{Marriage}_i}{\text{Population}_i} \times 100$
- Age-Specific Remarriage Rate: $\frac{\text{Marriage}_i}{\text{Divorced and widowed}_i} \times 100$
- Age-Specific First Marriage Rate: $\frac{\text{Marriage}_{\text{single},i}}{\text{Population}_{\text{single},i}} \times 100$

12.2.3 MODEL

- Becker (1981) views marriage as costly transaction that serves as optimal contract
 - Gains e.g. love, sex, children, money
 - Spouses with comparative advantages can engage in household specialization
 - Sharing household public goods and risks
 - Assortative matching
 - Divorce entails financial obligations making exit costly (alimony, property sharing etc.)
- Friedberg and Stern (2005) formalised this:
 - Two people m and f can choose to be single or a couple (i.e. pool resources: $C = C_m + C_f$)
 - U depends on consumption X and cleanliness C ; W_i is wage, p price of consumption
 - Couple: $\max U(C, X_m) + U(C, X_f)$ s.t. $\sum_i w_i(1 - C_i) = p(X_m + X_f)$
 - Single: each i $\max U(C_i, X_i)$ s.t. $w_i(1 - C_i) = pX_i$
 - Solving:
 - Couple choose $(X_m^C, X_f^C, C_m^C, C_f^C)$; Single choose (X_m^S, C_m^S) and (X_f^S, C_f^S)
 - Couple is Pareto dominant because benefit from each other's cleaning as well as own: $U(C_m^C + C_f^C, X_m^C) + U(C_m^C + C_f^C, X_f^C) > U(X_m^S, C_m^S) + U(X_f^S, C_f^S)$
 - Could explain why women historically specialised in household production: As $\frac{w_f}{w_m}$ decreases relative to a , men specialise in market activity and women in home
 - Required to because of childbearing (additional constraint)
 - Women more productive in household: $C = aC_f + C_m$ where $a > 1$
 - Men more productive in market work: $\frac{w_f}{w_m} < 1$

12.3 AGEING

12.3.1 TRENDS

- Growing dependency ratio:
 - By 2050 number of elderly will surpass number of children
 - In 2015 2/3 population living in countries at or below replacement fertility
 - Vary greatly: Argentina ~60 throughout 1970-2050; Korea declined to 39 by 2000
- Support Ratio: $\frac{\text{Labour Force}}{\text{Effective Number of Consumers}}$; will decline by 8% 1990-2060
 - Also influenced by relative consumption needs of people at different ages, changes in retirement age, labour force participation, and earning power of those not working
- Caselli & Vallin (1990): If Italian fertility remained at 1.4/woman to 2040 more than half increase in proportion of 60+ population would be due to mortality change

12.3.2 EFFECTS

- Changes sex ratio as men have higher mortality (60+ is 81:100; 80+ is 53:100)
- May affect savings as per Friedman's life-cycle hypothesis. But... evidence is mixed
- Cutler et al (1990): Using 29 cross-country time series 1960-85 find negative association between labour force and productivity growth
 - 1%-point decrease in annual labour force growth 1990-2050 raises productivity 0.62%-points
 - Responsible for 0.1-0.15% reduction in annual productivity growth rate observed
 - To offset need 3-4y increase in average age at retirement or 19%-point increase in female labour force participation
 - Possible reasons why: (i) growing population makes innovation profitable by allowing to spread out fixed costs; (ii) as share of population that is young declines as does dynamism
- But... Romer (1990): Rapid US productivity growth in periods of relatively slow labour force growth