Micro-economic theories of fertility: Quantity and Quality

Economic Demography

Econ/Demog 175

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UC Berkeley

Week 8, Lecture B

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Last time

- Fixed cost per child
- Children were considered a normal good (as with Malthus)
- Puzzle was how could increased income reduce fertility
- Answer was that costs of children were (time + $)
- An increase in the value of time *could* cause one to substitute away from children towards other goods

Empirical evidence

- Costs of time are disproportionately to women
- So, higher wages for men → income effect → higher fertility
- Higher wages for women → some substitution effect → lower fertility (or at least a smaller increase than for men)
- A number of studies have found this effect

Problems with theory

- Empirical problem: timing of fertility decline and women's earnings
- Theoretical problem: costs are fixed, but we know that costs have increased

Becker's Quantity-Quality Model

- Whereas utility was a function of goods (*X*) and the number of kids (*n*), Becker adds the idea that one would rather have a "higher quality" child (*q*)
- Quality is schooling, health, grooming, etc.
- Utility = U(X, n, q)

[Note: we use notation from Becker reading (n for kids, I for total income, p_c for cost of unit of quality, but we keep X for goods, Becker uses Z]

Budget constraint

Budget constraint goes from

- $X + pn$ = total income (Last week)

to

- $X + p_c qn$ = total income

- Assumption: every child gets same q, and every unit of q costs same p_c

Becker's non-linear Budget Constraint

- For simplicity, assume total income (Becker's *I*) and expenses on other goods (*X*) are fixed
- Then, budget constraint:

expenses = income

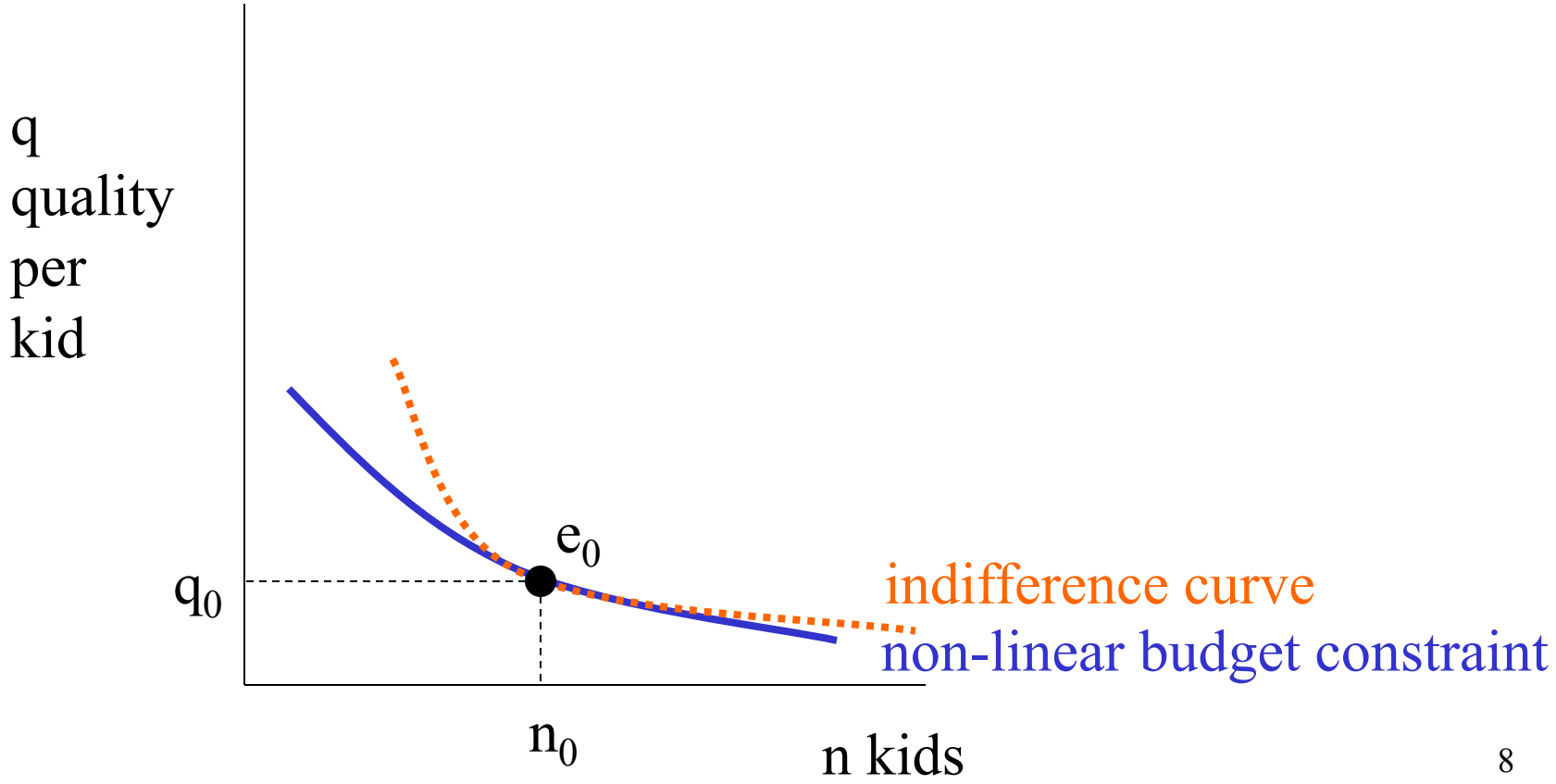
$$X + p_c qn = I$$

Or

$$n = (I - X) / (q\, p_c)$$

- If we let right side be constant, then we can draw budget constraint as a hyperbola (like $xy = c$). (Recall if left was additive, then BC was a straight line.)

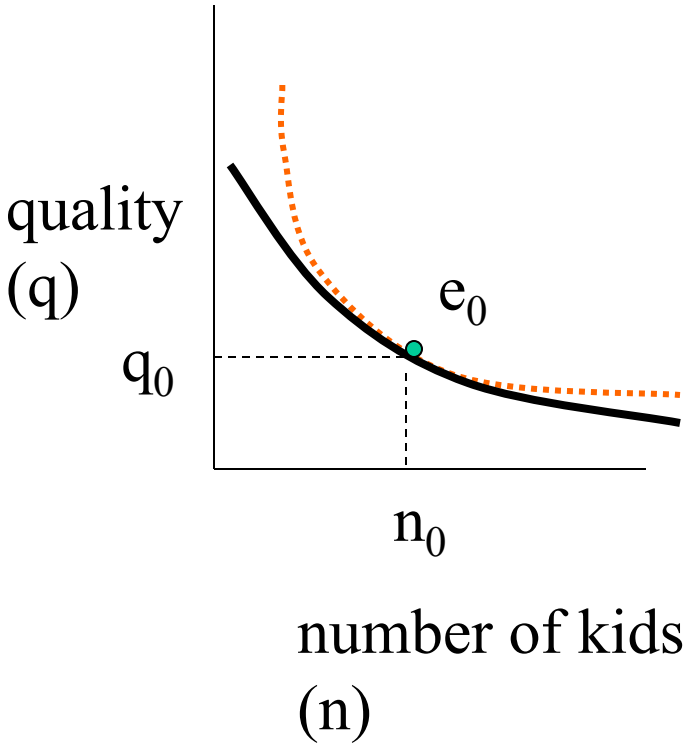
Graphing Budget Constraint



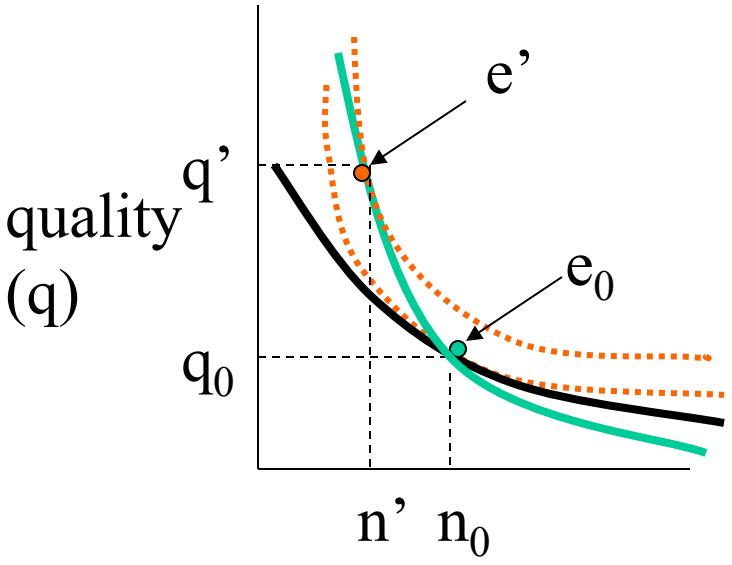
What if we change cost of quality?

- Say we lower p_c (public schooling, or subsidized healthcare?)
- This makes the budget constraint steeper
  - With 1 child fewer, can increase quality per child by more than earlier.
- We are going to see an increase in quality per child but a decrease (or at least a smaller increase) in the number of kids

Graphing Budget Constraint



but with cheaper quality …



Interaction between quantity and quality

- Total child costs = $p_c qn$
  (n and q enter multiplicatively, not linearly)
- Per child, cost is $p_c q$
- Per unit of quality, cost is $p_c n$

- Can get a feedback relationship whereby a small exogenous change can produce a big eventual change in q and n

Interaction between quantity and quality (Continued)

(1) Suppose costs of contraception fall – causing n to go down because fewer unintended births.

(2) Then price of a unit of quality goes down too – and people purchase more q.

(3) But as they do so, price of a child (which is $p_c q$) goes up. This has a further negative effect on the number of kids, n.

(4) Which can result in further increases in q and further declines in n until a new equilibrium is reached

Bottomline

- New part of model is feedback from number of kids to price of kids. This comes from the fact that *n* and *q* enter multiplicatively in the budget constraint – hence giving rise to an interaction.
- It is missing in standard 2-good utility maximising models, since price of good *x*, say, is p_x (independent of the amounts of *y* consumed). If price of *x* changes, you adjust consumption of both *x* and *y*, but the new (adjusted) amounts do not cause any further change in the prices.

Conclusions

- Becker's theory is not predictive (could choose to have *n* instead of *q*, but "revealed preferences" – i.e., data -- suggest otherwise.)
- Becker solves the timing problem, because small causes can have big effects
- Also he claims it explains the rapidity of fertility declines

Postscript: Some rapid fertility declines

US 1920 to 1930	-24%
US 1960 to 1972	-38%
Japan 1950 to 1960	-45%
Taiwan 1960 to 1975	-51%
England 1871 to 1901	-26%

Irreversibility

- Puzzle: why in economic crisis doesn't fertility rise again – as wages go down?
- Possible answer:
  - Norms about child quality appear fairly irreversible.
  - So to reduce $p_c qn$, parents reduce n

Summary (1)

- Quantity-quality interaction good for explaining demographic transition (rapid, big fertility declines)
- Cost-of-time model good for explaining more recent trends
- Can of course combine (and Becker does)

Summary (2)

Answers to puzzle of how fertility could fall with economic growth

1. It doesn't (because pure income effect > 0)
2. It does, substitution effect (cost of time) dominates
3. Parents get utility from quality, too. And so once fertility starts falling, big shifts toward quality.

Remaining puzzles

- Why don't we just have 1 kid and invest a lot in her?
- Why hasn't fertility recovered from recession?
- Dynamic life cycle decision making? When should we have children?
- What is behind variation in preferences: why some like many, and some few kids?