Transition from Stagnation to Growth:

Demographic Transition

Explaining Fertility Decline

Some other candidate explanations for fertility decline:

- Improvement in birth control technologies
- Lower mortality lowers the "precautionary" demand for children
- Restriction and/or Bans of child labor raise the cost of children
- Increasing education expenditures raise the cost of children.

Evaluating the Explanations for Fertility Decline

- Just like increase in female labor force participation and increase in public pension provision, improvements in birth control occurred too late to affect fertility during the main phase of fertility in Europe, i.e. between 1880 and 1920.
- Focus on mortality and "quality of children" channels (child labor versus education).

quality / quantity tradeoff

The Mortality Channel

- Key idea: As mortality rates fell, parents needed a smaller number of children to guarantee a given number of surviving children.
- Consider a family that (for whatever reason) wants to end up with n surviving children.
- If the mortality rate is m, the number of births b (i.e., the total fertility rate) that will achieve this objective has to satisfy:

$$(1 - m)b = n$$

or:

$$b = \frac{n}{1 - m}.$$

- If m falls, b will fall as well.

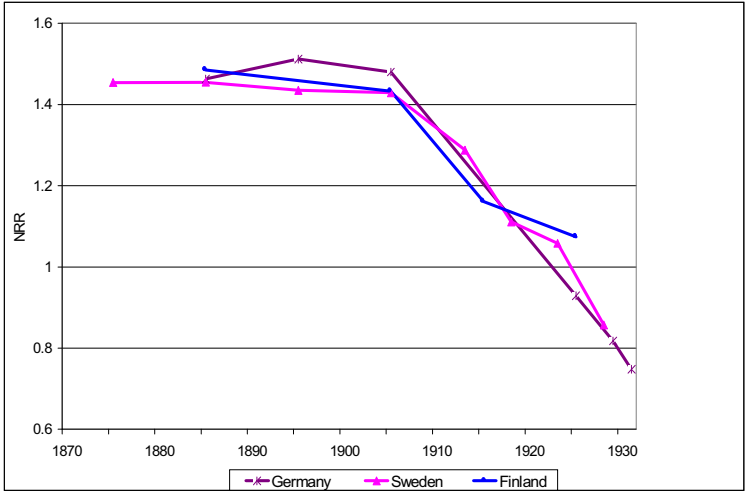
The Mortality Channel

- The argument shows that mortality decline can plausibly explain a reduction in overall fertility.
- So far, we kept n constant (surviving children, target).
  In the data, n also drop. (a lot)
- Can mortality account for the drop in surviving children?

  Maybe?

The Mortality Channel

- The net reproduction rate (number of daughters per woman surviving to childbearing age) in European countries:



The Mortality Channel

- Can mortality decline explain a decline in the net reproduction rate?
- One argument: The precautionary demand for children.
  - Parents are risk averse with respect to the number of surviving children. In particular, they want to be sure that they have at least some survivors.
  - When mortality is high, parents face the risk of all their children dying. They try to lower this risk by substantially raising their fertility rate.
  - On average, more children survive compared to an environment with low mortality.

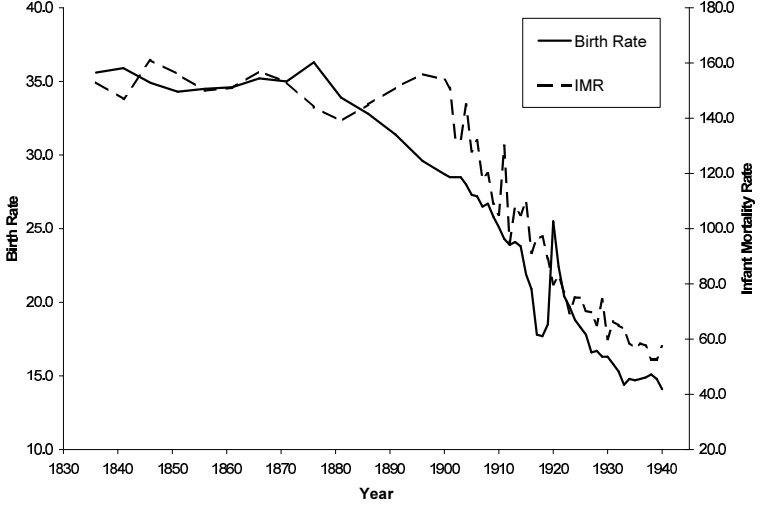
The Mortality Channel

- Precautionary demand story works well in theory.
- Is it convincing in practice?
  - in practice, children are born sequentially
  - mortality risk is very concentrated in early age
  - If a children died young, parents can respond having another child.
  - No need to stockpile children.

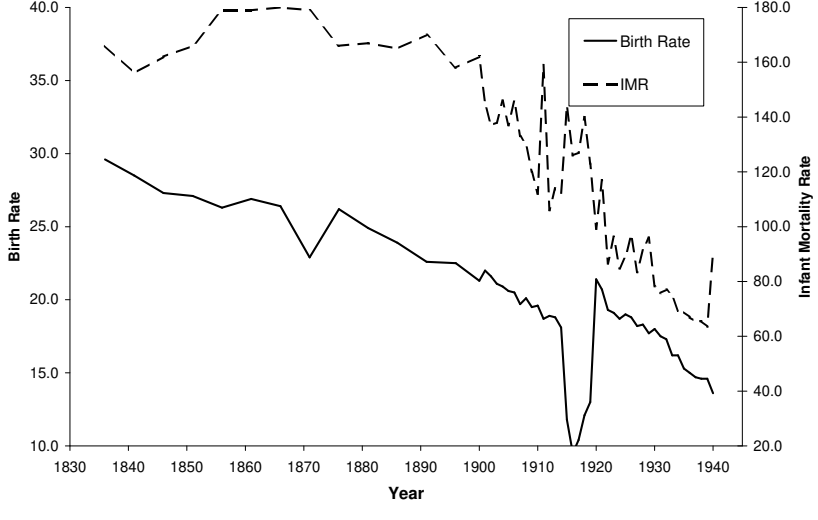
The Mortality Channel

- An additional problem for the mortality channel is the timing of changes in mortality.
- The initial decline in mortality rates (1750–1900) was mostly due to declining mortality rates at higher ages.
- Large drop in infant mortality occurred only at the beginning of the twentieth century, when fertility decline was already far progressed.

The Birth Rate and Infant Mortality Rate in England



The Birth Rate and Infant Mortality Rate in France



Quantity versus Quality and the Cost of Children

- Fertility may have declined because children became more costly.
- The child labor channel:
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  -
- The child investment channel:
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  -
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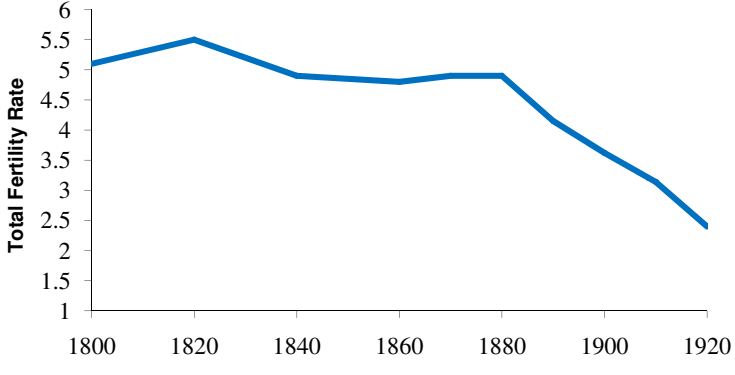
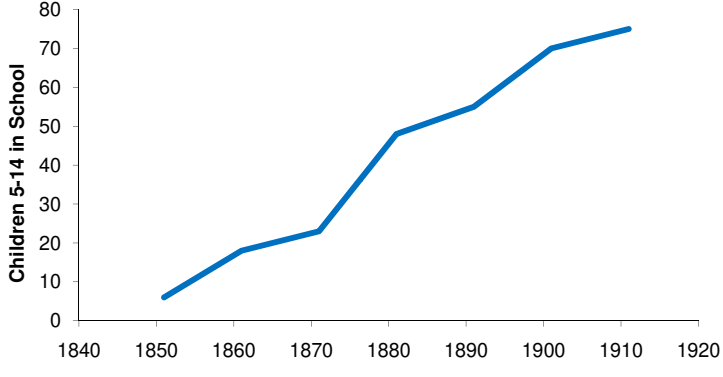
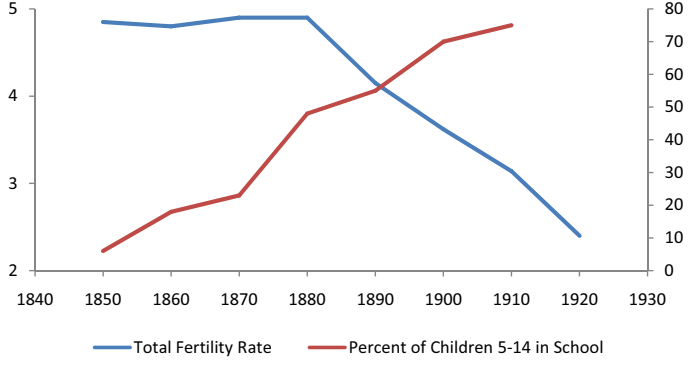
The Total Fertility Rate in England



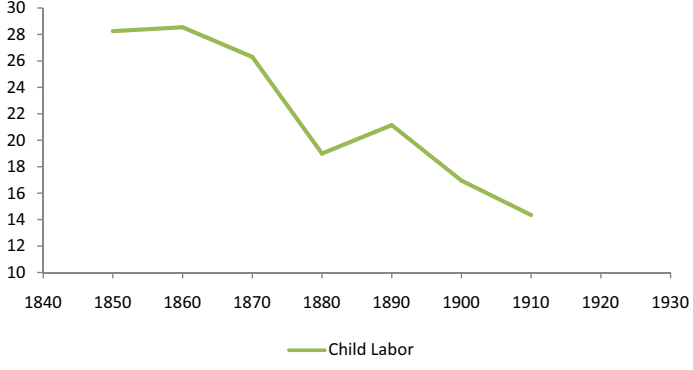
The Fraction of Children 5-14 in School in England



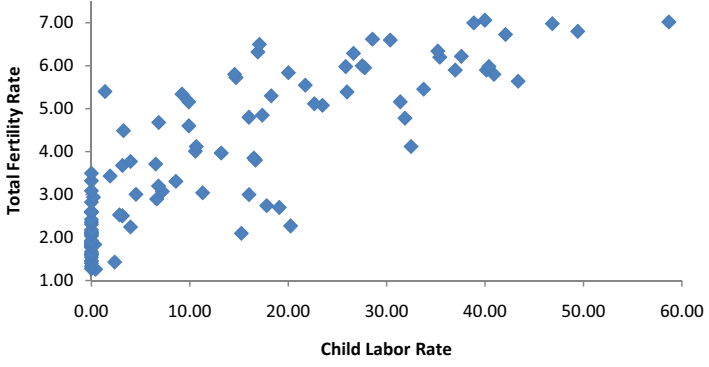
The Total Fertility Rate and the Fraction of Children 5-14 in School in England



The Child Labor Rate in England (Fraction of Children 10-14 at work)



Fertility and Child Labor Across Countries in 1990



Understanding the Rising Investment in Children

- Data supports the idea that rising investment in child quality (increase in education, reduction in child labor) can account for fertility decline.
- But why did parents decide to invest more in their children's education? What kept them from doing that in the pre-industrial era?
- Need a theory that incorporates the demand for "high quality" children.
- This is provided by the quantity-quality model of fertility choice: parents care both about their number of children and the child's quality (as measured by education, income, or utility).

A Simple Quantity-Quality Model of Fertility Choice

- Parents care about consumption c, number of children n, and child quality h (human capital):

- Parent earns wage w.
- Raising each child takes up fraction ϕ of parent's time. In addition, parent can choose to spend fraction $e \geq 0$ of time on each child's education.
- The parent's budget constraint:

- The education investment e determines the child's human capital:

Solving the Parent's Maximization Problem

The Optimal Choice of Number of Children

The Optimal Choice of Education

Using the Model to Explain the Demographic Transition

- Model predicts that fertility is decreasing in education, and that education is increasing in the return to education θ.
- Thus, the model can explain fertility decline if there is a shift in the return-to-education parameter θ.
- Generally, θ would depend on the cost of education provision and the return to human capital in the labor market.
- A plausible hypothesis is that new industrial technologies generated more demand for educated workers, which shifted up the value of θ over time.