Fertility Response to Child Mortality
Economics 623

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Recall that during the Demographic Transition societies moved from a regime of high–mortality and high–fertility to a regime of low–mortality and low–fertility.

Empirical studies from a large number of countries revealed that death rates declined before fertility rates decline.

As if couples have preferences defined over surviving number of children (target fertility).

As mortality rates fell, households did not immediately recognize the regime shift in mortality risks. Learning takes time.
Terms Defined

**Hoard** is a response to expected mortality.

**Replacement**: is a response to the *experienced* mortality.

If the children die very young and the mother can have another child, the same life cycle can be approximated by replacement. In this case, replacement is superior to hoarding as a reaction.

Superiority of replacement is clear, but it is not always possible. Risks of mortality extend beyond infancy. Fecundity may decline sharply with age and or parity; health risks may make replacement impossible.

Reaction to mortality near end of reproductive interval may be partly in the form of hoarding.
Illustration

Consider two couples, A and B, equal in tastes and all the exogenous variables that determine desired family size, sharing the same expectations wrt mortality, and have same number (e.g., 2) children born.

The difference is that couple B had a child die.
Assume that A and B continue to expect same survival rates for their remaining and future children.

Couple B is worse off. It lost a child while other activities were not disturbed.
Illustration

Adjustment means that B will try to restore some balance to its pattern of consumption — spreading the loss over various goods and services instead of having the loss concentrated in terms of child services.

If demand for (surviving children) is income inelastic, B-like families will fully replace lost children;

if the demand for children is somewhat responsive to income there will be only partial adjustment.
Extent to which B-like families respond to a loss of a child indicates something about the propensity to “consume” children (child services) out of income: absence of response would indicate limited propensity, and full replacement would indicate zero income elasticity.
Experience changes Expectations

May be couple B may revise its expectation of survival rates for remaining and future children.

Easily fits within a Bayesian Learning paradigm — B-like couples will decrease their (subjective) probability assessments of survival rates following a death of a child.

Recall Bayes Theorem: it instructs us how to incorporate prior information and observed outcomes to update our probability assessments.
Couples combine prior beliefs with realized mortality outcomes of their children (survival, death) using Bayes’ Theorem.

Let $pdf_{\text{prior}}(\pi)$ be the prior probability of a death of a child before attaining adulthood.

Let $pdf(data|\pi)$ represent the realized mortality outcomes.

Let $pdf_{\text{post}}(\pi)$ be the posterior probability of death of a child.

Bayes Theorem:

$$pdf_{\text{post}}(\pi) \propto pdf(data|\pi) \cdot pdf_{\text{prior}}(\pi)$$
Interpretation

Over time as a couple accumulates experience and as their own sample of children grows, they give greater weight to their own experience relative to the original prior probability.

Inference from experience is the source of a substitution effect that is being added on to the income effect described earlier.

Substitution in that with lower chance of surviving to adulthood raise the cost of children. Weakens the incentive for replacement.
Other considerations

Simple framework excludes others types of risks. For example, couples could have more surviving children than they want. Will fail to replace a child who dies.

How quickly will a couple respond to replace a lost child?

If fecundability declines sharply with age, couple may respond quickly.

If worried that may end up with more children than desired, may wait.

Couple may chose a strategy of **hoarding**: if the stock of children already planned on the expectation that some will die, the death of a child will not elicit a replacement response.

Replacement and hoarding are alternative and mutually exclusive strategies.
Other links between child mortality and fertility that do not stem from preferences wrt to family size.

Link between breast-feeding and fertility. Recall lactation reduces the mother’s susceptibility to conception.

Child mortality will reduce the length of intervals between births and will increase the number of births will have. (Mimics replacement)

Surviving infants impose large time and energy demands on women. She may be exhausted and sleeping arrangements may change that reduce the frequency of intercourse and increase the variability of response. (Lengthens birth intervals.)
Empirical Findings (Ben Porath)

Replacement and Hoarding are alternative strategies: if families have learned to expect high mortality and respond to it by hoarding, fertility should not respond strongly to actual mortality.

Tabular and regression analyses show that experienced mortality reduces the probability of stopping at a given birth (i.e., raises the number of births) and reduces the interval between births.

The findings indicate that replacement is a significant phenomenon and that it occurs fairly quickly; the age patterns or response can be reasonably interpreted.