The intergenerational spillover of early life conditions

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Background

Low levels of net nutrition in early childhood can have lasting consequences.

- Net nutrition is a function of nutritional inputs and infectious disease

Mechanisms

- Fetal or early life adaptation

Previous literature

- Recent studies in economics and epidemiology record evidence that conditions *in utero* or in infancy impact adult outcomes.
  - Conditions include infection, famine, recession, pollution.
  - Outcomes are indicators of cognitive function, health status and economic status in adulthood.
  - Barker 1997, Almond 2006, Almond et al. 2009, van den Berg et al. 2008, Venkataramani 2010, Fung 2010.
- Health impacts [morbidities] are typically observed in the post-reproductive period [age 50+].
  - This is consistent with evolutionary theory.

What we do

(a) We investigate whether any effects of adverse early life conditions are expressed during the reproductive period.

1. Do women born in adverse conditions initiate fertility earlier?

Coall and Chisholm 2003 suggest an evolutionary rationale for this. The idea is that women with lower life expectancy want to maximise the quantity of children- and this comes at the expense of quality.

No previous evidence in the economics literature.

2. Conditional upon age at birth, do they have less healthy children?

There is scarce evidence on intergenerational impacts of early life conditions though see, e.g., Fung and Wei 2010, Bhalotra and Rawlings 2010.

What we do- contd.

(b) We further investigate the hypothesis that the later life penalty associated with foetal adaptation to adverse early life conditions is larger when the post-natal environment improves.

- The biomedical literature suggests that the thrifty phenotype performs less well in conditions of plenty because it is maladapted for these conditions.

- Some compelling evidence for diabetes and obesity but not clear how general this phenomenon is.
- No previous evidence in the economics literature.

Data

- Comparable microdata for 63 developing countries compiled from the DHS country files.
- Estimation sample contains some 3 million births that occur in 1970-2000
- The births are of some 1 million mothers who are born in 1957-1987.

- We exploit country-cohort variation in the mother's birth year conditions.
- The conditions we focus on are the infant mortality rate which proxies the prevalence of infectious disease and GDP which proxies availability of nutrition (Deaton 2007).

Empirical model: hypothesis-a

Age at birth of mother *m* of cohort *c* born in country *j*, exposed to birth environment *E*

$$age_{mjc} = E_{jc}'\beta + \lambda_j + \theta_c + \gamma_j.c + x_{mjc}'\eta + u_{mjc}$$

Infant survival of birth *i* of mother *m* in year *t* in country *j*

$$survival_{imjt} = E_{jc}'\beta + \lambda_j + \theta_c + \gamma_j.c + x_{mjc}'\eta + \alpha(age) + u_{mjc}$$

$$t_m = c_m + age_m \qquad \ldots\ldots \textit{Mother specific}$$

Hypothesis-b

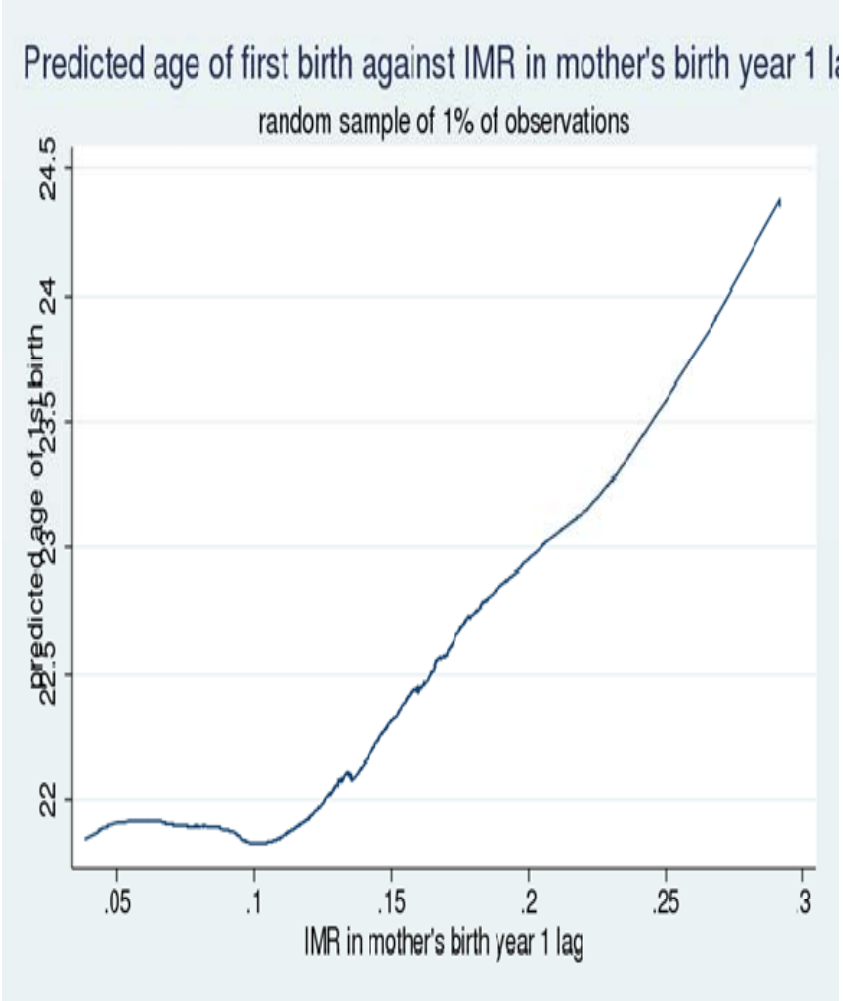
Infant survival as a function of environmental conditions in the mother's birth year and changes in these conditions between the mother's birth year and the child's birth year

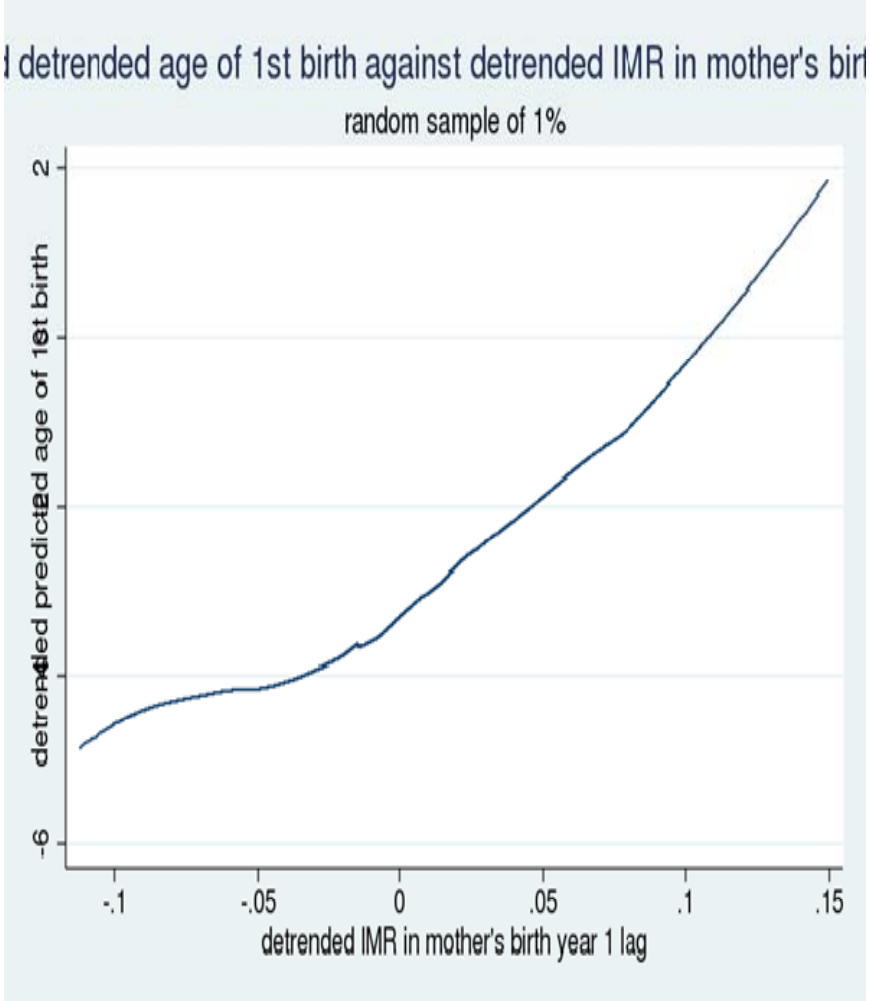
$$survival_{imjt} = E_{jc}'\beta_1 + (E_{jc}.\Delta E_{jc})'\mu + \Delta E_{jc}'\beta_2 \; controls + v_{mjc}$$

Controls are as in previous eqs.

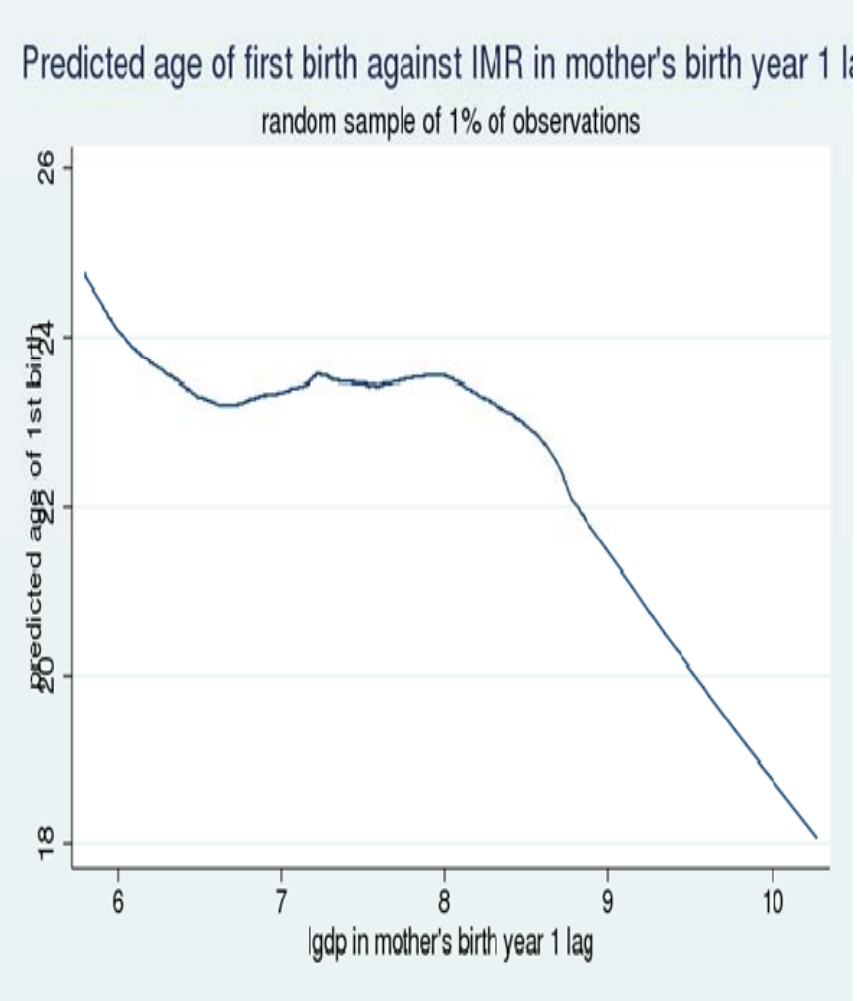
Unconditional plots with and without de-trending both variables

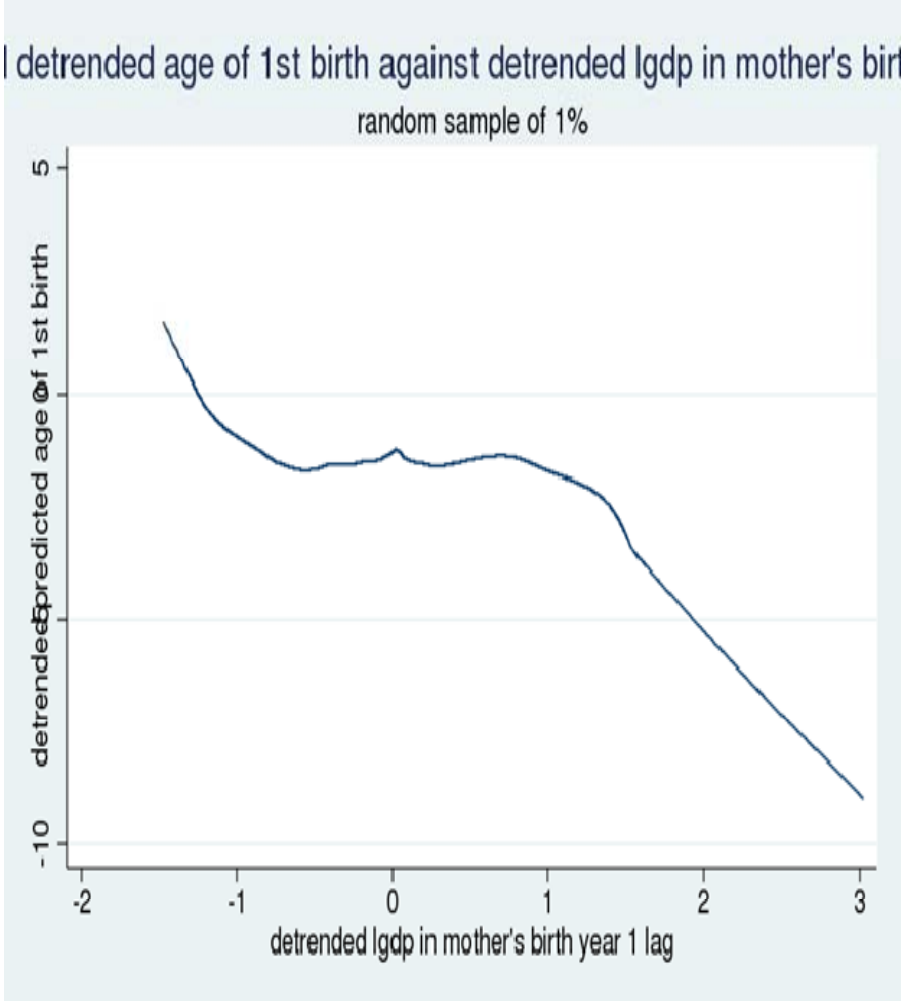
Plot of mother's age at birth against infant mortality rate in mother's birth year



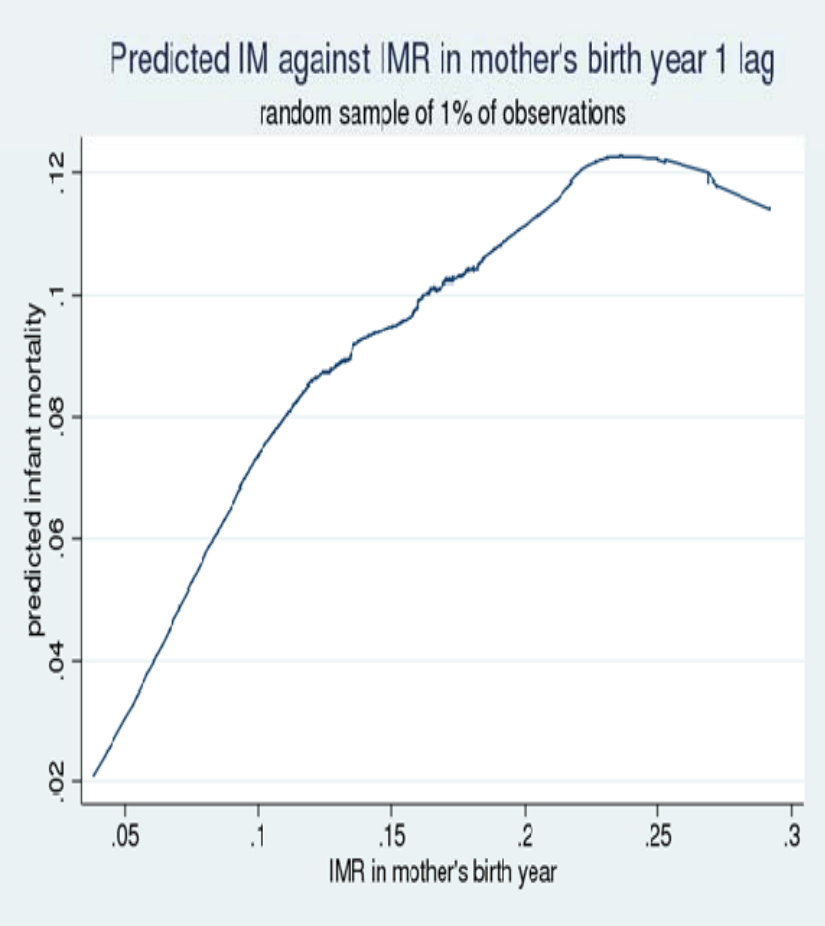


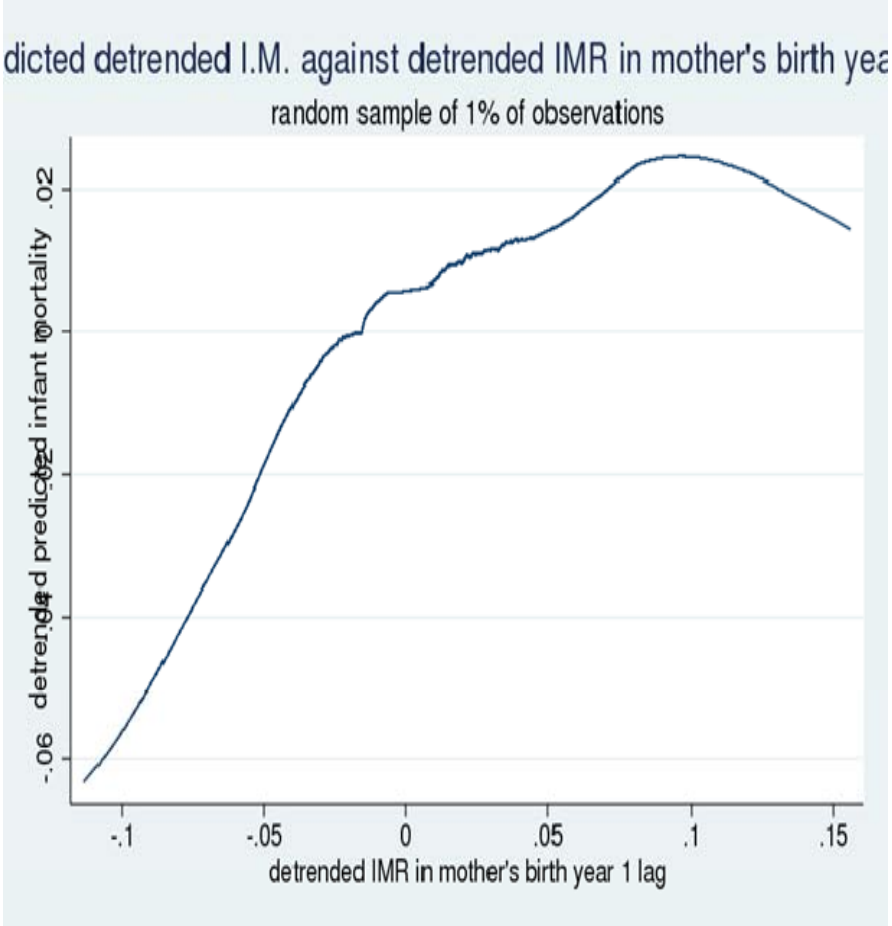
Plot of mother's age at birth against income in mother's birth year



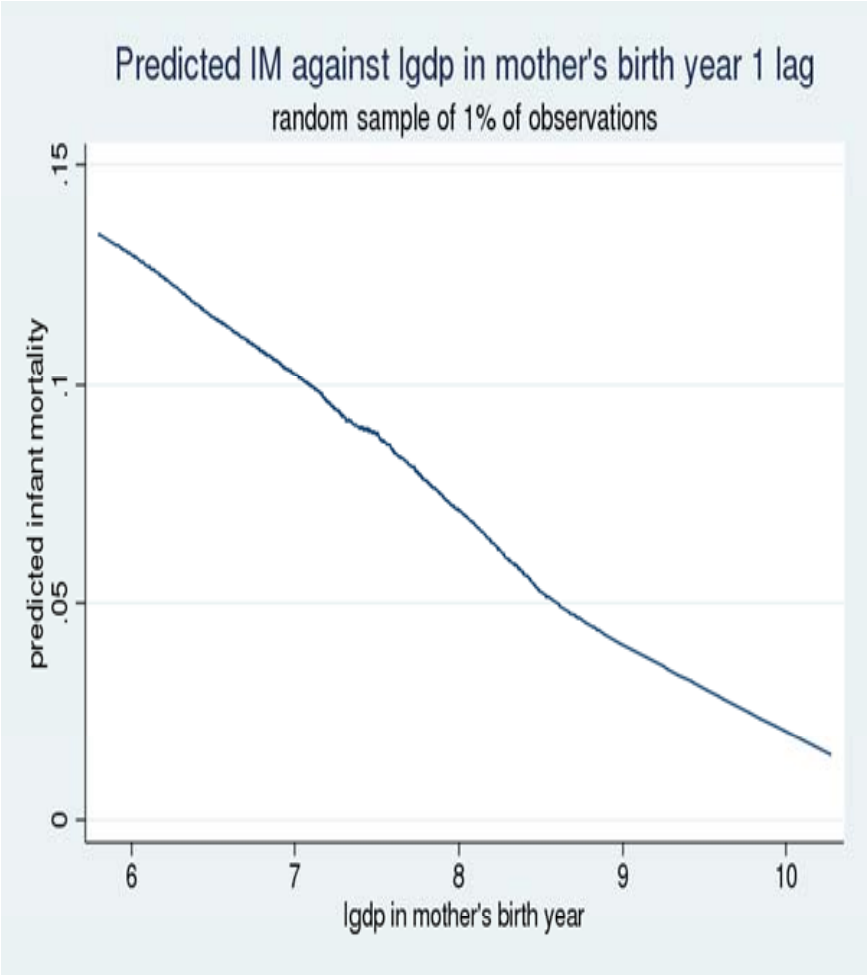


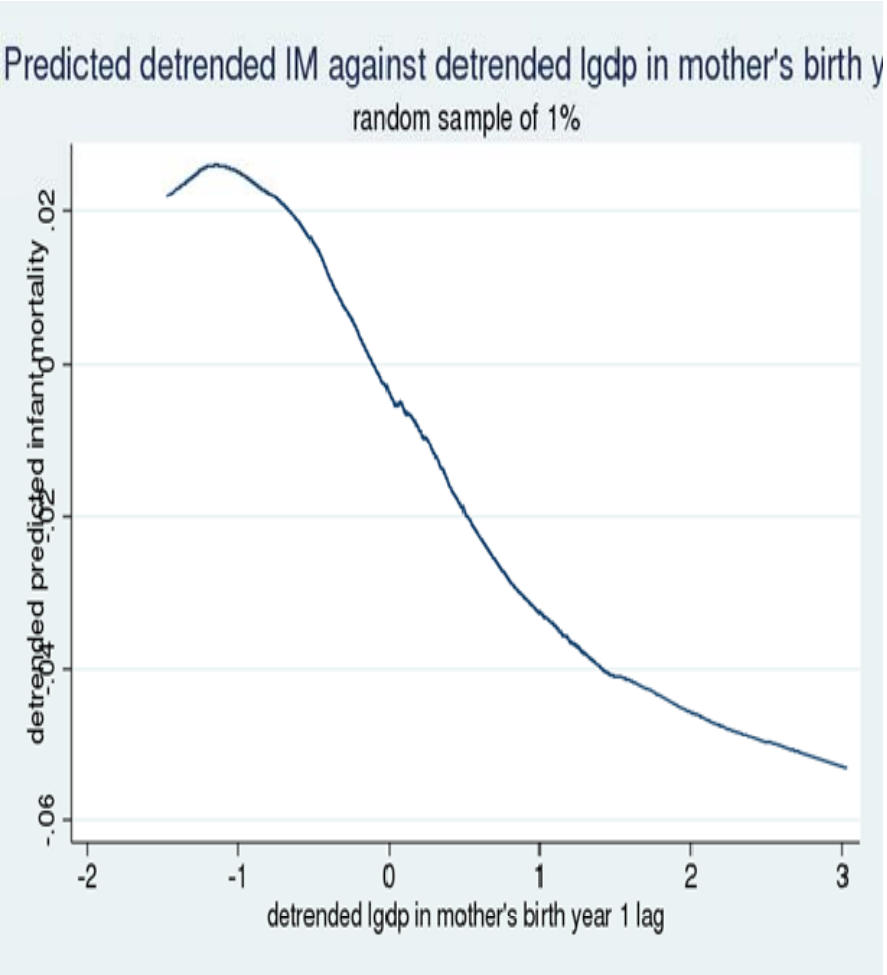
Plot of contemporary infant mortality against infant mortality rate in the mother's birth year





Plot of contemporary infant mortality against income in the mother's birth year





Results: Age of mother at birth

- Large and significant effects of signs opposite to those predicted by the evolutionary hypothesis.
- Mothers born in adverse conditions experience delayed onset of fertility.
- A potential explanation is that fecundity is impaired alongside other health impairments.
  - A 1 s.d. increase in the infant mortality rate [income] in the mother's foetal year lowers the probability that she gives birth before the age of 18 by 0.11 [0.36]. The mean of the d.v. is 0.55.

Results: Infant survival

- Scarring is evident up to the 10th percentile of the infant mortality distribution and beyond the 60th percentile of the income distribution.

- The relationship is quadratic, indicating that selection appears to dominate when early life conditions are poor (i.e. high infant mortality or low income in the mother's birth year).

- This is consistent with Bozzoli, Deaton and Quintana-Domeque (2009).

Results: interaction of early life conditions with postnatal improvement in conditions

This work is still in progress. Preliminary findings-

- The interaction term of interest is insignificant for infant mortality in the mother's birth year.

- It is significant but of the unexpected sign in the case of income in the mother's birth year: mother's born into low income environments have births that experience higher mortality risk [scarring]. Income growth across the mother's lifecourse mitigates scarring.

- Extending the specification to allow scarring created by the mother's early life environment to depend upon changes in the environment between her birth and the birth of her offspring produces significant scarring at the mean (i.e. selection now appears less important).

Further estimates

- In progress is work that investigates the extent to which the impact of the mother's birth environment on her fertility and on outcomes for her offspring works through her education and height (indicator of health).

- Preliminary estimates suggest that most of the reduced form impact is unexplained by education and height.

- This is *despite* the mother's education and her height being significantly influenced by her early life environment.

Conclusions

- Under-exploited sample of microdata from across developing countries.
- Infectious disease and low income characterise the early life environment of the poor in developing countries.
- Results of wide contemporary relevance.

Main findings

Country-cohort variation in infectious disease prevalence has effects in the same direction as country-cohort variation in low income. Infection and low income are significant conditional upon one another.

Mothers born into environments characterised by poor net nutrition experience delayed onset of fertility, which may indicate poor health. This is consistent with age at menarche increasing in poor health but it merits further research.

There is some evidence that deficits in the mother’s early life environment translate into lower infant survival of her offspring.

Contd.

Scarring effects of this sort are overwhelmed by selection at high levels of infant mortality and at low levels of income.

There is no clear evidence that improvements in the environment over the mother's lifecourse intensify scarring. Indeed, for income, they appear to mitigate scarring.

Impacts of mother's birth year conditions on her fertility or the survival of her offspring persist upon controlling for her education and height.

The mother's education and height are significantly influenced by her birth year conditions.

Please email comments to
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Thanks for attending!