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Cognitive and Economic Development

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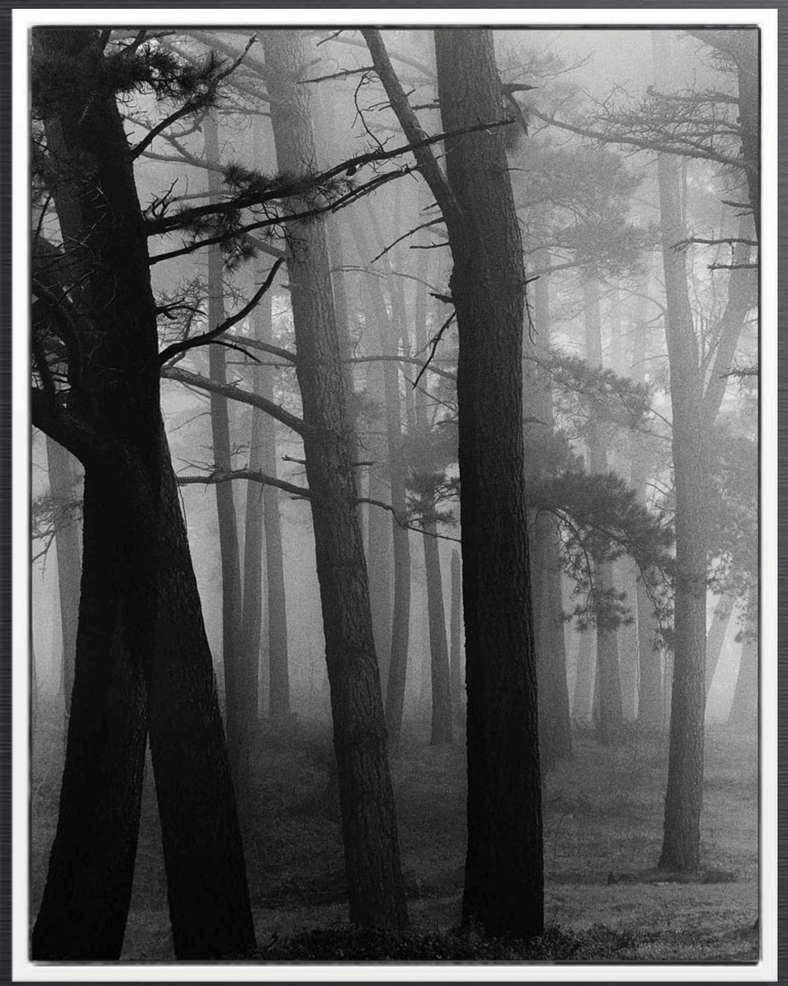

Cognitive and Economic Development

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cognition

- distinguishes homo *sapiens* from other animals
- central to modern economic growth
  - enables application of science and technology to production
  - why we have higher living standards than 1800

brain development

- revolution in neurobiology since 1960
  - brain development highly sensitive to environment
  - “window of opportunity” for neuroplasticity
    - conception to 24 months

cognitive risks

- undernutrition
  - deprives brain of it large energy budget
- disease saps energy & nutrients
  - gastrointestinal - major cofactor of undernutrition
  - anemia from malaria (250m.), helminths (⅕), TB (⅕)
- iron and iodine deficiency, largely irreversible

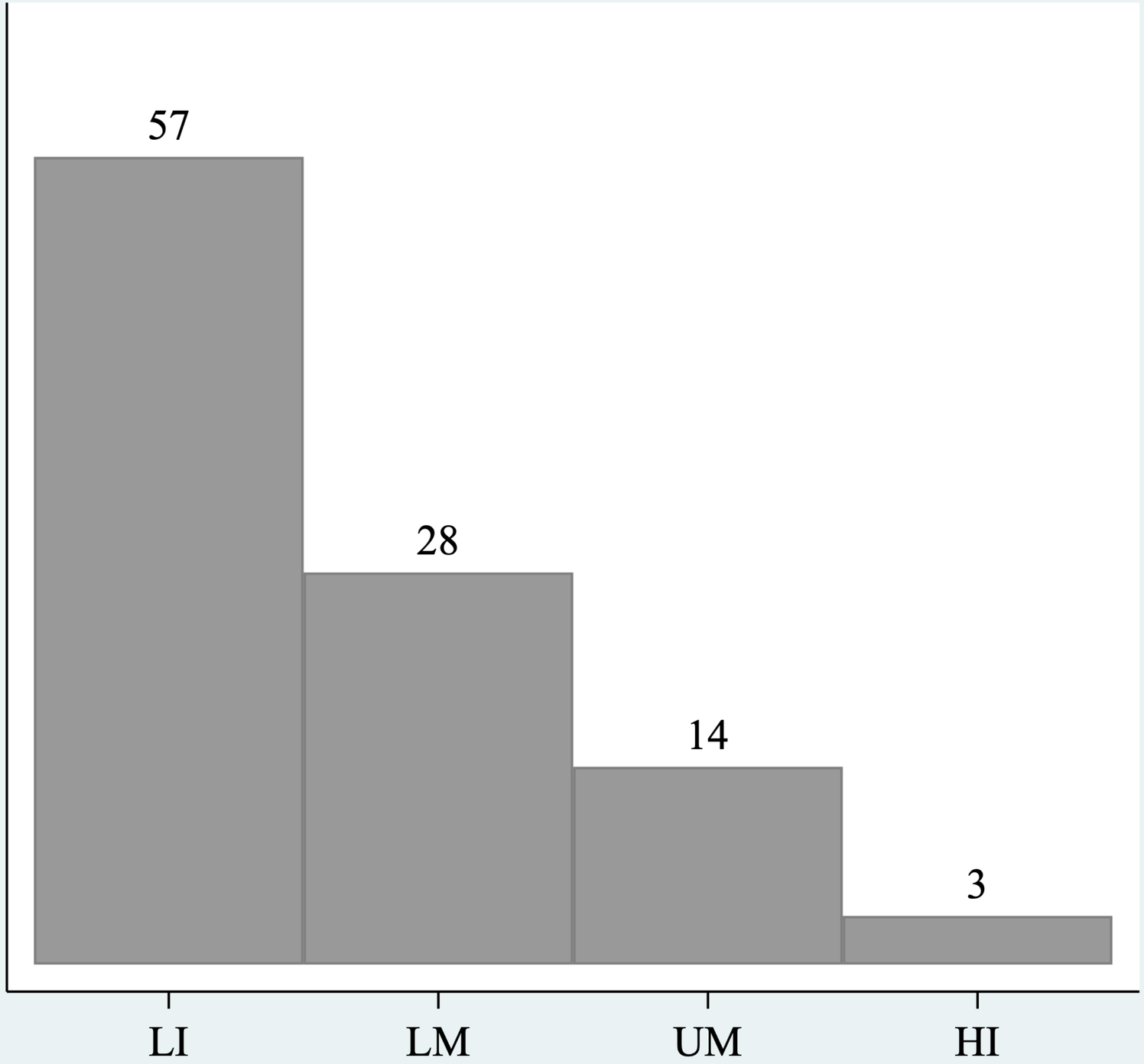
cognitive risks:
nurture, violence, toxins

- nurture, stimulation, breastfeeding
- chronic child stress reduces adult working memory
- exposure to violence in home, community or war
- lead - irreversible brain damage & aggression
- air pollution
- fetal alcohol syndrome: estimated 4% of U.S. children

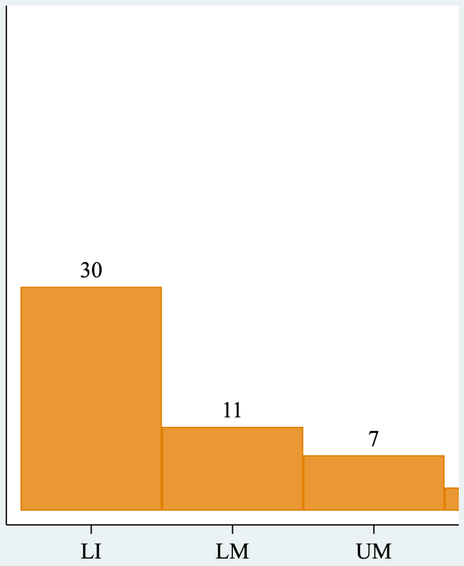
microeconomic studies

- *huge* literature on effect of cognitive insults on
  - school performance
  - wages and employment
  - Almond et al. (2018) major survey
    - "compelling research designs"
    - "large magnitude" of effects

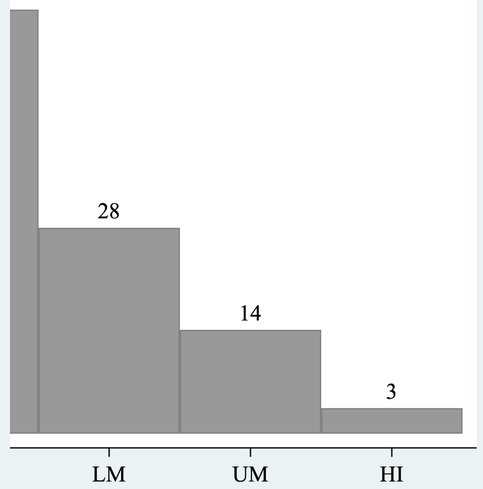
Child Lead Exposure



Undernutrition



Child Lead Exposure



what effect on the **economy**?

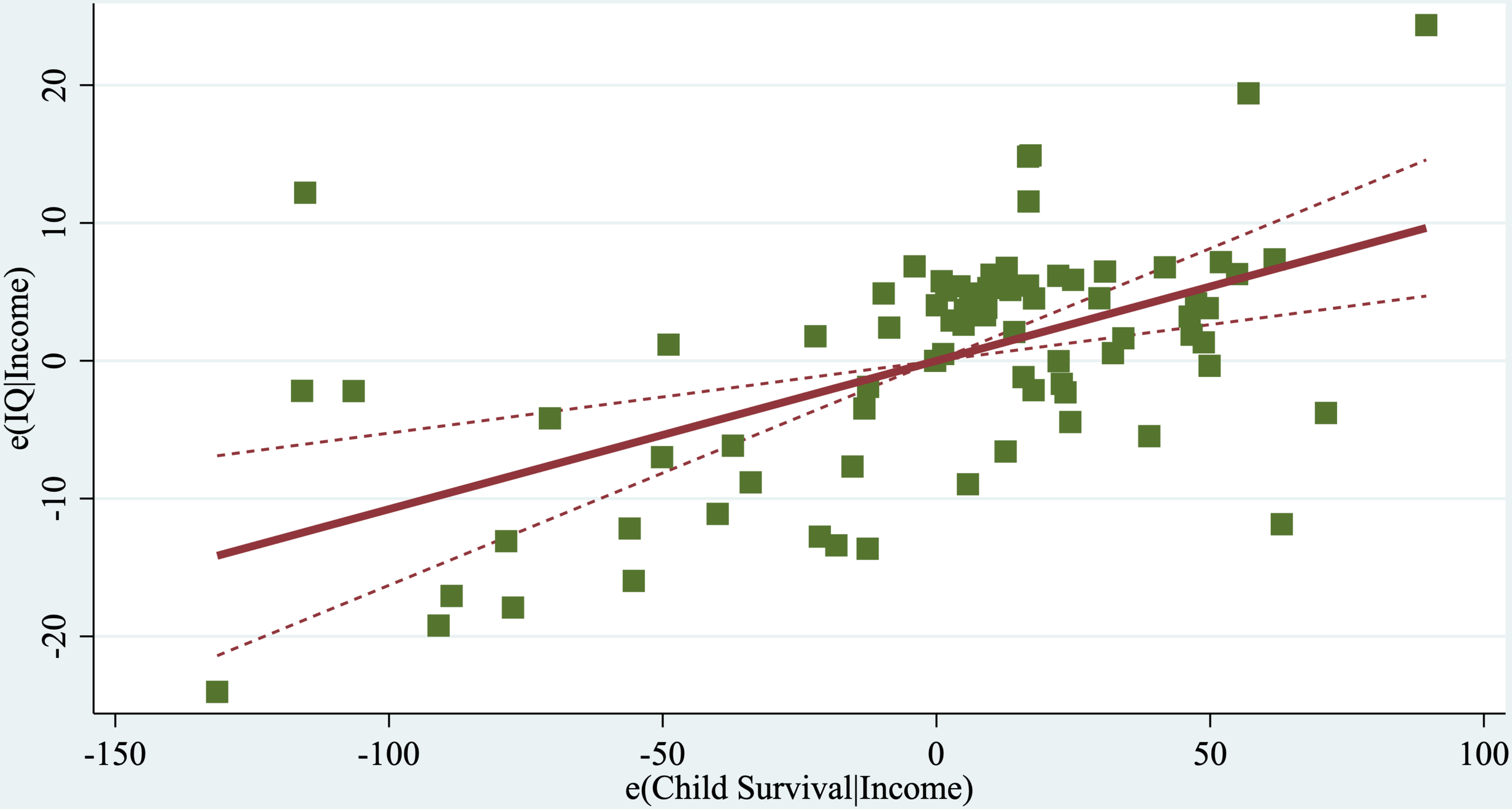
- all existing evidence is for individuals
- very high levels of risk factors in many countries
  - reduces child's productivity their whole life
  - quantify impact on economic growth
    - while controlling for other causes

cognitive risk variable

- all risk factors for cognitive development are also risks for child survival
  - nutrition, disease, nurture, violence, toxins
- use child survival rate as proxy for good cognitive development conditions
  - captures synergies between risk factors

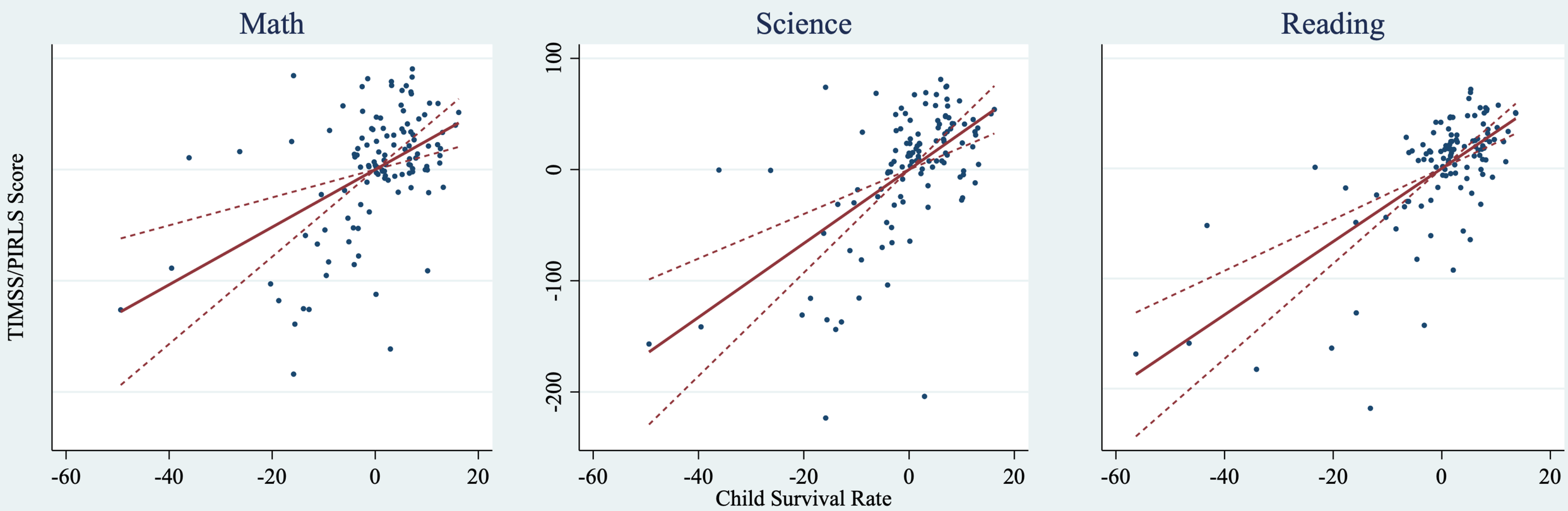
IQ and Child Survival Rate

controlling for income



Child survival vs. 4th grade TIMSS/PIRLS scores

conditional on income levels and education expenditure

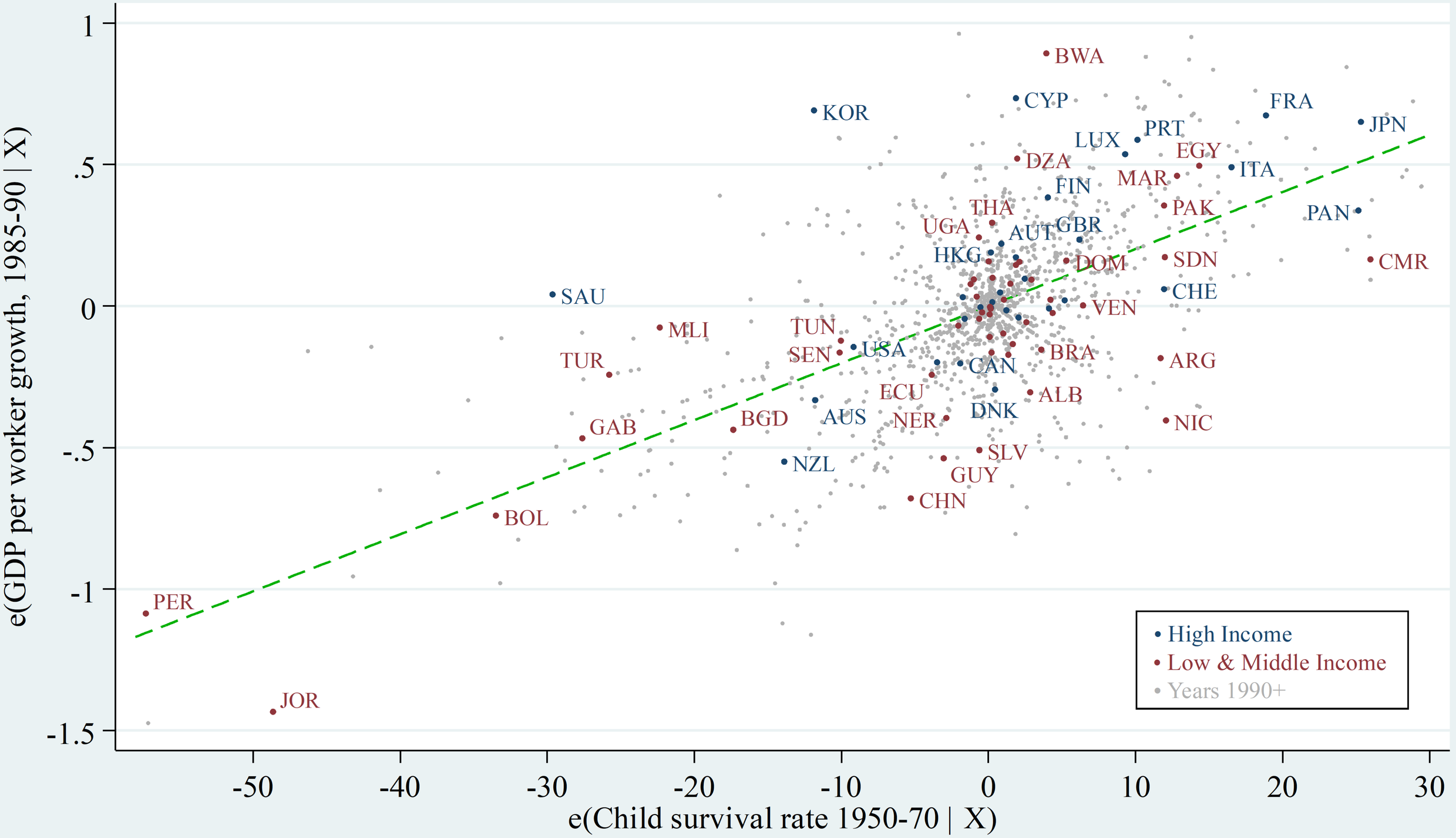


Lagged child survival

	GDPpw Growth	GDPpw Growth
Initial log GDP per worker	-3.642**	-3.566**
Institutional quality (0-100)	0.032	0.028
Trade (% of GDP)	0.005**	0.005**
Schooling (years)	0.215	0.222
Adult survival (per 1000)	0.008*	0.007*
Child survival, previous generation	0.022**	
Child survival, gen[-1], low income		0.022**
Child survival, gen[-1], high income		0.022**
Constant	8.248	8.409
$R^2(Corr(\hat{y}, y)^2)$	0.46	0.46
% Growth from 1 s.d. Δ CSR	1.76	
% Growth from 1 s.d. Δ ASR	0.86	
% Growth from 1 s.d. Δ CSR L.I.		1.63
% Growth from 1 s.d. Δ CSR H.I.		0.94

* $p < 0.05$; ** $p < 0.01$

economic growth versus child survival



optimistic story

- child health is improving almost everywhere
- we know how to improve maternal and child health
- investing in early child health is cheap
  - 3 year time period = 4% of 75 year life
  - countries spend less per year on child health

conclusion

- child health conditions when workers were children
  - highly correlated with economic growth
- most likely due to good child cognitive development
  - large microeconomic estimates of impact
  - high rates of risk factors in most countries
- economic problem as well as a health problem
  - may be most cost-effective economic growth strategy
- also improves human development (health, education, life satisfaction, equity)

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