

IQ in the Utility Function

Cognitive skills, time preference, and cross-country differences in savings rates

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Why do some countries save more?

- A syllogism:
 - Psych/Econ: High intelligence predicts patience
 - Psych: Average IQ currently differs across countries.
 - Growth theory: High patience predicts high savings rates & high capital intensity (K/Y)
- Therefore: If countries differ in IQ, they should differ in long-run savings behavior.

IQ and Patience across individuals

[A]cross [24] studies, higher intelligence was associated with lower D[elay] D[iscounting]...

-Shamosh and Ray, *Intelligence*, 2008

...[S]hort-run discounting [is] less common among those with higher standardized test scores...

-Benjamin/Brown/Shapiro, 2006

Also: Frederick (JEP 2005), Burks et. al (PNAS 2009)

Searching for a parameter: $d(\rho)/d(IQ)$

Problems:

1. Most psych/behav econ studies are short-term
2. Most psych studies report correlations:

Hard to back out parameters

Two exceptions:

1. Warner/Pleeter (AER 2001). Military Downsizing:
Lump-sum vs. Annuity: 200,000 obs., with AFQT scores
2. Dohmen et al (2009). German experiment: 1 year postdated check
Subjects given 2 of 11 subtests in Wechsler IQ test

Two parameter estimates: Similar

What units?

ρ = rate of time preference in %

IQ = 1 standard deviation rise in IQ within a typical national population: 1 s.d. = 15 IQ points

Warner/Pleeter: Military decision

$$d(\rho)/d(\text{IQ}) = -0.77\%$$

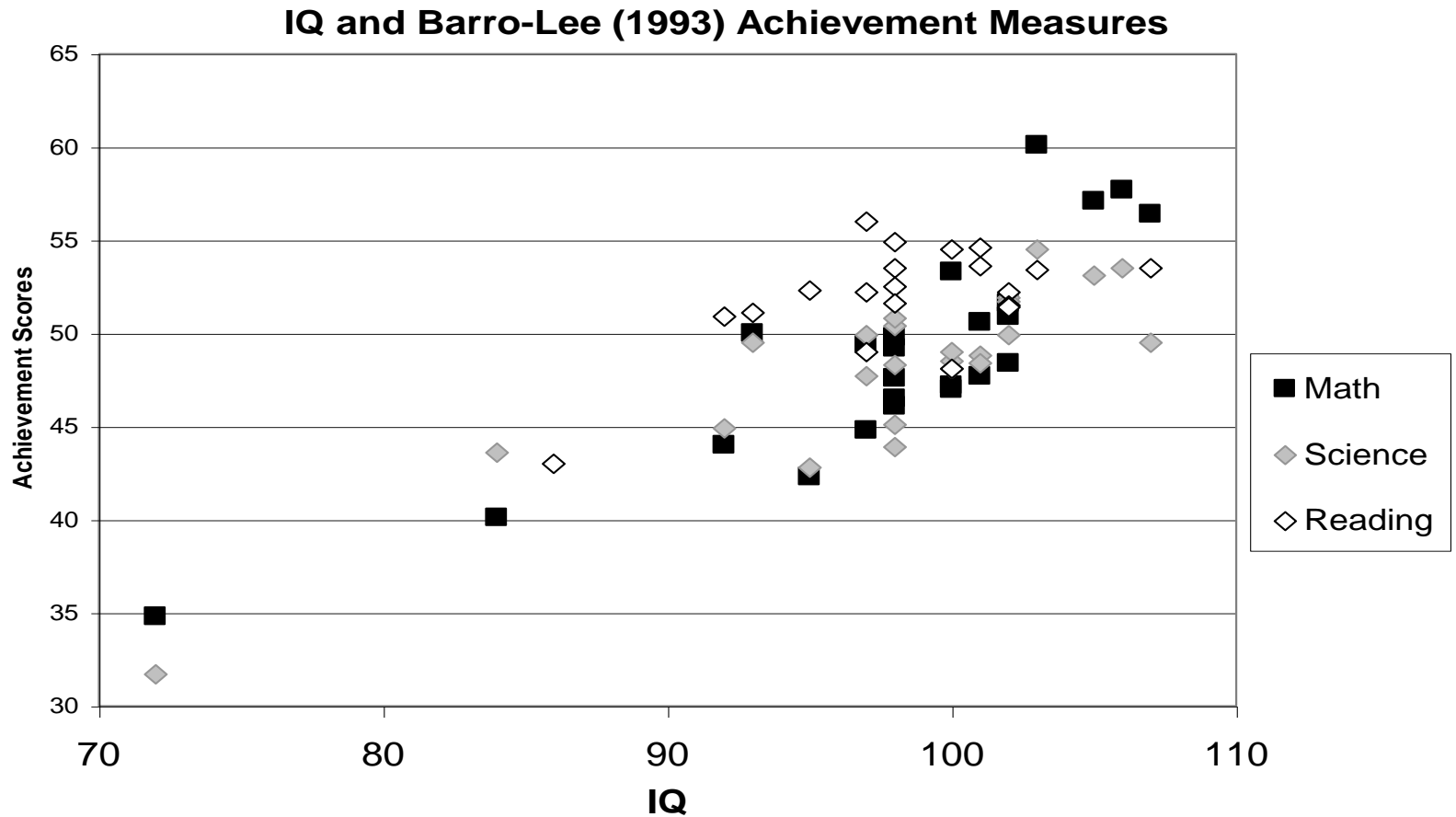
Dohmen/Falk: Average of 6 exp'l estimates:

$$d(\rho)/d(\text{IQ}) = -0.73\%$$

IQ differs across countries

- Not a controversial claim in psych literature
 - Controversy about precise magnitude, meaning
 - US/UK mean: 100 by definition
 - East Asians have scored 0.5σ higher for decades
 - Richard Lynn collected Japanese data in 1970's
- Lynn and Vanhanen ('06): **IQ and Global Inequality**
 - Database of 113 National Average IQ estimates
 - Global mean: 90. Global σ : 11 points
 - Robust across IQ tests: Verbal, Visual, “culture-fair”

IQ tells similar story to Barro-Lee

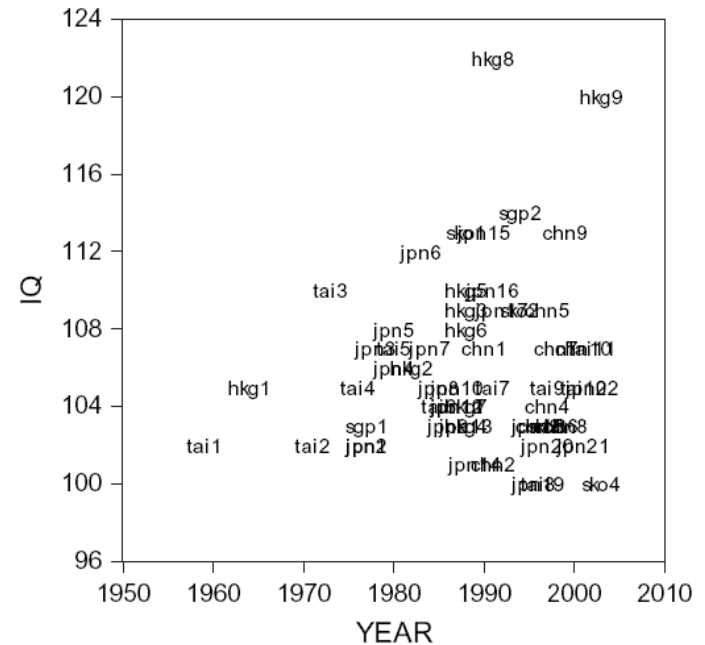


Thus, one can loosely interpret “IQ” as “Math/Science skill”

Is it *all* reverse causation?

- Would expect rapid IQ growth in East Asia, starting well below 100.
- Would expect rapid IQ growth in OPEC countries post-1973

FIGURE 4
IQ in East Asia: 1959–2003



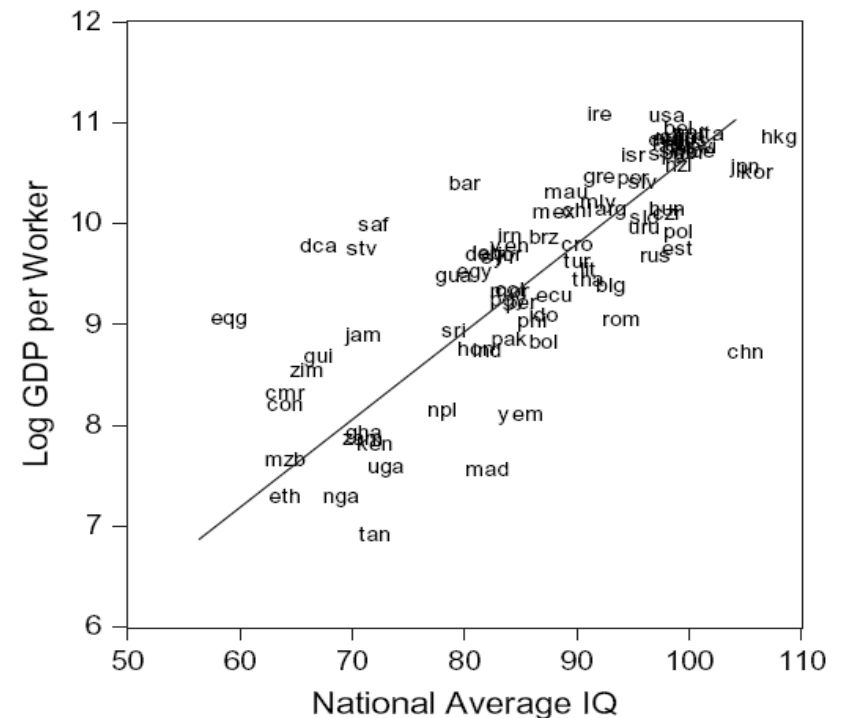
Source: LV (2006). Data labels indicate country and sequence order. Thus, hkg9 is the ninth IQ test given to a Hong Kong sample as reported in LV (2006).

National IQ: Significant in 455 growth regressions

$p < 1\%$ in 100% of 455 regressions controlling for SDM (AER 2004) robust variables

1. East Asian dummy +
2. Primary schooling 1960 +
3. Investment price -
4. GDP 1960 (log) -
5. Fraction of tropical area -
6. Population density coastal 1960's +
7. Malaria prevalence in 1960's -
8. Life expectancy in 1960 +
9. Fraction Confucian +
10. African dummy -
11. Latin American dummy -
12. Fraction GDP in mining +
13. Spanish colony -
14. Years open to trade +
15. Fraction Muslim +
16. Fraction Buddhist +
17. Ethnolinguistic fractionalization -
18. Government consumption share 1960's -

National Average IQ and Year 2000
GDP per Worker



Jones/Schneider (J. Econ Growth 2006)

IQ in the Ramsey Model:

First, strong Feldstein-Horioka channel

Discounted per-period utility: $[1 / (1 + \rho)]^t u(c)$

But now ρ is a function of national average IQ

Steady-state savings rate and capital/output ratio:

$$s^* = \alpha(g + n + \delta) / (\rho(IQ) + \theta_g + \delta)$$

$$(K/Y)^* = \alpha / (\rho(IQ) + \theta_g + \delta)$$

IQ in the steady state:

Taking U.S. parameters as benchmark

	1 σ	High-Low: 1.6 σ	High-Low 2.5 σ
$d(K/Y)/dIQ$ ($\alpha = .33$)	0.45	0.67	0.98
$d\ln(K/Y)/dIQ$	0.10	0.15	0.23
$d(K/Y)/dIQ$ ($\alpha = .67$)	0.9	1.4	2.0
$d\ln(K/Y)/dIQ$	0.10	0.15	0.23
ds/dIQ ($\alpha = .33$)	2.7%	4.0%	5.8%
$d\ln(s)/dIQ$	0.11	0.18	0.30
dr/dIQ	-0.7%	-1.2%	-1.8%

$$\rho(IQ) + \theta_g = 4\%, \delta = 3\% \text{ for U.S.}$$

$$dp/d(IQ) = 3/4\%$$

Correlation Matrix

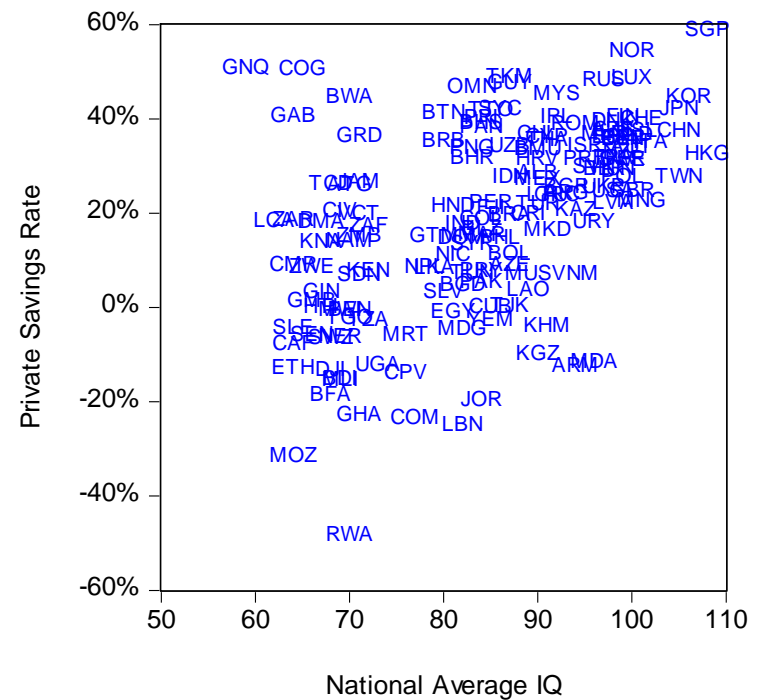
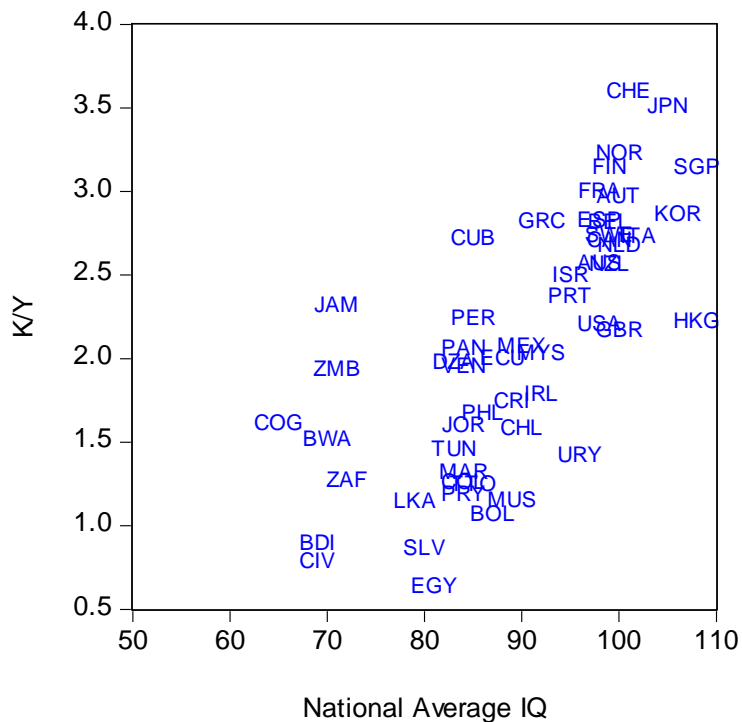
	IQ	IQ (interp'd)	log(K/L)	log(Y/L)	K/Y	s	r
IQ	1.00	1.00	0.80	0.79	0.64	0.64	-0.67
IQ(interp)	1.00	1.00	0.80	0.79	0.64	0.64	-0.67
log(K/L)	0.80	0.80	1.00	0.94	0.85	0.66	-0.83
log(Y/L)	0.79	0.79	0.94	1.00	0.66	0.54	-0.75
K/Y	0.64	0.64	0.85	0.66	1.00	0.74	-0.88
s	0.64	0.64	0.66	0.54	0.74	1.00	-0.58
r	-0.67	-0.67	-0.83	-0.75	-0.88	-0.58	1.00

Data: Lynn/Vanhanen (2006)

PWT for savings rates (1980-2005)

Caselli/Feyrer, "The Marginal Product of Capital," (QJE 2007): K, Y, r

IQ vs. K/Y and savings



Univariate regression estimates: Bigger than predicted

Dependent Variable	Coefficient	Predicted
$d(K/Y)/dIQ$	0.8 (0.1) n=50, R ² =53%	0.45
$d(\ln(K/Y))/dIQ$	0.4 (0.06) N=50 R ² = 49%	0.10
$d(s)/dIQ$	13% (1.7%) n = 152 R ² = 27%	2.7%
$d(\ln(s))/d(IQ)$	0.2 (0.04) n=152 R ² = 11%	0.11
dr/dIQ	-2.5%(1.1%) N = 49 R ² = 10%	-0.7%

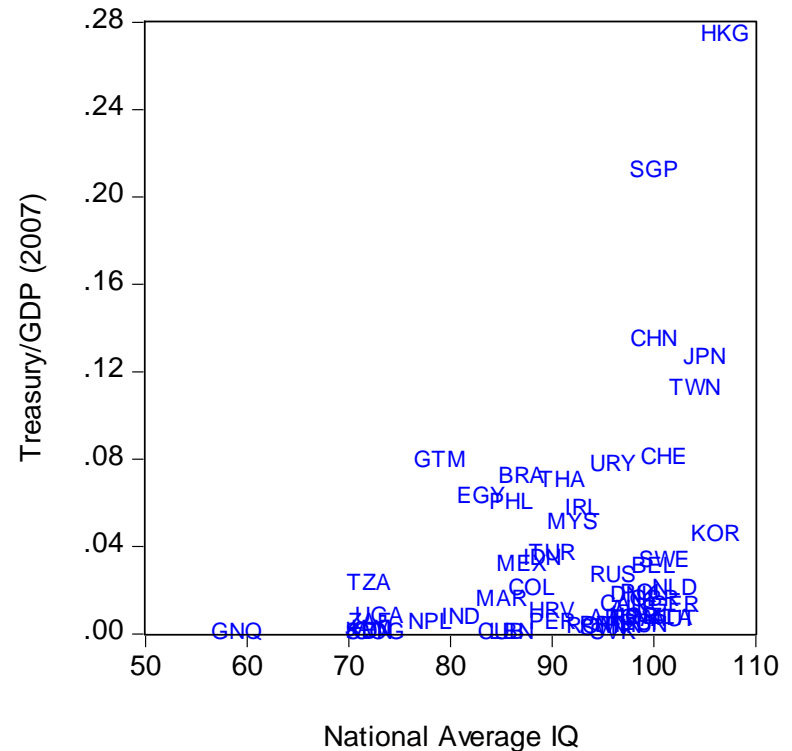
OPEC countries and countries with $s < -0.5$ omitted

An open-economy test: Safe Assets

Holdings of U.S.
Treasuries as fraction
of GDP: T/Y

Proxy for international
savings

Correlation robust to:
Y/L control,
agency securities



OPEC members, Caribbean Tax Havens,
and Luxembourg omitted

$T/Y = 5$ for Bermuda

Predicting the free-capital-flow future with Barro & Sala-i-Martin

Order all countries by their rates of time preference, with Country 1 the most patient:

“Asymptotically, **Country 1 owns all the wealth...**[all] claims on capital and the present value of the wage income in all countries.”

“All other countries own a negligible amount (per unit of effective labor) in the long run”

-Economic Growth, p. 164-165

Who is country 1?

- By National Average IQ:

A Tie: Hong Kong and Singapore (108)

- Within 3 IQ points:

S. Korea (106)

China, Japan, Taiwan (105)

Roughly 0.5σ above US/UK: A robust difference

Conclusion: IQ and time preference

- In theory and practice, national average IQ matters
 - Effect on time preference is large
 - Theory provides rigorous links:
$$IQ \rightarrow \rho \rightarrow \text{savings measures}$$
- Evidence supports this relationship
 - Closed-economy or strong Feldstein-Horioka
 - Open-economy: IQ predicts safe asset holdings
- More channels:
 - The folk theorem: ρ matters for cooperation (Jones, JEBO 2009)
 - Political economy stories turn on ρ , which differs across countries