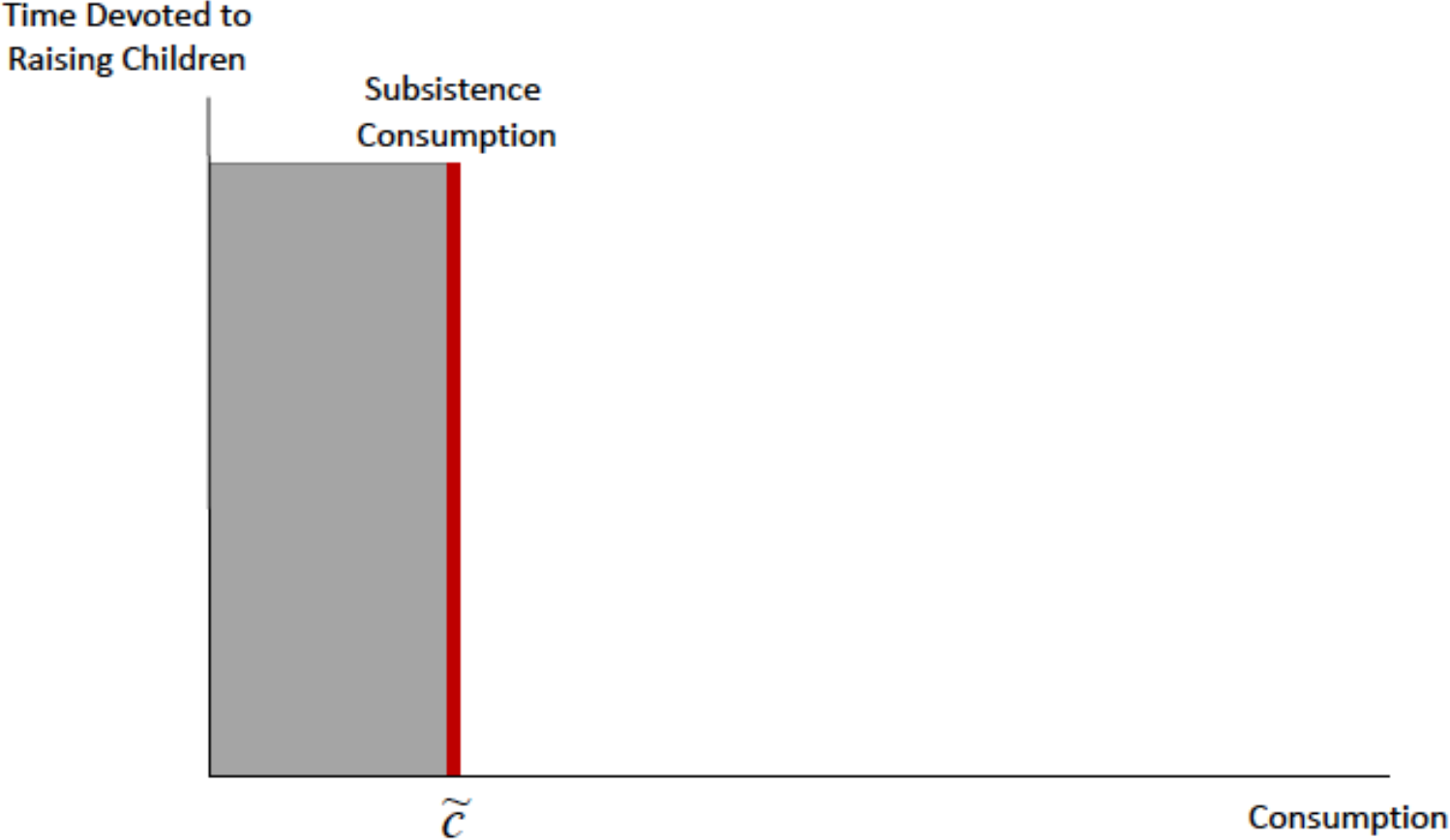




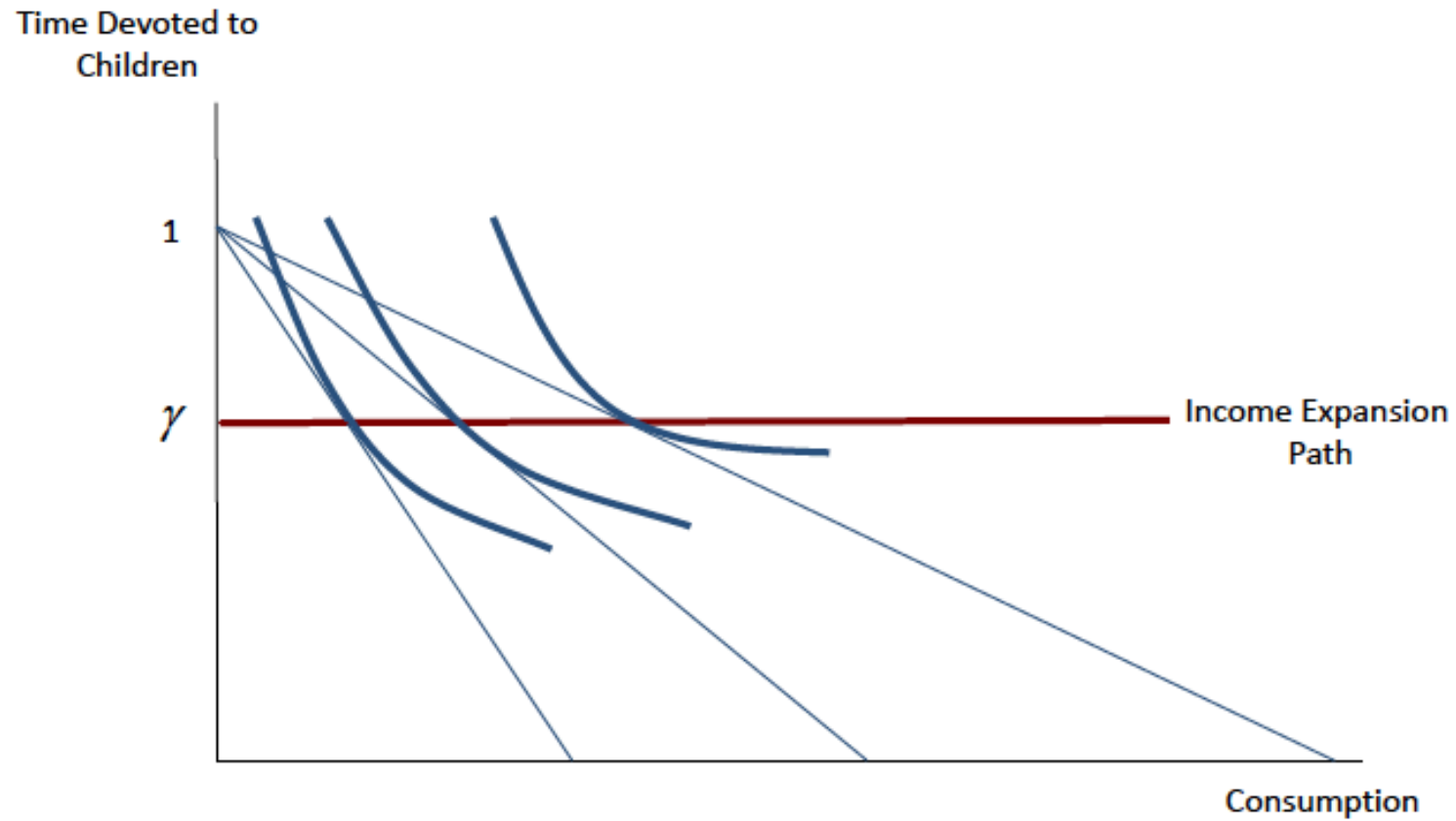
# Cultural and Religion Traits that Promotes Education: Gender Quality, Human Rights

Current Global Macro Perspectives  
Spring 2020 – Greg Siourounis

# Theory Check: Subsistence Level



# Once you escape subsistence

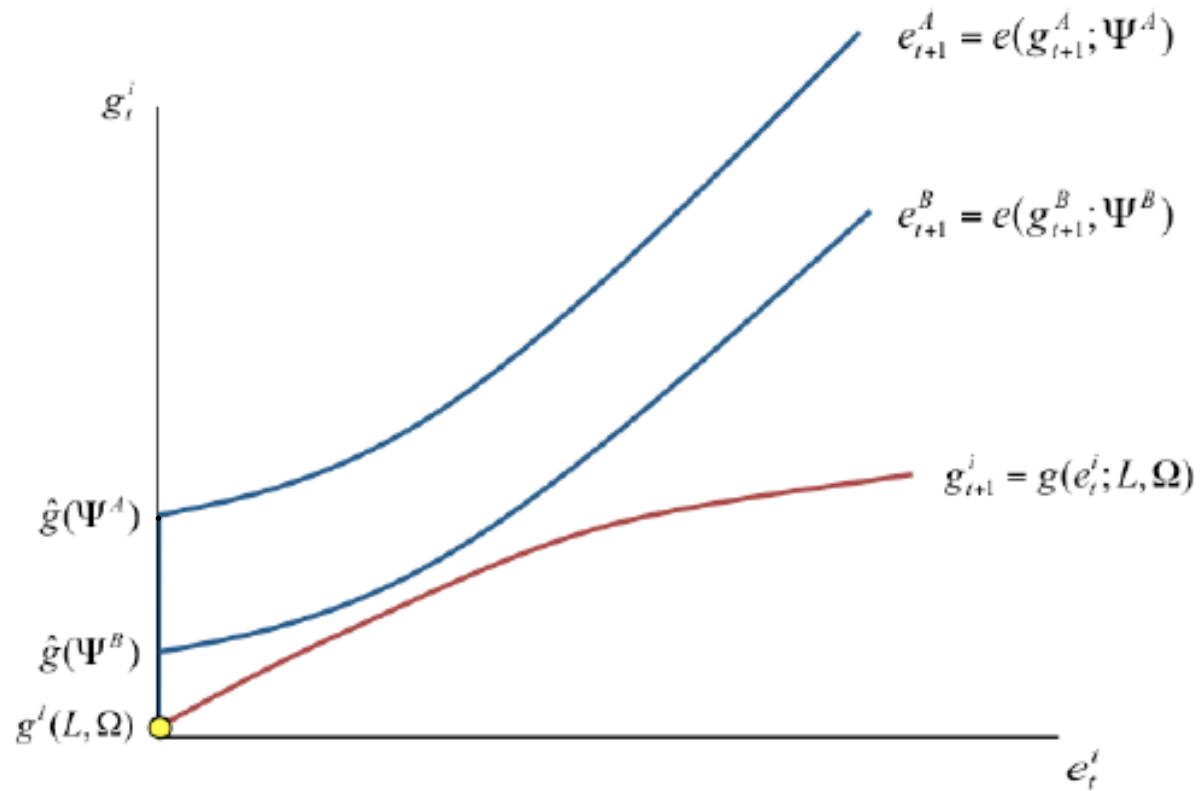


# Theory Check: Improving the Education Path

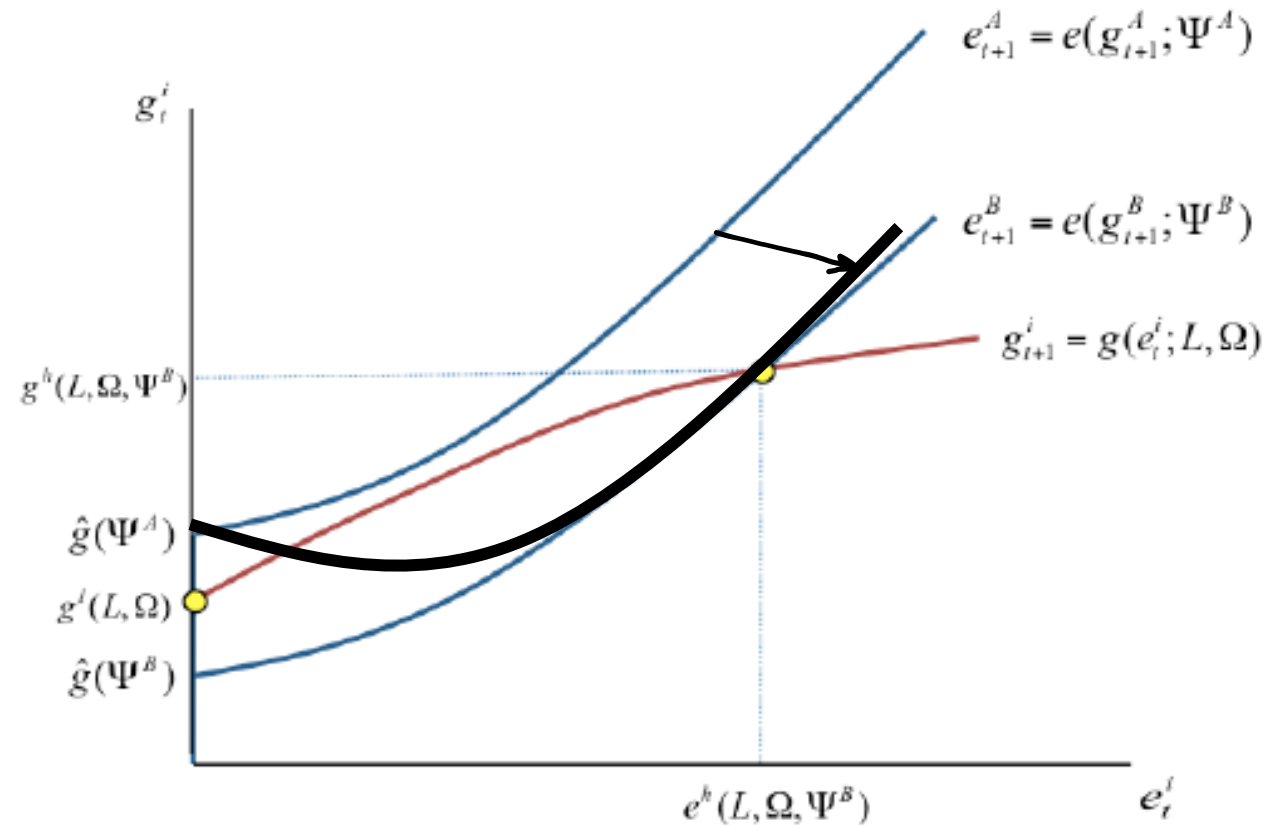
- For country-specific characteristics  $\Psi_t^i$

$$e_{t+1}^i = e(g_{t+1}^i; \Psi_t^i) \begin{cases} = 0 & \text{if } g_{t+1}^i \leq \hat{g}(\Psi_t^i), \\ > 0 & \text{if } g_{t+1}^i > \hat{g}(\Psi_t^i) \end{cases}$$

# Moving from no impact



Bisin & Verdier (2001): Parents transmit a particular cultural trait to their children if this grants utility to parents or children.



# What is the definition of Culture? Cambridge Dictionary.

- "Culture encompasses religion, food, what we wear, how we wear it, our [language](#), marriage, music, what we believe is right or wrong, how we sit at the table, how we greet visitors, how we behave with loved ones, and a million other things
- The word "culture" derives from a French term, which in turn derives from the Latin "colere," which means to tend to the earth and grow, or cultivation and nurture. "It shares its etymology with a number of other words related to actively fostering growth,"

# William Butler Yeats (1865-1939 - Irish)

- For without culture or holiness, which are always the gift of a very few, a man may renounce wealth or any other external thing, but he cannot renounce hatred, envy, jealousy, revenge. Culture is the sanctity of the intellect.



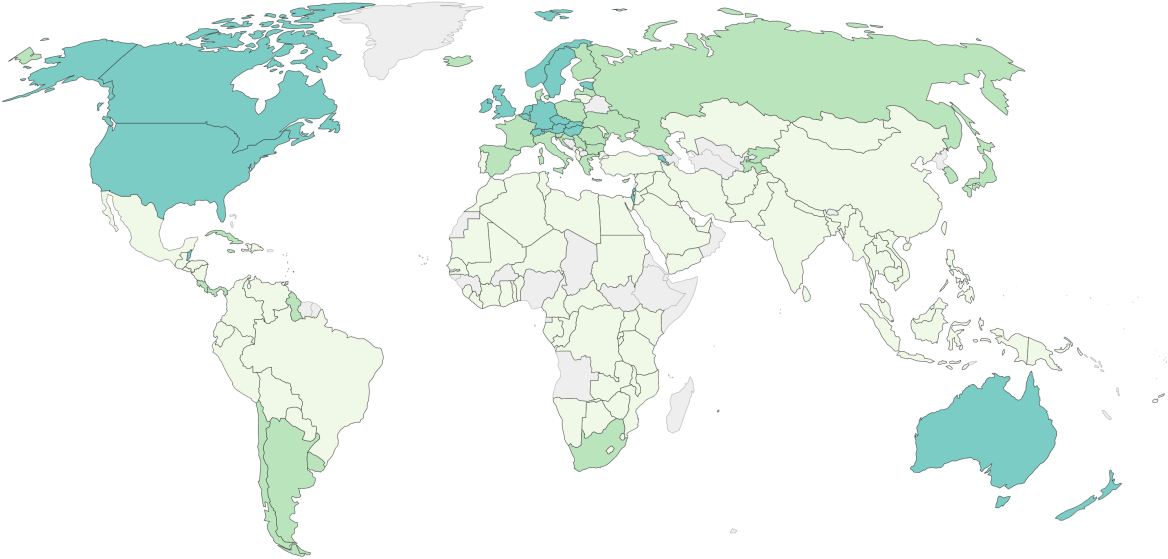
# Data Sources

- <https://ourworldindata.org/global-education>

# The state of the world

## Mean years of schooling, 1950

Average number of years of total schooling across all education levels, for the population aged 25+



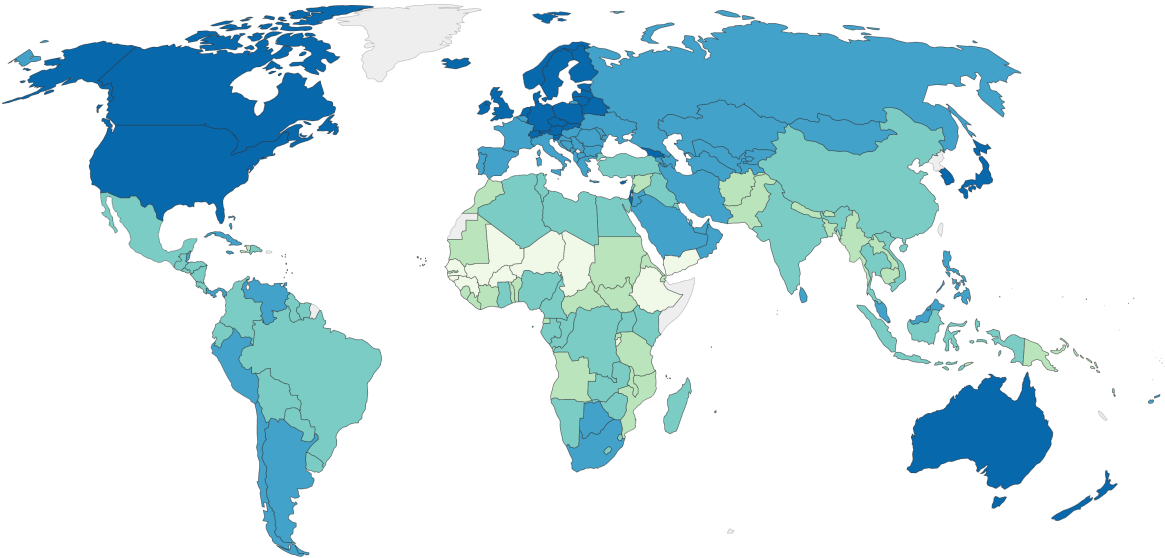
Source: Lee-Lee (2016), Barro-Lee (2018) and UNDP, HDR (2018)

OurWorldInData.org/global-rise-of-education • CC BY

# The state of the world today (2017)

## Mean years of schooling, 2017

Average number of years of total schooling across all education levels, for the population aged 25+



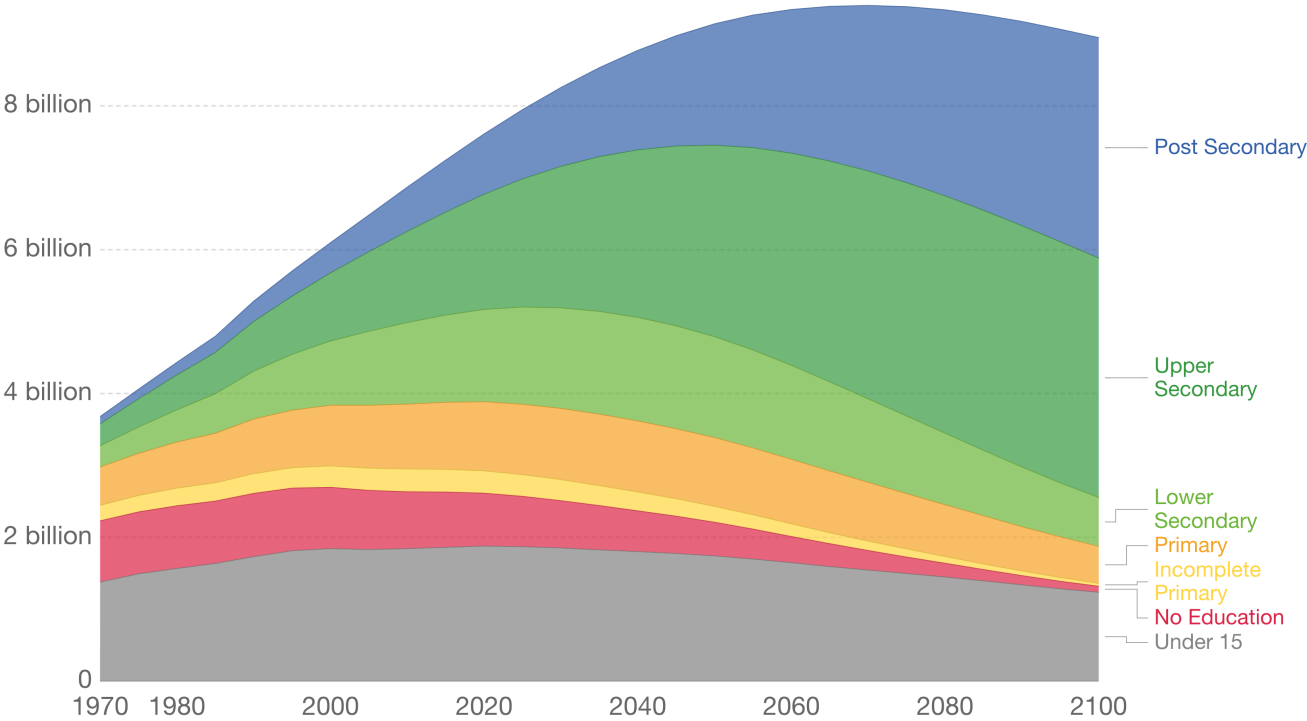
Source: Lee-Lee (2016), Barro-Lee (2018) and UNDP, HDR (2018)

OurWorldInData.org/global-rise-of-education • CC BY

# The state of the future world

## Projected world population by level of education

This visualization shows the Medium projection by the International Institute for Applied Systems Analysis (IIASA). The researchers who created this projection describe it as their "middle of the road scenario that can also be seen as the most likely path".



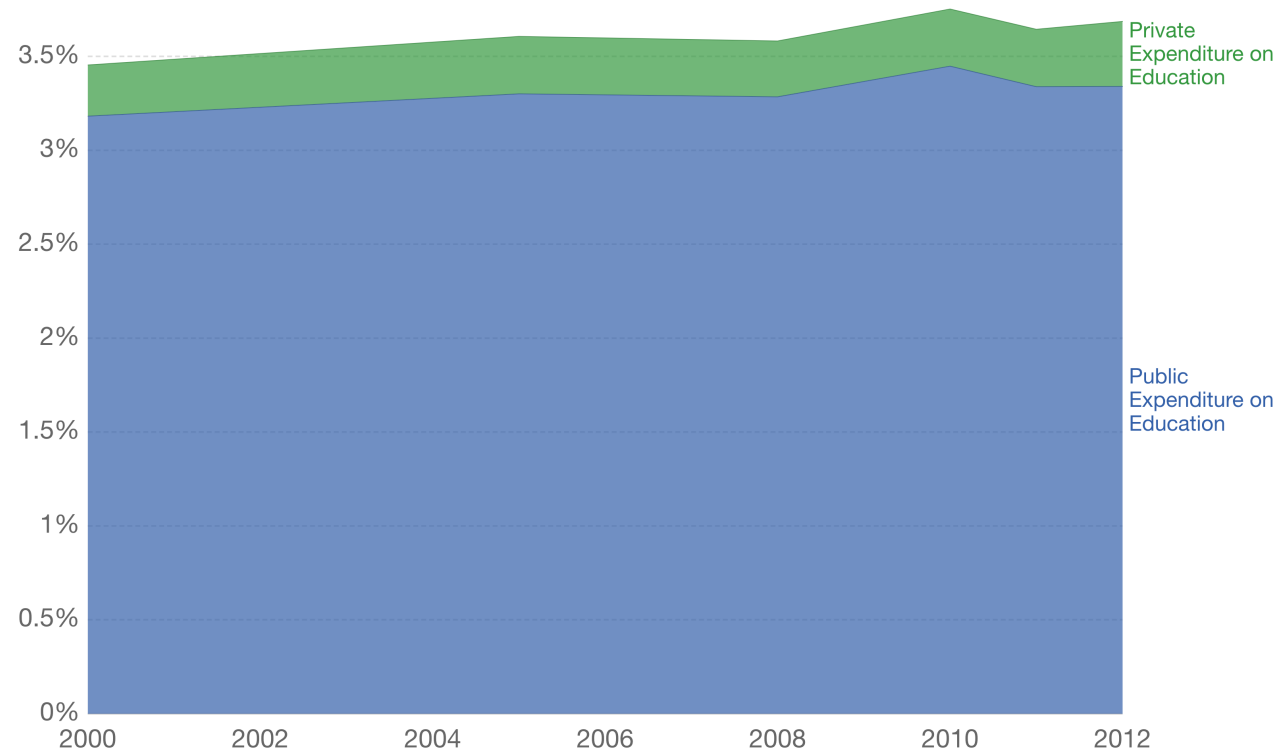
Source: Global Projection, Medium SSP2 - IIASA (2016)

OurWorldInData.org/future-population-growth • CC BY

# Collective vs Individual Culture: Private or Public

## Average OECD non-tertiary education expenditure by source of funding

Average expenditure on educational institutions given as a share of GDP, by source of funding (primary, secondary and post-secondary non-tertiary).



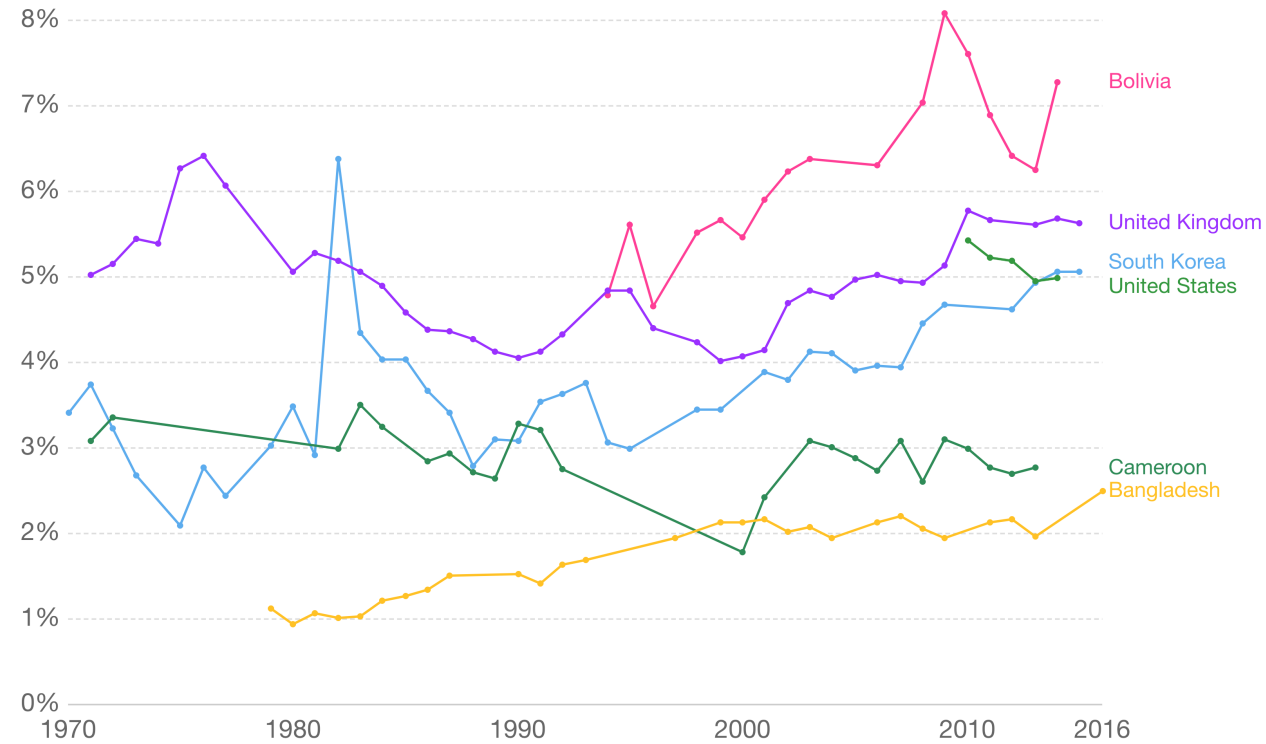
Source: OECD: Education Statistics (2017)

OurWorldInData.org/global-rise-of-education • CC BY

# Countries are spending more in education

## Total government expenditure on education

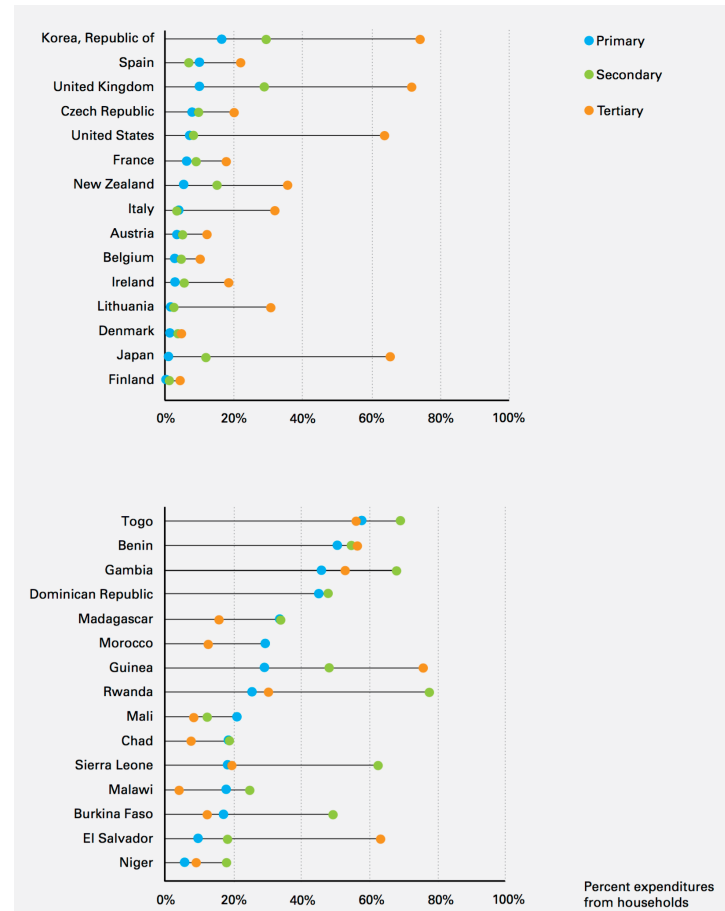
Total general government expenditure on education (all levels of government and all levels of education), given as a share of GDP.



Source: World Bank

OurWorldInData.org/global-rise-of-education • CC BY

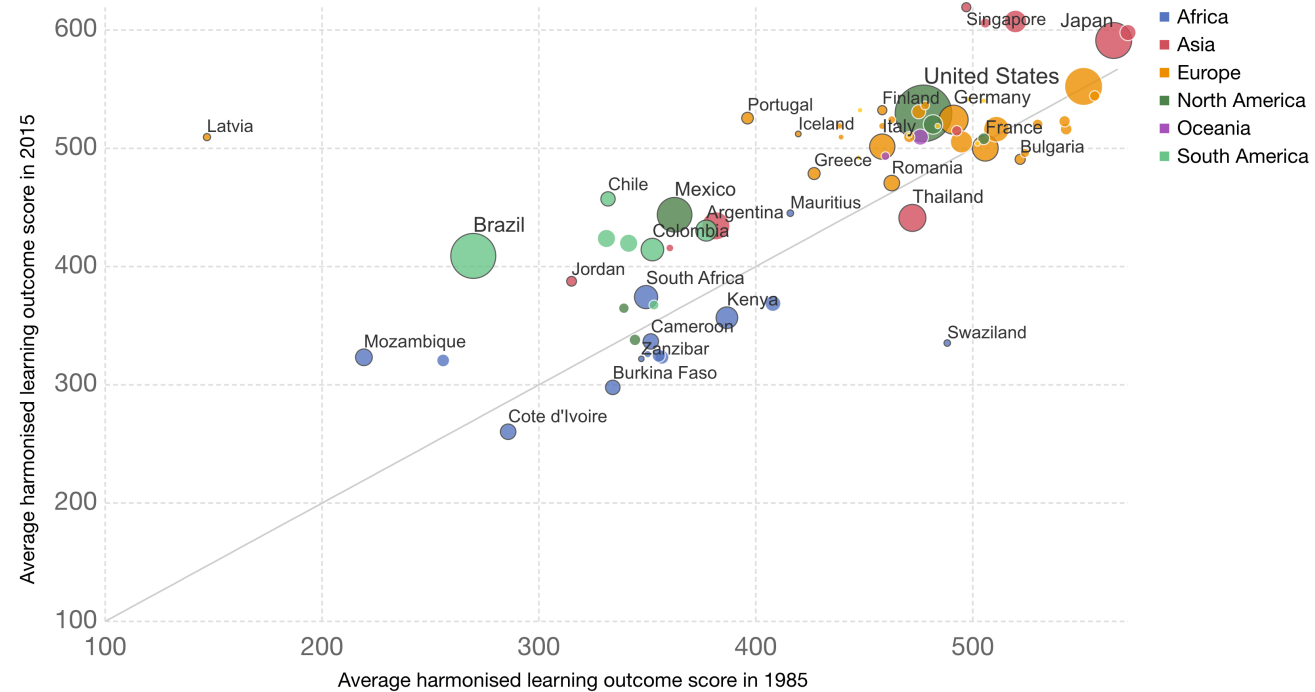
# But how about households? high income households spend larger share in education.



# Spending vs learning? Careful its Correlations!!!

## National average learning outcomes, 1985 vs 2015

Average scores across standardized, psychometrically-robust international and regional student achievement tests. In order to maximize coverage by country, tests have been harmonized and pooled across subjects (math, reading, science) and levels (primary and secondary education). The observations correspond to 1985 and 2015, or closest year available.

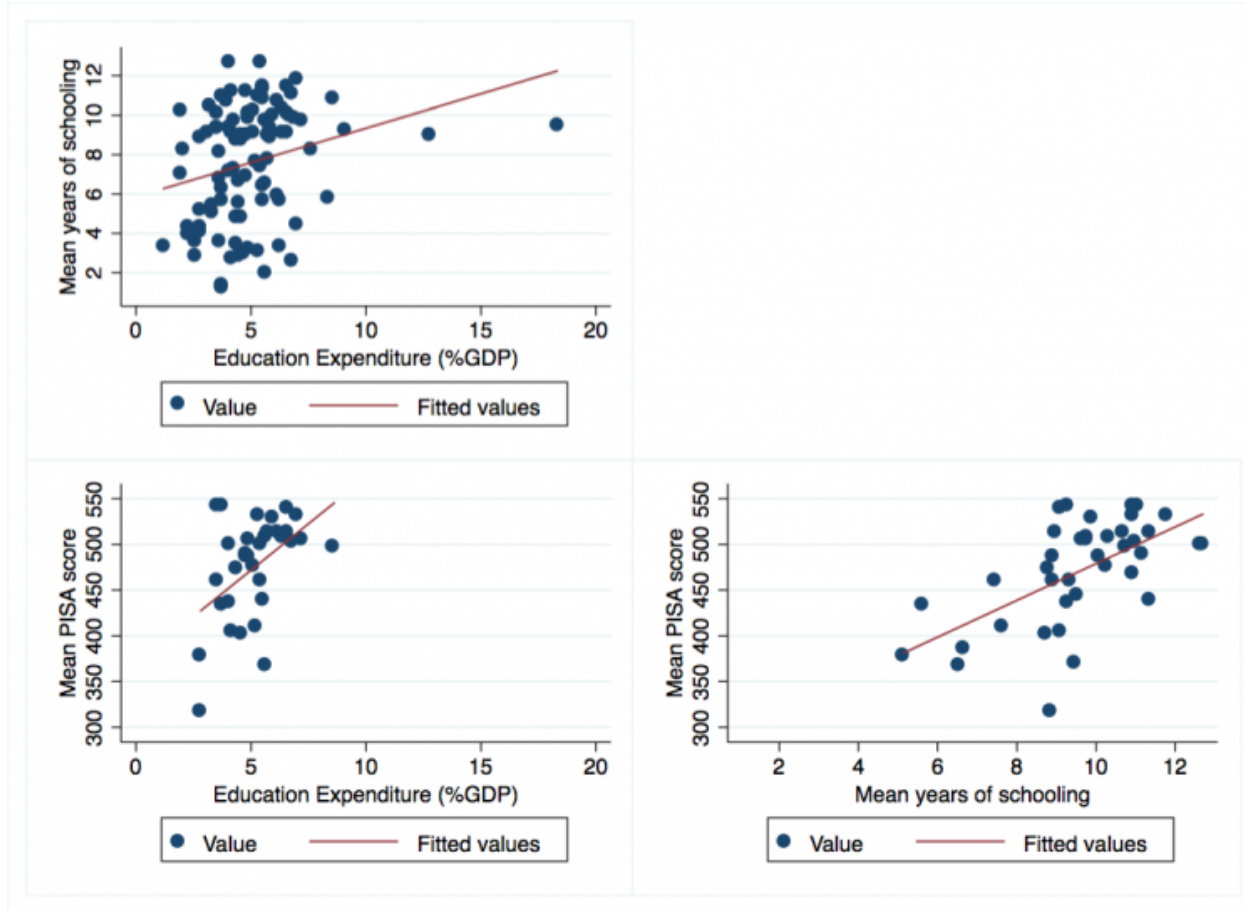


Source: Altinok, Angrist, and Patrinos (2018)

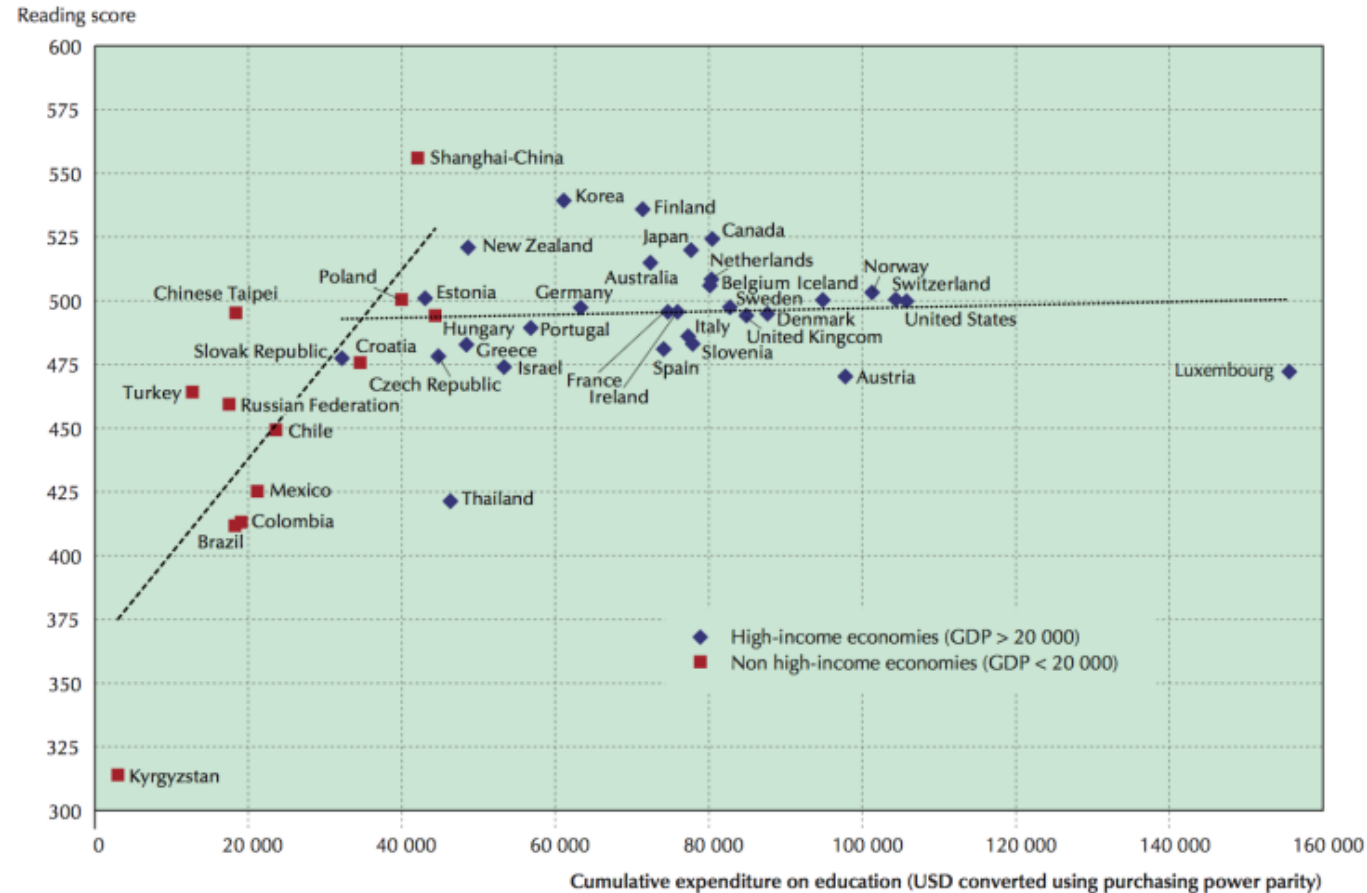
CC BY



# Spending vs Learning?



# Does cross-country variation in government education expenditure explain cross-country differences in education outcomes?

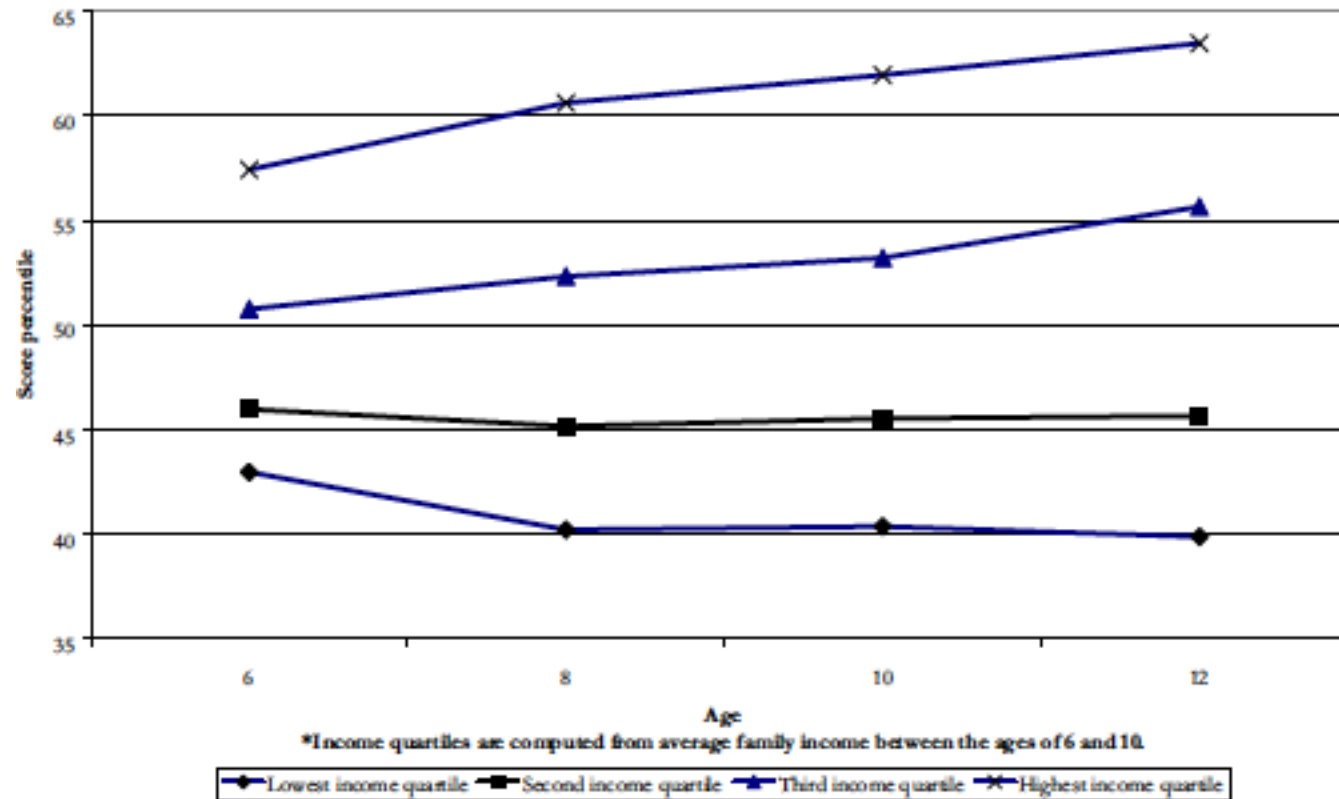


# Cuhna and Heckman (2008): it is culture in early life driven by rationality

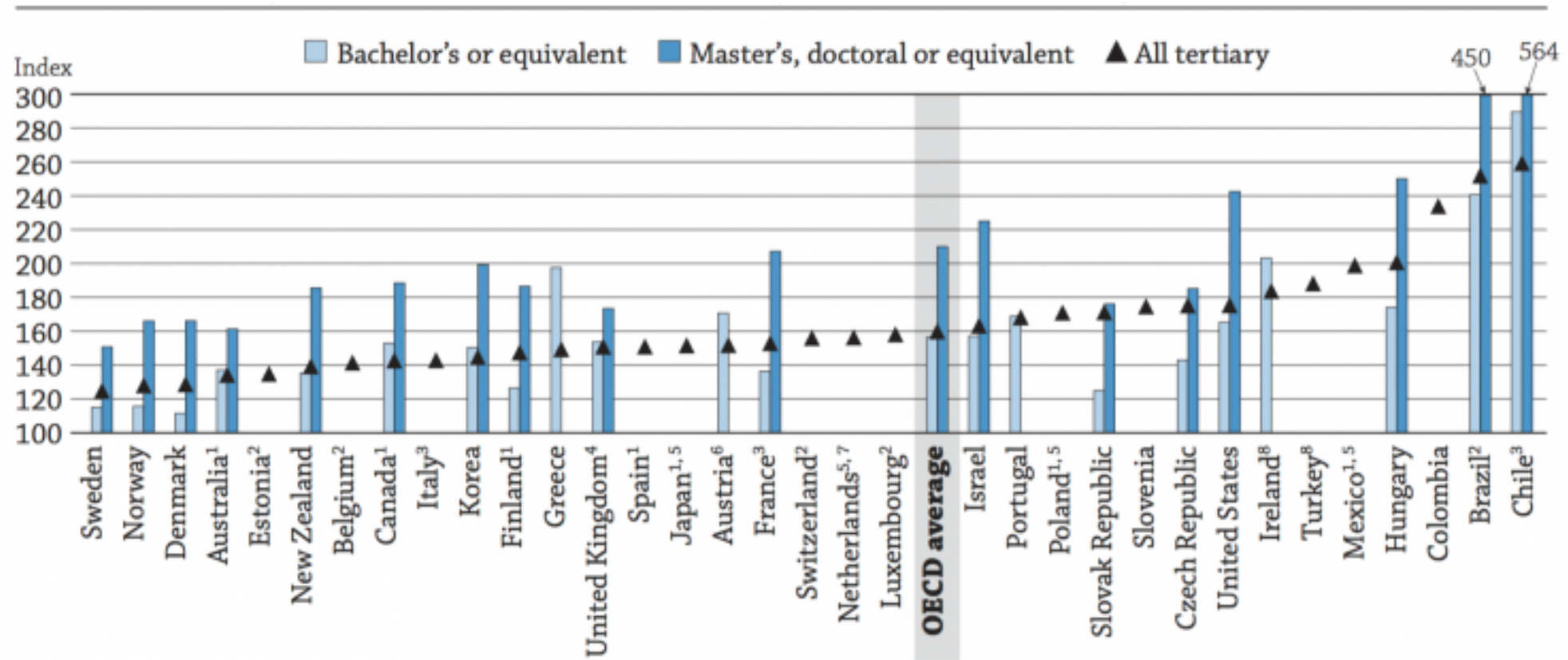
- The environment that children are exposed to early in life, plays a crucial role in shaping their abilities, behavior and talents.
- To a great extent, this is what drives large and remarkably persistent gaps in the education achievement between individuals in the same country, but in different socioeconomic environments.
- Cognitive and Non-Cognitive Skills Equally Important

# Endogenous Decisions on investments in Education

Figure 1. Children of NLSY: Average percentile rank on PIAT Math score, by income quartile.\*

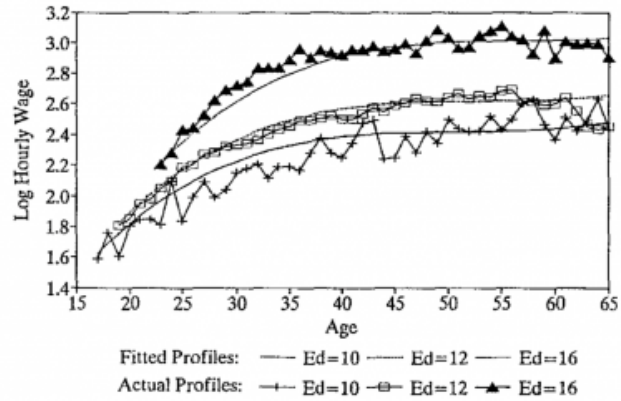


# Is it rational to spend to education? Earnings...

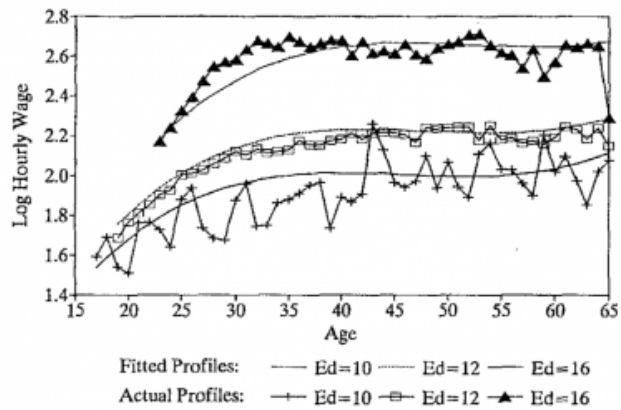


# Earnings over time by sex

a. Hourly Wage Profiles for Men



b. Hourly Wage Profiles for Women



# The elasticity of investment in education spending

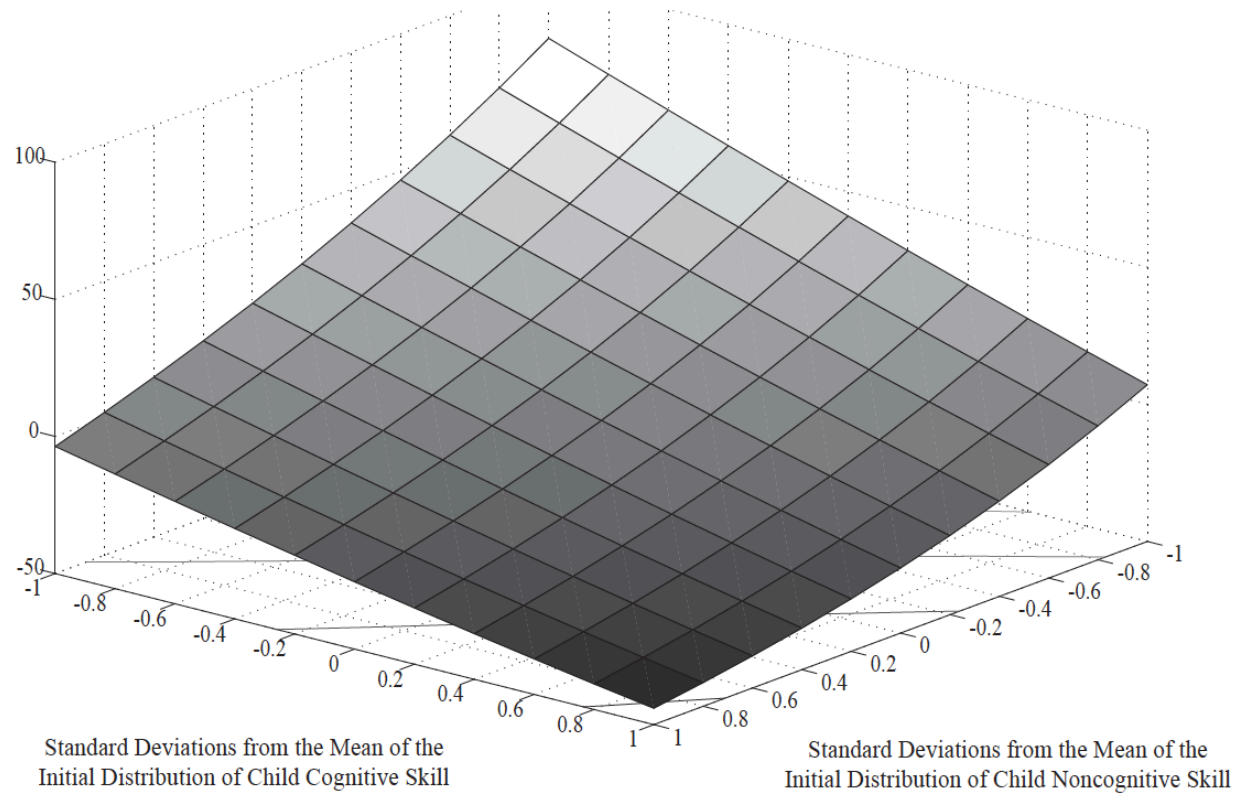
Table 2: Percentage Impact of an Exogenous Increase by 10% in Investments of Different Periods for Two Different Anchors White Males, CNLSY/79

Log earnings at age 23 – 28			Probability of graduating from high school		
Total percentage impact	Percentage impact exclusively through cognitive skills	Percentage impact exclusively through noncognitive skills	Total percentage impact	Percentage impact exclusively through cognitive skills	Percentage impact exclusively through noncognitive skills
Period 1			Period 1		
0.2487 (0.0302)	0.1247 (0.0151)	0.1240 (0.0150)	0.6441 (0.0789)	0.5480 (0.0672)	0.0961 (0.0118)
Period 2			Period 2		
0.3065 (0.0358)	0.0445 (0.0052)	0.2620 (0.0306)	0.3980 (0.0466)	0.1951 (0.0229)	0.2029 (0.0238)
Period 3			Period 3		
0.2090 (0.0230)	0.0540 (0.0059)	0.1550 (0.0170)	0.3565 (0.0389)	0.2366 (0.0258)	0.1198 (0.0131)

Note. From Cunha & Heckman (2008, Table 17). Standard errors in parentheses.

# Where should you invest? Where is needed!

*Figure 3.* Percentage increase in total investments as a function of child initial conditions of cognitive and noncognitive skills.

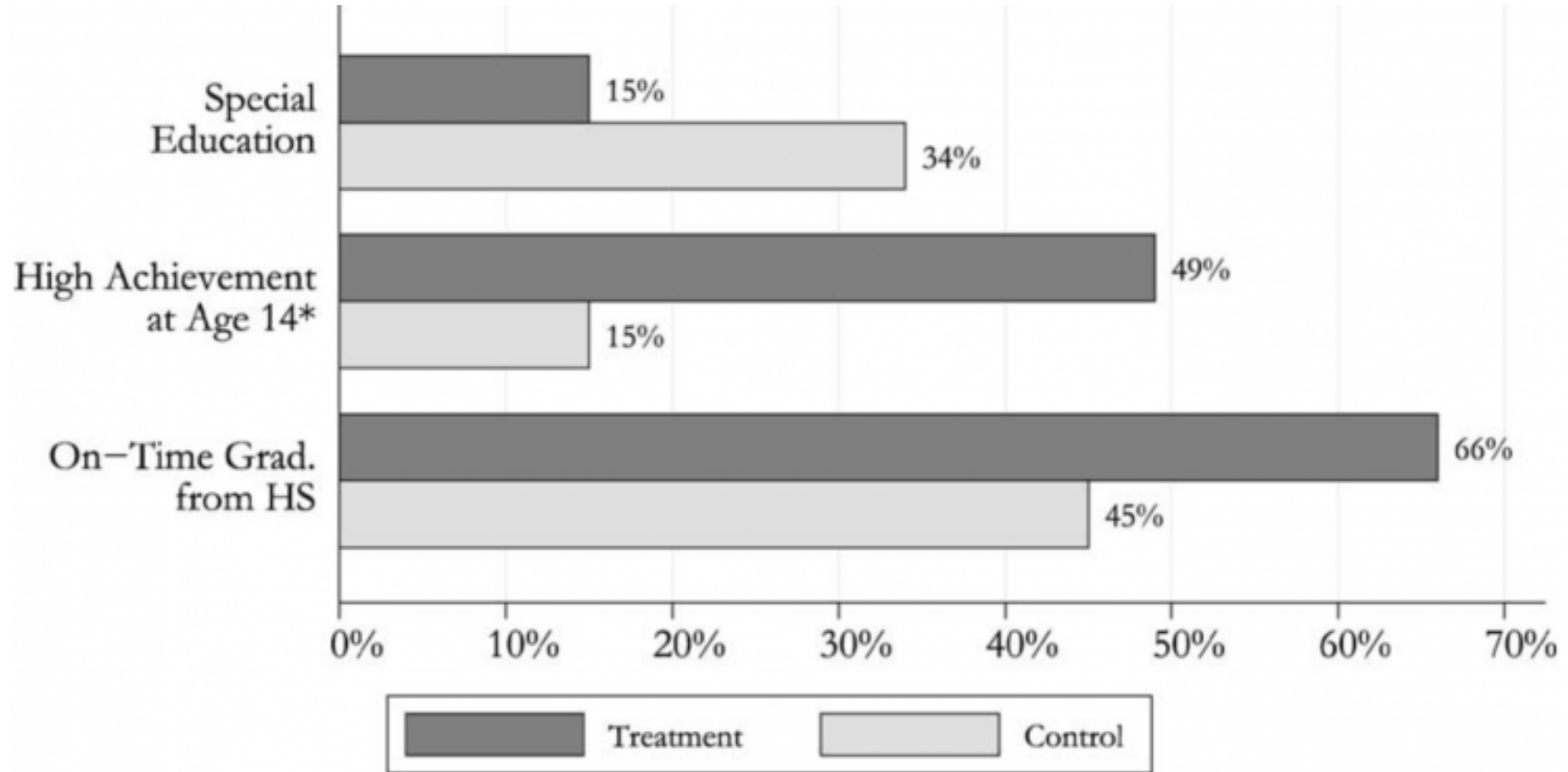




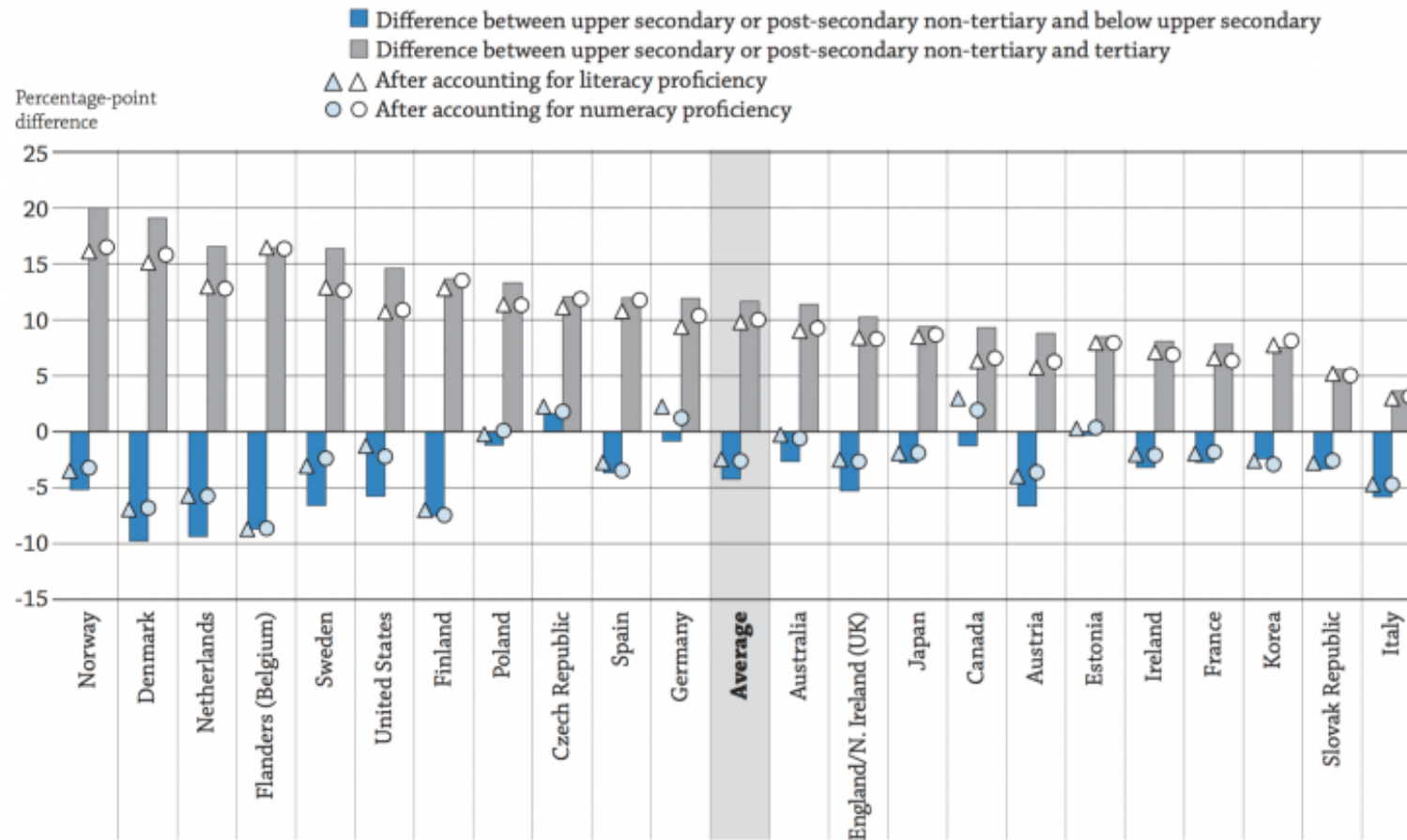
# Is it effective?

- Perry pre-school 'experiment' consisted in enrolling 65 randomly selected black children in a pre-school program, and comparing their outcomes later in life against those achieved by a control group of roughly the same size.
- The treatment consisted of a daily 2.5-hour classroom session on weekday mornings and a weekly 90-minute home visit by the teacher on weekday afternoons to involve the mother in the child's educational process.
- More information and details on the intervention are available in Cunha et al. (2006).

# You bet!



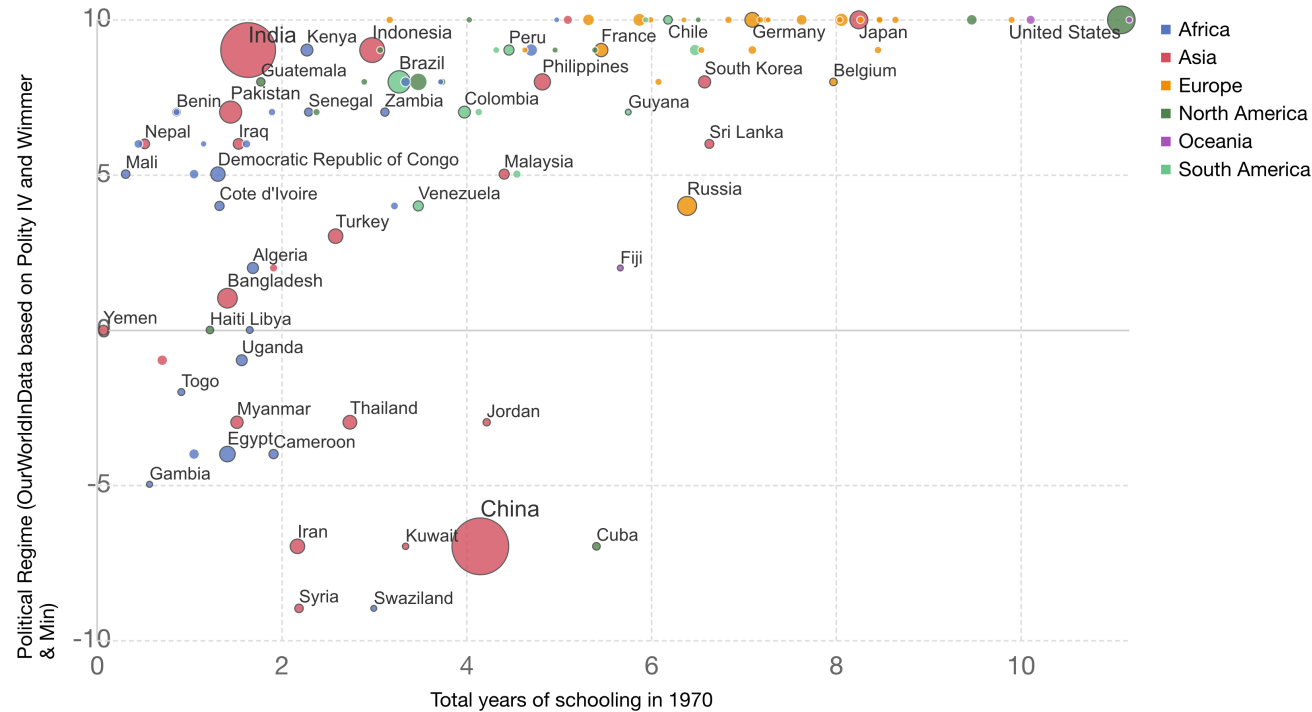
# How does education shape culture? Education correlates with prosocial behavior



# Countries with higher educational attainment in the past are more likely to have democratic political regimes today

## Correlation between education in the past and democracy today

Average years of schooling for total population aged 15-64 in 1970, and political regime according to the Polity IV assessment (ranging from -10 for 'Fully Autocratic' to +10 for 'Fully Democratic') in 2015.

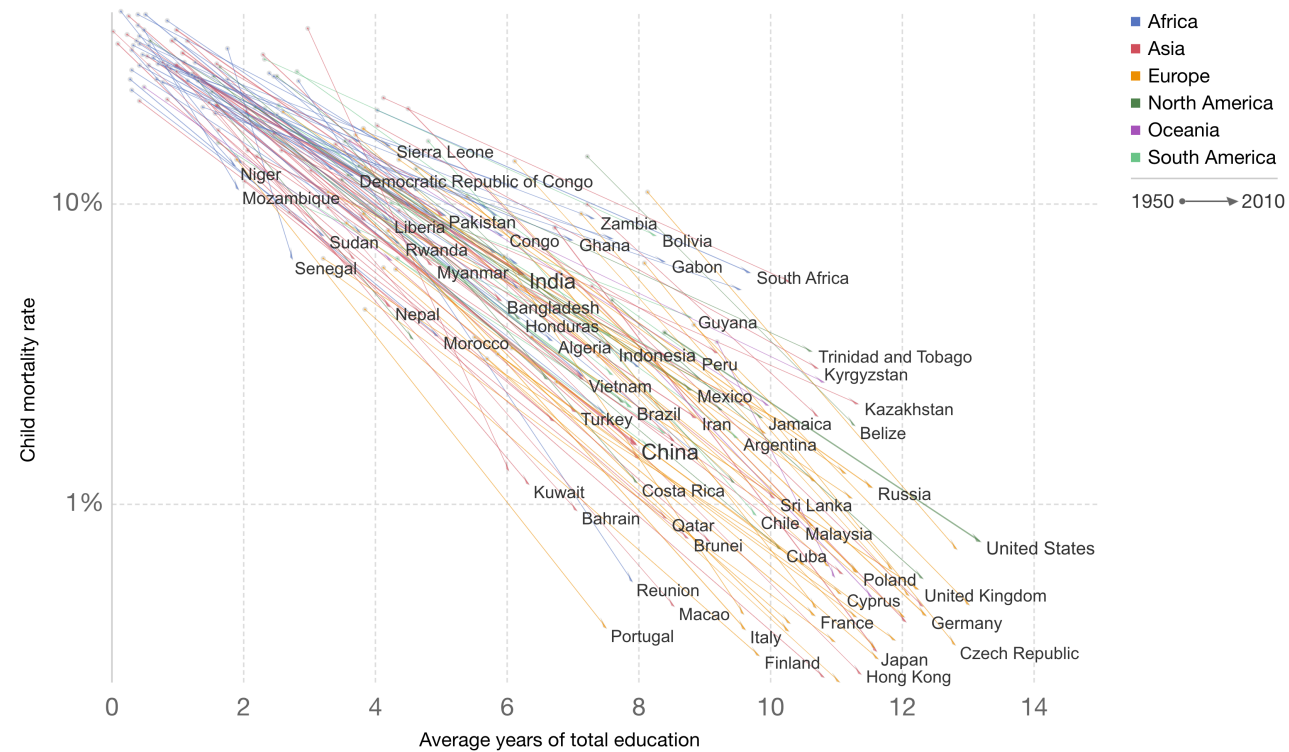


Source: Lee and Lee (2016), Political Regime (OWID based on Polity IV and Wimmer & Min), Population (Gapminder, HYDE(2016) & UN (2019))  
OurWorldInData.org/democracy/ • CC BY

# Education and Maternity

Child mortality vs. mean years of schooling, 1950 to 2010

Mean years of schooling is for those aged 15 and older.



Source: UN Population Division, Barro Lee Education Dataset

OurWorldInData.org/child-mortality/ • CC BY

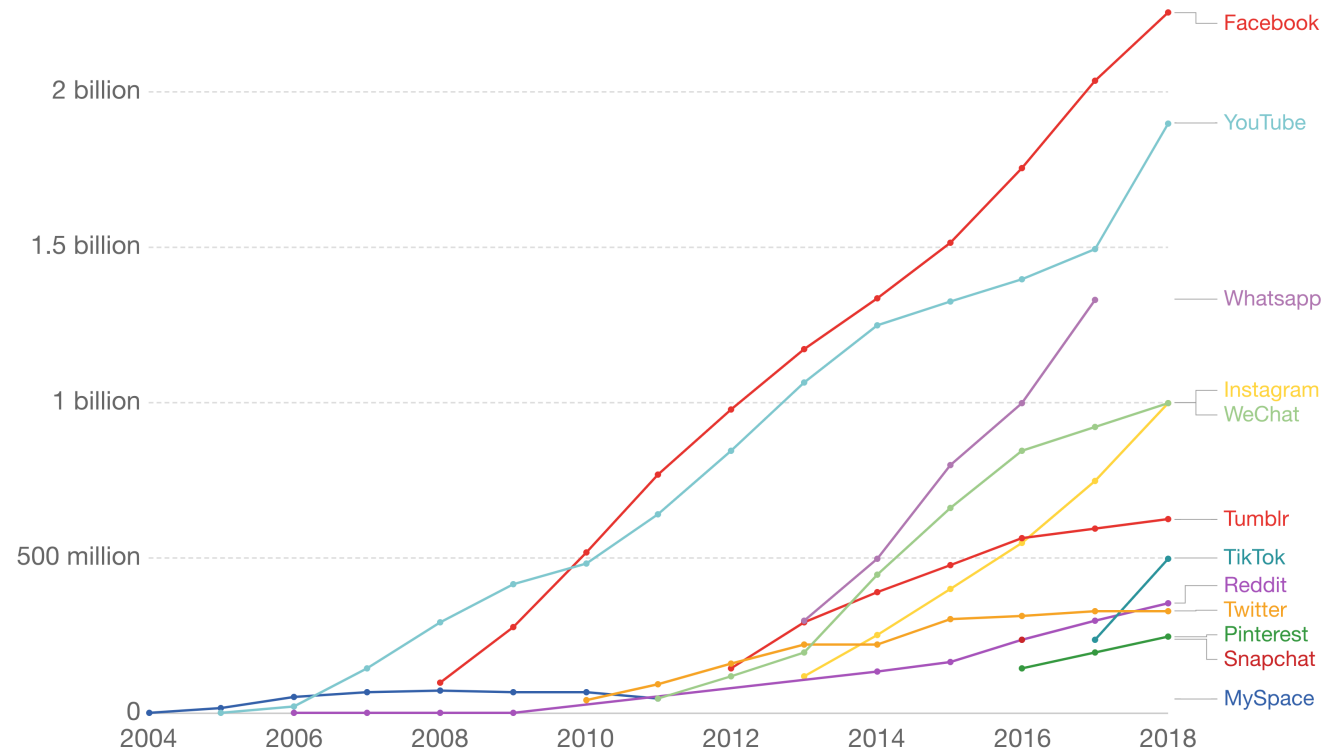
# And then Social Media Came....

- Social media has changed the world. The rapid and vast adoption of these technologies is changing how we [find partners](#), educate ourselves, how we [access information from the news](#), and how we [organize to demand political change](#).

# Number of People Using Social Media Platforms

## Number of people using social media platforms

Estimates correspond to monthly active users (MAUs). Facebook, for example, measures MAUs as users that have logged in during the past 30 days. See source for more details.



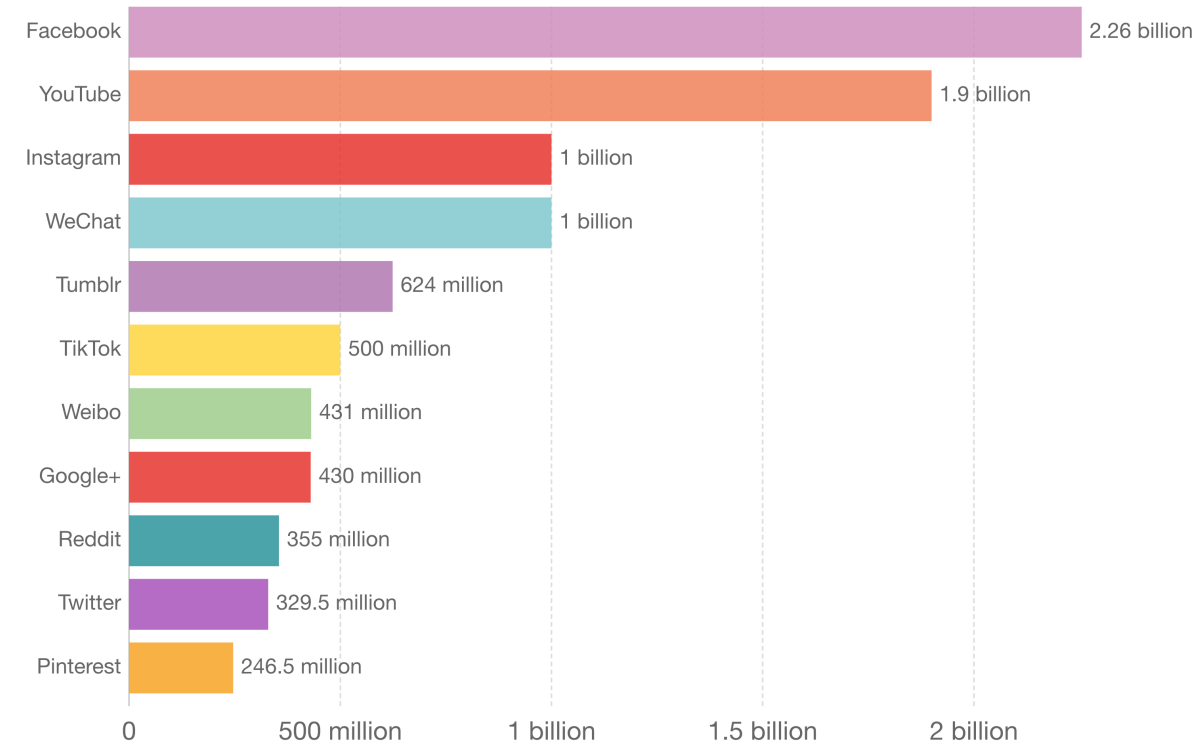
Source: Statista and TNW (2019)

CC BY

# Facebook has dominated the social media market for a decade, but five other platforms also have more than half a billion users each

## Number of people using social media platforms, 2018

Estimates correspond to monthly active users (MAUs). Facebook, for example, measures MAUs as users that have logged in during the past 30 days. See source for more details.



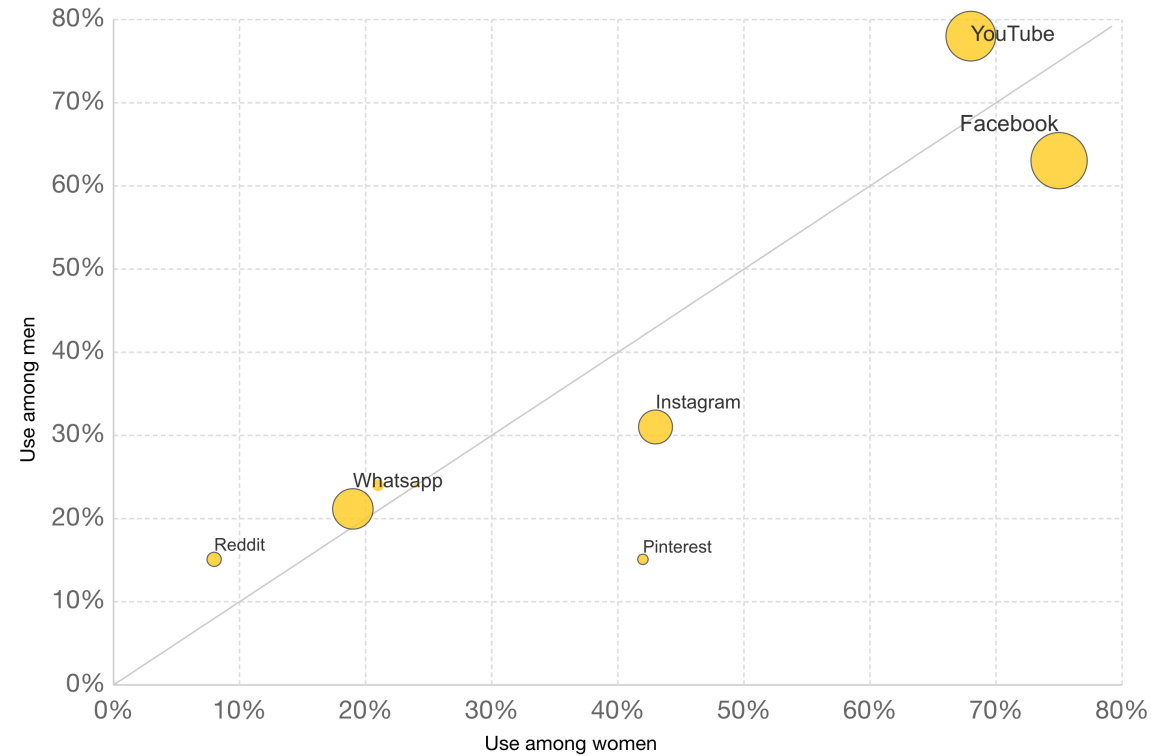
Source: Statista and TNW (2019)

CC BY



# Gender difference are prevalent!!

Percent of men and women using social media platforms in the US, 2019  
Estimates correspond to US adults who say they ever use these online platforms or apps. Bubble sizes are proportional to the total number of users of each platform.



Source: Pew Research Center (2019), Users by social media platform (Statista and TNW (2019))

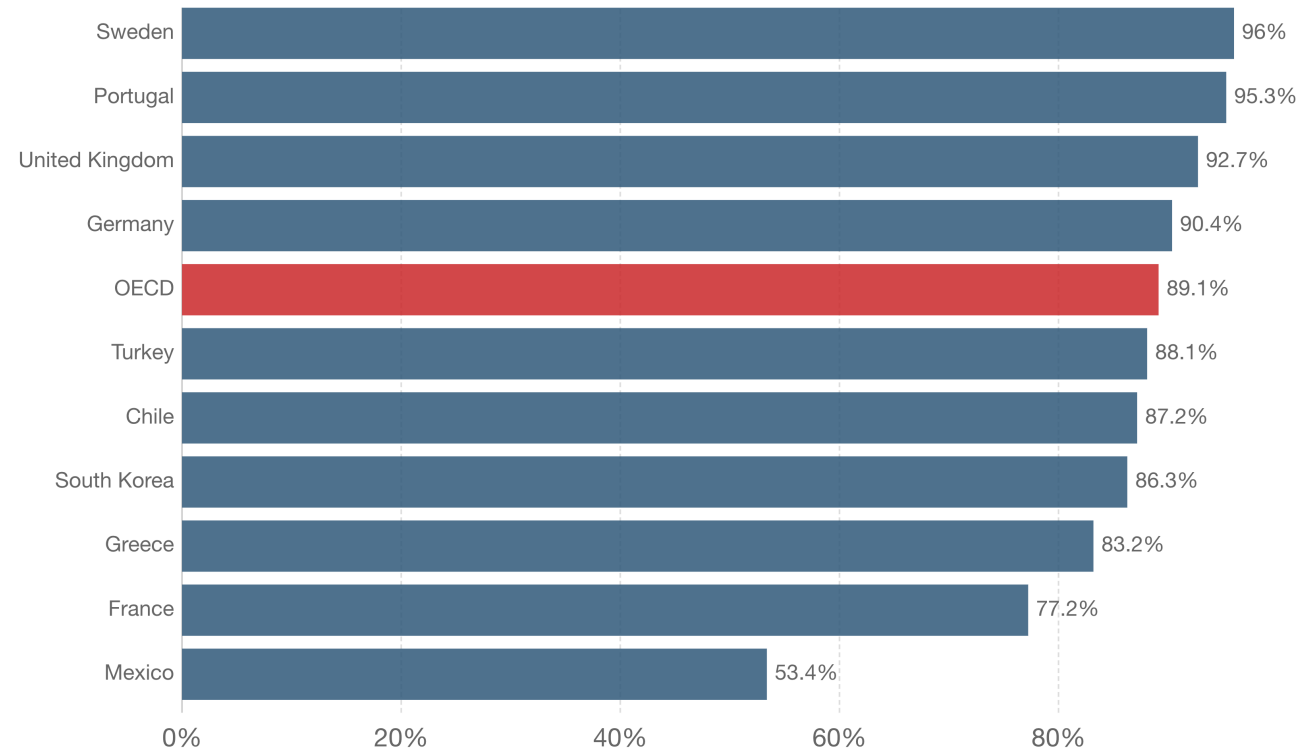
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# Accessibility is of paramount importance for young people!!!

## Percentage of young people engaging in social networking online, 2014

Our World  
in Data

Percentage of young people, aged 16-24, engaging in social networking online. The OECD average is unweighted.  
Data refer to 2014 or closest available estimate.



Source: OECD Society at a Glance (2019)

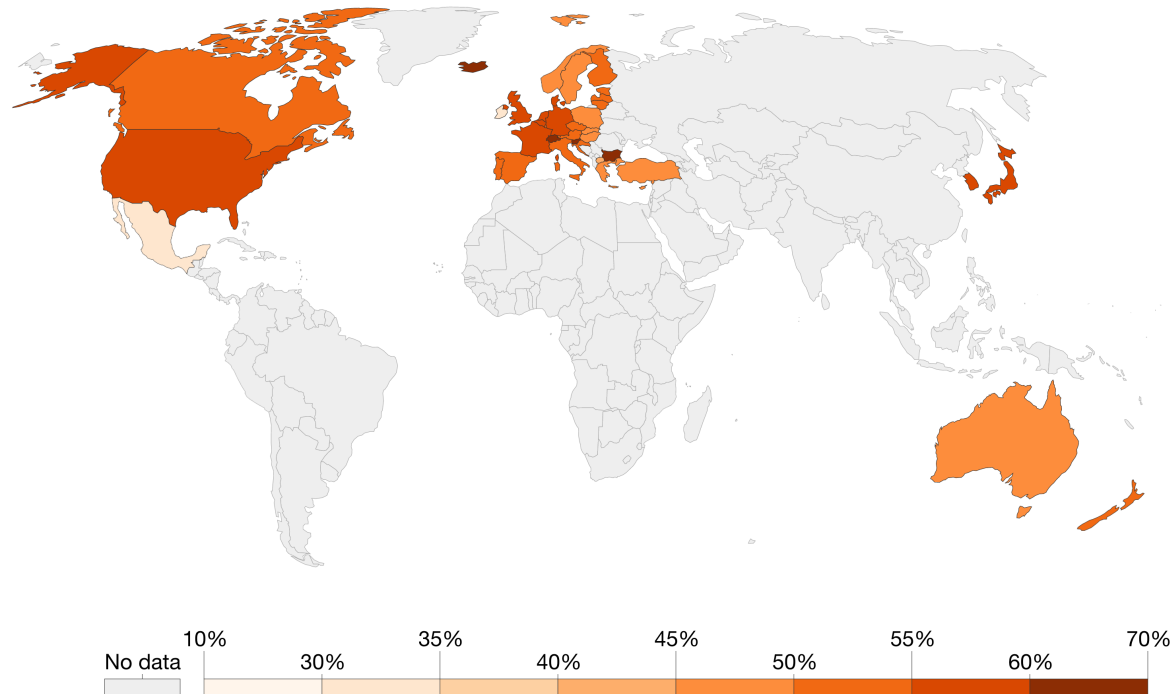
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# How much valuable is human capital around the globe? Lets see labor share in GDP

## Labour share of gross domestic product, 2018

Labour share of Gross Domestic Product (GDP) is the total compensation of employees given as a percent of GDP. It provides information about the relative share of output which is paid as compensation to employees as compared with the share paid to capital.

Our World  
in Data



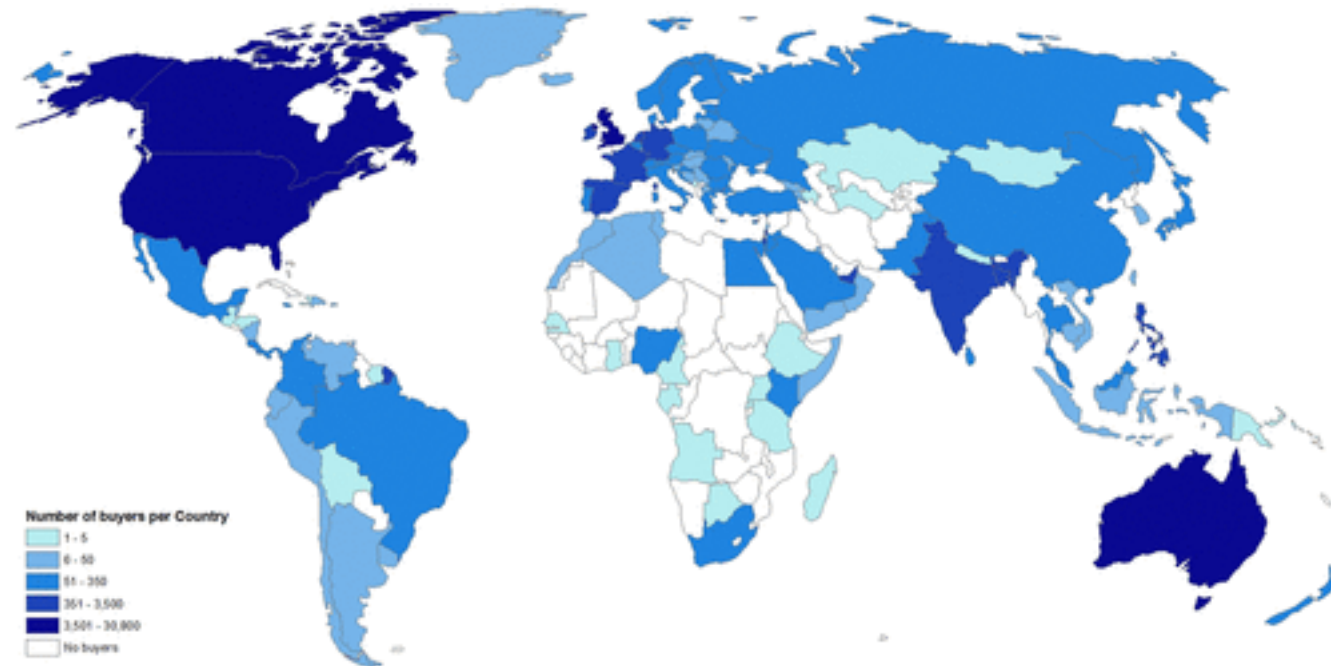
Source: UN Statistics Division

CC BY

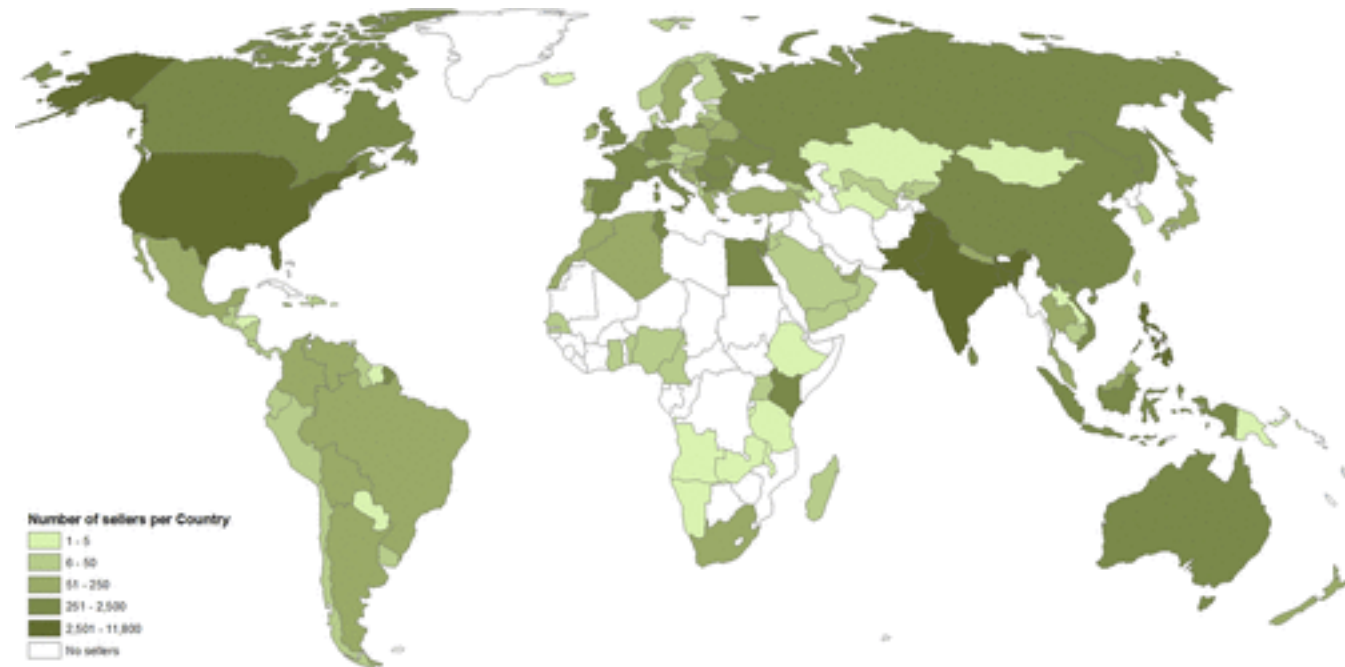
# Digital Traits: The Gig Economy and Education

- <https://journals.sagepub.com/eprint/3FMTvCNPJ4SkhW9tgpWP/full>

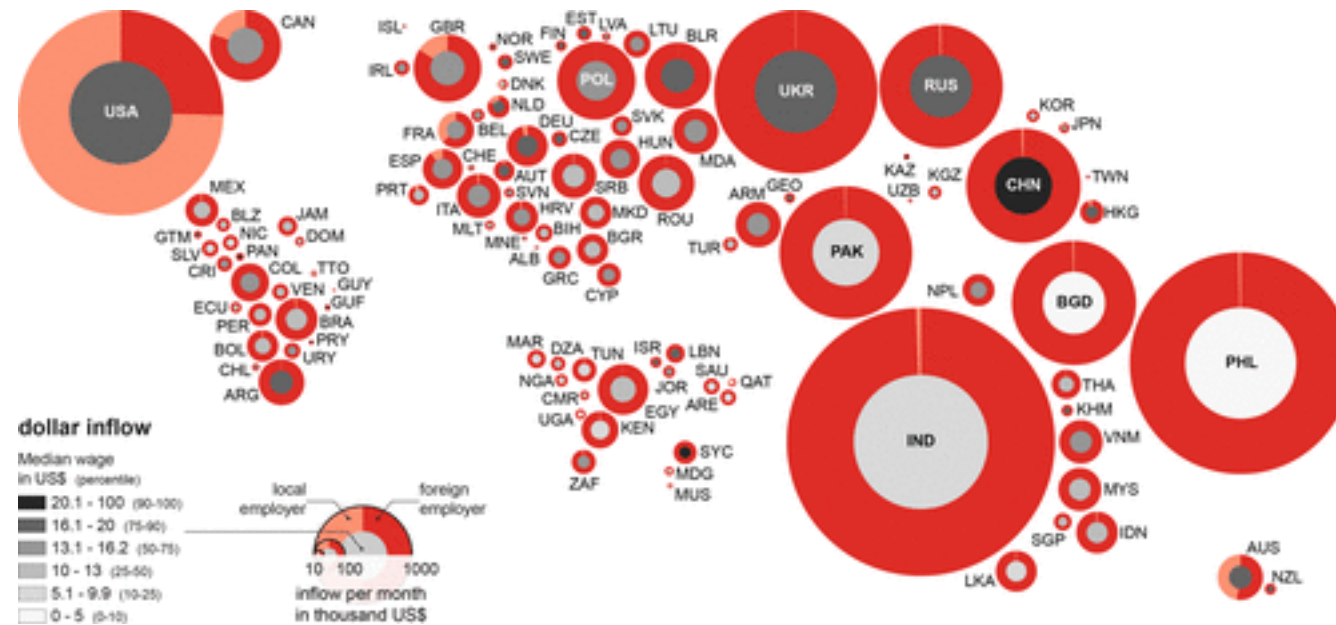
# So how does change demand for education? Global Demand for Gig Workers



# Global Supply of Gig Workers



# Global Wages for Gig Workers



Who produces more knowledge? Is it a cultural issue or depends on socioeconomic factors?

- Ojanperä, S., Graham, M., Straumann, R. K., De Sabbata, S., & Zook, M. (2017). [Engagement in the knowledge economy: Regional patterns of content creation with a focus on sub-Saharan Africa](#). *Information Technologies & International Development*, 13, 33–51



# In Deo Speramus (Robinson Hall Script)

The Vision of Saint John (1608-14): by Domenikos Theotokopoulos Known as El Greco



# Why do we need Religion?

- Individuals draw on religious beliefs and practices to understand and deal with unbearable and unpredictable situations.
- People seek a closer relationship with God or they find a reason for the event by attributing it to an act of God.
- Believers often answer that coping with adversity is one of the main purposes of religion, and scholars have emphasized that all major religions potentially provide coping.
- Indeed, Karl Marx and Sigmund Freud maintained that all religions evolved to provide individuals with a higher power to turn to in times of hardship.

# Jeanet Sinding Bentzen (2019): Acts of God? Religiosity and Natural Disasters Across Subnational World Districts

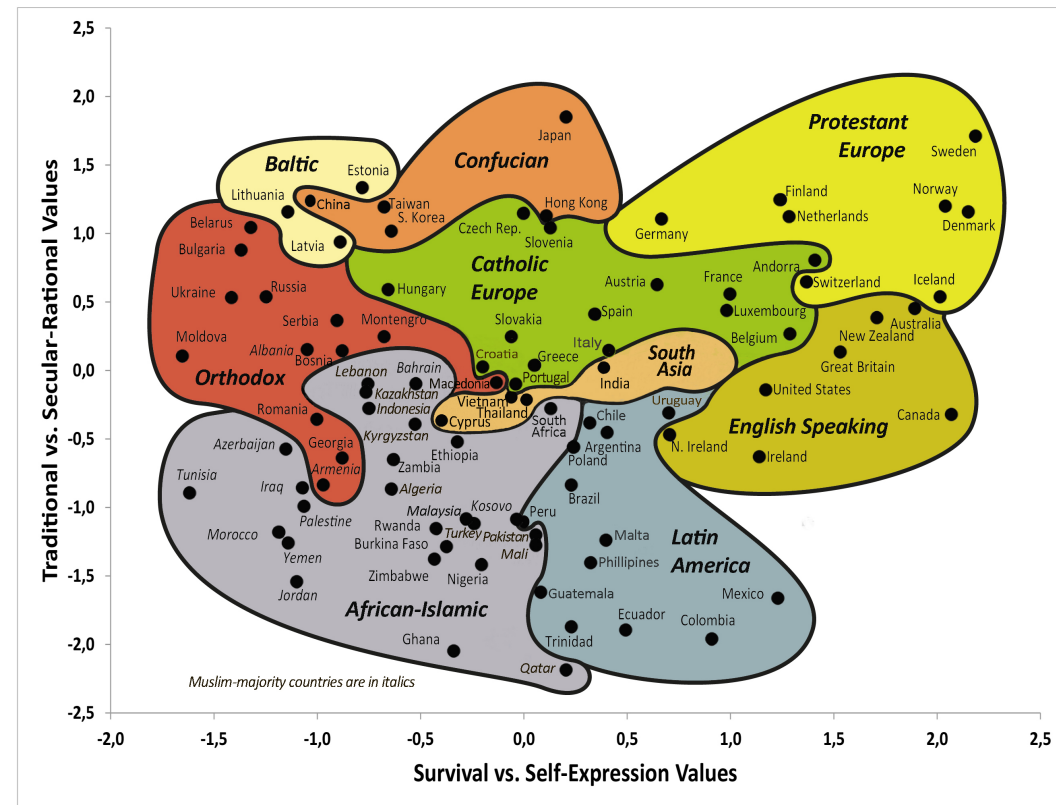
Tests whether the need to cope psychologically with adverse shocks is an important determinant of differences in religiosity.

- This is known as the religious coping hypothesis. The hypothesis states that individuals draw on religious beliefs and practices to understand and deal with unbearable and unpredictable situations.
- People seek a closer relationship with God or they find a reason for the event by attributing it to an act of God. Believers often answer that coping with adversity is one of the main purposes of religion, and scholars have emphasized that all major religions potentially provide coping.
- Indeed, Karl Marx and Sigmund Freud maintained that all religions evolved to provide individuals with a higher power to turn to in times of hardship

# Data: WVS and EVS

- The World Values Survey ([www.worldvaluessurvey.org](http://www.worldvaluessurvey.org)) is a global network of social scientists studying changing values and their impact on social and political life, led by an international team of scholars, with the WVS Association and WVSA Secretariat headquartered in Vienna, Austria.
- <http://www.worldvaluessurvey.org/wvs.jsp>
- The WVS Wave 6 data covering the 2010-2014 wave. With 60 countries and societies around the world and more than 85,000 respondents, this is the latest resource made available for the research community.
- <https://europeanvaluesstudy.eu>

# Cultural Map – WVS wave 6 (2010-2014)



# How Important is God in your Life?

Table 1. Summary statistics of the main religiosity measures

Survey questions	Answers	Data with district information			Full WVS-EVS dataset		
		N	Mean	Std.dev.	N	Mean	Std.dev.
How important is God in your life?	0="not at all important", 0.1,..., 1="very important"	202,514	.73	0.34	202,690	.69	0.36
Are you a religious person?	0="no", 1="yes"	197,137	.71	0.45	202,618	.70	0.46
How often do you attend religious services?	0="Never, practically never", 0.15,...,1="More than once a week"	201,674	.49	0.36	206,211	.47	0.35
Do you find comfort in God?	0="no", 1="yes"	120,284	.74	0.44	204,621	.69	0.47
Do you believe in God?	0="no", 1="yes"	124,201	.87	0.34	200,650	.84	0.37
Do you believe in life after death?	0="no", 1="yes"	122,968	.65	0.48	268,850	.60	0.40

Notes. The unit is an individual. The first columns show summary statistics for the dataset that has information on the subnational district. The last columns show averages for the entire pooled WVS-EVS 1981-2000 dataset. Source: Pooled WVS-EVS 1981-2000.

# How religious are we?

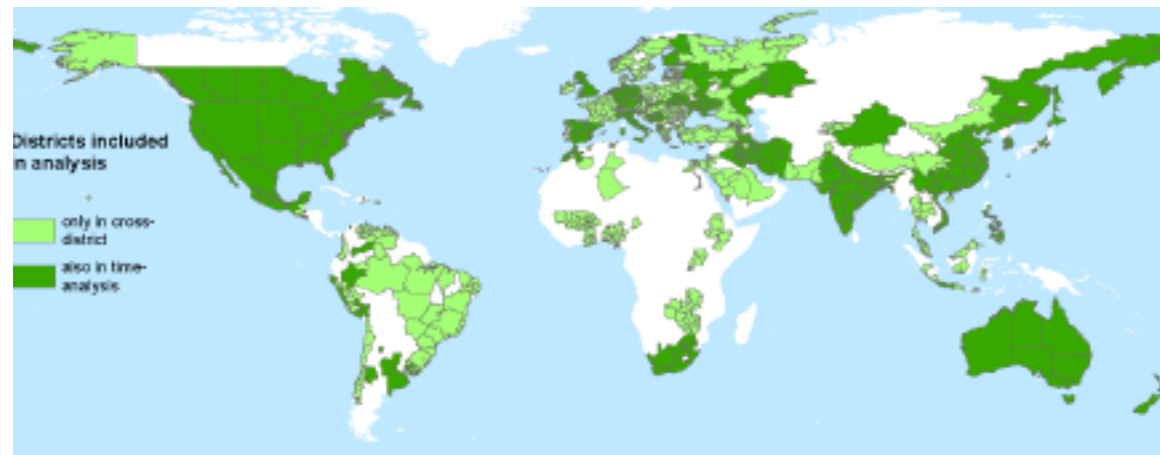


Figure 2. Subnational districts included in the analysis

# Earthquakes

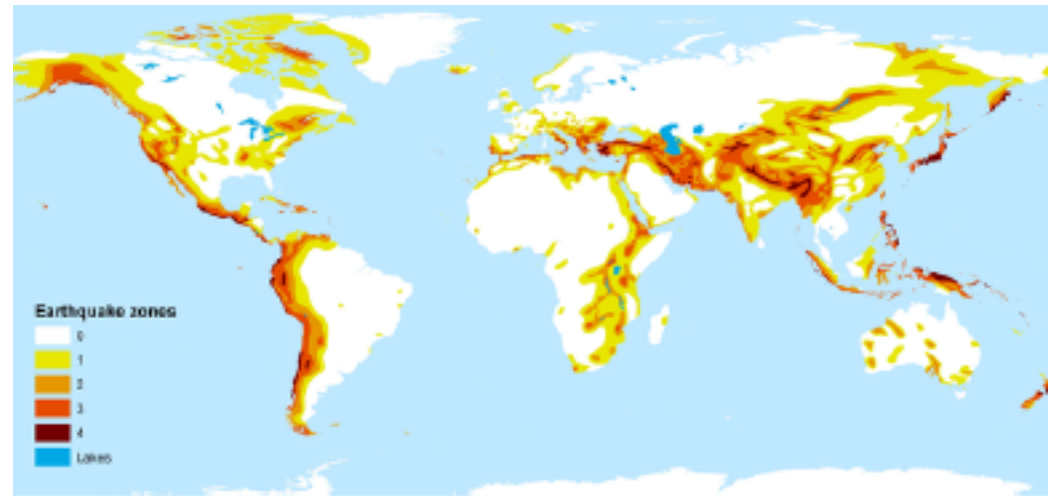
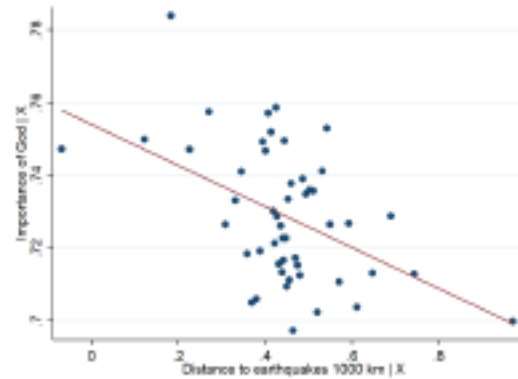


Figure 3. Earthquake zones



The closer I am to acts of god, the more I believe...



**Figure 4. Binned scatterplot of the main result including baseline controls**

**Notes.** The plot shows the regression in column (1) of Panel A of Table 2, binned into 50 bins.

So what about religiosity and education?  
 Importance of God when you leave close to acts of  
 god

Table A51. Main results restricted to different education categories

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Education category	All	1	2	3	4	5	6	7	8
<b>Panel A. Dependent variable: D.importance of God</b>									
Earthquake dummy	0.002*** (0.028)	0.002*** (0.027)	0.005*** (0.027)	0.002*** (0.028)	0.005*** (0.028)	0.005*** (0.027)	0.004*** (0.027)	0.005*** (0.027)	0.005*** (0.027)

# Are you a religious person and leave close to acts of god?

Panel B. Dependent variable: D.Religious person

---

Earthquake dummy	0.062**	0.062**	0.061**	0.059**	0.062**	0.062**	0.064**	0.062**	0.064**
	(0.027)	(0.026)	(0.027)	(0.026)	(0.027)	(0.026)	(0.026)	(0.026)	(0.026)

# Do you attend religious services? That is not significant...

Panel C. Dependent variable: D.attend religious services

---

Earthquake dummy	0.024	0.024	0.023	0.025	0.026	0.026	0.024	0.028	0.026
	(0.044)	(0.045)	(0.045)	(0.045)	(0.044)	(0.045)	(0.045)	(0.045)	(0.045)

# Does religiosity and acts of god depend on the level of education? Surprise!!!

Table A24. Main results with interactions with individual level development

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent variable: Strength of Intrinsic Religiosity Scale								
Measure of development	Inc	Inc	Edu	Edu	Agri	Agri	Unempl	Unempl
Dist(earthq), 1000km	-0.048*** (0.017)		-0.061*** (0.018)		-0.053*** (0.014)	-0.046*** (0.014)	-0.059*** (0.016)	-0.048*** (0.015)
Dist(earthq) x development	-0.001 (0.002)		-0.001 (0.001)		-0.002 (0.011)	-0.002 (0.011)	-0.036*** (0.008)	-0.026*** (0.007)
Dist(earthq) x dev1		-0.053*** (0.016)		-0.053*** (0.018)				
Dist(earthq) x dev2		-0.042*** (0.016)		-0.055*** (0.018)				
Dist(earthq) x dev3		-0.052*** (0.015)		-0.051*** (0.018)				
Dist(earthq) x dev4		-0.056*** (0.016)		-0.077*** (0.018)				
Dist(earthq) x dev5		-0.054*** (0.017)		-0.073*** (0.021)				
Dist(earthq) x dev6		-0.047*** (0.016)		-0.072*** (0.017)				
Dist(earthq) x dev7		-0.053*** (0.017)		-0.051*** (0.018)				
Dist(earthq) x dev8		-0.038** (0.016)		-0.068*** (0.018)				
Dist(earthq) x dev9		-0.071*** (0.022)						
Dist(earthq) x dev10		-0.059*** (0.023)						
Observations	71,376	71,376	98,278	98,278	76,464	67,589	101,045	68,569
R-squared	0.310	0.310	0.329	0.330	0.311	0.310	0.330	0.317
Baseline controls	Y	Y	Y	Y	Y	Y	Y	Y
Development	Inc	Inc	Edu	Edu	Agri	Agri	Unempl	Unempl
Income FE	N	N	N	N	N	Y	N	Y

# Epidemiology Approach: Parental Cultural Traits

- (Bisin & Verdier (2001)). Parents transmit a particular cultural trait to their children if this grants utility to parents or children.
- Religious individuals often have:
- Better mental health (Miller et al. (2014), Park et al. (1990))
- Higher life satisfaction (Ellison et al. (1989), Campante & Yanagizawa-Drott (2015)),
- Are better able to cope with adverse life events (Clark & Lelkes (2005)), and engage less in deviant behavior (Lehrer (2004))
- Thus, religion might have some benefits that parents would like to transmit to their children.

# Traits persist over time

Table 5. OLS estimates of religiosity on earthquake risk in parents' home country

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Dependent variable:	pray	pray	pray	religious	religious	religious	service	service	service
<b>Panel A. Simple linear effect</b>									
Dist(earthq zones), 1000 km	-0.050*** (0.014)	-0.026*** (0.011)	-0.028** (0.011)	-0.054*** (0.017)	-0.029*** (0.014)	-0.021** (0.012)	-0.041*** (0.014)	-0.027** (0.011)	-0.021** (0.010)
Observations	17,155	17,058	14,156	17,271	17,174	14,250	17,224	17,226	14,204
R-squared	0.122	0.120	0.175	0.074	0.085	0.120	0.100	0.110	0.127
Org countries	171	166	155	171	166	155	171	166	155

# Max Weber

Weber argues that capitalism developed to the advanced stage that it did in the West due to the fact that Protestantism encouraged the embrace of work as a calling from God, and consequently, a dedication to work that allowed one to earn a lot of money. This, combined with the value asceticism -- of living a simple earthly life devoid of costly pleasures -- fostered an acquisitive spirit. Later, as the cultural force of religion declined, Weber argued that capitalism was freed from the limits placed on it by Protestant morals, and expanded as an economic system of acquisition



But More importantly he said something deeper by studying India and China (strong authoritative countries):

- There is a definite relationship between power and administrative control and the educated class. Those in powerful or administrative positions influence and decide what qualifies as valuable and worthy education, and those who are educated fill the cadres of the administrative system.
- Essentially, those in power and in positions of administrative authority control education, and education thus becomes the key to joining the administrative cadres and to holding positions of power and influence. Weber, however, also highlights the status of those who are educated but not necessarily in positions of power or administrative authority. Here, the educated are seen as valuable and respected members of society even though they do not occupy seats of power

However, economists show that religion had little to do with growth. Becker and Woessmann (2008)



FIGURE I  
The Cross-Country Pattern of Protestantism and GDP Per Capita, 1900  
See Appendix III for data details.

# Its all about literacy...

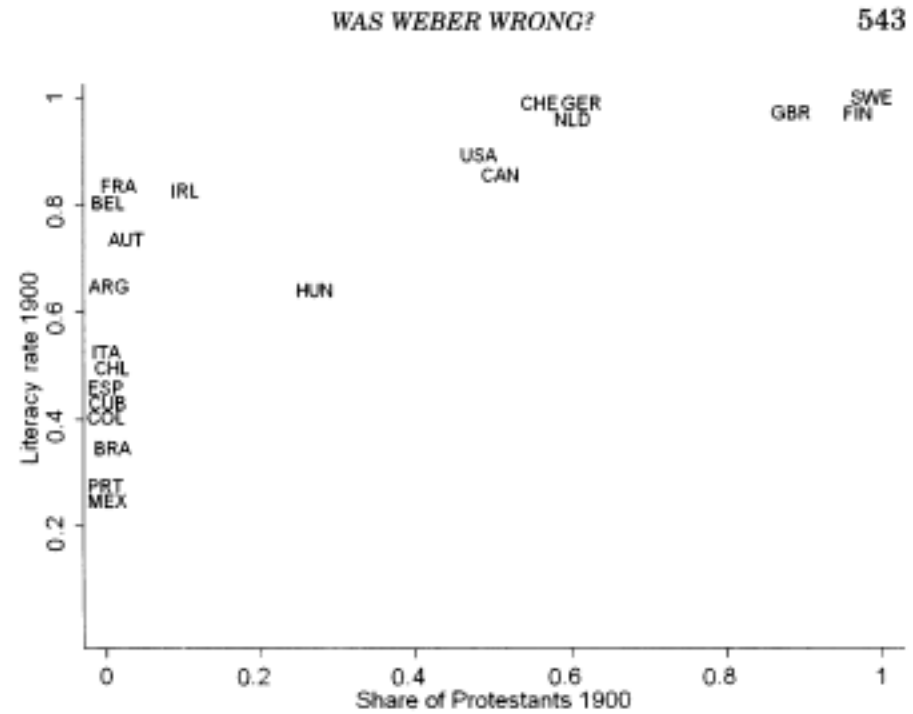


FIGURE II  
The Cross-Country Pattern of Protestantism and Literacy, 1900  
See Appendix III for data details.

# Very Important Paper: Squicciarini and Voigtlander (2015) - : The Model

$$Y_{A,n} = A_A h_n^{\beta_A} X_n^{\alpha_A} L_{A,n}^{1-\alpha_A}$$

$$A_{M,n,t} = \eta \bar{A}_t + (1 - \eta) A_{M,n,t-1} (1 + s_n \cdot \gamma \bar{A}_t)$$

# Prediction

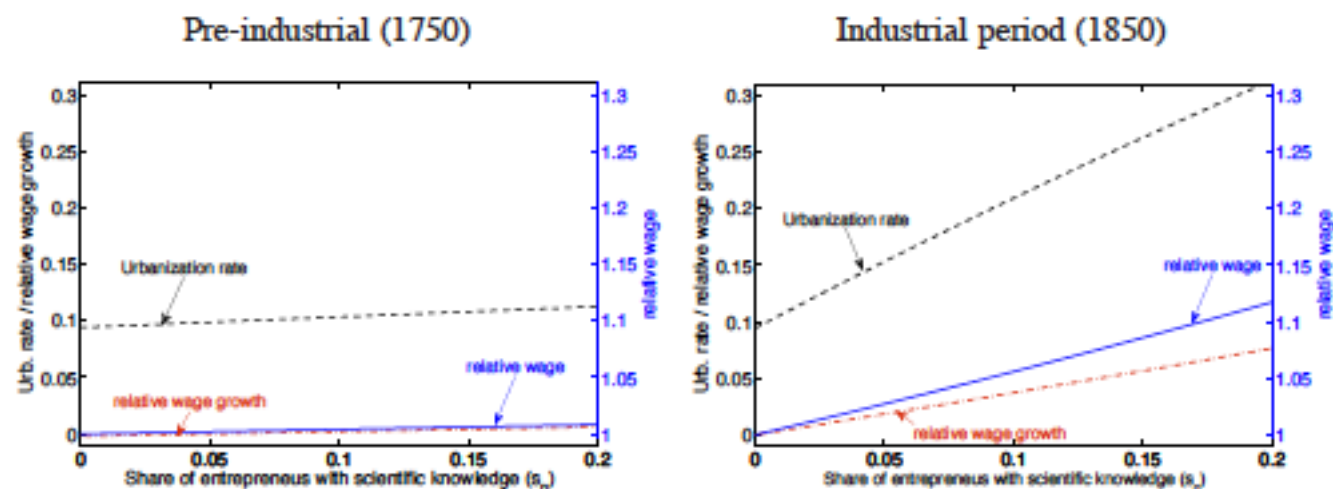
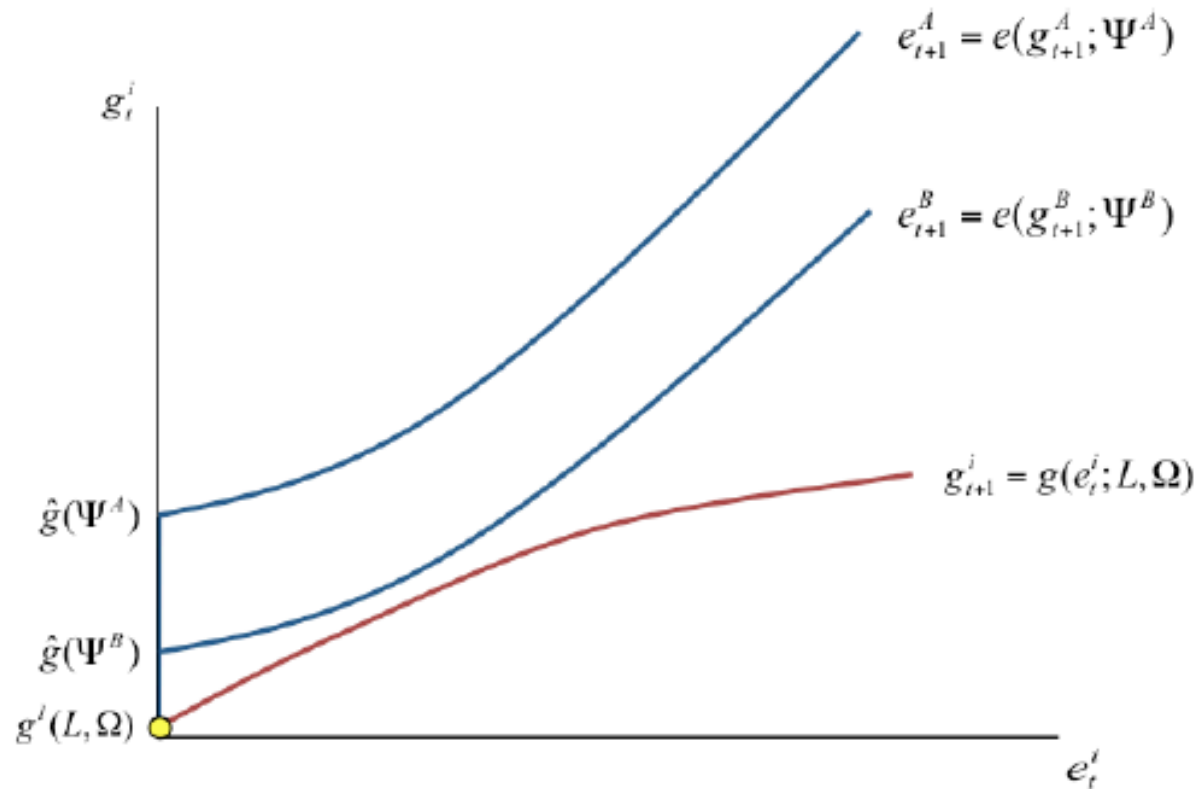


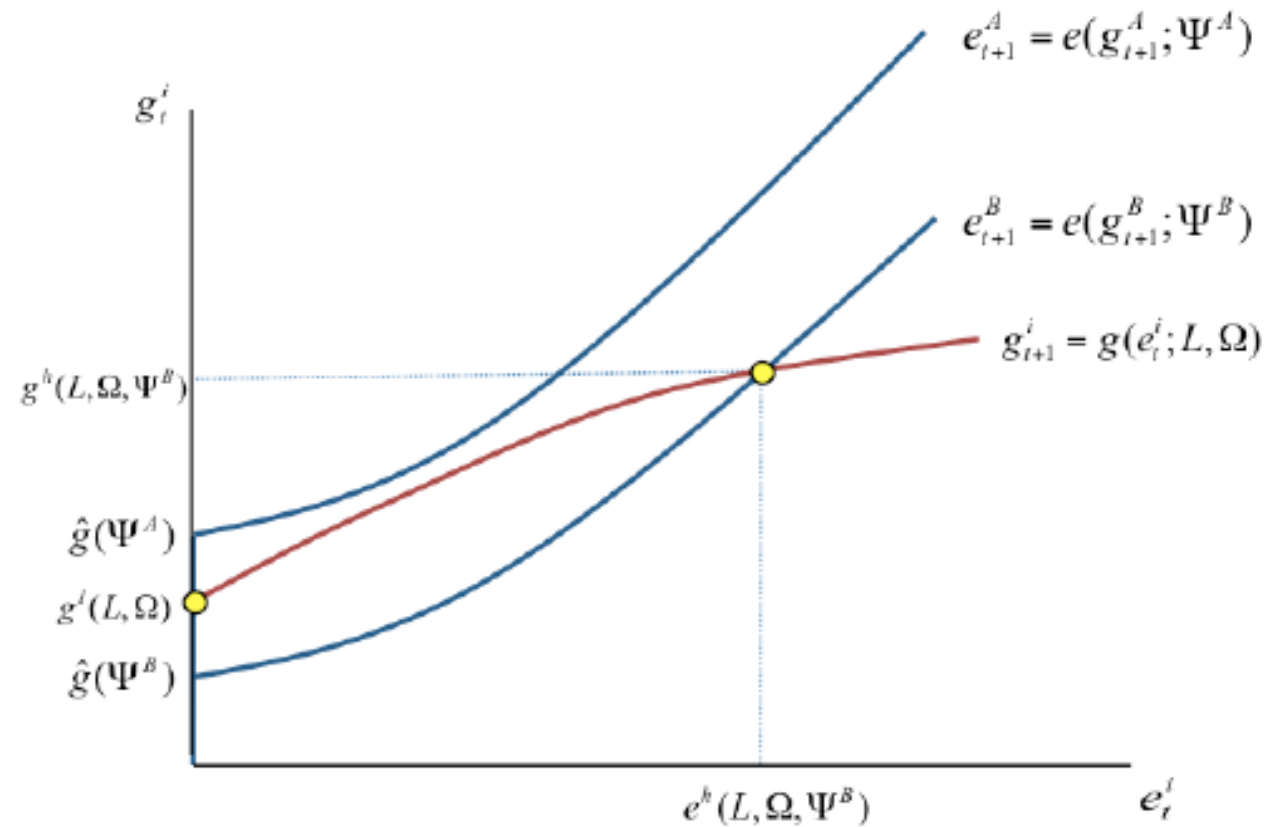
Figure A.1: Scientific knowledge and economic development

*Notes:* The figure illustrates how the share of entrepreneurs with scientific knowledge in region  $n$ ,  $s_n$ , affects urbanization, wages, and economic growth. The left panel refers to the pre-industrial period (illustrating model Prediction 1), and the right panel illustrates Prediction 2, referring to the industrial period. The urbanization rate corresponds to the labor share in manufacturing. Wages (right axis) are reported relative to regions without scientific knowledge ( $s_n = 0$ ). Relative wage growth (left axis) is measured as annual percentage growth in region  $n$ , net of growth in regions with  $s_n = 0$ .

# Galor's Model Analog (before industrialization): Nada



After Industrialization? Cities with higher education picked up faster!!!



# Empirical Evidence:

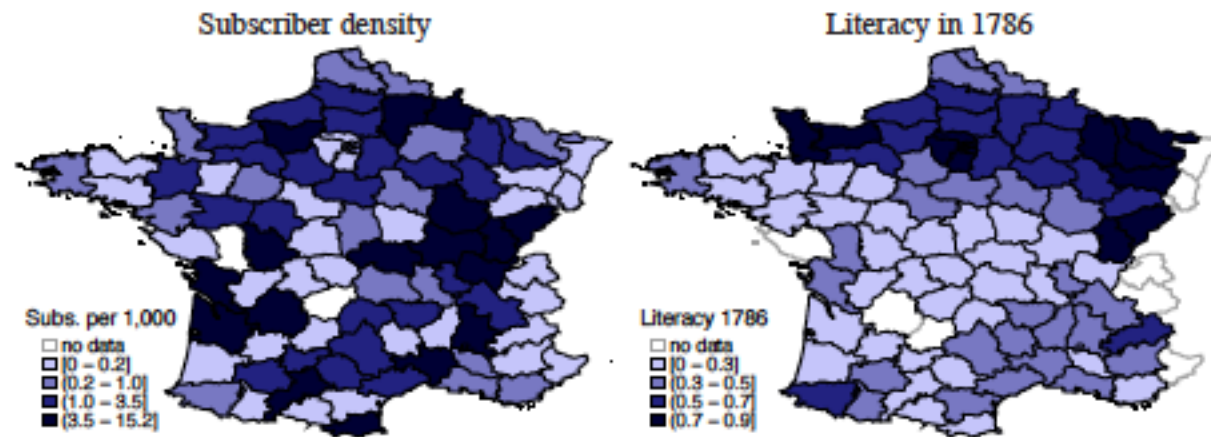


Figure 1: *Encyclopédie* subscriber density and literacy rates

Notes: The left panel shows the spatial distribution of *Encyclopédie* subscribers per 1,000 city inhabitants in the second half of the 18th century. The right panel shows the distribution of literacy rates (percentage of males signing their marriage certificate) across French departments in 1786. Both variables are described in detail in Section 3.1. Figure C.4 in the Appendix plots the two variables against each other, showing that they are not correlated.



# Cities grew faster the more top skilled person they had

Table D.2: Restricting the sample to cities with available data for the pre-1750 period

Dependent variable: log city growth, 1750-1850					
	(1)	(2)	(3)	(4)	(5)
Data on city size in	1750	1700	1600	1500	1400
<i>lnSubDens</i>	0.169*** (0.033)	0.154*** (0.036)	0.139*** (0.042)	0.157*** (0.037)	0.193*** (0.052)
Controls	✓	✓	✓	✓	✓
R <sup>2</sup>	0.36	0.39	0.57	0.55	0.57
Observations	193	148	58	62	50

Notes: All regressions are run at the city level, include a dummy for Paris, and are weighted by city population in 1750. The dependent variable is log city population growth in 1750-1850. We use cities where data on population from Bairoch et al. (1988) are available over for the year indicated in the header. "Controls" include the baseline controls and early knowledge controls listed in Table 1. For details on *lnSubDens* and controls see the notes to Table 1. Robust standard errors in parentheses. \* p<0.1, \*\* p<0.05, \*\*\* p<0.01.

# Cities with more highly skilled residents grew much faster in industrial revolution though!!

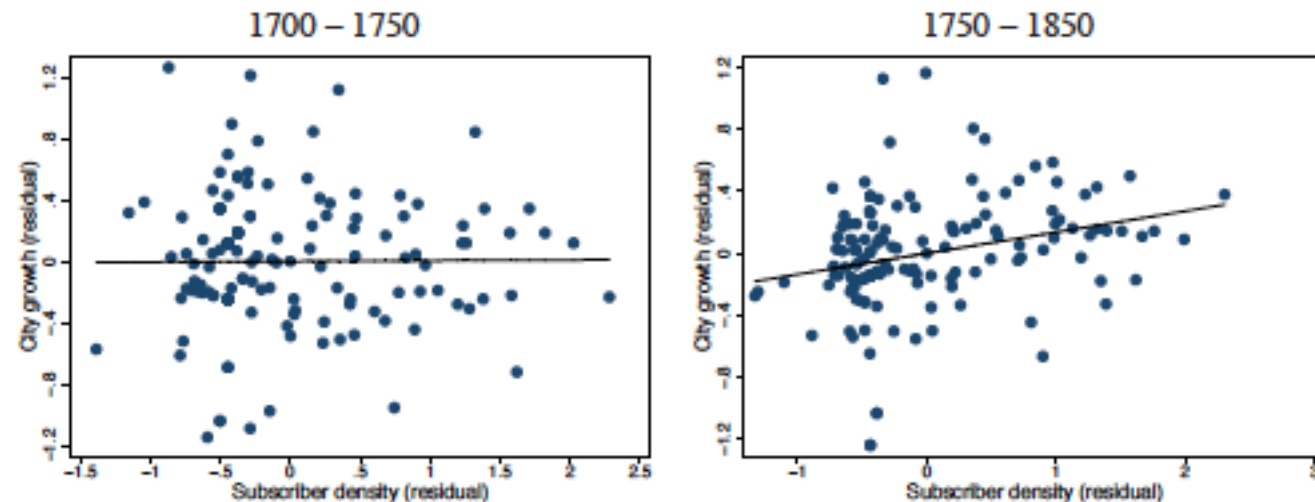


Figure D.2: *Encyclopédie* subscriptions and city growth – before and after 1750

*Notes:* The figure plots average annual city growth in France against *Encyclopédie* subscriber density ( $\ln SubDens$ ), after controlling for our baseline controls (listed in Table 1). The left panel uses the period before industrialization set in (1700-1750). The right panel examines the same cities over the period of French industrialization, 1750-1850. The sample is the same in both panels, including only cities for which growth can be computed over both periods. Among these, average annual city growth was 0.28% and 0.38% over the two periods, respectively.

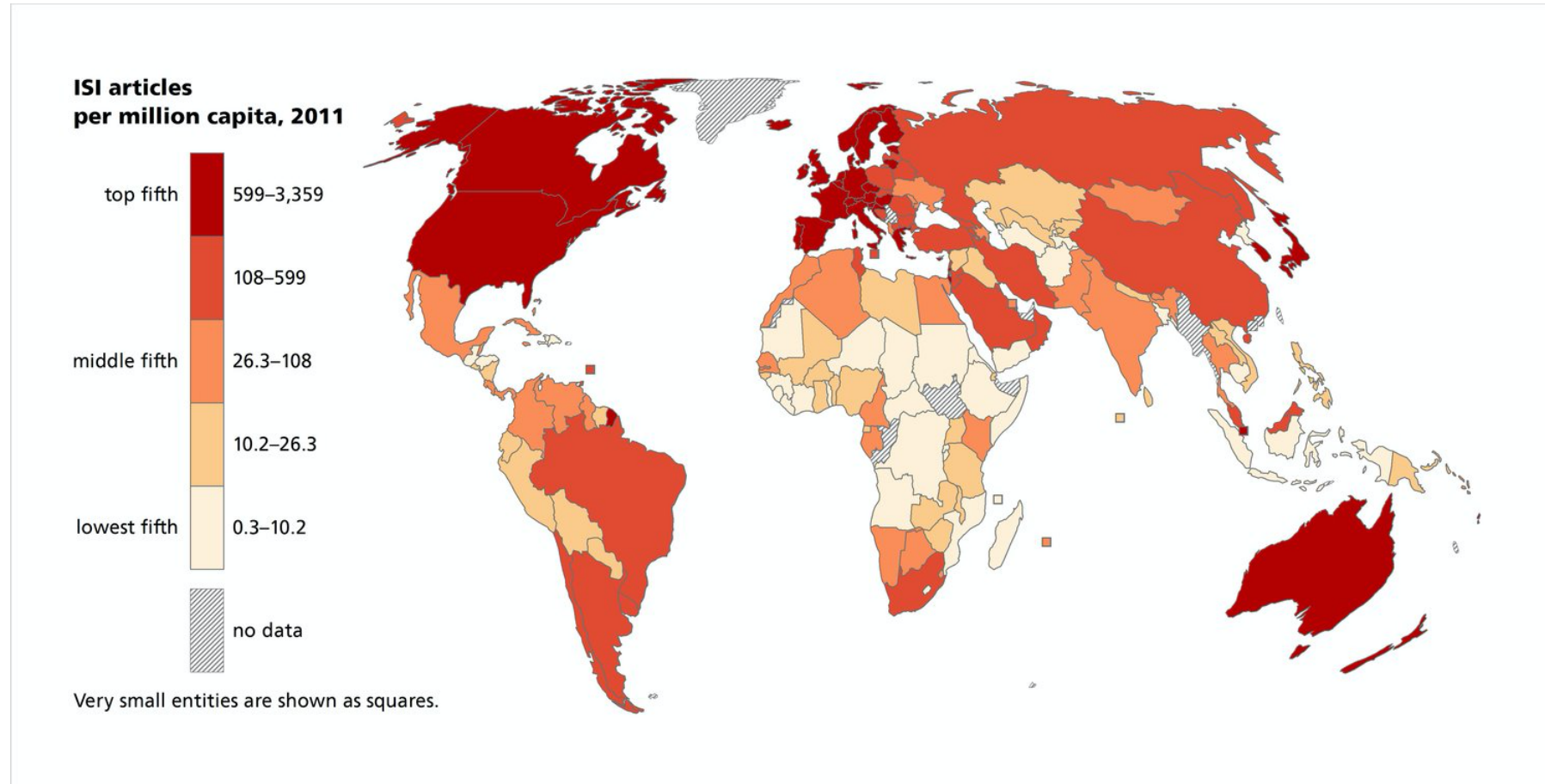
# What about today? Knowledge creation in the new Internet Economy, the 4<sup>TH</sup> Industrial Revolution

*Table 1. Descriptive Statistics of the Dependent Variables (logarithm transformed).*

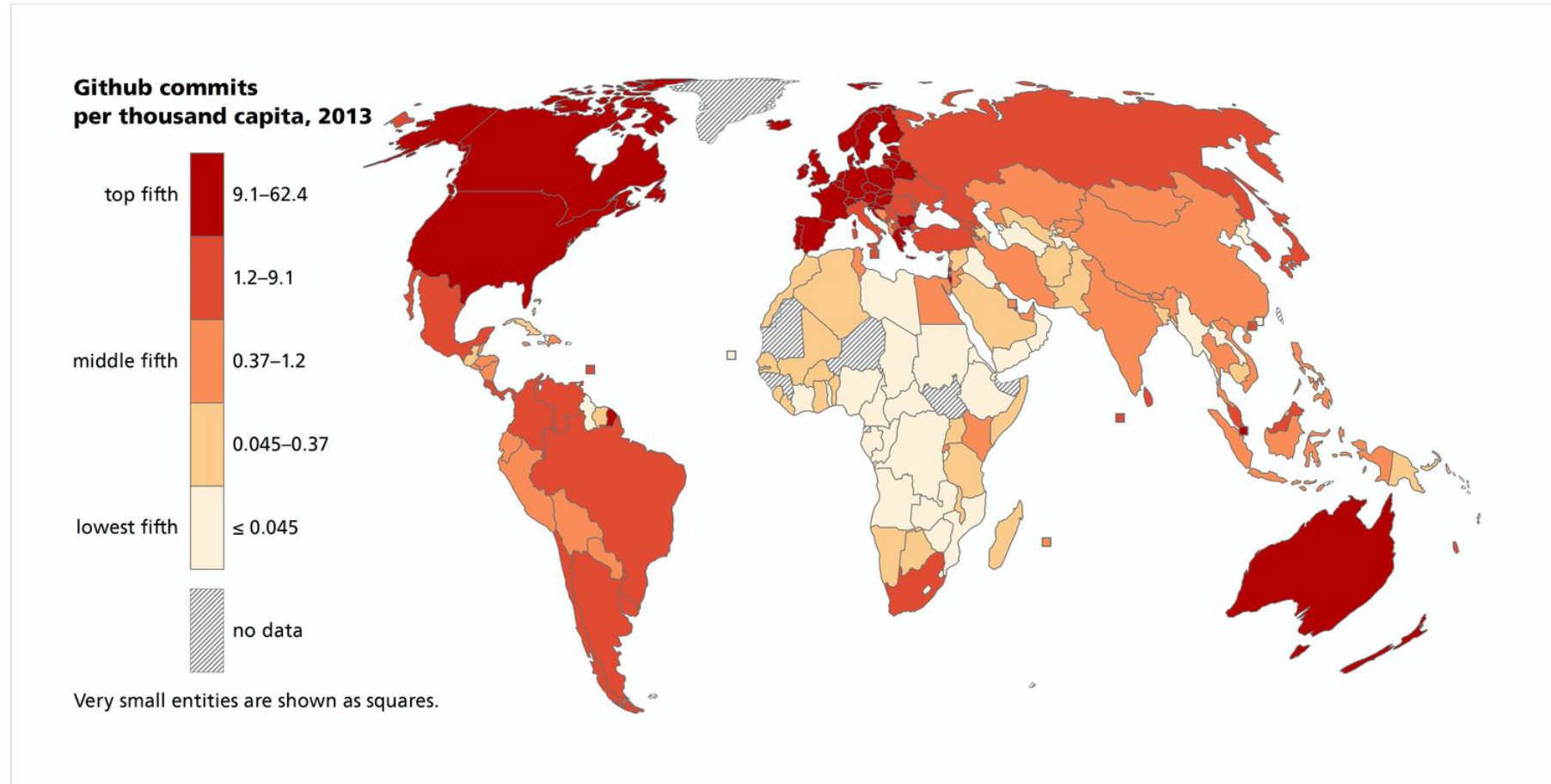
<b>Dependent Variable</b>	<b>Mean</b>	<b>Median</b>	<b>Standard Deviation</b>	<b>Year</b>	<b># of Country Obs.</b>	<b># of Units Across All Countries</b>
Academic articles (I)	6.38	6.11	2.61	2011	168	1,799,695
GitHub commits (I)	8.50	8.57	3.48	2013	171	35,069,679
Domain registrations (I)	10.69	10.61	3.00	2013	172	245,141,725

*Note: As the dependent variables had skewed heavy right tails, we logarithmized them to reduce the skewness and allow the patterns in the data to emerge more clearly in the analysis.*

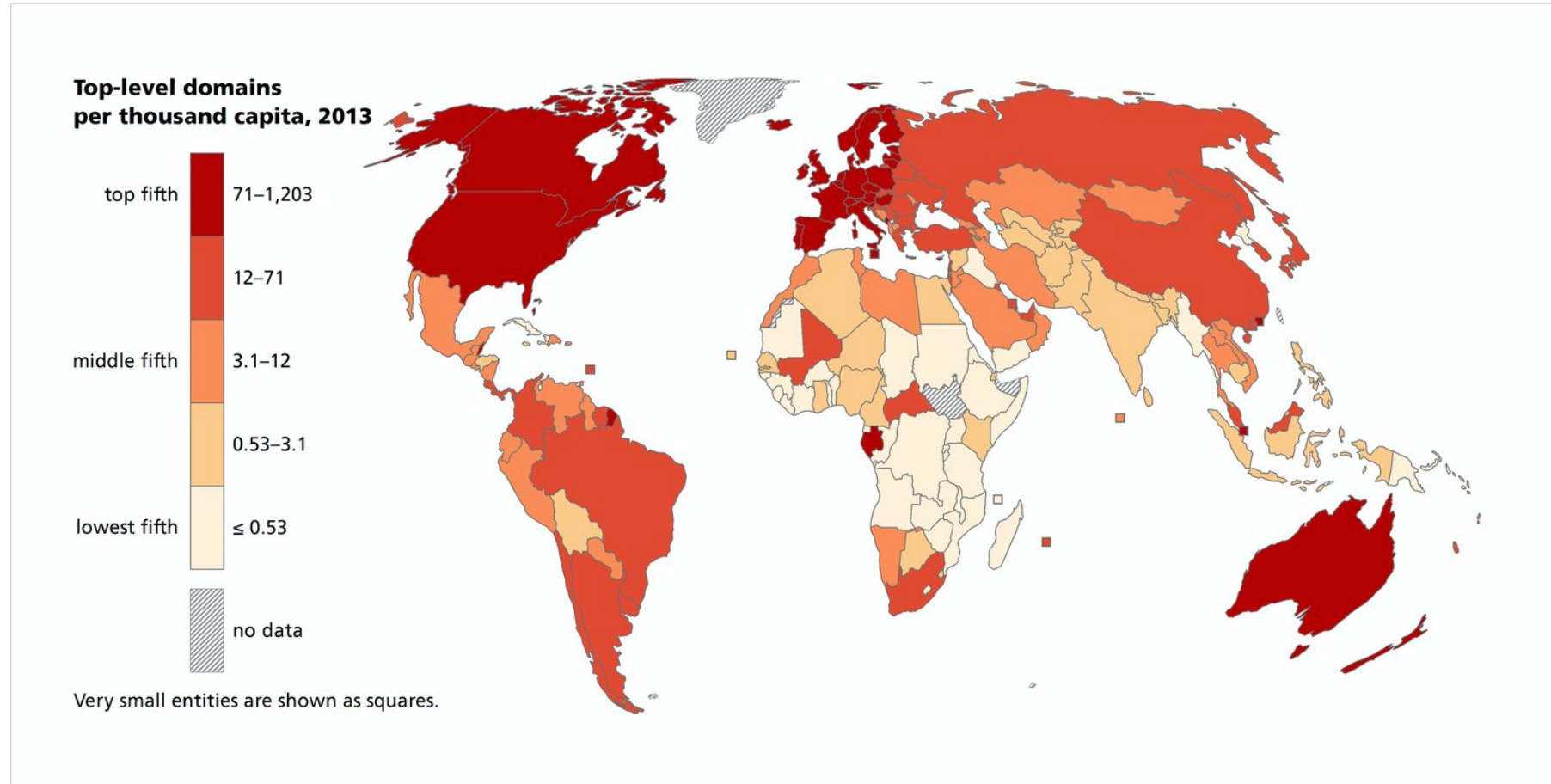
# Global Published and Codified Knowledge



# Global GitHub commitments



# Global domains registration across the world



# Global Content Creation

OJANPERÄ, GRAHAM, STRAUMANN, DE SABBATA, ZOOK

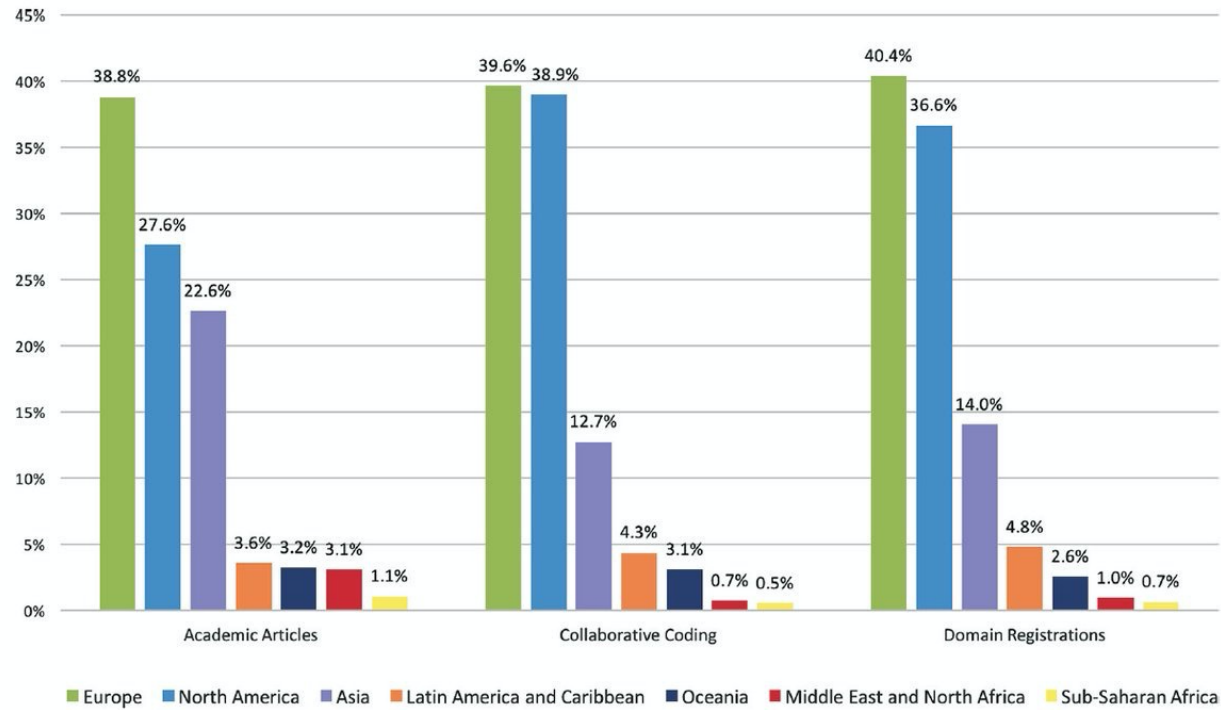


Figure 1. Content creation across continents.

Lets control for level of attainment in terms of broadband connectivity, education, innovation capacity, and public spending on education.

Academic Articles:

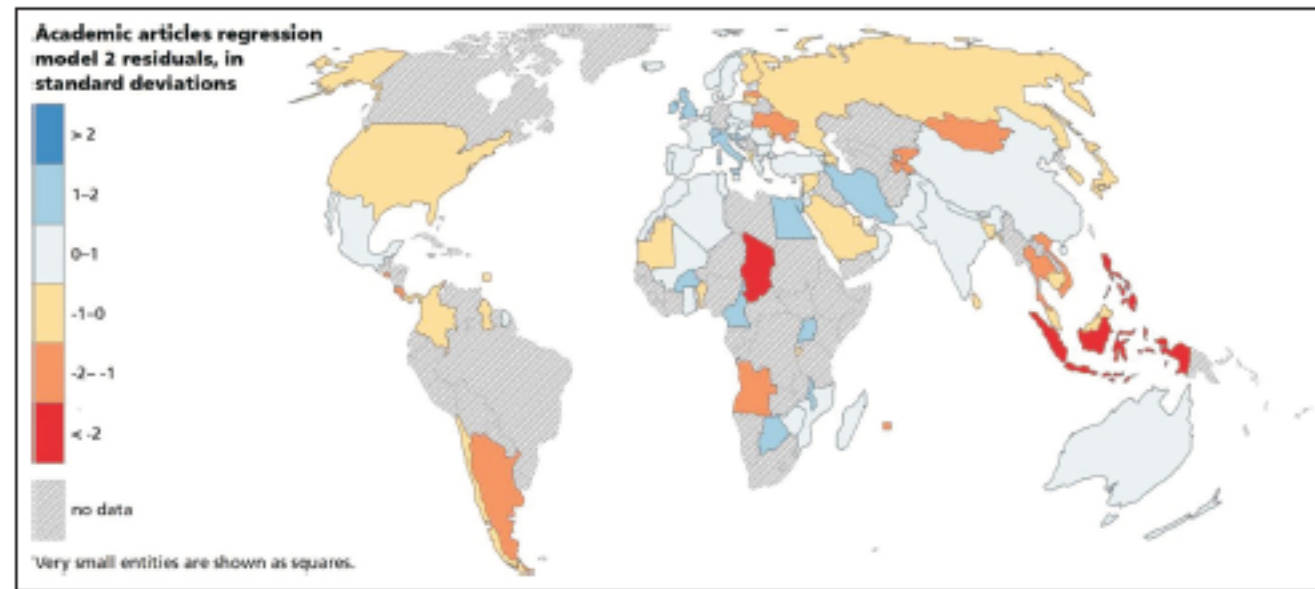


Figure 5. Residual map of academic articles.



# GitHub Commitments:

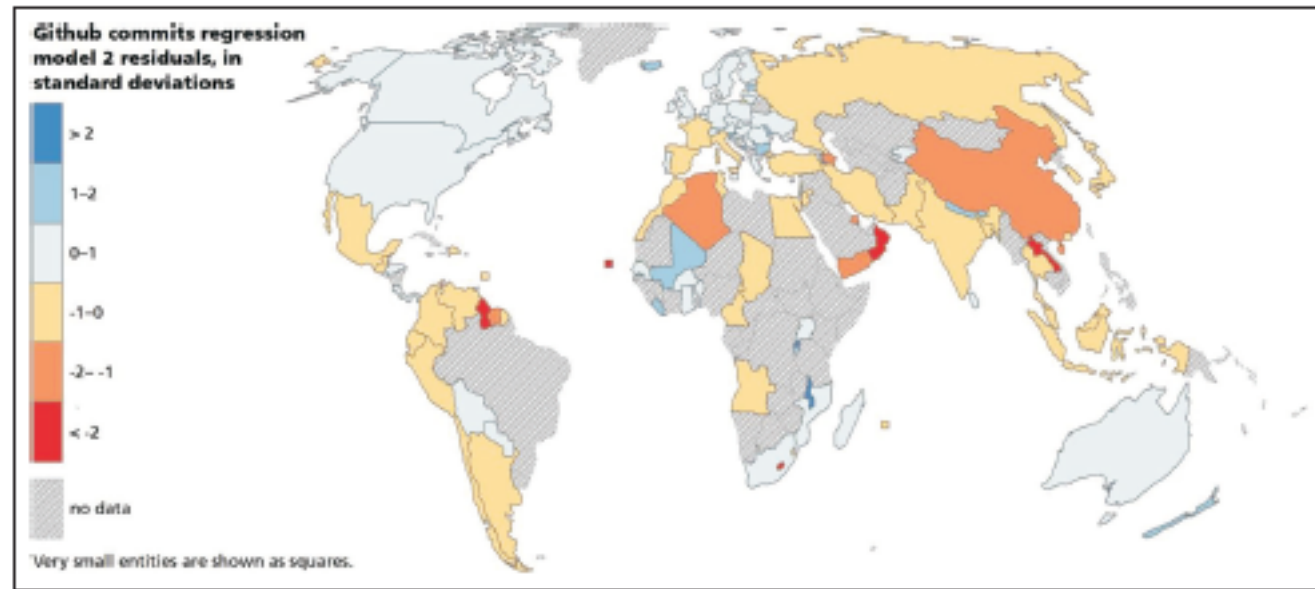
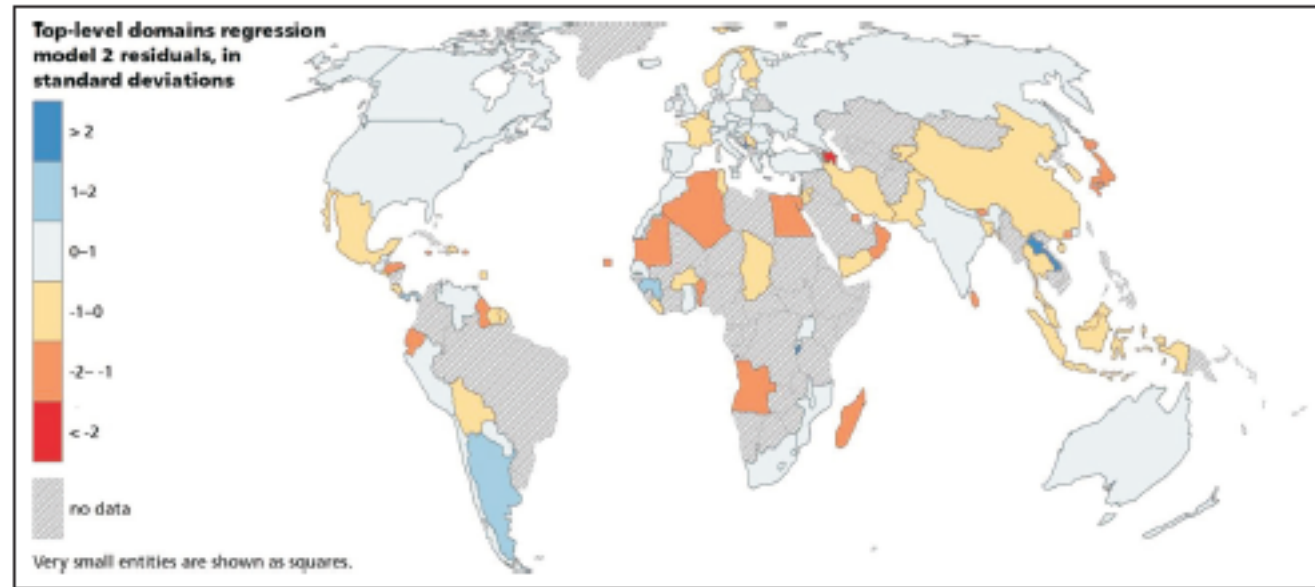


Figure 6. Residual map of GitHub commits.

# Domain registration:



*Figure 7. Residual map of top-level domains.*

# Why Gender Quality matters? Theory Check:

$$Y_t = H_t^\alpha (A_t X)^{1-\alpha}$$

- $H_t$   $\equiv$  efficiency units of labor
- $A_t$   $\equiv$  technological level
- $X$   $\equiv$  land

# Output per efficient worker! Not just L!

- Output per worker produced at time  $t$

$$y_t = h_t^\alpha x_t^{1-\alpha}$$

- $h_t \equiv H_t / L_t \equiv$  efficiency units per-worker

# Utility Function

- The utility function of individual  $t$  (adult at time  $t$ )

$$u^t = (1 - \gamma) \ln(c_t) + \gamma \ln(n_t h_{t+1})$$

- $c_t \equiv$  consumption of individual  $t$
- $n_t \equiv$  number of children of individual  $t$
- $h_{t+1} \equiv$  level of human capital of each child

# Remember the budget Constraint!

$$z_t n_t (\tau + e_{t+1}) + c_t \leq z_t$$

- $z_t \equiv$  potential income of individual  $t$
- $\tau \equiv$  time required to raise a child, regardless of quality
- $\tau + e_{t+1} \equiv$  time needed to raise a child with education  $e_{t+1}$
- $z_t (\tau + e_{t+1}) \equiv$  opportunity cost of raising 1 child with education  $e_{t+1}$

$$z_t \equiv y_t = h_t^\alpha x_t^{1-\alpha}$$

So output is a function of education,  
technological progress and resources

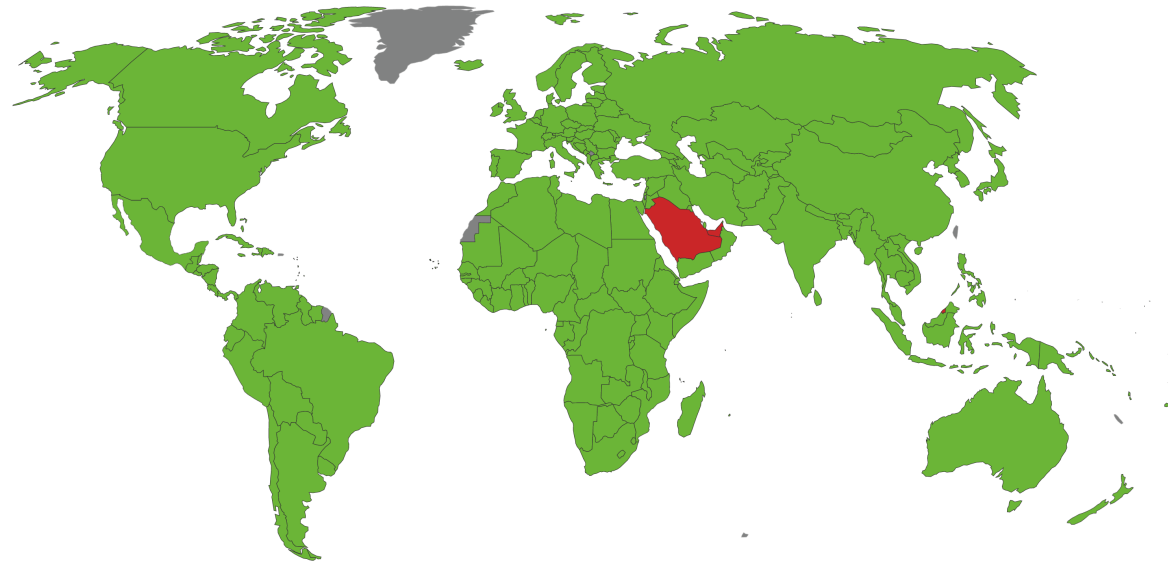
$$z_t \equiv y_t = h_t^\alpha x_t^{1-\alpha} = h(e_t, g_t)^\alpha x_t^{1-\alpha} = z(e_t, g_t, x_t)$$

# Gender Equality: Lets start from the basic

## Universal suffrage granted to women, 2017

This map shows, for any given year, whether universal suffrage is granted or has previously been granted to all women in the country.

Our World  
in Data



■ No data ■ No ■ Yes

Source: OWID Milestones of Women's Political Representation, using Paxton et al (2006)

CC BY

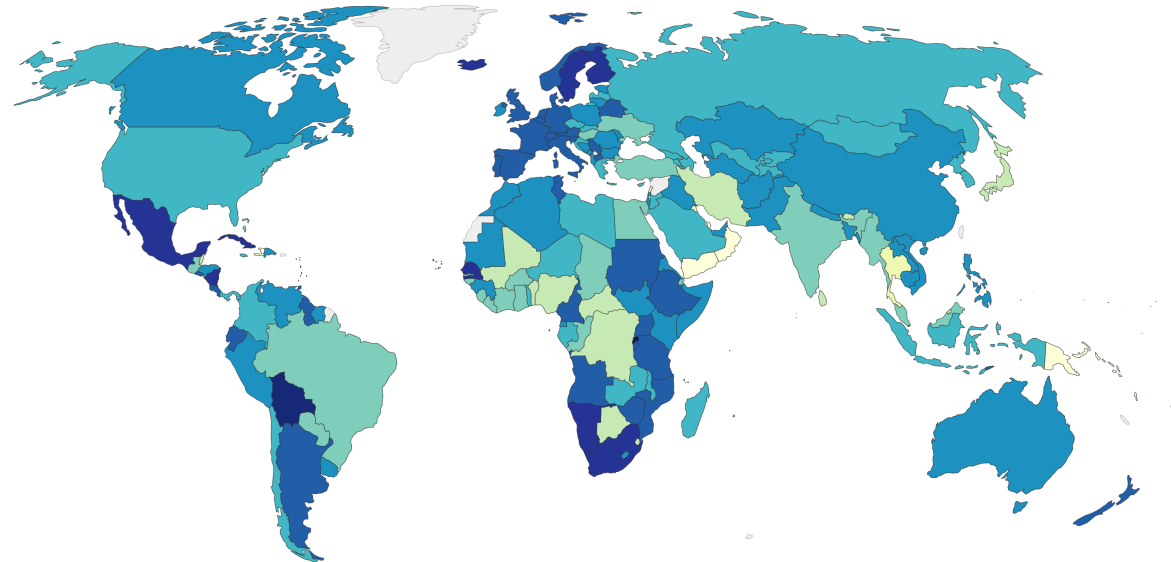


# Political Power?

## Proportion of seats held by women in national parliaments, 2017

The proportion of women in national parliaments is defined as the percentage of parliamentary seats in a single or lower chamber held by women.

Our World  
in Data



Source: World Bank, World Development Indicators (WDI)

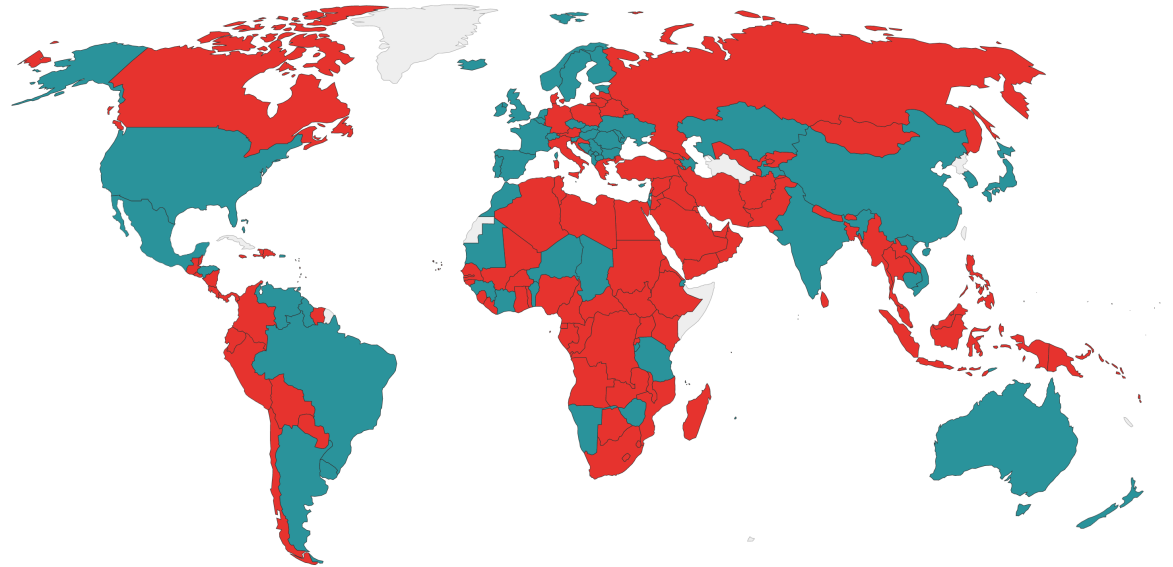
CC BY

# Gender Equality: Same access?

## Does the law mandate nondiscrimination based on gender in hiring?, 2015

Measures whether the law specifically prevents or penalises gender-based discrimination in the hiring process. Job advertisements, selection criteria and recruitment, although equally important, are not considered "hiring" for the purposes of this measure.

Our World  
in Data



No data

No

Yes

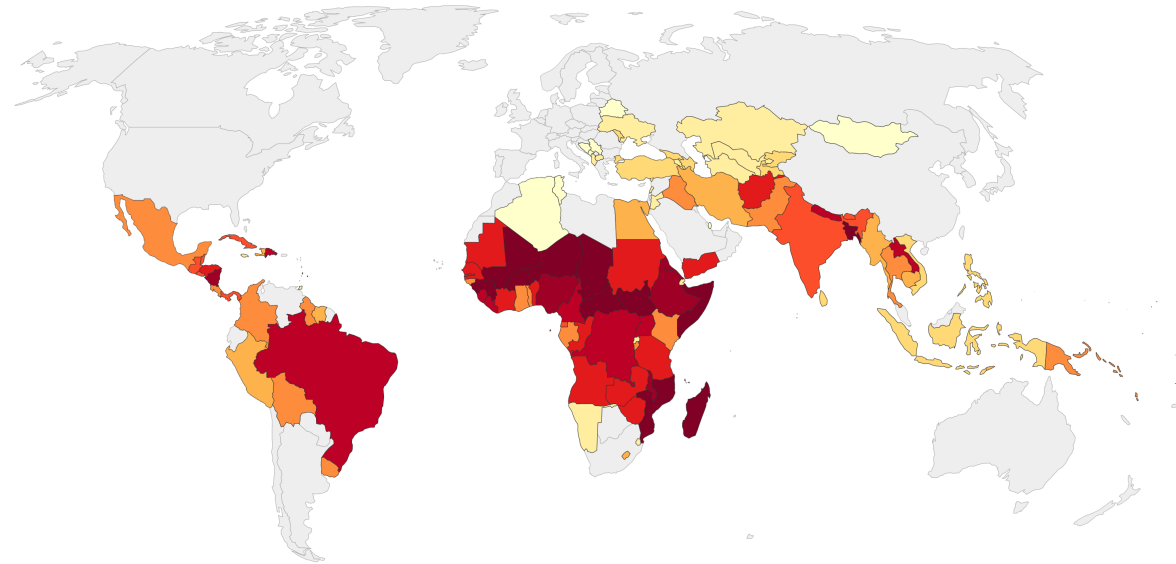
Source: World Bank

CC BY

# If married early, then no time for school!

Share of women (aged 20-24) years who were married by age 18, 2016

Percentage of women aged 20 to 24 years old, who were married or in a union before they reached the age of 18.



Source: World Bank

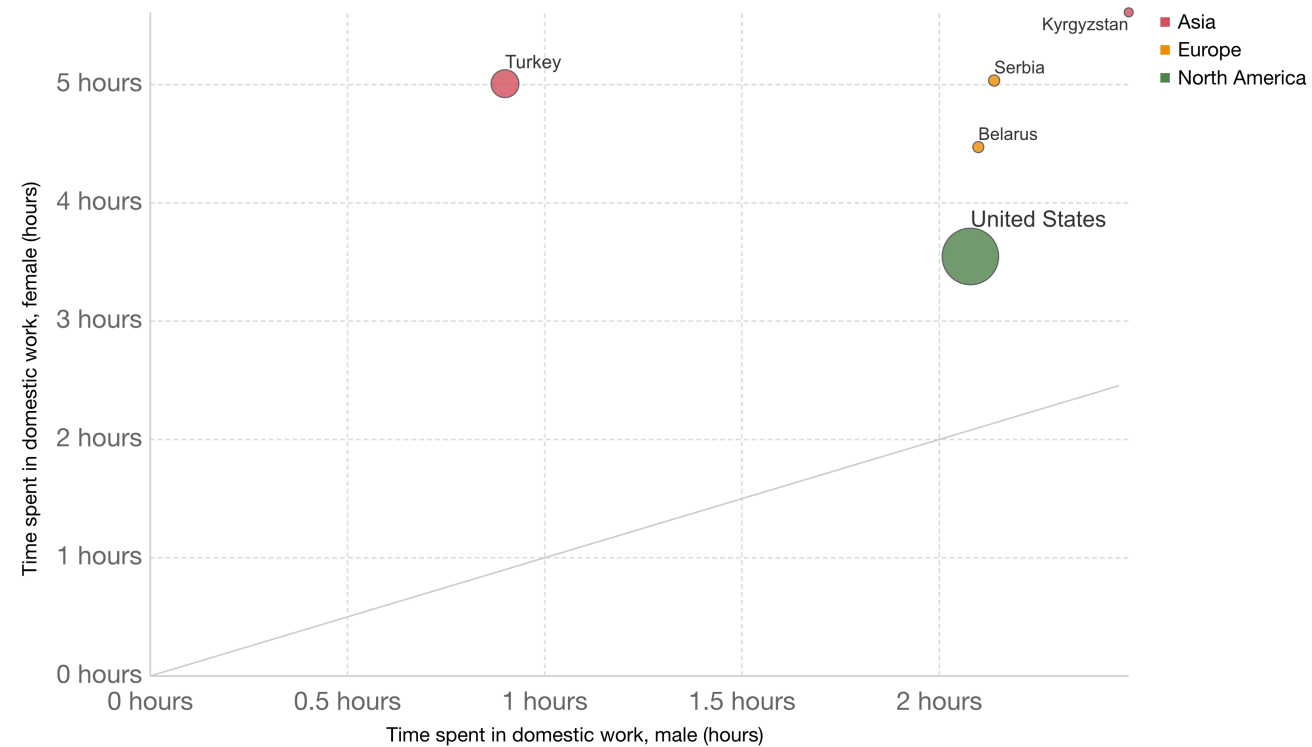
CC BY

# Why? Household tasks are not easy

## Time spent in domestic work, female vs. male, 2015

The average hours per day that women and men aged 20-74 spent on housework, child and adult care, gardening and pet care, construction and repairs, shopping and services, and household management.

Our World  
in Data



Source: World Bank

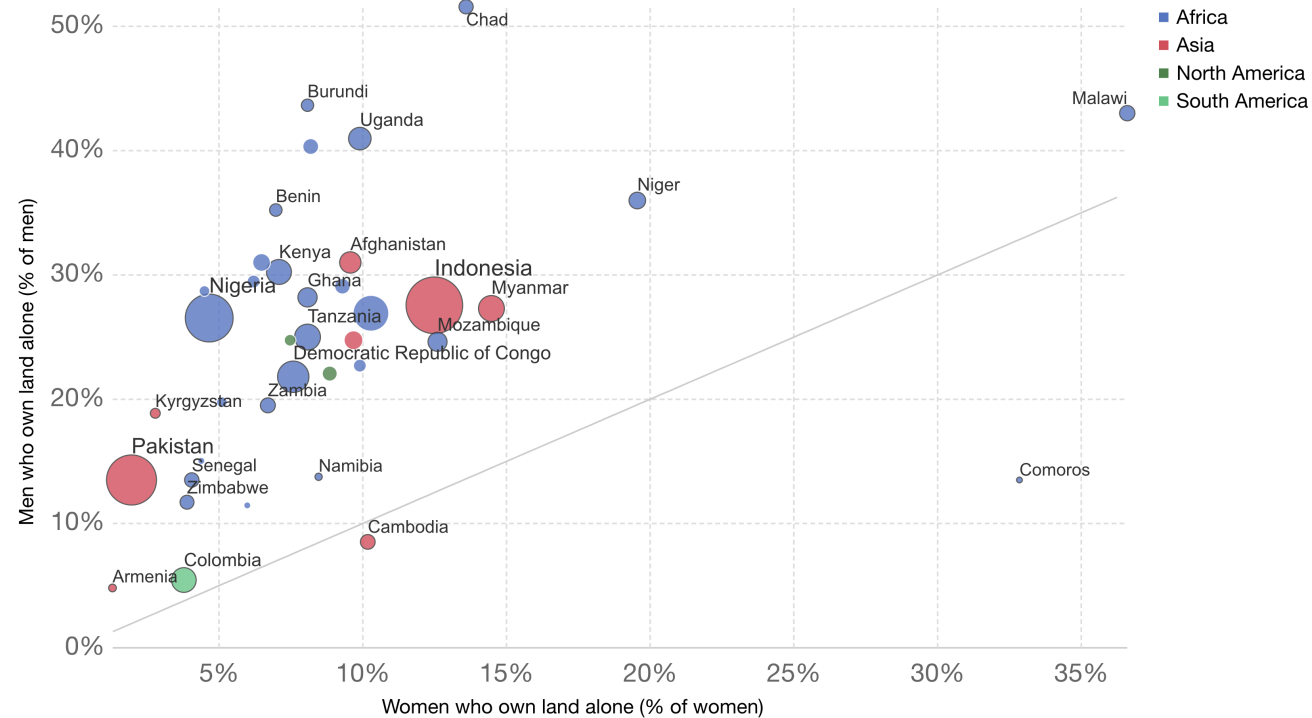
CC BY

# What about property rights?

## Land ownership, men vs women, 2016

Percentage of men and women (age 15-49) who solely own a land which is legally registered with their name or cannot be sold without their signature. Colors represent world regions. Bubble sizes are proportional to the population of the country.

Our World  
in Data



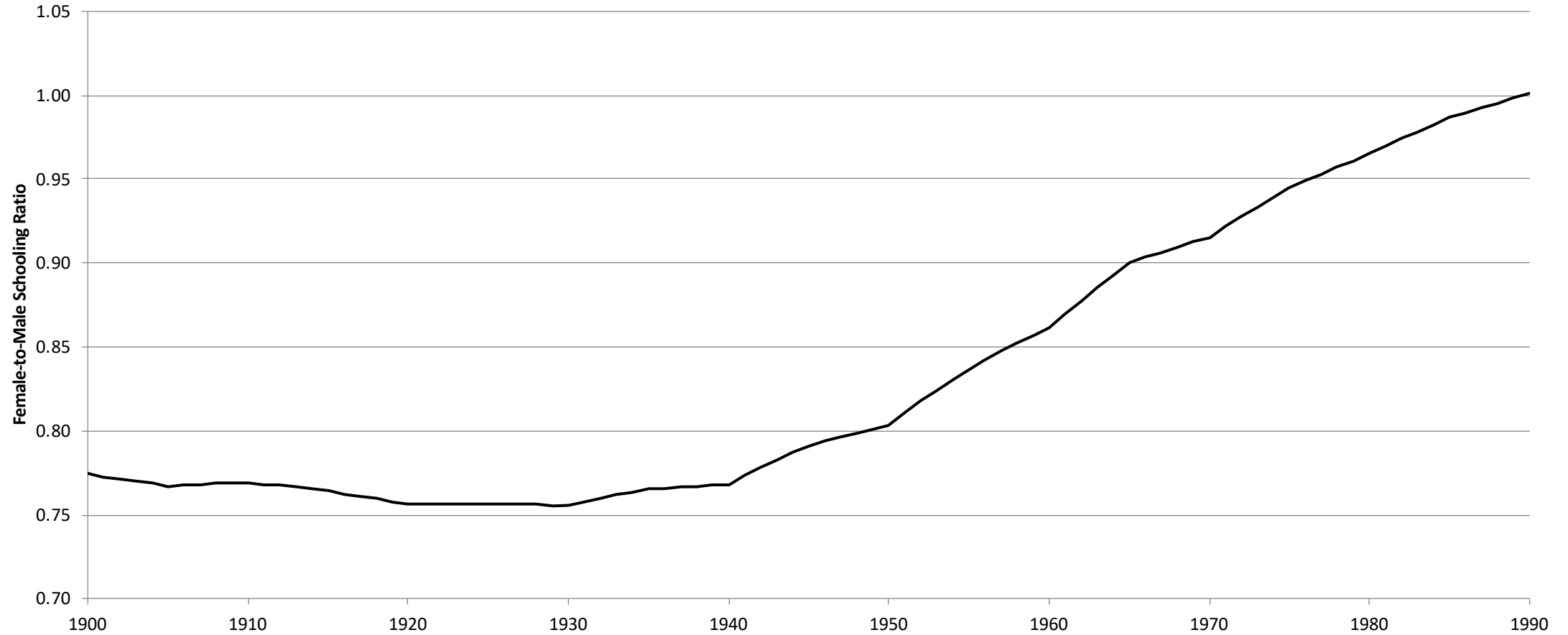
Source: World Bank, Population (Gapminder, HYDE(2016) & UN (2019))

CC BY

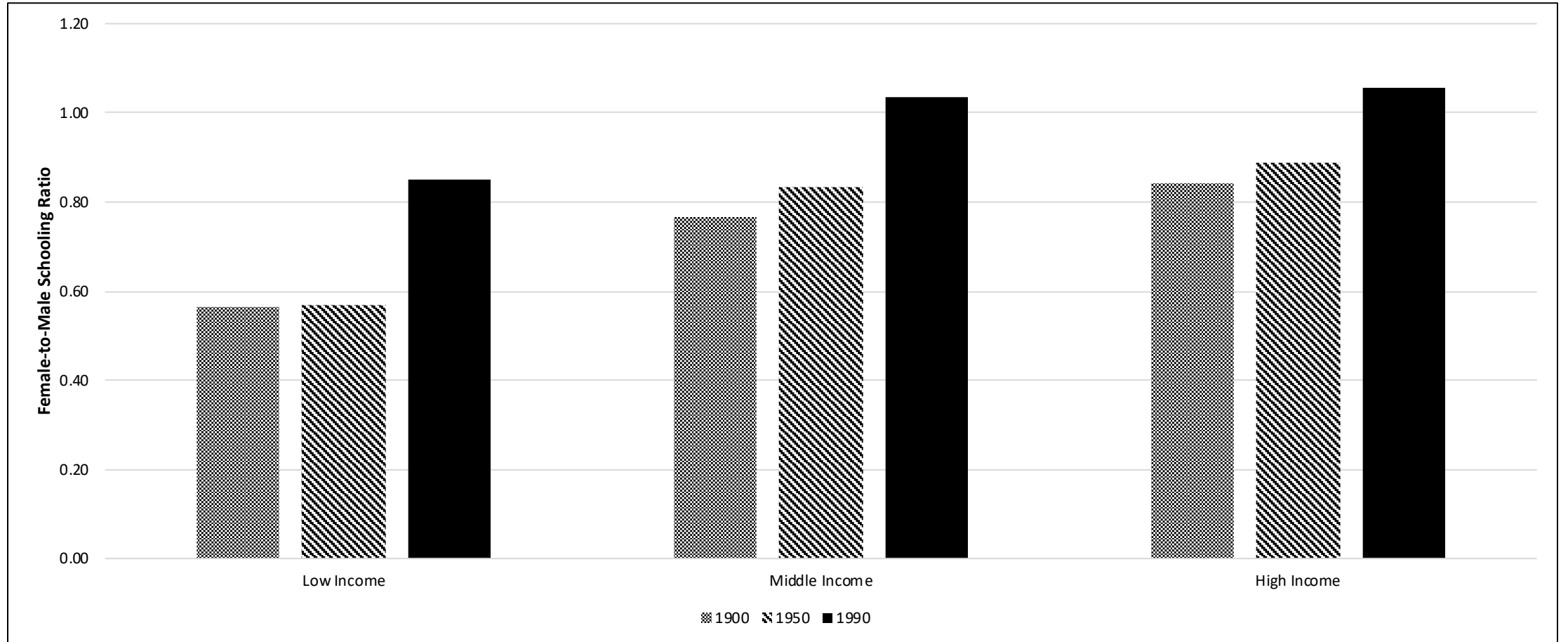
# Klasing and Milionis (2020): The International Epidemiological Transition and the Education Gender Gap

Year	Life expectancy at birth, Females	Life expectancy at birth, Males	Female-Male Life Exp. Ratio	Aver. years of schooling, Females	Aver. years of schooling, Males	Female-Male Schooling Ratio
1900	46.3	43.7	1.059	5.0	5.5	0.919
1913	51.0	48.1	1.059	5.5	6.0	0.906
1928	55.7	52.7	1.056	6.4	7.2	0.894
1939	60.0	56.0	1.071	7.3	8.0	0.908
1950	66.6	62.2	1.071	8.9	9.5	0.931
1964	73.0	67.2	1.086	11.2	11.3	0.990
1977	75.9	69.2	1.098	12.2	12.0	1.019
1990	78.3	71.5	1.094	12.7	12.2	1.042

# Gender Inequality over time

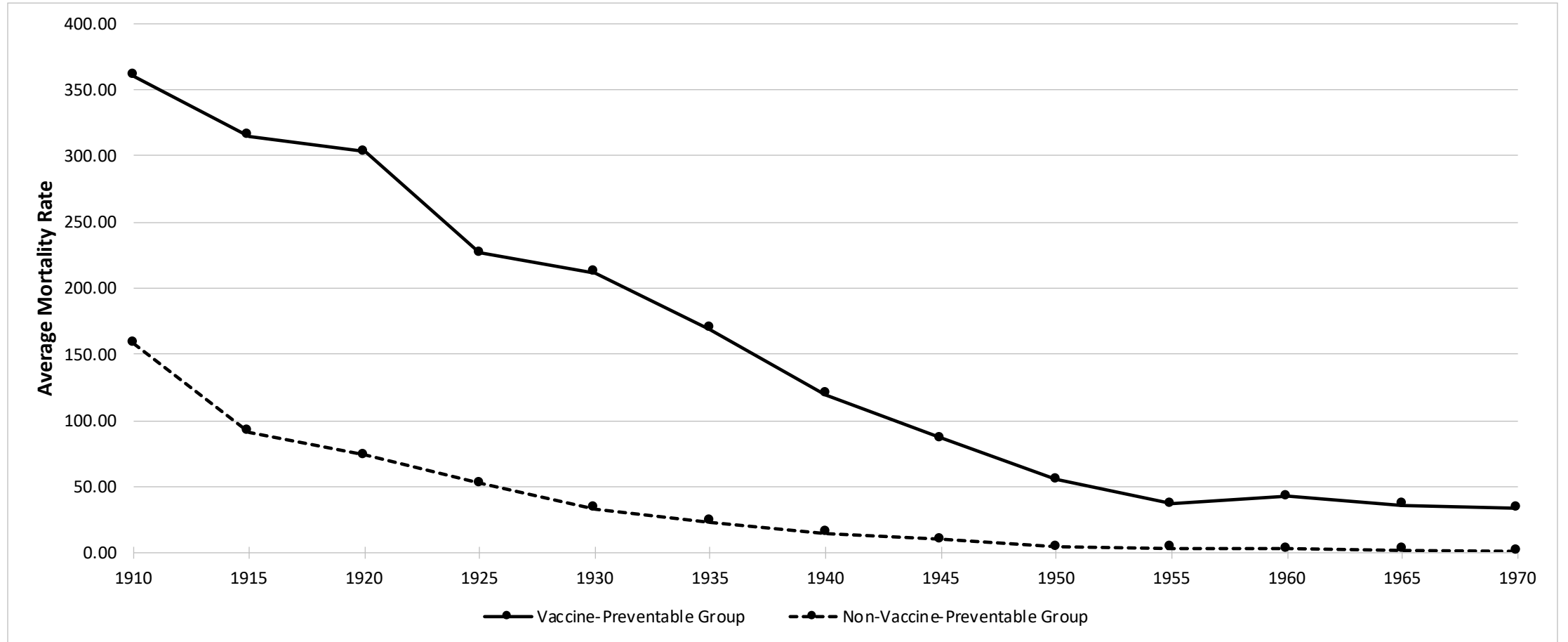


# Gender Inequality is closing

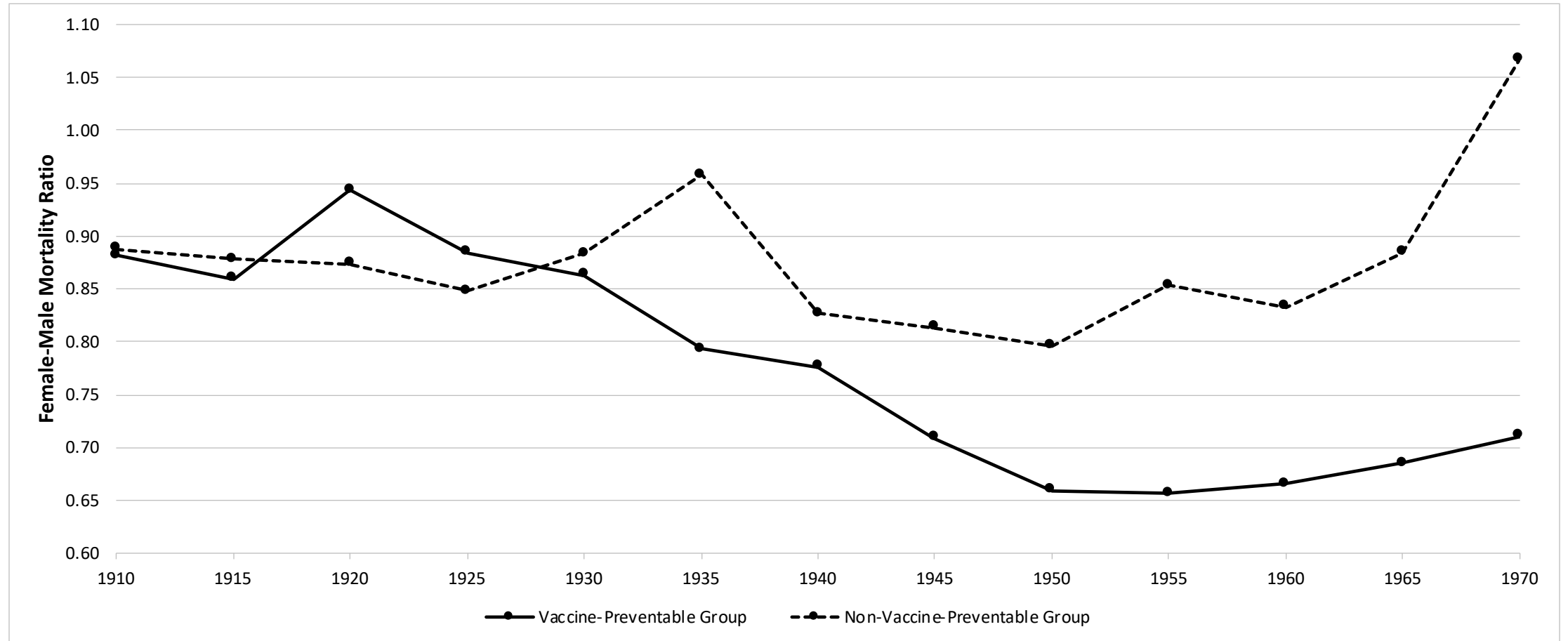




# Mortality Rates and vaccination



# Female-male vaccine acceptance: mortality rates



# Female expected life and educational attainment

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Estimation Method	2SLS with Baseline Mortality Instrument			2SLS with Global Mort. Instrument	2SLS with US Mort. Instrument	2SLS with Adv. Countries Mort. Instrument	OLS	Reduced Form		
Panel A: 1st stage results	Life expectancy at birth						Avg. years of schooling			
Mortality, overall	-15.388***	-12.938***						-1.803**	-1.582*	
	[2.108]	[2.167]						[0.880]	[0.875]	
Female x Mortality, overall		-4.900**							-0.441**	
		[2.154]							[0.172]	
Mortality, VP-group			-11.538***	-13.606***	-11.211***	-11.439***				-1.639*
			[2.410]	[2.842]	[2.465]	[2.451]				[0.969]
Female x Mortality, VP-group			-4.959**	-5.847**	-5.139*	-5.158*				-0.416**
			[2.440]	[2.877]	[2.648]	[2.647]				[0.207]
Mortality, NVP-group			-18.534***	-18.839***	-18.120***	-18.350***				-1.715
			[4.588]	[4.663]	[4.597]	[4.586]				[1.576]
Female x Mortality, NVP-group			-5.618	-5.711	-6.008	-5.985				-0.673
			[6.799]	[6.911]	[6.776]	[6.776]				[0.531]
Panel B: 2nd stage results	Avg. years of schooling									
Life expectancy at birth	0.117***	0.115***	0.114***	0.114***	0.112***	0.114***	0.100***	-	-	-
	[0.044]	[0.043]	[0.041]	[0.041]	[0.043]	[0.042]	[0.032]	-	-	-
Observations	300	300	300	300	296	300	300	300	300	300
Countries	75	75	75	75	74	75	75	75	75	75
Effective F-Statistic	26.56	15.21	9.17	9.17	8.72	9.09	-	-	-	-