

Development economics

Lecture 10: Education and development (human capital)

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Where are we on our path?

► Lectures

1. Introduction
2. Traditional growth models
3. Modern (endogenous) growth models
4. Taking stock on growth models and poverty traps
5. Games in economic development
6. Measuring poverty and inequality
7. Group differences and discrimination
8. Culture, institutions, and the role of history
9. Health and nutrition
10. **Education**
11. The role of foreign aid
12. Credit markets and microcredit
13. Risk and insurance
14. Behavioral development economics

Education statistics

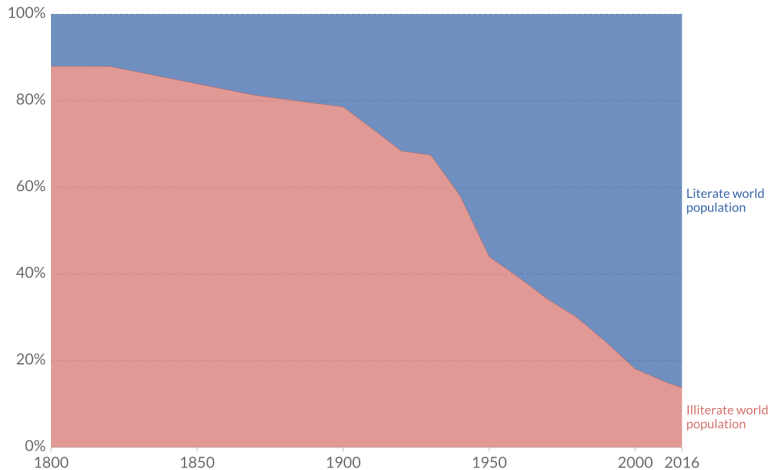
Why does education matter for development?

Challenges for education in developing countries

Literacy in historical perspective

Literate and illiterate world population

Population 15 years and older.



Source: Our World in Data based on OECD and UNESCO (2016)

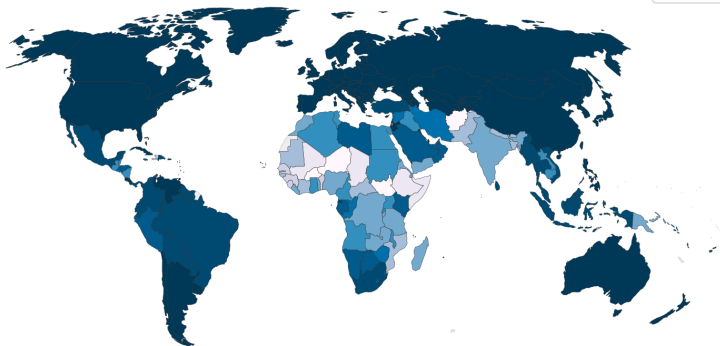
Literacy in around the world

Literacy rate by country, 2011

Literacy rate for the entire population, 2011 or latest data from CIA Factbook.



World



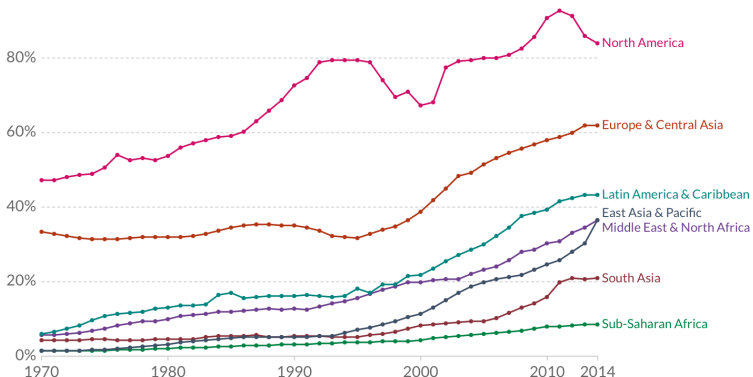
Tertiary education around the world

Gross enrollment ratio in tertiary education, 1970 to 2014

Total enrollment in tertiary education, regardless of age, expressed as a percentage of the total population of the five-year age group following on from secondary school leaving.



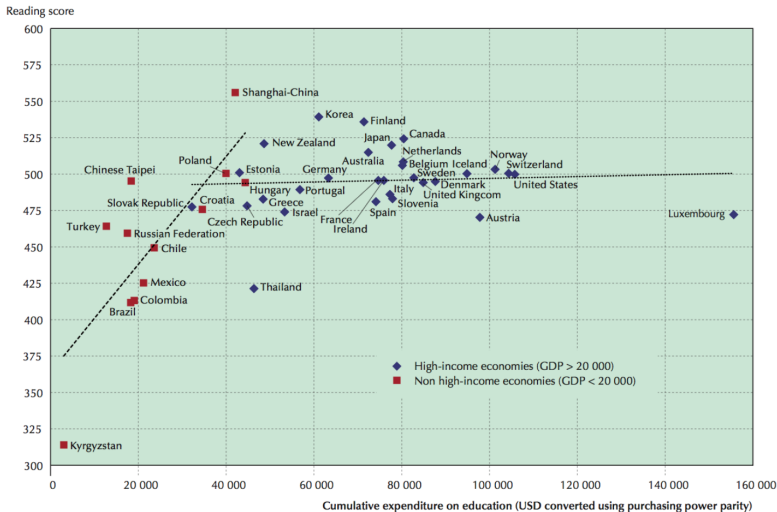
[+ Add country](#)



Source: World Bank

OurWorldInData.org/tertiary-education/ • CC BY

Can money buy you results? Up to a point... and quality matters!



Education statistics

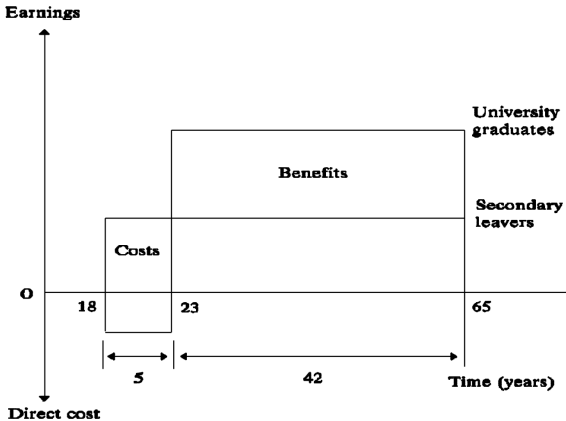
Why does education matter for development?

Challenges for education in developing countries

Why does education matter for development?

- ▶ Macroeconomic benefits: education increases economic growth
- ▶ Micro-level benefits: education improves multiple dimensions of life quality (income, health, fertility, etc.)
- ▶ Examples of education and growth miracles:
 - ▶ Germany and Japan after WW II: destruction of physical capital, human capital remained → economic boom
 - ▶ South Korea: heavy investment in education preceded industrial boom (*Miracle on the Han River*)
 - ▶ Importance of education after war. Literacy at 22% in 1945, 88% in 1970s.
 - ▶ University enrollment 0.4 mil in 1980 and 1.4 mil in 1989.
- ▶ But: In many countries education still strikingly low

Returns to education: model



Source: Psacharopoulos (1994)

Returns to education

- ▶ Measuring returns/benefits (Mincer wage regression):
 - ▶ S ... schooling
 - ▶ X ... experience
 - ▶ D_p, D_s, D_t ... dummies for attending primary, secondary, tertiary
 - ▶ **Normal:** $\ln(w_i) = \alpha + \beta_1 S_i + \beta_2 X_i + \beta_3 X_i^2 + \varepsilon_i$
 - ▶ **Extended:**
 $\ln(w_i) = \gamma + \delta_p D_{pi} + \delta_s D_{si} + \delta_t D_{ti} + \delta_1 X_i + \delta_2 X_i^2 + \mu_i$
- ▶ Returns to specific types of schooling (excluding direct and indirect costs of education):

$$r_p = (\delta_p)/(S_p) \quad r_s = (\delta_s - \delta_p)/(S_s - S_p) \quad r_t = (\delta_t - \delta_s)/(S_t - S_s)$$

Returns to education

Table 2. *Returns to investment in education by level (percentage) full method, latest year, averages by per capita income group*

Country	Mean per capita (US\$)	Social			Private		
		Prim.	Sec.	Higher	Prim.	Sec.	Higher
Low income (\$610 or less)	299	23.4	15.2	10.6	35.2	19.3	23.5
Lower middle income (to \$2,449)	1,402	18.2	13.4	11.4	29.9	18.7	18.9
Upper middle income (to \$7,619)	4,184	14.3	10.6	9.5	21.3	12.7	14.8
High income (\$7,620 or more)	13,100	n.a.	10.3	8.2	n.a.	12.8	7.7
World	2,020	20.0	13.5	10.7	30.7	17.7	19.0

Source: Table A-1.

Source: Psacharopoulos (1994)

Returns to education

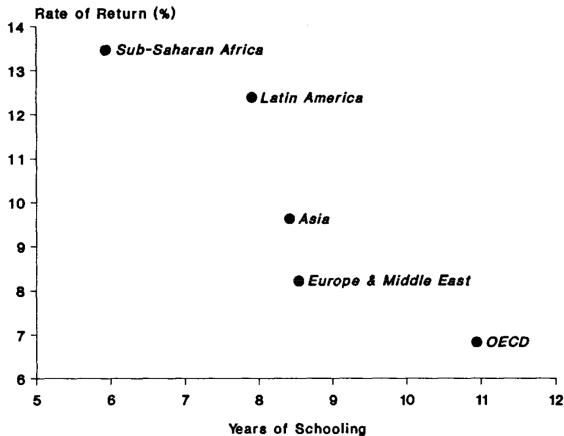


Figure 2. Mincerian returns and mean years of schooling.

Source: Psacharopoulos (1994)

Returns to education

- ▶ Consistent findings in Psacharopoulos (1994) and predecessors:
 1. Returns positive
 2. Cross-economy average return: 10% annually
 3. Returns highest in low/middle income economies
 4. Returns declining modestly over time; schooling attainment rising (supply chasing demand)
 5. Returns highest at the primary level and declining at the secondary and tertiary levels of schooling. → Not today! Highest benefits to university (theoretical justification?)

Returns to education

Region	Total		
	Primary	Secondary	Tertiary
High Income	4.9	6.6	11.1
East Asia	13.6	5.3	14.8
Europe/Central Asia	13.9	4.7	10.3
Latin America	7.8	5.4	15.9
Middle East/N. Africa	16.0	4.5	10.5
South Asia	6.0	5.0	17.3
Sub-Saharan Africa	14.4	10.6	21.0
All economies	11.5	6.8	14.6

Source: Montenegro and Patrinos (2014)

Problems with measuring returns to education

- ▶ Overestimation of returns to education. Why?
 - ▶ Simple OLS estimates cannot distinguish between unobservable differences in innate quality of students (i.e., what if those who go to school are better).
- ▶ Natural experiment to overcome the problem: Duflo (2001): Evidence from Indonesian school reform
 - ▶ Between 1974 and 1978 over 61,000 primary schools constructed in Indonesia (doubling stock).
 - ▶ Exogenous shock to education
 - ▶ Exploiting discontinuity in exposure to program in younger and older kids and differences in rate at which schools constructed.
 - ▶ Returns to education roughly 8% for each extra year of schooling (smaller but not that far from Psacharopoulos')

Problems with measuring returns to education

- ▶ Underestimation of (social) returns to education. Why?
 - ▶ People learn from each other, collaboration easier in educated society (spillovers)
 - ▶ Spillovers → technology adoption
 - ▶ But careful: some displacement effects on uneducated.
 - ▶ Duflo (2004) finds that increase of 10 percentage points in proportion of primary school graduates on labor market reduced wages of older cohorts in Indonesia not affected by schooling expansion by 3.8% to 10% (although formal labor force participation increased by about 7% to 10%).

Wider effects of education

- ▶ Education affects other outcomes apart from income (directly). Which?
- ▶ Higher literacy level → lower transaction costs. Why?
- ▶ Education increases opportunity costs for women and their participation on the labor market. Why?
- ▶ Literate electorate puts more pressure on governments → autocracy less likely

Wider effects of education

- ▶ Significant correlation between education and health outcomes:
 - ▶ Mirowski and Ross (2000): correlation between literacy and life expectancy higher than correlation between income and life expectancy
 - ▶ Chou et al. (2007): A school construction program in Taiwan decreased child mortality due to higher parental education
 - ▶ Education decreases fertility through decrease in desired fertility and higher use of contraceptives
 - ▶ Malawi: girls staying longer in school due to conditional cash transfer program less likely to become pregnant (Baird et al., 2010)

Costs and benefits of education

- ▶ Costs of education:
 - ▶ **Private:** foregone earnings while studying, tuition fees and other direct costs
 - ▶ **Social:** subsidies
- ▶ Benefits of education
 - ▶ **Private:** Wages, private non-market effects
 - ▶ **Social:** Shifting technological frontiers, social non-market effects, spillovers in worker productivity

Education statistics

Why does education matter for development?

Challenges for education in developing countries

Challenges for education in developing countries

- ▶ Although there are many, we'll discuss four:
 1. Basic school inputs missing
 2. Absenteeism in schools
 3. Parents and students having imprecise beliefs about returns to education
 4. Discrimination of children in school

- ▶ Distinguish between supply and demand challenges.
 - ▶ Which of the above supply, which demand?
 - ▶ What should be a response to a supply problem? And to a demand problem?
 - ▶ Education interventionists (Sachs, 2005) vs. aid pessimists (Easterly, 2006)

Basic inputs missing

- ▶ Schools lacking:
 - ▶ A building: 8% in India
 - ▶ Textbooks: 80% primary students in Kenya
 - ▶ Blackboards: 40% in rural northern Vietnam
 - ▶ Enough teachers: primary school pupil to teacher ratio in high-income countries is 16, in low-income countries is 32 (Sub-Saharan Africa 43)
- ▶ Will availability of textbooks increase test scores? → Glewwe, Kremer, and Moulin (2009)

Glewwe, Kremer, and Moulin (2009): Many Children Left Behind? Textbooks and Test Scores in Kenya

- ▶ Economic rationale: spending on non-teacher inputs will raise student performance much more than increased spending on teachers where governance poor (Pritchett and Filmer, 1999)
- ▶ Why can't you use the following OLS model?

$$test\ score_{ijks} = \alpha + \beta\ textbook_{ijks} + u_{jks} + \varepsilon_{ijks}$$

- ▶ RCT in Kenya (baseline: 80% students without textbooks).
- ▶ Result: Provision of textbooks on average did not increase test scores (only helped the brightest students)
- ▶ Why no effect?
 - ▶ Textbooks in English, while main language Kiswahili (not unique)
 - ▶ School curricula way above quality
 - ▶ Often absent teachers do not help students to improve

Glewwe, Kremer, and Moulin (2009)

TABLE 9—PROGRAM IMPACT ON NORMALIZED TEST SCORES, BY QUINTILE OF PRETEST SCORES

Years exposed	Quintile 1 (1)	Quintile 2 (2)	Quintile 3 (3)	Quintile 4 (4)	Quintile 5 (5)
1	-0.049 (0.064)	-0.021 (0.069)	0.032 (0.073)	0.142* (0.079)	0.218** (0.096)
2	-0.077 (0.081)	-0.109 (0.094)	-0.089 (0.104)	0.021 (0.101)	0.173 (0.131)

Notes: Each row represents five random effects regressions, one for each quintile (based on pretest scores from January of year 1), of post-test scores on a dummy variable indicating whether a child is in a textbook school and on dummy variables for region and sex. The sample consists of all children enrolled in January of year 1 who took both the pretest in year 1 and the relevant post-test. All results are aggregated over all grade/subject combinations that received textbooks.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

(Unconditional) increase in teacher pay instead?

- ▶ Ree et al. (2018): Doubling for nothing? Experimental evidence on an unconditional teacher salary increase in Indonesia.
 - ▶ Can unconditional increase in teacher salary improve student performance? (in contrast to Pritchett and Filmer, 1999)
 - ▶ Indonesia implemented unconditional salary increase doubling the base pay of eligible civil service teachers who went through a certification process.
 - ▶ Policy phased in over 10 years (from 2006 to 2015).
 - ▶ Salaries up from 50th to the 90th percentile of college-graduate salary distribution.
 - ▶ Why do we expect that increasing pay affects teacher quality?
 - ▶ Reduced absenteeism, more focus on job, less financial stress.
 - ▶ Reciprocity: you pay me more, I deliver better quality. "Gift exchange" (Akerlof 1982, Falk 2007).
 - ▶ Allowing managers/directors to demand accountability. Not possible if teachers feel underpaid.
 - ▶ Government motivation: *"improve teacher morale, motivation, and job satisfaction"*

Ree et al. (2018): Doubling for nothing?

- ▶ Large scale experiment:
 - ▶ 120 treatment schools skip the phase-in line and eligible for certification immediately
 - ▶ 120 control schools in existing queue
- ▶ Studying effects on incumbent teachers
- ▶ Results:
 - ▶ Teacher welfare ↑: higher income, more satisfied with their income, less likely to report financial stress.
 - ▶ Time use: less likely to hold a second job, worked fewer hours on second jobs
 - ▶ Teacher effort: no effect; no effect on absenteeism (self-reported)
 - ▶ Student performance: no effect (precisely estimated 0)

Ree et al. (2018): Doubling for nothing?

- ▶ Expensive policy (costs over 5% of the national budget)
- ▶ Issues with the findings?
 - ▶ Only focus on intensive margin (incumbent teachers)
 - ▶ Maybe extensive margin effects more promising: attracting better teachers...
 - ▶ Some evidence:
 - ▶ Dal Bo et al. (2013): salary increases for public sector jobs in Mexico increased the quality of job applicants
 - ▶ Ferraz and Finan (2011): higher wages for politicians in Brazil attracted more educated candidates
 - ▶ Issues?
 - ▶ Annual flow of new workers is low relative to the stock of existing workers, most extensive margin benefits would accrue far in the future.

Absenteeism in schools

Table 1

Provider Absence Rates by Country and Sector

	<i>Absence rates (%) in</i>	
	<i>Primary schools</i>	<i>Primary health centers</i>
Bangladesh	16	35
Ecuador	14	—
India	25	40
Indonesia	19	40
Peru	11	25
Uganda	27	37
Unweighted average	19	35

Notes: Providers were counted as absent if they could not be found in the facility for any reason at the time of a random unannounced spot check (see text for further detail). In Uganda, the sampled districts were divided into subcounties, and schools in subcounties with level III health centers comprise the school sampling frame. This sampling strategy may have had the effect of understated slightly the national absence rate there, given that schools in more rural areas appear to have higher absence rates.

Source: Chaudhury et al. (2006)

Absenteeism in schools

Table 3

Correlates of Teacher Absence (HLM, with District-Level Fixed Effects)

(dependent variable = visit level absence of a given teacher: 0 = present, 100 = absent)

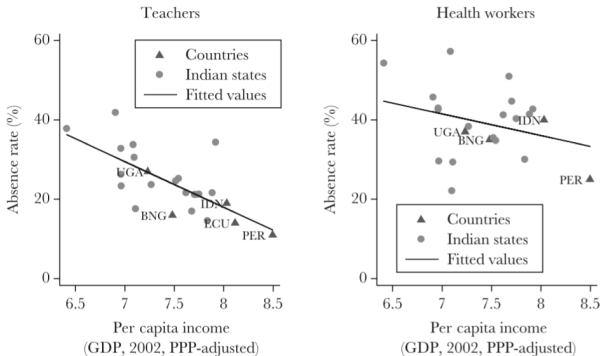
	Estimates for the multicountry sample		Countries where coefficient has same sign as multicountry coefficient
	Coefficient	Standard error	
Male	1.942**	0.509	BNG, ECU, IND***, IDN, PER
Ever received training	2.141	4.354	BNG, ECU***, PER
Union member	2.538*	1.258	ECU***, IND, IDN, PER
Born in district of school	-2.715**	0.833	BNG, ECU, IND***, IDN*, PER, UG
Received recent training	-0.740	2.070	BNG, ECU***, UGA
Tenure at school (years)	0.033	0.044	BNG, IDN, PER
Age (years)	0.021	0.046	ECU, IND, UGA*
Married	0.742	0.972	BNG, IDN, PER, UGA**
Has university degree	-1.055	1.162	ECU, IDN
Has degree in education	1.806	2.071	ECU***, IND*
Head teacher	3.771***	0.888	BNG, ECU, IND***, IDN**, PER, UGA
School infrastructure index (0-5)	-2.234***	0.438	BNG, ECU*, IND***, IDN, PER
School inspected in last 2 mos.	-0.142	1.194	BNG, ECU, IND***, UGA
School is near Min. Education office	-4.944	2.642	BNG, ECU***, IND**, IDN*
School had recent PTA meeting	2.308	1.576	BNG, ECU, PER*
School's pupil-teacher ratio	-0.095	0.080	BNG, ECU*, IDN, PER
School's number of teachers	0.015	0.113	ECU, PER, UGA
School has teacher recognition program	0.168	3.525	ECU, PER
Students' parents' literacy rate (0-1)	-9.361***	1.604	BNG, ECU, IND***, IDN, PER**
School is in urban area	2.039	1.441	ECU, IND, PER
School is near paved road	0.040	1.106	BNG, ECU, IDN, UGA
Teacher is contract teacher	5.722	2.906	ECU, IDN**, PER (no contract teachers in BNG/UGA)
Dummy for 1st survey round	2.938	1.874	BNG, ECU***, IND***, PER*, UGA
Constant	32.959***	1.963	BNG***, ECU, IND***, IDN**, PER**, UGA
Observations	34880		

Notes: * Significant at 10 percent; ** significant at 5 percent; *** significant at 1 percent. Regressions also included dummies for the days of the week (not reported here).

Absenteeism in schools

Figure 1

Absence Rate versus National/State Per Capita Income



Source: Authors' calculations.

Note: BNG = Bangladesh; ECU = Ecuador; IDN = Indonesia; PER = Peru; UGA = Uganda. India's national averages are excluded, due to the inclusion of the Indian states. For Indian states, incomes are the official per capita net state domestic products.

Source: Chaudhury et al. (2006)

Banerjee and Duflo (2006): Addressing Absence

- ▶ How to fight absenteeism? Ideas?
- ▶ External control
 - ▶ More intensive monitoring → Duflo, Hanna, and Ryan (2005)
 - ▶ Monitoring by camera (bonus for presentce / fine for absence)
 - ▶ Results: absence rate of (treatment) teachers cut by half
 - ▶ Monitoring by headmasters not working (Kremer and Chen, 2001) – side with the teachers
 - ▶ Incentives (rewards / punishments; monetary / shame–praise) based on measured performance
 - ▶ Glewwe, Ilias and Kremer (2010): In-kind incentives ($\approx 20\%$ of salary) for top and best improving schools in district exam test-scores
 - ▶ Improved test-score results, but no effect on absenteeism. How did they manage?
 - ▶ More test preparation (no effect on long-term learning)

Banerjee and Duflo (2006): Addressing Absence

- ▶ Beneficiary control over providers
 - ▶ Why don't parents do the monitoring?
 - ▶ World Bank Development Report (2004): *"Services can work when poor people stand at the center of service provision —when they can avoid poor providers, while rewarding good providers with their clientele, and when their voices are heard by politicians — that is, when service providers have incentives to serve the poor."*
 - ▶ Two important components for beneficiary control:
 - ▶ Beneficiaries must have a real demand for the service
 - ▶ Beneficiaries must have a mechanism for affecting providers
 - ▶ Experiments on community monitoring show no effects.
 - ▶ Punishment mechanisms rather limited in many developing countries
 - ▶ Maybe the parents value education too little. Rational or imprecise beliefs?

Jensen (2010): The (perceived) returns to education and the demand for schooling

- ▶ US students guess returns to education precisely (Smith and Powell, 1990). What about developing countries?
- ▶ Survey data for eighth-grade boys in the Dominican Republic (non-rural population, representative sample, 2250 students)
 - ▶ *Now, we would like you to think about adult men who are about 30 to 40 years old and who have completed only [primary school/secondary school/university]. Think not just about the ones you know personally, but all men like this throughout the country. How much do you think they earn in a typical week, month or year?*

Jensen (2010): The (perceived) returns to education

TABLE III
MEASURED AND PERCEIVED MONTHLY EARNINGS, MALES AGED 30–40

	(1) Measured mean	(2) Perceived (self)	(3) Perceived (others)
Primary	3,180 [1,400]	3,516 [884]	3,478 [863]
Secondary	4,479 [1,432]	3,845 [1,044]	3,765 [997]
Tertiary	9,681 [3,107]	5,127 [1,629]	5,099 [1,588]
Secondary – primary	1,299	329 [403]	287 [373]
Tertiary – secondary	5,202	1,282 [1,341]	1,334 [1,272]

Notes. All figures in 2001 Dominican pesos (RD\$). Standard deviations in brackets. Column (1) provides the mean earnings among men aged 30–40 from a household survey conducted by the author in January 2001. The number of observations is 1,278 primary, 339 secondary, and 83 tertiary. Columns (2) and (3) provide data from the Round 1 survey of eighth-grade male students, conducted by the author in April/May 2001. Column (2) refers to what current students expect to earn themselves under different education scenarios when they are 30–40. Column (3) refers to what current students believe current workers 30–40 years old with different education levels earn. For both columns, there are 2,025 observations with responses for primary and secondary, and 1,847 responses for tertiary.

Source: Jensen (2010)

Jensen (2010): The (perceived) returns to education

- ▶ Results: perceived returns to secondary school are extremely low, despite high measured returns
 - ▶ Similar results also in Nguyen (2008) for Madagascar, only with parents
- ▶ RCT on giving information to students:
 - ▶ Students at randomly selected (urban) schools given information on the higher measured returns
 - ▶ *"We found that the average earnings of a man 30 to 40 years old with only a primary school education was about 3,200 pesos per month, [...] of a man [...] who completed secondary school [...] was about 4,500 pesos per month [...]. And people who go to university earn about [9,500] pesos per month."*
 - ▶ Students given the information completed on average 0.20-0.35 more years of school over the next four years than those who were not.
 - ▶ Demand side problem!

Discrimination of children in school

- ▶ **Stereotype threat:** stereotyped-based expectations affect individual performance in the domain of the stereotype
- ▶ Remember the discrimination lecture: Stone et al. (1999), Hoff and Pandey (2006)

Taking stock

1. Returns to education positive and large!
 2. Positive effects of education beyond direct income effects
 3. Issues for education (in developing countries):
 - 3.1 Basic school inputs missing
 - 3.2 Absenteeism in schools
 - 3.3 Parents and students having imprecise beliefs about returns to education
 - 3.4 Discrimination of children in school
- ▶ Where next? The role of foreign aid