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What Explains Vietnam's Exceptional Performance in Education Relative to Other Countries? Analysis of the Young Lives Data from Ethiopia, Peru, India (Andhra Pradesh) and Vietnam

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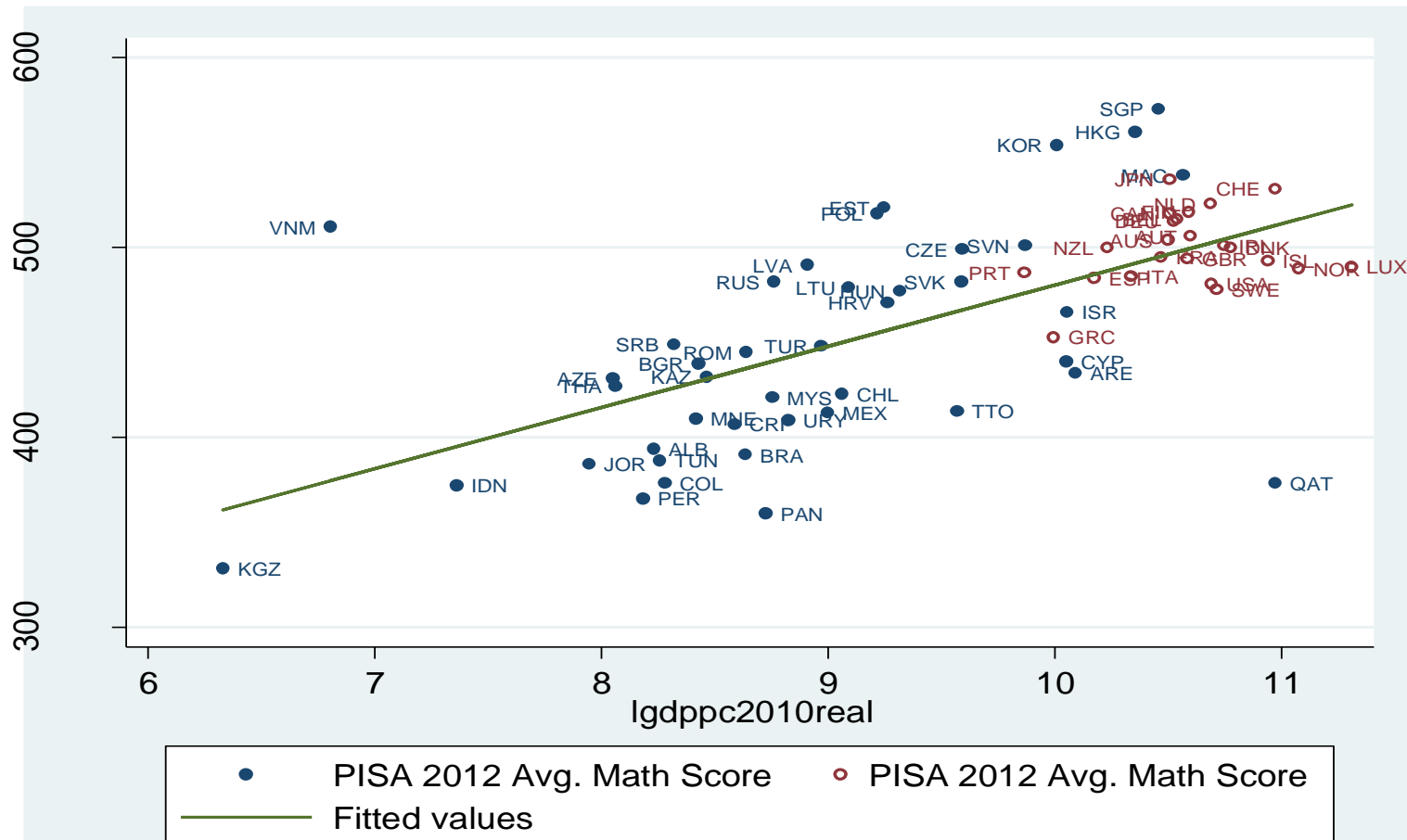
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Vietnam: An Apparent International Education Success Story:

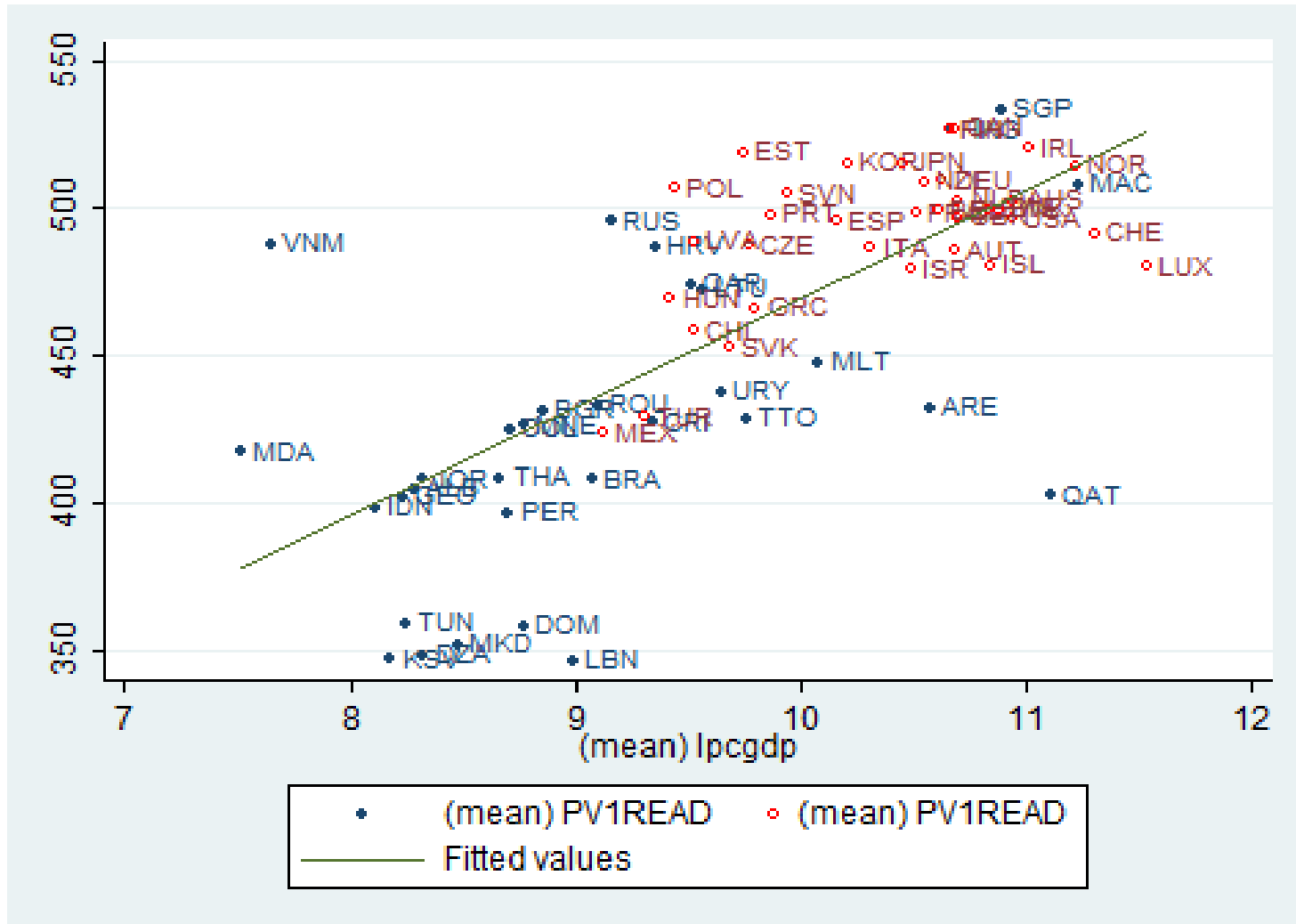
- Primary completion rate 97%, Lower secondary enrollment rate of 95%
- 2012 PISA (Programme for International Student Assessment)
 - 16th in math (out of 63 participating countries)
 - 18th in reading (out of 63 participating countries)
 - Ahead of U.S. and U.K.!
- Vietnam's performance on the 2015 PISA was similar, though slightly lower

Vietnam's PISA scores much higher than predicted by its income level:

Mean Age 15 Math Scores in 2012 PISA, by Log Real GDP/Capita, 2010



Mean Age 15 Reading Scores in 2015 PISA, by Log Real GDP/Capita, 2015



However, the PISA data have serious limitations...

- They **exclude children who are not in school**, and according to the PISA data's "coverage" rate Vietnam is the second lowest (lowest) country in the 2012 (2015) PISA in terms of the proportion of 15-year-olds who are in school
- The student-level data from the PISA are collected only when those students are age 15, and not at any earlier age.
- The school-level data are collected only for the schools that the students are currently attending, not the schools that they attended in earlier years.
- The school-level data are somewhat limited. For example, the question on teacher absence simply asks the school principal whether teacher absence is: a) Not a problem; b) A small problem; c) A moderate problem; or d) A serious problem
- The Vietnamese government appears to have "prepped" students for the PISA exam, which could explain, at least in part, its strong performance.

In Contrast, the Young Lives Data ...

- Include all 15-year-old children, regardless of whether they were in, or were not in, school.
- Were collected from the children over 14 years, when they were 1, 5, 8, 12 and 15 years old, and include much more detailed information than the data collected from the PISA student questionnaire.
- Collect data from the primary school the student attended (at the age when they were in grade 4 or 5) *and* data from the secondary school that they attended when they were about 14 years old.
- Collect much richer data at the school level, including school principal and teacher questionnaires, and school observation data.
- Do not attract any media attention and thus there is little reason to think that the Vietnamese government “prepped” the students.

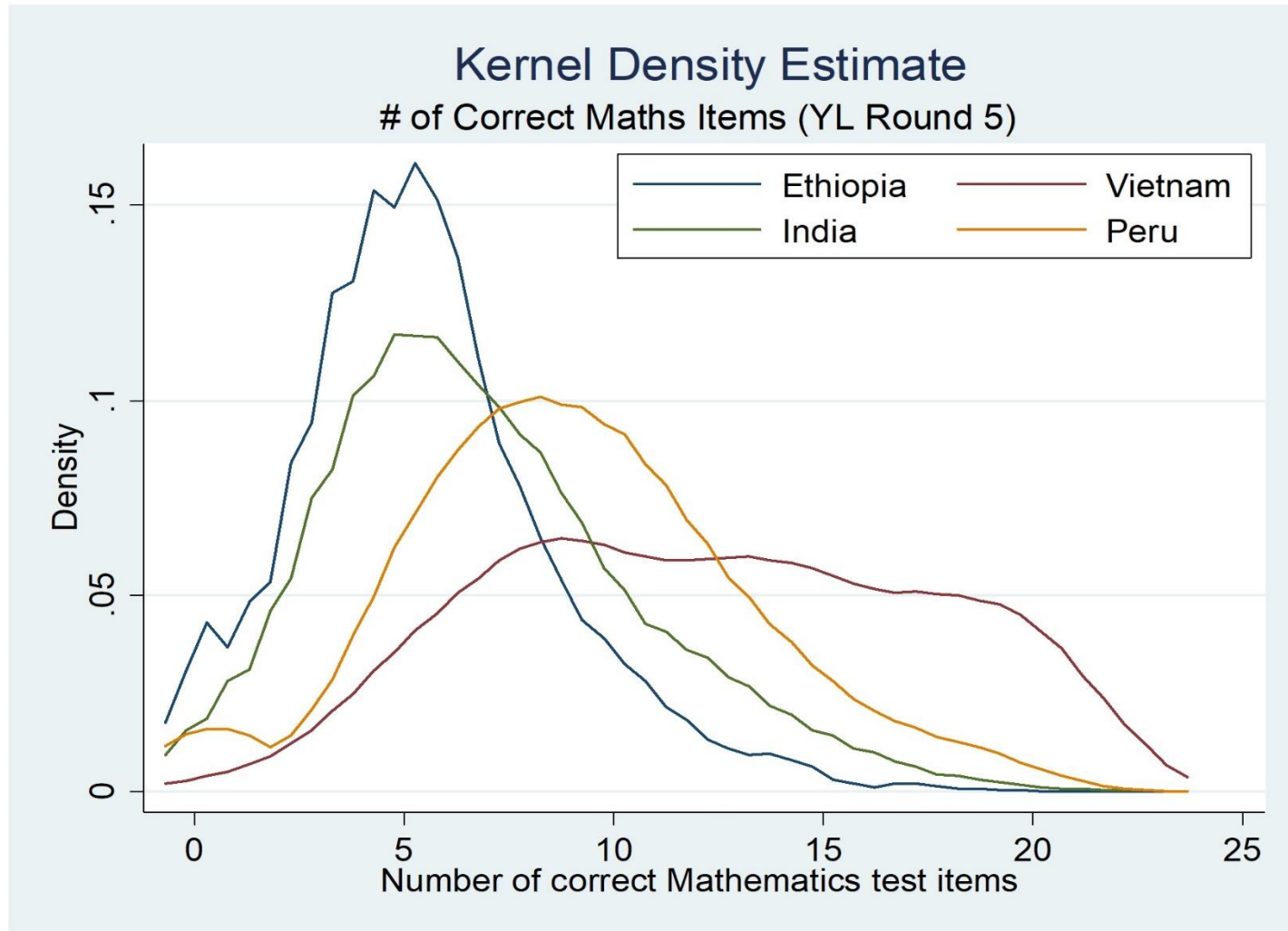
Of the 4 Young Lives countries, 15-year-old children (including those not in school) in Vietnam scored the highest on a Math test:

Number of Math Questions Correct out of 23 Questions Used in All 4 Young Lives Countries:

	Number Correct	Standardized Score
Ethiopia	5.5	1.13
India	6.9	1.42
Peru	9.1	1.87
Vietnam	12.3	2.54

Note: The standardized score divides the “raw” score by 4.8618, which is the standard deviation of the “raw” score for all 4 countries.

Another way to see this is to look at the densities for all 4 countries:



So What Is It about Vietnamese Children, or Schools, that Explains Vietnam's Strong Education Performance? Some Possibilities are:

1. Vietnamese children are better nourished, have fewer siblings, and are wealthier:

	Ethiopia	India	Peru	Vietnam
Average height-for-age Z-score, age 5	-1.45	-1.65	-1.54	-1.35
Percent of children who are stunted (Z-score < -2), age 5	31.3%	35.7%	33.2%	25.3%
Number of siblings, age 8	3.0	1.5	1.7	1.3
Wealth index (when child was 12 yrs old)	0.32	0.52	0.62	0.63

2. Vietnamese parents are better educated than the parents in the other three countries, and help their children more with their schoolwork:

	Ethiopia	India	Peru	Vietnam
Average father's years of education	3.5	4.7	8.9	7.0
Average mother's years of education	2.4	3.1	7.7	6.2
Mother or father helps child with homework: Age 12	14.3%	15.6%	34.9%	21.6%
Age 15	10.3%	9.6%	14.6%	4.3%

3. Vietnamese students spend more time in school, and study more at home:

	Ethiopia	India	Peru	Vietnam
Hours per day in school (including travel time):				
Age 8	4.9	7.7	6.0	4.9
Age 12	5.6	8.0	6.1	5.4
Age 15	5.3	7.8	6.9	5.0
Hours per day studying at home:				
Age 8	1.0	1.8	2.0	2.9
Age 12	1.5	1.9	1.8	2.6
Age 15	1.8	2.1	2.1	2.6

4. Vietnamese parents have higher aspirations for their children's education

	Ethiopia	India	Peru	Vietnam
Parents want child to complete university or other post-secondary education (reported when child was 5 years old)	71.8%	57.9%	87.2%	78.6%
Percent of parents that think child will attain parents' desired level	90.8%	88.7%	91.4%	78.9%

Regression Analysis to Check Explanatory Power of These Variables

Table 1. Regressions of Math Scores on Country Dummy Variables and Household/Child Variables

Ethiopia dummy variable	1.131*** (0.021)	[-1.406]	0.876*** (0.039)	[-0.915]	0.115* (0.061)	[-0.931]
India dummy variable	1.416*** (0.020)	[-1.120]	0.946*** (0.044)	[-0.845]	-0.023 (0.078)	[-1.068]
Peru dummy variable	1.865*** (0.020)	[-0.671]	1.109*** (0.049)	[-0.682]	0.380*** (0.068)	[-0.666]
Vietnam dummy variable	2.537*** (0.020)	[0.000]	1.791*** (0.048)	[0.000]	1.046*** (0.064)	[0.000]
Wealth index	--		0.890*** (0.066)		0.593*** (0.065)	
Mother's years of education	--		0.046*** (0.003)		0.030*** (0.003)	
Number of siblings	--		-0.017*** (0.006)		-0.008 (0.006)	
Height-for-age Z-score	--		0.072*** (0.009)		0.056*** (0.009)	
Hours/day study at home, age 8	--		--		0.023***	
Hours/day study at home, age 12	--		--		0.064***	
Hours/day study at home, age 15	--		--		0.088***	
Hours/day in school, age 8	--		--		0.016***	
Hours/day in school, age 12	--		--		0.024***	
Hours/day in school, age 15	--		--		0.051***	
Hope child will go to university	--		--		0.079***	
Observations/R-squared	7,297/0.824		7,008/0.854		6,957/0.869	

Note. These are “site” level averages.

Still a lot to be explained, so let's look at some teacher and school variables

5. Teachers and principals in Vietnamese primary schools are more qualified, and teachers are absent less often:

	Ethiopia	India	Peru	Vietnam
Teachers with 3- or 4-year general (non-education) university degrees	5.4%	78.6%	84.2%	94.4%
Principal's years of experience as a principal	4.0	6.3	12.7	10.4
Teacher days absent per month	0.63	0.71	0.48	0.26

22. (Primary) Schools in Vietnam have better infrastructure

	Ethiopia	India	Peru	Vietnam
School has electricity	52.8%	85.8%	94.1%	100.0%
School has a library	62.4%	20.7%	43.9%	79.2%
School has computers for students to use	20.1%	29.5%	58.2%	32.3%

Regression Analysis to Check Explanatory Power of School Variables

Table 2. Regressions of Math Scores on Country Dummies, Household/Child & School Variables

Ethiopia dummy variable	1.112*** (0.021)	[-1.413]	0.123** (0.062)	[-0.928]	0.134** (0.067)	[-0.777]
India dummy variable	1.419*** (0.020)	[-1.116]	-0.008 (0.080)	[-1.060]	-0.042 (0.106)	[-0.952]
Peru dummy variable	1.960*** (0.025)	[-0.574]	0.414*** (0.070)	[-0.638]	0.256** (0.101)	[-0.655]
Vietnam dummy variable	2.535*** (0.020)	[0.000]	1.051*** (0.066)	[0.000]	0.910*** (0.099)	[0.000]
Teacher has general univ. degree	--				0.151* (0.080)	
Rate of teacher absenteeism	--		adds child &		-0.067*** (0.020)	
Principal years of experience	--		household		0.012*** (0.003)	
Primary school had electricity	--		variables		-0.220*** (0.058)	
Primary school had a library	--		--		0.079 (0.053)	
Prim. sch. had computers for stud.	--		--		0.108*** (0.038)	
Observations/R-squared	6,425/0.826		6,425/0.869		6,425/0.871	

Bottom Line from this Regression Analysis:

1. Child and household variables “explain” about one third of the gap between Vietnam and Ethiopia, but only about 5% of the gap between Vietnam and India and does not at all explain the gap between Vietnam and Peru.
2. Adding school variables “explains” about 11% more of the gap between Vietnam and Ethiopia (so that about 45% of that gap is “explained”), about 10% of the gap between Vietnam and India (so that about 15% of the gap is “explained”), but does not “explain” any of the gap between Vietnam and Peru.
3. Note that **these are very preliminary results**, more variables will be investigated in the coming months.

What can be learned from an Oaxaca-Blinder decomposition?

- The analysis **thus far** assumes that the **impacts of each of the variables** on test scores **are the same for all 4 countries** in the analysis.
- But **perhaps Vietnam's exceptional performance is partly due to it being "more effective" in using various inputs**. For example, maybe Vietnamese parents' years of schooling represent a higher level of cognitive skills.
- To examine this possibility consider the standard **Oaxaca-Blinder decomposition**, applied to differences in test scores between Vietnam and the other 3 countries:

$$S_{i,vn} = \beta_{vn}'x_{i,vn} + u_{i,vn} \quad (\text{Vietnam})$$

$$S_{i,o} = \beta_o'x_{i,o} + u_{i,o} \quad (\text{Other 3 countries})$$

The important difference here is: β_{vn} is allowed to be different from β_o

The Oaxaca-Blinder decomposition:

Taking the mean of both sides of each regression gives the following:

$$\bar{S}_{vn} = \beta_{vn}' \bar{x}_{vn}$$

$$\bar{S}_o = \beta_o' \bar{x}_o$$

A useful variant of the Oaxaca-Blinder decomposition is:

$$\begin{aligned}
 \bar{S}_{vn} - \bar{S}_o &= \beta_{vn}' \bar{x}_{vn} - \beta_o' \bar{x}_o \\
 &= \beta_{vn}' \bar{x}_{vn} - \beta_o' \bar{x}_o + \bar{\beta}' (\bar{x}_{vn} - \bar{x}_o) - \bar{\beta}' (\bar{x}_{vn} - \bar{x}_o) \\
 &= \bar{\beta}' (\bar{x}_{vn} - \bar{x}_o) + [(\beta_{vn} - \bar{\beta})' \bar{x}_{vn} + (\bar{\beta} - \beta_o)' \bar{x}_o]
 \end{aligned}$$

where $\bar{\beta} = (\beta_{vn} - \beta_o)/2$.

Interpretation: The term $\bar{\beta}' (\bar{x}_{vn} - \bar{x}_o)$ differences in the x variables, and the second term (in brackets) accounts for differences between β_{vn} and β_o .

Table 3: Means of Regression Variables, for Vietnam and for Other Countries, 2012

Variable (x)	Vietnam	Other 3 Young Lives Countries
Math test score (number correct), age 15	12.323	7.054
Math test score (normalized), age 15	2.535	1.451
Wealth index (adjusted), age 12	0.635	0.482
Mom years schooling	6.332	4.187
Number of siblings, age 8	1.292	2.076
Height-for-age Z-score, age 5	-1.337	-1.509
Hours of study at home per day, age 8	2.922	1.618
Hours of study at home per day, age 12	2.688	1.791
Hours of study at home per day, age 15	2.608	2.072
Hours of in school per day, age 8	4.945	6.339
Hours of in school per day, age 12	5.491	6.748
Hours of in school per day, age 15	5.139	6.824
Parents hope child will go to university, age 5	0.809	0.750
Proportion of teachers with general univ. degree	0.941	0.539
Days teacher was absent in last 30 days	0.263	0.621
Principal years of experience as a principal	10.409	7.096
School has electricity	1.000	0.762
School has a library	0.789	0.415
School has computers for students to use	0.312	0.335
Sample size	1,793	4,632

**Table 4: Oaxaca-Blinder Decomposition for Normalized Math Score, Age 15
(diff = 2.535– 1.451 = 1.084)**

Variable	β_{vn}	\bar{x}_{vn}	β_o	\bar{x}_o	$\bar{\beta}$	$\bar{\beta}'(\bar{x}_{vn}-\bar{x}_o)$	$(\beta_{vn}-\bar{\beta})'\bar{x}_{vn} + (\bar{\beta}-\beta_o)'\bar{x}_o$
Wealth index (adj), age 12	0.800***	0.635	0.492***	0.482	0.646	0.099	0.172
Mom years schooling	0.033***	6.332	0.033***	4.187	0.033	0.071	-0.002
Number of siblings, age 8	-0.007	1.292	-0.006	2.076	-0.007	0.005	-0.001
Height-for-age Z-score,	0.082***	-1.337	0.048***	-1.509	0.065	0.011	0.148
Hours study at home, age 8	0.030*	2.922	0.029***	1.618	0.030	0.039	0.004
Hours study at home, age 12	0.072***	2.688	0.048***	1.791	0.060	0.054	0.052
Hours study at home, age 15	0.097***	2.608	0.057***	2.072	0.077	0.041	0.096
Hours/day in school, age 8	0.017	4.945	0.001	6.339	0.009	-0.012	0.087
Hours/day in school, age 12	0.004	5.491	0.019***	6.748	0.012	-0.014	-0.092
Hours/day in school, age 15	0.069***	5.139	0.042***	6.824	0.055	-0.093	0.166
Par. hope child go to univ.	0.163***	0.809	0.090***	0.750	0.126	0.007	0.057
Prop. tchrs gen. univ. degree	0.400*	0.941	0.111**	0.539	0.256	0.103	0.214
Days teacher absent	-0.072	0.263	-0.071***	0.621	-0.071	0.025	-0.001
Principal yrs of experience	0.028***	10.409	0.021***	7.096	0.025	0.082	0.054
School has electricity	0.000	1.000	-0.158***	0.762	-0.079	-0.019	0.139
School has a library	0.159	0.789	0.143***	0.415	0.151	0.056	0.009
School has comps for studs.	0.122	0.312	0.125**	0.335	0.124	-0.002	-0.001
Constant	-0.451	1.000	0.019	1.000	-0.216	0.000	-0.470
						0.453	0.631

Comments on Oaxaca-Blinder Decomposition:

1. About **42% of the gap** is “explained” by **differences in the X variables** (differences in characteristics of Vietnamese children and of the schools they attend) while **58%** is “explained” by **differences in the “impacts” of variables** on math test scores.
2. The variable that with the most “explanatory power” **due to differences in characteristics** is the proportion of teachers with a university degree (94% in Vietnam but only 54% in other countries), closely followed by household wealth.
3. The variables with the most explanatory power **due to differential effectiveness** ($\beta_{vn} - \beta_o$), ignoring the constant term and other variables with “opposite” effects are:
 - a) Greater “efficiency” in household wealth
 - b) Greater “efficiency” in impact of child nutrition
 - c) Greater “efficiency” in hours spent in school at age 15
 - d) Greater “effectiveness” of teachers with university degrees

Final Comments:

- 1) These **results are VERY likely to change** given that **this is a preliminary analysis**.
- 2) One variable that I do not have yet is teacher performance on a math test, which is restricted access but I hope that I can get it.
- 3) Many variables are based on questionnaires that used slightly different wording, so there could be serious comparability problems.
- 4) I am, with several others, collecting new data in Vietnam to better understand its apparent success in education, including video recordings of teachers in the classroom. More results will be coming out over the next 3 years.

¡Gracias!

¿Comentarios?

¿Preguntas?