



Statistics - Investment in the Future 2
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Assessing the Impact of ICT Use on PISA Scores

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www.oecd.org/sti/measuring-infoeconomy/guide

Outline

- Why is it difficult to measure ICT impact?
- What explains computer use?
- What explains student performance?
- ICT and performance: does it make a difference?
- What does it mean for policy?



Why is it difficult to measure ICT impact? (1/2)

1. Group students by ICT use, eg: users/non-users
2. Compare performance between users/non-users
3. If performance users $>$ non-user = ICT improve performance

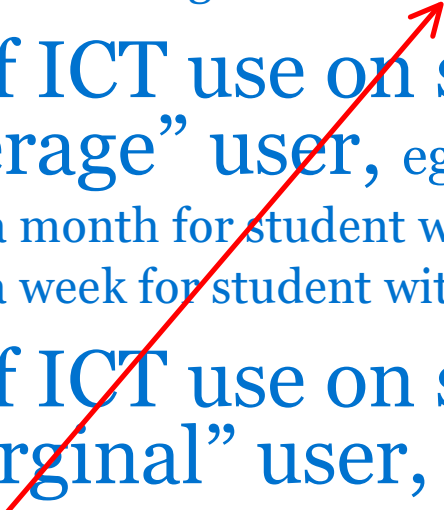
2 problems:

- “Good” students use ICT more \Rightarrow ICT is a proxy for performance

Previous studies control for this and find no effect of ICT

- Students are different \Rightarrow benefits from ICT are different

Self-selection model

1. What characteristics explain computer use, eg:
Household income
 2. “Average” characteristics for each frequency of ICT use, eg:
Once a month: average income = 500€;
Once a week: average income =1000€ ; etc.
 3. Effect of ICT use on student performance for the “average” user, eg:
ICT once a month for student with income = 500€;
ICT once a week for student with income=1000€; etc.
 4. Effect of ICT use on student performance for the “marginal” user, eg:
ICT once a week for student with income = 500€
- 
- A red arrow originates from the text 'marginal' in step 4 and points diagonally upwards and to the right towards the text 'average' in step 2.



What explains computer use (1/2)?

- **2 Places:**
 - Home;
 - School
- **5 frequencies of computer use:**
 - Never
 - Once a month or less
 - A few times a month
 - Once or twice a week
 - Almost every day
- Same model (*Probit*) in each of 23 OECD+10 partners
- All statistical tests are very good
- All variables have the expected sign

What explains computer use? (2/2)

Household characteristics

- the wealth of the student's family(+);
- the educational resources available at home (+);

Parents' characteristics

- the occupation of his/her parents (skills +);

Student's characteristics

- his/her immigration status (migrants +);
- his/her gender (male +);

School characteristics

- the number of teachers per student (+);
- the quality of educational resources (+);
- the size of the school (+);

ICT access in school

- the number of computers per student at school (+);
- the percentage of school computers connected to the Internet (+).



What explains student performance? (1/2)

- **Science scores** in 23 OECD + 10 partners
- Same model (*OLS*) in each country
- 81 replications x 5 plausible science scores (405 runs)
- All relevant PISA variables based on previous studies
- We dropped variables that were not statistically significant one at the time...
- ...starting with the less significant one
- All statistical tests are very good
- All variables have the expected sign

What explains student performance? (2/2)

Students' characteristics

- Gender (male +);
- Immigration status (migrant +);
- Interest in science (+);
- Motivation to continue learning about science (+);

Parents' characteristics

- Science-related carrier (+);
- Educational attainments (+);
- Occupation (+);

Household characteristics

- Home possession (+);
- Educational resources (+);
- Number of books at home (over 100 +);

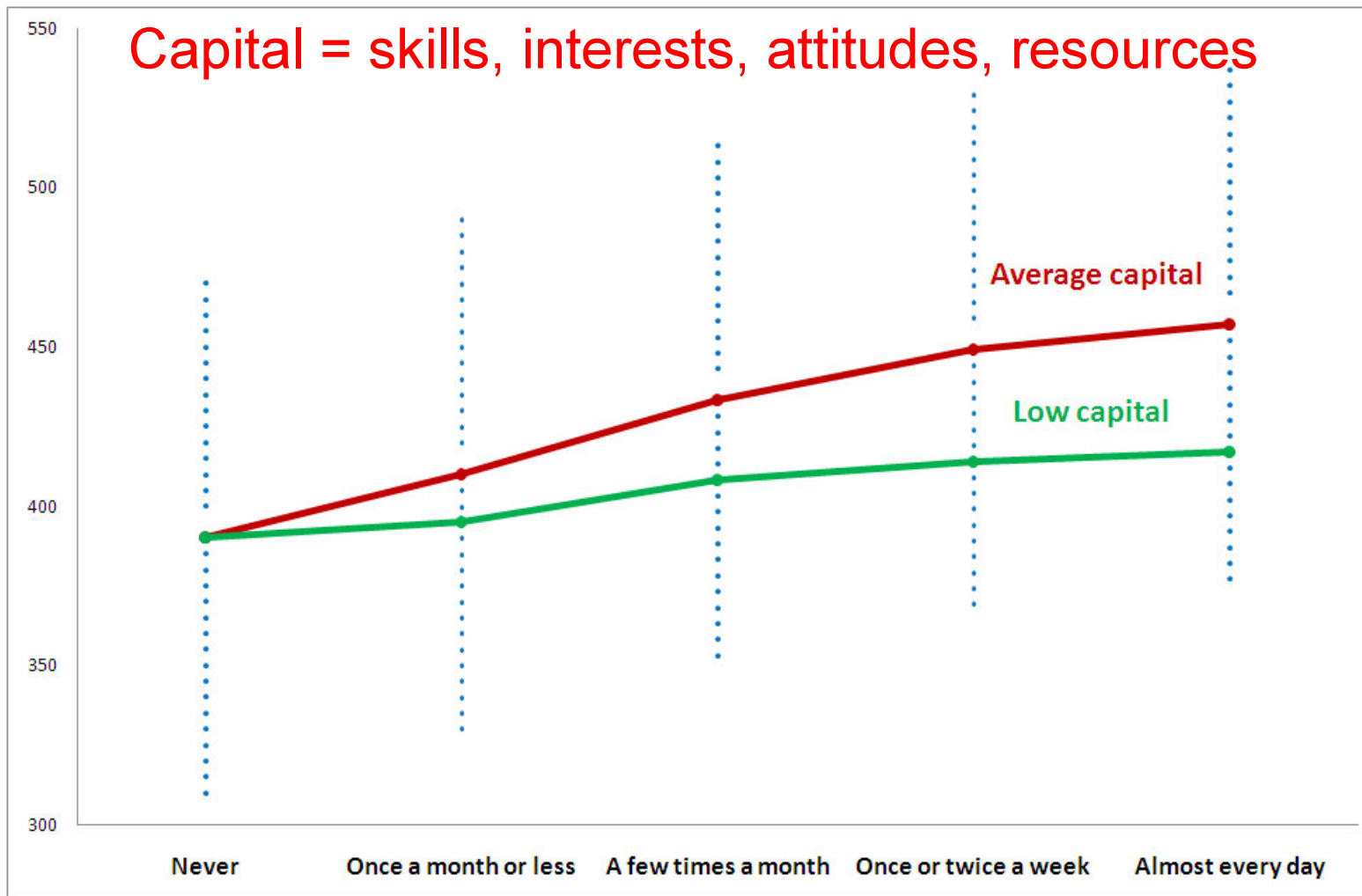
School characteristics

- Number of teachers per student (+);
- Size of the school (+);
- Quality of educational resources (+);

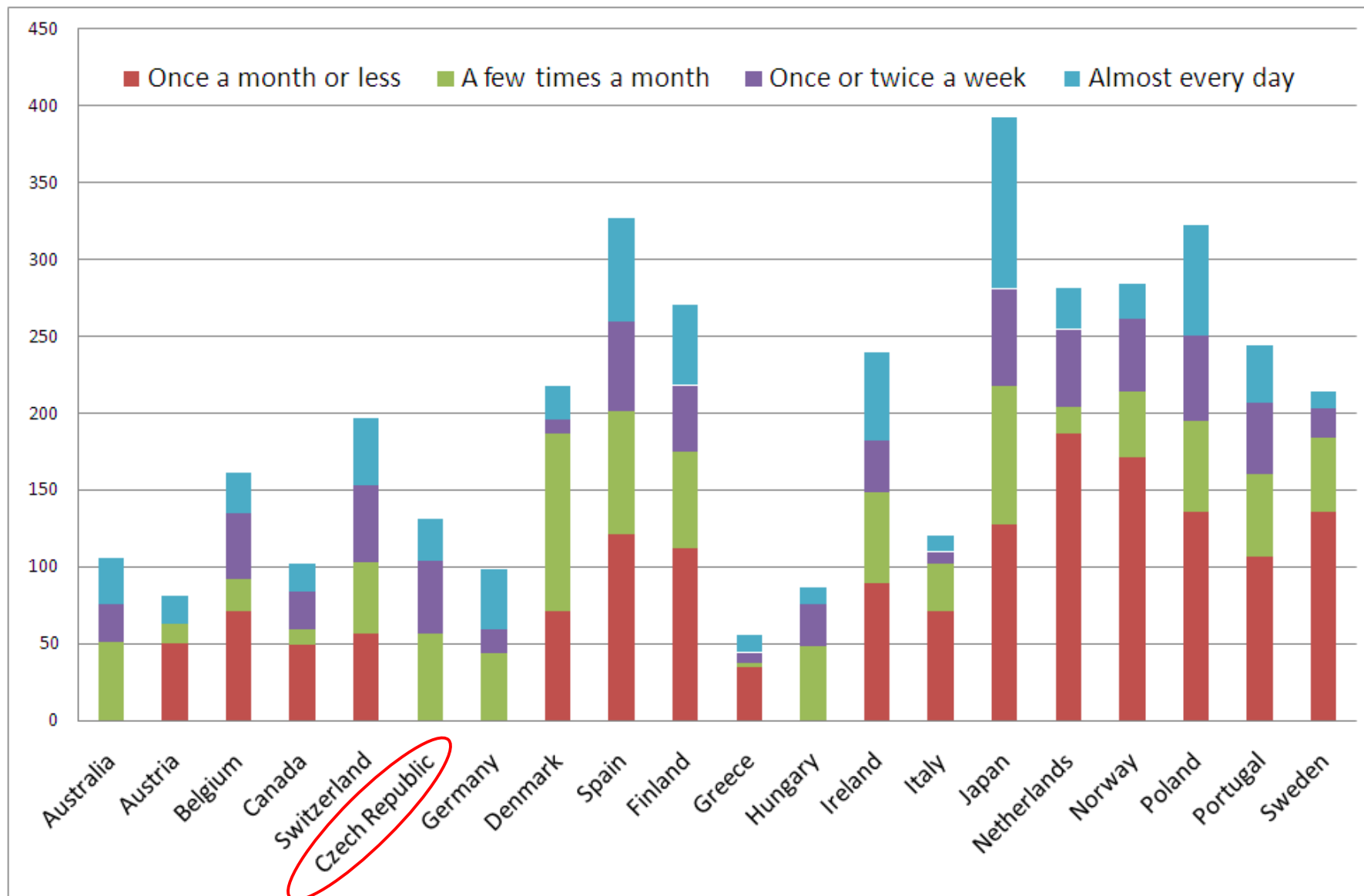
Frequency of computer use

- Associated to the “average” level of students' capital (+);
- Associated to the “marginal” level of students' capital (-).

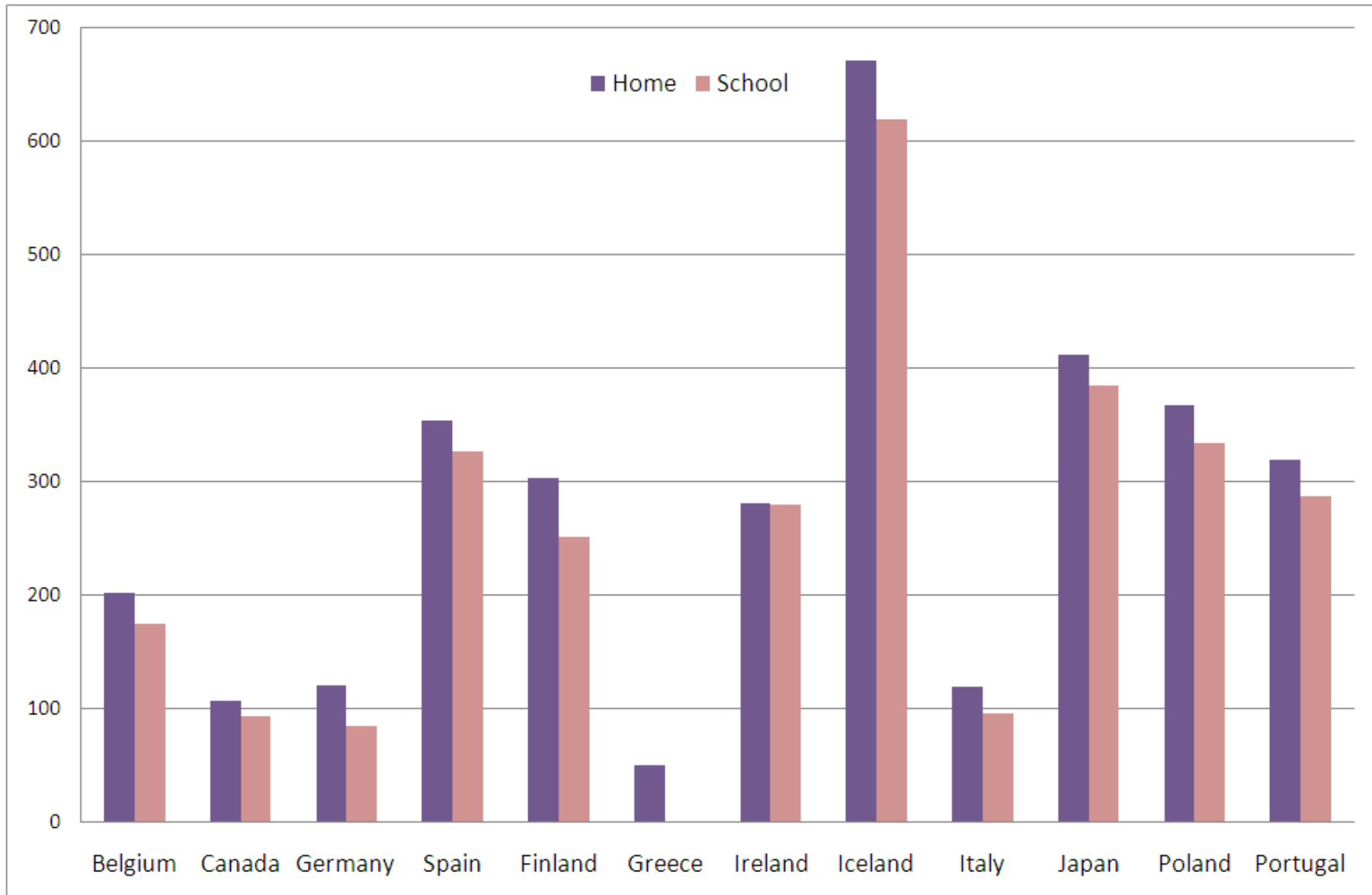
ICT benefits depend on the student's "capital"



ICT use and PISA science scores



Home matters more than school



What does it mean for policy?

- ICT benefits depend on the characteristics of each student
⇒ policies to increase computer use need to be tailored on students. *The present analysis provides a tool*
- ICT benefits are largest if students have the right skills, interests and attitudes
⇒ Policy should help to develop complementary skills, interests and attitudes
- Should educational policy invest more on ICT at home than at school?