Student Academic Motivation and Non-Cognitive Skills: Improving Comparability across Cultures and Gender

Hanka Vonkova, Gema Zamarro, Ondrej Papajoanu, Katerina Kralova & Lina Anaya

SREE

April 2020

Academic Motivation is an Important Determinant of School Performance

- Most research, however, lacks an international perspective and it has ignored the fact that students in different cultures may have a different understanding of concepts such as effort and academic motivation

- Self-reported measures can be biased if respondents differ in their use and interpretation of the different scales in the provided self-reported questions
  - Anchoring vignettes method could enhance comparability of student self-reports of academic motivation across countries and across groups defined by gender

- A recent related literature proposes the use of measures of survey and test effort as alternative proxy measures of related non-cognitive skills like conscientiousness and academic diligence (Soland et al., 2019)

In this paper

- We study:

    1. Can anchoring vignettes help improve comparability of self-reported measures of academic motivation across countries and within countries by gender?

    2. How do measures based on survey and test effort relate to self-reported measures of academic motivation? How do they vary by gender?

    3. The extent to which academic motivation and student effort contribute to explain gender gaps in math achievement

Data: PISA 2015

- Triannual survey with more than 540,000 15-year-old students from 72 participating countries and economies

    - Standardized test of Math, Reading and Science subjects

- Sample restrictions:

    - 58 countries and economies that took the computer test

    - Booklets about math, science, and reading only

    - Total test time of a maximum of 120 minutes. We eliminated a total of 2,492 observations that presented total test times above this maximum

- Student background survey: administered immediately after the completion of the test

Self-reported Academic Motivation and Vignettes

Achievement motivation (ST119)

1. I want top grades in most or all of my courses.

2. I want to be able to select from among the best opportunities available when I graduate.

3. I want to be the best, whatever I do.

4. I see myself as an ambitious person.

5. I want to be one of the best students in my class.

Scale: strongly disagree, disagree, agree, strongly agree

Anchoring vignettes (ST121)

Vignette 1 (low): *<NAME 1> gives up easily when confronted with a problem and is often not prepared for his classes. <Name 1> is motivated.*

Vignette 2 (medium): *<NAME 2> mostly remains interested in the tasks she starts and sometimes does more than what is expected from her. <Name 2> is motivated.*

Vignette 3 (high): *<NAME 3> wants to get top grades at school and continues working on tasks until everything is perfect. <Name 3> is motivated.*

Non-Parametric Vignettes Approach

- The self-assessment response y of a respondent is rescaled based on his responses to a number of J ordered vignettes (z_1 to z_j) resulting in a single adjusted self-report C as follows:

$$C = \begin{cases} 1 & if \ y < z_1 \\ 2 & if \ y = z_1 \\ 3 & if \ z_1 < y < z_2 \\ \vdots & \\ 2J+1 & if \ y > z_j \end{cases}$$

- **A challenge:** Ties or inconsistencies in ratings of the vignettes

- Over 50% of our sample presented vignettes inconsistencies or ties between vignettes 2 and 3

- We focus our corrections on using vignettes 1 and 2 only

Measuring Survey and Test Effort in a computer test

- **Item non-response** in the PISA survey:

  - Percentage of questions a student leaves blank

- **Rapid guessing in the test**:

  - Percentage of questions in the test where the student responds with a time of less than 10% of the country-specific mean time for answering that question
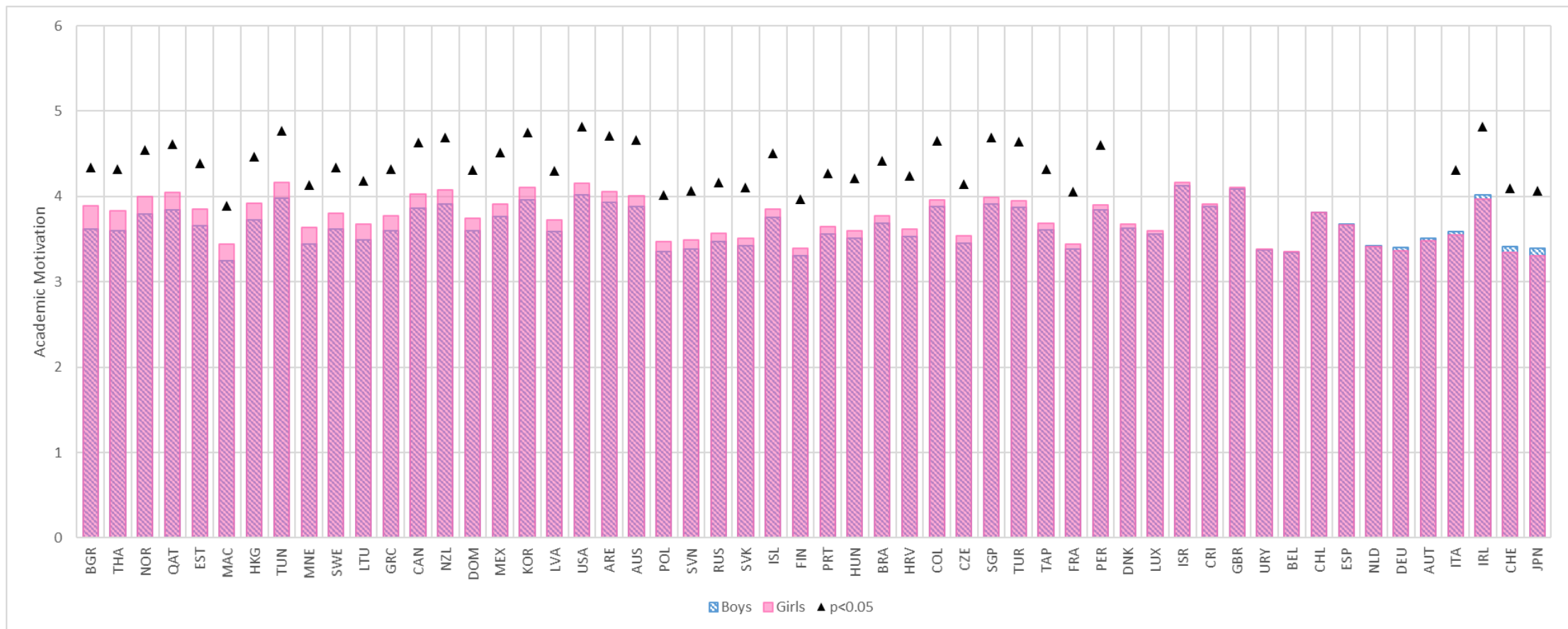
Self-reported Academic Motivation by gender across countries
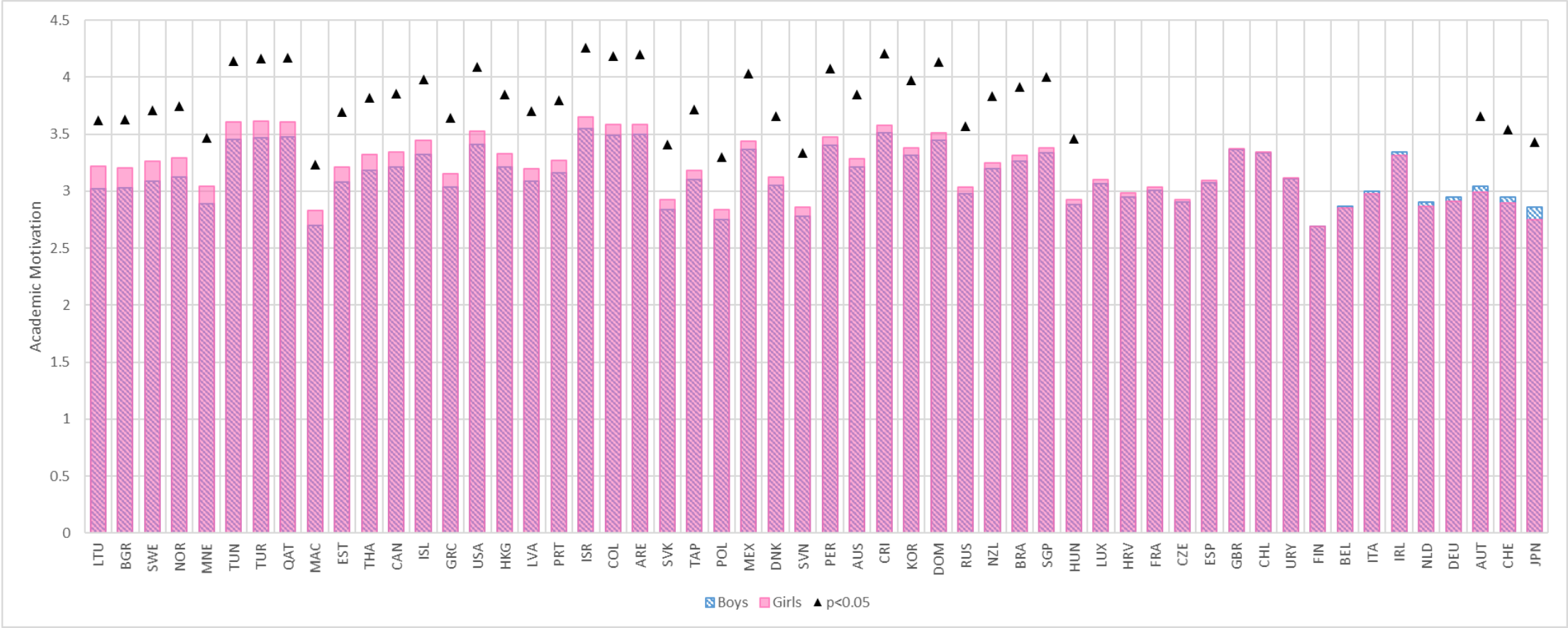
N(min)= 2,362   N(max)=16,074   N(total)=294,211   N(average)=5,349
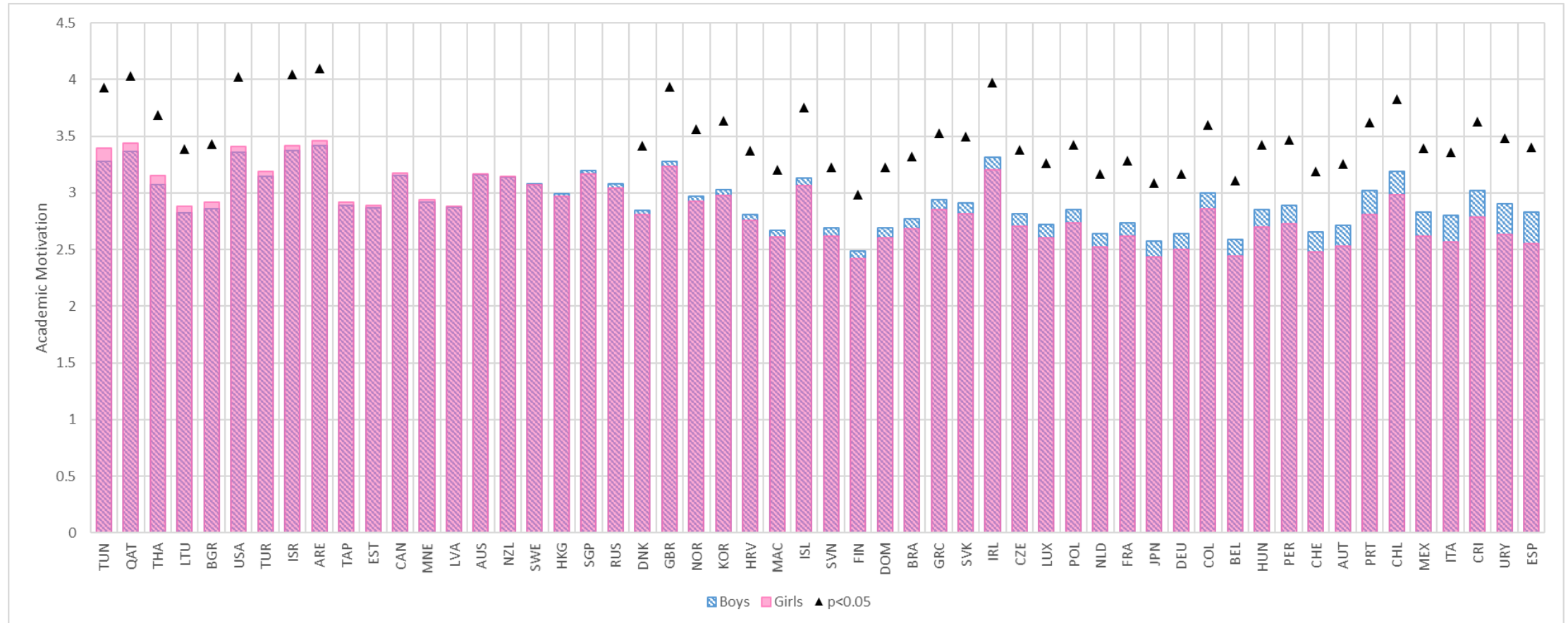
Self-reported Academic Motivation- Vignettes Adjusted (Vignettes 1 and 2)
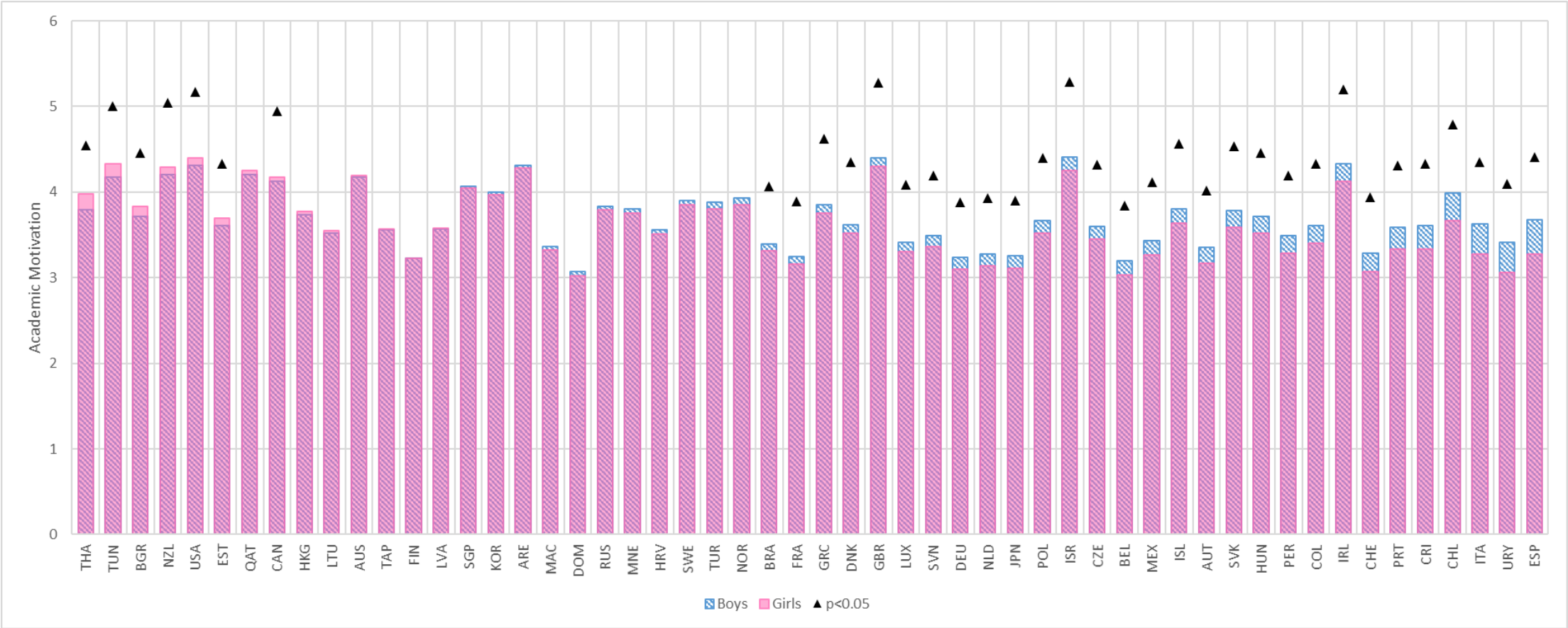

N(min)= 2,362   N(max)=16,074   N(total)=294,211   N(average)=5,349

Self-reported General Motivation by gender across countries
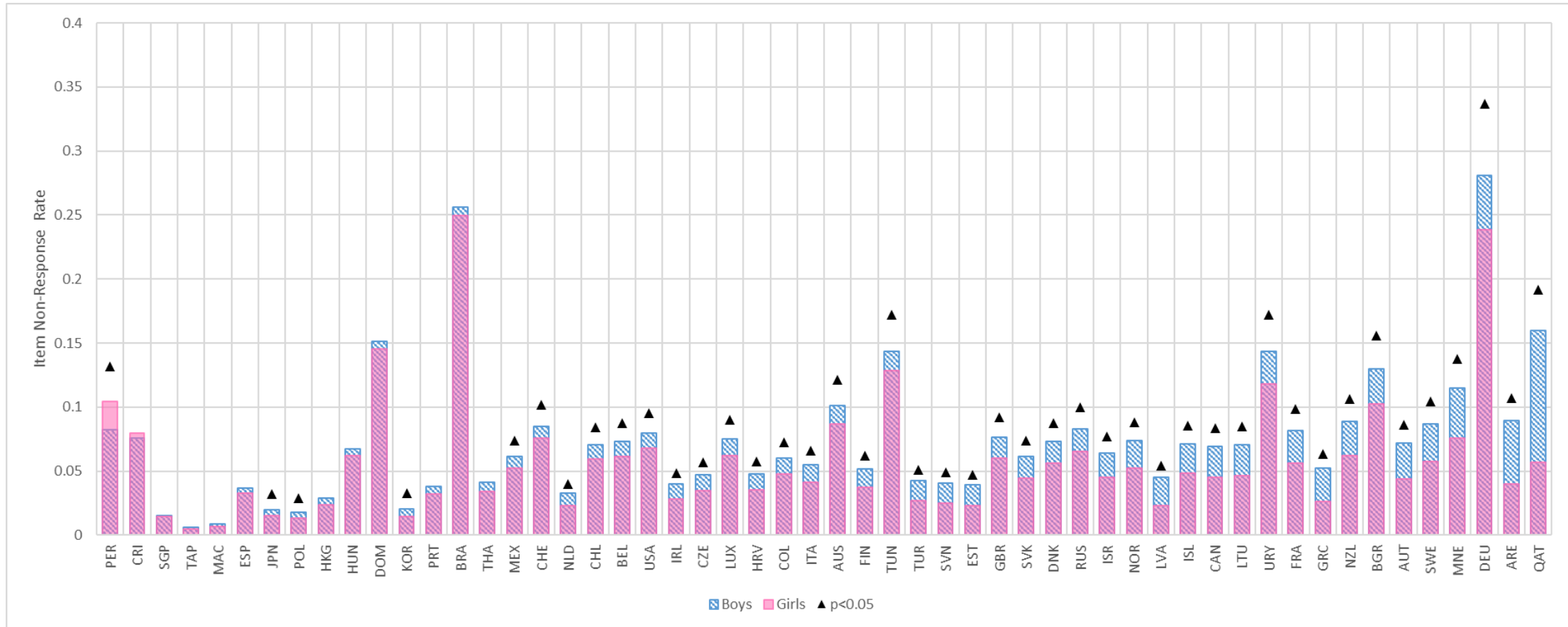

N(min)= 2,362   N(max)=16,074   N(total)=294,211   N(average)=5,349

Self-reported General Motivation- Vignettes Adjusted (Vignettes 1 and 2)
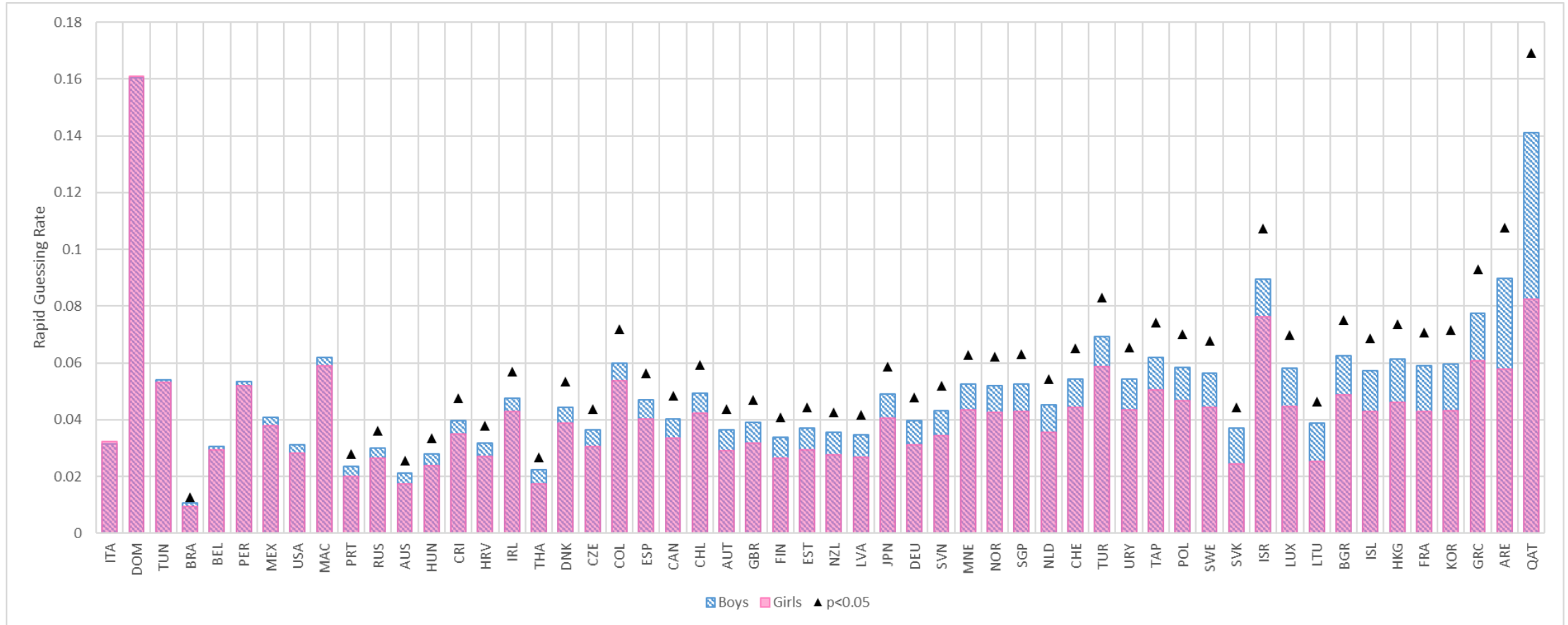

N(min)= 2,362   N(max)=16,074   N(total)=294,211   N(average)=5,349

Survey Effort: Item Non-Response

N(min)= 2,362   N(max)=16,074   N(total)=294,211   N(average)=5,349

Test Effort: Rapid Guessing in the Test

N(min)= 2,362   N(max)=16,074   N(total)=294,211   N(average)=5,349

Academic Motivation and Survey and Test Effort

	Academic Motivation	Academic Movitation-Adjusted
Female	0.039***	0.041***
	(0.003)	(0.004)
Survey Non-Response	-0.208***	-0.403***
	(0.015)	(0.022)
Female*Survey Non-Respond	0.010	0.063*
	(0.021)	(0.032)
Rapid Guessing Test	-0.294***	-0.573***
	(0.021)	(0.030)
Female*Rapid Guessing	0.298***	0.466***
	(0.031)	(0.045)
Constant	3.633***	4.109***
	(0.008)	(0.012)
Observations	298,348	294,045
Adjusted R-squared	0.146	0.0868

Standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$. Demographic, parental education, and income controls included. Country fixed effects also included.

# Math Achievement, Academic Motivation, and Survey and Test Effort

	Math Performance	Math Performance-Academic Motivation Adjusted
Female	-33.159***	-25.411***
	(1.430)	(1.252)
Academic Motivation	18.141***	16.391***
	(0.311)	(0.221)
Female*Academic Motivation	3.665***	0.996***
	(0.436)	(0.320)
Survey Non-Response	-132.917***	-127.283***
	(1.930)	(2.028)
Female*Survey Non-Response	0.935	0.496
	(2.754)	(2.885)
Rapid Guessing Test	-174.707***	-171.486***
	(2.705)	(2.745)
Female* Rapid Guessing	96.037***	97.817***
	(4.014)	(4.055)
Constant	436.422***	436.128***
	(1.494)	(1.363)
Observations	298,348	294,045
Adjusted R-squared	0.412	0.414

	Mean	S.D	Min.	Max.
Math Score	470.9	97.9	113.4	826.3

Mean Math Score- Boys	475.5
Mean Math Score- Girls	466.3
Difference	0.09 S.D

Standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$. Demographic, parental education, and income controls included. Country fixed effects also included.

Percentage change in the gender gap in <u>math</u> achievement after correcting for survey and test effort

Legend:
- (0; 76]
- (-30; 0]
- (-60; -30]
- (-100; -60]
- [-1,158; -100]
- No data
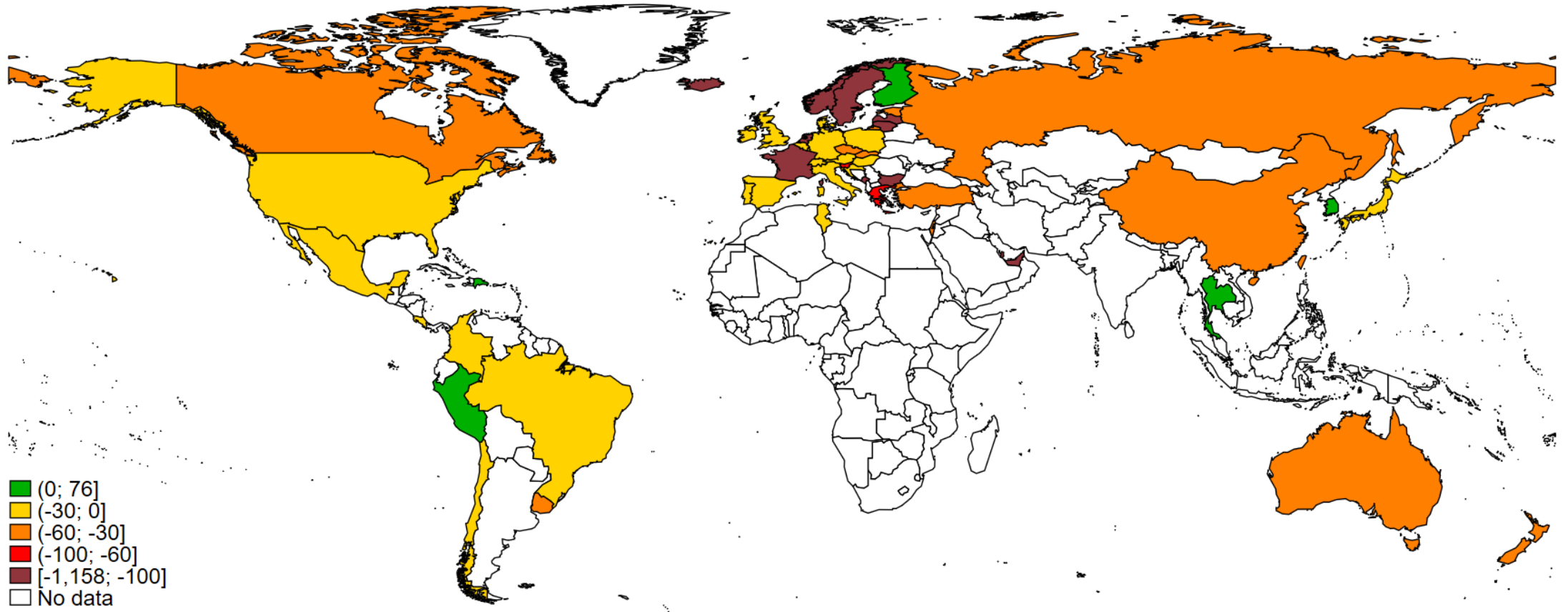
N(min)= 2,362   N(max)=16,074   N(total)=294,211   N(average)=5,349

General Conclusions

- There are no clear gender patterns of self-reported motivation across countries. In most countries girls report higher levels of academic motivation while boys report higher levels in general motivation questions

- Anchoring vignettes can be challenging in the context of motivation
  - Girls appear to use more the extreme points in the scale
  - Over 50% of our sample presented vignettes inconsistencies or ties between vignettes 2 and 3
  - To avoid ties and inconsistencies we had to only use two vignettes 1 and 2

- In line with self-reported academic motivation, looking at survey and test effort there is a clear pattern with girls showing more effort in almost all countries
  - Accounting for survey and test effort would increase observed gender gaps in math

General Conclusions

- Measures of survey and test effort appear to be significantly correlated with self-reported motivation in the expected direction but, for the case of rapid guessing, relationships are stronger for boys

- Similarly, both self-reported academic motivation and effort measures are significantly related to math achievement but the relationship with rapid guessing is stronger for boys

THANK YOU!

@gema_zamarro

@Charassein

https://www.facebook.com/charassein/