

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

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**SREE**

March 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
- Booklets are randomly assigned to the students within each country
- 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

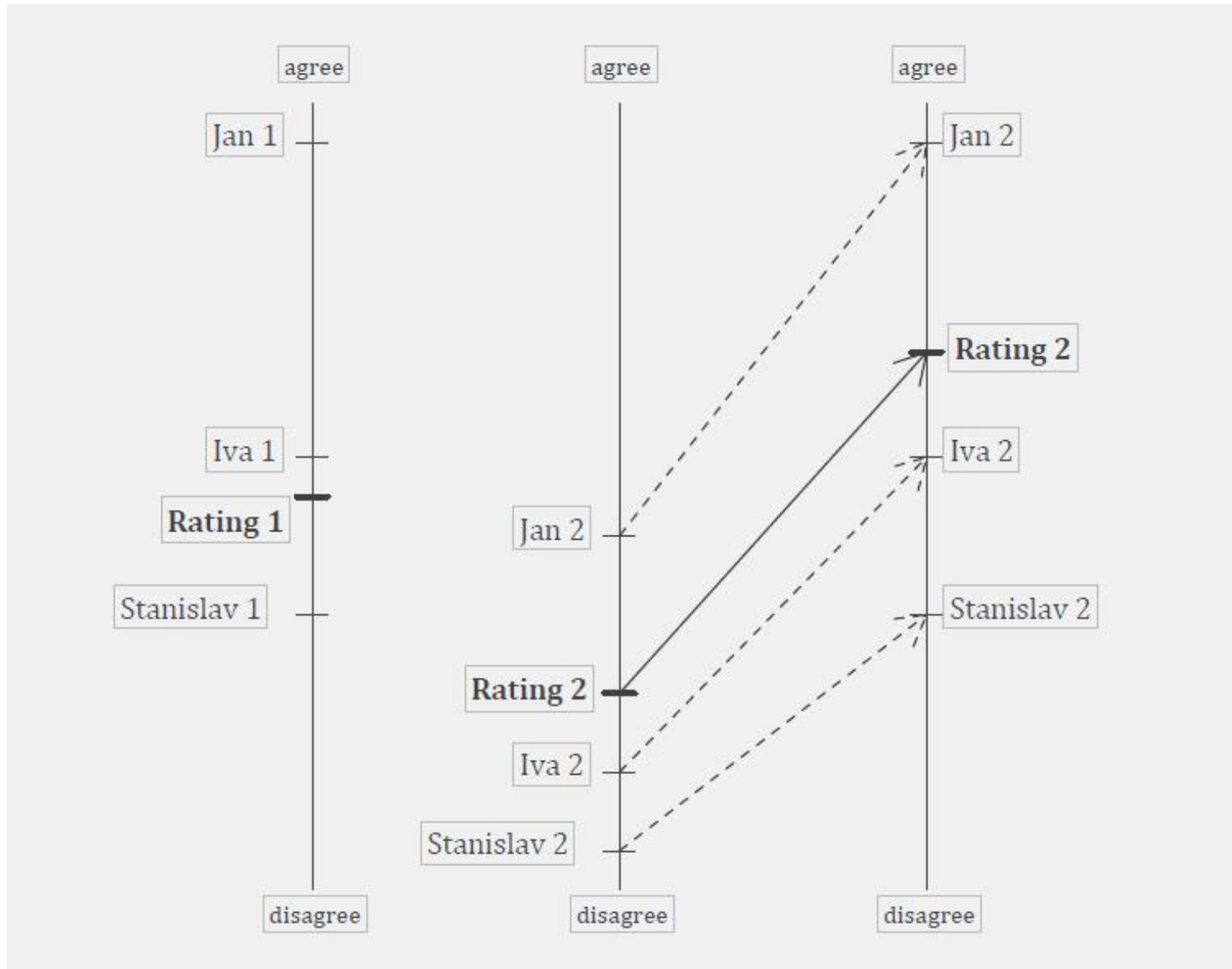
## Anchoring vignettes (ST121)

**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

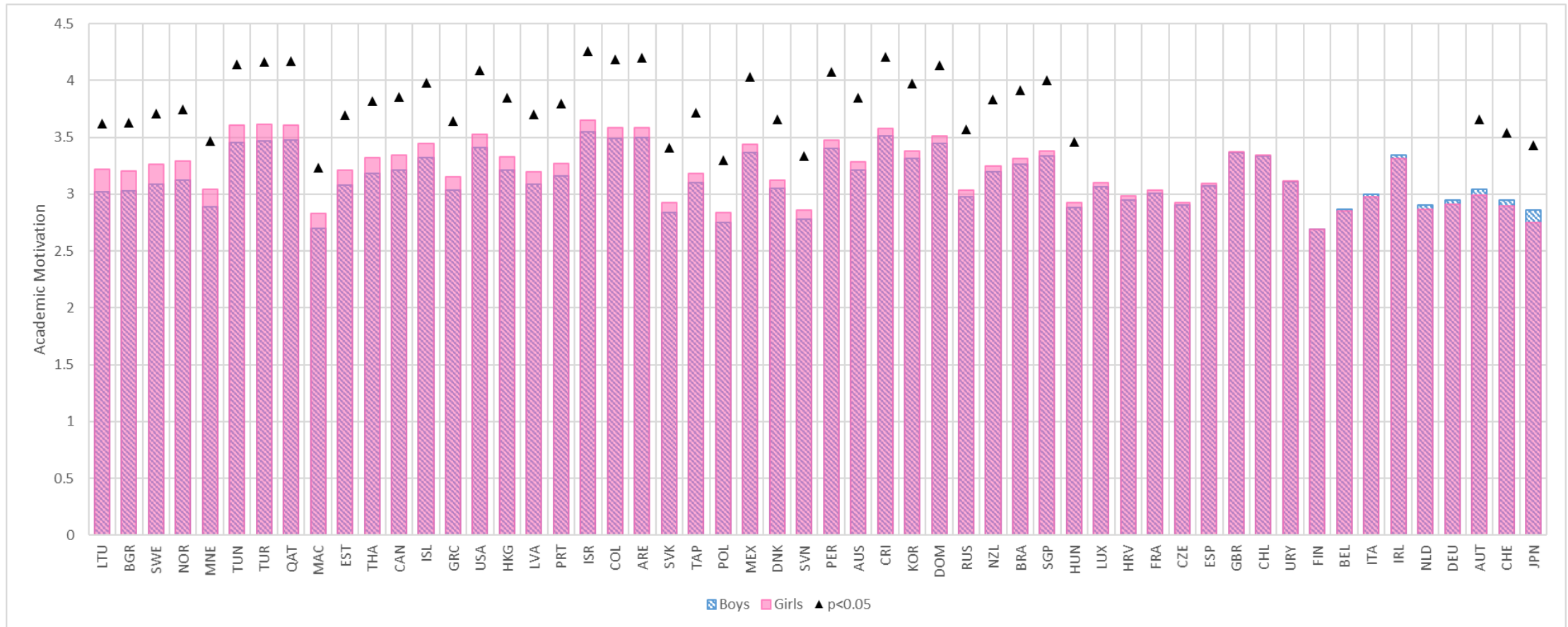


$$C = \begin{cases} 1 & \text{if } y < z_1 \\ 2 & \text{if } y = z_1 \\ 3 & \text{if } z_1 < y < z_2 \\ \vdots & \\ 2J+1 & \text{if } y > z_j \end{cases}$$

# 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

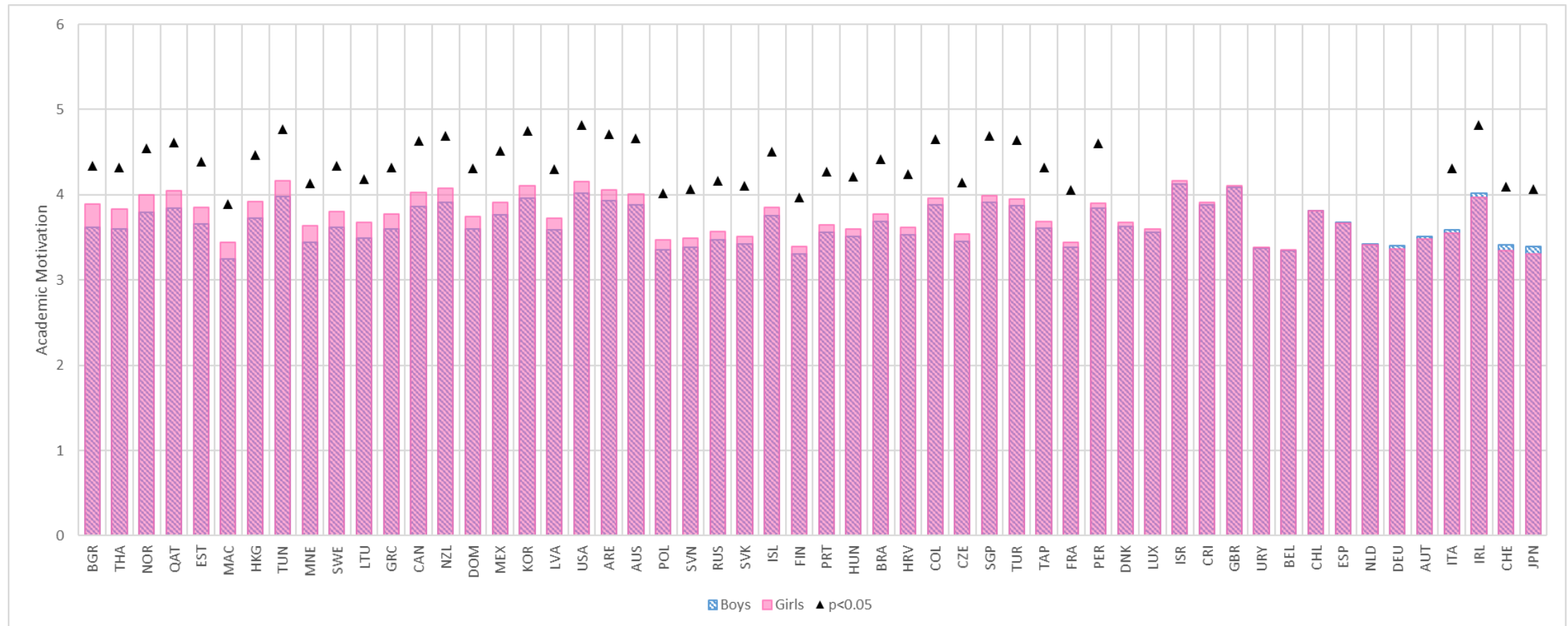
# Self-reported Academic Motivation (Questions 1, 2 and 5) by gender across countries



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

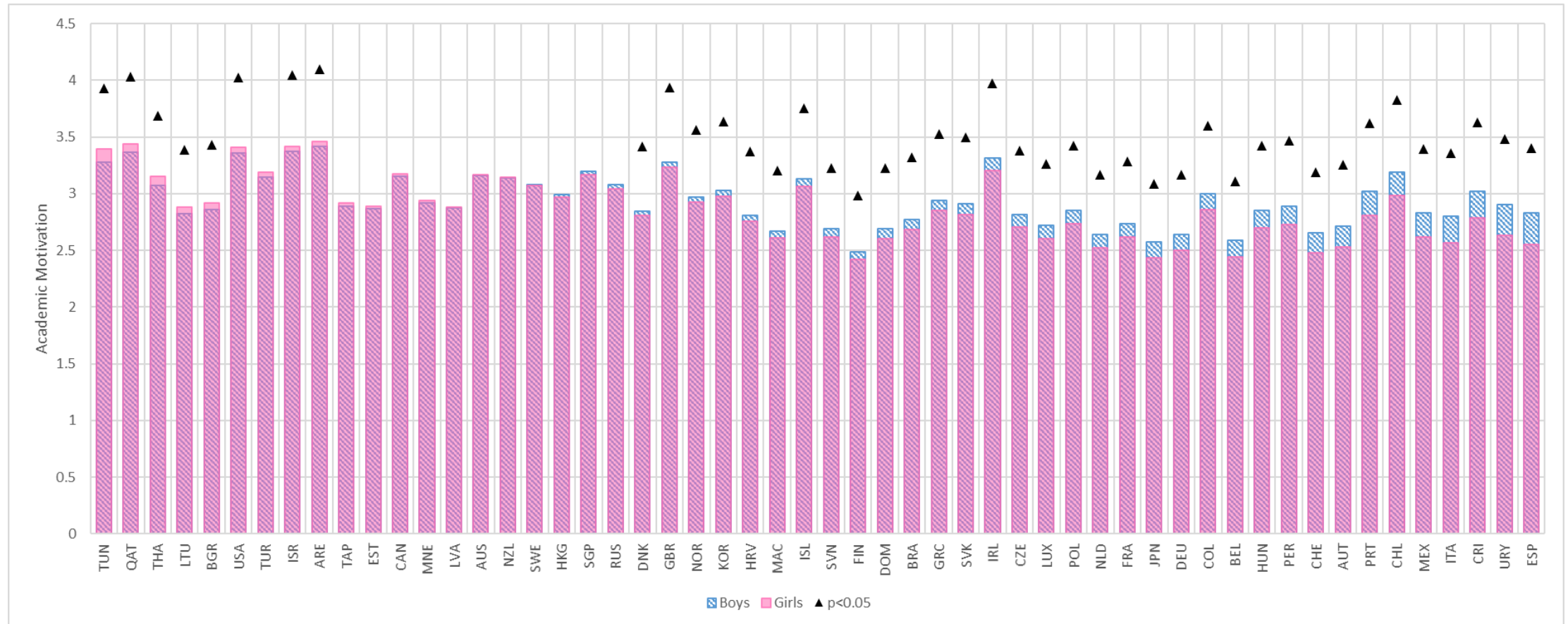


# Self-reported Academic Motivation (Questions 1, 2 and 5) - Vignettes Adjusted (Vignettes 1 and 2)



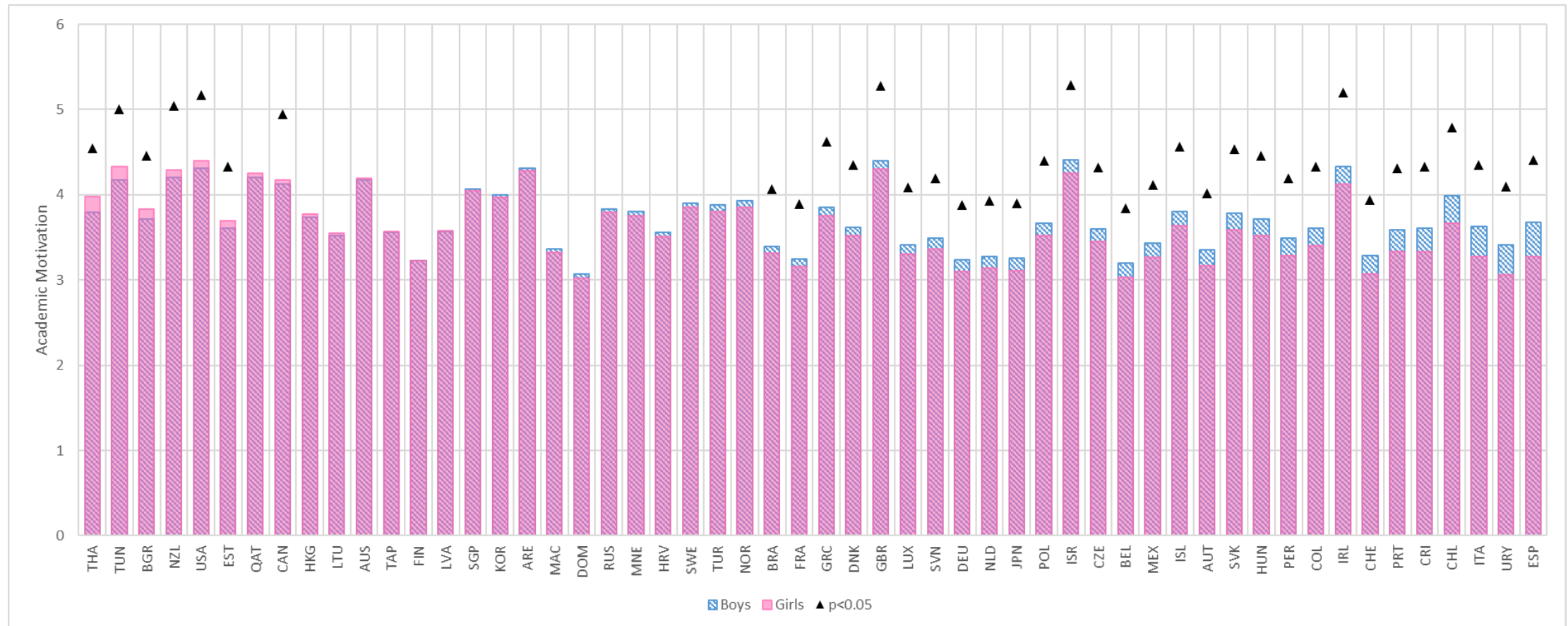
N(min)= 2,362 N(max)=16,074 N(total)=294,211 N(average)=5,349

# Self-reported General Motivation (Questions 3 and 4) by gender across countries



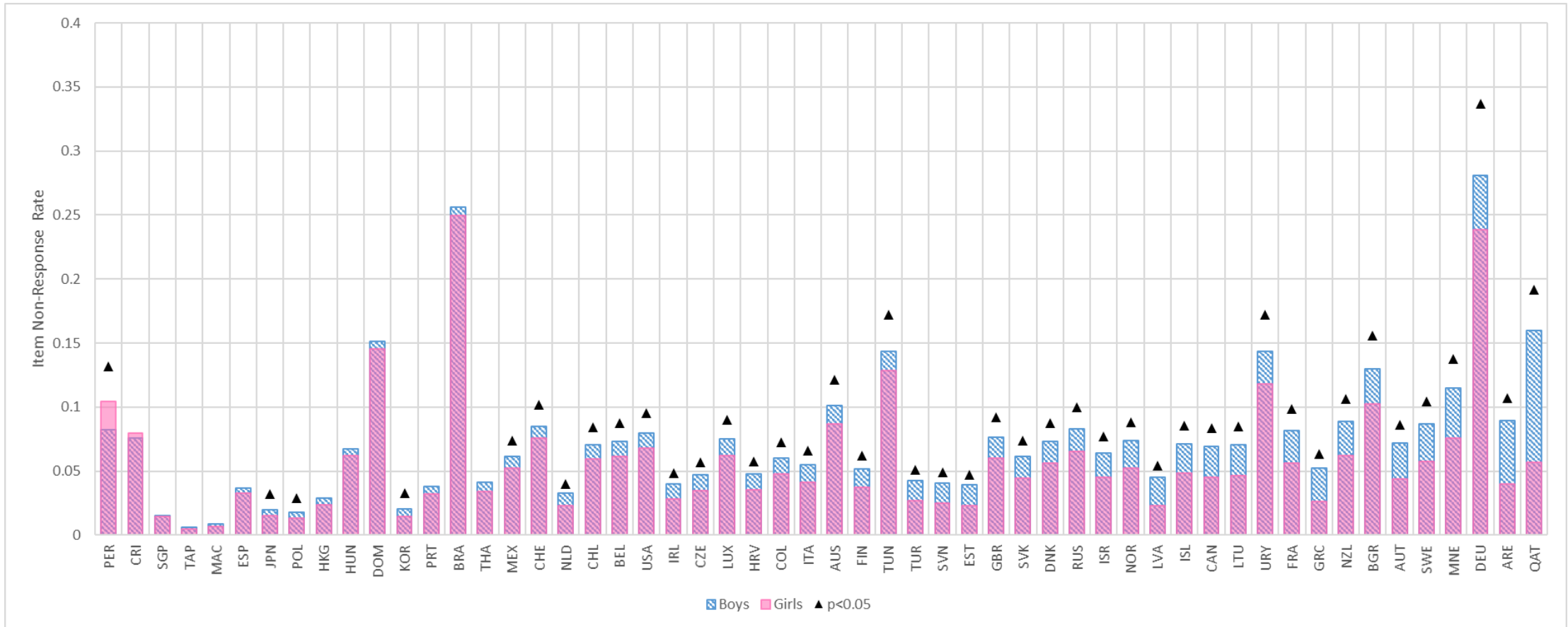
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# Self-reported General Motivation (Questions 1, 2 and 5) - Vignettes Adjusted (Vignettes 1 and 2)



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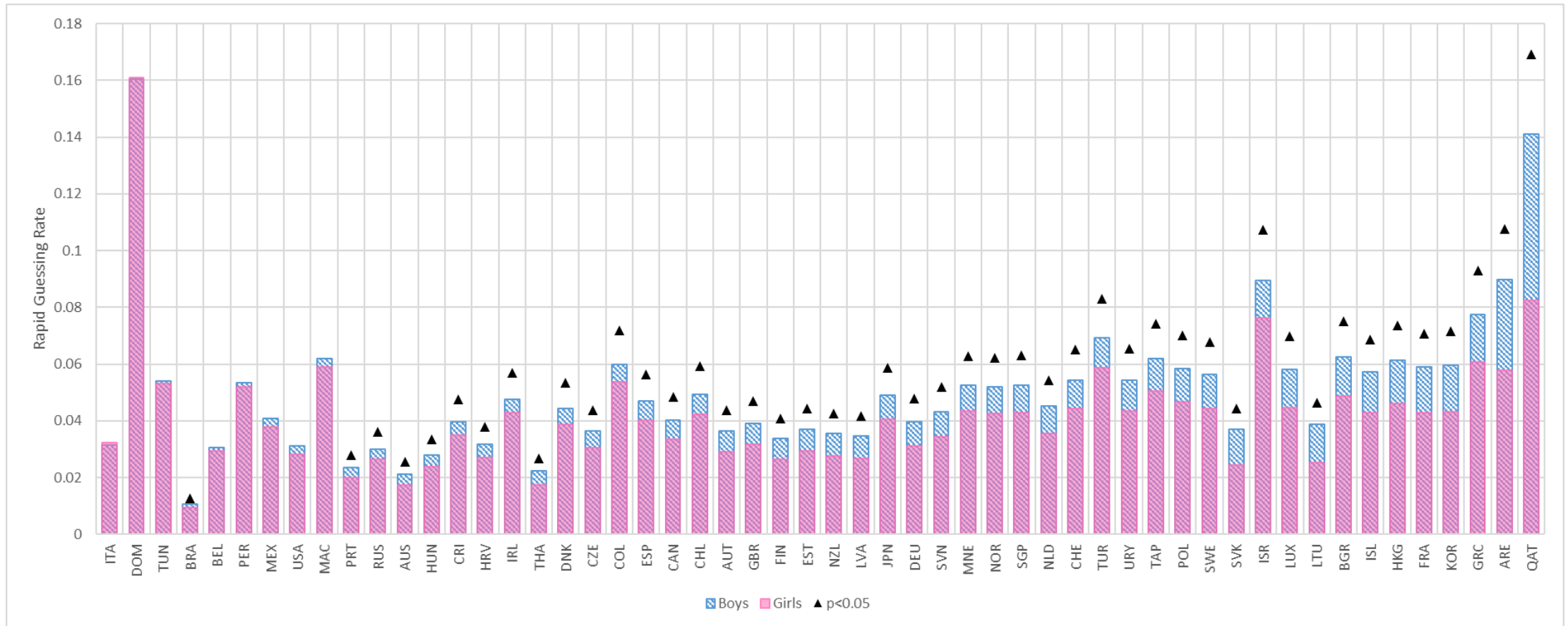
# Survey Effort: Item Non-Response



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

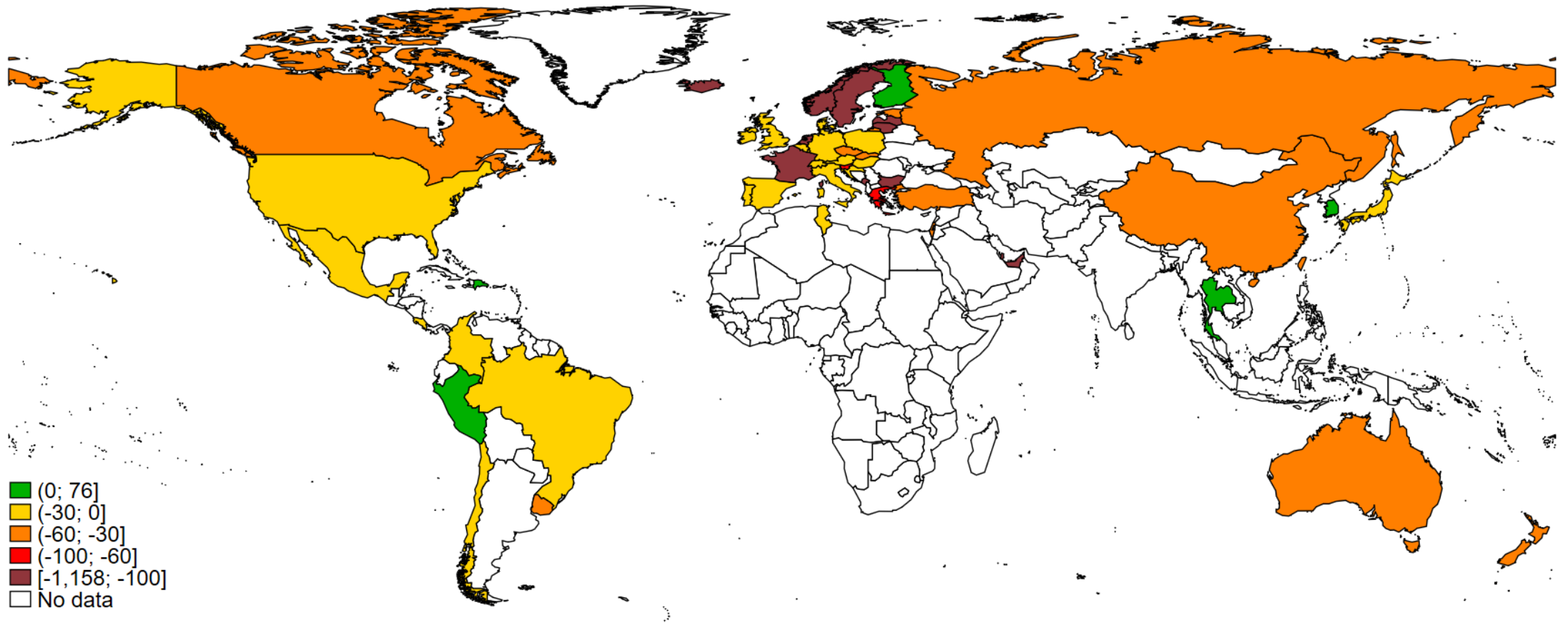


# Test Effort: Rapid Guessing in the Test



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

# Percentage change in the gender gap in math achievement after correcting for survey and test effort



# Academic Motivation and Survey and Test Effort

	Academic Motivation	Academic Motivation-Adjusted
Female	0.039*** (0.003)	0.041*** (0.004)
Survey Non-Response	-0.208*** (0.015)	-0.403*** (0.022)
Female*Survey Non-Respond	0.010 (0.021)	0.063* (0.032)
Rapid Guessing Test	-0.294*** (0.021)	-0.573*** (0.030)
Female*Rapid Guessing	0.298*** (0.031)	0.466*** (0.045)
Constant	3.633*** (0.008)	4.109*** (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.

# General Motivation and Survey and Test Effort

	General Motivation	General Motivation-Adjusted
Female	-0.104*** (0.003)	-0.084*** (0.004)
Survey Non-Response	-0.183*** (0.017)	-0.423*** (0.024)
Female*Survey Non-Respond	0.009 (0.025)	0.034 (0.034)
Rapid Guessing Test	-0.177*** (0.024)	-0.411*** (0.033)
Female*Rapid Guessing	0.247*** (0.036)	0.376*** (0.048)
Constant	3.590*** (0.009)	4.071*** (0.013)
Observations	296,662	292,498
Adjusted R-squared	0.144	0.110

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

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.

# 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!**



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