Gap between Actual and Expected Time Allocation to Academic Activities and its Impact on Undergraduate Academic Performance

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Study Purpose

› Examine student time allocation to academic activities within the context of ECTS and Carnegie standards.

Research Questions

- To what extent does the amount of time students allocate to academic activities deviate from academic credit standards (ECTS and Carnegie)?

- How does time allocation gap (TAG) impact undergraduate academic performance?

Why Time Allocation Matters:

- **key input in knowledge acquisition and skills development** (Babcock & Marks 2011; Stinebrickner & Stinebrickner 2008)
- "**key indicator of student engagement**" in academic activities (Baik, Naylor, & Arkoudis 2015)
- **Important caveat: Time is not a measure of learning** (Harris 2002, Shedd 2003)

Number of Hours Allocated to Academic Activities per Week

Country	Class Attendance	Out-of-class Study Time	Sources
USA	15-16 hours	12-15 hours	Brint & Cantwell (2010); McCormick (2011); Arum & Roksa (2011) Babcock & Marks (2011); Ribera et al. (2013)
Germany	18.9 hours	17.3 hours	Grave (2010, 2011)
UK	13.5 hours	14.3 hours	Neves & Hillman (2016)
Australia	15 hours	17-18 hours	James et al (2010); Baik et al. (2015)
China	?	13.4 hours	Guo (2014)

Red: Lowest; Blue: Highest

Impact of Time Allocation On Academic Performance and Outcomes

Context	Study	Impact of class attendance time	Impact of Self-study time	Impact of total time invested
USA	Stinebrickner & Stinebrickner (2008)		Positive	
	Brint & Cantwell (2010)			Positive
	Arum & Roksa (2011)		Positive	
	Babcock & Marks, (2010, 2011)		Positive	

Legend: An empty cell means that the study did not focus on that particular aspect of time allocation.

Impact of Time Allocation On Academic Performance and Outcomes

Context	Study	Impact of class attendance time	Impact of Self-study time	Impact of total time invested
Spain	Dolton et al. (2003)	Positive	Positive	
	Andrietti & Belasco (2015)	None	Positive	
Nine European countries	Meng & Heijke (2005)	Positive	Positive	
Germany	Grave (2010, 2011)	Positive	Positive	
Italy	Bratti & Staffolani (2013	Positive	Positive	
Belgium	Masui et al. (2014)		Positive	
China	Guo (2014)		Positive	

Legend: An empty cell means that the study did not focus on that particular aspect of time allocation.

Study Context

Nazarbayev University:

- Elite public research university established in 2010, in Astana, to be a model for higher education reform in Kazakhstan
- Academic programs created through unique strategic partnerships with top universities in the US, UK, and Singapore
- Use of English as medium of instruction
- About 85% of undergraduate students go through a yearlong preparation program

Data Collection

Sources:

- Student surveys (spring semesters 2016-2018)
- Administrative records

Population of Interest:

- 1st- & 4th–year undergraduate students

Data Source	Data Collected
Student Surveys:	▪ Number of hours preparing for class ▪ Number of classes missed ▪ Frequency of academic behaviors, ▪ Level of difficulty encountered ▪ Stress level experienced ▪ Self-confidence ▪ Self-esteem ▪ Dependency on others
Registrar's Office:	▪ Term study field ▪ Term credit load (ECTS/Carnegie) ▪ Course enrollment records ▪ Term GPA (0-4 scale)
Admissions Department	▪ Demographic characteristics ▪ Secondary school type attended ▪ Secondary school GPA ▪ Entry-level English test scores ▪ Admission type ▪ Admission year

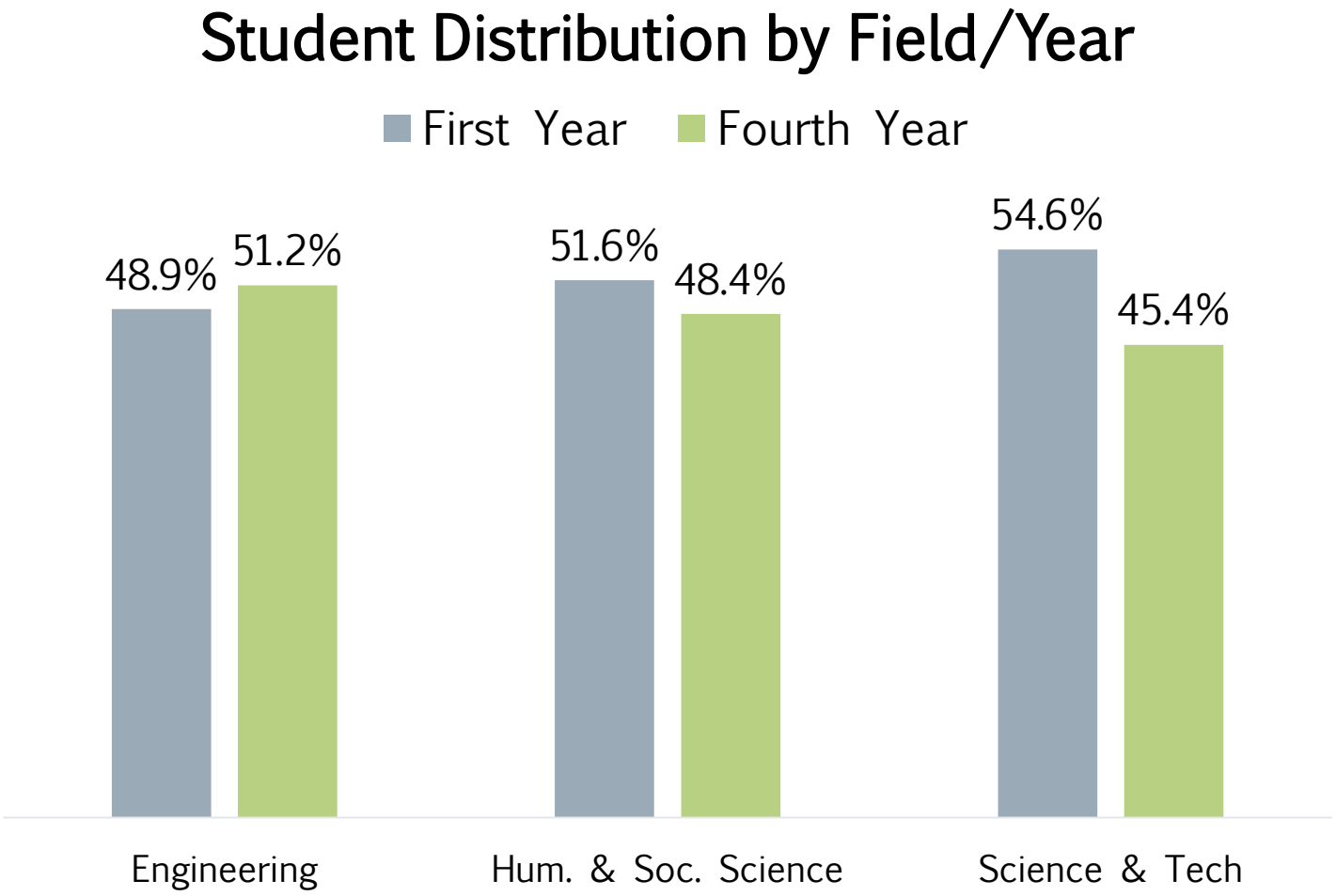
Study Sample

2,232

first- and fourth-year undergraduate students who participated in surveys in spring semesters 2016-2018

Response rates:

- First-year students: 57%
- Graduating students: 71%



Time Allocation Gap (TAG) Measure

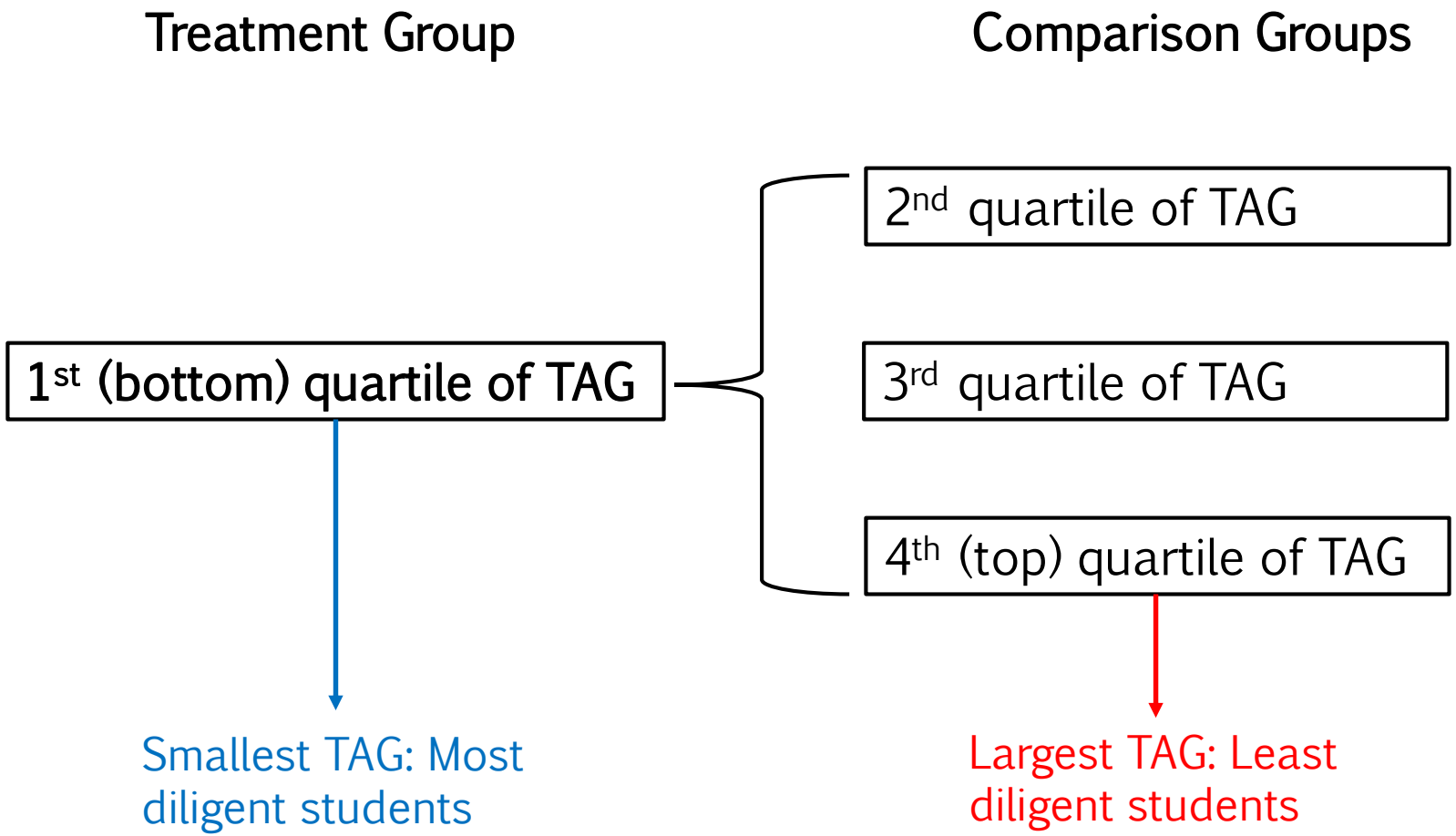
$$\mathrm{TAG} = \frac{\text{Expected Time} - \text{Actual Time}}{\text{Expected Time}} * 100$$

Where:

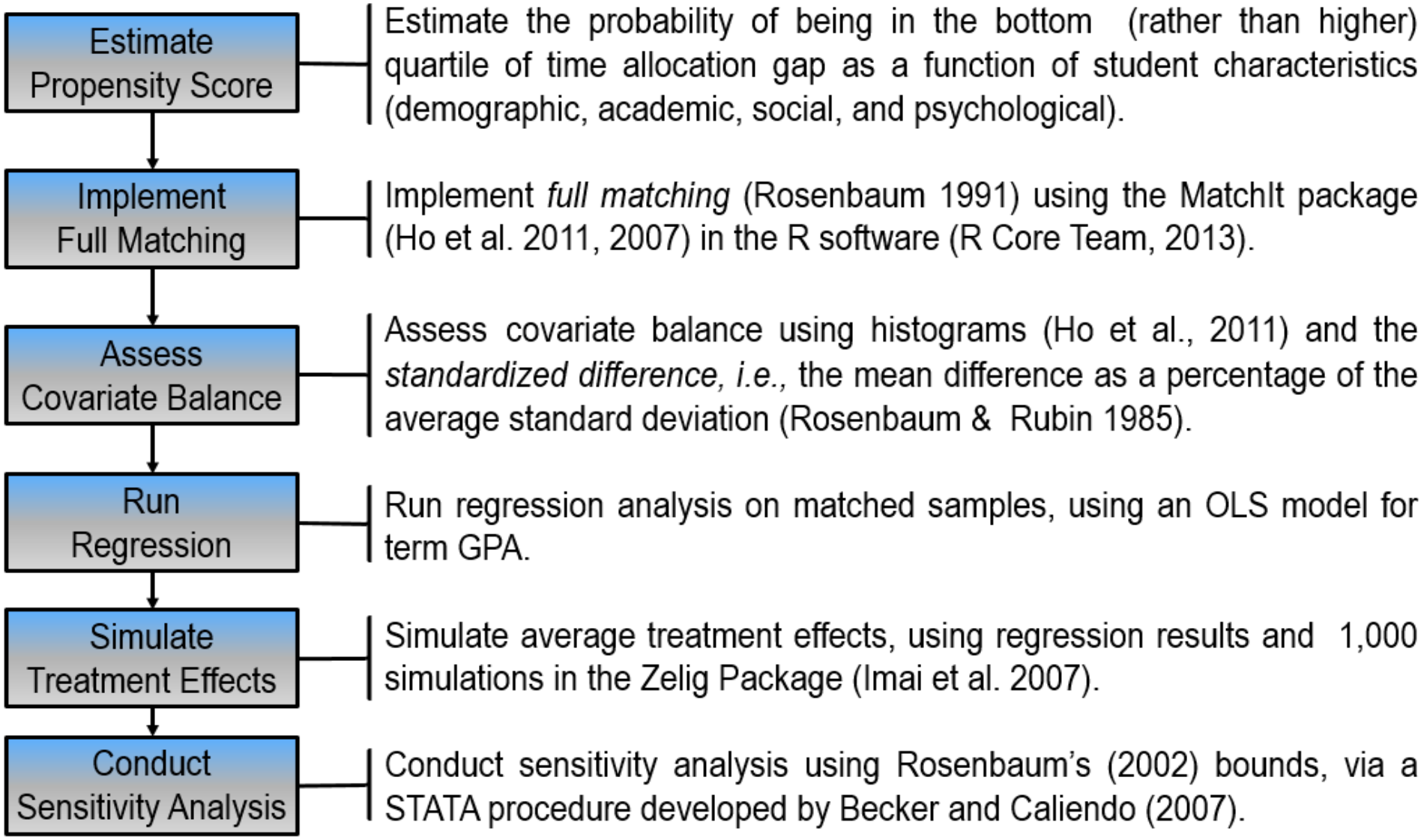
- ***Expected time*** = Total number of weekly hours student was expected to allocate to academic activities given his/her credit load, and based on:
  - ECTS standards: 1 ECTS = 25 hours workload (minimum) over course duration
  - Carnegie standards: 1 Credit = 3 hours of workload per week

- ***Actual Time*** = Number of hours of class attendance (adjusted for absenteeism) + number of hours of out-of-class study per week

Time Allocation Gap (TAG) Study Design

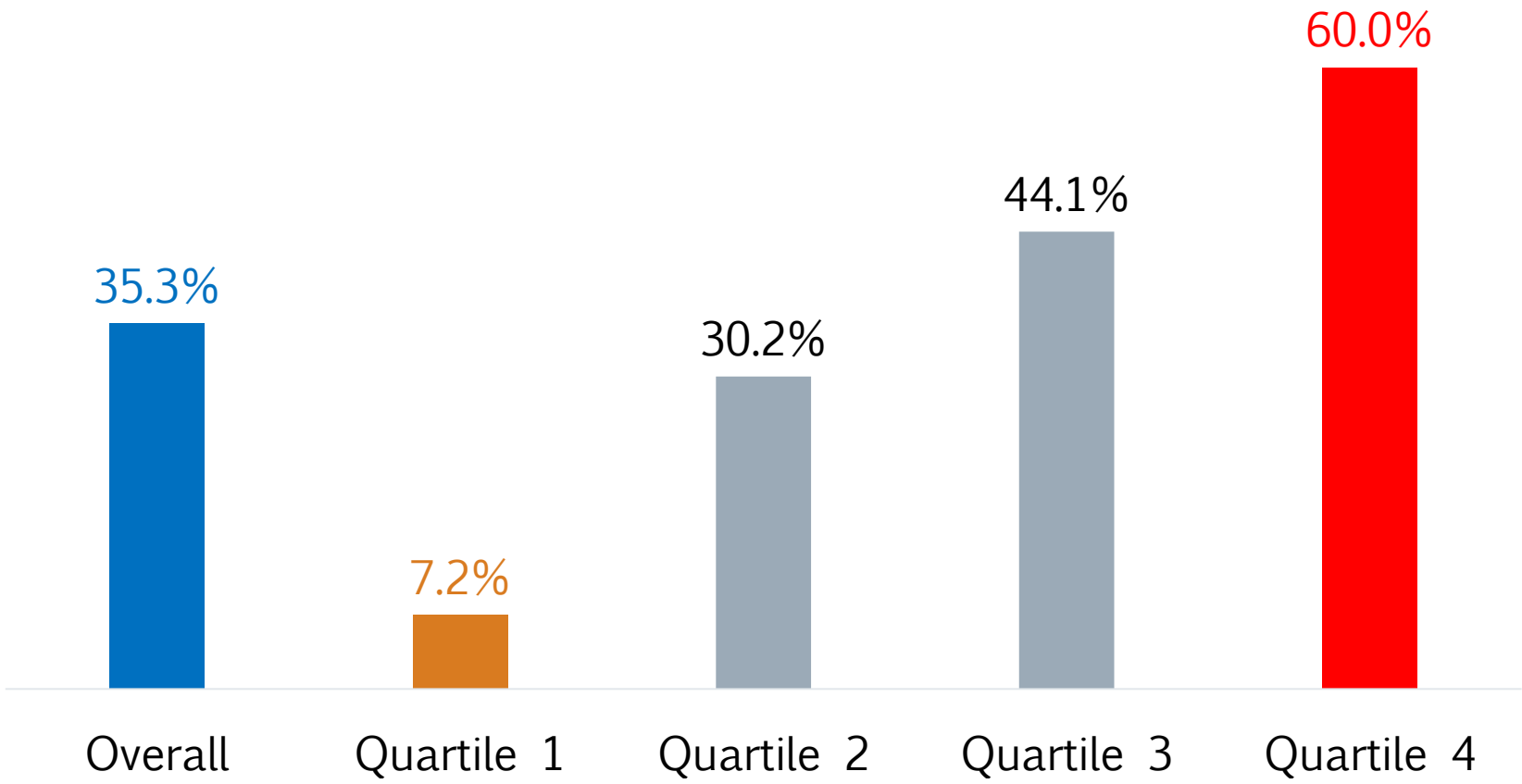


Analytical Approach



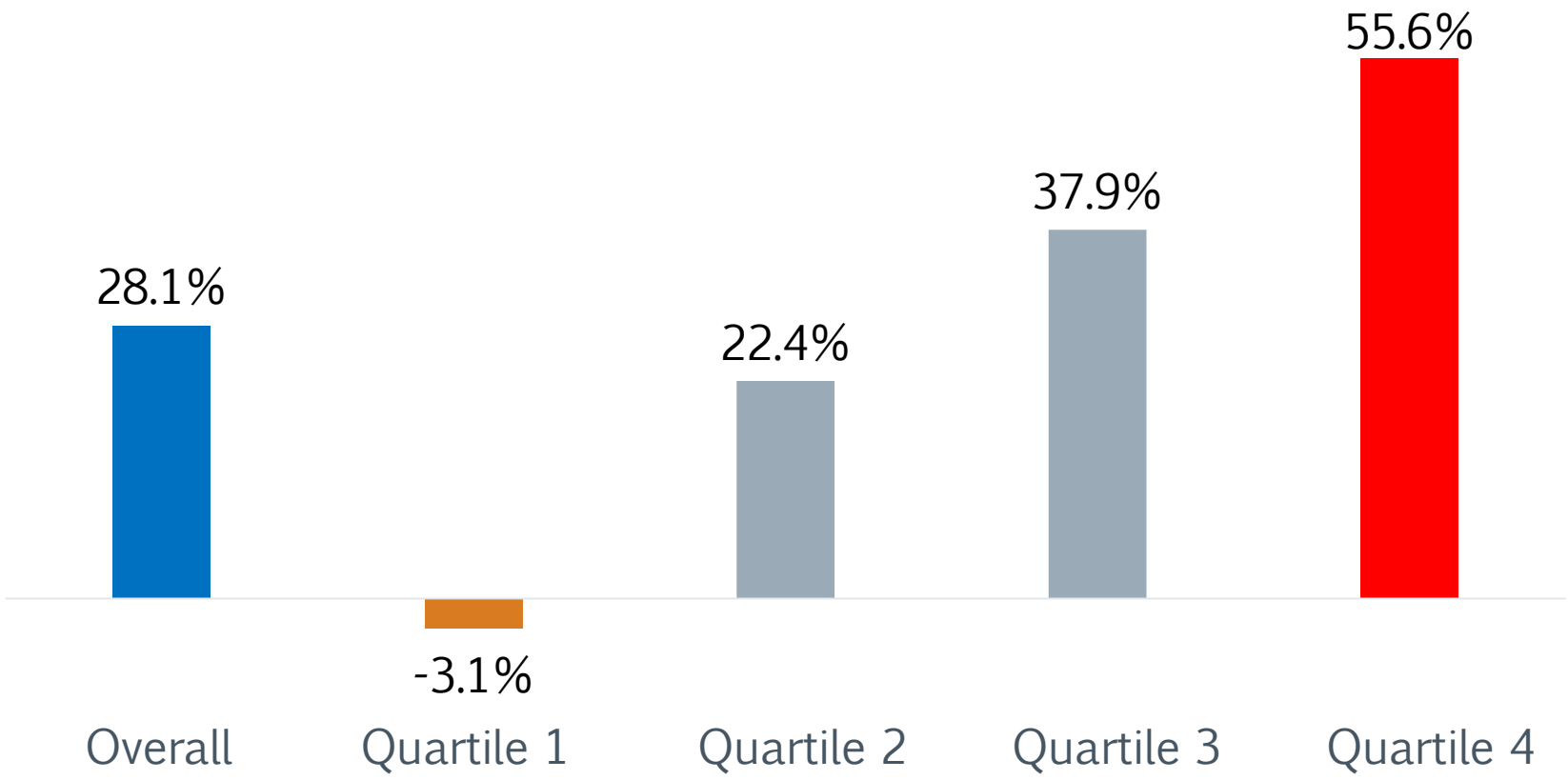
Descriptive Results: Average ECTS TAG (in %)

Students allocated 35% less time to academic activities than expected under ECTS standards. Students in the bottom quartile allocated 7% less time and those in the top quartile 60% less time to academic activities than expected.



Descriptive Results: Average Carnegie Time Allocation Gap (in %)

Students allocated 28% less time to academic activities than expected under Carnegie standards. Students in the bottom quartile allocated 3% more and those in the top quartile 56% less time to academic activities than expected.



Results of Propensity Score Matching: Predictors with a Standardized Difference >20%

ECTS MODEL

Before matching: 38.6%

After matching: 0%

CARNEGIE MODEL

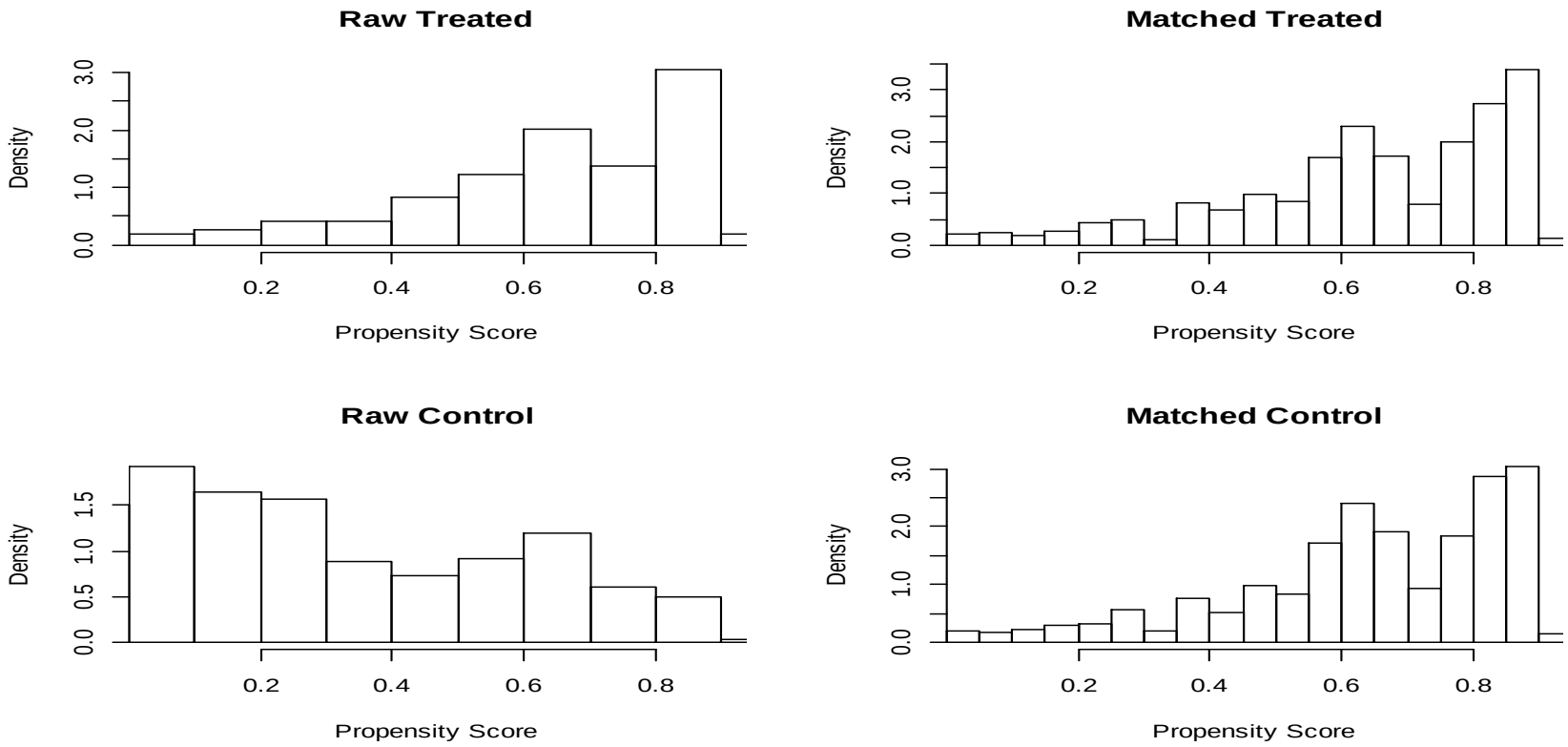
Before matching: 30%

After matching: 0%

Matching made treatment and comparison groups more similar on background characteristics.

Results of Propensity Score Matching: Covariate Balance Example

Treatment and control groups differed substantially in the distribution of propensity scores before matching. After matching, however, the two distributions were very similar.



Post-Matching Results: Finding from Regression Analysis

- Time allocation gap had an impact semester GPA.
- Finding consistent under ECTS and Carnegie standards and for both first-year students and graduating students.

Average Treatment Effect on the Treated (ATT)

ATT: For students in the treatment group, what was the GPA gain associated with being in the 1st rather than 2nd, 3rd or 4th quartile of time allocation gap ?

Time allocation Gap (TAG) Quartiles		First Year Students		Fourth Year Students	
Treatment Group	*Comparison Group*	*ECTS*	*Carnegie*	*ECTS*	*Carnegie*
1st quartile	2nd quartile	0.07	0.07	0.05	0.07
1st quartile	3rd quartile	0.20***	0.22***	0.14**	0.15**
1st quartile	4th quartile	0.24***	0.27***	0.18***	0.23***

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$

Average Treatment Effect on the Untreated (ATU)

ATU: What would be the GPA gain for students in the comparison group (2nd, 3rd, or 4th quartile of time allocation gap), if these students had actually been in the treatment group (1st quartile of time allocation gap)?

Time allocation Gap (TAG) Quartiles		First Year Students		Fourth Year Students	
Treatment Group	*Comparison Group*	*ECTS*	*Carnegie*	ECTS	Carnegie
1st quartile	2nd quartile	0.07	0.07	0.05	0.07
1st quartile	3rd quartile	0.19***	0.23***	0.14**	0.15**
1st quartile	4th quartile	0.24***	0.26***	0.19***	0.23***

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$

Adjusted Term GPA for First-Year Students

Adjusted term GPA was higher for first-year students in the first quartile (Q1) of ECTS time allocation gap compared to students with similar characteristics who were in the third (Q3) or fourth (Q4) quartile.

Adjusted Term GPA for Fourth-Year Students

Adjusted term GPA was higher for fourth-year students in the first quartile (Q1) of ECTS time allocation compared to students with similar characteristics who were in the third (Q3) or fourth (Q4) quartile.

Sensitivity Analysis: Time Allocation Quartiles 1 and 4

At what value of the sensitivity parameter could the treatment effect cease to be significant?

	ECTS Model (Q1 vs. Q4)	Carnegie Model (Q1 vs. Q4)
First-year students	1.7	1.7
Fourth-year students	2.6	3.0

The treatment effect could cease to be significant if:

An unobserved variable caused the odds ratio of treatment assignment to differ between treatment (Q1) and control (Q4) cases—that have the same values on observed covariates—by a factor of 1.7 for first-year students and a factor of 2.6 to 3.0 for fourth-year students.

Summary of findings

- Existence of a gap between the amount of time students allocated to academic activities and the amount expected under ECTS and Carnegie standards

- Existence of large variations in time allocation gap amount students:
  - ECTS: Mean = 35.3% &; Standard Deviation = 21.2%
  - Carnegie: Mean = 28.1%; Standard Deviation = 23.6%

- Better academic performance (20% to 33% of a standard deviation) for most diligent students (time allocation gap quartile 1) compared to least diligent students (time allocation gap quartiles 3 and 4), after adjusting for selection bias.

Further Considerations

- Time allocated to academic activities does no equal learning (Harris 2002, Shedd 2003)

- However, time remains a key input in the acquisition of knowledge, skills, and human capital (Dolton et al. 2003, Stinebrickner & Stinebrickner 2008, Babcock & Marks 2011)

- Important questions that institutions need to address:
  - Are students simply investing the minimum amount of time needed to be successful in college? (Kuh et al. 2010)
  - Are instructor and program expectations for students of sufficiently high standards? (Babcock & Marks 2010, McCormick 2011)

Questions, thoughts, comments?

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