

Online Appendix for Fictional Money, Real Costs: Impacts of Financial Salience on Disadvantaged Students

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APPENDIX A: EXAMPLES OF MONETARY QUESTIONS

An example monetary question from the TIMSS data (multiple choice answer options omitted for brevity):

- *John was given the following table by his teacher and was asked to identify the graph that correctly displays the data. Which graph below should he choose?*

Name	Savings
Sara	22 zeds
Peter	15 zeds
Pamela	17 zeds
Chris	10 zeds

Five additional examples of sets of a monetary and non-monetary question in the ASSISTments data that are in the same matched question group are illustrated below:

- Example set 1:
 - *Bob works at a local convenience store and has been putting every penny earned into a savings account. Now, Bob wants to use a bank statement to graph the balance of the account. How much does Bob make each day given the bank statement below? Bob's salary does not change during the time shown by the statement.*

Bob's Account	
Date	Balance in \$
Day 7	898.00
Day 9	994.00
Day 15	1282.00
Day 16	1330.00

- *Joe is part of an environmental group that researches birds. Every so often, the group counts the number of birds in an area. Now, Joe wants to graph the number of birds to find the rate that the population grows each year. Given the results shown below, how much does the population of birds grow each year? Assume the rate of growth is constant.*

Birds in Area

Year of result	Population size
1964	1484
1971	2226
1973	2438
1979	3074

- Example set 2:

- *Liam is an artist. He paints portraits. The table below shows the number of portraits painted in hours. Do the numbers in the table represent a proportional relationship?*

Number of Portraits	Time (in hours)
1	6
2	12
3	18

- *This table shows the amount earned by Isabella for selling ice cream. Do the numbers in the table represent a proportional relationship?*

Cups Sold	Earnings (\$)
3	15
6	30
9	45

- Example set 3:

- *Ms. Lindquist is a math teacher. Ms. Lindquist teaches 68 girls. Ms. Lindquist teaches **b boys**. Write an expression for how many students Ms. Lindquist teaches.*
- *John and his wife Beth have been saving to give their 5 children presents for the holidays. John has saved 1115 dollars for presents and Beth has saved **b dollars**. Write an expression for how much they have saved together.*

- Example set 4:

- *Anthony is in a row boat on a lake. He is 676 yards from the dock. He then rows for m minutes back towards the dock. Anthony rows at a speed of 30 yards per minute. Write an expression for Anthony's distance from the dock dependent on the number of minutes he has rowed.*
- *Samantha starts a job at McDonald's that will pay her 11 dollars an hour. Samantha gets dropped off by her parents at the start of the shift but she takes a taxi home that costs her 12 dollars. Samantha works an h hour shift. After taking into account her taxi ride, write an expression for how much she makes in one night.*

- Example set 5:

- *Tiffany has started an Instagram account and is able to get 2 more followers each day. Tiffany has already gotten 8 new followers. Write an algebraic equation that describes the relationship between the number of days (d) and the number of followers (n). Fill in the blank for $n =$*
- *Jane earns \$5.00 per hour washing cars at the car dealership. Jane has already earned \$60.00 from working for Jane's employer. Write an algebraic equation that describes the relationship between hours Jane works (h) and the total money Jane earns (m). Fill in the blank for $m =$*

A translated example of a monetary themed question from a 4th grade ENLACE exam (multiple choice answer options omitted for brevity):

- *Maria is going to pay the following bills: telephone \$209.40, electricity \$198.50 and water \$100.30. How much will she pay in total?*

APPENDIX B: PARENTAL SURVEY NON-RESPONSE IN TIMSS

Table B1 shows that students whose parents do not complete the parental questionnaire perform worse than their peers, even when controlling for classroom fixed effects, and these students also do worse on their exam if it features a higher share of monetary questions. These estimates are comparable to those for students with parental SES indicators below the national median. Since my estimation exploits the random assignment of booklets to students, which is orthogonal to parental non-response, as demonstrated by table B2, estimates are internally valid.

TABLE B1—MISSING PARENTAL EDUCATION

	Standardized Score			
	(1)	(2)	(3)	(4)
Missing Parental Education	-0.297 (0.00368)	-0.233 (0.00356)	-0.283 (0.00509)	-0.221 (0.00474)
Missing Par Edu. x Prop Mon Q.			-0.227 (0.0578)	-0.200 (0.0519)
FE: Booklet x Year	Yes	Yes	Yes	Yes
FE: Country	Yes	.	Yes	.
FE: Class	No	Yes	No	Yes
N	445342	445190	445342	445190

Note: Robust standard errors in parentheses. Observations are at the student by examination level with a student-level SES indicator: parental education. The omitted category is students with reported parental education levels. The proportion of monetary questions in a booklet is a value from 0 to 1.
Source: TIMSS data.

TABLE B2—EXAM BOOKLET RANDOMIZATION CHECK

	Proportion Mon Q. in Booklet			
	(1)	(2)	(3)	(4)
Below Nat. Median	-0.000141 (0.000198)		-0.000234 (0.000239)	
Post Secondary		-0.000266 (0.000263)		-0.000270 (0.000294)
Upper Secondary		-0.000315 (0.000242)		-0.000367 (0.000291)
Lower Secondary		0.000185 (0.000346)		0.0000258 (0.000419)
Primary or None		0.000178 (0.000378)		0.0000918 (0.000499)
FE: Year	Yes	Yes	Yes	Yes
FE: Class	No	No	Yes	Yes
N	379468	379468	379160	379160

Note: Robust standard errors in parentheses. Observations are at the student by examination level with a student-level SES indicator: parental education. Omitted categories are students with reported parental education levels above the national median in columns 1 and 3 and university educated parents in columns 2 and 4. The proportion of monetary questions in a booklet is a value from 0 to 1.

Source: TIMSS data.

APPENDIX C: ESTIMATION USING ENLACE EXAMS

The Mexican Evaluación Nacional de Logros Académicos en Centros Escolares (ENLACE) exams were administered to all public and private schools in the country each June from 2006 to 2013. ENLACE exams were low stakes exams for students but were used to assess school and teacher performance. The census of school level subject results for grades 3 through 9 in all schools in Mexico is publicly available. The data also includes the school's marginalization index (1 to 5) as defined by Mexico's National Population Council.¹ All students in Mexico in the same grade take the same exam with new exams being written for all the grades each year.² ENLACE examination booklets are also publicly available. Within each booklet, I tally the total number of mathematics prompts and the number featuring a monetary theme.³ Panel c of figure F2 shows that there is variation in the proportion of monetary questions featured on exams within each grade. Panel c of figure F2 also shows the variation in the marginalization indicator across schools, the other source of variation necessary for my estimation.⁴

I use a panel of school performance for 135,306 different schools between the years 2009 and 2013.⁵ Because multiple grades are tested each year, the ENLACE data allows me to look at heterogeneity of effect sizes by grade.

C1. Impacts in ENLACE Examinations

Using the ENLACE exam data, I estimate

¹Mexico's National Population Council (CONAPO) calculates local geographic marginalization indices using a principal components method based on percentage indicators of social exclusion collected in the census. Indicators include: illiteracy, incomplete primary education, lack of running water, sewage systems, electricity, dirt floors, household overcrowding, geographic isolation, and low incomes in employment. Further details are available at <http://www.conapo.gob.mx>. The index is then grouped into five levels of marginalization: very disadvantaged, disadvantaged, middle, advantaged and very advantaged which are provided for the schools in the data. Although the marginalization index does not change over time for most schools, the index changes for a small share of schools with CONAPO's scheduled recalculation of the indicator. To simplify interpretation and presentation of the results I opt to maintain the discreet nature of this index and treat this index as time invariant, calculating the average for each school and rounding to the closest index category.

²In 2011 two different test booklets were used for the 3rd and 4th grades in certain regions. As the data does not indicate which booklet was used, these observations are dropped from the final dataset.

³An example question from an ENLACE exam is available in appendix A.

⁴The histogram of school marginalization in panel c of figure F2 does not weigh school observations by the number of students. When weighted, the median student attends a very advantaged school. For this analysis, schools that are not very advantaged are coded as below median.

⁵In many schools, examinations were administered in several sessions throughout the day. Performance data is reported for each session. I construct a single school level subject result for each grade by calculating a weighted average of the performance in the different sessions using the number of tested students as weights. Though some data is available for the earlier years, the number of examined students is not included in the 2006 and 2007 data. Furthermore, the data in 2008 does not disaggregate performance by subject. Analysis is thus focused on the years 2009-2013.

$$(C1) \quad E_{sgy} = \Theta_1 + \Theta_2 LowZ_s * PM_{gy} + \kappa_{gy} + \tau_{sy} + \epsilon_{sgy},$$

$$(C2) \quad E_{sgy} = \theta_1 + \sum_{z=2}^5 \theta_{2z} Z_s * PM_{gy} + \kappa_{gy} + \tau_{sy} + \epsilon_{sgy}.$$

Each observation represents the mean performance on the mathematics portion of the exam of grade (g) in school (s) in year (y). I regress the standardized school average for each grade and year (E_{gys}) on SES indicators interacted with the proportion of questions on that grade's exam that featured a monetary theme that year (PM_{gy}).⁶ Here, SES indicators include an indicator for whether a school's marginalization index falls below the national median ($LowZ_s$) in equation C1 or the school marginalization index dummies (Z_s) as specified in equation C2. I include a grade by year fixed effect (κ_{gy}) to control for overall difficulty of each particular exam booklet and school by year fixed effects (τ_{sy}) to control for local shocks that might affect overall performance in a school. In some specifications, I also add a grade by school fixed effect (ρ_{gs}) to control for the time invariant performance of a grade in a school. As exam booklets are assigned at the cohort level, standard errors are clustered at the booklet (grade by year) level.

Results are reported in table C1 and are consistent with the results using the TIMSS data. Students in disadvantaged schools see their mathematics exam scores further depressed when more monetary questions are featured on the exam. As illustrated in panel b of figure F2, the percentage of monetary questions featured on an exam can vary by up to 18 percentage points within a grade level. These estimates suggest that a 10 percentage point increase in the share of monetary themed questions differentially reduces performance in below median schools by 0.025 standard deviations and up to 0.126 standard deviations in very disadvantaged schools. The overall student weighted performance gap between above and below median schools is 0.18 standard deviations. Thus the effect of a 10 percentage point increase in monetary salience represents about 13.5% of the overall performance gap.

C2. Effect Size by Grade

The ENLACE data reports exam performance in a school for each grade between the 3rd and 9th grades. I investigate the grade heterogeneity in effect sizes by adding the relevant interaction terms with the indicators for the k grades.

Results are displayed graphically in figure C1. Figure C1 suggests that the the negative impact of financially salient questions on the exam performance of students in disadvantaged schools generally increases as they progress through the grades within a school. The negative impact reaches its largest magnitudes in the 6th and 9th grades which are the terminal grades for elementary and junior

⁶The standardization of the school averages is weighted by the number of students who took the exam.

secondary schools. The transition from elementary to junior secondary school, between the 6th and 7th grade, is associated with a break in the overall trend as there is substantial selection and sorting of the students who enter into junior secondary school. Note that selection of students and differences in the topics tested across grades complicates across grade comparisons. Nonetheless, this is suggestive evidence that the magnitude of the negative impact of financially salient questions on the exam performance of students in disadvantaged schools generally increases as they progress through the grades within a school.

TABLE C1—FINANCIAL SALIENCE AND AGGREGATE PERFORMANCE IN ENLACE

	Standardized Score			
	(1)	(2)	(3)	(4)
Below Median x Prop Mon Q.	-0.232 (0.126)		-0.254 (0.152)	
Advantaged x Prop Mon Q.		-0.184 (0.0649)		-0.0891 (0.0885)
Middle x Prop Mon Q.		-0.308 (0.134)		-0.251 (0.147)
Disadvantaged x Prop Mon Q.		-0.158 (0.191)		-0.330 (0.243)
Very Disadvantaged x Prop Mon Q.		-0.750 (0.435)		-1.266 (0.446)
FE: Grade x Year	Yes	Yes	Yes	Yes
FE: Year x School	Yes	Yes	Yes	Yes
FE: School x Grade	No	No	Yes	Yes
N	1911526	1911526	1870220	1870220

Note: Standard errors in parentheses are clustered at the grade by year (booklet) level. Observations are weighted by the number of tested students. Observations are at the school by grade by year level with a school level SES indicator: the school's marginalization index. Omitted categories are schools at or above the median marginalization level of students for columns 1 and 3 and very advantaged schools for columns 2 and 4. The proportion of monetary questions in a booklet is a value from 0 to 1.
Source: ENLACE data.

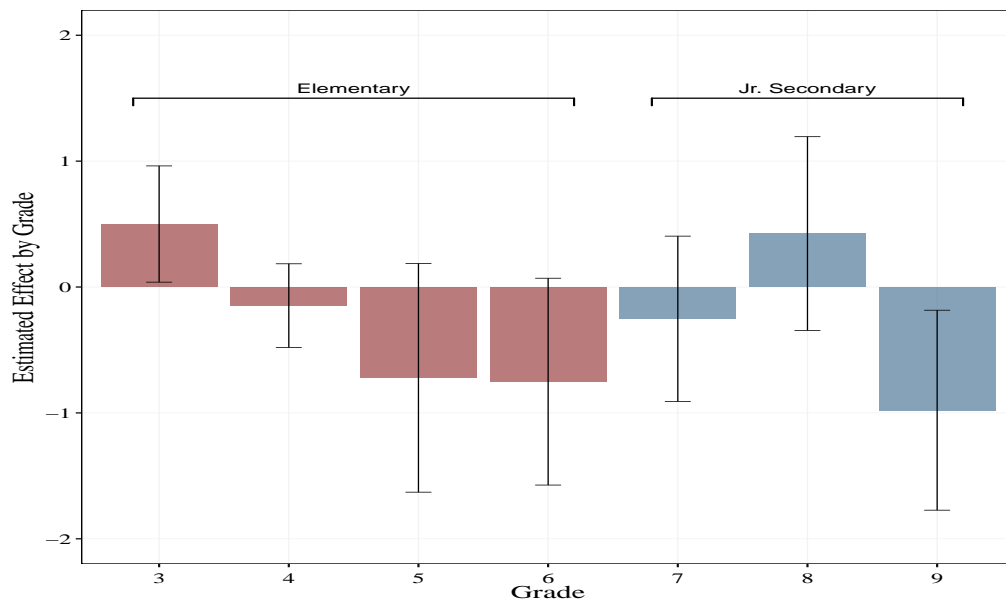


FIGURE C1. IMPACTS OF FINANCIAL SALIENCE IN ENLACE BY GRADE

Note: This figure displays estimates of the performance differential by grade with 95% confidence intervals, clustered at the grade by year (booklet) level.

Source: ENLACE data.

APPENDIX D: ATTENTION CAPTURE VERSUS COGNITIVE FATIGUE IN TIMSS

The estimates in table 3 and figure 1 are very much consistent with the attention capture hypothesis. Nevertheless, there remains the possibility that the estimates on subsequent questions reflect the effect of cognitive fatigue as discussed in the ASSISTments data. For each question, I calculate the share of students from each SES category that answered the question correctly and use this as an indicator for how difficult a question is for a student from a particular SES category. I generate four lags of this indicator to control for differential difficulty of the four questions leading up to a question. Results are reported in table D1. Controlling for the differential difficulty of leading questions in columns 3 and 4 seems to slightly reduce the magnitude of the estimates on subsequent questions by a small amount, though they remain negative and statistically significant, suggesting that this explanation cannot explain the entirety of the effect.

As an alternative method to estimate whether the effect on subsequent questions is due to cognitive fatigue from the differential difficulty of preceding questions, I generate 1000 placebo estimates from the data. Instead of flagging the true monetary questions, I flag a random set of questions as monetary and the 4 questions following this random set as post questions.⁷ These placebos are then used to estimate equation 4.

The resulting pairs of $\hat{\Lambda}_3^{placebo}$ and $\hat{\Lambda}_2^{placebo}$ coefficients are plotted in figure D1. The scatter plot suggests that it is highly unlikely that the two coefficients would both be jointly negative and of such a large magnitude by random chance, confirming the main results. In addition to verifying the main results, looking at the correlation between the coefficient pairs can also help decompose the role of cognitive fatigue in explaining the effect on subsequent questions. Suppose the differential difficulty of preceding questions generates differential cognitive fatigue and thus differential performance on subsequent questions. Under these conditions, if the randomly selected placebo monetary questions happen to be differentially difficult for the low SES students, then we would expect them to perform differentially worse on subsequent questions and vice versa. Thus we would expect the correlation between $\hat{\Lambda}_3^{placebo}$ and $\hat{\Lambda}_2^{placebo}$ to be positive. To investigate this, I estimate the following regression.

$$(D1) \quad \hat{\Lambda}_{3p}^{placebo} = \psi_1 + \psi_2 \hat{\Lambda}_{2p}^{placebo} + \epsilon_p$$

Results are reported in table D2 and plotted in figure D1. ψ_2 is indeed positive and statistically significant, suggesting that cognitive fatigue due to the differential difficulty of preceding questions does explain part of the magnitude of the estimated effect on subsequent questions. Nonetheless, as visible in figure D1, the predicted value of the coefficient on subsequent questions using the estimated

⁷Some question blocks are repeated across the two years. To ensure that the distribution is representative of the actual distribution of monetary questions, I make sure to randomly select 6 questions from the non-repeated blocks and 8 questions from the repeated blocks.

placebos ($\hat{\Lambda}_3^{placebo}$) is significantly smaller in magnitude than the estimate using the actual monetary questions, $\hat{\Lambda}_3$. I can reject that cognitive fatigue due to the differential difficulty of preceding questions explains the entirety of the effect on subsequent questions, supporting the attention capture hypothesis. When decomposed, I estimate that cognitive fatigue due to the differential difficulty of the previous questions explains approximately 34% of the estimated effect on subsequent questions.⁸ I interpret the remainder as evidence of attention capture.

TABLE D1—MONETARY AND SUBSEQUENT QUESTIONS IN TIMSS WITH CONTROLS FOR PRECEDING DIFFERENTIAL DIFFICULTY

	Question Answered Correctly (=100)							
	(1)		(2)		(3)		(4)	
Below Nat. Median x Mon Q.	-1.108	(0.151)	0.190	(0.202)	-1.202	(0.153)	0.199	(0.202)
Post Sec. x Mon Q.			-0.450	(0.187)			-0.461	(0.187)
Upper Sec. x Mon Q.			-1.599	(0.265)			-1.640	(0.265)
Lower Sec. x Mon Q.			-2.249	(0.280)			-2.352	(0.282)
Primary/No x Mon Q.								
Below Nat. Median x 4 Post	-1.005	(0.102)			-0.878	(0.104)		
Post Sec. x 4 Post			-0.393	(0.136)			-0.370	(0.136)
Upper Sec. x 4 Post			-0.793	(0.126)			-0.754	(0.127)
Lower Sec. x 4 Post			-1.002	(0.179)			-0.904	(0.180)
Primary/No x 4 Post			-1.306	(0.191)			-1.156	(0.192)
Below Med. Performance on q-1					0.0612	(0.0102)		
Below Med. Performance on q-2					0.0312	(0.0107)		
Below Med. Performance on q-3					-0.0130	(0.00993)		
Below Med. Performance on q-4					-0.0498	(0.0103)		
Par. Edu. Group Performance on q-1							0.0327	(0.00644)
Par. Edu. Group Performance on q-2							-0.0160	(0.00660)
Par. Edu. Group Performance on q-3							0.0359	(0.00638)
Par. Edu. Group Performance on q-4							-0.0576	(0.00662)
FE: Student	Yes		Yes		Yes		Yes	
FE: Question	Yes		Yes		Yes		Yes	
FE: Below Med. x Diff.	Yes		.		Yes		.	
FE: Below Med. x Seq.	Yes		.		Yes		.	
FE: Below Med. x QType x Country	Yes		.		Yes		.	
FE: Below Med. x QTopic x Country	Yes		.		Yes		.	
FE: Par. Edu. x Diff.	.		Yes		.		Yes	
FE: Par. Edu. x Seq.	.		Yes		.		Yes	
FE: Par. Edu. x QType x Country	.		Yes		.		Yes	
FE: Par. Edu. x QTopic x Country	.		Yes		.		Yes	
Exam Mean	49.56		49.56		49.56		49.56	
Exam SD	23.56		23.56		23.56		23.56	
N	8046329		8046329		8046329		8046329	

Note: Standard errors in parentheses clustered at the student-level. Observations are at the question by student-level with a student-level SES indicator: parental education. When a question is answered correctly the indicator is set to 100, 0 otherwise. Omitted categories are students with parental education at or above the national median for columns 1, 3 and 5 and university educated parents for columns 2, 4 and 6. Difficulty is a 20 bin binned indicator based on the performance on a question by students with university educated parents. Sequence is a 5 bin binned indicator based on the the position of a question within the exam booklet. Question type indicates whether a question is multiple choice or completed response. Question topic indicates categorized questions based on the topics listed in panel b of figure F3. The sample mechanically does not include the first four questions on an exam for which the differential difficulty controls are undefined.

Source: TIMSS data.

⁸Estimates in table D2 imply that $E(\hat{\Lambda}_3^{placebo} | \hat{\Lambda}_2^{placebo} = -1.207) = -0.31$ or 34% of $\hat{\Lambda}_3 = -0.891$.

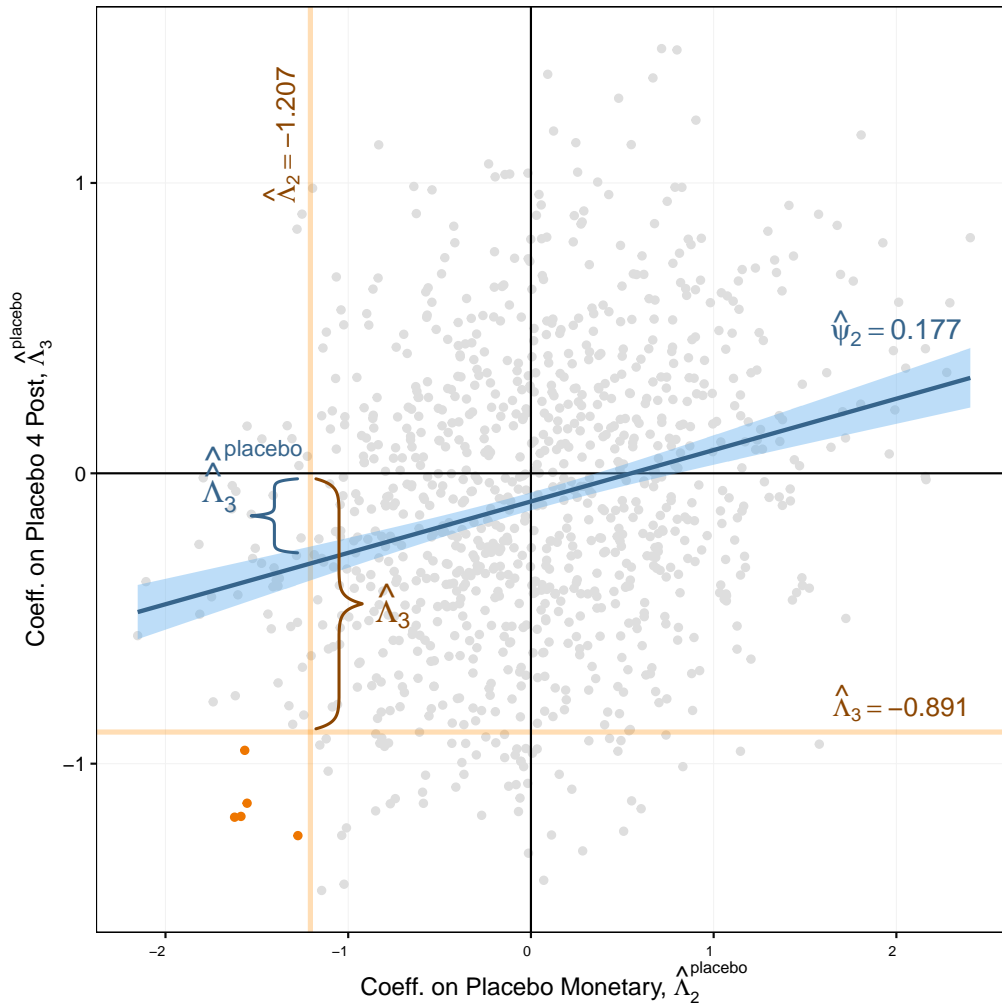


FIGURE D1. ESTIMATES FROM 1000 PLACEBO ESTIMATIONS

Note: This figure displays the coefficient estimates obtained for the monetary and four subsequent questions from 1000 placebo regressions where monetary questions were randomly assigned. Only five iterations yield estimated coefficients that were both jointly negative and of equal or larger magnitude than the estimates reported in column 3 of table 3. The regression line shows that there is a positive correlation between the differential difficulty of the leading question and differential performance on subsequent questions but that this effect can only explain about a third of the overall performance gap on subsequent questions.

Source: TIMSS data

TABLE D2—REGRESSIONS ON PLACEBO COEFFICIENTS

	Placebo Post Estimates ($\hat{\Lambda}_3^{placebo}$)
Placebo Mon. Estimates ($\hat{\Lambda}_2^{placebo}$)	0.177 (0.0208)
Constant	-0.0970 (0.0157)
N	1000

Note: $\hat{\Lambda}_2^{placebo}$ are the estimates for Λ_2 from equation 4 when randomly selected questions are flagged as placebo monetary questions. $\hat{\Lambda}_3^{placebo}$ are the estimates for Λ_3 on the corresponding placebo subsequent questions.

Source: TIMSS data.

APPENDIX E: SIMULATING EFFECTS AND REPLICATING THE COMIPEMS
PLACEMENT ALGORITHM

The COMIPEMS exams consists of 128 multiple choice questions covering mathematics, Spanish, history and the natural sciences and is administered to about 250,000 students each year. Though I do not observe the exam booklets, practice COMIPEMS mathematics questions do feature monetary themed questions. I use data from the 2004 and 2005 COMIPEMS entrance exam in which I observe parental education, student rankings of preferred high schools, actual high school placement, and performance on the COMIPEMS exam in the different subjects.

I consider how a 10 percentage point decrease in the share of monetary questions would change the scores of students on the mathematics portion of the COMIPEMS test. I use the parental education indicator and the estimates from column 2 of table 2 to calculate a student's new counterfactual math COMIPEMS score and then generate a new counterfactual ranking of students.⁹ These estimates suggest that a 10 percentage point decrease in the share of monetary questions should increase the mean score of students who have parents with a primary or less education by 0.0219 standard deviations.¹⁰ Exam scores are not adjusted for the substantial number of students with a missing SES indicator making the outcome of this simulation conservative. If a substantial share of these are low SES students, as their average performance suggests, there would be more movement in the allocation of students. Once ranked using the counterfactual scores, the ranking of students in disadvantaged groups improves, at a cost to those in the more advantaged groups.¹¹

Students in Mexico City are assigned to high schools according to a serial dictatorship mechanism. High schools first set the maximum number of students they will accept.¹² Students who fail to score above 30 or who fail to complete middle school are disqualified from attending high school. The remaining students are

⁹I only simulate the effect of monetary questions on the mathematics portion of the exam as this paper has focused on mathematics, and all of the estimates are derived using mathematics questions. I elected to focus on mathematics questions because monetary questions are a common feature in mathematics instruction and the structure of many mathematics exams and assignments (multiple short, distinct questions) helps with identification. Nevertheless, though not identified in this paper, it is possible these effects may apply to other subjects.

¹⁰The math portion on the COMIPEMS had a standard deviation of 5.12 points in 2004 and 5.26 points in 2005. Because scores on the COMIPEMS use round numbers only, I use these values to generate a random binomial and add 1 point to the math COMIPEMS score of randomly selected students with primary or less parental education indicators such that their aggregate performance on the mathematics section is improved in a manner consistent with the TIMSS estimate. I repeat the same procedure for students at each marginalization level using the relevant estimates.

¹¹Ranking among students with identical exam scores is generated randomly.

¹²Many students receive the exact same COMIPEMS score. In the actual assignment process, once a school's available slots are filled, the school must elect to admit all or none of the students who receive the marginal score and would otherwise be assigned to that school based on the student's stated school preferences. Since I do not observe this rounding process, I cannot replicate it in the simulation. For competitive schools, where the lowest exam score of an admitted student was above 31, I use the number of students who were admitted into the school in each year as the maximum number admissible. I do not constrain the number of students admitted for non-competitive schools.

placed based on their ranked exam performance and the list of preferred schools students submit prior to taking the exam. A computer program proceeds through the ranked list of students, starting with the highest scoring, and allocates students to their top-ranked school with open seats remaining. If no seats remain at any of the schools a student listed, the student is unassigned. After the first assignment process, unassigned students undergo a secondary selection process that allocates them to remaining openings (Dustan, de Janvry and Sadoulet (2017)). Following these rules, I perfectly replicate the placement algorithm used by the COMIPEMS's centralized admission system and verify that high school placement in Mexico City actually follows the rules described above.¹³

¹³In addition to the matching conditions above, UNAM and IPN affiliated schools have an additional minimum GPA requirement.

APPENDIX F: SUPPLEMENTAL TABLES AND FIGURES

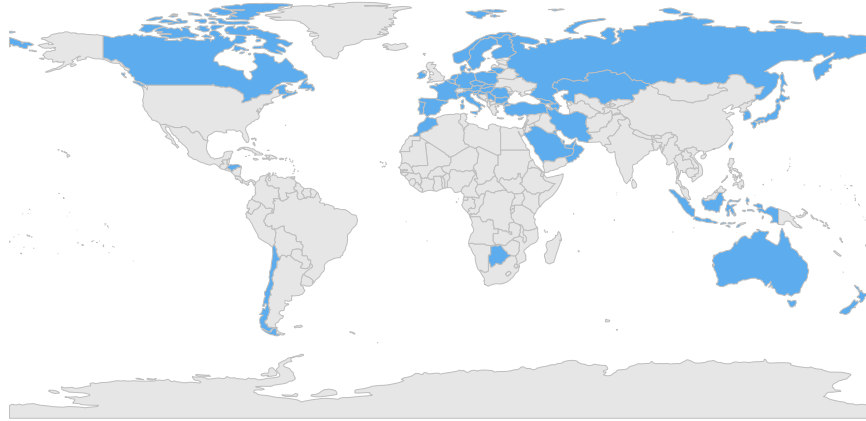


FIGURE F1. COUNTRIES PARTICIPATING IN 4TH GRADE TIMSS

Note: Mapped countries only show countries participating in the 4th grade TIMSS in 2011 and/or 2015 in which parental questionnaires were administered. Countries participating in 2015 4th grade exams that administered parental questionnaires include: Abu Dhabi, Australia, Bahrain, Flemish Belgium, Buenos Aires, Bulgaria, Canada, Chile, Chinese Taipei, Croatia, Cyprus, Czech Republic, Denmark, Dubai, Finland, France, Georgia, Germany, Hong-Kong, Hungary, Indonesia, Ireland, Iran, Italy, Japan, Kazakhstan, Republic of Korea, Kuwait, Lithuania, Morocco, Northern Ireland, Netherlands, Norway, New Zealand, Oman, Ontario, Poland, Portugal, Qatar, Quebec, Russian Federation, Saudi Arabia, Singapore, Serbia, Slovak Republic, Slovenia, Spain, Sweden, Turkey, United Arab Emirates. Countries participating in 2011 4th grade exams that administered parental questionnaires include: Abu Dhabi, Australia, Austria, Azerbaijan, Botswana, Chinese Taipei, Croatia, Czech Republic, Dubai, Finland, Germany, Georgia, Honduras, Hong-Kong, Hungary, Ireland, Iran, Italy, Lithuania, Morocco, Malta, Northern Ireland, Norway, Oman, Poland, Portugal, Qatar, Romania, Russian Federation, Saudi Arabia, Singapore, Slovak Republic, Slovenia, Spain, Sweden, Quebec, United Arab Emirates.
Source: TIMSS data.

TABLE F1—TIMSS BOOKLET STRUCTURE

	Part 1		Part 2	
	First Block	Second Block	First Block	Second Block
Booklet 1	M01	M02	S01	S02
Booklet 2	S02	S03	M02	M03
Booklet 3	M03	M04	S03	S04
Booklet 4	S04	S05	M04	M05
Booklet 5	M05	M06	S05	S06
Booklet 6	S06	S07	M06	M07
Booklet 7	M07	M08	S07	S08
Booklet 8	S08	S09	M08	M09
Booklet 9	M09	M10	S09	S10
Booklet 10	S10	S11	M10	M11
Booklet 11	M11	M12	S11	S12
Booklet 12	S12	S13	M12	M13
Booklet 13	M13	M14	S13	S14
Booklet 14	S14	S01	M14	M01

Note: A student handed booklet one would complete their math section first in part 1 and after a short break their science section in part 2. The math component of their exam would consist of prompt blocks M01 and M02. In contrast, a student handed booklet two would complete their science section first in part 1 followed by their math section in part 2. Their math section would consist of prompt blocks M02 and M03. Thus about half of the math prompts are identical between booklets 1 and 2. Additionally, 8 prompt blocks are re-administered between 2011 and 2015.

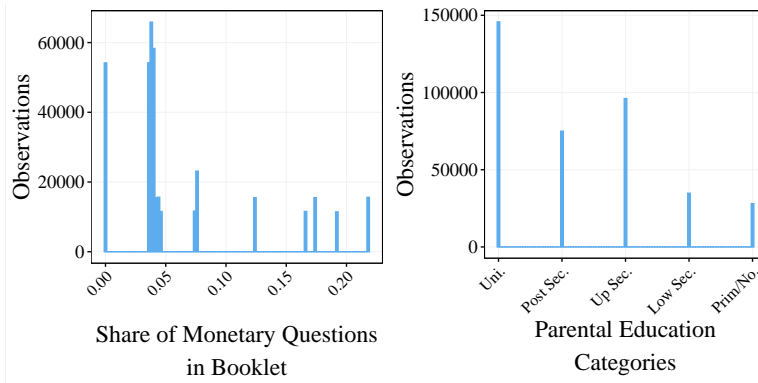
Source: TIMSS documentation.

TABLE F2—QUESTION RANDOMIZATION CHECK

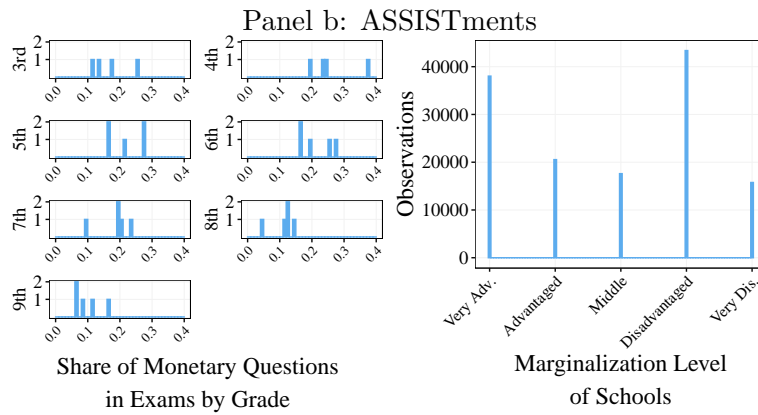
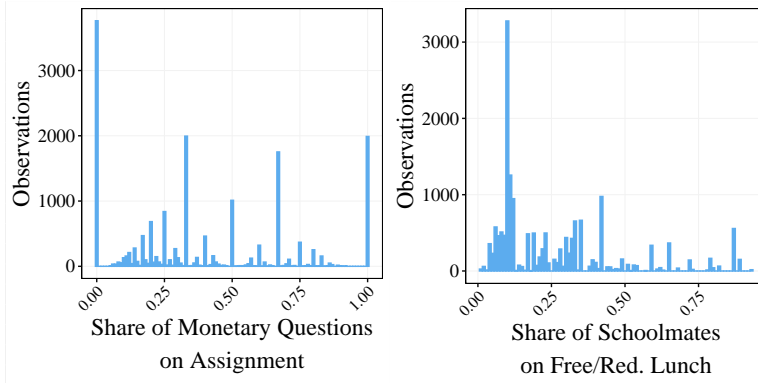
	Prop. MonQ.	MonQ. in 1st 3
Pct. Free/Red. Lunch	0.00313 (0.00826)	0.00974 (0.0285)
FE: Problem set	Yes	Yes
Dependent Mean	0.391	1.195
Dependent SD	0.324	1.017
N	17428	16015

Note: Robust standard errors in parentheses. Observations are at the student by problem set level with a school level SES indicator: share of students in the school receiving free or reduced lunch. Observations in the second column only include student assignments in which at least three questions were assigned.

Source: ASSISTments data.



Panel a: TIMSS



Panel c: ENLACE*

FIGURE F2. VARIATION IN FINANCIAL SALIENCE AND SES INDICATORS

Note: This figure shows the variation in the share of financially salient questions in student assignments and exams in the first column for all three datasets. The second column displays the variation in the SES indicators in all three datasets. The ENLACE data and results are presented in appendix C.
Source: TIMSS, ASSISTments and ENLACE data.

TABLE F3—FINANCIAL SALIENCE AND EXAM-LEVEL PERFORMANCE IN TIMSS

	Standardized Score			
	(1)	(2)	(3)	(4)
Below Nat. Median	-0.438 (0.00975)		-0.268 (0.00728)	
Post Secondary		-0.315 (0.00906)		-0.209 (0.00793)
Upper Secondary		-0.493 (0.0112)		-0.334 (0.00855)
Lower Secondary		-0.712 (0.0131)		-0.488 (0.00941)
Primary or None		-0.779 (0.0168)		-0.523 (0.0123)
Below Nat. Median x Prop Mon Q.	-0.260 (0.0885)		-0.262 (0.0732)	
Post Sec x Prop Mon Q.		-0.0812 (0.108)		-0.0515 (0.0629)
Upper Sec x Prop Mon Q.		-0.0865 (0.101)		-0.0844 (0.0711)
Lower Sec x Prop Mon Q.		-0.160 (0.137)		-0.147 (0.0821)
Prim/No x Prop Mon Q.		-0.219 (0.177)		-0.242 (0.153)
Constant	0.160 (0.00221)	0.314 (0.00426)	0.100 (0.00157)	0.213 (0.00323)
FE: Booklet x Year	Yes	Yes	Yes	Yes
FE: Country	Yes	Yes	.	.
FE: Class	No	No	Yes	Yes
N	379468	379468	379160	379160

Note: Standard errors in parentheses clustered at the booklet level. Observations are at the student by examination level with a student-level SES indicator: parental education. Omitted categories are students with parental education at or above the national median for columns 1 and 3 and university educated parents for columns 2 and 4. The proportion of monetary questions in a booklet is a value from 0 to 1.

Source: TIMSS data.

TABLE F4—TIMSS EXAM-LEVEL RESULTS BY OCCUPATION

	Standardized Score	
	(1)	(2)
Small Business	-0.163 (0.00651)	-0.114 (0.00596)
Clerical	-0.249 (0.00497)	-0.131 (0.00467)
Skilled Labor	-0.373 (0.00659)	-0.220 (0.00626)
General Labor	-0.518 (0.00989)	-0.292 (0.00930)
Never Wk. for Pay	-0.438 (0.0105)	-0.217 (0.00924)
Small Business x Prop Mon Q.	0.0142 (0.0792)	-0.0646 (0.0715)
Clerical x Prop Mon Q.	-0.0179 (0.0598)	-0.0374 (0.0550)
Skilled Labor x Prop Mon Q.	-0.0968 (0.0776)	-0.0815 (0.0720)
General Labor x Prop Mon Q.	-0.182 (0.114)	-0.215 (0.103)
Never Wk. for Pay x Prop Mon Q.	-0.161 (0.122)	-0.212 (0.102)
Constant	0.148 (0.00195)	0.0857 (0.00178)
FE: Booklet x Year	Yes	Yes
FE: Country	Yes	.
FE: Class	No	Yes
N	379468	379160

Note: Robust standard errors in parentheses. Observations are at the student by examination level with a student-level SES indicator: parental occupation. The omitted category is students with professional parental occupations. The proportion of monetary questions in a booklet is a value from 0 to 1.

Source: TIMSS data.

TABLE F5—TIMSS QUESTION FIXED EFFECTS

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	
				Question Answered Correctly (=100)							
Below Nat. Median x Mon Q.	-0.885 (0.123)	-1.207 (0.131)	-0.694 (0.124)	-1.573 (0.126)	-1.399 (0.127)	-0.484 (0.128)	-0.478 (0.128)	-1.208 (0.131)	-1.436 (0.128)	-0.992 (0.131)	
Below Nat. Median x 4 Post	-0.680 (0.0880)	-0.891 (0.0969)	-0.716 (0.0893)	-0.990 (0.0957)	-1.024 (0.0969)	-0.642 (0.0886)	-0.674 (0.0903)	-0.888 (0.0954)	-0.858 (0.0969)	-1.078 (0.0970)	
FE: Student	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
FE: Question	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
FE: Below Med. x Diff.	No	Yes	No	Yes	Yes	No	No	Yes	Yes	Yes	
FE: Below Med. x Seq.	No	Yes	Yes	No	Yes	No	Yes	No	Yes	Yes	
FE: Below Med. x QType x Country	No	Yes	No	No	No	Yes	Yes	Yes	Yes	No	
FE: Below Med. x QTopic x Country	No	Yes	No	No	No	Yes	Yes	Yes	No	Yes	
Dep. Variable Mean	49.93	49.93	49.93	49.93	49.93	49.93	49.93	49.93	49.93	49.93	
Dep. Variable SD	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	
N	9564201	9564201	9564201	9564201	9564201	9564201	9564201	9564201	9564201	9564201	

Note: Standard errors in parentheses clustered at the student-level. Observations are at the question by student-level with a student-level SES indicator: parental education relative to the national median. When a question is answered correctly the indicator is set to 100, 0 otherwise. Omitted categories are students with parental education at or above the national median. Difficulty is a 20 bin binned indicator based on the performance on a question by students with parental education above the national median. Sequence is a 5 bin binned indicator based on the the position of a question within the exam booklet. Question type indicates whether a question is multiple choice or completed response. Question topic indicates categorized questions based on the topics listed in panel b of figure F3.

Source: TIMSS data.

TABLE F6—TIMSS UNANSWERED QUESTIONS

	Question Left Unanswered (=1)					
	(1)	(2)	(3)	(4)	(5)	(6)
Below Nat. Median x Mon Q.	-0.00378 (0.000691)		-0.00362 (0.000723)		-0.00169 (0.000803)	
Post Sec. x Mon Q.		-0.000789 (0.000848)		-0.00153 (0.000888)		-0.000661 (0.000927)
Upper Sec. x Mon Q.		0.00120 (0.000813)		-0.00182 (0.000847)		-0.00294 (0.000942)
Lower Sec. x Mon Q.		-0.00120 (0.00127)		-0.00264 (0.00133)		-0.00266 (0.00146)
Primary/No x Mon Q.		-0.00732 (0.00144)		-0.00842 (0.00151)		-0.00873 (0.00182)
Below Nat. Median x 4 Post	-0.00147 (0.000545)		-0.00296 (0.000604)		-0.00232 (0.000666)	
Post Sec. x 4 Post		0.00157 (0.000671)		-0.00148 (0.000742)		-0.00166 (0.000780)
Upper Sec. x 4 Post		0.00416 (0.000641)		-0.000794 (0.000705)		-0.00301 (0.000784)
Lower Sec. x 4 Post		0.00351 (0.000994)		-0.00151 (0.00110)		-0.00324 (0.00121)
Primary/No x 4 Post		0.00178 (0.00115)		-0.00164 (0.00129)		-0.00674 (0.00152)
FE: Student	Yes	Yes	Yes	Yes	Yes	Yes
FE: Question	Yes	Yes	Yes	Yes	Yes	Yes
FE: Below Med. x Diff.	No	.	Yes	.	Yes	.
FE: Below Med. x Seq.	No	.	Yes	.	Yes	.
FE: Below Med. x QType x Country	No	.	Yes	.	Yes	.
FE: Below Med. x QTopic x Country	No	.	Yes	.	Yes	.
FE: Par. Edu. x Diff.	.	No	.	Yes	.	Yes
FE: Par. Edu. x Seq.	.	No	.	Yes	.	Yes
FE: Par. Edu. x QType x Country	.	No	.	Yes	.	Yes
FE: Par. Edu. x QTopic x Country	.	No	.	Yes	.	Yes
FE: Class x Mon Q.	No	No	No	No	Yes	Yes
FE: Class x 4 Post	No	No	No	No	Yes	Yes
Dep. Variable Mean	0.0598	0.0598	0.0598	0.0598	0.0598	0.0598
Dep. Variable SD	0.237	0.237	0.237	0.237	0.237	0.237
N	9564201	9564201	9564201	9564201	9563918	9563918

Note: Standard errors in parentheses clustered at the student-level. Observations are at the question by student-level with a student-level SES indicator: parental education relative to the national median. When a question is left unanswered the indicator is set to 1, 0 otherwise. Omitted categories are students with parental education at or above the national median for columns 1, 3 and 5 and university educated parents for columns 2, 4 and 6. Difficulty is a 20 bin binned indicator based on the performance on a question by students with university educated parents. Sequence is a 5 bin binned indicator based on the the position of a question within the exam booklet. Question type indicates whether a question is multiple choice or completed response. Question topic indicates categorized questions based on the topics listed in panel b of figure F3.

Source: TIMSS data.

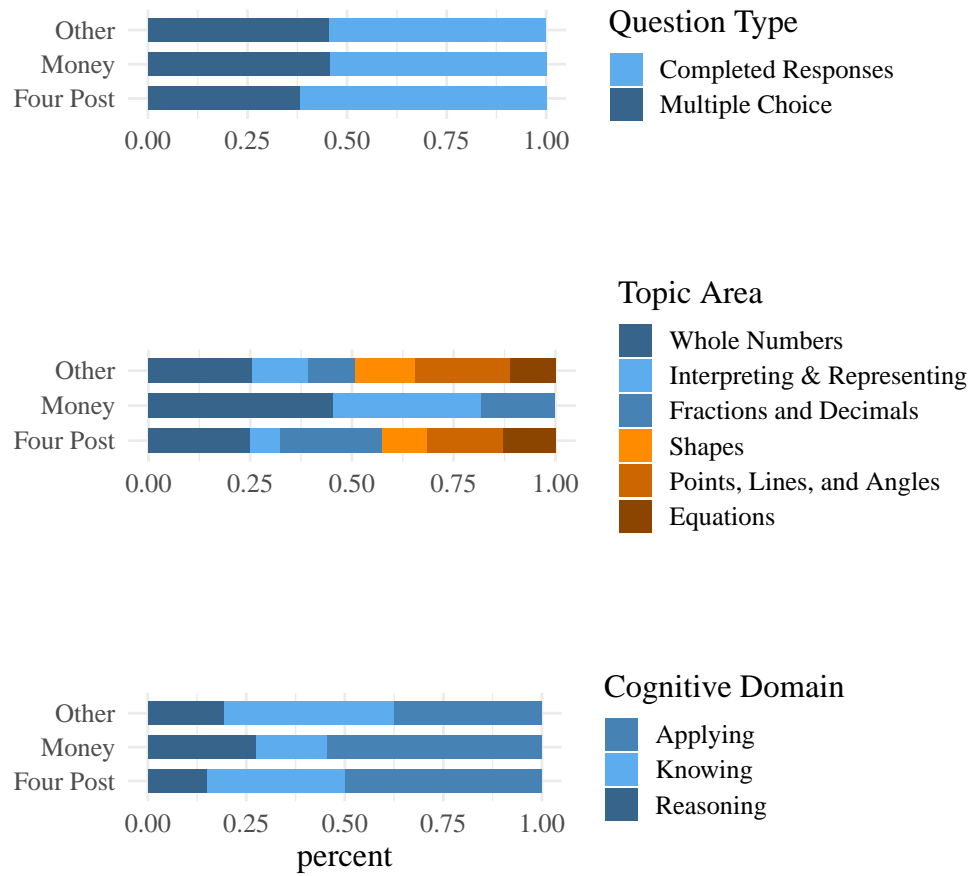


FIGURE F3. QUESTION CHARACTERISTICS BY CATEGORY

Note: This figure displays the distribution of observable question characteristics in the TIMSS data based on whether a question is categorized as monetary or positioned within the four questions that follow a monetary question.

Source: TIMSS data.