Cash and Cognition: The Impact of Transfer Timing on Standardized Test Performance and Human Capital*

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Abstract

This paper shows that the timing of monetary transfers to low-income families affects students' cognitive performance on high-stakes standardized tests. We combine administrative records from the world's largest conditional cash transfer program with college admission exam results of 185,000 high school students from beneficiary families. Exploiting random variation in payment dates, we find that receiving the transfer in the days preceding the exam increases test scores by 0.01 standard deviations relative to receiving it the subsequent week. Question-level analysis reveals that effects are concentrated in final questions and easier questions, suggesting improved cognitive endurance and effort allocation. The impacts are largest for recipients of larger transfers, who experience persistent gains in human capital accumulation: their college enrollment increases by 0.6 percentage points, with higher graduation rates and formal employment. Our findings show that short-term liquidity constraints during high-stakes events can have long-lasting implications, and suggest opportunities to improve social programs through improved payment scheduling.

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1 Introduction

Cash transfer programs are one of the main anti-poverty policies in developing countries. In Latin America alone, 18 countries operate these programs, reaching over 135 million individuals (García and Saavedra, 2022). Given the scale and central role of these programs in social protection, understanding how to optimize these programs' effectiveness could benefit millions of households. In this paper, we focus on payment timing and examine how it affects beneficiaries' cognitive performance—a fundamental determinant of decision-making and predictor of life success (e.g., Heckman et al., 2006; Kuncel and Hezlett, 2007; Hanushek and Woessmann, 2008; Burks et al., 2009; Dohmen et al., 2010; Benjamin et al., 2013; Fe et al., 2022).

To investigate this, we study Brazil's *Bolsa Familia Program* (BFP)—the world's largest conditional cash transfer (CCT) program by coverage, serving over 13 million households. BFP provides monthly transfers to low-income households, granting on average 93 USD per month, which represents approximately 40% of beneficiaries' income. To measure cognition, we combine BFP administrative records with data from 185,000 high school students from beneficiary families who took a high-stakes test used for college admissions called ENEM.

Our identification strategy exploits exogenous variation in payment dates. The day of the month a household receives its BFP payment is determined by the last digit of a randomly-generated beneficiary identifier. In our sample, approximately 60 percent of households receive their monthly BFP transfer before the ENEM exam ("early recipient"), while the remainder receive it the week after ("late recipient"). Over 90 percent of early recipients withdraw their benefits prior to the ENEM exam, creating quasi-experimental variation in household liquidity at the time of the exam.

Our main result is that receiving the transfer before the exam improves test performance. Early recipients score approximately one percent of a standard deviation higher than late recipients. We find positive effects across all exam subjects, with the largest effects in language arts and the essay. The effects are concentrated in the middle of the score distribution and are driven by students who received the largest transfers, with limited effects for recipients of smaller transfers. Importantly, these effects are not driven by changes in test-taker composition, as early recipients have the same probability of attending the exam as late recipients.

To investigate potential mechanisms, we analyze question-level data using two sources

of variation. First, we exploit the random assignment of test booklets to students, where all booklets have the same set of questions but in different positions. Second, we leverage natural variation in question difficulty. We find that the effects are concentrated in the final questions of the exam, consistent with increased cognitive endurance (Sievertsen et al., 2016; Mani et al., 2013; Reyes, 2023; Brown et al., 2024). We also find larger effects on easier exam questions, but *negative* effects on the most challenging questions that exceed students' ability. This pattern suggests that early recipients more strategically allocate their time and cognitive resources across exam questions.

Next, we assess whether these performance gains have persistent consequences for human capital accumulation. The ENEM exam plays a central role in Brazil's higher education system, determining access to scholarships, student loans, and university admissions for over five million test-takers annually (Machado and Szerman, 2021). Given the exam's scale, even modest increases in ENEM scores could significantly affect students' college trajectories. To examine potential effects on college outcomes, we link ENEM records to Brazil's higher education census, focusing on students who received larger transfers—the group where we found the strongest effects on test performance.

Early transfer payments have positive effects on human capital accumulation. We find that the college attendance rate increases by 0.6 percentage points (or 3.9 percent relative to a baseline of 15.3 percent) among students who receive larger transfers. We provide suggestive evidence that increased access to government scholarships serves as a mechanism behind the higher enrollment rates, as early recipients are more likely to meet the minimum test score requirements for scholarship eligibility. Importantly, these students succeed academically despite potential concerns about their lower academic preparation and limited financial resources. We analyze degree completion rates up to seven years after the ENEM exam and find that seven-year graduation rates increase by 0.8 percentage points (or six percent relative to a baseline of 13 percent) among students who received larger transfers.

A natural question is whether the improved college outcomes translate into better labor market outcomes. To assess this, we link ENEM test-takers to employer-employee matched data covering the universe of Brazil's formal-sector workers. Since we observe students for up to nine years after the ENEM exam, our analysis captures early-career outcomes. We find that receiving transfers before the exam increases formal employment rates by 0.9 percentage points (or 3.1 percent relative to late recipients). We find no significant effects on earnings or wages during this period, though this null result may reflect that many

students are still completing their degrees or early in their career trajectories.

Our results demonstrate that liquidity constraints, even when short-lived, can have persistent effects when they coincide with high-stakes events such as college entrance exams. This finding points to a low-cost opportunity to improve the effectiveness of cash transfer programs through optimized payment timing. Program administrators could improve participants' outcomes by aligning transfer schedules with key events in beneficiaries' lives, without requiring changes to benefit levels or eligibility criteria.

This paper contributes to the literature on CCTs and educational outcomes.[1] Previous work finds positive impacts of CCTs on school enrollment, attendance, and dropout rates (e.g., Glewwe and Kassouf, 2012; García and Saavedra, 2017). However, evidence on CCTs' effects on test scores is mixed (Millán et al., 2019). A key empirical challenge is that CCT benefits are often conditional on school attendance, which changes the composition of test takers (García and Saavedra, 2022). Most existing work thus relies on strong identification assumptions to address selection into test-taking.[2] We circumvent this challenge by exploiting variation in *when* households receive their transfer, which allows us to measure impacts on test scores under weaker identification assumptions.[3] We also show that these test score effects translate into meaningful differences in college enrollment and completion.

We also contribute to the literature on income shocks and cognitive performance. Recent empirical work shows that poverty can directly impair cognitive functioning (Mani et al., 2013; Schilbach et al., 2016; Dean et al., 2019), that income shocks affect performance on cognitive tests (Lichand and Mani, 2020; Kansikas et al., 2023), and that financial concerns impact task performance (Duquennois, 2022; Kaur et al., 2025).[4] Our paper advances this literature in three ways. First, we examine effects on household dependents rather than direct transfer recipients. Second, we study impacts on a high-stakes test rather than laboratory measures of cognition.[5] Third, because we study an existing nationwide policy, our

[1]For overviews of this literature, see Fiszbein and Schady (2009); Baird et al. (2014); Millán et al. (2019); García and Saavedra (2022).

[2]See for example Behrman et al. (2000); Garcia and Hill (2010); Báez and Camacho (2011). A small number of studies test randomly-selected children at home to avoid selection (e.g., Evans et al., 2014; Barrera-Osorio and Filmer, 2016; Paxson and Schady, 2010).

[3]By focusing on immediate effects, our design rules out many indirect channels through which cash transfers can impact cognition. For instance, one of the conditions to remain enrolled in BFP is for school-age children to be enrolled in school and attend. Thus, BFP could have long-term impacts on cognition partly due to their impact on schooling (Hansen et al., 2004; Brown et al., 2024).

[4]Though other work fails to find impacts of income shocks on cognition (Carvalho et al., 2016; Fehr et al., 2022), and recent reviews suggest the overall evidence is mixed (De Bruijn and Antonides, 2022; Haushofer and Salicath, 2023).

[5]Incentives are important for measuring cognitive performance because in their absence, cognitive tests

estimates have direct policy relevance and benefit from a substantially larger sample than previous studies.[6]

Finally, we contribute to the literature on the optimal design of cash transfer programs. Previous work has analyzed the impact of conditioning transfers on household behaviors, "labeling" the intended use of benefits, and comparing in-kind to cash transfers (e.g., Baird et al., 2011; Cunha, 2014; Attanasio et al., 2015; Benhassine et al., 2015; Cunha et al., 2019). The *timing* of transfers has received less attention as a design feature, even though evidence from other social programs suggests that payment timing can substantially affect household behavior (e.g., Hastings and Washington, 2010; Goldin et al., 2022; Bond et al., 2022).[7] We provide novel evidence that transfer timing can impact longer-run outcomes like college attendance and graduation, offering insights into how improved program design can enhance human capital accumulation.

2 Institutional Context and Data

2.1 Cash Transfer Program

The *Bolsa Família Program* (BFP) is a conditional cash transfer (CCT) program that provides monthly benefits to low-income families. BFP covers about 14 million households in Brazil, reaching over 50 million individuals (approximately 25 percent of the country's population), making it the largest CCT program worldwide (Brollo et al., 2020).

BFP benefits are determined by household composition and income through a two-tier structure. Households below the extreme poverty line receive both an unconditional transfer and conditional payments tied to children's school attendance and health check-ups. Households between the extreme poverty and poverty lines are eligible only for the conditional component.[8] In 2013, the year we analyze, the average beneficiary family received a monthly payment of $93, representing approximately two-thirds of their average

capture not only cognitive ability but also other performance determinants such as intrinsic motivation (Wise and DeMars, 2005; Duckworth et al., 2011; Segal, 2012; Finn, 2015; Gneezy et al., 2019).

[6] A related literature on "payday effects" documents significant intra-month declines in liquidity and consumption as households approach their next paycheck, social security benefit, or food stamps benefit (Stephens Jr, 2003; Shapiro, 2005; Mastrobuoni and Weinberg, 2009; Hastings and Washington, 2010). We show in a developing country context that these effects can have significant long-term consequences when they coincide with high-stakes events.

[7] Notable exceptions include Barrera-Osorio et al. (2011) and Kansikas et al. (2023).

[8] The conditional benefits include payments for pregnant women and nursing mothers who meet health monitoring requirements, school-age children under 17 who maintain minimum attendance, and children under seven who follow vaccination schedules (Glewwe and Kassouf, 2012).

monthly income of $138.

The last digit of this NIS determines the household's monthly payment date. Payments begin on the third Monday of each month with households whose NIS ends in '1', followed by sequential disbursement to subsequent digits on consecutive business days. Figure 1 illustrates this schedule for October 2013. This systematic variation in payment timing based on the randomly-assigned NIS forms the foundation of our identification strategy, which we detail in Section 3.

To enroll in BFP, households must register in the Social Programs Registry (*Cadastro Único*). During registration, each household is assigned a randomly generated eleven-digit identification number called *NIS*. The disbursement schedule of the benefits each month is directly linked to the last digit of the NIS number. Households whose NIS ends with the digit '1' are the first ones to receive the transfer, typically on the third Monday of the month. Thereafter, transfers are made sequentially, with each subsequent day serving those whose NIS ends with the next sequential digit, and with no disbursements occurring over the weekends and public holidays. Figure 1 shows the October 2013 payment schedule. Our identification strategy, described in Section 3, exploits the variation in payment timing induced by the NIS last digit.

2.2 ENEM Exam

The High School Assessment Exam (*Exame Nacional do Ensino Médio*, or ENEM) is a high-stakes exam that determines students' educational trajectory. Most universities in Brazil, including those in the centralized admission system, use ENEM scores as their sole admission criterion. Application components common in other countries, such as extracurricular activities, interviews, or motivation essays, play no role. ENEM scores also determine eligibility for government scholarships through ProUni (*Programa Universidade para Todos*) and student loans through FIES (*Fundo de Financiamento ao Estudante do Ensino Superior*).

The ENEM exam consists of an essay and 180 multiple-choice questions across four subjects: mathematics, natural sciences, social sciences, and language arts. Each exam subject is graded based on Item Response Theory (IRT). Testing occurs once a year over two consecutive weekend days. Test-takers are randomly assigned an exam booklet that contains the same set of questions but in different orders within each subject area. Over five million individuals enroll to take the ENEM exam every year, making it the second largest college admission exam in the world.

2.3 Data

We combine several administrative datasets. First, we use the 2013 ENEM exam records, which contain both student- and question-level information. The student-level data include test scores and demographic characteristics such as age, gender, race, and family income. The question-level data provide information about the subject and skill being tested, as well as measures of question difficulty.

We identify students from BFP recipient households by linking ENEM records to the Registry of Social Programs and BFP payment sheets from 2013. The Registry identifies households receiving BFP. The payment sheets contain information on transfer size, withdrawal dates, and beneficiaries' NIS numbers, which determine the day households receive their monthly transfer.

To examine longer-run outcomes, we link these records to two additional datasets. The Census of Higher Education (2014-2021) provides information on college enrollment, field of study, degree progress, and graduation outcomes. The RAIS employee-employer matched data (2014-2022) contains earnings, occupation, and industry information for all formal-sector workers in Brazil.

2.4 Sample, Summary Statistics, and Balance

We focus on high school seniors from BFP recipient households who enrolled to take the 2013 ENEM. To construct our sample we implement several sample restrictions. First, we exclude individuals who take the exam in their junior year, as these students typically do so for practice. Second, we exclude individuals who take the exam after dropping out of high school, who typically take the ENEM to obtain a high school equivalency certificate. Third, we exclude individuals who take the exam after graduating from high school, who often take the exam to enroll in a college degree or switch from college degrees.[9] Fourth, we exclude students whose families are not enrolled in BFP. Finally, we exclude a small fraction of students from households that were enrolled in BFP but did not receive transfers during the exam month, typically due to ineligibility or non-compliance with program requirements. These restrictions yield a sample of approximately 185,000 students.

Table 1 presents summary statistics for our sample and comparison groups. Column 1 shows characteristics of all high school seniors who registered for the ENEM exam, while columns 2–3 and 4–5 compare students by their enrollment status in the Social Programs

[9]To ensure we capture potential new entrants into higher education, we exclude students who appear in the higher education census as enrolled in college during or prior to taking the ENEM exam.

Registry and BFP, respectively. Our analysis sample, shown in column 4, consists of students who are older (20.5 years versus 18.9 in the full sample), more likely to be female (65.2 percent versus 58.8 percent), and more likely to identify as Black or Brown (72.4 percent versus 53.5 percent overall). Students in our sample come from disadvantaged backgrounds, with only 1.8 percent attending private high school (compared to 18.6 percent overall) and 2.0 percent having college-educated mothers (versus 16.2 percent in the full sample). Among test-takers, BFP beneficiaries score approximately 0.6 standard deviations below non-beneficiaries across all exam subjects.

The sample is balanced on observable characteristics across payment timing groups. Table 2 compares mean characteristics of students whose households receive BFP transfers before versus after the ENEM exam (columns 1 and 2). The differences between groups are small in magnitude (column 3), and for most variables, we cannot reject equality at conventional significance levels. We also find a balanced sample when examining student characteristics across all ten possible NIS last digits (Appendix Table A1). Consistent with this, the last digit of household NIS numbers is uniformly distributed across students (Appendix Figure A1).

3 Research Design

3.1 Regression model

Our empirical strategy compares test scores between students whose households received their BFP transfer before versus after the ENEM exam. As described in Section 2, this variation stems from the last digit of households' randomly-assigned NIS numbers, which determines payment timing. We estimate the following baseline specification:

$$Y_i = \alpha + \beta \text{BFPBeforeENEM}_i + \varepsilon_i, \tag{1}$$

where Y_i is student i's outcome and BFPBeforeENEM_i is an indicator that equals one if the last NIS digit of i's family allows them to receive the transfer before the exam.

Our main outcomes include both immediate test performance and longer-run outcomes. For test performance, we examine either student i's average score across all exam subjects or their score on a specific subject. We standardize test scores to have mean zero and standard deviation one in our sample. For longer-run outcomes, we analyze human capital accumulation (college attendance, college selectivity, and graduation likelihood) and labor

market outcomes (formal employment, wages, and earnings). Standard errors are clustered at the student level.

The coefficient β captures our main parameter of interest. Because not all eligible households withdraw their cash transfer before the exam, β identifies the intention-to-treat effect of being eligible to withdraw BFP funds before the exam. We interpret this parameter as the effect of alleviating end-of-cycle financial constraints—the liquidity shortages that households typically face in the days before their next transfer payment. Rejecting the null hypothesis that $\beta = 0$ would provide evidence that households face binding end-of-cycle constraints that affect cognitive performance.

3.2 Transfer Payment Timing and Withdrawal Patterns

We begin by examining the timing of household benefit withdrawals relative to BFP disbursement dates. Figure 2 plots the cumulative distribution function (CDF) of withdrawals relative to scheduled payment dates. Since payment dates vary across households based on their NIS number, we normalize each household's payment date to zero. The x-axis represents days relative to the payment date, while the y-axis axis shows the cumulative share of households that have withdrawn their benefits.

Withdrawal patterns indicate that households face binding liquidity constraints and value immediate access to funds. We observe virtually no withdrawal activity before the scheduled payment date. On the payment date itself, approximately 75 percent of households withdraw their benefits, and this share rises to over 85 percent within three days. This rapid withdrawal behavior means that the vast majority of households scheduled to receive transfers before the exam had accessed their funds prior to the exam weekend (Appendix Figure A2).

4 The Impact of Monetary Transfers on Exam Performance

This section examines the impact of the timing of BFP cash transfers on students' exam performance. We begin by assessing whether receiving BFP early affects the likelihood of attending the ENEM. Then, we turn to our main analysis and investigate the impact of receiving the cash transfer on the overall test and across different test subjects. We conclude the section by studying heterogeneity by transfer size and student characteristics.

4.1 Exam Attendance

We begin by studying selection into attending the ENEM. Receiving the cash transfer in the days preceding the exam could impact the individual's decision to take the exam. Moreover, if the students induced to take the exam have systematically different cognitive abilities, this effect could lead to test-score differences between early- and late-receivers, irrespective of any cognition effects.

To measure the impact of BFP on the probability of attending the exam, we define indicator variables for whether students were present on both exam days, at least one day, and respectively on the first and second day. Table 3 presents estimates of equation (1) using these attendance indicators as outcomes. Additionally, Appendix Figure A3 plots the proportion of BFP beneficiaries who attended both exam days (blue circles) and at least one day (red triangles) against the days elapsed since receiving the transfer.

We find that BFP does not significantly affect the probability of attending the ENEM. The impact of BFP on attendance for both days is of -0.1 percentage points (on a baseline of 75.8 percent), and the impact on attending at least one day is of -0.2 percentage points (on a baseline of 78.5 percent). These effects are small in magnitude and statistically insignificant (columns 1 and 2). The results are analogous when examining the probability of attending the first testing day (column 3) or the second testing day (column 4). Consistent with the regression results, Appendix Figure A3 shows that attendance does not systematically vary according to the number of days since the student's household received the transfer.

4.2 Test Scores

To motivate our main analysis, we begin by studying student performance across cash transfer disbursement dates. Figure 3 plots the average test score (y-axis) against the BFP disbursement date relative to the exam date (x-axis). Students who receive the cash transfer prior to the exam tend to have higher test scores than those who received it afterwards. For example, the average test score of students who received the BFP benefits five days *before* the exam is 0.0027 SD (s.e. = 0.0.0025 SD), whereas that of students who received the cash transfer four days *after* the ENEM is -0.0061 SD (s.e. = 0.0031 SD). The average test score of students whose family received the transfer prior to the exam (henceforth "early recipients") tends not to vary much based on the transfer date. Thus, for the remainder of the analysis we group students into early- and late- recipients.

Table 4 reports regression estimates of β from equation (1). Each column shows the results for a different dependent variable. In column 1, the outcome is the average test score across the subjects tested. In columns 2–6, we show the results separately for each subject tested and the essay. Additionally, Appendix Figure 5 shows the average test score of early and late recipients in each subject tested.

Receiving the cash transfer in the days preceding the exam increases test scores. On average, receiving BFP early improves test scores by $\beta = 0.009$ SD ($p < 0.05$), as shown in column 1. This figure represents a 1.69 percent increase relative to the late-recipients' average score. Notably, the performance of early-recipients is better on all subjects tested (Appendix Figure 5). The impact of BFP is larger for the language arts test ($\beta = 0.014$ SD, $p < 0.01$) and the essay ($\beta = 0.010$, $p < 0.10$), with test score increases of approximately 2.5 percent relative to the late recipients mean (columns 4 and 6). While we also estimate positive impacts on the sciences and math (columns 2, 3, and 5), these effects are not statistically distinguishable from zero. These results are robust to controlling for socioeconomic and demographic characteristics (Appendix Table A2).

One potential concern with these results is that other government programs may also disburse their benefits based on households' last NIS digit. If the timing of other government programs coincides with the BFP disbursement, it could potentially confound our results. To address this concern, we examine students in our sample whose households possess an NIS identifier but do not receive BFP.[10] This subgroup allows us to isolate the impact of any non-BFP programs that distribute benefits based on the last NIS digit. Our regression results for this subgroup, presented in Appendix Table A4, show statistically insignificant coefficients that substantially smaller than our baseline estimates.[11]

Taken together, the evidence indicates that receiving BFP early increases student performance on the exam by about one percent of a SD, which represents a two percent increase compared to the late-receivers' mean. This effect is comparable to the test-score impact of improving teacher value added by 0.06 SD (Chetty et al., 2014a), improving air quality during the test by 0.20 SD (Ebenstein et al., 2016), decreasing ambient pollen levels during the exam by 0.32 SD (Bensnes, 2016), or taking the exam under one degree Fahrenheit hotter condition (Park, 2020).

[10] As detailed in Section 3, households are assigned an NIS when they first enroll in the Social Registry Program, which is required to receive benefits from any Government program (including, but not limited to, BFP).

[11] This result is consistent with conversations between the authors and staff of the Ministry of Citizenship, the government agency in charge of managing BFP. According to the staff, the last digit of the NIS did not determine the benefit disbursement schedule of any other programs.

Another way to benchmark our effect size is to estimate the public funds that would be required to achieve a corresponding test score increase. In a meta-analysis of the impact of public school spending on student test scores, Jackson and Mackevicius (2023) finds that increasing spending by $1,000 per student for four years leads to a test-score increase of 0.031 SD. Extrapolating this US-based estimate to Brazil and assuming that the impact of public funds scales linearly, our estimated increase of 0.009 SD (Table 4, column 1) would require approximately $260 per student for four years (or about $115 million, given the number of students who are early-recipients).

4.3 Heterogeneous Treatment Effects

4.3.1 Transfer Size. Next, we ask whether the impact of BFP on test scores scales with the size of the transfer. In our sample, we observe substantial variation in transfer sizes. The average household receives $94 per month, with a standard deviation of $49. To examine whether the impact of BFP varies depending on transfer size, we group students into terciles of transfer size and estimate equation (1) separately for each tercile.[12] Table 5 shows the results. Each panel shows the estimates for a different tercile and each column for a different subject tested.

The impact of BFP on test scores is larger for students who receive the largest transfers. For the average student in the top transfer size tercile, receiving BFP early improves test scores by $\beta = 0.02$ SD ($p < 0.01$). This effect represents a 3.3 percent increase compared to the average score of late-recipients in the top transfer size tercile (Panel A, column 1). The impact is positive for all subjects tested and the magnitude is largest for the language arts test ($\beta = 0.026$ SD, $p < 0.05$, column 4) and the essay ($\beta = 0.025$ SD, $p < 0.05$, column 6). In contrast, we find considerably smaller and typically statistically insignificant effects for students in the middle and bottom transfer size terciles (Panels B and C). These results are robust to controlling for socioeconomic and demographic characteristics (Appendix Table A5).

4.3.2 Student characteristics We investigate whether student characteristics mediate the impact of BFP on test scores. Understanding whether specific types of students particularly benefit from the cash transfer is important for program targeting (Kitagawa and Tetenov, 2018). We define indicator variables measuring student gender, race, mother's educational attainment, student employment. Then, we estimate an interacted version

[12] The average transfer sizes in the bottom, middle and top terciles are $49, $84 and $152, respectively.

of equation 1 that includes the student characteristic indicator and its interaction with the early BFP receipt indicator. Appendix Table A7 shows estimates of β and of the interaction term.

We find strong heterogeneity by the education of the test-taker's mother, but not along any other dimension. Column 2 shows that the impact of BFP on test scores is 0.057 SD larger for students with a college-educated mother ($p < 0.1$). One interpretation is that college-educated mothers may have higher perceived returns to their children's education (Boneva and Rauh, 2018), and therefore allocate a higher share of the cash transfer towards educational inputs. Other characteristics do not mediate the impact of BFP. While the impact of BFP on test scores is 0.006 SD smaller for students who work 20 hours per week than for those who do not, this difference is not statistically significant (column 1). Similarly, there are no differential impacts between female and male students, nor between white and non-white students (columns 3 and 4). Lastly, household composition does not seem to mediate the impact of BFP on test scores table A6.

4.4 Test-Taking Mechanisms: Evidence from Question-Level Data

To provide suggestive evidence on what mechanisms during the exam lead to improved performance, we exploit two sources of variation in question characteristics: question position and question difficulty. We focus on recipients of large transfers, where the test score effects are concentrated.

4.4.1 Question position. Receipt of BFP before the exam could temporarily boost students' "cognitive endurance" — the ability to sustain performance on a cognitively demanding task. Previous studies document significant performance declines in academic tests as the exam progresses, highlighting the importance of being able to withstand cognitive fatigue (Debeer et al., 2014; Balart et al., 2018; Reyes, 2023; Brown et al., 2024).[13] Given that the ENEM involves 10 hours of testing across two consecutive days, cognitive endurance may be particularly valuable.

To investigate this channel, we test whether the increase in the probability of correctly answering a question is concentrated in the final questions, when fatigue is most likely to set in. We do so by leveraging a unique feature of the ENEM exam that generates

[13]While these studies conceptualize cognitive endurance as a dimension of human capital, the medical and psychological literature shows that short-term factors, such as sleep and nutrition, can influence performance on cognitive tasks that require sustained attention (Van Dongen et al., 2003; Lim and Dinges, 2010; Gilsenan et al., 2009)

exogenous variation in question position: students are randomly allocated to one of four exam "booklets," which contain the same set of question, but in a different order.

We estimate the following regression at the student-question level (i.e., with 180 observations per student):

$$\begin{aligned} \text{Correct}_{ij} = \alpha + \beta \text{BFPBeforeENEM}_i + \gamma(\text{BFPBeforeENEM}_i \times \text{FinalQuestion}_{ij}) \\ + \phi \text{FinalQuestion}_{ij} + \varepsilon_{ij} \end{aligned} \tag{2}$$

where Correct_{ij} is an indicator variable that equals one if student i correctly responded to question j and zero otherwise, and $\text{FinalQuestion}_{ij}$ equals one if question j is among the last ten questions of either the first or second test-day of student i. The coefficient of interest, γ, captures the differential impact of BFP on the probability of correctly answering questions that appear towards the end of either test day. To assess whether the differential impacts are driven by a particular test day, we also estimate analogous regressions where the interaction term is test-day-specific.

Table A8 presents the results. Column 1 shows that the impact of BFP on the probability of correctly answering a question is $\gamma = 0.2$ p.p ($p < 0.05$) higher for questions appearing at the end of either test day. This is driven by the second test day, when the differential impact of BFP on the last ten questions is $\gamma = 0.3$ p.p. compared to $\gamma = 0.1$ p.p on the first day (columns 2 and 3).

Furthermore, we illustrate graphically the concentration of positive BFP impacts on the final exam questions. First, we construct 180 binary variables that take the value of one if student i correctly responded to the question in position j, for $j \in [1, 180]$. We then estimate equation (1) at the student level, using each of these variables as an outcome. This yields a vector of 180 coefficient estimates of β, one per question position. Appendix Figure A4 plots each coefficient estimate against its position. Consistent with the question-level regressions, the figure shows a clustering of positive effects in the final questions of the exam.

4.4.2 Question Difficulty. Next, we examine whether the impact of BFP on test scores varies according to question difficulty. We classify each question into percentile ranges of difficulty based on the out-of-sample share of students correctly answering each question. We then estimate equation (1) at the student level using the share of correct responses in

each difficulty category as outcomes.

The results are shown in Table A9. BFP *reduces* the share of correct responses to the hardest questions by between 0.14 and 0.16 p.p. (columns 1 and 2), but has no impact on questions of medium difficulty (columns 3 and 4). By contrast, Column 6 shows that BFP *increases* the share of correct responses to the easiest questions (90^{th} - 100^{th} difficulty percentile) by 0.4 p.p. ($p < 0.05$). The share of correct responses to slightly harder questions (75^{th} - 90^{th} difficulty percentile) increases by 0.002, although the effect is not statistically significant.

Taken together, the negative effects on the hardest questions and positive effects on the easiest questions are consistent with improved allocation of cognitive resources. Students may be spending less time on the hardest questions, where the marginal returns to effort are low, and more time on the easiest questions, where the marginal returns are high. An alternative explanation is that the cognitive boost from BFP is not sufficient to help students answer the hardest questions, where mastery of the material is necessary, but it suffices to help them answer the easiest questions, where reduced lapses in attention, or avoidance of silly errors, can lead to correct answers.[14]

5 Human Capital Accumulation

This section analyzes whether the immediate impact of BFP on test scores had long-term effects on human capital accumulation. We first show that early BFP recipients have a higher college attendance rate, and experience similar degree progression and graduation rate than late BFP recipients. Finally, we explore the mechanisms behind BFP's impact on college enrollment.

5.1 ENEM Test Scores and College Access

Given that millions of students annually compete for university spots, scholarships, and loans, even a modest improvement in ENEM scores can significantly influence their college prospects and outcomes.

To assess whether the increase in test scores due to BFP impacts college outcomes, we link the ENEM records to the Higher Education Census, which contains information on all college enrollees from Brazil. With this data, we assess whether an individual taking

[14] Although this would explain the positive effects on the easiest questions, it would not explain the negative effects on the hardest questions.

the ENEM exam enrolled in college and, if so, analyze their academic journey throughout college.

We use the Higher Education Census to measure three sets of college outcomes. First, we define college enrollment as an indicator for appearing in the Census one year after taking the ENEM. We additionally create indicators for enrolling in a publicly- and privately-operated college. Second, we define earnings-based indices of college quality. To do this, we group all college-educated workers in an employee-employer matched data (RAIS) for the years 2016-2022 based on the university they attended and compute the average predicted earnings at age 30 of the graduates from each university.[15] For college graduates that are never observed in the RAIS, we assign the average monthly earnings in the informal sector in their state of residence. Students that do not attend a college are likewise assigned the informal sector earnings in their state.[16] Third, we define measures of degree persistence—i.e., whether students remain enrolled—and graduation.

5.2 The Impact of BFP on College Enrollment, Quality, and Graduation

We measure the impact of receiving the BFP transfer on each college outcome by estimating equation (1). Tables 6 through 7 present the results. Table 6 presents the results for college enrollment, Table A10 for college quality, and Table 7 for degree persistence and graduation. Panel A of each table shows the results for the entire sample, while Panels B–C present the results for students receiving different transfer sizes.

We find that BFP increased access to college for some students (Table 6). On average, across all students, receiving BFP in the days preceding the exam increases college enrollment by $\beta = 0.2$ percentage points, although this effect is not statistically different from zero (column 1, Panel A). For the subset of students receiving the largest transfer size, BFP increases college enrollment by $\beta = 0.6$ percentage points ($p < 0.10$). This effect represents a 4 percent increase in enrollment relative to the late-recipients enrollment rate of 15.3 percent (column 1, Panel B). This effect is driven by increases in private-college enrollment ($\beta = 0.5$ percentage points, column 2), whereas we find no increases in public-college enrollment (column 3). We find no evidence that BFP affected the enrollment rates of students who received smaller transfers (Panels C and D).

Crucially, the marginal students induced to attend college do not drop out; they remain

[15] This index is analogous to the college quality measure used by Chetty et al. (2011) and Chetty et al. (2014b) to study the long-term impacts of kindergarten quality and teachers, respectively.

[16] We calculate informal earnings in each state using the PNAD Contínua, a quarterly nationally-representative household survey.

enrolled in subsequent years, resulting in higher graduation rates seven years after the exam (Table 7). Among large-transfer beneficiaries, receiving BFP before the exam increases the probability of being enrolled in college three and four years later by $\beta = 0.8-0.9$ percentage points ($p < 0.05$), or 4.5% relative to a late-recipient mean of 19.5% (Panel B, Columns 1 and 2). As a result, they are $\beta = 0.8, p < 0.05$ percentage points more likely to have graduated from a college seven years after the exam (Panel B, Column 4). Consistent with the attendance impacts documented in Table 6, we do not find any effects for the average student, nor for recipients of smaller transfers (Panels A, C and D).

We find no significant average impacts of BFP on college quality, but detect small positive effects among recipients of large transfers (Table A10). The average late-recipient has predicted monthly earnings of US$295 (column 1, Panel A). The impact of BFP on this outcome is $\beta =$ US$ 0.5, an effect that is economically small and statistically insignificant. Among large-transfer beneficiaries, early-recipients have between US$ 4 (1.5%) and US$5 (1.6%) higher predicted monthly earnings ($p < 0.01$), depending on how we impute informal-sector earnings. We find no effects for recipients of smaller transfers.

Taken together, these results indicate that receiving BFP shortly before the exam increased private college enrollment rates for students who received the largest transfers. These students remained enrolled, leading to higher college graduation rates seven years after the exam. The effects are consistent with the significant test score improvements observed for large-transfer students, as documented in Section 4. In contrast, we find no impacts for students who received smaller transfers. We also document no negative impacts on the quality of colleges or degrees chosen.

5.3 Mechanisms

The test score improvement induced by receiving BFP early could impact college enrollment through different channels. First, a higher test score may induce students to change their application behavior. For instance, some students may apply to more selective programs since a higher test score means they have a better chance of getting accepted. Relatedly, if the higher test scores open opportunities for competitively allocated funding, they may also apply to colleges that previously they were not able to afford. This last channel may be particularly important for BFP-beneficiary students, who tend to come from low-income families and, when they attend college, tend to do so at non-selective for-profit private colleges. Second, holding student application behavior constant, a higher test score could push some marginal students above admission cutoffs, thus leading them to gain acceptance

to more programs. This is because many colleges only use ENEM test scores for admission. We next test each of these mechanisms.

We do not find evidence that the increase in college enrollment was due to marginal students being pushed above critical admission cutoffs. First, recall that we documented null effects on the probability of enrolling at a public college (Table 6, column 3); and the majority of colleges that use the ENEM for admissions are publicly-operated.[17] Moreover, consistent with this null effect, the admission process at public universities is highly competitive, and thus prospective applicants require very high test scores to get admitted. In Appendix Figure A5, we plot the distribution of admission cutoffs in public college programs in 2017 alongside the distribution of low-income students' ENEM scores.[18] Admission cutoffs tend to be substantially higher than the test score of the typical student. This suggests that any improvements in test scores resulting from the BFP would need to be at the higher end of the score distribution to significantly affect public university enrollment. Yet, we find that the effects of BFP on test scores are concentrated in the middle of the distribution, where score improvements are unlikely to affect admission at public universities (Appendix Table A11).

Still, while unlikely to affect admission at public universities, the test-score improvement may have led to better chances of getting access to selective private colleges that use the ENEM for admissions. To test for this possibility, in Table 8, we estimate equation (1) using as outcome an indicator variable that equals one if the student enrolled in a college that uses ENEM scores in their admission process. We find precisely estimated null effects on the probability of attending this type of college (Table 8, column 1). This suggests that the ENEM score improvements resulting from the BFP transfer are unlikely to have affected admission into selective colleges.

Next, we investigate whether the test-score improvement affected access to financial assistance, possibly allowing some students to afford college. In Brazil, the *ProUni* government program provides full and partial scholarships to low-income students admitted into *private* universities. Scholarships are allocated competitively by ranking students based on their ENEM score. To be eligible, applicants must satisfy two requirements: (i) their average ENEM score across all subjects must be higher than 450 points, and (ii) their score on the essay cannot be zero. On average, 51.2% of late recipients satisfy the average score

[17] Only a small minority of private colleges use the ENEM to make admission decisions. In 2014, only 16% of students who enrolled in a private college reported using ENEM scores to gain admission.

[18] The information on admission cutoffs comes from the centralized admission system. The earliest year for which we have access to this data is 2017.

requirement and 96.1% satisfy the essay score requirement.

We find positive impacts of BFP on the likelihood of fulfilling these two requirements (Table 8, columns 2 and 3). Column 2 shows that early recipients are 0.6 percentage points (or 1.1%) more likely to meet the average score requirement ($p < 0.05$), while column 3 shows they 0.02 percentage points (or 0.2%) more likely to meet the essay requirement, although this last effect is not statistically significant. For students who receive the largest transfer sizes, we document larger and statistically significant effects on the two requirements (Panel B). For the rest of the students, we tend to find positive but not statistically significant effects (Panel C and D).

Finally, we estimate the impact of BFP on the likelihood of receiving either a full or partial *ProUni* scholarship (Table 8, columns 4 and 5). On average 8.3% of late recipients receive a full scholarship and 6.9% receive a partial scholarship. For the average student, we find precisely estimated zero impacts on the probability of receiving either type of scholarship (Panel A). For students who receive the largest transfer size, we find suggestive evidence of higher access to scholarships. Early BFP recipients have a 0.3 percentage point (or 4.1%) increase in the likelihood of receiving a full scholarship and a 0.5 percentage point (or 8.3%) increase in the likelihood of receiving a partial scholarship. However, due to our much smaller sample size in these specifications, these coefficients are not statistically different from zero.

Taken together, the evidence from this section indicates that the positive impact of BFP on college enrollment is driven by increased access to competitively allocated scholarships. This access allowed low-income students—those who receive the largest transfer sizes and for whom budget constraints are more likely to be binding—to afford an education at a private institution.

6 Labor Market Outcomes

The Brazilian labor market is characterized by high rates of informality, with 39% of the labor force employed in the informal sector in 2023. Formal jobs offer substantially higher wages and benefits, but access to these jobs depends heavily on educational attainment; holding a university degree is highly predictive of formal employment. Given the positive effects on college enrollment and graduation documented in Section 5, this section tests whether the timing of BFP has corresponding impacts on labor market outcomes.

To measure labor market outcomes, we link all test-takers to an annual administrative

employee-employer matched database called RAIS (Relação Anual de Informações Sociais) for the years 2018-2022. The RAIS covers the universe of formal-sector workers in Brazil, but it excludes workers employed in the informal sector, self-employed individuals, or the unemployed. We define three primary outcomes. First, a formalization binary outcome that equals one if a test-taker holds a formal sector job at any point between 2018 and 2022. Second, monthly (formal-sector) earnings of test-takers who appear in the RAIS, averaged across the 2018-2022 period. Third, an "unconditional" version of monthly earnings where we impute the earnings of test-takers that are never observed in the RAIS with the informal-sector earnings obtained from *PNAD Contínua*, a quarterly, nationally-representative household survey.[19] Fourth, for individuals observed in RAIS, we calculate the hourly wage as the ratio between monthly earnings and the hours worked per week.[20] Earnings and wages are inflation-adjusted and expressed in 2023 US$.

Table 9 Panel A shows null average effects across all labor market outcomes. On the other hand, among large-transfer beneficiaries, receiving BFP before the exam increases the probability of formal employment by $\beta = 0.9$ percentage points, or 3.1% relative to a baseline of 28.8% (Panel B). We nevertheless find precise null effects on earnings and wages, potentially because these individuals are still early in their careers. We do not find any effects for recipients of smaller transfers (Panels C-D). This pattern of effects is consistent with the positive college enrollment and graduation impacts, which are concentrated exclusively among large-transfer beneficiaries.

7 Discussion

This paper shows that cash transfer programs have immediate effects on cognition. Students who received a cash transfer program in the days preceding a high-stakes exam performed significantly better than observationally equivalent students who received the transfer afterward. Moreover, because test scores are a central component in college admissions, this improvement in exam performance translated into higher college access.

Our results suggest a previously unexplored mechanism by which persistence in low-

[19] We impute with the average monthly earnings in the test-taker's state. We categorize individuals in PNAD as being in the informal sector following the definition of the Brazilian Statistical Agency (IBGE): individuals with employment relationships that are not formally registered (or without a signed work card); self-employed individuals and employers without a CNPJ (National Registry of Legal Entities); domestic workers without formal registration; and those engaged in unpaid family work.

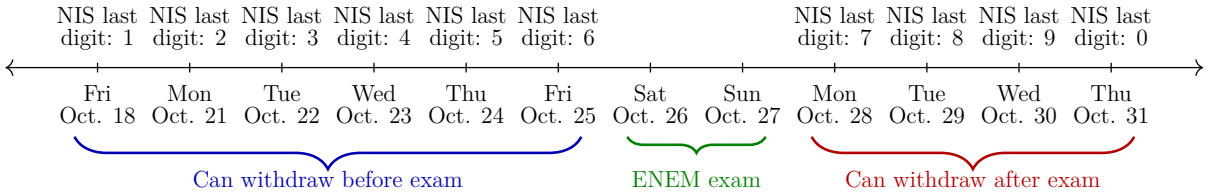
[20] The data on hours indicates the number of hours per week that the worker is expected to work based on their contract, not the hours actually worked.

income status can perpetuate. A precarious financial situation directly impairs performance on cognitive tasks, which subsequently influences access to education and human capital accumulation. Human capital, in turn, shapes future financial outcomes. By highlighting this linkage, our findings suggest that well-timed policy interventions that affect immediate financial stress can have long-term consequences.

Finally, our findings suggest that the timing of cash transfer programs can be an effective policy tool to improve the outcomes of low-income households. There are many critical one-time events where maximizing performance or making the right decision can have long-lasting consequences (e.g., job interviews, choosing the right savings plan or insurance provider, etc.). Although personalizing the timing of each transfer to align with the unique needs of each household might be infeasible, offering households the flexibility to select their preferred timing within a time window could be a practical approach.

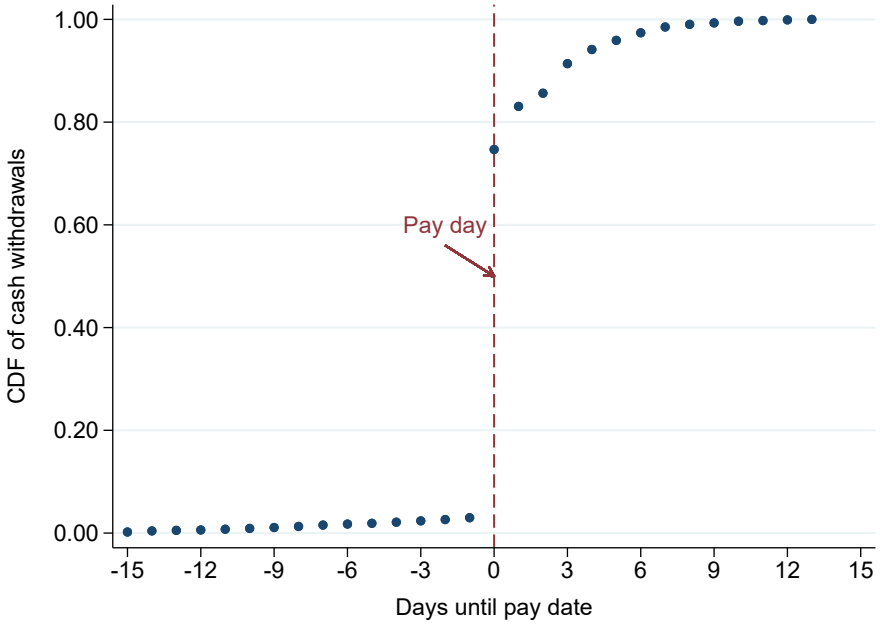
Figures and Tables

Figure 1: Timing of Bolsa Familia disbursements and ENEM exam during 2013



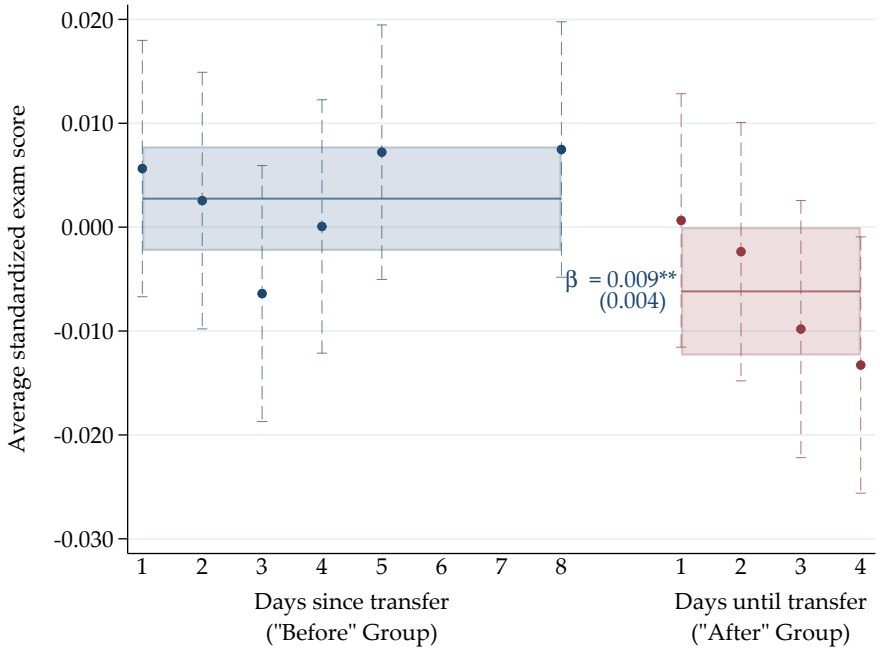
Notes: This figure shows the BF transfer disbursement schedule for October 2013. Every month, payments are sequentially disbursed across 10 consecutive weekdays (excluding public holidays), typically starting on the third Monday of the month. Which of these ten days a beneficiary receives the transfer is fully determined by the last digit of each beneficiary's randomly assigned NIS number. NIS numbers ending in '1' are paid the first day. Thereafter, payments are made sequentially, with each subsequent day serving NIS numbers ending in the next sequential digit. As a result of this disbursement rule, in October 2013, a subset of BF beneficiaries received the transfer before the ENEM exam, while others received it the following week.

Figure 2: Household withdrawal behavior following BFP payment date



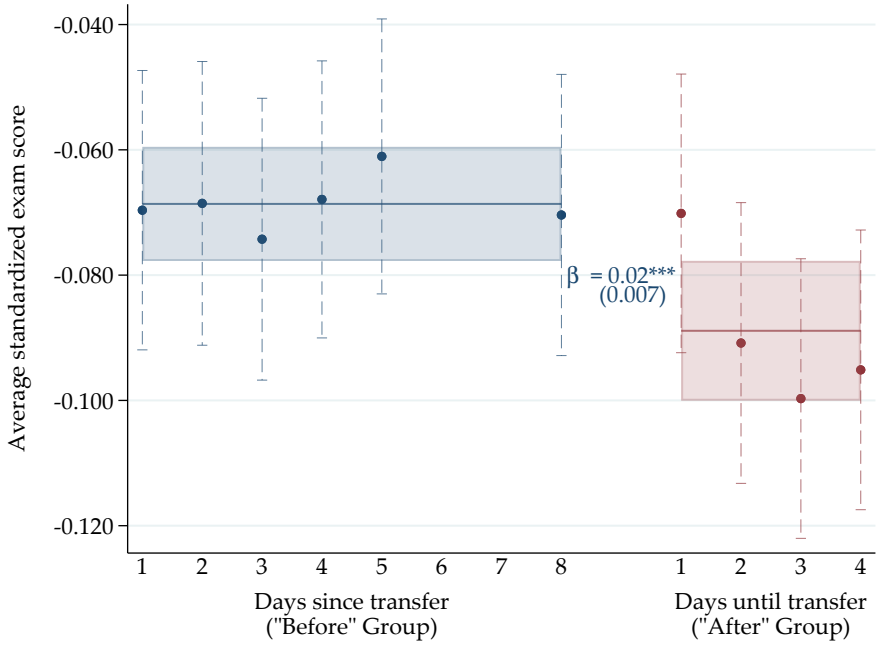
Notes: This figure shows the cumulative distribution function (CDF) of cash withdrawals relative to households' scheduled BFP payment dates. The x-axis shows days relative to the scheduled payment date (day 0), while the y-axis shows the fraction of households that have withdrawn their benefits by each day. The vertical dashed line indicates the scheduled payment date.

Figure 3: Average ENEM score by days since BFP cash transfer



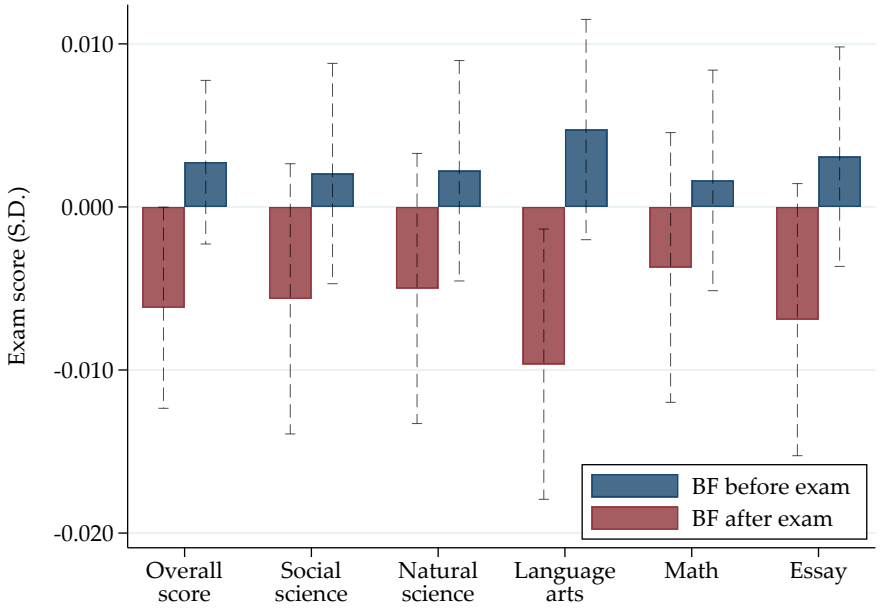
Notes: This figure plots the average standardized ENEM score of BFP recipients and corresponding 95 percent confidence intervals (y-axis) against the days elapsed between the BFP disbursement date and the ENEM exam (x-axis). Positive x-axis values correspond to students in households that received the transfer before the ENEM, while negative values correspond to those who received it after the ENEM. Test scores are standardized to be mean zero and standard deviation one among among test-takers who received BFP (our estimating sample).

Figure 4: Average ENEM score by days since BFP cash transfer among large transfer recipients



Notes: This figure plots the average standardized ENEM score of BFP recipients and corresponding 95 percent confidence intervals (y-axis) against the days elapsed between the BFP disbursement date and the ENEM exam (x-axis). Positive x-axis values correspond to students in households that received the transfer before the ENEM, while negative values correspond to those who received it after the ENEM. Test scores are standardized to be mean zero and standard deviation one among among test-takers who received BFP (our estimating sample).

Figure 5: ENEM score in each exam subject



Notes: This figure compares the average standardized ENEM scores of students in households that received the BFP transfer before the exam (in blue) to the average scores of students in households that received BFP after the exam (in red). The overall score is computed as the average score across the five subjects. Test scores are standardized to be mean zero and standard deviation one among test-takers who received BFP (our estimating sample). Confidence intervals with a 95 percent confidence level are shown.

Table 1: Summary Statistics on students in the sample

	High school	In Cadastro Unico?		In Bolsa Familia?	
	seniors	Yes	No	Yes	No
	(1)	(2)	(3)	(4)	(5)
Panel A. Demographic characteristics and race					
Age	18.864	20.575	18.435	20.520	18.650
Female	0.588	0.632	0.577	0.652	0.580
White	0.465	0.324	0.500	0.276	0.489
Black/Brown	0.535	0.676	0.500	0.724	0.511
Panel B. SES and household characteristics					
Went to a private HS	0.186	0.026	0.226	0.018	0.207
Family size	4.209	4.388	4.164	4.601	4.158
Mom completed high school	0.463	0.244	0.516	0.202	0.496
Mom completed college	0.162	0.033	0.193	0.020	0.179
Family earns above 2x M.W.	0.362	0.120	0.422	0.069	0.399
Family earns above 5x M.W.	0.043	0.001	0.053	0.000	0.048
Panel C. Geographic location					
Lives in the North	0.092	0.100	0.090	0.119	0.088
Lives in the Northeast	0.275	0.392	0.245	0.486	0.247
Lives in the Southeast	0.411	0.326	0.432	0.266	0.430
Lives in the South	0.139	0.097	0.149	0.061	0.149
Lives in the Midwest	0.084	0.085	0.083	0.068	0.086
Panel D. Exam attendance and test scores					
Took at least one test	0.855	0.782	0.873	0.784	0.864
Took all tests	0.832	0.753	0.852	0.757	0.842
Overall score	0.541	0.072	0.645	-0.001	0.604
Math	0.610	0.082	0.727	-0.001	0.681
Natural science	0.611	0.074	0.730	-0.001	0.682
Social science	0.539	0.073	0.642	-0.001	0.602
Language arts	0.553	0.082	0.657	-0.001	0.617
Essay	0.392	0.046	0.468	-0.001	0.437
Panel E. BFP benefits					
Disbursed through bank deposit	0.257	0.257	.	0.257	.
Total BF benefits value (US$)	94.379	94.379	.	94.379	.
Number of test-takers	1,616,321	324,404	1,291,917	184,895	1,431,426

Notes: This table shows the average characteristics of all high school seniors that registered for the ENEM (column 1), disaggregated by whether the student's household is registered in the Registry of Social Programs (columns 2-3), and by whether the student's household is a Bolsa Familia beneficiary (columns 4-5). Panels A through D use administrative data from the ENEM exam, including a socioeconomic questionnaire that students answer when registering. Test scores are standardized to be mean zero and standard deviation one among test-takers who received BFP (our estimating sample). Panel E uses administrative data from the Registry of Social Programs (Cadastro Unico) and from the BFP program.

Table 2: Balance test of students receiving BFP before relative to after the exam

	Receives Bolsa Familia		
	Before Exam (1)	After Exam (2)	Difference (3)
Panel A. Student characteristics			
Age	20.50	20.54	-0.036
Female	0.652	0.651	0.001
White	0.276	0.276	0.000
Went to a private HS	0.018	0.018	-0.000
Panel B. SES and household characteristics			
Monthly income (US$)	197.43	198.57	-1.138
Monthly p.c. income (US$)	47.73	47.90	-0.176
Family size	4.602	4.600	0.001
0-17 year olds in household	1.714	1.716	-0.002
0-2 year olds in household	0.092	0.092	0.000
Share of women in household	0.589	0.590	-0.001
Mom completed high school	0.202	0.202	-0.000
Mom completed college	0.020	0.020	0.000
Panel C. Geographical location			
Lives in the North	0.119	0.121	-0.002
Lives in the Northeast	0.486	0.485	0.001
Lives in the Southeast	0.266	0.265	0.002
Lives in the South	0.061	0.062	-0.001
Lives in the Midwest	0.068	0.068	-0.000
Panel D. BFP benefits			
Disbursed through bank deposit	0.258	0.254	0.004*
BF Transfer Size (US$)	94.35	94.43	-0.080
Panel E. Predicted Score			
Predicted mean score	-0.022	-0.023	0.001
Number of test-takers	111,201	73,694	184,895

Notes: This table compares the average characteristics of students in households that received BFP before the exam (column 1) to students in households that received BFP after the exam (column 2). Column 3 tests whether the difference in means between both groups is statistically significant. It shows the coefficient from a regression at the student level of each characteristic on an indicator variable for receiving BFP before the exam. ***, ** and * denote significance at the 10%, 5% and 1% levels, respectively.

Table 3: The effect of Bolsa Familia on the probability of attending the ENEM

	Dependent variable:			
	Showed-up both days (1)	Showed-up any day (2)	Showed-up day 1 (3)	Showed-up day 2 (4)
BF before exam	-0.001	-0.002	-0.002	-0.001
	(0.002)	(0.002)	(0.002)	(0.002)
Mean after	0.758	0.785	0.782	0.761
N	184,895	184,895	184,895	184,895

Notes: This table reports estimates of β from equation (1). The sample is composed of all final-year high school students who registered for the ENEM. The outcomes, displayed in the column headers, are indicator variables for attending both exam days (column 1), attending any of the two exam days (col. 2), attending the first day (col. 3) and attending the second exam day (col.4). Standard errors, clustered at the student level, shown in parentheses. ***, ** and * denote significance at the 10%, 5% and 1% levels, respectively.

Table 4: The effect of Bolsa Familia on test scores

	Dependent variable:					
	Average score	Social science	Natural science	Lang. arts	Math	Essay
	(1)	(2)	(3)	(4)	(5)	(6)
BF before exam	0.009**	0.008	0.007	0.014***	0.005	0.010*
	(0.004)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Mean after	-0.006	-0.006	-0.005	-0.010	-0.004	-0.007
N	140,040	140,040	140,040	140,040	140,040	140,040

Notes: This table reports estimates of β from equation 1. The sample is composed of final-year high school students who attended both exam days. The outcomes, displayed in the column headers, are the average standardized test score across all subjects (col. 1) and the standardized test score in each subject (cols. 2-6). Test scores are standardized to be mean zero and standard deviation one among test-takers who received BFP (our estimating sample). See Appendix B.2 for variable definitions. Standard errors, clustered at the student level, shown in parentheses. ***, ** and * denote significance at the 10%, 5% and 1% levels, respectively.

Table 5: The effect of Bolsa Familia on test scores by transfer size

	Dependent variable:					
	Average score	Social science	Natural science	Lang. arts	Math	Essay
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A. Top transfer size tercile						
BF before exam	0.020***	0.020**	0.011	0.026**	0.020**	0.025**
	(0.007)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)
Mean after	-0.089	-0.088	-0.071	-0.113	-0.090	-0.083
N	40,521	40,521	40,521	40,521	40,521	40,521
Panel B. Middle transfer size tercile						
BF before exam	0.000	-0.005	0.000	0.002	-0.001	0.006
	(0.007)	(0.009)	(0.010)	(0.010)	(0.010)	(0.009)
Mean after	0.019	0.023	0.012	0.024	0.019	0.014
N	45,912	45,912	45,912	45,912	45,912	45,912
Panel C. Bottom transfer size tercile						
BF before exam	0.008	0.010	0.011	0.016*	-0.000	0.002
	(0.007)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
Mean after	0.035	0.033	0.030	0.039	0.042	0.033
N	53,607	53,607	53,607	53,607	53,607	53,607

Notes: This table reports estimates of β from estimating equation 1 separately for three sub-samples of students grouped according to the size of the cash transfer: transfers in the top size tercile (Panel A), transfers in the middle size tercile (Panel B) and transfers in the bottom size tercile (Panel C). All sub-samples are restricted to final-year high school students who attended both exam days. The outcomes, displayed in the column headers, are the average standardized test score across all subjects (col. 1) and the standardized test score in each subject (cols. 2-6). See Appendix B.2 for variable definitions. Test scores are standardized to be mean zero and standard deviation one among test-takers who received BFP (our estimating sample). Standard errors, clustered at the student level, shown in parentheses. ***, ** and * denote significance at the 10%, 5% and 1% levels, respectively.

Table 6: The effect of Bolsa Familia on college enrollment

	Dependent variable:		
	Enrolled in any college (1)	Enrolled in private college (2)	Enrolled in. public college (3)
Panel A. All BFP test-takers			
BF before exam	0.002	0.000	0.001
	(0.002)	(0.002)	(0.001)
Mean after	0.181	0.134	0.050
N	140,032	140,032	140,032
Panel B. Top transfer size tercile			
BF before exam	0.006*	0.005	0.001
	(0.004)	(0.003)	(0.002)
Mean after	0.153	0.107	0.049
N	40,515	40,515	40,515
Panel C. Middle transfer size tercile			
BF before exam	-0.004	-0.005	0.001
	(0.004)	(0.003)	(0.002)
Mean after	0.188	0.140	0.051
N	45,911	45,911	45,911
Panel D. Bottom transfer size tercile			
BF before exam	0.003	0.002	0.002
	(0.004)	(0.003)	(0.002)
Mean after	0.197	0.148	0.051
N	53,606	53,606	53,606

Notes: This table reports estimates of β from estimating equation 1 using four estimating samples. Panel A includes all test-takers whose household received BFP in October 2013. Panels B-C separately estimate equation 1 for three sub-samples of students grouped according to the size of the cash transfer: transfers in the top size tercile (Panel B), transfers in the middle size tercile (Panel C) and transfers in the bottom size tercile (Panel D). All estimating samples are restricted to final-year high school students who attended both exam days. The outcomes, displayed in the column headers, are indicator variables for student i being enrolled in any college (col. 1), a private college (col. 2) and a public college (col. 3) in 2014, the year following the ENEM exam. See Appendix B.2 for variable definitions. Standard errors, clustered at the student level, shown in parentheses. ***, ** and * denote significance at the 10%, 5% and 1% levels, respectively.

Table 7: The effect of Bolsa Familia on college persistence and graduation

	Dependent variable:			
	Enrolled 3 years later (1)	Enrolled 4 years later (2)	Graduated 6 years later (3)	Graduated 7 years later (4)
Panel A. All test-takers				
BF before exam	0.003	0.001	0.002	0.001
	(0.002)	(0.002)	(0.002)	(0.002)
Mean after	0.232	0.232	0.123	0.158
N	140,032	140,032	140,032	140,032
Panel B. Top transfer size tercile				
BF before exam	0.008**	0.009**	0.006*	0.008**
	(0.004)	(0.004)	(0.003)	(0.003)
Mean after	0.196	0.196	0.101	0.130
N	40,515	40,515	40,515	40,515
Panel C. Middle transfer size tercile				
BF before exam	-0.003	-0.005	-0.000	-0.002
	(0.004)	(0.004)	(0.003)	(0.004)
Mean after	0.242	0.240	0.126	0.162
N	45,911	45,911	45,911	45,911
Panel D. Bottom transfer size tercile				
BF before exam	0.004	-0.001	0.001	-0.001
	(0.004)	(0.004)	(0.003)	(0.003)
Mean after	0.252	0.253	0.137	0.176
N	53,606	53,606	53,606	53,606

Notes: This table reports estimates of β from estimating equation 1 using four estimating samples. Panel A includes all test-takers whose household received BFP in October 2013. Panels B-C separately estimate equation 1 for three sub-samples of students grouped according to the size of the cash transfer: transfers in the top size tercile (Panel B), transfers in the middle size tercile (Panel C) and transfers in the bottom size tercile (Panel D). All estimating samples are restricted to final-year high school students who attended both exam days. The outcomes are displayed in the column headers. The outcomes in columns 1 and 2 take the value of one if the test-taker was enrolled in any college three and four years after the exam, respectively. The outcomes in columns 3 and 4 take the value of one if the test-taker had graduated from any college six and seven years after the exam, respectively. See Appendix B.2 for variable definitions. Standard errors, clustered at the student level, shown in parentheses. ***, ** and * denote significance at the 10%, 5% and 1% levels, respectively.

Table 8: Testing college enrollment mechanisms among large-transfer recipients

	Dependent variable:					
		Meeting Scholarship Requirements:			Enrolled with Scholarship	
	Selective Adm. Process	=1 if Eligible	ENEM Score > 450	Essay score > 0	Partial Tuition	Full Tuition
	(1)	(2)	(3)	(4)	(5)	(6)
BF before exam	-0.000	0.008	0.008	0.004**	0.004	0.006
	(0.002)	(0.005)	(0.005)	(0.002)	(0.007)	(0.007)
Mean after	0.044	0.468	0.468	0.954	0.085	0.070
N	40,515	40,521	40,521	40,521	6,514	6,514

Notes: This table reports estimates of β from estimating equation 1 using four estimating samples. Panel A includes all test-takers whose household received BFP in October 2013. Panels B-D separately estimate equation 1 for three sub-samples of students grouped according to the size of the cash transfer: transfers in the top size tercile (Panel A), transfers in the middle size tercile (Panel B) and transfers in the bottom size tercile (Panel C). All estimating samples are restricted to final-year high school students who attended both ENEM exam days. The outcome variables are shown in the column headers. Column Standard errors, clustered at the student level, shown in parentheses. ***, ** and * denote significance at the 10%, 5% and 1% levels, respectively.

Table 9: The effect of Bolsa Familia on Labor Market Outcomes

	Dependent variable ($t+5$ to $t+9$)			
	Formal Employment	Monthly earnings (if in RAIS) (US$)	Monthly Earnings (uncondi-tional) (US$)	Hourly Wage (if in RAIS) (US$)
	(1)	(2)	(3)	(4)
Panel A. All test-takers				
BF before exam	-0.000	-1.894	-0.747	0.015
	(0.003)	(2.203)	(0.905)	(0.023)
Mean after	0.310	369.014	299.292	2.199
N	140,040	47,683	140,040	47,669
Panel B. Top transfer size tercile				
BF before exam	0.009*	-1.950	1.544	-0.026
	(0.005)	(3.888)	(1.541)	(0.040)
Mean after	0.288	361.091	283.646	2.158
N	40,521	13,135	40,521	13,132
Panel C. Middle transfer size tercile				
BF before exam	-0.000	0.286	-0.653	-0.005
	(0.004)	(3.654)	(1.531)	(0.044)
Mean after	0.312	365.198	299.311	2.223
N	45,912	15,780	45,912	15,773
Panel D. Bottom transfer size tercile				
BF before exam	-0.007	-3.292	-2.503	0.061*
	(0.004)	(3.798)	(1.578)	(0.037)
Mean after	0.324	377.513	311.065	2.208
N	53,607	18,768	53,607	18,764

Notes: This table reports estimates of β from estimating equation 1 using four estimating samples. Panel A includes all test-takers whose household received BFP in October 2013. Panels B-D separately estimate equation 1 for three sub-samples of students grouped according to the size of the cash transfer: transfers in the top size tercile (Panel A), transfers in the middle size tercile (Panel B) and transfers in the bottom size tercile (Panel C). All estimating samples are restricted to final-year high school students who attended both ENEM exam days. The outcome variables, shown in the column header, are measured using the RAIS, an employee-employer administrative database capturing the universe of formal-sector workers. The outcomes are the following: Column 1 – a binary variable that equals one if the test-taker held any formal employment during the period 2018-2022 (4-8 years after the exam); Column 2 – monthly earnings averaged across the 2018-2022 period, based on years in which the test-taker had formal employment (i.e., this variable is conditional on having any formal employment during 2018-2022); Column 3 – an unconditional version of monthly earnings in which test-takers that are not in formal employment in the period (and for whom we thus lack earnings data) are imputed with the mean informal earnings in their state, calculated from the PNAD Contínua, a nationally-representative household survey; Column 4 – the hourly wage, conditional on appearing in the RAIS, defined as the ratio between monthly earnings and the hours worked per week according to workers' contracts. Standard errors, clustered at the student level, shown in parentheses. ***, ** and * denote significance at the 10%, 5% and 1% levels, respectively.

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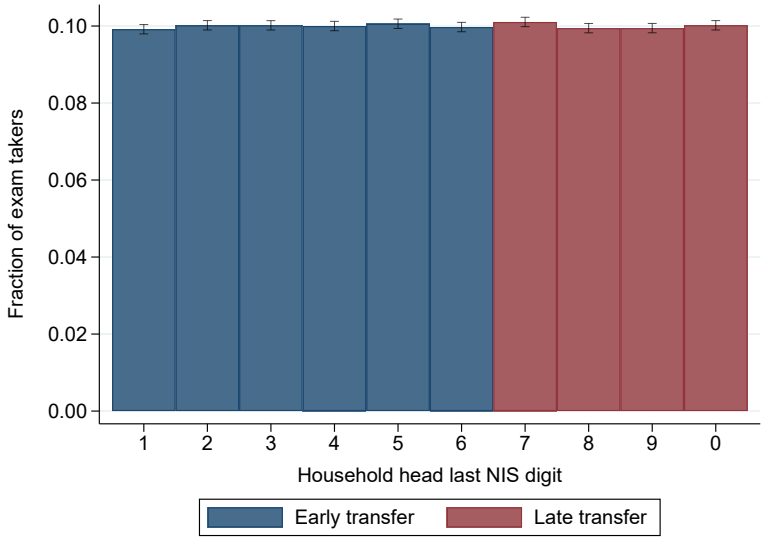
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Appendix

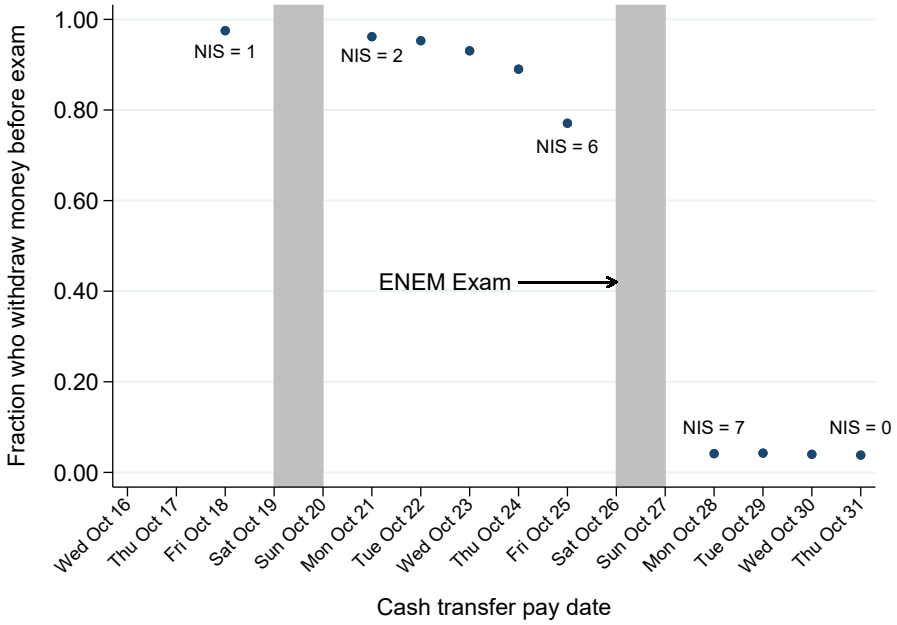
A Appendix Figures and Tables

Figure A1: Fraction of students with each NIS last digit in 2013



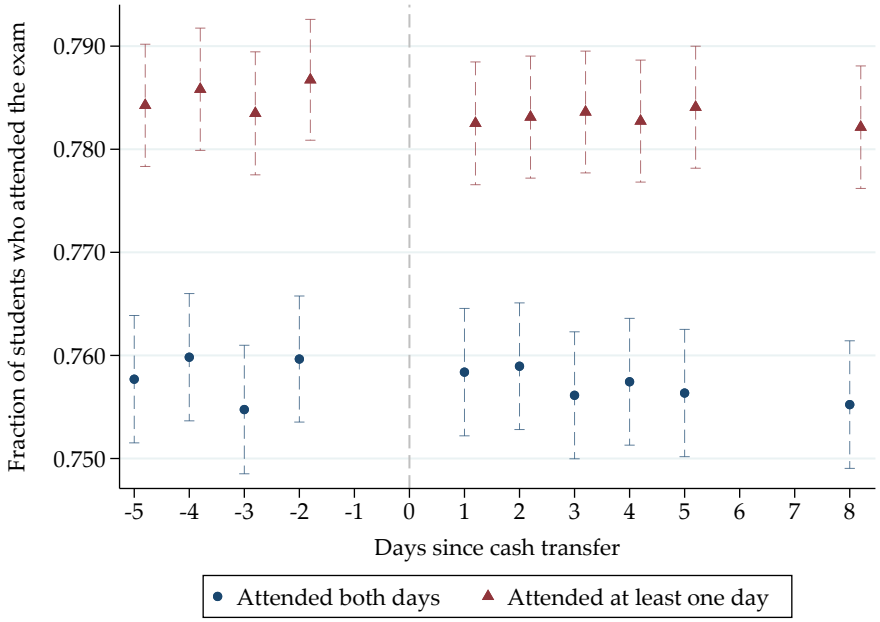
Notes: This figure shows the distribution of students, categorized by the last NIS digit of their household, based on data collected in 2013. The blue bars represent final NIS digits for households that received the cash transfer prior to the ENEM exam in 2013. Conversely, the red bars represent NIS ending digits for households that received the cash transfer after the 2013 ENEM exam.

Figure A2: Share of households withdrawing BFP before ENEM by NIS last digit



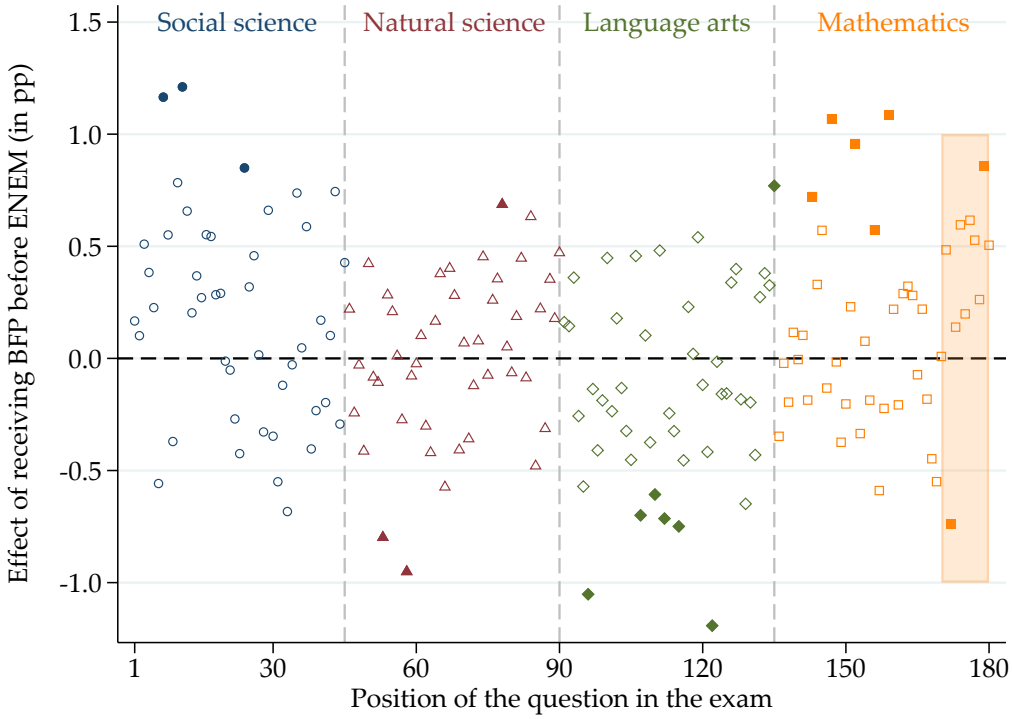
Notes: This figure shows the fraction of households that withdrew their October 2013 BFP payment by Friday, October 25 (the day before the ENEM exam), separately by the last digit of their NIS. The NIS last digit determines the household's payment date, with disbursement beginning on Monday, October 21 for NIS ending in 1, and proceeding sequentially on subsequent business days. Gray shaded areas indicate weekends.

Figure A3: Fraction of students who showed up to take the ENEM by NIS digit



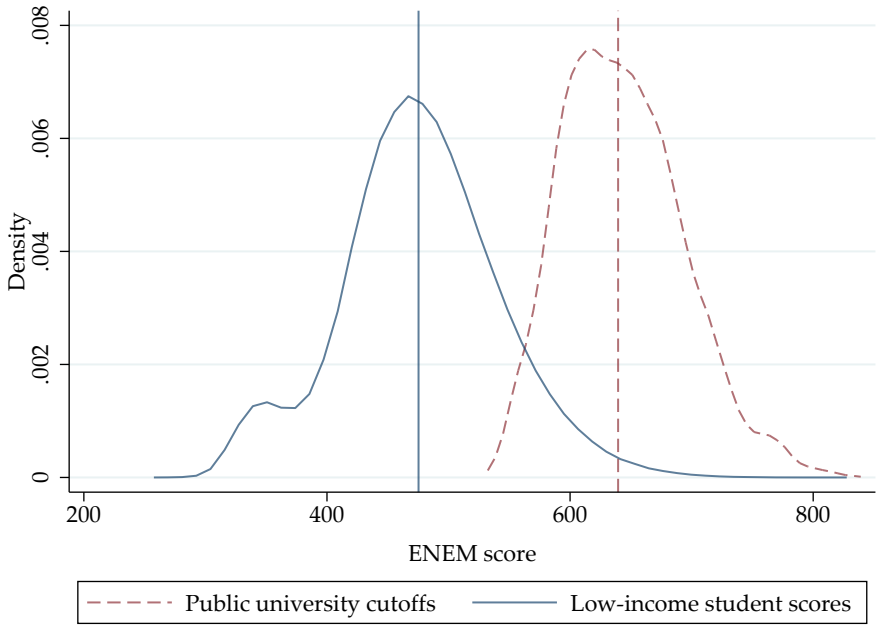
Notes: This figure plots the proportion of students registered for the ENEM exam who attended both exam days (blue circles) or at least one exam day (red triangles) against the BFP disbursement date relative to the exam date (x-axis). Positive x-axis values correspond to students in households that received the BFP transfer before the ENEM, while negative values correspond to those who received it after the ENEM.

Figure A4: BFP Impact by Question Position



Notes: This figure displays the estimated effect of receiving the Bolsa Família Program (BFP) transfer before taking the ENEM exam on students' likelihood of correctly answering exam questions, measured in percentage points (pp). The x-axis shows the position of each question in the exam, while the y-axis shows the estimated effect. Different colors and markers distinguish subject areas: Social Science (blue circles), Natural Science (red triangles), Language Arts (green diamonds), and Mathematics (orange squares). The dashed vertical lines indicate the boundaries between subject sections. The shaded orange region highlights the last segment of the Mathematics section, where effects appear more pronounced.

Figure A5: Admission cutoff scores in public universities



Notes: This figure plots the distribution of admission cutoff scores across all public-university programs in 2017 (red dashed lines) and the distribution of ENEM scores in 2017 for students with family income less than or equal to the minimum wage (solid blue line). The information on admission cutoffs comes from a publicly-available version of *SISU*, the centralized admission system the Ministry of Education uses to allocate students into public universities based on their ENEM scores. The vertical dashed and solid lines denote the median admission cutoff and ENEM score, respectively.

Table A1: Average student characteristics by last NIS digit

	Last NIS digit:											
	1	2	3	4	5	6	7	8	9	0	F	P-val.
Panel A. Student characteristics												
Age	20.45	20.64	20.53	20.42	20.54	20.46	20.51	20.55	20.56	20.55	2.05	0.030
Female	0.651	0.657	0.648	0.650	0.653	0.653	0.651	0.649	0.650	0.654	0.61	0.794
White	0.282	0.278	0.276	0.275	0.269	0.276	0.272	0.278	0.277	0.276	1.08	0.373
Went to a private HS	0.018	0.020	0.018	0.018	0.019	0.018	0.020	0.018	0.017	0.019	0.84	0.583
Panel B. SES and household characteristics												
Monthly income (US$)	198.06	197.01	197.73	198.14	196.05	197.57	197.66	199.89	198.54	198.19	0.53	0.856
Monthly p.c. income (US$)	47.78	47.72	47.73	47.82	47.63	47.68	47.84	48.20	48.01	47.57	0.35	0.957
Family size	4.594	4.596	4.605	4.606	4.603	4.608	4.596	4.590	4.595	4.621	0.56	0.828
0-17 year olds in household	1.714	1.717	1.708	1.717	1.714	1.712	1.701	1.717	1.711	1.737	1.12	0.344
0-2 year olds in household	0.092	0.093	0.091	0.092	0.093	0.094	0.092	0.089	0.094	0.093	0.35	0.959
Share of women in household	0.589	0.592	0.587	0.593	0.589	0.588	0.592	0.587	0.588	0.592	1.80	0.062
Mom completed high school	0.196	0.202	0.206	0.205	0.202	0.200	0.200	0.201	0.203	0.204	1.01	0.433
Mom completed college	0.021	0.020	0.020	0.022	0.021	0.019	0.020	0.020	0.019	0.021	0.73	0.685
Panel C. Bolsa Fanilia Benefits												
Disbursed through bank deposit	0.257	0.259	0.255	0.257	0.260	0.260	0.260	0.251	0.251	0.255	1.25	0.256
BF Transfer Size (US$)	94.30	94.33	94.26	94.64	94.72	93.82	93.96	94.17	94.58	95.01	0.86	0.559
Panel D. Geographical location												
Lives in the North	0.123	0.116	0.121	0.117	0.117	0.118	0.117	0.119	0.122	0.124	1.39	0.186
Lives in the Northeast	0.482	0.492	0.484	0.489	0.494	0.478	0.490	0.484	0.484	0.481	1.92	0.044
Lives in the Southeast	0.265	0.263	0.268	0.268	0.260	0.274	0.261	0.268	0.265	0.267	1.67	0.091
Lives in the South	0.063	0.063	0.058	0.060	0.062	0.060	0.065	0.063	0.059	0.060	1.57	0.118
Lives in the Midwest	0.067	0.066	0.070	0.066	0.067	0.070	0.067	0.067	0.069	0.068	0.67	0.735
Panel E. Predicted Score												
Predicted mean score	-0.021	-0.024	-0.022	-0.019	-0.024	-0.020	-0.023	-0.021	-0.024	-0.022	0.66	0.742
Number of test-takers	18,488	18,522	18,621	18,615	18,568	18,387	18,696	18,247	18,328	18,423		

Notes: This table compares the average characteristics of students according to the last digit of the NIS number associated with the BFP beneficiary in a student's household. The last NIS digit fully determines the date in which a student's family receives the cash transfer. Each column reports the average characteristic of students associated with the digit denoted in the column header. For each NIS digit d, the F-statistic and associated p-value are obtained from regressing an indicator variable that takes the value of one if the BFP beneficiary in student i's household has a last NIS digit d on the characteristics shown in panels A-C.

Table A2: The effect of Bolsa Familia on test scores controlling for student characteristics

	Dependent variable:					
	Average score	Social science	Natural science	Lang. arts	Math	Essay
	(1)	(2)	(3)	(4)	(5)	(6)
BF before exam	0.007*	0.007	0.006	0.013**	0.004	0.008
	(0.004)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Mean after	-0.006	-0.006	-0.005	-0.010	-0.004	-0.007
N	140,040	140,040	140,040	140,040	140,040	140,040

Notes: This table reports estimates of β from equation 1, controlling for students' socioeconomic and demographic characteristics, including age, gender, race, income and parental education. The sample is composed of final-year high school students who attended both exam days. The outcomes, displayed in the column headers, are the average standardized test score across all subjects (col. 1) and the standardized test score in each subject (cols. 2-6). Test scores are standardized to be mean zero and standard deviation one among all test-takers (not just those who recieve BFP). See Appendix B.2 for variable definitions. Standard errors, clustered at the student level, shown in parentheses. ***, ** and * denote significance at the 10%, 5% and 1% levels, respectively.

Table A3: Effect of receiving BFP across essay score components

		Components of the essay score:				
	Overall	Formal Portuguese	Thesis argumentation	Use of information	Linguistic resources	Intervention proposal
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A. All test-takers						
BF before exam	0.010*	0.012**	0.007	0.007	0.011**	0.005
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Mean after	-0.007	-0.008	-0.005	-0.005	-0.007	-0.004
N	140,040	140,040	140,040	140,040	140,040	140,040
Panel B. Top transfer size tercile						
BF before exam	0.025**	0.025**	0.027***	0.019*	0.026**	0.010
	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)
Mean after	-0.083	-0.081	-0.076	-0.077	-0.077	-0.042
N	40,521	40,521	40,521	40,521	40,521	40,521
Panel C. Middle transfer size tercile						
BF before exam	0.006	0.007	0.005	0.007	0.011	-0.003
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
Mean after	0.014	0.014	0.010	0.013	0.009	0.012
N	45,912	45,912	45,912	45,912	45,912	45,912
Panel D. Bottom transfer size tercile						
BF before exam	0.002	0.008	-0.006	-0.003	-0.001	0.009
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
Mean after	0.033	0.028	0.036	0.034	0.031	0.012
N	53,607	53,607	53,607	53,607	53,607	53,607

Notes: This table displays estimates of β from equation 1 using four estimating samples. Panel A includes all test-takers whose household received BFP in October 2023. Panels A-C separately estimate equation 1 for three sub-samples of students grouped according to the size of the cash transfer: transfers in the top size tercile (Panel A), transfers in the middle size tercile (Panel B) and transfers in the bottom size tercile (Panel C). All estimating samples are restricted to final-year high school students who attended both exam days. The outcomes, displayed in the column headers, are the standardized scores in the different components of the overall essay score: mastery of formal written Portuguese (col. 2); ability to develop a consistent argumentative thesis (col. 3); effective use of information and facts to support the argument (col. 4); effective use of linguistic resources, such as conjunctions, that guarantee cohesion (col. 5); ability to develop an intervention proposal that addresses the social problem considered in the essay.

Table A4: Placebo test: NIS digit and test scores using non-BFP Cadastro Unico sample

	Dependent variable:					
	Average score	Social science	Natural science	Lang. arts	Math	Essay
	(1)	(2)	(3)	(4)	(5)	(6)
BF before exam	0.007	0.004	0.006	0.006	0.010	0.008
	(0.005)	(0.007)	(0.007)	(0.007)	(0.007)	(0.006)
Mean after	0.167	0.174	0.174	0.194	0.189	0.106
N	100,334	100,334	100,334	100,334	100,334	100,334

Notes: This table reports estimates of β from a placebo version of equation 1. Instead of using students in BFP-beneficiary households, we restrict the sample to students with a household member enrolled in the Registry of Social Programs (Cadastro Unico), but who was not a BFP beneficiary. Exploiting the fact that all Cadastro Unico enrollees are assigned a NIS, we construct a placebo treatment variable that equals one if the enrollee in student i's household had a NIS last digit that would have made it eligible for receiving BFP before the exam had they been enrolled in BFP. The outcomes, displayed in the column headers, are the average standardized test score across all subjects (col. 1) and the standardized test score in each subject (cols. 2-6). Test scores are standardized to be mean zero and standard deviation one among all test-takers (not just those who recieve BFP). See Appendix B.2 for variable definitions. Standard errors, clustered at the student level, shown in parentheses. ***, ** and * denote significance at the 10%, 5% and 1% levels, respectively.

Table A5: Effects on test scores by transfer tercile, controlling for student characteristics

	Dependent variable:					
	Average score	Social science	Natural science	Lang. arts	Math	Essay
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A. Top transfer size tercile						
BF before exam	0.018**	0.018*	0.009	0.023**	0.017*	0.021**
	(0.007)	(0.010)	(0.010)	(0.010)	(0.009)	(0.010)
Mean after	-0.089	-0.088	-0.071	-0.113	-0.090	-0.083
N	40,521	40,521	40,521	40,521	40,521	40,521
Panel B. Middle transfer size tercile						
BF before exam	-0.002	-0.007	-0.002	0.000	-0.003	0.003
	(0.007)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
Mean after	0.019	0.023	0.012	0.024	0.019	0.014
N	45,912	45,912	45,912	45,912	45,912	45,912
Panel C. Bottom transfer size tercile						
BF before exam	0.008	0.010	0.011	0.017**	0.000	0.002
	(0.006)	(0.009)	(0.009)	(0.009)	(0.008)	(0.008)
Mean after	0.035	0.033	0.030	0.039	0.042	0.033
N	53,607	53,607	53,607	53,607	53,607	53,607

Notes: This table reports estimates of β from estimating equation (1) controlling for students' socioeconomic and demographic characteristics, separately for three sub-samples grouped according to the size of the cash transfer: transfers in the top size tercile (Panel A), transfers in the middle size tercile (Panel B) and transfers in the bottom size tercile (Panel C). All sub-samples are restricted to final-year high school students who attended both exam days. The outcomes, displayed in the column headers, are the average standardized test score across all subjects (col. 1) and the standardized test score in each subject (cols. 2-6). See Appendix B.2 for variable definitions. Test scores are standardized to be mean zero and standard deviation one among all test-takers (not just those who recieve BFP). Standard errors, clustered at the student level, shown in parentheses. ***, ** and * denote significance at the 10%, 5% and 1% levels, respectively.

Table A6: Heterogeneous effects by household composition

	Heterogeneity dimension:			
	> median female HH members (1)	> median HH members age 0-2 (2)	> median HH members age 0-5 (3)	> median HH members age 18-24 (4)
BF before exam	0.010*	0.008*	0.009*	0.009**
	(0.005)	(0.004)	(0.005)	(0.004)
Before × het.	-0.002	0.010	0.001	0.001
	(0.008)	(0.014)	(0.010)	(0.016)
N	140,040	140,040	140,040	140,040

Notes: This table reports estimates from augmented versions of equation (1) that include indicators for household composition and their interactions with receiving BFP before the exam.

The outcome variable is the standardized ENEM score. "BF before exam" shows the main effect of receiving transfers before the exam, while "Before × het." shows the interaction effect with the respective household composition indicator, displayed in the column headers: above-median number of female household members (column 1), above-median number of household members aged 0-2 (column 2), above-median number of household members aged 0-5 (column 3), and above-median number of household members aged 18-24 (column 4).

Heteroskedasticity-robust standard errors clustered at the student level in parentheses. ***, ** and * denote significance at 1%, 5% and 10% levels, respectively.

Table A7: Heterogeneous effects by student characteristics

	Heterogeneity dimension:				
	Works > 20 hours/week	College-educated mother	Female student	White student	Took exam in home municipality
	(1)	(2)	(3)	(4)	(5)
BF before exam	0.010**	0.008*	0.008	0.007	0.006
	(0.004)	(0.004)	(0.007)	(0.005)	(0.008)
Before × het.	-0.006	0.057*	0.001	0.005	0.004
	(0.013)	(0.031)	(0.009)	(0.009)	(0.010)
N	140,040	140,040	140,040	140,040	140,040

Notes: This table reports estimates from augmented versions of equation (1) that include indicators for student characteristics and their interactions with receiving BFP before the exam.

The outcome variable is the standardized ENEM score. "BF before exam" shows the main effect of receiving transfers before the exam, while "Before × het." shows the interaction effect with the respective student characteristic indicator, displayed in the column headers: whether the student works more than 20 hours per week (column 1), has a college-educated mother (column 2), is female (column 3), is white (column 4), and took the exam in their home municipality (column 5).

Heteroskedasticity-robust standard errors clustered at the student level in parentheses. ***, ** and * denote significance at 1%, 5% and 10% levels, respectively.

Table A8: Question-level impacts by question position

	Position dummy interacted with treatment:		
	Last 10 questions (day 1 or 2)	Last 10 questions (day 1)	Last 10 questions (day 2)
	(1)	(2)	(3)
BF before exam	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)
Before × het.	0.002**	0.001	0.003**
	(0.001)	(0.001)	(0.001)
Constant	0.240***	0.238***	0.239***
	(0.000)	(0.000)	(0.000)
N	7,494,350	7,494,350	7,494,350

Notes: This table reports estimates from equation (2), examining whether the impact of receiving Bolsa Família Program (BFP) before the exam varies by question position. The dependent variable is an indicator for whether the student correctly answered the question. "BF before exam" captures the main effect of receiving transfers before the exam, while "Before × het." represents the interaction effect with indicators for questions appearing at different positions: the last ten questions of either test day (column 1), the last ten questions of day 1 (column 2), and the last ten questions of day 2 (column 3).

The sample consists of all question-level observations for students who received transfers in the top tercile of the transfer size distribution. See Section 4 for details on sample restrictions.

Heteroskedasticity-robust standard errors, clustered at the student level, are shown in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table A9: Question-level impacts by question difficulty

	Share correct responses in question difficulty percentile range:					
	1^{st} - 10^{th}	10^{th} - 25^{th}	25^{th} - 50^{th}	50^{th} - 75^{th}	75^{th} - 90^{th}	90^{th}- 100^{th}
	(1)	(2)	(3)	(4)	(5)	(6)
BF before exam	-0.0016*	-0.0014*	0.0005	0.0008	0.0019	0.0039**
	(0.0008)	(0.0008)	(0.0011)	(0.0015)	(0.0014)	(0.0017)
Mean after	0.131	0.160	0.342	0.453	0.347	0.463
N	40,521	40,521	40,521	40,521	40,521	40,521

Notes: This table presents estimates of the effect of receiving the Bolsa Família Program (BFP) transfer before the ENEM exam on the likelihood of correctly answering exam questions, conditional on question difficulty. The outcome is the share of correct responses within each question difficulty percentile range, shown in the column headers.

Heteroskedasticity-robust standard errors clustered at the student level in parentheses. ***, ** and * denote significance at 1%, 5% and 10% levels, respectively.

Table A10: The effect of Bolsa Família on earnings-based college quality index (USD)

	Imputation of students not in formal sector:	
	Imputing with Informal earnings (1)	Grads in Formal sector (2)
Panel A. All test-takers		
BF before exam	0.503	0.787
	(0.759)	(1.498)
Mean after	294.618	372.876
N	140,032	140,032
Panel B. Top transfer size tercile		
BF before exam	4.021***	5.410**
	(1.348)	(2.626)
Mean after	275.178	341.291
N	40,516	40,516
Panel C. Middle transfer size tercile		
BF before exam	-0.097	-2.028
	(1.324)	(2.630)
Mean after	296.092	377.419
N	45,910	45,910
Panel D. Bottom transfer size tercile		
BF before exam	-1.597	-0.250
	(1.256)	(2.495)
Mean after	308.021	392.840
N	53,606	53,606

Notes: This table reports estimates of β from equation 1. The sample is composed of final-year high school students who attended both exam days. The outcomes, displayed in the column headers, are the imputation with informal earnings (col. 1), imputation with zero (col. 2), and graduates in the formal sector (col. 3). See Appendix B.2 for variable definitions. Standard errors, clustered at the student level, shown in parentheses. ***, ** and * denote significance at the 10%, 5% and 1% levels, respectively.

Table A11: Effect on probability of scoring above cutoffs

	Scored above:							
	300	350	400	450	500	550	600	650
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A. All test-takers								
BF before exam	0.001	0.002*	0.003	0.006**	0.004*	-0.000	0.000	-0.000
	(0.000)	(0.001)	(0.002)	(0.003)	(0.002)	(0.001)	(0.001)	(0.000)
Mean after	0.995	0.956	0.817	0.511	0.228	0.075	0.018	0.004
N	140,040	140,040	140,040	140,040	140,040	140,040	140,040	140,040
Panel B. Top transfer size tercile								
BF before exam	0.002***	0.004*	0.010**	0.008	0.009**	0.002	0.000	-0.000
	(0.001)	(0.002)	(0.004)	(0.005)	(0.004)	(0.002)	(0.001)	(0.001)
Mean after	0.994	0.947	0.787	0.468	0.193	0.060	0.014	0.003
N	40,521	40,521	40,521	40,521	40,521	40,521	40,521	40,521
Panel C. Middle transfer size tercile								
BF before exam	0.001	0.002	0.001	0.006	-0.001	-0.003	0.001	-0.001
	(0.001)	(0.002)	(0.004)	(0.005)	(0.004)	(0.003)	(0.001)	(0.001)
Mean after	0.996	0.960	0.827	0.524	0.237	0.079	0.019	0.004
N	45,912	45,912	45,912	45,912	45,912	45,912	45,912	45,912
Panel D. Bottom transfer size tercile								
BF before exam	-0.001	0.001	-0.000	0.004	0.005	0.001	-0.000	0.000
	(0.001)	(0.002)	(0.003)	(0.004)	(0.004)	(0.002)	(0.001)	(0.001)
Mean after	0.996	0.961	0.831	0.533	0.245	0.082	0.022	0.004
N	53,607	53,607	53,607	53,607	53,607	53,607	53,607	53,607

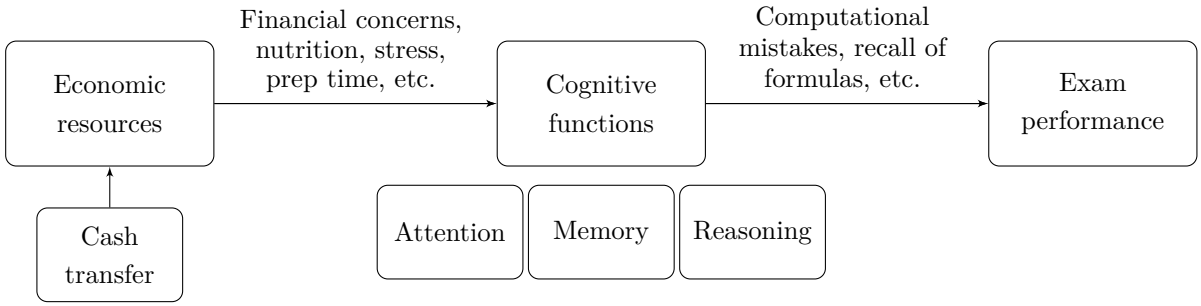
Notes: This table reports estimates of β from equation 1. The sample is composed of final-year high school students who attended both exam days. The outcomes, displayed in the column headers, are the average standardized test score across all subjects (col. 1) and the standardized test score in each subject (cols. 2-6). Test scores are standardized to be mean zero and standard deviation one among BFP test-takers. See Appendix B.2 for variable definitions. Standard errors, clustered at the student level, shown in parentheses. ***, ** and * denote significance at the 10%, 5% and 1% levels, respectively.

B Empirical Appendix

B.1 Conceptual framework

Our framework has two building blocks rooted in the relationship between economic resources, cognitive functions, and exam performance. Appendix Figure B1 illustrates the framework.

Figure B1: Conceptual framework linking monetary transfers to exam performance



The first building block is the link between economic resources and cognitive functions. Scarcity of economic resources can negatively impact cognitive functions through several channels, including improper nutrition, heightened stress, insufficient time spent on exam preparation, or intrusive thoughts related to financial concerns. The cash transfer we study can be understood as a positive shock to economic resources, which could improve exam performance through any of these channels.

The second building block is the link between cognitive functions and exam performance. Cognitive functions such as attention, memory, and reasoning are essential for performance on mentally-demanding tasks like standardized tests. Impaired cognitive functions can negatively impact exam performance in a multitude of ways. For example, with impaired attention, individuals are more likely to ignore important aspects of a question; with impaired memory, students are more likely to forget necessary formulas; and with impaired reasoning, students are more likely to make computational errors.

B.2 Definition of Key Variables

Test score. The Brazilian Testing Agency grades the ENEM exam based on the three-parameter item response theory (IRT). According to IRT, the probability that an individual

i with ability θ_i correctly answers question j is:

$$\Pr(C_{ij} = 1|\theta_i) = p_j(\theta_i) = c_j + \frac{1 - c_j}{1 + e^{-a_j(\theta_i - b_i)}}, \tag{B1}$$

where a_j, b_j, and c_j are three question-level parameters that represent, respectively, a question's discrimination, difficulty, and pseudo-guess.[21] The test score is the estimate of θ_i generated by the testing agency. ENEM scores are normalized to have a mean of 500 and a standard deviation of 100.

College enrollment. We define college enrollment as an indicator for appearing in the higher-education census one year after taking the ENEM. The rest of the college outcomes are defined conditional on college enrollment.

College quality. We construct an earnings-based index of college quality. To do this, we group all college-educated workers in the RAIS (not just the workers in our sample) based on the university they attended and compute the average earnings of the graduates from each university.

College degree quality. We create an index of college degree (or major) quality using the average earnings of the graduates of each college degree. To allow for international comparisons, we classify majors based on the International Standard Classification of Education (UNESCO, 2012).

First-year persistence. We define first-year persistence as an indicator that equals one if a student remains enrolled in college at the end of their freshmen year and zero otherwise. We also create measures for persistence in further years.

Degree progress. We calculate the ratio between the number of credits completed at the end of each academic year and the total number of credits required to graduate.

Likelihood of graduating. We define an indicator for graduating one to six years after enrolling in college. Most students who ever graduate do so within the first six years. As robustness, we define a measure of on-time graduation based on expected degree length. The higher-education census contains information on how long a student in good standing should take to graduate from each program. We use this information to define an indicator for graduating within the expected number of years.

College financial assistance. We define indicator variables that equal one for students

[21] A question's discrimination refers to its ability to discriminate between low- and high-ability individuals; the difficulty represents the value of θ at which $p_j(\theta_i)$ has the maximum slope, and the pseudo-guess parameter indicates the likelihood that a student with an infinitely negative ability has to correctly respond to the question.

who received different forms of financial assistance when enrolling in college in the year following the ENEM exam: (i) full or partial *ProUni* scholarships, which fund college-related expenses for low-income students attending private colleges; (ii) university-funded scholarships; (iii) government-funded student loans; (iv) university-funded student loans.