Short-Term Impacts of a Cash Transfer Program for Girls' Education on Academic Outcomes: Evidence from a Randomized Evaluation in Malawian Secondary Schools

Booyuel Kim

This paper evaluates a randomized controlled trial of a cash transfer program for the girls' education by studying the short-term academic achievement of 3,997 female students (9^{th}–11^{th} grade) across 124 classrooms in 33 public secondary schools in Malawi. Results show that students provided with one-year tuition support and monthly cash stipends are more likely to attend school and have better test scores in the short run. These students also regarded education more seriously with higher aspirations for educational achievement.

Keywords: Cash transfer, Girls' education, Malawi, Randomized Controlled Trial (RCT)

JEL Classification: C93, I20, O15

Booyuel Kim, Assistant Professor, KDI School of Public Policy and Management, Sejong 30149, Republic of Korea. (E-mail): bkim@kdischool.ac.kr, (Tel): +82-44-550-1023, (Fax): +82-44-550-1129.

I am very grateful to Cristian Pop-Eleches, Hyuncheol Bryant Kim, Syngjoo Choi, Douglas Almond, and Miguel Urquiola. I would like to thank seminar participants at KDI School, PAA 2015, Seoul National University, Sogang University, and Yonsei University for useful discussions. I also thank Young-sim Baek, Susie Kim, Eunseok Kim, Sangeun Park, Joshua Kim, Jinho Kim, Taeksoo Kim, Hanyoun So and all members of 'Project Malawi' team for their support, excellent field work, and data management. The IRB review for this project was approved by Malawi National Health Science Research Committee (Malawi NHSRC #902). This project is supported by funding and administrative support from Korea International Cooperation Agency (KOICA), Africa Future Foundation (AFF), and Daeyang Luke Hospital. All views expressed are mine, and all errors are my own.

[**Seoul Journal of Economics** 2016, Vol. 29, No. 4]

I. Introduction

Education has been considered as one of the most important determinants of human capital development. Improved education measured by test scores is correlated with increased wages later in life at the micro-level (Blau, and Kahn 2005) and is argued to facilitate the economic growth of a country at the macro-level (Hanushek, and Woessmann 2012). Recent studies emphasize the importance of non-cognitive abilities as the underlying mechanisms connecting educational interventions to test scores and later to adulthood outcomes (Glewwe *et al.* 2013; Wydick *et al.* 2013). This study contributes to literature by providing a unified evaluation of several academic outcomes and determining educational intervention's effect on a number of intermediate outcome variables (such as non-cognitive skills) that could be potential mechanisms explaining outcomes during adulthood. The ideal way to identify possible underlying mechanism of educational interventions for outcomes in adulthood is a randomized controlled trial (RCT) targeted towards experimentally changing each potential mechanism separately. While the present study was not designed to do this, it is nevertheless important to capture and describe the impact of the educational intervention on these potential mechanisms in the short run.

The paper uses experimental data from the cash transfer program for girls' education in Malawi. In 2012, 124 classrooms of grades 9^{th}, 10^{th}, and 11^{th} across 33 public secondary schools in Lilongwe rural areas participated in the cash transfer program and 62 classrooms are randomly selected as the treatment group while the remaining 62 classrooms served as the control. All female students in treatment classrooms received a year of tuition fee assistance directly deposited to the school account, as well as monthly stipends distributed to students. The experimental design evaluates the causal effects of the cash transfer program on schooling outcomes (dropout and absence), test scores, and non-cognitive abilities.

In terms of schooling outcomes, dropout rates (both self- and school-reported) declined. The impact of the program on dropout rates is significant and stronger among 9^{th} grade (starting grade of a secondary school) students, whereas they are insignificant in 10^{th} and 11^{th} grade students. The probability of remaining at the original school in the treatment group (considering both dropouts and transfer students)

increased by 6.7 percentage points (63.8%). School absence also diminished among treated students on average by five days per year. For the Junior Certificate Exam (JCE), a national exam at the end of 10^{th} grade in secondary school, the cash transfer program increased the probability of baseline ninth grade students in the treatment group to take the JCE by 15.5 percentage points (24.8%). The probability to pass JCE also rose by 18.7 percentage points (36.7%) and overall exam scores improved by 0.241 standard deviations. However, the effects of the program on the Malawi School Certificate Exam (MSCE), another national exam that secondary school students take at the end of 12^{th} grade, are minimal and statistically insignificant. For non-cognitive abilities, treated students take education more seriously, with higher aspirations for educational achievement.

The paper is organized as follows. Section II briefly reviews related literature on the education support program. Section III presents the experimental design and addresses potential biases to the validity of the experiment. In Section IV, the empirical strategy based on simple OLS models is presented, followed by the results and analysis on schooling outcomes, test scores, and non-cognitive abilities in Section V. Finally, Sections VI concludes the paper.

II. Brief Literature Review on Education Support Programs

This section provides a brief overview of the related literature, limiting the scope to only financial incentives for students from field experiments. Randomized evaluations of financial incentives for education improvements have been concentrated in developing countries. The pioneering conditional cash transfer program in Mexico, PROGRESA, provided monthly cash grants (US$ 55 on average) to poor families, on the condition that their children attend school at least 85% of the time. Schultz (2004) reported an increase in school enrollment, and Behrman *et al.* (2005) showed that participation in the PROGRESA program is associated with improved school enrollment, less grade repetition, lower dropout rates, and higher school reentry rates among dropouts. Similar to this paper, Barid *et al.* (2011) used an experimental design to study the effects of conditional (and unconditional) cash transfers on schooling outcomes, test scores, marriage, and pregnancy for unmarried girls aged 13–22 in Malawi. They found that school enrollment, attendance, and test scores are significantly higher among

treated in-school girls, without any impact on marriage and pregnancy. A recent cash transfer program in rural Morocco showed that an unconditional cash transfer (US$ 80–130 per year) made to households of primary school-aged children greatly influenced school participation, although the transfer is not conditional on regular school attendance (Benhassine *et al.* 2015).

Kremer *et al.* (2009) evaluated the effect of a merit-based girls' scholarship program in rural Kenya. The top 15% of 6th grade female students in the program districts received two-year scholarships (US$ 20 per year). The study found that merit scholarship improved average test scores by 0.19 standard deviations. For Colombia's school voucher program (PACES) with a merit-scholarship component, the program provided nearly 125,000 students from poor neighborhoods with vouchers (worth US $ 190) between 1991 and 1997 that covered approximately half the cost of private secondary school. Angrist *et al.* (2002) found that treated students are more likely to attend private school with improved test scores. Seven years after the voucher program, lottery winners are more likely to graduate from high school and scored higher on college entrance exams (Angrist *et al.* 2006). In general, various financial incentives such as cash transfers and merit-based scholarships for the education of students have been proven effective in improving schooling outcomes and test scores.

III. Background, Experimental Design, and Data

A. Background: Education in Malawi

Malawi is a small landlocked country in Sub-Saharan Africa, with basic education consisting of eight years of primary education (Standard 1 through 8), followed by four years of secondary education (Form 1 through 4). Secondary students are required to pay tuition and other fees that cost an average of approximately US$ 21 (Malawi Kwacha 3,500) per semester.[1] Students have to pay tuition fees each semester. If payment is not submitted on the first couple of weeks into the semester,

[1] Secondary schools in Malawi run three semesters per year. First semester starts in September to December. Second semester is January to April and third semester is April to July. One US dollar was worth 165 Malawi kwachas (MK) in April 2012 (http://www.oanda.com/currency/converter).

students cannot enroll, and they drop out from the school.

For the national examinations in secondary schools in Malawi, 10^{th} grade students (Form 2) must pass the JCE in order to move on to the next grade. 10^{th} grade students who fail to pass the JCE repeat the grade. 12^{th} grade students (Form 4) take the Malawi School Certificate Examination (MSCE). 12^{th} grade students who fail to pass the MSCE graduate from secondary school without the certificate, and they cannot apply for tertiary education until they pass.

B. Experimental Design

The one-year cash transfer program was implemented to 3,997 girls (9^{th}–11^{th} grades) at 33 public schools located around rural Lilongwe in partnership with the Daeyang Luke Hospital.[2] Table 1 shows the experimental designs for the cash transfer program. After stratifying a total 124 classroom by grade, 62 classrooms were randomly assigned a treatment status.[3] All girl students in the treatment classrooms received one-year school tuition (three semesters) and monthly cash stipends (three times per semester). School tuition and other fees per semester on average was 3,500 Malawi kwacha and were directly deposited to each schools account, while the monthly cash stipends of 300 Malawi kwacha were distributed to treated students. In total, the cash transfer program was equivalent to around US$ 70 per year,[4] which were

[2] The partner hospital has four catchment districts: Chimutu, Chitukula, Tsabango, and Kalumba in rural Lilongwe areas. All 33 public schools (excluding private boarding schools) in these districts were invited to participate in the cash transfer program for girls' education.

[3] The fact that the lottery was held with all 33 participating school headmasters under the supervision of the division education officer ensured the transparency of the process and helped the participating schools view the offers as fair.

[4] The cash transfer program started in the third semester of academic year 2011–2012 (April, 2012), and the intervention continued in the first and second semesters of academic year 2012-2013. The amount of monthly stipend was increased from 300 Kwacha to 500 Kwacha in the second semester of academic year 2012-13 due to the huge depreciation of Malawi Kwacha. Early in 2012, the exchange rate between US Dollar and Malawi Kwacha was 165/$. However, the value of Kwacha depreciated after over 50% currency devaluation on May 7, 2012, and the exchange rate in early 2013 was 350/$. In total, a treated student in the scholarship program received 13,900 Kwacha (3,500 Kwacha × 3

Table 1
Experimental Design

Group	Assignment	Classrooms	Students
G1	Treatment	62	2,102
G2	No treatment (Control)	62	1,895
Total		124	3,997

substantial considering that Malawian GDP per capita (2013 est.) was US$ 226 and the minimum wage per month in rural areas was around US$ 17 (MK 2,742). The school tuition and other fees of the beneficiary students were transferred to the school's account at the beginning of each semester, whereas enumerators visited every month on announced dates to directly distribute the monthly cash stipends to the treatment group. This program has a weak conditionality on school enrollment (not school participation) similar to that of Benhassine *et al.* (2015), and the beneficiary students should be enrolled in the baseline school at the time of the transfers. The intervention was immediately discontinued for transfer and dropout students.

The internal validity of the experimental design allows us to assess the causal inferences based on two assumptions: the successful randomization of students into treatment and control classrooms and the absence of differences in attrition. First, whether students were randomly assigned to the treatment and control groups was evaluated. Table 2 shows the baseline statistics and randomization balance for the girls' education support program. The age of students on average is 15.7 years old and 5.2% of the sample are orphans without both parents. 21.6% and 9.5% of the sample reported that their fathers and mothers graduated from a 2-year college or 4-year university, respectively. Moreover, 45.6%, 32.7%, and 25.1% of the sample reported that their house has electricity, refrigerator and car at home, respectively.[5] 24.8%

semesters + 300 Kwacha × 6 times + 500 Kwacha × 3 times), which is equivalent to around US$ 70 per year. Kremer *et al.* (2009) provided 6th grade girls in Kenya with a yearly scholarship of US$20 and Baird *et al.* (2010) provided conditional US$ 120 cash transfers annually to 13–22 year-old females in Malawi including current schoolgirls and recent dropouts.

[5] Malawi DHS 2010 reported that only 9.1%, 4.3%, and 2.1% of the population have electricity, refrigerator, and car, respectively. Although the responses of students on household assets may be exaggerated, the huge differences between

TABLE 2
BASELINE STATISTICS AND RANDOMIZATION BALANCE

Dependent Variable	Avg. (s.d)	Cash Transfer
	(1)	(2)
Age (year)	15.7	0.001
	(1.623)	(0.016)
Orphan	0.052	-0.030
	(0.221)	(0.035)
Father's tertiary education	0.216	0.056**
	(0.412)	(0.025)
Mother's tertiary education	0.095	-0.035
	(0.293)	(0.031)
Father's white-collar job	0.273	-0.032
	(0.445)	(0.024)
Mother's white-collar job	0.115	-0.019
	(0.319)	(0.032)
Household assets (0-16)	7.79	-0.003
	(3.438)	(0.009)
Household asset: Electricity	0.456	-0.016
	(0.498)	(0.036)
Household asset: Refrigerator	0.327	0.047
	(0.469)	(0.029)
Household asset: Car	0.251	0.009
	(0.434)	(0.025)
Better School	0.248	0.108
	(0.432)	(0.112)
p-value of joint F-test		0.204
Observations		3,978
R-squared		0.012

Notes: Orphan equals one when both parents died. Parent's tertiary education equals one when they graduated from a 2-year college or a 4-year university. Parent's white-collar job equals one when they have a professional or government job. Household Assets are defined the total number of assets they own from 16 asset questions. Better school equals one when a student is enrolled in a conventional secondary school. Column (2) shows randomization balance for the cash transfer program. Robust standard errors clustered by classroom are reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

the sample and Malawi DHS 2010 can be understood after considering that the sample in the present study represents the family who is able and willing to send their daughters to secondary school.

of the sample students go to the district day conventional schools while the remaining students go to community day secondary schools (CDSS).[6] Overall, the sample exhibits higher socioeconomic characteristics than the Malawi population as a whole. As shown in Column 2 of Table 2, none of the demographic characteristics except father's education predicted the likelihood that a girl is assigned to the cash transfer program. F-tests for the joint significance of all the predetermined demographic variables on girls' scholarship is insignificant ($p = 0.204$), and does not reject that all baseline coefficients are jointly equal to zero, showing that the randomization for the intervention was balanced between treatment and control groups across predetermined baseline characteristics.

C. Data

The baseline survey was conducted on 3,997 female students at 33 public secondary schools in four rural districts around Lilongwe between October 2011 and May 2012. The survey collected information on demographics, household characteristics, education, health, and sexual behaviors prior to random assignment. The follow-up survey was conducted between January and June 2013. 68.4% of the baseline sample students (2,733 students) completed the survey, and 31.6% (1,264 students) were lost because of absence, transfer, or dropout. Given that the selectivity of those lost can be linked to systematic bias, I randomly chose 15% of the lost students (187 students) for an intensive tracking survey. A total of 128 students (69.6%) out of those 187 students were surveyed. This resulted in an effective survey follow-up rate of 90.4%.[7] Thus, 2,861 students completed the follow-up survey.

[6] The secondary education in Malawi was traditionally provided in a group of elite secondary schools, referred to as conventional secondary schools. These conventional secondary schools can be categorized into national government boarding, district boarding, and district day schools. To increase access to secondary education, the Malawi government started to provide secondary education in so-called "distance education centers," which later became community day secondary schools (de Hoop 2011). Generally, conventional secondary schools are better than community day secondary schools in terms of student qualities, teacher qualifications, and school environments.

[7] The effective survey rate (ESR) is a function of the regular follow-up rate (RFR) and home-visit follow-up rate (HFR) as follows: $ESR = RFR + (1 - RFR) \times HFR$. Overall, ESR is 90.4% (68.4% + 31.6% × 69.6%). Weight for home-visit survey is

TABLE 3
RELATIONSHIP BETWEEN SURVEY ATTRITION AND BASELINE CHARACTERISTICS

Dependent variable	= 1 if surveyed in follow-up or intensive tracking surveys			
	Treatment	Adjusted	Main effect	Interaction
	(1)	(2)	(3)	(4)
Cash Transfer Program	0.040*	0.038*		0.068
	(0.022)	(0.022)		(0.207)
Age		-0.015**	-0.012	-0.006
		(0.006)	(0.008)	(0.011)
Orphan		-0.081**	-0.071	-0.025
		(0.039)	(0.057)	(0.079)
Father's tertiary education		-0.003	-0.009	0.001
		(0.025)	(0.038)	(0.051)
Mother's tertiary education		-0.070**	-0.069	-0.000
		(0.034)	(0.050)	(0.069)
Father's white-collar job		-0.024	-0.041	0.035
		(0.017)	(0.027)	(0.034)
Mother's white-collar job		-0.028	-0.004	-0.049
		(0.027)	(0.038)	(0.053)
Household Assets		-0.001	-0.005	0.006
		(0.003)	(0.004)	(0.007)
Better School		0.049**	-0.008	0.102**
		(0.023)	(0.035)	(0.048)
Observations	3,997	3,993	3,993	
R-squared	0.014	0.024	0.027	

Notes: Regressions are OLS models with grade fixed effects. The robust standard errors clustered by classroom are reported in parentheses. The weight of 6.67 was given to home-visit survey sample. Columns 3 and 4 present results from one regression with the main effects (Column 3) and all covariates interacted with the treatment effect (Column 4). *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

Differential attrition is another threat to the experimental design. Table 3 presents the relationship between survey attrition and baseline characteristics. Students who received the scholarship intervention

6.67 since 15% was randomly sampled from the sample attrition.

controlling for the full set of demographic characteristics were 3.8 percentage points more likely to stay in the sample (Column 2), which causes negative attrition (or retention) bias. This attrition was tested to determine whether it was differential by baseline characteristics and no evidence was found on the systematic relation of the survey attrition to the baseline characteristics. To account for the resulting attrition bias, an entire set of background controls were included in all of the regressions.

The JCE and MSCE data were obtained from the District Education Office (DEO), and test scores were normalized so that scores in the control classrooms are distributed with a mean of zero and a standard deviation of one.[8] JCE and MSCE have three core subjects Chichewa, English, and Math, and students have to take at least three or five additional subjects, respectively. 9^{th} or 11^{th} grade students (at baseline) took JCE / MSCE in June 2013.

IV. Estimation Strategy

This study focused on the reduced-form estimation of the program effects on schooling outcomes and exam scores. To better understand possible underlying mechanisms, I also evaluate program impacts on non-cognitive traits by estimating the following simple model using ordinary least squares:[9]

$$Y_{ic} = \beta_0 + \beta_1 ES_c + \beta_2 X_{ic} + \delta_c + \varepsilon_{ic} \quad (1)$$

The variable Y_{ic} is the outcome for student i in classroom c. The variable ES_c is an indicator for whether classroom c was assigned for

[8] The JCE/MSCE data contain three identifying variables for each student: attending school, gender, and name. However, an exact match on these identifying variables is very difficult because of the name spelling differences. To deal with the issue of differently spelled names I applied probabilistic matching algorithms in the spelling of names by using "reclink" STATA command (de Hoop 2011). The matching algorithm provides a match score, which indicates how closely two names match on a scale from zero to one. I used a cutoff with a match score below 0.6 (by default), and I was conservative in the matching procedure by checking all approximate string matches manually.

[9] When outcome variables are binary, I estimated the main treatment effects using probit models, which yielded consistent results.

education support program and the coefficient β_1 captures the average program impact. X_{ic} is a vector that includes the sociodemographic controls, such as age, orphan status, parents tertiary education, parents' white-collar job, household asset ownership, and school type in order to address any minor baseline differences between the treatment and control classrooms despite randomization. Given that the randomization successfully produced treatment and control classrooms that are balanced across most baseline characteristics, the inclusion of these controls does not significantly change the treatment effect estimates but sometimes improves statistical precision. δ_c is the classroom fixed effect, and ε_{ic} is the error term clustered at classroom level.

V. Results

A. Schooling Outcomes: Dropout and Attendance

Panel A of Table 4 describes the self- (Columns 1 and 2) and school-reported dropout rates (Columns 3 and 4).[10] Both are in similar magnitude. When we examine school-reported dropout rate in column 4, the estimate suggests that the probability of being enrolled in the school increases by 3.2 percentage points (37.6%). When school-reported dropouts and transfers are combined (Columns 5 and 6), estimates suggest that the probability of being enrolled in the original school increases by 6.7 percentage points (63.8%). Considering that not all students who transferred to other schools were actually enrolled, this estimate can be regarded as the upper bound for school dropouts.

Panels B, C, and D show differential dropout patterns by grade, and suggests that the program's effect on dropout rates decreases as students advance to higher grades. A significant decrease in school dropouts among the 9^{th} grade was observed, whereas the

[10] Kremer *et al.* (2009) used school participation data based on unannounced checks by NGO enumerators, whereas Baird *et al.* (2011) employed school enrollment and attendance information from official school ledgers as benchmark while collecting self- and teacher-reported data. I collected both self-reported and official school attendance data. School-reported dropout and transfer were consistent with the self-reported data in the sample. 82% and 84% of school-reported dropouts and transfers were exactly matched with self-reported data, respectively.

TABLE 4

EFFECTS OF THE CASH TRANSFER PROGRAM ON SCHOOLING OUTCOMES

Dependent variable	drop-out (self-reported)		drop-out (school-reported)		drop-out or transfer (school-reported)		absence (self-reported)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: Whole sample								
Cash Transfer Program	-0.039	-0.037	-0.034**	-0.032***	-0.076***	-0.067***	-1.707***	-1.663***
	(0.029)	(0.024)	(0.013)	(0.011)	(0.023)	(0.022)	(0.345)	(0.314)
Observations	2,861	2,860	3,980	3,976	3,980	3,976	2,715	2,714
Panel B: Grade 9								
Cash Transfer Program	-0.101**	-0.083**	-0.050**	-0.047***	-0.104***	-0.071*	-1.491***	-1.498***
	(0.049)	(0.039)	(0.019)	(0.016)	(0.037)	(0.036)	(0.365)	(0.343)
Observations	889	889	1,216	1,216	1,216	1,216	855	855
Panel C: Grade 10								
Cash Transfer Program	0.012	-0.004	-0.029	-0.033	-0.097**	-0.100**	-1.860**	-1.763**
	(0.047)	(0.033)	(0.028)	(0.021)	(0.041)	(0.037)	(0.720)	(0.704)
Observations	1,040	1,039	1,590	1,586	1,590	1,586	996	995
Panel D: Grade 11								
Cash Transfer Program	-0.045	-0.046	-0.024	-0.022	-0.021	-0.021	-1.717***	-1.716***
	(0.050)	(0.043)	(0.015)	(0.013)	(0.039)	(0.032)	(0.539)	(0.493)
Observations	932	932	1,174	1,174	1,174	1,174	864	864
Controls	No	Yes	No	Yes	No	Yes	No	Yes

Notes: Columns 1 and 2 show the coefficients for self-reported drop-out conditional on being surveyed at follow-up or home-visit surveys. Columns 3–6 are school-reported data for drop-out or transfer which includes the whole baseline sample. Columns 7 and 8 are self-reported school absence outcomes. Regressions are OLS models with grade fixed effects. Robust standard errors clustered by classroom are reported in parentheses. The baseline values of the following variables are included as controls: age, orphan status, parents' tertiary education, parents' white-collar job, household asset ownership, and school type. The weight of 6.67 is given for self-reported outcomes. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

cash transfer program does not affect the dropout rates of 10^{th} and 11^{th} grade students.[11] This finding is consistent with recent work by Son (2013), who found that negative income shocks (unemployment, crop loss, drought, and Asian financial crises) in Indonesia affect school enrollment across different grade levels; this impact is strongly mitigated for students who enter the final grade of junior or senior high school.[12] To examine the robustness of the results, the coefficient with and without the baseline controls were analyzed. The inclusion of these controls does not significantly affect the estimates, given that the covariates are balanced across classrooms. This robustness check approach is applied in all specifications.

Columns 7 and 8 indicates that the cash transfer program affects school absence. The average absences based on the self-reported data was 3.8 days per semester (or 11.4 days per year) and treated girls were 1.66 days per semester (or 5 days per year) less likely to be absent. Baird *et al.* (2011) reported that conditional cash transfers increased school attendance by 10 more school days over the entire school year. The magnitude of the result on school absence (five more school days) is half of that of Baird *et al.* (2011). This is reasonable because Baird *et al.* (2011) imposed school attendance conditionality for their program, whereas the cash transfer program in this paper did not.

B. Test Scores: The Malawi School Certificate Examination

Table 5 presents the influence of scholarship programs on the MSCE performance of 11^{th} grade students at baseline. The first outcome considered was simply whether students took the MSCE.[13] Column 2

[11] When secondary-school-aged girls are not in school, they are likely to be unemployed, married, and begin child-bearing according to Malawi Demographic and Health Survey 2010. 63.4% of females whose ages are 15–19 years old are unemployed and only 36.5% are employed (most of female employments are agriculture farming and domestic work without earned wages). 23.4% of those girls in the same age bracket get married or start cohabiting as 26% of them begin childbearing. These figures on marriage and childbearing rapidly increased when these teenage girls enter the 20–24 age bracket.

[12] This is called sheepskin effect, which occurs when the wage return to an additional year of schooling is higher if that year allows a student to complete a school level. The origin of the term relates to printing of diplomas on sheepskin before.

[13] When the MSCE and JCE data from the Division Education Office matched

TABLE 5

EFFECTS OF THE CASH TRANSFER PROGRAM ON THE 2013 THE MSCE OF 11TH GRADE STUDENTS

VARIABLES	= 1 if took MSCE		= 1 if passed MSCE		Overall score		Chichewa score		English score		Math score	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Cash Transfer Program	-0.026	-0.020	0.038	0.023	0.054	-0.013	0.074	0.007	0.085	0.030	-0.020	-0.076
	(0.055)	(0.048)	(0.069)	(0.061)	(0.169)	(0.134)	(0.195)	(0.158)	(0.181)	(0.125)	(0.139)	(0.131)
Controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Observations	1,186	1,186	1,186	1,186	851	851	853	853	867	867	865	865
R-squared	0.009	0.028	0.002	0.088	0.001	0.122	0.002	0.101	0.002	0.193	0.000	0.052

Notes: MSCE scores: 0 - fail, 1–2 - pass, 3–6 - credit, and 7–8 - distinction. Chichewa, English, and Math are the three core subjects. The overall and the three core subject scores have been standardized to have a mean of zero and a standard deviation of one in the control group. Regressions are OLS models with grade fixed effects. Robust standard errors clustered by classroom are reported in parentheses. The weight of 6.67 is given to home-visit survey sample. The baseline values of the following variables are included as controls: age, orphan status, parents' tertiary education, parents' white-collar job, household asset ownership, and school type. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

suggests that students in the treatment classrooms were 2 percentage points less likely to take the MSCE but this result was statistically insignificant. Given that no evidence of selection existed in the exam taking, the effects on MSCE performance can be simply interpreted. Only 34.7% of the sample passed the MSCE and the remaining 65.3% of the students graduated without MSCE certificate.[14] Columns 3 and 4 report no significant improvement on the probability of passing MSCE although the point estimates were positive; furthermore, Columns 5–12 show no impact on the overall scores and the three core subjects: Chichewa, English, and Mathematics.[15] The absence of impact on MSCE can be attributed to the relatively short period between baseline and follow-up surveys. Improving exam scores especially in difficult examinations takes time, and the one-year short term follow-up may not be able to fully capture the full range of possible effects.

C. Test Scores: The Junior Certificate Examination

Table 6 shows the program impact on the JCE of 9^{th} grade students at the baseline. Treated girls were 15.5 percentage points more likely to take the JCE (Column 2), and this result is consistent with the finding that 9^{th} grade students were more likely to stay in school, which translates into the increased probability of taking the exam one year later.

Improvements in the JCE performances were also observed.[16] Column 4 shows that the probability of passing the JCE improved by 18.7

with the baseline sample, the match was defined as exam taking. A total of 1,186 11th grade female students in the sample and MSCE data are matched with 74.1% (879 students) of the sample.

[14] The MSCE passing variable equals zero for students whose MSCE data from the Division Education Office are missing or do not matched with the baseline survey. If the MSCE passing variable is defined for those who took MSCE (or whose MSCE data is matched), then 46.8% of the sample passed the exam.

[15] The overall score is the standardized sum of the three core subject scores (Chichewa, English, and Math), each standardized on its own before summation. Thus, the overall score has a mean of zero and standard deviation of one for the control group.

[16] Compared to MSCE, JCE is relatively easier to pass. 59.8% of the sample passed the exam. If the sample is restricted to those who took the exam, then 84.4% of students who took JCE passed the exam.

TABLE 6

EFFECTS OF THE CASH TRANSFER PROGRAM ON THE 2013 JCE OF 9TH GRADE STUDENTS

VARIABLES	= 1 if took JCE		= 1 if passed JCE		Overall score		Chichewa score		English score		Math score	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Cash Transfer Program	0.173***	0.155***	0.151**	0.187***	0.196	0.241*	0.226	0.261**	0.094	0.193	0.156	0.143
	(0.037)	(0.038)	(0.060)	(0.048)	(0.188)	(0.127)	(0.153)	(0.128)	(0.214)	(0.137)	(0.151)	(0.108)
Controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Observations	1,220	1,220	1,220	1,220	853	853	856	856	855	855	858	858
R-squared	0.041	0.052	0.023	0.091	0.010	0.242	0.014	0.120	0.002	0.324	0.005	0.142

Notes: JCE scores: 0 - fail, 1 - average, 2 - good, 3 - very good, 4 - excellent. Chichewa, English, and Math are the three core subjects. JCE scores are standardized with a mean of zero and a standard deviation of one for the control group. Regressions are OLS models with grade fixed effects. Robust standard errors clustered by classroom are reported in parentheses. The weight of 6.67 is given to home-visit survey sample. The baseline values of the following variables are included as controls: age, orphan status, parents' tertiary education, parents' white-collar job, household asset ownership, and school type. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

percentage points (36.7%), and the overall scores increased by 0.241 standard deviations when the treatment effect was adjusted with the baseline characteristics. The improvement on the overall scores can be attributed to the increased scores in the Chichewa subject although no significant improvements were detected in the English and Math subjects.

However, these results should be considered cautiously because of the selection bias in the first stage of JCE taking. The group of students from treatment classrooms was likely to contain a higher fraction of relatively weak students because a higher proportion of students from the treatment classrooms took the JCE; that is, strong students are likely to take the JCE regardless of the scholarship program, whereas marginal students take the exam because they received scholarships are likely relatively lower scoring students. Such a selection process can have a bias downward effect on the average JCE performances reported in Table 6.

D. Non-cognitive Ability

Three variables on non-cognitive abilities: self-esteem, aspiration for education, and importance of education were analyzed. Self-esteem was measured using the Rosenberg self-esteem scale, whereas aspiration for education is a dummy variable for when students aim to continue on to bachelor or master degrees. Importance of education is a categorical data that ranged from 1 as not important at all to 5 as very important. Table 7 shows the program's effect on non-cognitive abilities. No significant change in self-esteem was found, whereas the cash transfer program improved the variables on aspirations for education and importance of education. Although psychology research conducted in the 1970s found that extrinsic rewards such as cash transfers may interfere with intrinsic motivation, which reduces effort in some circumstances (Deci 1971; Kruglanski *et al.* 1971) surveys of students in the Malawian data provided no evidence that the cash transfer program weakened the intrinsic motivation for education, at least in the short run. When baseline characteristics were controlled, educational aspirations of the treatment classrooms increased by 0.144 standard deviations. Moreover, treated girls were 0.112 standard deviations more likely to think that education is important (Column 6).

Table 7
Effects of the Cash Transfer Program on Non-cognitive Traits

Dep. Var.	Rosenberg Self-esteem		Aspirations for education		Importance of education	
	(1)	(2)	(3)	(4)	(5)	(6)
Cash Transfer Program	-0.067 (0.087)	-0.054 (0.066)	0.152 (0.093)	0.144** (0.072)	0.099** (0.045)	0.112** (0.048)
Controls	No	Yes	No	Yes	No	Yes
Observations	2,861	2,860	2,861	2,860	2,799	2,798
R-squared	0.023	0.087	0.006	0.102	0.003	0.007

Notes: Non-cognitive traits are standardized to have a mean of zero and a standard deviation of one in the control group. Self-esteem was constructed by 10 questions from Rosenberg self-esteem scale. Aspiration for education equals one when students aim to pursue bachelor or master degrees. Importance of education (1: Not important at all—5: Very Important) is based on the difference between baseline and follow-up survey responses. Regressions are OLS models with grade fixed effects. Robust standard errors clustered by classroom are reported in parentheses. The weight of 6.67 is given to home-visit survey sample. The baseline values of the following variables are included as controls in the regression analyses: age, orphan status, parents' tertiary education, parents' white-collar job, household asset ownership, and school type. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

VI. Conclusion

The effects of education have traditionally been measured by test scores, and underlying mechanism for improved test scores has been explained by simple schooling outcomes such as enrollment and attendance. This paper investigates the impacts of a cash transfer program for girls' education on the schooling outcomes, test scores, and non-cognitive abilities of secondary students using data from a randomized controlled trial in Malawi. Students who were randomly assigned to the program are less likely to drop out and absent from school. Although there are improvements in the JCE scores for 9^{th} grade students, no significant effect was detected on the MSCE scores for 11^{th} grade students. Furthermore, the treated students showed modest improvements on non-cognitive traits. Given that non-cognitive traits are considered to be more stable and persistent than test scores, the improvements on non-cognitive traits may affect future educational achievements and adulthood labor market outcomes.

(Received 24 September 2016; Revised 19 October 2016; Accepted 28 October 2016)

Reference

Angrist, J., E. Bettinger, E. Bloom, E. King, and M. Kremer. "Vouchers for Private Schooling in Colombia: Evidence from a Randomized Natural Experiment." *American Economic Review* 92 (No. 5 2002): 1535-58.

Angrist, J., E. Bettinger, and M. Kremer. "Long-Term Educational Consequences of Secondary School Vouchers: Evidence from Administrative Records in Colombia." *American Economic Review* 96 (No. 3 2006): 847-62.

Baird, S., C. McIntosh, and B. Özler. "Cash or Condition? Evidence from a Cash Transfer Experiment." *Quarterly Journal of Economics* 126 (No. 4 2011): 1709-53.

Behrman, J. R., P. Sengupta, and P. Todd. "Progressing through PROGRESA: An Impact Assessment of a School Subsidy Experiment in Rural Mexico." *Economic Development and Cultural Change* 54 (No. 1 2005): 237-75.

Benhassine, N., F. Devoto, E. Duflo, P. Dupas, and V. Pouliquen. "Turning A Shove into A Nudge? A "Labeled Cash Transfer" for Education." *American Economic Journal: Economic Policy* 7 (No. 3 2015): 86-125.

Blau, F. D., and L. M. Kahn. "Do Cognitive Test Scores Explain Higher US Wage Inequality?" *Review of Economics and Statistics* 87 (No. 1 2005): 184-93.

De Hoop, J. "Selective Schools and Education Decisions: Evidence from Malawi." Working Paper, Free University of Amsterdam, 2011, Unpublished.

Deci, E. L. "Effects of Externally Mediated Rewards on Intrinsic Motivation." *Journal of Personality and Social Psychology* 18 (No. 1 1971): 105-15.

Glewwe, P., P. H. Ross, and B. Wydick. "Developing Aspirations: The Impact of Child Sponsorship on Self-Esteem and Life Expectations." Working Paper, 2013, Unpublished.

Hanushek, E., and L. Woessmann. "Do Better Schools Lead to More Growth? Cognitive Skills, Economic Outcomes, and Causation." *Journal of Economic Growth* 17 (No. 4 2012): 267-321.

Kremer, M., E. Miguel, and R. Thornton. "Incentives to Learn." *Review of Economics and Statistics* 91 (No. 3 2009): 437-56.

Kruglanski, A., I. Friedman, and G. Zeevi. "The Effect of Extrinsic Incentives on Some Qualitative Aspects of Task Performance." *Journal of Personality and Social Psychology* 39 (No. 4 1971): 606-17.

National Statistical Office (NSO). *Welfare Monitoring Survey*. Lilongwe, Malawi: Government of Malawi (GOM), 2011.

Schultz, T. Paul. "School Subsidies for the Poor: Evaluating the Mexican Progresa Poverty Program." *Journal of Development Economics* 74 (No. 1 2004): 199-250.

Son, Hyelim. Human Capital Investment When Sheepskin Effects Matter: Evidence from Income Shocks in Indonesia. Job Market Paper, Department of Economics, Columbia University, 2013.

Thomas, D., E. Frankenberg, and J. P. Smith. "Lost but Not Forgotten: Attrition and follow-up in the Indonesia Family Life Survey." *Journal of Human Resources* 36 (No. 3 2001): 556-92.

Thomas, D., F. Witoelar, E. Frankenberg, B. Sikoki, J. Strauss, C. Sumantri, and W. Suriastini. "Cutting the Costs of Attrition: Results from the Indonesia Family Life Survey." *Journal of Development Economics* 98 (No. 1 2012): 108-23.

Wydick, B., P. Glewwe, and L. Rutledge. "Does International Child Sponsorship Work? A Six-Country Study of Impacts on Adult Life Outcomes." *Journal of Political Economy* 121 (No. 2 2013): 393-436.