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The impact of conditional cash transfers on the matriculation of junior high school students into rural China's high schools

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ABSTRACT

The goal of this study is to examine whether promising a conditional cash transfer (conditional on matriculation) at the start of junior high school increases the rate at which disadvantaged students matriculate into high school. Based on a randomised controlled trial (RCT) involving 1418 disadvantaged (economically poor) students in rural China, we find that a CCT voucher has no effect on increasing high school matriculation for the average disadvantaged student. The CCT voucher also has no differential impact on students at any point in the distribution of baseline academic achievement. This result suggests that CCTs, while shown to be effective in many contexts, do not always work.

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Conditional cash transfer; voucher; rural education; dropout; high school; randomised controlled trial; China

1. Introduction

A number of developing countries are making the transition from economies based on low-wage, labour-intensive manufacturing to economics based on higher value-added, high-wage industries. In the course of this transition, the demand for skilled labour will increase and the demand for unskilled labour will likely begin to decline as low-skill industries move to lower-wage countries (Paul 2002; Duryea and Mary 2003; De Brauw and Rozelle 2007; Liu et al. 2009; Heckman and Yi 2012). Even if unskilled wage rates are high today, today's students need to acquire skills at the level of high school or above if they want to be able to compete effectively in the higher-skill labour market of the future (as low-wage, low-skill jobs disappear – Mayhew and Keep 1999; Angrist and Victor 2009; Fiszbein et al. 2009). If students fail to acquire such skills now, not only will they have a hard time finding high-wage employment in the future economy, but the industries they work in may also stagnate from a short supply of skilled labour and entire countries may suffer from slower development (Benhabib and Spiegel 1994; Park and Cai 2011).

Unfortunately, in many low- and middle-income countries students from disadvantaged (poor, rural) backgrounds often fail to obtain a high school education (Duflo and Kremer 2005; Reddy and Sinha 2010; Wang et al. 2013). Low rates of high school matriculation among disadvantaged students come about in one of two ways. First, some students never finish junior high school.

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For example, in Mexico, nearly one-third of students drop out of junior high school (Behrman, Sengupta, and Todd 2005a). In India and Ghana, the official dropout rates for junior high school are approximately 27 per cent and 21 per cent, respectively (Choudhury 2006; Sabates et al. 2011). In China, field studies have shown that 27 per cent of students drop out before the end of junior high school (Zhao and Glewwe 2010; Mo et al. 2013). Second, even among those disadvantaged students that do graduate from junior high school, many decide not to continue on to high school (Fiszbein et al. 2009).

A major reason why disadvantaged students fail to go to high school (either because they drop out during junior high or because they choose not to go to high school even after graduating from junior high) is that attending high school can be costly (Banerjee et al. 2001; Angrist and Victor 2009). High school tuition rates in a number of both low- and middle-income countries, such as Bangladesh, Indonesia and Mexico are high (World Bank Report 2008). Attending high school can also be associated with high opportunity costs since the wages for unskilled labour, especially in middle-income countries, can be high (and rising) (Cai and Yang 2011; Huang et al. 2011).

To address the negative consequences associated with the high costs of high school, policy-makers in a rising number of developing (low- and middle-income) and developed (high-income) countries have provided disadvantaged students with conditional cash transfers (CCTs) for staying in school or enrolling in higher levels of schooling. As of 2008, more than 20 low- and middle-income countries had such education-targeted CCT programmes in place (Fiszbein et al. 2009). These CCT programmes have been shown to raise education matriculation and attendance in many countries, such as in Colombia (Attansio et al. 2010; Barrera-Osorio et al. 2011), Pakistan (Nazmul and Parajuli 2008), Mexico (Schultz 2004; De Janvry et al. 2006; De Brauw and Hoddinott 2011) and Brazil (Heinrich 2007; Glewwe and Kassouf 2012). A subset of these studies in Colombia and Mexico found impacts of CCT programmes on matriculation and attendance at the high school level in particular (Heinrich 2007; Attansio et al. 2010; Barrera-Osorio et al. 2011).

However, there are reasons that CCT programmes may not work in all situations. For example, it could be that in countries that have highly competitive education systems with restricted enrolment into high school, poor students will not be able to matriculate to higher levels of school regardless of the level of CCT (or other financial aid) that is offered (Clarke, Haney, and Madaus 2000; Glewwe and Kremer 2006). Many studies have found that providing CCTs conditional on student enrolment does not translate into higher student achievement (Behrman, Parker, and Todd 2005b; Banerjee et al. 2007; Filmer and Schady 2009a). Therefore, to the extent that students that are poor (economically) also are performing poorly in school, CCTs may not help students pass competitive high school entrance requirements. It may also be that the perceived costs, including the opportunity cost of attending school, are so high that, regardless of the presence of a CCT programme (that is set at a level that only covers tuition or some share of direct costs), poor students choose not to attend high school because they would rather begin to enter the labour market and earn a wage. In short, it could be that CCTs will be less successful when implemented in countries with school systems that are highly competitive or too expensive (in terms of direct costs and the opportunity cost of attending school).

It is also possible that CCT programmes are particularly effective for certain subsets of students. Since many developing countries have competitive high school admissions systems for which academic performance is a critical determinant of advancement (Hannum 1999; Cheney, Ruzzi, and Muralidharan 2005; De Janvry, Dustan, and Sadoulet 2012), it may be the case that the CCT has a differential impact on students with different academic ability. CCTs may have less impact on the high school matriculation rates of students with lower academic performance because they are constrained in their decision to continue on in school not only by financial concerns but also by their ability to qualify for academic high school in the first place. By contrast, higher achieving students are likely able to qualify for academic high school on their own merits but may need CCTs in order to afford high school tuition. We therefore might expect to see a differential impact of the CCTs on students of different academic ability. However, it might also be that when disadvantaged students are high

performing that their families have already figured out how to finance high school, despite the high costs. If this is so, the CCTs may also not have an effect on high performing students.

The overall goal of this paper is to examine the long-term effectiveness of CCTs on the decisions of disadvantaged students to attend high school. Specifically, we are interested in examining the impact of a programme that promises a CCT at the start of junior high school (3 years before a student can matriculate to high school) on dropout from junior high school and high school matriculation (after 3 years). In addition to exploring the impact of the CCT on the average student, we also examine the potential heterogeneous impacts of the CCT by academic achievement.

To fulfil these goals, we draw on the results of a randomised controlled trial (RCT) among 1892 poor students across 132 schools in rural China. Like other middle-income developing countries, the cost of attending high school in China can be high (Liu et al. 2009) and students are often not aware of the high costs of attending high school (Loyalka et al. 2013). Also similar to other developing countries, China has a competitive education system with strict entrance requirements for attending academic high school (Hannum 1999). Understanding whether CCTs are effective at increasing the long-term outcomes of students in China may therefore provide important lessons for other developing countries as well.

Although we believe this study is an important contribution to the literature on CCTs in developing countries, it must be acknowledged that the design of this study does have an important difference from most CCT studies that have been conducted elsewhere. According to Fiszbein et al. (2009) and Gaarder (2010), CCT programmes are efforts that seek to transfer cash to poor individuals (households) on the condition that those individuals (households) make pre-specified investment in the human capital of their children. Clearly, this study fits neatly into that definition. Still, across CCT studies there is considerable variation in programme design (contract design, cash transfer amount, timing, so forth) and these differences in design may influence the likelihood of programme success. Compared with most CCT programmes that have been conducted and evaluated in the past, our study evaluates a CCT with a longer than average period between the initial contract signing and the possibility of receiving the cash transfer. In particular, in our study students are given the CCT voucher at the end of seventh grade, fully 3 years before they can expect to receive a cash transfer (upon enrolling in high school). In most CCT programmes, compliance is verified much more quickly following the initial CCT offer, ranging from monthly (Ahmed et al. 2007) to a year at the most (Galasso 2006). More research is needed to evaluate the importance of this distinctive feature of the CCT programme evaluated in this study.

The rest of the paper is structured as follows. Section 2 presents the research design. Section 3 describes the data. Section 4 discusses our statistical approach. Section 5 presents the main and heterogeneous impact results. Section 6 presents the findings and concludes. Section 7 discusses our findings in contrast with other CCT studies.

2. Research design

2.1. *Sampling and randomisation*

We conducted an RCT to measure the impact of CCT vouchers among 1892 poor seventh-grade students in 132 rural, public junior high schools in 15 nationally designated poor counties in Shaanxi and Hebei provinces. We chose these two provinces because they differ in terms of location and geography, allowing us to increase the generalizability of our findings. The 15 counties were located in three prefectures: Shangluo prefecture in Shaanxi province and Zhang Jiakou and Cang Zhou prefectures in Hebei province.

We used official records to create a sampling frame of all rural, public junior high schools in the 15 sample counties at the start of the programme. A total of 150 rural junior high schools were identified. We then excluded 18 schools in Hebei because the administrative records reported that the number of seventh grade students in these schools was fewer than 50.[1] Our final sample,

therefore, included 132 schools (71 in Shaanxi and 61 in Hebei). All seventh grade classes in each sample school were enrolled into our sample. We sampled all seventh-grade students in these 132 schools (a total of 19,797 students in 473 classes). This sample (our *full sample*) is roughly representative of rural, public junior high schools in nationally designated poor counties in provinces like Shaanxi and Hebei.

We conducted a baseline survey of all the seventh-grade students and their homeroom teachers in our full sample at the beginning of the school year (in early October 2010). Students were asked to complete a checklist of major household assets. The homeroom teacher of each class also filled out a questionnaire. One of the most important parts of the homeroom teacher's form was a list of the poorest five students in his or her class based on his or her understanding.

Following the baseline survey, we identified the four poorest students in each classroom in three steps. First, a monetary value was attached to each asset (based on the National Household Income and Expenditure Survey, published by the China National Bureau of Statistics – CNBS, 2007) to produce a single ranking of family asset value in each class. Second, we asked homeroom teachers at the baseline survey to provide a list of the 10 poorest students in his or her class. Third, we checked the list of asset poor students against the lists of poor students provided by the homeroom teachers. Only those students who appeared on both lists simultaneously were included in our final list of poor students. Fortunately, in 100 per cent of the cases, students who were designated as poor by the family asset value rankings were also on the list of poor students provided by the homeroom teachers. Through this process, we identified the four poorest students in each class (1892 students in total).

We randomly assigned our sample schools into 2 groups (66 schools in each group). The first group of schools was called the CCT schools, which meant that students within these schools would have a chance to receive the CCT vouchers. The other group of schools was the pure control schools, in which no students would receive a CCT voucher. Among the 1892 students in our poor students sample, 948 were in the CCT schools and 944 students were in the pure control schools.

Next, we randomly assigned the (poor) sample students in the CCT schools to either receive or not receive the CCT vouchers. We used information from the baseline survey to assign the 948 CCT school sample students into matched pairs. We created two pairs from the four poor students in each class. We used an optimal matching algorithm to create pairs that were most similar in terms of individual characteristics and main outcome variables by minimising the total (Mahalanobis) distance within the matched pairs (Moore and Schnakenberg 2012). The Mahalanobis distance measure is based on the following baseline covariates: math achievement (based on the TIMSS test we administered), plans to go to academic high school (an indicator variable equal to 1 if a student plans to go to academic high school and to 0 otherwise), and plans to go to vocational high school (an indicator variable equal to 1 if a student plans to go to vocational high school and to 0 otherwise). For a basic description of our dependent and independent variables, please see Table A1.

After matching CCT school students into pairs, we randomly assigned one student in each pair to one of two groups: the first group would receive the CCT vouchers and was called the paired treatment group. The second group would not receive the CCT vouchers and was called the paired control group. Altogether, 474 students in the CCT schools were assigned to the paired treatment group and 474 students were assigned to the paired control group. Finally, all 944 students in the pure control schools were assigned to the pure control group, which also would not receive the CCT voucher (Figure 1).

The research design included both a paired control group (within the same schools as our treated students) and a pure control group (in different schools from our treated students) due to our concern about the potential for spillover effects from the CCT voucher. Because the CCT voucher intervention was conducted at the student level within the same classroom (in the CCT schools), we were concerned about potential spillover effects from treatment students to paired

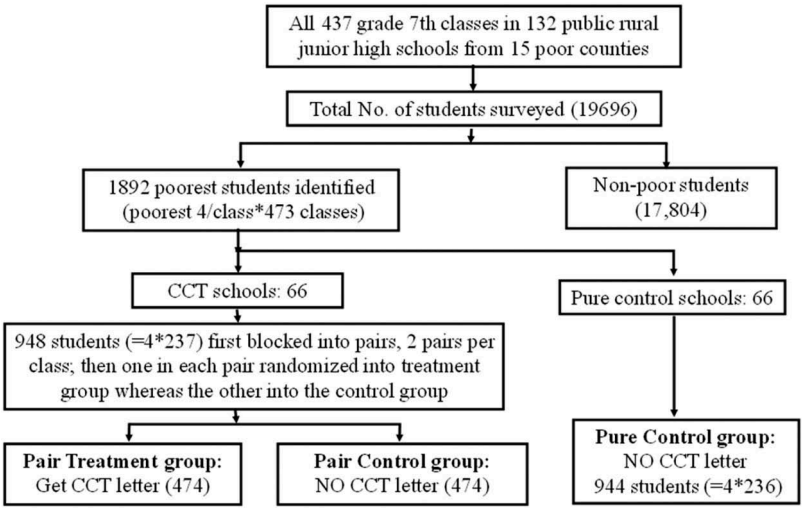

Figure 1. Research design.
See Table A2 for our pre-balance check, and Table A3 for our attrition analysis.

control students. The CCT voucher could engender positive or negative spillover effects. On the one hand, if students who did not receive the CCT voucher found out that some of their classmates had received the CCT voucher, they might feel left out and less inclined to pursue high school. The CCT voucher intervention would then have a negative spillover effect on control students. Alternatively, students who heard about their classmates' CCT voucher might instead think that there would be additional chances to receive a CCT voucher in the future and therefore feel motivated to study harder – leading to a positive spillover effect. We included a pure control group in separate, pure control (non-CCT) schools for the express purpose of controlling for these kinds of spillover effects. Table A2 shows the pre-balance test of all covariates between paired treatment group and pure control group. To allow for full consideration of these issues, we present the results using each control group (pure control group and paired control group) side-by-side throughout the paper.

2.2. *Power calculations*

We conducted power calculations to determine the minimum number of schools and students we would need for our experiment. Given an estimated intra-class correlation coefficient (ICC) of 0.15 and an R^2 of 0.35, we estimated that we would need at least 100 schools (with 30 students per school) to detect an effect size of 0.20 SDs with 80 per cent power at the 5 per cent significance level. To ensure that we have enough statistical power, we selected a sample size of 1892 students in 132 schools (474 treatment students and 474 paired control students in 66 CCT schools, and 944 students in 66 pure control schools).

2.3. *Experiment arms and implementation*

Students in the treatment group received a CCT voucher intervention shortly after the baseline survey (at the start of seventh grade in November 2010). We promised the CCT to students according to a strict protocol. In December 2010, we asked school principals to summon each CCT recipient individually to the principal's office along with the student's parents (or guardians). The CCT vouchers were then given in the form of a contract. To improve their legitimacy, the

contracts were printed on the letterhead of the Chinese Academy of Sciences (CAS) and Peking University.[2]

The contract stipulated that if the student was actively enrolled in a 3-year vocational or academic high school programme by September 2013, CAS/Peking University would provide 1500 yuan (190 USD) per year in financial aid to roughly cover the costs of 3 years of high school tuition. The contract further stipulated that CAS/Peking University would send the money to a post office near the recipient's high school for the students to retrieve themselves. All students and parents understood that Chinese post offices often serve as banks, especially in rural areas where banks are less prevalent. All of the students assigned to the treatment group (as well as their parents or guardians) signed the contract. Each contract had three copies: the student kept one copy, the school principal kept one copy and CAS/Peking University kept the third copy. We also took a photograph of the contract signing ceremony and mailed the photograph to each student's family as a reminder of the agreement 1 week after the ceremony. Afterwards, we called each treatment student again once each year around May to remind them that the contract was still valid.[3]

3. Data collection

3.1. *Baseline data collection*

As we mentioned earlier, baseline surveys were administered in four blocks in October 2010. In the first block, students were asked to provide a checklist of their household assets, including almost all household durable goods. This variable was used as part of each student's household economic information to identify the poorest students in each class.

The second block was a 30 min standardised math test using items from the Trends in International Mathematics and Science Study (TIMSS).[4] The baseline and evaluation math exams were both constructed on the foundation of a pilot in which we tested the exam questions with over 300 students in schools outside our sample. No one in the sample schools – neither teachers nor students – knew the test questions beforehand. Our enumerators closely proctored the students and enforced strict time limits.[5] Finally, the scores were normalised by subtracting the mean and dividing by the standard deviation (SD) for each county. These normalised scores are used as our measure for math achievement.

The third block of the student survey asked students about expected costs for going on to higher levels of schooling. In particular, we asked students to predict the total direct costs of going to academic high school. Understanding student expected costs at different points in time will allow us to assess the extent to which the CCT voucher is having a price-signalling effect for the cost of attending high school.

In the fourth block, enumerators collected data that were used to create the study's control variables. Specifically, we collected data on student individual characteristics (gender and age) and family characteristics (number of siblings, parent health status, parent years of schooling and whether parents had ever migrated). Previous studies have used similar variables to explain student-level differences in educational outcomes (Currie and Thomas 2000; Behrman Jere and Rosenzweig 2002; Yi et al. 2012). We also asked students about their plans for the time period after junior high school. We allowed students to say that their plans included academic high school, vocational high school or the labour market. We also allowed the student to say that he or she was undecided.

When we carried out our baseline survey, no one in the schools (neither students, homeroom teachers nor school principals) knew about the CCT voucher programme. During the baseline survey, students were told that the survey was for a general study on education conducted by the Chinese Academy of Sciences and Peking University. Not even the enumerators knew about the CCT voucher programme during the baseline survey in order to avoid revealing any information about the programme.

3.2. *Follow-up surveys*

As shown in Figure 2, in May 2011 (at the end of the 2010–2011 academic year), enumerators revisited all the sample schools and asked all students in our poor students sample to participate in the first round follow-up survey. The first round follow-up survey was identical to the baseline survey except that enumerators did not ask students about their household assets or basic demographic/socio-economic characteristics again.

During the follow-up survey, enumerators also identified students who had dropped out of school in the time between the baseline and follow-up surveys. Dropouts were identified using the following protocol. If students were absent on the day of the evaluation survey, the enumerators asked teachers and classmates the reason for the absence (coded as transferred to other schools, dropped out or on temporary leave due to illness). After the field survey was over, the enumerators called the relatives or neighbours of the students to confirm whether the students had actually dropped out of school (or were instead temporarily absent or had transferred schools). For treatment students, we also confirmed that the family still had the contract. While control students did not receive the CCT voucher, students in the control group filled in the same number of surveys and were visited the same number of times as treatment students.

In May 2013, just as the students were finishing junior high school, we conducted a second follow-up survey. In the second follow-up survey, we collected information on student dropout using the exact same procedure as in the first follow-up survey. Based on these two rounds of follow-up survey data, we identified whether students had dropped out of school before junior high school graduation or not. For a third time, we also collected information about students' expected costs of attending high school.

In October 2013, after the end of junior high school (the end of ninth grade), we did the third round follow-up survey. In this round, we confirmed whether students had (a) matriculated into academic high school; (b) matriculated into vocational high school or (c) left school to enter the labour market. We visited all the students who had matriculated into academic high school and vocational high school in person to confirm their status and administer a survey; for the students

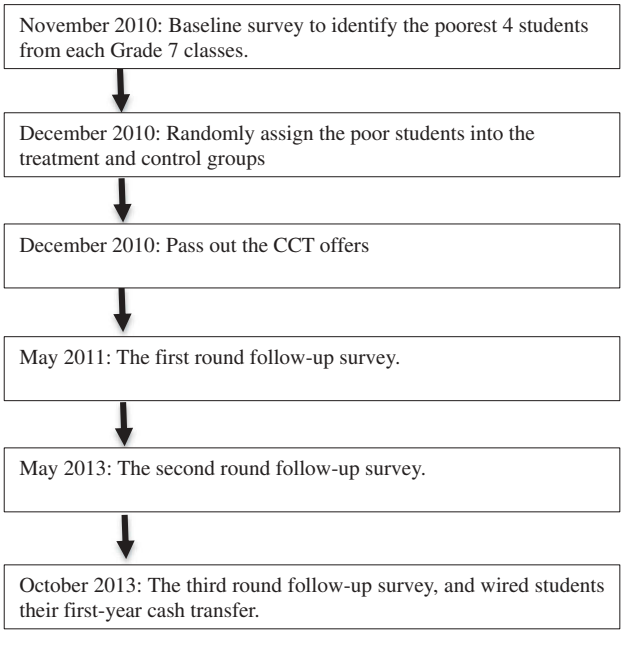

Figure 2. Timeline of the CCT intervention.

who left school after graduation, we solicited the help of their previous teachers and classmates and were able to track 88 per cent of the sample students over the phone or by visiting them at their current place of residence (1244 students out of the original 1418). As shown in Table A3, we retained good balance between treatment arms among this non-attrited sample. In particular, only one of the baseline factors was found to differ significantly across treatment arms within this sample – treatment students had slightly higher baseline math performance (Table A3, row 5). As we control for baseline math performance in all of our analyses, this is unlikely to bias our results.

In order to further ensure that this attrition did not bias our results, we followed a strict tracking protocol. After tracking 88 per cent of the sample students in the third round follow-up survey, we then randomly designated 25 per cent of the untracked students (the remaining 12 per cent of the full sample) as our 'must-follow' group. We spent two additional months working carefully to get in contact with the must-follow students, and we visited all of the must-follow students in person. Among the 62 must-follow students, there were 7 students enrolled in academic high school, 4 students enrolled in vocational high school and 51 students who had left the schooling system entirely. In our analyses, the must-follow subset of students was weighted so that each must-follow student counted for four times the value of the students tracked through the original tracking procedure. The weighting allows us to estimate unbiased effects for the full sample even after attrition.

4. Statistical approach

We examine the impact of the CCT voucher on two primary outcomes. First, we examine the impact on student matriculation status into high school (two binary outcomes for whether students matriculated into academic high school and whether students matriculated into vocational high school). We also examine the impact of the CCT voucher on student dropout status, which we define as dropping out between the time of the baseline survey and the second follow-up survey (prior to the end of junior high school).

4.1. *The main impacts of receiving CCT vouchers*

To estimate the main impacts of the CCT vouchers on student outcomes, we first use an ordinary least squares (OLS) model that does not adjust for covariates (we call this our *unadjusted model*):

$$Y_i = \alpha_0 + \alpha_1 T_i + \varepsilon_i \tag{1}$$

In Equation (1), Y_i represents any one of the outcomes of interest for student i. T_i is a dummy variable that takes on a value of 1 if student i receives a CCT voucher and 0 otherwise. ε_i is the random error term. We are primarily interested in α_1, which measures the impact of receiving CCT vouchers on student outcomes.

To increase the efficiency of our estimates and also address slight imbalances in baseline covariates between treatment and control students, we also run the following OLS model that adjusts for covariates (we call this our *adjusted model*):

$$Y_i = \beta_0 + \beta_1 T_i + \beta X_i' + \varepsilon_i \tag{2}$$

where X_i' represents a vector of baseline covariates including student age, gender, baseline plans to attend academic and vocational high school, baseline math test scores, parent characteristics (which include each parent's years of schooling, dummy variables for each parent's health status and whether each parent had ever migrated) and family characteristics (which include number of siblings and family asset value). The means and SDs of the baseline covariates are given in Table A1.

4.2. *Heterogeneous treatment effect analyses*

To see whether the impact of the CCT voucher differs between different types of students, we further conduct heterogeneous effect analyses. Specifically, we use the following model to estimate heterogeneous effects:

$$Y_i = \delta_0 + \delta_1 T_i + \delta_2 T_i D_i + \delta X_i' + \varepsilon_i \quad (3)$$

where D_i is a binary indicator representing a particular baseline characteristic of students. In the model above, the coefficient δ_2 measures the differential impact of CCTs on students with that baseline characteristic (as opposed to students that do not possess that baseline characteristic).

We measure the heterogeneous effects of CCT voucher across students that differ by levels of academic achievement. To examine these heterogeneous effects, we divide the sample students into three groups based on the percentile of their normalised baseline test score: upper tercile, middle tercile and lowest tercile and examine the impact of the CCT voucher on each subgroup.

5. Results

5.1. *Main effects of the CCT voucher*

We find that there is no significant impact of the CCT vouchers on the average student in our sample. First, when we compare the paired treatment group versus pure control group, our unadjusted results (estimated with Equation (1)) show no significant impact on dropout and a coefficient of only 0.001 (Table 1, row 1, column 1). After controlling for baseline covariates (estimated with Equation (2)), the coefficient on dropout remains low (0.010) and insignificant (Table 1, row 1, column 3). We also see no long-term effect on student behaviour 3 years after the CCT voucher offer. In particular, both adjusted and unadjusted results show no significant impact of the CCT vouchers on matriculation to either academic or vocational high school (Table 1, row 1, columns 2, 3, 5 and 6).

The unadjusted results are entirely consistent when we compare the paired treatment group and paired control group after controlling for school fixed effects, showing no significant impact of the CCT vouchers in reducing junior high dropout or increasing matriculation into academic or vocational high school. The adjusted results continue to show no impact on student matriculation, but show the unexpected result that the CCT vouchers actually significantly increased the dropout rate for the treatment students relative to the paired control students (Table 2, row 1, columns 1, 4). This result is significant at the 10 per cent level. This suggests that the CCT vouchers may have had a positive spillover effect on the paired control students.

Table 1. Impact of CCT voucher on the average student (paired treatment group vs. pure control group).

Dependent variables	Dropout from junior. high	Enrolled in academic high	Enrolled in vocational high	Dropout from junior high	Enrolled in academic high	Enrolled in vocational high
	(1)	(2)	(3)	(4)	(5)	(6)
1. Received CCT voucher, 1 = yes	0.001	0.009	0.025	0.010	−0.015	0.030
	(0.033)	(0.038)	(0.028)	(0.031)	(0.033)	(0.027)
2. Student, parents and family characteristics controlled	No	No	No	Yes	Yes	Yes
Constant	0.299***	0.293***	0.146***	−0.833***	1.181***	0.197
	(0.021)	(0.023)	(0.018)	(0.180)	(0.187)	(0.128)
Observations	1418	1288	1288	1418	1288	1288
R^2	0.000	0.000	0.001	0.133	0.173	0.024

Cluster-robust standard errors in parentheses; ***$p < 0.01$, **$p < 0.05$. Students in the 'must-follow' group were weighted to account for the attrited students.

Table 2. Impact of CCT voucher on the average student, school fixed effects model (paired treatment vs. paired control).

Dependent variables	Dropout from junior high	Enrolled in academic high	Enrolled in vocational high	Dropout from junior high	Enrolled in academic high	Enrolled in vocational high
	(1)	(2)	(3)	(4)	(5)	(6)
1. Received CCT voucher, 1 = yes	0.041	−0.028	0.008	0.054**	−0.052	0.009
	(0.027)	(0.031)	(0.026)	(0.024)	(0.029)	(0.027)
2. Student, parents and family characteristics controlled	No	No	No	Yes	Yes	Yes
3. School fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Constant	0.480***	0.014	−0.004	−0.664**	1.185***	0.166
	(0.013)	(0.015)	(0.013)	(0.278)	(0.275)	(0.197)
Observations	948	858	858	948	858	858
Number of schools	0.204	0.246	0.191	0.328	0.407	0.202

Cluster-robust standard errors in parentheses; ***$p < 0.01$, **$p < 0.05$.

While this analysis could be biased by positive or negative spillover effects from treated to untreated students, this analysis does have an important advantage in that within-CCT schools contrast will get rid of all school-level variations (that is school fixed effects) and help isolate the treatment effects. Overall, we find that providing students with a CCT voucher at the start of junior high school does not yield any discernible reduction in dropout rates or improvement in high school matriculation.[6]

5.2. *Impact of CCT voucher on students with different baseline academic performance*

We also do not find any impact of the CCT vouchers on student outcome variables for students with standardised math test scores that are in either the middle or upper tercile (Table 3, rows 2 and 5). Similarly, the CCT vouchers had no impact on matriculation rates or dropout rates for students at the lowest tercile (Table 3, row 8). These results are all consistent across both specifications of our control group (pure control and paired control).[7] These results suggest that providing the CCT vouchers has no impact on matriculation or dropout decisions no matter the student's academic performance.

6. Conclusion

Drawing from a large-scale RCT, this paper has reported the effects of CCT vouchers on high school matriculation and junior high school dropout. We find that providing disadvantaged (poor, rural) students a CCT voucher for 1500 yuan (190 USD) per year at the start of junior high school (conditional on matriculation into a 3-year academic or vocational high school) has limited (or no measurable) effect on the average disadvantaged student. The paper also finds that the CCT voucher does not have significant heterogeneous effects on students with low-/middle-/high-academic performance.

7. Discussion

Research conducted both in other developing countries (Schultz 2004; De Janvry et al. 2006; Heinrich 2007; Nazmul and Parajuli 2008; De Brauw and Hoddinott 2011; Barrera-Osorio et al. 2011) and in rural China (Mo et al. 2013) has shown that CCTs can be effective in boosting school enrolment and/or decreasing school dropout. In Table A4 we present summary statistics from other studies from developing countries that evaluate the impact of CCTs on similar educational outcomes – we limit our comparison to other studies that use school enrolment, school attendance or student dropout as outcome variables.[8] In 14 out of 15 studies a positive and significant impact of

Table 3. Heterogeneous impact of CCT voucher by academic performance (paired treatment group vs. pure control group).

	Dropout from junior high	Enrolled in academic high	Enrolled in vocational high
Dependent variables	(3)	(1)	(2)
		Panel A: Upper 33rd percentile	
1. Received CCT voucher, 1 = yes	0.025	−0.023	0.020
	(0.040)	(0.036)	(0.031)
2. Received CCT voucher* upper 33%	−0.047	0.028	0.030
	(0.047)	(0.061)	(0.054)
3. Student, parents and family characteristics controlled	Yes	Yes	Yes
Constant	−0.846***	1.174***	0.217
	(0.183)	(0.191)	(0.131)
Observations	1418	1288	1288
R^2	0.133	0.174	0.025
		Panel B: Middle 33rd percentile	
4. Received CCT voucher, 1 = yes	0.020	−0.008	0.038
	(0.032)	(0.037)	(0.033)
5. Received CCT voucher* middle 33%	−0.030	−0.017	−0.024
	(0.049)	(0.053)	(0.051)
6. Student, parents and family characteristics controlled	Yes	Yes	Yes
Constant	−0.841***	1.185***	0.197
	(0.179)	(0.186)	(0.128)
Observations	1418	1288	1288
R^2	0.133	0.174	0.024
		Panel C: Lowest 33rd percentile	
7. Received CCT voucher, 1 = yes	−0.016	−0.012	0.031
	(0.033)	(0.040)	(0.030)
8. Received CCT voucher* lowest 33%	0.075	−0.009	−0.004
	(0.055)	(0.055)	(0.046)
9. Student, parents and family characteristics controlled	Yes	Yes	Yes
Constant	−0.823***	1.180***	0.187
	(0.179)	(0.187)	(0.128)
Observations	1,418	1,288	1,288
R^2	0.135	0.173	0.025

Cluster-robust standard errors in parentheses; ***$p < 0.01$, **$p < 0.05$. Students in the 'must-follow' group were weighted to account for the attrited students.

CCTs on at least one of these educational outcomes was found. On average, the impact of CCTs on these educational outcomes was 9 percentage points across all studies. So why did the CCT vouchers in our study not have greater impact on the students in our sample? We can conclude with confidence that this result is not due to attrition in our sample (which was marginal, well balanced and largely accounted for by tracking and weighting the 'must-follow' group).

It is also possible that the value of the CCT voucher offered in this intervention (1500 yuan) was simply not high enough to incentivise behaviour change. In making the decision to stay in junior high school or attend high school, students in rural China face considerable opportunity costs. The unskilled wage rate in China has been rising since the early 2000s and today virtually all young, able-bodied rural individuals are able to find jobs off the farm (Cai and Yang 2011; Huang et al. 2011). Indeed, recent China's statistics show that the monthly earnings of the typical unskilled worker (who had off-farm employment in both 2011 and 2012) were almost 2900 yuan per month during 2012 (CNBS, 2014). When compared with such high monthly wages in the unskilled labour-force, it maybe not surprising that poor rural children are unwilling to change their behaviour for only 1500 yuan per year. More research is needed to assess whether a CCT of a larger magnitude can have a greater impact.

However, it should be noted that international evidence suggests that CCTs can be effective with even modest cash transfer amounts. We note briefly that the size of the CCT voucher used in

this study (190 USD per year) is roughly equivalent to (or even higher than) other CCTs that have been shown to be effective in other developing country contexts (for example $45–$60 per year in Cambodia – Filmer and Schady 2009b; $200–$250 per year in Mexico – De Janvry and Sadoulet 2004). In addition, a review of the literature on CCTs, in general, has concluded that substantial impacts have been brought about in many programmes despite the wide variation in transfer size (Filmer and Schady 2009b). Indeed, although little research has explicitly examined the question of the magnitude of transfer required to bring about behaviour change, what research has been conducted suggests that there are diminishing marginal returns to increasing the size of the transfer. Baird, McIntosh, and Berk (2011) found that the smallest transfer size tested ($5 per month) resulted in the same change in behaviour as a CCT twice that size. A study from Cambodia by Filmer and Schady (2009b) compared the effectiveness of CCTs of $45 and $60 and found clear evidence of diminishing marginal returns as the size of the cash transfer is increased.

Some research suggests that disadvantaged rural students face many challenges to continuing on in school beyond the liquidity constraints and lack of motivation that CCTs seek to address. In light of the strict academic requirements for promotion to academic high school in China today, some students may be dissuaded from continuing on in school regardless of financial concerns based simply on what they perceive as their low chances of being able to gain admission to academic high school (Shi et al. 2015).[9] While vocational high school – with minimal academic admission requirements – is an option for lower performing students, recent research suggests that vocational high schools in rural China are generally of low quality (Loyalka et al. 2013) and that that low quality is perceived by many rural students (Shi et al. 2015).

Finally, it may also be that anxiety and other mental/psychological issues in rural schools are driving dropout and non-matriculation. Wang et al. (2015) found in a study in rural Shaanxi province that 74 per cent of surveyed seventh- and eighth-grade students were deemed clinically at risk for mental health issues, a rate 12 times higher than that found among urban students. The same research team was also able to show that a counselling intervention designed to help students overcome anxiety issues was able to reduce dropout from junior high school (Wang et al. 2014). If any of these issues are playing a major role in student decision-making, it may be that providing a CCT voucher is simply not addressing the most important obstacles that these students face in continuing their education.

Whatever the case, the high school matriculation gap between rural and urban areas remains a significant problem in China today. We have shown in this paper that a CCT voucher given out during the beginning of junior high school is not effective in reducing this gap. More research is needed to find alternative ways to increase educational attainment in rural areas. If this gap is not addressed, not only will rural individuals face exclusion in the future job market, China's economic stability and growth may also be threatened.

Notes

1. In the aftermath of China's 2005 School Merger Policy, smaller schools are likely to be merged with more centrally located schools, which would complicate our data collection.
2. The Chinese Academy of Sciences (CAS) and Peking University (PKU) are both located in Beijing and are two of the highest ranked universities in China with well-known roles as 'think tanks' for the government. The connection to these two prestigious institutions would lend the contract increased credibility.
3. We called in May because in most cases school summer holidays start at the end of June. During the summer holidays, some students migrate to urban areas to do short-term work which sometimes leads students to drop out of school afterwards. Therefore, May was a critical time to remind students of the outstanding CCT contract.
4. We chose math test scores because they are one of the most common outcome variables used to proxy educational performance in the literature (Glewwe and Kremer 2006; Rivkin, Hanushek, and Kain 2005; Schultz 2004).
5. There may be concern that students did not take the test seriously, due to a lack of strong incentives for effort. However, we believe that these test results are of the highest quality possible in a field setting. The test was

administered with the full support of the school principal, and before each test the homeroom teacher (a very authoritative figure in Chinese schools) introduced the enumerators, explained the reason for our visit and the purpose of the exam and encouraged the students to take the exam seriously. In China's test-based education system, promotion to every level of education is dependent on high-stakes standardised tests. Unlike in the United States, students are almost never administered low-stakes tests that have no bearing on their progress through school. As a result, students are trained to take standardised tests very seriously and we think it is highly unlikely that students did not try hard on this test.

6. One additional robustness check involves running the same analysis after matching students in the treatment group with most similar students in the pure control group. We find that the results of the matching analysis are consistent with the main results.
7. For the sake of brevity, we have not presented the heterogeneous analysis using the paired control group as the comparison group. The results are consistent and can be provided at request.
8. To provide a comprehensive summary of previous CCT studies, we searched the top 10 development-related journals (according to the *Journal of Economic Literature* database and *SCImago Journal* and *Country Rank*) for the keywords 'conditional cash transfers' (or 'CCTs') and 'education' (or schooling), as well as various databases (for example that of the World Bank; and 3ie (International Initiative of Impact Evaluation)). In total, we found 68 papers investigating the impact of CCTs on schooling outcomes. In the summary table (Table A4), we include results from all of the subsets of CCTs studies that used one of three outcome variables: school enrolment, school attendance, or school dropout (a total of 15 papers).
9. Admission to academic high school in China is almost entirely dependent on student scores on the high school entrance exam. While vocational high school admission is not dependent on test scores, academic high school is considered the most desirable path for students with the necessary academic credentials. Still, it should be noted that academic pressures cannot explain the lack of impact of CCT on matriculation to vocational high school.

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Appendix

Table A1. Description of all variables.

Variable	Observation	Mean	Standard deviation	Minimum	Maximum
Dependent variables					
1. Matriculated into academic high school, 1 = yes	1288	0.31	0.46	0	1
2. Matriculated into vocational high school, 1 = yes	1288	0.16	0.37	0	1
3. Dropout from junior high school, 1 = yes	1418	0.30	0.46	0	1
Treatment variables					
4. Received CCT voucher, 1 = yes	1418	0.33	0.47	0	1
5. Control group, 1 = yes	1418	0.67	0.47	0	1
Controlling variables collected at baseline survey					
6. Student age, in years	1418	13.51	1.05	10.81	18.03
7. Female student, 1 = yes	1418	0.50	0.50	0	1
8. Plans to go to academic high school at baseline, 1 = yes	1418	0.45	0.50	0	1
9. Plans to go to vocational high school at baseline, 1 = yes	1418	0.14	0.35	0	1
10. Normalised standard TIMSS test at baseline	1418	−0.09	1.00	−2.72	2.72
11. Student's expected cost of academic high school, in 1000 yuan	1418	11.30	11.30	0	60
Parents' characteristics					
12. Mother's years of schooling, in years	1418	5.25	3.46	0	20
13. Father's years of schooling, in years	1418	7.03	2.91	0	19
14. Mother's health status at baseline survey, 1 = good	1418	0.37	0.47	0	1
15. Father's health status at baseline survey, 1 = good	1418	0.47	0.49	0	1
16. Mother ever migrated at baseline survey, 1 = yes	1418	0.49	0.49	0	1
17. Father ever migrated at baseline survey, 1 = yes	1418	0.80	0.39	0	1
Household characteristics					
18. Number of siblings at baseline survey, person	1418	1.01	0.81	0	5
19. Family asset value at baseline survey, 1000 yuan	1418	3.66	2.63	0	17.36

Students in the 'must-follow' group were weighted to account for the attrited students.

Table A2. Covariates pre-balance test between experimental arms.

Variable	Treatment group	Control group	Difference between treatment and control group, (3) = (1) − (2)
	(1)	(2)	(3)
Student characteristics at baseline			
1. Student age, in years	13.49	13.52	−0.03
	(0.06)	(0.06)	(0.09)
2. Female student, 1 = yes	0.48	0.51	−0.04
	(0.02)	(0.02)	(0.03)
3. Plans to go to academic high school at baseline, 1 = yes	0.46	0.45	0.01
	(0.02)	(0.02)	(0.03)
4. Plans to go to vocational school at baseline, 1 = yes	0.14	0.15	−0.01
	(0.01)	(0.01)	(0.02)
5. Normalised Standard TIMSS Test at baseline	0.00	−0.14	0.14
	(0.06)	(0.06)	(0.08)
6. Student's expected cost of academic high school, in 1000 yuan	11.82	11.02	0.80
	(0.59)	(0.47)	(0.76)
Parents' characteristics at baseline			
7. Mother's years of schooling, in years	5.35	5.20	0.15
	(0.25)	(0.20)	(0.32)
8. Father's years of schooling, in years	6.94	7.07	−0.13
	(0.17)	(0.12)	(0.20)
9. Mother's health status, 1 = good	0.34	0.38	−0.04
	(0.02)	(0.02)	(0.03)
10. Father's health status, 1 = good	0.46	0.48	−0.03
	(0.02)	(0.02)	(0.03)
11. Mother ever migrated, 1 = yes	0.49	0.49	0.00
	(0.03)	(0.03)	(0.04)
12. Father ever migrated, 1 = yes	0.81	0.80	0.01
	(0.02)	(0.02)	(0.03)
Family characteristics at baseline			
13. Number of siblings	1.04	1.00	0.04
	(0.05)	(0.04)	(0.06)
14. Family asset value, in 1000 yuan	3.66	3.66	0.00
	(0.28)	(0.29)	(0.40)
15. Number of observations	474	944	1418

Cluster-robust standard errors in parentheses; ***$p < 0.01$, **$p < 0.05$. Students in the 'must-follow' group were weighted to account for the attrited students.

Table A3. Covariates pre-balance check among students directly tracked in the third-round follow-up survey.

Variable	Treatment group	Control group	Difference between treatment and control group, (3) = (1) − (2)
	(1)	(2)	(3)
Student characteristics at baseline			
1. Student age, in years	13.45	13.51	−0.06
	(0.06)	(0.06)	(0.09)
2. Female student, 1 = yes	0.47	0.52	−0.05
	(0.02)	(0.02)	(0.03)
3. Plans to go to academic high school at baseline, 1 = yes	0.48	0.47	0.02
	(0.02)	(0.02)	(0.03)
4. Plans to go to vocational school at baseline, 1 = yes	0.14	0.14	−0.01
	(0.01)	(0.01)	(0.02)
5. Normalised Standard TIMSS Test at baseline	0.05	−0.14	0.19**
	(0.06)	(0.06)	(0.08)
6. Student's expected cost of academic high school, in 1000 yuan	12.06	11.22	0.85
	(0.65)	(0.49)	(0.81)
Parents' characteristics at baseline			
7. Mother's years of schooling, in years	5.52	5.21	0.30
	(0.24)	(0.21)	(0.32)
8. Father's years of schooling, in years	7.01	7.15	−0.16
	(0.18)	(0.13)	(0.22)
9. Mother's health status, 1 = good	0.34	0.38	−0.04
	(0.03)	(0.02)	(0.04)
10. Father's health status, 1 = good	0.45	0.48	−0.03
	(0.02)	(0.02)	(0.03)
11. Mother ever migrated, 1 = yes	0.48	0.49	−0.01
	(0.03)	(0.03)	(0.04)
12. Father ever migrated, 1 = yes	0.80	0.81	−0.01
	(0.02)	(0.02)	(0.03)
Family characteristics at baseline			
13. Number of siblings	1.04	1.00	0.04
	(0.05)	(0.04)	(0.06)
14. Family asset value, in 1000 yuan	3.78	3.62	0.16
	(0.28)	(0.29)	(0.40)
15. Number of observations	443	801	1244

Cluster-robust standard errors in parentheses; ***$p < 0.01$, **$p < 0.05$. Students in the 'must-follow' group were weighted to account for the attrited students.

Table A4. Summary of previous studies in developing countries of the impact of CCTs on educational outcomes.

Country	Programme	Evaluation methods	Age/grades	Educational Outcome variables	Impacts[a]	Source
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Bangladesh	Female Secondary School Assistance Program	FE	Age: 11–18 years (girls)	Enrolment rate	12.0**	Khandker et al. (2003)
Brazil	Bolsa Escola/Familia	FE	Grade 1–4	Enrolment rate	5.5***	Glewwe and Kassouf (2012)
			Grade 5–8	Enrolment rate	6.5***	
Cambodia	Japan Fund for Poverty Reduction	DD	Grades 7–9 (girls)	Enrolment rate	31.3***	Filmer and Schady (2008)
	Cambodia Education Sector Support Project	RDD	Grades 7–9	Enrolment rate	21.4***	Ferreira et al. (2009)
China	Conditional Cash Transfer	RCT	Grade 8	Dropout rate[b]	−8.0**	Mo et al. (2013)
Chile	Chile Solidario	RDD	Age 6–15	Enrolment rate	7.5***	Galasso (2006)
Columbia	Familias en Accion	PSM, DD	Age 8–13	Enrolment rate	2.1**	Attanasio et al. (2005)
			Age 14–17	Enrolment rate	5.6***	
Ecuador	Bono de Desarrollo Humano	IV, RCT	Age 6–17	Enrolment rate	10.3**	Schady and Araujo (2008)
Honduras	Program de Asignacion Familiar	RCT	Age 6–13	Enrolment rate	3.3**	Glewwe and Olinto (2004)
Jamaica	Program of Advancement through Health and Education	RDD	Age 7–17	School Attendance	0.5**	Levy and Ohls (2007)
Mexico	Oportunidades	RCT	Grades 1–5	Enrolment rate	1.9	Schultz (2004)
			Grade 6	Enrolment rate	8.7***	
			Grade 7–9	Enrolment rate	0.6	
Nicaragua	Atencion a Crisis	RCT	Age 7–15	Enrolment rate	6.6***	Macours and Vakis (2008)
	Red de Proteccion Social	RCT	Age 1–13	Enrolment rate	12.8***	Maluccio and Flores (2005)
Pakistan	Punjab Education Sector Reform Program	DDD	Grade 10–14 (girls)	Enrolment rate	11.1***	Chaudhury and Parajuli (2008)
Turkey	Social Risk Mitigation Project	RDD	Primary school	Enrolment rate	−3.0*	Ahmed et al. (2007)
			Secondary school	Enrolment rate	5.2	

DD, difference-in-difference method; DDD, difference-in-difference-in-difference; FE, fixed-effects analysis; IV, instrument variable method; PSM, propensity score matching method; RCT, randomised controlled trails; RDD, regression discontinuity design.

[a]Cluster-robust standard errors in parentheses; ***$p < 0.01$, **$p < 0.05$.

[b]Positive impacts are observed when concerning on enrolment. To reducing the dropout rate, we observed negative impacts on decreasing dropout.