

**INFORMATION, COLLEGE DECISIONS AND FINANCIAL AID:  
EVIDENCE FROM A CLUSTER-RANDOMIZED CONTROLLED TRIAL IN CHINA**

Prashant Loyalka<sup>a</sup> ([prashant@ciefr.pku.edu.cn](mailto:prashant@ciefr.pku.edu.cn))

Yingquan Song<sup>a</sup> ([yqsong@ciefr.pku.edu.cn](mailto:yqsong@ciefr.pku.edu.cn))

Jianguo Wei<sup>a</sup> ([jgwei@ciefr.pku.edu.cn](mailto:jgwei@ciefr.pku.edu.cn))

Weiping Zhong<sup>a</sup> ([wpzhong@ciefr.pku.edu.cn](mailto:wpzhong@ciefr.pku.edu.cn))

Scott Rozelle<sup>b</sup> ([rozelle@stanford.edu](mailto:rozelle@stanford.edu))

<sup>a</sup>China Institute for Educational Finance Research (CIEFR), Peking University

<sup>b</sup>Stanford University, Freeman Spogli Institute for International Studies

July 2012

Corresponding Author:

Prashant Loyalka

China Institute for Educational Finance Research (CIEFR)

Building 17, Peking University

#5 Summer Palace Rd.

Beijing, PRC 100871

Phone: +1-573-2897470

JEL: I22, 015

Keywords and phrases: education, China, financial aid, information, RCT, experiment

**INFORMATION, COLLEGE DECISIONS AND FINANCIAL AID:  
EVIDENCE FROM A CLUSTER-RANDOMIZED CONTROLLED TRIAL IN CHINA**

ABSTRACT

Past studies find that disadvantaged students in the United States are often misinformed about college costs and financial aid opportunities and thus may make sub-optimal decisions regarding college. This information problem may be even more serious in developing countries. We therefore conducted a cluster-randomized controlled trial to examine the effects of providing information on college costs and financial aid to high school students in poor regions of northwest China. We find that information increases the likelihood that students receive some types of financial aid, but has no significant effect on specific college choices or whether students persist to go to college.

JEL: I22, 015

Keywords and phrases: Education, financial aid, information, cluster-RCT

## **1. Introduction**

Recent research underscores the effect of college costs and financial aid on educational outcomes (Long, 2008). Increased financial aid can improve college outcomes by lowering the price of college and loosening credit constraints (Dynarski, 2002). Empirical studies find positive effects of merit aid (Cornwell, Mustard, and Sridhar, 2006), needs-based aid (Kane, 1996) and educational loans (Dynarski, 2003). The effects are multidimensional; financial aid raises college attendance (Linsenmeier, Rosen and Rouse, 2006), increases enrollment (van der Klauuw, 2002), prolongs attendance (Bettinger, 2004) and influences college choice (Avery and Hoxby, 2003). As the cost of college in a net sense (that is, total cost minus the contribution of financial aid) is potentially of greatest concern to students from disadvantaged backgrounds, a number of studies focus on the effects of financial aid on lower-income and minority students (e.g. Linsenmeier, Rosen and Rouse, 2006).

Despite the importance of financial aid on student outcomes, students and their parents may not have complete or correct information about the costs of college and financial aid options (Ikenberry and Hartle, 1998; Horn, Chen, and Chapman, 2003; ACSFA, 2005). This information problem is especially prevalent among low-income families and minorities (McDonough and Calderone, 2006; Kane and Avery, 2004; Horn, Chen, and Chapman, 2003). According to several studies, if students and their parents overestimate the expected net costs of higher education (which includes underestimating the probability of receiving financial aid), they are less likely to attend college; they may choose colleges of lower quality; and/or they may fail to apply for all of the available sources of financial aid (Long, 2008;

Commission, 2006). As a consequence, differences in access to information about financial aid and college costs among the population of potential college students may in part explain why disadvantaged groups tend to have more difficulties attending college (Long, 2008).

To address this information problem, governments, universities and other private organizations in developed countries provide students and their families with steadily improving access to low-cost (or free), user-friendly materials about college costs and financial aid (Perna, 2006). Some organizations offer comprehensive intervention packages that include college counseling, mentoring and pre-college preparation programs (Long, 2008; Kane and Avery, 2004). The assumption is that the information conveyed through such materials and services helps students make better decisions. However, such assumptions are based on perception and not evidence. In fact, we are only familiar with one concurrent study in the United States that utilized experimental methods to evaluate the causal effects of providing this kind of information on college outcomes (Bettinger et al., 2009).

This paper contributes towards closing this gap in the literature by presenting experimental evidence about the effects of providing college cost and financial aid information on a student's choices of college, their persistence to go to college, and their likelihood of receiving aid. Specifically, in this paper we present results from a cluster-randomized controlled trial conducted across poor counties in Shaanxi province in Northwest China. During the intervention, designed and implemented by the authors, trained enumerators provided senior high school students in 41 high schools with comprehensive, user-friendly information about college costs and financial aid. After conducting a baseline survey and intervention in April 2008, we followed-up with students eight months later and

inquired about three main outcomes: what college did they choose to apply for; did they choose to repeat the college entrance exam, and did they receive financial aid. Our results indicate that college cost and financial aid information increased the probability that students received certain types of financial aid. The results also suggest that information had no significant impact on whether students chose to go to (free) military college or the likelihood that students repeated the entrance exam.

The findings of this paper may be of interest to policymakers in China. In 2007, the State Council implemented a new financial aid policy that, for the first time, provided extensive coverage and substantial funding to eligible students. Yet descriptive evidence, including our own baseline survey data, indicates that a significant proportion of students in their last year of high school, especially those of lower socioeconomic status, are not adequately familiar with the financial aid opportunities granted by this policy or even with college costs in general (Shi et al., 2007). According to the findings of the current paper, China's education system should provide more information to students so that they can take advantage of the financial aid available to them.

The rest of the paper is organized as follows. Section 2 describes the costs of attending college in China and introduces different types of financial aid instruments that are currently available to students. Section 3 explores how students in China are acquiring information about college costs and financial aid. In this section we also discuss how greater access to information may affect the college outcomes of students. Section 4 lays out the hypotheses. Section 5 describes the intervention, the cluster-randomized research design and the analytical

models. Section 6 describes the data from the baseline and post-intervention surveys. Section 7 presents the results of the analysis and section 8 concludes.

## **2. College costs and financial aid opportunities in China**

In 1999 the central government embarked on an ambitious initiative to expand higher education. Four-year college undergraduate enrollments grew from 2.7 million in 1999 to over 10 million in 2007 (National Bureau of Statistics of China, 2008). The number and diversity of higher education institutions (HEIs) also increased. Two years earlier, in 1997, cost-sharing (implemented in large part to finance the expansion of the college system) and financial aid also emerged in China's higher education system.

Together, the new cost-sharing policies, the expansion in enrollments and greater institutional differentiation combined to dramatically increase the public's concerns about the affordability of college. Scholars and educators began to discuss the challenges families faced in affording college (Chen and Zhong, 2002). In response, China's government began establishing policies for controlling college costs (MOE, NDRC, MOF, 2003) and introducing financial aid instruments that have steadily grown in scope and complexity.<sup>1</sup>

While college costs have grown everywhere, they vary systematically across the higher education landscape (Table 1).<sup>2</sup> College costs in China are fixed by policymakers in different agencies at both the central and provincial levels. Policymakers control tuition according to an institutional hierarchy that exists within the higher education system (rows 1 to 4). The two most selective university tiers, tiers one and two, are generally comprised of four-year public universities which admit only students with the highest college entrance exam scores. Paradoxically, college costs at these universities are relatively low compared to

those of the less competitive four-year private institutions that comprise tier three universities. The costs of tier four colleges are similar to those of tier one and two. Tuition fees also vary across different provinces and universities (columns 1 to 3). In fact, college costs can even differ across majors within the same university (Shaanxi Admissions Committee, 2007).

While rising costs have become a reality for those pursuing a college education, financial aid initiatives have emerged to help low-income students. In the 1990s policymakers began to offer subsidies and grants for low-income students. Work study programs were launched. Tuition reductions were ostensibly offered to students having trouble paying tuition and fees. A government-subsidized student loan scheme was also piloted. In 2000, education officials initiated the “green channel” program which was designed to allow low-income students to enroll in and begin attending university before undergoing a needs-based financial aid assessment or having to pay any tuition fees. A national merit scholarship was also implemented in 2004.

Even after these programs were established, however, many gaps still remained. In 2007 the State Council made several adjustments to the existing financial aid system. First, it significantly expanded the national needs-based grant program with the goal of providing enough funding to reach 20 percent of total college enrollment. Second, it provided a greater number of merit-based scholarships. Third, it offered full-tuition waivers and stipends to students who enrolled in one of six normal universities affiliated with the Ministry of Education (MOE). Finally, the government piloted a new kind of student loan scheme in which students could apply for loans in their hometowns through the China Development Bank (hereafter referred to as “home-based” loans).

### **3. Information about college costs and financial aid in China**

Despite the rapid expansion of and continual reforms within China's higher education system over the last decade, students continue to perceive that the levels of tuition and fees are a major barrier to obtaining a college education. A significant proportion of students in our baseline survey (described below) show a limited knowledge of college costs and financial aid. Given the complex nature of China's university admissions process and the fact that students are granted admission into only one university, such lack of information may inhibit students from making optimal choices. In this section we first discuss when and how students acquire information on college costs and financial aid. In the second part of the section we explore the potential importance of timely and complete information.

#### **3.1 How students access information**

To gain admission into college, China's high school students take a provincial-wide college entrance exam at the end of their senior year. A week or two later, students fill out a college choice form (called the *zhiyuan* form) and submit their top choices in each of the different tiers of colleges to a provincial education authority. In filling out their college choice form, students are able to choose several universities within each of the four university tiers (described in section 2), as well as from a "pre-tier" which is comprised of universities that have special permission to offer early admissions to students (e.g. military universities, arts and sports universities). After the college entrance exam scores of the students are tallied, provincial educational authorities sort through the college choice forms, matching students to universities according to their score ranking. At the end of the sorting process, each student is assigned to only one university. Admitted students receive an admissions packet in



mid-summer and then have just one choice—attend the college to which they are assigned or not attend college. If they choose to matriculate, students go to their university around late August, pay the required tuition and fees and are then enrolled.

In lieu of a formal program or information source to help guide students through this process, high school students rely on a mix of information sources, including their parents, friends and teachers (Liu et al., 2008). Economically-disadvantaged students in fact often get information from individuals who themselves never went to college and are generally not in a position to keep up with the latest changes in educational policy (Liu et al., 2008).

Students' only official introduction to financial aid opportunities comes in the form of a financial aid informational booklet that is included in the admissions packet sent to students after they *have already been admitted* into public universities.<sup>3</sup> In other words, students do not have access to the booklet, which is created by the Ministry of Education and the Ministry of Finance, when they fill out their college choice form. In their admissions packet, students also officially learn *for the first time* about the costs of going to the particular college into which they are enrolling. Students also do *not* find out about whether or not they are eligible for financial aid until—at the earliest—the middle of their first semester in university.

### **3.2 The importance of access to information**

The problems resulting from inadequate information about college costs and financial aid have the potential to seriously affect the choices and educational outcomes of students everywhere. Net college prices may directly affect the educational choices of students—especially in poorer developing countries like China. Having access to adequate college cost and financial aid information may be particularly important for poor students

from rural areas, as the average annual tuition for a public four-year Chinese university is roughly 150% of an average rural household's yearly disposable income.<sup>4</sup> The tuition and fees can be many times more than the income of a family at the poverty line.

Unlike the US, where colleges usually offer financial aid packages to attract students *before* they make their decision to enroll, students in China formally learn about financial aid only once they have made their college choices and been admitted into one specific university. This lack of timely information about costs and financial aid may cause students to make poor college-related choices. Without having a clear idea of China's HEI fee structure or the financial aid opportunities that they may be eligible for, students might overestimate the cost of attending more selective universities. Such a miscalculation could, for example, cause students to choose lower-ranked schools or to apply for military universities or teaching colleges (which although free, require lengthy periods of service upon graduation). At the same time, some students could underestimate the cost of college. If so, they may choose to enroll in an institution that they cannot afford and thus have to make the difficult post-admissions decision of whether or not to attend the college despite its high costs, reapply for college the next year, or choose an option outside of the higher education system. In China, where students gain admission into a single HEI and generally cannot transfer to another university or department, the ramifications of making poorly-informed choices are serious.

Students from disadvantaged backgrounds may especially lack information. For example, educators in poorer regions may provide lower quality information to their students or students may not be able to acquire informational resources easily through the Internet. This is further exacerbated by the fact that the language used in China's financial aid policies

tends to be jargon-laden and difficult to understand. These types of information constraints raise the costs of college decisions for disadvantaged students (Hastings et al., 2007).

Finally, because China's education system tracks students at various points along their educational careers, misinformation about net college costs could deter disadvantaged students from aspiring or preparing for college early on (Long, 2008). Parents lacking accurate information about college costs and financial aid may assume that they will not be able to afford college in the future, and thus early on steer their children into non-academic tracks or allow them to drop out of school altogether and join the unskilled labor force.

#### **4. Hypotheses**

The broad research questions of this paper are: How does access to information about college costs and financial aid affect the choice of college? Does information affect persistence in attempts to go to college? Can access to information increase the likelihood of receiving financial aid? In this section we explore these questions in more detail within the context of the present study and provide a specific hypothesis for each.

##### **4.1 Information and College Choice**

There are many dimensions of college choice in China that might be affected by increased access to information. Given the complexity of China's application and admissions process (as well as the ways in which this process could interact with an information intervention to offer diverse and competing incentives to students from different backgrounds), we decided that it was difficult to produce unambiguous hypotheses when considering some dimensions of college choice. Indeed, the complexity of China's admissions matching process combined with the fact that aid is allocated only after students enter college makes the value

of providing information difficult to assess for many choices. For the sake of illustration, Appendix 1 presents a simple model of choice to illustrate the potential role of college cost and financial aid information in affecting students' college choices.

For example, we specifically chose not to look students' choices to go to one of six normal universities that offered free tuition as a result of the financial aid policy in 2007; this is because this policy also required students to agree to spend a lengthy period of service as a teacher (and perhaps in a certain location) in exchange for such aid. Thus the direction of the effect of information about financial aid on whether a student chose to apply for one of these six normal universities is not clear a priori.

We decided to focus on a single college choice that could be directly affected by receiving more college cost and financial aid information and that would enable us to predict a relatively clear direction for the treatment effect. Specifically, in our main analyses we examine the effect of improved access to information about college costs and financial aid on a student's decision to apply for early admission to a military college. Though military colleges have been widely known not to charge tuition or other fees for decades, they do require students to serve in the military for a lengthy period of time, thereby restricting their future career mobility (and possibly their long run expected earnings).<sup>5</sup> If students who choose to attend a military college due to financial constraints are aware that non-military colleges have potentially lower net costs than they previously expected, they may be less likely to apply for an early admissions military college.<sup>6</sup> We thus hypothesize that:

*Hypothesis A. Having greater access to college cost and financial aid information will make students less likely to submit an early admissions choice to go to a military college.*

## **4.2 Information and College Attendance**

Each year, approximately 30 percent of students in Shaanxi choose to retake the annual college entrance exam. These students can be divided into two subgroups: (1) students who did not score high enough on the exam to qualify for any college; (2) students who did not score high enough to qualify for the university or university tier of their choice.

In our study, students who did not score high enough to qualify for college, but who were given more information about college costs and financial aid, may find net college costs to be less than they originally thought. Such students may be more likely to spend another year to prepare for and retake the exam the following year. Thus, we hypothesize that:

*Hypothesis B. Having greater access to college cost and financial aid information will increase the probability that students who did not get into college will prepare to take the college entrance exam again the next year.*<sup>8</sup>

## **4.3 Information and the likelihood of receiving financial aid**

There are a few reasons why the probability of students receiving certain types of financial aid may change when they have better access to information. Better information could raise their awareness that aid exists and is quite extensive, help them better prepare for the application process and notify them of their rights. Access to information might also allow students to express grievances if they have unfair experiences.<sup>9</sup> Finally, better information may let low-income students know that they may be able to take advantage of the “green channel” protocols (mentioned in section 2) that have been set up to aid poor students during the early periods of matriculation into their colleges.

In this paper we look at needs-based grants in particular, since they have the widest coverage by far among the different types of financial aid and are targeted specifically at low-income students. In addition, needs-based grants are a relatively new form of aid.

In the same vein, we also look at the green channel policy. An information intervention may be expected to have an effect because during the baseline, a large proportion of students did not appear to understand this policy.

Following the above discussion, we posit that:

*Hypotheses C and D. Having greater access to college cost and financial aid information will increase the likelihood that students receive needs-based grants (C) and take advantage of the green channel policy (D).*

## **5. The intervention and research design**

To answer the questions above, we designed and implemented a cluster-randomized controlled trial (hereafter “cluster-RCT”) across 41 counties in Shaanxi province. This section discusses the use of cluster-RCTs to assess information interventions, describes our particular intervention and presents the research design and model.

### **5.1 Cluster-randomized controlled trials and information interventions**

Many scholars consider well-conducted, policy-relevant randomized experiments to be the best platform from which to draw causal inferences (Shadish and Cook, 2009). In addition to potentially minimizing selection bias which often plagues studies involving observational data, randomized experiments can potentially reduce publication bias (Duflo, Glennerster and Kremer, 2007). Glewwe and Kremer (2006) also argue for the use of

randomized experiments to examine the impact of school inputs on student outcomes instead of traditional production function approaches used pervasively in the economics of education.

In this paper, our concern is that students and their families may possess different degrees of information about college costs and financial aid, and this is likely to be correlated with a number of observable and unobservable factors that are in turn associated with college outcomes. A well-designed randomized experiment may help address this selection-bias issue and estimate the true impact of college cost and financial aid information.

Cluster-RCTs differ from individual-RCTs in that intact clusters such as schools are assigned to treatment or control groups and yet the outcomes of individuals who are nested within those clusters are analyzed. There are several reasons why we chose to conduct a cluster-RCT instead of randomizing at the level of individual students. First, running a cluster-RCT enabled us to conduct the intervention in the natural setting of the classroom. A scaled-up intervention from government agencies would likely provide information through schools directly. Also, the use of a cluster-RCT across 41 “nationally-designated poor counties” from Shaanxi province increased the external validity of our study.<sup>10</sup> Our sample is fairly representative of senior students in non-fast track classes in the largest (and sometimes only) high schools in poor counties in Shaanxi. Furthermore, by sampling geographically dispersed clusters, we avoided information spillovers that would have compromised experimental validity.

## **5.2 The intervention**

In this study, students in randomly-selected “treatment” classes were primarily given information on college costs and financial aid through a 30-page user-friendly booklet. The

booklet contained information related to financial aid, including the target population and explanations about the different financial aid programs supported by the central government (including merit-based scholarships, needs-based grants, tuition waivers, various types of subsidies, loans, work-study options, military and teaching college fee waivers and stipends and the green channel policy). The booklet also detailed the exact process for applying for financial aid, including an explanation of the materials students need to prepare before arriving at university. Other sections of the booklet discussed the timing of receiving financial aid both within and across a student's college years; provided different government agency hotline numbers for further inquiries or to report problems; and listed additional web resources and policy documents to which students could refer. Yet another part of the booklet was devoted to college costs. In particular, we produced tables that illustrated the price ranges that students from Shaanxi would face if they were admitted to different tier universities. These tables also documented the variation in tuition list prices across majors in various provinces and in university tiers across China. Dorm fees and other costs were discussed.

In producing the booklet, we took care to make sure the information was presented in an accessible manner. It was written in a simple, jargon free question-answer format that covered the information in a concise yet thorough manner and designed with clear headings, large fonts, and an attractive color cover. The booklet is posted on our website (ID INFO).<sup>11</sup>

Each treatment class also received a 17-18 minute oral presentation that covered the main points of the booklet. The presentations were delivered by trained enumerators who were instructed to give the presentations exactly the same way each time.<sup>12</sup> After the presentation, five minutes were left open for students to ask questions that might be answered



using the content of the booklet only.<sup>13</sup> After the question-answer period, the students were asked to fill out an anonymous five-minute feedback form regarding the booklet and presentation.<sup>1</sup> The feedback form was designed to elicit qualitative evidence about whether or not the information intervention was helpful and to examine whether students had further questions about the topics covered or others that were not addressed.<sup>14</sup> Students in treatment classes were also asked to take the booklet home and share its content with their parents.

### **5.3 Research design and model**

The sample for our cluster-RCT was drawn from the largest high school in each of 41 nationally-designated poor counties in Shaanxi Province and was chosen in a four step process. The first step involved generating a list of the 41 counties from which we chose the largest (and sometimes only) high school in each county.<sup>15</sup> The second step involved randomly assigning 20 schools to receive an information treatment intervention and 21 schools to receive no intervention.<sup>16</sup> The third step involved visiting each school and randomly choosing one non-fast track class of third-year students (seniors) from “science track” classes.<sup>17</sup> Students in these classes were given the information intervention (if they were in a treatment school). This enabled us to examine the differences in college-related outcomes between treated and untreated students from science classes to find the main effects of the information intervention.

We were concerned that information given to the treatment group might in some way make its way to students in the control schools. We thus tried to minimize the existence of *uncontrolled* information spillovers and other types of unintended externalities when

---

<sup>1</sup> Enumerators also briefly introduced themselves to students in both treatment and control groups, gave each student in both groups a small gift (a pen), and briefly thanked all students for participating in the general survey.

constructing the research design. For example, we decided to randomize at the level of counties to minimize the sharing of information between students in treatment and control groups, as this would likely bias the treatment estimates. Furthermore, as mentioned in section 2, as it seemed possible that the information intervention could interact with China’s complex college and application process (especially since students compete for a limited number of university and major spots), we decided to target the intervention to only one class per treatment school. In this way we avoided creating general equilibrium effects in which the college and major choices of some students could crowd out the choices of students who did not receive the intervention. Similarly, we wanted to avoid the situation in which application for financial aid of the treated students could crowd out the efforts of other students to obtain aid.

*Statistical Models.* We used unadjusted and adjusted ordinary least squares (OLS) regression analysis to estimate how college choices and financial aid receipt changed for students that received the financial aid information intervention relative to students that did not receive the intervention. We first regressed each outcome variable on a treatment indicator, which indicated whether schools received the financial aid information intervention. The basic specification of the “unadjusted model” is:

$$Y_{ij} = \beta_0 + \beta_1 I_j + u_{1ij} \tag{1}$$

where  $Y_{ij}$  represents the outcome variable of interest of student  $i$  in school  $j$ .  $I_j$  is a dummy variable that takes a value of 1 if the school that the student attended was in the information treatment arm and 0 if the student was not in the information treatment arm. The symbol  $u_{1ij}$  is a random error term.

We also estimated an “adjusted model” which controls for baseline variables:

$$Y_{ij} = \beta_0 + \beta_1 I_j + X_{ij} \beta + u_{2ij} \quad (2)$$

where the additional term  $X_{ij}$  in equation (2) represents a vector of variables that includes information from the baseline survey. Specifically, these baseline variables include age, gender, parents’ highest education level, number of siblings, urban/rural residence, a dummy for father’s occupational status (1 = high status, 0 = low status), and a dummy for whether a student had a minimum goal of attending at least a second-tier university (“student aspiration”). We also include a dummy variable that notes whether or not a county was affected by the earthquake in May 2008.<sup>19</sup> For the financial aid receipt outcomes, we also added an indicator variable that equaled 1 if students felt they could receive that type of aid. In all regressions, we accounted for the clustered nature of our sample by constructing Huber-White standard errors corrected for school-level clustering (relaxing the assumption that disturbance terms are independent and identically distributed within schools).

In addition to the main analysis, we also conduct an analysis of heterogeneous effects. Specifically, we examine whether female students (as opposed to male students) are affected by the information intervention. We also examine whether students of lower socioeconomic status (SES) are particularly affected by the intervention differently than students from better off families. We measure lower SES by a dummy indicator of whether a student’s father’s education level is below high school or not. In our sample, 55% of students have a father whose education level is below high school.

*Other Statistical Issues:* We paid close attention to statistical power. We tried to minimize across-cluster variation by focusing on poor counties within the same province and choosing the largest high school in each county. We also chose non fast-track classes.

## 6. Data

Our field experiment took place in Shaanxi province in northwest China. Shaanxi is one of China's poorest provinces. It ranks 26<sup>th</sup> out of 31 among provinces in terms of average per capita disposable income for urban dwellers and 28<sup>th</sup> for rural residents.<sup>20</sup> Shaanxi has 107 counties, but in our study we surveyed only the 41 that are officially designated as poor counties. Altogether we collected baseline survey data in April 2008 on 2,508 science students. Research teams first asked students in all classes to fill out a short baseline questionnaire.<sup>21</sup> Enumerators also collected baseline information from teachers and principals about classroom and school characteristics.

Data from the baseline survey show that the randomization across schools resulted in treatment and control groups which were reasonably identical in baseline characteristics (Table 2). The number of females was slightly higher in the treatment group, while the age was slightly lower.<sup>2</sup> Because of this, we control for these covariates (as well as the other covariates) in our later regression analyses.

Figure 1 further shows the distribution of students' baseline survey estimates of the gross tuition fees for first tier universities. From this figure, we can see that students tend to overestimate tuition prices: the median estimate of first tier colleges is more than 50% the

---

<sup>2</sup> Although high school entrance exams are different between different prefectures in Shaanxi province (a prefecture is composed of several counties), we also examined the balance in high school entrance exam scores (after creating z-scores for each prefecture) between students in treatment and control schools. Although this is a somewhat crude analysis, we found that students had similar high school entrance exam score distributions between treatment and control groups.

maximum tuition of a first-tier university in Shaanxi province. The range of student estimates also varies considerably. Student estimates of tuition prices for all other tiers have very similar distributions (i.e. the median prices grossly overestimate actual tuition prices in Shaanxi and vary widely around the median) (results not shown). These findings are especially pertinent as most students admitted into college in our sample eventually enter a higher education institution in Shaanxi. Finally, 16% of the students in our sample reported that they never heard of needs-based grants and 75% of students reported that they had never heard of the green channel policy, indicating that students were not familiar with certain types of financial aid.

We followed up with students in December 2008 via both telephone and Internet, locating 93.3% (2341) of students.<sup>22</sup> In the follow-up, we asked students about their educational or occupational status, their score on the college entrance exam, the choices they made on the college choice form, and whether they applied for and received each of the main types of financial aid. Briefly, we found that over 99% of students in the sample took the entrance exam, 56% attended college, and 31% chose to repeat their last year of high school to retake the college entrance exam.

## **7. Results and Discussion**

Our main analysis in the first subsection below looks at the effects of the information intervention on college-related outcomes between students in treatment and control science-track classes. The analysis focuses on explaining four binary outcomes: a) the probability of applying for early admission into a military college; b) the probability of repeating the college entrance exam; c) the likelihood of receiving needs-based grants; and d)

the likelihood of qualifying for the green channel policy. We run heterogeneous effect analyses to see whether the information intervention particularly impacted female students and students of lower socioeconomic status. We also perform several robustness checks for missing data for the analyses in subsection 7.2 to examine if our results are affected by the (relatively mild) attrition in our post-intervention data. Finally, in 7.3 we explore student feedback (from students in science-track treatment classes) about the intervention.

## 7.1 Results

In regards to Hypothesis A, we are unable to reject the null hypothesis that the intervention does not have a significant impact on the choice of early admission to a military college. The estimate from the unadjusted model is small in magnitude and has a large standard error (Table 3A, Row 1). The estimate from the covariate adjusted model is also small in magnitude and statistically insignificant (Table 3B, Column 1). In other words, we find little evidence that the intervention affected the decision to apply to a military college.

In regards to Hypothesis B, we could not reject the null hypothesis that the information intervention does not have a significant impact on the decision to repeat the college entrance exam for lower SES students (Tables 3A and 3B).<sup>24</sup> The estimate from the unadjusted model is again small in magnitude and is not statistically significant at even the 10% level (Table 3A, Row 2). The same holds for the covariate-adjusted model (Table 3B, Column 2). We therefore find little evidence that the intervention affected the decision to repeat the college entrance exam.

Although our results find little evidence that the information intervention impacts students' college choices, we find that the intervention does impact the likelihood that

students receive financial aid. Specifically, the results indicate that the intervention may affect the likelihood that students receive needs-based grants (hypothesis C). The unadjusted and covariate-adjusted estimates are both positive and statistically significant at the 10% level (Table 3A, Row 3; Table 3B, Column 3). The magnitude of the effect is not small: the information intervention increases the likelihood of receiving needs-based grants by about 4 percentage points or 30%.

The results also show that the information intervention may impact the likelihood that students participate in the green channel program (hypothesis D). Similar to the results for needs-based grants, the unadjusted and covariate-adjusted estimates are both positive and statistically significant at the 10% level (Table 3A, Row 4; Table 3B, Column 4).<sup>25</sup> The impact is substantial: the information intervention increases the likelihood that students will receive the green channel by about 2.5 percentage points or 109%.

The impact of the information intervention is more striking for particular subgroups of students. For example, according to our heterogeneous effects analysis, the information intervention increased the likelihood that female students received one of type of financial aid. Specifically, female students that received the information intervention were more likely to receive needs-based grants by 9 percentage points (table omitted for the sake of brevity). The result is statistically significant at the 1% level. The result accords with other studies in China which indicate that female university students in Shaanxi are more likely to receive needs-based grants, in general, even after controlling for other background factors (Loyalka et al., 2012). The information intervention did not, however, increase the likelihood that female

students would be more likely to choose a military university, retake the college entrance exam, or qualify for the green channel.

The information intervention also increased the likelihood that students of lower SES received financial aid. Specifically, the results show that the information intervention increases the likelihood that students from lower SES households use the green channel services by 4 percentage points (table omitted for the sake of brevity). The result is statistically significant at the 1% level. The information intervention did not increase the likelihood that students of lower SES status would be more likely to choose a military university, retake the college entrance exam, or receive needs-based grants.

Beyond our main four hypotheses, we also explore the effect of the information intervention on other forms of financial aid (Tables 4A and 4B): the receipt of nationally supported, home-based loans (column 3), the receipt of nationally supported, school-based loans (column 4) and access to special subsidies for poor students (column 5).<sup>26</sup> The results from these analyses indicate that information may positively affect the likelihood of a student being able to obtain a home-based loan (row 1, column 3). The effect is fairly large in magnitude and is statistically significant at the 5% level. The information intervention may have especially impacted the likelihood that students received home-based loans, since the policy of home-based loans was implemented across the nation in the same year that we conducted the information intervention.

There are several possible reasons why the information intervention appears to have no effect on the choice of military college or repeating the college entrance exam. Outcomes are perhaps influenced more by factors besides information on college costs and financial aid.



Specifically, elements such as: a) the returns to different colleges and majors; b) personal preferences for different institutions and future careers; c) the influence of family, teachers and peers in making college-related decisions (informed or not); d) family background; and e) performance on the entrance exam may have greater influence on college-related decisions. Furthermore, it could be that the intervention was not powerful enough because current policy does not reduce fees sufficiently to influence the decisions of students. It is also possible that the information was not presented over a long enough time or in the proper manner. Finally, it is possible that students in the midst of high-pressure preparations for the college entrance exam could not absorb the information from the intervention. Future research might test if earlier interventions affect college choices and repeat exam decisions.

Our analysis suggests that information does increase the likelihood that students will receive certain types of financial aid, notably needs-based aid, the green-channel policy and home-based loans. On our baseline survey, a large proportion of students especially stated that they were unfamiliar with the green channel policy. Home-based loans were also a relatively new policy that students may not be familiar with. Moreover, it is important to note that home-based loans are best applied for and used prior to the matriculation of students into university. This would also partially explain why our intervention affected this type of aid more than others.

## **7.2 Accounting for Missing Observations**

As mentioned in section 6, in the follow-up evaluation survey in December 2008, we were able to locate 93.3% of the students. Despite this small proportion of missing observations in the post-intervention survey, balance in observable characteristics is for the

most part maintained across treatment and control groups for both types of classes among the students we located (see Table 5). Similar to the situation of the balance in baseline covariates (see Table 2), the proportion of females was slightly higher in the treatment group, while the average age was slightly lower.

We seek to account for missing data in two ways. We first run the analyses without making missing data adjustments—this is the “listwise deletion” approach which is only viable under the missing completely at random assumption (Schafer and Graham, 2002). However, the students that we could not find may be missing non-randomly because of certain factors that also affect the relationship between access to information and one of the college outcomes. As such, we also tested the robustness of our results by using multiple imputation for the missing data. Specifically, we impute the missing outcome values across clusters within treatment and control groups separately. Multiple imputation makes findings robust under a more general missing at random assumption (Schafer and Graham, 2002).

The results of our analysis were substantively similar whether we use listwise deletion or multiple imputation (results omitted for the sake of brevity). Namely, that the intervention has a statistically significant (at least at the 10% level) and positive effect on the likelihood of receiving needs-based aid or the green channel, but no discernible effects on the other two outcomes.

### **7.3 Feedback Form Results**

The feedback portion of the intervention was intended to learn about students’ subjective impressions about whether they found the intervention helpful. Approximately 90% of the treated science-track class students said they found the financial aid information

intervention helpful (50%) or very helpful (40%). These students gave reasons for why the information was helpful. While more than half of the reasons were limited to general statements such as “I learned more about the university financial aid system and related policies”, students also indicated that they learned more about specific types of financial aid such as grants (7%), the green channel (3%), loans (14%), scholarships (9%), work-study (4%) as well as the costs of college (7%). In addition, 94% of all treatment science-track students also said their parents would find the financial aid information booklet helpful (66%) or very helpful (28%). These positive reactions to the intervention support the idea that information may have an impact on the chances that students receive financial aid.

While it is possible that students made positive statements on their feedback forms out of politeness to the enumerators, students also provided feedback about ways in which the booklet and presentation could be improved, as well as whether or not the information would affect their college choices and how. Out of the one-third of the treated science-track students who said the intervention could be improved: about 27% wanted still more detailed information about college costs and financial aid, while about 2% asked that the style and/or quality of the presentation and booklet be improved. Finally, about 25% of the treated science-track students said that the intervention would affect their college choices. Out of these students, about 41% said that they would now choose a college only after further considering aid and expenses (but they did not state specifically how their choices would change), about 20% of them said that knowing about these financial aid policies would allow them to choose a higher-quality college without having to worry about finances, another 11% said they would choose a less-expensive college. Altogether, we find that a significant

proportion of students felt information would affect their college choices, albeit in different ways.

## **8. Conclusion**

This study conducted a cluster randomized controlled trial in poor counties in northwest China to evaluate the effects of providing college cost and financial aid information on senior high school students' future college outcomes. The results of the study indicate that such information has little impact on the decision to apply for early admission at a military university or the likelihood that students of lower socioeconomic status choose to retake the college entrance exam. Our information intervention does however increase the likelihood that students receive certain types of financial aid.

Why did our information intervention increase the probability of receiving needs-based aid and the green channel? First, our financial aid information intervention was more detailed than the booklet given (to students admitted into college) by the government regarding the procedures and rights for getting college financial aid. The government booklet was also not often seen by students that entered private colleges. In addition, our information intervention was given a few months earlier than the government's financial aid booklet; this allowed treated students more time to overcome bureaucratic hurdles to acquire materials (such as proof of "financial need") from their hometown government offices. This is especially the case for home-based loans for which our exploratory analysis also found significant effects; home-based loans require students to go to the government office in the county seat and complete a number of procedures before leaving for college. Given that admissions letters were sometimes sent to students only a few weeks before the college start-date, many students may have missed the opportunity to apply for these loans. Our results therefore bear some similarity to those of Liu et al. (2011), who find that the timing of financial aid offers for high school seniors in China can impact their college outcomes.

The results differ somewhat from those of Bettinger et al. (2009) who find that a financial-aid “information-only” intervention (particularly one that gives personalized aid estimates and net tuition cost information for a few local public colleges) does not have a significant effect on the likelihood of submitting a FAFSA application for students in the United States. Possible reasons for the difference in findings between the two studies are that students from poor areas in low and middle-income countries lack informational resources to a greater extent and/or that the financial aid process is orders of magnitude more complex in the United States than in China.

Based on the results of this study then, Chinese policymakers who design financial aid instruments may consider improving the way their programs are publicized. In particular, efforts could better target high school students from poor areas in a timely manner (i.e. before the college entrance examination). Similar efforts are, in fact, being pursued in other countries outside of China. For example, a 2005 report to the United States government presented 8 out of 10 relatively costless recommendations to increase access to such information (ACSFA, 2005). The main goal of such efforts is to increase the educational aspirations and efforts of students concerned about the burden of college costs. Similarly, policymakers in China may want to provide greater access to user-friendly information online; provide cost calculators to help students and their families determine eligibility; and provide standardized curriculum to introduce college cost and aid information in earlier grades.

One limitation of our study was that we only provided information to students in their last semester of high school, when they were busy preparing for the college entrance exam, and at which point they may have already solidified their college choices. Subsequent research could therefore look at the effect of such an information intervention in earlier grades and also examine a broader set of college choices. The concern about college cost and financial aid information is actually part of a broader issue concerning the lack of formal

school counseling in pre-tertiary levels in China. Overall there may be considerable room to help students and their families become better informed about their educational choices. We hope this study stimulates exploration into these issues in China and elsewhere.

### **Endnotes**

<sup>1</sup> “Costs” in this paper refers to tuition fees and other direct college expenditures (e.g. dormitory fees) from the perspective of students and families.

<sup>2</sup> In this section we discuss tuition fees. Other college fees have been capped by government policies. For example, dormitory fees across all university types cannot exceed 1200 RMB (about 180 US dollars) per year (MOE, NDRC and MOF, 2003).

<sup>3</sup> The content of this booklet is similar to the one used in our intervention, but it does not include information on general college costs, contains fewer details about the process by which students apply for financial aid and their basic rights, and also includes less detail about certain types of aid, including home-based loans.

<sup>4</sup> This figure was obtained by dividing the average rural household income in Shaanxi in 2007 (Shaanxi Statistical Yearbook, 2008), by the list tuition prices for Shaanxi four-year public universities found in Table 1. By comparison, the annual list price for four year college in the US is \$32,307, about half of the annual income of the median US family (Long, 2008).

<sup>5</sup> This phenomenon is widely known among the general population in China since early-admission into military colleges has historically always been cost-free.

<sup>6</sup> Also, the early admissions college choice takes precedence over other first, second, third, and fourth tier college choices. Thus, if qualified students choose an early admissions military college, they will not have other college choices.

<sup>7</sup> However, contrary to our hypothesis, it could also be that some students now perceive the

absolute cost of college to be too high, and therefore decide not to try to take the college entrance exam again. Given the high rate of return to college in China (Heckman and Li, 2003), as well as the existence of loans and other types of financial aid which loosen students' credit constraints, we think this may not be as important a consideration, however.

<sup>8</sup> We note that the effect of the information intervention on retaking the exam is theoretically ambiguous. On one hand, the intervention might increase the likelihood that students who did not get into any college retake the exam. This is because students who did not get into any college may perceive that it is less expensive to go to college than they originally thought (before the information intervention) and thus try to gain admissions into college again. On the other hand, the intervention might also decrease the likelihood that students who did get into a particular college retake the college entrance exam. For example, the information intervention may have made the student aware of financial aid opportunities that allowed them to attend that college (when they otherwise would not in the absence of the intervention).

Because we cannot look at the impact of the intervention on the subset of students who did not qualify for college (since not qualifying for college is itself a post-treatment outcome), we attempt to focus our later analysis on the subsample of students that is more likely to perform poorly on the college entrance exam and not get into college. We do not have a direct measure in our baseline data to identify which students are likely to perform poorly on the exam and be left out of schools, however. Testing the effects of the information intervention on the subsample of students who did not get into any school would be inappropriate because admission is endogenous to the treatment. Therefore, we later test Hypothesis B using the

subsample of students who are from families of lower SES later on in the paper (i.e. when we test for heterogeneous effects). Specifically we limited the sample to 55% of the original sample by including only the students whose father's had a completed (at most) a junior high school education or below. We look at students of lower SES because they comprise a subsample of students that is more likely to do poorly on the college entrance exam and be left out of all schools. As we note later in the results section, however, the information intervention does not cause students of lower socioeconomic status to retake the exam more.

<sup>9</sup> We examine the outcome “received aid” rather than “applied for aid” because our intervention focuses on helping students prepare well for the entire application process—that is, it informs them about how policymakers intend to target aid, individual student rights, as well as where students can express grievances.

<sup>10</sup> In 1994, the State Council of China identified 50 “national poor counties” in Shaanxi Province which contained over 5 million people under the national poverty line.

<sup>11</sup> The authors exerted great efforts to ensure the quality of the information intervention (e.g. circulating draft booklets among policymakers/researchers, piloting in other poor counties, and extensive training of enumerators to ensure a highly-standardized presentation).

<sup>12</sup> The enumerators spent numerous sessions together standardizing the delivery of the intervention under the supervision of the authors and according to a detailed outline. We further conducted two pilots in which the delivery of all enumerators was observed to ensure that the content and delivery was identical. Variation in individual enumerator presentation styles does not likely have much of an effect on student outcomes.

<sup>13</sup> The presenters were asked not to answer questions outside of the content of the booklet to



keep the treatment uniform across classes.

<sup>14</sup> Note that students in the treatment classes were not told that they would receive any type of intervention until after they finished their baseline questionnaire.

<sup>15</sup> Out of the 50 nationally designated poor counties in Shaanxi province in Spring 2008, the high schools in 8 counties had already been concurrently chosen as the sites of another RCT about the effects of early financial aid offers on high school senior students' college-going outcomes (see Liu et al., 2011). The high schools in one other poor county in the province were chosen as pilot schools for our financial aid information intervention. We thus excluded these 9 counties from our main research design. The remaining 41 counties represent the majority of poor counties in Shaanxi province.

<sup>16</sup> There were numerous barriers to acquiring adequate information about the characteristics of these high schools before randomization. We were thus unable to use randomization techniques that might have increased power (e.g. pair-matching, see Imai et al., 2009)

<sup>17</sup> This type of class prepares students for the *science* (versus the *humanities*) track of the provincially-based college entrance exam. Around two-thirds of admitted college students in Shaanxi in 2008 came from the science track.

<sup>18</sup> We present results from ordinary least squares (OLS) with robust, school/county-level clustered errors, as is standard in the economics literature (e.g. see Jensen, 2010). Since all of our outcomes are binary variables, we also ran logit models and random effects logit models (with adjusted standard errors for clustering at the school-level, see Hayes and Moulton, 2009; Raudenbush and Bryk, 2002). We also ran generalized estimating equations models (with an exchangeable correlation matrix and robust SEs; see Liang and Zeger, 1986). The results from

the logit, random effects logit and generalized models are omitted for the sake of brevity. The results, however, are substantively the same as the results from the OLS model (both in terms of the statistical significance and magnitude of our treatment effect estimates).

<sup>19</sup> Two counties in our sample were affected by the earthquake and students from these counties were given additional financial aid assistance by universities.

<sup>20</sup> Source: China 2007 National Economic and Social Development Statistical Bulletin.

<sup>21</sup> After all the questionnaires were handed in, research assistants distributed the information booklet and then began the oral presentation.

<sup>22</sup> We compared baseline characteristics of students in attrition and non-attrition groups. Groups were similar on observable variables (e.g. age, gender, urban, test scores, and parent education level). The number of students missing in the treatment group (86) was also similar to that of the control group (82).

<sup>24</sup> We also limited the sample to those who did not directly qualify for fourth tier universities (see section 4.2 for a discussion) and found similar results.

<sup>25</sup> In addition to testing the above confirmatory hypotheses (Schochet, 2008), we also explored whether the information intervention affected other outcomes prior to being accepted to college, yet upon which the receipt of financial aid might be conditional. Namely, we found no statistically significant effects of the intervention on the likelihood of taking the college entrance exam, college entrance exam scores (on average and at various quantiles), the likelihood of filling out college choices at all (yes or no), or the likelihood of being admitted into college. Our unadjusted estimates do however show that students are 7 percentage points more likely to go to university if they receive the information intervention. The result is (only)

statistically significant at the 10% level. Students that received the information intervention may have decided to go to university more if their perceived costs of attending university become lower (as students become more aware of more chances to receive financial aid and of lower tuition prices). The fact that students that received the information intervention decided to go to college more could also explain why students that received information were more likely to receive financial aid. However, the result could also be due to random chance since it was only significant at the 10% level and we are now testing a number of hypotheses.

<sup>26</sup> These analyses are exploratory as testing multiple hypotheses reduces statistical power (Schochet, 2008), and we thus refrain from drawing strong conclusions from them.

## References

- Advisory Committee on Student Financial Assistance (ACSFA). (2005). The student aid gauntlet: Making access to college simple and certain. *Final report of the Special Study of Simplification of Need Analysis and Application for Title IV Aid*. Washington DC: Department of Education.
- Avery, C. & Hoxby, C.M. (2003). Do and should financial aid packages affect students' college choices? NBER Working Paper 9482.
- Bettinger, E. (2004). How financial aid affects persistence. In C. Hoxby (Ed.), *College choices: The economics of which college, when college, and how to pay for it* (pp. 207-238). Chicago: University of Chicago Press and NBER.
- Bettinger, E., Long, B.T., Oreopoulos, P. & Sanbonmatsu, L. (2009). The role of simplification and information in college decisions: Results from the H&R Block FAFSA experiment. NBER Working Papers 15361.
- Bloom, H.S., Richburg-Hayes, L. & Black, A.R. (2007). Using covariates to improve precision for studies that randomize schools to evaluate educational interventions. *Educational Evaluation and Policy Analysis*, 29(1), 30-59.
- Chen G.S., & Zhong, Y.P. (2002). Theory and empirical analysis of higher education costs and returns. Beijing: Beijing Normal University Press.
- Commission on the Future of Higher Education. (2006). *A test of leadership: Charting the future of U.S. higher education*. Washington, DC: U.S. Department of Education.

- Cornwell, C., Mustard, D. & Sridhar, D. (2006). The enrollment effects of merit-based financial aid: Evidence from Georgia's HOPE scholarship. *Journal of Labor Economic*, 24(4), 761-786.
- DesJardins, S. L., Ahlburg, D. A., & McCall, B. P. (2006). An integrated model of application, admission, enrollment, and financial aid. *Journal of Higher Education*, 77(3), 381–429.
- Duflo, E., Glennerster, R. & Kremer, M. (2006). Using randomization in development economics research: A toolkit. In T.P. Schultz & J. Strauss (Eds.), *Handbook of development economics* (pp. 3895-3962). North Holland: Elsevier Science Ltd.
- Dynarski, S. (2002). The behavioral and distributional implications of subsidies for college. *American Economic Review*, 92 (2), 279-85.
- Dynarski, S. (2003). Loans, liquidity, and schooling decisions. John F. Kennedy School of Government Faculty Research Working Paper, Harvard University.
- Glewwe, P., & Kremer, M. (2006). Schools, teachers, and education outcomes in developing countries. In E. Hanushek & F. Welch (Eds.), *Handbook of the economics of education*, 2(16), 945-1017.
- Hastings, J., Van Weelden, R. & Weinstein, J. (2007). Preferences, information, and parental choice behavior in public school choice. NBER Working Paper No. 12995.
- Hayes, R. J., & Moulton, L.H. (2009). *Cluster randomized trials*. Boca Raton, Florida: Chapman & Hall/CRC.
- Heckman, J.J. & Li, X.S. (2003). Selection bias, comparative advantage and heterogeneous returns to education. NBER Working Paper 9877.

Horn, L.J., Chen, X.L. & Chapman, C. (2003). *Getting ready to pay for college: What students and their parents know about the cost of college tuition and what they are doing to find out*. Washington, DC: U.S. Department of Education, National Center for Education Statistics.

Ikenberry, S.O., & Hartle, T.W. (1998). *Too little knowledge is a dangerous thing: What the public thinks about paying for college*. Washington, DC: American Council on Education.

Imai, K., King, G. & Nall, C. (2009). The essential role of pair matching in cluster-randomized experiments, with application to the mexican universal health insurance evaluation. *Statistical Science*, 24, 29–53.

Jensen, R. (2010). The perceived returns to education and the demand for schooling. *Quarterly Journal of Economics*, 125(2), 515-548.

Kane, T.J. (1996). Lessons from the largest school voucher program ever: Two decades of experience with pell grants. In B. Fuller, R. Elmore, & G. Orfield (Eds.), *Who chooses? Who loses? Culture, institutions and the unequal effects of school choice*. New York: Teachers College Press.

Kane, T. J., & Avery, C. (2004). Student perceptions of college opportunities: The Boston COACH program. In C. Hoxby (Ed.), *College decisions: The new economics of choosing, attending and completing college*. Chicago: University of Chicago Press and the National Bureau of Economic Research.

Kim, Jiyun, Stephen L. DesJardins, and Brian P. McCall. 2009. "Exploring the Effects of Student Expectations About Financial Aid on Postsecondary Choice: A Focus on

- Income and Racial/Ethnic Differences.” *Research in Higher Education* 50 (8) (June 25): 741–774. doi:10.1007/s11162-009-9143-x.
- Liang, K.Y. & Zeger, S.L. (1986). Longitudinal data analysis using generalized linear models. *Biometrika*, 73 (1), 13-22.
- Linsenmeier, D. M., Rosen, H.S. & Rouse, C.E. (2006). Financial aid packages and college enrollment decisions: An econometric case study. *The Review of Economics and Statistics*, 88 (1), 126-145.
- Liu, C.F., Zhang, L.X., Luo, R.F., Rozelle, S., Sharbono, B., & Shi, Y.J. (2008). Development challenges, tuition barriers and high school education in China. *Asia Pacific Journal of Education*, 29 (4), 503 – 520.
- Liu, C.F. Zhang, L.X., Luo, R.F., Wang X.B., Rozelle, S., Sharbono, B., Adams, J., Shi, Y.J., Yue, A., Li, H.B., & Glauben, T. (2011). Early commitment on financial aid and college decision making of poor students: Evidence from a randomized evaluation in rural China. *Economics of Education Review* 30 (4), 627-640.
- Long, B.T. (2008). What is known about the impact of financial aid? Implications for policy. National Center for Postsecondary Research Working Paper.
- Loyalka, P., J.G. Wei, Song, Y.Q. (2012). Is aid reaching poor students? The distribution of student financial aid across China’s higher education system.” *China Economic Review*. <http://dx.doi.org/10.1016/j.chieco.2012.04.010>.
- Manski, C.F., “Adolescent Econometricians: How Do Youth Infer the Returns to Education?” in *Studies of Supply and Demand in Higher Education*, Charles T. Clotfelter and Michael Rothschild, eds. (Chicago: University of Chicago Press, 1993).

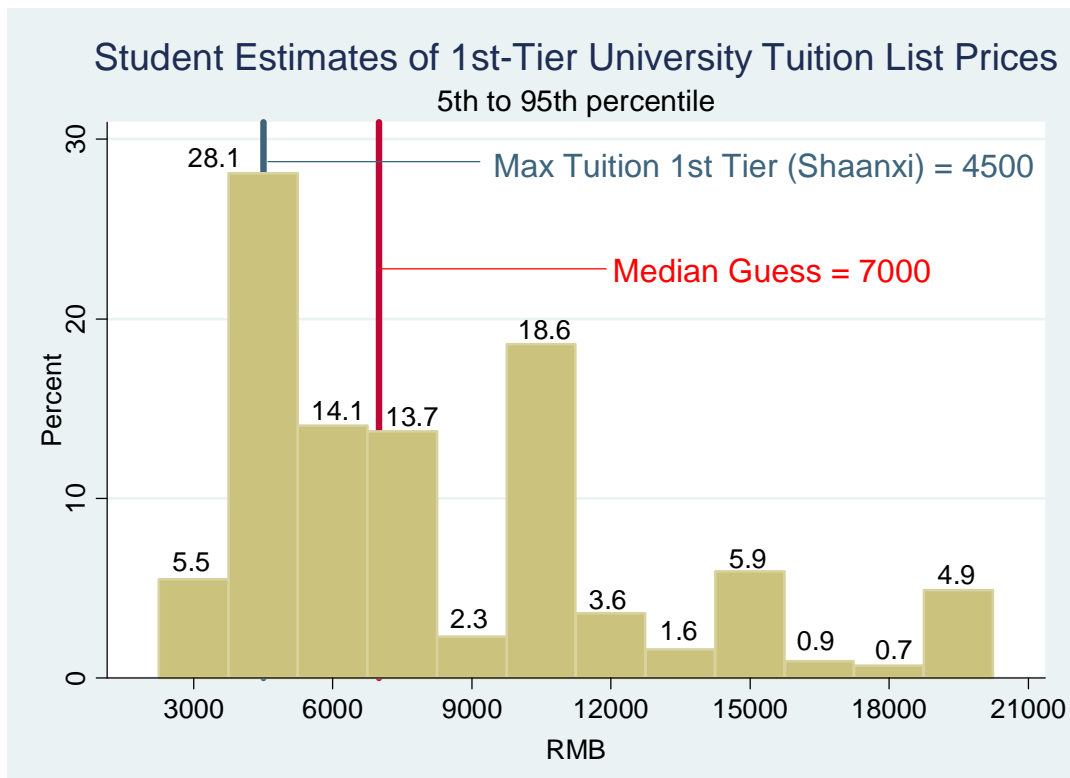
- Manski, C.F. 2007. Identification for Prediction and Decision. Cambridge: Harvard University Press.”
- McDonough, P.M. & Calderone, S. (2006). The meaning of money: Perceptual differences between college counselors and low-income families about college costs and financial aid. *American Behavioral Scientist*, 49 (12), 1703-1718.
- Ministry of Education and Ministry of Finance. (2007). Guidelines concerning the determination of financial need for low-income university students. China.
- Ministry of Education, National Development and Reform Commission, and Ministry of Finance. (2003). Notice on School Tuition Issues. China.
- National Bureau of Statistics. (2008). China Educational Statistics Yearbook. Beijing: China Statistics Press.
- Perna, L.W. (2006). Understanding the relationship between information about college prices and financial aid and students’ college-related behaviors. *American Behavioral Scientist*, 49(12), 1620-1635.
- Raudenbush, S.W. & Bryk, A.S. (2002). *Hierarchical linear models*, 2nd edition. Thousand Oaks, CA: Sage.
- Schafer, J.L. & Graham, J.W. (2002). Missing data: Our view of the state of the art. *Psychological Methods*, 7(2), 147–177.
- Schochet, P. Z. (2008). Statistical power for random assignment evaluations of education programs. *Journal of Educational and Behavioral Statistics*, 33(1), 62-87.
- Shaanxi Statistical Yearbook. (2008).



- Shaanxi Admissions Committee. (2007). *2006 Higher Education Institution Student Recruitment Plan*. Northwest University Press.
- Shadish, W.R., & Cook, T.D. (2009). The renaissance of field experimentation in evaluating interventions. *Annual Review of Psychology*, *60*, 607-629.
- Shi, Y.J, Zhang, L.X., Bai, Y.Y., Luo, R.F., Sylvia, S., Sharbono, B., & Rozelle, S. (2007). Taking the next step: Are information and finances holding poor rural students back? NSDRC Working Paper WP-07-E4.
- State Council of China. (2007). Opinions on Establishing and Improving the Policies for Subsidizing College Students of Regular Undergraduate Education, Post-secondary and Secondary Vocational Schools for Families with Financial Difficulties.
- Van der Klauuw, W. (2002). Estimating the effects of financial aid offers on college enrollment: A regression discontinuity approach. *International Economic Review*, *43* (4), 1249-1287.
- Zhang, M., Tsiatis, A.A., & Davidian, M. (2008). Improving efficiency of inferences in randomized clinical trials using auxiliary covariates. *Biometrics*, *64*, 707-715.

**Figure 1: Student Estimates of First Tier University Tuition Prices**

*Source: baseline survey responses of students in our sampled high schools in 41 poor counties*



**Table 1: Range (Minimum to Maximum) of Tuition List Prices (RMB) for Different University Tiers across China in 2009**

	<b>Beijing/Shanghai</b>	<b>Shaanxi</b>	<b>Other Regions</b>
First and second tier universities (public four year)	4200-10000	3500-4500	2500-5500
Third tier universities (private four-year)	11500-18000	8500-10000	6000-18000
Fourth tier public colleges (three-year vocational)	6000-7500	4500-6100	1200-7000

**Source: Shaanxi Admissions Committee (2007)**

*Notes:* (1) China's State Council (2007) fixed list tuition prices at 2006 levels for five years. (2) Tuition prices across tiers and across provinces are somewhat higher for more competitive majors.

**Table 2: Baseline Traits for Treatment and Control Groups**

<b>VARIABLE</b>	<b>Treat ment</b>	<b>Control</b>	<b>Difference (p-value)</b>
Female	.41	.34	.07
Height	1.68	1.68	.63
Parent's education level	6.23	6.01	.31
Father's occupation	.38	.34	.32
No. of siblings	1.73	1.69	.78
Urban	.21	.18	.38
Age	18.7	18.9	.02
Expect can receive needs-based grants	.62	.60	.70
Willing to repeat entrance exam	.51	.48	.53
Class Size	61.6	60.5	---
# earthquake counties	1	1	---

N = 2486-2503

**Table 3A: The Effects of Financial Aid Information on Student Outcomes**  
*(Descriptive Analyses, Unadjusted for Covariates)*

	(1) all students	(2) information arm	(3) control arm	(4) difference between information and control arms
Chose Military University (%)	9.6	10.5	8.7	1.8 (2.3)
Repeated College Entrance Exam (%)	31.4	31.7	31.1	0.6 (4.8)
Received Needs-based Grant (%)	14.2	16.1	12.4	3.7* (2.2)
Received Green Channel (%)	3.5	4.8	2.3	2.5* (1.4)
Received Home-based Loan (%)	7.1	10.3	4.0	6.3*** (2.0)
Received National Loan (%)	1.3	1.0	1.6	-0.6 (0.0)
Received Poverty Subsidy (%)	4.0	3.8	4.2	-0.4 (1.0)

Robust standard errors in parentheses, \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table 3B: Effects of Financial Aid Information on Student Outcomes**  
*(OLS Regressions, Adjusted for Covariates)*

	(1)	(2)	(3)	(4)
	chose military univ (Y/N)	repeat college entrance exam (Y/N)	received needs- based grant (Y/N)	received green channel (Y/N)
Treatment	0.02 (0.02)	-0.01 (0.03)	0.04* (0.02)	0.02* (0.01)
Earthquake county (Y/N)	0.01 (0.02)	-0.05 (0.08)	0.09*** (0.03)	0.00 (0.01)
Age	-0.02** (0.01)	-0.04*** (0.01)	0.01 (0.01)	-0.00 (0.01)
Female (Y/N)	-0.07*** (0.01)	-0.07*** (0.02)	0.04** (0.02)	0.00 (0.01)
Urban (Y/N)	0.01 (0.02)	-0.02 (0.03)	-0.04** (0.02)	-0.01 (0.01)
Parent's education level	0.00 (0.01)	0.01 (0.02)	-0.01 (0.02)	-0.01 (0.01)
Father's occupation	0.02 (0.02)	0.05* (0.03)	-0.01 (0.02)	-0.02** (0.01)
1 sibling	-0.00 (0.03)	0.03 (0.04)	-0.01 (0.02)	-0.00 (0.01)
2+ siblings	-0.02 (0.03)	0.01 (0.04)	0.02 (0.03)	0.01 (0.01)
Student aspiration	0.08*** (0.01)	0.16*** (0.03)	-0.00 (0.02)	0.02 (0.01)
Will choose military univ.	0.05*** (0.01)			
Willing to repeat exam		0.19*** (0.02)		
Expect needs-based grant			0.05*** (0.01)	
Expect green channel				-0.00 (0.01)
Constant	0.34** (0.14)	0.93*** (0.22)	-0.09 (0.16)	0.09 (0.10)
Observations	2,253	2,249	2,256	2,256
R-squared	0.051	0.118	0.022	0.016
Robust standard errors in parentheses				
*** p<0.01, ** p<0.05, * p<0.1				

**Table 4A: Estimates of Financial Aid Information on the Receipt of Various Types of Financial Aid**

(Without Covariate Adjustments, using non-Imputed Data)

	(1)	(2)	(3)	(4)	(5)	(6)
	needs-based grant	green channel	national loan	home- based loan	poverty aid	tuition waiver
Treatment	0.04*	0.03*	-0.01	0.06***	-0.00	-0.00
	(0.02)	(0.01)	(0.00)	(0.02)	(0.01)	(0.01)
Constant	0.12***	0.02***	0.02***	0.04***	0.04***	0.01**
	(0.01)	(0.00)	(0.00)	(0.01)	(0.01)	(0.00)
Observations	2,337	2,337	2,337	2,337	2,337	2,337
R-squared	0.003	0.005	0.001	0.015	0.000	0.001
Robust standard errors in parentheses						
*** p<0.01, ** p<0.05, * p<0.1						

**Table 4B: Estimates of the Effects of Financial Aid Information on the Receipt of Various Types of Financial Aid**

(With Covariate Adjustments, using non-Imputed Data)

	(1)	(2)	(3)	(4)	(5)	(6)
	needs-based grant	green channel	national loan	home-based loan	poverty aid	tuition waiver
Treatment	0.04*	0.02*	-0.01	0.06***	-0.00	-0.00
	(0.02)	(0.01)	(0.00)	(0.02)	(0.01)	(0.00)
Expect aid+	0.05***	-0.00				
	(0.01)	(0.01)				
Earthquake county	0.09***	0.00	-0.00	-0.05	0.01	0.06***
	(0.03)	(0.01)	(0.01)	(0.05)	(0.02)	(0.02)
Age	0.01	-0.00	0.00	0.00	0.01	-0.00
	(0.01)	(0.01)	(0.00)	(0.01)	(0.01)	(0.00)
Female	0.04**	0.00	0.00	0.00	-0.01	-0.00
	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)
Urban	-0.04**	-0.01	-0.01	-0.03***	-0.01	-0.01**
	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)
Parents' education	-0.01	-0.01	-0.00	0.00	0.00	0.00
	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)
Father's occupation	-0.01	-0.02**	0.01	-0.01	-0.01	0.00
	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)
1 sibling	-0.01	-0.00	-0.00	0.03*	0.02	0.00
	(0.02)	(0.01)	(0.01)	(0.02)	(0.01)	(0.00)
2+ siblings	0.02	0.01	-0.01	0.04**	0.02	-0.00
	(0.03)	(0.01)	(0.01)	(0.02)	(0.01)	(0.00)
Student aspiration	-0.00	0.02	0.01	0.06***	0.01	-0.00
	(0.02)	(0.01)	(0.00)	(0.01)	(0.01)	(0.00)
Constant	-0.09	0.09	-0.05	-0.04	-0.10	0.01
	(0.16)	(0.10)	(0.05)	(0.16)	(0.11)	(0.04)
Observations	2,256	2,256	2,256	2,256	2,256	2,256
R-squared	0.022	0.016	0.003	0.037	0.005	0.025
Robust standard errors in parentheses						
*** p<0.01, ** p<0.05, * p<0.1						



**Table 5: Balance between Treatment and Control Groups for Non-Missing Cases**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Expect aid	Earthquake county	Age	Female	Urban	Parents' education	Father's occupation	No. of siblings	Student aspiration
Treatment	-0.00	0.00	-0.21**	0.06*	0.03	0.06	0.03	0.05	0.01
	(0.02)	(0.07)	(0.10)	(0.03)	(0.03)	(0.04)	(0.04)	(0.17)	(0.10)
Observations	2,335	2,335	2,326	2,310	2,317	2,318	2,323	2,331	2,331
R-squared	0.000	0.000	0.014	0.004	0.002	0.003	0.001	0.000	0.000
Robust standard errors in parentheses									
*** p<0.01, ** p<0.05, * p<0.1									

## Appendix 1.

We use a simple random utility model (RUM) framework to illustrate the potential role of college cost and financial aid information in affecting students' college choices (see Manski, 2007). In our study, we assume that an individual student  $i$  chooses between two college choices  $j$  or  $k$  based on the expected utilities  $E[U_i(\cdot)]$  associated with  $j$  and  $k$ . The student is also limited in his/her choices by a budget constraint in which the total cost of college cannot exceed the total resources available for investing in student  $i$ 's college education. Subject to the budget constraint, if  $E[U_i(j)] \geq E[U_i(k)]$  then student  $i$  chooses  $j$ . Otherwise, student  $i$  chooses  $k$ . For example, a student can choose to go to a military college ( $j$ ) or not ( $k$ ), can choose to retake the college entrance exam ( $j$ ) or not ( $k$ ), and so on. In a more general situation in which a student's college choice set includes two or more colleges, a student will choose college  $j$  over colleges  $\neq j$  if the expected utility of choosing  $j$  is greater than the expected utility of choosing any other college in the choice set.

More specifically, we assume that the utility associated with a particular college choice can be represented by the following linear specification:

$$U_i(\cdot) = B_i\alpha + C_i\beta + R_i\delta + \varepsilon_i.$$

In the model,  $B_i$ ,  $C_i$ , and  $R_i$  are each vectors representing the different types of perceived benefits, costs, and risks associated with making a particular college choice. That is, students make choices based on perceived rather than actual benefits, costs, and risks (Manski, 1993).  $\alpha$ ,  $\beta$ ,  $\delta$ , in turn, each represent vectors of coefficients in the relationship between  $B_i$ ,  $C_i$ ,  $R_i$

and utility  $U_i(\cdot)$ .  $\varepsilon_i$  represents unobserved factors related to utility. When estimating the coefficients of the model, the college choice literature often assumes that  $\varepsilon_i$  is i.i.d. according to an extreme value distribution (Kim et al., 2009; DesJardins et al., 2006).

We can further specify the perceived benefits, costs, and risks associated with making a particular college choice. We assume that  $B_i$  is a combination of the perceived pecuniary and non-pecuniary benefits associated with a particular college choice.  $C_i$  is a combination of the perceived net college fees (total college fees  $F_i$  minus expected financial aid receipt  $A_i$ ), opportunity costs  $O_i$ , and non-pecuniary costs  $N_i$  associated with a particular college choice ( $C_i\beta = \beta_1F_i - \beta_2A_i + \beta_3O_i + \beta_4N_i$ ). Finally,  $R_i$  is a combination of the perceived risks associated both with the future benefits (e.g. future earnings) as well as with the future costs (e.g. net college fees) associated with a particular college choice. More specifically,  $R_i\delta = \delta_1V(E_i) - \delta_2V(F_i - A_i)$ , where  $V(E_i)$  is the perceived variation in future earnings and  $V(F_i - A_i)$  is the perceived variation in net college fees associated with a particular college choice.

Using the above model, we hypothesize that the college cost and financial aid information intervention mainly affects college choices through perceived costs ( $C_i\beta$ ). For example, in our baseline survey, students tend to overestimate total college fees and underestimate financial aid receipt. The information intervention can thus lower (perceived) total college fees ( $F_i$ ) and decrease expected financial aid receipt ( $A_i$ ) for college choice  $j$  (say retaking the college entrance exam among students who do not get into college) relative to college choice  $k$  (not retaking the college entrance exam among students who do not get into college). This will increase the likelihood that students choose  $j$  over  $k$ . In the case of

military colleges, we assume that students already know that there are no college fees for military colleges and yet that attending a military college carries a high opportunity cost (and perhaps high non-pecuniary cost) of having to work in the military for a number of years after graduation. Students will therefore be less likely to choose a military college (college choice  $j$ ) versus a non-military college (college choice  $k$ ) when they learn that the relative total costs might be lower (e.g.  $F_i$  is lower and  $A_i$  is higher) for a non-military college ( $k$ ).

In many cases, even when the information intervention affects perceived costs, the effects of the intervention may be theoretically ambiguous. For instance, the information intervention may increase the expected financial aid receipt ( $A_i$ ) that a student can receive if they gain admission into one of the top six normal colleges. At the same time, the information intervention may increase the perceived opportunity costs  $O_i$  from attending a top six normal college (since the new financial aid policy stipulates that a student who benefits from the generous financial aid at the top six normal colleges must also work for several years as a teacher in his/her hometown after graduation). We are therefore unable to predict whether the information intervention will increase the likelihood that a student chooses one of the top normal colleges.

The college cost and financial aid information intervention may also affect expected utility through perceived risks. If we assume that students from poor, rural counties are risk-averse, then a decrease in the perceived variation of net college fees for college choice  $j$  relative to college choice  $k$  will increase the likelihood that students choose  $j$  over  $k$ . Indeed, the considerable variation in perceived total college fees that students report in our baseline survey indicates that the information intervention may lower their perceived net

college fees in general.

Finally, the information intervention can increase the likelihood that a student makes college choice  $j$  (over competing choices) by affecting a student's budget constraint. In other words, a student initially may not be able to afford college choice  $j$  because of short-term credit constraints. If the information intervention makes the student feel that he/she has a higher chance of qualifying for a college loan, the intervention may effectively move the student's perceived budget constraint. The student will therefore not abandon a college choice  $j$  (at least early on, between the time of college admissions and college registration) due to credit constraints.