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## China Economic Review



## The distribution of financial aid in China: Is aid reaching poor students?

Prashant LOYALKA\*, Yingquan SONG, Jianguo WEI

China Institute for Educational Finance Research, #5 Summer Palace Rd., Rm. 406, Education Building, Peking University, Beijing 100871, China

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## ABSTRACT

China's central government incrementally introduced various kinds of student financial aid since the late 1990s in response to public concerns about the rising burden of college prices. Despite the marked increase in financial assistance from governmental as well as non-governmental sources in recent years especially, little is known about how well aid is currently distributed across Chinese universities and whether it is successfully reaching needy students. We use a unique randomly-sampled dataset of all local senior college students in one northwest province and a combination of non-parametric, semi-parametric and fixed effects methods to examine how various types of financial aid are currently distributed to students of different backgrounds across the university system. We also evaluate whether aid is reaching the main target population of low-income students. We primarily find that government-financed aid is allocated evenly across universities of varying selectivity and is reaching its target population of low-income students within universities. By contrast, university- and society-financed aid is not reaching low-income students. In addition, students in the most selective universities receive large implicit subsidies as they have high instructional costs, get more aid, and pay low tuition fees. Finally, a significant proportion of disadvantaged students do not seem to receive any type of aid.

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## 1. Introduction

In 1997, China's central government instituted a cost-sharing policy that required most of the country's college students to begin paying tuition and other college fees. This cost-sharing policy financed the subsequent rapid expansion of the higher education system leading to an almost five times increase in student enrollments over a decade (Loyalka, Song, & Wei, 2009a). From 1997 to 2006, college tuition alone nearly tripled from 1620 yuan to 4500 yuan per student year and occupied a significant proportion of average household disposable income (Cui, 2007; Yu, 2008). Affording a college education thus became a concern for many, especially economically-disadvantaged families in China.

In response to these concerns, the Chinese government incrementally introduced various kinds of financial aid, including scholarships, need-based grants and loans to help students pay for college. In 2007, the State Council mandated that the amount of financial assistance for college students be substantially augmented to approximately 27.3 billion yuan (about 3.7 billion US dollars), with the majority to be spent on low-income students (Ministry of Education, 2008a). On a smaller scale, social organizations, local governments and universities also increased aid ostensibly for disadvantaged college students.

Unfortunately, policymakers in many developing countries face difficulties in accurately gauging how well student financial aid is reaching target populations (Johnstone, 2003), and China is no exception. Because China lacks a well-developed tax system, there is no universal and accurate way of measuring a student's household income. Provincial governments therefore ask

\* Corresponding author. Tel.: +86 15001166847; fax: +86 10 62756183.

E-mail addresses: [prashant@ciefr.pku.edu.cn](mailto:prashant@ciefr.pku.edu.cn) (P. Loyalka), [yqsong@ciefr.pku.edu.cn](mailto:yqsong@ciefr.pku.edu.cn) (Y. Song), [jgwei@ciefr.pku.edu.cn](mailto:jgwei@ciefr.pku.edu.cn) (J. Wei).

universities to assess their overall student need and this is used as a basis to determine the distribution of lump transfers of financial aid funds across institutions. It is then the responsibility of each university to allocate financial aid to individual students who are most in need. However, without access to reliable household income data, universities are forced to measure need according to general background characteristics provided by students (Ministry of Education & Ministry of Finance, 2007). Combined with a lack of specific and universal guidelines about how to evaluate need and allocate aid (Ministry of Education & Ministry of Finance, 2007), it is likely that aid may not be distributed effectively to low-income students.

In light of these issues, this paper first examines how the main types of financial aid are allocated by aid providers (e.g. provincial governments) across the institutions of the four-year university system (i.e. by tracks, tiers, universities, and majors) and how well aid and net prices match with the general distribution of student's socioeconomic status (SES) across these institutions. In general, an efficient allocation of financial aid might consider the economic backgrounds as well as the expected returns of students across various institutions, providing relatively more grants to low-income students in institutions with low private returns and high social returns and relatively more loans to higher-income students in institutions with higher private returns (Oosterbeek, 1998). Policymakers in China may be unable to allocate aid in this manner, however, given their rough knowledge of the distribution of students from different economic backgrounds and returns across the university system, and because separate universities may further negotiate for maximum aid.

A second objective of this study is to present a more reliable description of how financial aid is distributed by institutions (in particular universities) to individuals from different backgrounds. In particular, we examine how well different types of financial aid are reaching poor students. We also see to what degree other student background characteristics besides SES are associated with the receipt of the main types of financial aid. Given the rather coarse information that colleges possess about students' economic background, we might expect a priori that aid may not be allocated effectively to poor students, but may instead be allocated to students according to other background characteristics such as high entrance exam scores.

Research in China has attempted to explore some of these issues (Li, 2006; Liu & Jiang, 2006; Shen, 2008; Sun & Yuan, 2005; Yang, 2010). Yang (2010) found that poorer students (as measured by self-reported household income), students with college-educated fathers, higher-performing students in science-related majors, female students and students who attend more selective institutions all tend to receive more aid. Shen (2008) similarly found that aid is allocated more to higher-achieving students. Despite using fairly large samples, however, these studies suffer from some major limitations. Foremost, they use unclear and potentially problematic sampling procedures either to select universities, departments, or individual students within those institutions and have relatively low survey response rates. They thus fall short of presenting a reliable description of the distribution of financial aid for a well-defined population. Second, these studies often use categorical information about parental education, occupation status, or level of self-reported family income as measures of household wealth or socioeconomic status (SES). These types of categorical measures such as parental educational level may not be detailed enough to account for potential non-linear relations between financial aid receipt and family economic background. Finally, with the exception of Shen (2008), all of these studies examine only one or two types of financial aid such as loans or need-based grants (Li, 2006; Liu & Jiang, 2006; Sun & Yuan, 2005) or conduct most of their analyses using total financial aid received as an outcome variable (Yang, 2010).

This paper addresses these limitations. We collected data on a 17% simple random sample of senior college students in Shaanxi province who attended one of the four-year universities in that province in 2008; to our knowledge, this is the first dedicated, large random sample of college students collected in China. The survey also had an extremely high response rate on all survey questions. We moreover constructed a continuous measure of relative socioeconomic status (SES) using self-reported household asset information and recent best practices in the development economics literature (Kolenikov & Angeles, 2009a; McKenzie, 2005). This continuous measure has been generally found to be as reliable as self-reported income measures in measuring SES and is used in fully non-parametric and semi-parametric regressions that account for the potential and likely non-linear associations between SES and aid receipt. As we explain in Section 4, failing to account for these nonlinear relationships could lead to misinterpretations of the data. Furthermore, because asset information is not collected by policymakers and university administrators, the use of our SES construct can be regarded as an independent means by which to assess wealth inequality between students. Finally, because we examine each of the main types of financial aid, we discuss the implications of our various findings for each of the related financial aid providers (such as policymakers, university administrators, banks, and social organizations) separately.

Altogether, we present several policy-relevant findings. First, government need-based aid and government merit aid is spread fairly evenly across the tracks, tiers, and four-year universities of the higher education system. While this distribution appears equitable from one perspective, it ignores the fact that students in more selective universities, who are from more advantaged backgrounds and who have higher expected returns to college, are receiving large implicit subsidies to attend college. Second, according to policymakers' stated intentions, government need-based aid is reaching lower-income students within universities while government merit-aid is reaching higher-ability and lower-income students within universities. Third, aid financed by societal organizations are allocated more to students at selective institutions rather than to students from disadvantaged backgrounds; this is despite the fact that many societal organizations often seek to target disadvantaged students. Fourth, university-financed aid is on the whole not being directed towards lower-SES students within universities even though policymakers have mandated that university aid should be targeted to low-income students. Fifth, financial aid is distributed to individuals not only in consideration of student SES, but also in consideration of other factors such as college entrance exam score, gender and party membership. Sixth, although over 60% of the students in our sample receive some types of financial aid, some poor students may have been inadvertently overlooked; in particular, approximately one-fifth of students in the bottom 30% of our constructed-SES distribution do not receive any type of financial aid.

The rest of the paper proceeds as follows. The second section provides background concerning the college fee structure across different university tiers in China, as well as the types of financial aid available to students. It also describes the principles used to allocate aid to institutions and the process by which universities determine student need. The third section describes the data. The fourth section explores the distribution of SES, financial aid and net college fees across the tracks, tiers, universities and majors of the four-year university system. The fifth section explores how well financial aid reaches individual low-income students and whether other factors are involved in receiving financial aid beyond SES. The sixth section discusses the overall results. The seventh section concludes.

## 2. College fees and financial aid

### 2.1. College fees

Policymakers in China have carefully regulated college tuition prices since cost-sharing began in 1997. For example, the government has mandated that tuition prices at higher education institutions (HEIs) remain fixed at 2006 levels until 2011 (State Council of China, 2007).<sup>1</sup> The government has also set tuition prices so that they vary systematically by tiers and majors. For instance, the tuition prices of the most selective first tier and second tier institutions (four-year public universities) are relatively low compared to those of the less selective third tier institutions (four-year private institutions). Third-tier prices are again much higher than fourth tier (three-year polytechnic) institutions (Table 1).<sup>2</sup>

### 2.2. Financial aid

Since the late 1990s, the government has introduced various types of financial aid such as loans, work study programs, tuition waivers, living subsidies, and scholarships. Even after these instruments were established, however, many gaps still remained. There were reports of poor high school students who passed their college entrance exams but were unable to attend because of the inability to pay for tuition and fees (Net, 2005).

In recognition of this problem, the State Council in 2007 substantially augmented the funding for financial aid and gave greater attention to the needs of low-income students (Ministry of Education, 2008a). Most notably, it expanded the national need-based grant program to reach 20% of total college enrollment, provided a greater number of merit-based scholarships, and piloted a new kind of student loan scheme in which students could more easily apply for loans in their hometowns (hereafter referred to as “home-based loans”).

In addition to this unprecedented effort from the government, financial aid has also become increasingly available through non-governmental sources. For example, public universities have been required by policymakers to set aside 4–6% of their operating revenues to assist low-income students (Ministry of Education & Ministry of Finance, 2007). Private universities that set aside a similar proportion of their operating revenues to assist low-income students are subsequently eligible to receive government financial aid (Ministry of Education & Ministry of Finance, 2007). Local governments, corporations, and philanthropic organizations also provide scholarships to college students (herein referred to as “society” aid). However, little is known about how much financial aid is currently provided by society or how this aid is targeted to students overall.

Table 2 lists the main types of financial aid that are currently financed respectively by the government, universities, society, and commercial banks (i.e. loans), along with a short description of each type of aid. “Government need-based aid” consists of need-based grants (*guojia zhuxuejin*) and living and meal subsidies (*linshi huoshi buzhu*).<sup>3</sup> “Government merit aid” consists of merit-based scholarships (*guojia jiangxuejin*), need-based merit scholarships (*guojia lizhi jiangxuejin*), and special major scholarships (*zhuanke jiangxuejin*). “University aid” consists of tuition waivers (*xuefei jianmian*), work-study (*qingong zhuxue*), special need subsidies (*teshu kunnan buzhu*), university scholarships, and university need-based aid. “Society aid” consists mostly of scholarships. Finally, two types of loans are provided through commercial banks—“school-based loans” (*guojia zhuxue daikuan*) and “home-based loans” (*guojia kaifa yinhang shengyuandi zhuxue daikuan*).

Central government policies provide general principles for how the above types of government aid, which together comprise a large proportion of total available financial aid, should be distributed across the higher education system.<sup>4</sup> For example, government merit aid should be allocated somewhat more to higher quality HEIs and HEIs that have “special majors that are necessary for the country's development” (Ministry of Finance & Ministry of Education, 2007).<sup>5</sup> Need-based grants, on the other hand, should target HEIs with low-income students but also be allocated somewhat more to Ethnic Minority HEIs and HEIs with special majors (Ministry of Finance & Ministry of Education, 2007). In addition, government aid should be allocated to eligible private HEIs based on their fee structure, enrollments, the types of majors they have (Ministry of Finance & Ministry of Education,

<sup>1</sup> Dormitory fees were also capped at 1200 RMB per year (Ministry of Education, National Development and Reform Commission, & Ministry of Finance, 2003).

<sup>2</sup> This study focuses on four-year university students. Due to the significant costs and time constraints associated with high quality data collection, we did not also randomly sample students in 3-year institutions.

<sup>3</sup> Living and food subsidies (*linshi huoshi buzhu*) are also partially financed from the operating revenues of universities.

<sup>4</sup> The total amount of financial aid (for three and four-year undergraduate students as well as graduate students) from the government (all levels), universities, and commercial banks in 2007 was equal to 27.3 billion yuan. The breakdown for 2007 was scholarships 25%, grants 25%, loans 34%, work study 5%, tuition waivers 3%, and need-based subsidies 8% (Ministry of Education, 2008a).

<sup>5</sup> “Special majors” includes agriculture, forestry, water utilities, geology, mining, petroleum, and nuclear power related-majors.

**Table 1**  
Approximate 2009 tuition list prices (yuan) for different tiers across China.

	Beijing/Shanghai	Shaanxi	Other regions
First and second tiers (4-year public HEIs)	7000	4000	4000
Third tier (4-year private HEIs)	15,000	9250	12,000
Fourth tier (3-year private and public HEIs)	6750	5800	4100

Notes:

- (1) State Council of China (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.

2007). While these principles govern the allocation of government aid to different types of universities, different provinces may still apply these principles somewhat differently.<sup>6</sup>

University administrators later determine how government and university aid are allocated to students within their own institutions. While policymakers give general guidelines, individual HEIs are given ample room to establish many of their own rules for assessing need and allocating aid (Ministry of Education, 2008b; Shaanxi Provincial Government, 2007).

To assess individual need, each HEI relies on household background information provided by students. In the fall semester of college each year, students fill out a basic, standardized form which asks about household member occupations and incomes, the number of household members, and urban versus rural residence status, in addition to some other information relevant to assessing need (Ministry of Education & Ministry of Finance, 2007).<sup>7</sup> Thus financial need is assessed and financial awards are allocated, even for new college entrants, after students have already enrolled in college. This “delay” in the assessment and allocation of financial aid awards (as contrasted, for example, with aid offers in United States higher education, which take place before students decide to enroll in a particular college) may potentially deter low SES students from enrolling in college and is likely the result of the inability of policymakers and university administrators to reliably measure household financial status through such means as a well-developed household income tax system. In China, as well as in other countries, there is the accompanying concern that students may not report information about their household financial status accurately (Wang & Zhang, 2005). There is also no standard for how administrators at different institutions use this information to assess student need (Wang & Zhang, 2005).

Because of the unreliability of the information provided in the student application forms, students are also required to acquire a certification from their hometown government office to verify their low-income status. There is some concern, however, that students who are not from low-income households are sometimes able to acquire this type of certification (Wang & Chen, 2008). University administrators thus sometimes look at long-term student records kept in student administrative folders (*dangan*) (Wang & Chen, 2008). However, the information in the administrative folder is still limited and there is no standard for how it should be used. This lack of reliable information might cause students of lower SES to miss out on financial aid opportunities and give students of higher SES unwarranted financial aid opportunities.

In summary, a number of factors make it difficult to know how aid is distributed across the higher education system. First, there are various financial aid providers (e.g. provincial governments or banks) who may have separate criteria for how aid should be distributed to HEIs and students. Second, although policymakers outline broad principles for how student's need should be assessed, in the end each HEI must decide how to evaluate need according to its own methods and distribute aid to students according to its own rules. Third, it is difficult for financial providers and university administrators to assess the socioeconomic level and therefore the financial need of students and their households; this difficulty exists both across institutions and within institutions. Altogether, it may be difficult for students and their families to know the bottom line: whether they will receive aid if they go to college and how much aid they would be likely to receive. Policymakers and university administrators may similarly not know how well aid is reaching targeted students.

### 3. Data

To understand the distribution of student background and financial aid receipt across a single provincial-level higher education system, we collected a 17% simple random sample of all fourth-year college students who either took the science track or the humanities track college entrance exam in Shaanxi province in 2005 and were admitted into a four-year university in Shaanxi that same year (hereafter referred to as the “2008 Shaanxi data”). Thus approximately one-sixth of the local Shaanxi students in Shaanxi universities were selected from an administrative population frame in order to capture the variation across and within the full set of tracks, tiers, institutions, and majors. Of the 8521 sampled students in this survey, 502 (413 from the science track and 89 from the humanities track) were admitted into military universities and could not be surveyed. Out of the remaining 8019 sampled students who were from 41 different universities, 7197 took the survey, 550 students never registered

<sup>6</sup> We find little published evidence that speaks to these differences, however.

<sup>7</sup> More specifically, higher education institutions (HEIs) require students to fill out two forms which ask for student's average annual household income, household member occupations and salaries, number of family members, and rural/urban residency status. This information is used in combination with the economic level of the region of the university, a student daily expenditure standard, and other special circumstances concerning the student's family (for example if the student is a with a single parent, orphaned, disabled, etc.).

**Table 2**  
The main categories (types) of college student financial aid in China.

Type of aid	Description	Amount and coverage
<i>Government need-based aid</i>		
1. Need-based grants	All students who are faced with financial difficulties can apply	Amount: RMB1000–3000 per year Coverage: 20% of all university students in China
2. Living and meal subsidies	Subsidies to defray living and meal costs	Variable
<i>Government merit aid</i>		
1. Merit-based scholarships	Sophomores, juniors, seniors can apply; applicants should be among the top-performing students in college	Amount: RMB 8000 per year Coverage: 0.3% of all university students in China
2. Need-based merit scholarships	Sophomores, juniors, seniors who are faced with financial difficulties, perform well in college, and are of high virtue	Amount: RMB 5000 Coverage: 3% of all university students in China
3. Special major scholarships	Given to students in majors that are in special need in the country such as agriculture, forestry, education, etc.	Variable
<i>University aid</i>		
1. Tuition waivers	Reductions in student tuition	Variable
2. Work-study	Typical work study arrangement	Variable
3. Special need subsidies	Subsidies for students in dire need	According to need
4. University scholarships	Merit scholarships given by the university	Variable
5. University need-based aid	Subsidies for low-income students	Variable
<i>Society aid</i>		
1. Grants and scholarships	A hodgepodge of aid from local governments, corporations, and philanthropic organizations	Variable
<i>Loans</i>		
1. National school-based loans	Provided by commercial banks in coordination with the university Should be repaid within 6 years after graduation	Amount: RMB 6000 per year (maximum) Government subsidizes interest while student attends college
2. Home-based loans	Provided by the National Development Bank after students apply through county-level student financial aid offices in their home towns Should be repaid within 10 years after graduation	Amount: RMB 6000 per year (maximum) Government subsidizes interest while student attends college

in college, 23 dropped out before the senior year, 40 students declined to take the survey, and 209 students or about 2.6% were unreachable even by university administrators. The data are thus highly representative of students from Shaanxi province who attended a non-military four-year university in Shaanxi through their senior year.<sup>8</sup> Furthermore, among the students who filled out the questionnaire, response rates for each question were above 99%.

We bring attention to the fact that college dropout is an extremely rare circumstance in Chinese four-year universities (probably due to the fact that students are guaranteed to get their degrees after four years, by law, as well as the fact that the rate of return to four-year colleges is high see [Fan, Meng, Wei, & Zhao, 2010](#)). Indeed less than 1% of the students in our 41 universities dropped out between the time of college entry and their senior year.

The 2008 Shaanxi data contain rich information on a student's family background, high school characteristics, college application and admissions information, financial aid receipt, and expected outcomes after graduation. In regard to data on financial aid receipt, students reported whether they had received different types of financial aid (those listed in [Table 2](#)) and the amount of aid they received for each type, all in their third year of college.

Another variable that figures prominently in the analysis below is a single continuous household SES measure. This measure is constructed using information on household ownership of 22 types of assets (such as bicycle, car, washing machine, etc.) as well as parents' education and income.<sup>9</sup> Specifically, we conduct polychoric principal components analyses using the asset indicators, father and mother's education level, number of siblings, and income level (five categories) to construct the SES measure (see

<sup>8</sup> If the military college, unregistered, and dropped out students are counted as "blanks" in the sampling procedure ([Kish, 1995](#)), the remaining students can be counted as randomly sampled with the proportion of missing observations equaling  $209/(7197 + 209) = 2.8\%$ .

<sup>9</sup> Our constructed SES measure is both abstract (as compared to standard indicators such as parents' education level or income) and imperfect in terms of assessing relative socioeconomic status between students. Nonetheless, we maintain that this SES measure is useful as an additional, outside indicator (i.e. independent of the way in which the government or universities measure student socioeconomic status) with which to assess the relative distribution of financial aid among students of different socioeconomic backgrounds; the use of the asset-based SES measure is also supported by a number of studies (see [Kolenikov & Angeles, 2009a](#) for a review).

Kolenikov & Angeles, 2009a). The first principal component explains 54% of the variance in the above variables. The second principal component falls dramatically in the amount of variance it explains (less than 10%). This indicates that the SES measures each capture well the common relationship underlying the inputs (Kolenikov & Angeles, 2009a).

Another indication of the validity of the SES measure is that the scoring coefficients on the first principal component for each input variable all run in the anticipated directions (McKenzie, 2005). In other words, the possession of most assets indicates a higher first principal component score (the SES measure). Higher income levels, higher parental education levels, and fewer siblings also indicate higher SES.

Fig. 1 displays the distribution of the SES measure. The distribution is skewed to the right (because of the division of the population into urban and rural students), but there is little evidence of clumping or truncation in either measure (see McKenzie, 2005). The SES measure is also strongly correlated with father's education (.63), mother's education (.64), the urban dummy (.68), and the income category variable (.72). Further information about the conceptual underpinnings of this SES measure, as well as details about its construction, is available from the authors upon request.

#### 4. The distribution of aid and college prices across the HE system

This section looks at the distribution of financial aid and college prices across tracks, tiers, universities, and majors and compares it with the distribution of student SES across these same categories. We first estimate average student SES across tracks, tiers, universities and majors (Section 4.1). We then look at the proportion of students who receive different types of financial aid (i.e. government need-based aid, government merit aid, university aid, society aid and loans), as well as the average award amounts, across tracks and tiers (Section 4.2). We next examine whether differences in financial aid opportunities exist between universities after controlling for student SES (Section 4.3). We finally estimate average gross prices (tuition plus dormitory fees) and average net prices (gross prices minus all types of financial aid besides loans) to provide the “bottom line” for students attending various tracks, tiers, and majors (Section 4.4).<sup>10</sup>

##### 4.1. The distribution of SES across the four-year university system

Tables 3a and 3b present differences in average student SES across the tracks, tiers and majors of the four-year university system in Shaanxi province. Average student SES in the humanities track is slightly but significantly greater than that of students in the science track (a difference of .21 SDs) (Table 3a, last row).<sup>11</sup> Average student SES is also slightly but significantly greater in the first tier as compared to the second tier (.25 SDs) (Table 3a, last column). Third tier students are of higher average SES than either the first or second tiers (.41 SDs and .66 SDs, respectively). In regard to individual universities, average student SES in the most selective university in the first-tier is considerably higher (slightly more than 1.2 SDs) than average student SES in the least selective university of the first-tier; the differences between most other universities in the first-tier or between universities in other tiers, however, are considerably less (results not shown). Table 3b shows that students in the major categories of economics, law, literature, and management have higher average SES than students in agriculture, education, medicine, and science, but these differences diminish considerably when comparing majors within each tier. Finally, while there are clear differences between tracks, tiers, universities and majors, most of the variation in SES is within majors (80%) as opposed to between universities or between majors within universities.

##### 4.2. The distribution of different types of financial aid across tracks and tiers

Overall, students from Shaanxi attending four-year universities in Shaanxi have high chances of receiving at least some types of financial aid (61%). Differences are (statistically) significant between science (63%) and humanities (59%) tracks, as well as between first (67%), second (61%), and third tiers (50%).<sup>12</sup> In addition, 26% of students receive more than one aid award.

###### 4.2.1. Government need-based aid

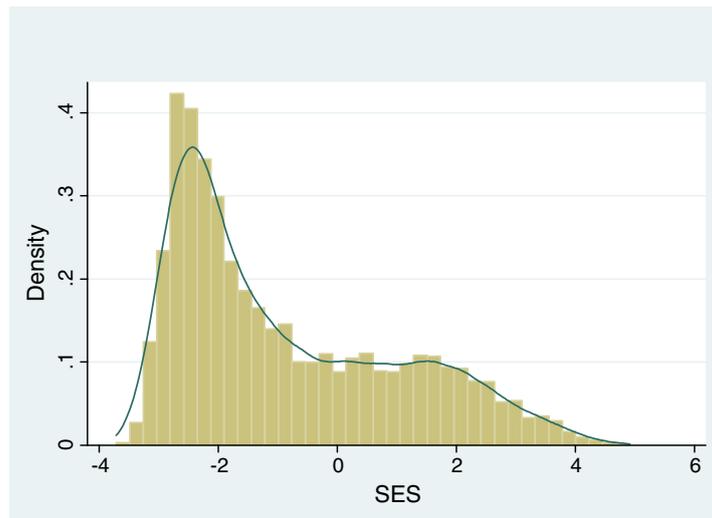
Table 4a (column 1) presents the average chances of receiving government need-based aid as well as the average amount given to each (awarded) student by tracks and tiers. Science track students are significantly more likely to receive government need-based aid than humanities students (43% versus 41%), and this is especially true for students in the first two tiers. The magnitude of this difference is not large, however, and students in both tracks receive about the same amount of aid per (awarded) student (1394 versus 1401 yuan).

The distribution of government need-based aid differs somewhat between tiers. Third tier students have significantly less opportunities to receive government need-based aid than students in the first and second tiers (39% versus 45% and 42%

<sup>10</sup> We used official annual list tuition prices of various universities and majors in Shaanxi as well as self-reported annual dorm fees to calculate gross prices. We did not include self-reported expenditures for meals, study materials, transportation, entertainment, etc.

<sup>11</sup> Tests of significance are conducted for all comparisons in this subsection using chi-square tests and one-way ANOVA.

<sup>12</sup> Unless otherwise indicated, standard significance tests for regression coefficients or chi-squared tests were conducted for the comparisons described in this subsection.



Source: 2008 Shaanxi University Survey Data

Fig. 1. The distribution of SES (Shaanxi students in Shaanxi four-year universities).

Table 3a

Average SES by tiers and tracks.

Source: 2008 Shaanxi University Student Data.

	Humanities	Science	Total
First tier	-.16	-.82	-.73
Second tier	-.91	-1.3	-1.20
Third tier	.07	.03	.05
Total	-.58	-.97	-.86

Note: In SES composite units.

respectively) and receive less aid per (awarded) student. First and second tier students have relatively equal chances of receiving about the same amount of government need-based aid.

#### 4.2.2. Government merit aid

Table 4a, column 2 shows that science and humanities track students are equally likely to receive government merit aid (6%), although the average amount per (awarded) student is significantly higher for science track students (4798 yuan versus 4229 yuan). First and second tier students receive roughly the same amount of government merit aid per student (i.e.  $5228 \times .06 = 314$  yuan/student and  $4327 \times .07 = 303$  yuan/student for first tier and second tier, respectively), however, and this is more than what is received by third tier students (189 yuan per student).

Overall, in comparison to students in the first two tiers (who are of relatively lower SES on average), the likelihood of receiving government aid is less for students in the third tier (who are of relatively higher SES on average). Similarly, in comparison to students in the science track (who are of relatively lower SES on average), the chances of receiving aid are also slightly lower for students in the humanities track (who are of relatively higher SES on average). Government aid thus seems to be allocated across tiers and tracks in alignment with the average SES level of students. As we shall see directly below, this is not necessarily true for other types of aid.

#### 4.2.3. University aid

The proportion of students receiving university aid is significantly higher in the science track (28%) than in the humanities track (25%) although the magnitude of the difference is not great (Table 4b, column 1). The proportion of students receiving this type of aid is also significantly and substantially higher in the first tier (32%) versus the second tier (27%) and in the second tier versus the third tier (18%). The amount of university aid per (awarded) student is moreover greater in the first tier (852 yuan) than the second (699 yuan) or third tier (707 yuan).<sup>13</sup>

<sup>13</sup> This is true for both tracks combined and for science tracks separately. The difference between tiers is not significant for humanities track students.

**Table 3b**

Average SES by majors and tiers (both tracks' students combined).  
Source: 2008 Shaanxi University Student Data.

	1st tier	2nd tier	3rd tier	Total
Economics	.05	-.41	-.19	-.27
Law	-.35	-.48	-.28	-.46
Education	-.97	-1.48	-2.04	-1.41
Literature	-.07	-1.14	.38	-.57
History	-.35	-1.57	n/a	-1.36
Science	-.82	-1.63	-.07	-1.32
Engineering	-.83	-1.35	-.00	-.93
Agriculture	-1.69	-1.74	n/a	-1.47
Medicine	-.24	-1.77	n/a	-1.61
Management	-.72	-.87	.05	-.60
All majors	-.72	-1.20	.05	-.86

Notes:

- (1) In SES composite units.
- (2) "N/a" indicates that these majors are not offered in 3rd tier (4-year private) colleges in the sample.

**Table 4a**

Proportion of students that receive government aid and the amount of aid (in yuan) per awarded student.  
Source: 2008 Shaanxi University Student Data.

	Government need-based aid			Government merit aid			All government aid		
	Science	Humanities	Total	Science	Humanities	Total	Science	Humanities	Total
1st tier	.46	.39	.45	.06	.05	.06	.49	.41	.48
	1363	1645	1400	5232	5206	5228	1905	2253	1949
2nd tier	.44	.39	.42	.07	.08	.07	.48	.45	.47
	1497	1558	1515	4510	4006	4327	1996	2058	2016
3rd tier	.34	.45	.39	.04	.04	.04	.36	.47	.40
	994	859	930	4854	4535	4722	1416	1201	1316
Total	.43	.41	.43	.06	.06	.06	.47	.45	.46
	1394	1401	1396	4798	4229	4627	1903	1890	1899

#### 4.2.4. Society aid

Society aid only covers 1.7% of students, but awards a fairly significant amount on average (2410 yuan per awarded student) (Table 4b, column 2). Science track students are 2 to 6 times more likely to receive society aid than humanities track students. First tier students are also much more likely to receive society aid (4%) than second (1%) or third tier students (0%) and receive significantly higher awards (2650 yuan) than second tier students (1541 yuan).

#### 4.2.5. Loans<sup>14</sup>

Overall, about 9% of students receive loans (Table 4b, column 3). Science track students are much more likely to receive loans (10% compared to 6% for humanities students), as are students in more selective tiers (15%, 8%, and 1% for the first, second, and third tiers, respectively). The size of loans is roughly equivalent across tiers, as the range is fixed by government policy.

### 4.3. The distribution of different types of financial aid across universities

Having looked at the distribution of the main types of financial aid in broad terms by tracks and tiers, we now examine how aid is distributed across individual universities. In particular, we explore differences between universities in the likelihood that students receive different types of financial aid and the average amount they receive after non-parametrically controlling for student SES. We control for SES non-parametrically as the relationship between SES and financial aid receipt may not be linear (or any obvious nonlinear function). For example, if the relationship between SES and financial aid receipt is concave, a linear regression of aid on SES would overestimate aid at the lowest level of SES, underestimate at the middle level of SES and overestimate at the high end. Universities with a large number of mid-level SES students would therefore look like they are

<sup>14</sup> In addition to the two major types of loans listed in Table 2, we also include two other types of loans in "loans". They are loans that students get independently from commercial banks and loans sometimes given by universities—both types of loans are uncommon and their inclusion does not change results substantively.

**Table 4b**

Proportion of students that receive non-government aid and the amount of aid (in yuan) per awarded student.  
Source: 2008 Shaanxi University Student Data.

	University aid			Society aid			Loan aid		
	Science	Humanities	Total	Science	Humanities	Total	Science	Humanities	Total
1st tier	.33 861	.29 794	.32 852	.04 2705	.02 1917	.04 2650	.17 5232	.09 4905	.15 5205
2nd tier	.27 698	.27 700	.27 699	.01 1345	.01 2129	.01 1541	.08 5177	.07 4704	.08 5039
3rd tier	.20 714	.16 693	.18 707	.01 3275	0 n/a	0 3275	.01 5150	.01 5250	.01 5200
Total	.28 767	.25 716	.27 754	.02 2457	.01 2031	.02 2410	.10 5209	.06 4770	.09 5127

getting less than they should. We specifically control for potential nonlinear relationships then by running a partial linear regression in which a non-parametric component for SES, and university dummies, are entered on the right side of the following equation (Li & Racine, 2006; Yatchew, 1997):

$$Y = f(\text{SES}) + \text{university dummies} + \text{error}. \quad (1)$$

In the above equation  $Y$  is either a dichotomous variable (received aid = 1, didn't receive aid = 0) or a continuous variable (the amount of aid received), SES is the continuous indicator described in Section 3, and university dummies represent each university.

Partial linear regressions that use “whether a student receives aid” as the outcome were run for each of the five major types of financial aid (see Fig. 2a–e). The results indicate that after controlling for SES, students at only one university have a significantly lower likelihood of receiving government need-based aid than students at the top university in the province (the omitted group), while students at seven universities have a significantly higher likelihood of receiving government need-based aid. For government merit-based aid, however, students at 13 universities have a significantly lower likelihood of receiving aid compared to students at the top university in the province and students at no university have a significantly higher likelihood of receiving that type of aid. The remaining types of aid (university aid, society aid, loans) are even more extreme with students at more than 30 universities having a significantly lower likelihood of receiving each type of aid than the top university. Furthermore, the magnitudes of the university dummy coefficient estimates are rather large for university aid and loans (with a median of around  $-.2$ ) compared to the need-based, merit, and society aid (medians of  $.01$ ,  $-.05$ , and  $-.06$  respectively). The results thus indicate that after accounting for SES the chance of a student receiving government need-based aid has little to do with the particular university he or she attends. The university that the student attends matters somewhat more for the chances of receiving government merit-based aid and even more for receiving university aid, society aid, and loans.

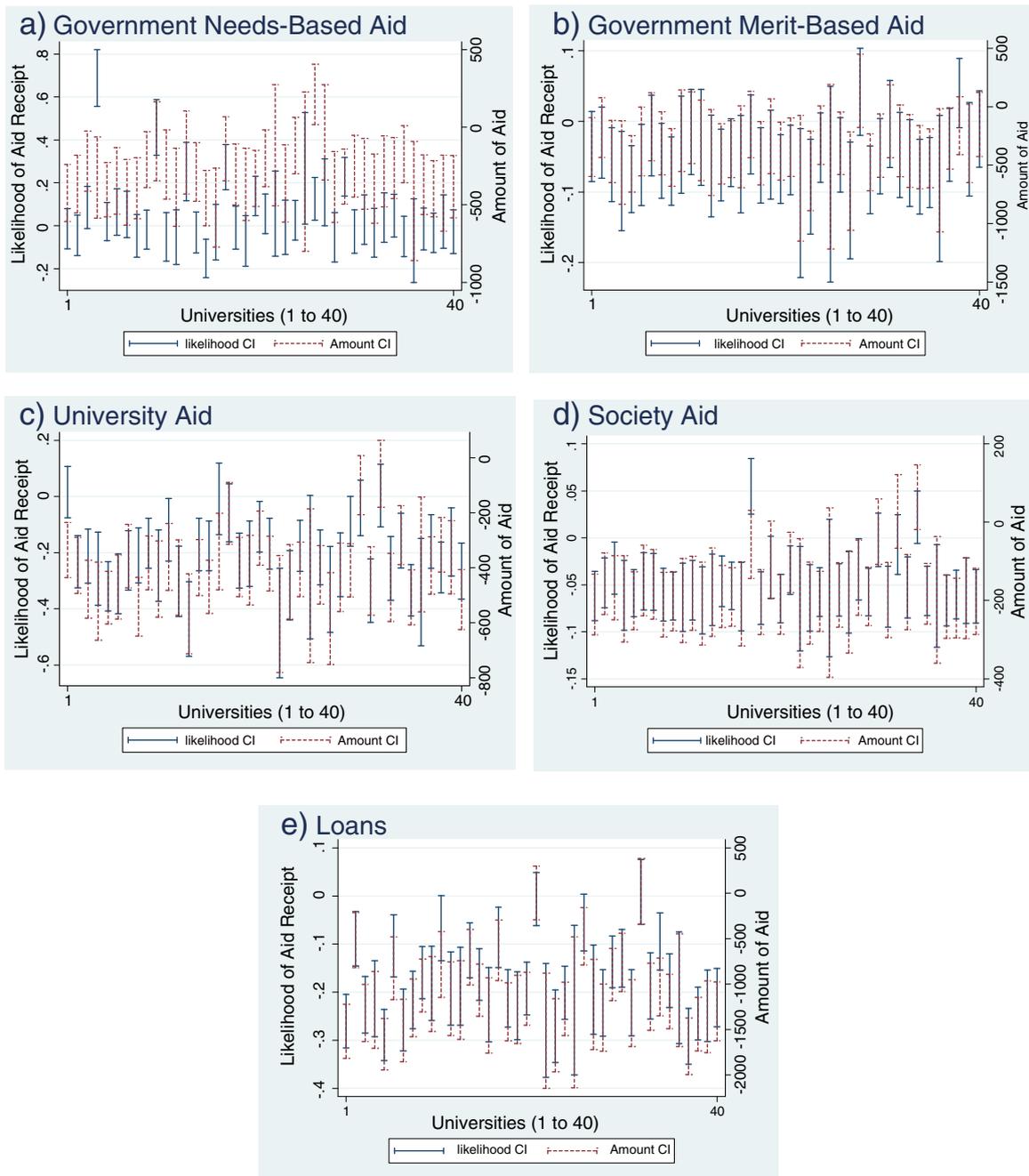
Partial linear regressions with the amount of aid a student receives as the outcome were again run for each of the five major types of financial aid (also see Fig. 2a–e). The figures indicate that for all types of aid, students at the vast majority of universities have significantly less aid per student than the top university in the province, after controlling for SES. Furthermore, the differences in the average amounts of aid between these universities and the top university are fairly large in magnitude: students in the top university receive anywhere from 600 to 1500 yuan more in loans per student and 500 to 1600 more in total non-loan aid (i.e. all aid types excluding loans) per student. Thus after controlling for SES, the particular university a student attends can have an important association with the amount of financial aid he or she receives.

Altogether, the results from Sections 4.2 and 4.3 indicate that the rankings of estimated means of SES (using our SES construct) align fairly closely with the likelihood and amount of government aid across tracks, tiers and universities (in the sense that lower average SES in these categories corresponds to more government aid). This is less true for university aid, society aid and loans.

#### 4.4. Gross and net prices

The gross prices of going to college across tracks, tiers, universities and majors are of immediate concern to students and their families and may also influence how financial aid is distributed. The left half of Table 5a shows the average gross prices of going to college by tracks and tiers. Science track students face slightly yet significantly higher average gross prices than humanities track students within each tier (differences of around 600–700 yuan). First tier students also face higher average gross prices (5618 yuan) than second tier students (5139 yuan), whereas third tier students face higher average gross prices (10,397 yuan) than students in the other tiers. Furthermore, most first tier universities are slightly but significantly cheaper than the top university in the first tier (results not shown).

In regard to average gross prices across majors, science and engineering are among the most expensive majors within each tier, whereas economics and law are among the least expensive majors within each tier (Table 5b). Medicine is also a relatively expensive major in the first two tiers, while management is a less expensive major in the second and third tiers. Simply comparing gross college prices across majors for all four-year university students, however, makes it appear that economics, management, and literature are the more expensive majors. This is because there are proportionally more students in economics, management, and literature in the third tier (where gross prices are higher).



Source: 2008 Shaanxi University Survey Data

Note: 95% confidence intervals for university coefficients are shown in the graphs above from a partial linear regression of aid receipt (yes/no) or aid amount on  $f(\text{SES})$  and university dummies (top university is the omitted category). This is done for each main type of aid.

Fig. 2. a–e: Differences in the likelihood of aid receipt and aid amount between separate universities and the top university in the province.

Tables 5a and 5b also present average net college prices across tracks, tiers, and majors. On the whole, science track students pay more within each tier to go to college than humanities track students (differences of roughly 500–600 yuan) (Table 5a), despite the fact that they are of slightly lower SES on average (in the first two tiers).<sup>15</sup> There are also significant differences in average net prices between first tier students (4268 yuan), second tier students (3988 yuan), and third tier students (9463

<sup>15</sup> The differences mentioned in this paragraph are all statistically significant.

**Table 5a**

Gross and net prices of going to 4-year universities by track and tier (yuan/year).  
Source: 2008 Shaanxi University Student Data.

	Gross prices			Net prices		
	Humanities	Science	Total	Humanities	Science	Total
1st tier	5020	5723	5618	3787	4352	4268
2nd tier	4729	5341	5139	3599	4179	3988
3rd tier	9761	10,397	10,142	9084	9717	9463
Total	5868	6138	6060	4821	4964	4923

**Table 5b**

Gross and net prices of going to 4-year universities by major and tier (yuan/year).  
Source: 2008 Shaanxi University Student Data.

	Gross prices				Net prices			
	1st Tier	2nd Tier	3rd Tier	Total	1st Tier	2nd Tier	3rd Tier	Total
Economics	5078	4667	9757	6467	3739	3524	8797	5359
Law	4846	4849	9746	4992	3528	3716	8655	3841
Education	5158	4924	11,200	5027	3204	3643	7200	3619
Literature	5304	4829	10,194	6070	3910	3624	9596	4948
History	5050	5094		5087	3387	3555		3526
Science	5730	5384	10,839	5751	4498	4142	9892	4526
Engineering	5800	5344	10,455	6313	4408	4236	9887	5169
Agriculture	4145	5288		4948	2299	3641		3291
Medicine	5816	5815		5814	3585	4494		4398
Management	5358	4836	9656	6213	4330	3837	8942	5283
Total	5618	5139	10,142	6060	4268	3988	9463	4923

yuan).<sup>16</sup> The average net prices of different majors follow roughly the same pattern as that of average gross prices, with science and engineering majors within each tier being the most expensive (Table 5b). This means that certain majors in the first two tiers (e.g. science) have students of lower average SES and yet pay higher tuition prices compared to other majors (e.g. economics). Also, after accounting for financial aid, the top university (which is roughly 500–800 yuan higher in average gross prices than most other universities in the first tier) becomes comparable in price to other first tier institutions; in the end, two universities have significantly higher average net prices and two universities have significantly lower average net prices than the top university (results not shown).

Finally, Tables 6a–6c respectively show, each by SES quintile and tier, the: (1) likelihood of receiving different types of aid (and total aid), (2) average amount of different types of aid (and total aid) conditional upon the receipt of aid, as well as (3) gross and net tuition prices. We find from Table 6a that the likelihood of receiving total aid, government need-based aid, government merit aid and loans are generally higher in magnitude for students in the lower SES quintiles (for all tiers and for four-year universities in general). This seems to be less true for university and society aid. We also see from Table 6b that the amounts of total aid and government need-based aid are higher for students in lower SES quintiles (for all tiers and for four-year universities in general). A similar, but less stark trend exists for university aid and society aid. The amount of government merit aid and loans, on the other hand, do not seem to vary as much by SES quintiles. Finally, Table 6c shows us that while gross tuition prices are similar across SES quintiles, net tuition prices are on average lower for students in the lower SES quintiles.<sup>17</sup>

Students in the lower SES percentiles are therefore receiving more aid and overall have to pay lower net prices than upper percentile students. In other words, students of lower SES are receiving some additional support to afford college relative to students of higher SES. On the other hand, approximately 20% of students in the lowest 30% of the SES distribution do not receive any aid (loans or non-loan aid), whereas 40% of students in the upper 30% of the SES distribution do receive some types of financial aid (results not shown).

<sup>16</sup> An exception is that the average net price of going to the first-tier is not significantly different (statistically) from going to the second tier.

<sup>17</sup> We also use two-sample t-tests with unequal variances to see whether the likelihood of receiving aid and net tuition prices respectively differ in the bottom quintile and top SES quintiles (for all universities and also by tiers). We find that the differences in likelihood are statistically significant (i.e. higher in the lowest SES quintile than the highest SES quintile) in most cases except for university aid in the first tier, for society aid in the second and third tiers, and loans in the third tier (since loans are seldom given in the third tier). We also find that differences in net costs are statistically significant (i.e. lower in the lowest SES quintile than the highest SES quintile).

**Table 6a**

Percentage of college students who received financial aid in 2007. By socioeconomic status (SES) quintile and tier of higher education institution (HEI). Source: 2008 Shaanxi University Survey Data.

SES	Any aid				Government need-based aid				Government merit aid			
	1st tier	2nd tier	3rd tier	All tiers	1st tier	2nd tier	3rd tier	All tiers	1st tier	2nd tier	3rd tier	All tiers
0–20%	86.9	79.1	78.5	81.3	70.0	62.2	62.4	64.4	10.6	9.4	11.8	9.9
20–40%	80.3	73.7	72.4	75.3	61.1	55.6	60.2	57.5	7.4	10.0	7.3	9.1
40–60%	70.9	62.7	62.7	65.3	48.1	40.2	47.7	43.7	6.2	6.7	6.2	6.5
60–80%	56.4	44.7	47.9	49.0	31.1	26.9	34.7	29.8	3.0	3.2	1.9	2.9
80–100%	48.2	32.0	32.7	37.6	19.3	9.6	25.3	17.2	3.1	2.3	0.8	2.2
Total	67.6	61.7	50.3	61.7	44.7	42.4	38.7	42.5	5.9	6.9	3.7	6.1

SES	University aid				Society aid				Loans			
	1st tier	2nd tier	3rd tier	All tiers	1st tier	2nd tier	3rd tier	All tiers	1st tier	2nd tier	3rd tier	All tiers
0–20%	35.0	28.8	25.8	30.3	5.2	1.2	0.0	2.2	35.7	15.3	1.1	20.2
20–40%	33.4	29.8	26.0	30.4	6.6	0.4	0.0	2.0	22.9	10.7	0.8	13.1
40–60%	30.9	28.3	22.2	28.3	2.9	0.6	1.6	1.5	17.2	5.5	1.0	8.6
60–80%	30.1	24.4	19.9	25.2	3.2	0.3	0.0	1.1	4.3	1.2	1.0	2.1
80–100%	31.7	21.9	11.4	22.2	2.7	1.1	0.3	1.4	0.8	0.4	0.3	0.5
Total	32.1	27.1	18.5	27.3	4.0	0.7	0.4	1.6	15.5	7.6	0.7	8.9

**Table 6b**

Average amount of aid (in yuan) granted to HEI recipients of financial aid (2007). By socioeconomic status (SES) quintile and tier of higher education institution (HEI).

Source: 2008 Shaanxi University Survey Data.

SES	Any aid				Government need-based aid				Government merit aid			
	1st tier	2nd tier	3rd tier	All tiers	1st tier	2nd tier	3rd tier	All tiers	1st tier	2nd tier	3rd tier	All tiers
0–20%	2703	2300	2245	2420	1724	1798	1529	1756	5140	4413	4773	4661
20–40%	2501	2163	1707	2217	1689	1583	1321	1589	5029	4425	4611	4568
40–60%	2020	1764	1686	1842	1476	1364	1204	1379	5036	4502	4417	4652
60–80%	1170	1393	992	1221	750	1022	656	843	5462	3977	4767	4563
80–100%	976	738	505	732	441	431	332	395	6027	2869	6000	4700
Total	2118	2003	1318	1942	1399	1515	929	1395	5230	4325	4722	4625

SES	University aid				Society aid				Loans			
	1st tier	2nd tier	3rd tier	All tiers	1st tier	2nd tier	3rd tier	All tiers	1st tier	2nd tier	3rd tier	All tiers
0–20%	972	767	935	843	3114	1764	n/a	2650	5365	4979	6000	5176
20–40%	1022	798	733	859	3030	2813	n/a	3000	5102	5102	6000	5106
40–60%	816	705	1026	777	2588	1400	2367	2273	5068	4980	2750	5000
60–80%	681	549	1026	601	1707	600	n/a	1569	5282	5750	8000	5678
80–100%	787	529	446	640	2146	717	6000	1910	3750	5850	100	3829
Total	854	700	707	755	2635	1541	3275	2397	5202	5047	5200	5130

**Table 6c**

Four-year HEI gross and net tuition prices (yuan/year). By socioeconomic status (SES) quintile and tier of higher education institution (HEI).

Source: 2008 Shaanxi University Survey Data.

SES	Gross tuition prices				Net tuition prices			
	1st tier	2nd tier	3rd tier	All tiers	1st tier	2nd tier	3rd tier	All tiers
0–20%	5599	5215	9898	5627	3283	3415	8123	3683
20–40%	5556	5171	9965	5684	3609	3597	8641	4033
40–60%	5627	5120	10,131	5955	4237	4054	9017	4780
60–80%	5601	5092	10,130	6340	4919	4549	9691	5777
80–100%	5695	5045	10,271	6701	5090	4811	10,074	6354
Total	5619	5139	10,142	6061	4274	3988	9463	4925

## 5. Aid and individuals

This section examines to what degree SES explains the allocation of various types of financial aid to individuals. It also explores whether factors such as college entrance exam score, gender and Communist party membership are related to the distribution of aid.

There are a number of reasons why student characteristics besides SES may contribute to the distribution of financial aid. First, exam score reflects the selectivity of the institution a student attends, and the results from Section 4 indicate that college selectivity may influence the receipt of aid. At the same time, each university may be tempted to give their higher-scoring students a greater proportion of financial aid. Second, female students are sorted differently from male students across tracks, tiers, universities and majors (Loyalka et al., 2009a); as shown in Section 4, the placement of students within these categories of the university system are related to their chances of receiving aid. Individual universities may favor or discriminate against female students as well. Finally, party membership may be a factor in receiving financial aid, as policies actually state that universities should allocate aid to those students who have a love for their country and support the Communist Party.

We first explore the degree to which student SES contributes to the distribution of financial aid across the four-year university system as a whole. Table 7a presents sample Somers' D estimates (with confidence limits) for a binary indicator of whether a student received aid or not (for each of the main types of financial aid separately) and the continuous Total SES indicator from Section 4 (Newson, 2001).<sup>18</sup> We also repeat the analysis after replacing SES with college entrance exam score to see the degree to which the score contributes to the distribution of financial aid (without considering student SES).<sup>19</sup>

Table 7a shows the 95% confidence limits for the Somers' D estimates between receiving or not receiving government need-based aid and SES (top row) and exam score (bottom row) respectively. The first column shows that given a randomly sampled person who received government need-based aid and a randomly sampled person who did not receive government need-based aid, the person who received aid is 39% to 44% less likely to be of higher SES (than the person who did not receive aid) than to be of lower SES (Newson, 2001). Similarly, the person who received government need-based aid is 1% to 8% more likely to have a higher score (than the person who did not receive government need-based aid) than to have a lower score. In other words, it is often the case that a person who received government need-based aid is of lower SES than one who did not; also, (slightly) more often than not, a person who receives aid has a higher exam score than one who did not.

The Somers' D estimates for government merit aid and SES are smaller in magnitude than those for government need-based aid. The estimates for exam score also have wider confidence intervals. This indicates that the distribution of government merit aid is (negatively) related to SES, but less so than government need-based aid. Furthermore, a person who receives government merit aid is only slightly more likely to have a higher exam score (when considering the population of local four-year college students in the province).

The estimates are quite different for the remaining types of financial aid. In less precise language, when looking at the four-year university system as a whole, SES and exam score both have little to do with students receiving university aid. While SES has a small negative relationship with receiving society aid, the exam score of a student has a large positive relationship with receiving society aid. Finally, a student who receives loans is often likely to be both of lower SES and have a higher exam score than the one who does not receive loans.<sup>20</sup>

To more closely examine how different components of SES are driving the above results, we run a regression of receiving aid (yes/no dummy indicators for each of the five types of aid separately) on dummies for each level of father's education, dummies for mother's education level, dummies for income category, and an urban/rural dummy.<sup>21</sup> Table 7b shows that income, mother's education level, and urban are all significantly and negatively correlated with the likelihood of receiving government need-based aid and loans. Income and urban (a dummy indicator) are also significantly and negatively correlated with the likelihood of receiving university aid and government merit aid. SES components for the most part are not correlated with the receipt of society aid, except that students in the highest income category are less likely to receive society aid.

We next focus on whether other factors such as exam score, gender, or party membership contribute to the distribution of financial aid *after* flexibly controlling for SES (across the higher education system as a whole). We run partial linear regressions taking "received or did not receive aid" as the dependent variable and SES as the non-parametric component. We also alternatively enter exam score, an indicator for female, and an indicator for party membership as the linear covariate in separate regressions.

<sup>18</sup> With two variables X and Y where X is a binary variable (1 = received aid, 0 = did not receive aid) and Y1 and Y0 are two individual values of SES randomly sampled from the respective populations of students that received aid (X = 1) and did not receive aid (X = 0), Somers' D is defined as  $P(Y1 > Y0) - P(Y0 > Y1)$  (Newson, 2001).

<sup>19</sup> Whereas for SES we use both science and humanities track students, for college entrance exam score we use only science track students (because the tests are different between science and humanities tracks). The results for SES lead to the same conclusion whether they are run for both tracks or just for the science track alone.

<sup>20</sup> We also look at the Somers' D estimates limiting the sample to students in the first two tiers. This is because the first two tiers are public universities while the third tier is private universities (and they each have different policies applied to them, different tuition rates, etc.). While these estimates are similar to those with all four-year university students, they also indicate that exam score has no significant relationship with receiving government (need-based or merit) aid nor does SES have a significant relationship with receiving society aid.

<sup>21</sup> Father and mother's education are each divided into 14 categories starting from "no primary education", "some primary education", "completed primary education" eventually to "graduate degree". Income categories include both parents making less than 2000 yuan a month to both parents making over 20,000 yuan a month. We also checked for multicollinearity using colldiag in Stata. The two largest condition numbers were 26 and 11 for two of the father's education dummies.

**Table 7a**

Comparing SES and exam scores among those who did and did not receive aid.

(Somers' D estimates with confidence intervals).

Source: 2008 Shaanxi University Student Data.

	Government need-based aid	Government merit aid	University aid	Society aid	Loans
SES	[−.44, −.39] 0.000	[−.35, −.26] 0.000	[−.11, −.05] 0.000	[−.23, −.01] 0.034	[−.54, −.48] 0.000
Exam score	[.01, .08] .005	[.01, .14] 0.026	[.10, .17] 0.000	[.41, .58] 0.000	[.33, .42] 0.000

Note: 95% confidence intervals are shown in square brackets; p-values are just below.

**Table 7b**

Linear regressions of received aid (yes or no) on separate components of SES.

Source: 2008 Shaanxi University Student Data.

	Need-based aid	Merit aid	University aid	Society aid	Loans
<i>Father's education</i>					
Primary school	−0.02 (−1.16)	−0.01 (−1)	0.03 (−1.46)	0 (−0.33)	0 (−0.22)
Junior high	−0.06 (2.64)**	−0.02 (−1.91)	0.02 (−1.11)	−0.01 (−1.56)	−0.01 (−0.68)
Senior high	−0.08 (2.84)**	−0.02 (−1.44)	0.03 (−1.02)	−0.01 (−1.57)	−0.03 (−1.89)
College	−0.09 (3.09)**	−0.03 (2.03)*	0.07 (2.21)*	−0.01 (−1.12)	−0.01 (−0.77)
<i>Mother's education</i>					
Primary school	−0.06 (3.52)**	0 (−0.21)	0 (−0.19)	0 (−0.29)	−0.02 (2.08)*
Junior high	−0.09 (5.19)**	0.01 (−0.98)	0.01 (−0.36)	0.01 (−1.28)	−0.04 (3.88)**
Senior high	−0.09 (3.25)**	0 (−0.31)	0.02 (−0.72)	0.01 (−1.51)	−0.02 (−1.6)
College	−0.09 (2.77)**	0.02 (−1.24)	0 (−0.03)	0.03 (−1.85)	−0.04 (3.01)**
<i>Parent's income (yuan/month)</i>					
2000–5000	−0.17 (12.06)**	−0.04 (5.55)**	−0.04 (3.16)**	−0.01 (2.03)*	−0.06 (9.29)**
5001–10,000	−0.23 (9.73)**	−0.04 (5.11)**	−0.1 (4.15)**	0 (−0.17)	−0.06 (8.58)**
10,001–20,000	−0.14 (2.64)**	−0.02 (−0.8)	−0.14 (3.11)**	−0.01 (−0.74)	−0.07 (11.20)**
More than 20,000	−0.35 (7.05)**	−0.03 (−1.12)	−0.18 (3.09)**	−0.02 (5.92)**	−0.1 (10.42)**
<i>Urban dummy</i>	−0.14 (9.55)**	−0.03 (3.97)**	−0.03 (2.08)*	0 (−0.19)	−0.06 (7.68)**
<i>Constant</i>	0.65 (36.20)**	0.1 (9.03)**	0.27 (16.67)**	0.02 (3.93)**	0.16 (12.76)**
<i>Observations</i>	7170	7170	7170	7170	7170
<i>R-squared</i>	0.12	0.01	0.01	0	0.05

Notes:

(1) Robust t statistics in parentheses.

(2) \* significant at 5%; and \*\* significant at 1%.

Table 8a provides the estimates from the partial linear regressions. Exam score is significantly and positively related to the likelihood of receiving government need-based aid, government merit aid, university aid, society aid, and loans even after controlling flexibly for SES (row 1).<sup>22</sup> Females are significantly more likely to receive government need-based aid, government merit aid, and university aid after flexibly controlling for SES (row 2). Finally, party members also are significantly more likely to receive all types of financial aid (row 3). Furthermore, whereas the coefficients for the female indicator are fairly small in magnitude, the coefficients for party member in the case of government merit aid and university aid are quite substantial.<sup>23</sup>

<sup>22</sup> We converted exam score into percentile ranks for the regressions associated with Tables 8a and 8b.

<sup>23</sup> We also run linear regressions inserting dummy variables for father's education level, mother's education level, income categories, and urban/rural in place of the SES indicator. The results are essentially the same as those of the partial linear regressions with the exception that party members are not significantly more likely to receive loans.

**Table 8a**

Partial linear regressions of received aid (Y/N) on f(SES) and various covariates.  
Source: 2008 Shaanxi University Student Data.

	Government need-based aid	Government merit aid	University aid	Society aid	Loans
Exam score (percentile)	.06*** (.02) [.01]	.02* (.01) [.08]	.15*** (.02) [.00]	.06*** (.01) [.00]	.20*** (.01) [.00]
Female (Y/N)	.04*** (.01) [.00]	.06*** (.01) [.00]	.12*** (.01) [.00]	.00 (.00) [.65]	-.01* (.01) [.08]
Member (Y/N)	.05*** (.01) [.00]	.09*** (.01) [.00]	.20*** (.01) [.00]	.02*** (.00) [.00]	.02** (.01) [.03]

Notes:

- (1) The first (top) numbers in each row are coefficient estimates. Standard errors are located in parentheses below coefficient estimates, followed by p-values in brackets.
- (2) \*\*\* indicates significance at the 1% level, \*\* indicates significance at the 5% level, and \* indicates significance at the 10% level.

The positive findings for females and party members require some discussion. That females receive significantly more aid in the three largest categories of financial aid (government need-based aid, government merit aid, and university aid) is of particular interest given that they are more represented in both the humanities track and the second tier (proportional to the first) (Loyalka et al., 2009a), whereas the analysis in Section 4 shows that generally lower tiers and humanities students are (slightly) less likely to receive aid. It may be that university administrators intentionally grant females more of the policy-mandated types of financial aid.<sup>24</sup> In regard to party members, it is of course impossible to know without further study whether other factors correlated with party membership determine the likelihood of receiving aid or even whether students become party members because they receive aid (i.e. reverse causality). Yet, it seems highly possible that the language of policy documents to provide aid to students “who love their country and support the Communist Party” could manifest itself in greater aid being awarded to students who are party members.

We conduct two last analyses in this paper. First of all, we run nonparametric regressions of receiving aid (a dichotomous variable equal to 1 if a student receives a particular type of aid and 0 otherwise) on SES and a categorical variable indicating the university a student attends.<sup>25</sup> The reason for including the variable for university attended is that the ultimate distribution of many types of financial aid depend both on how aid is allocated to universities as well as how each university assesses need and allocates aid to individuals. By putting in the university variable, we can focus solely on the actions of university administrators within their own universities (i.e. use within-university variation). Second, we again run partial linear regressions of receiving a particular type of aid on a nonparametric component for SES as well as other student characteristics such as gender, score, and party membership—this time, however, we also add university dummies. By putting in university dummies, we again focus on the actions of university administrators within their own universities.

The nonparametric regressions indicate that some types of aid are distributed systematically to students of lower SES *within universities*, while other types of aid are not. Fig. 3a–e show the relationship between the likelihood of receiving each of the five main types of aid (y-axis) and student SES (x-axis) for each university separately (i.e. each university represents a separate curve in each figure). Fig. 3a shows that most universities distribute government need-based grants to students of lower SES as compared to students of higher SES. Loans are also distributed to students of lower SES within universities (Fig. 3e). By contrast, some universities distribute university aid more to students of lower SES while other universities distribute university aid more to students of higher SES (Fig. 3c).

Table 8b presents the partial linear regression results that incorporate university dummies, a nonparametric component for SES, and a particular student characteristic: parallel with Table 8a, we alternatively add only exam score, an indicator for female, or an indicator for party membership as the latter linear covariate, in separate regressions. These results differ somewhat from the results in Table 8a (i.e. without university dummies). They show that college entrance exam score has a much larger relationship with the likelihood a student receives government merit aid (row 1, column 2). This is in accord with the idea that policymakers attempt to distribute this type of aid more evenly across institutions, but that within institutions students of higher achievement receive merit aid more. Furthermore, for both university aid and for loans, the coefficient on exam score becomes statistically insignificant from zero. This shows that university aid may be inequitably distributed (in terms of SES) because more selective universities have higher operating revenues per student from which to allocate university aid and that loans are often allocated in relation to college selectivity (rather than based on how high a student scores within a particular university). The party member

<sup>24</sup> This is a tentative conclusion as the “effect” of gender could be due to other unobserved covariates. At the same time, we also ran partial linear regressions of aid receipt (yes or no, for each of the different main types of aid) on gender, a flexible function of SES, and a fuller set of covariates including exam score, Party membership, whether or not the student went to a key high school, whether or not the student was in a fast-track class in high school, major dummies for the main 11 major categories, and university dummies (the latter for Table 8b only). The coefficients on the gender variable (and indeed on exam score and Party membership) did not change in a substantive way (i.e. either in magnitude or in statistical significance) after adding in the additional covariates. We thus (still tentatively) surmise that “it may be that university administrators intentionally grant female more of the policy-mandated types of financial aid.

<sup>25</sup> See Li and Racine (2006) for a discussion of incorporating categorical variables into nonparametric regressions.

(Source: 2008 Shaanxi University Survey Data)

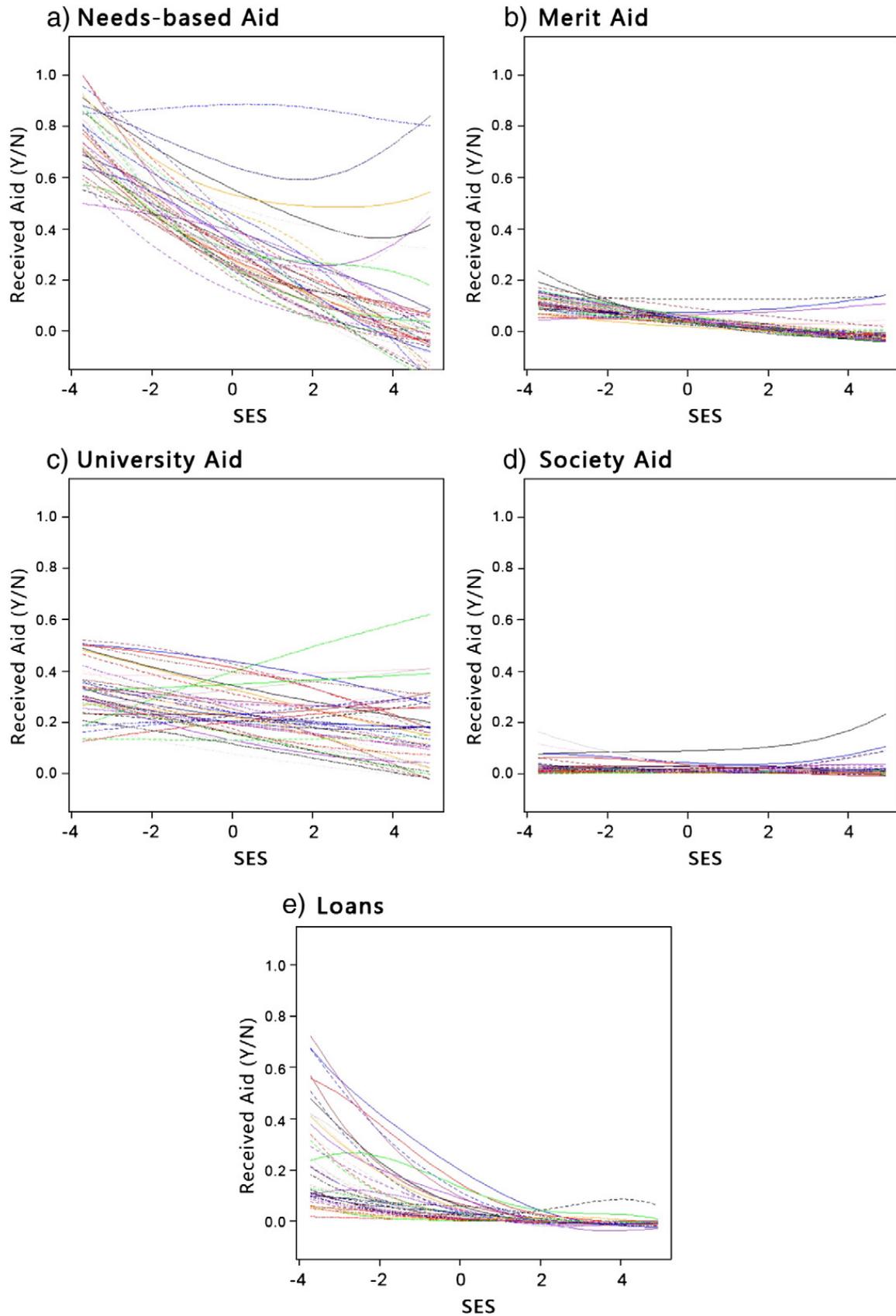


Fig. 3. a–e: Relation between “type of aid” and SES (within universities).

**Table 8b**

Partial linear regressions of received aid (Y/N) on f(SES), covariates and college dummies.

Source: 2008 Shaanxi University Student Data

	Government need-based aid	Government merit-based	University aid	Society aid	Loans
Exam score (percentile)	.02 (.07) [.79]	.11*** (.03) [.00]	.14 (.06) [.02]	.06*** (.02) [.01]	.03 (.04) [.50]
Female (Y/N)	.04*** (.01) [.00]	.06*** (.01) [.00]	.14*** (.01) [.00]	.01* (.00) [.06]	.00 (.01) [.74]
Member (Y/N)	.04*** (.01) [.00]	.09*** (.01) [.00]	.20*** (.01) [.00]	.02*** (.00) [.00]	.01 (.01) [.44]

Notes:

(1) The first (top) numbers in each row are coefficient estimates. Standard errors are located in parentheses below coefficient estimates, followed by p-values in brackets.

(2) \*\*\* indicates significance at the 1% level, \*\* indicates significance at the 5% level, and \* indicates significance at the 10% level.

coefficient in the loans regression becomes insignificant after including university dummies, which indicates that being a party member may be correlated with some other characteristics related to university. The rest of the findings agree substantively with those of Table 8a; females and party members are generally more likely to be granted aid after accounting for SES and variation between universities.

## 6. Discussion

The results from Section 4 illustrate certain trends in how SES, financial aid, and net college fees are currently allocated across the institutions of the Chinese four-year university system. First, in comparison with non-government aid (university aid, society aid, loans), government aid is allocated more according to tracks, tiers, and institutions where average student SES is less rather than where the student college entrance scores are higher; this is especially true across tiers and to some degree across universities within tiers. Furthermore, compared to the different types of non-government aid, a higher percentage of government aid is allocated to third-tier students. On the whole, it seems that government aid is distributed by policymakers across the institutions of the higher education system in due consideration of the principle of balancing aid between tiers. By contrast, non-government aid is given more to the first tier and more selective universities within the first tier.

There are several reasons why non-government aid may be allocated towards more selective institutions. In regard to university aid, more selective universities and universities with more science track-related majors have larger operating budgets from which to allocate aid to students. The proportion of students receiving university aid in the third tier may also be especially low because some third tier universities do not give any university aid.

Society aid, on the other hand, is a hodgepodge of aid given by local governments, philanthropies, and corporations who each may have different reasons for granting aid to students. For example, county governments may give scholarships to students who get into more selective universities, while philanthropic organizations may attempt to give aid to low-income students. At the same time, more selective institutions may be more capable of attracting society aid even from philanthropic organizations. A further consideration is that certain types of students (e.g. those of higher SES or with lower exam scores) may not actively seek out opportunities to obtain society aid.

Loans may be distributed more to students in more selective universities for several reasons. First, because commercial banks provide national school-based loans to students in close coordination with universities, more selective universities may have greater resources with which to help students acquire these types of loans. Third tier students are further not eligible to receive these types of loans. Second, although home-based student loans should in principal be distributed to students equally regardless of the institution type or tier they attend, in practice, loan providers may be concerned with the future ability of students to pay back the loans. They may thus distribute loans more to students in more selective institutions as these students have higher expected wages. Finally, loans are different from other types of financial aid in that fewer (and a more select group of) students may wish to apply. The intention of policymakers for loans to be distributed to students with financial constraints, regardless of the selectivity of the institution the student attends, may thus be frustrated.

Despite the tendency of non-government aid to be distributed towards students in more selective colleges, the overall distribution of total non-loan aid does not substantially change the original pattern of gross prices across tiers and institutions. In fact total non-loan aid only offers slightly more relief to students in more selective institutions relative to those in less selective institutions. Before taking into account the non-loan aid, the price of a first tier HEI is about 500 yuan more on average than a second tier HEI; this difference is reduced to 300 yuan after considering non-loan aid. Top universities in the first tier also become somewhat less expensive relative to other universities after non-loan aid is taken into account. Finally, in relative terms third tier universities become relatively even more expensive than universities in the first two tiers after accounting for non-loan aid.

This slight advantage in net fees given to students in more selective institutions (not to mention the increased opportunity to acquire loans as well) may be contrary to the objective of distributing financial aid equitably. As described in Section 4.1, more selective institutions in the first two tiers have students of somewhat higher SES. In addition, students in more selective

institutions expect to receive substantially higher average wages upon graduation than those in less selective institutions (see Loyalka et al., 2009a). Students in more selective institutions further receive an implicit subsidy; policies keep college fees artificially low at more selective institutions despite their higher costs of training students (see Section 2) and greater expected wages upon graduation. Finally, although third tier students are only of moderately higher SES on average, their average net prices of going to college are generally more than twice as much as first and second tier students. Thus if policymakers and other providers are concerned about increasing equity through the provision of aid, they might consider giving even more government-financed aid to students in less selective institutions in the second and third tiers.

Section 4 also shows that in the first two tiers, science track students are of lower average SES than humanities track students and yet pay higher net tuition fees. In particular, some majors within the first or second tier that draw proportionally more students from the humanities track (e.g. economics) have higher average SES than other majors (e.g. science), have higher gross fees, and yet receive about the same amount of total non-loan aid. This may mean that universities internally distribute aid rather evenly across departments or majors (as another factor to be considered besides SES). Students in the science major may also only receive equivalent amounts of aid as economics students (for example), because they are expected to have higher wages after graduation.

In terms of allocating aid to individual students, Section 5 provides ample evidence that each of the main types of financial aid is distributed in a different manner to students of varying backgrounds. For example, as set forth in policy documents, government aid is generally given more to students of lower SES, females, and party members; government need-based aid is given with little regard for exam scores compared to other types of aid, while government merit aid is given to higher scoring students within universities. The allocation of university aid, by contrast, is not only allocated slightly more to students of lower SES across the four-year system as a whole (Table 7a); it is also given considerably more to higher scoring students after controlling for SES. Furthermore, university administrators (i.e. within universities) seem to be distributing university aid with little regard for student exam scores, only some regard for SES, and with considerable regard for gender and party membership. Society aid is distributed differently still, as it is given to students with higher exam scores and/or party membership and less with regard for student SES and gender. Finally, loans are given to students with higher exam scores because they are distributed more to students in selective institutions and not to higher scoring students within universities (Tables 8a and 8b); within universities loans are given to students of lower SES.

Our findings imply that university administrators may not adequately consider students' SES level when distributing university aid; this would be in contrast to the intent of government policies which specify that university aid should be directed towards low-income students. Moreover, since government aid is being effectively targeted more towards students of lower SES within universities (at least according to our measure of SES), it is not necessarily the case that university administrators are unable to measure need. At the same time, university administrators seem to be distributing both government and university aid more to females (after controlling for SES) perhaps as a type of affirmative action since females are relatively less represented in more selective institutions (in the science track) compared to males (Loyalka et al., 2009a).

At the end of the day, students in the bottom 30% of the SES distribution are more likely to receive non-loan aid (and a greater amount of non-loan aid) than students in the top 70% of the SES distribution. The average amount of total non-loan aid for students in the bottom 30% of the SES distribution in each track-tier is fairly substantial; it is higher in the first tier (2000–2200 yuan) than the second tier (1700–1900 yuan) which is in turn higher than the third tier (1200–1500 yuan). However, it is not clear whether these aid amounts are adequate to meet the needs of lower-income students. It is also important to note that approximately 20% of students in the bottom 30% of our SES distribution do not receive any financial aid.<sup>26</sup>

## 7. Conclusion

This paper finds that government financial aid has been allocated rather evenly across the institutions of the higher education system. However, this allocation does little to offset the relatively high subsidies (instructional costs minus tuition prices) that the government already provides to more economically-advantaged and potentially higher-earning students in more selective universities. That is, the current distribution of financial aid combined with the college fee structure maintains an implicit advantage for first-tier over lower-tier students. Students in third-tier universities also seem to bear a disproportionate burden (in terms of prices relative to their level of SES) compared to students in other tiers. Therefore, a recommendation to policymakers is to increase equity in the distribution of financial aid across the higher education system by shifting more aid to students in the second and third tiers.

This paper also finds that, in accordance with policymakers' stated intentions – and in contrast to the findings of other studies – government need-based aid is reaching lower-income students within universities and government merit-aid is reaching higher-ability and lower-income students within universities. At the same time, other types of aid such as university aid, society aid, and loans are targeted less towards lower income students and in fact favor higher SES students at more selective institutions. Our finding that one-fifth of students in the bottom 30% of our SES measure do not receive any financial aid (while more than 60% of all students receive at least some form of aid), indicates that local governments and other non-governmental providers should continue to strengthen the assessment of financial need as well as the targeting of aid to needy students.

<sup>26</sup> Because the SES measure constructed in this paper is imperfect (i.e. it has measurement error), the actual percentage of economically-disadvantaged students that are not receiving any type of aid may be higher or lower. The finding does not change substantively when other SES-related indicators are used.

This paper also finds that various types of aid are distributed not only in consideration of student SES and college entrance exam score, but also possibly in consideration of other factors such as gender and party membership. Future research can explore the relationship between student characteristics and the receipt of aid more closely, incorporating more student and institutional characteristics and exploring the degree to which these factors influence aid receipt. It is important to note that our analysis mainly sought to understand the first-order relations between SES, ability, gender and aid receipt without examining the underlying mechanisms behind such relations. Future work could explore these mechanisms in greater depth.

Besides exploring the distribution of financial aid to institutions and from institutions to individuals, this paper also provides a basic outline of the actual college prices facing students and their families for the higher education system in one province. In Shaanxi specifically, we find that the net college prices (tuition and dorm fees net of non-loan financial aid) of going to a first-tier institution comprise only about 40% of the annual per capita disposable income of urban households as compared to 160% for rural households. The average net college fees of going to a third-tier institution is roughly 90% of annual per capita disposable income for urban households compared to a formidable 360% for rural households. Besides the fact that college prices can be especially burdensome to students of lower SES, these students may also know little about the actual prices of going to college (Loyalka, Song, & Wei, 2009b). Knowing these average net prices by tracks, tiers, and majors may help these students estimate future prices and returns to college and make appropriate decisions when applying for college. As students in China have to make college and major application choices within each university tier after having already chosen the science or humanities track, knowledge of actual college fees across tracks, tiers, universities, and majors may influence how students are sorted into and across the higher education system.

Finally, readers may be concerned that our analysis of the distribution of financial aid across four-year universities may be biased given that our sample consists of senior college students who are reporting financial aid receipt (for their third year of college). More to the point, if lower SES students already dropped out of college between the first and third years of college because they did not receive aid, then our results could be overly optimistic about the chances of lower SES students receiving aid. However, as we discussed previously, dropouts are extremely uncommon in Chinese four-year universities and thus financial aid receipt in college is not related to dropout.<sup>27</sup>

While financial aid does not affect college dropout once students have gotten into college,<sup>28</sup> it is still important to explore how financial aid could have potentially affected college access among high school seniors. This is an important issue to consider because students in our sample entered college in 2005 and did not drop out by 2008. But in turn this could mean that students who were in our sample may have self-selected into college based on their ability to pay for college. How do we understand then the effects of college financial aid on college access as this is related to our findings about how aid has been distributed in college?

We rely on a study, conducted in the same province in recent years, to help address this question. Liu et al. (2011) reported the findings from a randomized control trial in which extra scholarships were given (by an NGO) to the poorest senior students in 10 high schools in 8 poor counties in Shaanxi province in 2007 (Liu et al., 2011). The authors found that scholarship awards that were purposefully given earlier to students in high school, much before these students would usually know about their eligibility for financial aid (i.e. in college, after enrolling), had *no* effect whatsoever on the students who were eligible for public (first and second tier) colleges. This is because students eligible for first and second tier colleges in both treatment and control groups *all* decided to go to college. The authors concluded that by the third year of high school, parents had either already decided to pay the fees for tier 1 and 2 colleges, even by borrowing or liquidating assets, or pulled their child out of school at some earlier point to enter the labor market. We argue that in 2005 (even before the State Council's financial aid policy), lower SES households were similarly committed to supporting their children to go to tier 1 and tier 2 colleges by the senior year of high school. This is because of a combination of the high rates of return to going to these colleges, the relatively high tuition fees that had already been paid for high school, and the fact that students and their parents often seemed to lack basic information about the State Council's financial aid policy in 2007 and 2008 (Liu et al., 2011; Yatchew, 1997).

What about students who could qualify for third-tier private institutions (the remaining four-year institutions)? Table 5a of our study, shows that the gross tuition prices for private colleges are approximately double that of public colleges and that non-loan financial aid on average is only about 1500 yuan or 15% of tuition conditional on aid receipt.<sup>29</sup> Thus, financial aid comprises a small part of (expensive) private university tuition, and we think it is fair to assume that the impact of aid on the college matriculation decision would be quite small for students eligible for third tier universities.

Since financial aid does not seem to have much of a direct impact on either four-year college access or dropout, then what are the implications of examining whether aid has been distributed fairly? We argue that financial aid has implications for more than just college persistence and matriculation. Boatman and Long (2008), for example, find effects of financial aid on the engagement

<sup>27</sup> There are several reasons why dropouts are uncommon. First, once a student is admitted into a four-year college in China, she is essentially legally guaranteed to obtain a degree in four years; the risk of failing to obtain a college degree conditional on registering for college is thus very low. Second, the rate of return to college (especially 4-year college versus 3-year college, see Fan et al., 2010) is quite high in China (and indeed in other large, developing countries such as Brazil or India). Third, in China, there may be more intra-household and inter-household (e.g. through social networks) sharing/lending of resources through which prospective college students can overcome short-term credit constraints (compared to say the US).

<sup>28</sup> Another related detail is that the State Council's major financial aid policy (which resulted in approximately eight times more funding for financial aid between adjacent pre-policy and post-policy years) was first executed in the 2007–2008 school year. In our study, we measure aid receipt in the 2007–2008 school year (by asking students in Nov. 2008 about aid receipt in their third year of college, which they had just finished). We therefore measure the allocation of financial aid to students in the first year of the implementation of the State Council policy.

<sup>29</sup> More specifically, 40% of students receive aid; only 4% of all students receive aid equaling more than 30% of tuition, from various sources. Less than 0.4% of students received some kind of college loan in our sample, as students were generally not eligible for loans in 2007.

of disadvantaged college students in the US (Boatman & Long, 2008). Financial aid has also been found to have effects on college achievement (Stater, 2009). In China, aid could especially have had an impact on student engagement and learning, as college students reportedly lived under difficult economic circumstances before the State Council's 2007 policy. Moreover, because households in China are willing to take on sometimes excessive financial responsibilities to pay for their children's college education (for the reasons discussed above), the current allocation of financial aid to students from lower income backgrounds may help relieve this burden to some extent. Whether aid actually has these impacts, especially on disadvantaged students and their households, is outside the scope of our paper, but something we hope that future research can explore.

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**Prashant Loyalka** is an Assistant Professor at the China Institute for Educational Finance Research at Peking University. He received his PhD in International Comparative Education and his MA and BA in Economics from Stanford University.

**Yingquan Song** is an Associate Professor at the China Institute for Educational Finance Research at Peking University. He received his PhD in Education from UC Berkeley.

**Jianguo Wei** is an Associate Professor at the China Institute for Educational Finance Research at Peking University. He received his PhD, MA, and BA in Law from Peking University.