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主编：闵维方；副主编：丁小浩 阎凤桥；

编辑：岳昌君 孙冰玉

Who Gets More Financial Aid In China? A Multilevel Analysis

Po YANG¹

Institute of Education and Economy
Graduate School of Education, Peking University
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Abstract: The newly established Chinese financial aid system is a response to the reduced affordability of postsecondary education and open college access to disadvantaged students. However, research base for access to aid is extremely thin at present. Using a cross-sectional sample of 16,058 college students from 54 institutions in Beijing, China, this study finds female students, students with college educated fathers or from poorer households, and CCP members are expected to receive more aid. Junior or senior students and more able individuals in science related majors obtain significantly more aid. Attending selective institutions with high ability peers is positively correlated with more aid, and enrolling in selective institution increases the odds of getting aid.

Key word: financial aid, equity

¹ The author can be reached at: poyang@pku.edu.cn.

Who Gets More Financial Aid In China? A Multilevel Analysis

Higher Education Expansion and Student Aid in China

Observers of higher education sector indicated the expansion of financial aid program had been crucial in increasing access to postsecondary education in the past three decades (Grubb & Tuma, 1991; Ziderman, 2003,2004). Education economists suggest college student aid can partially release one's financial burden and thus promote retention and timely graduation (Ziderman, 2002). Although aid cannot eliminate all income constraints for college-bound generation, it certainly allows many high school graduates who could otherwise not be able to attend college matriculate into college, such as female, low-income, older and minority students. In this sense, student aid generates a "democratization effect" in college access (Avery & Kane, 2004; Hansen, 1983; Linsenmeier, Rosen & Rouse, 2001).

Most discussions of student aid focus on its availability and adequacy (Long, 2003; Turner, 2004; Venti & Wise, 1980) and the impacts of student aid (Ehrenberg & Mavros, 1995; Klaauw,2002). Unfortunately, a majority of researches explores the experiences of developed countries. Little is known about college aid in developing countries with large public sector and high private higher education expenditure such as China (Wang, Wei, Yang, & Yi, 2008). Given that China becomes one of the largest providers of college-educated labor, it is critical to understand forces which shape the financial aid policy in China and the consequence of their interactions.

The expansion of Chinese tertiary education sector in late 1990s has led to an unprecedented enrollment growth. The gross tertiary enrollment rate increases from 3.4% in1990 to 23% in 2007 (China Bureau of Statistics, 2008). The expansion is stratified along selectivity and sector lines. The most rapidly growing institutions are public non-selective 4-year institutions and vocational higher education institutions (Yan, Zhuo & Yu, 2006), following the tertiary expansion pattern in U.S., Korea and Taiwan (Wu, 2009).

One of the unintended consequences of the expansion is a heavy fiscal burden for central government, which used to provide full support for all public institutions under a strict enrollment quota. In order to share this fiscal burden, government introduced a cost-sharing scheme in 1997, characterized by the beginning of tuition charging and the shift of enrollment from public 4-year to less-than 4-year and private institutions. Soon after the initiation of cost sharing, Higher Education Act of 1999 declared provincial governments should be primarily responsible for locally controlled institution.² The decentralization trend further shifted the funding burden from central to local public authorities. As a response, provincial governments gradually adopted a revenue diversification strategy for public institutions (Yang, 2009a). Currently, 40% of revenue for locally controlled institutions comes from tuition charge and 19% for centrally controlled ones (Bao, 2007).

Cost-sharing scheme and revenue diversification have contributed to a continuous erosion in per student public expenditure, even though the fiscal appropriation for tertiary education has experienced a robust growth during the same time period (Bao & Liu, 2009). To deal with the inadequate budget, public institutions raise their tuition and fee level at an accelerated rate. To break credit constraints for low-income students, Chinese government integrated its student aid system³ and implemented a substantial expansion of student aid programs in 2005 (Wang et al, 2008). Even though aid coverage grows rapidly, aid beneficiary is still a small proportion of college population. For instance, student loan covered 4.6% of total enrollment in 2006 (Wang et al, 2008). Tuition growth and aid expansion push China from a “low-tuition/low-aid” country to a “high-tuition/ relatively low-aid” nation.

² In 2007, there are 1908 tertiary education institutions in China. 111 of them are centrally controlled institutions and 1797 are under the sponsorship of provincial governments or private entities. The latter group is referred to as locally controlled institutions.

³ Before the grand expansion in 1999, Chinese government supported its students through tuition waiver and People Scholarship. Since 1987, People Scholarship evolved into student grants and loans programs. From 1999 to 2003, there was a gradual introduction of commercial loan program. In 2002, the National Fellowship Program was established which was soon changed to National Scholarship Program in 2005. Meanwhile, the commercial loan program was succeeded by National Development Bank loan in 2004. Central government built a large endowment for aid in 2007, in order to increase the coverage and the level of aid (Wei, 2009; Wang et al. 2008).

Recent analyses also show the tertiary expansion has changed the composition of study body. College students come from a more diverse background in terms of ability, socioeconomic status, and high school preparation. Ding (2006) found the proportion of college students with less educated parents increased from 1991 to 2000. Although there are fewer disparities in overall participation rate in higher education among different socioeconomic groups; however, a growing share of low-SES students concentrated in non-selective 4-year institutions, vocational or private less-than 4-year institutions (Shen & Yan, 2006). The new and heterogeneous student body demands more financial aid and obviously more need-based aid.⁴

Given Chinese government's daunting endeavors in improving its student aid system, is there equity in access to aid at tertiary level? In this study, we are interested in identify major determinants of financial aid with a cohort of recent Chinese college students. The purpose is to explore how individual and institution characteristics shape access to aid. In particular, this study intends to answer the following research questions:

1. Whether access to financial aid is equitable?
2. Do certain kinds of students, or students in certain types of institutions, have more difficulty obtaining aid?

This study takes the advantage of a rich data from a cross-sectional student survey. It is one of the first attempts to assess equity in aid distribution in China, with a special focus on low-SES students. To fully capture aid variation across institutions, we employ a multilevel analysis with student- and institution-level predictors. In addition, this study uses a Tobit model to deal with the left censoring in aid award. The rest of the paper is organized as following. The next section reviews current financial aid literature and the application of multilevel analysis in education research. The third

⁴ Review of historical development of Chinese student aid system suggests it is far from perfection with respect to equity, efficiency and sustainability. From equity perspective, there is regional disparity in student aid distribution, utilization and collection and differences in access to student loan and take-up rate by institution type. As for efficiency, institutions and county-level financial aid centers were not efficient in loan management and collection, and there is no clear risk sharing between government, banks and universities.

section presents data, sample and analytical model. The following section reports findings. The final section summarizes the findings and discusses their implications.

Literature Review

Access to Student Aid

Access to financial aid does not create equal. In the past decades, researchers have pointed out access to financial aid has been shaped by individual characteristics such as gender, race/ethnicity, age, socioeconomic status, and ability, high school preparation, college performance, as well as institutional characteristics and policy (Grubb & Tuma, 1991; Kane & Spizman, 1994; Boshung, Sharpe & Abdel-Ghany, 1998; Duffy and Goldberg, 1998).

The earlier studies focus on the role of individual characteristics in determining aid award (Caplan, 1980; McPherson, 1988; St John and Noell, 1989). Grubb and Tuma (1991) conducted a careful examination of the National Postsecondary Student Aid Survey (NPSAS 1986) data. Their linear probability model indicated the likelihood of receiving aid declined with parental income. Male, older and Asian students were less likely to receive aid. In addition, student's need and merit play a relatively minor role in determining aid award (Cartter, 1971; Barnes and Neufeld, 1980).

Later studies examine the level of aid received. Kane and Spizman (1994) introduced a Tobit model in analyzing the National Longitudinal Study of the High School Class of 1972 data. SAT score and high school rank significantly increased aid amount, but high parental income and education were negatively correlated with grant and loan level. Boshung, Sharpe and Abdel-Ghany (1998) used NPSAS 1990 to analyze racial and gender differences in aid. Using a decomposition technique, they found Asian and black students received significantly more aid than their white counterparts among aid recipients. For ones without aid, Asian and black students were 5% to 7% more likely

to received aid. Singell (2002) adjusted sample selection bias in Tobit model and verified math SAT scores had positive impacts on subsidized and unsubsidized aid, but verbal SAT scores negatively correlated with subsidized aid.

Institution attributes, such as institution type, selectivity, and student body characteristics also influence access to aid. Boschung et al. (1998) confirmed students from private institutions enjoyed a large aid premium than public school students. Another study found students in private 4-year institutions and proprietary schools were twice likely to apply for and receive aid than those from public 2-year institutions. Private 4-year college students had significantly higher probability of getting aid than their public counterparts (Grubb & Tuma, 1991).

Unfortunately, virtually no study has analyzed the determinants of aid for Chinese students. Majority of research focuses on aid distribution and impacts of aid. Shen (2008) found a very high unmet financial needs among Chinese students. The analysis also showed students with aid had good academic standing. Shen & Ziderman (2009) compared student loan programs in 44 countries and found loan repayment ratio and loan recovery ratio were very high in China. Yang (2009b) analyzed 9989 students from 19 institutions in 3 provinces and identified a significantly positive correlation between aid award and college GPA and out-of-classroom study time.

Multilevel Analysis

Although prior studies have paid attention to institutional difference in aid, their explanatory power is substantially compromised by their single-level analysis approach. At present, researchers use both student- and institution-level variables to predict student-level outcomes such as aid award. Given the nested structure of multiple institution data, it is inappropriate to use student-level logit or tobit model to analyze distribution of aid. Because aid awards for students from different institutions are independent, but it is not for those from same institutions. In addition, institution-level variables are used to explain variation in access to aid across

institutions, not disparities across individuals.

One obvious solution is to introduce multilevel model to account for within group and between-group variation. Many scholars have employed Hierarchical Linear Model (HLM) to identify the impacts of institutional characteristics on college choice and retention. Rhee (2008) analyzed the effect of institutional climate on student departure. Relying on the Cooperative Institutional Research Program (1985-1989), the HGLM model found institution selectivity and diversity emphasis had significantly positive impacts on stop-out, but a significantly negative influence on transfer. In order to identify the role of state policies on college choice, Perna and Titus (2004) utilized a HLM model with National Educational Longitudinal Study (92/94) data. They suggested state appropriation, tuition at 4-year and 2-year institutions, state need-based financial aid were positively correlated with choosing in-state public or private institutions. Li (2008) used institution-level variables to explain variation in baccalaureate degree attainment. HLM analysis showed students from public institutions with higher tuition and average graduation rate were more likely to graduate.

Nevertheless, no known studies have applied multilevel analysis to study access to aid in China. Among few Chinese studies using HLM, scholars were interested in how village-level characteristics influenced rural student's probability of dropout (Liu, 2007) and how class size and school type affected student's aggressive behaviors (Li and Xin, 2006). Others used HLM in education production function analysis and estimated the impacts of school- and class-level predictors on college entrance exam scores (Ding and Xue, 2009; Ma, Peng, Thomas, 2006). This study improves upon prior studies by introducing a HLM model to account for intra- and inter-institution variation in access to aid.

Data and Model

Date and Sample

This study drew student-level data from the 2008 Beijing College Student Development Survey (CSDS: 2008), a survey was jointly designed and administrated by Peking University and Beijing Education Committee in December 2008. The survey involved stratified sampling in two stages. First, researchers divided all tertiary institutions in Beijing into 4 groups: Project 985 institutions; Project 211 institutions; non-selective 4-year institutions; and vocational less-than 4-year institutions.⁵ The survey took institutions from these four groups according to their proportions in total population. Next, the survey categorized all majors within an institution into 4 categories⁶, and then randomly sampled 200 to 1200 students from four categories in each institution according to its enrollment size. The survey retrieved 29,806 questionnaires from 54 institutions and the response rate was close to 83%. In addition, this study obtained institution-level data from Beijing Education Yearbook 2008 and institution websites.

To create an analytical sample, we first deleted 13,206 students received zero amount of aid. Then we eliminated another 642 students without college major or institution identifier. Thus we generate a complete student sample of 16,058 students. Given our interests in low-SES students, we delete another 10,843 students with college educated father and household annual income greater than \$1500. The low-SES sample includes 5,215 students. To deal with missing data, this study used pair-wise deletion and all analyses were conducted with STATA 10.0.

The dependent variable is the amount of total financial aid received, which is the sum of all grants, student loans and aids. Grants include National Fellowship, National

⁵ There are 39 Project 985 institutions in China and they are referred to as “very selective institutions”. There are 100 Project 211 institutions which are selective institutions in China. Vocational higher education institutions are less-than 4-year institutions which offer sub-baccalaureate degrees on vocational majors.

⁶ The four categories are humanities, social science and law, engineering, and science and medicine.

Incentive Grant, and Institutional Fellowship. Student loans include National Student Loan, Student Loan of National Development Bank, commercial loan, and institution interests-free loan. Aids include National Student Grant, regional government grant, work-study, temporary low-income student assistance, tuition waver and stipends.

Consistent with the aforementioned empirical studies, we assume the amount of aid received is determined by student- and institution-level attributes. Student-level variables measure individual gender, Chinese Communist Party (CCP) membership, father education, household annual income, high school type and class rank, college entrance exam raw score, college cohort and major. CCP membership serves as an indicator of social engagement. College entrance exam score is a proxy for ability. Father education and household income are typical measures of socioeconomic status.

Many studies suggest institution type and quality are good predictors of aid award (Grubb and Tuma, 1991; Boschung et al. 1998). This study incorporates institution selectivity as a measure of college quality. It further controls college price by including average annual tuition. In addition, this study uses percentage of students from low-SES households and average raw score of college freshmen class as proxies for institution socioeconomic status and student average ability level.

Table 3 indicates that majority of students come from middle-class but less educated households, and most of them are majored in social science and science. In the complete sample, 44% are male and 18% are CCP party members. Around 65% of students have fathers with less than college education and 38% of them are children of households with annual income less than \$1500. 21% of them majored in humanities, 29% came from social science and law, another 41% studied science and engineering and the rest 8% majored in medicine. 22% of sample students attend very selective institutions, 31% go to selective colleges, 39% choose non-selective 4-year institutions, and 8% attend vocational less-than 4-year colleges. The characteristics of low-SES sample is similar as that of complete sample, except that low-SES students have slightly lower college entrance exam scores (549 vs. 555).

Empirical Model

To explicitly address the variation in aid award across institutions, this study introduces a multilevel model to analyze the impact of student- and institution-level covariates on aid received. It is particularly interested in finding the determinants of college aid for low-SES students, since prior studies find they are more sensitive to college costs. In addition, we find the interclass correlation coefficient for aid award across institution of low-SES sample is twice as large as that for the complete sample, indicating the unequal access to aid may be more serious among disadvantaged students. Thus, the HLM applies to low-SES sample with a positive amount of aid.

The HLM is appropriate because students are nested within institutions. We focus on the role of the macro-level institution variables in determining the micro-level student outcome, conditional on student-level variables (Kreft and De Leeuw, 1998; Snijders and Bosker 1999; Rabe-Hesketh and Skrondal, 2008). Failing to statistically accounting for different units of analysis could lead to biased and inconsistent estimates (Bryk and Raudenbush, 1992). In an auxiliary analysis not showed here, we find OLS model with fixed effects for institutions implies a large variation in aid across institutions. Hence, it is ideal to use HLM to take care of it.

The HLM analysis involves two models: a student-level model to capture the effects of individual characteristics on aid award within college and an institution-level model to estimate between-college variation in access to aid. The student-level model indicates aid received is a function of student characteristics, as presented in function (1). We try four different specifications for the institution-level model, including: (1) a random intercept model with only student-level predictors (M1 in Table 4); (2) a random intercept and random slope model with only student-level predictors (M2 in Table 4); (3) a random intercept model with both student-level and institution-level predictors (M3 in Table 4); (4) a random intercept and random slope model with both student-level and institution-level predictors (M4 in Table 4). The final model is as the following:

$$Aid_{ij} = \beta_{0j} + \beta_{1j} * X1_{ij} + \beta_{2j} * X2_{ij} + r_{ij} \quad (1)$$

$$\beta_{0j} = \gamma_{00} + \gamma_{01} * Z_{ij} + U_{0j} \quad (2)$$

$$\beta_{1j} = \gamma_{10} + U_{1j} \quad (3)$$

$$\beta_{2j} = \gamma_{20} \quad (4)$$

Where Aid_{ij} denotes total amount of aid for student i in institution j . X_{1j} and X_{2j} are student-level predictors such as gender, CCP membership, father education, household income, college entrance exam score, college cohort and major. β_{1j} and β_{2j} indicate the influence of student-level covariates on aid amount. The intercept term β_{0j} is allowed to vary across institutions. Z_{ij} is institution-level predictors. r_{ij} is student-level error term. U_{0j} and U_{1j} are error terms at institutional level.

One of the limitations of running HLM over low-SES sample is that we include only students with non-zero amount of aid. In fact, about 48% of all survey respondents from CSDS: 2008 received no financial aid. Without taking this left-censoring into account, HLM model may yield biased and inconsistent estimates. To check this possibility, we run robustness check with other model specifications.

In an extended analysis, this study introduces a Tobit model to deal with data censoring issue (Boschung et al, 1998). This study uses a decomposition technique (McDonald and Moffitt, 1980) to decompose the marginal effect on actual variable into two parts: (1) the effect of independent variables on the amount of aid for students who received aid; and (2) the effect of independent variables on the probability of receiving aid for those students who don't receive any aid⁷.

⁷ See Boschung et al. (1998) for a complete presentation of the model. In STATA 8.2, the procedure is completed through -dtobit- and -dtobit2- command in STATA version 8.2.

Findings

Basic Pattern of Financial Aid

Most Chinese studies on student aid focus on impact of aid on academic development (Yang, 2009b) or the efficiency of particular kind of financial aid (Shen & Ziderman, 2009). There is a lack of information on the distribution of various kinds of financial aid among different types of students at a variety of institutions. Because of the rich information contained in CSDS: 2008, this study is able to carefully sort out financial aid distribution by institution type, aid type, and household background.

In the complete sample, 48% had no financial aid, 10% received grant only, 1.25% only got student loan, 23% only had aid, and the other 18% received a combination of different kinds of aid. Among the non-aided students, 45% were from non-selective institutions. Average financial aid in complete sample was \$236 and was \$455 among students with a positive amount of aid. Figure 1 illustrated there are two peaks in the kernel density estimate for aid. The aid distribution is censored at zero.

Access to aid is closely related to institution type and favors more selective institutions. In the upper panel of Table 1, our basic results indicates students from selective and above institutions were more likely to received aid than others. From instance, 54 to 57% of students from selective institutions received financial aid; in contrast, only 48.6% in non-selective institutions and 46.5% from vocational colleges got aid. The gap is more obvious with respect to aid type. Students from very selective institutions were four times more likely to get college grant than those from vocational colleges (28% and 7%, respectively). Similarly, the gap in student loan access between these two groups was 7.9% (11.5% for very selective institutions and 3.6% for vocational colleges).

The lower panel of Table 1 demonstrates students from more selective institutions are not only more likely to received aid, but get higher level of aid than their counterparts.

Among aided students, individuals from very selective institutions on average received \$574 in total aid compared with \$278 for those from vocational colleges. This large gap is mainly due to the fact students in very selective and selective institutions obtained much more grant and loan (\$160-\$205) than ones in non-selective and vocational colleges (\$60-\$90), even though they received similar amount of aid (\$160-\$190).

The “selective institution” aid premium is also confirmed in Figure 2. In this chart, selective institutions had a higher median aid level than non-selective and vocational institutions. However, they also had a larger interquartile range than the latter group indicating a large within-group variation.

The relation between household income and aid types further demonstrates the major beneficiaries of aid policies are low-income students (see Table 2). First, 70% of “loan only” students, 71% of “grant and loan” recipients, and 77% of “loan and aid” recipients came from households whose annual incomes were less than \$1500. Second, 44% of need-based aid recipients came from lowest income group. However current aid level is not adequate to cover tuition and living expenditures. Among students with aid, total aid equaled to 51% of tuition and 24% of annual expenditures. Hence, current level of aid is relatively low compared with expenditure. Student’s unmet financial need is quite high.

Whether access to financial aid is equitable? The association between household income and aid shows that low-income students are more likely to get aid. However, when adding institution type into analysis, it is clear that it is the low-income students from selective institutions who benefit from current aid programs. Table 1 reports among students from family with household income less than \$1500, 67% from selective institutions receive college aid, but only 48% from vocational college do so. These obvious advantages for elite institutions are worrisome given middle- and upper-class are taking over selective high schools in China and may easily extend their privileges into college (Yang, 2006). It implies financial aid is not able to close

the gap in college access, especially in the competition for entering high quality institutions.

However, this “selective institution” aid premium may be due to other causes such as student body composition. In next section, this study analyzes whether there are systematic differences among institutions in access to aid or whether the difference is due to types of students who attend various colleges.

HLM Analysis of Determinants of Aid

Do certain kinds of students, or students in certain types of institutions, have more difficulty in obtaining aid? This study answers this question by first introducing a HLM based on low-SES sample. Because this group of students is most likely to face credit constraints in college access and is the target of most need-based aid programs. If access to aid were not correlated with institution characteristics, it is fair to say that the distribution of aid is equitable. Table 4 summarizes the multilevel analysis findings. M5 in Model 4 is an OLS regression with same sets of predictors, serving as our reference point. Before running the full model, we run a null model and get the interclass correlation coefficient (ICC) of 0.11 with a reliability ratio of 0.92, which show sufficient variation across colleges and justify the use of multilevel analysis.

The multilevel analysis clearly points out the large variation in aid are closely related to institution characteristics. First, access to student aid is not “selectivity neutral”. Holding other variables constant, attending very selective or selective institutions (a high quality institution) has a positive and significant impact on aid level. Students from these institutions obtain 465 RMB (\$68) more in total aid than otherwise identical individuals (M4 in Table 4). The positive effect is statistically significant. The OLS model in Table 4 finds similar result, but with a smaller magnitude.

Second, college average ability is significantly correlated with aid. Table 4 reports that if a student attending a college whose average Freshmen Class score falling into the bottom 25% of national average in college entrance exam (a low quality

institution), she will expect to receive 905 RMB (\$133) fewer in aid than an otherwise identical student. The reduction is statistically significant. In other words, attending low quality institution decreases aid award.

Third, average SES level has a negative but insignificant effect on aid. Table 4 reports every 1% increment in the share of low-SES students at college is associated with an 806 RMB (\$119) reduction in aid, but the negative effect is not significant. But the OLS model finds a significant association between aid and average SES. The discrepancy between HLM and OLS model indicating their difference in dealing with interclass correlation.

The findings suggest attending high quality institutions significantly increases aid award. Although prior studies have not explicitly examined this association, they find college type and sector are significant predictors of student aid. Enrolling at private or proprietary institutions increased aid award and also increased the probability of getting aid (Boschung et al. 1998). Grubb and Tuma (1991) also found private 4-year college students were more likely to get aid. It seems institution quality, as college type and sector, is a source of variation in access to aid.

A few of the student characteristics also prove significant. Statistically controlling for other covariates, male students are expected to obtain 318 RMB (\$47) fewer in aid than females. It is surprising to find CCP members get substantially more aid (1084 RMB, or \$160) than others, which is more than double the effect of attending an elite university (\$68). We hypothesize CCP membership may be an indicator of unobserved individual characteristics which positively correlate with aid award, such as expectation, motivation, and social network. Because we cannot measure these variables with CSDS: 2008 dataset, the coefficient on CCP membership may be overestimated due to the omitted variable bias.

Students with less educated fathers (less than college) are expected to face a 648 RMB (\$95) reduction in aid compared with those with more educated fathers. All else

equal, household income is significantly negatively correlated with aid award. For every 100 points increment in college entrance exam score, one can expect to earn 450 RMB (\$66) more in total aid. It is also true that junior or senior students get significantly more aid than freshmen and sophomores. Finally, compared with science and engineering students, aid for medical major students is 691 RMB (\$102) fewer.

TOBIT Model Analysis

To deal with the left censoring issue, we propose a Tobit model and apply it to the complete sample. This study introduces a decomposition technique which separate coefficients on latent variables (ME1 of Table 5) from those on actual variables (ME2). It further divides marginal effect on actual variable into two parts: effects of independent variables on aid award (ME3) and effects of independent variables on the probability of getting aid (ME4). Table 5 reports the results from OLS and Tobit model.

Compared with coefficients from HLM (M4 of Table 4), Tobit estimates (M3 of Table 5) have similar signs but smaller magnitude. For instance, being CCP member significantly increases one aid award by 667 RMB (\$98) in Tobit model, but 1084 RMB (\$159) in HLM model and 1059 RMB (\$156) in OLS model.

The most striking finding is that same variables may have different impacts on aid award and the probability of getting aid. For instance, students with father education lower than college face an aid reduction of 196 RMB (\$29) if they were granted any aid. However, having a less educated father also increases one's probability of getting aid by 0.05 points for non-aided students. Similarly, household income is negatively related to aid amount and positively associated with the likelihood of getting aid. In addition, college entrance exam score and college cohort are positively associated with aid level, but negatively link to the probability of having aid.

Tobit model confirms that institution quality has significant impact on aid award and the odds of receiving aid. Attending selective institutions increases total aid by 133

RMB (\$20) and it also raises the chance of getting aid by 0.035 points. Attending institutions with less able peers (freshmen entrance exam score in bottom quartile of national average) associates with a 180 RMB (\$26) reduction in aid award and the probability of getting aid is also lowered by 0.05 points.

In conclusion, decomposition technique indicates attending high quality institution significantly increases the odds of getting aid for non-aided students and the amount of aid for aided students. These findings partially explain the aid premium enjoyed by students in elite institutions: they are more likely to obtain financial aid and receive more aid when they get aid.

Discussion

The higher education expansion in late 1990s is characterized by increased college access and reduced affordability of college education. This phenomenon is only possible in Chinese context where government used to have a strict college enrollment quota and the excess demand for college education remained high for an extended time. Budgetary appropriation per student in public institutions has been declining after the enrollment expansion. The revenue loss is largely compensated by substantial tuition increment, justified by the cost-sharing and revenue diversification arguments. Hence, the newly established financial aid system is a response to the reduced affordability of postsecondary education, as well as further opening college access to disadvantaged students.

This unique situation puts the equity issue on the top of the public agenda (Yang, 2006). In the past decades, there is a growing demand for equal access to financial aid, including grant and student loans (Xu, 2008). However, the research base for access to aid is extremely thin. This study is one of the first attempts to disentangle the financial aid puzzle facing contemporary Chinese college students. Using HLM analysis to address multilevel structure of the dataset and a Tobit model to deal with

the left censoring issue, we are able to find significant student- and institution-level predictors of aid award and the likelihood of getting aid.

In summary, this study finds that female students, students with educated father or from poorer households, and CCP members are expected to receive more financial aid. Junior or senior students or individuals with higher college entrance exam scores in science related majors are more likely to have a higher amount of aid.

The most disturbing finding is that access to financial aid is not independent of institution quality. Among the low-SES students, individuals in Project 985 and Project 211 institutions obtain more aid than others. Among all college students, matriculating into elite public institutions also increases the likelihood of receiving aid. In other words, attending high quality institutions increases the actual and expected value of aid award.

Particularly, students in non-selective 4-year and vocational less-than 4-year institutions will get less aid and expect to obtain lower amount of aid. This is worrisome since enrollment in less-than 4-year institutions is more sensitive to aid offering than enrollment in 4-year institutions (Leslie and Brinkman, 1987). In addition, tuition elasticity is higher for low-income students, especially for high school graduates interested in attending less-than 4-year colleges (Grubb, 1988). Thus, financial aid is more critical for opening access and increasing affordability among low-SES students in non-selective 4-year and vocational less-than 4-year institutions. Nevertheless, this study finds current Chinese student aid system is not in favor of these students, but low-income students in elite institutions.

While the evidence from this study is not conclusive, the advantage of students in selective universities is more irritating when taking into account the impact of student aid on academic achievement and labor market outcomes. In general, financial aid can reduce the probability of dropout and the odds of graduation (Cabrera, Nora & Castaneda 1993; DesJardins, McCall, Ahlburg, & Moye, 2002) and increase college

GPA (Starter, 2009; Betts & Morrell, 1999).

Unequal access to student aid will lead to unequal education and economic outcomes in the long run. Using data from 19 institutions in China, Yang (2009b) introduced a generalized ordered logit model to estimate academic influence of aid. Getting financial aid and having more aid had a significantly positive impact on college GPA and a negative effect on course failure. Aided students also spent significantly more extracurricular time on study. In a separate analysis with the similar sample, Yang (2009c) suggested students with aid were more likely to choosing work instead of attending graduate school or unemployed. However, this study suggests Chinese students in non-selective institutions won't be able to enjoy these benefits.

Why are students from high quality institutions getting more aid? First, Chinese student aid program is still in its early developmental stage. At present, government encourages the competitive merit-based aid instead of the non-competitive need-based aid (Yang, 2009b). Even among the need-based aid programs, there are always minimum requirements for academic performance. Often time, high ability students are able to attend high quality institutions and obtain merit-based aid. Hence, there is a concentration of merit-aid award in selective institutions.

Second, because of the limited public finance for higher education, government allocates more resources to elite public institutions such as Project 985 and Project 211 Institutions (Wang et al., 2008). The unbalanced resource allocation increases the capacity of high quality institution in offering institutional aid. Thus, students in elite colleges received more institutional aid.

Finally, student loan programs also favor top universities. To control default rate and improve loan repayment ratio, Chinese Development Bank and other commercial lenders prefer to give credits to students in high quality institutions who have higher future income and lower probability of default. As a result, the loan coverage rate is much lower in non-selective, vocational, and private institutions. All these forces

shape the access to aid and make it biased toward high quality institutions.

How can we get a more equal student aid system? The experiences of U.S. and other developed countries suggest bumping more money into student aid system is not the single best solution. It is the structure rather than the scale of aid system which makes the biggest difference in equity of student aid.

To this end, we consider several alternatives. First, improving the overall level of government support for student aid with targeting is a good option. Instead of having a cross-the-board aid expansion, it is ideal to target the increment towards students from non-selective 4-year and vocational institutions. The targeting scheme can improve aid coverage and the level of aid received.

Second, another possibility is prioritizing the development of need-based program. Given the current aid priority is increasing affordability and opening access for low-income students, one should put more emphasis on expanding need-based programs and controlling the growth of merit-based ones. Specifically, it is worthy of reconsidering the merit of substituting grant with student loan program.

Finally, given the increasing college cost, it is wise to measuring up aid level with tuition and living expenditure. For most aided students, their aid awards are much lower than actual tuition payment and costs of living. For needy students with extremely low family support, it is appropriate to link their aid award to tuition and costs of living.

Without doubt, this study can be improved in many ways. First, the analysis relies on self-report financial aid data. Although measurement error in dependent variable won't bias coefficient estimates, it is still desirable to use administrative data from College Financial Aid Center in each institution. In the following study, we will try to link survey data with administrative aid and academic performance data.

Second, although this study uses a representative sample of tertiary institutions in

Beijing, it may not be a good proxy for Chinese universities. Our sample includes a higher proportion of students from selective institutions than national average. Hence, one should be cautious in generalizing the finding of this study.

Third, the sample is based on actively enrolled college students. It doesn't include those who applied but didn't matriculate into colleges due to financial difficulties and those who enrolled but dropped out before the survey. In addition, students are not randomly assigned to different types of institutions, but strategically choosing colleges based on their ability, family and institution characteristics (Manski & Wise, 1983). These problems may cause biased estimates due to sample selection bias. In the future study, we may consider using change in college admission policy, such as introduction of early admission in Chinese universities, as instrumental variables to deal with the selection bias.

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Appendix: Tables and Figures

Table 1 Student Aid Received by Type of Institution

	Very Selective 4-year	Selective 4-year	Non-selective 4-year	Vocational Less-than 4-year	Total
Percent of Students Who:					
Received any grants	27.5%	25.8%	22.6%	7.2%	23.2%
Received any loans	11.5%	12.6%	5.5%	3.6%	8.6%
Received any aids	39.3%	44.3%	38.4%	42.8%	40.6%
Received any financial aid	54.0%	57.1%	48.6%	46.5%	52.0%
Received any need-based aid	41.9%	46.7%	39.4%	43.9%	42.4%
Received any merit-based aid	27.5%	25.8%	22.6%	7.2%	23.2%
HHC less than \$1500	66.6%	66.7%	56.3%	47.7%	60.2%
HHC bt \$1500 and \$6000	54.9%	58.3%	52.0%	46.0%	53.9%
HHC bt \$6000 and \$15000	46.0%	51.5%	45.9%	50.3%	47.7%
HHC greater than \$15000	41.0%	46.5%	38.0%	40.6%	41.3%
Average Amount of Aid for Students Receiving Aid					
Grant (\$)	204	161	143	68	156
Loan (\$)	173	178	85	61	131
Aid (\$)	197	163	158	149	168
Total Aid (\$)	574	502	386	278	455

Note: Calculation of aid coverage is based on complete sample from 54 institutions. Calculation for aid level is based on students with non-zero amount of total financial aid.

Table 2 Student Characteristics by Type of Financial Aid

	Household Income less than \$1500	Household Income between \$1500 and \$6000	Household Income between \$6000 and \$15000	Household Income greater than \$15000	Total Amount of Aid	Annual Tuition and Fees	Student Annual Expenditure
No Aid	28%	29%	22%	11%	0	945	2076
Grant Only	24%	34%	26%	10%	316	898	2041
Loan Only	70%	23%	4%	1%	749	816	1765
Aid Only	33%	34%	21%	8%	188	861	1867
Grant & Loan	71%	21%	5%	1%	1307	768	1662
Loan & Aid	77%	18%	2%	1%	1121	790	1655
Grant & Aid	34%	35%	20%	8%	540	824	1853
Grant & Loan & Aid	75%	19%	2%	1%	1619	797	1668
Need-based only	41%	31%	18%	6%	351	848	1829
Merit-based only	24%	34%	26%	10%	316	898	2041
Total	33%	31%	20%	9%	236	891	1936

Note: Calculation is based on complete sample.

Table 3 Summary of College Student Characteristics

Dependent Variable	Total Sample		Low SES Sample	
	Mean(S.E.)	Sample Size	Mean(S.E.)	Sample Size
Total Aid Amount (RMB)	3096.07 (3435.93)	16058	4794.23 (4021.82)	5215
Independent Variable				
<i>Level-1 (individual level)</i>				
Male	0.44 (0.50)	15930	0.51 (0.50)	5179
Party Membership	0.18 (0.38)	16058	0.18 (0.39)	5215
Father Education Lower than College	0.65 (0.48)	16058		
Household Annual Income Less Than \$1500	0.38 (0.49)	16058		
College Entrance Exam Raw Score	555.42 (126.48)	15000	548.81 (95.68)	4910
College Major - Humanities	0.21 (0.41)	16058	0.17 (0.38)	5215
College Major - Social science	0.29 (0.45)	16058	0.26 (0.44)	5215
College Major - Science	0.41 (0.49)	16058	0.47 (0.50)	5215
College Major - Medicine	0.08 (0.27)	16058	0.08 (0.28)	5215
<i>Level-2 (school level)</i>				
Institution Selectivity				
Very Selective Institution	0.22 (0.42)	16058	0.22 (0.42)	5215
Selective Institution	0.31 (0.46)	16058	0.30 (0.46)	5215
Non-selective Institution	0.39 (0.49)	16058	0.36 (0.48)	5.22E+03
Less-than 4-year Institution	0.08 (0.27)	16058	0.11 (0.32)	5215
Average Annual Tuition (RMB)	5752.08 (1767.87)	16058	5689.85 (1555.34)	5215
Percentage of Students from Low-SES Households at Current Institution	0.38 (0.10)	16058	0.36 (0.09)	5215
Average Raw Score of College Freshmen Class	555.19 (77.23)	16058	545.89 (80.98)	5215

Note: Standard error in parentheses. Total sample includes all students with a non-zero amount of college financial aid. Low-SES sample includes students with father education less than college and household

annual income less than \$1500.

Table 4 HLM Model for Predicting Financial Aid Amount (Low-SES sample)

	HLM Model				OLS
	M1:HLM	M2:HLM	M3:HLM	M4:HLM	M5:OLS
Slope Terms					
Male	-271.1* (118.40)	-267.6* (118.34)	-318.6** (118.42)	-317.8** (118.39)	-313.1** (117.78)
Party Membership	1078.9*** (143.23)	1079.4*** (143.16)	1083.8*** (142.82)	1083.9*** (142.77)	1039.2*** (142.30)
Father Education Lower than College	-648.0*** (62.86)	-648.6*** (62.81)	-646.3*** (62.82)	-647.9*** (62.78)	-644.7*** (63.35)
Household Annual Income Level	-388.3*** (107.53)	-401.9** (128.32)	-375.6*** (107.45)	-391.3** (125.74)	-403.5*** (108.35)
College Entrance Exam Raw Score/100	636.23*** (88.63)	635.8*** (88.36)	444.4*** (98.15)	449.6*** (98.10)	455.8*** (91.21)
College Cohort	409.9** (137.39)	406.1** 137.32	320.1* (137.64)	316.9* (137.53)	371.7** (124.67)
College Major - Humanities	-71.9 (195.17)	-75.2 (194.91)	-113.6 (195.41)	-113.1 (195.26)	-353.9* (171.13)
College Major - Social science	-94.3 (161.05)	-95.2 (160.90)	-107.8 (159.61)	-110.0 (159.52)	-77.7 (140.92)
College Major - Medicine	-803.8* (332.41)	-800.6* (331.70)	-694.5* (311.63)	-690.6* (311.98)	-432.1* (207.60)
Intercept Terms					
Attending 985/211 Institution			435.6 (296.96)	464.8* (278.57)	422.9** (162.57)
Middle Provinces			562.6*** (135.34)	551.6*** (135.32)	621.8*** (134.67)
Western Provinces			420.2* (169.31)	412.2* (169.23)	446.4** (168.93)
Average School Tuition/1000			34.5 (81.82)	34.5 (81.75)	60.6 (48.70)
College Freshmen Score Lower Than Bottom 25% of National Average			-929.9* (428.69)	-904.6* (428.23)	-816.2*** (218.35)
Percentage of Students from Low-SES Households in School			-751.9 (1389.52)	-806.3 (1387.29)	-1719.9* (759.31)
Constant	2906.9*** (664.52)	2944.5*** (674.63)	4079.1*** (1100.00)	4090.5*** (1133.97)	4099.7*** (892.81)
No Observations	4870	4870	4870	4870	4870
Deviance	93858.5	93855.0	93742.9	93740.6	93992.5
Adj R-squared					0.122

Note: * stands for significant at 5% level, ** stands for significant at 1% level, *** stands for significant at 0.5% level, **** stands for significant at 0.1% level. Standard error in parentheses. Low-SES sample includes students with father education less than college and household annual income less than \$1500.

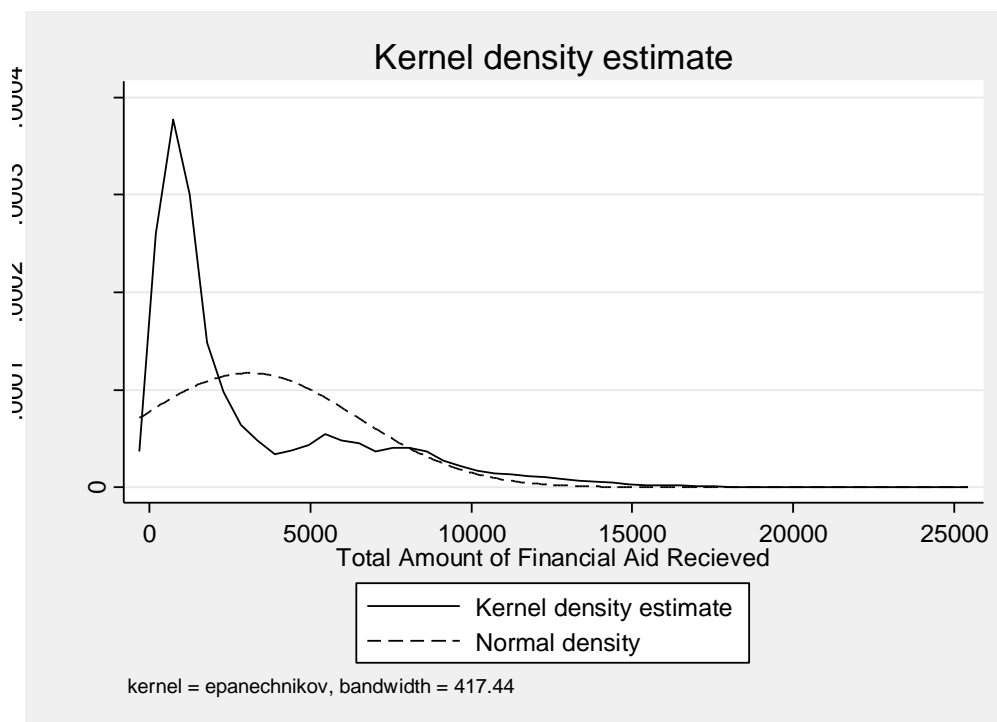
The reference group for college major is science, for institution region is Eastern Provinces,

Table 5 OLS and TOBIT Model for Predicting Financial Aid Amount (Complete Sample)

	OLS	Marginal Effect			
		ME1	ME2	ME3	ME4
Male	-296.32*** (36.81)	-826.46*** (61.12)	-422.9*** (31.46)	-305.8*** (22.70)	-0.08*** (0.006)
Party Membership	1058.72*** (49.97)	1644.26*** (78.88)	939.4*** (40.60)	666.6*** (29.30)	0.16*** (0.008)
Father Education Lower than College	-323.27*** (11.16)	-526.50*** (18.57)	-270.9*** (9.56)	-195.6*** (6.90)	0.051*** (0.002)
Household Annual Income Level	-300.95*** (9.93)	-448.35*** (16.73)	-230.7*** (8.61)	-166.5*** (6.22)	0.044*** (0.002)
College Entrance Exam Raw Score/100	119.12*** (16.30)	202.93*** (25.86)	104.4*** (13.31)	75.4*** (9.61)	-0.019*** (0.003)
College Cohort	396.50*** (33.93)	974.94*** (59.94)	501.7*** (30.85)	362.1*** (22.27)	-0.095*** (0.006)
College Major - Humanities	-240.69*** (50.79)	-566.25*** (84.60)	-283.2*** (43.54)	-205.9*** (31.42)	-0.055*** (0.008)
College Major - Social science	-191.90*** (44.85)	-349.19*** (73.34)	-177.3*** (37.75)	-128.4*** (27.24)	-0.034*** (0.007)
College Major - Medicine	87.38 (73.62)	215.89 (117.47)	113.1 (60.45)	81.3 (43.63)	0.021 (0.011)
Attending 985/211 Institution	309.35*** (47.25)	356.54*** (77.48)	183.5*** (39.87)	132.5*** (28.78)	0.035*** (0.008)
Middle Provinces	531.14*** (43.98)	892.19*** (71.45)	480.4*** (36.77)	343.7*** (26.54)	0.086*** (0.007)
Western Provinces	564.89*** (59.69)	903.09*** (96.36)	496.03*** (49.59)	353.6*** (35.79)	0.087*** (0.009)
Average School Tuition/1000	21.66 (12.88)	-17.85 (21.68)	-9.2 (11.16)	-6.6 (8.05)	0.002 (0.002)
College Freshmen Score Lower Than Bottom 25% of National Average	-334.57*** (66.40)	-492.17*** (109.30)	-248.1*** (56.25)	-179.9*** (40.60)	-0.048*** (0.011)
Percentage of Students from Low-SES Households in School	-528.37* (240.58)	-99.84 (395.61)	-51.4 (203.60)	-37.1 (146.95)	0.010 (0.039)
Constant	2503.02*** (213.58)	638.13 (355.28)	328.4 (182.84)	237.0 (131.97)	-0.062 (0.035)
No Observations	25695		25695		
Adjusted/Pseudo R Square	0.1657		0.1624		

Note: * stands for significant at 5% level, ** stands for significant at 1% level, *** stands for significant at 0.5% level, **** stands for significant at 0.1% level. Standard error in parent ices.

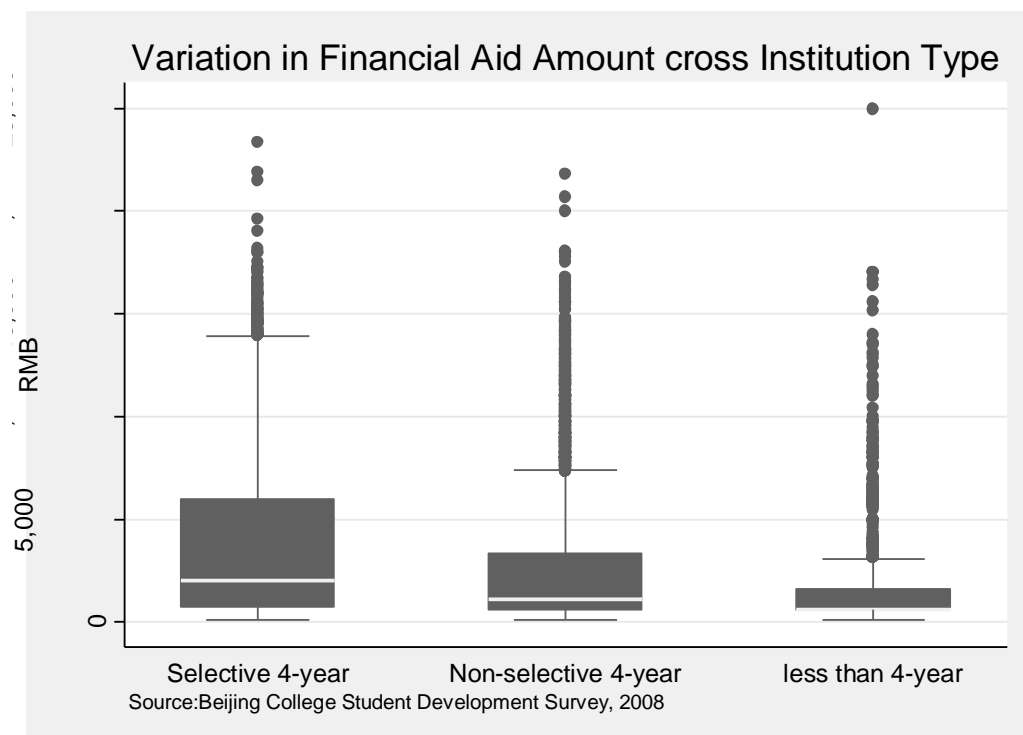
Figure1 Kernel Density of Financial Aid Amount



Data sources: Beijing College Student Development Survey 2008

Note: Calculation is based on students with non-zero amount of aid.

Figure2 Box Plot for Aid Distribution by Institution Selectivity



Data sources: Beijing College Student Survey 2008

Note: Calculation is based on students with non-zero amount of aid.