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Impacts of Financial Aid on Learning, Career Decision and Employment: Evidence from Recent Chinese College Students

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Abstract: China established a large-scale financial aid system in the late 1980s. This multi-layered aid system aimed at enhancing educational and employment opportunity. However, very few studies have examined the impact of student aid on learning effort and outcome, career decision, and early labor market performance. Using two recent Chinese college student surveys, this study found that students who received financial aid were significantly more likely to take more courses, spend more hours studying outside of class, have a higher class ranking, and be less likely to fail a course. Additionally, having financial aid could promote graduate school enrollment and initial employment, but had no significant impact on expected salary. Current aid programs are thus beneficial for those who receive public financial assistance in terms of educational outcome and employment perspective.

Key word: financial aid, academic achievement, employment

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College Financial Aid in the Chinese Context

The Chinese government launched an ambitious college financial aid reform in 2007. The State Council issued its *Opinions on Establishing and Improving Student Aid System for Needy Students in Regular Postsecondary Institutions, Postsecondary Vocational Colleges, and Secondary Vocational Schools*. This *Opinion* mandated a substantial increase in financial aid for college and vocational school students. It represented a considerable shift from a highly-subsidized and grant-dominated system to a moderately-subsidized aid system with a heavy reliance on student loans (State Council., 2007).

In Chinese context, need-based financial aids (Zhu Xue Jin in Chinese) include national or institutional temporary subsidies for needy students, tuition waiver and reduction for low-income students, and work-study program payment. Grants (Jiang Xue Jin in Chinese) refer to national or institutional fellowship and scholarship programs. Student loans (Xue Sheng Dai Kuan in Chinese) refer to National Development Bank loans, institution loans, and commercial bank loans[1]. The current aid system is mainly financed by government appropriations with very specific spending restrictions. For example, need-based financial aid is awarded to cover living expenses, while grants and student loans are designed to support tuition and room and board costs.

The financial aid system intends to increase support for needy students in order to promote college access and education equity in a harmonious society (State Council., 2007). It is part of government's demand-side financing strategy to fight for educational

[1] Both need-based financial aids and grants are 100% subsidized by government or institution and students don't need to pay back, while student loans are partially subsidized and have to be repaid after college graduation. Throughout this paper, we use financial aid and aid interchangeablely which refers to all financial assistance for college students. When we discuss three major types of aids, we use the terms such as need-based financial aid, grant, and student loan.

equality in Chinese higher education system. Recent literature indicates that Chinese aid system has experienced constantly changes since the late 1980s (Po Yang, 2010). Its rapid development is characterized by an increase in public investment, a diversification of aid options, and the growing flexibility to accommodate the needs that result from subsequent policy changes[1].

College financial aid is supposed to provide those without the necessary financial means access to a college education. To determine the effectiveness of such policies, much of the recent academic interests in China has been focused on the role of financial aid in enhancing college enrollment as well as on the distribution of financial aid (Loyalka, Song., & Wei., 2009; Hong Shen, 2008; Hua Shen & Ziderman, 2009; Yang, 2009; Po. Yang, 2010). However, the roles of financial assistance in promoting learning, enhancing persistence and timely graduation, and its influence on postgraduate choice have received relatively little attention due to data limitations.

No consensus has been reached regarding the effects of financial aid even though the scale of the aid system has expanded exponentially since the early 2000s. From 2001 to 2004, the total public aid for college students increased from 6 billion to 19.6 billion RMB. In 2006, the government-provided college aid programs served 15.6 million students with 18.7 billion RMB[2]. This represents a significant government investment on behalf of the society. Because of the rising accountability movement in Chinese higher education system (Yang, 2007; Yang, 2008), it is critical to demonstrate how well needy students are served by these publicly-funded programs.

With the rich individual and institutional information from recent student surveys, this paper intends to analyze the association between financial aid award and individual educational and economic achievement. Specifically, it raises the following research questions:

1. What are the impacts of financial aid on college student's learning effort and

[1] See Yang (2010) for a more detailed discussion about the financial aid policy change in the past 20 years.
[2] In 2006, 1 dollar equaled to 7.9RMB.

learning outcome?

2. How do financial aid influence college graduate's career decision and early labor market performance?

This study extends prior literature by focusing on college learning and postgraduate choice. In addition, the analyses are based on 2008 Beijing College Student Development Survey (2008 BJCSDS) and 2007 College Graduate Employment Survey (2007 CGES), two large cross-sectional surveys which only become available recently and contain rich student and financial aid information. In the analysis, we explicitly evaluate the impacts of financial aid with four alternative aid measurements: a dummy variable of whether receiving aid; dummy variables for 7 aid categories (grant only, loan only, aid only, grant and loan, loan and aid, grant and aid, and the combination of grant and loan and aid); dummy variables for need-based aid (including need-based financial aid and student loans) and merit-based aid (including grant); and dummy variables for 4 quartiles of total aid amount. Finally, this research deals with the endogeneity of financial aid in the prediction of aid impact with the propensity score matching model.

Literature Review

Theory

Economists argue that individuals make college attendance decisions based on balancing their expected costs and benefits. Financial aid can effectively lower the expected costs (present discounted value of costs) of college enrollment and persistence. Thus, college financial aid can potentially open college access by making it more affordable (Manski & Wise, 1983). Adequate amount of aid can allow individuals work less in college years than they would otherwise, which is also assumed to increase retention and promote timely graduation (DesJardins, Ahlburg, & McCall, 2002). Higher education researchers have conceptualized this decision-making process in the financial nexus model. It suggests that there is a nexus between the financial reasons

for choosing to attend a college and the ways students responded to actual colleges costs and aids (St. John, Paulsen, & Carter, 2005; St. John, Paulsen, & Starkey, 1996).

By the same token, access to financial aid may also leverage individual learning effort and outcome as well as adjust their postgraduate decisions. One explanation is that receiving aid can relax one's credit constraint and reduce individual's working time during college. When students put more time or effort for study, they may increase their academic integration and achieve better grades (Cabrera, Nora, & Castaneda, 1993; Tinto, 2006). Moreover, academically competitive undergraduates tend to attend graduate or professional schools more frequently than others (Thomas & Zhang, 2005). When they choose to work, graduates with higher GPAs often find high-paying jobs (Jones & Jackson, 1990).

A competing argument may suggest, however, that the financial aid premium is nothing but a reward for unobserved individual characteristics. High ability or highly motivated students are both more likely apply for financial aid and obtain higher academic achievement. In addition, capable students tend to perform better in labor market. The self selection into the financial aid recipient group based on unobserved characteristics cause the acquisition of financial aid become endogenous to the prediction of the impact of such financial assistance on individual attainment. This is often referred to as the endogenous bias or selection bias related to financial aid.

In both cases, access to financial aid seems to improve academic performance and postgraduate career opportunity. We test both hypotheses in this study: we first analyze the effect of aid on learning effort and outcome using selection-on-observable approach; and then we explore the consequence of receiving financial aid after removing the endogenous bias with propensity score matching method.

Empirical Evidence

College financial aid accounts for a large proportion of government funding for higher education. It is not surprising to find a proliferation of financial aid studies in the

past decades. Existing U.S. literature has extensively examined the role of student aid in opening college access (Dynarski, 2003; Kane, 2004; Manski & Wise, 1983); enhancing college persistence and retention (Ehrenberg & Mavros, 1995); improving college learning (Starter, 2009); and adjusting individual postgraduate choice (Field, 2003; Fox, 1992; Zhang, 2007).

Prior studies demonstrate that college financial aids have substantial impacts on students' learning effort and outcomes (Long, 2006). Unfortunately, the endogenous bias related to financial aid award has plagued in this line of research and makes it difficult to assess the causal link between aid award and individual achievement. Recent quasi-experiment and experiment studies introduce some exogenous variations in access to financial aid and thus identify a causal aid effect.

For instance, Henry, Rubenstein and Bugler (2004) used matching technique to identify Georgia's HOPE Scholarship recipients and non-recipients who were just above and below the selection criteria and otherwise identical. Their analysis showed that scholarship holders accumulated more credit hours, achieved slightly higher GPAs, and were more likely to graduate after 4 years of college. Scott-Clayton (2008) investigated the PROMISE Scholarship in West Virginia. The analysis used a regression-discontinuity analysis based on ACT score threshold for PROMISE eligibility. The study found robust and statistically significant impacts of scholarship on 4-year BA completion rates.

The existing studies enrich our understanding of the impact of aid on academic performance; however, they fail to separate aid influences on learning effort and learning outcomes. Thus, it is hard to decide whether financial aid has an independent effect on academic performance through inducing extra studying effort.

So far, scholars have largely overlooked the role of financial aid in career decision and early labor market performance. Among few existing studies, a majority confirms that student aid has a significant effect on career choice. Millett (2003) analyzed the

Baccalaureate and Beyond Longitudinal Study of 1992-93 (B&B: 1992) and found that among students who expected to earn a doctoral degree, those with debt of $5000 or higher were significantly less likely to apply for graduate schools than their peers. Using the B&B 1993/1997 data and an instrumental variable strategy, Zhang (2007) verified that undergraduate loans had a negative and significant impact on graduate school attendance among public college students, but not for those in private ones.

The type and the timing of financial aid also matter for career choice. Field's (2003) study investigated how the timing of career-contingent financial aid influenced its effectiveness in encouraging law students to enter public interests work. The propensity score matching analysis found that law students in New York University with tuition waivers rather than ex-post loan assistance were 37% more likely to enter public interests work than others. Another study focused on the consequence of substituting student loans with grants in a highly selective institution (Rothstein & Rouse, 2007). It showed that undergraduate loans caused students to pursue high-salary jobs and reduced their likelihood of choosing low-paid public interest job.

Moreover, financial aid plays an important role in predicting starting salary and wage growth. Using the 1987 National Postsecondary Student Aid Survey data, Minicozzi (2002) found that individuals with larger student loan debt had significantly higher initial wages the year after graduation. The higher debt amount also decreased one's predicted wage growth over the next four years.

The current literature appears to be limited to the impact of student loans and pays little attention to other forms of aids such as grants and need-based financial aids. Moreover, they narrowly focus on graduate school attendance and going to public interests work as career options, and ignore other occupation options such as employment in private sector, study abroad, and self-employment. Very few studies have compared the employment status and the starting salary of recently graduated financial aid recipients and non-recipients. In addition, no known study has analyzed the association between financial aid and career decision among Chinese students. This

study intends to address these issues with recent Chinese college graduate surveys.

Empirical Model and Data

Data and Sample

For the prediction of college learning, we work with the 2008 Beijing College Student Development Survey. This survey was developed by a team from one leading Chinese research university. The survey was administrated in December 2008. It intended to collect information on student background, college learning and development, and career expectation. The survey involved two-stage stratified sampling. It collected a total of 29,806 college sophomore and junior questionnaires from 54 institutions[1]. After omitting 5564 incomplete questionnaires, the analytical sample for learning consisted of 24,242 students. Table 1 provides summary statistics for 4- and 2-year students.

As for the analysis of post-college choice and early labor market performance, we consider the 2007 College Graduate Employment Survey. This survey was conducted by a research team from a leading Chinese research university in June 2007. The questionnaire collected information on individual and household background, college performance, employment outcome upon graduation, job searching process, and career expectation. The survey covered 16,388 students from 28 postsecondary institutions in 15 provinces[2]. To construct the analytical sample, we eliminated all 1,630 master's and doctoral students first. Next, we eliminated another 244 students with incomplete individual or college information. The final sample included 14,914 college senior students. Table 1 provides the summary statistics for aid-recipients and non-recipients.

Model for Learning Effort and Outcome

This paper introduces four measurements of financial aid as mentioned earlier: aid

[1] There were nine very selective institutions (22% of survey respondents), 17 selective institutions (28%); 24 less-selective institutions (42%); and four less-than-4-year vocational colleges (9%). Thus, the survey was a good representation of college students and 82 postsecondary institutions in Beijing.

[2] The survey included 3 selective "Project 211" 4-year institutions; 15 non-selective 4-year institutions; and 10 3-year vocational colleges. About 39% of respondents were 3-year vocational college graduates, 54% were 4-year college graduates, and the rest 16% were M.A. or PH.D graduates.

award; type of aid; aid category; and amount of aid[1]. As presented in previous literature (Gary T. Henry et al., 2004; Starter, 2009), we intend to model aid influence on learning effort and outcome, conditional on individual characteristics and high school performance, college experience, and institutional characteristics. In the analysis of learning, we create two measurements for college learning effort. They are number of courses taken each semester and how long students study outside of class on a daily basis. We also include two variables for evaluating learning outcomes: ranking in the top 25% of students in their major and having ever failed a course. The estimations are based on samples from 2008 BJCSDS.

Specially, we define several linear and non-linear models for predicting aid impacts. First, we utilize binary logit models to predict the impacts of financial assistance on the likelihood of course failure, and ranking within the top 25% of college major. Next, we introduce OLS models to estimate the consequences of aid award on the number of courses taken per semester and daily out-of-class study time. In brief, the coefficient on financial aid captures the effect of receiving financial aid on learning, conditional on other major covariates

Model for Career Choice

We introduce a multinomial logit model to predict one's career choice. Career options are employed, self-employed, unemployed and continuing to graduate or professional school[2]. Unemployed upon graduation is served as the reference group. The analysis is based on the 2007 College Graduate Employment Survey sample. In this study, we assume that financial aid award (aid recipient and aid amount), individual and household characteristics (such as gender, father's education, and household income); college experience (such as degree type, college major and ranking, course failure); and job search effort (obtaining professional certificate and number of formal

[1] The 2008 BJCSDS questionnaire asked specific types of aid received. Based on that data, we first sort them into three categories: grant (fellowship and scholarship); loan (institution or government); need-based infnancial aid (aid for needy students; work-study; tuition waver). Then we create four sets of measurements for aid.

[2] Employed refers to college students who had accepted a job offer and signed employment contract by graduation. Unemployed are those who had not accepted any job offer. Self-employed are students who claimed to work for himself or herself in survey questionnaire.

job applications), are all important predictors of individual's career choice.

Propensity Score Matching for Labor Market Performance

The most critical methodological challenge in this line of literature comes from the non-random selection of students into various financial aid programs. To deal with this selection issue, our aforementioned prediction models are based on the critical assumption of "selection-on- observables" to identify the effect of receiving aid in the presence of non-random selection (Heckman, 1985). With this assumption, we can eliminate the bias resulting from the differential selection of more able, more motivated, and otherwise better students into aid programs by conditioning on pre-determined observed individual characteristics. However, the selection-on-observable approach may fail if the analysis is unable to include all observables; or there exists some unobserved personal traits that influence both the probability of receiving aid and individual choice, such as innate ability, motivation, and expectation[1]. Inadequate control for unobservables implies that the estimated financial aid effects are subject to endogeneity bias (Brand & Halaby, 2006).

As an alternative, recent studies introduce the propensity score matching method as a way to deal with self selection in observational data (Rosenbaum & Rubin, 1983). Dehejia and Wahba (2002) argued that "Matching involves pairing treatment and comparison units that are similar in terms of their observable characteristics. When the relevant differences between any two units are captured in the observable (pretreatment) covariates, which occurs when outcomes are independent of assignment to treatment conditional on pretreatment covariates, matching methods can yield an unbiased estimate of the treatment effect." (ibid, p. 151).

As indicated in prior literature, the propensity score matching method involves two stages. First, we estimate individual's propensity score for receiving financial aid using a logit model with 3 matching methods. We use three matching estimators: the

[1] Furthermore, the linearity assumption underlying this method can hide the failure of the "common support" condition. See Black and Smith (2004) for detailed discussion.

k-nearest neighbor matching; radius matching; and kernel matching[1].The propensity score specification includes the following predictors: gender, age, number of siblings, father's education, household income, father's occupation, household region, college type, college major, class ranking, student leadership status, double major, course failure, and tuition costs. Most of the covariates pass the standard balancing tests in the final specification provided by Stata 10.0[2].

Next, we match individuals in aided and non-aided group based on their propensity scores. In the analysis, we work with five outcome variables: career decided upon graduation[3]; choosing graduate study or studying abroad; employed upon graduation; employed student expected income; and unemployed student expected income. The mean difference in outcome variables for each matched pair is the estimated impact of financial aid on students. We further compare the estimations from the conventional linear probability models and OLS models with those from the propensity score matching models, in order to check whether the PS matching improves the estimation precision after statistically controlling for the potential selection bias.

Findings

Descriptive Analysis

Preliminary analysis of the 2008 BJCSDS reveals a large disparity in access to financial aid. Table 1 shows that about 52% of sampled undergraduates received public financial aid with an average amount of 3,096RMB. Another 48% received no financial assistance. Among the aid recipients, a majority obtained public aid at a low level of assistance. About 45% received need-based financial aids (average of 1,278RMB); 15% obtained grants (average of 2,152RMB); 2.4% had student loans (average of 5,096RMB). It is worthy of noticing that access to financial aid is correlated with

[1] Asymptotically, all the different matching estimators produce the same estimate, because in an arbitrarily large sample, they all compare only exact matches. In finite samples, different matching estimators produce different estimates because of systematic differences between them in which observations they assign positive weight, how much weight they assign them, and how they handle (implicitly) the support problem.
[2] We used –psmatch2-, -pstest-, -psgraph- provided by Stata 10.0 for estimation and post-estimation test.
[3] Career decided upon graduation refers to students who were employed or decided to go to graduate schools.

institution type. Students in very selective or selective institutions were 7% to 10% more likely to obtain public aid than those in non-selective 4-year or 3-year institutions. The aid gap is substantial with respect to grant and loan programs in particular.

Table 1 inserted here

The unequal access to financial aid may lead to unequal educational outcomes. Table 2 illustrates individual learning effort and outcome by financial aid status. It is obvious that aided students perform better than their counterparts with no or fewer aids. Comparing aided and non-aided students, aid recipients enrolled in more courses per semester, were more likely to attend classes more than 90% of time, spent more time on study, were less likely to fail course, and were more likely to have higher class ranking. When comparing students in the bottom and the top financial aid quartiles, students with more aids perform even better. For instance, 39% of students in the bottom quartile failed at least one course and only 24% in the top quartile did so.

Table 2 inserted here

We further explore the association between student aid and career choice with the 2007 CGES dataset. Students with more financial aid are more likely to attend graduate school than their peers with less aid. For instance, about 20% of students in the top aid quartile planned to study in graduate school while only 10% from the lower-middle aid quartile intended to do so. Moreover, students with more aid are more likely to find a job. Around 44% from the top aid quartile already held a job upon graduation. The number was 38% for individuals from the bottom aid quartile. In addition, students with more financial aid have a higher level of expected income. Students from the top two aid quartiles on average had a higher expected income than those from the bottom aid quartiles. However, this difference is significant for employed students, not for unemployed ones[1]. In general, aided students perform better in the labor market.

[1] The kernel density estimation plot for expected income also indicates that the income distributions for aided students have higher means and smaller dispersions. The two-sample Kolmogorov-Smirnov test for equality of distribution functions suggests that the test statistics is 0.0694 with P-value of 0.000 among students with job offers and 0.0491 with P-value of 0.048 among students without job offers. Thus, we conclude that there is a statistically

However, these unconditional results need to be verified by the multivariate analysis with controls for covariates.

Impacts of Aid on Learning

Table 3 reports a strong positive association between having received aid and learning effort. Statistically controlling for other covariates, this study found that receiving aid significantly increased one's course enrollment per semester by 0.39. Earlier U.S. studies on merit-based scholarship also find that obtaining aid can significantly increase course enrollment and major selection (Cornwell, Lee, & Mustard, 2006; Gary T. Henry et al., 2004). Receiving financial aid also induces more learning effort in terms of study time. On average, financial aid recipients spent 0.086 hour more per day for out-of-class studying than non-aided students. However, the estimate is quite modest compared with that from an earlier study of Chinese college students in three provinces (Yang, 2009). In addition, the study confirms that receiving aid can increase academic performance. Conditional on major covariates, individuals with aid were 1.97 times more likely to achieve the top 25% major ranking. Aided students were 22% less likely to fail a course than their non-aided peers who did not receive financial assistance. The results largely agree with an earlier analysis in which Yang (2009) reported that aided students were 1.9 times more likely to achieve a higher major ranking and 26% less likely to fail a course.

Table 3 inserted here

Aid type also makes a difference for college performance. First, it is evident that the impact of receiving aid from multiple sources is much larger than that of receiving a single type of aid. For instance, receiving a combination of grant and loan increased the number of course enrolled by 0.89, while the effects obtaining only a grant was 0.32. Similar patterns are also observed for out-of-class study time and course failure. Second, student loans have a very limited impact on learning. Except for a significant

significant difference in expected income distribution for employed students and no significant difference for unemployed students.

positive impact on course enrollment, the amount of educational debt had no significant effect on other outcomes. Although there is a trend of shifting from student grant to loan programs in China, this study presents contrary evidence to the benefit of such a shift since most of the positive learning effects of financial aid is largely absent for student loan programs.

Merit-based aid has a larger impact for learning effort and outcome than need-based aid. The most striking result is that students with merit-based aid were 7.4 times more likely to achieve the top 25% major ranking while the need-based aid recipients were 19% less likely to achieve the highest major ranking than others. In addition, need-based aid had no impact on individual study time and course failure. The finding is counter intuitive because the need-based aid allows individuals to study more and work less during college by releasing one's financial constraints. One explanation is that the current level of need-based aid is not sufficient to cover students' demands and thus is less likely to induce a greater learning effort.

Finally, more financial aid significantly improves learning; however, the effect may not be linear. Compared with individuals in the bottom aid quartile, students in other aid quartiles were much more likely to have a higher major ranking, enroll in more courses, and spend more time on study. Nevertheless, students from the top aid quartile performed worse than those from the upper-middle aid quartile in major ranking and course failure. This indicates a non-linear association between aid amount and academic performance.

Impacts of Aid on Career Decision and Employment

It is evident that receiving financial aid has a strong positive impact on finding employment, but not for attending graduate school or self-employment. Table 4 shows that statistically controlling for other covariates, receiving financial aid significantly increased the probability of being employed upon graduation by 29% compared with the likelihood of being unemployed. However, obtaining aid is only slightly associated with a higher probability of attending graduate school or studying abroad. The finding

is in line with earlier U.S. studies (Zhang, 2007). In addition, financial-aid students were slightly and insignificantly less likely to be self-employed.

More financial aid significantly increases both the likelihood of finding employment and the odds of continuing onto graduate study. Holding other variables constant, one unit of logarithmic increment of aid amount significantly increased the probability of being employed by 30% and the likelihood of attending graduate school by 46%. This is an indication that financial aid can promote employment and graduate school attendance when it reaches a critical threshold level.

Table 4 inserted here

The propensity score matching estimators suggested that obtaining financial aid could significantly increase one's probability of having making career decision upon graduation, increase one's odds of attending graduate school or study aboard, and increase individual's likelihood of being employed upon graduation. Table 5 also reports the findings from the linear probability models (LPM) and OLS models, three matching estimators, and OLS regression with PSM weights.

Table 5 inserted here

The upper panel of Table 5 suggests that the k-nearest neighbors matching estimator was 0.061, the radius matching estimator was 0.017, and the kernel matching estimator was 0.057. All three matching estimators were statistically significant. The marginal effect for receiving aid on employment in LPM model was 0.065.The LPM model with PS matching weights obtained an estimate of 0.087. Thus, the five estimators largely agree with each other in sign and magnitude—that is, having financial aid can significantly leveraging one's employment opportunity even after taking care of the selection bias by matching. Similarly, the matching estimators for career decision ranged from 0.026 (LPM with PMS weight) to 0.051 (Radius matching). All the matching estimators suggested that individual with financial aid had a significantly higher probability of going to graduate study. Hence, the results confirm

the findings from the prior multinomial logit model in Table 4 without correction for selection bias.

The lower panel of Table 4 reports the impact of aid on expected monthly income. The three matching estimators agreed with the traditional OLS estimators that there was no significant aid effect on expected staring salary. For instance, the impact of financial aid on monthly income for employed students ranged from 50.8RMB to 91RMB, but none of them were statistically significant. Similarly, the aid effect for unemployed students varied from -68RMB to 22RMB. In other words, individual's income expectation has no association with their college aid status.

Discussion

Summary of Findings

Chinese government has adopted a more diverse financial aid system since the late 1980s and has consistently increased its investment in college financial aid programs (Wang, Wei, Yang, & Yi, 2008). College financial aid serves as a direct policy instrument to promote equity in higher education system. However, earlier studies paint a controversial picture of the present aid system. While more students receive aid, the overall aid coverage and the assistance level relative to college costs remain very low (Hong Shen, 2008; Yang, 2009). This study explores whether it is worthwhile to expand current aid system by assessing the impacts of financial aid on recent college students.

The analysis has yielded some promising findings. First, despite the unequal distribution of financial aid, students with more aid or a combination of various financial assistances are academically more successful than those without aid, receiving single type of aid or receiving less aid. Particularly, student loans have almost no significant impact on learning outcome. The positive aid impact on learning outcome comes mainly from the fact that financial aid incentives induce more studying effort. Thus, public aid contributes to increasing equity in educational process and outcome among aided students, in addition to making college more accessible and affordable.

Second, the association between financial aid and career decision-making are statistically significant. Having financial aid can promote the opportunities for graduate study and initial employment, but have no significant impact on expected starting salary. Hence, college financial aid influences individuals' future career overwhelmingly through changing their probabilities of going to graduate school and getting employed, rather than leveraging personal income after graduation.

Contribution and Limitation

The major innovation of this study is that it explicitly tests the association between financial assistance and career decision as well as early labor market performance. Unlike earlier studies that focus narrowly on student loans, this study considers a wider range of financial assistance programs and various levels of aids. In addition, our analysis considers a broader set of career options for a cohort of recent Chinese college graduates. Most importantly, this study introduces the propensity score matching technique to deal with potential selection bias related to aid award.

Without a doubt, this study can be improved in multiple ways. The current analysis is based on self-reported student aid data and there may be measurement error in self-report aid, academic achievement, and employment outcome. We consider integrate student survey with institution administrative data in the future study. Moreover, the 2007 CGES were conducted right before college graduation in June 2007. The self-report employment status may not be an accurate account of early labor market performance, because of the high job turnover rates among recent college graduates. Thus, we are interested in using other college graduate follow-up surveys in our next study.

Except for the measurement error, there maybe remaining endogenous bias related to financial aid award. The success of propensity score matching method critically hinges on the assumption that outcomes are independent of treatment assignment conditional on pretreatment covariates. Thus it is possible to match aided and non-aided students who are otherwise identical. If there are remaining observed individual

characteristics which cause correlation between the treatment assignment and outcome variable, the matching procedure may yield biased estimates due to the failure of the conditional independence assumption. Unfortunately, there is no summary statistics which can test the effectiveness of PS matching method in eliminating the selection bias so far.

Policy Implication

The positive learning- and employment-enhancing effects of student aid have many implications. Traditionally, college financial aid is viewed as an instrument for improving college access in China. However, the postsecondary education environment in the past decade has moderately changed. The policy priority has shifted from opening college access to maintaining educational quality and enhancing college employment. As a result, government has assigned a new function to financial aid—not only as a way to attract low-income students into colleges, but improve their learning outcomes and employment perspectives.

The new mission has achieved some preliminary successes. This paper documents that the financial aid can induce extra individual learning effort as well as significantly improve academic outcome. However, at present only 52% of Chinese undergraduate students are covered by public aid programs. In addition, there is a high concentration of aid recipients in highly selective or selective institutions (Po. Yang, 2010). As a result, only a small proportion of Chinese undergraduates can and actually have taken advantage of the current aid system. The positive externality of financial aid hardly reaches needy students in less selective 4-year or 3-year vocational colleges. Consequently, there is a higher risk that the unequal distribution of financial aid may transform into unequal distribution of learning achievement and employment opportunity in the near future.

One obvious solution is to expand the student aid program coverage and increase the subsidy level for disadvantaged students. Particularly, this study has showed that providing aid package or merit-based aid are much more efficient in improving learning

than offering single kind of aid or need-based aid. In addition, we find higher aid offerings are critical for leveraging learning and employment probability. It is also evident that offering student loans have virtually no effect on learning. Thus, it is more desirable to provide grants or need-based financial aids than simply offering loans.

Enhancing employability and promoting college graduate employment are high on government agenda (Yang & Lin, 2010). The present study provides some preliminary evidence that enhancing financial aid system can stimulate graduate and professional school attendance and initial employment. It is feasible to improve college employment by offering more favorable financial aid packages for disadvantaged college students. For instance, the state merit scholarship programs in the U.S. have been taken as a direct way to keep the best and brightest in state and promote local economic development (Gary T. Henry et al., 2004; Scott-Clayton, 2008). Chinese provincial government may consider using local financial aid incentives attracting college graduates into job with high social benefits but low private benefits such as public-interests work, in order to increase the overall efficiency in college graduate's labor market.

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Appendix

Table 1 Summary Statistics for 2008 BJCSBS Survey and 2007 CGSE Survey

2008 BJCSBS Survey				2007 CGES Survey		
	Sample Student	4-year Student	2-year Student		Without Aid	With Aid	Total
Male	0.463	0.477	0.358	Male	0.59	0.48	0.55
	(0.499)	(0.499)	(0.479)		(0.492)	(0.500)	(0.498)
Party Member	0.136	0.152	0.023	Father's education: Junior high school or less	0.35	0.37	0.35
	(0.343)	(0.359)	(0.150)		(0.476)	(0.483)	(0.478)
Urban Household	0.789	0.800	0.698	Father's education: College or higher	0.29	0.27	0.28
	(0.408)	(0.400)	(0.459)		(0.453)	(0.442)	(0.449)
In-state Student	0.472	0.418	0.865	Father's education: High school	(0.35	0.36	0.35
	(0.499)	(0.493)	(0.342)		(0.478)	(0.479)	(0.478)
Household Income <=10000RMB	0.332	0.319	0.436	Household income <=10000 RMB	0.34	0.37	0.35
	(0.471)	(0.466))	(0.496)		(0.473)	(0.484)	(0.477)
Household Income 10000-40000RMB	0.307	0.309	0.300	Household income: 10000-50000 RMB	0.49	0.48	0.49
	(0.461)	(0.462)	(0.458)		(0.500)	(0.500)	(0.500)
Household Income 40000-100000RMB	0.205	0.213	0.148	Household income: 50000-100000 RMB	0.13	0.11	0.12
	(0.404)	(0.410)	(0.355)		(0.336)	(0.314)	(0.328)
Household Income >=100000RMB	0.088	0.092	0.055	Household income >=100000 RMB	0.04	0.03	0.04
	(0.283)	(0.290)	(0.228)		(0.201)	(0.177)	(0.193)
HS Rank top 50%	0.869	0.893	0.719	College major: Humanities	0.13	0.15	0.14
	(0.337)	(0.309)	(0.449)		(0.333)	(0.362)	(0.344)
HS Exam Standardized Score Top 25%	0.328	0.350	0.160	College major: Social science	0.31	0.33	0.32
	(0.469)	(0.477)	(0.367)		(0.462)	(0.471)	(0.465)
College Freshmen	0.049	0.048	0.059	College major: Science & engineering	0.34	0.33	0.34
	(0.216)	(0.213)	(0.236)		(0.475)	(0.470)	(0.474)
College Sophomore	0.164	0.065	0.866	College major: Medicine & Agricultural	0.14	0.14	0.14

	(0.370)	(0.247)	(0.341)		(0.350)	(0.343)	(0.347)
College Junior	0.764	0.861	0.072	Class ranking: Top 25%	0.23	0.53	0.34
	(0.425)	(0.346)	(0.258)		(0.418)	(0.499)	(0.474)
College Senior	0.024	0.026	0.003	Class ranking: Upper middle 25%	0.48	0.38	0.44
	(0.152)	(0.160)	(0.057)		(0.500)	(0.486)	(0.497)
College Major: Humanities	0.250	0.249	0.245	Class ranking: Lower middle 25%	0.23	0.07	0.17
	(0.433)	(0.433)	(0.430)		(0.421)	(0.259)	(0.376)
College Major: Social Science	0.291	0.269	0.461	Class ranking: Bottom 25%	0.06	0.02	0.05
	(0.454)	(0.444)	(0.499)		(0.245)	(0.133)	(0.211)
College Major: Science	0.382	0.396	0.286	Ever had course failure	0.32	0.21	0.28
	(0.486)	(0.489)	(0.452)		(0.465)	(0.408)	(0.447)
College Major: Medicine&Agriculture	0.061	0.070	0.002	Held professional certificate	0.85	0.97	0.89
	(0.240)	(0.255)	(0.049)		(0.358)	(0.177)	(0.311)
Household Province in West	0.103	0.115	0.017	Number of job application	8.81	10.60	9.47
	(0.304)	(0.319)	(0.128)		(14.94)	(17.97)	(16.15)
Household Province in Middle	0.224	0.248	0.055	Job search expenditure	1051.77	1060.91	1055.32
	(0.417)	(0.432)	(0.227)		(1695.05)	(1595.63)	(1657.1)
Household Province in East	0.638	0.602	0.901	Unemployed	0.33	0.28	0.31
	(0.481)	(0.489)	(0.299)		(0.469)	(0.449)	(0.462)
Private Institution	0.039	0.025	0.143	Employed	0.38	0.40	0.39
	(0.193)	(0.155)	(0.350)		(0.485)	(0.49)	(0.487)
Vocational Colleges	0.088	0.001	0.716	Graduate school or study abroad	0.14	0.20	0.16
	(0.284)	(0.027)	(0.451)		(0.345)	(0.398)	(0.366)
Receiving Any Student Aid	0.519	0.536	0.422	Self employed	0.16	0.12	0.14
	(0.500)	(0.499)	(0.494)		(0.364)	(0.326)	(0.352)
				Expected income for employed	1588.65	1665.77	1618.07
					(1086.36)	(1246.43)	(1150.6)
				Expected income for unemployed	1876.84	1857.29	1870.08
					(1565.12)	(1486.44)	(1538.2)

Number of Observations	*30911*	*26860*	*3715*	*Number of observations*	*9579*	*5335*	*14914*

Note: Standard error in parent ices. Sample only included undergraduate students with complete information.

Table 2 Learning Effort and Outcome by Aid Status

	Average Aid Amount	**No of Courses Enrolled**	**Out-of-class Study Time (hour)**	**Major Ranking Top 25%**	**Course Failure**
No Aid		8.1	2.6	37%	41%
		(2.70)	(1.93)	(0.48)	(0.49)
Bottom 25%	518	8.5	2.4	42%	39%
	(123.77)	(2.71)	(1.76)	(0.49)	(0.49)
Lower Middle 25%	925	8.7	2.7	47%	30%
	(217.97)	(2.55)	(1.81)	(0.50)	(0.46)
Upper Middle 25%	2773	8.6	2.9	64%	18%
	(1147.76)	(2.62)	(1.99)	(0.48)	(0.39)
Top 25%	8468	8.6	3.0	56%	24%
	(2706.86)	(2.47)	(1.98)	(0.50)	(0.43)
Total	1608	8.4	2.7	45%	34%
	(2919.86)	(2.65)	(1.92)	(0.50)	(0.47)

Source: Author’s calculation based on 2008 BJCSDS survey data.

Table 3 Impact of Ever Received Aid

	No of Enrolled Courses OLS	**Out-of-class Study Time OLS**	**Major Ranking Logit (Odds Ratio)**	**Course Failure Logit (Odds Ratio)**
Aid Status				
Ever Received Aid	0.3971***	0.0863**	1.9772***	0.7837***
	(0.040)	(0.028)	(0.058)	(0.027)
Pseudo/adjusted R-Square	0.1232	0.0361	0.0844	0.2187
Number of Observations	17955	21499	24242	23025
Aid Type				
Grant Only	0.3197***	0.2023***	7.3870***	0.3507***
	(0.067)	(0.045)	(0.416)	(0.027)
Loan Only	0.4888**	0.22	0.79	1.05
	(0.165)	(0.114)	(0.106)	(0.143)
Aid Only	0.3608***	-0.06	0.8237***	1.05
	(0.047)	(0.033)	(0.030)	(0.041)
Grant & Loan	0.8875***	0.4451**	5.3484***	0.2854***
	(0.245)	(0.166)	(1.077)	(0.093)
Loan & Aid	0.4693***	0.1716**	0.7692***	1.1801*
	(0.094)	(0.065)	(0.059)	(0.092)

Grant & Aid	0.5054***	0.2181***	6.4113***	0.4177***
	(0.063)	(0.043)	(0.333)	(0.029)
Grant & Loan & Aid	0.5114***	0.4399***	5.7721***	0.4692***
	(0.115)	(0.080)	(0.551)	(0.061)
Pseudo/adjusted R-Square	0.1235	0.0393	0.1701	0.2313
Number of Observations	17955	21499	24242	23025
Aid Category				
Need-based Aid	0.3778***	-0.02	0.8167***	1.06
	(0.045)	(0.031)	(0.029)	(0.040)
Merit-based Aid	0.3192***	0.2001***	7.3933***	0.3504***
	(0.067)	(0.045)	(0.416)	(0.027)
Pseudo R-Square	0.1235	0.0384	0.17	0.2311
Number of Observations	17955	21499	24242	23025
Aid Amount				
Aid Amount 26-50%	0.2337***	0.06	1.5923***	0.7231***
	(0.054)	(0.038)	(0.065)	(0.035)
Aid Amount 51-75%	0.2580***	0.2759***	3.1353***	0.5331***
	(0.056)	(0.038)	(0.133)	(0.030)
Aid Amount 76-100%	0.2678***	0.3063***	2.5397***	0.6487***
	(0.062)	(0.043)	(0.118)	(0.037)
Pseudo R-Square	0.1201	0.0392	0.17	0.2227
Number of Observations	17955	21499	24242	23025
Other Covariates				
Control for individual and household characteristics	YES	YES	YES	YES
Control for high school preparation	YES	YES	YES	YES
Control for college performance	YES	YES	YES	YES
Control for institutional characteristics	YES	YES	YES	YES

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.

Table 4 Multinomial Logit Model for Career Decision

	Aid Award			Aid Amount		
	Employed	**Continuing Study**	**Self Employed**	**Employed**	**Continuing Study**	**Self Employed**
Receiving financial aid	1.2998***	1.06	0.95			
	(0.08)	(0.11)	(0.08)			
Ln of aid amount				1.2975***	1.4568***	1.03
				(0.06)	(0.11)	(0.06)
Control of individual characteristics	YES	YES	YES	YES	YES	YES
Control of college experience	YES	YES	YES	YES	YES	YES
Control for job search effort	YES	YES	YES	YES	YES	YES
Pseudo R square		0.031			0.044	
Number of observations		7491			3070	

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. Table reports odds ratio. Sample included all undergraduate students with complete data. The reference group is unemployed students.

Table 5 Propensity Score Matching Model for Career Decision and Expected Income

		LPM/ OLS	**K-nearest Neighbors Matching**	**Radius Matching**	**Kernel Matching**	**Regression With PSM Weights**
Upper Panel: Career and Employment						
Career Decided upon Graduation	ATT	0.032**	0.040***	0.051***	0.039***	0.026
	S.E.	(0.011)	(0.013)	(0.007)	(0.011)	(0.015)
	T statistics	2.92	3.2	7.12	3.46	1.79
Choosing Graduate Study or Studying Aboard	ATT	-0.006	0.032**	0.078***	0.032***	0.030**
	S.E.	(0.007)	(0.010)	(0.006)	(0.009)	(0.010)
	T statistics	-0.89	3.27	12.42	3.67	2.89
Employed upon Graduation	ATT	0.065***	0.061***	0.017*	0.057***	0.087***
	S.E.	(0.013)	(0.013)	(0.008)	(0.012)	(0.016)
	T statistics	5.16	4.59	2.13	4.77	5.31
Lower Panel: Expected Income						
Employed Student Expected Income	ATT	72.507	50.738	90.531	63.642	64.520
	S.E.	(37.566)	(52.177)	(28.447)	(44.618)	(44.166)
	T statistics	1.93	0.97	3.18	1.43	1.46
Unemployed Student Expected Income	ATT	-60.467	-57.581	16.261	-68.183	21.470
	S.E.	(80.342)	(78.798)	(45.432)	(69.370)	(75.456)
	T statistics	-0.75	-0.73	0.36	-0.98	0.28

Note: Standard error in parent ices. * 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. The table reported the regression coefficients and the average treatment effects with standard errors and T statistics.