

Article

The Influence of Financial Aid Systems on Student Academic Development in Higher Education in China

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Abstract: The main purpose of this paper is to analyze the relationship between the multiple mixed financial aid systems and the academic development of college students in Chinese higher education. Under the assistance of National Student Financial Aid Center of China, this study used sample data from the questionnaire survey conducted among students in 11 colleges and universities, and used logistic regression analysis based on human capital theory and student development theory to investigate the effects of different forms of financial aid on students' academic development in higher education. The main results of the study showed that, firstly, receiving National Scholarships, National Encouragement Scholarships, and National Student Loans were significantly and positively correlated with receiving excellent grades, but receiving National Grants and work-study positions were significantly and negatively correlated with receiving excellent grades. Secondly, receiving higher National Scholarships and work-study funding significantly increased students' probability of receiving excellent grades, but receiving higher National Student Loans funding significantly decreased students' probability of receiving excellent grades. Further analysis of the influence of different forms of financial support on students' academic development revealed that receiving National Scholarships and National Encouragement Scholarships can significantly increase the probability of study exchanges between sponsored students, teachers, and classmates and of attending seminars; receiving higher National Scholarships and work-study positions can help sponsored students clarify their study goals and increase study exchanges with teachers and classmates. The results of this study showed that the students' academic development is influenced by the National Scholarships and work-study positions. Based on the results of the empirical study, countermeasures and suggestions were proposed in terms of precise financial aid systems, allocation of financial aid resources, and work-study positions, so as to improve the impact of higher education mixed financial aid systems on college students' academic development in China.

Keywords: student financial aid; academic development; influence; higher education; scholarships



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1. Introduction

As one of the biggest higher education providers in the world, the Chinese government has worked to improve the financial support system for university students and is continually increasing its financial investment. These are important measures to ensure that China not only remains among the biggest higher education providers in the world, but is progressing toward becoming a country with a highly educated population. They are also important manifestations of the State Council's reform and are a result of the implementation of "the project of benefiting the people". They are important measures to ensure that the majority of students have ready access to higher education. Achieving equity in opportunity, process, and outcome of higher education for students from economically disadvantaged families is of great practical importance to develop China's human capital.

Since the expansion of higher education enrollment in China in 1999, the form, scope, and scale of financial aid projects for university students have continued to increase. Higher education in China was initially established as a multiple mixed financial aid system, comprising “scholarship[s], loans, work-study, [and] subsidies or tuition exemptions for particularly [disadvantaged] students” [1]. In 2021, the gross enrollment rate was 57.8% [2], indicating the popularization of higher education in China. Following this stage of popularization, the implementation of cost-sharing policies in education and the introduction of a financial aid policy for university students provided added impetus to higher education becoming increasingly popular. Thus, university students with financial difficulties are a large, growing social group, and their needs inevitably impact resource allocation in the current financial aid system.

Financial aid for university students increased from 16,298 billion yuan in 2006 to 124,379 billion yuan in 2020, and the number of sponsored university students increased from 153,027 million to 367,822 million [3]. Given its main components, financial aid is an investment of national education expenditure, which is an educational investment in human capital. The financial aid for college students has consequently attracted increasing attention. The scale and increasing structural complexity of China’s student financial aid system has caught the attention of the government and the academic community, who are concerned about its effectiveness. This study focuses on the multiple mixed financial aid system for university students in China, its impact on students’ academic development, and the actual effects of different financial aid projects. It aims to provide a scientific decision-making basis for the government and universities to improve the national financial aid system, rationally allocate financial aid resources, and increase the effectiveness of such financial aid.

The concept of college student financial aid has been defined both broadly and narrowly [4]. In a narrow sense, it refers to financial aid provided by the government, while in a broader sense, it refers to various forms of financial aid provided by the government and social institutions. Regardless of the conceptual scope, financial aid for university students is a form of economic support, and its basic principle is that it helps students with financial difficulties to successfully complete their studies by providing them with support by means of financial aid. This study adopted the narrow definition of financial aid for college students.

China implemented a cost-sharing policy for its higher education system in 1997, which has since been adopted by colleges and universities across the country. Given the increasing enrollment in institutions of higher education, students with financial difficulties became an emerging group. China piloted the National Student Loans policy in 1999, establishing a multiple mixed financial aid system of “scholarship[s], subsidies, work-study, reductions, and loans”.

The China State Council issued the Opinions on Establishing and Improving the Financial Aid System for [Financially Disadvantaged] Students of Undergraduate Institutions, Vocational Colleges, and Secondary Vocational Schools in May 2007. For the first time, a comprehensive and systematic plan for a student financial aid system in China was developed. It gave rise to opinions and suggestions to further improve the National Scholarships system, grants system, student loan policy, and policy implementation for government-funded teacher training students. The Ministries of Finance and Education issued relevant policies with clear and detailed provisions on funding, such as National Scholarships, National Encouragement Scholarships, National Grants, and work-study positions, in the same year.

To further improve the operation of National Student Loans, the Ministries of Finance and Education and the National Development Bank launched a pilot project of student loans via the local governments in Jiangsu, Hubei, Chongqing, Shaanxi, and Gansu in 2007, and the policy’s scope was expanded in 2008 [5]. The government has paid tuition fees and National Student Loans for those students pursuing grassroots employment since 2009 to encourage college graduates to work in grassroots units in the central and western

regions and in poor and remote areas. A national financial aid system for enlistment was also established that year to encourage college graduates to enlist in military service [6]. In 2011, an education subsidy policy was implemented for retired soldiers. Soldiers admitted to higher education institutions after their retirement were given a one-semester subsidy, including tuition subsidies, poverty living subsidies, and other scholarships [7]. A program to support first-year students with financial difficulties in registering for higher education was developed by the China Education Development Foundation [8] in the following year. In 2014, the National Student Loans policy system was improved to promote the development of student loans from local governments [9], and those loans' funding standards and proportions were amended [10].

Higher education in China has thereby established a multiple mixed financial aid system that combines National Scholarships, National Encouragement Scholarships, National Grants, National Student Loans, grassroots employment students' tuition fees or National Student Loans paid by the government, a national financial aid system for enlistment, a policy of tuition-free students, freshmen enrollment grants, an education subsidy policy for retired soldiers, work-study grants, school scholarships, difficulty grants, food subsidies, tuition exemptions, and a "green channel" for freshmen [11]. In terms of the concept of financial aid for students, China has gradually completed the process of forming an all-round concept of "financing and education", evolving from economic assistance to development assistance. Regarding the function of financial aid for students, the main purpose is to help economically disadvantaged students, while giving full play to the incentive role of economic assistance, with three primary functions: helping economically disadvantaged students, rewarding excellent students, and guiding students [12]. China specifically provides tuition fee waivers for university students who experience financial difficulties and encourages them to apply for National Student Loans to reduce the burden of their tuition fees. National Scholarships and teaching assistant positions are simultaneously provided to alleviate those students' financial burdens, and scholarships and grants are provided to students who achieve excellent academic performance.

The main source of financial aid for Chinese students is government investments and allocations. The government's financial investment in colleges and universities was 65,304 billion yuan in 2020, accounting for 52.51% of the total funding for colleges and universities. National Student Loans issued by the banks comprised 37,812 billion yuan, accounting for 30.4% of the total funding for colleges and universities; financial aid toward colleges and universities' business income was 18,362 billion yuan, accounting for 14.76%; and social organizations, enterprises, institutions, and individuals contributed 2901 billion yuan, accounting for 2.33% [3].

In this paper, we analyze the impact of financial aid for college students in China on the academic development of the recipients using data from a questionnaire survey conducted by the National Student Financial Aid Center of China among students in 11 colleges and universities, focusing on the group of college students who received financial aid (see Supplementary Materials). The paper analyzes not only the impact of different types of financial aid (scholarships, grants, loans, and work-study grants) on students' academic development, but also the impact of the degree of different types of financial aid. The results of the study showed that National Scholarships, National Encouragement Scholarships, and National Student Loans had a positive effect on academic performance, but National Grants and work-study positions had a significant inhibitory effect on academic performance. To better understand the mechanisms by which financial aid may affect students' academic development, we also analyzed the relationships between different types of financial aid and learning goals, learning exchanges, and participation in lectures. The study found that National Scholarships and National Encouragement Scholarships had a positive impact on increasing learning exchanges between sponsored students and teachers and peers, and on participation in learning lectures.

The structure of the paper is as follows. In the next section, we provide an overview of some existing studies in China, Europe, and the US. The third section outlines the theoretical

framework and research hypotheses of the paper. The fourth section presents the data, sample, variables, and methods. The fifth section presents the study results. In the sixth section, the main research findings results are summarized, and relevant countermeasures are suggested in the seventh section.

2. Literature Review

Murphy and Wyness [13] found that providing financial aid and enhancing financial assistance standards can improve students' academic performance. Yang [14] disclosed a significant positive correlation between financially assisted students and excellent academic performance. Greater financial aid could significantly increase the probability of excellent performance; grants, and grant and loan combinations, could significantly increase the learning time students have at their disposal, which was significantly correlated with financial aid levels. Bao and Chen [15] divided student forms of financial aid into delayed-payment poverty grants (National Student Loans), grant-in-aid (grants, tuition waivers, hardship grants), and grant-based incentive aid (various scholarships) and found that financial aid to students could directly or indirectly promote improved academic achievement. These types of financial aid have differential effects among students.

Financial aid linked with academic achievement seems to improve students' academic performance [16]. Goldrick-Rab et al. [17] evaluated grant programs at 13 public universities in Wisconsin, US, and found that providing additional grants to students from low-income families increased their probability of obtaining a bachelor's degree. In Italy, Facchini et al. [18] found that bursaries based on the bi-standard of performance and demand could improve academic performance and increase timely graduation rates among aided students. Fack and Grenet [19] examined French administrative data and found that demand-based grants positively impacted assisted students' academic continuity and timely graduation. Bettinger [20] assessed a 2006 Ohio student aid policy, arguing that increasing demand-based financial aid standards would increase the probability of assisted students entering a four-year college course.

However, Leuven et al. [21], in a randomized field experiment in the Netherlands, reported that financial rewards associated with academic performance could improve performance in highly skilled students while negatively impacting performance among low-skilled students. Schudde and Scott-Clayton [22] argued that the Perl scholarship program, in which meeting minimum academic standards is a basis for grant renewal, showed no clear evidence of motivating students to improve their academic performance, but negatively impacted the assisted students' early sustainability at the university.

Dynarski and Scott-Clayton [16] unearthed some rigorous studies that show how student loans affect college entrance rates, grades, or academic achievements. Card and Solis [23], using official data from Chile, found that obtaining student loans, which account for 85% of total tuition fees, increases the proportion of students returning to university and attaining their degrees. Chen and DesJardins [24] examined survey data of the National Center for Education Statistics and found that subsidized student loans had a significant positive impact on students' academic perseverance, while unsubsidized student loans did not. McKinney and Burrige [25] analyzed the impact of student loans on community university students' academic determination, concluding that student loans had a positive effect on academic tenacity at the end of the first year but a negative effect during the third and sixth years after initial enrollment. Herzog [26] studied first-year students at a public research university and found that student loans had a significant negative impact on academic perseverance, while interest-free subsidized government loans had no significant impact. Huang et al. [27] found that student loans failed to improve first-generation university students' academic development but increased their extracurricular work time and debt service pressure. Zhong [28] posited that students with economic difficulties who received student loans performed better than those who did not. Student loans could contribute to increasing students' financial capital, time, and energy for studying, as they

would no longer need to work to pay tuition and living expenses, thus improving their academic performance.

Thus, scholars across the world have reached general consensus on the effectiveness of financial aid for students' academic development. However, there is no firm conclusion about which aspects of, and to what extent, the various methods in the multiple mixed financial aid system promote academic development. Therefore, this study aimed to explore the effects of the multiple mixed financial aid system on students' academic development, analyze whether students with economic difficulties can improve their academic development through financial aid, and determine whether and how the academic achievements of aided students differ from unaided students. The goal is to provide a basis for further improvement of the financial aid system in higher education and to aid rational allocations of various financial aid resources.

3. Theoretical Analysis and Research Hypothesis

Foreign scholars were the first to analyze the impact of financial support on student development from the perspective of human capital theory. In the 1960s and 1970s, human capital theory, pioneered by Theodore W. Schultz, Gary Becker, and others, was built around the investment and return of human capital. Schultz (1960) [29] considered human capital as the type of capital that is embodied in people through investment and which is dependent on their own abilities, such as knowledge, skills, experience, and proficiency. Becker [30] proposed a variety of methods for estimating the amount of human capital investment through extensive empirical arguments, such as his proposed formula for the rate of return on investment in education, which provides a reference for making decisions about human capital investment. The main function of financial aid is to increase the attractiveness of attending a school by reducing the cost of education borne by the student, who will sacrifice entering the labor market for work or leisure time to increase the time devoted to learning and thus achieve better academic performance. Bourdieu [31] advanced the theory of capital transformation—he believed that capital could be divided into economic capital, human capital, cultural capital, and social capital, and the four kinds of capital could be connected and be part of each other. Economic capital is the root of the other forms of capital and reflects its own value through non-economic capital. After university students with financial difficulties receive financial aid, they essentially obtain a certain amount of economic capital and can spend more time and energy on learning and exploring knowledge, skills, cognition, and ability, which has a significant impact on their academic development.

Financial aid is an “economic investment” based on the return of human capital development, such as knowledge, experience, skills, cognition, and ability, of students with financial difficulties. Human capital elements have become an important basis for the selection of academic development indicators for sponsored college students. The core elements of human capital, such as knowledge, experience, and skills, of college students are mainly measured by academic achievement indicators, which provides a theoretical basis for evaluating the impact of financial aid on the human capital of college students.

However, the academic development of university students is influenced by the interaction of many factors, and financial aid is not the only influencing factor. There were two major schools of thought on college student development in the US in the late 1960s: the College Student Development Theory, and the Institutional Impact Theory. The college development theory applies human development theory to the field of higher education and suggests that colleges can influence student development by clearly articulating college goals, increasing opportunities for student interaction, providing opportunities for collaboration with faculties, and encouraging student engagement in learning. Institutional influence theory suggests that the academic development of university students is the result of the interaction between students and tertiary education institutions, where student engagement (in other words, student effort and socialization interactions) is the key factor affecting students' academic development. Colleges and universities provide

basic financial, academic, health, and employment guidance and support for student development, guide and motivate students to devote their limited time to effective learning activities, and improve student engagement. Students can only achieve growth and ability enhancement by actively participating in opportunities. Compared to the economics of education, research on student development in higher education lags significantly in the analysis of the effectiveness of financial aid policies.

Student development theory provides an important theoretical basis for analyzing the effect of financial aid in the academic development of sponsored college students. The theory can understand academic development as the interaction between college students and the academic elements of the institution, in which the effect of financial aid on the academic development of sponsored students is further refined into students' academic motivation and academic integration, which are mainly measured by indicators such as learning goals, academic exchanges, and academic conferences in this paper.

In summary, the following conclusions can be drawn: A multiple mixed financial support system affects university students' academic development by indirectly influencing the time and energy students devote to academic activities. To be precise, financial aid reduces students' financial stress and the psychological burden caused by financial stress. It also reduces the time and energy they devote to other activities, such as working for an income to settle tuition fees, thus being in a position to devote more time and energy to effective learning activities and promote their academic development. The higher the level of grants or incentive-based financial aid, the more adequate the aid, and the more time and energy students can devote to effective learning activities. This, in turn, results in improved academic performance. Student loans may achieve the opposite effect, which is that a higher level of aid increases the psychological pressure of loan repayments, which in turn increases the time and effort the recipient student devotes to having to work for an income, which is detrimental to academic development. Based on the above theoretical framework, this study mainly analyzed and explored the relationship between financial aid and academic development of sponsored students from the perspectives of education economics and education management, and examined the effect of the multiple mixed financial aid system on the academic development of the less affluent, sponsored university students. The following research hypotheses are proposed.

Hypothesis 1. *Gift-based financial aid.*

National Grants are used to support students from economically disadvantaged families in general undergraduate programs, which may reduce the number of part-time work hours that these students have during their college studies; too many work hours during college are not conducive to academic development [32], so the grants may improve the academic performance of the recipient students. However, state grants in Chinese universities are generally higher than general scholarships in schools, which weakens students' motivation to obtain this financial aid by improving their academic performance, especially since the study group in this paper comprises university students who receive financial aid; thus, we hypothesize that state grants have no significant positive effect on students' academic performance in the financial aid system.

Hypothesis 2. *Incentive-based financial aid.*

The National Scholarship is open to all general undergraduate students, and the National Encouragement Scholarship is open to students with family financial difficulties; both are for outstanding students with good character and high financial aid standards. Students who receive scholarship funding will feel that the state attaches positive importance to them; academic performance is one of the important criteria for selecting scholarships, and the recipient students may devote more time to their studies and regularly participate in activities such as study exchanges and study lectures among teachers and classmates. The college student development theory believes that college students can achieve continuous

development of academic performance in this way, so that in the following academic year, they can continue to receive scholarship funding. Therefore, we hypothesize that National Scholarships and National Encouragement Scholarships can significantly contribute to the academic development of the recipient students.

Hypothesis 3. *Repayment financial aid.*

National Student Loans are an important part of China's student financial aid system and can effectively alleviate the financial pressure of students from economically disadvantaged families, reduce the working hours of these students during their college years, and thus improve their academic performance. However, studies have shown that there is a debt tolerance level for the level of state student loan support, below which student loans positively affect students' academic development, and beyond which students' debt tolerance level increases students' psychological pressure to repay loans and may increase the working hours of students during college, leading to a negative impact on students' academic development. Therefore, we hypothesize that there may be an inverted U-shaped relationship between state National Student Loans and students' academic development.

Hypothesis 4. *Human capital return financial aid.*

College students with financial difficulties can receive income through work-study positions, which is higher than the input-output ratio of off-campus part-time jobs but still increases students' part-time work time, which is not conducive to improving academic performance. However, appropriate work-study positions can increase the participation of recipient students in school and positively influence students' academic development. Therefore, we hypothesize that work-study positions will inhibit the academic development of the recipient students, but an appropriate increase in the level of funding for work-study positions can indirectly affect the academic development of the students.

4. Materials and Methods

This study constructs a theoretical framework based on the educational production function model and the institutional impact model, and treats multiple mixed funding as an economic investment by the state and universities in students. The multiple mixed financial aid system in this paper is a narrow concept that refers to aid for university students such as National Grants, National Scholarships, National Encouragement Scholarships, National Student Loans, and work-study positions. Data were obtained via a questionnaire survey among university students who received assistance through the multiple mixed financial aid system and were used to quantitatively analyze the impact of this system on academic development. The research questions aimed to answer whether and how the multiple mixed financial aid system affects university students' academic development.

4.1. Data and Samples

Under the assistance of the National Student Financial Aid Center of China, the survey conducted among university students from 11 universities and colleges in eight provinces and cities (Jilin, Zhejiang, Jiangsu, Guangdong, Hunan, Gansu, Chongqing, and Shaanxi) in 2016. Based on the regional division criteria of China's economic development levels by the China Science and Technology Statistical Yearbook, samples of universities were selected: Jilin Province was chosen for the northeast region; Zhejiang, Jiangsu, and Guangdong provinces for the developed eastern region; Hunan Province for the central region; and Gansu Province, Chongqing Municipality, and Shaanxi Province for the underdeveloped western region. To ensure the representativeness of the sample of subsidized university students, a total of 10 colleges and universities were selected as the survey objects, and the types of colleges and universities involved comprehensive, science and technology, teacher training, agriculture and forestry, and medicine as fields of study. The sample included

diverse levels of colleges and universities: “985 colleges and universities”, “211 colleges and universities”, and other general colleges and universities. China launched the “211 Project” in 1995, which is a construction project to build approximately 100 higher education institutions and a number of key disciplines for the 21st century. China launched the “985 Project” in 1998, which aimed to build a number of first-class universities, and 39 universities from the “211 Project” were selected in three phases under the “985 Project”.

The scientific survey adopted a stratified sampling method according to the types and levels of colleges and universities to ensure the sample accurately reflected issues related to the academic development of university students enjoying financial aid. A total of 6000 questionnaires were distributed, and 5270 completed questionnaires were returned. In line with this study’s purpose, 1110 questionnaires from first-year students in 2016; 321 that were not beneficiaries of National Grants, National Scholarships, National Encouragement Scholarships, National Student Loans, or work-study position categories were deemed invalid. The final number of valid questionnaires was 3839. Among the samples, universities in the 985 Project accounted for 28.2%, those in the 211 Project accounted for 59.1%, and other colleges and universities accounted for 12.7%. Males accounted for 46.6%, and females for 53.4%. Regarding students’ major subjects, approximately 21.5% were literature, history, and philosophy students; 18.1% economics, law, education, and management; 48.6% science and engineering; and 11.8% agriculture and medicine. The control group sample of university students who did not receive financial aid also came from the 11 universities surveyed, with 5286 questionnaires, of which 1676 of 2016’s first-year and ineligible graduate students were rejected, leaving 3610 valid questionnaires.

4.2. Selection of the Independent Variable

The multiple mixed financial aid system mainly comprises National Grants, National Scholarships, National Encouragement Scholarships, National Student Loans, and work-study positions, all of which are included in the econometric model. Domestic scholars also include financial aid levels in the econometric model of the impact of student financial aid on academic development: Li (2015) [33] used scholarships and grants as well as specific funding amounts as variables for student financial aid; Yang [14] incorporated scholarships, student loans, grants, and funding levels; Chen, Fu, and Shi [34] included the level of scholarships; and Bao and Chen [15] included financial aid needs and satisfaction to measure financial aid intensity. Therefore, in this study, the total number of university students receiving multiple financial aid types, the type of financial aid received, and the funding strength of each financial aid project are included in the variable of student financial aid input.

The total amount of financial aid refers to the total amount of National Scholarships, National Encouragement Scholarships, National Grants, National Student Loans, and work-study positions, whereas the type of aid refers to the method of receiving the same. The intensity of aid refers to the extent to which university students can address their own difficulties for the purpose of using National Scholarships, National Student Loans, and work-study positions.

4.3. Dependent Variables for Academic Development

This paper analyzed the impact of financial aid on university students’ academic development. Combining the above academic analysis, the theoretical framework, and econometric model constructed in this paper, the focus is on the relationship between the type of financial aid, the intensity of financial aid, and students’ academic development. Since these indicators are measured differently in different studies, this paper refined and transformed them into operational definitions, taking into account the actual situation of China’s financial aid system for university students and the availability of data. Variable selection in this study mainly refers to existing domestic and international research to measure the impact of student financial aid policies on academic development. For example, Pascarella [35] identified five factors that influence university students’ academic

development: organizational characteristics of colleges and universities, the environment of colleges and universities, individual background, self-effort, and teacher–student interaction. Yang [14] used excellent and failing grades as a measure academic performance, daily extracurricular learning time, overall school satisfaction, and other measures of the impact path. Liu and Qu [36] analyzed the impact of student financial aid on academic development using learning with teachers and students, learning time, and the amount of the scholarship. Liao and Zhang [37] defined academic development as classroom learning participation, academic activity participation, classroom learning achievement, and academic activity achievement.

In this study, increments in students’ academic development were measured by “the improvement of academic achievement in the previous semester”, the current state of students’ academic development by “the class ranking of this school year”, and students’ academic development quality by “the awards of learning”. This study found that financial aid cannot only directly affect the increment, status, and quality of students’ academic development but also indirectly affect their academic development by influencing their academic engagement. This paper used “clear learning objectives”, “active communication and learning with teachers or students”, and “participation in symposiums, lectures and presentations” to measure the academic development of university students.

Factors affecting university students’ academic development, in addition to financial aid, include institutional department-level factors such as institution level and major subject type as well as student-level factors such as gender, age, ethnicity, and political affiliation, which are included as control variables in this study. The definition of variables of the impact of multiple mixed financial aid on university students’ academic development is shown in Table 1.

Table 1. Definition of variables of the impact of multiple mixed financial aid on university students’ academic development.

	Variable Code	Independent Variable	Nature of Variables	Variable Category	Variable Value Definition
Amount of financial support (X1)	X11	Total amount of financial support	Continuous variables	—	—
Types of financial assistance (X2)	X21	Whether to receive National Scholarships	Dichotomous variables (nominal)	No Yes	0 1
	X22	Whether to receive the National Encouragement scholarships	Dichotomous variables (nominal)	No Yes	0 1
	X23	Whether or not to receive National Grants	Dichotomous variables (nominal)	No Yes	0 1
	X24	Whether to receive National Student Loans	Dichotomous variables (nominal)	No Yes	0 1
	X25	Whether to obtain work-study positions	Dichotomous variables (nominal)	No Yes	0 1
Financial support efforts (X3)	X31	National scholarship support	Multicategorical variables (serial number)	Cannot be solved	1
				60–80%	2
				80–100%	3
				100%	4
	X32	National Student Loan funding support	Multicategorical variables (serial number)	Cannot be solved	1
				60–80%	2
				80–100%	3
				100%	4
	X33	Work-study position support	Multicategorical variables (serial number)	Cannot be solved	1
				60–80%	2
				80–100%	3
				100%	4

Table 1. Cont.

	Variable Code	Independent Variable	Nature of Variables	Variable Category	Variable Value Definition
Academic Development (Y)	Y1	Achievement progress	Dichotomous variables (nominal)	No Yes	0 1
	Y2	Class ranking for the current academic year	Multicategorical variables (ordered)	61–100% 41–60% 21–40% 11–20% Within the top 10%	1 2 3 4 5
	Y3	Learning rewards	Dichotomous variables (nominal)	No Yes	0 1
	Y4	Clarity of learning objectives	Multicategorical variables (ordered)	No goals Blurred objectives Have clear but relatively short-term goals Have clear and long-term goals	1 2 3 4
	Y5	Take the initiative to communicate with teachers or classmates about their studies	Multicategorical variables (ordered)	Never attended Rarely Generally Frequently	1 2 3 4
	Y6	Participation in seminars, lectures, and presentations	Multicategorical variables (ordered)	Never attended Rarely Generally Frequently	1 2 3 4
Control variables (Z)	Z1	Institution level	Dichotomous variables (nominal)	General Institutions 211 colleges and universities	0 1
	Z2	Type of specialization	Dichotomous variables (nominal)	Humanities and Social Sciences Science, Engineering, Agriculture, and Medicine	0 1
	Z3	Sex	Dichotomous variables (nominal)	Female Male	0 1
	Z4	Age	Continuous variables	—	—
	Z5	Political affiliation	Dichotomous variables (nominal)	Non-party members Party members	0 1

4.4. Econometric Model of the Impact of Multiple Financial Aid on Academic Development

This study built a model of the impact of multiple mixed financial aid on assisted university students' academic development. Based on the data type of the academic development dependent variables, the logit measurement model and sequential logit measurement model were selected for empirical analysis. The specific model settings are as follows:

$$\text{Logit}(Y_m) = \alpha + \sum \beta_j X_j + \sum \gamma_n Z_n + \varepsilon \quad (1)$$

$$\text{oLogit}(Y_i) = \alpha + \sum \beta_j X_j + \sum \gamma_n Z_n + \varepsilon \quad (2)$$

where Y_m ($m = 1, 3$) represents progress and academic rewards compared to the previous semester; Y_i ($i = 2, 4, 5, 6$) represents class ranking, clear learning goals, and initiative to communicate with teachers or classmates and participate in seminars, lectures, and presentations; X_j represents all independent variables measuring the investment of the multiple financial aid system; β_j represents the impact of multiple financial aids on students' academic development; Z_n denotes the institution-level and student-level control variables; and ε is a random disturbance item; that is, all the specified factors impact assisted university students' academic development.

5. Results

We investigated whether there was a significant difference in academic development among students with and without financial aid, confirmed the impact of financial aid on

students' academic development on a practical level, and examined the effect of multiple mixed financial aid on assisted university students' academic development. The measurement models as a whole were statistically significant ($p \leq 0.001$). Exp (β) was used to analyze the impact of multiple mixed financial aid on university students and to measure the change in the original incidence ratio caused by each additional unit of each financial aid project, that is, the effect of various financial aid projects on students' academic development under the multiple financial aid system. Exp (β) indicates the event occurrence rate of the influence of financial aid on the development of university students' learning ability. It measures the change of the original occurrence rate caused by each unit's increase of the dependent variable of financial aid. Odds = $P/(1-P)$, i.e., the ratio of the probability of occurrence to the probability of non-occurrence.

5.1. Types and Levels of Financial Aid Received by University Students

The types and levels of financial aid received by university students were analyzed to establish a baseline of the financial support received by the sampled university students. First, we analyzed the demands of university students for financial support, and the types of financial support they received. Among the financial aid projects that the sponsored university students had applied for, applications for National Scholarships ranked first, followed by applications for National Student Loans and work-study positions. The National Scholarship is the type of financial aid with the highest incidence of successful applications, followed by National Student Loans and work-study positions, for students with financial challenges. However, when determining the kind of financial aid that proved most helpful in reducing students' economic burdens, only 39.78% of university students indicated that National Grants were the most beneficial, and the percentage of university students who applied for and received the most financial aid for National Student Loans and work-study positions was generally low (see Table 2). From the statistical analysis, it can be seen that there is still room to further improve the coverage of financial aid for university students in China.

Table 2. Statistics on the types and levels of financial support received by university students (unit: persons, %).

	Type of Financial Aid Applied for		Type of Financial Aid Received		Types of Financial Aid That Help the Most	
	Sample Size	Proportion	Sample Size	Proportion	Sample Size	Proportion
National student loans	1564	40.7	1463	38.1	1026	26.73
National Scholarships	437	11.4	350	9.1	163	4.25
National Encouragement Scholarships	1271	33.1	967	25.2	527	13.73
National Grants	3149	82.0	2973	77.4	1527	39.78
Work-study positions	1737	45.2	1309	34.1	98	2.55
Hardship grant	—	—	817	21.3	105	2.74
Tuition waiver	—	—	158	4.1	65	1.69
"Green channel" for admission	—	—	529	13.8	37	0.96

The level of funding among university students who received financial aid is illustrated in Table 3: among all students who received National Scholarships, the average funding amount was 6520 yuan; among all those who received National Student Loans, the average funding was 10660 yuan; among all those who received work-study positions, the average funding received was 2170 yuan. The average funding amount and standard deviation of National Student Loans were higher than those of scholarships and work-study positions,

indicating that the amount of National Student Loans received by individual university students varied more among university students than National Scholarships and work-study positions.

Table 3. Level of financial aid received by university students (unit: 10,000 yuan/person).

	Average Value	Standard Deviation	Sample Size
National Scholarships	0.652	0.614	3704
National Student Loans	1.066	0.980	1945
Work-study positions	0.217	0.338	2138
Total funding	1.287	1.216	3839

5.2. Differences in Academic Development between Aided and Unaided University Students

The independent sample *t*-test was used to test the differences in the variables related to the development of learning ability between the aided and unaided university students.

As we can see in Table 4, there are significant differences between students who did and did not receive financial aid on direct measures of academic development, such as academic progress, class ranking in the current academic year, and receipt of academic awards. It is evident that the multiple mixed financial aid system directly impacted assisted university students' academic development.

Table 4. Analysis of the differences in academic development between aided and unaided students.

Variable		Levene's Test for Variance Equations		t-Test of the Mean Equation				
		F	Sig.	T	Df	Sig. (Bilateral)	Mean Difference	Standard Error
Progress in achievement	Equality of variances Disparity	600.28	0.00	−12.29	7447.00	0.00	−0.13	0.01
				−12.24 **	7127.92	0.00	−0.13	0.01
Annual class ranking	Equality of variances Disparity	1.43	0.23	−7.64 **	7447.00	0.00	−0.23	0.03
				−7.63	7402.26	0.00	−0.23	0.03
Learning rewards	Equality of variances Disparity	3.27	0.07	−8.72 **	7447.00	0.00	−0.21	0.02
				−8.72	7412.73	0.00	−0.21	0.02
Learning objectives	Equality of variances Disparity	9.15	0.00	−11.31	7447.00	0.00	−0.18	0.02
				−11.24 **	7032.05	0.00	−0.18	0.02
Learning exchange	Equality of variances Disparity	12.58	0.00	−7.13	7447.00	0.00	−0.12	0.02
				−7.13 **	7409.25	0.00	−0.12	0.02
Lectures, etc.	Equality of variances Disparity	13.93	0.00	−14.03	7447.00	0.00	−0.24	0.02
				−14.00 **	7331.90	0.00	−0.24	0.02

Note: ** $p < 0.01$.

Similarly, there were significant differences between students who and did not receive financial aid regarding indirect measures of academic development, such as learning goals, initiating and communicating with teachers or classmates, and attending symposiums, lectures, and presentations. The multiple mixed financial aid system also demonstrated an indirect impact on assisted university students' academic development.

5.3. Direct Impact of the Multiple Mixed Financial Aid System on Academic Development

The results of the model show that the National Scholarships, National Encouragement Scholarships, and National Student Loans had significant effects on assisted students' academic development. National Scholarships and work-study projects had a significant inhibiting effect. The total amount of financial aid received was a disincentive for academic progress and class ranking among assisted students. For every 10,000 yuan increase in the total financial aid amount, the effective rate of students' academic performance progress in the current academic year was 0.92 times higher than the original (Table 5). Thus, the effective occurrence ratio for improving the class rank by one level in the current academic year was reduced by 8%, compared to the original 7%. Thus, the multiple mixed financial aid system of higher education in China showed a significant direct promoting effect on academic development as well as a significant inhibiting effect. This suggests waste in the allocation of funding in the multiple financial aid system. It is therefore necessary to further analyze the influence of the strength of each type of financial aid on academic performance and provide suggestions for the reasonable allocation of funding resources in the multiple mixed financial aid system.

Table 5. Results of the model on the multiple mixed financial aid system on the academic development of college students.

Multiple Aid			Direct Impact			Indirect Impact	
			Progress in Achievement	Class Ranking	Learning Rewards	Learning Objectives	Lectures, Exchange, etc.
Constant term			1.43	-	-3.90 **	-	-
X ₁	X11		-0.08 *	-0.07 *	-0.02	0.01	-0.03
	X21		0.17	0.98 **	1.15 **	0.15	0.25 *
X ₂	X22		0.21 *	1.52 **	2.16 **	0.14	0.44 **
	X23		0.10	-0.20 *	-0.07	-0.12	0.07
	X24		0.46	0.61 **	0.51 *	-0.17	-0.05
	X25		-0.16	-0.20 **	-0.004	-0.10	-0.005
X ₃	X31	100%	-0.05	0.22	-0.37	0.49 **	0.42 *
		80–100%	0.39 *	0.41 **	0.34 *	0.25 *	0.18
		60–80%	0.22 *	0.13	0.15	0.06	0.08
	X32	100%	-0.16	-0.72 **	-0.72 **	0.19	0.12
		80–100%	-0.28	-0.57 **	-0.34	0.13	0.15
		60–80%	-0.07	-0.51 *	-0.43	0.33	0.11
	X33	100%	0.26	0.29	0.48	-0.04	0.57 *
		80–100%	0.23	0.16	0.44	0.26	0.39 *
		60–80%	0.37 **	0.19 *	0.20	0.48 **	0.34 **
	z		YES	YES	YES	YES	YES
	Prob > chi2		0.00	0.00	0.000	0.00	0.00
	Pseudo R2		0.02	0.07	0.166	0.02	0.02

Note: * $p < 0.05$ ** $p < 0.01$.

5.3.1. The Impact of National Grants on Academic Development

National Grants had a significant inhibitory effect on the academic development of recipient students. However, National Scholarships and National Encouragement Scholarships showed a significant impact on assisting students' academic development. For students who had not received National Grants, those who had received the grants were 0.82 times more likely to improve their class rank by one rank in the current academic year over the former. For students who had received National Scholarships, the relative probability of their class ranking improving one grade in the current academic year was 2.66 times or 166% higher than students who had not received such scholarships, and the relative probability of receiving a scholarship was 3.16 times higher than the former's.

For university students who had not received the National Encouragement Scholarships, the relative likelihood they would improve their academic performance in the current academic year was 1.23 times better than the former's, the relative likelihood of improving their class ranking in the current academic year was 4.57 times higher than the former's, and the relative likelihood of obtaining a reward was 8.67 times higher than the former's. When National Scholarships and bursaries met 60–80% of a student's financial aid need, the student's progress in the current academic year could be effective. The occurrence ratio of assisted students who made academic progress during the academic year was 1.25 times higher than the control group (thus, the financial aid funding intensity of the control group for this method cannot satisfy students' needs) when the financial aid funding level was between 80–100%. The assisted effective incidence ratio was 1.48 times higher than the control group. National Scholarship-supported students improved their class ranking by one level for the current academic year when support was between 80–100%. The relative likelihood of receiving a learning award was 1.51 times higher than for the control group. The effective incidence rate of receiving a learning award was 1.40 times higher than the control group when the National Scholarship support was 80–100% of the financial aid funding level.

5.3.2. The Impact of National Student Loans on Academic Development

National Student Loans showed a catalytic effect on assisted students' academic development; however, an increase in financial aid could inhibit their academic development. Compared to university students who had not received National Student Loans, students who did were 1.84 times more likely to improve their class ranking by one level for the current academic year and 1.67 times more likely to receive academic awards than students in the control group. When National Student Loans met 60–80% of students' financial needs, the relative probability for class ranking for assisted students in the current academic year was 0.60 times higher than that of the control group, i.e., 40% lower. The relative probability for an increased class ranking for assisted students in the current academic year was 43% lower when the subsidy was 80–100%. When the subsidy reached 100% of the student's need, the recipient student's class rank improved by one rank in the current school year, with the relative probability of a 51% decrease. When National Student Loans met 100% of students' needs, the relative probability of receiving a learning reward was reduced by 51%.

The results regarding higher financial aid from the National Student Loans indicated that these students might have more economic difficulties, and thus do not have access to better educational resources, which affects their academic performance. The empirical results of Zhong [38] showed that social class background has a negative effect on academic performance. Further, excessive student loans might affect their academic performance. The high level of National Student Loans may also reduce the contribution of the total amount of student aid to assisted students' academic development.

5.3.3. The Impact of Work-Study Programs on Students' Academic Performance

Work-study projects showed a dampening effect on assisted students' academic performance but could significantly improve academic development as the level of financial aid increased. University students who received financial aid for work-study projects were 18% less likely to move up one grade in their class ranking for the current academic year than students who did not.

When work-study projects were funded at a level that met 60–80% of students' financial aid needs, the effective incidence of academic progress aid for assisted students during the academic year was 1.45 times higher than that of the control group. Assisted students were 1.21 times more likely than control students to improve their class ranking by one level in the current academic year. University students facing budgetary constraints might combine studies and internships. Therefore, students who had been offered work-study

projects might yet have to correctly understand their value or view them as a means to address their economic problems.

5.4. Indirect Impact of the Multiple Mixed Financial Aid System on Academic Development

We verified the influence of the multiple mixed financial aid system on assisted students' academic development, and analyzed the indirect influence of multiple mixed financial aid on university students' academic development, i.e., the analysis of the impact pathways on academic performance. National Scholarships and National Encouragement Scholarships had a significant indirect effect on academic development; however, there was no significant indirect effect of National Grants, National Student Loans, or work-study projects. The total amount of financial aid had a restraining effect on students' participation in symposiums, lectures, and presentations. For every 10,000 yuan increase in the total financial aid amount, the effective rate of students' participation in symposiums, lectures, and presentations decreased by 10%.

5.4.1. Indirect Impact of National Grants on Academic Development

There was no significant indirect effect of National Grants on university students' academic development. National Scholarships and National Encouragement Scholarships had a significant indirect effect on assisted students' academic development. For assisted students who had not received National Scholarship support, the relative likelihood that they would increase their frequency of communication and learning with their teachers or classmates by one level was 1.28 times that of the former, and the relative likelihood of attending symposiums, lectures, and presentations was 1.27 times higher than the frequency level of the former. For assisted university students who had not received National Encouragement Scholarships support, the relative likelihood of improving communication with teachers or classmates and communicating learning frequency by one level was 1.55 times greater than the former, and the relative likelihood of increasing the frequency of participation in symposiums, lectures, and presentations by one level was 1.43 times higher.

When the National Scholarships met 80–100% of students' needs, the effective incidence rate of a one-level increase in the learning objective for assisted students was 1.28 times higher than for the control group. The relative likelihood of students receiving financial aid to improve their learning goal level at 100% was the same as the control group, at 1.63 times. When the National Scholarships and National Grants met 100% of students' needs, the relative likelihood that assisted students would improve one level in communication with teachers or classmates was 1.52 times higher than for the control group.

5.4.2. Indirect Impact of National Student Loans on Academic Development

There was no significant indirect effect of receiving National Student Loans or the strength of student loans on university students' academic development. The indirect effect of National Student Loans on the development of university students' learning ability was limited.

5.4.3. Indirect Impact of Increased Intensity of Financial Support for Work-Study Programs on Academic Development

There was no significant indirect effect of the increased intensity of financial support from work-study projects on university students' academic development. However, there was a significant positive effect on their learning ability development. This verified that university students who had received financial aid from work-study projects failed to correctly understand the balanced role of college study and work study.

Compared with the control group, when work-study projects met 60–80% of students' needs, the students' relative probability of receiving support to improve their learning objectives was 1.62 times higher, and the relative probability of receiving support to improve communication and learning frequency with teachers or classmates was 1.40 times higher. When work-study programs supported 100% of students' needs, the relative probability

of improving communication and learning frequency was 1.48 times higher than the control group.

6. Conclusions

This study showed that the multiple mixed financial aid system affects university students' academic development, and the effects differ by financial aid type and the extent of financial aid.

First, financial aid is the main means for implementing the national financial aid policies for university students. However, there is a significant negative relationship between the total amount of financial aid received by students and their academic development under the multiple financial aid system, when compared to a single form of aid. In other words, it significantly hindered students' academic progress and class ranking during the academic year and reduced the frequency of students' attendance at symposiums, lectures, and presentations. An analysis of the funding strength of each financial aid type in the multiple mixed student financial aid system showed that excessive student loan funding might be the main reason for this disincentive effect.

Second, there was a significant negative relationship between the National Grants and the academic development of the recipient students, and there was no significant correlation with the academic development pathway. The reason for this is that the National Grants were mainly for students with financial difficulties, and the grant amount did not completely solve the cost of living in college, so it did not have a significant positive effect. Awards and subsidies, such as National Scholarships and National Encouragement Scholarships, could significantly promote assisted students' academic development and indirectly promote their academic development by improving and clarifying the school's learning objectives, increasing learning exchanges with teachers and classmates as well as participation in learning lectures. Increased scholarships and funding also showed a significant positive impact on university students' academic development. This effect manifested as follows: when the amount of National Scholarships funding met 100% of students' needs for funding, the amount of National Scholarships funding had a positive direct effect on students' academic development. However, when the amount of funding met or exceeded 100% of students' needs for funding, that positive effect was more on the path of students' academic development rather than a direct effect, indicating that there was a scale effect of National Scholarship funding as an economic investment in students' human capital development.

Third, National Student Loans were shown to improve students' class ranking and earn academic awards in the current academic year but had no indirect effect on academic development. As financial aid increased, it hindered students' ability to improve their class ranking and obtain academic rewards, especially if 100% of the students' financial needs were met. Therefore, the mechanism of the influence of student loans on academic development needs to be studied further. On the one hand, the positive contribution of National Student Loans to students' academic development cannot be ignored, and on the other hand, attention should be paid to the negative impact of obtaining excessive amounts of National Student Loans on students' academic development. We posit that an excessively high amount of student loans may reduce the time needed for university students to study and could affect their academic performance. Obtaining a high amount of student loans indicates that a student's family's economic level and social class affect their academic development.

Fourth, work-study projects had a negative effect on students' class ranking in the current academic year but increased funding from work-study programs. In other words, when the amount of funding was between 60% and 80% of students' financial aid needs, it had a significant positive effect on academic development, which was promoted through indirect methods such as learning objectives, learning exchanges, and lecture participation. In particular, with further increases of financial support, the work-study positions could significantly improve the frequency of learning exchanges between the sponsored students

and their teachers and classmates. This paper argues that sponsored students use their after-school time to participate in work studies to secure legal compensation. Receiving a large amount of work-study funding also means that students sacrifice more after-school time. While this could improve the overall quality of the sponsored students, it takes up much of their after-school time; thus, work-study positions at lower funding levels will promote the indirect development of students' academics through the improvement of overall quality, but the direct effect on academic achievement is not significant and can even be negative.

7. Discussion

In China, the multiple mixed financial aid system is available throughout students' four-year learning period in college and is an important guarantee for academic development. We primarily studied the influence of the multiple mixed financial aid system on assisted students' academic development and only briefly examined financial aid policies' performance. Based on the study's empirical research findings, relevant countermeasures are proposed in terms of a precise financial aid system, financial aid resource allocation, and work-study projects.

First, we should establish precise financial aid policy mechanisms and steadily improve their effectiveness. Introducing the mechanism of "precise poverty alleviation" into the financial aid work of university students is an effective way to solve the problem of "fair" allocation of financial aid resources in colleges and universities at the present stage. This would involve identifying students with financial difficulties and their aid needs and improving the role of financial aid in promoting university students' human capital development. When allocating and using financial aid funds, colleges and universities should accurately locate the needs and support the strengths of financial aid types for students with economic difficulties, ensuring the most efficient and effective use of funds to the greatest extent possible to support students in need.

Based on objective criteria and supplemented by subjective judgments, we established a database of criteria for identifying students with domestic financial difficulties, having used big data means to count students' campus one-card consumption levels, teachers and counselors' subjective judgments of them, and students' family financial situation through work at their place of origin to accurately identify students with domestic financial difficulties. Financial aid staff of colleges and universities should take the initiative to understand the financial aid needs of students with financial difficulties and provide targeted financial aid to construct the core of accurate financial aid work for university students. For example, financial aid for junior university students should focus on helping them attain academic achievements and should facilitate their ability to develop academically; senior students should be provided with forms of aid that focus on enhancing social awareness and participation, self-planning development skills, and employability.

Second, a reasonable allocation of financial aid resources is necessary to reduce the pressure on university students to repay their study loans. The type and extent of financial aid should be reasonably matched, and the extent of scholarship aid should be appropriately increased to alleviate the pressure on students with financial difficulties to apply for National Student Loans. At present, the main forms of financial support for university students in China are awards, loans, assistance, and subsidies, among which the National Scholarships mainly focus on rewarding merit, which does not cover all students with financial difficulties. The National Grants serve students with financial difficulties, but the funding standard is low. The National Student Loans mainly solve the basic tuition pressure of students with financial difficulties but increase the pressure of loan repayment for graduates. The work-study positions mainly focus on improving personal skills and the quality of students with financial difficulties, which, to a certain extent, reduces the after-school study time of sponsored students. Combining the findings related to the regression results of the econometric model of this paper, it is postulated that increasing National Grants could effectively stimulate their positive effect on assisted university

students' human capital development, alleviate the negative effect of excessive applications for National Grants, and effectively improve the positive effect of financial aid on the development of human capital in colleges and universities.

Third, students' awareness of work-study projects should be improved, and their academic development ensured. The role of work-study positions in enhancing the development of human capital among university students needs to be properly managed. In managing work-study projects, students who have been awarded work-study grant positions should be correctly guided to recognize the important role that work-study projects play in the development of their own personal human capital from the perspectives of academic performance and development capacity, their ability to participate in society, their employability, and the reasonable balance needed between their studies and time spent in work-study positions. Colleges and universities should be equipped with special college student work-study managers to protect the legitimate rights and interests of students, arrange special instructors for college student work-study positions, and unify the organization, training, and assessment of university students who fill work-study positions.

Finally, it should be noted that there are some limitations to this study. First, this study used the financial aid and academic development data compiled from individual students who had received financial aid, which might result in some degree of measurement error, leading to bias in the results of the measurement model. Second, multivariate financial aid is not a purely exogenous variable, and there are certain unmeasured factors that affect students' access to financial aid, such as individual educational expectations, which might also affect the assisted students' academic development, resulting in multiple financial aid becoming an endogenous variable of academic development.

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