

# ***The "Prisoner's Dilemma" and Countermeasures of Tuition Fee Collection in Colleges and Universities***

**Jiaze Sun<sup>1,a,\*</sup>**

<sup>1</sup>*Northeast Yucai Foreign Language School, Shenyang, 110000, China*

*a. 13840066611@139.com*

*\*corresponding author*

**Abstract:** In recent years, the scale of higher education institutions in China has been expanding year by year, and the number of college students has been increasing year by year, and the problem of tuition fee arrears has become more and more prominent, which is called a major problem in the financial work of colleges and universities, causing certain interference to the economic operation of colleges and universities, and also has a great impact on the moral education of college students. Based on this, the paper uses game theory to establish the game model of "Prisoner's Dilemma" for tuition fee collection in colleges and universities, and the strategic game model between tuition fee arrears and supervision, in order to explore the root causes of tuition fee collection difficulties in colleges and universities in China, and to give corresponding countermeasures with the conclusion of game equilibrium.

**Keywords:** game theory, universities, tuition collection, prisoner's dilemma, countermeasures

## **1. Introduction**

The problem of unpaid tuition fees in colleges and universities is a prominent problem in the current financial work of domestic colleges and universities, which even directly affects the normal operation of colleges and universities. Under the background of "developing the country through science and education", the country focuses on developing education, and colleges and universities have also gained great development [1]. With the expansion of university enrollment, the phenomenon of students' tuition fees in arrears increases year by year. Therefore, it is necessary to analyze the reasons for the difficulty of collecting tuition fees in colleges and universities and explore the corresponding countermeasures. Based on the game theory, the game model of "prisoner's dilemma" and the strategic game model of unpaid fees and supervision are constructed to explore the root causes of the difficulties in collecting tuition fees in colleges and universities, and countermeasures are proposed based on the conclusions of the model analysis, which have positive reference significance for solving the problems of collecting tuition fees in colleges and universities in China.

## 2. The Prisoner's Dilemma Game Model of Tuition Collection

### 2.1. The Causes of Tuition Delinquency in the University

Assume that the school does not supervise tuition arrears, and that there are only two students, A and B, with the same major and the same amount of tuition due. These two students have only two behavioral options: to pay or to default on their payments. Due to the lack of supervision, both students A, and B will take the behavioral approach of defaulting on tuition payments, which will have a negative effect on the school's operation and thus have a negative impact on the students' academic performance. If, on the contrary, all students are willing to pay tuition, the school has sufficient funds to carry out normal teaching and learning activities and thus improve the academic performance of students, assuming that the benefit per student in this case is  $y$ . When one student decides to default on tuition and the other student pays, assuming that the benefit for the student who defaults on tuition is  $z_1$  and the benefit for the student who chooses to pay is  $z_2$ , the school The school receives a portion of the tuition and instruction is carried out normally, at which point it is clear that the gain for the delinquent student,  $z_1$ , is greater than the gain for the paying student,  $z_2$ , and it follows that  $z_2 < x < y < z_1$ .

Table 1: Prisoner's dilemma game matrix for tuition collection.

		Student B	
		Delinquent Tuition Fee Payment	Pay Tuition
Student A	Delinquent Tuition Fee Payment	$x, x$	$z_2$
	Pay Tuition	$z_2, z_1$	$y, y$

In this game model (Table 1), assuming that both Student A and Student B fully understand each other's behavioral strategies and have perfect information symmetry, then when Student A decides to default on tuition, B will definitely choose to default as well. The reason is that for Student B, the gain from choosing to default on tuition is  $z_1$  and the gain from choosing to pay tuition is  $z_2$ , and  $z_1 > z_2$ ; on the contrary, if Student A chooses to pay tuition, Student B will still choose to default on tuition because the gain from B choosing to default on tuition is  $z_1$  and the gain from choosing to pay tuition is  $y$ , and  $z_1 > y$ . And  $(y, y)$  is obviously not consistent with individual rationality, so a Nash equilibrium cannot be reached. In this game, a Nash equilibrium  $(x, x)$  will be formed, i.e., both students A and B will choose to default on their tuition fees and receive lower payoffs. In fact, a college contains  $n$  students, if the university does not monitor or supervise the tuition fee collection, all students will be motivated by the default tuition fee, and students will play the game among themselves and finally be pulled into the "Prisoner's Dilemma", therefore, the college must pay attention to the supervision of tuition fee collection and increase the supervision. In this game model, assuming that both students A and B fully understand each other's behavioral strategies and the information is completely symmetrical, then when student A decides to default on tuition fees, B will definitely choose to default as well. This is because for Student B, the gain from choosing to default on tuition is  $z_1$  and the gain from choosing to pay tuition is  $z_2$ , and  $z_1 > z_2$ ; on the contrary, if Student A chooses to pay tuition, Student B will still choose to default on tuition because the gain from B choosing to default on tuition is  $z_1$  and the gain from choosing to pay tuition is  $y$ , and  $z_1 > y$ .

And  $(y, y)$  is obviously not individually rational, so a Nash equilibrium cannot be reached. In this game, a Nash equilibrium  $(x, x)$  will be formed, i.e., both students A and B will choose to default on their tuition fees and receive lower payoffs. In fact, if a university contains  $n$  students and the university does not monitor or supervise the tuition fee collection, all students will be motivated to default on tuition fees, and students will play the game among themselves and finally be pulled into the "prisoner's dilemma", so it is necessary for universities to pay attention to the supervision of tuition fee collection and increase the supervision.

## 2.2. A Single-strategy Game Model of Fee Default and Regulation

Assume that the cost of school tuition collection and supervision is  $C$ , the penalty for being caught in default is  $F$ , and the loss of students' personal reputation is  $h$ . The loss of school reputation caused by default is  $H1$  in the case of strict supervision, and the loss of school reputation caused by default is  $H2$  in the case of inadequate supervision. assume that the school gains  $T1$  when students do not default on tuition, and the school gains  $T2$  when there are students who default on tuition. assume that the behavioral benefit when students choose to default on tuition is  $R1$ . Assuming that the behavioral benefit when students choose to default on fees is  $R1$  and the behavioral benefit when they choose to pay fees is  $R2$ , the single-strategy game matrix of default and regulation is shown in Table 2.

Table 2: Single-strategy game matrix for default and regulation.

		School	
		Strictly supervised	Not strictly supervised
Student	Delinquent	$R1-h-F, T1-H1-C$	$R1-h, T1-H2$
	Payment of fees	$R2, T2-C$	$R2, T2$

According to the game matrix, if the cost of regulation  $C$  is greater than  $H1-H2$ , the school's best strategy is not to strictly regulate. If  $R1-h-F$  is greater than  $R2$ , then the best strategy for students is to default on fees, regardless of whether they are strictly supervised or not. When the above two cases are not considered, the results of the game of default and regulation will result in two Nash equilibria, i.e., in the absence of regulation, the student chooses to default, and if regulation is strict, the student chooses to pay. Thus, it can be seen that the lack of strict regulation as well as the imperfect integrity system are the root causes of students' fee default.

## 3. Countermeasures

### 3.1. Education on Students' Integrity Awareness and Behavior

In the publicity and education work, the student management department and the publicity department should actively strengthen cooperation with relevant departments and the news media to publicize the national financial aid policy for poor students, publicize the "green channel" provided by schools for students, publicize the law and integrity, so that the society, schools, parents and students can understand that higher education is not compulsory, students are voluntarily enrolled in school, and paying tuition is a kind of integrity. Students should understand that higher education is

not compulsory, and that paying tuition fees is a legitimate obligation of college students, and that paying tuition fees on time is a sign of integrity [2]. Lack of honesty not only has a negative impact on human behavior, but also has a negative impact on human growth. In addition, schools should take the initiative to grasp the psychological trends of college students in time, strengthen legal and integrity education, guide students to be grateful to the society, to the school, to be honest according to the law, to be self-reliant, and to cultivate correct values and outlook on life [3]. To intervene timely and effectively in the bad performance of college students, guide them to participate in club activities, sports activities, public welfare activities and other activities, so that they can give full play to their values in extracurricular activities.

### **3.2. Strengthen Departmental Collaboration and Complete Regulatory System**

First of all, strengthen the cooperation of all departments to improve the efficiency of collection. Most people would blame the finance department for students' default on tuition fees, but in fact, tuition fee collection is not only the responsibility of the finance department; whether the collection can be implemented in time and be effective requires the joint efforts of all departments. Only when all departments and colleges cooperate closely and work together, the efficiency of collecting fees will be higher. Due to their high economic autonomy and mobility, the prepaid tuition fees of modern college students are somewhat different from the actual tuition fees incurred, and certain original regulations on tuition fee regulation can no longer meet the actual requirements [4]. Therefore, it is necessary to strengthen the organizational leadership, coordinate the research on students' tuition arrears of finance, academic affairs, student management and other related departments, and formulate a more detailed, scientific and easy-to-operate tuition arrears supervision system, on the one hand, take the academic registration management as the grasp, set up integrity items in students' academic records, and implement a student integrity recommendation mechanism; at the same time, in student registration, elective courses, examinations, life logistics services, certificate collection, employment procedures, and timely remind and discipline students to pay tuition fees on time in important links such as student registration, elective courses, examinations, living and logistic services, certificate collection, employment procedures, and online registration of graduation certificates, and strictly control the phenomenon of malicious non-payment of fees from the source, which is both targeted and can warn some students who maliciously owe fees [5]. At the same time, it is necessary to establish a departmental performance evaluation mechanism, establish an indicator responsibility system, and implement an incentive accountability mechanism to link the annual evaluation and related interests of each relevant department to the issue of tuition fee collection, so as to clarify the main responsibility and avoid negative shirking of responsibility by each department in the work of fee arrears collection [6].

### **3.3. Provide More Help for Poor Students**

In the context of the rapid development of China and social economy, the fees of colleges and universities have also been rising, which brings greater economic pressure to a few students from poor families. In order to guarantee students' normal study and reduce the phenomenon of tuition fee arrears, colleges and universities should make full use of various forms of assistance activities, such as student loans, scholarships, grants, work-study, tuition subsidies and tuition fee remission in various forms [7], actively seek support and donations from government departments at all levels and social forces, organize forces to carry out tuition fee arrears mapping, conduct a comprehensive and in-depth mapping survey from the beginning of students' enrollment to the process of

graduation and leaving school, and strive to accurately grasp the situation of poor students, while strictly investigating fake poor students and effectively curbing some students' malicious arrears [8]. For students who do have financial difficulties in using the state grant support, they should also correct banks and other financial structures for more loans. In addition, attention should also be paid to mental health counseling education for poor students to form a positive and healthy psychology and overcome negative psychology such as low self-esteem [9]. Provide some work-study positions for poor students on their own initiative to cultivate their independent living ability and at the same time reduce their financial burden. For students who are in financial difficulties due to sudden accidents of their own or their family members, the school can adopt moderate donations to help them get through the difficulties and enable them to successfully complete their studies while reducing tuition arrears [10].

#### 4. Conclusion

The collection of tuition and fees in colleges and universities has always been a key task for colleges and universities because it is related to all aspects of the normal operation of a school. In this paper, we analyzed the "prisoner's dilemma" model of tuition and fees collection in colleges and universities, and found that if there is no monitoring or supervision, all students will be motivated to default on tuition and fees, and students will form a game among themselves and finally fall into the "prisoner's dilemma". By analyzing the single-strategy game model of tuition default and regulation, we find that the lack of regulation and the imperfect integrity system are the root causes of students' tuition default. We propose to educate students on integrity awareness and behavior, strengthen the collaboration between departments, and complete the supervision system.

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