

The Application of Case Teaching Method in Econometrics Teaching

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Abstract. Econometrics is a core course for undergraduates majoring in economics. Abstraction and tediousness make it difficult for teachers to teach and students to learn. Reform of the teaching mode based on lectures is imperative. Based on the content of chapter "Multivariate Regression Analysis", this paper introduces the practical application of case teaching method in the course design and teaching content of economics undergraduate teaching. The students were randomly divided into traditional teaching group and case teaching group. After the course, the two teaching methods were evaluated and compared. The results showed that the case teaching method was more effective. Finally, this article puts forward some problems that should be noticed when applying this teaching method in the teaching of econometrics.

Keywords: case-based teaching method, econometrics, T-test

1. Introduction

The case teaching method originated in the 1920s and was advocated by Harvard Business School. At that time, a very unique case teaching method was adopted. The cited cases were all from real situations or events in business management. In this way, it helped to cultivate and develop students to actively participate in classroom discussions. After the implementation of this method, it is quite effective. This case teaching method did not receive the attention of teacher training until the 1980s, especially the 1986 report "A Nation Prepared: Teachers for the 21st Century" issued by the Carnegie Task Force in the United States, which proposed the value of case-based teaching method in the teacher training curriculum. It regarded it as a rather effective teaching model. However, the domestic education community began to explore case-based teaching methods only after the 1990s.

Case-Based teaching method is method based on analysis of cases. Cases essentially propose a kind of education dilemma where is no specific solution while teachers act as designers and motivators when teaching. The teacher plays the role of designer and motivator in teaching to encourage students to actively participate in discussions. Unlike the traditional teaching methods, the teacher adopting such method is a very knowledgeable person who plays the role of imparting knowledge. The basic operating procedure of the case-based teaching method: students' self-preparation → group discussion preparation → focused group discussion → summary stage.

Chengwen Ma, Jin Lu and Wenhua Wei (2011)[1] proposed and discussed the application of case teaching method in the course of "Econometrics". On the basis of explaining the necessity of using cases in the teaching of econometrics, the specific application of this method in the teaching of the course of "econometrics" is discussed in detail from the case writing, case display, case analysis and discussion. It also points out the problems that need attention in the process of case teaching.

Xiangxuan Xue (2012)[2]. Put forward and study the application of case teaching method in the teaching of econometrics in independent colleges. On the basis of summing up his personal practical teaching experience, he tried to put forward feasibility suggestions on the application of the case teaching method of econometrics in independent colleges.

Wenai Zhang (2017)[3] studied the application of the case teaching method of econometrics oriented to the development of applied ability, and proposed countermeasures and suggestions for the application of the case teaching method of econometrics to promote the development of

econometrics and improve teaching Effect, and further develop the curriculum in the cultivation of undergraduates' application ability. The important roles in the above aspects have been actively explored.

Zeng Qian (2018)[4] explored the application of "case teaching method" in the course of econometrics, analyzed the application process of case teaching method through the analysis of specific cases, and actively explored ways to improve the teaching effect.

Linhe Zhu, Xiao Zhou (2019)[5]. In the application of case teaching method in the course of "mathematics modeling", they used case teaching method, taking the classic infectious disease warehouse model as an example, and analyzed the necessity and effectiveness of the implementation of case teaching method in the course of "mathematics modeling".

2. The Organizational Form of Case-Based Teaching Method

The process of case teaching method is to first select real cases in the real society, and on this basis, elicit specific problems, combine theoretical knowledge with practice, and use cases to highlight the theory of problem solving. The entire process is centered on students. As a guide, the teacher organizes a group discussion mode for the questions raised. Discussion groups are generally made up of 3-4 classmates who take the initiative to learn under the guidance of teachers. The teaching process can be divided into: case introduction → problem raising → group discussion → group report → teacher summary. The specific organizational process is described by taking the content of the "multivariate regression model" chapter[6] in econometrics as an example.

2.1 Introduction of Cases

Before class, select a piece of economics background material related to the teaching content, which can be video, news or textual materials such as short stories. These materials are presented to students in the class to guide students to discuss the real economic issues involved in the material, which variables are involved in the material, and what are the possible relationships between the variables. For example, in the part of "Multivariate Regression Analysis", the example "Chinese per capita consumption of residents" is introduced. According to the National Bureau of Statistics, the per capita disposable income of residents in China in 2018 was 28,228 yuan. In 2018, the per capita consumption expenditure of residents nationwide was 19,853 yuan, a nominal increase of 8.4% over the previous year. After deducting price factors, the actual increase was 6.2%. Among them, the per capita consumption expenditure of urban residents was 26,112 yuan, an increase of 6.8%, after deducting the price factor, the actual growth was 4.6%; the per capita consumption expenditure of rural residents was 12,124 yuan, an increase of 10.7%, after deducting the price factor, the actual growth was 8.4%.

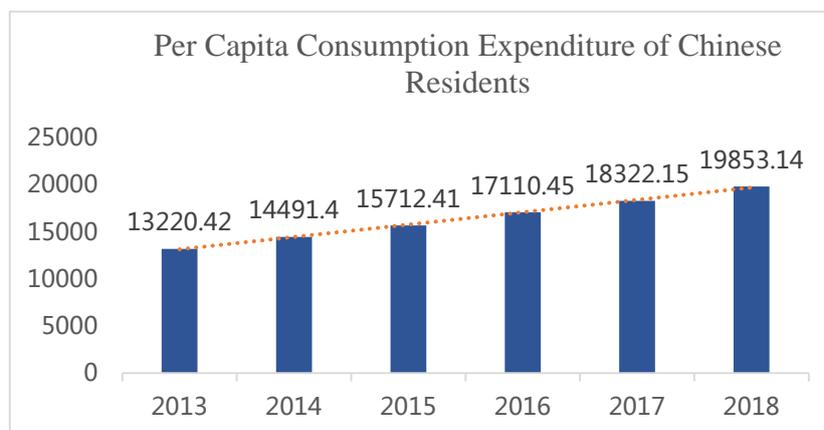


Figure 1. Per Capita Consumption Expenditure of Chinese Residents from 2013-2018

Through this case, the students are guided to analyze the changes in per capita consumption of Chinese residents, explore the factors that affect the consumption of Chinese residents, predict the

trend of per capita consumption of Chinese residents, and enable students to continuously feel the changing economy and society through the case and use econometric knowledge to explain real economic phenomena and linking the two to clarify their relationship, thus generating the motivation to think proactively.

2.2 Statement of Problem

Questions are raised based on actual cases, which arouse students' learning interest and motivation to solve problems. In this process, the teacher should guide the students to ask questions, let the students take the problem to find a solution to the problem, the teacher will continue to expand the problem in the process of solving the problem, enhance the students' ability to find and solve problems, and let the students collect relevant data after class. The modeling steps of econometrics are as follows: first, set up the basic form of the model based on the theory, then collect the data, then use the software to estimate the parameters based on the sample data, and finally check and modify the model. Students may be required to follow this procedure for model building. For example, still returning to the "multivariate regression analysis" section, after the teacher introduces the cases, students will actively ask questions about economic situations, such as "What is the current status of per capita consumption of Chinese residents?", "What are the influencing factors?", "What is the quantitative relationship between the per capita consumption of residents and various influencing factors?", "Is the model's conclusion accurate?" In order to explain these questions, students will actively seek solutions to generate learning motivation. After the questions are sorted out, the teacher can point out the content of the course chapters, relevant reference materials, and references that are related to these questions, so that students can collect information and solve the problems by themselves, in order to prevent students from deviating from the correct direction and facilitate students to learn independently.

2.3 Group Discussion

The key to whether the case teaching method can achieve the expected results is whether the students are well prepared before class. Therefore, teachers need to inform the students of the case and the questions raised by the teachers and classmates through the online teaching platform of the university city one week before the class to give the students sufficient preparation time. The students in the class can be freely combined and divided into several groups, each group of 3-4 students, and a team leader is elected. The group members study together. The teacher guides the students to read and think about the case materials carefully. The group members divide the work and cooperate with each other to collect relevant data and materials through teaching materials, libraries, and the Internet. After a certain accumulation, based on the case materials and questions raised, discussions were held within the group members, mainly around the initial setting of the theoretical model, the collection of relevant data and processing methods, and how to estimate and test the parameters of the model. After the discussion, each group form its own group's views and conclusions into an analysis report. In the discussion, the teacher plays the role of organizer and moderator, encouraging each student to express his or her own opinion. In this process, the teacher can record the common problems of each group, so as to give corresponding answers during the summary session. For example, in the teaching of "Multivariate Regression Analysis", students propose "What is the current status of per capita consumption of Chinese residents?", "What are the main factors influencing per capita consumption of Chinese residents?", "Per capita consumption of Chinese residents.", "What is the specific quantitative relationship with various influencing factors?". After class, the teacher ask students to collect relevant information through various channels. After each group has a certain amount of knowledge, students can first discuss it, including what function form to choose as a theoretical model, and why is this function form chosen? What method is used for parameter estimation? Can the F-test and T-test models success? Does the model have problems such as multicollinearity, heteroscedasticity, and autocorrelation? If the problem occurs in the model, how can I fix it? and many more. In the group discussion, students can express their opinions freely, and the teacher can make comments next to them, and point out the reasonableness

and deficiencies of each group's analysis. Then, guide the students to check the teaching materials again to solve the deficiencies pointed out by the teacher. At the same time, let students take the initiative to learn, find solutions, learn the methods of setting, estimating, testing and modifying the parameters in multiple regression analysis, and build a multiple regression model that is most in line with actual economic problems.

2.4 Group Report

Integrate various aspects of information, each group produces multimedia report courseware, arranges speaking students during the class, and explains the solution to the students and teachers in groups, mainly explaining the research content, working process and conclusions of the research. For example, in the part of "Multivariate Regression Analysis", each group sorted out their analysis conclusions into a PPT, and showed them in class, explaining the model setting form, parameter estimation method, Results of model estimation, test conclusions, whether any model amendments are needed, etc.

2.5 Teacher's Summary

After the group report, the teacher summarizes and comments on the research conclusions of each group, summarizes and analyzes common problems, and discusses individual problems with classmates separately after class. In the end, the teacher reviews and explains the main content and difficult points of the class with PPT. Teachers should break the students' inherent thinking, and gradually introduce new knowledge points from students' discussions and teacher's explanations to the students' minds, combine professional knowledge with practice, and link econometrics with actual economic problems. Then the students will command the ability of using economic models to explain actual economic phenomena, apply what they have learned, and reach a standard of applied talents. Finally, students are required to summarize and summarize the whole process to strengthen and consolidate the learning effect of the students. For example, in the teaching of "Multiple Regression Analysis", students have mastered the form of multiple regression models, and the estimation and testing of relevant parameters of Chinese residents' per capita consumption and its influencing factors have also been completed. Therefore, teachers can use the following questions to summarize and summarize the curriculum: "How to set up multiple regression models?" "Estimation methods and test methods for multiple linear regression model parameters", "How to use this method in the face of actual economic problems?" "How to measure?". They can also use multimedia courseware to review the main content and important points of the lesson, so that students can systematically master this part of the knowledge, and by assigning homework, students can consolidate and master multiple regression analysis methods again.

2.6 Comparison and Analysis of Teaching Effects

In this teaching practice, we selected a total of 116 students from Class 1705 and Class 1707 of the Faculty of Economics of Guangzhou Business School (entered in 2017) as the survey object. The students taught are randomly divided into the traditional teaching group and the case teaching method group. The students in the traditional teaching group use the inculcated learning mode, which is mainly lectured by teachers. The theoretical knowledge of the classroom is first passed to the students, and then computer experiments are conducted. It is a mode of teacher operating then students following the practice. The other group uses a case-based approach to allow students to play a leading role, with teachers as participants. After the course, we evaluated the effects of different teaching methods through experimental reports.

Data analysis was performed on the final results of the two groups of students. The significance level was 5%. The software used was SPSS20. The mean \pm standard deviation was used to represent the theoretical test scores, and the t test was used to compare the two test scores. The results are shown in the table below.

Table 1. Comparison of teaching effect between traditional teaching method group and case-based teaching method group

	Mean	Standard deviation	Standard error of the mean
Class 1705's results	73.90	5.955	0.782
Class 1707's results	81.17	5.968	0.784

Table 2. T test of teaching effect of traditional teaching method group and case teaching method

	Mean	Standard deviation	Standard error of the mean	95% confidence interval of the difference		T test value	Sig.(bi-side) P value<0.05
				Lower limit	Higher limit		
Class 1705's results-Class 1707's results	-7.276	2.56	0.336	-7.949	-6.603	-21.644	

As can be seen from the table above, there are significant differences in the performance of the students in the two classes using different teaching methods, which indicates that compared with the traditional teaching methods, the case-based teaching method has significantly improved the teaching effect of students.

3. Conclusion

Based on the feedback from students during the teaching process and the results of students' evaluation of teachers, we found that this teaching mode can effectively stimulate students' enthusiasm for learning econometrics. After comparing the final grades of several years, it is found that under this teaching mode, econometric modeling has improved significantly. The case teaching method is suitable for the teaching of econometrics. Teachers should pay attention to the following aspects when applying the teaching method and arranging teaching:

In building models and computer experiments, each group member should repeatedly review related books and materials to complete the case tasks we arrange.

In case teaching, students' learning interest will increase, which makes students willing to spend more time and energy to learn econometrics.

When dividing a group, the group members must be properly divided, which will directly affect the overall teaching effect. Try to avoid obvious disparities between groups.

This is the integrated teaching model we have established. With this teaching model, we can solve the teaching problems of econometrics well, and motivate students to study econometrics.

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References

- [1]. Chengwen Ma , Jin Lu. Wei Wenhua Application of case teaching method in the teaching of "Econometrics" course. *ECONOMIC RESEARCH GUIDE*. Vol. 141 (2011)No. 31, p.265-267.
- [2]. Xiangxuan Xue. Application of Case Teaching Method in Econometrics Teaching in Independent Colleges. *Journal of Chifeng University (Natural Science Edition)*. Vol. 28 (2012) No. 5, p. 242-243.
- [3]. Zhang Wen-ai. Application of Case Teaching Methodology in Econometrics Oriented to the Development of Applied Ability. *Rural Economy and Science and Technology*. Vol. 28 (2017) No. 2, p. 275-276.

- [4]. Qian Zeng. Application of "Case Teaching Method" in Econometrics Course. *Rural Economy and Science and Technology*. Vol. 29 (2018) No.12, p.300.
- [5]. Linhe Zhu, Xiao Zhou. The Application of Case Teaching Method in the Course of "Mathematics Modeling". *The Science Education Article Collects*. Vol. 478 (2019) No. 25, p. 58-59.
- [6]. Hao Pang. *Econometrics*. Science Press, 2016, p. 81-85.