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Regional distribution of college enrollment in China under a multiple-principal framework

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ABSTRACT

What factors affect the regional distribution of college enrollment in China? This paper establishes a simple theoretical model under a multiple-principal framework and verifies that local college enrollment is affected by factors such as the principals involved, the educational quality, the availability and type of incentives, and policy constraints. The results show that principals adopt different incentive strategies, including “performance purchase” and “cost support”. In addition, local government fiscal incentives can increase local enrollment. Among affiliated colleges, those with higher educational quality have higher local enrollment; among local colleges, those with higher educational quality have lower local enrollment.

1. Introduction

The distribution of enrollment resources for Chinese higher education institutions differs across regions. In some areas, there are large disparities between the planned enrollment and the number of local students. This has led to wide gaps in the ratio of college enrollment between local and non-local students in various provinces. In 2014, for example, enrollment in the first tier of higher education institutions in Beijing, Tianjin, and Shanghai exceeded 20%, while enrollment in Shanxi, Liaoning, and Sichuan was less than 6.5%.¹ This phenomenon has led to a series of social problems, such as “Gaokao migration” (migration for the college entrance examination)² and “long-distance Gaokao” (taking the college entrance examination somewhere other than one’s own hometown).³ These strategies have further intensified the inequalities in the Chinese higher education system. In 2014, the Ministry of Education announced that, for the first time, the number of applicants taking the college entrance examination in places other than their own hometown had reached 56 thousand. Unlike the systems in the West, most higher education institutions in China are public institutions established by the government and are institutionally affiliated with government departments. The government not only provides funding and appoints university presidents but also prescribes planned enrollment numbers every year. Higher education institutions are responsible for preparing for these planned enrollment numbers in different provinces. The planned enrollment in various provinces

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¹ Source of data: the website of the Ministry of Education of the People’s Republic of China.

² To increase their opportunities for college enrollment, examinees use various means to migrate to provinces with higher enrollment ratios to participate in the *Gaokao* (National College Entrance Examination).

³ Examinees’ parents move their entire families so that their children can participate in the local *Gaokao*. This strategy is employed because the *Gaokao* scores required for college enrollment vary by region.

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reflects the distribution of educational resources in these regions and is, therefore, an important index for evaluating the supply of educational resources. In May 2016, a mass disturbance occurred in Hubei Province when the parents of examinees besieged the Education Department because they were dissatisfied with the adjustment of the provincial enrollment plan. However, this practice has become so established that the enrollment plans of Chinese higher education institutions favor local placements. As early as 2008, the Ministry of Education required affiliated higher education institutions to gradually lower their local enrollment ratios. In 2009, a public proclamation was issued to maintain that ratio to 30%. From 2010 to 2015, “promoting the regional enrollment fairness of higher education” was set as an objective for which local policies were implemented. However, there is still a large gap between reality and the intended results of these policies. The inequality in enrollment resources of higher education institutions across different regions still exists, and social problems such as Gaokao migration are becoming increasingly serious.

The regional allocation of enrollment in Chinese universities has attracted the attention of scholars and involves two main debates. The first concerns the presence of educational injustice through the regional allocation of enrollment. Some scholars suggest that the regional differences in university attendance are reasonable because of the systemic differences among regions (e.g., [Chen, 2004](#); [Qiao et al., 2014](#)). Researchers concerned with the history of education believe it is necessary for national political balance to survey the trends in regional allocation of the imperial examination system ([Elman, 2001](#)). Most scholars, however, argue that the unequal educational opportunities associated with the differences in planned enrollment between provinces amounts to educational injustice (e.g., [Li, Wang, & Guo, 2012](#); [Miao & Bu, 2013](#)). This idea is supported by research into educational ethics (e.g., [Coleman, 1989](#); [Liu, 2005](#)). There is some evidence to support this, but empirical research is lacking. The second debate involves the reasons for these differences. Research examining the geography of education has analyzed the regional differences in educational opportunity based on the structure, placement and sustainable development of regional education (e.g., [Luo, 2004](#); [Ma, 2005](#)). In the field of pedagogical economics, various tools have been used to examine the regional differences between educational opportunities for universities in different provinces, including a representative index and a concentration curve (e.g., [Yang, 2005](#)). Additionally, studies have analyzed the number of examinees in each province, local per capita GDP, distances between universities and provinces, local economic development level, adjacency of provinces, population flow and other factors under the Gravity Model framework (e.g., [Pan, Xu, Chen, Kang, & Lan, 2010](#); [Pan & Ma, 2013](#); [Cui & Pan, 2016](#)). However, research in this area lacks a theoretical analysis of the phenomenon and formal model inference and experiential data verification using a theoretical framework (e.g., [Peng, 2008](#); [He, Shen, & Huang, 2012](#); [Fan, 2013](#)). In summary, previous studies have not considered the institutional factors involved in regional allocation. Given the current situation of universities, it is necessary to use the regional allocation of enrollment in an institutional structure as a starting point to determine the truth. In Chinese universities, the institutional structure is an important factor and refers to the existence of multiple principals.

Thus, using a multiple-principal framework, this paper analyzes the relationships between universities and governments, as well as their behavior models, and explains the regional allocation of enrollment at Chinese universities using a theoretical model and an experimental study. In particular, this paper emphasizes principal characteristics, agent characteristics, incentive strengths and policy constraints in forming research hypotheses and establishing a regression model. In total, 614 cross-sectional data points were tested in 2014. The results show that different principals adopt various incentive strategies, either “performance purchase” or “cost support” for universities. Thus, the university attribution, education quality, financial incentive strength, policy control and other factors influence the regional allocation of enrollment of the universities. The policy implications of these results are that when central and regional governments motivate universities, they should consider the externalities associated with incentives based on other principals and incentive effects. Improving the quality of education in universities will help balance the regional allocation of enrollment resources. The major contributions of this paper include establishing a theoretical model for university enrollment using the multiple-principal framework, quantitatively determining the relationship between incentive strategies and university enrollment, and verifying the factors that influence university enrollment through empirical research. The results of this empirical study can help governments design more effective incentives.

The structure of this paper is as follows: Part II establishes a simple theoretical model using the multiple-principal framework. Part III describes the methodology and results of the empirical research. Part IV discusses the research results and the current situation in China, and Part V presents the paper's conclusions.

2. Theoretical framework

In the public sector, the presence of multiple principals affects incentives in several ways. First, the number of principals determines the overall effects of incentives ([Bernheim & Whinston, 1986](#); [Dixit, Grossman, & Helpman, 1997](#); [Bergemann & Valimaki, 2003](#)). The presence of multiple principals results in a problem of “separation of powers” in the public sector. The degree of decentralization and the clarity in the division of power and responsibility directly affect how each principal designs his incentive contract ([Cao, 2011](#)). In addition, the degree of cooperation among principals influences the overall effects of incentives (e.g., [Calzolari & Scarpa, 2000](#); [Lausel & Breton, 2001](#); [Martimort & Stole, 2001](#)). With multiple principals, the incentive contract between each principal and agent does not function independently. The externalities associated with each incentive contract are known to the agents but not the principals ([Calzolari & Pavon, 2006](#)). Third, the characteristics of tasks also determine the overall effects of incentives (e.g., [Holmstrom & Milgrom, 1991](#); [Laffont & Pouyet, 2004](#); [Liu & Qin, 2015](#)). Finally, the decision order of principals is also important (e.g., [Páez-Pérez & Sánchez-Silva, 2016](#); [Whitford, 2005](#)). Under China's centralized political system, there is often a natural power hierarchy in the public

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