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# Who Decided College Access in Chinese Secondary Education? Rural-urban Inequality of Basic Education in Contemporary China

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**Abstract** This paper investigates the rural-urban inequalities in basic education of contemporary China. The China Education Panel Survey (2013-2014) (CEPS) was utilized to analyze the gaps between rural and urban inequality in junior high schools in terms of three domains, which include the equalities of access, inputs, and outcomes. From the sociocultural and sociopolitical perspective, the household registration system impeded the improvement and development of Chinese basic education. The study found that insufficient funding and support provided the cumulative negative impacts on educational mobility and equality. The regional basic education divide was caused by ineffective and unequal allocation of education resources. This analysis also addresses a number of pertinent economic and political issues related to basic education in current China.

**Keyword** Rural-urban Inequality, Junior High Schools, Equality of Access, Equality of Inputs, Equality of Outcomes, China's Basic Education

## 1. Introduction

China has witnessed a dramatic increase in economic development in recent decades. Moreover, the Chinese economy will continue to grow consistently in the next decades [1]. In accordance with the economic demand for skilled workers in the labor market, individuals should acquire professional skills [2]. In order to qualify a satisfied labor force, it is necessary to improve the quality of schooling in its current context. Specifically, 57% of China's population lived in rural areas in 2015. The underdevelopment of rural basic schooling still exists historically and contextually since 1949. Unfortunately, poor rural children and youth have no priority to witness the economic prosperity of China in terms of sufficient basic schooling. The low competition rate of basic education in poor rural areas demonstrates the severity of the quality of rural schools. Moreover, only two-thirds of poor rural students could complete junior high schooling and most of these rural children directly entered the labor market as unskilled laborers [3]. Students from the low SES (social economic status) have a tendency to prematurely leave schools [4]. The competitive education system in current China also impedes poor rural school students from receiving any additional education [5]. Unfortunately, the rural-urban disparity in access to basic educational opportunities is primarily proceeding toward a continuous increase.

Mitigating the disparity between urban and rural basic schooling will have a positive influence on the promotion of the urbanization process as well as alleviating the overall gaps between the two areas. According to the CEPS of 2011, the number of overall junior high schools was 54,823. From 2006 to 2011, the number of these rural schools had already decreased from 22,710 to 1,540 and the number of their student enrollments declined by 29.8% from 4,387,880,000 to 3,079,320,000. In the Chinese basic education spectrum, it is worth noting that it is significant to investigate the lack of balancing between rural and urban inequality of basic education. This paper focuses on analyzing rural and urban inequality of basic education from the three main perspectives of equality of access, input and outcome. Inequality of opportunity will undermine long-term prospects for development [6]. It is inevitable to deal with rural–urban inequality of basic education in the incomplete developing stage. In the early development of China's education, the rural-urban inequality of basic education was rooted in a historical contextual background. It is understandable the exacerbated rural-urban tension could be enlarged by inequality of educational resource allocation. Shrinking and eliminating the structural inequality of basic education is an unavoidable task for central and local governments in realms of economics and politics. This paper

is dedicated to investigate and analyze the regional basic education divide in current China.

The research questions addressed to examine the role of rural and urban inequality in basic education:

1. What caused rural-urban inequality of basic education in contemporary China?
2. To what extent can we understand the rural-urban inequality from the perspective of schools, students, and parents?
3. How can we predict and estimate the factors contributing to the discrepancy between rural and urban students?
4. What strategies can we provide to solve the unequal basic education in current China?

### 1.1. Literature Review

Many factors have contributed to the present day inequality of basic education in China. Scholars have illustrated the reasons for inequality of basic education from lack of funding, teacher effectiveness, governance intervention, policy formation, social mobility and social stratification. Moreover, these factors can be divided into external and internal domains in order to investigate the inequality of rural and urban education. Currently, the problematic rural basic schooling still influences the acceleration of the overall landscape of Chinese compulsory education.

### 1.2. External Forces of Inequality of Basic Education

#### 1.2.1. Inequality of Financial Support for Education

The shortage of funding resources in poor rural schools is an obvious challenge to the improvement of rural basic education [7]. "At least 5 million children are not receiving a basic education in China. And two further factors have increased the difficulty—the concern for social stability and the trickle-down nature of public funding in education [8]." In the meantime, improving the extra-budgetary revenue is necessary to enlarge the rural schooling expenditure [9] [10]. Moreover, the poor rural schools suffer from insufficient educational resources, geographical isolation, and low enrollment rate and completion rate [11]. In addition, the inadequate physical facilities of more and more village schools were showed to be of lower quality [12]. Poor rural students were always faced with lack of daily necessities like appropriate clothing, cleanliness, and poor nutrition. Also, school facilities are insufficient which makes learning difficult for rural students. Most of poor rural schools are lacking of physical education, sports grounds, foreign language labs, science labs, computer labs, and other learning facilities, which means they cannot meet the learning demand of the basic schooling curriculum and pedagogical reform [13].

In contemporary China, city-oriented educational resources allocated unfairly impedes the development of compulsory education. Moreover, according to the statistical report of the Education Expenditure Year Book, the rural basic school expenditure comprised merely 13.57% of the total education expenditure [14]. For example, local insufficient educational funding due to the ineffective federal policy led to poor transportation and heavy workloads for rural teachers. In addition, the tremendous gaps between coastal metropolitan cities and western rural areas are differences in educational budgetary priority. For example, Shanghai spent ten times on its educational support than the poorest rural area [15]. From the educational policy perspective, the mission of public policies is to distribute public resources rationally. However, the government funds utilized for rural compulsory education were much less than that for urban compulsory education, with an obvious statistical difference in the range from 39.14 to 70.52% in 2001. Also, no law guarantees the educational investment in rural basic education [16]. The entire rural educational system is lagging behind in terms of both physical infrastructure and teacher quality [17]. For example, in 2007, 73.8% of urban primary schools were equipped with an effective infrastructure to conduct experimental teaching in science courses in contrast to merely 53.1% of rural schools, which held these facilities [18]. From the economic inequality perspective, the unequal distribution of educational resources contributes to widen the income gap in the social stratification system. The great economic disparity between rural and urban areas directly led to the inequality of access of basic education [19]. Furthermore, the discrepancy of educational investment between rural and urban make regional educational inequity worse and worse [20]. To keep a sustainable and balanced allocation of resources between the rural and urban basic education gap is a serious and enormous challenge. In pursuit of the equality of basic education in rural and urban schooling, both the efficiency and equality of schooling should be considered by the central government.

#### 1.2.2. Inequality of Government Intervention

Basic education in contemporary rural China is embedded in the top-down educational government intervention. Since 2003, in response to the educational fiscal institutional settings, basic education has been the responsibility of local governments [21]. As a subordinate of local government, the local education bureau is responsible for implementing and routing management of basic education. This top-down educational management system provides little scope for bottom-up dynamics to influence this process. Accordingly, in order to effectively develop the basic education opportunity of poor rural students, the government should deeply analyze the obstacles such as the strict selection mechanism of entrance examinations and achievement examinations [22]. In the 1990s, in accordance with expanding the basic education in poor rural areas, the Chinese central government released an educational policy of "Every Village Establishing a Primary School and a Middle School" in response to the pursuit of the contextual universal nine-year compulsory education [23]." However, it

is problematic and controversial to conduct government interventions, which accounted for the imbalances between rural and urban basic education in the first place [24]. For example, the enrollment rate can illustrate the gaps between rural and urban schoolings with the ineffective educational government intervention. More than 80% of students in city school districts attended basic schools while less than 30 % of those from poor rural areas .

#### 1.2.3. Inequality of Policy Formation

In the 1950s, the household residential permit system (Hukou System) provided an obvious strict gap between rural and urban residents. In another words, the students with rural household residential permits were not allowed to obtain basic education in urban areas. Specifically, from the historical perspective, urban workers hold the so-called "Iron Rice Bowl" with adequate health care, pension benefits and housing subsides conversely to the rural laborers who have no benefit. The discrepancies between rural and urban living standards are substantially attributed to the inequality of Hukou System. Additionally, this system also triggered tensions and pressures on rural-urban social economics development. And, the rural and urban divide is mainly concerned with the "urban bias" policy. Accordingly, China's societal stability is consistent with social-economic stratification within rural and urban areas. Eliminating the social inequality of different social groups is emphasized on economic market transition, and resources distribution. Social inequality between rural and urban populations was mainly associated with cultural segregation in terms of Hukou System. Moreover, the social class designation system (Hukou system) and occupational rank dominated and determined individual social class and status [25].

In essence, the severe inequality of Hukou system demonstrates the dominating role of a social stratification hierarchy and social inequality structure in contemporary China. Dismantling the rigid household registration system can be served as the first step to mitigate the inequality of basic education. "The Hukou dichotomy and the rural-urban school dichotomy are two major forces of educational inequality in China [26]." The residential permit system (Hukou System) was inherited in the process of urbanization, and it also influenced the rural-urban educational inequality. Additionally, Hukou System served as a crucial access to urban education. So, it is important to modify the Hukou system, facilitate rural-urban migration, and establish equal educational service for rural poverty reduction.

#### 1.2.4. Inequality of Teacher Effectiveness

The shortage of qualified teachers is considered as one of the most critical factors of development of rural basic education [27]. Moreover, a large number of experienced teachers moved from the rural areas to urban areas. The shortage of rural teachers is a problematic issue in accordance with the development of compulsory education in current context of China's basic education [28]. In addition, the lack of funding provides a negative effect on teachers' working and living conditions, and the teachers in western rural schools have no tendency to receive teaching training [29]. As a result, the poor quality of teacher effectiveness is inherently involved in the essential learning achievement gaps between rural students and urban students [30]. Furthermore, the successful basic education requires well-trained teachers. The effectiveness of teachers plays an essential role in the promotion of rural basic education in current rural areas in China [31]. Theoretically, an initial teacher training qualification is the prerequisite for being a rural school teacher. But in reality, it is not always the case. Rural resident do not have the opportunity to receive the training and teachers with certificates are attracted to teach in rural areas. The practical shortage of qualified teachers and candidates pose barriers in the implementation of educational policy concerning the equality and quality of rural schoolings [32]. Specifically, the salary and the pensions for rural teachers impeded the development of rural basic education in rural poor areas. The low self-efficacy of rural teachers plays significant roles to decrease the quality of rural basic schooling [33]. In addition, rural teachers are always overburdened, and it is one major reason why it is difficult to promote the quality of teaching fundamentally [34]. The teaching quality of rural primary school in West rural areas is very poor by failing to meet the requirements of a basic educational syllabus. For example, the teaching quality of Chinese and mathematics for grade five in primary school in West rural China has basically reached the requirement of basic educational syllabus; however, the quality between village schools and central schools still obviously varies .

### 1.3. Internal Forces of Inequality of Basic Education

#### 1.3.1. Inequality of Social Stratification

In contemporary China, there exists an obvious gap between the national conditions of diversified SES in different regions. Additionally, the essential impact of family social economy status on the access of basic education has been extensively validated by many researchers. Some scholars [35][36] also emphasized on the influences of the specific social structural transformation. Obviously, the unbalance of rural and urban basic education is serious fundamentally [37]. These economic hidden barriers expanded the gaps between rural and urban basic education [38]. Therefore, it is imperative to develop and promote the accessibility of rural poor basic education.

Essentially, the dualistic social class is considered as the essential barrier in balancing rural and urban basic education. Moreover, there existed inherent conventional bias on intelligentsia and peasantry in China's traditional cultural and political context. Specifically, in modern society the "blue-collar worker", "white-collar worker", "golden-collar worker", and "grey-collar worker" are described as workers in different social classes in present day China. Actually, the term "grey–collar worker" is associated with migrant workers and laborers from rural areas without local urban

household registers. The rural children and youth of these households are isolated, discarded and marginalized by inherent social bias and social classes. Nonetheless, the inequality of social class inherently influenced educational development. To be precise, Xiaorong Han has described the vivid images of China's peasant as four types: "Ignorant, innocent, poor, and powerful (p.22)." Ironically, "rural values" are still immerged in China's current social stereotype. The stereotype of China's rural peasant is innocent and genuine pristine.

From the educational sociology perspective and capturing more educational historical context, educational stratification is closely connected with rural-urban inequality of basic education. Education inequality can be conceptualized by rural-urban income inequality. School enrollment and attainment rates served as crucial indicators to describe the inequality of basic education between rural and urban areas. Mare (1981) [39] noted that the allocation and distribution of basic education are conceptually independent and changeable in accordance with demographic and behavioral changes. Global expansion in mass education focused on a basis for comparison across countries and nations at different developmental steps and under different political powers [40]. Reducing inequalities in educational opportunities was considered as a complicated and remarkable responsibility for different countries. The maximization of educational equality was consistently accompanied with the trend of expansion of education enrollments [41]. Zhang (2013) [42] suggested that China's educational stratification by the rural-urban divide could be concluded by dichotomous inequality.

#### 1.3.2. Inequality of Social Mobility

Consistent evidences have shown that the rural-urban migration also impacted rural basic education in the trend of urbanization. The rural-urban labor mobility trigged the complicated pressures on the trend of urbanization. Specifically, faced with the rural migration flows, the school-age population in rural areas decreased dramatically. Xubei Luo (2008) [43] suggested that, resource misallocation between rural and urban areas was pervasive and related with the capital market distortion in recent China's economic growth. Zhang (2013) also highlighted that the financial friction significantly influenced on balancing rural and urban basic education. There existed concerns about the so-called "Floating Labor" that consisted of laborers from rural areas, which worked and lived in urban areas. For example, "The floating population is now estimated at about 140 million, up from 30 million in 1983 and 75 million in 1995, and floating employment is now estimated at 100 million [44]." And, it is inevitable for China's government to weaken the negative impact of the fragmentation and misallocation of rural labors and resources in current China's society. The profound transformation of rural-urban migration influenced the rural-urban social structured pattern. Therefore, mitigating the rural-urban income fluctuations and migrations is essential to balance the inequality of basic education.

Undoubtedly, both rural poverty and education inequality were closely associated and interacted with the rural-urban divide and migration. Moreover, the phenomenon of rural-urban divide still plays a significant role to influence the development of rural basic education. The contemporary labor market structures' distortions impacted on the inequality of rural- urban income [45]. Accordingly, the rural labor and resources allocation distortions directly trigged the rural–urban divide in China's current labor market. Additionally, the temporary migration of unskilled and semi-skilled labor also played a significant role in the transactions costs in rural labor market. Tsang (2002) [46] further suggested that fiscal decentralization led to growing disparities in the funding of basic education. For example, gender disparities, minority groups in rural areas still held low education attainment rates and enrollment rates [47]. Lai (2008) [48] describes the rural-urban divide as a mobile and relative dyad. Essentially, improving basic education quality and enhancing rural local economics provided two effective and productive pathways to mitigate the regional inequality and rural poverty. Chaudhuri and Ravallion (2006) [49] argued that it is worth noting that the rural-urban inequality and coastal-inland divide served as critical symbols to prevent China's economic development. Wan (2004) [50] suggested that the most significant factors that impacted the regional inequality and rural poverty were education, township and village enterprise. Sicular et al. (2006) [51] proposed that the rural-urban labor shift alleviated pressures of the rural-urban wages divide. In contemporary China, the rural-urban income gaps directly lead to inequality of primary education, and it serves as a core reason for the rural-urban divide. In addition to contributing to the inequality of basic education, both rural-urban migration and urbanization trends were characterized as the catalysts to stimulate the inequality of education.

To sum up, despite the remarkable urban achievements of implementing China's compulsory education, transforming the mechanism for balancing the rural and urban inequality of basic education is still complicated and multi-faced fundamentally. How to guarantee the sufficient funds for prompting the rural basic education still challenges the Chinese central government. Therefore, China should make a major breakthrough by integrating rural compulsory education under the public financial guarantee framework. The dynamic relationship between rural and urban basic education illustrates the importance of an equal and harmonized development of rural education and rational allocation of educational resources accompanied with the development of economy.

# 2. Methodology

### 2.1. Data

This article utilized the data of the China Education Panel

Survey (2013-2014) (CEPS), which was designed and implemented by Renmin University of China as a national comprehensive tracking survey with the goal of analyzing the influences among families, schools, communities, and the macro social structures on personal education outputs and further tracking the relationship between the personal education output and personal career development process. The China Education Panel Survey (CEPS) took the 2013-2014 academic years as baseline and junior middle school three grades of six, seven, eight as the starting point of this survey. The average education level and floating population rates were served as education stratification variables. This survey randomly selected from 28 national units (county, district, and city levels) investigated on the basis of schooling, and randomly selected 112 schools, 438 classes and about 20,000 students in the selective county unit. More specifically, the CEPS used multi-stages probability proportional to size (PPS) sampling methods.

### 2.2. Variables

The sampling process was divided into three stages separately.[1] In this research, the data weighting calculation was divided into sample frame reconstruction calculating weights of total data, the calculation of sampled probabilities and weights. Specifically, in the process of the calculation of sampled probabilities and weights, sampling probability design[2], actual sample probability[3], and modification of data based on response probability were used in this research. For the sample frame, value 1 represented samples from sample frame 1 (national core sample size); value 2 represented samples from sample frame 2 (2a Shanghai core; 2b Shanghai supplement samples); value 3 represented sample frame 3 (national supplement samples). The variable's name is grade 9 which represents the students' grades from 2013-2014 academic years. Variables name is fall. The baseline survey was conducted by spring and fall semesters. 17 PUSs were finished by the 2013 fall semester and 11 PUS were finished by the 2014 spring semester. The variable fall served as the specific semester, valuing 1 as 2013 fall semester and valuing 0 as 2014 spring semester.

### 2.3. Data Structures

The CEPS has multiple panel data, including the data of schools, classes, students and parents. Schools' data contained questionnaires for their directors using Pl as the prefix of variables name with sub variables of schools' levels (prefix of variables is sch) and of county (district) level (prefix of variables is cty). Classes' data included both questionnaires for teachers in charge of classes (prefix of variables is hr) and Chinese/ Math/ English teachers (prefix of variables separately is chn/ mat/ eng) with sub variables of class level (prefix of variables is cls). Students' data was comprised of students' questionnaire variables, cognitive abilities variables, mid-term/final exams' scores, and sub variables of families' level (prefix of variables is st). Parents' data consisted of parents' questionnaires (prefix of variables is b). In general, different levels' data were combined and matched by ids series: county (district) ids are represented by variables' name of ctyids arranging from 1 to 28, representing unique ids of 28 sampled counties (districts); schools' ids are represented by variables' name of schids arranging from 1 to 112, representing unique id of 112 schools; classes' ids are represented by variables' name of clsids arranging from 1 to 438, representing unique classes id of 438; and individual ids are represented by variables' name of ids, arranging from 1 to 19,487, representing the unique id of 19,487 students.

# 3. Analyzing

### 3.1. Logistic Regression Model of Students' Survey (2013-2014)

Logistic regression was used to predict and estimate the factors contributing on the discrepancies of rural students and urban students. In the logistic regression, the dependent variable is the household register types (urban and rural). Independent variables contained social economic status (SES), mother's education level, father's education level, having study desk or not, having Internet or not, having academic requirements or not and having education expectations or not. Both dependent variables and independent variables have been recoded in terms of creating binary logistic regression of students' survey. Descriptive statistics for all variables are described in Figure 1.

1 In the first stage (PSU), the country (district) level administrative units were named as the PSU; in the second stage, the schools were named as SSU; in the third stage, the class was regarded as TUS.

2 In the sampling process, without information of total sample scale at different stages, in response to actual student sampled probabilities, sample probabilities were indicated as followed: $P_l = \left(\frac{N_j}{N'_J}\right) * \left(\frac{N_{j,k}}{N'_{j,k}/_K}\right) * \left(\frac{N_{j,k,l}}{N'_{j,k,l}/_L}\right) * \left(\frac{n/_{(J*K*L)}}{N'_{j,k,l}}\right)$

3 In response to absence of students' refusal to answer the questionnaires, sampled probabilities were modified in term of response profanities of students' questionnaires when calculating students' weighting points. The modified sampled probabilities $rp_l$ can express as followed $rp_l = \frac{\bar{N}_{j,k,l}}{N'_{j,k,l}} * p_l$

3. According to calculating relevant proportion of female students in term of 2012 education statistical data, modified data was described as followed: $crw_i = \left(\frac{N_{famale}}{\sum_i mrw_i}\right) * mrw_i$

In the PSU sample of subsample 2, there were two subsamples in sample frame 2(Shanghai core sample, f2a) and one subsample in sample frame 2b (Shanghai supplement samples, fab), and one subsample in sample frame 3(National supplement samples f3). In two PSU samples of sample frame 2a, (Shanghai core sample, f2a), the student individual weights $wgt_i$ can be described as followed:

$wgt_i = crw_i(s2f2a) * \left(\frac{\sum_{i\in s2} crw_i\,(s2f2a)}{\sum_{i\in s2} crw_i(s2f2a)+\sum_{i\in s2} crw_i(s2f2b)+\sum_{i\in s2} crw_i\,(s2f3)}\right)$

| Variables | Model Role | Description |
|---|---|---|
| Household register type | Dependent | Binary value (1) Urban (2) Rural |
| Social economic status | Independent | Binary value (1) bad (2) good |
| Mother's education level | Independent | Binary value (1) low (2) high |
| Father's education level | Independent | Binary value (1) low (2) high |
| Having studying desk or not | Independent | Binary value (1) Yes (2) No |
| Having Internet or not | Independent | Binary value (1) Have (2) Not have |
| Having academic requirements | Independent | Binary value (1) Have (2) Not have |
| Having education expectation | Independent | Binary value (1) Have (2) Not have |

**Figure 1.** Variables

Based on model selection, the criteria of AIC can fit the final model. The optimal model was the one that tends to have its fitted values closest to the true outcome probabilities. This was the model that minimizes AIC = − 2(log likelihood − number of parameters in model). By the comparison of reduced model and full model, this full model was associated with both theoretical and statistical inference. In accordance with assumptions of this research, the model was associated with research questions as follows:

$$\begin{aligned}\log(\pi(\text{Household register type})) = \alpha + \beta_1\,(\text{SES}) \\ + \beta_2\ (\text{MEL}) + \beta_3\ (\text{FEL}) \\ + \beta_4(\text{Study desk}) + \beta_5\ (\text{Internet}) \\ + \beta_6\ (\text{Academic requirements}) \\ + \beta_7\ (\ \text{Education expectation}) + \varepsilon\end{aligned}$$

In the logistic regression model, α represents the overall intercept in the full model; $\beta_1$ to $\beta_7$ were separately the slopes of social economic status, mother's education level, father's education level, having study desk or not, having Internet or not, having academic requirements or not and having education expectations or not. Additionally, there was no interaction effect of these two or four variables such as interaction of SES / academic requirement, in term of the "Out /none of Convergence" in the SAS outputs. Hence, in this full model, there only contained main effects with these seven variables in the logistic regression model specification. The resulting model found to be significant ($x^2$= 64.237, df = 6, p < .0001). The overall goodness-of-fit for the logistic model was assessed using the Hosmer and Lemeshow (HL) test. The HL test has become a popular method for assessing goodness-of-fit for logistic models due to other limited credible techniques. More specifically, this research conducted logistic regression to explore the effect of several variables in combination with exposure to household register types.

Based on the output of SAS, the HL test had an approximate chi-square distribution under the null hypothesis, which indicated the fitted model was correct, and the HL test for the logistic model supported the null hypothesis that this model was a good fit for the data. Basically, the parameter estimates (β) generated from the logistic models, which were difficult to interpret, and typically only their sign (+ or –) was of value. Without using the β coefficient to describe the impact of parameters upon the model outcome, the odds ratio was used instead. The usage of the odds ratios in connection with the sign of the β coefficient was interpreted for each one-unit increase, and in the independent variable X there was a Y increase/decrease in the dependent variable. Specifically, using the reported β coefficients and odds ratios reported in Figure 3, as one unit increase in SES results in a 2.58 times higher odds of having the probability of the urban household register resident. Of the seven significant model parameters, SES (odds ratio = 1.328, p < .001), mother's education (odds ratio = 1.442, p < .001), father's education (odds ratio = 1.088, p < .001), having studying desk (odds ratio = 1.012, p < .001), and having Internet (odds ratio = 1.291, p < .001) had the substantial positive impact on the odds of having the urban household resident. In other words, the results of the logistic regression also show that these six parameters had the negative impact on the odds of holding the rural household resident. In addition, this research, however, found that neither having academic requirements (odds ratio = 0.662, p = .183), nor having education expectations challenge (odds ratio = 0.231, p = 0.132) had the significant predictive roles in predicting household register resident type (rural or urban students). Moreover, this result suggested that students who have higher social economic status, educated parents, and sufficient educational supplements may have a greater possibility and are already more likely to be students who hold the urban household register resident. In contrast, students who have a low social economic status, parents with a low educational background, and insufficient educational supplements might have a greater possibility to be students who hold the rural households register resident. In addition, the large sample size of the dataset (n = 18,594) gave the logistic analysis statistical validity. With this level of statistical validity, significant parameters may be detected by limited practical meaning. This model fits significantly well with the statistics. This measurement model predicted relevant variables at P-value significant. More specifically, this research conducted logistic regression to explore the effect of several variables in combination with exposure to students' geographic identity. Based on results of residuals versus fitted values plot, the points on the plot appear to be randomly scattered around zero, so error terms assumed to have a mean of zero maybe reasonable. The vertical width of this scatter appeared to increase or decrease across this fitted values. Hence, the variance in the error term is assumed to not be very constant. In accordance with the plot of residuals versus fitted values, I can assume this data could fit this model fairly well.

| Parameters | N | Minimum | Maximum | Mean | Standard Deviation |
|---|---|---|---|---|---|
| Household register type | 18594 | 1 | 2 | 1.46 | 0.498 |
| Social economic status | 19264 | 1 | 2 | 1.15 | 0.357 |
| Mother's education level | 19129 | 1 | 2 | 1.13 | 0.333 |
| Father's education level | 19093 | 1 | 2 | 1.15 | 0.359 |
| Having study desk or not | 19098 | 1 | 2 | 1.21 | 0.405 |
| Having Internet or not | 19252 | 0 | 1 | 0.69 | 0.463 |
| Having academic requirements | 19330 | 1 | 2 | 1.16 | 0.321 |
| Having education expectation | 19376 | 1 | 2 | 1.11 | 0.315 |

**Figure 2.** Descriptive Statistics of Analysis Variables

| Parameters | Parameter Estimate | Standard Error | P-Value | Odds ratio |
|---|---|---|---|---|
| Intercept | 0.15 | 0.145 | < 0.001 | |
| Social economic status | 0.258 | 0.05 | < 0.001 | 1.328 |
| Mother's education level | 1.628 | 0.087 | < 0.001 | 1.442 |
| Father's education level | 1.577 | 0.073 | < 0.001 | 1.088 |
| Having studying desk or not | -0.698 | 0.041 | < 0.001 | 1.012 |
| Having Internet or not | 0.951 | 0.048 | < 0.001 | 1.291 |
| Having academic requirements | 0.078 | 0.058 | 0.183 | 0.662 |
| Having education expectation | 0.017 | 0.145 | 0.132 | 0.231 |

Note: *P*-value is significant at the .05 level, Hosmer-Lemeshow Goodness of fit $\chi^2 = 64.237$, $df = 6$, $p < .0001$

**Figure 3.** Maximum Likelihood Estimates

# 4. Findings

According to the data of students' survey from the CEPS, it is summarized that students who have higher social economic status, educated parents, and sufficient educational supplements may have a greater possibility and are already more likely to be students who hold the urban household register. On the contrary, students who have low social economic status, poorly educated parents, and insufficient educational supplements might have a greater possibility to be students who hold the rural household register. Not surprisingly, in current China, from an individual's perspective, there still exists tremendous and indisputable gaps between rural students and urban students in social capital, education opportunities and public resources. Moreover, from this researcher's perspective, the inequality of access, inequality of inputs and inequality of outcome also provided profound insight to investigate the inequality of basic education in rural schools.

## 4.1. Inequality of Access

### Enrollment Rates between Rural and Urban Basic Schools

Based on statistical outcome of the current enrollment rate of Grade 7 compared with five years ago, 57% of rural schools' presidents thought that enrollment rates in Grade 7 were decreased; conversely, about 56% urban presidents found that the enrollment rates in Grade 7 were increased compared with five years ago. The remarkable discrepancies concerning the trend of enrollment rates illustrates that there should be tremendous pressures on improving the educational quality of rural schools, and the explosion of enrollment in urban areas also evokes one to focus on changes which impact urban basic education. Additionally, it is worth noting that the floating enrollment rates also seized the attention to investigate the migrating group from rural to urban areas (See Table 1).

**Table 1.** Enrollment Rate of Grade 7 compared with five years ago (% percent)

| Enrollment rate of grade 7 compared with five years ago (% percent) | | | |
|---|---|---|---|
| | Decreased | Changed slightly | Increased |
| Rural schools | 0.57 | 0.19 | 0.24 |
| Urban schools | 0.24 | 0.17 | 0.56 |

Note: In stage 2 (SSU), probability proportional to size (PPS) sampling methods was used.

### Proportion of Students' Household Residency Registration

The proportion of students' household residency registrations has also shown as follows: for rural schools, the proportion of the local country residency mostly occupied 83.22% of the whole population; the proportion of other counties' residency within provinces took up 7.33%; and the proportion of the number of outside provinces took up 9.48% of the total number. For urban schools, the proportion of the local country residency mostly occupied 70.17% of the whole population; other counties' residency within provinces took up 7.63%; and the number of outside provinces took up 22.32% of the total number. Apparently, the number of students' outside provinces' household residency register in urban schools was 13% higher than the number in rural schools. It is indisputable that the number of students with outside provinces' household register has

increased and will continue in coming years (See Table 2). In fact, it is worth noting that rural-urban migration was considered as a critical factor to affect rural-urban inequality in the process of urbanization.

**Table 2**. Proportion of Students' Household Register Residency (% percent)

| Proportion of students' household register residency (% percent) | | | |
|---|---|---|---|
| | Local country residency | Other counties residency within provinces | Outside provinces |
| Rural schools | 83.22 | 7.33 | 9.48 |
| Urban schools | 70.17 | 7.63 | 22.32 |

Note: In stage 2 (SSU), probability proportional to size (PPS) sampling methods was used

## The proportion of Independent and Governmental Enrollments

**Table 3**. Proportions of Independent Enrollment and Governmental Allocation of Students

| The proportions of independent enrollment and governmental allocation of students (% percent) | | | | |
|---|---|---|---|---|
| | Independent recruitment | Government allocation | Both | Others |
| Rural schools | 0.33 | 0.38 | 0.10 | 0.19 |
| Urban schools | 0.05 | 0.72 | 0.22 | 0.045 |

Note: In stage 2 (SSU), probability proportional to size (PPS) sampling methods was used.

Table 3 shows that the proportion of independent and governmental enrollments as follows: for rural schools, the proportion of the independent recruitment took up 33.3% of the whole population; the percentage of government allocation was about 39%; the proportions of both independent recruitment and government allocation took up 9.5%; the proportion of other enrollment strategies took up 19%. For urban schools, the proportion of independent recruitment took up 4.9% of the whole number; the percentage of government allocation was about 72%; the proportions of both independent recruitment and government allocation took up 2.19%; and the percentage of other enrollment strategies took up 4.8%. Based on the proportions of independent enrollment and governmental allocation of students, it was found that rural schools applied two main enrollment policies, including independent recruitment and government allocation. Oppositely, government allocation enrollment took the highest proportion in urban schools. The tight enrollment controlling policy for urban schools indirectly impacted the number of migration students from rural areas (See Table 3).

### 4.1.1. Inequality of Inputs

#### National Funding Allocation

According to outcomes of the data, in rural schools the annual average national funding allocation total per junior high school student was 72,545 RMB (116 U.S. Dollars); while in urban schools, it was 138,661 RMB (221 U.S. Dollars). The urban schools' national funding allocation for per student was about twice higher than rural schools' funding allocation. Through the lens of rural-urban inequality, the challenge is enormous and complex to close the gaps between Chinese rural and urban educational resources. It is inevitable to adjust national education funding allocation for cultivating the education of rural children and youth. Narrowing down the disparities between rural and urban educational gaps and strengthening rural basic education should be addressed as a crucial subject for policymakers in order to solve the rural-urban inequality of basic education.

#### Proportion of Schools Funding Resources

From the perspective of schools' funding resources, for rural schools the proportion of central and provincial funding allocation took up 37.87% of the whole percentage; the proportion of local governments funding is 2.38% of the whole percentage; the percentage of counties (districts) funding took up 59.29% of the whole proportion; commercial income took 0.48% of the whole proportion; social donation took 0.47% of the whole; others took 0.24%; for urban schools, central/ provincial funding allocation took 24.67%; the proportion of local governments funding is 17.39%; the percentage of counties (districts) funding took up 51.12%; the proportion of commercial income took up 0.34% of the whole proportion; social donation took 0.61% of the whole percentage; others took 4.26%. Making comparison between rural and urban schools' proportion of funding resources, it is concluded that central and provincial funding served as the two main resources for schools. Most importantly, local government funding for urban schools of 17.29% was much higher than merely 2.38% of rural schools. This result indicated that it is a common phenomenon that local government funding for rural schools is insufficient to support basic education in rural areas compared with urban local government financial supports (See Table 4).

**Table 4.** Proportion of Schools Funding Resources (% percent)

| The proportion of Schools Funding Resources (% percent) | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Central/ provincial funding allocation | Local governments funding | Counties (districts) funding | Students fee | Commercial income | Social donation | Others |
| Rural schools | 37.87 | 2.38 | 59.29 | 0 | 0.48 | 0.48 | 0.24 |
| Urban schools | 24.67 | 17.39 | 51.12 | 2.44 | 0.34 | 0.61 | 4.27 |

Note: In stage 2 (SSU), probability proportional to size (PPS) sampling methods was used.

**Table 5.** Average Number of the Density of Teachers in Rural and Urban Schools

| Average Number of the Density of Teachers in Rural and Urban Schools (2012-2013) | | | | | | |
|---|---|---|---|---|---|---|
| | Total amount of teachers | Amount of male teachers | Teaching certifications holders | Substitute teachers | Retired teachers (2012-2013) | New recruitment (2012-2013) |
| Rural schools | 55 | 26 | 55 | 0 | 0.714285714 | 1.333333333 |
| Urban schools | 106 | 35 | 100 | 4 | 6.902439024 | 6.512195122 |

Note: the formula of population density is equal to the number of people divides the areas of they occupy.
Data sources: data of the Ministry of Education within 2012-2013 academic years

**Table 6.** the Situation of Recruiting New Teachers (% percent)

| The situation of recruiting new teachers (% percent) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Math | | | Chinese | | | English | | |
| | Easy | A little hard | Very hard | Easy | A little hard | Very hard | Easy | A little hard | Very hard |
| Rural schools | 0.38 | 0.57 | 0.04 | 0.48 | 0.43 | 0 | 0.285714286 | 0.476190476 | 0.142857143 |
| Urban schools | 0.49 | 0.317 | 0.07 | 0.54 | 0.22 | 0.10 | 0.341463415 | 0.170731707 | 0.12195122 |

## The Density of Teachers in Rural and Urban Schools

Table 5 shows the different density of the average number of teachers in rural and urban schools. Specifically, in each rural school unit the average total number of teacher density was about 55, the average number of male teachers was over 25, the average number of teachers with certificates was about 55, and the average number of substitute teachers was 0.33. From the 2012 to 2013 academic year, the average number of retired teachers was about 0.71 and the mean of new recruitment was 1.33. For each urban school unit, the average total number of teacher density was about 107 in each unit, the average number of male teachers was over 35. The average number of teachers with certificates was about 99, and the average number of substitute teachers was 5. From 2012 to 2013 academic year, the average number of retired teachers was about 7; the mean of new recruitment was 7. Remarkably, it is worth noting that the total average number of the teacher density in urban schools was about twice higher than the average amount of teachers in rural schools. More importantly, the average number of substitute teachers also indicated that the shortage of teachers with certifications in urban schools because of the rapid explosion of migrant students from rural areas (See Table 5).

## The Situation of Recruiting New Teachers

Table 6 describes an overview of recruiting new teachers for rural and urban schools as follows: 57% of rural schools' presidents thought it was somewhat difficult to hire new math teachers compared with 32% of presidents in urban schools, whereas about 49% of urban schools' presidents felt that it is easy to recruit math teachers compared with 28% of rural schools. From the perspective of hiring Chinese teachers, about 43% of rural schools' presidents' thought that it was somewhat difficult to employ Chinese teachers compared with just 22% of urban schools. More remarkably, over 62% of rural schools' presidents felt that it was somewhat difficult to recruit English teachers. Relatively speaking, urban schools have more of a priority to recruit qualified teachers in Chinese, math and English subjects. It is an especially terrible situation for English teachers to work in rural schools because of the disadvantages of poor pay and lack of welfare which has been mentioned before (See Table 6).

## The Distribution of Population of Teachers with Teaching Experience

Table 7 shows the distribution of experienced teachers between rural and urban schools. The average number of teachers with 1-4 years of teaching experience is about 32% compared with a lower proportion of 11% in urban schools; the mean of 5-9 years teachers of teaching experience is 32% higher than about 17% of urban schools; conversely, the average number of teachers with 10 years and above teaching experience occupied about 72% with twice higher than about 37% of teaching experience in rural schools. Consequentially, urban schools absorbed more teachers with more professional and skilled teaching experiences than rural schools with larger proportion of inadequate teaching experience (See Table 7).

**Table 7.** The Distribution of Population of Teachers with Teaching Experiences

| The distribution of population of teachers with teaching experiences (% percent) | | | |
|---|---|---|---|
| | 1-4 years | 5-9 years | 10 years and above |
| Rural schools | 31.55 | 32.11 | 36.59 |
| Urban schools | 11.35 | 16.95 | 71.73 |

Note: In stage 2 (SSU), probability proportional to size (PPS) sampling method was used.

## The Distribution of Teachers' Degrees

Table 8 describes the distribution of teachers' degrees

between rural and urban schools. For rural schools, the average number of teachers with only a high school diploma was about 20% of the total number of teachers compared with none in urban schools. The average number of teachers with junior college degrees in rural schools is about 46% much higher than about 18% of urban teachers with the same degree. The average number of teachers with bachelor's degrees in urban schools occupied almost 67% of the total number of teachers compared with just 34% of bachelor degree holders in rural areas. Moreover, the average number of teachers with master's degrees and higher in urban schools was 11.34% as a whole compared with just 1% of rural teachers with comparable degrees. Facing this vivid description of data, it is summarized that asymmetric distribution of teachers with higher teaching qualifications and degrees as crucial internal factors that led to dysfunctional rural schooling in current rural areas. (See Table 8)

**Table 8.** The Distribution of Teachers' Degrees

| The Distribution of teachers' degrees (% percent) | | | | | |
|---|---|---|---|---|---|
| | Junior high school below | High schools | Junior colleges | Bachelor degree | Master degree and above |
| Rural schools | 0 | 19.76 | 46.33 | 34.55 | 1.25 |
| Urban schools | 0 | 0 | 17.55 | 67.32 | 11.34 |

Note: In stage 2 (SSU), probability proportional to size (PPS) sampling methods was used.

Annual Average Income and Government Subsides

Annual average income of teachers between rural and urban schools was shown as follows: the annual average income for senior high school teachers in rural schools was about 49,923 RMB (8,000 U.S. dollars) compared with 60,817 RMB (9,600 U.S. dollars). The annual average income for teachers with ten years and more teaching experience in rural schools was about 43,595 RMB (6,975 U.S. dollars) compared the annual salary of 64, 899 RMB (10,383 U.S. dollars) for teachers in urban schools with the same teaching experience. To emphasize, the large income gap between rural and urban schools seemed like a constant chain influencing the inequality of rural and urban schooling. The current financial support situation of government subsidies for teachers' salaries was summarized as follows: 57% of rural schools had received government subsidies for teachers' salaries in comparison with about 73% of urban schools which was allocated subsidies from local governments. Apparently, the discrepancies between rural schools with one-third percentage receiving governmental subsidies for teachers' salary and urban schools with one-half percentage sufficiently explained one significant reason why there is a rural-urban inequality of basic education.

4.1.2. Inequality of Outcomes

The Schools' Administration

Table 9 shows the basic situation of schools' administration: in rural schools, 24% schools' administers felt that parents were not coordinated with schools; 33% rural schools' administers found that parents required to allocate students to assigned classes; 9.5% rural schools' administers felt that students skips classes frequently; 19% rural schools' administers found that it is difficult to manage schools' principles and rules; 19% rural schools' administers found that schools were a little crowed; 28% rural schools' administers felt that frequent mobility of teachers in their schools. For urban schools' administers, 15% schools' administers felt that parents were not coordinated with schools; 49% urban schools' administers found that parents required to allocate students to assigned classes; 12% urban schools' administers found that schools were a little crowed; 2.4% urban schools' administers felt that frequent mobility of teachers in their schools. Particularly, the parent- school relationship was extensively intension in rural schools in term of many complains of frequent mobility of teachers (See Table 9).

**Table 9**. The Basic Situation of Schools' Administration

| The basic situation of schools' administration | | |
|---|---|---|
| | Rural schools | Urban schools |
| Parents were not coordinated with schools | 0.24 | 0.15 |
| Parents required to allocate students to assigned classes or teachers | 0.33 | 0.05 |
| Students skips classes frequently | 0.10 | 0 |
| The difficulties of managing schools' principles and rules | 0.19 | 0 |
| Schools were a little crowed | 0.19 | 0.12 |
| Frequent mobility of teachers | 0.29 | 0.02 |

Note: In stage 2 (SSU), probability proportional to size (PPS) sampling methods was used.

Current Administrative Challenges

Table 10 identifies the current challenges of schools in terms of administration both in rural and urban schools. For rural schools, the poor quality of students occupied about 67%, the poor quality of teachers was about 12%, and the shortage of funding was about 17%. For urban schools, shortage of funding support took up about 37%; the poor quality of students took up 21%. It is important to note that the shortage of financial support impacted on the whole quality of schooling and resulted in a poorer quality of students in the rural areas. Inadequate funding also influenced the academic performance in urban schools in accordance with the increasing number of migration students (See Table10).

**Table 10**. Current Challenges of Schools in Term of Administration

| Current challenges of schools in term of administration (% percent) | | | | | |
|---|---|---|---|---|---|
| | Poor quality of students | Students without local household register | Poor quality of teachers | Shortage of funding support | Others |
| Rural schools | 0.67 | 0.01 | 0.12 | 0.17 | 0.09 |
| Urban schools | 0.21 | 0.17 | 0.013 | 0.37 | 0.31 |

Note: In stage 2 (SSU), probability proportional to size (PPS) sampling methods was used

**Table 11.** Situation of Students Qualified or not to Apply Followed High Schools

| The situation of students without local household register qualified or not to apply followed high schools (% percent) | | | |
|---|---|---|---|
| | Impossible | Possible with specific requirement | Possible without any requirement |
| | | Rural schools | |
| Key high schools | 0.10 | 0.19 | 0.71 |
| Common high school | 0.09 | 0.10 | 0.71 |
| Vocational schools | 0.05 | 0 | 0.86 |
| | | Urban schools | |
| Key high schools | 0.67 | 0.21 | 0.13 |
| Common high school | 0.20 | 0.26 | 0.37 |
| Vocational schools | 0.03 | 0.086 | 0.77 |

Note: In stage 2 (SSU), probability proportional to size (PPS) sampling methods was used.

Qualifications of Applying for High Schools

The local household registry qualifications for students to be able to take the senior high school exam were summarized as follows: it is possible for about 64% of rural students to take the senior high school exam without the local household registry. Conversely, just 21% of urban schools allowed students without local household registry to take the senior high school exam. Consistently, the household registry policy was embedded in the current basic education system. Table 11 has shown the situation of students without local household registry qualified or not to apply to the following high schools: for rural schools, it is impossible for about 9.5% rural schools to allow students without local household registry to apply to local key high schools; 19% of rural schools with specific requirements allowed students without local household register to apply to local key schools; 71% of rural schools permitted students without local household registry to apply to local key schools without any requirement; about 71% of rural schools permitted students without local household register to apply to a local common school without any requirement; about 86% of rural schools allowed students without local household registry to apply to local vocational schools without any requirement. For urban schools, about 68% of urban schools had no priority to permit students without local household register to apply for local key schools; about 37% of urban schools was allowed students without local household register to apply local common high schools with any requirement; about 77% of urban schools permitted students without local household register to apply local vocational schools. It is convincible to understand the tremendous constriction and limitation of education mobility from basic education domain. The household register policy in urban schools was much more severe than it in rural schools. The conservative household register policy was adhered to constrain regional geography, which seriously impeded the acceleration of urbanization and modernization of current society. The conservative residential policy was inherently imbued with sociocultural and sociopolitical scenario of current China (See Table 11).

# 5. Conclusions and Policy Implications

From the students' data perspective, in contemporary China rural students were always characterized as having low social economic status' families, poorly educated parents, and insufficient educational supplements. Social and human capital served as two core reasons for rural-urban inequality and education resources allocation. From the schools' data perspective, there existed pressures both on rural poor quality of basic education and the explosion of urban education enrollments with large number of floating populations. It is worth noting that the number of rural-urban migration has rapidly increased to enlarge rural-urban inequality in the process of urbanization. Moreover, the obsolete policies of enrollment allocation in urban schools as internal factors fundamentally influence the number of migration students from rural areas. From inequality of inputs, local government funding for rural schools was insufficient and inadequate to support basic education in rural areas compared with diverse urban local government financial support. Moreover, rapid explosion of migrant students from rural areas directly led to the shortage of

certified teachers in urban schools. Rural schools had no priority to recruit more professional and skilled teachers with terms of low payment and welfare. To summarize, the asymmetric and dysfunctional distribution of educational resources was considered as essential roots of rural-urban inequality of basic education. From the inequality of outcome perspectives, the parents-school relationship was extensive in rural schools in terms of complaints of frequent mobility of teachers. Inadequate funding support also influenced the academic performance in urban schools in accordance with the increasing number of migrating students. It was not surprising that the conservative household register policy constrained regional geography, which seriously impeded the acceleration of urbanization and modernization of current society and was inherently imbued with sociocultural and sociopolitical scenarios of current China.

### 5.1. Building Sufficient and Reasonable Governmental Funding System

Creating a sufficient and reasonable governmental funding system is essential to mitigate the inequality of basic education in rural and urban schools. The fragmentation of the basic education funding support system led to the misallocation of education resources. From the economic development standpoint, there were not sufficient economic investment returns to support equitable education resources allocation and distribution. Moreover, the current rural basic educational circumstance illustrates the future implication of rural- urban inequality of education. It is significant that the economic productive gaps between rural and urban areas essentially influence the inequality of rural-urban education resources. In the current economic scenario, labor productivity in agriculture was consistent with labor intensive and the rural labor shift led to the shortage involved in agriculture labor intensity. Dwayne et al. (2010) suggested that, "The policies seemed to trap their victims, especially the lower-educated in agriculture, and impeded their movement into more lucrative labor markets (p.22)." More specifically, rural economic contribution provided solid evidences to solve current inequality of rural-urban basic education. Hence, it is inevitable to build a sufficient and reasonable funding system for improving the quality of rural basic education. . Consistency of financial support serves as a key factor to alleviate the pressures of education inequality. Building adequate educational financing support for rural education system can avoid inequality of educational resources attribution. Also, building a functional labor market and employment system will critically impact on the mitigation of rural-urban inequality of basic education.

### 5.2. Providing Comprehensive Political Support to Labor Mobility

From an education policy perspective, addressing the rural-urban inequality in basic education contributes to sufficient labor mobility. Moreover, rural-urban migration is also associated with serious social pressures. The inadequate basic education was connected with the poverty of low- income rural residents. Promoting labor mobility and developing a diverse rural employment system will profoundly contribute to the improvement of quality of basic education in rural areas. Generally, the residential permit system was inherited in the process of urbanization in current China and impeded the rural- urban inequality of basic education. In order to essentially eradicate China's regional inequality of basic education, the official registration system should be adjusted and provide an equal platform for rural students to get access to urban basic education. Hence, it is definitely significant to modify and adjust the resident registration system to facilitate rural- urban migration, and establish equal educational services for rural poverty reduction.

### 5.3. Creating Solid Teaching Incentive Mechanism

Solid teaching incentive mechanisms in basic education are considered as a core task to narrow rural-urban inequality of basic education. It was worth noting that improving rural teaching capacity to adjust the developing of basic education is related to narrow down the gaps between rural and urban schools. Boosting teachers' productivity can provide the fundamental guarantee to enhance the quality of basic education. Providing teaching incentive mechanisms might guarantee basic education enrollment, attainment and graduation rates. Incomprehensive and inequity credit, welfare and insurance provided poor incentives to attract skilled teachers in rural areas. In accordance with these intractable constrains and boundaries in rural areas, the central government should have a tendency to create new solid teaching incentive mechanisms to attract more and more teachers to devote themselves to cultivate students in rural schools. Therefore, the relationship between rural and urban demonstrated the complicated reality of rural-urban inequality currently. In order to lessen excessive pressures and burdens for urban capacity, it is unquestionable to improve basic education supplements, enhance the productivity and effectiveness of teaching and break up teacher market segmentations between rural and urban. The central government should put emphasis on modifying the resident registration system, facilitating rural- urban migration, and establishing equal educational service for rural poverty reduction.

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