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Teacher shortage: an analysis of the rural teachers living subsidy policy on teacher attraction and retention in rural Western China

Jinqiu Jiang ^a and Sun Yee Yip ^b

^aCollege of Urban Economics and Public Administration, Capital University of Economics and Business, China; ^bFaculty of Education, Monash University, Clayton, Victoria, Australia

ABSTRACT

The teacher shortage is a critical issue in many rural areas around the world. This paper presents the findings of two studies that investigated the impact of financial incentives on teacher attraction and retention in rural schools in Western China. Using the theory of compensating wage differentials and a mixed-method approach, we found that providing living subsidies to student-teachers has an impact on teacher attraction but not retention, while tuition fee and loan reimbursements have a positive impact on both attraction and retention. For teachers already teaching in rural schools, the amount of the living subsidy, satisfaction with the policy, and identification of the policy are the key factors that affect the success of the policy. We argue that for the subsidy amount to be effective, it should be based on feedback from rural teachers and be at least 15% of their monthly salary.

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Teacher shortage; rural teacher; teacher attraction; teacher retention

Introduction

The teacher shortage issue has gained widespread attention in education systems worldwide in recent years. Challenges associated with teacher recruitment and retention have been widely reported in the US (Dee & Goldhaber, 2017; Garcia & Weiss, 2019; Sutcher et al., 2019), England (Adams, 2023; United Kingdom Department for Education, 2019), Sweden (See & Gorard, 2020), Australia (Department of Education, 2021), and China (A. Liu et al., 2022; Zhang et al., 2022). The situation is particularly severe for schools in rural areas due to their geographical remoteness, inadequate transport infrastructure, limited access to social support and health services, and, in some cases, lower economic growth, which makes these areas less attractive for teachers (Echazarra & Radinger, 2019). To address this issue, countries have adopted different approaches to encourage teachers to work in rural schools. Among these are financial incentives such as salary bonuses, subsidised housing, and travel allowances. In this paper, we draw on the theory of compensating wage differentials and a mixed-method approach to examine the impact of financial incentives on attracting and

CONTACT Sun Yee Yip  sunyee.yip@monash.edu  Faculty of Education, Monash University, 29 Ancora Imparo Way, Clayton, Victoria 3168, Australia

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retaining rural teachers in China. We first provide the background to the study by considering the theory of compensating wage differentials and reviewing the literature on the impact of financial incentives on attracting and retaining rural teachers. We then explain the research method and our findings. The paper concludes by discussing our findings in relation to past research on rural teachers, our contribution to the theory of compensating wage differentials, and the implications of our findings for policies and practice.

Background

The theory of compensating wage differentials

The theory of compensating wage differentials, originally conceived by Adam Smith in his book *Wealth of Nations*, has a long tradition in labour economics. He observed that:

the wages of labour vary with the ease or hardship, the cleanliness or dirtiness, the honourableness or dishonourableness of the employment. A blacksmith seldom earns so much as a [coal miner]. His work is not quite so dirty, is less dangerous, and is carried on in daylight and above ground. (A. Smith, 1776, p. 89).

The theory explains that jobs with undesirable characteristics will compensate with higher wages than popular, more desirable jobs, which provide lower wages to their workers (Smith, 1979). The theory has been developed and widely examined in labour economics for over 200 years (Lamadon et al., 2022; Taber & Vejlin, 2020). Quantifying the tradeoffs between wage and job features, known as “compensating wage differences,” is critical for understanding labour supply and wage dispersion (Lavetti, 2023, p. 189). Hence, the theory of compensating wage differentials provides a suitable analytical economic framework to explain teachers’ career choices in the teacher labour market.¹

Suppose a teacher is given a choice between two jobs, both of which are identical except that one is in a rural area and the other is in an urban area, the preference of a teacher who pursues utility maximisation² can be presented by the utility function:

$$U = u(W, R).$$

Where W denotes the wage and R represents the “ruralness.” The value of R is between $[0,1]$. The larger the R value, the higher the “ruralness” of the school (McEwan, 1999). Utility is increasing in W , the wage, and decreasing in R , the amount of “ruralness” (Figure 1).

Figure 1 shows that the teacher’s utility will be the same anywhere along point d and point a. Z is the minimum differential expected by that teacher to compensate them for the undesirable aspects of teaching in rural schools. Given that $\Delta W = W_1 - W_0$ represents the additional wage teachers will receive when working in rural schools, a teacher will choose to teach in a rural school when $\Delta W > Z$, and will choose to teach in an urban school when $\Delta W < Z$. The government might therefore consider offering high compensating wage differences to attract highly qualified teachers to rural schools. This basic policy has been proposed in many countries around the world.

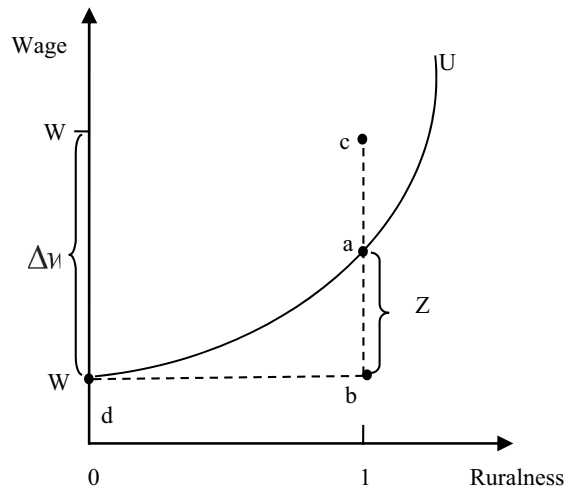


Figure 1. Teachers' school choice based on wage difference and ruralness. Adapted from McEwan (1999).

Rural teacher compensating wage policy and its effect

Many countries have implemented compensating wage policies or financial incentives to attract and retain teachers in hard-to-staff rural schools. Although these incentives have delivered promising results in attracting newly graduated teachers to rural schools (Falch, 2011; Hough & Loeb, 2013; Steele et al., 2010), their impact on teacher retention is unclear. For example, Hough and Loeb's (2013) study on newly graduated teachers in San Francisco showed that offering higher salaries and bonuses led to increased recruitment but no difference in the retention rate between teachers who received and did not receive the financial incentives. Steele et al. (2010) evaluation of the Governor's Teaching Fellowship scheme in the US showed that while the scheme attracted twice as many people to enrol into teacher education, there was no difference in retention rate between the recipients and the non-recipients. For programmes that offer a yearly monetary payout to teachers who stayed in the school or district, research showed that the retention effect did not last once the payment stopped (Glazerman et al., 2006), suggesting that there is no lasting benefits of financial incentives scheme on teacher retention (Choi, 2018). While examining the Florida Critical Teacher Shortage Program in the US between 1986 and 2011, Feng and Sass (2018) found that offering student loan pay-off and recruitment and retention bonuses had a positive effect, but this again disappeared once the funding was removed. Some studies argue that financial incentives alone are insufficient to reduce teacher mobility (Fulbeck, 2014) and that school-level contextual factors such as school leadership, school climate, and working conditions are also critical in teacher attrition and retention (Bjork et al., 2019; Zavelevsky & Lishchinsky, 2020).

Like many Western countries, rural schools in China are also experiencing acute teacher shortages. Data from China's Ministry of Education (2021) show that the rural primary school teaching workforce decreased substantially from 1,771,923 in 2017 to 1,614,360 in 2021 (157,563 or 8.9%). This shortage has been attributed to the teachers' perceived lower

social status (Cui et al., 2022) and unfavourable working conditions (J. Liu, 2021). Rural teachers have also reported receiving relatively lower salaries that do not compensate them for their work (Cui et al., 2022). Wang and Li (2017) surveyed 10,356 rural teachers in 30 counties of Yunnan province and found that nearly 80% expressed a desire to move to the cities.

To attract and retain rural teachers, the Chinese Government implemented various financial incentives (Yue et al., 2018). However, the effectiveness of these incentives remains unclear, and staffing rural schools with qualified teachers remains challenging. For example, Qian et al. (2020) investigated the impact of the Chinese Government's Free Teacher Education program, which provides tuition fee exemption, free accommodation, and a monthly stipend to attract graduates to teach in rural schools. They found that although participants acknowledged that the working conditions of rural schools have improved, their negative perception of rural teaching had persisted, and they still indicated a preference to teach in city schools. Fu and Fan (2018) examined the impact of the Rural Teachers Support Plan (2015–2020) by surveying teachers in 120 rural schools. They found that while the programme has attracted more teachers to rural schools, it has not necessarily attracted high-quality teachers. In analysing official statistics on teacher salaries and mobility in China, An (2018) found that the lower salaries of rural teachers have led many to seek opportunities to teach in city schools.

Given the large number of financial incentives implemented by the Chinese Government to address rural teacher shortages, research that has examined the impact of these incentives is relatively scarce. Moreover, past studies lack theoretical discussions about how teachers make career choices between teaching in rural and city schools. Our study addresses this gap by investigating the impact of the Rural Teacher Living Subsidy Policy, a major government policy that aims to attract and retain rural teachers in China.

Rural Teacher Living Subsidy Policy (RTLSP) in China

In 2013, the Ministry of Education and the Ministry of Finance jointly issued the "Notice on Implementing the 2013 Central Document No. 1 requiring living subsidies for rural teachers working in poverty-stricken areas (Policy number [2013] 106)." Also called the Rural Teacher Living Subsidy Policy (RTLSP), it was first piloted in 14 poverty-stricken rural areas in Western China. The local government is responsible for implementing and funding the subsidy policy, while the central government supports the effort through rewards and topping up the local government's coffers. The implementation details are determined by the local governments, including the scope and subsidy amount. Generally, the subsidy is determined based on the degree of hardship that the rural teachers experience. Teachers working in village schools and areas with difficult living conditions are compensated with a higher subsidy amount. The subsidy stops when teachers resign from the rural school or retire from teaching. Then, in 2015, the China General Office of the State Council issued the Rural Teacher Support Plan (2015–2020). This plan extended the RTLSP by including strategies to encourage young people to teach in rural schools, including tuition fee compensation for college graduates and student loan reimbursement for freshly graduated teachers who took up teaching positions in rural schools.

According to the Ministry of Education data, by the end of 2016, 684 of the 708 counties in poverty-stricken rural areas had implemented the RTLSP (96.6% of counties and 1.295 million rural teachers in 81,000 schools). On average, each teacher received a subsidy of 284 RMB per month (Ministry of Education of the People's Republic of China, 2017), which accounted for 4.9%³ of the average monthly salary of primary school teachers nationwide.

The RTLSP provides compensatory wages for rural teachers in two forms: (1) living subsidies and (2) tuition fee compensation and loan repayment for graduate students. The data reported in this paper came from two studies that investigated the impact of the RTLSP. The first study examined the impact of RTLSP on student-teachers' intention to teach and remain (for more than three years) in rural schools. The second study examined the impact of the RTLSP on rural school teachers' intention to continue teaching in rural schools. Both studies were approved by the local education bureau of each county and ethical clearance was obtained from the first author's institution.

Research method

To investigate the effect of the RTLSP on rural teacher recruitment and retention, we adopted a mixed-method research design comprising a survey and focus group interviews in 2019. In the first study, we selected 15 teacher education colleges in the western region of China based on a stratified sampling method and distributed questionnaires to third and fourth-year student-teachers through the school administrative staff: 2585 student-teachers responded to the questionnaires. We then interviewed 21 student-teachers, comprising 11 who indicated that they were willing to teach in rural schools and 10 who were reluctant to do so. The interviewed participants were invited to talk about their attitude towards teaching in rural schools as a future career, why they choose to work in rural schools, and why they are reluctant to do so.

To investigate the impact of the RSTLP on rural school teachers' intention to remain teaching in their schools, we administered a questionnaire to all rural school teachers in three counties in the western area and received 859 valid samples. We then selected nine schools from three counties, each with different degrees of remoteness. Each of these

Table 1. Demographics of participants.

	Characteristics	Categories	N	%
Student-teachers	Gender	Male	794	30.7
		Female	1791	69.3
	Minority	Yes	1034	40.0
		No	1551	60.0
	Major in education	Yes	1799	69.6
	No	786	30.4	
Rural teachers	Gender	Male	395	46.0
		Female	464	54.0
	Age(year)	≥50	131	15.3
		30–50	148	17.2
		≤30	580	67.5
	Marital status	Married	704	81.9
		Unmarried	155	18.1
	Education level	Below Bachelor degree	110	12.8
Bachelor degree & above		749	87.2	

nine schools nominated three teachers to participate in our interviews (total 27). Table 1 provides a breakdown of the demographics of the participants.

Most of the student-teacher participants were female (69.3%), and most majored in education (69.6%). Most of the rural teacher participants were less than 30 years old (67.5%).

Impact of rural teacher living subsidy policy on student-teachers' intention to teach in rural schools

To investigate the effect of the RSTLP on student-teachers' intention to teach in rural schools, we employ the Logit regression model with SPSS 22.0. The setting of the regression model is based on the compensating wage differentials theory. A student-teacher's decision to teach in a rural area is determined by the rural subsidy policy (Compensation wage differences), rural working conditions (Ruralness), and individual preferences (Z), which are affected by their personal and family characteristics. The Logit regression model is:

$$\text{Logit}(P_{Y_i}) = \text{Ln} \frac{P_{Y_i}}{1 - P_{Y_i}} = \beta_0 + \beta_1 \text{RS} + \beta_2 \text{R} + \beta_3 \text{S} + \beta_4 \text{F} + u \quad (i = 1, 2) \quad (1)$$

Where the dependent variable P_{Y_i} is the probability of student-teachers' intention to work in rural schools, RS is the indicator that measures whether students know about the RSTLP well (1 = yes, otherwise = 0), R denotes student-teachers' perception of "ruralness," S controls for student-teacher factors such as gender, academic grades, and whether they are the only child, and F controls for student-teacher family features such as hukou,⁴ parents' educational degree, whether their parents are teachers, and family support for rural teaching. We also specifically analysed the responses from student-teachers specialising in arts and physical education, as teachers in these subject areas are particularly in short supply in rural areas (A. Liu et al., 2021). The results are presented in Table 2.

Table 2 shows that the living subsidy policy has a positive and significant impact on student-teachers' intention to teach in rural areas ($\beta = 0.85$, $p < 0.01$), which means that

Table 2. Estimation results of logit regression model.

Independent variable	Dependent variable: intention to teach in rural school (Y)			
	Full samples		Arts and physical education student samples	
	(≤3 years)	(>3 years)	(≤3 years)	(>3 years)
RSTLP (RS)				
Rural teacher living subsidy policy	0.85***	0.14*	0.65**	0.47
Tuition fee and loan reimbursement	0.26***	0.54*	0.80***	0.11*
"Ruralness" (R)				
Poor school facility	0.11	0.11	-0.06	0.11
Undeveloped economy	-0.23**	-0.23**	-0.17	-0.42
Multi-disciplinary workload	0.03	0.03	-0.10	0.18
Poor education standards for children	-0.26**	-0.26**	-0.12	-0.05
Inadequate transport infrastructure	-0.26**	-0.26**	-0.56***	-0.27
Log-likelihood	2689.20	1510.90	788.93***	496.93***
Adjoint probability	0.00	0.00	0.00	0.00
Nagelkerke R2	0.36	0.17	0.43	0.25
N	2585	2585	841	841

***Significant at the 1% level; **significant at the 5% level; *significant at the 10% level.

student-teachers who are aware of the living subsidy policy have a 1.33 ($=e^{0.85} - 1$) times higher odds ratio than those who are unaware. However, the same policy has a relatively small impact on student-teachers' willingness to remain teaching in rural schools for more than three years ($\beta = 0.14, p < 0.1$). In other words, the short-term effect of this policy is greater than the long-term effect. This could be attributed to the high unemployment rate of college graduate students studying in the country's western areas, as many are willing to take up any immediate job opportunities available. However, as rural school teachers are typically employed on a three-year contract, our study showed that the desire to renew their contract after the first three years decreased significantly. Some participants in the interview expressed fear of living in the countryside in the long term. According to one participant:

The subsidy policy shows that the country attaches great importance to rural education and encourages us to go to rural areas to teach. I think this is a good opportunity for employment because the employment situation of students in our local colleges is not optimistic. I want to solve the job problem first and get a three-year appointment. After my term expires, I will seek opportunities to transfer to work in urban schools. . . It would be terrible if I had to stay and work in the countryside for the rest of my life with no chance to leave.

For students majoring in art and physical education, the policy only has an impact on their short-term willingness to teach ($\beta = 0.65, p < 0.5$), and has no significant impact on long-term teaching ($\beta = 0.47, p > 0.1$). This result could be because students majoring in art and sports have invested significant time and financial resources in developing their specialised skills, usually through attending additional training classes, and they may then expect to receive a higher subsidy amount to compensate for their investment. In other words, the minimum differential (Z value) expected by these student-teachers is higher and the subsidy amount provided by the government may not meet their expectations. Additionally, student-teachers who major in arts typically come from more well-to-do families and may not be enticed by the financial incentives.

Impact of tuition fee and loan reimbursement on student-teachers' intention to teach in rural schools

According to the estimation results, tuition fee and loan reimbursement subsidies have a positive effect on student-teachers' intention to teach in rural schools ($\beta = 0.26, p < 0.1$) and remain in the school for more than three years ($\beta = 0.54, p < 0.01$). Exposure to tuition fee and loan reimbursement subsidies is associated with a 29.7% ($=e^{0.26} - 1$) increase in the odds ratio of wanting to teach in rural schools for less than three years and a 71.3% ($=e^{0.54} - 1$) increase in the odds ratio of teaching in rural schools for more than three years. Thus, the tuition fee and loan reimbursements have both a short-term and long-term positive impact. The possible reason is that this policy focuses on students from poor families and can reduce their families' financial burden.

I majored in physical education and grew up in a rural village. My parents were both farmers. It was not easy for them to support my education, so I worked part-time during college to supplement my family income. . . The tuition compensation and loan reimbursement policy can reduce my financial burden. I believe that rural teachers will be better paid in the future. I will consider applying for a job in a rural school in my hometown in future.

Impact of “ruralness” characteristics on student-teachers’ intention to teach in rural schools

The data indicated that an undeveloped economy ($\beta = -0.23, p < 0.05$), poor education standards of students ($\beta = -0.26, p < 0.05$), and inadequate transport infrastructure ($\beta = -0.26, p < 0.05$) negatively affect student-teachers’ willingness to teach in rural areas, both in the short term (<3 years) and the longer term (>3 years). Students majoring in art and physical education value transportation conditions the most, and this factor was the only significant factor that affects their willingness to teach ($\beta = -0.56, p < 0.01$). These persistent issues in rural areas in western China are significant barriers to attracting teachers, particularly art and physical education teachers, to work in rural regions. According to one participant:

I have lived in the city since I was a child, and all my friends are there. I will definitely not choose to go to the countryside to teach. Even if I am given a higher living allowance, I will not be able to find large shopping malls, cinemas, and other entertainment in the countryside to spend the money.

In addition, due to teacher shortages, rural teachers often experience multi-disciplinary workloads as they are assigned to teach multiple subjects across different levels. However, the data revealed that a multi-disciplinary workload ($p > 0.1$) and poor school facilities ($p > 0.1$) do not have a significant impact on the willingness of student-teachers to teach in rural areas. The smaller class size in rural schools could mitigate the extra load of teaching multiple subjects. Additionally, the recent upgrading of conditions and facilities in rural schools has made the environment more welcoming and conducive to teaching and learning.

Impact of RSTLP on rural teacher retention

To investigate the impact of the RSTLP on rural teachers’ intention to remain in rural schools, we use the order Probit model, and because the measurement of teachers’ intention to stay is an ordered variable, its value ranges from 1 (strongly disagree) to 5 (strongly agree). The specific model is:

$$Y_i = \alpha_0 + \alpha_1 X_i + \beta_j C_i + \varepsilon_i \quad (2)$$

Where the dependent variable P_{Y_i} is the probability of rural teachers’ intention to stay in rural schools, X_i is a set of variables to measure the policy, including the level of subsidy, teachers’ satisfaction with the policy, and teachers’ identification with the policy, and C_i denotes the control variables of teacher characteristics of gender, age, marital status, education degree, professional level, and number of children. To compare the impact of compensatory wages on teachers in areas with different degrees of ruralness, we divided the rural teachers into three groups according to the schools’ remoteness (suburb, remote area, most remote area). The core estimation results are shown in [Table 3](#).

Impact of living subsidy level on rural teachers’ intention to stay

As shown in [Table 3](#), the level of the living subsidy has no statistically significant ($p > 0.1$) impact on rural teachers’ intention to stay. The result is consistent across schools in different geographical locations, with all the p values greater than 0.1 in Models 2 to 4. According to the theory of compensating wage differentials, this could mean that the amount of the living subsidy is lower than the minimum differential expected by that rural

Table 3. Estimation results of probit model.⁵

Independent variable	Dependent variable: Intention to stay in rural school			
	Model 1 (Full sample)	Model 2 (Suburb)	Model 3 (Remote area)	Model 4 (Most remote area)
Level of living subsidy	0.0002 (0.0000)	0.0004 (0.0003)	0.0003 (0.0005)	-0.0006 (0.0009)
Satisfaction with subsidy policy	0.3047*** (0.036)	0.3297*** (0.065)	0.3303*** (0.068)	0.3119** (0.071)
Identification with policy	0.1565*** (0.033)	0.1339** (0.063)	0.1739*** (0.062)	0.2008*** (0.067)
Pseudo R2	0.0583	0.1131	0.065	0.0872
Log-likelihood	145.23	99.28	49.31	58.00
Prob>chi 2	0.0000	0.0000	0.0000	0.0000
N	895	397	266	232

***Significant at the 1% level; **significant at the 5% level; *significant at the 10% level.

Table 4. The actual and expected range of subsidies for rural teachers.

Subsidy category (RMB per month)	Real subsidy received by rural teacher		Subsidy expected by rural teacher	
	N	%	N	%
≤200	243	50.21	23	6.76
200–300	191	39.46	45	13.24
300–500	24	4.96	97	28.53
500–1000	18	3.72	102	30.00
>1000	8	1.65	73	21.47
Valid response sample	484		340	

The average salary of rural teachers in our survey was 4,403 RMB per month.

teacher to be compensated for the hardship associated with teaching in rural schools. The survey results presented in [Table 4](#) show that 50.21% of the participants received a monthly subsidy of less than 200 RMB per month, and another 39.46% received between 200 and 300 RMB per month. However, 30% of the participants expected a subsidy between 500 and 1,000 RMB. Therefore, rural school teachers receive lower subsidies than expected, and the living subsidy does not act as a significant motivating factor for teachers to remain teaching in rural schools.

All three counties we surveyed had implemented the RTLSP in 2015; however, when asked about the policy, 38.6% of the participants said that no living subsidy was provided for rural teachers. Among these teachers, approximately 28% came from remote towns and villages and 10.5% came from the most remote villages. As one teacher said:

I don't know whether the county education bureau has implemented the teacher's living subsidy policy. I don't know what items my salary includes and whether there is a living subsidy. I only know the total salary that is recorded on the salary card.

Such lack of policy awareness could have negatively impacted on the result in this case. Being in a geographically remote location could mean that communication is limited, and new policies and initiatives may not reach the intended recipients.

Impact of satisfaction of policy on rural teachers' intention to stay

Satisfaction is a function of the difference between perceived performance and expectation, which is an important dimension for measuring the effectiveness of

policy implementation (Cardozo, 1965). The higher the rural teachers' satisfaction with the policy, the smaller the difference between rural teachers' expectations and actual feelings about the policy. Therefore, rural teachers will be more likely to continue teaching in rural areas. Our model estimation results support the above hypothesis (see Table 3). Policy satisfaction positively impacts on rural teachers' intention to stay ($\alpha = 0.3047$, $p < 0.01$), and this conclusion holds for schools in different geographical locations. Therefore, policy satisfaction is an important factor in predicting teachers' intention to stay. However, more than half (51.7%) of the surveyed teachers are still dissatisfied or strongly dissatisfied with the policy, which might lead to a potential loss of future rural teachers. According to one participant:

I have just been employed for one year and like going to the city regularly to shop, visit relatives, or meet friends. However, the current monthly subsidy of 200–300 yuan given to me is not enough to cover the transportation costs. I am disappointed with the policy.

Impact of identification with policy on rural teachers' intention to stay

Policy identification plays a critical role in the policy implementation process. Only when individuals affected by the policy have a comprehensive and correct understanding of the policy content and form policy identification on this basis can the policy be implemented and affect an individual's behaviour (Nigro et al., 2012). The data in Table 3 indicates that rural teachers' identification with the subsidy policy has a significant positive impact on their intention to continue teaching in rural schools ($\alpha = 0.1565$, $p < 0.01$). That is, the more rural teachers agree with the basis and the amount of living subsidies offered to rural teachers in their location, the more likely they feel that their work is recognised and incentivised by the policy, which increases their willingness to continue teaching in rural schools.

However, our survey revealed that 23.2% of the rural teachers "disagree" or "completely disagree" with the policy. Further analysis found that this group mainly consisted of teachers from schools in towns in County A. The interview revealed that these teachers in County A believe that they work in rural schools and should receive living subsidies for rural teachers according to national policies. However, the local policies exclude them as their schools are in townships and not villages, hence they are not categorised as rural schools. This situation caused the teachers to think the policy was unreasonable:

I work as a math teacher in a junior high school in a township. Our town is more than 60 km away from the county, but there is no 1-cent subsidy because our school is in the town and not in the village. However, it is far from the county and the transportation is inconvenient. As for teachers in village schools, some teachers can receive a monthly subsidy of 600 yuan. We feel that the policy is unfair to us.

Conclusion and implications

Our findings showed that the RTLSP effectively attracts student-teachers to teach in rural schools after graduation. However, this effect is short-lasting as most will leave after three years when their contract expires. This finding is consistent with previous studies in the US

(Hough & Loeb, 2013; Steele et al., 2010), which showed similar short-lasting effects. Our findings enrich the theory of compensating wage differentials by considering the time dimension. The existing theory does not differentiate between the long-term and short-term effects of compensating wages on individual career choices; however, our study found that compensating wages has a short-term effect on attracting teachers but no long-term effect. The difference between long-term and short-term effects deserves attention.

In addition, our findings enhance the compensating wage differentials theory through compensating wage payments. Compensatory wages need not necessarily be in salaries, as Rosen (1986) and McEwan (1999) proposed. Our data showed that the tuition fee and loan reimbursement incentives positively attract student-teachers to rural schools, particularly those from lower socioeconomic backgrounds. They also have a strong positive effect on student-teachers' intention to teach in rural schools for more extended periods.

Beyond the school-level factors highlighted in past studies, such as school climate and leadership (Bjork et al., 2019; Zavelevsky & Lishchinsky, 2020), we observed that an undeveloped economy, poor education standards of students and inadequate transport infrastructure are also critical in rural teacher recruitment and retention. This finding enriches the notion of ruralness in the compensating wage differentials theory. Existing theories only emphasise the degree of ruralisation and do not discuss what aspects of ruralness are included or how different rural conditions influence their attractiveness to teachers.

With regard to teacher retention, our survey with rural school teachers showed that the current level of the living subsidy has no significant impact on teacher retention, as more than half of the rural teachers surveyed were dissatisfied with the living subsidy and felt that it did not sufficiently compensate for the hardship and inconvenience they experienced teaching in rural schools. We also found that rural teachers' identification with the policy is a significant factor in their decision to remain in rural schools. Our data showed that insufficient information and understanding about the policy intent, dissatisfaction with the financial incentive amount, and perceived unfairness in policy implementation could negatively affect policy outcomes. This is a new finding and an area under-studied in research on rural teacher retention.

The findings from this study showed that the RTLSP is a promising approach to attracting student-teachers to rural schools. However, it is critical that local colleges and universities increase the communication and publicity of the policy to encourage more student-teachers to take up the scheme. School-university partnerships could also be established to match interested student-teachers to rural schools that need teachers in specific subject areas. As well as tuition fees and loan reimbursement, we also recommend extending the policy to provide incentives such as scholarships for undergraduate and postgraduate studies for student-teachers intending to work in rural schools.

We noted that the inherent characteristics of the rural areas make them less desirable for student-teachers to commit to when making career choices in the longer term. While issues associated with rural economic development and transport infrastructure cannot be significantly improved in the short term, we recommend that transportation subsidies, provision of temporary housing, and preferential policies for children to enrol into popular schools in the local area be considered as interim measures to attract teachers and their family members to live and work in rural communities in the longer term. As

most rural teachers in our study are married (81.9%) and less than 30 years old (67.5%), rural communities must provide a conducive environment for young families.

For teachers already teaching in rural schools, it is particularly critical to strengthen communication about the RTLSP to reach out to them. Nearly 39% of the teachers in our survey were unaware of the policy despite three years of implementation, possibly due to the geographical remoteness of these communities, which makes it challenging for communication. This lack of awareness is a significant barrier to the policy goal of retaining rural teachers.

While we know that teachers' decisions to remain teaching in rural schools is partly affected by the living subsidy they receive, the question is how much compensation is needed to retain teachers in rural schools. We suggest it would be better for policymakers to decide on the subsidy amount based on surveys or interviews with rural teachers. Our theoretical model shows that this amount needs to be more than the differential that teachers expect as compensation for the "ruralness" aspect of teaching in school (see [Figure 1](#)). Also, our empirical research showed that low subsidies do not have a significant impact; only subsidy levels that meet teachers' expectations will impact on their intention to stay in rural schools. Our findings showed that most teachers expected a subsidy in the range of 500 to 1,000 RMB per month, which is approximately 11% to 23% of a teacher's monthly salary. Therefore, an effective subsidy must be at least 15% of a teacher's monthly salary.

Financial incentive policies are expensive undertakings for the government, and an ineffective financial incentive policy not only wastes the country's resources but also has an opportunity cost as the money could have been used for other more effective programmes. Therefore, such policies must be robustly evaluated before being deployed in other countries facing similar challenges. This study adds to the limited research in the field by providing insights from the Chinese perspective.

We acknowledge that financial incentives are part of a more extensive set of factors that keep teachers in rural schools. Other factors, such as working conditions, professional development opportunities, mentorship, and community engagement, should also be considered (Azano & Stewart, 2016; Hudson & Hudson, 2019; Rude & Miller, 2018). It is, therefore, important to complement financial incentives with other factors. Longer-term "grow your own" initiatives that provide alternative teacher education pathways for local rural high school students to teach in their local community upon graduating from initial teacher education (Brenner et al., 2018; Gist et al., 2018; Rude & Miller, 2018; Zhang et al., 2022) may help to alleviate the teacher shortages; however, further study is needed to establish the effectiveness of such initiatives.

Finally, a longer-term comprehensive approach is to make rural areas more attractive to young people through infrastructure development, equity distribution of resources, and an emphasis on lifestyle factors such as a slower pace of living, enhanced well-being, and a stronger sense of community. This focus ensure that rural areas retain their charm and that rural teaching remains desirable.

Notes

1. The discussion of teacher supply is based on Rosen (1986) and McEwan (1999).
2. In economics, utility represents the satisfaction or pleasure that consumers receive for consuming a good or service. Utility function measures consumers' preferences for a set of

goods and services. Utility maximisation is a strategic scheme whereby individuals and companies seek to achieve the highest level of satisfaction from their economic decisions.

3. The *China Labour Statistics Yearbook* states that the average annual salary of primary school teachers in China in 2016 was 69,031 RMB. The proportion is approximately $284 \times 12/69,031 = 4.9\%$.
4. The hukou variable is used to measure whether the student-teacher was born in a rural region.
5. Our study focuses on the impact of subsidy policies, so the estimations of the control variable are not reported in the tables.

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Notes on contributors

Jinqiu Jiang is an Associate Professor at the College of Urban Economics and Public Administration, Capital University of Economics and Business, Beijing, China. Her research area has consistently focus on the teacher labour market and has ranged across topics such as teacher attraction and retention, teacher status, and teacher wellbeing, especially in the context of rural schools.

Sun Yee Yip is a Lecturer at the Faculty of Education, Monash University, Australia. Her research focuses on increasing teacher diversity and raising the status of the teaching profession. She has a keen interest in issues related to diversity, inclusion, and social justice and equity in education.

ORCID

Jinqiu Jiang  <http://orcid.org/0000-0003-1234-2473>

Sun Yee Yip  <http://orcid.org/0000-0002-2378-0789>

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