China & World Economy

China & World Economy / 98–120, Vol. 21, No. 3, 2013

How Are Secondary Vocational Schools in China Measuring up to Government Benchmarks?

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Abstract

Drawing on a survey of 106 secondary vocational schools and 7309 students in two provinces of China, this descriptive paper assesses whether vocational schooling is measuring up to government benchmarks for quality and whether poor students are able to access quality schools. We find that secondary vocational schools have met government benchmarks for teacher qualification and training, student opportunities for practical training and adequate facilities. Furthermore, poor students access schools of similar quality to non-poor students, even though 34 percent of poor students do not receive financial aid. We conclude that recent policies are successfully ensuring secondary vocational school quality and equity of access to school quality between poor and non-poor students. However, financial aid policies should be re-examined, such that poor students receive sufficient coverage. Moreover, given that input-based measures only proxy school quality, the government should consider holding schools accountable for outcomes such as student learning.

Key words: access, China, financial aid, quality, secondary vocational school
JEL codes: H52, I24, O15

I. Introduction

Secondary vocational schooling has expanded steadily over the past two decades in China.

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The authors acknowledge the financial assistance of the National Natural Science Foundation of China (Grant No. 71110107028) and CAS (Grant No. KZZD-EW-06-02).

Between 1990 and 2011, enrollments in secondary vocational schooling increased by 14.2 million, far outpacing concurrent increases in secondary academic schooling (NBS, 1990, 2011).

Motivating this rapid expansion is a belief among policy-makers that secondary vocational schooling can equip students with the skills needed for future employment (Wei *et al*., 1999; Fang *et al*., 2009). In 2002 and 2005, the State Council promulgated policy directives highlighting the importance of secondary vocational schooling in ensuring a skilled labor force to power China's future growth (Chinese State Council, 2002, 2005). Indeed, this commitment continues to drive the policy initiatives that are creating and molding secondary vocational schooling: the central government's Twelfth Five Year Plan for 2011–2015 highlighted secondary vocational schooling as an important component of future economic development (Xinhua Agency, 2011). In the present paper secondary vocational schooling refers to 3-year programs enrolling junior high graduates and training students for employment after graduation from vocational school (UNESCO, 2011).

However, policy-makers recognize that secondary vocational schools can only produce skilled graduates if school quality keeps pace with the expansion of enrollments (Xinhua Agency, 2011). As a basis for assessing the quality of secondary vocational schools, policy-makers focus on three specific benchmarks: (i) teacher qualifications and training; (ii) the degree to which school curricula are linked to practical skills valued by the market (practical training); and (iii) the presence of adequate facilities in schools (Chinese State Council, 2010). In the present paper we will discuss each of these benchmarks in turn.

First, according to the *Teachers' Law of the People's Republic of China*, all secondary vocational school teachers are required to have a bachelor's or vocational college degree (MOE, 1993). Teachers should have "dual certification" (*shuangshixing*), defined as having professional certification in teaching and a second non-teaching professional skill (Xinhua Agency, 2011). Moreover, all teachers should have working experience in industry before teaching (Chinese State Council, 2010). Aside from teacher qualifications, schools need to offer teachers in-service training to continue developing their skills (MOE, 1999).

Second, school curricula are required to focus on building practical skills. To better orient the curricula towards practical skills and generate worthwhile internship opportunities, schools have been encouraged to form tight partnerships with local enterprises (Chinese State Council, 1996). Schools are supposed to provide opportunities for students to participate in internships, both off-campus and on-campus when they are in the school (Chinese State Council, 2010).

Finally, secondary vocational schools should have an adequate set of facilities. To be considered as having adequate facilities, vocational schools must be equipped with laboratories, libraries, multimedia rooms, workshop centers and dormitories (Chinese State Council, 1996).

Although these input-based measures may not fully capture school quality, the international literature often uses input-based benchmarks to assess the quality of education systems in developing countries (Schnarr *et al*., 2008; Guo and Lamb, 2010; Shi and Qi, 2010). A complete evaluation of vocational school quality requires focusing on educational processes and outputs, such as student learning and employment outcomes. However, in practice, many studies have to rely on the imperfect input-based measures. For example, teacher certifications are sometimes used as proxies for teacher quality and have been found to be associated with student learning, measured by standardized test scores (Park and Hannum, 2001; Hanushek *et al*., 2005). Student curricula that do not link with market and industry needs may lead to adverse employment outcomes, such as decreased wages or increased time elapsed before finding employment (Ding and Li, 2007; Chen, 2009). Finally, school facilities, including libraries and classrooms, generally have positive impacts on student learning (Glewwe *et al*., 2011). In short, government officials and scholars concur that teacher qualifications and training, practical training and adequate facilities are important, albeit incomplete, reflections of vocational school quality (Schnarr *et al*., 2008; Guo and Lamb, 2010; Shi and Qi, 2010).

Beyond quality, policy-makers are also interested in ensuring access to secondary vocational schools among poor students, who may not be able to attend for financial reasons. One study estimates that 80 percent of students in poor rural areas in China enter the workforce without attending secondary school (Yi *et al*., 2012). Including the cost of living and tuition, the annual cost of attending secondary school is estimated to be approximately RMB5000, five times the per capita income of a rural family at the poverty line (Liu *et al*., 2009). When accounting for the opportunity cost of foregone wages, which students could be earning instead of attending school, the "full cost" is several times higher.

To address the problem of the high cost of secondary schooling, the Chinese Government has pledged nearly RMB 4.5bn (US$750m) to subsidize secondary vocational schooling for poor students in 2010 (Chinese State Council, 2010). In theory, the subsidies are required to be allocated in the form of stipends (students should receive RMB1500, or US$240, in each of the first 2 years) to poor secondary vocational school students (MOF and MOE, 2006; Fo and Xing, 2011). These investments are the result of the interests of policy-makers to ensure that poor students can acquire the knowledge and skills needed for work in China's rapidly developing economy (Chinese State Council, 2002).

Surprisingly, there have been very few studies examining either vocational school

quality or access in China. First, even using government benchmarks as proxies for school quality, there have been few evaluations of China's secondary vocational school system. Kuczera and Field (2012) report that employers do not always collaborate with China's secondary vocational schools to provide workplace training for students. However, their findings are based on a limited number of case studies and interviews in China as part of field visits rather than empirical evidence from systematically collected survey data. Guo and Lamb (2010) argue that insufficient investments have left schools with poorly trained teachers. However, this work relies on administrative and survey data from a limited sample in Yunnan Province.

Second, despite the policy interest to ensure poor students attend secondary vocational schooling, there is no empirical evidence showing whether poor students attend schools of comparable quality to non-poor students. Even if secondary vocational schools perform well compared to benchmarks, poor students may be attending schools of lower caliber.

Third, a related question is whether government financial aid for poor students to attend secondary vocational school is actually reaching them. Although policies have set out to cover 90 percent of all secondary vocational school students (Fo and Xing, 2001; Wang, 2012), there is no evidence that aid is actually reaching poor students. How well is financial aid being distributed? To the best of our knowledge there is no paper that has investigated whether and to what extent poor secondary vocational school students receive financial aid.

Given these gaps in the literature, the present study pursues three objectives. First, we attempt to understand how secondary vocational schooling measures up to the three sets of government-established benchmarks: (i) teacher qualifications and training; (ii) practical training; and (iii) adequate facilities. Second, we examine whether, according to government-established benchmarks, poor students are attending schools of comparable quality to non-poor students. Third, we identify the extent to which government financial aid is targeted toward poor students. Ultimately, we would like to know whether China's secondary vocational schooling is measuring up to government-established quality standards, whether poor students have access to quality schooling and whether poor students are receiving the financial assistance to attend secondary vocational schools.

The remainder of the paper is structured as follows. Section II introduces the methodology used in the present paper, describes the data collection process and details our analytical approach. Section III reports the results of the study, assessing how secondary vocational schools are performing according to the three major government benchmarks. Section IV presents results on our analysis of whether poor students and non-poor students attend schools of comparable quality. Section V identifies whether financial aid is reaching poor students. Section VI concludes.

II. Methodology

1. Dataset

The present paper uses a dataset collected by the authors in October 2011. In executing the survey, we include both a coastal and inland province in China. Shaanxi Province, the inland province in our study, ranks 15th among all provinces in terms of GDP and was among the slowest growing provinces in China during the 2000s (NBS, 2011). By contrast, Zhejiang is the fifth richest province in China in terms of per capita GDP, after Tianjin, Shanghai, Beijing and Jiangsu (NBS, 2011).

After selecting the two provinces, we chose the most populous prefectures based on official records: three in Shaanxi and four in Zhejiang Provinces. There are more than 1000 vocational schools in the seven prefectures. Resource constraints prevented us from sampling all majors. Therefore, using administrative data, we identified the most popular major (i.e. the major with the largest enrollments) among secondary vocational schools in each province: computing. Using official records, we excluded schools that reported having no computer or computer-related majors.[1] We called the remaining schools to ascertain their expected enrollment in the following school year. Schools with fewer than 50 students enrolled in the computer or computer-related major were also excluded. We ultimately enrolled 51 schools in Shaanxi and 54 schools in Zhejiang in our study.

The next step was to choose the actual set of students that could be surveyed. In each school we randomly sampled two first-year computer major classes (if the school only had one computer major class). There are a total of 181 classes sampled and 7309 first-year secondary vocational school students in these classes.

In October 2011 (1 month after the start of the autumn semester), our team of enumerators went to each school. From the school survey we gathered information on teacher qualifications and training, practical training for students and the nature of the school's facilities. More specifically, we collected information about the degrees of the teaching staff (how many teachers had bachelor degrees or vocational college degrees, teaching certifications, professional experience and/or dual certification). We also collected information regarding whether the school offered training (if any training was offered, how many training sessions were offered and how long each training session lasted). In regards to practical training for students, the survey asked about the number of partnerships with companies and the nature of those partnerships. The survey also asked to what extent

[1] We define computer or computer-related majors by whether the official name of the major contained the word "computer." The most common major is titled "computer applications," followed by "computer maintenance," "computer design" and "computer programming."

students participated in school and company internships. In terms of school facilities, we asked, for example, whether the schools had dorms, cafeterias, libraries and laboratories. Because multimedia rooms, workshop centers and computer clusters are required for a computer major, we also asked how many of these facilities existed and whether the facilities were operational.

Enumerators were trained to conduct data quality checks to catch obvious misreporting from principals, including asking other administrators questions, gathering curriculum plans, cross-checking principals' responses against school records and referencing school promotional materials. A total of 105 vocational school surveys were completed (school data). These data form the core of our analysis to measure school quality.

To further verify whether the data from the school survey was accurate, we also administered surveys to the homeroom teacher of the sampled computer major classes. Our concern was that schools might provide inflated reports on government benchmarks. Therefore, we asked teachers to fill out surveys, allowing us to further verify the accuracy of principals' survey responses. A total of 181 teachers, representing 181 classes, responded to our surveys. Henceforth, we refer to the results from the homeroom teacher surveys as teacher data.

To address our research questions regarding financial aid and access, we also conducted a four-block student survey. The first block requires that each student fill out a checklist of the durable assets owned by his or her household, including items such as washing machines, computers and television sets. We use this checklist to identify students who are poor (we will describe our specific methodology in the analytical approach section below). The second block of the survey asks students whether they received any financial aid and how much financial aid they received as of October 2011. The third block of the survey involves a standardized mathematics and computer skill test developed by a psychometrician from the Peking University. We administered the test ourselves. From this block we develop our measures of academic performance. The fourth block of the survey collects information on the basic characteristics of students, including their age, ethnicity and gender.

2. Analytical Approach

To present data on government benchmarks of quality, we report the mean values of each variable. We also report the standard deviations, minimum and maximum, using schools as the unit of analysis. We then compare these values with government benchmarks.

To test whether poor students attended schools meeting government benchmarks or received financial aid, we first generate a measure for whether a student is poor or not. We assign a monetary value based on the National Household Income and Expenditure Survey, organized and published by the NBS (2008), to each asset in the checklist of common

durable household assets. We then sum the value of the assets owned by the household of each student to create a single metric of the value of the asset holdings of each student's household. To control for the effect of being in a rich coastal province (Zhejiang) versus a poor inland province (Shaanxi), we rank students separately in each province. We then split the ranked students into four quartiles. The poorest 25 percent of students are labeled quartile 4 (Q4), students ranking from 25 to 50 percent fall under quartile 3 (Q3), students ranking from 50 to 75 percent fall under quartile 2 (Q2) and the richest 25 percent of students fall under quartile 1 (Q1).

Following the procedure to identify poor students, we split the student sample into two groups based on whether they are poor (in Q4) or non-poor (in Q1, Q2 or Q3). We then compare the means in the quality benchmarks of kinds of schools they were attending using a *t*-test. To control for the fact that these students were actually clustered in schools, we proceed to set the dummy variable *Q*4 as the dependent variable in an OLS model to examine whether poor students attend schools meeting government benchmarks. The unadjusted model is:

$$Q4_{is} = b_1 X_{is} + e_{is}, \tag{1}$$

where the dependent variable is a dummy variable for whether student *i* in school *s* is ranked among the poorest of all the students in our sample (Q4). The independent variable *X* is one of the school quality benchmarks. We run this regression once for each individual independent variable, and, thus, do not hold constant the other variables. We will report all the values in Section IV. If the coefficient on a particular (i.e. a particular school quality benchmark) is significant, it means that poor students and non-poor students are attending schools of different quality in terms of that particular benchmark. We calculate cluster-robust standard errors to adjust for the clustering of students within schools.

To control for differences across Shaanxi and Zhejiang, we add a province dummy as follows (adjusted model):

$$Q4_{is} = b_1 X_{is} + province_s + e_{is}. \tag{2}$$

This adjusted model is identical to the unadjusted model, except that it controls for whether a school is located in Zhejiang.

We also use an OLS model with cluster-robust standard errors to relate receiving any financial aid and how much financial aid is received with whether a student is poor. Our unadjusted modelis:

$$y_{is} = b_1 Q4_{is} + e_{is}, \tag{3}$$

where the dependent variable *y* is either a dummy variable for whether a student receives any financial aid, which equals 1 if student *i* in school *s* receives financial aid, or the amount

of aid received (a continuous variable measured in yuan). The dummy variable *Q*4 equals 1 if student *i* in school *s* is ranked in the bottom 25 percent in terms of the value of household assets.

We also add a series of control variables to the unadjusted model. Then, we obtain:

$$y_{is} = b_1 Q4_{is} + b_2 X_{is} + province_s + e_{is}. \quad (4)$$

Equation (4) is identical to Equation (3). However, we add a vector *X*, which incorporates the following control variables: age (in years), gender (a dummy variable where 1 = male), ethnicity (a dummy variable where 1 = Han), math test performance (standardized in our sample), computer test performance (standardized in our sample) and whether the student would like to take the college entrance examination (1 = yes). We also include the dummy variable *province* to indicate whether the student attends school in Zhejiang or Shaanxi (1 = Zhejiang) to control for regional differences. In both Equations (3) and (4), we are interested in b_1, the coefficient for whether a student is poor, which allows us to infer whether a poor student is more likely to receive any aid and how much aid he or she will receive.

III. Results: Are Schools Meeting Benchmarks?

1. Teacher Qualifications and Training

In terms of the minimum degree requirements of teachers, schools are largely meeting government benchmarks. According to our school data in Table 1, 79.7 percent of teachers have bachelor degrees and 22.3 percent have vocational college degrees (some teachers have more than one degree). In fact, almost 95 percent of teachers have either a bachelor degree or vocational college degree. Indeed, these percentages are confirmed by teacher data: 97 percent of teachers report that they either had a bachelor or vocational college degree (omitted in Table 1 for brevity).

From Table 1 we find that not only secondary vocational school teachers appear to fulfill minimum degree requirements, but also most are certified to teach in secondary vocational schools and report having considerable experience. Specifically, according to school data in Table 1, 82 percent of teachers have teaching certificates: a credential required to teach in secondary vocational schools. The teacher data are largely consistent with school data. According to the principals, 75 percent of teachers report that they have teaching certificates (table omitted for the sake of brevity). Teachers in the computer major report having an average 8.38 years of teaching experience (see Table 1).

Although most teachers have formal degrees, fewer teachers have industry experience or qualifications. For example, according to school data, only 33 percent of teachers have dual certification (***shuangshixing***, see Table 1). Whether teachers have dual certification in

Table 1. School Quality in Terms of Teacher Qualifications and Training, October 2011

	Mean	Standard deviation	Minimum	Maximum
Percentage of teachers with				
Bachelor's degree	79.70	23.96	8.33	100
Vocational college degree	22.30	26.34	1.47	100
Either bachelor or vocational college degree	94.70	14.62	12.73	100
Teacher's certification	82.01	24.12	16.72	100
How many years has teacher taught?	8.382	7.41	0	46
Industry experience				
Proportion of teachers with dual certifications	0.33	0.18	0.036	0.86
Any industry experience (1 = yes)	0.32	0.46	0	1
Years of industry experience	2.17	2.44	0.090	10
Industry experience relevant to teaching (1 = yes)	0.46	0.50	0	1
Trainings in 2010–2011 school year				
Any teacher training offered by school (1 = yes)	0.94	0.24	0	1
Sessions of trainings offered by school	75.61	110.53	2	489
Average number of training sessions per teacher	0.79	1.02	0.032	4.11
Average duration of each training session (in days)	11.42	10.72	0.50	50
Did room teachers attend any training? (1 = yes)	0.68	0.47	0	1
Observations	105			

both teaching and a second (non-teaching) professional field is believed (by policy-makers) to be an important measure of whether teachers are able to keep up with changes in industry (Chinese State Council, 2010).

The same trend, of few teachers having industry experience or qualifications, is true when examining teacher data in Table 1. Only 32 percent of teachers have any kind of industry experience (outside of teaching), including any previous job in the labor market (outside of an educational institution). In addition, of those with previous industry experience, the average length of work experience for teachers is approximately 2 years. Fewer than half of those with industry experience report that their previous work was relevant to the subjects they were teaching (see Table 1).

According to China's national vocational training policy, a minimum requirement is that all schools offer in-service training for their teachers (MOE, 1999). Schools may offer in-service training to their teachers in two ways. They can either send their teachers to training sessions organized by the local bureau of education or organize the training sessions themselves. Our school data in Table 1 show that almost all (94 percent) schools offered teacher training sessions during the 2010–2011 school year. Schools with teacher training offered an average 75.6 training sessions during the 2010–2011 school year. Assuming each teacher in a given school attended a single training session for the school year, each

school (that reported offering trainings) provided an average 0.79 training sessions per teacher (see Table 1). In short, schools are mostly meeting minimum requirements to offer teacher training.

Although schools report that they met national requirements in terms of offering training sessions, teachers did not always attend them. Only 66 percent of first-year computer major homeroom teachers report attending any training session offered by the school during the 2011–2012 school year (see Table 1). In other words, although almost all schools report that they offered training to teachers, roughly one-third of homeroom teachers (who should be among the first staff members in schools to receive training (MOE, 2011)) did not attend training.

Therefore, our evidence suggests that while vocational schools are largely meeting government benchmarks in terms of teacher qualifications and training, quality gaps still remain. First, only one-third of teachers have any industry credentials or experience. Second, although schools are providing training sessions for their teachers, teachers did not always attend these sessions.

2. Practical Training

One of the main purposes of vocational education is to ensure that students join the workforce. As such, policy-makers encourage secondary vocational schools to closely link their curricula to the workplace (Chinese State Council, 1996). In this subsection we examine the degree of school–industry collaboration and internship participation among first year secondary vocational school students as measures of the provision of practical training for students.

According to the school data in Table 2, schools and industries have formed a number of different types of partnerships. Most (91 percent) schools have at least one of several different types of industry partnerships. The most common type of partnership is sending secondary vocational school graduates to enterprises as full-time employees (80 percent). On average, 54.52 percent of the students in our secondary vocational sample schools were able to find employment through these partnerships. The second most common type of partnership involves inviting industry professionals to train teachers (43 percent) or to teach classes to secondary students (42 percent). The least common type of partnership was the formulation of a joint curriculum. Only 12 percent of schools reported having this kind of partnership. Based on these findings, we conclude that schools and enterprises are, indeed, collaborating with one another, primarily in terms of sending students to internships and placing students in full-time employment positions after graduation.

According to the teacher data, schools are doing well in terms of maintaining industry relationships and ensuring student participation in internships, which is consistent with

Table 2. School Quality in Terms of Practical Training, October 2011

	Mean	Standard deviation	Minimum	Maximum
School–industry partnerships				
Has at least one industry partnership (1 = yes)	0.91	0.28	0	1
Industry provides job offers to graduates (1 = yes)	0.80	0.40	0	1
Percentage of graduates with industry job offers	54.52	39.32	0	100
Teacher trainings given by industry professionals (1 = yes)	0.43	0.50	0	1
Student trainings given by industry professionals (1 = yes)	0.42	0.50	0	1
Industry and school develop curriculum together (1 = yes)	0.12	0.33	0	1
School internships				
Were school internships offered? (1 = yes)	0.50	0.50	0	1
Were industry internships offered? (1 = yes)	0.71	0.46	0	1
Does teacher communicate with internship supervisor? (1 = yes)	0.93	0.26	0	1
Observations	105			

government educational targets (Chinese State Council, 2010). From Table 2, it is evident that the degree of internship participation among students is high. Students may stay in their school and take courses while also participating in an internship in the school (a school internship). Students may also leave the school with an internship supervisor to work at a company directly (an industry internship). Half of the teachers report that their students attended school internships; 71 percent report that their students attended industry internships. Importantly, 93 percent of teachers say that they communicate regularly with internship supervisors (see Table 2). Our data suggest at the very least that the school does connect its internships with its curriculum/activities.

3. Adequate Facilities

Table 3 shows that almost all schools have the facilities that are required by policy-makers. It is found that 98 percent of schools have laboratories and 99 percent have libraries. Almost all (95 percent) of the sample schools have multimedia rooms, and all (100 percent) schools sampled have computer clusters. Clearly, secondary vocational schools (at least those with computer majors) are largely meeting minimum requirements in terms of having adequate facilities.

Table 3 also shows that facilities are open for use (at least for formal instruction). Multimedia rooms are open for use 28.9 hours per week. Access also appears to be sufficient for school computer clusters. Students also can use computer clusters 35.2 hours per week.

Finally, a large number of schools meet government benchmarks by having workshop centers. Workshop centers (*shiyanshixunjidi*) are supposed to be built in a way that allows students to practice skills using industry-caliber equipment and protocols.

Table 3. School Quality in Terms of Proper Facilities, October 2011

	Mean	Standard deviation	Minimum	Maximum
Basic facilities				
Has laboratory (1 = yes)	0.98	0.15	0	1
Has library (1 = yes)	0.99	0.11	0	1
Multimedia rooms				
Has multimedia room (1 = yes)	0.95	0.22	0	1
Multimedia room availability (hours open per week)	28.9	20.4	2	90
Computer rooms				
Has computer room (1 = yes)	1	0	1	1
Computer room availability (hours open per week)	35.21	26.32	0	144
Workshop centers				
Is the school equipped with a workshop? (1 = yes)	0.86	0.35	0	1
Is the workshop equipped with specialized staff? (1 = yes)	0.92	0.28	0	1
Money spent on workshop equipment per student (yuan)	668.3	1198.2	0	6666.7
Money spent on construction and upkeep per student (yuan)	2266.6	2180.3	9.23	10 571
Observations	98			

Workshop centers are set up under the supervision of (and in collaboration with) industry professionals (MOE, 2012). According to the school data in Table 3, 86 percent of schools have workshop centers. Of the schools with workshop centers, 92 percent are equipped with specialized staff to maintain and run them. During the 2011–2012 school year, schools with workshop centers reported spending roughly RMB 668 per student on workshop center equipment.

Based on the above analyses, the evidence suggests that, while not perfect, secondary vocational schools are mostly meeting government benchmarks in terms of teacher qualifications and training, practical training for students and facilities. There are some weak points. For example, teachers might not be attending training sessions offered by schools. However, according to our surveys with principals and teachers, secondary vocational training schools appear to have teachers that meet minimum criteria, the training they provide to students appears to be augmented somewhat by industry partnerships and internships, and basic facilities appear to be accessible to students.

IV. School Quality for Poor versus Non-poor Students

In the previous section, our data show that, on average, secondary vocational schools are more or less meeting government benchmarks. However, because there are still a number of schools that do not meet the benchmarks, we are not able to conclude on this basis that poor students are attending schools that meet government benchmarks (relative to non-poor students). It is possible that there is a systematic bias, with poor students lacking full

access to secondary vocational schools that meet government benchmarks.

However, despite concern about the failure to provide qualified education to the poor (Wang, 2012), our results show that, with some exceptions, poor students appear to attend schools of comparable quality to non-poor students. For example, in Table 4, in terms of teacher qualifications, 95 percent of poor students have teachers with a bachelor or a vocational college degree; 96.5 percent of their non-poor peers have teachers with these degrees. Although this difference is significant at the 1-percent level, the magnitude (1.5 percentage points) is small, and policy-makers consider this difference negligible. There are no statistically significant differences between poor and non-poor students in terms of whether their teachers have teaching credentials. Moreover, 96 percent of poor students attend schools where training was offered, compared to 94 percent of non-poor students. While this difference is statistically significant at the 1-percent level, the difference is not large enough to be a policy concern.

In terms of practical training, poor students attend schools of comparable (perhaps even better) quality than their non-poor peers. Table 4 shows that 92 percent of both poor and non-poor students attend schools with one or more industry partnerships. Fewer than half (44 percent) of both poor and non-poor students attend schools offering school internships. However, whereas 71 percent of poor students attend schools offering industry internships, only 67 percent of non-poor students do (see Table 4). That is, poor students seem to have a slight advantage over non-poor students in accessing industry internships.

In terms of facilities, poor students seem to be at only a slight disadvantage. Table 4 shows that 98 percent of poor students attend schools with laboratories, compared to 99 percent of non-poor students. Likewise, 99 percent of poor students attend schools with

Table 4. Comparison of School Minimum Requirements by Poverty

	Non-poor	Poor	*p*-value
Either bachelor or vocational college degree	96.5	95.0	0.00
Teacher certifications	83.1	84.1	0.11
Any teacher training offered by school (1 = yes)	0.94	0.96	0.00
Has at least one industry partnership (1 = yes)	0.92	0.93	0.46
Were school internships offered? (1 = yes)	0.44	0.44	0.81
Were industry internships offered? (1 = yes)	0.67	0.71	0.00
Has laboratory (1 = yes)	0.99	0.98	0.01
Has library (1 = yes)	1.00	0.99	0.00
Has multimedia room (1 = yes)	0.96	0.94	0.00
Has computer room (1 = yes)	1	1	NA
Observations	7292		

Notes: The *p*-value based on *t*-test of difference of means between poor and non-poor schools. NA, not available.

Table 5. OLS Regression for Association of Poverty to Government Benchmarks, October 2011

	(1)	(2)
Minimum requirements for teachers		
Either bachelor or vocational college degree	–0.002*	–0.002*
	(0.001)	(0.001)
Teacher certifications	0.000	0.000
	(0.001)	(0.001)
Any teacher training offered by school (1 = yes)	0.084**	0.104***
	(0.025)	(0.028)
Minimum requirements for practical training		
Has at least one industry partnership (1 = yes)	0.014	0.014
	(0.063)	(0.063)
Were school internships offered? (1 = yes)	0.002	0.005
	(0.027)	(0.029)
Were industry internships offered? (1 = yes)	0.036	0.036
	(0.027)	(0.027)
Minimum requirements for facilities		
Has laboratory (1 = yes)	0.099***	0.100***
	(0.018)	(0.025)
Has library (1 = yes)	0.252***	0.254***
	(0.015)	(0.017)
Has multimedia room (1 = yes)	–0.063	–0.061
	(0.054)	(0.056)
Controls for whether school is in Zhejiang (1 = yes)	No	Yes
Observations	6335	6335

Notes: Robust standard errors are in parentheses. ***, ** and * denote statistical significance at the 1, 5 and 10-percent level, respeectively.

libraries, compared to 100 percent of non-poor students. In addition, 94 percent of poor students attend schools with multimedia rooms, compared to 96 percent of non-poor students. Although these findings are all significant, the magnitude of difference is no more than 2 percentage points, a difference that is also unlikely to be of policy concern.

Our regression results, which account for robust standard errors and clustering by school, are largely consistent with the above findings: with some exceptions, poor and non-poor students attend schools of similar quality. In terms of teacher qualifications, poor students are 0.2 percentage points less likely than non-poor students to have teachers with either bachelor or vocational college degrees (see column 1, row 1 in Table 5). Our adjusted regression yields identical results: the point estimate does not change (see column 2, row 1 in Table 5). Although this finding is statistically significant at the 10-percent level, the magnitude (0.1 percentage points) is even smaller than the small difference observed in the descriptive results (1.5 percentage points). In both adjusted and unadjusted regressions,

there are no differences in terms of whether teachers have teacher certifications (see column 2, row 2 in Table 5).

There is one exception: poor students are more likely to attend schools where teacher training is offered. In the unadjusted model, poor students are 8.4 percentage points more likely to attend schools with teacher training compared to their non-poor peers (see column 1, row 3 in Table 5). The adjusted model is consistent with the unadjusted results: poor students are 10.4 percentage points more likely than non-poor students to attend schools with teacher training (see column 2, row 3 in Table 5), and this result increases in significance to the 1-percent level. These results suggest that poor students attend schools where teachers have more access to training opportunities.

In terms of practical training, the unadjusted and adjusted regression results echo the descriptive results: poor students attend schools of comparable quality to their non-poor peers. Although poor students were up to 1.4 percentage points more likely to attend schools with any industry partnerships when compared to non-poor students (see column 2, row 4 in Table 5), this finding is not statistically significant. In the unadjusted and adjusted models, poor students are 0.5 percentage points more likely to attend schools with school internships (see columns 2, row 5 in Table 5). In terms of industry internships, poor students are 3.6 percentage points more likely to be in schools where students participated in industry internships (see column 2, row 6 in Table 5). However, none of these findings are statistically significant. In sum, poor and non-poor students attend statistically identical schools in terms of practical training.

In terms of facilities, multivariate results show that poor students are attending lower quality schools. In Table 5, poor students are 10 percentage points less likely than non-poor students to attend schools without laboratories (see column 1, row 7 in Table 5). This finding is significant at the 1-percent level and remains significant even after controlling for province (see column 2, row 7 in Table 5). Poor students are also 25 percentage points less likely to attend schools with libraries. This finding is significant at the 10-percent level (see column 2, row 8 in Table 5). Although poor students are less likely to attend schools with laboratories and libraries, there is no indication of the same trends in terms of multimedia rooms and computer clusters. These results suggest that poor students attend schools with slightly worse facilities than non-poor students.

We also conduct three robustness checks to verify our results. First, one concern is that our variable for poverty is a dummy variable. As such, we use a logit model with the same specifications and examine the coefficients at the mean to assess whether the coefficients match those in OLS. Second, we shift the cutoff to create the dummy variable for "poor" from 25 to 30 percent and 20 percent, respectively. Third, instead of ranking on assets weighted by household item values, we create student asset rankings using polychoric

principal components analysis, as per the work of Kolenikov and Angeles (2009). Although the coefficients change slightly in these robustness checks, the general nature and statistical significance of the results reported above are the same. The results of the robustness checks are available upon request from the authors.

Taking the evidence together, we conclude that poor students attend schools of similar quality when compared to their non-poor peers. There are some exceptions: poor students tend to attend schools where teachers do not have a bachelor or vocational college degree. They are also more likely to attend schools without laboratories or multimedia rooms. In other cases, poor students attend schools of better quality than their non-poor peers. Poor students attend schools where in-service training is offered to teachers more frequently than non-poor students. However, the differences (as per our descriptive results) are mostly small and not policy relevant. As such, our data suggest that there are no major quality differences in schools attended by poor or non-poor students.

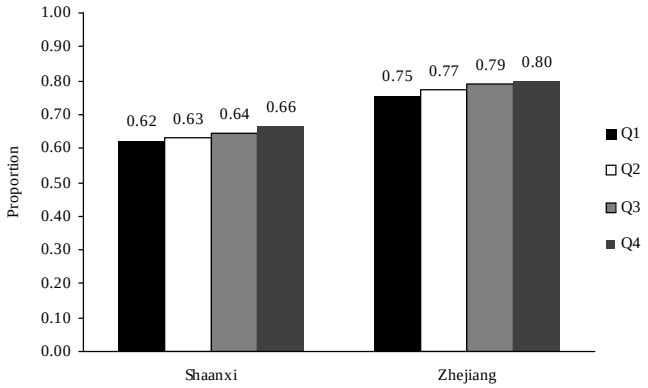
V. Are Financial Aid Policies Well Targeted?

Although we find that poor students attend schools of similar quality to their non-poor peers, an additional concern is whether they (and their families) are shouldering heavy financial costs to attend these schools. In fact, in our survey, the average cost per semester of secondary vocational schooling for a student (including tuition and costs of living, and without any financial aid) is RMB4100, similar to the cost reported in the literature (RMB5500 (Liu *et al*., 2009)). In contrast, the average household asset value of poor students in our sample (i.e. students ranked below quartile 4 as described in our methods) is RMB3736, suggesting that the cost of schooling may be beyond their means (approximately four to five times per capita income for the 3 years of secondary vocational school). Although government financial aid policies are targeted toward poor students and are intended to reduce these financial burdens, there is no empirical data showing whether poor students receive the aid.

Our descriptive data in Figure 1 show that 34 percent of the poor students in Shaanxi and 20 percent of the poor students in Zhejiang received no financial aid.

One reason for the shortage of funds for poor students is that a large amount of financial aid is going to the richest students in schools. In Shaanxi, 62 percent of Q1 students receive financial aid. In Zhejiang, 75 percent of the Q1 students receive financial aid (see Figure 1). Although it is true that rich students still receive less financial aid than poor students (a 4-percentage point difference in Shaanxi and a 5-percentage point difference in Zhejiang), students in Q1 report average asset value of RMB26 300, over seven times the value of students in Q4. In short, there is evidence that the distribution of financial aid is inappropriate. One-third of poor students are not covered, and a large proportion of aid is going to rich

Figure1. Proportion of Students Receiving Financial Aid by Poverty Quartile and Location, October 2011



Source: Authors' survey.

Note: Q1, Q2, Q3 and Q4 refer to household asset value quartiles 1 through 4, respectively.

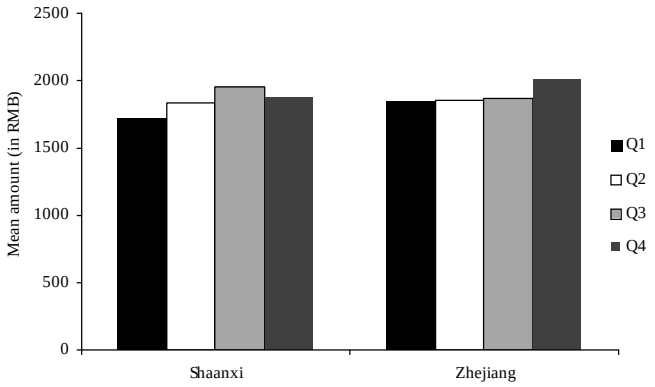
students. If all of the aid were provided to the poor, our data suggest that there would be enough financial aid to cover them all. However, the empirical findings of the study show that much of China's financial aid for secondary vocational schools is currently going to support the families of rich students who do not need it as much as the families of poor students.

This flawed distribution story is consistent with the analysis of the amount of financial aid actually received by each student. Poor students in Shaanxi received, on average, RMB1879 in financial aid as of October 2011 (see Figure 2); during the same time period, the non-poor students (students in Q1 to Q3) in the sample received, on average, RMB1718 in financial aid. In other words, poor students only received RMB161 (or 9 percent) more than non-poor students. The same general pattern also appears in Zhejiang (see Figure 2). This means that in both Shaanxi and Zhejiang poor students are not receiving significantly more financial aid than rich students.

When we turn to our multivariate regression results, the analysis produces results consistent with the simple descriptive statistics. In the unadjusted model (which pools students from Zhejiang and Shaanxi together), the regression result actually suggests that poor students are 1.4 percentage points less likely to receive financial aid compared to their non-poor peers (see column 1, row 1 in Table 6). Although not statistically significant, this finding suggests that poor students are not more likely to receive financial aid than non-poor students.

In our adjusted model, which controls for whether a student is in Zhejiang or Shaanxi (as well as other student characteristics, such as age, gender, ethnicity or baseline test scores), we find that poor students are only 2.6 percentage points more likely to receive aid than non-poor students (see column 2, row 1 in Table 6). In other words, we find that poor students are only

Figure 2. Conditional on Receiving Aid, How Much Aid Received, October 2011
(By Poverty Quartile and Location)



Source: Authors' survey.
Note: Q1, Q2, Q3 and Q4 refer to household asset value quartiles 1 through 4, respectively.

marginally more likely to receive any financial aid than their non-poor peers.

Of students receiving financial aid, our data show that, on average, poor students

Table 6. OLS Regression for Determinants of Getting Financial Aid, October 2011

	(1)	(2)
Socioeconomic characteristics		
Ranked in lowest asset quartile (1 = yes)	–0.014	0.026*
	(0.012)	(0.013)
Attend school in Zhejiang (1 = yes)		0.140***
		(0.014)
Student characteristics		
Student's age (years)		–0.003
		(0.006)
Student's gender (1 = male)		–0.007
		(0.012)
Student's ethnicity (1 = Han)		–0.060
		(0.040)
Academic characteristics		
Baseline math test score (standard deviation)		–0.002
		(0.006)
Baseline computer test score (standard deviation)		–0.011
		(0.006)
Prepared to take college entrance examination? (1 = yes)		0.026*
		(0.012)
Constant	0.729***	0.737***
	(0.006)	(0.108)
Observations	7345	6877

Notes: Robust standard errors are in parentheses. ***, ** and * denote statistical significance at the 1, 5 and 10-percent level, respeectively.

Table 7. OLS Regression for Determinants of Amount of Financial Aid, October 2011 (in RMB)

	(1)	(2)
Socioeconomic characteristics		
Ranked in lowest asset quartile (1 = yes)	83.19*	95.77**
	(33.47)	(37.03)
Attend school in Zhejiang (1 = yes)		66.60
		(35.87)
Student characteristics		
Student's age (years)		–1.334
		(15.97)
Student's gender (1 = male)		–76.15**
		(29.22)
Student's ethnicity (1 = Han)		–81.66
		(102.7)
Academic characteristics		
Baseline math test score (standard deviation)		44.59**
		(13.63)
Baseline computer test score (standard deviation)		–11.34
		(14.61)
Prepared to take college entrance examination? (1 = yes)		–8.695
		(29.10)
Constant	1855.8***	1961.6***
	(14.28)	(282.1)
Observations	5008	4712

Notes: Robust standard errors are in parentheses. ***, ** and * denote statistical significance at the 1, 5 and 10-percent level, respeectively.

receive RMB100 more than their non-poor peers. In our unadjusted model, poor students receive an average of RMB83.19 more financial aid than their non-poor students (column 1, row 1 in Table 7).This finding is significant at the10-percent level. In our adjusted model, the difference increases to RMB95.77 (see column 2, row 1 in Table 7), a finding significant at the 5-percent level. To put this value in perspective, the average financial aid received among all students is RMB1961.6 (column 2, row 9 in Table 7). Thus, these results mean that poor students are only receiving 5 percent more in financial aid than the average student. In essence, poor and non-poor students can be considered to be receiving the same level of financial aid at the same rates.

VI. Conclusions and Discussion

Employing a dataset collected from two provinces (one coastal and one inland), we

demonstrated that secondary vocational schools largely appear to meet government benchmarks of teacher qualifications and training, practical training and adequate facilities (inputs). We also showed that (with some exceptions) poor students generally attend schools that are comparable in quality to the schools attended by non-poor students. However, poor students may be shouldering heavy financial burden to attend school. We find that financial aid misses roughly 34 percent of poor students and also includes many rich students who may not need it.

These findings suggest the success of recent policies. One reason that schools perform adequately when we evaluate them based on inputs may be the recent wave of policy interest of the Chinese Government in secondary vocational education. The amount of attention paid to secondary vocational education on a policy level, whether in the Twelfth Five Year Plan (Xinhua Agency, 2011) or the National Education Reform and Development Outline (Chinese State Council, 2002), has been matched with increases in investments for each secondary vocational school student (by over six times; NBS, 1990, 2011). This increase in investment very likely has helped schools meet government benchmarks.

These pro-vocational education policies also ensure that poor students attend schools that are of comparable quality to the schools of their non-poor peers. As witnessed in its commitment to providing financial aid for poor students, the central government is keen to ensure that poor students benefit from the expansion of secondary vocational education (Chinese State Council, 2002). While we cannot be certain, one possible reason why poor and non-poor students were able to enroll in schools of comparable quality is that recent investments in school inputs from the central government have been relatively equitable. That is, financial resources have been distributed equally across schools accessed by poor and non-poor students alike.

However, inputs are only a proxy for school quality. In fact, there is reason to believe that inputs (e.g. teachers, facilities, curricula, or financial resources) are not translating to student outcomes (e.g. student learning gains). Min and Tsang (1990) find that vocational schools do not significantly increase student wages after graduation. Yang (1998) conducts a survey on 1400 employees and concludes that vocational training had no measurable positive benefit in terms of job performance. Using enrollment data from the *Chinese Statistical Yearbook*, Wang (2012) estimates that the dropout rate among secondary vocational school students is roughly 15 percent. While these studies are either dated or rely on secondary administrative data, they do suggest gaps in secondary vocational school quality when measured in terms of student outcomes.

Moreover, even if poor and non-poor students receive the same inputs, the poor likely face challenges in achieving the same outcomes (measured in future income or graduation

rates). Even though government policies are, in fact, targeting poor students, the distribution of financial aid is flawed and misses some poor students. Therefore, poor students may be pressured to drop out earlier to enter the workforce and earn an income. Financial burden might interfere with their ability to learn skills at school or to participate in internships. In addition, our study only focuses on students who had the financial ability to attend vocational schools: the lack of financial aid may have kept certain students from attending.

Although our findings indicate some success of recent policies, there is still more work to do. First, while schools are generally performing well, quality gaps still exist. For example, while training sessions are offered, teachers do not seem to be attending. Secondary vocational school teachers lack the industry experience required according to government benchmarks. Second, for the purpose that financial aid policies are targeting poor students, policy-makers should examine the distribution of aid to ensure that poor students are, in fact, covered. Third, and most importantly, schools should be held accountable for outcomes and not just inputs. Published studies have been mainly focused on inputs to education (Kuczera and Field, 2012), which could very well explain why schools appear to have been so successful in terms of inputs. However, if schools do not yield gains in terms of student outcomes (such as learning or employment), the fact that they are providing sufficient inputs may, in fact, reveal serious flaws in administration, curricula, or other important areas.

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(Edited by Zhinan Zhang)