

Progress and Challenges of Upper Secondary Education in China

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WORLD BANK GROUP

Education Global Practice

October 2019

Abstract

Over the past decade, China's transition rate from lower secondary education to higher secondary education has increased significantly, from 80.5 to 93.7 percent. In light of this impressive progress, the Chinese government aimed at raising the gross enrollment rate in senior high schools to above 90 percent by 2020. Quality and relevance in vocational and academic high school education could be a key bottleneck in further expansion. The way tracking operates between academic and vocational streams could itself

be a distortion for the sector's further expansion. Looking ahead, reforms in upper secondary education are imperative, given increasing demand for a highly skilled labor force and China's fast demographic change as the young population cohorts decline. The paper examines the sector's key constraints in access, financing, tracking, and informed decisions and recommends how the quality of the general and vocational education tracks can be further improved.

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JEL codes: I21, I28

Keywords: Upper secondary education, vocational education, tracking, China

¹ This report has been co-authored by Dandan Chen, Ning Fu, and Yilin Pan. Authors are listed alphabetically. We would like to thank Prof. Yiming Zhu and Dr. Minyu Wu of East China Normal University for their substantial input, including field data collected from Yunnan Province and interviews conducted in Shanghai. We would also like to thank Yunnan Provincial Department of Education and Tengchong County Education Bureau for their support for data collection. The findings, interpretations, and conclusions presented in this paper are entirely those of the authors. They do not necessarily represent the views of the International Bank for Reconstruction and Development/World Bank and its affiliated organizations or those of the Executive Directors of the World Bank or the governments that they represent.

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Section 1. Background and introduction

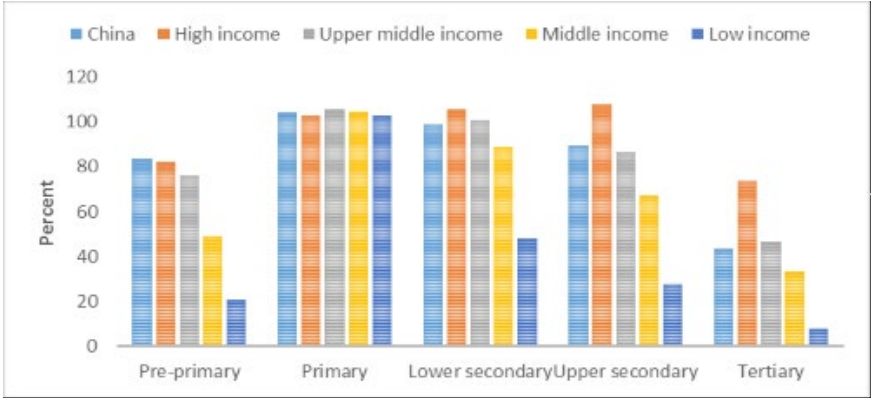
China’s human capital development potentials, the 13th Five-year Plan, and rationale for focusing on upper secondary education

Making the right investments in human capital and facilitating labor market transitions are quintessential to China’s continuing economic transformation and innovation. Contemporary literature emphasizes human capital, knowledge, and ideas for sustaining economic growth and economic development over the long term (Romer 1990, 1993). One early seminal study finds that differences in human capital investment can explain up to 80 percent of the cross-country variation in per capita gross domestic product (GDP) (Mankiw, Romer, and Weil 1992).

The strategic goals of China’s education sector by 2020 are to basically modernize education, bring a learning society into shape, and turn China into a country rich in human resources. As outlined in China’s National Plan for Medium and Long-term Education Reform and Development 2010–2020, the strategic goals include the following: (a) further popularize education, including setting specific access goals for each level of education; (b) deliver equal education to everyone; (c) enhance the quality of education; (d) build a consummate framework for lifelong education; and (e) establish a full-fledged, vibrant education system.

Building human capital for facilitating greater innovation and higher degrees of technology diffusion requires a still larger share of skilled labor. Compared with the average enrollment rates in upper-middle-income and high-income countries, China performs similarly or better in early years and basic education. The GERs for upper secondary education (89.7 percent) and tertiary education (43.4 percent) have also picked up sharply over the years and become comparable with those in upper-middle-income countries, though they still lag high-income countries. Still, educational attainment has wide scope to improve. The GER for China’s tertiary education is expected to reach 50 percent by 2019, and the enrollment rate for high schools in most provinces and municipalities will hit 90 percent by 2020 (Li et al. 2017).

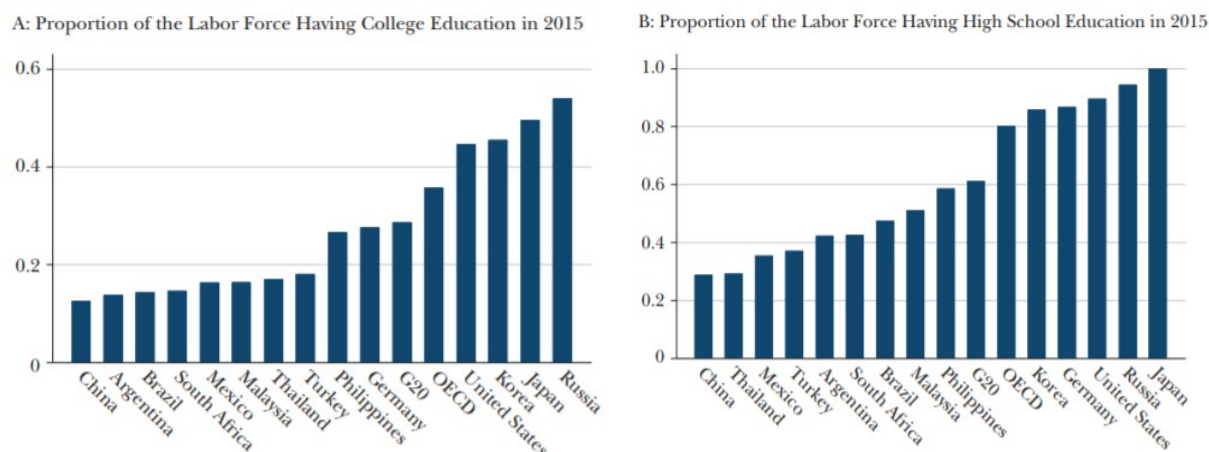
Figure 1.1 The GER in different levels of education: Comparing China with high-income, upper-middle-income, middle-income, and low-income countries in 2015



Source: UNESCO Institute for Statistics.

Due to the relative lack of education for the labor force born before 1980s, the proportion of China’s overall labor force with high school and college education is still relatively low, in comparison with not only advanced economies but also several emerging markets. In light of this gap, perhaps not surprisingly, “average length of education received by the working-age population (years)” is listed as an obligatory indicator in the Main Economic and Social Development Indicators for the 13th FYP period. During the 13th FYP period, this indicator is anticipated to increase from 10.23 years in 2015 to 10.8 years in 2020.

Figure 1.2 Proportion of labor force with college education and high school education, 2015



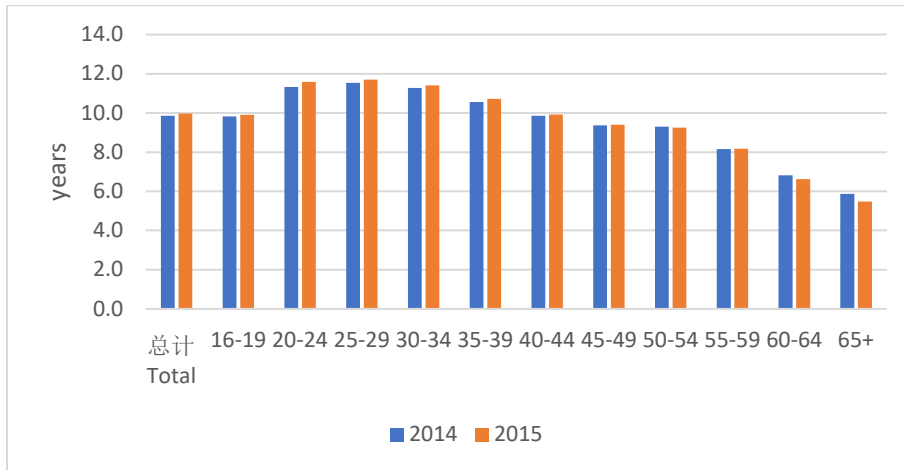
Source: Li et al. 2017.

Table 1.1 13th FYP indicators for “wellbeing of the people”

Main Economic and Social Development Indicators for the 13th Five-Year Plan Period				
Indicators for “Wellbeing of the people”				
Indicator	2015	2020	5-year average [5-year cumulative total]	Type of indicator
Growth in disposable income per capita (%)	n/a	n/a	>6.5	Anticipatory
Average length of education received by the working-age population (years)	10.23	10.8	[0.57]	Obligatory
New urban employment millions of people)	n/a	n/a	[>50]	Anticipatory
Rural population lifted out of poverty (millions of people)	n/a	n/a	[55.75]	Obligatory
Basic old-age insurance coverage (%)	82	90	[8]	Anticipatory
14. Rebuilt housing in rundown urban areas (millions of units)	n/a	n/a	[20]	Obligatory
Average life expectancy (years)	n/a	n/a	[1]	Anticipatory

The increase in total years of schooling of China’s working population hinges on the education levels of younger cohorts (Figure 1.3). For example, for the age cohort of 20–24 years, there is a 0.3 year increase in the average years of schooling between two consecutive years, reflecting the rapid expansion of education coverage and participation in recent years. However, looking ahead, with the demographic change, the age composition of the labor force will be changing with lower shares of younger cohorts. To counter the negative effects of the population decline, an increase in education attainment for the younger population is crucial.

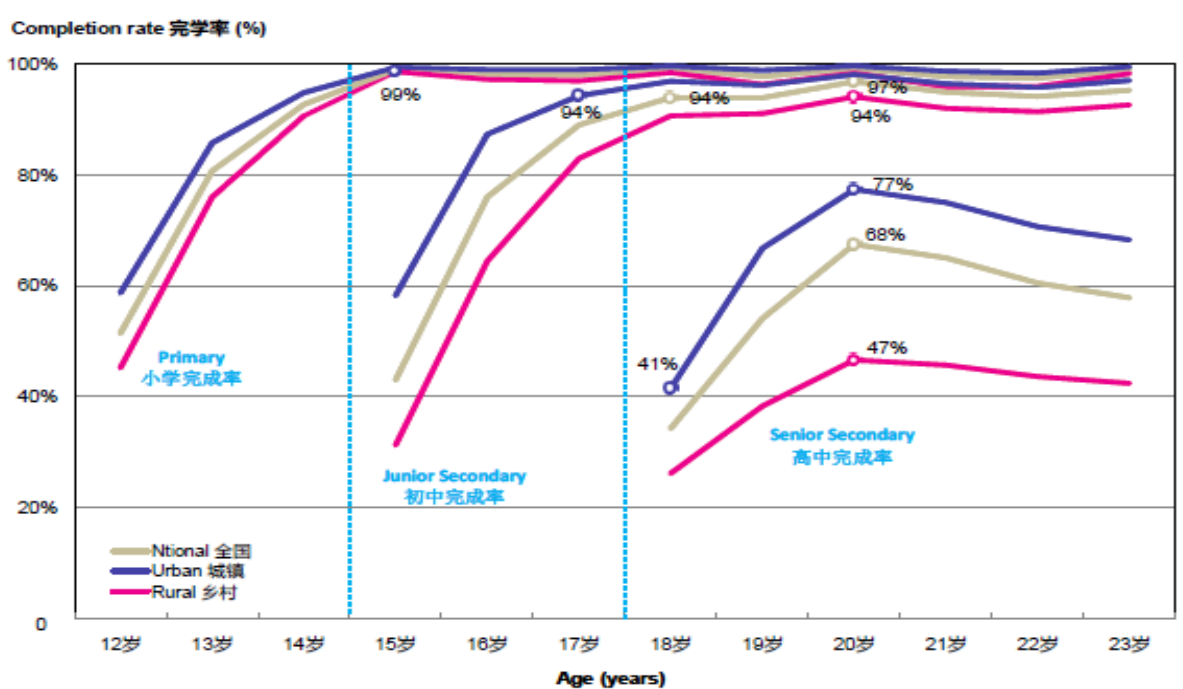
Figure 1.3 Average years of schooling of employed labor force by age, 2014 and 2015



Source: National Bureau of Statistics of China 2015b, 2016.

Whether and how fast the 13th FYP’s goal can be reached largely depends on younger cohorts staying in school longer. As education for the first nine years is compulsory and nearly universal, reaching the 13th FYP’s goal then hinges more and more on access to and retention at the post-compulsory education level. Currently only 77 percent of 34 million Chinese youth at age 20 have completed high school, and for rural youth this ratio is only 47 percent, as shown in Figure 1.4. China’s upper secondary education or post-compulsory secondary education reform has been increasingly attracting attention in recent years, particularly following the country’s pledges to universalize (Pu Ji) this level of education. Post-compulsory secondary education is a special and important stage for most Chinese students, which links the nine-year compulsory education either to advanced learning in college before they enter the labor market or to a job directly upon graduation. Post-compulsory secondary education therefore has been considered a key period to improve the quality of the nation’s human resources.

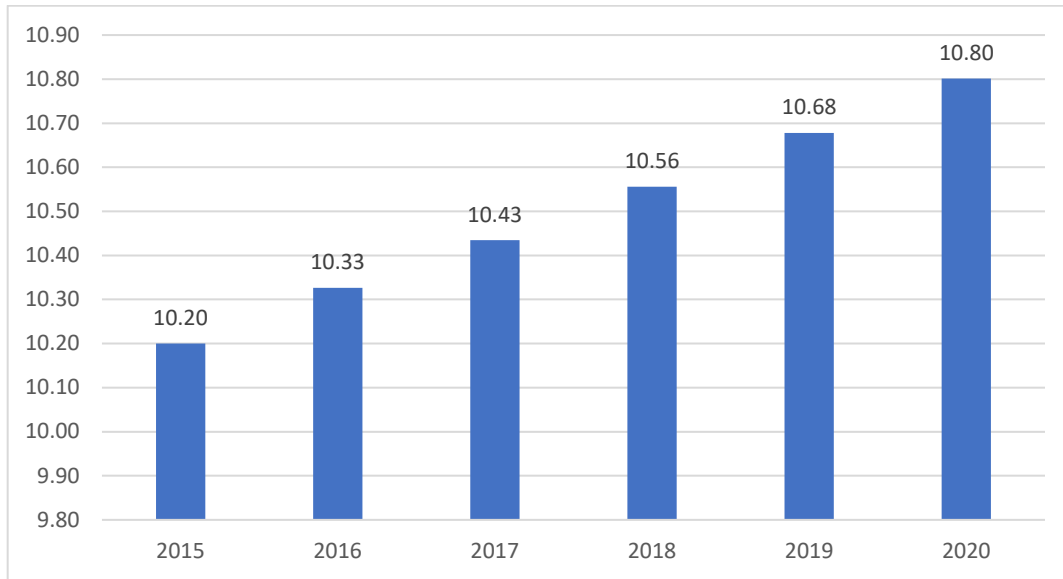
Figure 1.4 Completion rates for primary, junior secondary, and senior secondary students in China by urban-rural residence, 2015



Source: UNICEF, NBSC, and UNFPA 2017. The data were drawn from 1 percent National Population Sample Survey, National Bureau of Statistics, 2015.

Based on the performance from 2015 to 2017, the “average length of education received by the working-age population (years)” is on track for achieving the 2020 target in the short term. This 2020 target is mainly affected by the population entering and leaving the labor force and their education levels. Extrapolating from the development trend of these factors from 2015 to 2017, we predict the average years of schooling among the working population to be 10.8 in 2020, the same as the target set in the 13th FYP. Overall, the factors contributing to the average increase from the 2015 baseline—increasing number of university graduates (with at least 16 years of education) and the relatively large, albeit declining, number of high school graduates (with 12 years of education)—outweigh the reducing factors associated with the population with relatively little education. As a result, the interaction of these three factors leads to an estimated 0.6 year increase in educational attainment in the working population from 2015 to 2020. This simulation exercise also confirms the crucial role of upper secondary education in contributing to the education attainment of the labor force. Applying the logic of Blinder-Oaxaca Decomposition, we find that 60 percent of the variance in this increase is explained by upper secondary education.

Figure 1.5 Average years of schooling among the working population ages 16–59



Source. Authors' calculation.

Looking ahead, while starting from a low base, by 2030 China will be the leading contributor to the world's talent pool. Between 2000 and 2015, the number of higher education institutions more than doubled from 1,041 to 2,560, and the enrollment of college students almost tripled from 2.3 million to 7.8 million. According to an Organization for Economic Co-operation and Development (OECD) analysis, as university enrollment in China continues to increase, the number of 25- to 34-year-old college graduates in the country will triple by 2030, or 10 times the 30 percent rise in Europe and the United States.¹ China will then contribute 27 percent of the talent pool of OECD and G-20 countries. At this scale, the volume of highly skilled labor will be a critical advantage to China's knowledge economy. This can only be sustained in the medium term by a high-performing upper secondary sector.

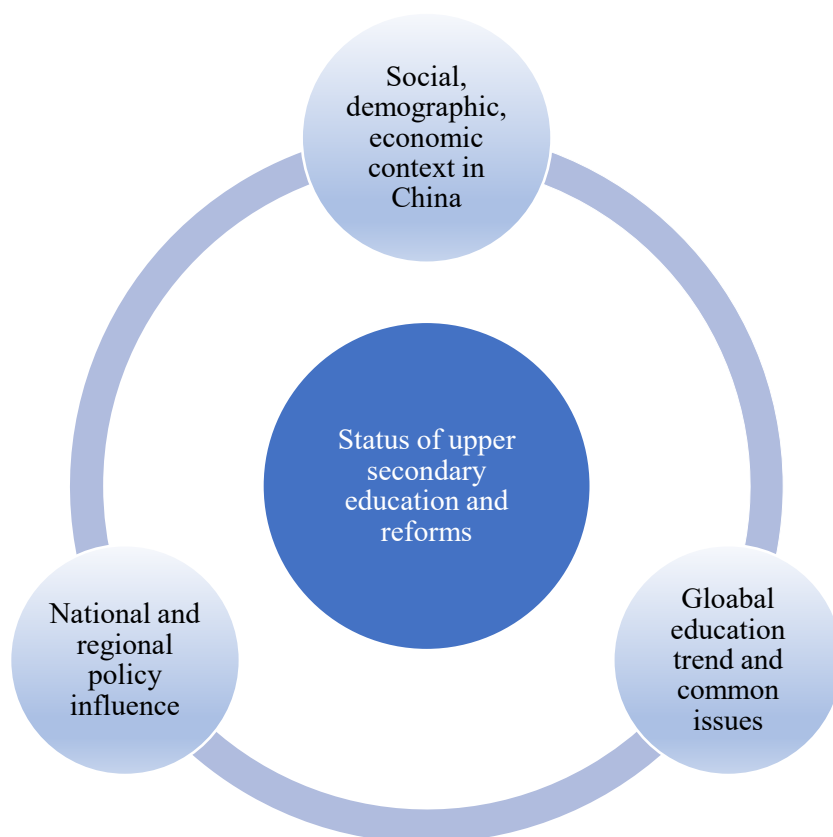
In March 2017, the Ministry of Education (MOE) and three other state agencies released the Program for Promoting Senior High School Education (2017–2020), aimed at promoting educational equity and raising the gross enrollment rate (GER) in senior high schools to above 90 percent by 2020. This government initiative has a strong equity agenda—priority has been given to improving enrollment in poverty-stricken western and central regions, regions inhabited by ethnic minorities, remote inland areas, and old revolutionary base areas. The program also underlines the need to solve an array of outstanding issues, such as ensuring access to education for students with disabilities or from low-income households and reversing the declining enrollment ratio in vocational schools (MOE 2018).

Built on these insights, this report aims to summarize the progress and challenges of upper secondary education in China and provide policy recommendations on how to optimize the structure and improve the quality of upper secondary education to prepare children ages 15–17 who will be the leading force of China's knowledge economy.

Analytical approach and data

The review will adopt a multidimensional conceptual framework for identifying the key bottlenecks and opportunities for upper secondary education development. A framework, as presented in Figure 1.6, lays out the three main external factors influencing the current progress and challenges of China's upper secondary sector.

Figure 1.6 An analytical framework



Social, demographic, and economic context in China. Upper secondary enrollment is associated with various aspects of demographic change and socioeconomic development. The review will be set against the backdrop of rapid socioeconomic changes in China, highlighting the key characteristics that define the relevance of education and identify the future needs for reshaping the overall sector structure and development directions.

Global trend and common issues. Across the countries, there are two distinctive ways of organizing upper secondary education: comprehensive schools or separated schools following academic or vocational tracks. With the rapid technological change and the growing knowledge economy, the practice of tracking students into academic and vocational streams is frequently challenged by today's education research. Traditionally, academic upper secondary education tends to be seen as preparatory for tertiary education. In comparison, vocational upper secondary education is aimed at equipping youth with specific technical skills for the world of work upon graduation.

National and regional policy influence. Given the differences and imbalances between China's regions, the development of education in China is characterized by a large degree of diversity under broad national policies and guidelines. In different regions, any level of education can represent very different features and trends. Upper secondary education is no exception. The review therefore examines how both central and regional policies and measures—such as the enrollment quota system and public financing system—have shaped upper secondary education, particularly the division between academic and vocational tracks.

The report is composed of five sections, including this introduction. Section 2 analyzes how the three external factors play a role in shaping the status of China's upper secondary education. Built on this, Section 3 describes the current status of upper secondary education. Section 4 uses Yunnan Province to illustrate the key challenges to strengthen upper secondary education under the 13th FYP. Section 5 discusses policy considerations.

Section Summary

Due to the relative lack of education for the labor force born before the 1980s, the proportion of China's overall labor force with high school and college education is still relatively low, in comparison with not only advanced economies but also several emerging markets. The increase in total years of schooling of China's working population hinges on the education levels of younger cohorts. Looking ahead, while starting from a low base, by 2030 China will be the leading contributor to the world's talent pool. At this scale, the volume of highly skilled labor will be a critical advantage to China's knowledge economy. This can only be sustained in the medium term by a high-performing upper secondary sector. Built on these insights, this report aims to summarize the progress and challenges of upper secondary education in China and provide policy recommendations on how to optimize the structure and improve the quality of upper secondary education to prepare children ages 15–17 who will be the leading force of China's knowledge economy. The review will adopt a multidimensional conceptual framework for identifying the key bottlenecks and opportunities for upper secondary education development.

Section 2. External factors

Both domestic and international factors influence the development of China's upper secondary education subsector. This report analyzes the social, demographic, and economic context in China as well as national education policies. In addition, the global trends and common debates in upper secondary education are introduced, as they provide valuable lessons for high school reforms in China.

External Factor 1: Social, demographic, and economic context in China

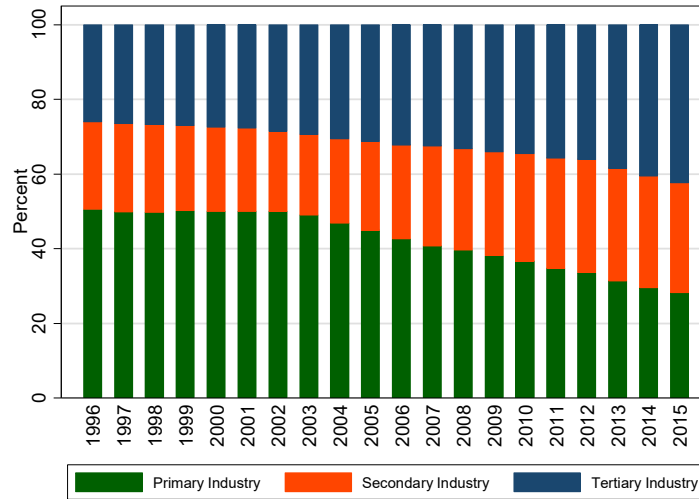
Role of China's human capital in its past and future economic growth

It is well recognized that education has supported China's impressive economic growth by supplying a large number of skilled workers. The economic transformation in China has largely been based on massive reallocation of labor from agriculture to manufacturing and later to services, high levels of industrial investments and exports, and rapid urbanization. Over the past decades, China has made remarkable progress in universalizing compulsory education and expanding access to education at all levels. Human capital plays a much more important role in China's economic growth than some available literature suggests, accounting for 38 percent of economic growth between 1978 and 2008 and even higher for 1999 to 2008 (Whalley and Zhao 2010). In particular, it is estimated that education's impact on labor reallocation between sectors accounts for about 9 percent of Chinese growth, whereas its impact on within-sector human capital growth explains only 2 percent (Lee and Malin 2013).

After more than three decades of average annual economic growth close to 10 percent, China's economy is transitioning to a "New Normal" of slower but more balanced and sustainable growth. This transition demands not only continued support from the education sector but also some transformative measures to boost China's human capital base. One important demographic trend is China's rapidly declining labor force, which is expected to shrink to 62 percent of the population by 2040. The labor contribution to the GDP is also expected to decline moving forward. On current trends, the absolute contribution of human capital to GDP will fall slightly in the coming decades. Increasing labor productivity will be vital in the face of a shrinking labor force, rising factor costs, and growing global competition for labor-intensive manufacturing.

China has benefited from globalization through a surge of manufacturing jobs, but the rise of manufacturing is leveling off. China has also benefited tremendously from globalization as advanced countries offshored their manufacturing activities to China, bolstering a steady growth of employment in manufacturing until the late 2000s. By 2012, manufacturing accounted for 30 percent of employment in China. But for the past five years, the employment share of manufacturing has stagnated, with some indication of a decline in the past couple of years. Meanwhile, employment in services has been steadily rising, soaring from 28 percent of employment in 2000 to 42 percent in 2015.

Figure 2.1 With manufacturing flagging, the share of services in employment has been soaring (percentage, 1996–2015)



Source: data.stats.gov.cn.

Trends in technological advancement and automation

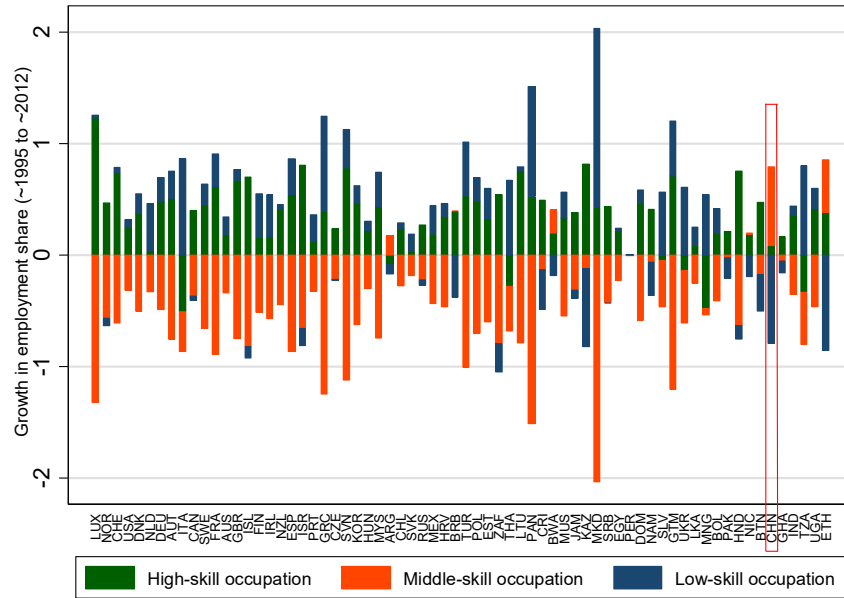
Digital technologies are fundamentally changing the modern workplace. Computers have become phenomenally better than humans at performing activities that involve high-frequency codifiable tasks, which Autor, Levy, and Murnane (2003) call “routine,” scripted in algorithms and thus automated. These tasks are prevalent in mid-skill occupations such as clerks, craftsmen, and operators. With the wave of the latest digital technologies, such routine tasks increasingly include cognitive tasks such as mathematical calculations, organizing of information, and some of the manual repetitive work on assembly lines.² As the price of computing continues to fall, more and more of these tasks are being automated.

Technological progress has polarized employment, particularly in developed countries. This polarization is reflected by the displacement of labor from the mid-skill routine tasks, the increased labor productivity in high-skill ‘abstract’ tasks, and the fewer technological disruptions of low-skill occupations intensive in nonroutine manual tasks. These changes are largely due to the adoption of new technologies that displace routine tasks. Industries and countries that have seen a faster information and communication technology (ICT) growth have increased the demand for college-educated workers and lowered the demand for workers with mid-level skills without necessarily displacing the low-skill or the least-educated workers (Michaels, Natraj, and Van Reenen 2014).

Although China has been among the developing countries where the employment share of the mid-skill occupations is not falling significantly, there are already indications that the job polarization may start sooner than anticipated (see Figure 2.2 and Figure 2.3). There are four main factors that may have slowed down the process. First, the structure of labor markets in developing countries tends to be different, with a smaller share of mid-skill occupations (given, for example, the predominance of low-skill agricultural and informal employment). Second, the pace of technological adoption is much slower than in advanced economies. Third, the positive productivity impact of technological progress might spur local demand for goods and services,

which would further increase employment in disrupted sectors. Fourth, increased trade and globalization have increased demand for low- and mid-skill occupations, primarily through outsourcing manufacturing tasks to these countries.

Figure 2.2 Labor markets are polarizing in the developed world, in the developing world, and in China

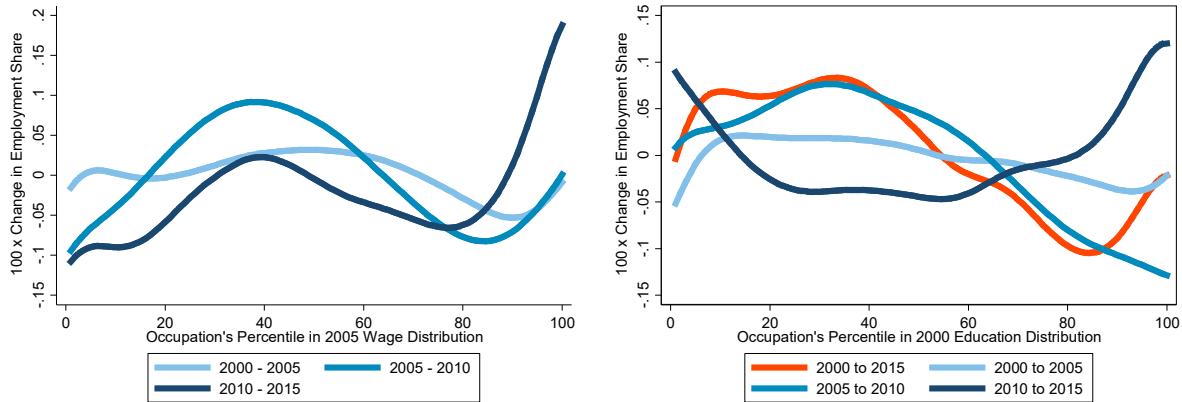


Source: WDR 2016 figure 2.15. Countries sorted by descending order of per capita income.

Note: The figure displays changes in employment shares between 1995 and 2012 for countries with at least seven years of data. The classification of occupations follows Autor (2014). For the United States, comparable data could be accessed only for a short period (2003–2008); consistent with Autor (2014), the observed polarization is limited in this period, with most of it taking place in earlier years.

In China, the mid-skill employment shares in broad employment categories increased from 2000 to 2010 (see Figure 2.2). However, compared with other developing countries, China has a much faster pace of technological adoption than other lower-middle-income countries, and thus job polarizing may occur sooner. Indeed, there is evidence of emerging employment polarization in China in recent years. Between 2010 and 2015, only the top 15 percent of the initial wage distribution and the top and bottom 20th percentiles of the initial education distribution saw gains in employment shares (see Figure 2.3). China’s increasing shares of employment gains at the top and bottom end of the skill distribution are consistent with the evidence for polarization in developed countries.

Figure 2.3 Employment polarization is increasing in China

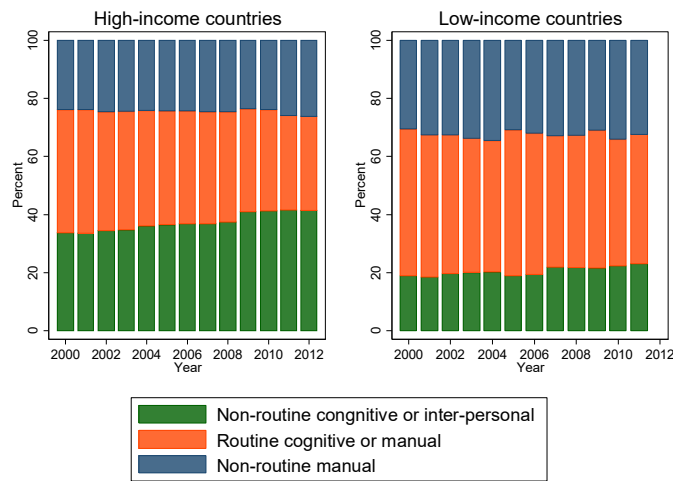


Source: Du and Park 2017.

Note: The figure shows the employment share for five-year periods between 2000 and 2015 by two measures of initial skills. The left panel shows it using initial levels of wages as proxies for the skill distribution, and the right panel using initial levels of education.

The new or transformed jobs require a fundamentally different set of skills. As most of these jobs involve nonroutine tasks, they may not be readily filled by the displaced workers. Regardless of whether labor markets are showing signs of polarization in developing countries, the tasks and skills that individuals use at work are changing. Work is becoming increasingly intensive in nonroutine cognitive and interpersonal skills. Tasks that are difficult to automate—intensive in the latter skills—are becoming a larger share of tasks performed by the workforce in the developed and developing world (Figure 2.4). The steady increase in demand for nonroutine cognitive and interpersonal tasks suggests that these skills are highly valued in the face of technological changes, globalization, and structural changes.

Figure 2.4 Nonroutine cognitive and interpersonal skills are highly valued everywhere

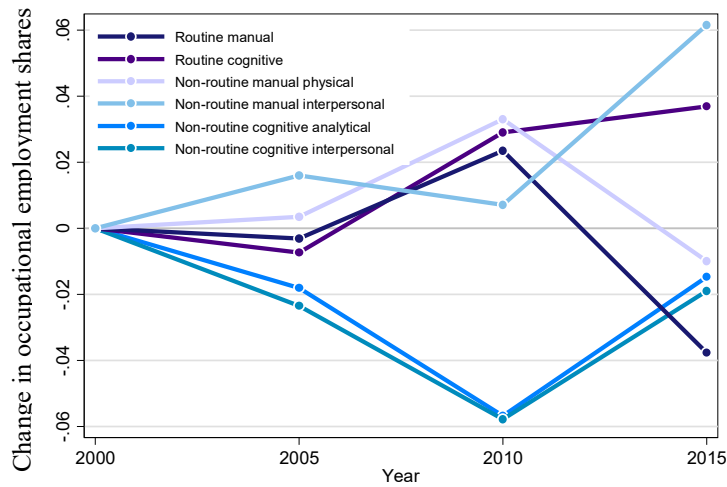


Source: World Bank 2016.

Nonroutine interpersonal and cognitive skills are increasingly valued in China's labor market, with demand steadily increasing between 2000 and 2015 (Figure 2.5). This suggests that the increase

in jobs requiring such skills is greater than the rate at which technology has been able to automate them. This could be a result of the structural changes in the Chinese economy—or of globalization channeling more jobs with routine cognitive tasks to China. Globalization might also be behind the increasing demand for routine and nonroutine manual tasks between 2000 and 2010. As rapid technological progress and automation in developed countries reduce the number of manual jobs outsourced to China, and as China itself advances in automation of manual tasks, the demand for these tasks is likely to fall. In fact, between 2010 and 2015, the share of jobs involving manual tasks fell drastically. The evolution of nonroutine cognitive tasks follows the opposite pattern. The share of these tasks fell in 2000–2010 but then rose in 2010–2015.

Figure 2.5 Demand for non-routine interpersonal and cognitive skills has steadily increased in China, based on the change in occupational employment shares

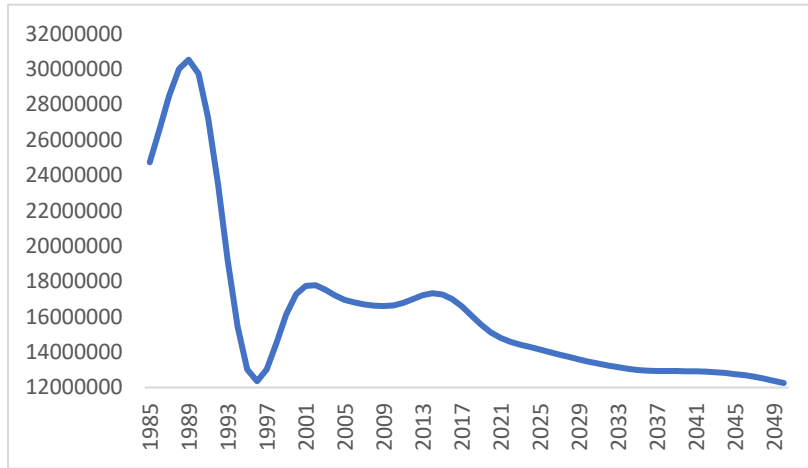


Source: Du and Park 2017.

Trends in population and implications for upper secondary enrollment

While China is the second largest economy in the world, it has also been experiencing a dramatic demographic change since the 1980s. As shown in Figure 2.6, the newborn population peaked at the turn of the 1990s but plummeted by 60 percent in the mid-1990s. Despite a small revival in the number of newborns at the turn of the century, a long-term decline was anticipated after 2015. The newborn population in 2015 was only a little over half the 1989 level.

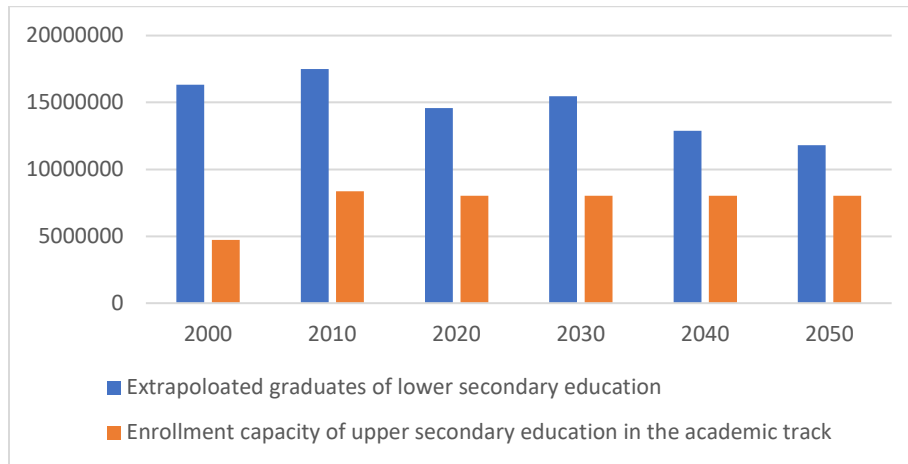
Figure 2.6 China's newborn population



Source: The World Bank DataBank.

The constant decline in the newborn population is expected to lead to a decrease in the number of students who graduate from lower secondary education. In 2016, 14.2 million students graduated from junior secondary schools and will need to choose among attending academic track high school, attending vocational track high school, or joining the labor market. By 2050, the total junior secondary school graduates will drop to 11.8 million. In 2016, 8 million graduates from lower secondary education enrolled in the academic track, accounting for 58 percent of upper secondary new entrants, greater than the 50 percent quota for the academic track. Due to population decline, academic senior secondary schools will have the capacity to enroll 68 percent of junior secondary school graduates by 2050.

Figure 2.7 Extrapolated graduated of lower secondary education versus enrollment capacity of upper secondary education in academic track

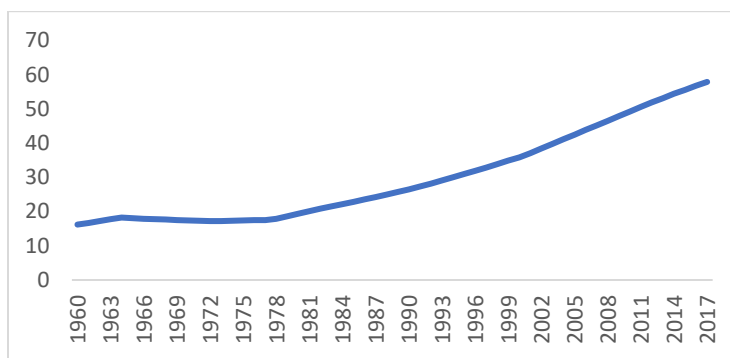


Source: National Bureau of Statistics of China, 2016b and World Bank DataBank.

Trends in urbanization and implications for upper secondary enrollment

China's dramatic demographic change is also accompanied by its drastic urbanization since the 1980s. The urban population was only 190 million in 1980, which accounted for 19.4 percent of the total population. With the launch of a series of economic and political reforms in the 1980s, rural residents were gradually endowed with the freedom to migrate to cities for better economic opportunities and higher standards of living, leading to an overturn in the composition of the rural and urban populations. In 2010, about half of the total population in China was identified as urban residents. The urban population continued to grow to 803 million in 2017, which accounted for 57.9 percent of the total population.

Figure 2.8 China's percentage of population identified as urban residents, 1960–2017



Source. World Bank DataBank.

China's urbanization process has allowed more of the population to become urban residents, including children under the age of 17. The urban-rural composition of the population ages 0–17 mirrors the pattern in the total population. While urban children accounted for only 16.6 percent of the population ages 0–17 in 1982, this percentage increased to about 50 percent in 2015. Over the past decade, while incomes for both urban and rural residents have increased significantly, those who live in urban areas continue to earn more than twice as much as the rural residents.

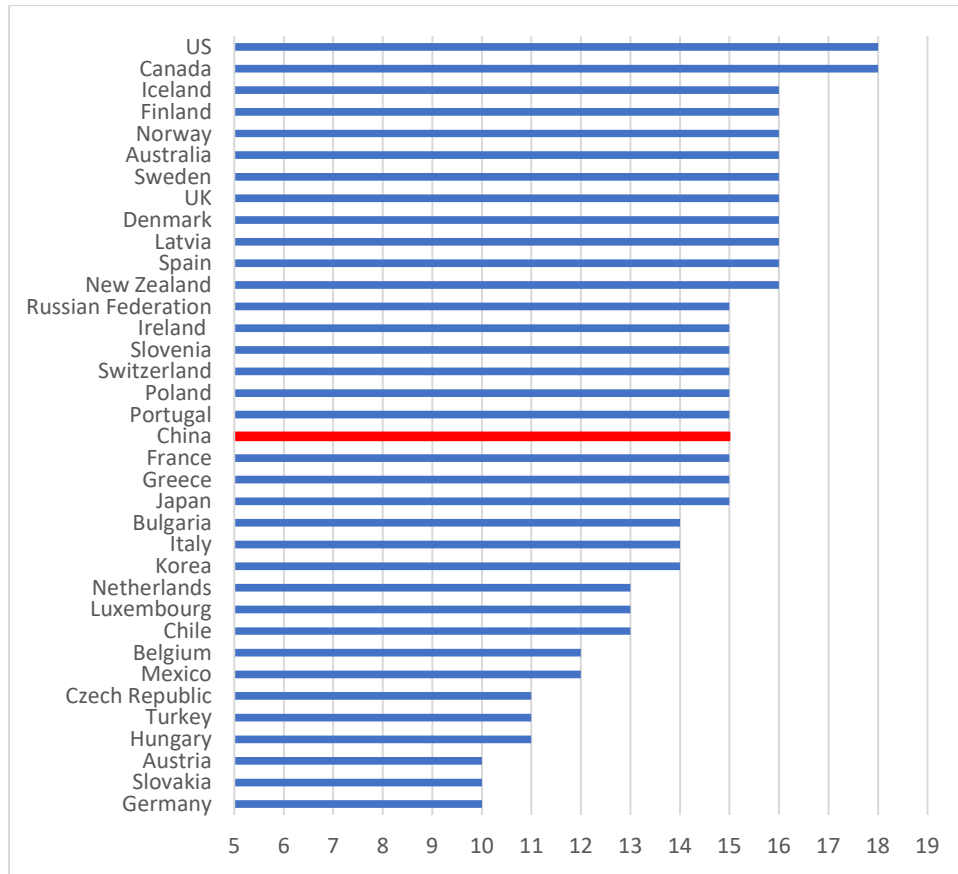
External Factor 2: Global trends and common debates in upper secondary education

Around the globe, upper secondary education³ is typically designed as an immediate step after basic or compulsory education in preparation for tertiary education or to provide skills relevant to employment, or both. Programs at this level offer students more varied, specialized, and in-depth instruction than programs at lower secondary education.⁴ They are more differentiated, with an increased range of options and streams available. Some countries stress vocational education that develops specific job-related skills to prepare students to work in specific occupations, while others emphasize general education that provides students with broad knowledge and basic skills in mathematics and communication and serves as the foundation for further learning and on-the-job training.

There is a wide variety of approaches countries have adopted in terms of upper secondary schooling structures depending on their focus on the job transition. On the one hand, the United States and Canada have largely eliminated vocational education as a separate track in secondary

school, arguing the importance of students to adapt to new technologies rather than focusing on specific skills that become obsolete quickly. On the other hand, there is the “dual system” modeled after Germany with a distinct vocational track including direct involvement of industry through apprenticeships. The underlying rationale for the German model is that by concentrating on specific vocational skills, it is possible to improve the entry of workers into the economy and to make them productive at an earlier point (Hanushek et al. 2017). Most countries are between the two approaches in terms of separating the vocational and general education streams, which is reflected in the starting age of school tracking (Figure 2.9).

Figure 2.9 Starting age of school tracking

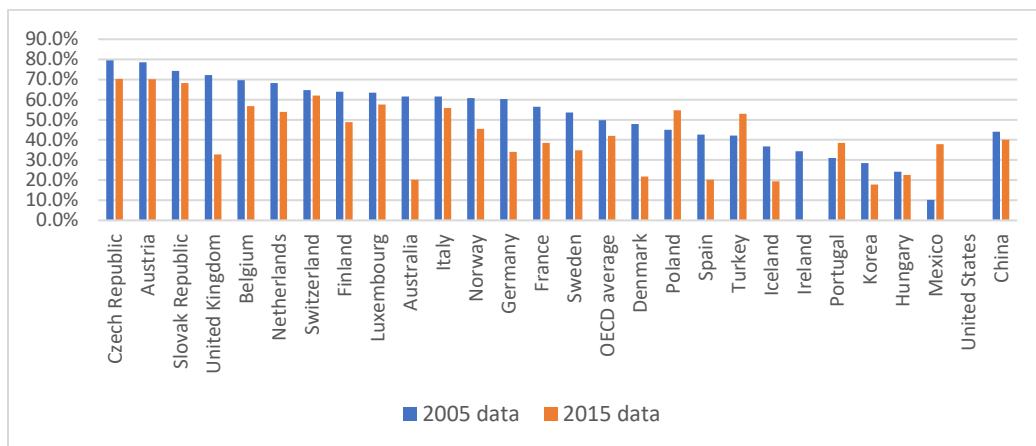


Source: Brunello and Checchi 2007.

Notably, during the past decades, there has been a tendency in many OECD countries toward adopting more comprehensive school systems and delaying general and vocational education tracks. In many countries today, the entry age for vocational schooling has largely coincided with the start of upper secondary education or the end point of compulsory education. In a few countries, however, either at the beginning or sometime during lower secondary education, parents must choose (or schools decide) an educational pathway or a specific type of schooling for students. For example, this takes place from the age of 10 in most of the regions in Germany and in Austria, at age 11 in Liechtenstein, and at age 13 in Luxembourg and the Netherlands. Together with the trend of postponed tracking, there has been increased enrollment share of the general track at the upper secondary level (Figure 2.10). One important point, though, is that there are large variations of how the tracked system works in practice. For example, Switzerland is well-known for its thriving

apprenticeship traditions. But the apprenticeship only starts at the later stages of secondary education. The program has 45 percent private funding from companies. In addition, it is not only flexible but also selective and prestigious. It is not unheard of that one starts out in an apprenticeship program but becomes a professor later (Atkins 2017).

Figure 2.10 Percentage of vocational program enrollment in total upper secondary enrollment



Source: OECD 2007, 2017.

Even in countries where tracking starts relatively early, students tend to follow the same common core curriculum for a large share of their upper secondary education. In Germany, students follow entirely similar curricula for the first two years so that the selection of specific branch of study can be deferred. In the Netherlands, students follow a common core curriculum, usually for the first two to three years of the secondary education in different streams. The common core curriculum specifies the minimum skills that should be acquired by all students, although the level of study may vary depending on the type of school concerned. The three types of lower secondary school in Liechtenstein also offer the same basic common curriculum but in the Realschule or Gymnasium, the curriculum includes additional elements.

In the United States where upper secondary education focuses on general skills, there is evidence that students can benefit from having meaningful career readiness and vocational-oriented courses. Arkansas provided a compelling case study of integrating “Career and Technical Education” (CTE) in general upper secondary study. Beginning with the class of 2014, all high school students must take six units of “career focus” coursework to graduate, which they can fulfill with CTE. A follow-up assessment found that the more CTE courses students take, the better their education and labor market outcome, especially for students who take at least three courses of the same discipline to form a “concentration,” who are 21 percentage points more likely to graduate from high school than otherwise identical students (Dougherty 2016).

For most countries, the theoretical debates over student tracking are generally around the trade-off between efficiency and equity. Proponents of tracking argue that it is economically efficient to group students by ability to create more homogeneous schools. Educators could tailor curriculum and their pedagogical approaches for the given set of students. In particular, not all students may benefit from an upper secondary education with substantial academic content. Opponents of tracking argue that since tracking is largely based on academic ability, it condemns students placed into the lower tracks to lower educational attainment, as young people in vocational training are less likely to invest any more in education and training than those in more general tracks, leaving

them even farther behind in skills and future labor market outcomes. The efficiency gains can be further reduced by the inflexibility of switching tracks when an initial assignment error is made. This is particularly common if the track assignment is determined by the performance in a one-time standard examination.

Overall, the existing literature seems to be consistent in finding that tracking perpetuates the learning gap. However, cautions are highlighted on the promises of the reforms of postponing tracking or simply boosting one track over the other. Early results show that it is probably not the tracking per se but the inflexibility of students' movement across tracks that matters more. In addition, the reforms may not bear fruit in terms of higher education attainment and better labor market outcomes without expanding tertiary education opportunities and higher demand for advanced level of skills that comes with economic transformation.

- Tracking tends to perpetuate inequality in general. The cross-country examination by Brunello and Checchi (2007) suggests that tracking, by and large, reinforces the effect of family background on the student's performance. It thus increases inequality and reduces intergenerational mobility for most measures of educational attainment and early labor market outcomes. Similarly, Schutz, Ursprung, and Woessmann (2008) compile a large set of 54 nations and test whether the link between students' math scores and books in the home, which is strongly positive, becomes weaker in countries that begin tracking at a later age. They find evidence favoring this idea. Hanushek and Woessmann (2006) compare the differences in outcome between primary and secondary schools across tracked and nontracked systems. The results suggest that there is a tendency for early tracking to reduce mean performance and find that early tracking is associated with significant increases in inequality in secondary schools relative to primary schools.
- There is suggestive evidence that shifting the age when tracking begins is associated with a change in student performance. Van Elk, van der Steeg, and Webbink (2009) study the effect of differentiated starting age geographically in the Netherlands at which the students are placed into different types of schools. Their results suggest that when students are tracked at an earlier age, their average probability of participating in postsecondary education falls as a result. Studies on specific European countries include Bauer and Riphahn (2006) on the correlation between parents' and children's education across Swiss cantons, which set the different grades at which tracking begins. The paper finds that tracking that starts at a later grade is associated with increased probability that children enroll in the secondary track that is considered "university bound" regardless of the parental education level.
- Effort in boosting general education at the cost of vocational education yielded mixed results. Malamud and Pop-Eleches (2010) look into the relative benefits of general education and vocational training during Romania's transition to a market economy. They examine a 1973 educational reform that shifted a large proportion of students from vocational training to general education. Based on census and household survey data, it is found that men affected by the policy are significantly less likely to work in manual or craft-related occupations but have similar levels of labor market participation and earnings compared to their counterparts unaffected by the policy. The same authors also find that although students from poor households, rural areas, and with less educated parents were significantly more likely to finish an academic track and become eligible to apply for

university after the reform, this did not translate into an increase in university completion, largely due to the insufficient higher education places (Malamud and Pop-Eleches, 2011).

- Abolishing tracking yields mixed results. Kerr, Pekkarinen, and Uusitalo (2013) evaluated the effects of the school system on mathematical, verbal, and logical reasoning skills using data from the Finnish comprehensive school reform that abolished the two-track school system in the 1970s with newly obtained cognitive test score data. On average, they found that the reform had a small positive effect on the average verbal test scores and no significant positive or negative effect on the average arithmetic or logical reasoning test scores.

What is clear among the countries that have vocational upper secondary education is that work-based learning (WBL) design is a more effective approach in linking students with the labor market (European Commission 2013, 2015; Kis 2016; OECD 2014; World Bank 2018). WBL is defined as learning that takes place through some combination of observing, undertaking, and reflecting on productive work in real workplaces (Kis 2016). When implemented effectively, the technical skills acquired through WBL are better aligned with actual labor market skill demand than the skills that are acquired through other learning methods, such as classroom teaching or workplace simulations. In addition, it is believed that WBL helps equip students with essential nontechnical skills, such as the ability to work in teams, problem-solving, and communication skills, to an extent that is not achieved through other learning approaches. WBL can only take place when there is a strong partnership between employers and vocational education providers, and whether or not employers are motivated to engage in such a partnership depends on the extent to which they consider overall vocational education and training provision can meet skill demand. Consequently, only programs that meet employer needs will be able to identify WBL placements for their students.

There has been increasing focus on the trade-off between immediate employment gains of vocational-oriented education and general skills required for lifelong learning. Hanushek et al. (2017) argue that skills generated by technical-oriented training may facilitate the transition into the labor market but may become obsolete at a faster rate and that initial labor market advantage of vocational relative to general education decreases with age. The study pooled individuals from the 11 countries with sizeable vocational education systems and found that individuals with general education initially face worse employment outcomes but experience improved employment probability as they become older relative to individuals with vocational education. The pattern is most pronounced in the apprenticeship countries of Denmark, Germany, and Switzerland. In these countries, the easier entry into the labor market is balanced by noticeably greater withdrawal at older ages. Using Austrian social security data, the study showed that after a plant closure, the relative employment rates of displaced blue-collar workers (with more vocational training) are above those of white-collar workers at younger ages but below them at ages above 50.

Such a trade-off is likely to become more pronounced in light of technical advancement and automation. Kattan, Macdonald, and Patrinos (2018) show that while automation puts jobs at risk in general, upper-middle-income countries are at the highest risk. This risk can be mitigated through a boost in cognitive and socioemotional skills such as openness to experience. It might be difficult to acquire these skills only through technical and job-specific training, but high-quality education that focuses on general skills can help acquire the skills.

Box 2.1: Tracking reform in selected OECD countries

In Sweden, until roughly 1950, all students attended compulsory elementary schools up to grade 6, at which point students with the best grades enrolled in junior secondary schools, which had a strong academic focus, with these students later matriculating into upper secondary schools and ultimately postsecondary education. Students in Grade 6 who had lower grades were required to attend more basic compulsory schools, for either one or two additional years, and had the opportunity to attend vocational schools after that. Between 1949 and 1962, Sweden experimented with a new approach that implemented several reforms at the same time including the reform that ended placement into academic versus nonacademic tracks at the end of Grade 6 and introduced a national curriculum for all secondary students. This reform did not require all schools to teach the same material. Indeed, a three-level secondary school system was created, with academic, more basic academic, and vocational paths available at the student's discretion. Individual schools typically housed all three of these programs. Notably, the reform also went further, increasing the minimum number of years of schooling required from seven or eight years (depending on the region) to nine years. Further, this increase in the school attendance requirement was buttressed by a financial stipend to families to make up for the lost labor market earnings of adolescent family members who would have otherwise entered the labor market had the school attendance law not changed.

In 1991, the Swedish Parliament decided on a reform that substantially reduced the differences in curricula between the academic and vocational tracks in upper secondary schools. This was done by considerably increasing the academic content of all vocational tracks. The length of these tracks was at the same time extended from two to three years, giving them the same length as the academic tracks. As a result of these changes, students graduating from vocational tracks attained basic eligibility for university studies. The reform was preceded by a six-year pilot period in which the new vocational tracks were evaluated in some municipalities. As the pilot did not coincide with any other changes of the upper secondary school system, it can be used to identify the effects of introducing more academic vocational tracks on students' educational and labor market outcomes.

The United Kingdom acted in the 1960s to remove its system of tracking or "streaming" students into one of three levels of secondary education based on tests all students took at the age of 11.

A move toward de-tracking in Finland in the 1970s was associated with a national school reform program implemented in phases between 1972 and 1977. In the preexisting system, students were placed into one of two tracks after four years of primary school. After the reform, the "civic schools" that had enrolled many students up to Grade 8 or 9, and which provided a relatively vocational education, were abolished, as were most of the private secondary schools that enrolled students with strong academic aspirations. In their place, a nine-year comprehensive school for all students was implemented. After Grade 9, students had an option to apply to upper secondary schools (the college-bound track) or vocational schools. The reform was phased in over five years, with six broad regions being put on different timetables for reform.

External Factor 3: National and regional policy influence

In China, senior secondary education takes three years and there are generally four types of senior secondary schools available in China. General (or "regular", "academic") senior secondary school (); technical or specialized secondary school (); adult specialized secondary school (); and vocational senior secondary school ().⁵ Upon graduation from junior secondary education after Grade 9, students undergo a public examination called Zhongkao () to be assigned to different types of senior secondary schools.

As a response to the goals set in the 13th FYP, the MOE issued an Action Plan with specific access targets. In line with the broad development objectives for the 13th FYP period, the MOE issued

the “Popularizing Senior Secondary Education Action Plan (2017–2020)” (高中阶段教育普及攻坚计划 [2017–2020年]). The Action Plan set the target that both the national- and provincial-level GER should reach over 90 percent by 2020, and in particular, the GER in the central and western regions should rise significantly. The Action Plan particularly focuses on several types of areas in need of support, including remote locations, poverty-stricken areas, areas with high concentration of ethnic minorities, and areas with traditionally low education levels. It further emphasized priority actions: raising the enrollment level, optimizing mapping and structure, strengthening service conditions, and enhancing quality.

The Action Plan is set in the backdrop of China’s “National Long-term Education Reform and Development Plan (2010–2020)” (). The long-term plan clearly specifies the following directions for senior secondary education development:

- Accelerating the popularization of senior secondary school education. Attention shall be paid to cultivating self-learning and self-support abilities and social adaptability among students and to reducing negative effects of examination-oriented education. By 2020, senior secondary school education shall be universalized. Appropriate enrollment ratios shall be set for regular senior secondary schools and secondary vocational schools in light of socioeconomic development needs. These two categories of schools shall generally maintain the same enrollment scale for some time to come. More assistance shall be granted to senior secondary school education in impoverished areas in central and western regions.
- Improving students’ quality in all respects in senior secondary school. Curricular reform shall be pushed forward in depth and syllabi implemented in a comprehensive manner. Conditions shall be created for more elective courses, and more choices for students shall be provided. The stage should be set for comprehensive and personalized student development. Instances of overcrowded classrooms shall be reduced. Exploratory learning (or projects), community service, and social practices shall be promoted. A scientific teaching quality evaluation system shall be in place, and academic proficiency tests and comprehensive evaluation of student quality should be instituted throughout senior secondary school education. A framework shall be set up to provide guidance in overall student development.
- Promoting diversification of senior secondary schools. The school-running system shall be diversified, and high-quality education resources shall be expanded. It is also necessary to diversify the modes of education and meet the needs of students with different potentials. More ways and means for discovering and cultivating innovative personnel shall be explored. Senior secondary schools shall be encouraged to distinguish themselves with unique features and, if possible, offer vocational trainings. The mode of developing comprehensive senior secondary schools shall be studied. Vocational education shall be offered through various ways to students at school and graduates who have failed to enter college.

The senior secondary education development directions are complemented by equally ambitious plans of expanding vocational education—at both secondary and tertiary levels. The plan committed to the government-led expansion with increased investment in vocational education. Quality improvement—through a strong quality assurance system aligned with professional and

occupational standards and close collaborations with enterprises—is also high on the agenda. Making vocational training more appealing through opening more pathways for professional learning and education advancement is also a key area. The long-term plan further highlighted the importance of development of vocational education and training in rural areas to upgrade rural farming communities’ productivity. To do this, the responsibilities of provincial and prefecture-level local governments are emphasized. In 2014, the Building Modern Vocational Education System policy paper was released setting the policy direction for TVET reforms.

Section Summary

Three external factors are affecting the status of upper secondary education in China:

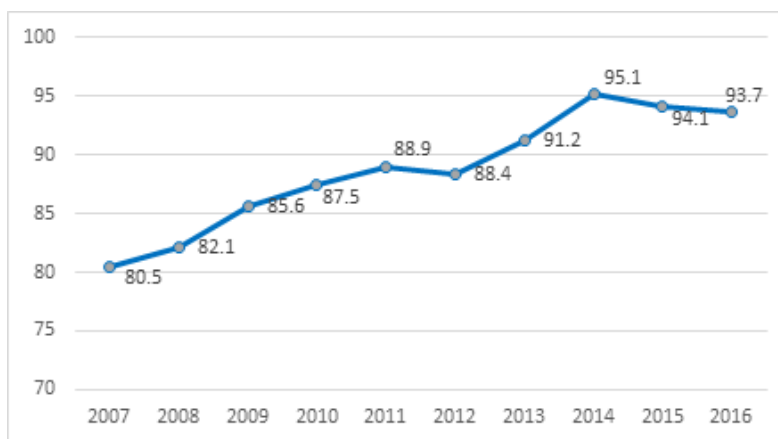
- External Factor 1: Social, demographic, and economic context in China. After more than three decades of average annual economic growth close to 10 percent, China’s economy is transitioning to a “New Normal” of slower but more balanced and sustainable growth with a growing services sector. Digital technologies are fundamentally changing the modern workplace. The new or transformed jobs require a fundamentally different set of skills. Nonroutine interpersonal and cognitive skills are increasingly valued in China’s labor market. Due to population decline, academic senior secondary schools will have the capacity to enroll 68 percent of junior secondary school graduates by 2050. Urban children accounted for only 16.6 percent of the population ages 0–17 in 1982 and this percentage increased to about 50 percent in 2015. A driving factor for urbanization is income disparity between urban and rural areas.
- External Factor 2: Global trends and common debates in upper secondary education. During the past decades, there has been a tendency in many OECD countries toward adopting more comprehensive school systems and delaying general and vocational education tracks. Even in countries where tracking starts relatively early, students tend to follow the same common core curriculum for a large share of their upper secondary education. Overall, the existing literature seems to be consistent in finding that tracking perpetuates the learning gap. However, cautions are highlighted on the promises of the reforms of postponing tracking or simply boosting one track over the other. What is clear among the countries that have vocational upper secondary education is that WBL design is a more effective approach in linking students with the labor market.
- External Factor 3: National and regional policy influence. As a response to the goals set in the 13th FYP, the MOE issued an Action Plan, which sets the target that both the national- and provincial-level GER should reach over 90 percent by 2020, and in particular, the GER in the central and western regions should rise significantly. The senior secondary education development directions are complemented by equally ambitious plans of expanding vocational education—at both secondary and tertiary levels.

Section 3. Current status of upper secondary education

Improved transition rate from lower secondary schools

Over the years, the transition rate from lower secondary education to higher secondary education has increased significantly. This increase is mostly driven by increased access for rural students. Even though the transition rate from lower to upper secondary education⁶ has been increasing sharply during the last decades, two points warrant attention. First, there has been a decline of the promotion rate between junior and senior secondary education. According to the MOE data, the nationwide promotion rate reached 95.1 percent in 2014, but it further fell back to 94.1 percent and 93.7 percent in 2015 and 2016, respectively (Figure 3.1). Second, even though the senior secondary education participation rate is more than 20 percentage points higher today than a decade ago, the total number of students has actually decreased over the same period: from 45.3 million to 39.7 million enrollees in all types of senior secondary education (National Bureau of Statistics of China 2018) due to population decline.

Figure 3.1 Transition rate from lower secondary education to upper secondary education



Source: MOE.

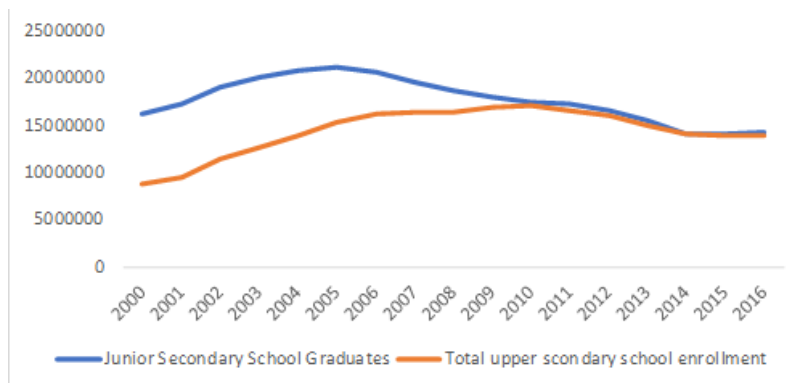
Table 3.2 Share of 15–17-year-olds with some upper secondary attainment by urban-rural residency (or Hukou) status according to MOE-reported statistics and 2015 micro census data from 2005 to 2015

Year	MOE-Reported Statistics			Micro-Census Data		
	All [1]	Urban [2]	Rural [3]	All [4]	Urban [5]	Rural [6]
2005	53	91	43	53	90	43
2006	60	98	51	54	88	46
2007	66	100	57	56	87	48
2008	74	100	64	59	89	51
2009	79	100	69	64	98	56
2010	83	100	73	70	100	62
2011	84	100	76	73	100	66
2012	85	100	78	74	100	69
2013	86	100	80	75	98	70
2014	87	100	82	78 [†]	98	74
2015	87	100	83	80 [†]	97	77

Source: Wang et al. 2018.

The relative decline of the newborn population post the late 1980 peak also allows existing space in upper secondary schools to absorb more graduates. As mentioned earlier, it is anticipated that the long-term population decline will allow the existing infrastructure to absorb the graduates from lower secondary education (Figure 3.2).

Figure 3.2 Junior secondary graduates versus upper secondary education entrants



Source: MOE statistics.

Box 3.1 Private upper secondary schools in China

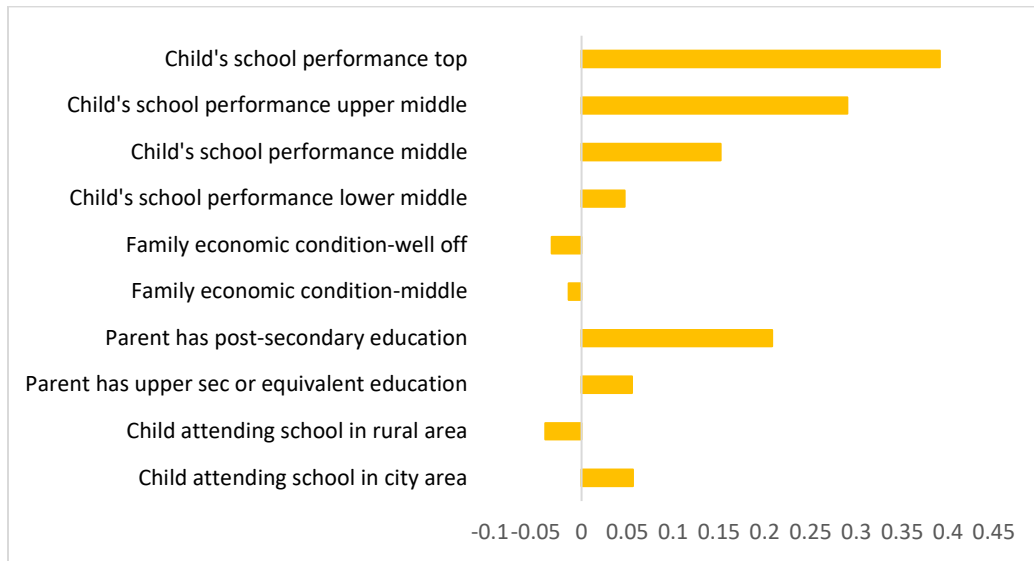
In 2016, there were a total of 4,902 private upper secondary schools enrolling a total of 4.6 million students, which takes a share of 11.7 percent of all students enrolled at the upper secondary level. In general, 16.9 percent of vocational track students are enrolled in private schools whereas 10.8 percent of academic track students are enrolled in private schools.

From 2017 onward, educational entrepreneurs outside compulsory education are free to decide whether they want to establish nonprofit or for-profit schools. Once the choice is made, for-profit schools will be treated as businesses, while nonprofit schools continue to enjoy tax breaks, advantages in land allocations, and so on. Potential surpluses generated at nonprofit schools need to be reinvested into the schools (Schulte 2017). However, the modalities and clarification of the boundaries between nonprofit schools and private education businesses continue to evolve, with implications on land, tax rates, and other preferential treatments. The impact of such legislation change on private provision of high schools in China will continue to be closely monitored.

Household demand

Household demand for higher education attainment—often through participating in academic senior secondary schools—is high but cannot be fully met. Using survey data of China Education Panel Survey (CEPS) from the academic year 2013/14,⁷ we found that parents' expectation for their Grade 9 children attaining tertiary education is inelastic with respect to household economic conditions.⁸ Other factors held constant, tertiary education is desired by all families, rich or poor. To some extent, parental expectation differentiates by rural or urban location of the school where the child is participating; however, the factor with the largest effect on parental expectation is the child's academic performance in class—the higher the ranking, the more likely that parents expect them to attain tertiary education. Parents' own education attainment also affects their expectations for children's education attainment (Figure 3. 3).

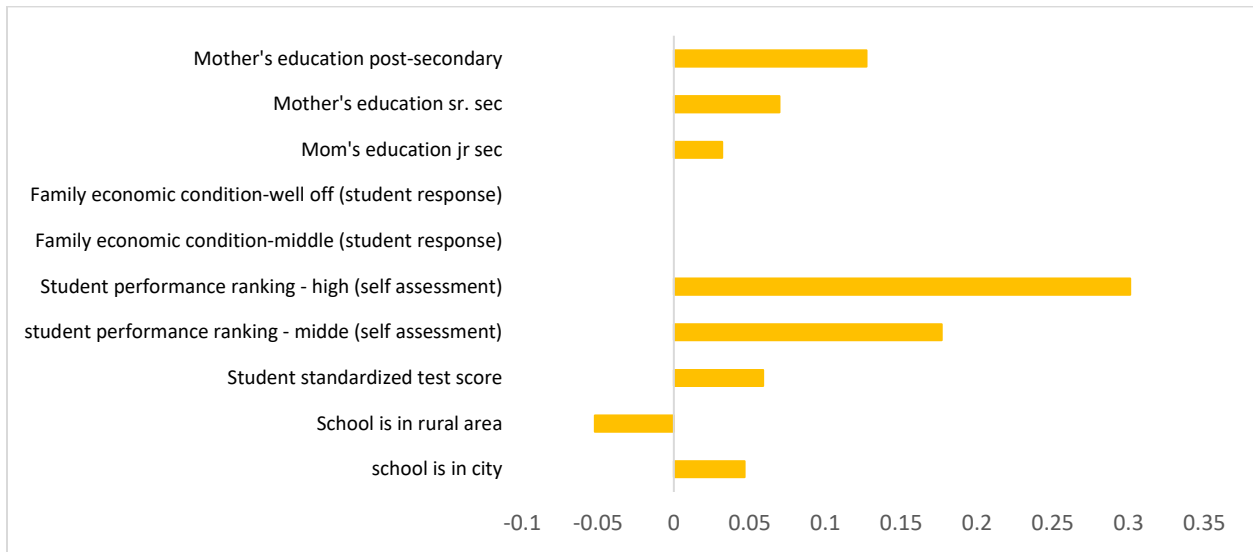
Figure 3.3 Parental expectation of child attending tertiary education (marginal change in probability)



Source: Authors' calculation based on the CEPS.

Students' own expectation for their future education is similar to that of parents. There is a high correlation between students' academic performance and their own expectation on the highest level of education they will attain. Students who ranked themselves top performers expect to receive higher educational attainment than lower performing students. In addition, students whose mothers achieved post-secondary-level education expect to have higher educational achievement than students whose mothers achieved senior or junior secondary-level education (Figure 3.4).

Figure 3.4 Student's own expectation of attending tertiary education (marginal change in probability)

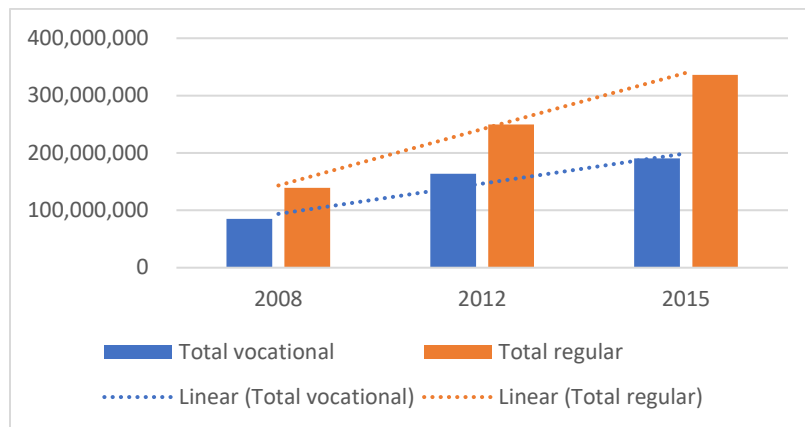


Source: Authors' calculation based on the CEPS.

Financing trends

Financial resources supporting senior secondary schools have been increasing rapidly over the past decade, with an even faster rate for the academic track. Figure 3.5 shows that from 2008 to 2015, total financing to senior secondary education increased rapidly. In 2015, the total amount reached nearly CNY 530 billion (about US\$80 billion). The annual growth rate was 15 percent on average. Noticeably, even though the explicit policy of promoting vocational education was in place during this period, the total financing for regular senior secondary schools was growing faster.

Figure 3.5 Total financing is increasing (in CNY)

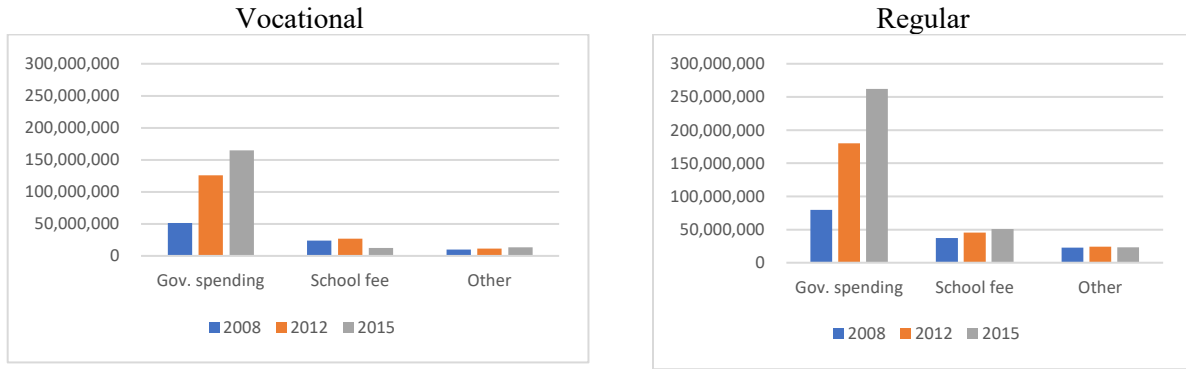


Source: National Bureau of Statistics of China 2008, 2012, and 2015a.

A breakdown of the financial resources also shows consistent trends with household demand. Public financing is the most important source for senior secondary schools in China (Figure 3.6). A majority of schools are under the oversight of the local government—over 80–90 percent of the schools are under the purview and financing of the county-level government. While the overall level of resources that the sector receives is increasing, the composition of the sources of financing

is also changing. Financing in the form of school fees decreased for vocational schools between 2008 and 2015, even in terms of absolute value, while it increased for regular schools during the same period when public financing was increasing in both types of schools—and faster in regular schools. This is somewhat consistent with the observation above that the household demand for regular schools continues to increase while that for vocational schools seems have tapered off.

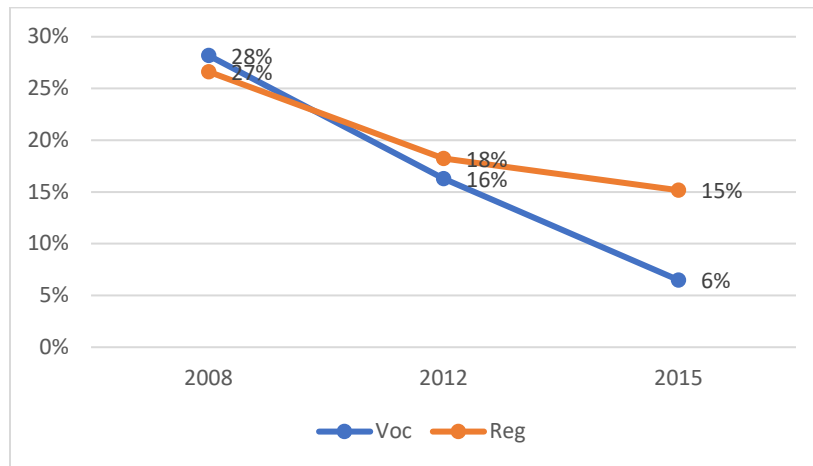
Figure 3.6 Composition of school financing 2008, 2012, 2015 (in CNY)



Source: National Bureau of Statistics of China 2008, 2012, and 2015a.

Relatively, school fees play a lesser role in both types of schools. In 2008, school fees represented 20–30 percent of total school financing. The ratio has reduced to 15 percent for academic schools and merely 6 percent for vocational schools—dwarfed by a fast increase of spending from government sources (Figure 3.7). Nonetheless, this does not mean that households are decreasing their overall education spending—the spending can be high in the form of tutoring and other expenditures.

Figure 3.7 Trend of share of school fees in total senior secondary school financing

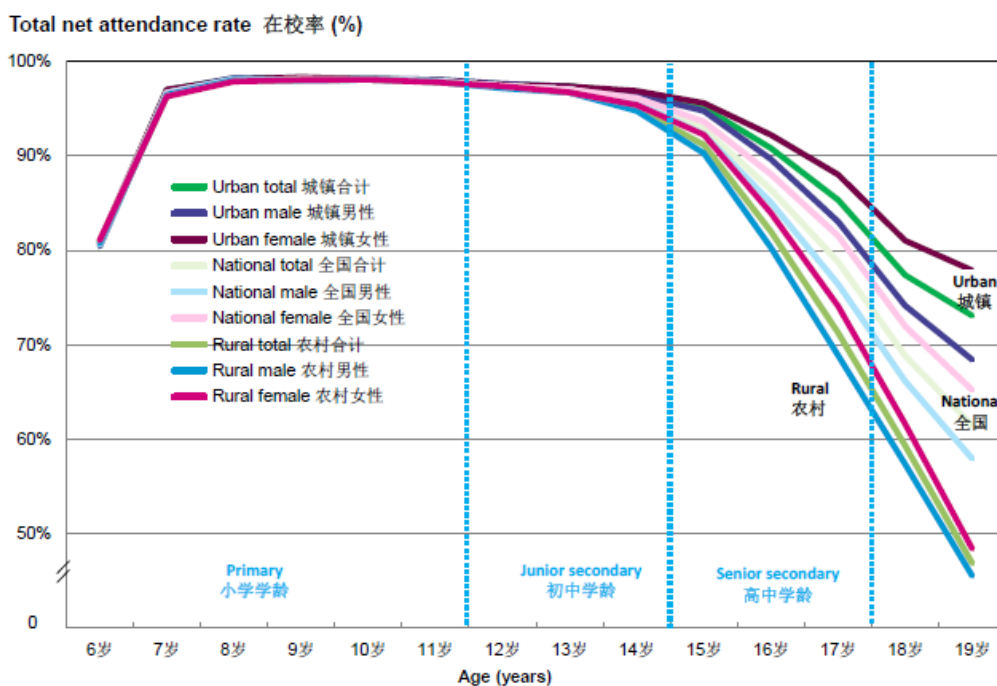


Source: National Bureau of Statistics of China 2008, 2012, and 2015a; authors' calculation.

Remaining human capital gaps as a result of divergent paths

An overview of net attendance rate patterns across different age cohorts reveals that major human capital gaps start to form at the high school stage. Between ages 6 and 15, net attendance is well above 90 percent in 2015 due to near universalization at this education stage. At the high school stage, the overall net attendance rate is 85.6 percent, further improved from 80.6 percent in 2010. However, noticeable decreases after the first year in high school are also observed, highlighting a retention challenge. Considering the near perfect attendance rate at prior education stages, upper secondary school is where human capital gaps start to form. Net attendance gaps affect different groups of people differently, which ultimately lead to human capital gaps in the labor force.

Figure 3.8 Total net attendance rate in 2015, by age, gender, and urbanicity



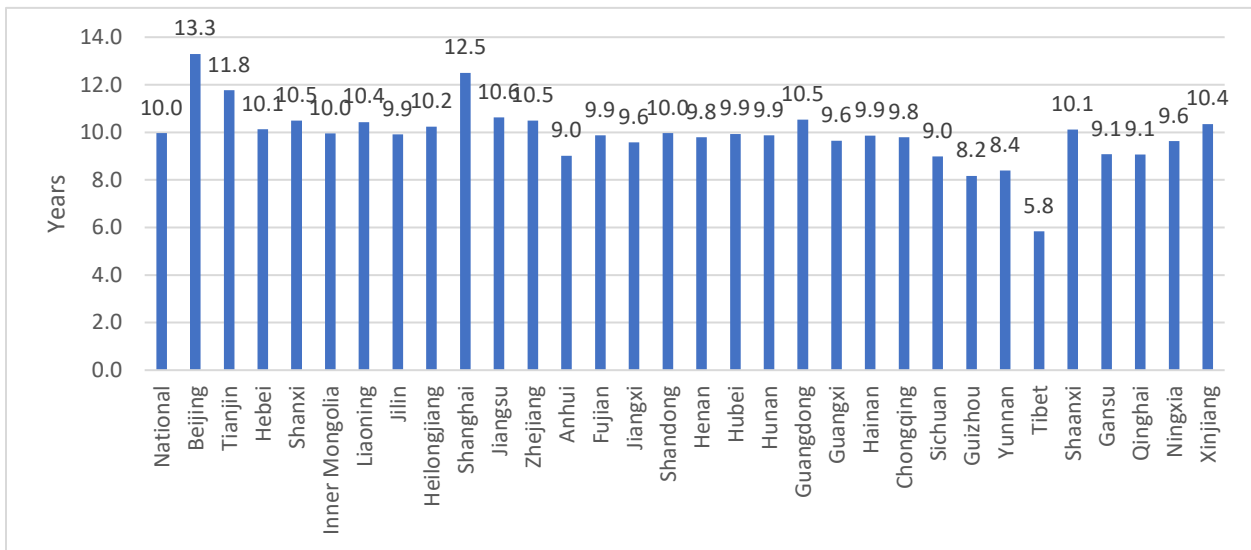
Source: UNICEF, NBSC, and UNFPA 2017.

- Urban/rural gap.** There is a large disparity in the share of more educated labor force between urban and rural populations. Only 11.3 percent of adult workers in the 25–64-age bracket from rural areas had at least high school education in 2015. In contrast, 44.1 percent of individuals from urban areas had high school education (Li et al. 2017). Starting from 2007, urban areas in China have achieved universal access to upper secondary education. The remaining access gap at the upper secondary level, however, is mostly attributed to rural area performance, which has seen a large increase from 57 percent to 83 percent in 2015. Based on micro census data, the percentage of rural children enrolled in upper secondary schools is even smaller, at only 77 percent, versus that of urban youth, which is 97 percent (Shi et al. 2015). The micro census data also show that only 47 percent of rural youth have completed upper secondary education at the age of 20. One of the main reasons for rural youth to exit education is participating in the labor market early. The 1 percent

national population survey data also show that 16 percent of rural youth at the age of 16–17 have participated in the labor market.

- Regional and provincial gap.** The sample size in the 1 percent population data may not be large enough to derive meaningful provincial trends. However, provincial labor statistics indicate that variation of the provincial-level average years of schooling of employed labor force is large. Beijing (13.3 years) and Shanghai (12.5 years) have the highest education attainment, while Tibet (5.8 years), Guizhou (8.2 years), and Yunnan (8.4 years) are among the provinces with the lowest education attainment of their labor force (Figure 3.9).

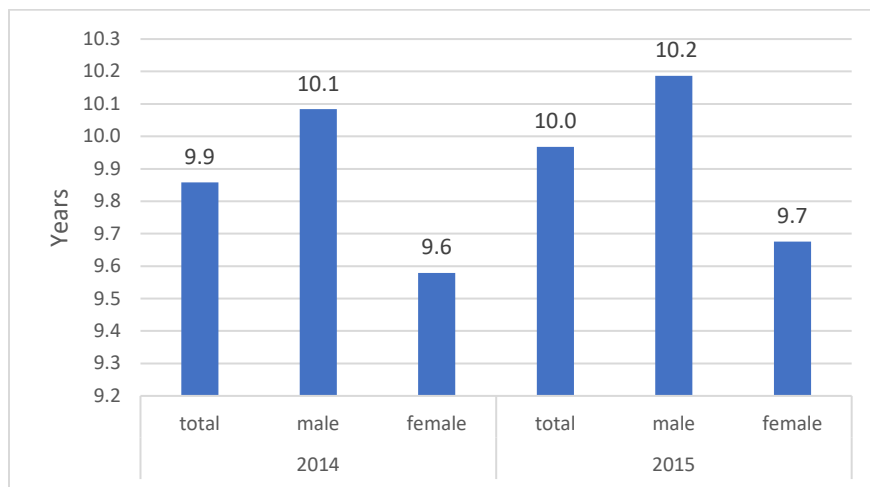
Figure 3.9 Average years of schooling of employed labor force, 2015



Source: National Bureau of Statistics of China 2016a.

- Gender gap.** Comparison between 2014 and 2015 shows that the average years of schooling attained is increasing, but the male-female gap is noticeable (Figure 3.10). Similarly, the real gap can be even larger given that female labor force participation is lower than that of males. In 2015, the data of employed labor force comprised 58 percent males and 42 percent females. In 2014, it was 55 percent and 45 percent, respectively.

Figure 3.10 Average years of schooling of employed labor force by gender 2014 and 2015



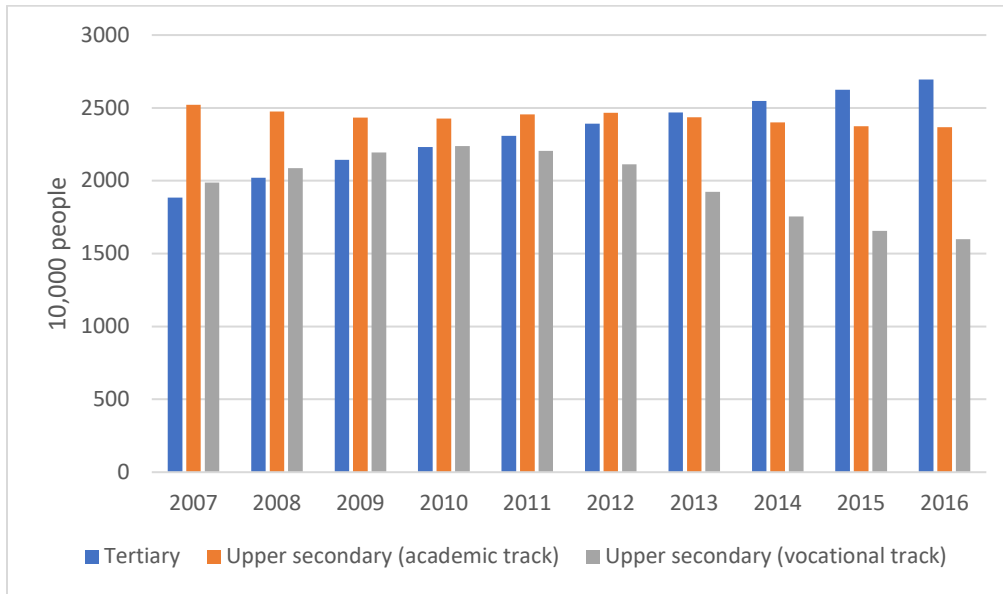
Source: National Bureau of Statistics of China 2015b and 2016a.

Vocational versus academic tracks

A key feature of upper secondary education in China is the dichotomy of academic and vocational upper secondary education. Depending on the track, high school graduates either advance to tertiary education or enter the labor market directly. Through a provincial-level standard examination upon finishing Grade 9, the final year of compulsory education, the placement of students into two tracks directly follows their academic performance in the exam—better-performing students are able to secure places at academic upper secondary schools. The selection process is highly competitive: nationwide, less than 60 percent of the total upper secondary school enrollment was in academic schools in 2016.

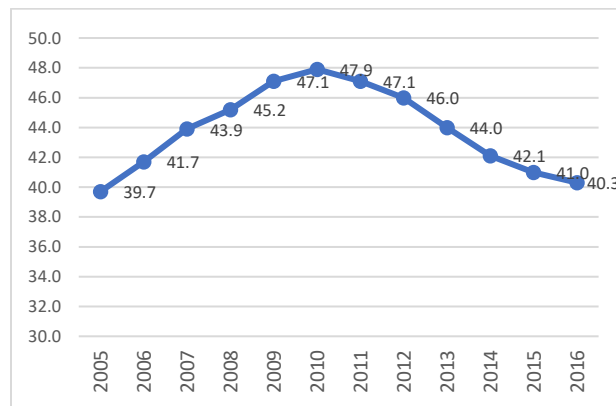
The structure of the post-compulsory education enrollment has gone through fundamental changes during the past decade. In 2007, less than 19 million students enrolled in tertiary education, and this figure rose to nearly 27 million in 2016, an 8 million increase. The scale of this increase is even more astonishing considering that during the same period the youth cohort at ages 15–17 was decreasing (Figure 3.11). In 2016, there were 7.5 million entrants into tertiary education, compared with 5.7 million in 2007, while during the same period, the number of graduates from academic senior secondary education largely remained constant—7.88 million in 2007 versus 7.92 million in 2016.⁹

Figure 3.11 Trend of total enrollment at senior secondary



Source: National Bureau of Statistics of China, 2016b.

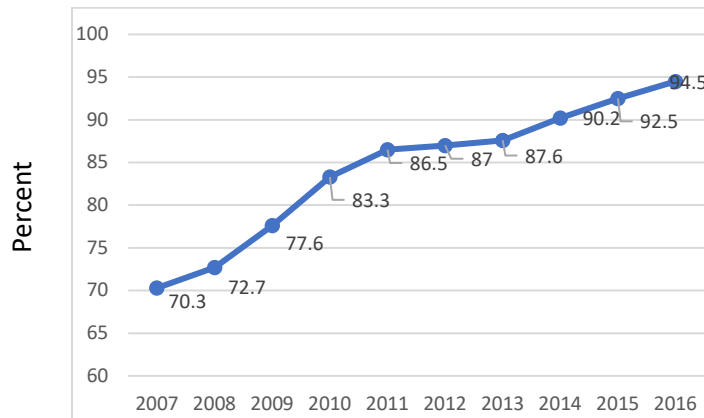
Figure 3.12 Percentage of upper secondary vocational enrollment in China, 2005–2016



Source: http://www.moe.edu.cn/s78/A03/moe_560/jytjsj_2016/2016_qg/201708/t20170822_311608.html

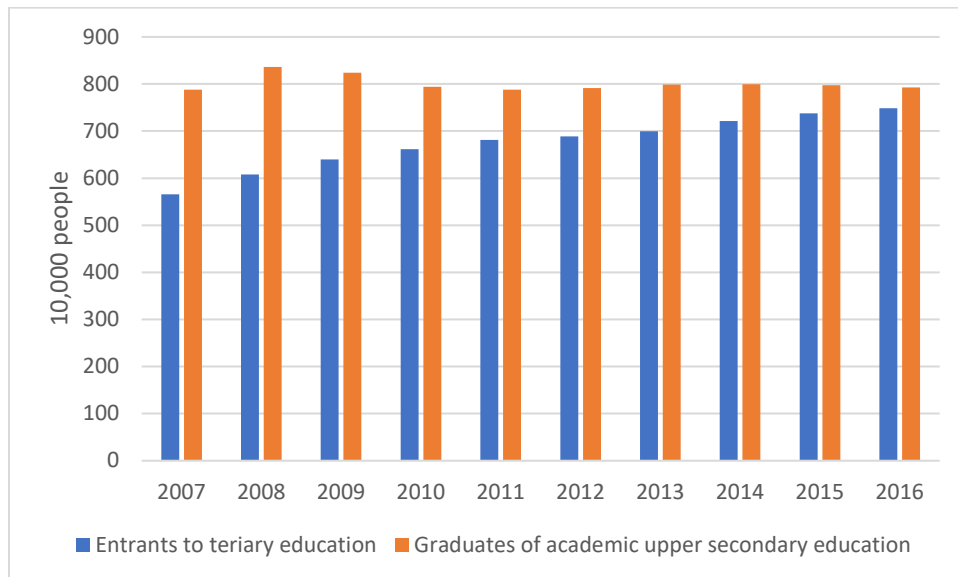
Among those who stay in upper secondary education, which track they took also determined their likelihood to pursue tertiary education. The likelihood of a senior secondary graduate continuing to tertiary education has increased significantly. In theory, vocational school graduates are not excluded from participating in the university entry examination and continue to participate in tertiary education. However, in practice, the chance is slim. National Bureau of Statistics of China reports the promotion rate of general secondary graduates, together with the number of graduates, and the total number of university entrants each year. Using these data, the number of vocational graduates entering university can be extrapolated. The results show that nearly 100 percent of the university entrants are from the general education track (Figure 3.13 and Figure 3.14).

Figure 3.13 Promotion rate to tertiary education for graduates of academic senior secondary education



Source: National Bureau of Statistics of China, 2016b.

Figure 3.14 Numbers of total university entrants versus entrants from academic senior secondary education

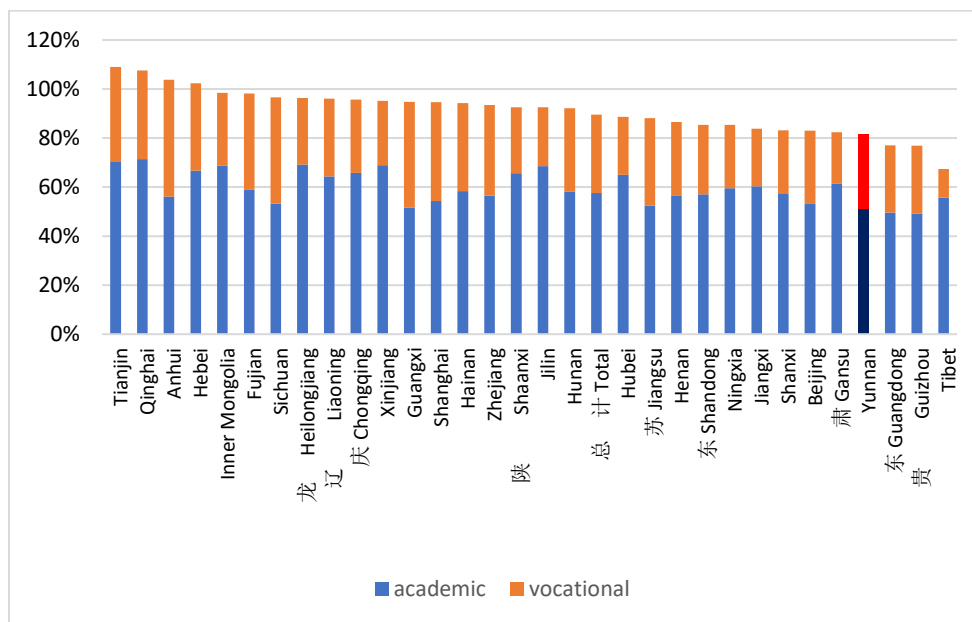


Source: National Bureau of Statistics of China, 2016b.

While vocational education provides a path for many youths with rural background to upper secondary education, it perpetuates the urban and rural divide. Due to the large gaps in the quality of basic education as well as the costs associated with continuing education, rural children exhibit lower progression to the academic stream of upper secondary schools. The overall enrollment rate for upper secondary education increased from 79.2 percent in 2009 to 87.0 percent in 2015 and much of the increase was due to the expansion in vocational education. In the meantime, the enrollment gap for academic upper secondary schools remains large between urban and rural students. In 2015, 78 percent of urban lower secondary school graduates entered the academic stream of senior secondary education, in contrast to only 45 percent in rural areas (including county and township areas).

Among the provinces, the proportions of students entering the two tracks also vary largely and are further affected by migration trends. Interpreting these rates at the regional level as shown in Figure 3.15 needs to consider the large-scale internal migration in China accompanying the economic transformation in recent decades. The low transition rate in some provinces can also be a result of outward migration of students with families. There has already be a trend in big cities such as Shanghai, where children of migrant workers have constituted a large share of (vocational) school enrollment.

Figure 3.15 Lower to upper secondary promotion rate in 2015

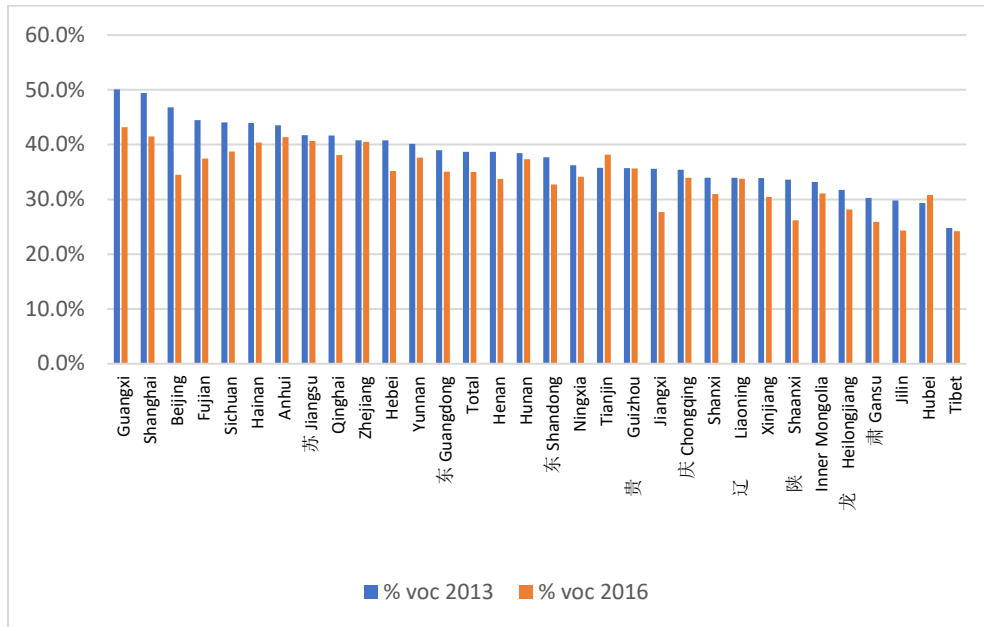


Source: National Bureau of Statistics of China, 2016b.

The policies on school admission of children of migrant workers may have a large effect on the senior secondary education enrollment dynamics recently. Children of migrant workers are not eligible to be enrolled in public regular senior secondary schools. They have the option of being enrolled in private schools or public vocational schools. In fact, for newly migrated families without temporary residence card in the destination province, while their children can be enrolled in public junior secondary schools, they cannot participate in any public national examinations in the destination provinces such as Zhongkao for a seat in regular upper secondary schools.

It appeared that almost all provinces went through a period of declining proportion of vocational enrollment recently, challenging the 50-50 tracking ratio. As Figure 3.16 shows, only Hubei and Tianjin had slight increases. However, even after these increases, the share of vocational students in Tianjin remains below 40 percent and just passes 30 percent in Hubei's case. These recent trends have posed several important challenges to the strategies and policies at the senior secondary level. The goal of 50-50 vocational to general secondary enrollment ratio obviously has difficulty maintaining. Although loosening, the administrative control toward reaching this goal has been a strong feature at this level of education. Often, the annual enrollment plans are set by the authorities down to the county/district level. Not surprisingly, enforcing these quotas has faced increasing difficulties. Most importantly, whether it is desirable is becoming more and more debatable.

Figure 3.16 Percentage of vocational upper secondary school enrollment by province, 2013 versus 2016



Sources:

http://www.moe.edu.cn/s78/A03/moe_560/jytjsj_2016/2016_gd/201708/t20170828_312534.html

http://www.moe.edu.cn/s78/A03/moe_560/jytjsj_2016/2016_gd/201708/t20170828_312546.html

http://www.moe.edu.cn/s78/A03/moe_560/s8492/s8494/201412/t20141216_181697.html

http://www.moe.edu.cn/s78/A03/moe_560/s8492/s8494/201412/t20141217_181848.html

Note: 2013 is the earliest year with provincial-level data.

Labor market returns do not lend support to the efficiency argument for the tracking policy. There is an argument that the tracking arrangement and selective promotion to tertiary education increases the efficiency of investment in education by matching the different levels and types of schooling with labor market need. There is however a lack of empirical evidence on this. The moderate labor market returns to higher education in recent years in China (World Bank, forthcoming) not only signal the lower value added of higher education but also raise the question of whether the cost of early tracking outweighs the benefit. According to the study, with the average returns to college of 59 percent, the private internal rate of return (IRR) to investing in college is only 4 percent a year, and when accounting for public spending, the social IRR is only at 1.8 percent a year. Using the distribution of estimates obtained in the quantile treatment effects, the study further estimates that about 10 percent of the quantiles yield a negative IRR using only private costs. With the inclusion of public expenditures, the IRRs are negative for 36 percent of the quantiles. This suggests that a significant portion of the college graduates are actually receiving a negative rate of return to their financial investment in tertiary education. Two important factors may contribute to this: (a) the students selected through the examination results especially at Zhongkao may not actually be of higher ability in the labor market and (b) the content of the education from academic senior secondary curriculum to higher education may add limited value in terms of relevant knowledge and skills gained.

Challenges for the vocational education

The expansion in TVET enrollment may not necessarily be associated with increased educational quality and relevance. Based on a study conducted in 118 schools located in a province in central China, Yi et al. (2018) found that 90 percent of students do not show gains in vocational or general skills and 60 percent of students expressed dissatisfaction with their programs. While the skills assessment and sampling methods can always be improved, this study suggests sizable gaps in the quality and relevance of the vocational programs delivered at the upper secondary level. Specifically, the challenges can be described in the following five dimensions.

- **Link between schools and industry.** Some of the schools lack industrial guidance on the skills in need. In consequence, some skills demanded by the labor market are not offered by the schools' education programs, for example, the lack of mechanical skills training offered for vehicle powered by new energy and the lack of training provided for the application of silicon materials. Due also to the low levels of industrial link, fragmentation and repetition are common among schools. Some of the popular training subjects are delivered in many schools and cause redundancy and low efficiency.
- **Teaching quality.** Many of the teachers are from pure educational background and lack necessary industrial experience. As a result, there is a lack of teachers with both technical and teaching qualification for the level of training they are providing.
- **School management.** Schools need to set up or update their school charters and regulations in accordance with the priorities highlighted in the 13th FYP (2016–2020). As some of the schools are recently merged and upgraded, there is also a need to review their management and personnel arrangement. Extracurricular activities need to be expanded to provide more services for students.
- **Curriculum, pedagogy, and assessment.** The curriculum, pedagogy, and assessment mechanisms are generally not competence based. This is due partially to the lack of good national standards. The Ministry of Human Resources and Social Security (MOHRSS) standards are widely regarded as being outdated and lacking relevance. The MOE standards are prone to be theoretical and do not fully reflect real competencies required in practice. At the school level, the lack of school-industry link also determines that little is done by the schools to complement the standards set up by the government. As a result, the training does not cater to the skills the students need for their future work.
- **School facilities and equipment.** Many schools require additional space for practical training and classroom instruction. Some of the new skills offered also require a new set of equipment for hands-on practice.

The quality concerns are compounded by the relatively high cost of attending school, especially for rural students. One key barrier of expansion can be the opportunity cost particularly faced by the rural populations in the form of foregone urban wages if they migrate. Brauw and Giles (2017) find that low-skill jobs in urban areas that pay well relative to nonagricultural employment in migrant hometowns raise the opportunity cost of high school for middle school graduates. Further, the high cost of enrolling the children of migrants in urban schools frequently leads parents to either leave children behind with grandparents or to bring them to cities and educate them in

alternatives to urban public schools. Both of these choices have negative consequences for long-term educational attainment of the children of migrants.

Directions of reforms for the vocational track

As many challenges remain in building a modern TVET system in China, the government has rolled out initiatives to enhance school-industry collaboration, market relevance of TVET curricula, and enhancement in pedagogy. As a result, there are certainly examples of successful vocational schools, in some cases schools that benefited from cooperation with international companies or international organizations (see Box 3.2). However, overall the practical relevance of vocational training still needs to be improved. There are also significant disparities in the qualities of the facilities and staff across schools, with only 35 percent of teachers having industry experience. Furthermore, TVET governance and management are fragmented across public agencies, quality is uneven across schools, courses need to be adapted for a more services-oriented economy, and TVET funding needs to be made output rather than input driven.

Technical stream attendees should be provided with more opportunities to acquire general competencies. Vocational programs with an overwhelming technical focus do not provide an ideal learning environment for young learners to acquire core competencies for long-term career development. Global evidence indicates that youth employment rates for those with TVET education are higher than those with academic education at the initial point of transition from education to work. That advantage decreases with age, however, as the narrow technical skills that initially help in obtaining work become outdated and the absence of more general competencies for adapting and lifelong learning becomes a constraint (Hanushek et al. 2017). As such, the two streams should be viewed not as separate programs but as part of an integrated system. At the very least, students should be allowed to shift between streams more easily, with credit acknowledged for skills acquired in either stream.

Box 3.2 Lessons from recent World Bank-supported TVET projects in China

In the past decade, the World Bank team has implemented several provincial TVET projects and accumulated experience from reform activities. Since 2007, the World Bank's key investments in the education sector have been skill development projects in targeted provinces ranging from more developed Guangdong Province to less developed western provinces such as Gansu, Xinjiang, and Yunnan. The projects showcased good practices of how to build modern TVET schools and improve systems through piloting and institutionalizing reforms.

- **Strengthen school industry link.** Training success is tied to how closely the programs are linked to the real demands of the labor market, which requires employers to be involved in the teaching and learning process at the school level. Industry-led Skill Councils can guide curriculum development based on specific skills demanded, and school-led "School-Industry Committees" can steer broad-based school reforms of curricula, pedagogy, and assessment.
- **Ensure government buy-in.** Systematic provincial reform helps the project achieve its objectives and sustains the project results in the long term. School reforms need to be accompanied by structural and institutional reforms at a broader provincial environment to avoid setbacks in reform.
- **Customize teacher training plan.** To enhance the effectiveness of instructor training, schools developed a customized training plan based on the instructor's professional development plan that accurately reflects needs, skill demand, and good training practices.
- **Promote modular competency-based training for lifelong learning.** Modular courses promote flexible entry to and exit from training over a worker's career and are inherently demand driven. They promote student-centered pedagogy and competency-based evaluation instruments to assess students' learning outcomes and teachers' teaching effectiveness.
- **Build pathways for further study.** Opening pathways to tertiary studies can increase the demand for secondary technical and vocational education.

Pathways for skill acquisition urgently need to be diversified. While options for post-TVET education have increased in recent years, in some programs there is a lack of opportunities for their graduates to pursue continued study in higher education. While it is possible for qualified graduates of secondary vocational schools to be admitted to tertiary-level vocational programs, such programs are generally considered less prestigious than regular universities. Considering that a large majority of TVET students are from rural, migrant, and blue-collar families, more options post-TVET training allow more opportunities for social mobility among those students. As more universities are to be turned into "universities of applied learning," pathways can be explored for vocational students to enter those universities.

The government can have a more coordinated effort managing the TVET sector. Currently, both the MOE and the MOHRSS and their local departments are involved in TVET. Other line ministries are also involved for delivering sector-specific training. Despite the MOE's and MOHRSS' leading role in implementing TVET system reforms, the lack of coordination between the two ministries and other players makes the reform challenging. The government could pursue greater coordination among agencies for TVET. To achieve this, one option is to establish a new Skills Development Authority. Such unifying authority will reduce the fragmentation and improve the efficiency in service delivery.

The link between schools and enterprises needs to be tightened. Technical and institutional assistance would help facilitate the provision of work-based training, especially by small and

medium enterprises (SMEs). The qualifications framework needs to be updated, with standards and competencies that reflect changing labor market demand. Examples of national training authorities can be found in Australia, Brazil, New Zealand, the Philippines, South Africa, and the United Kingdom. The fragmented governance has made the TVET system less efficient to manage.

Vocational education needs to acquire greater market relevance through closer private sector involvement. The development of a National Qualifications Framework for schools should be considered. Public-private partnerships to foster enterprise leadership in curricular design, delivery, and practical training opportunities have been used in other countries, such as the Meister Schools in the Republic of Korea and the German apprentice system. China has a quality assurance and accreditation system set up, but it needs to be updated to ensure relevant and reliable standards for quality improvement. Occupations and the associated competencies have been changing rapidly and curriculum and standards require inputs from the industries to stay relevant. In addition to outdated standards, the following challenges are identified as impeding factors for the training to stay relevant: teachers typically lack industry connection and therefore are not equipped with most up-to-date technical knowledge; pedagogy tends to be teacher oriented rather than student centered, making students less likely to actively engage during training process; and facilities tend to be outdated, constraining students' acquisition of hands-on experience.

Successful systems require a high degree of coordination and partnership between government agencies and the private sector, as well as giving the demand side—businesses and individuals—a strong voice in determining training policy. The government should provide the oversight by monitoring data on program quality, encouraging autonomy and accountability, and ensuring efficiency and results orientation in government financing. Building demand-side buy-in—from employers—is a key challenge. The United Kingdom and some European countries provide useful insights for setting up sector employer councils, while East Asian countries have established independent apex training authorities, such as Singapore's Institute for Technical Education, with strong partnerships with employers and other stakeholders.

Vocational education needs to gear more toward preparing workers for entrepreneurship. This begins with course offerings, which only recently started incorporating entrepreneurship and core business skills training that are directly relevant for self-employment, management of small enterprises, and services. For example, these skills encompass costing, pricing, preparing financial statements, keeping business records, project management, marketing, sales, and preparing business plans, among others. Promising programs in Korea and other countries are introducing entrepreneurship, work readiness skills, and experiential applied teaching methodologies in secondary schools in developing new TVET curricula with a focus on skills for self-employment.

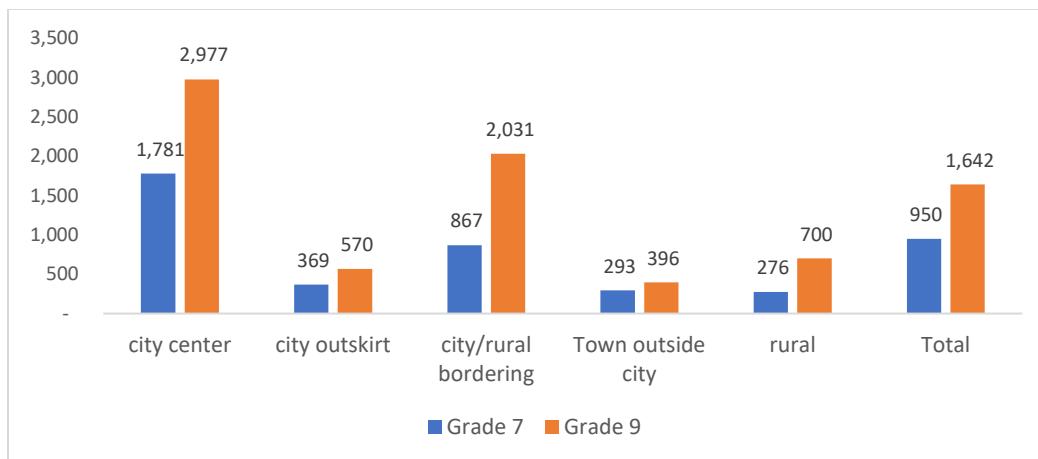
Challenges for the academic track

Education incentives for the academic track are strongly driven by university entrance exams (discussion draws from King and Rogers [2014]). Such exams are common in East Asian countries, including Japan and Korea, where students have historically scored high on international assessments, such as the OECD's Programme for International Student Assessment (PISA) test. The school exam system has been criticized for creating strong incentives for students and teachers to focus on academic or even testing skills, rather than on problem-solving, curiosity, or creativity. In fact, a common view is that, compared with other leading systems, East Asian education systems often inhibit creativity and emphasize rote memorization. However, the OECD's assessment of

creative problem-solving on PISA 2012 found that East Asian students, including students from China, outperformed other countries. In addition, there is evidence that exam-driven systems develop persistence (“grit”), goal orientation, and self-control and willpower that can help students in their careers and lives (Baumeister, Vohs, and Tice 2007; Choi 2014; Duckworth et al. 2007). The success of East Asian emigrants in Silicon Valley, where China and Japan are among the top five source countries for immigrant entrepreneurs, also suggests that growing up in an exam-driven system may not inhibit creativity.

However, exam-driven systems require tremendous amount of student commitment both within and outside of normal school hours, as evidenced by significant household costs on tutoring. With the universally high demand for tertiary education, the fact that nearly all general secondary school graduates can be admitted to a tertiary institution, while a very limited number of graduates from vocational schools are able to do so, has basically raised the stake of the examination at the end of Grade 9 (Zhongkao) extremely high. The competition to gain seats at good quality general senior high school is among students as well as schools. Schools often extend guided study hours for Grade 9 students, and families often pay for extra tutoring to prepare their children for the test. Figure 3.17 compares the tutoring expenditure of households on Grade 7 and Grade 9 students by location of schools attended. Not surprisingly, families of students at city schools spend the highest amount. However, all families with Grade 9 students spend much more on tutoring than families with Grade 7 students. In city centers, there is a 67 percent increase in the household expenditure on tutoring from CNY 1,800 (about US\$300) spent on Grade 7 students to about CNY 3,000 (about US\$500) on Grade 9 students per term. On average, tutoring spending is around CNY 1,600 (about US\$250) per term for Grade 9 students, compared with CNY 950 (US\$150) for Grade 7 students.

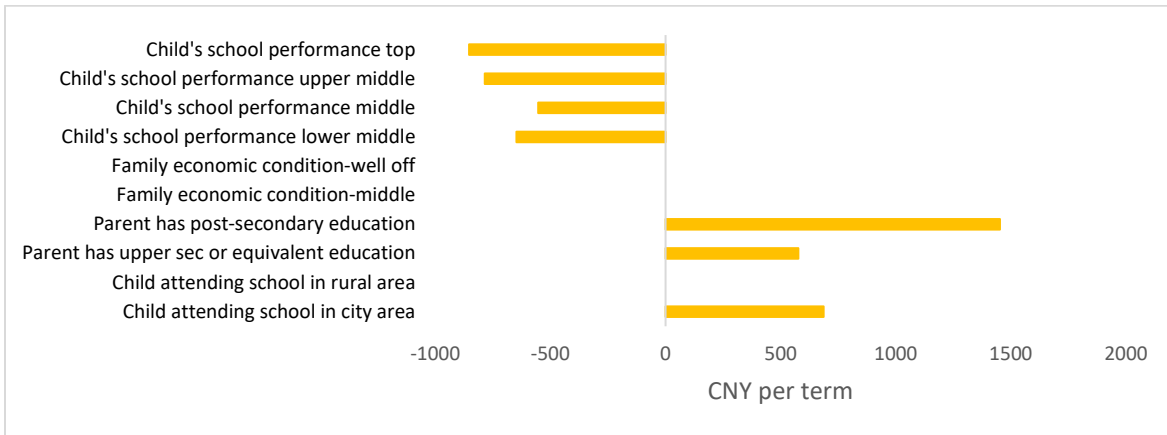
Figure 3.17 Household tutoring expenditure per term



Source: Authors’ calculation based on the CEPS.

Household tutoring expenditure is highly associated with student school performance. While parental education and household location (urban versus rural) are naturally correlated with household tutoring spending, parents tend to spend less on tutoring when their children’s performance rank in class is higher (Figure 3.18). Gaining an edge in Zhongkao serves as a strong incentive for households to spend more on improving their children’s school performance. In contrast, household economic condition, which normally has a strong wealth or income effect on spending, does not appear to have significant effect on tutoring spending.

Figure 3.18 Household expenditure on tutoring of Grade 9 students (marginal change in probability)



Source: Authors' calculation based on the CEPS.

Exam-driven systems can inhibit intrinsic motivation and stifle creativity. Such abilities are often gained beyond traditional classrooms and through extracurricular activities. Preparing for the high-stake test at Grade 9—sorting students into secondary school tracks—basically has become the dominant and often the sole activity toward the last year of junior secondary school, during one of the most important formative periods of their lives. The CEPS data show the time allocation of Grade 9 students. Students in urban areas tend to have the highest pressure—on average they sleep a little over seven hours—with more than three hours of homework per day. More than half of them study during school vacation. While over half of the total students reported participation in extracurricular activities, the extracurricular activities in the survey also include further studies of selected subjects. Excluding these advanced studies, only 18 percent of the surveyed Grade 9 students spend any time on any extracurricular activities.

Table 3.2 Grade 9 student activities by school location

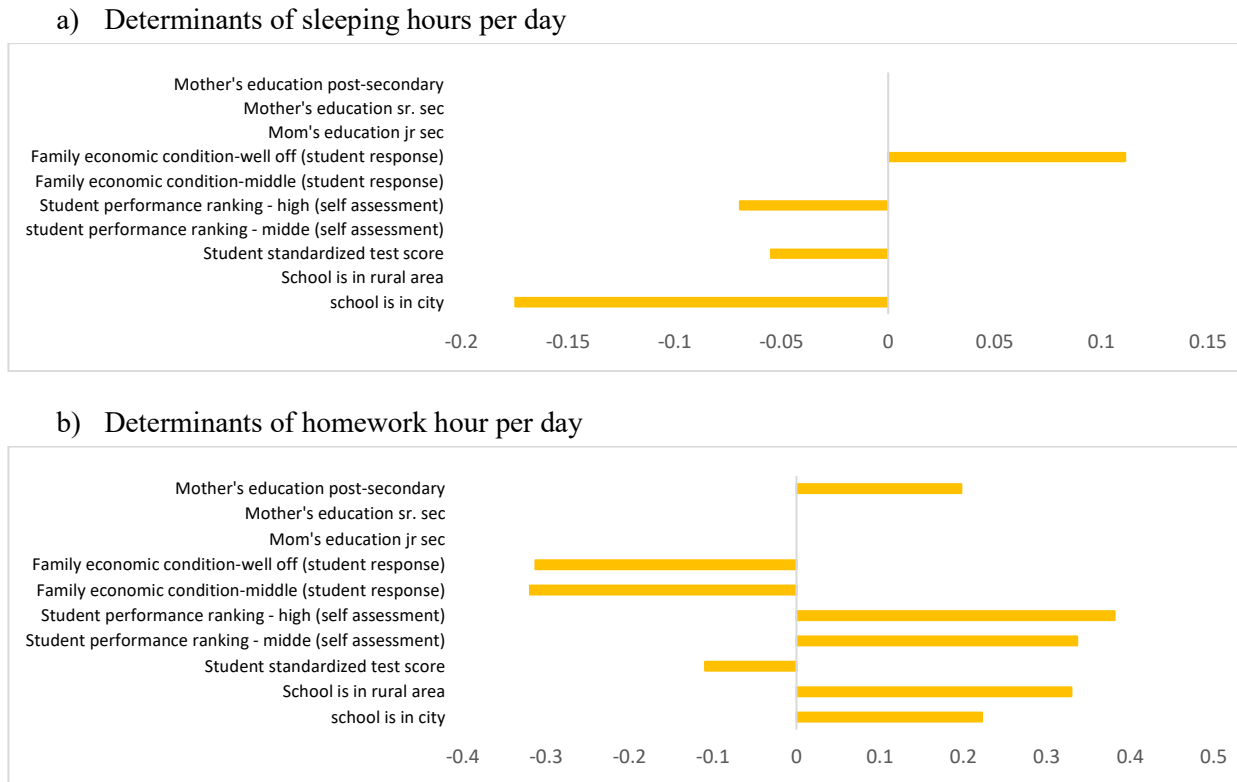
School location	Hour/d ay sleep	hour/d ay home work	% students with hobbies	Study during school vacation (%)	Never been to museum, zoo, science exhibition (past year) (%)	Never been to movies, performance, sport games (%)	No extracurricular activities (%)
City center	7.19	3.10	14.5	51.0	33.64	20.72	35
City outskirts	7.51	2.90	15.5	27.0	51.95	38.69	66
City/rural bordering	7.62	2.64	14.8	34.6	39.85	33.82	58
Town outside city	7.93	2.74	15.8	20.6	62.81	53.60	72
Rural	7.96	2.87	17.0	23.2	58.57	55.60	75
Total	7.57	2.91	15.4	35.1	46.88	37.28	56

Source: Authors' calculation based on the CEPS.

Further looking into the key factors associated with student time allocation, we find that less sleeping time has a positive correlation with student academic performance—not only with student

self-assessment of performance ranking in class but also with their performance in the test that was conducted under the survey. However, while more homework time is associated with student self-assessment of performance ranking in class, it is actually negatively correlated with the test score produced by the survey. While we believe student self-assessment of their performance standing in class is largely accurate—as it is a common practice that schools regularly rank students by their examination scores—these results may shed some light on the likelihood that different sets of tests tend to generate different rankings.

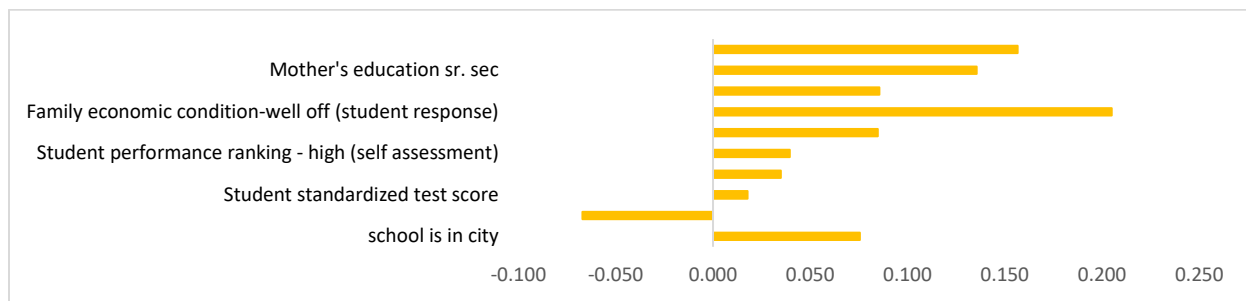
Figure 3.19 Factors associated with the student’s hours of sleeping and homework per day (marginal change in probability)



Source: Authors’ calculation based on the CEPS.

The system of examination, ranking, selection, and promotion has often been viewed as meritocratic. However, the limitation of this system serving as a mechanism for social mobility is well recognized. Children from disadvantaged background tend to already lag when they reach Grade 9. The CEPS data set also reveals another layer of hidden cost related to the selective system for achieving social equity. According to the survey, students from a more disadvantaged background appear to sacrifice more to go through the highly competitive and selective process of participating in senior secondary education. Not only do they have higher pressure and spend more time on homework and sleep less, they are also less likely to be exposed to other activities—enrichment or entertainment—such as visiting museums and exhibitions, going to movies, or participating in sports (Figure 3.20). This layer of cost can be manifested by the situation that even when they are able to continue to the higher levels of education, children from disadvantaged background can have difficulties adjusting and adapting to a new environment where a lot more outside academic studies matter for a fulfilling life.

Figure 3.20 Probability of going to museums, films, exhibitions, or sports events during the past year



Source: Authors' calculation based on the CEPS.

Curriculum reforms for the academic track

There have been continued curriculum reforms in China, and one of the primary goals of the reform in recent years is to emphasize holistic development of students (), shifting away from the exam orientation. The Eighth Curriculum Reform is one of the most ambitious reforms. The reform covered the entire basic education system including preschool, compulsory education (primary school and middle school), and high school. The high school part of the reform was enacted in 2004. It was first formally implemented in four provinces (Shandong, Hainan, Guangdong, and Ningxia) in China. Other provinces and municipal cities joined the reform in succession in the following eight years until 2012.

There are six specific implementation goals of the reform as stated in the MOE's "Basic Education Curriculum Reform Outline" (MOE 2001).

- (a) Change the existing curriculum, which puts too much emphasis on imparting knowledge to students, to a new curriculum to emphasize helping students form positive and active attitudes toward learning.
- (b) Reduce the number of subjects and form a more balanced and comprehensive curriculum. Adjust the curriculum to satisfy different needs of students in different areas in China.
- (c) Reduce the workload of students by removing the "hard, sophisticated, seldom-used, and outdated" contents from courses. Pay attention to students' interest, and select the most fundamental knowledge and skills that could provide lifelong benefits.
- (d) Change the current style of teaching that only requires students to memorize and accept what is taught in class, and cultivate students' abilities in collecting and processing information, acquiring knowledge, analyzing and solving problems independently, as well as in communicating effectively and cooperating with each other.
- (e) Align curriculum with student development rather than a tool for screening.
- (f) Improve the adaptation of the curriculum to students and schools by changing the centralized management of curriculum to a three-tier management at the national, the local, and the school levels.

The key changes included new compulsory courses such as arts, even though these are not covered by the university entrance examination. It also provided extensive elective courses and established a credit system. The elective content constitutes enriching extensions of the compulsory courses.

For example, for compulsory math courses, only the most fundamental knowledge in mathematics is presented. A series of other topics in mathematics are covered in elective mathematics courses, including topics on the history of mathematics, economic mathematics, the application of mathematics on information security, and so on.

Designing of a new student evaluation system started and was near completion in recent years. The goal of this new evaluation system is not only to pay attention to students' scores in exams but also to focus on students' potential in all dimensions and help them build their identity and self-confidence.

The curriculum reform also led to some experiments on changing the university entrance exam. However, a majority of these changes have not lasted. Recently, a new Zhongkao system linked to the revamped student assessment approach was started in Shanghai in 2018 (Box 3.3).

Box 3.3. Recent reforms in Shanghai on secondary education student assessment and enrollment

In 2018, Shanghai Education Commission published a series of reforms on secondary education student assessment and enrollment. The reforms comprise the following three main parts:

- **Combine the graduation and entrance exams.** Under the reform, the junior secondary education academic achievement exam is combined with the senior secondary enrollment examination. In addition to the subjects covered by the standard examinations and scoring system at the end of Grade 9 (Chinese, math, physics, chemistry, foreign language, law and ethics, history, and physical education), a small continuous evaluation component also counts toward the overall performance. The performance in geography, science, social study, life science, information technology, arts, labor, and technical skills are graded on a four-level scale—excellent, good, passing, and failing.
- **Junior secondary student comprehensive development evaluation (implementation starts with the Grade 6 cohort in 2018).** The evaluation emphasizes student's experience in self-initiated research projects and participation in social and vocational activities. The evaluation will be in the form of an essay, which will form a required part for graduation from junior secondary education.
- **Senior secondary education enrollment system (implementation starts with the Grade 6 cohort in 2018).** Nearly half of the enrollment of the leading high schools will be allocated to junior secondary that have no competitive admissions criteria for incoming primary school graduates to enter.

Source: Shanghai Education Commission (<https://mp.weixin.qq.com/s/0MbaKjvmEtfkallshIiMiw>).

In the meantime, there has already been evidence of the positive effect of this curriculum reform on the overall student ability well-being. Yu and Mocan (2018) investigated the causal effect of this high school curriculum reform on students' educational outcomes in university, as well as on their happiness, mental and physical health, self-confidence, confidence in their academic ability, and attitudes toward learning. Using survey data on students from 15 universities and employing a difference-in-differences strategy, the research found that the curriculum reform had a significant and positive effect on all student outcomes analyzed. Specifically, students who were exposed to the new curriculum in high school have better academic performance in university, are more willing to learn and master the course material, are more engaged in social activities in university, and are more confident in their academic and overall ability. In addition, the students who were

exposed to the reform appeared to have more positive mental status and to be happier. They are also more likely to retain a healthy body mass index.

Section Summary

Households demand upper secondary education as it leads to higher levels of education and higher labor market returns. Such demand is anticipated to increase given the fast demographic change and increasing need for highly skilled labor force as China explores new drivers for growth and development. However, the expansion in high school supply faces bottlenecks as noticeable drops in net attendance rates are observed after the first year in high school. Quality and relevance of high school education is a key contributor to such gaps. High dropout rates for TVET programs—10.7 percent during the first year and up to 22 percent in some prefectures according to Yi et al. 2015—suggested poor value added of vocational programs, in addition to socioeconomic factors. As for the academic track, the exam-driven systems require tremendous amount of student commitment both within and outside of normal school hours, as evidenced by significant household costs on tutoring. Exam-driven systems can hinder the overall learning quality by inhibiting intrinsic motivation and stifle creativity. The tracking between academic and vocational streams could itself be a distortion for the sector’s further expansion as an inflexible quota will not be able to adhere to demographic trends. Further, the exam-based enrollment cutoff limits the students’ ability to make informed decisions about the track they take.

As such, continued reforms in the upper secondary school stage are much needed in the following areas:

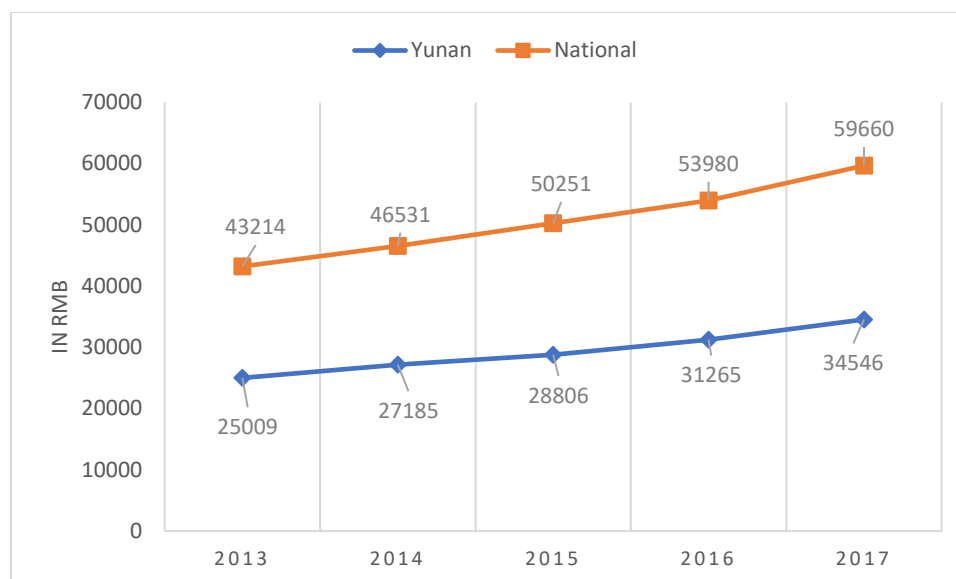
- **Tracking and informed decisions.** Tracking decisions are better handled at the local level and two tracks can be made more integrated and less rigid. Younger cohorts of students can have more exposure to vocational education and the world of work.
- **Broader skills for general education.** The exam-driven culture should be reevaluated for general education. Instead, a broader set of skills should be introduced as foundational cognitive and socioemotional skills are essential for a “well-educated” labor force that can adapt in the rapidly changing labor markets of the 21st century global economy.
- **Higher quality and relevance and more pathways for vocational education.** The efficiency of vocational training delivery can be improved through better coordination among the providers and the managing authority. The link between vocational schools and enterprises should be strengthened. School-level reforms are key to improving quality and relevance. Pathways between technical and academic streams can be better integrated.

Section 4. An illustration of Yunnan Province

Different regions in China exhibit different patterns and trends in upper secondary education expansion in recent years—largely associated with the varied socioeconomic development paths and characteristics across the regions. Located at the southwest side of China, bordering the Lao People’s Democratic Republic, Myanmar, and Vietnam, Yunnan is a medium-size Chinese province with a population of 46 million, of which 30 million reside in rural areas and 16 million in urban areas. Yunnan’s progress and challenges in upper secondary education typifies that of the less developed provinces in China and is presented in this report to allow for a more in-depth understanding of the upper secondary education subsector.

Yunnan is one of the least developed provinces in China and its income gap with the rest of the country is closing at a slow pace. In 2016, Yunnan’s GDP per capita was CNY 31,093 (approximately US\$4,935) or 58 percent of the national average that year (CNY 53,935 or US\$8,561). While Yunnan is slowly bridging the gap with the rest of the country, it is not doing so quickly enough. Its GDP per capita grew from 52 percent of national average in 2007 to 58 percent of national average in 2016. Even at this rate, Yunnan will not converge with the national average until 2080. Overall, Yunnan appears to have a slower pace than the rest of the country in structural transformation. The share of value added of the primary sector is declining at a slower pace, and the tertiary sector is also expanding at a slower pace than the national average.

Figure 4.1 GDP per capita, Yunnan versus national average (CNY)

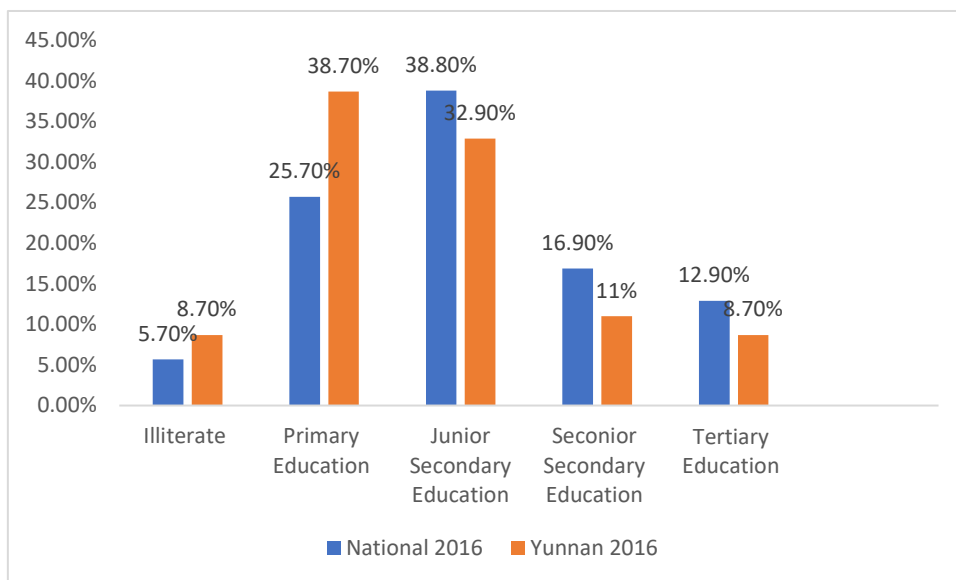


Source: National Bureau of Statistics of China 2017.

The lack of human capital is a major constraint for Yunnan’s economic development, as in many less developed regions in China. Yunnan people, on average, have fewer years of schooling. As mentioned in Section 1 of this report, in 2015, the employed labor force in Yunnan has on average 8.4 years of schooling, lower than the national average of 10 years. This is consistent with the statistics from the population survey carried out by the National Bureau of Statistics in 2016 (see Figure 4.2). It shows that for the population of age 6 and above, Yunnan has smaller shares of its population having attained education levels of secondary and above while much larger shares of education levels of primary and below. Perhaps not surprisingly, Yunnan has one of the lowest

rates of access to upper secondary education in China. Yunnan Province has a relatively low upper secondary (gross) transition rate at 82 percent in 2015 in comparison with other provinces in China.

Figure 4.2 Composition of population by education level, Yunnan versus national average (2015)

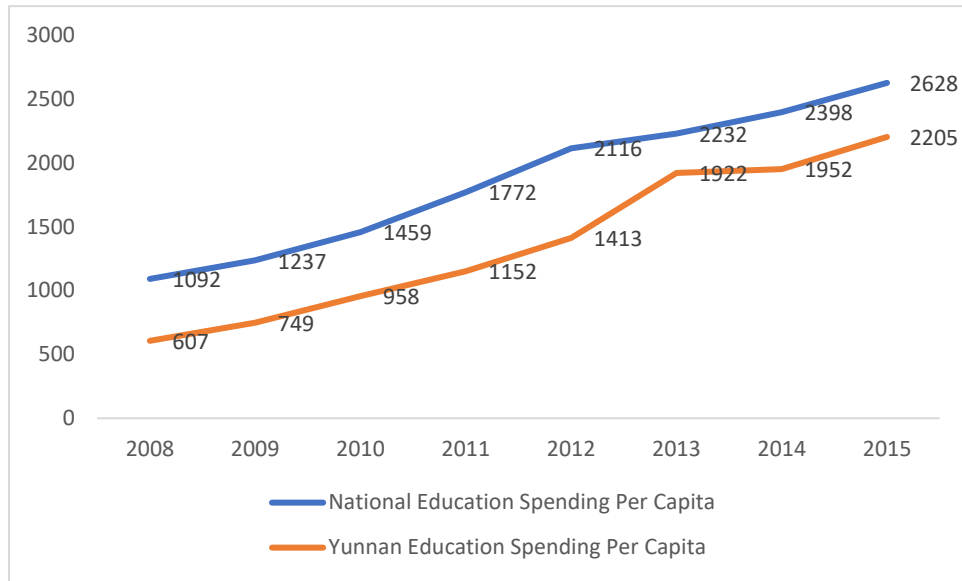


Source. National Bureau of Statistics of China 2016b. <http://www.stats.gov.cn>.

Yunnan has gradually narrowed the education gap, except at post compulsory level. In recent years, Yunnan has been bridging its education gap with the rest of China. Compared with the results of NBS’ household survey between 2007 and 2016, the share of Yunnan’s population attaining at least junior secondary education has largely increased—from 38 percent to 53 percent. Nonetheless, compared with the rest of China, Yunnan is still lagging in its share of population reaching upper secondary education level and above at 20 percent compared with 30 percent nationwide. In light of this gap, the provincial FY13 development plan outlined specific targets—by 2020, the Yunnan aims to achieve 90 percent GER at upper secondary education level (same as national target) and 45 percent GER at tertiary institutions (slightly lower than national target).

Considering the FY13 education targets, Yunnan has meaningfully increased its education financing and narrowed the financing gap relative to the national average. Yunnan spent a gross CNY 2,204 per capita in 2015 (US\$350), about 84 percent of the national average (CNY 2,628 or US\$417). While it is low, this level of spending is a much higher proportion than Yunnan’s relative per capita income. This is a welcome investment, since, as noted, Yunnan’s large population is one of its most valuable but underdeveloped resources. In 2015, Yunnan’s financing for education reached CNY 76,746,000 (US\$12,182,000); it represented an astounding close to four times increase from that in 2007. In contrast, the national average had increased three times. Yunnan’s faster growth in education financing was noticeable across all sources, with the only exception of donations and fundraising. Moreover, its financing gap with the rest of the country has been rapidly shrinking across the last decade. Yunnan’s education financing used to be at 55 percent of the national average in 2008, 65 percent in 2010, 66 percent in 2012, and 81 percent in 2014 (Figure 4.3). At this rate of increase, Yunnan is on track to reach the national level of financing in education by 2019.

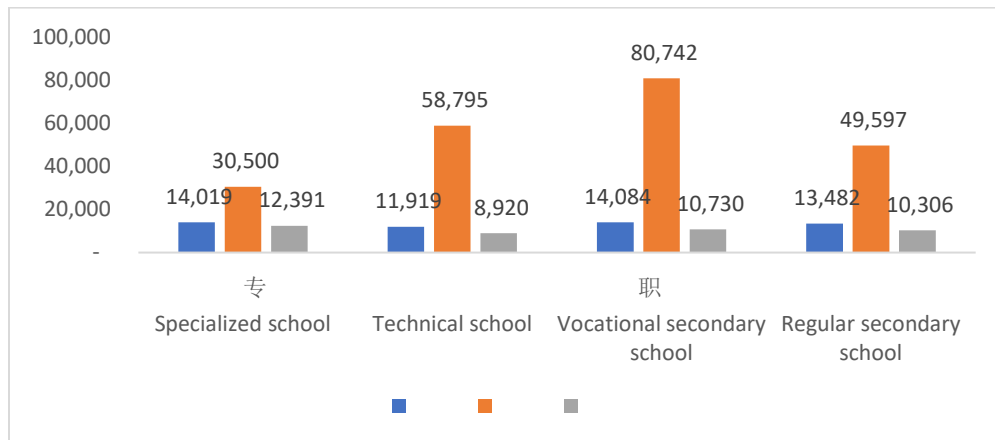
Figure 4.3 Per capita education spending, Yunnan versus national average (2015 in CNY)



Source. National Bureau of Statistics of China 2016b. <http://www.stats.gov.cn>.

In the meantime, Yunnan’s per student spending at the upper secondary level is still among the lowest in the country (Figure 4.4). In 2015, for example, spending per student at upper secondary vocational school is below CNY 11,000, compared with the national average of over CNY 14,000. Across all school types at the upper secondary level, Yunnan’s per student spending is only a small fraction of that in regions with the most advanced municipalities, such as Shanghai. As financing upper secondary education is largely public, and predominantly sourced through fiscal spending of local government, the large resource gaps to a large extent reflect the large regional gaps in fiscal capacity. Noticeably, Yunnan’s per student spending gap with the national average is larger for vocational track than for academic track, suggesting a persisting supply constraint for vocational education.

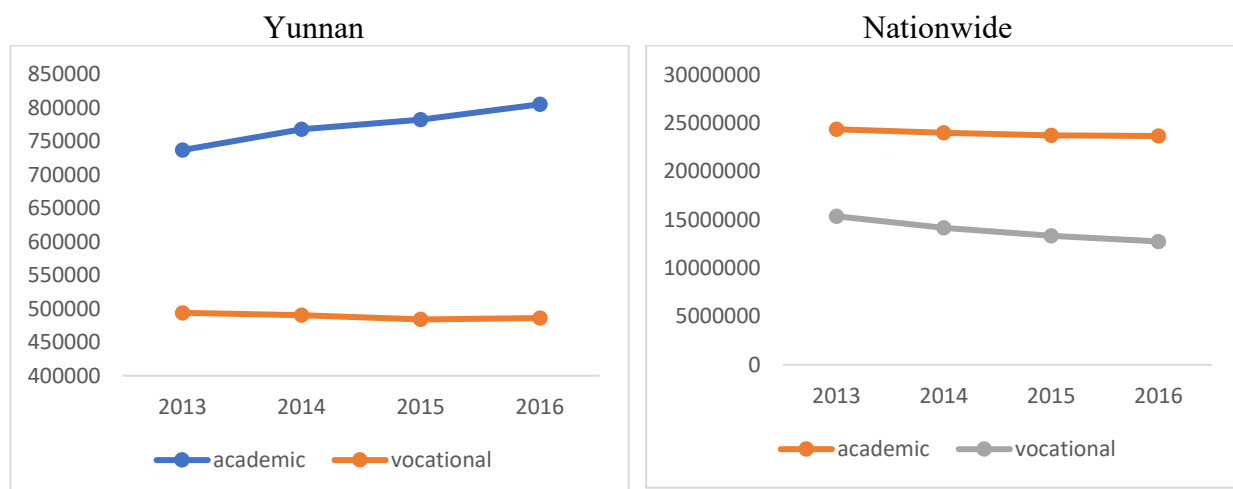
Figure 4.4 Per student spending: national, Yunnan, and Shanghai (in CNY)



Source. National Bureau of Statistics of China 2015a.

Most of Yunnan’s access gains at the upper secondary level has been disproportionately driven by academic track expansion. Yunnan’s upper secondary enrollment growth in recent years has largely been a phenomenon of expansion of academic secondary education while the total enrollment in vocational education has been flat (Figure 4.5). This represents a deviation from the national trend where declining total enrollment is observed in both tracks. Population trends play an important role where due to Yunnan’s relatively high birth rates in the past two decades the negative effects of a declining population on high school enrollment observed in many other parts of the country have not been prominent in Yunnan. The disproportional increase of academic track enrollments has widened the gap between shares of academic and vocational students. In 2016, only about 37 percent of high school entrants are absorbed in vocational secondary education, while the rest 63 percent entered academic secondary education, despite the 50-50 allocation requirement at the national level.

Figure 4.5 Upper secondary enrollment (2013–2016): Yunnan versus nationwide



Source: National Bureau of Statistics of China 2017.

Several factors could influence the widening gap between academic and vocational education enrollment. These factors include (a) remaining financial constraints mentioned earlier, (b) a concurrent expansion for tertiary education created for demand for academic track, and (c) different education quality and perceptions of career opportunities and economic returns associated with each track. To help better understand these factors we conducted a stakeholder analysis to gain in-depth understanding of the key stakeholders’ attitudes and opinions toward upper secondary education at the local level in addition to the analysis on the national CEPS data in Section 3.

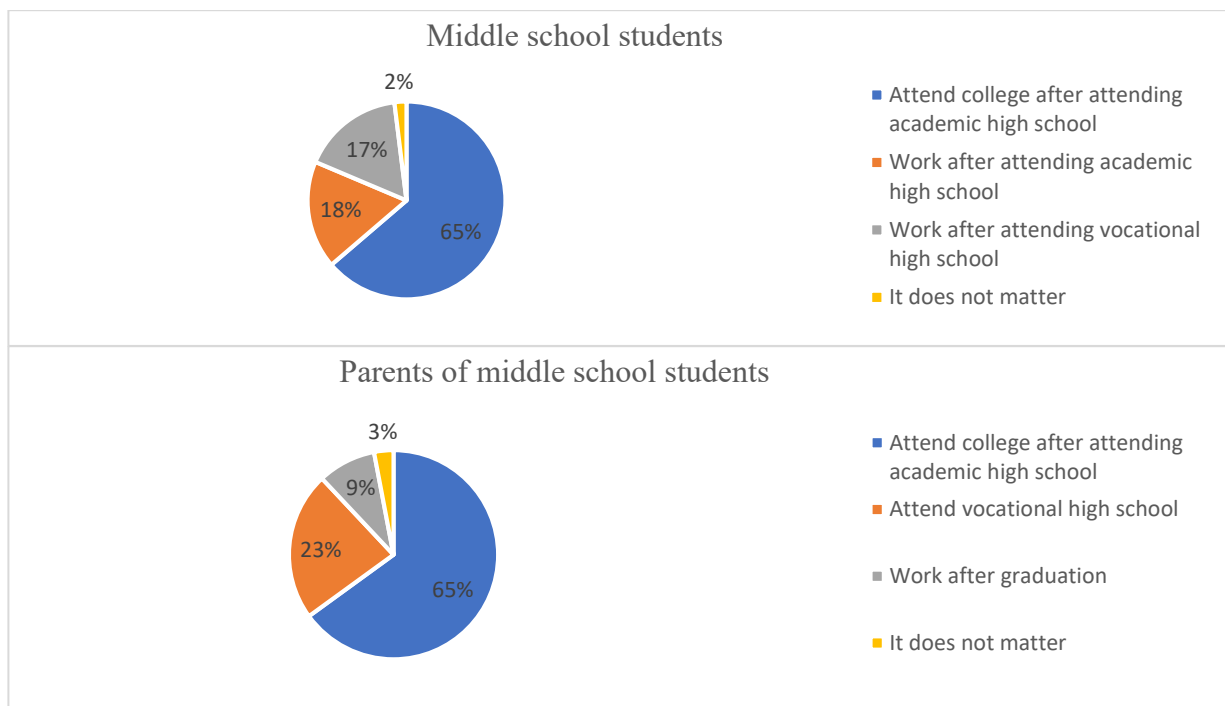
For the stakeholder analysis, we surveyed a convenient, albeit large, sample from Tengchong County, Yunnan. The sample included a large variety of key stakeholders including middle school students (n = 381), high school students (n = 169), students from vocational high schools (n = 277), and parents of middle school students (n = 473), with a total of 1,300 valid responses. We also interviewed education administrators at the county level (n = 7), school principals (n = 9), teachers (n = 25), students (n = 57), and parents (n = 15) using semi-structured questions. Tengchong County presents typical challenges faced by upper secondary education in Yunnan and many parts of China. It is a relatively poorer county in Yunnan Province. Due to a relatively lack of industries (as evidenced by its CNY 24,034 GDP per capita¹⁰ versus CNY 28,806 of the provincial average

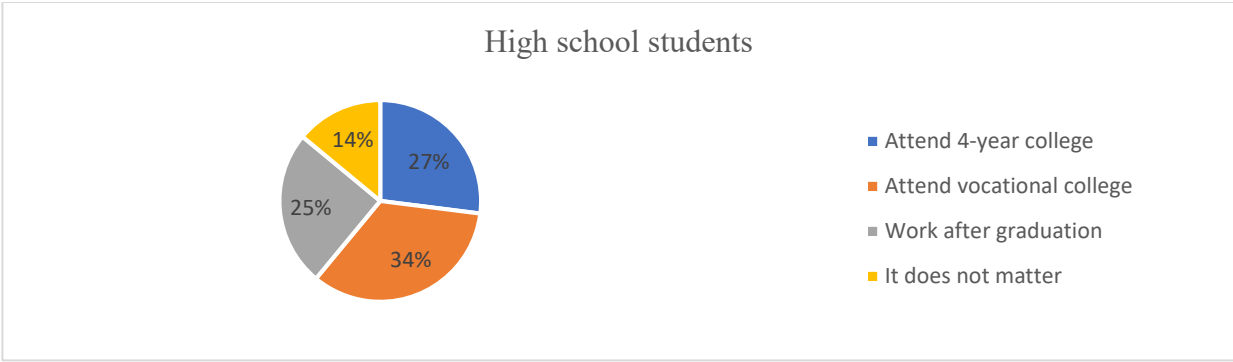
in 2016¹¹), the vocational education sector is relatively small as well with only one vocational high schools and 9 academic high schools. In the broader Baoshan Municipality where Tengchong County belongs, only 28 percent of high school enrollment is in vocational schools.

The stakeholder analysis includes both quantitative and qualitative measures and has a broad-based representation. The study team visited an academic school with Grades 6–12, a vocational high school, and a high school targeting minority students. The student surveys collect information on student demographics, academic achievement, career expectations, their attitudes and their parents’ attitudes toward vocational education. The parent survey includes questions on family income, parents’ educational level, career expectations for their children, and their attitudes toward vocational education. The interviews with the educational administrators, principals, and teachers aim to identify the current status and the existing problems of vocational education, while the interviews with the students and parents focus on further exploring their attitudes toward vocation education. Our analysis of the responses from the surveys and the interviews shows the following results.

Most parents and students in Tengchong County preferred pursuing higher education to receiving vocational education, either at the secondary or tertiary level. As shown in Figure 4.6, only 17 percent of the middle school students and 23 percent of the parents surveyed are willing to choose vocational high schools, while only 34 percent of the high school students are inclined to attend vocational colleges. Meanwhile, more than 80 percent of the surveyed middle school students and high school students believe that middle school or high school diplomas alone would be insufficient to prepare them for the labor market (Figure 4.7).

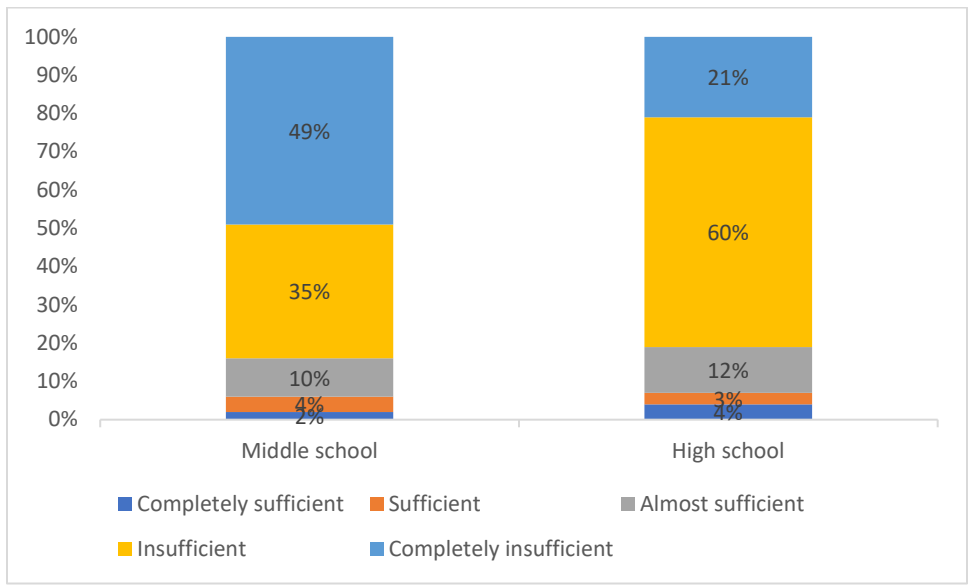
Figure 4.6 Survey results of the inclination for educational choices: middle school students, parents of middle school students, and high school students





Source: Authors.

Figure 4.7 Students' opinions on how well completing middle school and high school would prepare themselves for the labor market



Source: Authors.

Correlation analysis suggests that preference for school tracks is closely associated with perceived chance of entering the academic track. According to correlation analysis, household preference for academic high school versus vocational school is not significantly correlated with parents' education level and family wealth. Rather, the choice for school track is strongly correlated with students' school performance (self-evaluated), which is a proxy for the chances to entering academic track versus vocational track. In other words, the household choice for the type of high school is strongly affected by the number of slots available in academic schools versus vocational schools and their chances of obtaining the admissions to the academic schools based on entrance exams.

Pursuit of tertiary education through academic high schools is widely recognized among parents and students while less so for secondary vocational school graduates. Based on the feedback from the interviews, the common perception for the academic track is that it is key to greater economic opportunities and beneficial for personal development and a high-quality academic secondary school is widely perceived as a pathway to first-tier universities, higher education degrees, and better economic opportunities outside of the province.

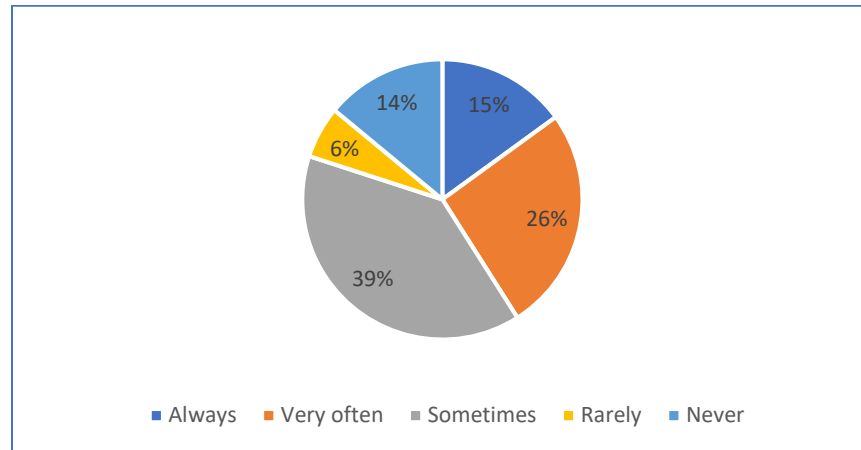
In terms of perceived quality of vocational education, the interviewed education administrators, students, and parents expressed their concerns about the teacher quality of vocational education. Some of parents and students believed that the faculty at vocational schools lacks motivation. The education administrators also reported that in some vocational schools, teachers who are supposed to teach academic courses (for example, Chinese, English, and math) are assigned to teach vocational courses after a short session of professional training. For example, in one school, English teachers are sent to attend training sessions of auto repair so that they can take over these courses. In another vocational school, out of 500 teachers who teach vocational courses, more than 300 are not specialized in these subjects. In addition, only a small percentage of the vocational faculty has obtained a bachelor's degree.

Pathway for further study is also being perceived as being very limited for vocational school graduates. When asked about pathways for vocational students to advance to tertiary education, one school principal mentioned that among 2,000 students, there are fewer than 70 students with intention to do so. The two important contributing factors to this are that the available tertiary education programs that vocational program students can choose from are limited as only a very small number of second-tier colleges accept secondary vocational school graduates and most vocational schools do not have the capacity to help their students pass the national exam (vocational student specific) for college entry.

Respondents also seem to judge the quality of vocational education by its admission mechanisms rather than the training content. Perceptions on vocational upper secondary education are uniformly negative. Enrolling into the vocational track is not regarded as a “choice,” but as a result of low academic performance. Ending up in vocational school is deemed a “failure” and “not setting good example to (my) younger siblings.” Such views are particularly strong among Grade 9 students who are soon to face the tracking crossroads. Among the 20 middle school students that we interviewed, only 2 are willing to attend vocation high school, and the main reason is that their academic performance is not good enough to allow them to attend academic high school. This bias is rooted in the exam performance of students entering vocational education rather than objective measures of the vocational school performance. In fact, as the only vocational school in Tengchong County, Tengchong No.1 Senior Vocational School is a national-level demonstration vocational school with an impressive 98.8 percent employment rate, and over the past few years, it has gone through extensive school-level reforms to improve its curriculum, pedagogy, and assessment methods and link with industries. However, such achievements do not seem to get picked up by the middle school students, their parents, and teachers.

Indeed, the negative perceptions and attitudes toward vocational education among middle school students are highly subjective and could be a result of misinformation. The quantitative analysis shows that there is a lack of career counseling services in middle schools, leaving middle school students unprepared for a well-informed decision about which track to choose in Grade 9 (Figure 4.8). Lacking a clear idea about their career planning, middle school students are reported to be highly influenced by the perceptions of their parents and teachers rather than career interest.

Figure 4.8 Frequency of receiving counseling services in middle schools



Source: Authors.

In summary, Yunnan's progress and challenges in upper secondary education typifies that of the less developed provinces in China. Yunnan is one of the least developed provinces in China. The lack of human capital is a major constraint for the province's economic development, as in many less developed regions in China. Yunnan has gradually narrowed the education gap, except at the post compulsory level. Most of Yunnan's access gains at the upper secondary level has been disproportionately driven by academic track expansion. Several factors could influence the widening gap between academic and vocational education enrollment, including financial constraint and household perceptions toward the upper secondary education. The results of a stakeholder survey conducted by this study show that pursuit of tertiary education through academic high schools is widely recognized among parents and students while less so for secondary vocational school graduates. In terms of perceived quality of vocational education, the interviewed education administrators, students, and parents expressed their concerns about the teacher quality of vocational education. However, the perceptions could be a result of misinformation. There is a lack of career counseling services in middle schools, leaving middle school students unprepared for a well-informed decision about which track to choose in Grade 9. Lacking clear ideas about their career planning, middle school students are highly influenced by the perceptions of their parents and teachers rather than their own career interest.

Section 5. Summary of findings and policy considerations

Over the past decade, China's transition rate from lower secondary education to higher secondary education has increased significantly, from 80.5 percent to 93.7 percent. This has been supported by a large increase in financial resources, at an annual rate of 15 percent between 2008 and 2015. The total financing for regular senior secondary schools has been growing faster. In 2008, school fees represented 20–30 percent of total school financing, but this ratio has fallen to 15 percent for regular schools and merely 6 percent for vocational schools—dwarfed by the fast increase in spending from government sources.

In light of this impressive progress, the Chinese government aimed at raising the GER in senior high schools to above 90 percent by 2020. “Average length of education received by the working-age population (years),” a target in the country's 13th FYP, is also anticipated to increase from 10.23 years in 2015 to 10.8 years in 2020. Sixty percent of this increase is explained by upper secondary education, highlighting the critical role the subsector. Despite the impressive progress and ambitious goals, access gaps remain at the upper secondary school level, with only 77 percent of Chinese youth completing high school by age of 20, and for rural youth this ratio is only 47 percent. Quality and relevance in high school education could be a key bottleneck in further expansion.

High dropout rates for TVET programs—10.7 percent during the first year and up to 22 percent in some prefectures according to Yi et al. (2015)—suggest poor value added of certain vocational programs in terms of student learning, in addition to family background and other personal factors. From the attitude data collected in a Yunnan county, education administrators, students, and parents expressed their concerns about the teacher quality of vocational education. According to the background studies of World Bank-supported projects in China, the challenges can be described in the following five dimensions: (a) link between schools and industry; (b) teaching quality; (c) school management; (d) curriculum, pedagogy, and assessment; and (e) school facilities and equipment. Aside from the quality perceptions, a lack of career counseling among middle school graduates contributed to the uninformed decisions about which track students take.

As for the academic track, education incentives for the academic track are strongly driven by university entrance exams. However, exam-driven systems require a tremendous amount of student commitment both within and outside normal school hours, as evidenced by significant household costs on tutoring. Exam-driven systems can inhibit intrinsic motivation and stifle creativity. Such abilities are often gained beyond traditional classrooms and through extracurricular activities. The system of examination, ranking, selection, and promotion has often been viewed as meritocratic. However, the limitation of this system serving as a mechanism for social mobility is well recognized. Some curriculum reforms led to a few experiments on changing the university entrance exam. However, most of these changes have not lasted. In the meantime, there has been evidence of the positive effect of this curriculum reform on overall student well-being.

The tracking between academic and vocational streams could itself be a distortion for the sector's further expansion. Among those who stay in upper secondary education, which track they pursue also determines their likelihood to enter further education. While vocational education provides a path for many youths with rural background to enter upper secondary education, it perpetuates the urban and rural divide. One mechanism is through fee difference. As vocational school becomes a

more affordable option than the academic track, fee difference could affect choice of school tracks, which further perpetuates the socioeconomic divide between the two tracks. There is also strong evidence that the 50-50 tracking ratio set at the national level falls short of reflecting the industry and household demand at the local level or adhering to the demographic trends.

Looking ahead, reforms in upper secondary education are imperative, given increasing demand for a highly skilled labor force and China's fast demographic change as the young population cohorts decline. The shrinking secondary school-age cohort is the first pressing sign that enabling every child to develop to their full potential should be the overarching goal of the reforms. To this effect, a few policy considerations for the Chinese government are discussed in the following paragraphs.

Access and financing

Closing the remaining access and retention gaps, especially for the rural and disadvantaged population. The access gap in the high school stage directly relates to average length of education received by the working-age population—an area China falls behind not only advanced nations but several emerging market nations—and is tracked as an obligatory indicator in the Main Economic and Social Development Indicators for the 13th FYP period. Despite fast improvement from the past decade, the remaining gaps persist among the rural and disadvantaged population. Focusing on access and school retention among this population is key for success.

Further reducing tuition and fees for the upper secondary schools. The access cost of upper secondary education and the opportunity cost of work remain important barriers, particularly for the poor and the underserved, to attain upper secondary schooling. In line with the government's plan to universalize upper secondary education, China could consider using savings from the smaller school population to reduce—and over time eliminate—tuition and fees for both academic and technical streams of upper secondary education. Additional financial assistance should be provided to students from poor households and disadvantaged backgrounds to offset the opportunity cost of attending school.

Until a proper local finance system is established, the central government can play a more effective role in allocating education resources. The disparities in fiscal capacities are also often linked to the disparities in school resources. The central government can play a more prominent role particularly in supporting selected regions where the school-age population continues to increase while base enrollment is low, where there is a need for increased investment for the sheer expansion of school system coverage.

Tracking and informed decisions

Decentralize tracking quota decisions. A uniform 50-50 tracking system nationwide may not be consistent with the demands of local labor markets and could serve as a distortion for skills match. Instead, such allocations are better determined by local education authorities that have a better understanding of local industries and labor markets. It is also imperative for local governments to have a better tracking system of their graduates, so such decisions can be made in a more informed manner.

Make the tracking less rigid by integrating the pathways between technical and academic streams. During the past decades, there has been a tendency in many OECD countries toward adopting more comprehensive school systems and delaying general and vocational education

tracks. Even in countries where tracking starts relatively early, students tend to follow the same common core curriculum for a large share of their upper secondary education. Currently, the allocation to academic and vocational tracks is determined by “Zhongkao” and is largely irreversible. Second opportunities and admission mechanisms should be provided to vocational school students where they can take additional courses at academic high schools. Also, pilots can be introduced in academic high schools where certain learning time will involve career readiness and vocational-oriented courses. Lessons can be learned from notable practices in the United States. The government has already started to carry out reforms in the direction of a more integrated upper secondary education, such as piloting Comprehensive High Schools. Successful experiences should be well documented and scaled up.

Expose younger cohorts of students to vocational education and the world of work. Much of students’ preference for the academic track is due to a lack of knowledge on vocational education and its returns. High-performing secondary vocational schools can step up their outreach to junior secondary school students and share their success stories and trainings offered so that prospective students will have a more informed decision when choosing between academic and vocational tracks. Due to vocational institutions’ close connection to the job market, such outreach activities can also help students broaden their knowledge of the world of work. For instance, Shanghai has hosted “career experience” days since 2014 and its vocational institutions play an active role hosting such activities.¹²

Broader skills for general education

Reconsidering the exam-driven educational culture. The entrance exams and the learning process rely heavily on exam preparation skills such as memorization, the skills that are going to be less important in the future as computers and machines have advantages over them. Humans’ comparative advantage is probably in resourcefulness, flexibility, and ability to learn and productively use new technology. The exam-driven educational culture may have a variety of other costs that inhibit the “joy of learning” and life satisfaction of families, beyond impairing the creativity of graduates. The examinations themselves should include questions that encourage higher order thinking rather than rote learning.

Introducing a broader set of skills in general upper secondary education. Foundational cognitive and socioemotional skills are essential for a “well-educated” labor force that can adapt in the rapidly changing labor markets of the 21st century global economy. A number of countries—Finland, Korea and Singapore—have recognized the need for such reforms and are putting greater emphasis on problem solving, creative thinking, core socioemotional skills, and other higher order skills. The positive effects of China’s own curriculum reforms suggest that such reforms should continue.

Adopting new forms of assessment. To reduce the burden for exam preparation, it is essential to introduce new forms of assessment, such as project-based learning and continuous assessment in upper secondary education. These new forms of assessment will focus more on measuring higher order skills such as critical thinking and problem-solving.

Higher quality and relevance and more pathways for vocational education

Improving the coordination of vocational education providers. The government could pursue greater consolidation and coordination among relevant agencies for vocational training, possibly establishing a new Skills Development Authority. An integrated information system can be set up to help with skills match. A coordination mechanism among relevant ministries and agencies has been recently established indicating that the government is heading to the right direction.

School-level reforms are key to improving quality and relevance. Comprehensive school-level reforms, including school-industry cooperation, curriculum, pedagogy, assessment reforms, and quality assurance, are key to improving quality and relevance, as demonstrated in World Bank-supported TVET projects in Guangdong, Shandong, and Yunnan provinces. Such reforms help align teacher performance with practical skills, industry experience, ability to develop curriculum, and innovative pedagogy. They also help set up outcome-oriented quality monitoring systems.

Strengthening links between vocational schools and enterprises. Technical and institutional assistance would help facilitate the provision of work-based training, especially by SMEs. The existing qualifications framework should be updated with competencies and standards that reflect labor market demand, and a new National Qualifications Framework could be gradually developed.

Promote international collaboration. China's vocational school system could continue to learn from the notable practices in other countries and share its own success stories. This will not only help with quality of training provision but also with cross-border labor mobility.

New indicators for the next FYP

In the 13th FYP, the only education-related “well-being” indicator is “average length of education received by the working-age population.” This indicator, while providing an overall picture of the human capital stock of China's labor force, can be attributed to population trends as much as the work done by the government. For a better monitoring of the outcomes as a result of the government's efforts, it is recommended to have a sub-indicator focusing on the overall education attainment of the young population joining the labor force, such as ‘average length of education received by population at ages 18–24’, as this indicator will change more rapidly than that for the overall population. More importantly, as China needs to pay more policy attention to quality in upper secondary education, an indicator that monitors standard learning outcomes for both vocational and academic education can be introduced.

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¹ Often, the ‘routine task’ category is further divided into ‘routine manual’ and ‘routine cognitive’.

² In addition to Autor, Levy, and Murnane (2003), see Acemoglu and Autor (2011), Autor and Handel (2013), and Autor (2015) for more detailed discussion.

³ Upper secondary education in this report refers to OECD code ISCED level 3.

⁴ Lower secondary education in this report refers to ISCED level 2.

⁵ The National Bureau of Statistics also counts crafts school () as part of the senior secondary-level vocational education. But it is excluded from the MOE calculation. This report follows the MOE definition of senior secondary-level education.

⁶ Although the 12th FYP uses GER as an indicator for sector target, we are not able to find in official statistics provided by either the National Bureau of Statistics or by the MOE the regular report of indicator.

⁷ The CEPS is the first large-scale, nationwide tracking survey of junior high school students in China. It was designed by the National Survey Research Center (NSRC) of Renmin University and implemented jointly by the NSRC and academic institutions throughout the country. The purpose of the CEPS is to provide detailed and reliable data for the study of the current situation and future development of China's education. A total of 28 county-level units (counties, districts, and cities) were randomly selected as survey sites across the country. The implementation of the survey was based on schools. As many as 112 schools and 438 classes were randomly selected from the 28 county-level units to conduct surveys. The baseline surveyed approximately 20,000 students. We used 2013/14 data. The following round carried out in 2014/15 has not been made public.

⁸ All nonzero effects in the graphs are statistically significant ($P < 0.1$). Insignificant effects are graphed as 0 in Figure 3.3 and Figure 3.4.

⁹ There have not been continuous statistics on the graduates from the technical and vocational senior secondary schools during the same period.

¹⁰ Obtained from local government documents.

¹¹ The GDP per capita data are from Yunnan Statistical Yearbook 2016.

¹² Shi 2018.