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Providing the right skills
to all in China: From “made
in China” to “created in
China”

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By Margit Molnar and Vincent Koen

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ABSTRACT/RÉSUMÉ

Providing the right skills to all in China – From “made in China” to “created in China”

China has made impressive strides in education in recent decades, even though the accumulation of human capital has lagged behind that of physical capital. Going forward, access to and quality of education will be key to sustain economic convergence with the most advanced economies and to offset the drag exerted by population ageing. This will require addressing a number of problems. Access to pre-school education is still far from universal. Migrants' children as well as rural and poor families are still at a major disadvantage at every step of the education ladder. The focus on rote learning and exams remains excessive. More bridges are needed between vocational and general education. Graduating students often struggle to find a job matching their expectations and employers do not always find the requisite skills. Despite a soaring number of Chinese patents, the quality of most patents is still low and innovation output is weak. Reforms are underway to address these problems but further progress is needed in various areas against the backdrop of rapidly evolving market demands and the development of the knowledge economy. Among the priorities are more and better oriented funding of education, giving greater opportunities to children with a socio-economic or physical disadvantage, reducing the role of after-school tutoring, focusing less on memorisation and more on creativity, enhancing the appeal of the teaching profession, improving students' information on labour market prospects, developing workplace training, making greater use of online education potential, and more effectively nurturing research and innovation.

This Working Paper relates to the 2015 *OECD Economic Survey of China*
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Keywords: China, education, innovation, skill mismatch, human capital, education inequalities, migrant children, vocational training.

Donner à tous des compétences adéquates en Chine - Du “fabriqué en Chine” au “créé en Chine”

La Chine a fait ces dernières décennies des progrès impressionnants dans le domaine de l'éducation, même si l'accumulation de capital humain y a été moins rapide que l'accumulation de capital physique. À l'avenir, l'accès à l'éducation et la qualité de celle-ci seront déterminants pour favoriser la convergence économique avec les économies les plus avancées et compenser l'effet du vieillissement de la population. Il faudra pour cela s'atteler à la résolution d'un certain nombre de problèmes. Ainsi, l'accès à l'éducation préscolaire est encore loin d'être universel. À tous les échelons du système éducatif, les enfants de migrants, ainsi que les familles pauvres ou vivant en milieu rural, restent très désavantagés. L'importance donnée à l'apprentissage par cœur et aux examens reste excessive. Il faudrait aussi instaurer des passerelles plus nombreuses entre la formation professionnelle et l'enseignement général. Les étudiants diplômés ont souvent du mal à trouver un emploi correspondant à leurs attentes et les employeurs, pour leur part, ne trouvent pas toujours des candidats ayant les compétences requises. Malgré l'explosion du nombre des brevets chinois, la qualité de la majorité d'entre eux reste faible et les résultats en matière d'innovation sont modestes. Des réformes sont en cours pour s'attaquer à ces problèmes, mais les progrès doivent se poursuivre dans divers domaines, dans un contexte marqué par l'évolution rapide des exigences des marchés et le développement de l'économie de la connaissance. Les mesures à prendre en priorité doivent viser à mieux cibler et à accroître le financement de l'éducation, donner des chances plus importantes aux enfants issus de milieux socio-économiques défavorisés ou handicapés, réduire le rôle du soutien périscolaire, mettre moins l'accent sur la mémorisation et miser davantage sur la créativité, rendre la profession d'enseignant plus attrayante, améliorer l'information des étudiants sur les perspectives offertes par le marché du travail, développer la formation en entreprise, exploiter davantage les possibilités offertes par l'éducation en ligne, et promouvoir de manière plus efficace la recherche et l'innovation.

Ce Document de travail a trait à l'*Étude économique de l'OCDE de la Chine*, 2015
www.oecd.org/fr/eco/etudes/etude-economique-chine.htm

Classification JEL : H52, I00, I20, I21, I22, I23, I24, I25, I28, J24, O00, O30, O31.

Mots clés : Chine, éducation, innovation, inadéquation des compétences, capital humain, inégalités d'éducation, enfants de migrants, formation professionnelle.

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PROVIDING THE RIGHT SKILLS TO ALL IN CHINA – FROM “MADE IN CHINA” TO “CREATED IN CHINA”

By Margit Molnar and Vincent Koen¹

1. Human capital accumulation has played a large role in China’s economic catch-up over the past three decades, notwithstanding the even more rapid build-up of physical capital. It is becoming even more crucial now to bring about further improvements in living standards in the face of an ageing population and to provide the skills needed to transition from the world’s factory to a leading innovator. Educational attainment levels have improved considerably, as has access to schooling. International test scores, inasmuch as they are available, compare favourably. Even so, China’s education system (described in Annex 1) suffers from a number of shortcomings, pertaining both to efficiency and to fairness. There is also a need to improve training and innovation. The main challenges have been well identified several years ago and reforms are being rolled out to meet them (Box 1).

2. This paper first documents the remarkable progress made so far in educational attainment, but also highlights various skills mismatches faced by new graduates entering the labour market, drawing on new survey evidence. It stresses the importance of the right incentives to innovate in universities. The paper then discusses how to improve the quality of education, which is uneven and overly focused on rote learning and exams, and how to attract and retain better teachers. The paper goes on to examine inequalities in access to good education and explores how to make the education system more inclusive to provide opportunities at all stages to all, and flexible enough to adapt in the face of ongoing structural change. The paper highlights some of the key policy challenges faced by China in providing the right skills to all and proposes measures to address them:

- As China transits to a knowledge-based economy with higher value-added industries and a vibrant service sector, new skills need to be provided to meet demand by those industries. Workplace-based vocational training and lifelong learning will be key to that end. Innovation can become an engine of growth provided more weight is attached to quality and application in university research evaluation and world-class researchers are attracted and retained by greater research autonomy, merit-based promotion and stronger protection of intellectual property rights.
- On some measures, the Chinese education system performs very well, but greater focus on quality at all levels would be more conducive to accumulating the skills needed by the rapidly transforming economy and ageing society. Spending on education, in particular at the lower levels, where the social returns are higher, needs to increase alongside vocational education. Furthermore, making the teaching profession more attractive and more competitive would improve quality.
- Opportunities to receive a good education have become more unequal and this trend needs to be reversed to foster the accumulation of human capital and underpin inclusive development. Inequalities stem first and foremost from the urban-rural divide and secondly from social

1. Margit Molnar heads the China desk and Vincent Koen the Country Studies 3 Division in the OECD Economics Department. This paper is based on Chapter 1 of the OECD *Economic Survey of China* published in March 2015 under the authority of the Economic and Development Review Committee (EDRC). The authors would like to thank Alvaro Pereira, Robert Ford, Ben Westmore, Gang Zhang, Sandrine Kergroach, Andreas Schleicher, Stéphanie Jamet, Elizabeth Fordham, Glenda Quintini and other colleagues at the OECD’s Directorate for Employment, Labour and Social Affairs, Directorate for Science, Technology and Industry and Directorate for Education and Skills as well as Chinese government officials for valuable comments on earlier drafts. Special thanks go to Thomas Chalaux and Clara Garcia for statistical support and Nadine Dufour and Mercedes Burgos for editorial assistance.

stratification, while, age, gender and regional differences contribute to a lesser extent. More central funding at the compulsory level would ensure minimum quality. Migrant children should be provided access to public schools or given vouchers to private schools. They should be treated equally in terms of access and funding at all levels with urban peers.

Box 1. China's education, training and innovation reforms

In line with the call of the 2007 17th Communist Party Congress “to give priority to education and turn China into a country rich in human resources”, the July 2010 *Outline of China's National Plan for Medium and Long-term Education Reform and Development 2010-2020* sets out the major targets and directions for building up human capital through the end of the 13th Five-Year Plan period. This complements the State Council's *Medium and Long-Term National Plan for Science and Technology 2006-2020* issued in February 2006 and the *National Medium-and Long-term Talent Development Plan (2010-2020)* issued jointly by the Central Committee of the Chinese Communist Party and the State Council in June 2010. Together with the decisions taken at the Third Plenum of the 18th Communist Party Congress in November 2013, these strategic documents lay out a blueprint for human resource development to underpin the transition to a more knowledge- and innovation-based economy, with a set of quantitative targets (Table 1).

Table 1. Major targets for education development

	2010	2015	2020
Pre-school education			
Kindergarten enrolment (in millions)	30	34	40
Gross enrolment rate three years prior to compulsory education (%)	57	60	70
Gross enrolment rate one year prior to compulsory education (%)	82	85	95
Nine-year compulsory education (primary and junior secondary education)			
Enrolment (in millions)	152	161	165
Graduation rate (%)	90	93	95
Senior secondary education			
Enrolment (in millions)	47	45	47
Gross enrolment rate (%)	83	87	90
Vocational education			
Secondary vocational enrolment (in millions)	22	23	24
Tertiary vocational enrolment (in millions)	13	14	15
Higher education			
Enrolment (in millions)	29	31	33
Gross enrolment rate (%)	27	36	40
Master's and Doctor's degree students within the enrolment (in millions)	1.5	1.7	2
Continuing education			
Continuing education received by working people (in million times)	185	290	350
Firms' spending on training as a percentage of the wage bill		1.5	1.5
Innovation			
R&D spending as a percentage of GDP	1.4	2.2	2.5
R&D personnel (in millions, full-time equivalent)	2.6	2.8	3.8
R&D researchers (in millions, full-time equivalent)	1.2	1.5	2.0

Source: Ministry of Education (2010), *Outline of China's National Plan for Medium and Long-term Education Reform and Development 2010-2020*, State Council and Central Committee of the CCP (2010), *National Medium-and Long-term Talent Development Plan 2010-2020*, State Council (2006), *Medium and Long-Term National Plan for Science and Technology 2006-2020* and OECD Main Science and Technology Indicators (2014).

A number of major reforms have been undertaken since, or are underway. These include:

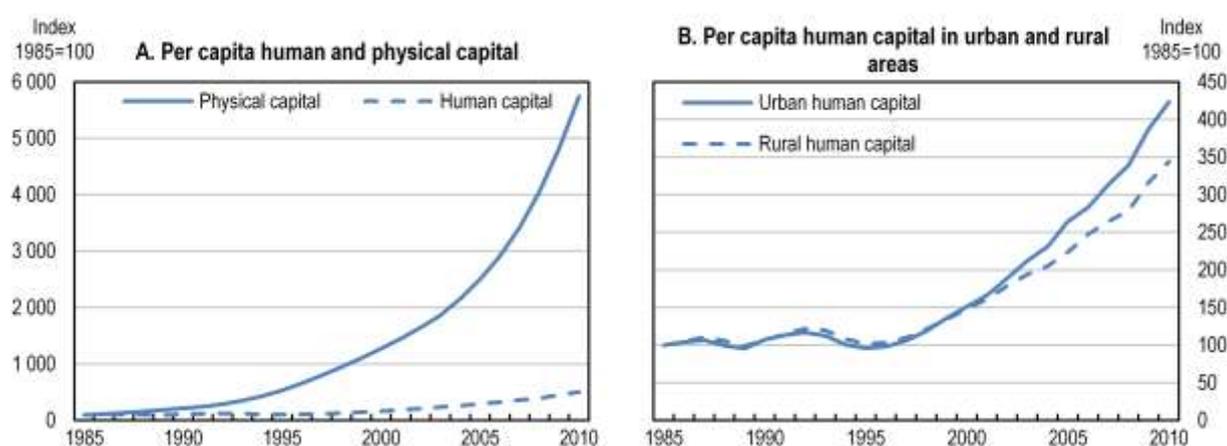
- Gradually narrowing the rural-urban and regional gaps in education
- Reforming curricula at all levels, focusing less on rote learning and more on creativity
- Reducing the role of standardised testing and reforming the *gaokao* (university entrance exam)
- Making teaching a more competitive profession
- Granting greater autonomy to higher-education institutions
- Promoting transparent admission procedures
- Carrying out better assessment of outcomes at all levels
- Providing tax incentives for firms to spend on training

Remarkable progress in accumulating human capital

Human capital has to increase further to respond to structural transformation needs

3. Human capital has increased rapidly even though by 2006-07, China's human capital stock per head was still only a fifth of that of the United States and a quarter of Canada's (China Center for Human Capital and Labor Market Research, 2013). Accordingly, the overall stock of human capital approached two thirds of that in the United States. Human capital has been built up far more slowly than physical capital (Figure 1.A). Moreover, rural areas have lagged behind (Figure 1.B). Indeed, private returns to education were long lower in rural areas but with a better functioning of markets, these returns have increased, which should encourage greater investment in education in rural areas (De Brauw and Rozelle, 2007). This in turn should facilitate urbanisation by enabling rural citizens to take up a wider range of non-farm jobs in cities. The shift of rural workers to more productive urban jobs accounts for about a sixth of labour productivity growth over 2000-11 (Molnar and Chalaux, 2015). However, the scope for further productivity gains on this score will diminish over time, as the urbanisation rate approaches that in more advanced economies.

Figure 1. Human capital accumulated slower than physical capital and slower in rural areas



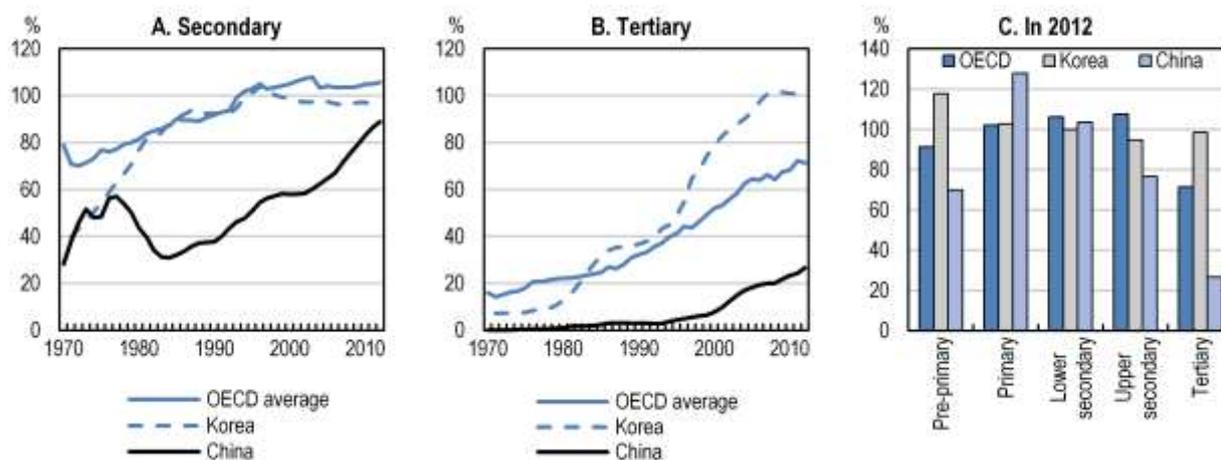
Note: Human capital is estimated as the expected future lifetime income of all individuals using the Jorgenson-Fraumeni approach, where the price of human capital equals the net present value of the individuals' lifetime labour income. To the extent wage income does not fully reflect the marginal productivity of labour due to imperfect labour market mechanisms in China, estimates based on wage income can be interpreted as conservative estimates of human capital as wages tend to be lower than the marginal productivity.

Source: China Center for Human Capital and Labor Market Research (2013).

Educational attainment rates have improved and returns to education are high

4. As a result of policies to boost human capital, enrolment rates have soared over the past decade or so (Figure 2.A-C). Gross enrolment rates at the primary level have long exceeded those in OECD countries, while at the pre-school, upper-secondary and tertiary levels there is still a gap to fill (Figure 2.D). Encouragingly, however, enrolment at the pre-school level has increased rapidly, to 67.5% by 2013, exceeding the 2015 target of 60% (Table 1).

Figure 2. Enrolment rates increased rapidly at all levels
Gross enrolment rates for both genders



Note: Gross enrolment ratios show the number of children enrolled in a level, regardless of age, divided by the population of the age group that officially corresponds to the same level. The ratio can be higher than 100% when children from other age groups are also enrolled. OECD average refers to a simple average of OECD member countries for which data are available.

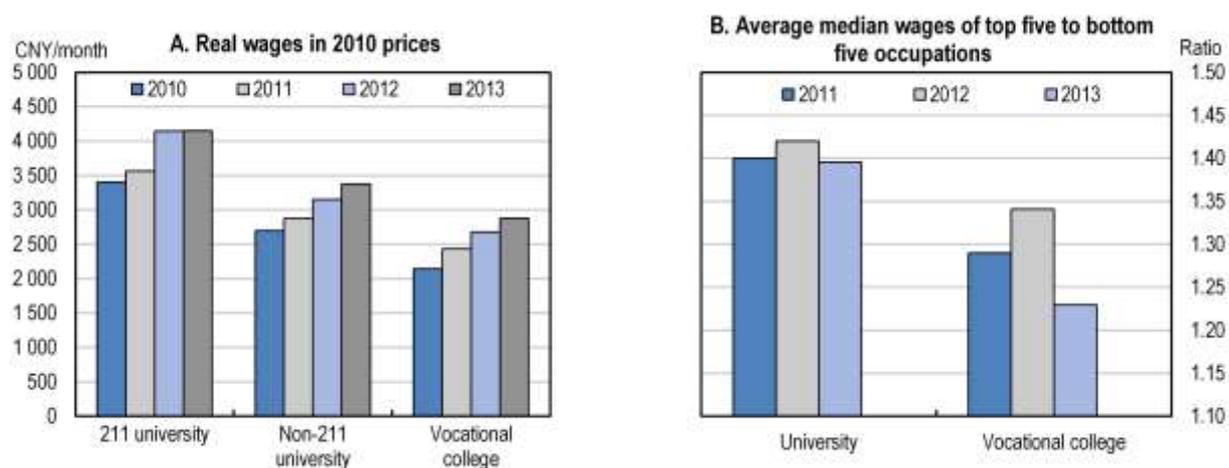
Source: UNESCO Institute for Statistics (UIS) database.

5. Rapidly rising educational attainment is not surprising given the high and increasing returns to education. In the pre-reform era when the wage structure was administratively determined and the state sector provided most employment, returns to education were low. Experience mattered more than education in a seniority-based system (Meng, 2012). With the emergence of the domestic and foreign private sector as large employers, wages became more market determined, leading to increasing wage premia on education and falling premia on experience. Returns to college-and-above education rose from around 16% in the late 1980s to over 50% in 2003 (Meng, 2012). The large-scale expansion of tertiary enrolment in 1999 and the associated decline in quality interrupted this trend and returns even fell slightly. However, over the medium term, skill-biased technological change will likely imply that returns will resume their trend increase. Returns to education measured by increased labour productivity appeared higher in labour-intensive industries although those industries require less skills than capital-intensive ones (Qu and Cai, 2011). This highlights the importance of investing in training workers in labour-intensive industries to boost manufacturing labour productivity.

6. Notwithstanding the diminishing returns to foreign education, more students continue to head abroad, and at younger ages. In the past decades, the returnees or *haigui* could benefit from easier access to top positions, but with the soaring number of jobseekers with foreign education, this advantage seems to be fading. Parents are still keen to send their offspring abroad to gain foreign experience and get exposed to different education environments. The number of Chinese students in higher education institutions the United States soared over the past ten years, to around 270 000 by 2013-14, making up half of the total number of China's overseas students, according to Project Atlas estimates.

7. Employers value the quality of education and skills more than degrees per se. Wages of graduates of prestigious universities continue to be significantly higher than those of other colleges, signalling differentiation by quality (Figure 3.A). Moreover, the wage premium for an average university degree appears small relative to vocational colleges. There is a large difference in wages of university graduates between the top five and the bottom five occupation groups ranked by wages. This may reflect the difference between university quality as graduates of top universities are more likely to be offered top-paying jobs. Such differences are much smaller for vocational college graduates and have shrunk in 2013, mainly due to a faster increase in wages in the low-wage occupation categories (Figure 3.B).

Figure 3. Wages for university graduates are higher and more dispersed than for vocational college graduates



Note: "211" universities represent around 100 top institutions to train talents for the 21st century and non-"211" universities are the remaining nearly 1 000 institutions. Vocational colleges are tertiary vocational institutions. Wages of graduates six months after graduation are ranked by 45 broad occupational groups.

Source: Authors' analyses based on MyCOS survey data.

Providing the skills needed by a knowledge-based economy

8. Migrant labour shortages in coastal cities in recent years might suggest that China has reached a "turning point" where rural labour supply is exhausted, but in fact this "shortage" is caused by obstacles to internal migration. Limited access to public services and social welfare benefits for rural migrants reduces their number and the length of their stay in cities. Although the Social Insurance Law, effective since mid-2011, requires all employers to pay health, unemployment, work injury and pension insurances for all their workers, including migrants, this remains an exception rather than standard practice. Therefore, migrants only stay about seven years in cities on average (Meng, 2012). If restrictions on the access to public services and social benefits were relaxed, 62% of migrants indicated they would stay in the city forever. Given the still large pool of potential migrants, the removal of restrictions would boost labour supply in the medium term.

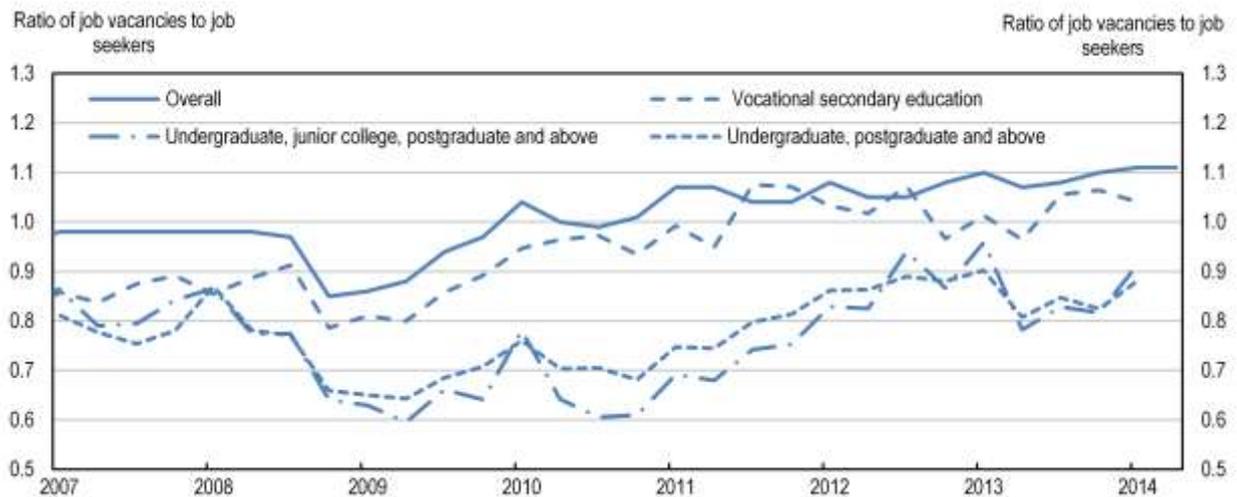
9. However, as the share of the overall working-age population falls, future growth will increasingly depend on the performance of the education system. The present industry structure, based on abundant low-cost labour, needs to adjust to rising wages as labour becomes scarcer once the remaining surplus labour in rural areas has shifted to more productive jobs in cities. Rising wages will imply a change in the relative prices of capital and labour and substitution from labour to capital. More capital-intensive production, in turn, demands higher skills. Indeed, education, measured by years of schooling, is positively correlated with capital intensity in manufacturing (Qu and Cai, 2011). As most of the workforce in China is composed of junior and senior high-school graduates, there is ample scope for investment in education and training to boost labour productivity. Labour productivity would be 23% higher if junior high-school graduates had senior high-school education and would double if senior high-school graduates had college training. Higher education attainment alone, however, may not be sufficient. To adapt to the changing industry structure, a broad set of skills and wide general knowledge are needed, which facilitate the acquisition of new skills.

For new college graduates it appears increasingly difficult to find a job

10. Increasingly, new college graduates struggle to find a job that fits their training, even though overall vacancy rates are high and rising (Figure 4). Job creation in 2013 in urban areas was a record high and the official urban unemployment rate remains low. Youth unemployment of the 15-24 age-group has

been edging up in recent years, but was still relatively low at 9.7% in 2012 and the gap with total unemployment is below the OECD average. Vocational secondary graduates are presented with more job offers per capita than college graduates. The most sought-after graduates are trained in the service, equipment operator and technical professional categories (Figure 5). In contrast, clerical and secretarial jobs are in shorter supply relative to the number of jobseekers. Reflecting the requirements of an expanding service sector, most secondary-level professional education and training has been offered in recent years in the areas of information technology, finance, economics and trade and healthcare.

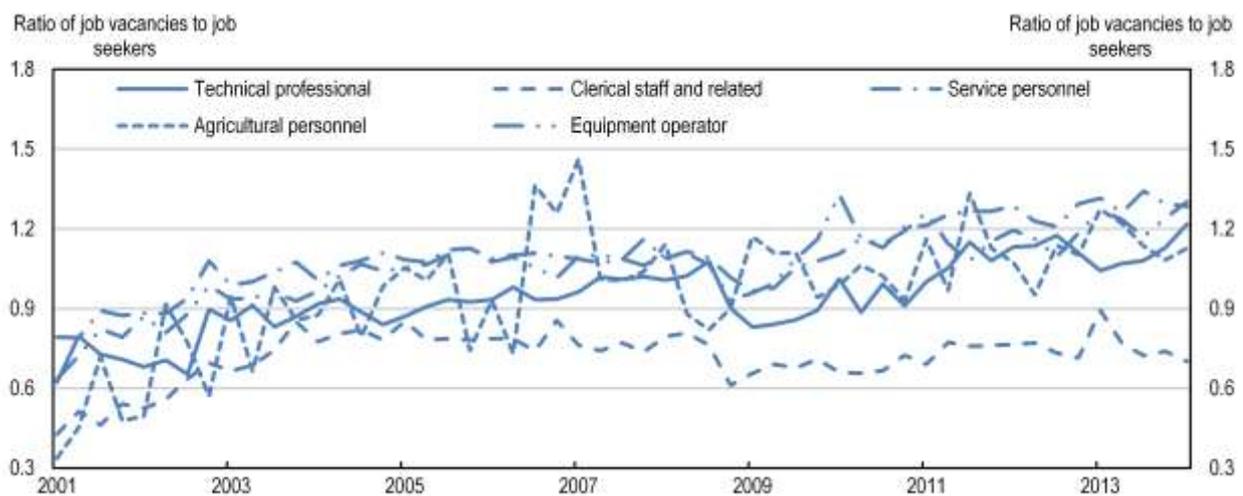
Figure 4. There are more vacancies per vocational high school than per university graduate
Ratio of job vacancies to job seekers



Note: Ratio above one means more jobs on offer than the number of job seekers in the respective category.

Source: China City Labour Force Survey, Ministry of Human Resources and Social Welfare.

Figure 5. Service, operator, technical and agriculture jobs are hard to fill while there are excess clerical staff
Ratio of job vacancies to job seekers



Note: Ratio above one means more jobs on offer than the number of job seekers in the respective category.

Source: China City Labour Force Survey, Ministry of Human Resources and Social Welfare.

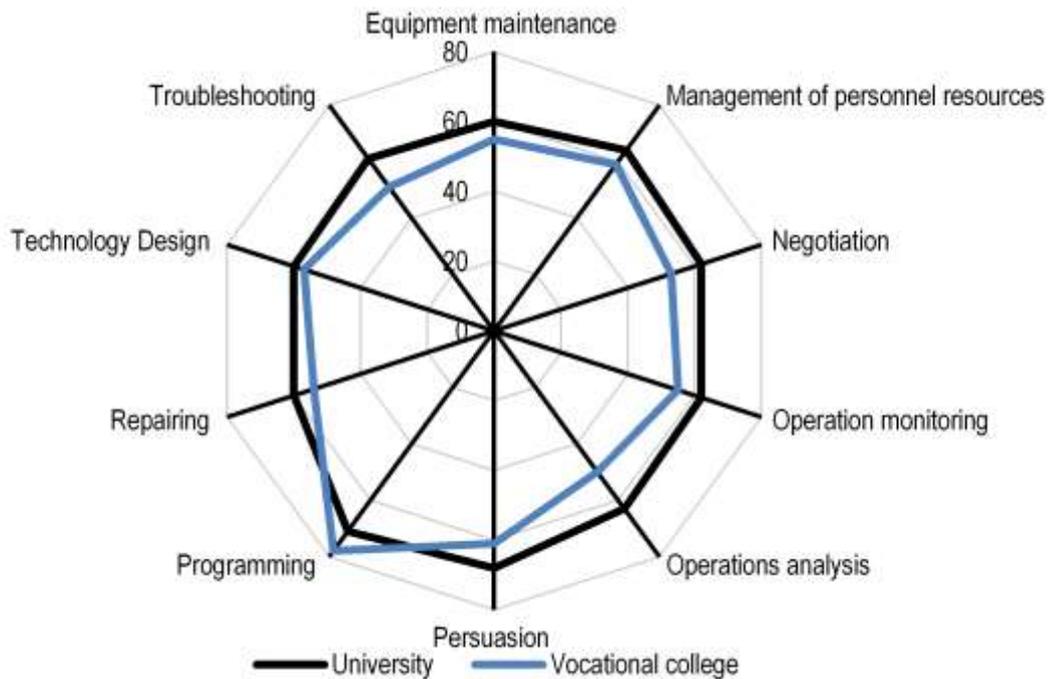
11. College graduates, even when they take up a job, often state that the positions they find fail to meet their expectations. According to the survey of 2013 graduates by MyCOS, over half of the newly-

employed university graduates and 60% of vocational college graduates say so. Moreover, a third in both groups had higher career expectations than what their present positions provide. The large gap between expectations and actual tasks leads to high job turnover: 43% of vocational college graduates quit their job within half a year after graduation, and so do 24% of university graduates. The overwhelming majority quit voluntarily and primarily because of a lack of development opportunities and low salaries. The lower turnover among university graduates and especially among top ones suggests that a stronger education background improves labour market matching. Such a high turnover hinders the accumulation of skills and experience and is not conducive to employers investing in training.

Jobseekers' skill sets do not sufficiently match market demand

12. The supply and demand of skills do not match for new graduates. The MyCOS graduate survey conducted in 2013 and covering 150 000 recent graduates asked them to rank skill categories by importance for their new jobs (Molnar et al., 2015). Soft skills such as management and communications ranked among the top ones. For university graduates, speaking, negotiation, persuasion and active learning precede practical skills such as programming. Vocational college graduates rank programming first, but the following skills in the ranking are similar to those of university graduates: speaking, negotiation, persuasion and judgement and decision making. Maths, writing and repairing are considered by both types of graduates among the least important knowledge/skills in the present marketplace. The skills acquired at the time of graduation do not appear to match the skills necessary to perform the job. The difference between the self-reported acquired skills at the time of graduation and the skills needed in their job six months after graduation gives a gauge of the mismatch in the graduate labour market. According to this measure, university graduates experienced the greatest mismatch in programming, followed by persuasion, management of personnel resources, operations analysis, operation monitoring and negotiation (Figure 6). Vocational college graduates also felt their programming skill deficit is the most acute, followed by persuasion, management of personnel resources, technology design and equipment maintenance.

Figure 6. Programming as well as management and other soft skills are falling short
 Percentage of university graduates in the top ten skill categories with the greatest gap, 2013



Note: University and vocational college graduates who had a job six months after graduation were asked whether the 5 skill categories out of 35 that are related to their job are necessary to perform their job (scale 1-7) and whether they had acquired the given skill by the time of graduation (scale 1-7). The difference between the weighted averages of the extent of necessity and the extent of acquired skills at school captures the skills gap. The ranking is based on the results for university graduates. Vocational college graduate skill shortages in the same skill categories are shown for comparison.

Source: Authors' analyses based on MyCOS survey data.

13. In some knowledge and skill categories, such as maths, monitoring, systems evaluation, instructing and equipment selection, less than half of university graduates think they acquired adequate skills at university to perform their job. Besides, in some of these categories and in financial and material resource management some feel they do not make use of those skills in their daily assignments. Surprisingly, graduates of vocational schools give very similar answers, suggesting skill shortages in those areas are not specific to certain school types.

14. There also appears to be a gap between the knowledge students acquire at higher education institutions and what is needed in their jobs. College training needs to catch up with the rapid development of services in recent years to provide enough professionals in areas such as sales and marketing, reported to have the greatest shortage: 64% of university and 59% of vocational college graduates judge their knowledge in this area insufficient to perform their job (Figure 7). Other services for which training is insufficient include personnel and human resources, therapy and counselling, and customer and personal services.

Figure 7. Service-related training is not meeting labour market needs
 Percentage of graduates reporting shortage of knowledge, top ten areas, 2013



Note: University and vocational college graduates that had a job six months after graduation were asked whether the 5 knowledge categories out of 28 that are related to their job are necessary to perform their job (scale 1-7) and whether they had acquired the given knowledge by the time of graduation (scale 1-7). The difference between the weighted averages of the extent of necessity and the extent of acquired knowledge at school captures the knowledge gap. The ranking is based on the results for university graduates. Vocational college graduate knowledge shortages in the same knowledge categories are shown for comparison.

Source: Authors' analyses based on MyCOS survey data.

15. Students very often end up in unrelated professions (31% of university and 38% of vocational college graduates) because there are not sufficient openings related to their major (16% of university and 13% of vocational college graduates that start a different profession from their major) or because they cannot reach the requirement for jobs related to their majors (11% of university and 13% of vocational college graduates that take up positions unrelated to what they studied). This indicates that the skills provided at higher education institutions do not sufficiently match market demand.

Higher education should focus more on applied skills

16. Practical and soft skills appear to be in greatest shortage among university graduates, reflecting an overly academic focus at those institutions. As noted above, programming skills are lacking most alongside soft skills such as human resource management or customer service. Soft skills in particular can be better acquired during workplace training, but internships would also help polish practical skills such as programming. While there is a need to train researchers in all areas, most university graduates will likely be working in applied areas needing more skills and knowledge that can quickly be put into use. The need for such applied programmes is more acute in universities not belonging to the “211” or “985” leagues as their graduates are more likely to face intense competition for jobs than graduates of top universities.

17. Recent measures to make higher education more relevant for the market include the pilot Engineering Excellence Training Plan that aims at establishing a mechanism for joint training of engineers by schools and firms. The Plan started in 2010 and covers 1257 undergraduate and 514 graduate majors in 208 higher education institutions. In the three years following the adoption of the Plan, 47 000 participants graduated and the overall quality of students and employer satisfaction are said to have increased.

Workplace-based vocational education and lifelong learning are key to provide the needed skills

18. Many jobs require vocational qualifications in China, and this is likely to remain so given that higher-level qualifications are also in high demand in OECD countries with more advanced industry structures (OECD, 2014b). It is estimated, for instance, that roughly two-thirds of overall employment growth in the European Union is likely to be in the “technicians and associate professionals” category. Likewise, in the United States, one-third of vacancies by 2018 will require professional training. As China’s industrial structure is adjusting towards that of more advanced countries, with services playing a greater role and with higher value-added manufacturing, demand for vocational skills is likely to increase further.

19. In 2010, existing majors in secondary vocational schools were re-aligned with industrial professions and 321 new ones were established to improve the match between subjects taught and professions. The skills gap in the labour market, however, is not only related to the mismatch between majors and positions on offer. To meet market demand for vocational skills, professional education and training efforts need to be stepped up: more students should learn marketable skills, more government support should be directed to such training, and it should reach out to all ages and all categories, including the unemployed, the laid-off with obsolete skills and the low-skilled. Training a large number of people, often in new areas, and equipping them with marketable skills requires an institutional framework that effectively co-ordinates between employers, teacher-trainers, students and the government and enables mobility across different institutions and streams. It also demands better information systems on skill levels, needs and labour market outcomes.

Workplace training is key to effective vocational education

20. A key ingredient to develop relevant skills is workplace learning, which should be part of the curriculum, credit-earning and quality assured (OECD, 2014b). In countries with successful upper secondary and post-secondary vocational training systems such as Switzerland or Germany, workplace learning is typically part of the curriculum, in the form of apprenticeships or substantial internships, and earns credit. Workplace training is a precious experience for students as they can acquire the practical skills needed for their profession and thus become more employable by the time they graduate. It also provides an environment where trainees and employers can get to know each other, potentially leading to a job offer following graduation.

21. The Chinese government has made strengthening workplace training a major target of its vocational education reforms. However, workplace training in China is sporadic and far from being a required element of vocational programmes outside long-established trades such as martial arts and traditional Chinese medicine (Wang, 2014). The 1996 Vocational Education Law encourages partnerships with industry to gain practical experience. A 2011 survey of over 100 secondary vocational schools in two provinces showed that although 91% of schools had some type of industry partnership, most such partnerships took the form of sending graduates to enterprises as full-time employees (80%) and only just over 70% of the teachers reported that any of their students ever attended industry internships (Yi et al., 2013). In August 2014, the Ministry of Education issued an Opinion on Piloting a Modern Apprenticeship System, with detailed implementation measures to follow. As workplace training is not systematic at vocational schools, the quality of available assignments is not assured, potentially leading to abuse of student labour. In some cases, interns were assigned tasks usually performed by unskilled workers. Such experience does not improve students’ practical skills, nor does it help with future job search. Some soft skills that are perceived to be missing by tertiary graduates such as sales, marketing and, in general, dealing with customers, can be learnt more effectively in workplaces than in classrooms. Making workplace training a systemic and mandatory part of the curriculum would have a number of advantages. It would provide a powerful tool by which the mix of provision can be matched to labour market demand (by

constraining provision in fields which employers do not support with work placements). It would therefore provide strong incentives both for training providers and employers to work in partnership (since government funding would only flow to training where such local partnerships exist in the form of work placements). It would also avoid the risk that internships are only available to students whose parents are well-connected.

22. To make workplace training beneficial for all parties involved, an effective coordination mechanism between schools and businesses is needed and government intermediation could facilitate this process. Such coordination in China takes the form of tailor-made training, where schools train students on demand, combining work and learning either as a factory in the school or a school in the factory and school-run enterprises (Zhao et al., 2013).

23. The costs of providing training that meets both production and learning goals could also be shared among those three parties. Government support is warranted as the social return to developing skills needed by enterprises is high. Secondary vocational education is free for rural students, for urban students from disadvantaged backgrounds and for all students choosing agriculture-related subjects as major, but making it free as well for all urban students and linking school grants to systematic internship offerings could boost social returns to professional training. Progress is being made in this direction, with secondary vocational education now free in 18 provinces and municipalities (UNESCO, 2014). Individuals should also contribute to their skill development, in particular at the tertiary level, as the private return to marketable skills is also high. Enterprises should be interested in providing internship opportunities as part of their recruitment process given the shortage of needed skills, but very high turnover rates discourage them from spending on training. As noted above, high turnover rates are largely related to misperceptions about the job and wrong career expectations. Earlier internship experience would help reduce such expectation gaps.

Vocational teachers should be able to teach knowledge and train practical skills

24. As vocational school teachers need to possess thorough academic knowledge, up-to-date industry experience and pedagogical skills, a system allowing for a blend of those skills should be encouraged. In particular, industry experts can be effective part-time instructors in schools while retaining their role in industry, or alternatively entering the teaching profession full-time in mid-career. But regulatory barriers, such as identical qualification requirements with those of full-time career teachers, stand in the way and should be dismantled. Teacher training programmes where a blend of skills can be acquired also need to expand to meet the demand for multi-skilled trainers.

25. The aforementioned 2011 survey showed that although 95% of teachers had a degree, 82% had teaching certificates and only 32% had any kind of industry experience (Yi et al., 2013). Moreover, less than half of those with industry experience had relevant experience and they had a relatively short history of teaching. Dual certification among teachers is aimed to reach 60% by 2020 (Ministry of Education, 2014), but should be expanded further to meet the demand for both technical and teaching skills in professional education and training.

Basic skills need to be strengthened in a meaningful practical context

26. Integrating basic skills teaching such as numeracy or literacy with professional training appears to be more conducive to programme completion than remedial courses, insofar as skills taught in one course and reinforced in another can be mastered more easily (OECD, 2014b). Also, in contrast to remediation, in OECD countries, basic skill courses are credit earning and involve no additional cost for students. The large number of adults enrolled in primary and middle schools, at nearly 2 million in 2013, suggests that many need to strengthen their basic skills, particularly older women and women in rural areas.

Such basic skills might be acquired in meaningful practical contexts – particularly important when some of the adults involved may have unhappy memories of failing at school in a classroom setting.

Lifelong learning is important to acquire new skills in an ever-transforming economy

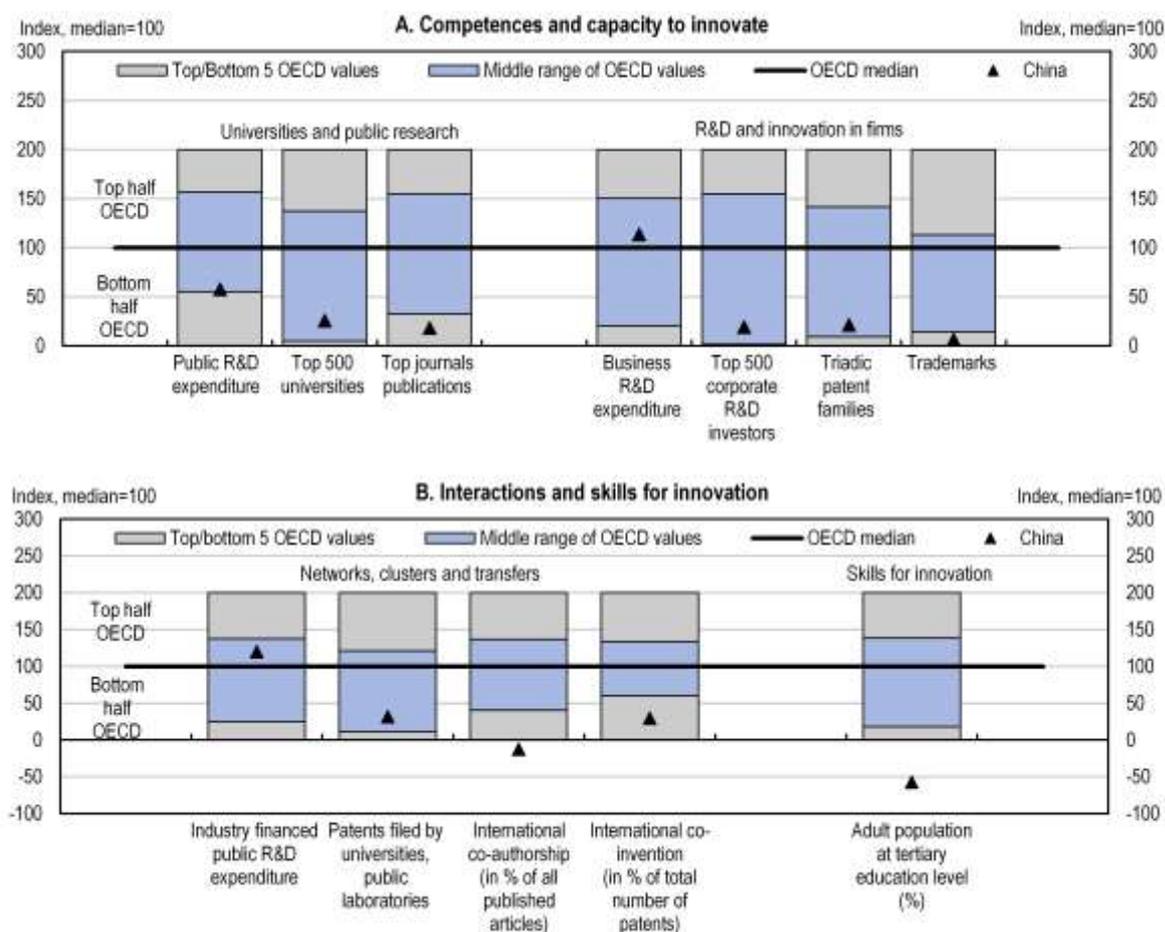
27. The major structural changes that the Chinese economy has undergone and is expected to undergo in one's working life span imply a continuous need to upgrade skills to meet market demand. Lifelong learning should therefore feature more prominently in the agenda for skill development. The 2010-2020 Plan envisages doubling the number of adult participants in continuous education to 350 million by 2020. In 2012 alone, nearly 6 million adults participated in lifelong learning programmes at higher education level, mostly in correspondence and spare-time courses run by regular higher education institutions and much less in adult higher education institutions. Most participants are enrolled in applied sciences such as engineering and medicine but the share learning administration or literature is also high. The Plan calls for a basic framework for lifelong education so that everyone can be taught what they want to learn, excel in what they learn and put what they learnt into use.

28. Employers are encouraged to provide continuous training to their workforce and are required to allocate an amount equivalent to 1.5% of the wage bill for training purposes. Firms with high technical skill requirements and good economic performance have to allocate 2.5% of wages. Available data suggest that in some cities, employers allocate less than even 1% of the wage bill for training. Clearer career prospects and planning, wider and better education in full-time institutions could enhance firms' incentives to train their workers while requiring repayment of training in case of resignation may deter excessive job hopping.

From “Made in China” to “Created in China”

29. Innovation is set to play an increasing role in raising productivity and the transition to a knowledge-based economy in the years to come (OECD, 2013). Given the complementarity between technology and skills, the accumulation of human capital will be key in this respect. R&D spending had risen to over 2% of GDP by 2013, above the EU average, and the aim is to raise it to 2.5% of GDP by 2020. Moreover, Chinese innovation output is still lagging in terms of international patenting and trademark registration (Figure 8) notwithstanding the exponential rise in the number of patents registered in China.

Figure 8. Capacity and skills to innovate need to be strengthened



Note: * indicates normalisation by the size of the economy. All indices are normalised relative to the median values in the OECD area (Index median=100). Country values are compared to the median observed in the OECD area. China may appear out of range i.e. lower than the lowest OECD country for some indicators.

Source: OECD (2014a).

Better university-industry collaboration is needed

30. China generates a large volume of knowledge, being the third largest producer of scientific articles (National Science Foundation Science and Engineering Indicators, 2014). Most of the world's top 20 patenting universities were in China in 2008, but patents' rate of utilisation is low, at 5% compared to for instance, Japan's 27%, and the bulk of university research lacks relevance for business (Luan et al., 2010). This suggests that there is wide variation in the quality of research. Furthermore, as regards patent citations, China has a gap to fill with countries at the technology frontier (Kwon et al., 2014). Producing more patents can boost productivity only if they are used or effectively commercialised. There are considerable variations across provinces and municipalities with respect to the efficiency of upstream R&D and downstream commercialisation (Guan and Chen, 2010). In a number of places, research needs to become more market-oriented. In many cases, information exchange platforms could facilitate the diffusion of patents and stimulate demand for innovation. A functioning venture capital system would help too. In places with better commercialisation but weaker R&D, there is a need to encourage innovation by strengthening the protection of intellectual property rights.

31. A better research evaluation system at universities that strikes a balance between quantity and quality, including applicability, would encourage more focus on utilisation. The present evaluation system focuses on patenting but pays less attention to utilisation. Since 2002, universities can own intellectual property rights in government-funded projects, which led to the surge in the number of patents, but incentives for commercialisation are lacking. National Technology Transfer Centres (NTTCs) act as intermediaries between university and industry to diffuse inventions. Unlike University Technology Transfer Offices in advanced economies that transfer technology through licensing, NTTCs in China mainly capitalise inventions through technology development contracts and the creation of university technology-based firms (Miesing et al., 2014). More autonomy for NTTC staff to market patented technology could make NTTCs more effective in increasing the utilisation rate of university patents. The East China University of Science and Technology for instance managed to build up a patent-transfer and commercialisation system and reached a 53% utilisation rate (Luan et al., 2010). Zhejiang University established its own Science and Technology Development and Transfer Office in the early 1980s and maintains close contacts with local governments. Its technology co-operation projects reach over 20 cities and counties in the province.

32. Low patent licensing partly reflects the inability of many Chinese firms to understand and recognise patents' value or the lack of absorptive capacity to commercialise them (Miesing et al., 2014). In addition, many patents may have no commercial value. More and more universities, however, set up firms to commercialise their inventions. Technology-based spin-offs now generate sizeable revenues for Tsinghua, Peking and many other top universities.

33. Notwithstanding relatively high overall R&D spending, the share received by higher education institutions in 2012 was only 0.15% of GDP versus 0.43% in OECD economies, reflecting the limited role of universities in this area compared with research institutions and businesses (OECD, 2014a). Moreover, over a half of that went to applied research and only a third to basic research and 13% to experimental development. A promising sign is, however, that businesses finance a high and increasing share of it, reaching a third in 2012, up from a fifth in 1990. A performance evaluation of 69 universities based on 14 input and 16 output indicators (including indicators capturing both teaching and research output) over 2006-08 showed that only 29 produced sufficiently high outputs given their inputs (Higher Education Research Centre of the National Institute of Education Sciences, 2009). Increased spending on university research should therefore be accompanied by efforts to raise the production of outputs such as national scientific awards, patents and technology transfer.

Training and attracting highly skilled human resources would boost innovation

34. Although China has the world's largest pool of human resources for science and technology, the shares of tertiary graduates in general and of doctoral graduates in science and engineering in particular are still very low (Figure 8.B). Furthermore, China aspires to train more world-class researchers. The need to attract globally established academics has long been recognised, to wit the Changjiang Scholars scheme established by the Ministry of Education in 1998 or the Thousand Talents Project launched in 2008. A more recent and comprehensive initiative is the *National Medium-and Long-term Talent Development Plan (2010-2020)* to attract and retain highly skilled individuals in six broad areas (political leaders and officials, business entrepreneurs, technical professionals, highly skilled industry staff, skilled workers in agriculture and rural areas and skilled social workers). In 2014, around a third of companies encountered a skills shortage, and 6% filled the gap by recruiting foreign talent (Standard Chartered, 2014). Although this share appears to be increasing, the talent gap is still well below the levels of around 70% reported in Brazil and India according to Manpower (2014).

35. Returnees, overseas workers and students are important human resources to tap for the knowledge economy. Although in China, as in other emerging economies, concerns have been raised about the outflow of talent (“brain-drain”), cross-border human mobility has been beneficial as it spurs innovation in Chinese high-tech firms (Liu et al., 2010), opening up a new channel of technology spillovers. Returnees facilitate both direct technology transfer and indirect technology spillovers to other local firms. Attention should also be paid to nurturing the non-technological skills for innovation such as management and marketing, which are indispensable to raise the utilisation rate of generated knowledge (Squicciarini and Le Mouel, 2012). Given the limited success so far with reversing the brain-drain, in particular as regards top-notch scientists, more efforts are needed in addition to financial incentives, including research autonomy, merit-based promotion and stronger protection of intellectual property rights.

Boosting quality at all levels

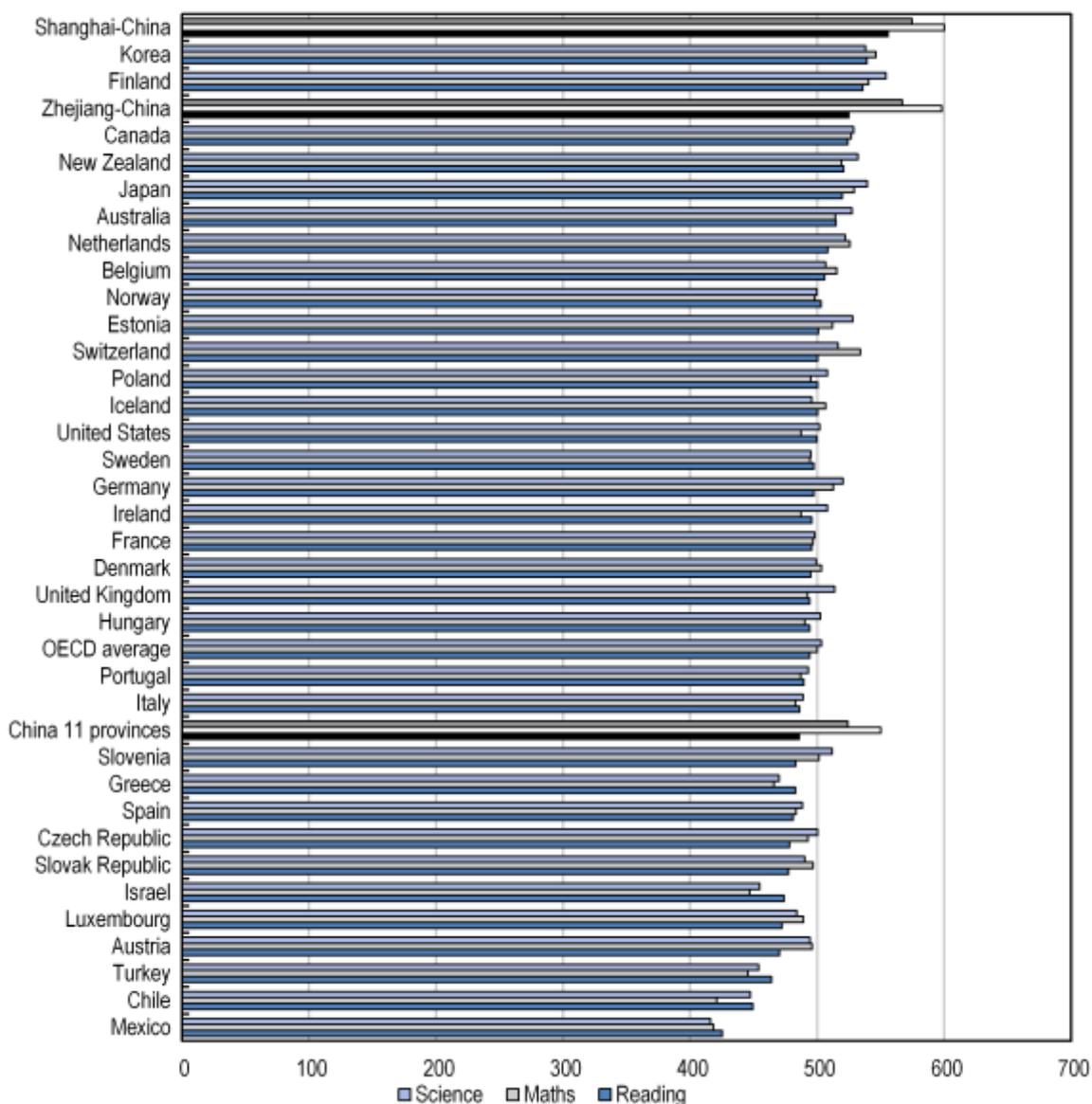
36. On some measures, the Chinese education system performs very well, but greater focus on quality at all levels would be more conducive to accumulating the skills needed by the rapidly transforming economy and ageing society. In addition to providing the right types of skills and knowledge (as discussed in the previous section), a good education system teaches how to learn and fosters curiosity and creativity rather than the mere pursuit of certificates.

Comparable education outcome measures indicate high quality

37. The OECD’s internationally comparable PISA scores measuring 15-year olds’ competence in math, reading and science have ranked Shanghai on top worldwide ever since it took part in the OECD Programme for International Student Assessment (OECD, 2014c). PISA-like trials were also carried out on a voluntary basis in 2009 for 21 003 pupils from 621 schools in 11 provinces and municipalities (Fangshan District in Beijing and Tianjin Municipality; Hainan, Hebei, Hubei, Jiangsu, Jilin, Ningxia, Sichuan, Yunnan and Zhejiang provinces). In the case of Zhejiang Province, only Korea and Finland performed better in reading and neither did in maths nor in science in 2009, when the trials took place (Figure 9). Fangshan and Jiangsu also performed well above the OECD average. The average reading score for the 11 provinces and municipalities was only slightly below the OECD average. Their average performance was above any OECD member in maths and behind only six OECD countries (Korea, Finland, Canada, New Zealand, Japan and Australia) in science. The extremely high achievement in maths not only in Shanghai and Zhejiang, which are famous for their education systems, but also in the other 10 provinces and municipalities reflects a strong bias towards maths in the Chinese education system, in particular in after-school courses.

38. Chinese universities are also represented among the top ones worldwide: two (Peking and Tsinghua University) are among the top 50 and several others among the top 400 in the world ranking by Thompson Reuters that takes into account teaching, research, knowledge transfer and international outlook. Those universities all belong to the top league of institutions benefiting from special attention in all respects (Box 2). It makes a big difference whether someone is a graduate of a top university or of an ordinary one. A university degree, unless from a top “211” university, does not offer more value than a vocational college degree, neither in terms of employment possibilities nor in terms of salary (Figure 3.A and 10).

Figure 9. Shanghai leads and other 11 provinces perform close to the OECD average in PISA-type tests
 PISA scores in reading, maths and science, 2009



Note: The ranking of countries and provinces is according to the reading score.
 Source: OECD: PISA 2009 database and Xue (2012).

Box 2. “211” and “985” – top league universities

“211” universities represent over 100 top public institutions with some well-reputed departments that have jointly been designated by the National Development and Reform Commission, the Ministry of Education and the Ministry of Finance and tasked since 1995 by the State Council to “nurture talents for the 21st century”, with substantial financial support from the Ministry of Education. They are located all over the country but with a strong bias towards Beijing and Shanghai, where nearly 30% of them are situated. Some of the most populous provinces have only a few universities in this league and Henan, China’s demographically largest province, has only one.

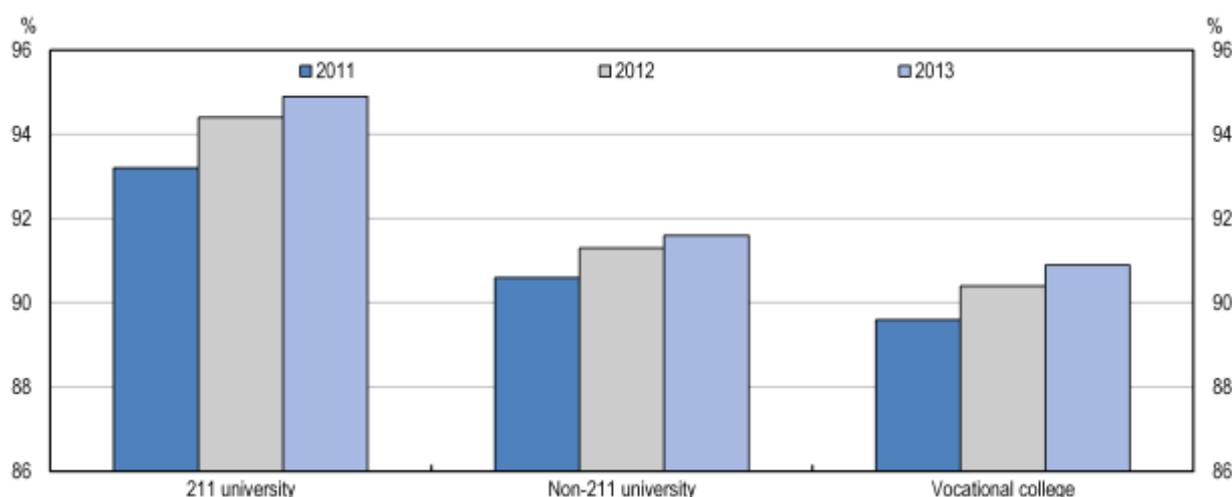
The history of the “985” league goes back to May 1998 when then-President Jiang Zemin made a speech on the occasion of the 100th anniversary of Peking University underscoring the need to establish world-class universities. The 985 universities have been given ample funding to build new research centres, improve facilities, hold international conferences, attract world-renowned faculty and visiting scholars, and help Chinese faculty attend conferences abroad. The 985 group now counts 39 members including the best-known universities such as Peking, Tsinghua, Renmin,

Fudan and Beijing Normal. Most are located in Beijing, some in other large cities and provincial capitals, but not all provinces host one.

Both “211” and “985” universities are administered directly by the Ministry of Education. Some other ministries also have universities but the majority are governed at the province level.

Figure 10. Top university graduates have the highest employment rates

Employment rates 6 months after graduation



Note: “211” universities represent around 100 top institutions to train talents for the 21st century and “Non-211” universities are the remaining nearly 1000 institutions. “Vocational colleges” are tertiary vocational institutions. The employment rate is defined as the ratio of the employed to the employable, including the self-employed but not including students continuing their studies after graduation.

Source: Authors’ analyses based on MyCOS survey data.

39. It is hard to benchmark China’s education system against best practices since China as a whole does not yet participate in the PISA survey, nor in other projects comparing outcomes across countries such as the Trends in International Mathematics and Science Study (TIMSS), Progress in International Reading Literacy Skills (PIRLS), the Teaching and Learning International Survey (TALIS) comparing teachers or the Programme of International Assessment of Adult Competencies (PIAAC) assessing adult skills. Country-wide surveys assessing education outcomes have been scarce too. The scores obtained at the *gaokao* exam (which conditions access to higher education) cannot serve as nationwide indicators since this exam is administered at the provincial level, with around half of the provinces and municipalities having their own exam questions rather than the national ones used by other, primarily less wealthy, ones. Exams at earlier stages, for instance to enter lower and upper-secondary schools (or even good primary schools) are even more decentralised – to the city, county/district or even the school level – hampering comparisons.

40. The importance of comparing the performance of pupils at various levels has, however, been recognised and in 2013 the Ministry of Education called for the creation of an indicator system to assess the quality of education at primary and lower-secondary levels. The indicator system covers 20 indicators in five major dimensions not confined to academic performance but also including moral development, physical and mental development, nurturing of academic interest and pupils’ burden. This framework was piloted in 30 areas, including in Zhejiang Province and Shanghai Municipality.

But other features of the system suggest less focus on quality

41. The Chinese national education plan places strong emphasis on the need to move away from the current competitive education system based on rote learning and focusing on test scores (Fan and Yang, 2012) and attaches great emphasis to fostering creativity and allowing individuals to develop different skills at their own pace. Several aspects of the current education system are recognised as needing reform to enable the country's transition towards an innovation economy. Schoolwork burdens on primary and middle-school students are often too heavy and there is enormous family pressure to get admitted to good schools. Schools are also keen to boost their reputation by sending as many of their graduates as possible to prestigious institutions. This leads to a myriad of techniques to enhance performance and keeps afloat an industry of innovators, producers and suppliers of cheating devices.

42. Notwithstanding the heavy schoolwork burden on pupils, schools do not adequately prepare them for exams to advance to higher levels. Tutoring and test preparation courses come extra, and are provided by a thriving private sector. Tutoring is a rapidly expanding and profitable business with several providers listed on stock exchanges. In 2011, over 71% of families spent money on after-school tutoring, mainly at the primary and secondary levels. With rapidly growing household disposable incomes, as long as tutoring is a prerequisite to academic success, such spending will increase.

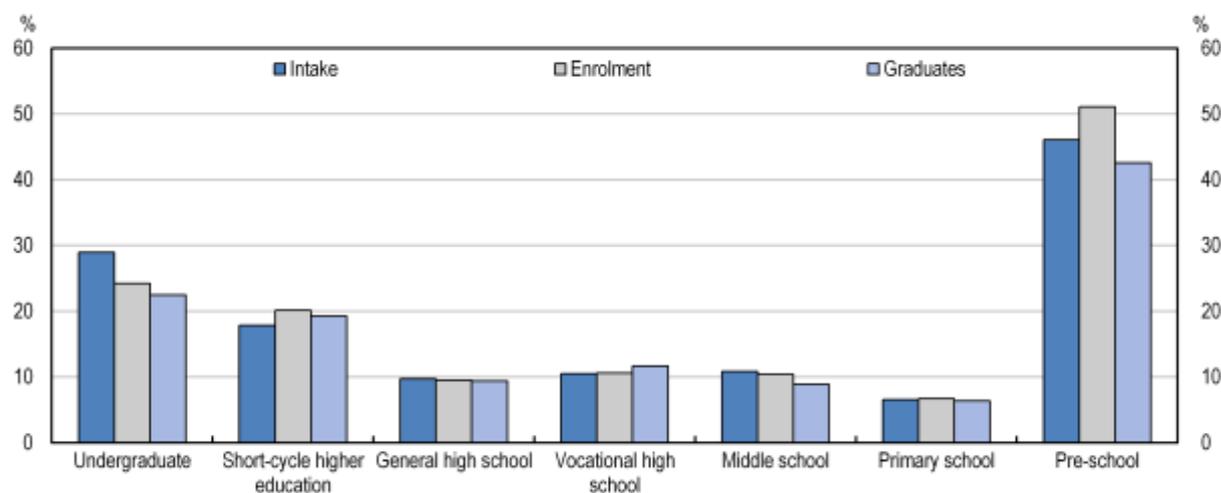
43. Fierce competition resulted in seeking alternative ways to enter good schools, notably by doing well in national competitions such as the maths Olympiads. In 2012, the Ministry of Education decided to no longer take into account Olympiad scores for university admission starting with the pupils entering high school in 2011 (i.e. the cohorts taking the *gaokao* from 2014 onwards). While competitions enable talented children to measure their knowledge in specific areas, excessive focus on performance in one area may hinder the acquisition of a broad set of skills and a wide range of knowledge, which would be more beneficial at an early age.

44. Examination pressure is also an issue during later studies. Plagiarism is widespread at universities (Fang et al., 2013). Excessive focus on certificates has also bred diploma mills producing fake degrees of famous foreign and domestic universities.

Private educational institutions should be provided a level playing field

45. Private educational institutions can make up over half of enrolment at certain levels in the education system (Figure 11), but many lag behind public schools in many respects including quality, budget and reputation. Participation of the private sector in providing education has long been encouraged in order to supplement limited government resources in the face of ever-increasing demand and to involve entrepreneurs in the formation of the country's human capital. Since the 2002 Law to Foster Private Education, consideration has been given to putting the private sector on an equal footing with public providers of education services but progress on this score is still called for. Most private schools can attract only less qualified teachers as they cannot offer civil servant status and their means to offer higher remuneration are limited. Private institutions, in particular higher education institutions, have also failed to attract the best students. A lack of good teachers and students and scarce funding have largely contributed to the lower status of private schools in general. As private schools play an important role in supplementing public education, obstacles to attracting quality teachers and resources should be removed and stronger quality controls put in place.

Figure 11. Private institutions' share is large at some levels
Share of private institutions in intakes, enrolment and graduates, 2013



Source: Educational Yearbook of China, 2013.

46. A special segment of private schools consists of local international schools (which, in contrast to international schools for foreign students only, admit both Chinese and foreigners) run by joint ventures and offering international curricula. These schools mostly cater to students heading for overseas universities in Anglophone countries and charge fees comparable to private schools in OECD countries that only the top one percentile of households can afford (Standard Chartered, 2014).

Reform measures reflect commitment to quality and need to be implemented

47. Rapid demographic change alongside structural transformation of the economy will be shaping demand for education at all levels in the medium term. The number of pre-school and primary-age children will continue to increase over the next 10-15 years and this trend may be amplified by the ongoing relaxation of the one-child policy. At higher levels in the education system, however, even allowing more than one child cannot stop the decrease of those cohorts over the next 10-15 years. University applications, for instance, have been declining since 2008 and admission rates are rising. With a decreasing school-age population, schools will be under increasing pressure to differentiate themselves by quality.

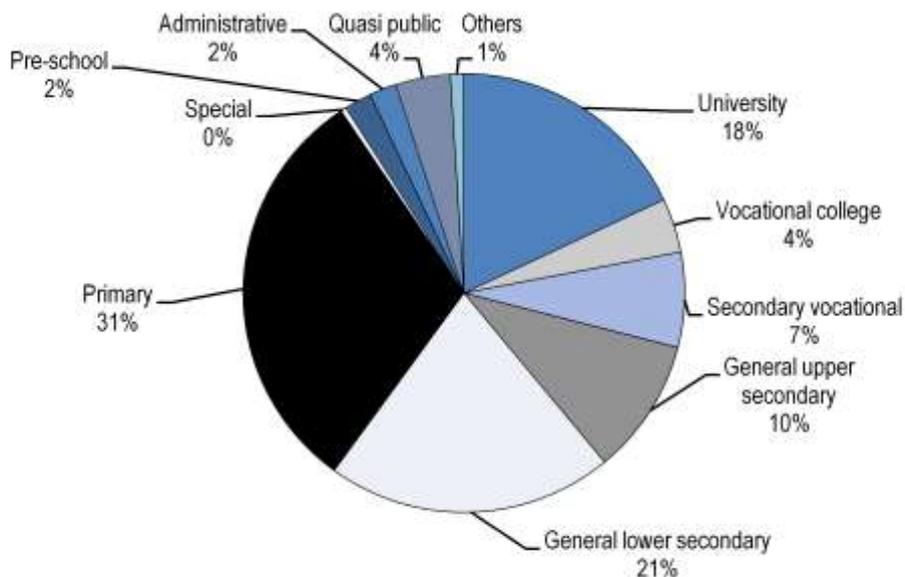
Quality is often constrained by funding, notably in vocational education

48. Underfunding of education institutions is a major reason for not delivering the quality needed for China's socio-economic development and demanded by the recipients of the service. China spent a percentage point of GDP less on education than the OECD average at around 6% in 2011, which is in line with Brazil's spending at 5.9% and higher than Russia's at 4.6%. Moreover, a larger part of spending comes from tuition and other fees than from budgetary sources compared to OECD countries. OECD countries on average finance almost 90% of their education spending from the budget, while in China that share is only 81%, although increasing from two-thirds a decade earlier. In recent years, the government has been continuously raising education spending at all levels. China achieved its long-term spending goal in this area in 2012, when public spending reached 4.3% of GDP. Spending in general needs to increase further to accelerate the build-up of human capital as the population ages and the share of government spending in particular needs to increase to reduce the burden on students and their families at lower levels in the education system where the social returns are higher.

49. Vocational education remains underfunded, but the government is striving to channel more funds to this type of education. Since 2006, at least 20% of education surcharges (3% surtax on the value added, consumption and business taxes going to the local treasury and 2% on the same tax base to the central government) must be spent on vocational education, and 30% in areas that have achieved full coverage in nine-year compulsory education (State Council Decision 2005/35 referring to urban areas). From 2014, at least 30% of education surcharges must be spent on vocational education in all areas (State Council Decision 2014). Nevertheless, while some 40% of students in higher education attend vocational colleges, these colleges account for only 5% of total spending, as against 23% for universities (Figure 12). Similarly, over 47% of high-school students were enrolled in vocational schools, but the latter can only spend three quarters of what general high schools spend. The share of secondary and tertiary vocational education in total education-related public expenditure was only 11.4% in 2013. The longstanding objective to spend at least a fifth of total education spending on vocational training has not yet been met. However, in 2014, the government set a target to spend at least CNY 12 000 (equivalent to about USD 3 570 at PPP exchange rates) per vocational college student by 2017, close to the level spent on undergraduate students. In some OECD countries with widespread vocational training, such as Austria or the Czech Republic, the share of spending can reach nearly a fifth, but on average OECD-wide it is around 12%. Training in a workshop setting for a trade or craft is typically more expensive than classroom teaching, because of the required equipment and the need for training in relatively small groups. This is generally recognised in per capita funding of vocational schools at a higher level than for students in academic schools. In China, vocational colleges tend to be located in smaller cities and to cater to poorer students, so they cannot charge high tuition fees nor rely on donations as much as more prestigious universities. This reduces their chances to attract good teachers and invest in the equipment needed to improve quality.

Figure 12. Little is being spent on vocational education at secondary and tertiary level

Share of total education spending, 2011



Source: Ministry of Education.

50. Decentralised governance may be more flexible to meet local needs and to support innovation and competition, but may lead to duplication of tasks and may render quality assurance difficult. The opening-up of the economy in 1978 led to demand for new skills. The rapid structural changes implied that a responsive policy framework was needed and prefecture-level governments appeared the most suitable to respond to industry and business needs by providing skills in vocational training institutions. However,

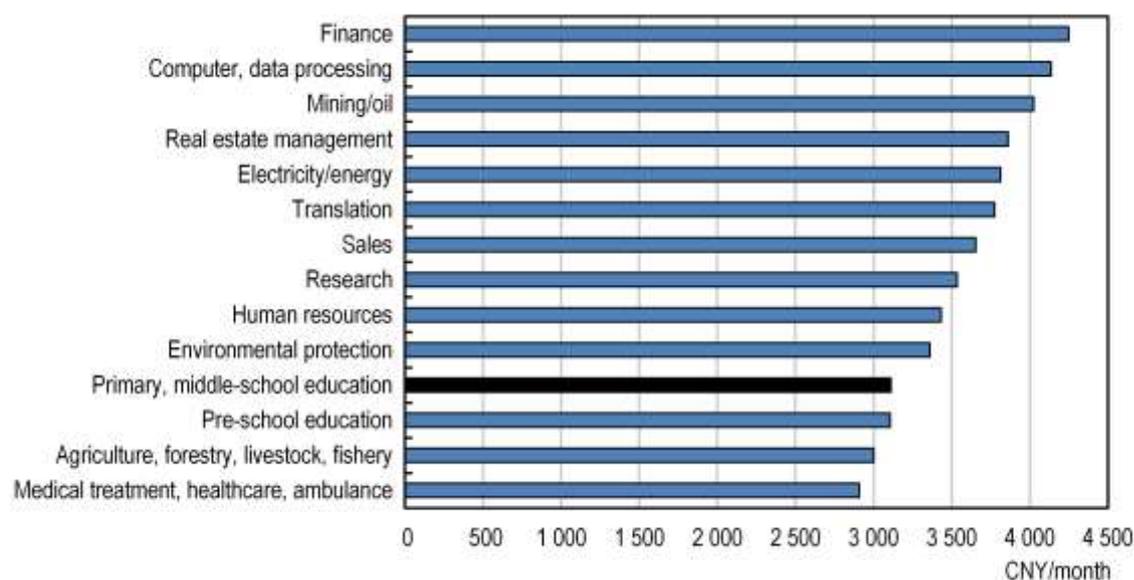
given the large disparities between prefectures in economic development and hence also in financing capacity, putting vocational education institutions under provincial authority is desirable. In addition, the central government should increase spending to redress inequalities.

Making the teaching profession more competitive and attractive would improve quality

51. Better qualified and motivated teachers are a prerequisite for high-quality education. China has taken significant steps to improve the teaching force. Teaching qualifications for primary and middle-school teachers are no longer issued automatically when graduating from teacher training schools. Like graduates of other colleges or mid-career applicants, all have to take a unified national exam, while before, province-level authorities administered the exams and the questions only covered pedagogy and psychology. In the new system, in addition to pedagogical skills, general knowledge will also be checked. The threshold of entry has visibly been raised: in comparison to a 70% average pass rate in the old system, only 27.5% of applicants have passed the exam in the pilot provinces over the past four years since the programme started. Moreover, teaching licences will only be issued for five years, ending life tenures for teachers. These measures, which started in Zhejiang and Hubei in 2011, covered 15 provinces and municipalities by 2014. Over time, they will make the profession more attractive and more competitive.

52. The propensity to undertake teacher training or to stay in the profession is influenced by salary conditions relative to other occupations requiring similar levels of qualification. Average salaries of incoming teachers in primary and middle-schools do not compare favourably (Figure 13). According to the International Average Salary Income Database, Chinese teachers fare worse, compared to salespeople, for instance, than teachers in Finland or Korea. Their earnings prospects are rather limited too. The wage gap with the top earners increases over time: based on a representative MyCOS sample of 30 000 young professionals who graduated in 2010, they earned only just above 60% of peers in finance and computer and data processing three years after graduation, and less than professionals with similar education attainment and experience in healthcare and agriculture.

Figure 13. Salaries of primary and middle-school teachers are lower than in most other professions
Monthly average wages of 2013 university graduates six months after graduation



Note: Averages are based on a representative sample of 120 000 university graduates in 2013. The sectoral classification is similar to that of the Occupational Information Network in the United States adapted to Chinese occupational circumstances and includes 51 categories for university graduates.

Source: Authors' analyses based on MyCOS survey data.

53. While remuneration is important, job satisfaction is also key. Teaching, especially of young children, is among the more gratifying professions, with primary-school teaching ranking sixth (65% satisfaction) and pre-school teaching 14th (63% satisfaction) among university majors in 2013. High satisfaction rates may also reflect a better match between the actual job and expectations than in other professions. Accordingly, few young professionals trained as teachers resign. Only people majoring in law, medicine and engineering are less likely to quit their job within half a year after graduation.

54. E-learning could extend high-quality teaching by providing access to a larger group of students and to participants in lifelong learning. So far, online education has mainly been used to supplement traditional offline coursework, in particular the communication application used by teachers as an exchange platform. Online courses have been piloted at Tsinghua, Zhejiang, Beijing Posts and Telecommunications and Hunan University, and by 2013 68 higher education institutions were offering online for-degree education. Inter-disciplinary talent understanding both IT and education, however, appears to be a constraint in the development of online education and leads to a shortage of education content (Deloitte, 2013). A major obstacle to online education is the dislike by potential users of the lack of intensive interaction with the teacher or peers, but physical barriers such as low internet speed are also cited (Standard Chartered, 2014).

55. Reforms increasing the entry threshold to the teaching profession and keeping the profession competitive should go hand-in-hand with increasing teacher remuneration to attract good students. Also, earning prospects need to be brighter to motivate teachers. Other indicators, such as job satisfaction ratings, should be better disseminated among students. Furthermore, teacher certification and training industry standards in vocational education could improve quality in those institutions. Looming shortages of high-quality teaching resources could be eased by making teaching materials available online to broader groups of users.

Less focus on exams and certificates and more on learning could improve quality

56. The *National Plan 2010-20* advocates to reform teaching so that it becomes exploratory, heuristic, discussion-based and participatory and helps students acquire learning skills. Courses offered and curricula have to be adjusted to market needs and workplace training should be built in. Schools outside of compulsory education have more freedom to set their curricula than primary and middle schools, where the central government controls the core subjects to be taught, the curricula and the textbooks. Such reforms need to go hand-in-hand with reducing the focus on exams when advancing to higher levels. Indeed, access to compulsory education institutions will no longer be based on examinations but pupils will be allocated by catchment area. This will likely reduce pressure on children and parents to overly focus on exams from a very young age, though it may shift the emphasis to high-school and university entrance exams. To change the exam focused system fundamentally, entrance exams at higher levels should also be reformed and students be given second chances.

57. Several reform schemes are being piloted for university entrance exams. At Zhejiang University, *gaokao* results now make up only 60% of evaluation criteria, 10% is based on results in high school and 30% on general knowledge or suitability tests. This reduces the weight of the *gaokao*, but the other exams carrying a 30% weight are similarly a one-shot game, thus changing only the content but not the pressure stemming from exams.

Equal opportunities for all

58. Educational attainment in the past couple of decades increased rapidly, but gaps still exist. China's overall national education indicators mask considerable regional differences (Molnar et al., 2015). Gaps are large in terms of funds raised, including budgetary support. Disparities are not particularly high for student-per-teacher ratios and tend to reflect within-province differences more than differences between provinces; they are also larger for primary than secondary and higher education. In terms of outputs, there are differences in enrolment and dropout rates between wealthier and poorer regions. Outcomes are more difficult to assess as indicators thereof are scarce and not available countrywide on a comparable basis. Opportunities to receive a good education have become more unequal and this trend needs to be reversed to foster the accumulation of human capital and underpin inclusive development. Inequalities stem first and foremost from the urban-rural divide, and secondly from social stratification (Yang et al., 2014). Age, gender and regional differences contribute to a lesser extent. People from all geographical areas and family backgrounds should be encouraged to invest in their education and be able to reap the associated returns. Recent reforms efforts have made progress in this direction.

Inequality with respect to educational opportunities stems from various factors

59. Individual opportunity is largely determined early in life: being born in rural or urban areas and having the respective *hukou* leaves a mark on one's career and life. Rural pupils have fewer opportunities to participate in pre-school education and have less access to good primary and middle schools. They also have less chance to pass the entrance exams of good urban high schools from their rural middle schools or urban migrant children's schools that also tend to be of lower quality. Moreover, they are less likely than their urban counterparts to have access to and be able to afford tutoring classes that are deemed a must to pass exams to higher institutions throughout their study life starting from entry to primary school till the *gaokao*.

60. The geographical area also matters for the chance to receive good education: although all cities have some good schools due to streaming policies, Beijing and other municipalities have the best ones at all levels. The distribution of universities, in particular of good ones is uneven, and some provinces lack top league universities. Vocational colleges are more evenly distributed across the country.

61. Children from an average family background face stiffer competition than those of various groups of privileged people (Zhan, 2012 and Zhang, 2013). Such privileges can stem from positions in the economy or society and children of these people are called *tiaozhisheng*. Others are admitted through "joint construction" agreements between government agencies or firms and schools to secure places for employees' children in exchange for contributing to school operation and construction (*gongjiansheng*). These two groups alone are said to make up around 10% of children entering middle school in Beijing. In addition, students who do not meet the minimum credit required by the coveted high school but are close to it can buy the missing credits through financial contributions to the school.

Universal pre-school enrolment would contribute to stronger basic social and learning skills

62. As yet not all children aged three to five have access to pre-school institutions. Although the share of children receiving three-year pre-school education has increased by over ten percentage points in three years, to 67.5% in 2013, it is still substantially lower than in OECD countries. The government is paying increasing attention to providing pre-school education. Over 2010-13, more than 25 000 new kindergartens were built, an additional 34 000 were launched in spaces freed by adjusting primary and middle-school resources, over 46 000 were established under primary schools and over 1 500 pre-school teaching spots were created in remote rural areas. From 2014, the focus is shifting towards a three-year pre-school system with the target of 75% gross enrolment rate in 2016. Indicators published in

February 2015 suggest that the number of pre-school teachers increased by 45% and the number of enrolled children by 31% over 2011-13.

63. Inequalities at kindergarten level relate to access and cost. Those who stand to benefit the most from pre-school, such as rural children or children from low-income urban families or with migrant parents, are least likely to enrol. However, enrolled children are enjoying improving learning conditions, with the child/teacher ratio falling from 32 to 23 over the past decade and the government has set targets to improve both access and quality. By 2020, all children are to be enrolled in at least one year of pre-school education and private capital is to complement government resources to set up new kindergartens. In 2012, the Ministry of Education published the *Guidance for Learning and Development of Children Aged 3-6*, which defines what and how to learn and teach. Tuition fees, which are typically much higher than for high school, will be regulated and targeted support provided. At present, less than 10% of enrolled children benefit from assistance administered by sub-national governments targeting families with economic difficulties. This average masks considerable regional differences: while in Western China nearly 20% of children receive such assistance, less than 5% do in the populous Central provinces, and 6% in the more prosperous East. Another form of assistance has been piloted in poor and remote areas of Western China under the aegis of the China Development Research Foundation (Lu, 2012; CDRF, 2013a and Yang, 2013). This “Go Teach” mobile education experiment has teachers rotate across villages each week to provide pre-school education for poor children.

64. Pre-school education should be compulsory for at least one year. To achieve close-to-universal pre-school enrolment and equitable learning opportunities, more of the financing of pre-school education needs to be shouldered by the central and provincial governments. Incentives should be provided to kindergarten teachers to move to rural areas. In all areas, vouchers ought to enable parents to choose from the available facilities that tend to be mostly private and not affordable to many.

Establishing standards in compulsory education would provide a more equal start

65. Entrance exams as well as special paths to primary and middle schools are being abolished and a computer-based system will allocate children to schools by catchment area. The Ministry of Education targets 100% enrolment in this way at the primary and 90% at the middle-school level by 2015 (and 95% by 2017) in 19 major cities. The phasing out of entrance exams in compulsory education will increase the chances for children whose parents cannot afford after-school tutoring, which is particularly intense at the primary level, to advance to good middle schools. While levelling the playing field opens up opportunities for a broader segment of the population, the catchment area system will further push up housing prices in the vicinity of good schools, thereby still excluding children from less wealthy backgrounds. To counteract this, the central government could finance schools to ensure a minimum standard quality of education in all of them.

66. Central government funding of rural schools has long been a focus of policies aiming at reducing urban-rural disparities in educational opportunities. Special funds have been designated to ensure sufficient financing of rural compulsory education, to support pupils’ nutrition and to provide training for teachers (Table 2). Such funds make up roughly half of education-related fiscal transfers by the central government to provinces and allow CNY 4 (roughly USD 1.2 at PPP exchange rates) per child per day to be spent on food. Schools provide meals either from the school kitchen or prepared externally. The nutrition effectiveness is three times higher in the former case, though operation expenses, which are borne by the county-level governments, tend to be higher (China Development Research Foundation, 2013b). To ensure a minimum standard of education countrywide, the per-student annual standard education spending is CNY 600 (about USD 179 at PPP exchange rates) for primary-school children in Western and Central China and CNY 650 in Eastern China. The corresponding amounts for middle-school children are CNY 800 and 850, respectively. Some provinces have recently initiated special policies for backward

regions: Jilin for instance doubled the per student standard education spending for minority schools and classes. Yunnan topped up the per-pupil standard by CNY 200 for children enrolled in boarding-schools and Gansu committed to guarantee a bed, a desk, safe drinking water, cafeteria with healthy food and hygienic facilities for each child in boarding schools.

67. Attracting new college graduates to teach in the poorest regions can help reduce disparities in educational opportunities. In 2012, the government launched a contractual teaching programme to attract fresh university graduates or young people below 30 with experience and teaching qualification to teach in villages, townships or county-towns for an initial period of three years. Since 2012, the central government has been financing the salaries of the young teachers to the extent of CNY 24 000 in Central China and 27 000 in the West. Only poor, remote and minority counties can participate in the programme. They are expected to provide housing and insurance coverage for the teachers and can top up their salary if they wish. This programme is meant to alleviate teacher shortages in remote counties, but more needs to be done to provide equal educational opportunities countrywide. Recently incentives have been introduced for local governments to increase teacher compensation and over a million rural teachers are benefiting. At the sub-national level, experiments with a compulsory rotation for primary school teachers after a certain number of years appear to improve education and learning methods for rural children. Tongling City in Anhui Province has been implementing this pilot programme to ensure education quality across the city-prefecture and is now seeking to set the right number of years for the rotation system. The *National Plan 2010-2020* also calls for exchanges of teachers within counties but in the poorer ones, this may not be very effective to increase overall quality.

Table 2. A number of fiscal transfers support compulsory education in rural areas

In billion CNY			
	2012	2013	2014
Rural compulsory education expense guarantee	86.5	82.8	87.9
Rural school reconstruction	18.0	20.6	30.8
Teacher training	1.3	1.5	2.0
Poor and remote area subsidy	4.5	4.4	4.4
Nutrition subsidy	15.1	17.0	17.0
Support to boarding-school children	7.4	7.7	7.3
Free textbooks	13.4	13.1	13.1

Source: Ministry of Finance.

68. Upgrading dormitories and classrooms features prominently in the government's agenda. Around a third of education infrastructure spending went to build or rebuild schools and related facilities at the primary and middle-school levels in 2012 and a quarter in 2013 (Table 3). By 2018, all basic school facilities are to be fully functional and county-level governments are required to draw up roadmaps to that end. The poorest counties, including border areas and minority regions, may obtain central transfers to cover the costs.

Table 3. A large share of infrastructure spending in education goes for primary and middle schools

School buildings, dormitories and equipment created over 2012-13

	Number of counties covered	Number of schools covered	New student places created (million)	Spending (billion RMB)	% of total infrastructure spending in education	Of which province-level spending (billion RMB)	% of total province-level spending
School buildings: newly built, rebuilt or expanded							
Area (million m ²)							
2012	78.1	2 386	46 194	4.9	148.8	31.8	23.2
2013	62.2	2 283	36 002	4.4	102.6	18.7	17.7
Dormitory buildings: newly built, rebuilt or expanded							
2012	12.4	1 740	11 427	1.5	15.9	3.4	3.9
2013	12.1	1 515	10 994	1.3	14.7	2.7	3.3
New equipment							
Pieces (million)							
2012	31.7	2 237	82 057	..	22.7	4.9	5.1
2013	26.8	2 080	78 465	..	27.0	4.9	2.9

Source: State Council Education Evaluation Committee Office (2014).

69. Migrant children following their parents to cities, who make up nearly a tenth of all children of compulsory education age, have recently been given access to public schools in many cities. Even so, on average, only about 80% of them are enrolled in public schools and another 3% in publicly-financed private schools, mainly in Shanghai and Zhejiang Province (Table 4). The remaining 17% of migrant children should be given access to public schools or their education in private institutions should be financed by public funds to make sure that no one bypasses compulsory education or drops out for economic reasons. The central government has long been encouraging sub-national authorities to provide education for migrant children, including through rewarding provinces that have successfully tackled this problem. However, the conditions under which migrant children can enrol in public schools are set by provincial and municipal governments and are often too harsh for the newly arrived, the self-employed or other migrants not covered by social security. Evidence from migrant schools in Shanghai shows that government financial support can considerably improve test scores (Chen and Feng, 2014). As migrant schools have scant resources, the marginal impact of increased funding is large. However, most of the children who can attend public schools may not be able to afford the preparatory schools that are necessary to perform well in exams.

Table 4. Migrant children make up a sizeable share of compulsory school-age children

Percentages

	2013
Migrant children as a share of compulsory-school age population	9.3
Share of migrant children attending public schools	80.4
Share of migrant children attending publicly-funded private schools	3.0
Left-behind children as a share of compulsory-school age population	15.5

Source: National Bureau of Statistics (2013).

70. Migrant workers often leave their children behind if they cannot find affordable private schools in their city of residence or if the city does not open the doors of its public schools to migrants. In some provinces such as Anhui, Hunan, Jiangsu, Jiangxi and Sichuan as well as Chongqing municipality more

than half of the rural children are left behind by one or both parents. Children left behind make up almost a fifth of all children and need additional attention as they are at a higher risk of dropping out. Also, a survey of 5 000 pupils aged 9 to 11 in a poor county in Hunan shows that being left behind by both parents reduces learning outcomes significantly both in maths and in Chinese (Zhang et al., 2014). Boarding schools in towns tend to offer somewhat better quality education than rural schools in general, though many fail to provide the necessary daily subsistence needs such as three meals per day. Nearly three quarters of boarding school places were filled with children left behind and 27% of all rural children attended boarding schools in 2013.

71. Most children complete the nine years of compulsory education enshrined in the 1994 Compulsory Schooling Law, but those who do not finish junior high school appear to be concentrated in the poor rural areas. The official cumulative dropout rate in junior high school is 2.6% nation-wide, but in some poor counties it may be six times higher (Yi et al., 2012). Pupils from poor and disadvantaged backgrounds tend to drop out in their 7th, 8th or 9th grades in greater numbers than the national average, despite longstanding efforts to avoid poverty-related dropouts by exempting pupils from tuition and school-related expenses, and subsidising their living costs. In addition to poverty, low marginal returns to junior high school education and high opportunity costs of education amid soaring wages for low-skilled workers also discourage junior high school enrolment. Dropout rates are higher for pupils at higher grades, as they have brighter prospects to find factory jobs when they are older. Although legally a junior high school degree is required for employment in factories, shortages of low-skilled workers encourage employers to ignore the law.

72. Children with disabilities should also be provided equal education chances. Much has been done recently on this score focusing on the Central and Western regions, including building or rebuilding 1 182 schools for the disabled over 2008-11 and ensuring that there is one in every prefecture or every county with over 3 million inhabitants or with a high concentration of disabled children. In 2012, the creation of teacher training colleges for special education and special higher and secondary vocational institutions for disabled children was decided. The aim is to achieve 90% enrolment of blind, deaf and mentally disabled children in compulsory education by 2016, as spelled out in the *2014-16 Plan to Upgrade Special Education*. Better access to education for disabled children is desirable though it could also be achieved by integrating them in regular education. Indeed, a small number of disabled children in regular classes improves these children's performance without reducing that of the others (WHO, 2011).

Building bridges between pathways may make vocational education more attractive

73. Despite the shortage of skilled workers, vocational schools are not popular as parents tend to encourage their (often only) child to choose the academic path. Only the children who fail to get into general schools or are considered unlikely to get accepted at a university go to vocational secondary schools, which receive lower funding than general high schools as discussed earlier in this paper. Also, high living costs in cities encourage poorer rural students to go to local vocational schools. This bias in choice is reinforced by exempting rural children from tuition fees at vocational secondary schools but not at general high schools. Support policies should not bias student choice: either they should be exempt from tuition fees at general high schools as well, or exemption (at both types of high schools) should be needs-based. Indeed, some areas such as Jilin City in Hunan Province or Wuqi County in Shaanxi Province provide free high-school education to all pupils (China Development Research Foundation, 2014).

74. General high schools of good reputation in Beijing have recently been advised to admit more students from other districts and counties that are less endowed with good high schools (Beijing City Education Committee Opinion 2014/2). This is likely to improve chances for poorer students to sit for entrance exams to such schools. In the same vein, the Ministry of Education's 2014 *Notice on High School Student Intake* emphasises that at least half of the places in the best or "model" high schools should be

allocated to middle schools instead of opening all places to competition. This will ensure that the best pupils from all middle schools have a chance to attend the best high schools.

75. Streaming policies at the sub-national level focusing on establishing model schools led to the indebtedness of high schools (Zhou and Han, 2011), which needs to be resolved by guaranteeing funding not only for operational expenses but also for equipment. A survey in Hubei Province showed that 88% of high school debt is related to spending in model high schools on facilities not directly related to learning.

76. Until now, vocational and academic streams have been mutually exclusive, but switching between pathways will be possible, which would make vocational schools more attractive. This would be implemented via the convertibility of credits between academic and vocational higher institutions as well as adult education institutions.

77. Vocational colleges make it easier for students to access higher education. In 2011, over 88% of vocational college graduates were the first in their families to attend higher education. Notwithstanding the expansion of vocational colleges and their ever-improving range of qualifications and facilities, they tend to cater to poor students and provide little opportunity to catch up. Less than 4% of vocational college graduates continue their studies at university level. Vocational colleges are distributed more evenly across the country than universities, thus allowing less wealthy students to attend. Financial constraints often confine the choice of students to vocational colleges. Indeed, among graduates of vocational colleges, those from Western China, designated poor areas and minority areas are over-represented. Most of the students from these three groups attend college in the same province and almost a quarter in the same prefecture. Partly related to the location of vocational colleges and to the limited career choices of their graduates, nearly two-thirds of them find employment in medium-size firms with less than 300 employees and one third in small firms with less than 50 employees. Over 2% become entrepreneurs, mostly with the purpose to realise their dreams or to earn more, and 7% choose self-employment for lack of a better job.

Good quality higher education should be accessible for all, regardless of background

78. Getting into a top university with bright employment prospects is not an equal chance for all. There are quotas at top universities for students from other provinces. The quotas are set jointly by the NDRC and the Ministry of Education for the university as a whole and quotas in specific programmes can be set by the university as long as they meet the overall quotas. Universities reserve a greater number of places for residents of the city where they are located on the grounds that they benefit from local government financial support.

79. The *gaokao* system, although designed to be fair, ends up discriminating against students with less information on colleges, who tend to be from rural areas or less educated family backgrounds and to apply to schools below their achievements to secure admission. Likewise, some migrant children, although they may be allowed to take the *gaokao* in the city where they reside, often prefer going back to their place of registration to do so, sensing that it will be easier to compete with peers in their hometowns. Most migrant children, however, are not allowed to take the *gaokao* in their city of residence. Big cities tend to impose a set of conditions to sit for the exam: being enrolled in a local high-school and having a local *hukou* may not be sufficient, very often parents' limited number of social contribution years or lack of employment permit are the major obstacles to children's taking the *gaokao*.

80. The *gaokao*, which is a major career determinant, is under reform. Some universities select a portion of entrants based on criteria such as achievements in academic, sports or art competitions. However, these criteria are criticised for being arbitrary and thus entailing corruption. The policy of some top universities to take in only students who indicate them as first choice in their application forms complicates

the selection process. A more transparent system making information on places, past score thresholds and numbers of applicants publicly available would allow students to compete on a more level playing field.

81. Even those who secure a place at a top university may have difficulties to study there if they are from poor families. Tuition is not prohibitively expensive, but living costs in big cities are high and scholarships or allowances usually only cover part thereof. The total amount of financial support to students enrolled in higher education institutions is below 10% of overall higher education spending (Box 3). Financial assistance to poor students is the largest component, followed by loans and merit-based scholarships (Figure 14). Almost a third of students in Western China receive financial assistance, compared with just over a quarter in Central China and 22% in the East.

Box 3. Financial support schemes in higher education

In 2013, 37.2 million scholarships, subsidies and loans were disbursed to higher education students. The National Scholarship targets outstanding students from the second year of their studies and well-performing universities are allocated a greater number of such scholarships. It is, however, biased towards majors like agriculture and forestry, water and energy, and oil and mining. It cannot be combined with the National Endeavour Scholarship but poor students can simultaneously receive National Financial Support. The treatment of private universities is at the discretion of provincial governments.

The National Endeavour Scholarship targets students from their second year who have both outstanding results and are from poor families. Higher education institutions have to allocate 4-6% of their operating revenues (from tuition fees) to support students with financial difficulties. Private schools meeting those criteria are also covered by this scheme.

Student loans started to be piloted in 1999. The maximum amount is CNY 8 000 (around \$1 300) per student per year at the undergraduate and CNY 12 000 at the graduate level, the repayment period 10-14 years and the government subsidises the interest payment during the course of the studies. No guarantor is needed. Only students with economic difficulties are eligible. Around 10% of students benefited from National Student Loans in 2013. The “green channel” was established to enable poor children who were offered admission to start their studies at a higher education institution. In 2013, 10% of new students enrolled through the “green channel”.

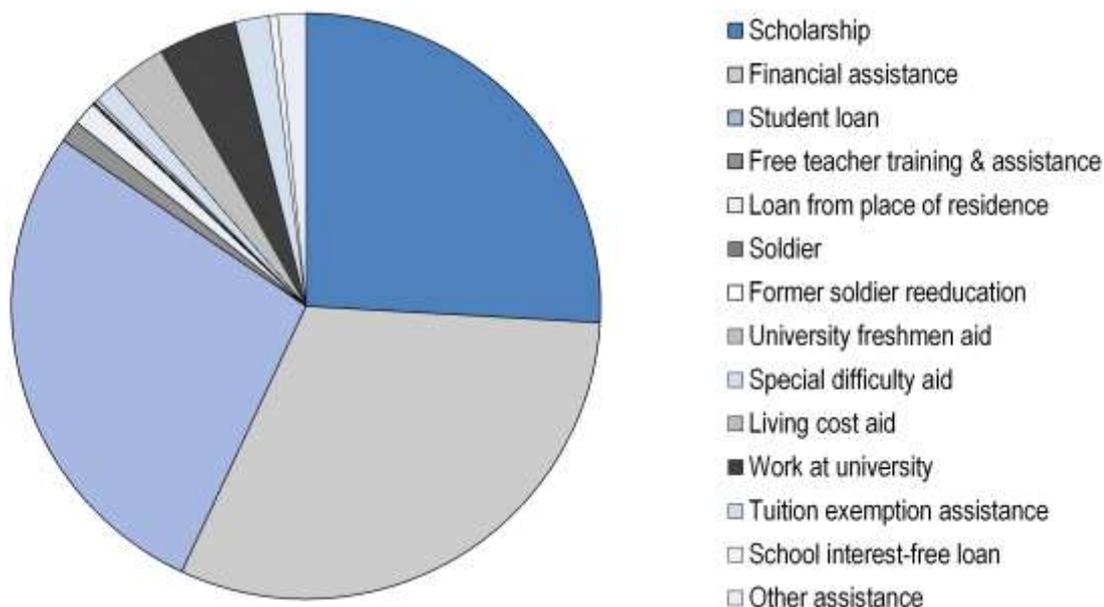
Table 5. There are a variety of assistance schemes

	Amount in CNY	Number of recipients	Conditions
National Scholarship	8 000/year/person	50 000/year	
National Endeavour Fellowship	5 000/year/person	510 000/year	Students from families with economic difficulties
National Financial Support	3 000/year/person	3.4 million/year	Students benefitting from free tuition cannot apply
National Student Loan	Up to 8 000/year/person at the undergraduate and 12 000 at the graduate level	The loan is disbursed at the school location	Students from families with economic difficulties Interest-free loan, no guarantor needed
Work at university	8/hour	Disbursed by the school	Max. 8 hours/week
Free tuition for teacher training students	Free tuition and dormitory plus living expense support		12 000 students enrolled in 6 teacher training colleges under ministries
Green channel	New students from poor families can proceed with admission without the obligation to pay the tuition and living costs. Assistance is determined at a later stage.		

Source: Student Financial Aid Management Centre.

Figure 14. Financial assistance, loans and scholarships make up most of student support

Student support by type, 2013



Source: Student Financial Assistance Management Centre (2014).

82. Graduates with parents of lower educational attainment are more likely to go to vocational colleges than to universities. However, once graduated from a higher education institution, students' family background explains little (1.2%) of the wage variation across graduates, indicating that higher education is key to social mobility. Therefore, to increase social mobility, access to higher education should be provided to all.

Conclusion

83. Human capital accumulation has played a large role in China's economic catch-up over the last three decades as educational attainment made rapid progress. It is becoming even more crucial now to bring about further improvements in living standards in the face of an ageing population and to provide the right skills needed to transition from the world's factory to a leading innovator. As China becomes a knowledge-based economy with higher value-added industries and a vibrant service sector, new skills have to be provided. Workplace-based vocational training and lifelong learning will be key to that end. Innovation can become an engine of growth provided more weight is attached to quality and application in university research evaluation and world-class researchers are attracted and retained by greater research autonomy, merit-based promotion and stronger protection of intellectual property rights.

84. In addition to providing the right types of skills and knowledge, a good education system teaches how to learn and fosters curiosity and creativity. Improved funding of education institutions will help delivering the quality needed for China's socio-economic development and demanded by the recipients of the service. Better qualified and motivated teachers are a prerequisite for high-quality education and brighter earnings prospects would attract better students and motivate teachers.

85. Opportunities to receive a good education have become more unequal and this trend needs to be reversed to foster the accumulation of human capital and underpin inclusive development. More central funding at the compulsory level would ensure minimum quality across the country, thereby reducing the urban-rural divide. Migrant children should be provided access to public schools or given vouchers to private schools. They should be treated equally in terms of access and funding at all levels with urban peers.

Main policy recommendations on providing the right skills to all

Upgrading skills

- Boost spending on education, including by increasing teacher compensation to improve education quality. Ensure equal opportunities for disadvantaged children.
- Establish a countrywide workplace training-based vocational education system; enhance career guidance and better disseminate information on jobs.
- Focus education on applied knowledge and skills and conduct skill-needs surveys more systematically to reduce the skills gap.
- Evaluate universities and university staff more on the quality of academic output.
- Promote research autonomy, merit-based promotion and stronger intellectual property right protection to attract or retain world-class researchers.

Enhancing quality

- Conduct assessments of education outcomes and make them public.
- Raise the threshold of entry into the teaching profession, scrap life-long tenure and increase salaries.
- Use online education more effectively to disseminate quality teaching materials, by, for instance, making public the names of the teachers who based on the number of downloads provide the best materials.
- Reduce the focus on exams and certificates and nurture a spirit of inquiry from a young age.

Providing equal opportunities

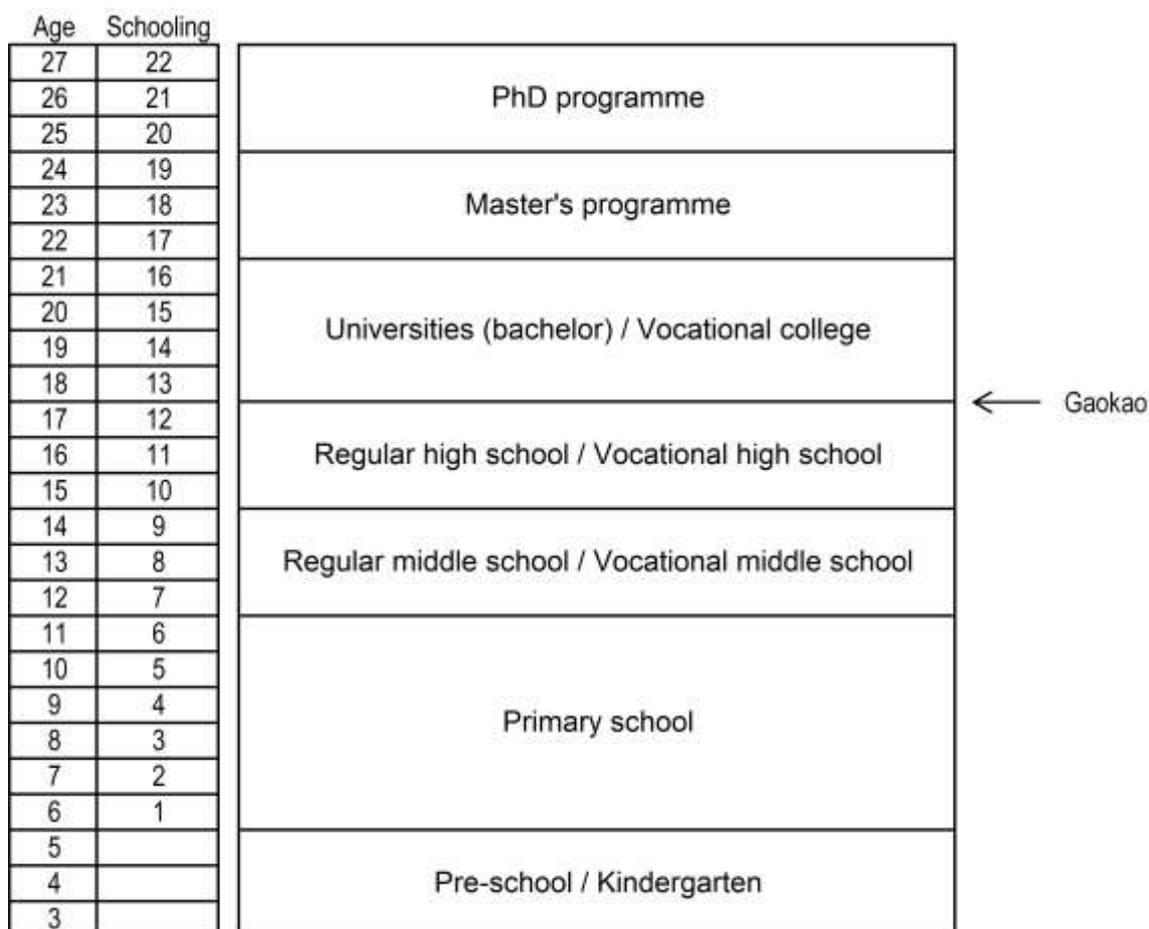
- Improve access to pre-school education by extending social assistance to a wider range of people and providing vouchers for use at private facilities.
- Finance compulsory education from the central budget and ensure minimum quality across the country. Direct more funds to the populous provinces in Central China.
- Continue teacher exchanges within the same county and with more developed regions to reduce disparities in education opportunities.
- Open up public schools to children of internal migrants, or, where such schools are not available, provide vouchers to enable them to attend private schools.
- Allow resident migrant children to sit for the university entrance exam irrespective of their parents' work or social security status.

ANNEX 1. THE CHINESE SCHOOL SYSTEM: SYNOPSIS

The Chinese school system starts with kindergarten, which is not available all around the country as yet. Children are enrolled one to three years ahead of primary school. After the six years of primary education, students go to middle schools, mostly of the general sort, although there are still some vocational schools at this level in rural areas. Compulsory education encompasses the primary and the middle-school levels. After middle school, pupils can choose general or vocational high school, each lasting three years. From regular high schools children can apply to universities. From vocational high schools they can mainly apply to vocational colleges. There is also a condensed version of vocational high plus college that can be completed in five years instead of six. Masters' programmes after university can take up to three years and the PhD course another three.

Entrance exams have long been the basis of selection into the primary, middle and high school and higher education levels. In some cases, even admission to kindergarten is conditioned on an exam. With the recent reforms, only the high school and higher education institution entrance exams will be kept.

Figure A1. Structure of the Chinese school system



Note: The figure does not show combined programmes such as the five-year combined vocational programme from high school to college, combined undergraduate-Master's and Master's-PhD programmes.

Source: Ministry of Education.

Bibliography

- Beijing Normal University News (2014) “Beishida Fabu Quanguo Shouge Quyu Jiaoyu Zhiliang Jiankang Zhishu” (Beijing Normal University Releases First Regional Education Quality Indicator), *Beijing Shifan Daxue Xuebao*, Vol. 339(1).
- Chen, S. (2012), “Contributing Knowledge and Knowledge Workers: The Role of Chinese Universities in the Knowledge Economy”, *London Review of Education*, Vol. 10(1).
- Chen, Y. and S. Feng (2014), “Quality of Migrant Schools in China: Evidence from a Longitudinal Study”, *Shanghai University of Finance and Economics School of Economics Working Paper*, No. E2014001.
- China Center for Human Capital and Labour Market Research (2013), *Human Capital in China 2013*, Central University of Finance and Economics, Beijing.
- China Development Research Foundation (2013a), *Fanpinkun yu Zhongguo Ertong Fazhan (Poverty Alleviation and Child Development in China)*, CDRF, Beijing.
- China Development Research Foundation (2013b), *Nongcun Yiwu Jiaoyu Xuesheng Yingyang Gaishan Jihua – Pinggu Baogao (Nutrition Improvement Plan of Rural Pupils in the Compulsory Education System – Evaluation Report)*, CDRF, Beijing.
- China Development Research Foundation (2014), *Demographic Developments in China*, CDRF, Beijing.
- China National Centre for Student Financial Aid (2014), *2014 Nian Quanguo Xuesheng Zizhu Fazhan Baogao* (Report on National Developments in Student Financial Aid).
- De Brauw, A. and S. Rozelle (2007), “Returns to Education in Rural China”, in Hannum, E. and A. Park, eds, *Education and Reform in China*, Routledge, Oxon.
- Deloitte (2013), *Reflections on Education and Technological Development in China*.
- Fan, K. Y. and J. F. Yang (2012), “Lun Xuesheng Xuexi Fangshi de Zhuanbian” (Discussing the Change in Students’ Learning Methods), *Jiaoyu Kexue Yanjiu (Education Science Research)*, 2012(2).
- Fang, R. S., D. M. Fang and P. F. Guo (2013), “Suoshi Yanjiusheng Xuwei Lunwen Xueshu Buduan Xiangwei de Tezheng Fenxi” (Characteristics of Academically Improper Behaviour by Graduate Students in their Master’s Theses), *Xuwei yu Yanjiusheng Jiayu (Degree and Graduate Education)*, 2013(5).
- Guan, J. and K. Chen (2010), “Measuring the Innovation Production Process: A Cross-Region Empirical Study of China’s High-Tech Innovations”, *Technovation*, Vol. 30.
- Higher Education Research Centre of the National Institute of Education Sciences (2009), *Zhongguo Gaodeng Xuexiao Jixiao Pingjia Baogao, (Performance Evaluation Report of Chinese Higher Education Institutions)*, National Institute of Education Sciences, Beijing.
- Kuczera, M. and S. Field (2010), *Learning for Jobs – OECD Reviews of Vocational Education and Training – Options for China*, OECD, Paris.
- Kwon, S., J. Lee and S. Lee (2014), “International Trends in Technological Progress: Stylised Facts from Patent Citations, 1980-2011”, *Centre for Microdata Methods and Practice Working Paper*, CWP16/14.
- Liu, X., J. Lu, I. Filatotchev, T. Buck and M. Wright (2010), “Returnee Entrepreneurs, Knowledge Spillovers and Innovation in High-Tech Firms in Emerging Economies”, *Journal of International Business Studies*, Vol. 41.
- Lu, M. (2012), “China: Investing in Human Capital”, *OECD Observer*, No. 290-291.
- Luan, C., C. Zhou and A. Liu (2010), “Patent Strategy in Chinese Universities: A Comparative Perspective”, *Scientometrics*, Vol. 84.
- Manpower (2014), *Talent Shortage Survey 2014*.
- Meng, X. (2012), “Labor Market Outcomes and Reforms in China”, *Journal of Economic Perspectives*, Vol. 26(4).

- Miesing, P., M. Tang and M. Li (2014), “University Technology Transfer in China: How Effective Are National Centers?”, in A. Corbett, J. Katz and D. Siegal (eds), *Academic Entrepreneurship: Creating an Entrepreneurial Ecosystem*, Emerald Group Publishing Limited.
- Ministry of Education (2010), *Outline of China’s National Plan for Medium and Long-term Education Reform and Development 2010-2020*.
- Ministry of Education (2013), *Gaodeng Xuexiao Keji Tongji Ziliao Huibian* (Statistics of Research Activities of Higher Education Institutions).
- Ministry of Education (2014), *Xiandai Zhiye Jiaoyu Tixi Jiianshe Guihua 2014-2020* (Plan for Building a Modern Vocational Education System).
- Ministry of Science and Technology and Ministry of Finance (2002), *Measures for Intellectual Property Made under Government Funding*.
- Molnar, M. and T. Chalaux (2015), “Recent Trends in Productivity in China – Shift-share Analysis of Labour Productivity Growth and the Evolution of the Productivity Gap”, *OECD Economics Department Working Paper*, forthcoming.
- Molnar, M., B. Wang and R. Gao (2015), “Assessing China’s Skills Gap and Inequalities in Education”, *OECD Economics Department Working Paper*, forthcoming.
- MyCOS (2014), *Jiuye Lanpishu - 2014 Nian Zhongguo Daxuesheng Jiuye Baogao* (Blue Book of Employment – 2014 Chinese College Graduates’ Employment Annual Report).
- National Bureau of Statistics (2012, 2013), *Nongmingong Jiance Diaocha Baogao* (Migrant Worker Survey Report).
- OECD (2013a), *OECD Economic Survey of China*, OECD, Paris.
- OECD (2014a), *Science, Technology and Industry Outlook*, OECD, Paris.
- OECD (2014b), *Skills Beyond School: A Review of Post-Secondary Vocational Education and Training*, OECD, Paris.
- OECD (2014c), *PISA 2012 Results: What Students Know and Can Do: Student Performance in Mathematics, Reading and Science*, Vol. I, revised edition, OECD, Paris.
- Qu, Y. and F. Cai (2011), “Understanding China’s Workforce Competitiveness: A Macro Analysis”, *Journal of Chinese Human Resource Management*, Vol. 2(1).
- Squicciarini, M. and M. Le Mouel (2012), “Defining and Measuring Investment in Organisational Capital – Using US Micro-data to Develop a Task-Based Approach”, *OECD Science and Technology Working Paper No. 2012/05*.
- Standard Chartered (2014), *China Education – Passing with Distinction*.
- State Council (2005), *Guanyu Dali Fazhan Zhiye Jiaoyu de Jueding No 2005/35* (Decision on Boosting Vocational Education No 2005/35).
- State Council (2006), *Medium and Long-Term National Plan for Science and Technology 2006-2020*.
- State Council (2011), *Zhongguo Ertong Fazhan Zhaiyao 2011-20* (China Child Development Outline 2011-20).
- State Council (2014), *Guanyu Jiakuai Fazhan Xiandai Zhiye Jiaoyu de Jueding No 2014/9* (Decision on Accelerating the Development of Modern Vocational Education No. 2014/9).
- State Council Education Evaluation Committee Office (2014), “2013 Evaluation of Equitable Development in Compulsory Education”, *State Education Evaluation Report*, No. 2014(1).
- State Council and Central Committee of the CCP (2010), *National Medium-and Long-term Talent Development Plan 2010-2020*.
- Student Financial Assistance Management Centre (2014), *2013 Report on Student Aid Development*.
- UNESCO (2014), *BRICS Building Education for the Future – Priorities for National Development and International Cooperation*, UNESCO, Paris.

- Wang, C.Y. (2014), “Apprenticeships in China: Experiences, Lessons and Challenges”, presentation made at the OECD, available at http://www.oecd.org/els/emp/C_WANG-Apprenticeships%20in%20China%20Update.pdf accessed on 20 July, 2014.
- Wang, J. ed. (2013), *Zhongguo Zhiye Jiaoyu Fazhan Baogao* (China Vocational Education Development Report), Higher Education Publishing.
- WHO (2011), *World Report on Disability*, World Health Organisation, Geneva.
- Xue, P. (2012), “Zhejiang Sheng Chengxiang Xuesheng Nengli Bijiao Yanjiu – Jiyu PISA Ceshi Jieguo” (Comparative Research between the Abilities of Urban and Rural Students in Zhejiang: Based on PISA Test Results), *Zhejiang Social Sciences*, Vol. 6.
- Yang, X. (2013), “Yige Guopinxiande Youeryuan Tuwei Qinshi” (Breakout of a Designated Poor County), *Jiaoyubao* 21 November 2013.
- Yang, J., X. Huang and X. Liu (2014), “An Analysis of Education Inequality in China”, *International Journal of Educational Development*, Vol. 37.
- Yi, H., L. Zhang, C. Liu, J. Chu, P. Loyalka, M. Maani and J. Wei (2013), “How Are Secondary Vocational Schools in China Measuring up to Government Benchmarks?”, *China & World Economy*, Vol. 21(3).
- Yi, H., L. Zhang, R. Luo, Y. Shi, D. Mo, X. Chen, C. Brinton and S. Rozelle (2012), “Dropping Out: Why Are Students Leaving Junior High in China’s Poor Rural Areas?”, *International Journal of Educational Development*, Vol. 32.
- Zhan, S. (2012), “Zexiao yu Jiaoyu Junhenghua Guanxi de Tantaoy: Jiyu PISA 2009 de Shizheng Yanjiu” (Relationship between School Choice and Education Equalization: An Empirical Study Based on PISA 2009), *Xiandai Jichu Jiaoyu Yanjiu*, Vol.5.
- Zhang, T. (2013), “Quyue Jiaoyu Junheng Fazhan – Lichang yu Luxian” (The Balanced Development of Regional Education: Standpoint and Route), *Jiaoyu Fazhan Yanjiu*, 2013(11).
- Zhang, H., J. Behrman, C.S. Fan, X. Wei and J. Zhang (2014), “Does Parental Absence Reduce Cognitive Achievements? Evidence from Rural China”, *Journal of Development Economics*, forthcoming.
- Zhao, B., B. Sun and Z. Yang (2013), “Gaoduan jinengxing rencai peiyang moshi de bijiao yanjiu ji qishi” (A Comparative Study of Training Models for High-Level Skilled Talents and its Inspiration), *Journal of Harbin Vocational & Technical College*.
- Zheng, S. and G. Wen (2014), “Dangqian woguo minbangaoxiao zhanlue zhuanxing mianlinde wuda kunjing” (Five Major Issues Private Higher Institutions Should Address), *Education Exploration*, Vol. 273(3).
- Zhou, C. and Y. Han (2011), “Gongban Gaoji Zhongxue Fuzhai Wenti Tanxi” (Examining the Issue of Public High School Debt), *Shenji Wenzhen*, No. 7.

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