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The Survey was prepared by Margit Molnar and Ben Westmore, with contributions from Chunyan Bian, Ruidong Gao, Thomas Chalaux and Clara García, under the supervision of Vincent Koen. Secretarial assistance was provided by Nadine Dufour and Mercedes Burgos.

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The Survey is published on the responsibility of the Secretary-General of the OECD.

Basic statistics of China, 2013

(Numbers in parentheses refer to the OECD)[a]

LAND AND PEOPLE					
Population (millions)	1 360.7	(1 261.6)	Population density per km²	144.6	(34.8)
Under 15 (%)	16.4	(18.3)	Life expectancy (years, 2012)	75.2	(80.2)
Over 65 (%)	9.7	(15.7)	Men	73.9	(77.5)
Latest 5-year average growth (%)	0.5	(0.6)	Women	76.5	(82.9)
Urbanisation rate	53.2	(79.8)	Agricultural land (% of total, 2012)	54.8	(35.6)
ECONOMY					
GDP, current prices (market exchange rate, trillion USD)	9.5	(47.6)	Value added shares (%)		
GDP, current prices (trillion CNY)	58.8	(292.8)	Primary	10.0	(2.5)
Latest 5-year average real GDP growth (%)	8.9	(0.8)	Industry including construction	43.9	(26.8)
GDP per capita (000 USD PPP)	12.3	(38.1)	Services	46.1	(70.2)
GENERAL GOVERNMENT					
Expenditure (% of GDP)	37.4	(42.5)	Net lending (% of GDP)	-0.3	(-4.6)
Revenue (% of GDP)	37.1	(36.8)			
EXTERNAL ACCOUNTS					
Exchange rate (RMB per USD)	6.15	n.a	Main exports (% of total merchandise exports)		
PPP exchange rate (USA = 1)	3.44	n.a	Machinery and transport equipment	47.0	n.a
In per cent of GDP			Miscellaneous manufacturing articles	26.3	n.a
Exports of goods and services	25.4	(28.7)	Manufactured goods	16.3	n.a
Imports of goods and services	22.9	(28.8)	Main imports (% of total merchandise imports)		
Current account balance	1.9	(-0.1)	Machinery and transport equipment	36.4	n.a
Net international transfers	-0.1	(-0.8)	Mineral fuels, lubricants and related materials	16.1	n.a
Balance of income	-0.5	(0.7)	Crude materials, inedible, except fuel	14.7	n.a
LABOUR MARKET, SKILLS AND INNOVATION					
Employment rate (total population, %)	56.6	(44.2)	Unemployment rate (urban) (%)	4.1	n.a
Participation rate (total population, %)	58.3	(48.0)	Tertiary educational attainment 25-64 year-olds (%, 2012)	3.6	(31.5)
Gross domestic expenditure on R&D (% of GDP, 2012)	2.2	(2.4)			
ENVIRONMENT					
Total primary energy supply per capita (toe, 2012)	2.1	(4.2)	Freshwater use (m^3 per capita)	407.2	(831.2)
Electricity production from renewables (%, 2012)	20.0	(20.1)	*of which:*		
Fine particulate matter concentration (urban, PM10, µg/m^3, 2011)	82.4	(28.0)	by agriculture (% ot total use)	64.6	(31.7)
CO2 emissions from fuel combustion per capita (tonnes, 2012)	6.1	(9.7)	by households (% ot total use)	12.1	(24.9)
			by industry (% ot total use)	23.2	(43.4)
SOCIETY					
Income inequality (Gini coefficient, 2011)	0.477	(0.308)	Education outcomes (PISA score in Shanghai, 2012)		
Poverty headcount ratio at USD2 a day (PPP) (% of population, 2010)	23.2	(1.0)	Reading	570	(496)
Share of women in parliament (%)	23.4	(26.7)	Mathematics	613	(494)
Net official development assistance (% of GNI, 2012)	0.0	(0.4)	Science	580	(501)

Better life index: *www.oecdbetterlifeindex.org*

a) Where the OECD aggregate is not provided in the source database, a simple OECD average of latest available data is calculated where data exist for at least 29 member countries.

Source: Calculations based on data extracted from the databases of the following organisations: National Bureau of Statistics, OECD, International Energy Agency, World Bank and International Monetary Fund.

Executive summary

Main findings

Following three decades of unprecedented growth underpinned by deep structural reforms, China continues to catch up with the OECD economies, albeit more gradually. The working-age population is declining and the relaxation of the one-child policy will not slow ageing much. Growth will remain driven largely by investment but will require a reacceleration in productivity. China's transition is multifaceted – from rural to urban, public to private, investment to consumption and manufacturing to services – and will require unwavering commitment to structural reforms. The Third Plenum in late 2013 set out the associated roadmap, ahead of the start of the 13th Five-Year Plan (2016-20).

Reforms for more sustainable growth. Imbalances in the property and some heavy industry sectors have started to unwind and while risks remain, they appear to be manageable. The property market price correction is likely to continue until the inventory overhang is worked off and more affordable prices broaden the group of home-buyers. State-owned enterprises enjoy implicit government guarantees and easy access to cheap credit, which make it hard to reduce excess capacity and deter the construction of new overcapacity. Rapid bank and non-bank credit growth has fuelled financial stability concerns. Maturity mismatches on- and off-balance sheet imply liquidity risks. Sub-national government debt entails fiscal risks, even though land reserves and other assets provide a buffer.

Fostering inclusive urbanisation and services as drivers of growth. Urbanisation has taken place on a massive scale but still has some way to go in China. The foreseen migration of 100 million rural residents to cities by 2020, the extension of public services and social security to 100 million migrants already living in cities and the renovation of shanty-town housing for another 100 million urban citizens, will boost economy-wide growth and productivity. The share of services in value added has now overtaken that of manufacturing and will rise further as China becomes richer and urbanisation proceeds. However, productivity in the service sector is held down by the fact that the playing field is not level for all firms.

Providing the right skills to all. Growth will increasingly depend on the quality of human capital and innovation. The knowledge taught and skills nurtured at school do not sufficiently match labour market needs. Workplace training-based vocational education arrangements are woefully inadequate. Moreover, while the resources devoted to research increase rapidly, innovations are not being used to the full. Spending on education is comparable to that in some other BRIICS economies, but lower than in OECD countries. Average starting salaries of teachers do not compare favourably with other professions and earning prospects are bleak. Education inequalities are stark, stemming first and foremost from the urban-rural divide and secondly from social stratification.

Boosting agricultural productivity and enabling further rural development. Living standards in rural China remain far below those in urban areas. In the agricultural sector, average farm size is very small, limiting the potential for mechanisation and economies of scale in production. Many smallholder farmers have difficulty accessing finance and there is scope for improvements in farmer education and technical assistance. China's arable land per capita is low relative to other countries and the sustainability of farming is threatened by the overuse of chemical fertilisers, poor water efficiency and degradation of grassland. Rural residents aspiring to move to cities continue to face policy impediments. For those who remain in rural areas, social welfare coverage is incomplete and health services lag significantly behind those in urban China.

Key recommendations

Three overarching priorities to keep up and improve the quality of growth in China are:

- Strengthen market mechanisms and ensure adherence to the rule of law.
- Enhance skill provision from early childhood through to adult learning.
- Grant farmers greater land-use rights, and make them more enforceable and easier to trade.

Reforms for more sustainable growth

- Continue to pursue stated emission targets, including by implementing a national carbon emission trading scheme, phasing out subsidies to carbon-intensive producers and boosting investment in renewables.
- Phase out implicit government guarantees enjoyed by state-owned enterprises, so that all firms compete on a level playing field with regard to finance, regulation, taxation and public procurement.
- Continue to gradually liberalise deposit interest rates while enhancing financial stability through measures such as provisioning for actual bad loan exposures, including off-balance sheet loans.
- Increase fiscal transparency and sustainability including by permanently prohibiting local government investment vehicles from taking on new debt.

Fostering urbanisation and services as drivers of growth

- Extend public service provision and social security coverage to all migrant workers. Make social security benefits portable across the country.
- Reduce state ownership in commercially-oriented service industries such as retailing, hotels, restaurants and construction. Open up more sectors to private investment.

Providing the right skills to all

- Boost public 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.
- Evaluate universities and university staff more on the quality of academic output. Promote research autonomy, merit-based promotion and stronger intellectual property rights to attract and retain world-class researchers.
- Open up public schools to all children of internal migrants, or, where such schools are not available, provide vouchers to enable them to attend private schools.

Boosting agricultural productivity and enabling further rural development

- Give certificates to all rural households detailing their land-use rights and improve enforceability.
- Establish exchange platforms for the transfer of operation rights for rural farmland and collectively-owned construction land.
- Implement and enforce unit pricing of water for agricultural users and better water allocation mechanisms to encourage demand management and investment in water-saving technology.
- Expand the coverage of rural social welfare payments.

Assessment and recommendations

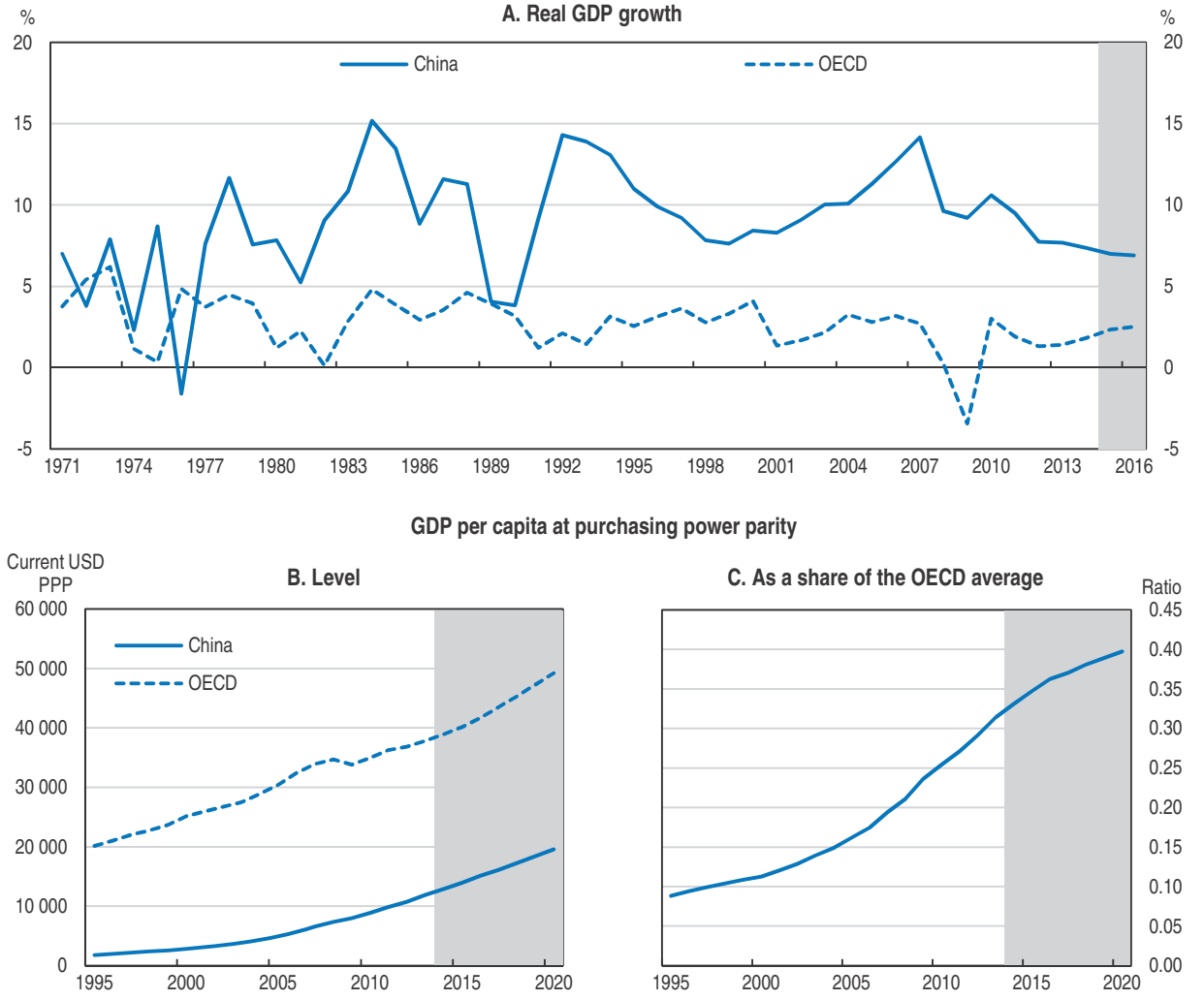
- *Avoiding a sharp slowdown*
- *Paving the way for sustainable and inclusive growth over the longer run*

Following three decades of extraordinary economic development, China is shifting to a lower but still rapid and likely more sustainable growth path – the "New Normal" (Figure 1). It is projected to continue to catch up with the most advanced economies, albeit more gradually, and seems to be on course to come close to achieving its goal of doubling GDP per capita between 2010 and 2020, by which time China could be considered a "moderately prosperous society". In this context, the authorities are willing to forgo some growth in the short run to ensure greater stability over the longer run, with a wider spread of the benefits of growth across society and less stress on a highly polluted environment.

The reform agenda set out at the Third Plenum in November 2013 emphasises strengthening market mechanisms and promoting innovation (Annex A1), and the Fourth Plenum the importance of the rule of law. Implementation of the envisaged reforms will help overcome existing economic imbalances, notably in the housing market and in heavy industry. Over the longer run, it will make growth more resilient, more inclusive and greener. It will also limit the risk of an abrupt deceleration, which would have major negative spillover effects on the global economy. This report highlights some of the key challenges faced by China and proposes policy measures to promote more sustainable and inclusive growth:

- An orderly unwinding of imbalances is underway, risks are manageable and an abrupt slowdown can be avoided. The price correction in the housing market could bring down vacancy rates by making housing more affordable. Restructuring in industries plagued by excess capacity can only be successful if implicit guarantees to state-owned enterprises (SOEs) are removed so that all firms compete on a level playing field with regard to finance, regulation, taxation and public procurement. Strengthening market mechanisms would make for a more efficient allocation of capital and for greener growth.
- Urbanisation and service sector development will be key drivers of growth. The migration of 100 million rural residents to cities by 2020, the extension of public services and social security to 100 million migrants already living in cities and the renovation of shanty-town housing for another 100 million urban citizens, will boost economy-wide growth and productivity. Since 2013, services have accounted for a larger share of GDP than manufacturing. More sectors, notably in services, should open up to private investment to boost productivity.
- Reforms of the education and training system, from early childhood through to adult learning, should continue so as to provide the right skills to all and meet the demands of a rapidly transforming economy. Promoting equal opportunities will help build the human capital needed for a knowledge-based economy.
- Land resources need to be reallocated within the agricultural sector to boost productivity and rural incomes. At the same time, shifts to off-farm employment should be facilitated and rural social welfare systems need to provide broader coverage for rural households.
- Rural land efficiency should be raised by market-based pricing of water and fertiliser and improved technical education of farmers.

Figure 1. **Trend growth is declining but still high, with GDP per capita set to almost double during the 2010s**



Note: The shaded areas indicate forecasts.

Source: World Bank World Development Indicators database; *OECD Economic Outlook 96 Database*, OECD Long-term Baseline projections 96, National Bureau of Statistics.

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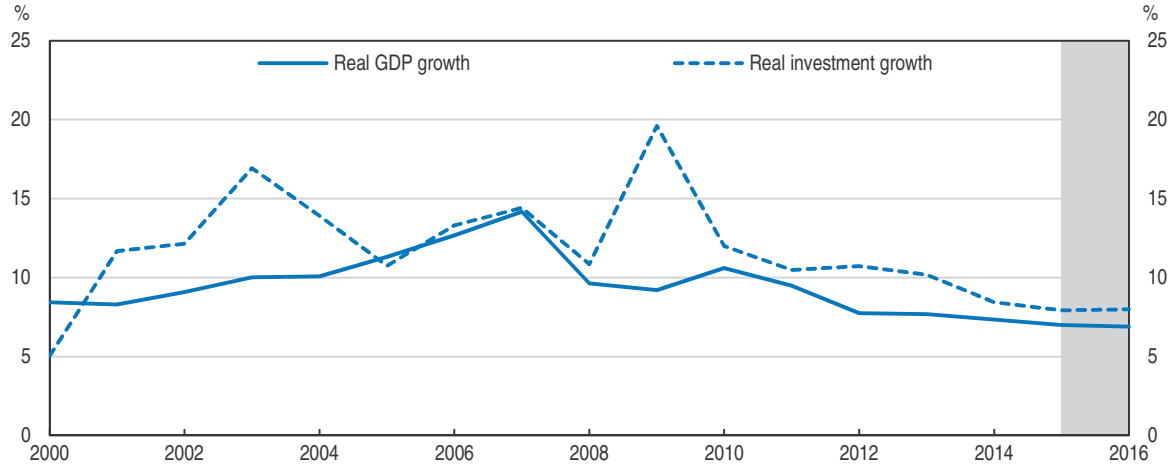
Avoiding a sharp slowdown

China's GDP growth reached 7.4% in 2014, close to the target of around 7.5%, even though for the first time in years, the target was not exceeded. Still, growth has been slowing, as has investment (Figure 2). This has partly reflected the lagged impact of earlier measures to restrain credit and the housing market boom. It may also signal a more deep-seated deceleration following an exceptionally long spell of very rapid growth (Pritchett and Summers, 2014). The pace of structural reforms will continue to influence short-term outcomes, the challenge being to keep up sufficient momentum to reduce imbalances while avoiding overly abrupt adjustments that might trigger a crisis. Another major policy target is job creation. Despite slower growth, around 13 million urban jobs were created both in 2013 and in 2014. This was helped by the ongoing rise in the share in value added of the relatively labour-intensive services sector.

Figure 2. **Growth has slowed as investment has weakened**



Note: Investment is gross fixed capital formation. The shaded area indicates forecasts. 2014 figures for investment are also forecasts.
Source: OECD Economic Outlook 96 Database.

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Growth is projected to remain moderate in 2015-16 by recent historical standards (Table 1), although still high in international comparison. It is set to edge down to the official target of "around" 7% in 2015 as imbalances in the property and some heavy industry sectors unwind. Non-food inflation is likely to remain subdued as prices of industrial products and inputs continue to decline. With relatively weak domestic demand and export prospects, the current account surplus is projected to widen to 2.5% of GDP by 2016. China is benefitting considerably from the sharp fall in the prices of oil, iron ore and other imported commodities in 2014. Indeed, the State Information Centre estimates that every 10% fall in the price of oil and four other commodities has added almost 0.2 percentage point to GDP and subtracted 0.3 and 0.6 percentage point from consumer and producer price inflation, respectively. In a similar vein, the People's Bank of China's computable general equilibrium model suggests that a 10% fall in oil prices in 2015 would raise GDP by just over 0.1% while lowering the CPI by around 0.25 percentage point.

Risks are mostly on the downside, and a sharper-than-projected slowdown of the Chinese economy would have global spillovers both directly through trade and investment channels but possibly also via confidence effects. As regards growth in China, investment might slow down more than foreseen, for example if stimulus measures fail to counterbalance the effects of the property market correction, shrinking excess capacity and the anti-corruption campaign. Consumption may also surprise on the downside if a cooling property market were to damp housing-related spending more than projected, or if housing prices were to fall sharply. A stronger US dollar may adversely impact export competitiveness as long as the renminbi remains closely linked to it. Another downside risk relates to potential disorderly defaults among corporate issuers, in particular in sectors with excess capacity, or of trust products and local government investment vehicles owing to the real estate market correction. However, a stronger-than-expected global recovery would boost exports, investment and growth. So would further declines in oil and other commodity prices.

Table 1. **Macroeconomic indicators and projections**

	2008	2009	2010	2011	2012	2013	2014	2015	2016
					% change				
Real GDP	9.6	9.2	10.4	9.3	7.7	7.7	7.4	***7.0***	***6.9***
Exports of goods and services[1]	8.5	-10.1	27.6	9.0	5.3	8.6	5.4	***5.5***	***6.0***
Imports of goods and services[1]	4.0	4.5	20.6	10.2	6.3	10.7	7.1	***7.5***	***5.9***
GDP deflator	7.8	-0.6	6.6	7.8	4.8	2.2	0.8	***0.9***	***1.3***
Consumer price index	5.9	-0.7	3.2	5.5	2.6	2.6	2.1	***1.8***	***2.0***
Terms of trade	-5.5	8.8	-9.6	-3.4	2.8	1.3	2.7	***2.6***	***0.2***
Fiscal balance					**% of GDP**				
Overall[2]	1.0	-0.5	0.1	0.5	0.0	-0.3	-0.5	***-1.2***	***-1.5***
Headline[3]	-0.1	-2.8	-2.5	-1.8	-1.5	-2.0	-1.8	***-2.3***	
Current account balance	9.3	4.9	4.0	1.9	2.5	1.9	2.1	***2.3***	***2.5***
Memorandum items:									
					Billion USD				
Foreign exchange reserves, end-year	1 946	2 399	2 847	3 181	3 312	3 821	3 843		
					% change				
Housing prices deflated by the CPI[4]	6.5	1.5	9.8	4.2	-0.7	5.9	2.6		
Total employment	0.3	0.3	0.4	0.4	0.4	0.4	0.4		
Urban employment	3.7	3.8	4.1	3.5	3.3	3.1	2.8		
					Level				
Nationwide Gini coefficient for household disposable income	0.49	0.49	0.48	0.48	0.47	0.47	0.47		

Notes: 2015-16 figures are OECD forecasts.

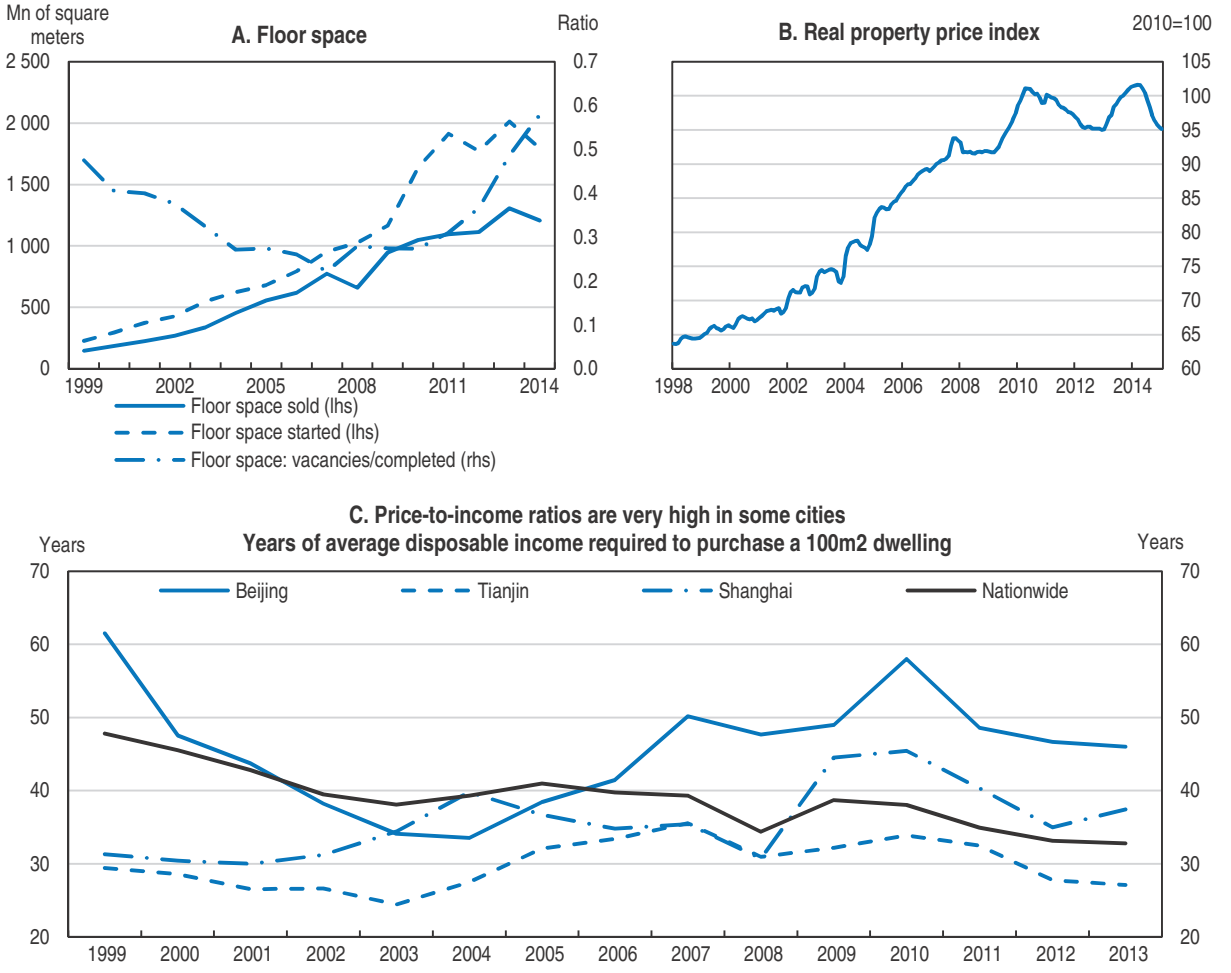
1. OECD estimates.
2. The overall fiscal balance encompasses the balances of all four budget accounts (general account, government managed funds, social security funds and the state-owned capital management account).
3. The headline fiscal balance is the official balance defined as the difference between the three items i) general budget revenue, ii) revenue from the central stabilisation fund and iii) sub-national budget adjustment on the revenue side and the three items iv) general budget spending, v) replenishment of the central stabilisation fund and vi) repayment of principal on sub-national debt on the spending side. The 2015 figure is the official deficit target.
4. The housing prices are estimated using the property price index of 70 cities for 2008-10, then the simple average of the property price index of newly constructed residential housing of 70 cities for 2011-14.

Source: OECD forecasts and estimates based on the *OECD Economic Outlook 96* and CEIC databases.

The property market is undergoing a correction

An unwinding of property market imbalances is underway and the measures taken to address local excesses should be sufficient to keep systemic risk at bay. The pace of real estate development has been frantic, not least in smaller cities: a 2014 survey by the Development Research Centre for City and Small Town Reform under the National Development and Reform Commission (NDRC) shows that 90% of the 191 surveyed prefecture-level cities are building new districts, which are up to almost eight times as large as the existing urban area. Policy measures have been taken to restrain demand and overall real estate investment – which accounts for about 19% of total fixed investment – has slowed. So have sales and investment in upstream industries such as cement, steel, flat glass and construction materials. Concomitantly, property-related lending, which makes up around one fifth of new loans, has slackened. Falling sales volumes and high inventories are driving property prices down in small cities, although demand has remained robust in megacities. Vacancy rates are increasing (Figure 3).

Figure 3. **The property market is cooling**



Note: Panel B: Housing prices are estimated using the property price index of 70 cities for 1998-10, and the simple average of the property price index of newly constructed residential housing of 70 cities from 2011 onwards. The CPI is used as a deflator.
Source: CEIC database.

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More recently, measures have been taken to limit the speed of the housing market correction. Home purchase restrictions are gradually being abolished: of the 46 cities that introduced them, only a handful continue the practice. Also, minimum mortgage lending rates were cut and conditions for second-house buyers became less restrictive.

However, the price correction ought to continue until the inventory overhang is worked off. More affordable prices will broaden the group of potential home-buyers and bring demand and supply into balance. In the process, some developers will face liquidity or even solvency problems, with knock-on effects on the financial sector. Slower property sales also reduce land development, and hence sub-national government revenues. A faster-than-envisaged property market correction could lead to sporadic defaults, but the stringent regulations governing housing investment offer protection against systemic risk. Households are not heavily indebted at below a third of GDP and the rapid rise in indebtedness is related to the pent-up demand stemming from the desire to own a home, which became possible only in the 1990s. Loan-to-value ratios are modest at 70% for

first-time home-buyers and housing cannot be collateralised for consumption purposes. Falling housing prices are also unlikely to lead to fire sales as housing sales are subject to income taxes within the first five years. Banking sector exposure is within a quarter of total loans and still strong wage growth keeps credit risk low. Developers may experience refinancing problems and smaller ones may default, which may trigger spillovers to financial institutions in some regions. Liquidity problems and increasing risk of default may lead to consolidation in the sector, where the biggest players record high growth notwithstanding falling sales volumes and values country-wide.

A number of industries suffer from excess capacity

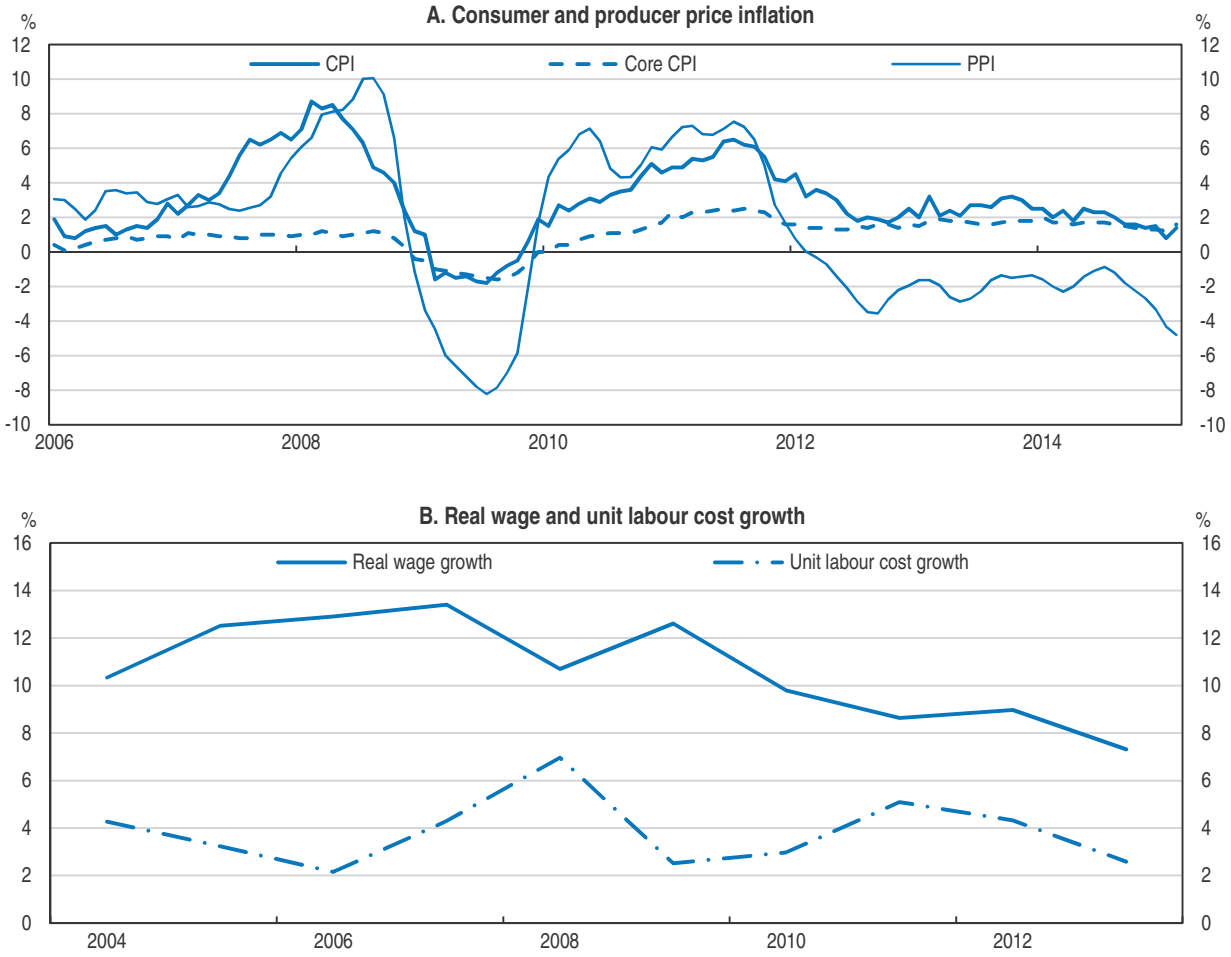
Excess capacity has been plaguing various industrial sectors, weighing on profitability and on capital spending in steel, cement, aluminium, flat glass and, downstream, electrical and railway equipment. Firms, including many SOEs, are driving down prices to secure market share at home and abroad. Falling prices of industrial products and inputs have kept core inflation subdued (Figure 4), notwithstanding labour shortages and resulting strong wage growth.

Rationalisation of existing capacity is warranted given fierce price competition, environmental damage and inefficiencies in many industries. The NDRC has long called for avoiding "blind" investment and redundant construction in steel mills, copper smelters and electrolytic aluminium. In 2013, the State Council took action more directly issuing guidelines to close down or merge high-cost production facilities across the country so as to reap economies of scale and restore profitability. Fewer steel mills now operate in Hebei and several aluminium smelters have been selected for closure in Guangxi and Guizhou. Rationalisation will help check greenhouse gas emissions, which tripled in two decades to reach 28% of global emissions in 2013 (Global Carbon Project, 2014). Smelters are also a significant source of air pollution. Estimates suggest that outdoor air pollution caused 1.3 million premature deaths in 2010, highlighting the pressing need to continue curbing pollution-intensive industry (OECD, 2014a). However, even as sizeable capacity is being phased out in some areas, massive new capacity is being built in others, for instance in the case of aluminium smelters in the four coal-rich Western provinces of Gansu, Ningxia, Qinghai and Xinjiang. While the relocation of energy-intensive industries is based on a better exploitation of comparative advantages and new facilities are typically more modern and cleaner, their proliferation works against the efforts to reduce excess capacity.

A more level playing field for enterprises would make for a more market-based rationalisation of excess capacity. An effective corporate governance system – that affects the environment for access to capital, the allocation of resources between competing ends and the monitoring of investments once they are in place – is essential to China's ambitions to boost the role of the capital market in optimising resource allocation. Stricter enforcement of environmental standards across the board would halt excessive and environmentally destructive competition among private firms. Private firms reportedly pollute more than their state-owned counterparts, in particular in the cement, steel and flat glass industries. This partly reflects greater investment in environmental protection by state-owned firms in recent years (Zhang, 2013). In contrast, private firms economised on such spending to cut costs and remain competitive. A gradual removal of subsidies and harder budget constraints for SOEs would be conducive to a market-driven and orderly rationalisation of excess capacity and deter building new overcapacity. Diversifying SOE ownership and board composition would introduce more checks and balances and

Figure 4. **Inflation has been subdued but unit labour costs have continued to increase**

Per cent change over previous year



Note: Core CPI excludes food and energy. Real wages are for urban employees. Unit labour costs are for the overall economy.
Source: National Bureau of Statistics.

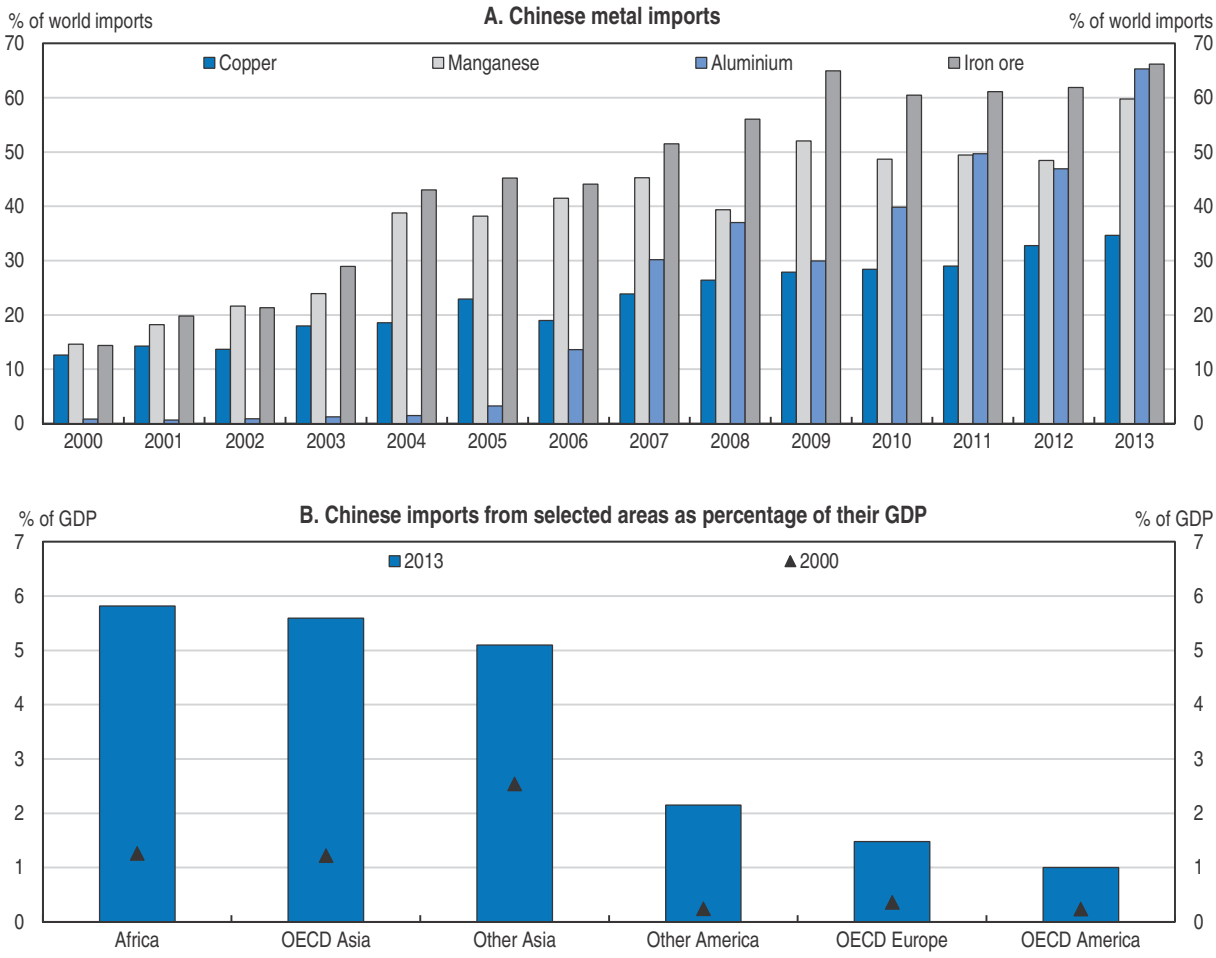
StatLink http://dx.doi.org/10.1787/888933198453

encourage market-based decisions. Professional managers at SOEs with incentive schemes comparable to those in the private sector would likely enhance efficiency and boost profitability (OECD, 2009). Subjecting SOEs to the same rate-of-return and dividend policies as private firms could also help avoid building up excess capacity.

China's slowdown affects commodity-producing economies

The slowdown of the Chinese economy has contributed to the end of the so-called "commodity super cycle". Adjustment in heavy industries implies lower imports of iron ore, coking coal, manganese ore and bauxite, affecting a range of countries as diverse as Australia, Brazil, Gabon, Myanmar and South Africa. However, Chinese demand for iron ore, which accounts for two thirds of the global market, will be held up somewhat by new railway construction. China also imports over 60% of the world production of manganese ore (Figure 5), which is used in steel making. China further imports nearly half of the world's copper output, but the announced huge investment in China's national grid is expected to support Chinese demand.

Figure 5. **China's commodity appetite has driven many countries' exports**



Source: UN Comtrade database.

StatLink http://dx.doi.org/10.1787/888933198466

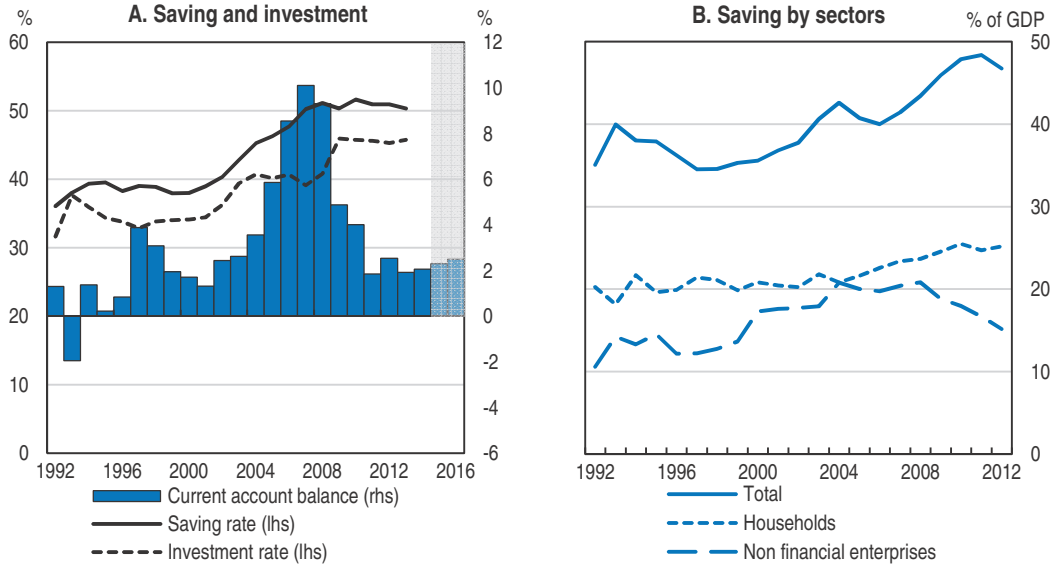
Slackening demand for minerals will also affect energy imports as metal smelting and pressing, chemicals and non-metal mineral manufacturing together account for a third of China's electricity consumption. Thermal coal exporters such as Australia, Indonesia or South Africa will likely be affected as high energy-intensity industries close down old facilities, build new ones closer to energy-rich areas inland or abroad and as higher environmental standards related to ash and sulphur content take effect. They will also be impacted by the recently imposed tariffs on coal imports and by the gradual rise in the share of nuclear and renewable energy.

While coal continues to dominate China's energy mix, investment in cleaner sources of energy has risen steeply. In 2013, China invested more in renewable energy than all European countries combined and it has committed to increase the non-fossil fuel share of energy to 20% by 2030 (Frankfurt School-UNEP Centre, 2014). This comes amid broader commitments to reduce CO_2 emissions per unit of GDP by 40-45% between 2005 and 2020 and for total emissions to peak by around 2030.

Progress with rebalancing is mixed

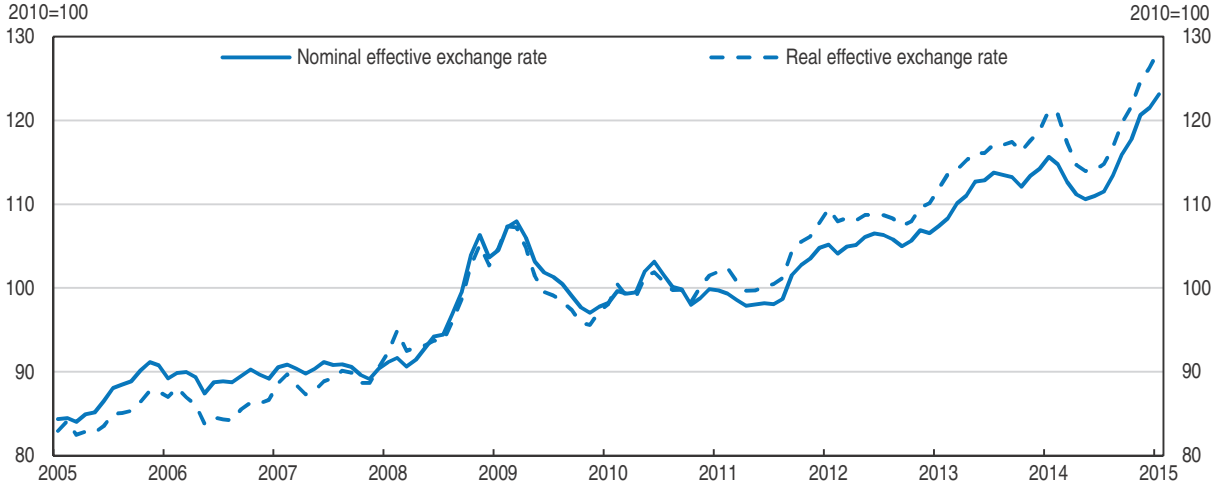
The rebalancing of growth from investment to consumption has been a gradual process. The national saving rate has fallen by around 1½ percentage points since its 2010 peak (Figure 6.A). Household saving remained stable at around 25% of GDP but corporate saving declined from around 20% at the start of the global crisis to around 15% by 2012 (Figure 6.B). The share of consumption is expected to rise as the population ages and healthcare and elderly care spending increase. Rising incomes and improvements in the social safety net should work in the same direction. So may the relaxation of the one-child

Figure 6. **The current account surplus has shrunk considerably**



Note: The shaded area indicates forecasts. National saving in Panel A is calculated as the difference between GDP and consumption in the World Bank WDI database while in Panel B it comes from the Flow-of-Funds accounts compiled by the National Bureau of Statistics.
Source: CEIC database, World Bank *World Development Indicators* database and for the forecasts *OECD Economic Outlook 96 Database*.
StatLink http://dx.doi.org/10.1787/888933198478

Figure 7. **The effective exchange rate has been appreciating**



Note: Broad effective exchange rate indices, based on 61 partner countries; the real effective exchange rate is computed using the consumer price index as a deflator.
Source: Bank for International Settlements.
StatLink http://dx.doi.org/10.1787/888933198485

policy (see below). Offsetting forces include the anti-corruption campaign and restrictions on public consumption.

While the saving rate declined, the investment rate held steady at very high levels. As a result, the current account surplus fell to long-time lows, at around 2% of GDP (Figure 6.A). In 2014, decelerating investment and sluggish consumption, partly as a result of reduced housing-related spending, held back imports. Export growth also weakened even as the effective exchange rate underwent a sizeable swing (Figure 7). Over the next two years, the current account surplus is set to hover in the range of 2.3-2.5% of GDP.

Monetary policy is supporting an orderly slowdown and is gradually becoming more market-based

Monetary policy has appropriately been supporting economic activity as growth has slowed, using a variety of levers. The People's Bank of China (PBoC) has cut reserve requirement ratios in steps since 2014, selectively for some categories of lenders or borrowers (notably small businesses and rural areas) and across the board in early 2015. It also reduced the policy rate for small businesses and subsequently for all borrowers. Deposit interest rates were also cut sequentially and the upward flexibility of the deposit rate increased. Those measures had only limited impact, however, given banks' general reluctance to lend to small businesses, which are considered riskier. Small firms' access to credit would be enhanced if they were subject to more rigorous reporting and disclosure requirements. The central bank also introduced pledged supplementary lending in 2014, which is a facility for targeted lending. The China Development Bank, for instance, is to disburse CNY 1 trillion for shanty-town projects over the course of three years. Pledged supplementary lending has collateral requirements, which should help limit moral hazard and improve the effectiveness of lending.

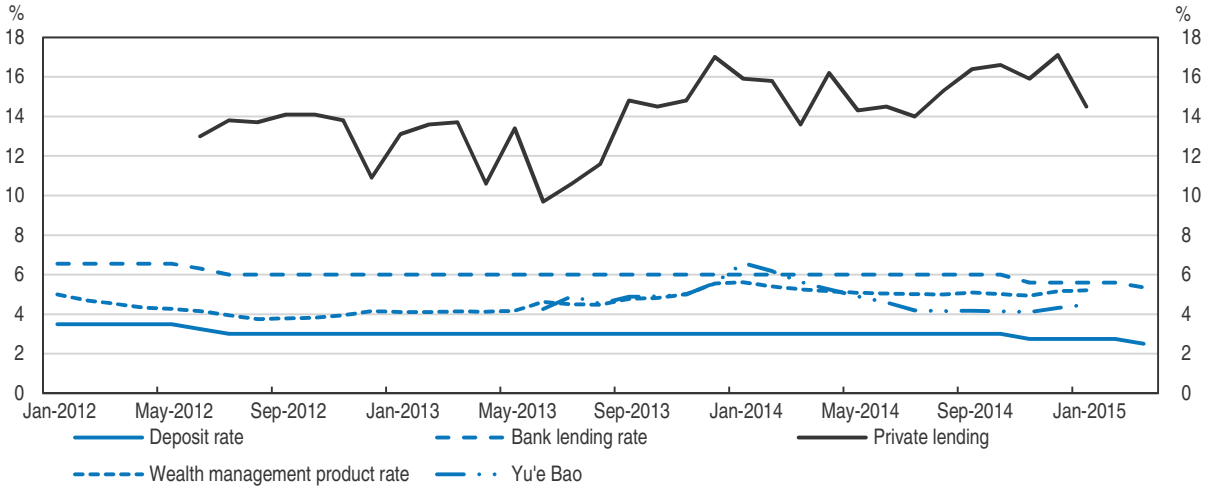
The active use of unconventional tools – such as targeted cuts in the reserve requirement ratio – is related to the fact that monetary transmission through interest rates is not very effective, which in turn reflects that borrowers are mostly SOEs or sub-national governments – entities that are less sensitive to interest rates. Thus, moving to a more efficient allocation of credit through market-based interest rates needs to go hand-in-hand with hardening budget constraints for these borrowers. The ongoing interest rate liberalisation, while a positive step towards market-based interest rates, has widened credit spreads for private businesses, but not for SOEs and other public borrowers, which continue to enjoy implicit guarantees. Owing to implicit guarantees to public borrowers, private businesses – especially smaller ones – are rationed out of the formal market and have to resort to retained earnings or informal borrowing to finance their activities.

Deposit rates are still controlled and only limited upward flexibility is allowed, but they are to be liberalised over time. This will push up the whole spectrum of interest rates, as deposit rates are well below market-clearing levels. Alternative savings instruments that have emerged in the past few years as a result of grassroots interest rate liberalisation provide substantially higher returns (Figure 8). With fuller domestic interest rate deregulation, the PBoC will need to anchor the short end of a market-based yield curve, by shifting the operating instrument of monetary policy from the money supply or multiple interest rates to a single benchmark short-term interest rate. In addition, competition among banks for deposits will intensify, which may force some less efficient banks out of the market. Therefore, prudential regulation should be strengthened prior to this last step in the interest-rate liberalisation sequence. In particular, a deposit insurance system is

necessary and is to be introduced in 2015, which will help avoid systemic risk stemming from bank runs. To complement this, an exit mechanism for financial institutions ought to be established (Pardee Center, 2014). Improved corporate governance standards in financial institutions will also help. To limit the impact of liberalisation on bank margins, the ceiling on long-term deposits could be increased before lifting the deposit ceiling altogether.

Figure 8. **Money market funds and wealth management products are more attractive than deposits**

Annual interest rates



Note: The deposit rate is the rate paid to households for one-year deposits; the bank lending rate is also for one year; the private lending rate refers to the monthly average of private lending rates in Wenzhou; the wealth management product rate is expressed as the weighted average rate of return of the underlying assets; the Yu'e Bao money market fund interest rate is a monthly average of the daily observations.

Source: CEIC database.

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Full interest rate liberalisation needs to be preceded by greater exchange rate flexibility to help the economy absorb shocks. Since March 2014, the exchange rate has been allowed to fluctuate up to 2% above and below a fixing rate against the US dollar set by the PBoC every day. This widened trading range may curb speculative activity and marks further progress toward capital account convertibility and the internationalisation of the currency. In the transition from a daily fixing mechanism to a market-based exchange rate system, a trade-weighted basket peg can help to anchor expectations and damp output fluctuations (Yoshino et al., 2014). Malaysia, for instance, switched from a dollar peg to a trade-weighted basket peg in 2005, which helped the central bank achieve currency stability.

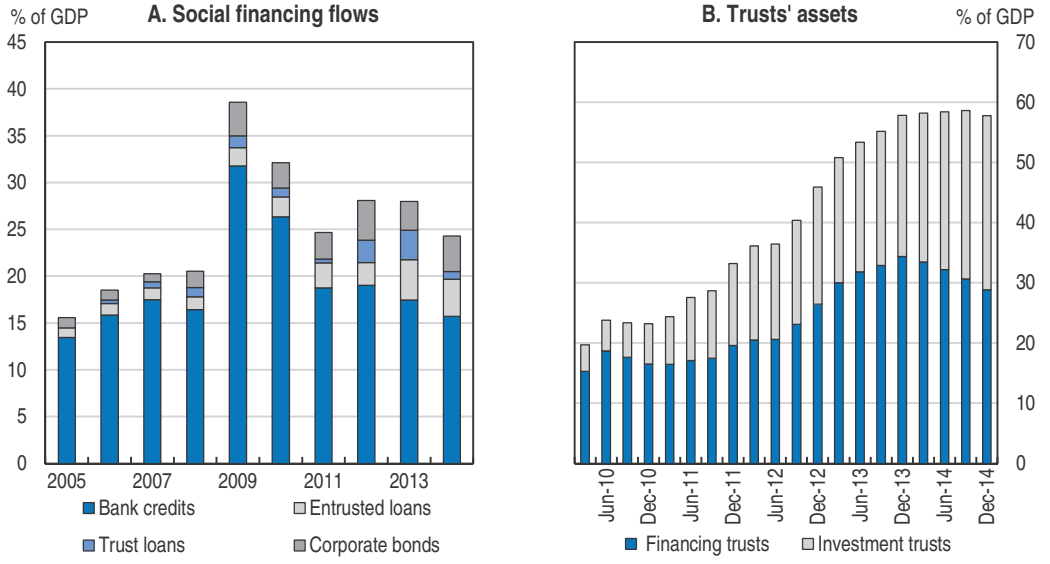
A more flexible currency is also a prerequisite to opening up the capital account. At present, foreigners can access China's capital markets through various routes, such as the Qualified Foreign Institutional Investor scheme. Central banks, renminbi clearing banks, other participating banks, sovereign wealth funds and foreign insurance companies can be granted access to the onshore interbank market, although with quotas. More recently, many foreign monetary authorities have signed foreign exchange swaps with the PBoC. In the Shanghai Free Trade Zone – launched in 2013 as a laboratory for reforms, including capital account liberalisation – free trade accounts were announced in mid-2014, allowing

free cross-border transfers of funds. As the Chinese economy remains attractive for investors and as funding costs can be lower for private firms abroad, capital inflows are expected to continue. Capital outflows could also be substantial insofar as households venture overseas to obtain higher returns than those on domestic bank deposits.

Rapid credit growth has raised financial stability concerns

Bank credit and even more so other forms of lending by non-bank financial institutions (NBFI) have soared in recent years, raising concerns about financial stability (Bank for International Settlements, 2014; International Monetary Fund, 2014). Caps on bank deposit rates led investors to search for higher-yielding assets at the same time as bank lending was constrained by the regulated loan-to-deposit ratio. As a result, lending outside the traditional banking sector surged. This provided firms with increased access to finance, with banks often using NBFI products and third-party institutions as tools for regulatory arbitrage. The rate of return on NBFI products, which are less regulated, has tended to exceed the bank deposit rate, partly reflecting the riskier profile of the underlying loans (Figure 8). The rapid growth in NBFI credit in the past few years has raised financial risks. However, authorities implemented a range of measures in 2014 that damped the growth in such activity (Figure 9), reducing the threat of financial instability from this source.

Figure 9. **Lending growth has been very rapid**



Source: CEIC and China Trustee Association.

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NBFI instruments come in many different forms. One is internet-based money market fund products, such as Yu'e Bao, which pool funds to invest in negotiable bank deposits and some other types of liquid assets that are low risk and offer higher interest rates than regular bank deposits. Households can readily invest in most of these products. A second type consists of wealth management products (WMPs), which are short-term deposit-like instruments with a CNY 50 000 minimum threshold that generally offer no explicit guarantee of the principal. In addition, the forthcoming deposit insurance scheme is

unlikely to cover such products. WMPs are issued by banks, although there is a restriction on the volume that each bank can issue. Funds are then channelled to an NBFI that invests them in a range of assets including loans, listed equities and bonds. These institutions include trust companies (Figure 9.B) and securities companies. Banks usually dictate how the funds are invested, although regulations require that 35% at most of the WMP funds can be invested in loans.

WMPs are often used to fund Local Government Investment Vehicles (LGIVs), which are established to finance public real estate and infrastructure projects (see below). LGIVs have accumulated a massive amount of debt in recent years reaching 7% of GDP in 2013, a large share of which might be non-performing without fiscal subsidies and special accounting practices (Zhang et al., 2013). WMPs have also been commonly used to fund real estate projects that face restricted access to bank finance due to government concerns about housing overinvestment. The lending rates offered to these institutions are unlikely to fully reflect the risk of failure, as there is a long-standing perception that the government would bail out any firms that are at risk of defaulting. The potential for corporate defaults may have become more tangible lately as the authorities seek to liberalise financial markets and ensure that risk is adequately reflected in market prices. The first default of a LGIV was disclosed by Qilu Bank in Shandong Province in 2013. In March 2014, the first onshore corporate bond default occurred for Shanghai Chaori Solar Energy Science and Technology Company, a solar power firm suffering from overcapacity. Nevertheless, the subsequent bail-out of bondholders by an asset management firm with close links to the government suggests that implicit government guarantees for Chinese corporates may still exist.

Banks are not required to hold reserves or capital provisions against WMPs, as they are off balance sheet. Although there is no legal obligation for banks to repay the principal in the event of a loan default, past episodes have highlighted that they come under substantial pressure to do so. With continued growth in the stock of lending underpinned by WMPs, a sudden increase in the scale of defaults in the underlying loans may place pressure on the capital reserves of some banks. However, the largest banks in China are well capitalised, lowering the financial risks of such a scenario. In addition, along with regulations that have curbed the growth in WMPs, the government has responded to the risks by reiterating that investors should bear the ultimate liability when investing in WMP products.

Although banks have had a growing inclination to invest themselves in trust assets funded by WMPs, recent regulatory changes have sought to reduce the associated financial risks. While banks were limited in their ability to hold such assets directly, they were establishing interbank structures to that end. One of the simplest arrangements was when a bank purchased trust beneficiary rights (TBRs) from another bank, with the funds then channelled through a trust company to a corporate borrower. The purchasing bank could include the loan as a "financial asset held under repurchase agreement", which required relatively limited capital coverage. Through such regulatory arbitrage, banks were funding loans to riskier sectors. Furthermore, banks were financing this activity by borrowing short term and investing in long-term assets, heightening maturity mismatch risk. The China Banking Regulatory Commission introduced regulations in 2013 to make the links between banks and trust companies more transparent. However, this led banks to strengthen ties with securities companies in the NBFI sector. More important may have been the recent joint publication of *Document 127* by the PBoC, the State Administration of Foreign

Exchange and the three financial regulators that substantially increased the capital coverage required for TBRs.

The primary motivation behind the growth in various NBFI products is the ability for riskier borrowers to obtain credit and for investors to earn higher returns. Consequently, further progress in liberalising bank interest rates will be key to contain growth in poorly provisioned off-balance sheet lending. The financial risks of WMPs would also be reduced if banks were required to make capital provisions against their stock of WMP issuance, at least while the expectation endures that banks guarantee the principal for WMP assets.

Overall, maturity mismatches on- and off-balance sheet imply liquidity risks, which call for the provision of sufficient, but not excessive, liquidity to avoid the reversal of deleveraging. Gradual deposit interest rate liberalisation should continue. Risk needs to be better reflected in the price of funding. Orderly defaults of failing borrowers would sharpen risk perceptions and lead to more efficient resource allocation without endangering financial stability.

More transparent budget management and balanced fiscal relations would reduce fiscal risk

Fiscal policy is set to remain slightly expansionary – in line with limited overall slack and growth close to potential. Recent fiscal measures to support growth include accelerated infrastructure and social housing investment, and tax breaks for SMEs. The budget deficit is projected to increase somewhat in 2015-16, and so will overall total gross public debt. The increase in debt will be partly driven by sub-national bond issues to finance urbanisation. If growth slows more than expected, additional stimulus may be imparted, which could be readily financed given the current fiscal space.

More specifically, while China's officially reported public debt at around 20% of GDP is not particularly high, debt at sub-national levels approaches 30% of GDP (Table 2) and is not recorded in government accounts, as documented in the previous *OECD Economic Survey of China* (OECD, 2013a). Data on sub-national debt are collected by the National Audit Office, which distinguishes between debt with direct repayment obligation, guaranteed debt and other implicit or contingent debt, part of which may involve a repayment obligation for the state. Financing platforms and government entities are the biggest debtors (Figure 10.A). Data on sub-national government debt, however, are not released on a regular basis. Even assuming that governments at all levels will be liable for all guaranteed and contingent debt, total public debt would have been around 52% of GDP as of mid-2013 – a manageable level. However, new official sub-national debt estimates to be released by spring 2015 may be substantially higher.

Table 2. **Overall government debt is not particularly high**

Debt in % of 2013 GDP at mid-2013

	Central government	Provinces	Prefectures	Counties	Townships	Total
Full repayment responsibility	16.7	3.0	8.2	6.7	0.5	**35.2**
Guaranteed debt	0.4	2.7	1.3	0.6	0.0	**5.0**
Contingent liabilities	3.9	3.2	2.9	1.3	0.1	**11.3**
Total	**21.1**	**8.8**	**12.4**	**8.6**	**0.6**	**51.5**

Note: Debt is classified into three categories: i) debt with full repayment responsibility, ii) guaranteed debt and iii) debt for which the sub-national governments may be partially liable.
Source: National Audit Office reports.

Sub-national debt has been an issue since the 1994 inter-governmental fiscal system reform, which delegated a large part of spending responsibilities to sub-national governments without assigning sufficient revenue sources to finance them (OECD, 2006; Wang and Herd, 2013). State Council Opinion 2015/71 on Reforming and Improving the Central-Local Fiscal Transfer System aims at addressing the mismatch by making the fiscal transfer system more transparent and increasing the share of general transfers so that sub-central governments can allocate funds more efficiently.

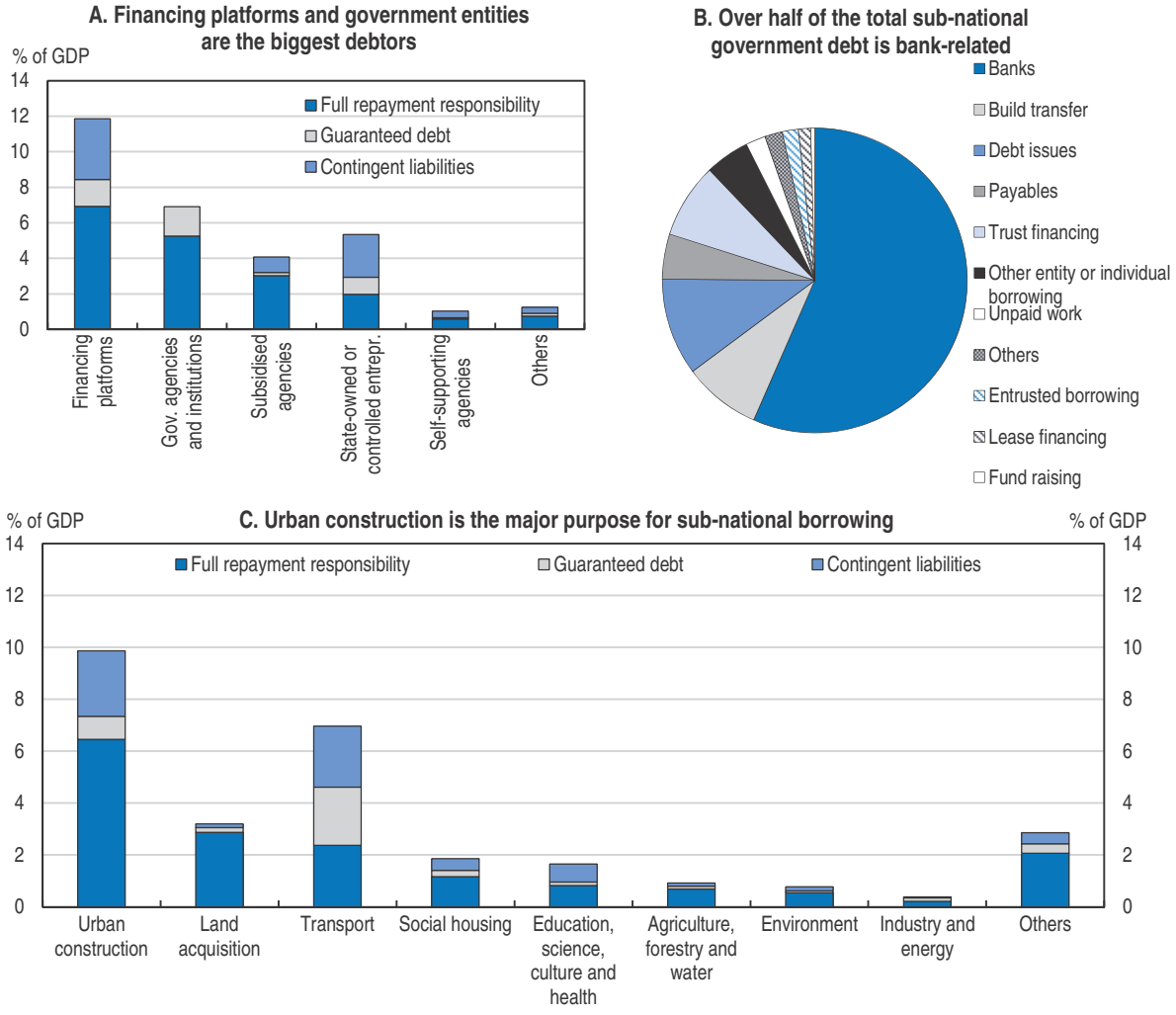
Against this backdrop, the Budget Law was amended in August 2014, with effect from 2015. It now allows provincial-level governments to issue debt subject to approval by the People's Congress and only up to a ceiling (so far, the central government occasionally issued bonds on behalf of selected sub-central governments and a few pilot municipal bond issues had been allowed). This will make it possible to replace expensive, shorter-term bank or trust debt (Figure 10.B) by cheaper, longer-term sub-national government debt. The revision of the Budget Law will also enhance transparency, in that it requires publishing all four budget accounts (general budget, fund budget, social security budget and SOE accounts). Moreover, the revision effectively abolishes the requirement for sub-national budgets to be balanced every single year, introducing a rolling multi-year framework, thereby reducing pro-cyclicality (and State Council Opinion 2015/3 on Medium-term Fiscal Planning stresses the role of accurate forecasting of macroeconomic variables in this framework). Furthermore, the ways to tackle existing sub-national debt have been specified. State Council Opinion 2014/43 on Strengthening Local Government Debt Management requires the handling of debt by type: for instance, debt related to general expenditures will be classified under the general budget account, and debt related to specific projects under the fund account.

A particularly risky type of sub-national government debt is related to build-transfer schemes. On average, build-transfer schemes account for 8% of sub-national government debt (Figure 10.B), but their share is much higher in a number of poorer provinces, reaching nearly 30% in Guizhou. Build-transfer schemes mimic the widely used build-operate-transfer model that involves the private sector in the construction of infrastructure and transfers the assets to the government 20-30 years later, but they lack the middle phase. Build-transfer schemes require a non-government party to build a project relying on its own financing and only two to three years after the project is finished, it is transferred to the government, which repays the project within a couple of years. The rate of return is typically around 20%, well above the 8-12% of build-operate-transfer projects, so it is attractive for SOEs or large private firms with a good reputation that can raise cheap funds. High costs, short repayment periods and lack of operation experience make this type of debt risky in comparison with other debt types even though the underlying project may serve as collateral.

Land reserves and other assets such as infrastructure provide a buffer against fiscal risk stemming from sub-national debt. The rapid accumulation of sub-national debt was made possible by the continuous acquisition of new land for development. Land reserves serve as collateral for borrowing and land sales generate revenue to service the debt. At present land reserves at hand in the biggest 34 cities cover roughly 40% of country-wide sub-national debt, implying that total land reserves should cover a much higher percentage. The ongoing property-market correction, however, may affect sub-national governments' ability to repay their debt. Indeed, so far land-related revenues, in particular land transfer income, made up around a third of sub-national government revenue on average, and much more in some areas (Figure 11).

Figure 10. **Sub-national debt has taken many forms**

Sub-national debt at mid-2013



Note: Sub-national debt is classified into three categories i) debt with full repayment responsibility, ii) guaranteed debt and iii) debt for which the sub-national governments may be partially liable. Debt expressed as a percentage of GDP is based on 2013 GDP.
Source: National Audit Office.

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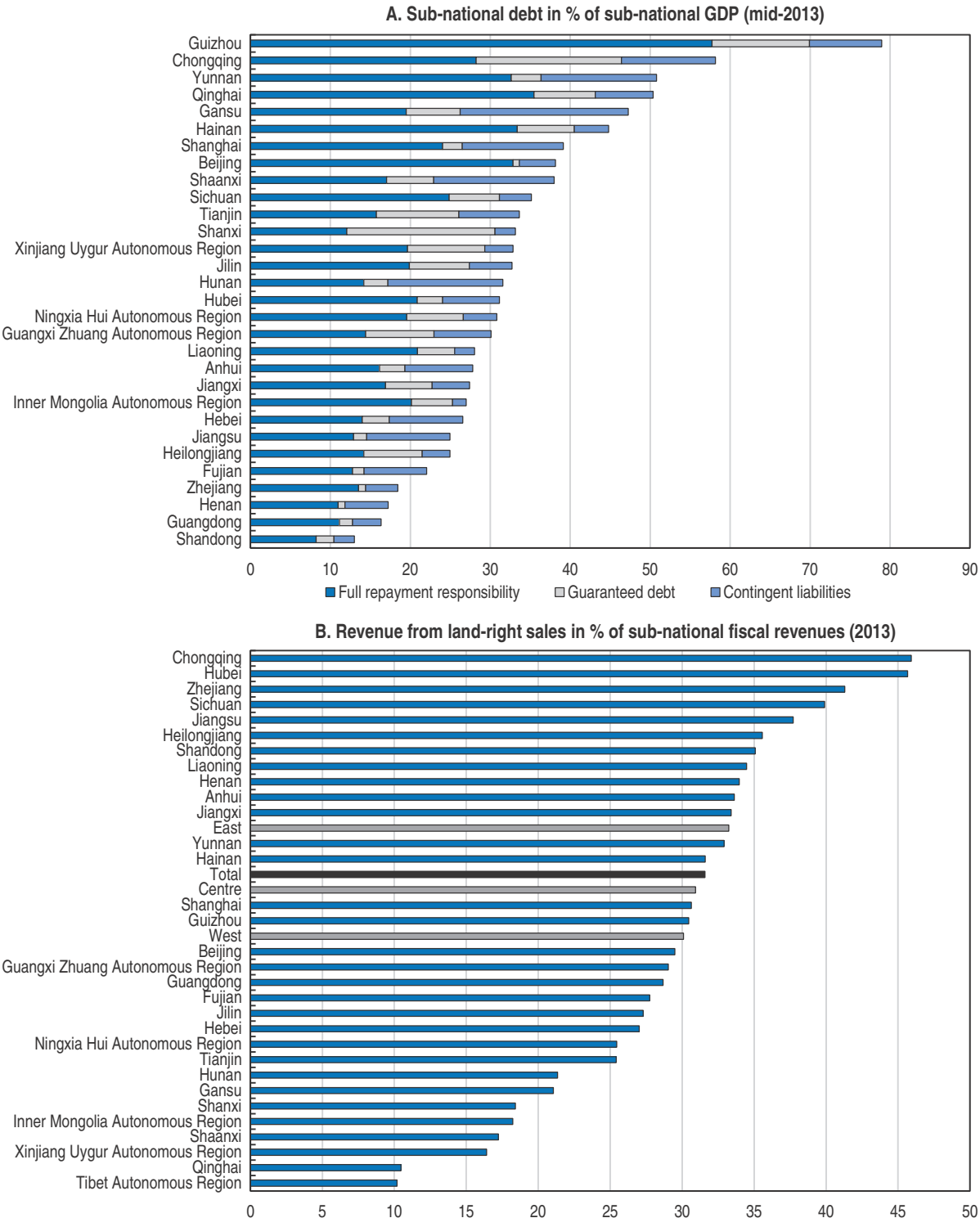
Although the bulk of sub-national debt is used for infrastructure and urbanisation projects (Figure 10.C), some may not generate any cash flow. Also, the extent of indebtedness varies widely across sub-central governments, some of which are heavily indebted. Improving budget management will help address the ensuing fiscal risks. Income and debt repayments by LGIVs ought to be integrated into the budget to discourage inefficient investment projects. Viable projects should still be financed – as sub-national investment is a major driver of urbanisation and growth – but through bonds. Adding debt to the indicators used to evaluate sub-national government officials' performance should reduce incentives to borrow unwisely. However, as long as mismatches between sub-national expenditure mandates and revenues endure, sub-national debt problems are likely to persist. Moreover, planned reforms such as the extension of social security coverage or other spending measures related to urbanisation will impose a large additional fiscal burden.

Figure 11. **The local debt burden varies and so does reliance on land-right sales**



Note: Sub-national fiscal revenue in Panel B is defined as the sum of general budget account revenue and fund account revenue.
Source: Sub-national Audit Office and Finance Bureau websites.

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Main recommendations to make growth more stable and reduce risks

- Continue to pursue stated emission targets, including by implementing a national carbon emission trading scheme, phasing out subsidies to carbon-intensive producers and boosting investment in renewables.
- Phase out implicit government guarantees enjoyed by state-owned enterprises, so that all firms compete on a level playing field with regard to finance, regulation, taxation and public procurement.
- Continue to gradually liberalise deposit interest rates while enhancing financial stability through measures such as provisioning for actual bad loan exposures, including off-balance sheet loans.
- Increase fiscal transparency and sustainability including by permanently prohibiting local government investment vehicles from taking on new debt.

Paving the way for sustainable and inclusive growth over the longer run

The economy's transition to a more moderate but still rapid cruising speed amid population ageing calls for the removal of distortions that inhibit sound growth, and specifically for greater reliance on market-based pricing, opening up off-limit industries to private and foreign firms and a more level playing field for non-state-owned market players. Thus, reforms in the areas of price mechanisms and market entry feature prominently in the authorities' structural reform agenda (Annex A1). Going forward, the major challenge is to make factor markets more efficient via greater market access and more market-based pricing mechanisms.

The role of market forces differs greatly across the economy. While market principles seem more potent in product than in factor markets, there is room to improve the way market forces operate in both. Distortions in factor markets often resulted from government intervention to address market failures during the transition from a centrally-planned to a market-based economy and act as subsidies, raising corporate profits and export competitiveness. The prices of capital, land and energy do not reflect the true social and environmental cost of production, making for a widespread misallocation of resources. Misallocation has been exacerbated by local authorities' growth-seeking behaviour as they competed to offer low-cost or free land, cheap credit, tax concessions and other subsidies to attract investment.

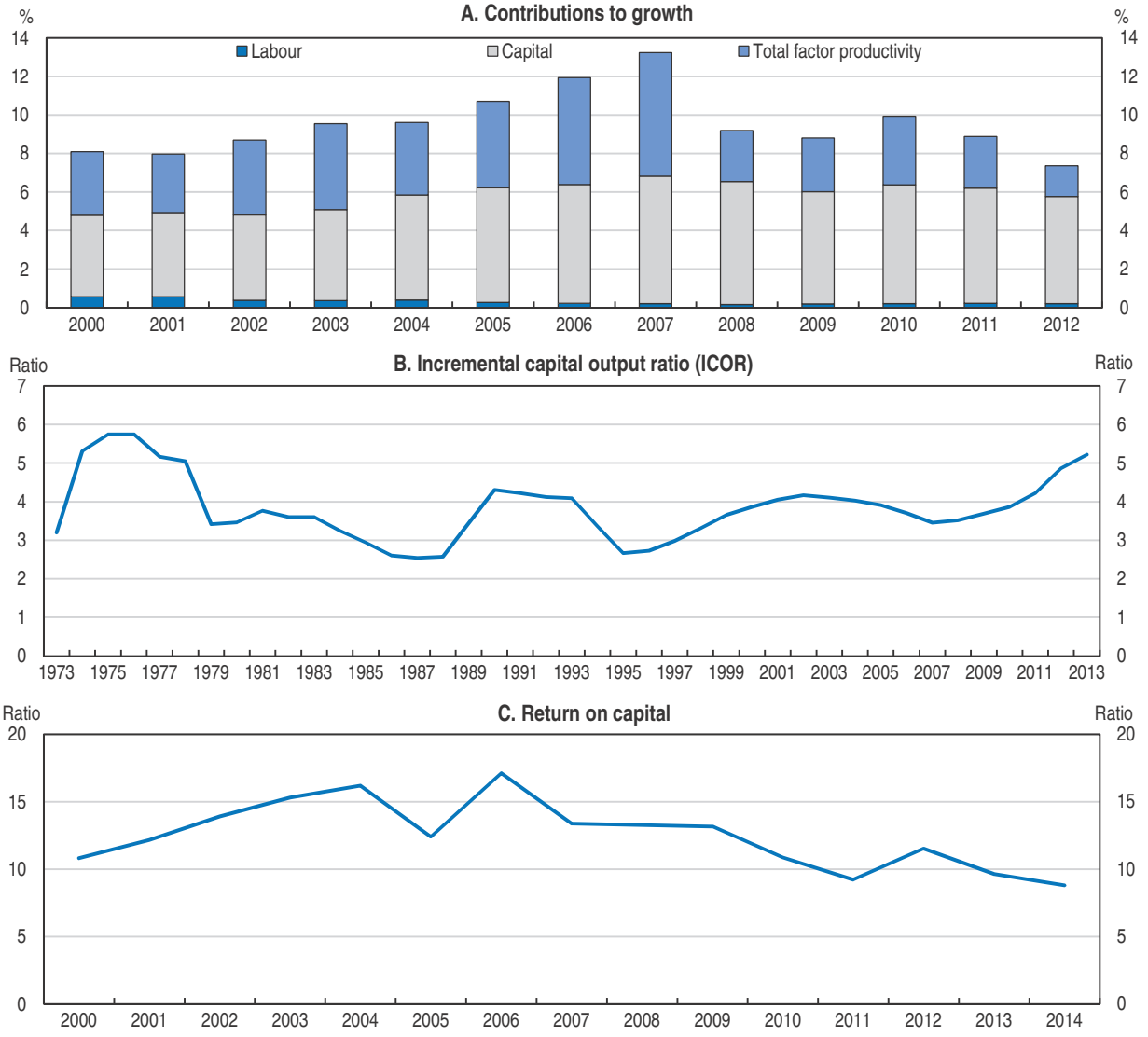
Cheap energy has led to the massive development of energy-intensive industries – where China does not have a comparative advantage as it is a net importer of coal and oil (IEA, 2013) – and has given energy-intensive products a competitive edge in global markets. Numerous measures have been taken in recent years to move energy prices towards market levels. Oil prices have been linked to international prices, though with a lag and greater downward than upward flexibility. More recently, natural gas prices have been indexed to crude oil benchmarks. However, at the sub-national level, there are scores of subsidy programmes for gas-fired power plants and renewable energy. They aim to encourage cleaner energy sources but also to keep energy prices low, which is a major source of local competitiveness.

For a long time, GDP growth was the indicator of local officials' performance. The Chinese economy has, however, moved a long way from a planned economy (Chinese Academy of Sciences, 2013). Local officials' performance is now also assessed based on environmental, social and sub-national debt indicators.

Capital accumulation drives growth amid population ageing and decelerating productivity

Growth has long been propelled by very high rates of investment in China, and even more so since the onset of the global financial crisis (Figure 6.A). Capital accumulation's contribution to overall GDP growth has even increased in recent years while that of total factor productivity (TFP) withered (Figure 12.A) (Wu, 2014). Given the still relatively low level of capital stock in per capita terms (Koen et al., 2013), investment in infrastructure and more advanced machinery is still very much needed.

Figure 12. **Capital continues to be the major driver of growth but returns on capital have decreased**



Note: Capital efficiency is measured by the incremental capital-output ratio (ICOR). The ICOR is the amount of capital needed per extra unit of output, expressed as a ratio. It is calculated as a ratio of the investment rate and the change in GDP and is expressed as a five-year moving average. The return on capital is calculated as the capital share of income divided by the capital-output ratio accounting for the difference between GDP and capital goods inflation and depreciation.

Source: Authors' calculations based on the Asian Productivity Organisation's Productivity Database and the *OECD Economic Outlook 96 Database*.

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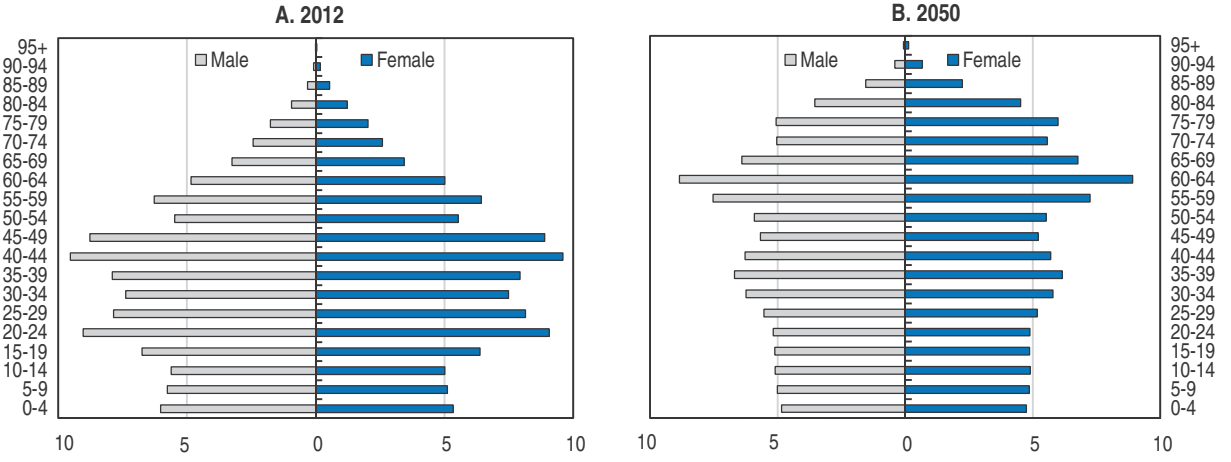
Capital efficiency appears to have fallen recently (Figure 12.B), but the rate of return on capital is still high (Figure 12.C). The incremental capital-output ratio has increased in recent years, implying that more capital is needed to produce an extra unit of output. Underlying this development is a rising share of real estate in overall investment that is less conducive to growth than, say, the introduction of new technology or the expansion of infrastructure. Also, infrastructure tends to have a long gestation period and the large investments made during the recent crisis as part of the stimulus programme (OECD, 2010) may take some time to bear fruit.

Rapid population ageing will be a drag on growth as it will reduce the national saving rate that supported high investment rates and growth in recent years. Consequently potential output growth will decline, raising the risk of China falling into a "middle-income trap" (Koen et al., 2013). Ageing will also exert growing pressures on public finances. China's rise to middle-income status was accelerated by a demographic transition, as the mortality rate dropped faster than the birth rate and the share of the working age group in the total population increased. However, due to the one-child policy and to some extent as a by-product of the increase in education attainment and living standards, fertility rates dropped sharply and the share of the working-age population started to decline early in the 2010s. The old-age dependency ratio is set to rise as the number of years in retirement increases (Figure 13). This will coincide with a falling child dependency ratio, however. Old-age dependency ratios vary enormously across provinces, with the oldest ones in line with the United States or Korea, and the youngest ones closer to India (Figure 14).

Figure 13. **The population is ageing rapidly**

Population structure in 2012 and 2050



Source: CEIC and United Nations Department of Economic and Social Affairs: *World Population Prospects: The 2012 Revision.*

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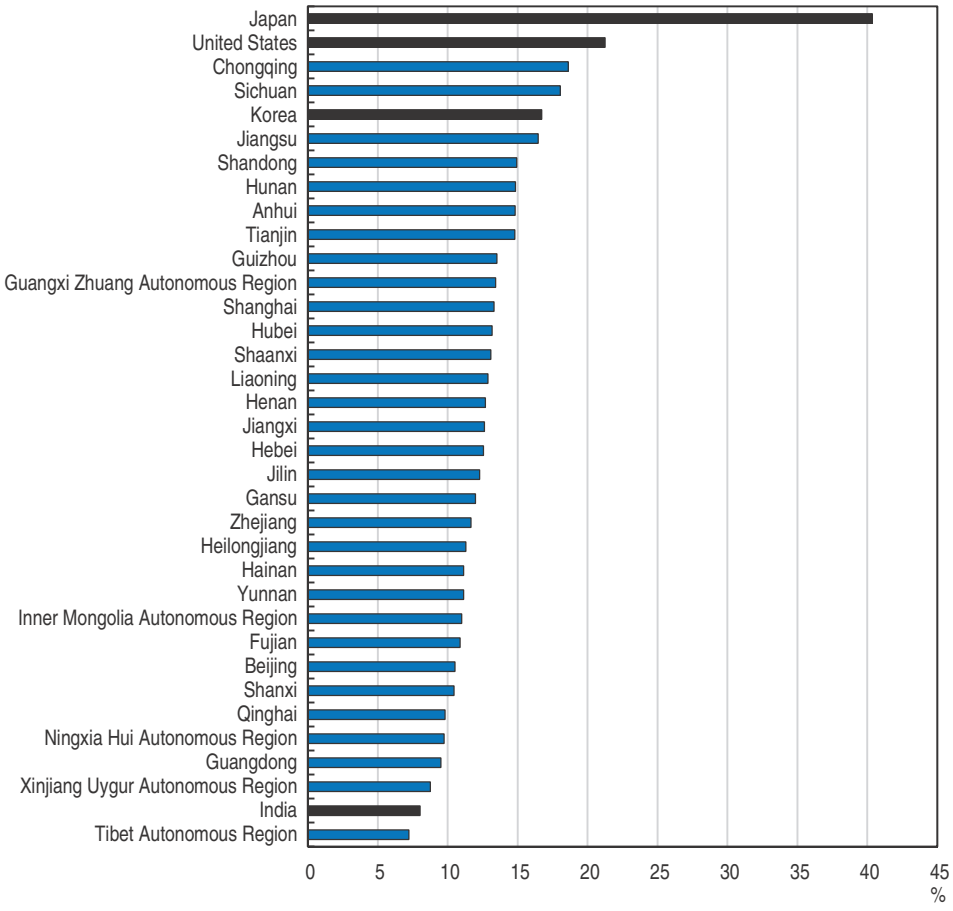
Ageing will be slowed only to a limited extent by the recent incremental relaxation of the one-child policy. Until recently only minorities, singleton couples and, in some areas (26 out of 31 provinces), families with the first child being a girl could have a second one. Recently, a further relaxation was announced allowing a second child if at least one of the parents is a single child. As most urban couples of child-bearing age are singletons, they are already allowed to have two children. Moreover, many provinces already allowed a second child if one of the parents is a singleton. As a result, less than 9% of the eligible

Figure 14. **Old-age dependency varies greatly across provinces**

The ratio of population above 65 to 15-64, 2012



Source: CEIC database, World Bank *World Development Indicators* database and OECD historical Population Data and projections.

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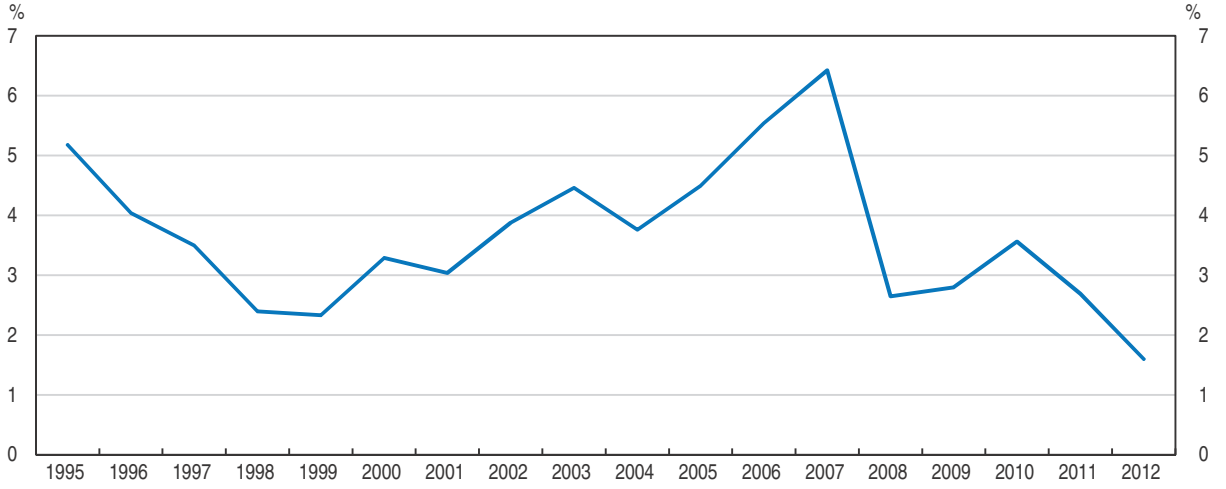
couples had applied to have a second child by end-2014. The very low application rate may also be related to additional conditions: in Beijing for example, the first child must be above four, the mother above 28 and at least one of the parents must hold a local urban residence permit or *hukou*. Therefore, the change is likely to increase the number of births by only one fifth. Experience in two-child policy regions shows that fertility rates declined like in the rest of the country, although a two-child policy can improve the gender balance.

Population ageing will also exert upward pressure on labour costs. At the same time, it will tend to bring down the household saving rate. The latter had been pushed up considerably by the one-child policy, in a context where by custom and by law children are to support their retired parents: fewer children reduced the financial and in-kind transfers to the retirees, leading them to save more when working (Choukhmane et al., 2014). Insofar as the elderly tend to save less, ageing will push down the overall household saving rate. The working population may also save less as they need to support larger cohorts of elderly family members, although this might be offset by a diminishing readiness on the part of the younger generations to do so.

The TFP deceleration (Figure 15) is worrying as it is the growth in productivity that matters most for competitiveness and growth over the longer run. The TFP deceleration indicates a less efficient use of production factors. Indeed, very high investment rates have led to decreasing capital efficiency. This process is likely to have been aggravated by the large-scale investment stimuli during the global financial crisis. Boosting TFP is particularly important in China, as population ageing will reduce the saving rate and the high investment rates that have been the major engine of growth. China fares relatively well in TFP and labour productivity levels, both in manufacturing and services, compared with the other BRIICS economies, even though the gap with the United States is still sizeable (Figure 16).

Figure 15. **TFP has decelerated recently**

Total factor productivity growth



Source: Asian Productivity Organisation Productivity Database.

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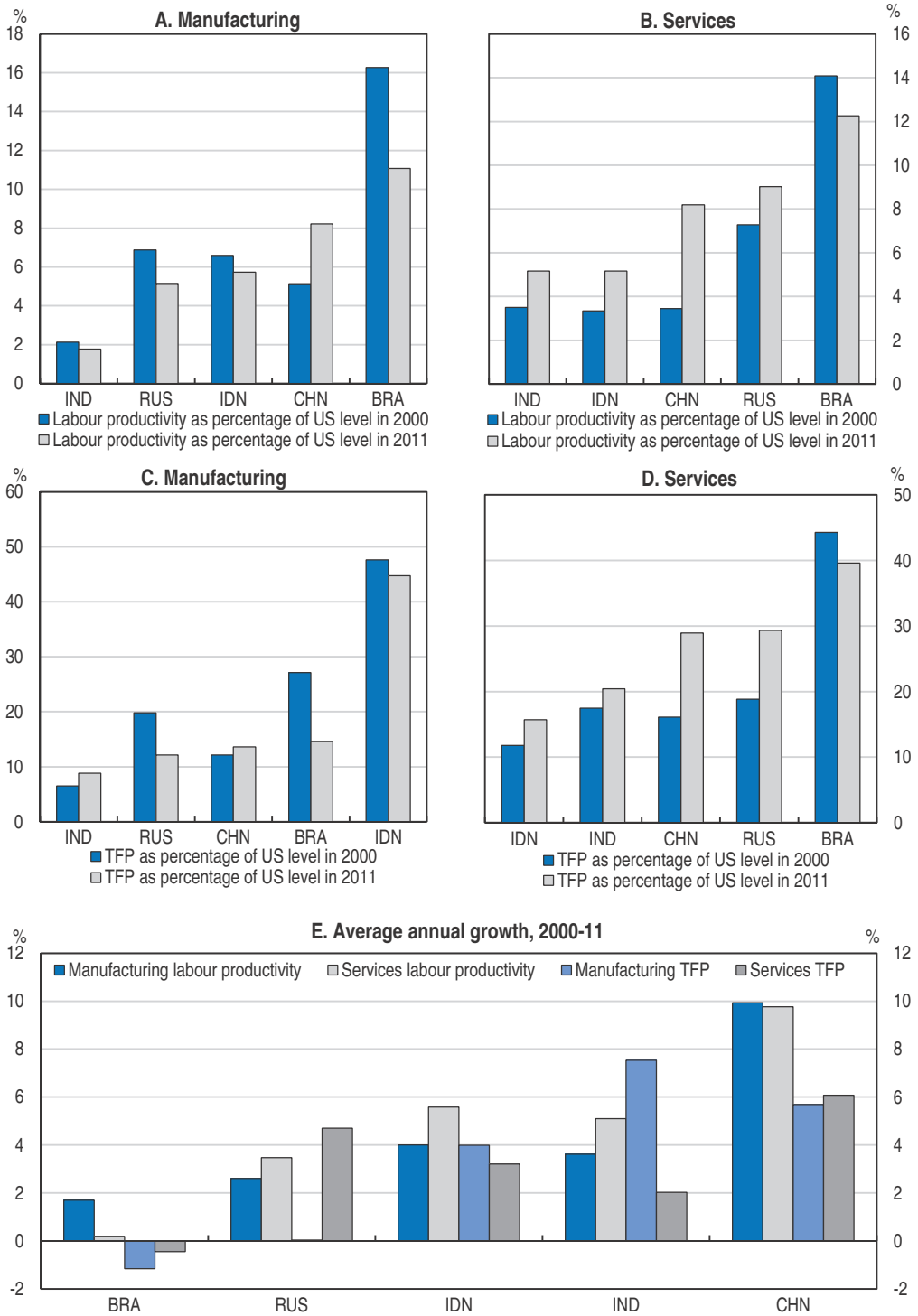
Productivity gains are being held back inter alia by constraints on the labour market and on innovation. Although China still has surplus labour, discrimination against migrant workers in the provision of public services inhibits a better utilisation of labour resources and is driving up wages in the coastal regions. Higher wage costs can only be afforded if the economic environment is sufficiently conducive to innovation and the development of more sophisticated skills required for the production of higher value-added goods and services. As China builds indigenous innovation capacity, the activities it undertakes as part of global value chains (GVCs) will evolve. At present, China's high-technology exports still rely heavily on imported intermediate inputs. China's share of world trade is much lower in value added terms than in volume terms, reflecting its position in GVCs as an assembler (OECD, 2013c). Nevertheless, with the development of human capital and innovation capacity over the past decade (see below), China is becoming a more important supplier of value-added to other countries' production. Policies to support China's further upgrading in GVCs are generally consistent with policies fostering enterprise-led innovation. In this context, strengthening the enforcement of the intellectual property right framework, encouraging further business R&D spending and encouraging competition in some sectors that are currently dominated by SOEs will be important.

Figure 16. **Productivity has been catching up faster in China than in other BRIICS economies**



Note: Labour productivity is defined by value added per employee (in 2002 US dollars) and TFP as the residual value added after accounting for labour and capital. All variables are in real terms and converted to US dollars at annual average exchange rates. The base year is 2002. TFP is estimated with sectoral data for 14 manufacturing and 18 services sectors classified according to the International Standard Industrial Classification Revision 3. Aggregate TFP for manufacturing and services is weighted by value added. For methodological details, see Molnar and Chalaux (2015). Comparable data for South Africa were not available, but comparisons for selected manufacturing sectors suggest productivity levels for South Africa are at the lower end among the BRIICS.

Source: Authors' estimations using the UNIDO Industrial Statistics and the World Input-Output Database.

StatLink http://dx.doi.org/10.1787/888933198577

In sum, growth has benefited from the demographic dividend in past decades but will henceforth be driven more by the reform dividend (Lu and Cai, 2014). Further relaxing family planning policies, raising labour participation rates – including through increasing the retirement age (Herd et al., 2010), enhancing the quality of human capital by training and boosting productivity through various reform measures that allow a more prominent role for the market to allocate resources can jointly add one to two percentage points to GDP growth over the next half century.

Urbanisation will continue to drive productivity

Given that around half of the population still lives in rural areas, further productivity gains can be achieved through continued migration to cities, which host more productive urban jobs. At the same time, technological change and industrial upgrading in some sectors should result in resources shifting from less to more productive industries. The transition to an increasingly market-based economy will work in the same direction. Decomposition of labour productivity gains into those from shifts among sectors and those from increases in productivity in individual sectors sheds light on these ongoing trends (Molnar and Chalaux, 2015). Productivity gains resulting from the movement of labour from less to more productive sectors (the so-called "shift effect") explain about 2 percentage points of annual labour productivity growth in the past decade, pointing to a better allocation of labour. Within-sector productivity gains have also been sizeable thanks, to a large extent, to China's strategy of tapping global knowledge through inward foreign direct investment (Girma et al., 2014). A certain level of concentration of foreign firms in an industry cluster, however, is necessary to bring about such productivity-boosting effects of FDI.

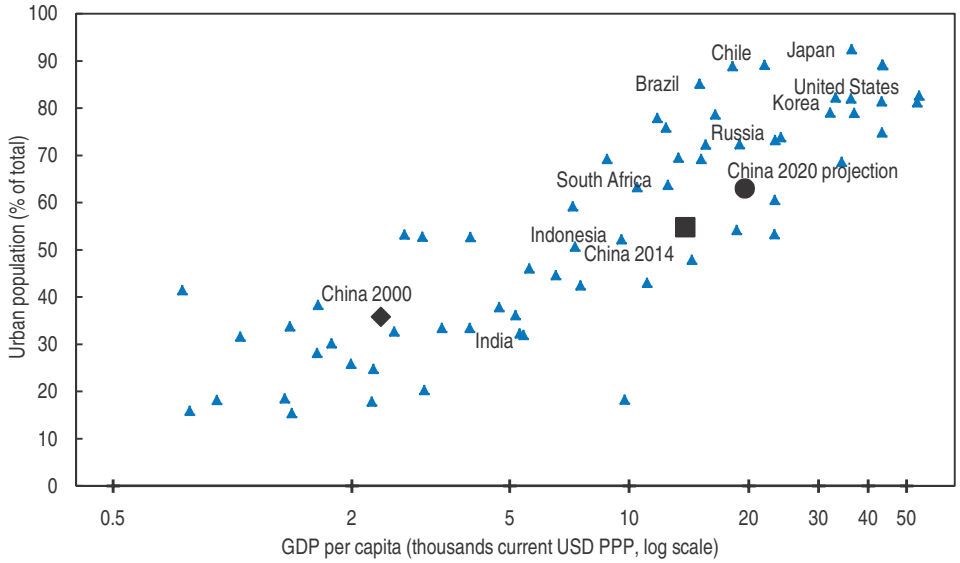
A new Urbanisation Plan was released in early 2014 focusing on human-centred and environment-friendly urbanisation (CCP and State Council, 2014). Urbanisation is an important way to boost domestic demand through consumption and investment in urban construction, public service utilities and housing (World Bank and Development Research Center, 2014). At the end of 2014, permanent urban residents accounted for close to 55% of China's total population, as against over 60% on average for countries with similar per capita income (Figure 17). Registered urban residents, who hold a *hukou* under China's household registration system, accounted for only 36% of the total population in 2013. The number of rural migrant workers stood at 274 million – 20% of the country's total population in 2014. The extension of public services and social security to 100 million of these migrants not yet covered will boost consumption and economy-wide productivity. Likewise, the renovation of shanty-towns housing another 100 million urban residents will support growth.

The Plan targets an urbanisation ratio of 60% by 2020, with the share of residents with urban registration increasing to 45%. This is to be achieved by continued easing of restrictions on obtaining urban residential status in third and fourth-tier cities and removing them altogether in towns and small cities.

Access to public services is key to unleashing the consumption potential of internal migrants, but, along with the expansion of urban infrastructure, it will entail large costs. Those will need to be financed by giving sub-national governments greater taxing power, through larger transfers from the central government and via sub-central bond issues (see above).

Figure 17. **China is under-urbanised**

All countries with populations over 15 million, latest year available



Source: World Bank *World Development Indicators Database*; National Bureau of Statistics; OECD (2013a).

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A novel element of the Plan is a promise of fair compensation for land requisitioning. This requires: i) creating a land requisition mechanism to increase the transparency and accountability of local governments; ii) completing the land-ownership registration system to recognise legal rights to develop, collateralise or transfer land; and iii) gradually unifying urban and rural land markets. The Plan aims at enhancing efficiency of land development through measures such as capping urban land construction to less than 100 m^2 per capita, linking land acquisition to the number of rural settlers, halting new approvals for land development in megacities and charging the government for land used for its facilities.

The Plan puts the emphasis on encouraging migration to towns and small cities, where employment opportunities are not always present and which, therefore, are not the major destinations for potential migrants. Subsidised training programmes will be offered to migrants and a nationwide website will be created to help match migrants with prospective employers. Migration restrictions continue to be stringent in megacities, where it is difficult for people without higher education, formal employment and a track record of social security payments to obtain a *hukou*.

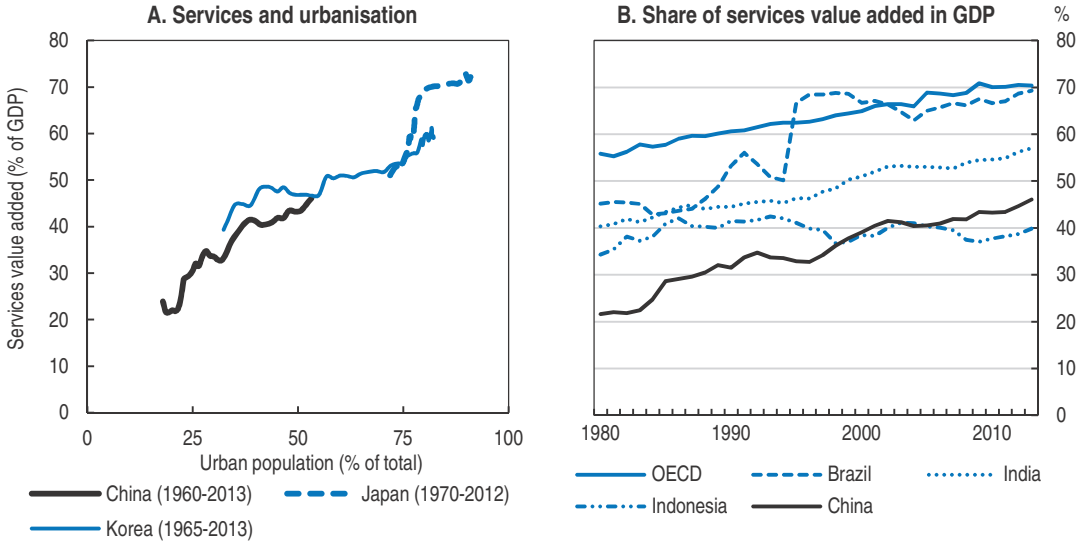
Excessive focus on small cities may result in more "ghost towns" with facilities but without residents. Moreover, without job creation, public service provision and social security coverage, the urbanisation drive may exacerbate property market imbalances. Urban construction work needs to take into account present and future demand for housing.

In general, urbanisation offers opportunities for leapfrogging in low carbon infrastructure. For example, developing bus rapid transit systems is an efficient way to promote sustainable transport in smaller cities, as underlined in the previous *Economic Survey of China* (OECD, 2013a). This helps improve air quality and reduce congestion, emissions and health costs. Stricter vehicle standards and avoiding policies that favour diesel vehicles could also contribute to these objectives.

Service sector expansion is a driver of growth and employment creation

Service sector development, which is closely related to urbanisation (Figure 18.A), is set to be a major driver of growth. The share of services in value added (excluding construction and utilities, which are classified as part of the secondary sector in China) almost doubled in the past four decades. By 2013, it had overtaken the share of manufacturing. Nevertheless, compared to OECD countries and even to some BRIICS economies, the service sector remains relatively small in China (Figure 18.B). Services-driven growth can be relatively inclusive and sustainable as services tend to be labour intensive and less polluting than manufacturing. Furthermore, the liberalisation of service sectors with previously high barriers to private and foreign investment – such as energy, banking and telecommunications – may boost productivity and facilitate catch-up.

Figure 18. **The share of services is still low**



Source: World Bank *World Development Indicators* database.

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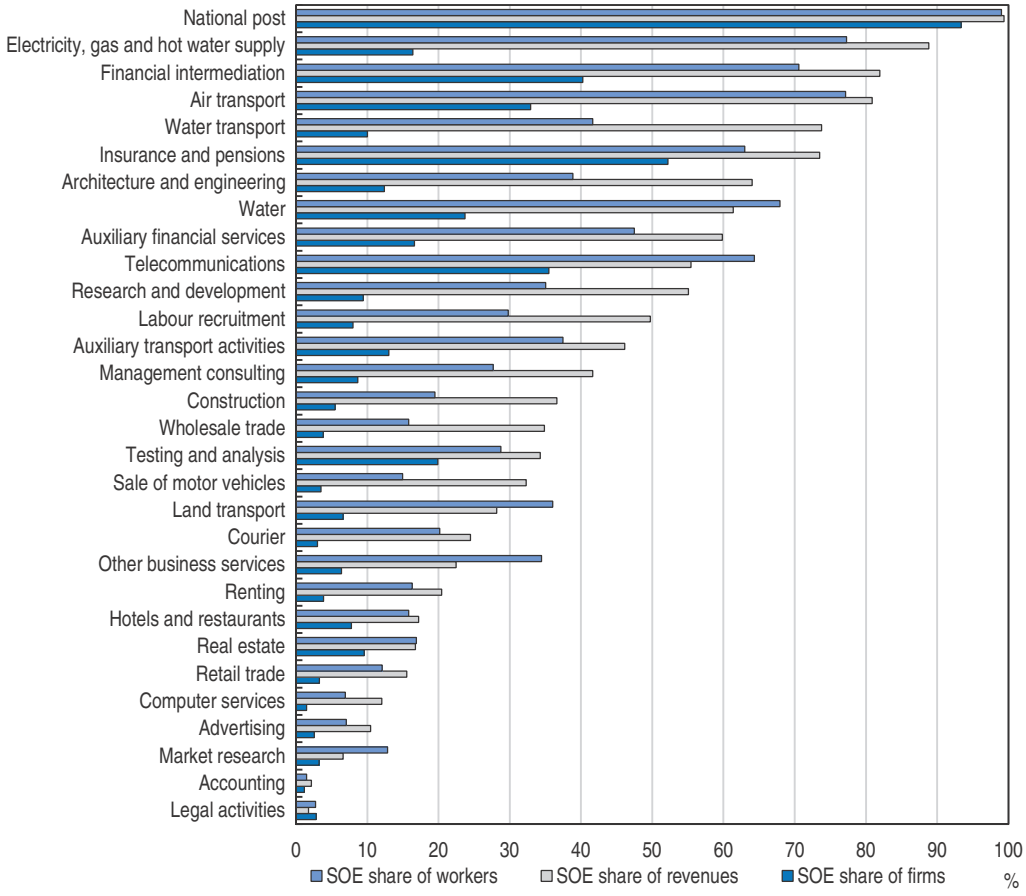
State-owned enterprises (SOEs) still dominate many service sectors, at least in terms of revenues, even in potentially competitive services like construction, and they have stakes in retail and hotel businesses (Figure 19). While central SOEs, at least in some activity areas, tend to be productive as they have experienced several rounds of cleansing and restructuring, local SOEs are the least productive among all ownership types, alongside collective firms (Molnar and Wang, 2015).

With structural and demographic transformation, and rising incomes, demand for healthcare, recreation, culture, education and commercial services is expected to rise. Adequate standards for service quality, environmental regulation and consumer protection are important in those sectors to avoid damaging competition when they open up. Competitive pressures are high in some services but relatively low in transport and hotels and restaurants (OECD, 2014b).

Figure 19. **SOEs account for a large share of revenues in sectors that should be more open to competition**



Note: Sectors are classified according to the United Nations ISIC Rev. 3 two-digit sector codes except for the following services, which are classified according to the four-digit sector codes: national post, courier services, legal activities, accounting and auditing, architecture and engineering, advertising, market research, labour recruitment, testing and analysis, and management consultancy.
Source: Authors' calculation based on the 2008 Economic Census.

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Main recommendations to foster urbanisation and services as new drivers of growth

- Extend public service provision and social security coverage to all migrant workers. Make social security benefits portable across the country.
- Reduce state ownership in commercially-oriented service industries such as retailing, hotels, restaurants and construction. Open up more sectors for private investment.

Providing the right skills to all is a prerequisite to sustainable and inclusive growth

As the share of the working-age population falls, growth will increasingly depend on the quality of human capital and on innovation. The present industry structure, based on abundant low-cost labour, needs to adjust to rising wages as labour becomes scarcer and

people continue to leave rural areas for higher-productivity jobs in cities. The increase in the cost of labour relative to that of capital will lead to more capital-intensive production, which tends to require higher skills. To adapt to the changing industry structure and achieve inclusive growth, a broad set of skills and wide general knowledge are needed, which facilitate the acquisition of new skills (OECD, 2013b).

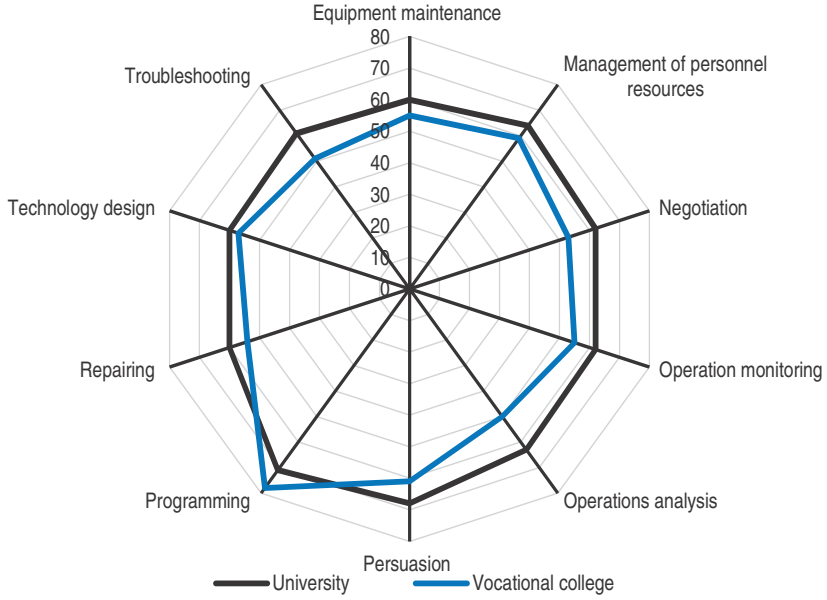
While enrolment at all levels has soared in recent decades, access to good education is not equally available for all. Education inequalities largely stem from the urban-rural divide, but also from social stratification (Yang et al., 2014). They are less driven by age, gender and regional differences. Good education should be accessible to all regardless of the place of upbringing and family background.

Skills need to be better aligned with market demand

Education attainment has improved markedly in recent years and returns to education appear high, but the knowledge taught and skills nurtured in school do not always match what is required by the market. The difference between the self-reported acquired skills at the time of graduation and the skills needed in their job six months after graduation, based on a 2013 survey of 150 000 graduates, indicates the mismatch in the graduate labour market. On this measure, the most acute deficits are in practical and soft skills and in knowledge areas needed for rapidly expanding industries such as services (Figures 20 and 21).

Figure 20. **Programming as well as management and other soft skills are falling short**

Percentage of 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 five 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 skill 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.

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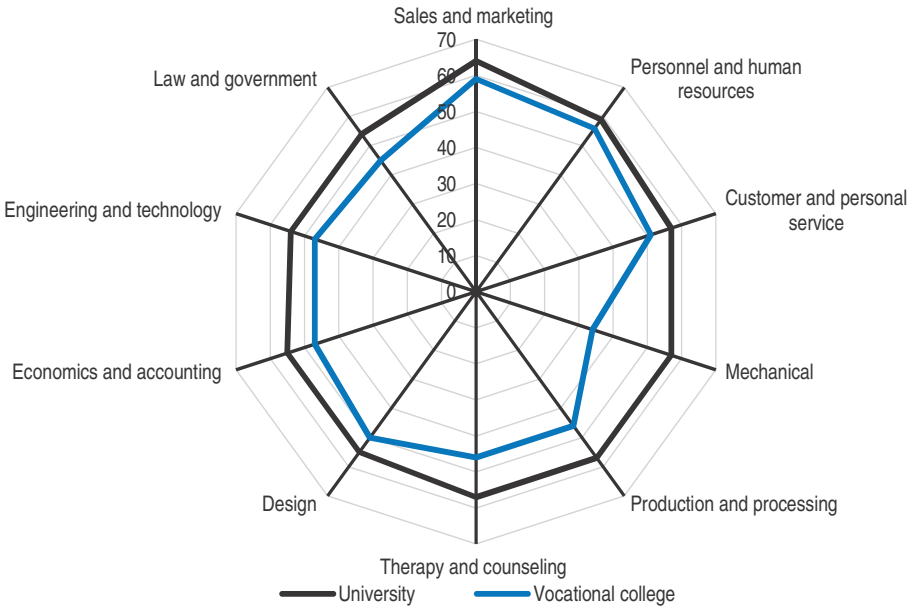
Figure 21. **Service-related training is not meeting labour market needs**

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 five 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.

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A systemic, workplace training-based vocational education system is needed to provide the right skills

Many jobs require vocational qualifications in China, and this is likely to remain so given that those qualifications are also in high demand in OECD countries with more advanced industry structures (OECD, 2014c). 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.

To meet market demand for practical skills, vocational education 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. Systemic, credit-earning and quality-assured workplace training is key to effective professional education and training (OECD, 2014c). The costs of providing training that meets both production and learning goals should be shared between government and firms. Government support is warranted as the social return to developing skills needed by enterprises is high and enterprises experience skill shortages. A professional education teacher training system blending theoretical and practical skills should be encouraged and

industry experts should not be subject to the same qualification requirements as full-time career teachers. Universities should also provide more technical skills as most graduates will likely be working in applied areas and not academia.

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

The deep structural changes that the Chinese economy is undergoing imply a continuous need to upgrade the skills of the workforce to meet market demand. Lifelong learning should therefore feature prominently in the agenda for skill development. Accordingly, the 2010-2020 Plan gives increased importance to lifelong learning. Currently, employers are encouraged to provide training to their workforce and are required to allocate an amount equivalent to 1.5% of the wage bill to that effect. Firms with high technical skill requirements and good economic performance must allocate 2.5% of wages. However, in some cities, employers allocate less than 1% of the wage bill for training. Clearer career prospects and planning, as well as wider and better education in full-time institutions could enhance firms' incentives to train their workers. Requiring repayment of training costs in the case of resignation may deter excessive job hopping.

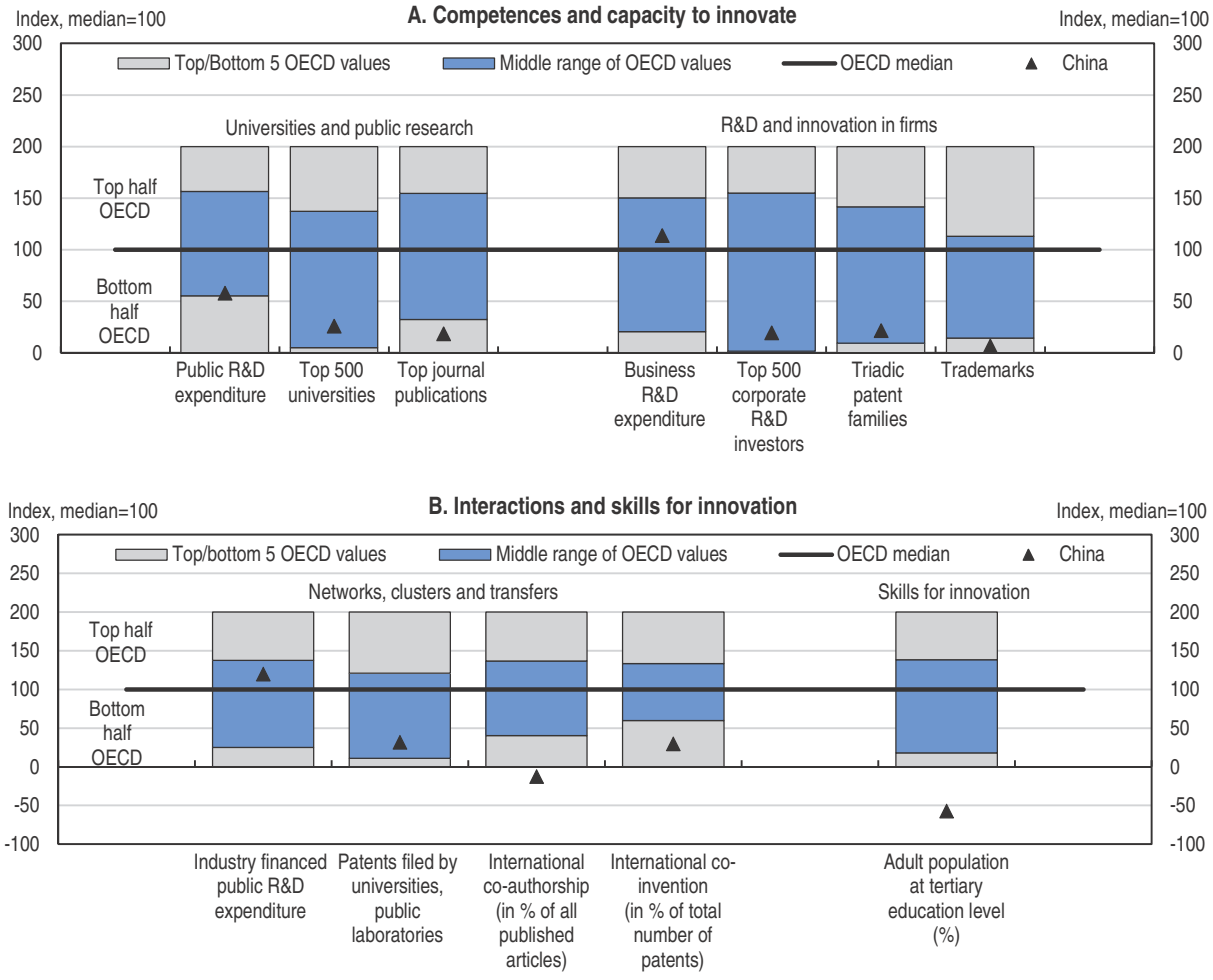
Promoting innovation as the economy becomes increasingly knowledge-based

Innovation is set to play a growing role in raising productivity and moving to a more knowledge-based economy (OECD, 2013a). R&D spending had risen to over 2% of GDP by 2013, above the EU average, and the target is 2.5% by 2020. Chinese innovation performance, however, is still weak in terms of international patenting and trademark registration (Figure 22). China generates a large volume of knowledge, with most of the world's top 20 patenting universities being in China by 2008, but patents' utilisation rate is low, at 5%, and the bulk of university research is not relevant for business (Luan et al., 2010). Furthermore, China is far behind countries at the technology frontier for patent citations (Kwon et al., 2014). A better research evaluation system at universities that strikes a balance between quantity and quality, including applicability of research, would encourage a greater focus on utilisation. More autonomy for national technology transfer centres to market patented technology could make them more effective at increasing the utilisation rate of university patents.

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 extremely low (Figure 22.B) and China needs more world-class researchers. Although in China, as in other emerging economies, concerns have been raised about the outflow of talent ("brain-drain"), cross-border labour 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. The Central Office of the Talent Coordination Group observed in 2013 that 87% of science and engineering graduates do not return to China after finishing their studies abroad. Similarly, the Ministry of Education reported that between 1978 and 2005, only a quarter of the graduates returned from abroad. Given the limited success so far with reversing the brain-drain, in particular as regards top scientists, more efforts are needed in addition to financial incentives, including as regards research autonomy, merit-based promotion and stronger protection of intellectual property rights.

Figure 22. **Capacity and skills to innovate need to be strengthened**

Normalised by the size of the economy unless indicated otherwise, latest year available



Note: 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, *Science, Technology and Industry Outlook* (2014d).

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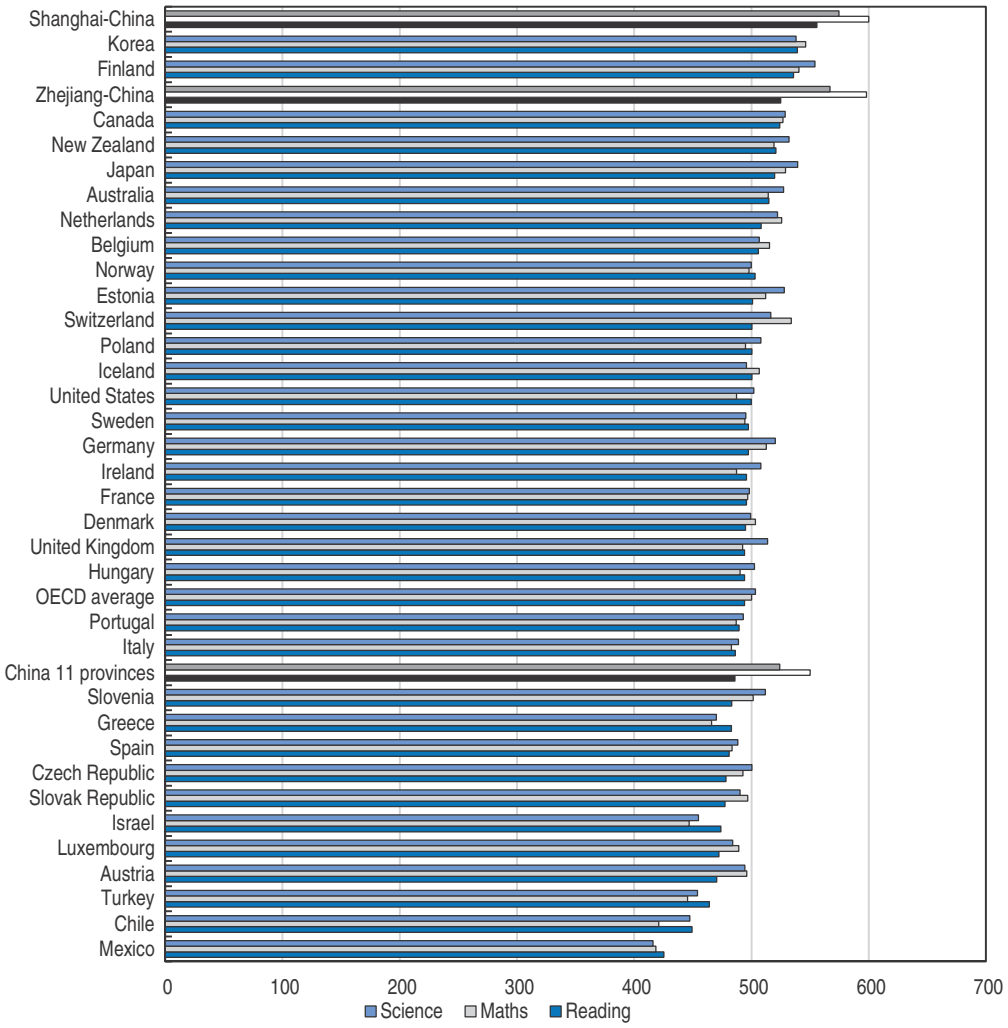
Measured quality of education is high but the system lacks funding and is overly exam-focused

The OECD's internationally comparable PISA scores measuring 15-year olds' competence in maths, reading and science have ranked Shanghai on top worldwide ever since it took part (OECD, 2014e). 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, where pupils performed close to the OECD average in reading and better in maths and science (Figure 23).

China's very competitive education system based on rote learning and test scores is often faulted for not sufficiently encouraging creativity and critical inquiry (Fan and Yang, 2012). Parents tend to press their offspring to get admitted to good schools. This leads to myriads of cunning techniques and keeps afloat an industry of innovators, producers and suppliers of cheating devices. Notwithstanding pupils' heavy schoolwork burden, schools do not prepare them effectively for exams to advance to higher levels. Tutoring and test

Figure 23. **Shanghai leads and 11 other provinces perform close to the OECD average in PISA-type tests**

PISA scores in reading, maths and science, 2009



Note: Countries and Chinese provinces are ranked by scores in reading. Vocational schools are included except in "Zhejiang-China " and "China 11 provinces".
Source: *OECD PISA 2009 Database* and Xue (2012).

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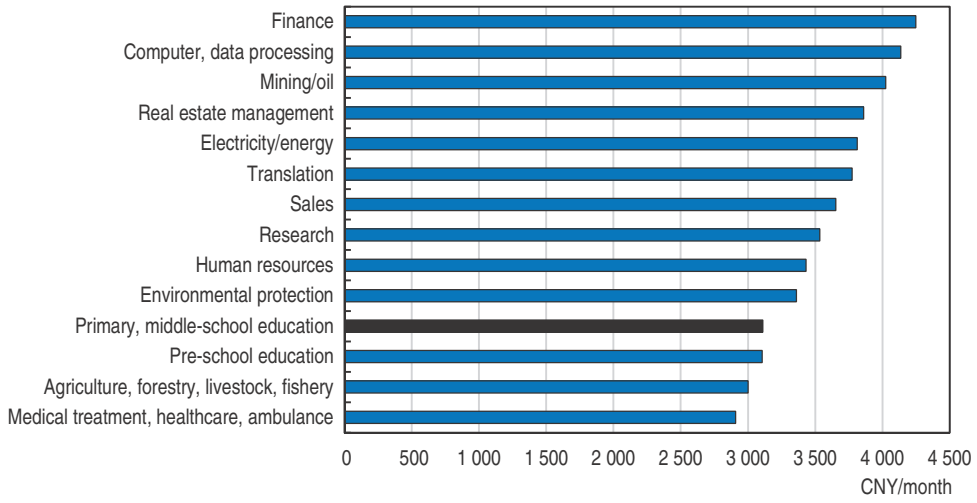
preparation courses come extra, and are provided by a thriving private sector. Plagiarism is widespread at universities (Fang et al., 2013). Diploma mills have been producing fake degrees and certificates, causing trouble for admission committees and hiring managers.

Inadequate spending on education and low teacher salaries affect education quality. According to the International Average Salary Income Database, Chinese teachers fare worse, compared to salespeople for instance, than teachers in Finland or Korea. Notwithstanding significant salary increases in the past decades, the teaching profession should be made more attractive and more competitive through higher starting salaries (Figure 24) and better salary prospects, and competence-based advancement. Pilots are underway with reforms in some of these areas. Online education should be more widespread to make high-quality teaching materials available to a larger audience.

Figure 24. **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.

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Kindergarten education is mostly provided by private institutions and not as yet available country-wide. Although the share of children who spent three years in pre-primary education has increased by ten percentage points in three years, to 67.5% in 2013, it is still substantially lower than in OECD countries. To provide an equal start for all children, pre-school enrolment ought to be made compulsory at least for one year and universal coverage should be aimed for ahead of the 2020 target. As public facilities are not always available and private tuition fees are prohibitively expensive, poorer families could be given vouchers to enrol their child in private facilities. Greater assistance needs to be provided in populous Central provinces where most children live. Extension of programmes such as the China Development Research Foundation "Go Teach" pilot, which rotates teachers from one village to another during the school week, would increase access to pre-school education.

Inequality with respect to educational opportunities stems from various factors

The recent decisions to abolish entrance exams to primary and middle school and to allocate children by catchment area will increase opportunities for children from less wealthy backgrounds to attend good schools. Around 10% of all children of compulsory-education age are migrant children following their parents to cities, but only 83% of them have access to public or publicly-financed private institutions (Table 3). The remaining 17% should be given access to such facilities to make sure that no one bypasses compulsory education or drops out for economic reasons. Nearly a fifth of all children are left behind by migrant parents and they deserve special attention as they are at a higher risk of dropping out. Around 27% of rural children (three-quarters of which are children left behind by migrant parents) attend boarding schools. These offer better quality education than rural schools but often fail to provide daily subsistence needs, such as three meals per day.

Table 3. **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), *Nongmingong Jiance Diaocha Baogao*, 2013 (Migrant Worker Survey Report, 2013).

General high schools of good reputation have recently had to increase their admission quotas for other districts/counties in the same prefecture, which will increase the chance of poorer students receiving good high-school education. Vocational schools are being made more attractive by allowing switching between general and vocational streams, which is likely to contribute to filling the skill gap.

Getting into a top university with bright employment prospects is not an equal chance for all as there are admission quotas for students from other provinces. Moreover, migrant students may not be allowed to sit for the *gaokao* (the university entrance exam) in their place of residence, even if they have a local *hukou*, if their parents lack formal employment or the required number of years of social security contributions. Financial support to students is below 10% of overall higher education spending and living costs in big cities may be prohibitive for students from poorer families. Family background explains very little of the wage variation across graduates, indicating that higher education is key to social mobility. To reduce inequalities in education opportunities, the central government should shoulder a higher share of education costs at all levels and boost assistance to students from disadvantaged families.

Main recommendations to provide the rights skills to all

- Boost public 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.
- Evaluate universities and university staff more on the quality of academic output. Promote research autonomy, merit-based promotion and stronger intellectual property rights to attract and retain world-class researchers.
- Open up public schools to all children of internal migrants, or where such schools are not available, provide vouchers to enable them to attend private schools.

Reforms to help rural China bridge the gap with urban areas

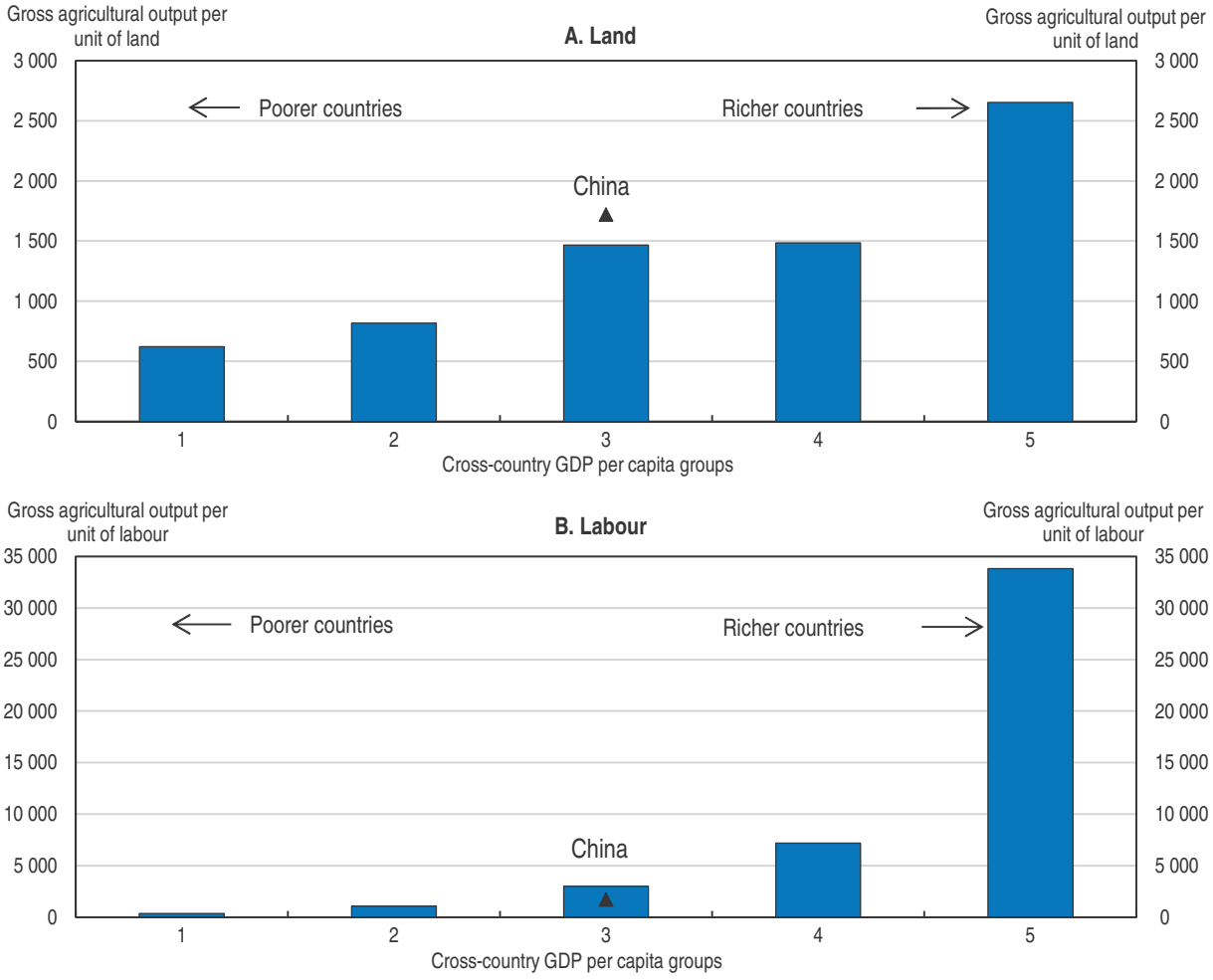
Living standards in rural China remain far below those in urban areas. Average rural disposable income per capita is around 1/3 of that in urban areas. To narrow this gap, reforms should facilitate the reallocation of resources, promote agricultural productivity gains and provide better government services in rural China.

As countries develop, the share of agriculture in the overall economy diminishes. China is still in the relatively early stages of this adjustment process, and the government is planning on 100 million rural migrants settling in cities by 2020. This process is facilitating productivity gains in both urban and rural areas. However, it also entails challenges that necessitate continued reform efforts. Government policy regarding the rural sector should offer alternative routes for the population during this adjustment phase. Reforms that help farmers raise productivity will be particularly important. However, a sizeable share of rural citizens will seek non-farm jobs. Others still, usually the elderly or less able, struggle to adjust and will need to be supported through public welfare schemes.

Labour productivity in China's agricultural sector remains low compared with more advanced economies (Figure 25). Reforms that improve farmers' access to finance will spur productivity-enhancing farm investment and mechanisation. In addition, measures that

Figure 25. **Compared with more advanced economies, agricultural labour productivity is low**

Average level 2006-11



Note: GDP per capita groups are calculated as averages based on data for 132 countries. Gross agricultural output is measured in constant 2005 US dollar terms, the land input is the number of hectares adjusted for quality and labour is the number of economically active persons working in agriculture (Fuglie, 2012).

Source: US Department of Agriculture, authors' calculations.

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encourage the reallocation of resources to the most productive uses will be key to raising productivity in the agricultural sector as well as other parts of the economy. Rural land in China is owned by village collectives, with rights to farmland distributed to village households with a renewable contract term of 30 years. For the purposes of equality, each household has the rights to a number of plots of varying quality that may be geographically separated. As a consequence, average farm size (where a farm is defined as a continuous tract of agricultural land) in China is very low compared with other countries (Table 4). This is reinforced by constraints on trading farmland operation rights (as distinct from the contract rights that remain with the original recipient) that make it hard for farmers who wish to pursue other work to transfer operation rights to productive farmers who want to scale up production. Such constraints include poorly defined farmland contract rights and a lack of institutional structures for the trading of operation rights. Additionally, weak rule of law in some areas may result in a lack of enforcement of land rights even if households possess certificates detailing their contract rights to rural land.

Table 4. **Average farm size is small in China**

	Average farm size (hectares)
China	0.6
Vietnam	0.7
Indonesia	0.8
Japan	1.2
India	1.3
Thailand	3.2
Turkey	3.2
Colombia	25
Venezuela	60
Brazil	73
Chile	84
South Africa	288

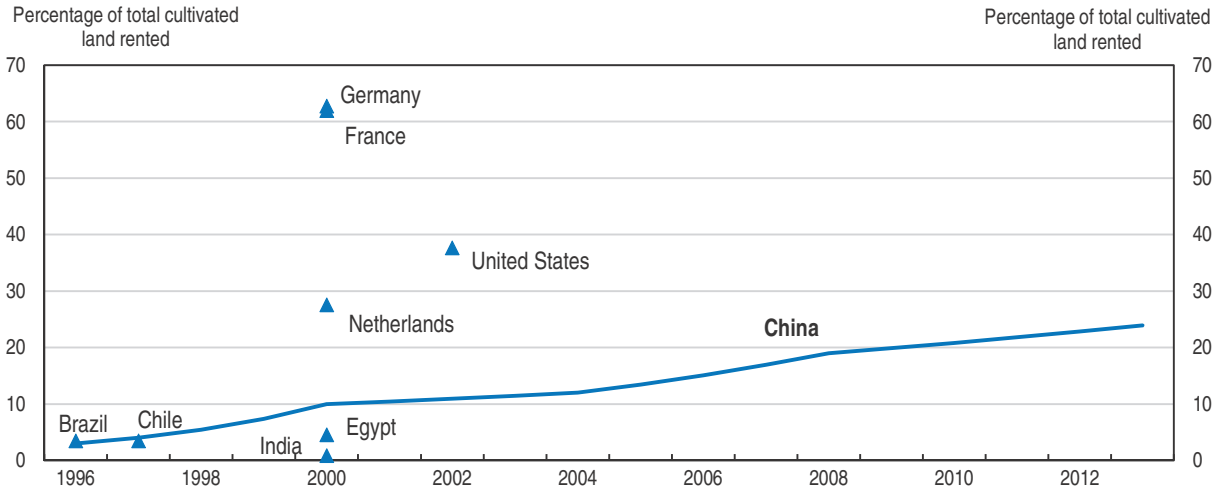
Note: Data for comparison countries are from agricultural censuses between 1996 and 2005. Data for China are for 2010.
Source: 2000 FAO World Census of Agriculture, Huang et al. (2012).

With increasing encouragement from the central government and new instruments, the trading of operating rights has steadily risen over the past two decades (Figure 26). Nevertheless, the frequency of land rental in China remains below that in advanced countries.

Improving allocative efficiency will also depend on reforms to the *hukou* system. Rural workers who wish to migrate may not be able to access public services in the largest cities, despite ongoing reforms. This discourages migration, constraining the reallocation of labour as well as the potential flow of remittances to rural areas. Government infrastructure such as transport links is also important to connect those wishing to pursue off-farm work with employment opportunities.

Education and technical assistance services can improve agricultural productivity by facilitating the diffusion of new technologies and best practices in the sector. China has a considerable network of such services. However, past reforms have sought to partly privatise these programmes, causing extension agents to substitute time spent giving technical assistance with commercial activities (Lohmar et al., 2011). Improved farmer

Figure 26. **The proportion of rented farmland has increased but remains below advanced countries**



Note: The figure shows that the share of rented cultivated farmland in China increased from 3% in 1996 to around 24% in 2013. Estimates from the World Census of Agriculture highlight that China's share of rented farmland by 2013 remained below that in many developed economies taken around 2000. These included France (taken in 2000), Germany (2000), the US (2002) and the Netherlands (2000).
Source: 2000 FAO World Census of Agriculture, Gao et al. (2012), State Council of the People's Republic of China.

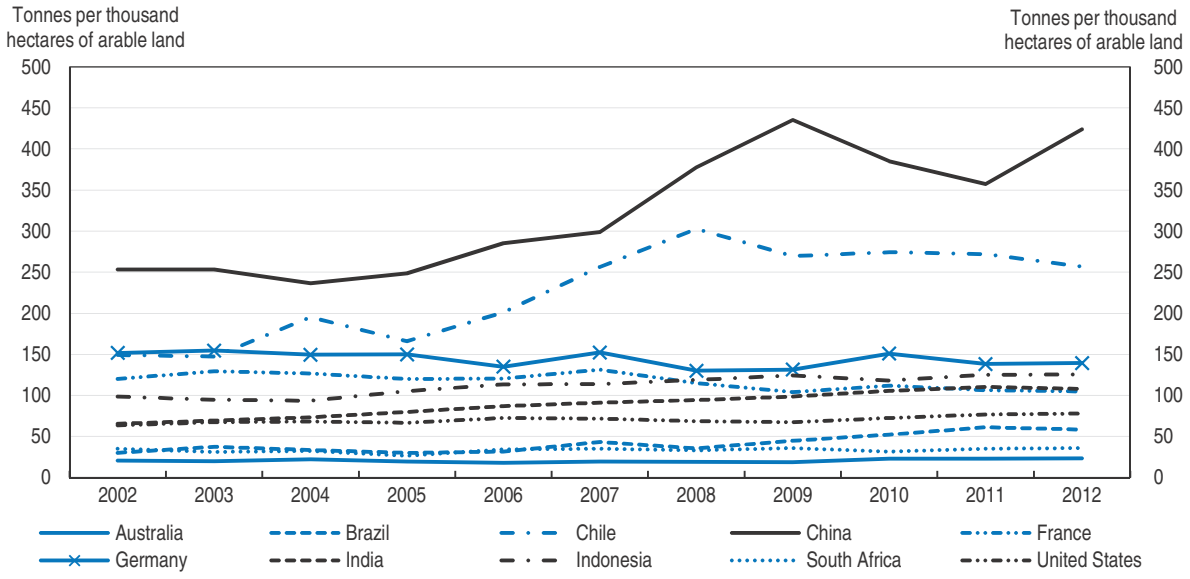
StatLink http://dx.doi.org/10.1787/888933198673

skills and the spread of modern technologies into the food production process can help lower the risk of contamination of food products. As human capital further improves, there will also be scope for greater indigenous innovation in China's agricultural sector. Since 2000, agribusinesses have relied less on public R&D and increasingly invested in their own innovation activity. This has coincided with a seven-fold increase in the number of agricultural patents granted. In future, the authorities should ensure that government agricultural R&D does not crowd out private R&D investment.

Arable land per capita is low relative to other countries, meaning that production methods need to preserve the long run fertility of land resources. As well as supporting rural incomes, this is important for China's ability to meet its food security objectives. One farming practice that is threatening the sustainability of rural land is the overuse of chemical fertilisers, with the intensity of nitrogen fertiliser consumption around double other countries with large agricultural sectors (Figure 27). The government's efforts to encourage the use of new technologies can be expected to reduce overuse. So would reducing subsidies for fertiliser products, improving farmer education and promoting the reallocation of agricultural resources to more highly-skilled farmers. Grassland degradation is also an ongoing concern for the long run fertility of agricultural land. Grassland is vital as the feed base for livestock and plays an important function in capturing greenhouse gas emissions. Further reforms to promote the preservation of grassland include educating farmers about appropriate animal species selection and, possibly, government payments to farmers for restoring grassland areas that are linked to the associated reduction in emissions.

Efficient water use is also critical to raising China's agricultural productivity and rural living standards. Water resources are relatively scarce, especially in the North, and water efficiency is woeful in the agricultural sector owing to waste in irrigation systems, water

Figure 27. **Nitrogen fertiliser is heavily overused in China**



Source: FAO, authors' calculations.

StatLink http://dx.doi.org/10.1787/888933198681

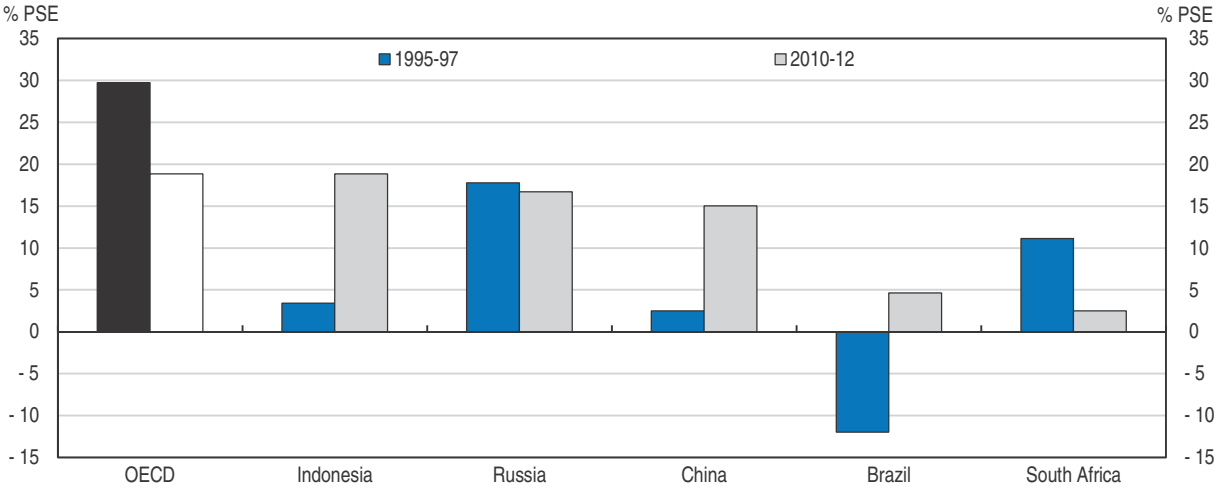
pollution and misallocation of resources among crops and locations (World Bank, 2009). This is because water is under-priced and farmers often pay an area-based water charge before irrigation. The NDRC plans to reform water pricing to encourage more efficient water use. This should be coupled with improvements in water allocation mechanisms. In addition, with wastewater discharges continuing to be a damaging source of water pollution, further government investment in rural water treatment and recycling plants will be crucial.

Raising agricultural productivity will help narrow the urban-rural divide. However, income support policies may continue to be needed for agricultural producers as the effects of productivity-enhancing reforms take time to materialise. Furthermore, such policies are important for groups that struggle to adjust during this period of rapid structural change for the rural economy. China's policy support to agricultural producers has risen significantly in recent years (Figure 28). These policies are meant to support rural incomes as well as food security and promote the mechanisation of agricultural production. However, some policies such as minimum purchase prices for grains may have adverse impacts on downstream firms. In the future, firm productivity will benefit from reforms that gradually replace minimum purchase prices for key grain crops with direct payments to farmers.

Some income support measures are specifically designed to target low-income rural citizens as rural China has a high concentration of the country's poverty-stricken families. The rural *dibao* programme is a direct payment to households equal to the difference between actual income and a determined minimum level. However, such payments only cover around 65% of the rural population that live below the poverty line, suggesting there is scope for improved coverage. There is also the *wubao* programme that aims to maintain the basic living standards of the elderly, the disabled and some children (those with no supporting family, no income and no ability to work) through the provision of in-kind

Figure 28. **China's support for agricultural producers has risen substantially**

Producer support estimate, per cent of gross farm receipts



Note: The producer support estimate (PSE) represents policy transfers to agricultural producers, measured at the farm gate. Transfers included in the PSE are composed of market price support, budgetary payments and the cost of revenue foregone by the government and other economic agents.

Source: OECD (2013d).

StatLink http://dx.doi.org/10.1787/888933198696

services. In addition, China has introduced the New Cooperative Medical Scheme, promoting voluntary enrolment in health insurance programmes partly subsidised by the government. Such measures need to be complemented by continued investment in rural health facilities, as inequality between health services in urban and rural areas remains significant (Dai et al., 2014). Furthermore, reforms which promote the portability of health insurance benefits and eventually work towards unifying urban and rural health insurance schemes should be a focus.

Main recommendations to boost agricultural productivity and enable further rural development

- Give certificates to all rural households detailing their land-use rights and improve enforceability.
- Establish exchange platforms for the transfer of operation rights for rural farmland and collectively-owned construction land.
- Implement and enforce unit pricing of water for agricultural users and better water allocation mechanisms to encourage demand management and investment in water-saving technology.
- Expand the coverage of rural social welfare payments.

Bibliography

Bank for International Settlements (2014), "Debt and the Financial Cycle: Domestic and Global", in *84th Annual Report*, Basel.

China Venture Research (2014), *2013 Nian Zhengfu Yindao Jijin Zhuanti Yanjiu Baogao* (2013 Report on Government-Initiated Foundations), China Venture Investment Consulting Ltd., Beijing.

Chinadialogue (2014), *Reimagining China's Cities – Towards a Sustainable Urbanisation,* Chinadialogue, London.

Chinese Academy of Social Sciences (2013), *Blue Book on the Development of the Private Economy*, Beijing.

Choukhmane, T., N. Coeurdacier and K. Jin (2014), "The One-Child Policy and Household Savings", *mimeo*, Yale, Sciences Po, CEPR and London School of Economics, 18 September.

Dai, B., L. Zhou, Y.J. Mei and C. Zhan (2013), "Regional Inequity in Financing New Cooperative Medical Scheme in Jiangsu, China", *International Journal of Health Planning and Management*, Vol. 29(2).

Dreger, C., T. Wang and Y. Zhang (2014), "Understanding Chinese Consumption: The Impact of Hukou", *BOFIT Discussion Papers*, 2014(7).

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 Xuewei Lunwen Xueshu Buduan Xiangwei de Tezheng Fenxi" (Characteristics of Academically Improper Behaviour by Graduate Students in their Master's Theses), *Xuewei yu Yanjiusheng Jiayu (Degree and Graduate Education)*, 2013(5).

Frankfurt School-UNEP Centre (2014), *Global Trends in Renewable Energy Investment 2014*, Frankfurt School of Finance and Management.

Girma, S., Y. Gong, H. Görg and S. Lancheros (2014), "Estimating Direct and Indirect Effects of Foreign Direct Investment on Firm Productivity in the Presence of Interactions between Firms", *IZA Discussion Papers*, No. 8509.

Global Carbon Project (2014), *Carbon Budget and Trends 2014*, *www.globalcarbonproject.org/carbonbudget*.

Herd, R., Y.-W. Hu and V. Koen (2010), "Providing Greater Old-Age Security in China", *OECD Economics Department Working Papers*, No. 750, OECD Publishing, Paris. DOI: *http://dx.doi.org/10.1787/5kmlh4x7pc7k-en*.

Huang, J., X. Wang and H. Qui (2012), "Small-scale Farmers in China in the Face of Modernisation and Globalisation", IIED/HIVOS, London/The Hague.

International Energy Agency (2013), *World Energy Outlook,* IEA, Paris. DOI: *http://dx.doi.org/10.1787/weo-2013-en*.

International Monetary Fund (2014), *2014 Article IV Consultation – Staff Report*, Washington DC.

Koen, V., R. Herd and S. Hill (2013), "China's March to Prosperity: Reforms to Avoid the Middle-Income Trap", *OECD Economics Department Working Papers*, No. 1093, OECD Publishing, Paris. DOI: *http://dx.doi.org/10.1787/5k3wd3c4219w-en*.

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.

Lohmer, B., F. Gale, F. Tuan and J. Hansen (2009), "China's Ongoing Agricultural Modernization: Challenges Remain After 30 Years of Reform", *Economic Information Bulletin*, No. 51, US Department of Agriculture, Economic Research Service, April.

Lu, Y. and F. Cai (2014), "China's Shift from the Demographic Dividend to the Reform Dividend", in Song, L., R. Garnaut and F. Cai (eds.), *Deepening Reform for China's Long-term Growth and Development*, Australian National University Press, Canberra.

Luan, C., C. Zhou and A. Liu (2010), "Patent Strategy in Chinese Universities: A Comparative Perspective", *Scientometrics*, Vol. 84.

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 Housing and Urban-Rural Development (2014), *2013 Nian Chengxiang Jianshe Tongji Gongbao* (2013 Statistical Report on Urban-Rural Construction).

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 Series*, forthcoming.

Molnar, M. and W. Wang (2015), "A Snapshot of the Service Sector in China", *OECD Economics Department Working Paper Series,* forthcoming.

MyCOS (2014), *Jiuye Lanpishu – 2014 Nian Zhongguo Daxuesheng Jiuye Baogao* (Blue Book of Employment – 2014 Chinese College Graduates' Employment Annual Report).

OECD (2006), *Challenges for China's Public Spending: Toward Greater Effectiveness and Equity*, OECD Publishing, Paris. DOI: *http://dx.doi.org/10.1787/9789264013728-en*

OECD (2009), *State-owned Enterprises in China: Reviewing the Evidence*, Working Group on Privatisation and Corporate Governance of State Owned Assets Occasional Paper, OECD, Paris.

OECD (2010), *OECD Economic Surveys: China,* OECD Publishing, Paris. DOI: *http://dx.doi.org/10.1787/eco_surveys-chn-2010-en*.

OECD (2013a), *OECD Economic Surveys: China,* OECD Publishing, Paris. DOI: *http://dx.doi.org/10.1787/eco_surveys-chn-2013-en*.

OECD (2013b), *OECD Skills Outlook 2013: First Results from the Survey of Adult Skills*, OECD Publishing, Paris. DOI: *http://dx.doi.org/10.1787/9789264204256-en*.

OECD (2013c), *Interconnected Economies: Benefiting from Global Value Chains*, OECD Publishing, Paris. DOI: *http://dx.doi.org/10.1787/9789264189560-en*.

OECD (2013d), *Agricultural Policy Monitoring and Evaluation 2013: OECD Countries and Emerging Economies*, OECD Publishing, Paris. DOI: *http://dx.doi.org/10.1787/agr_pol-2013-en*.

OECD (2014a), *The Cost of Air Pollution: Health Impacts of Road Transport,* OECD Publishing, Paris. DOI: *http://dx.doi.org/10.1787/9789264210448-en*.

OECD (2014b), *Perspectives on Global Development: Boosting Productivity to Meet the Middle-Income Challenge,* OECD Publishing, Paris. DOI: *http://dx.doi.org/10.1787/persp_glob_dev-2014-en*.

OECD (2014c), *Skills Beyond School: A Review of Post-Secondary Vocational Education and Training*, OECD, Paris.

OECD (2014d), *OECD Science, Technology and Industry Outlook 2014*, OECD Publishing, Paris. DOI: *http://dx.doi.org/10.1787/sti_outlook-2014-en*.

OECD (2014e), *PISA 2012 Results: What Students Know and Can Do: Student Performance in Mathematics, Reading and Science*, Vol. I, revised edition, OECD Publishing, Paris. DOI: *http://dx.doi.org/10.1787/9789264208780-en*.

Pardee Center (2014), *Capital Account Liberalization in China: The Need for a Balanced Approach*, Boston University, Massachusetts.

Pritchett, L. and L. Summers (2014), "Asiaphoria Meets Regression to the Mean", *NBER Working Papers*, No. 20573.

Qu, Y. and F. Cai (2011), "Understanding China's Workforce Competitiveness: A Macro Analysis", *Journal of Chinese Human Resource Management*, Vol. 2(1).

Rawdanowicz, Ł. R. Bouis, J. Brezillon, A.K. Christensen and K. Inaba (2014), "Spillover Effects from Exiting Highly Expansionary Monetary Policies", *OECD Economics Department Working Papers*, No. 1116, OECD Publishing, Paris. DOI: *http://dx.doi.org/10.1787/5jz417mb6dzp-en*.

Song, L., and F. Cai (2014), *Deepening Reform for China's Long-term Growth and Development,* Australian National University Press, Canberra.

State Council and Central Committee of the Communist Party (CCCP)(2014), *Guojia Xinxing Chengzhenhua Guihua* (National New-type Urbanization Plan (2014-2020)), March.

Survey and Research Centre for University China Household Finance (2014), *Chengzhen Zhufang Kongzhilü ji Zhufang Shichang Fazhan Qushe 2014* (Urban Housing Vacancy and Market Development Trends 2014).

Wang, X. and R. Herd (2013), "The System of Revenue Sharing and Fiscal Transfers in China", *OECD Economics Department Working Papers*, No. 1030, OECD Publishing, Paris. DOI: *http://dx.doi.org/10.1787/5k4bwnwtmx0r-en*.

World Bank (2009), *Addressing China's Water Scarcity: Recommendations for Selected Water Resource Management Issues*, Washington DC.

World Bank and Development Research Center of China's State Council (2014), *Urban China: Toward Efficient, Inclusive and Sustainable Urbanization*, Washington DC.

Wu, H. (2014), "China's Growth and Productivity Performance Debate Revisited – Accounting for China's Sources of Growth with a New Dataset", *The Conference Board Economics Program Working Paper Series*, EPWP14-01.

Xue, P. (2012), "Zhejiang Sheng Chengxiang Xuesheng Nengli Bijiao Yanjiu – Jiyu PISA Ceshi Jieguo" (The Comparative Research between the Abilities of Urban and Rural Students in Zhejiang: Based on PISA Test Results), *Zhejiang Social Sciences*, Vol. 6.

Yang, J., X. Huang and X. Liu (2014), "An Analysis of Education Inequality in China", *International Journal of Educational Development*, Vol. 37.

Yoshino, N., S. Kaji and T. Asonuma (2014), "Dynamic Transition of Exchange Rate Regime in China", *China & World Economy*, Vol. 22(3).

Zhang, G. (2013), "Zhengfu Ganyu Huanqing Wuran yu Qiye huanbao Touzi – Jiyu Zhongwuran Hangye Shangshi Gongsi de Jingyan Zhengju" (Government Intervention, Environmental Pollution and Corporate Environmental Protection Investment – Evidence of listed companies in heavy polluting industries), *Research on Economics and Management*, 2013(9).

Zhang, Z., H. Changchun and W. Chen (2013), "China's Heavy LGFV Debt Burden", Asia Special Report, Nomura Global Markets Research, Nomura International (Hong Kong), 24 September.

ANNEX A1

OECD 2013 key recommendations and China's reform orientations

OECD 2013 Survey key recommendations	Third Plenum *decisions* and implementation directly related to OECD recommendations	Other relevant Third Plenum *decisions* and measures taken
	Financial sector reform	
Continue to move to market-determined interest rates by progressively widening the allowable margin around the regulated rate. Align the regulation of bond markets for maturities of over five years with the practices of the market for shorter maturities.	*Accelerate interest-rate liberalisation.* **Dec-13:** PBoC publishes a guideline on certificates of deposit in the interbank market. **Mar-14:** PBoC removes interest rate ceilings on smaller foreign-currency deposits in the Shanghai Free Trade Zone. **Jun-14:** PBoC removes interest rate ceilings on smaller foreign-currency deposits in banks in Shanghai.	
Progressively increase the quota for inward investment in equities and long-dated bonds. Allow greater use of offshore renminbi deposits in mainland China. Allow for greater exchange rate flexibility.	*Improve the mechanism for market-based renminbi exchange rate formation, and accelerate the realisation of renminbi capital account convertibility. Establish a management system of foreign debt and capital flows within the framework of macroeconomic management. Build a deposit insurance system, and improve the market-based exit mechanism for financial institutions.* **Mar-14:** Daily trading band for CNY against USD is expanded to 2% from 1%. **Jun-14 onwards:** In addition to Hong Kong, PBoC establishes offshore renminbi clearing centers in several cities around the world including Frankfurt, London, Luxembourg, Paris, Seoul and Sydney. **Sep-13-Oct-14:** Investment quotas for qualified foreign institutional investors are increased several times, from USD46.4 bn to USD64.1 bn.	
	Competition and innovation	
Clarify rules concerning the opening up of new sectors to private investment. Strengthen the business operating environment by reducing the time taken to register a new business. Avoid promoting "national champions" in new strategic sectors.	*Allow non-state-owned entities to hold shares in projects invested by state-owned capital. Allow qualified non-governmental entities to set up financial institutions such as small or medium-sized banks.* *Implement a unified market access system; all market players may enter areas not on the negative list, on an equal basis and according to law. Consider providing foreign investors national treatment subject to a negative list at the pre-entry stage so that they are not disadvantaged in the selection process. Lift limits on access for foreign investors in childcare, care for the elderly, architectural design, accounting and auditing, trade and logistics, electronic commerce and other service sectors.* **May-13 - Jul-14:** State Council removes or delegates 395 administrative approval items to local governments from the original 1560 items. **Dec-13:** 12 government departments issue a working scheme to remove regional barriers and break industrial monopolies. **Feb-14:** Sinopec launches mixed-ownership reform to attract private capital in its sales businesses of oil products. **Mar-14:** China Banking Regulatory Commission (CBRC) approves a pilot scheme to set up five private banks. **May-14:** State-owned Assets Supervision and Administration Commission (SASAC) approves the sale of 11.3% of the equity of NavInfo to Tencent. **Jul-14:** China and the US commit to begin negative list negotiations early in 2015. **Sep-14:** 29.9% of Sinopec Sales Co. shares are sold to 25 private investors for CNY 107.1 bn.	

Competition and innovation		
Improve effectiveness of R&D spending by increasing the resources available to the agencies dispensing government funding and rebalance outlays towards fundamental research.	*Integrate science and technology programmes and resources, and improve the mechanism for the government to extend support to basic, strategic and pioneering scientific research and generic technology research. Improve the financing conditions for small and medium-sized enterprises of science and technology.* **Sep-14:** Small enterprises can import advanced equipment duty free if it cannot be produced domestically.	
Strengthen IPR enforcement by raising awareness of laws and increasing penalties for infringements to ensure adequate protection to domestic and foreign innovators.	*Explore ways to set up intellectual property rights courts.* Nov-14: A court specialising in intellectual property rights (IPR) opens in Beijing.	
Inclusive urbanisation		
Allow migrants to enroll in high schools in their place of residence and university entrance examinations to be taken in the place of residence. Abolish local quotas for entrance to university.	**Sep-14:** State Council issues guideline on offering migrant workers and families equal access to basic public services in cities, including education, community hospitals and public housing.	*Accelerate steps in the development of a modern vocational education system, deepen the co-operation between schools and enterprises, and train high-caliber workers.* *Allow the transfer of credits among regular higher education institutions, vocational and adult colleges, thus broadening the channels for lifelong learning.*
Disconnect the provision of local public services from local registration.	*Help the eligible population to move away from agriculture and become urban residents. Incorporate farmers who have registered as urban residents into the urban housing and social security network, and make sure their previous subscription to old-age insurance and medical insurance in the countryside continues in the urban social security system.* **Mar-14:** State Council issues a new urbanisation plan for 2014-20. **Jul-14:** State Council issues a guideline on implementing *hukou* reform. **Sep-14:** State Council selects 62 prefecture-level cities and counties to pilot new urbanisation reforms.	*Improve the public service system for employment that serves both urban and rural areas equally, and build a lifelong vocational training system for workers.* *Improve the systems of government subsidies and student loans.*
Equalise the use-rights of agricultural and urban land by extending rural leases.	*Endow farmers with the rights to land transfer, and mortgage and guarantee of contracted land-use. Endow farmers with more property rights.* **Sep-14:** The 5th China Reform Leading Group (CRLG) meeting discusses rural land reform issues, including leasing contracted farmland to boost the scale of farms and granting farmers the right to possess and mortgage their shares of collective assets.	*Encourage the transfer of contracted land-use right to big, specialised operators, family farms, farmer cooperatives and agricultural enterprises. Set up a rural property rights transfer market.* *Reform the system of subsidising agriculture, and improve the agricultural insurance system.* *Support large-scale and specialised operations in rural areas. Allow qualified cooperatives to receive fiscal funds, and to engage in credit co-operation.*
Subject to zoning and planning requirements, ease the limits on the use of agricultural land for development, and allow farmers to sell land to developers directly and to consolidate holdings.	*Ensure rural households' usufruct of their homestead. Push forward the mortgage, guarantee and transfer of farmers' residential property rights, and expand the channels for farmers to increase their property income. Set up a rural property rights transfer market.* **Jul-14:** State Council stresses the need to improve rural property and land rights registrations. **Sep-14:** State Council has completed opinion seeking on a provisional property registration guideline. The government has promised a unified national property registration scheme by the end of 2014.	*Form a unified construction land market for both urban and rural areas. Allow rural collectively owned profit-oriented construction land to be sold, leased and appraised as shares.*

Intergovernmental fiscal relations		
Raise the share of general intergovernmental transfers and improve the design of earmarked ones.	*Improve the general transfer payments growth mechanism, and mainly increase the transfer payments to old revolutionary base areas, regions inhabited by ethnic minorities in compact communities, border areas and poverty stricken areas. Tidy up, integrate and regulate special transfer payments projects.* **Mar-14:** The number of earmarked transfers is reduced to 150 from 220 in 2013.	*Improve the budget management system. Establish a standardised and reasonable debt management and early warning mechanism for both central and local governments.* **Aug-14:** National People's Congress adopts a revision to the Budget Law which clears ambiguity and allows provincial governments to issue bonds within a quota set by the State Council. These bonds must be included in the provincial budget.
Where major cities cover a relatively small geographical area, expand their boundaries to absorb surrounding counties in order to create authorities covering a metropolitan region.	*Grant towns with large immigrant populations and great economic strength the right of jurisdiction in line with their population and economic size. Establish and improve a trans-regional urban development coordination mechanism.*	
Switch from taxing land transactions to taxingland possession, while keeping the overall property tax burden broadly unchanged.	*Accelerate real estate tax legislation and push the related reform forward in a timely manner.*	
Environment		
Improve incentives for energy conservation by raising excise duties on gasoline and fully deregulating prices. Move to full market-based pricing for natural gas and coal. Deregulate electricity prices, beginning in the generation sector, and avoid preferential electricity pricing for selected industrial users. Raise piped water prices to end-users to better reflect scarcity and encourage conservation.	*Accelerate pricing reform for natural resources and their products to give full expression to their market supply and demand, the extent of resource scarcity, ecological and environmental damage costs and restoration benefits. Push ahead with pricing reforms of water, oil, natural gas, electricity, transportation, telecommunications and some other sectors while relaxing price controls in competitive areas.* **Sep-14:** Three government departments issue a plan to upgrade coal conservation technology and eliminate outdated capacity, and aim to lower the share of coal energy to below 62% by 2020.	
Strengthen pollution price signals by increasing levies and pollution taxes. Ensure effective implementation of CO_2 pilot emissions trading schemes. Move towards national carbon pricing, preferably by implementing a carbon tax, depending on experiences with the pilot schemes. Further lift standards for motor vehicle emissions as well as fuel quality.	*Develop the environmental protection market, implement a trading system for energy conservation, carbon emission, waste discharge and water usage rights.* **Oct-2013:** State Council issues a guideline on reducing excess capacity in steel, cement, electrolytic aluminum, flat glass and shipbuilding. **Jun-13-Jun-14:** Carbon trading is launched in seven pilot provinces and cities: Beijing, Tianjin, Shanghai, Chongqing, Hubei, Guangdong and Shenzhen.	
Establish targets for a broader range of environmental objectives and hold local governments accountable. Improve national data collection and dissemination of all major pollutants including CO_2 and other greenhouse gases.	*Establish the mechanism to monitor and give early warning to the carrying capacities of resources and the environment, and implement restrictive measures for regions where water and land resources, the environment and oceanic resources have been excessively exploited.* **Dec-13:** State Council issues a circular on national-level nature reserves. **Dec-13:** CPC Organisation Department issues a guideline on incorporating indices related to the consumption of natural resources and environmental protection in the performance appraisal of local officials. **Apr-14:** NPC adopts the revised Environmental Protection Law which emphasises the need to improve monitoring, survey and risk assessment mechanisms for the environment and health.	

Thematic chapters

Chapter 1

Providing the right skills to all

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.

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 A1.1) 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 1.1).

This chapter 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 chapter 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 chapter 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 chapter 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 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 1.1. **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 1.1).

Table 1.1. **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).

Box 1.1. **China's education, training and innovation reforms** *(cont.)*

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

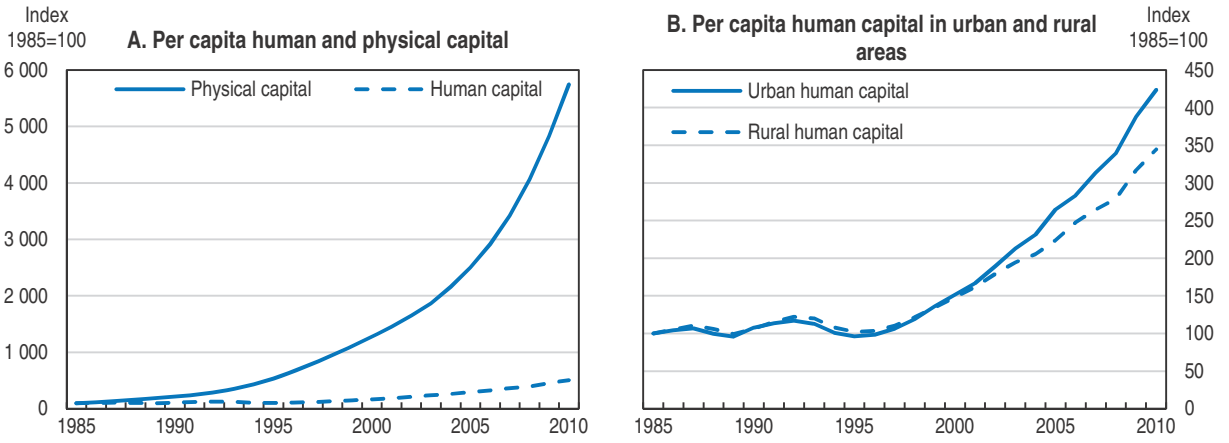
Human capital has increased rapidly even though by 2006-07, China's human capital stock per head was still only a fifth of that of the United States and a quarter of Canada's (China Center for Human Capital and Labor Market Research, 2013). Accordingly, the overall stock of human capital approached two thirds of that in the United States. Human capital has been built up far more slowly than physical capital (Figure 1.1A). Moreover, rural areas have lagged behind (Figure 1.1.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.

Educational attainment rates have improved and returns to education are high

As a result of policies to boost human capital, enrolment rates have soared over the past decade or so (Figure 1.2.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 1.2.D). Encouragingly, however, enrolment at the pre-school level has increased rapidly, to 67.5% by 2013, exceeding the 2015 target of 60% (Table 1.1).

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

Figure 1.1. **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).

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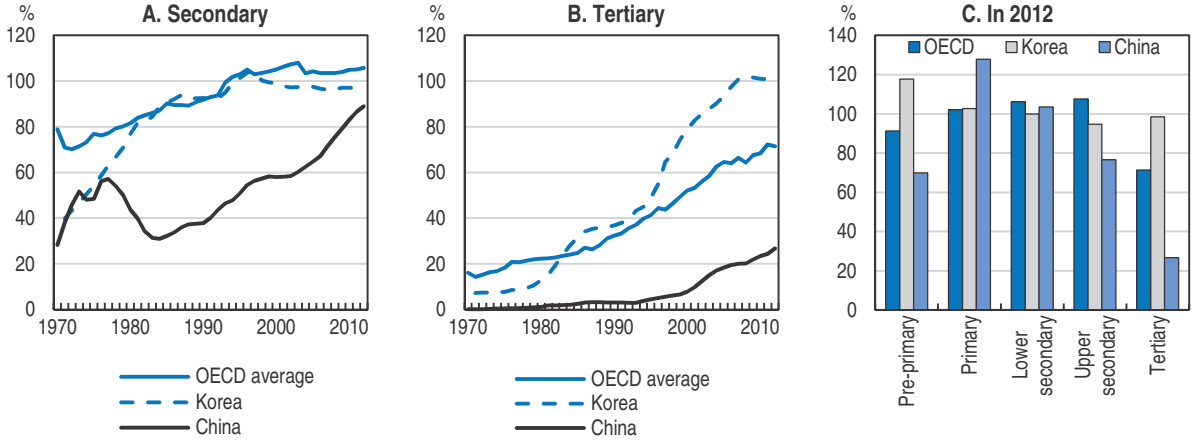
Figure 1.2. **Enrolment rates increased rapidly at all levels**

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.

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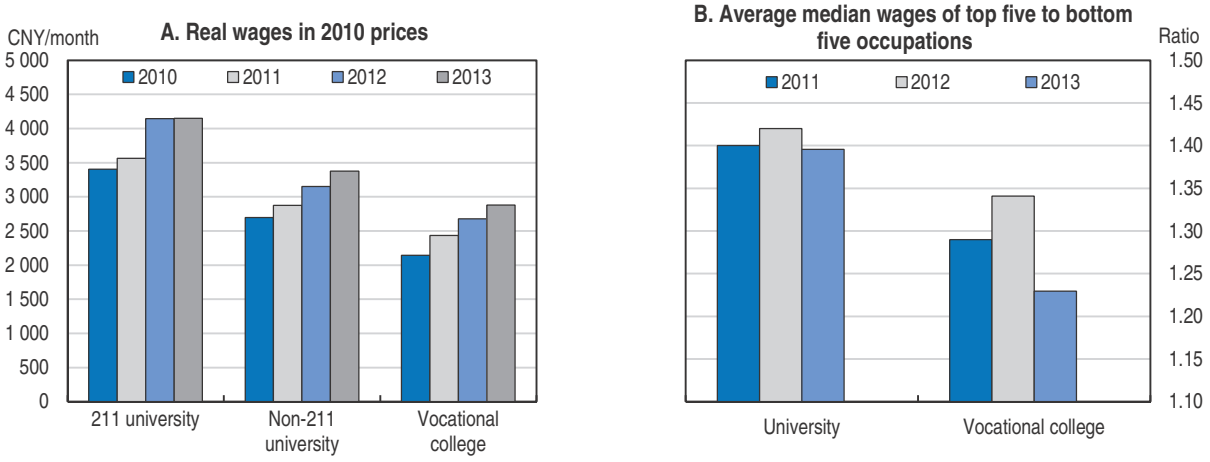
enrolment in 1999 and the associated decline in quality interrupted this trend and returns even fell slightly. However, over the medium term, skill-biased technological change will likely imply that returns will resume their trend increase. Returns to education measured by increased labour productivity 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.

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 job seekers 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.

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 1.3.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 1.3.B).

Figure 1.3. **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.

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Providing the skills needed by a knowledge-based economy

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.

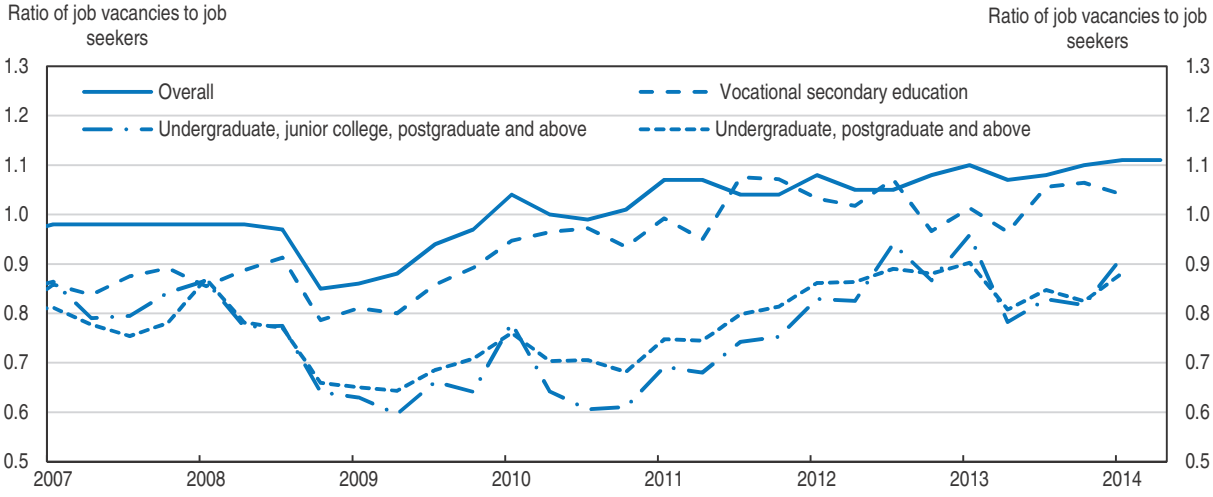
However, as the share of the overall working-age population falls, future growth will increasingly depend on the performance of the education system. The present industry structure, based on abundant low-cost labour, needs to adjust to rising wages as labour becomes scarcer once the remaining surplus 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

Increasingly, new college graduates struggle to find a job that fits their training, even though overall vacancy rates are high and rising (Figure 1.4). 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 1.5). In contrast, clerical and secretarial jobs are in shorter supply relative to the number of job seekers. Reflecting

Figure 1.4. **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.

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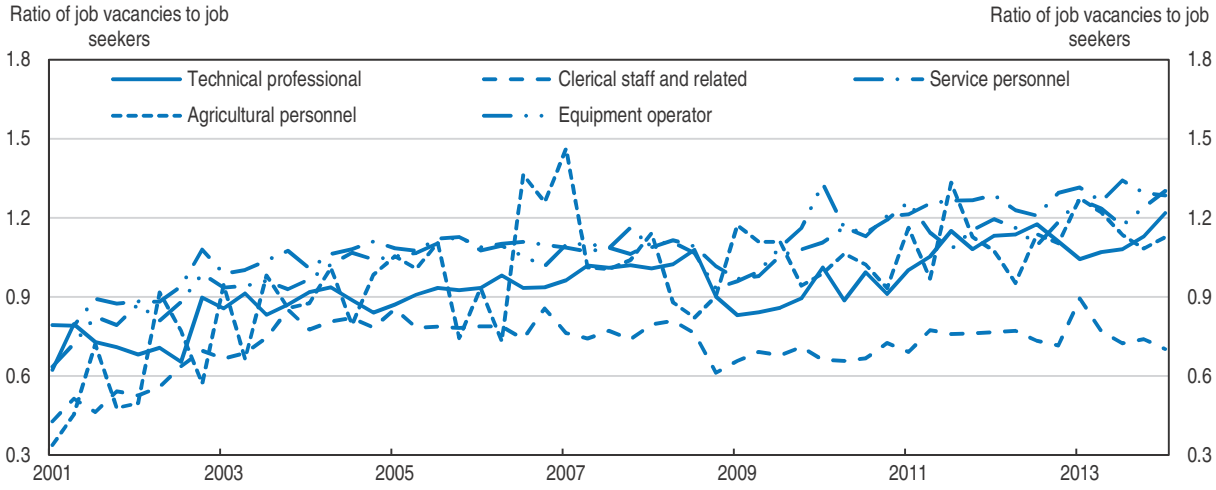
the requirements of an expanding service sector, most secondary-level professional education and training has been offered in recent years in the areas of information technology, finance, economics and trade and healthcare.

Figure 1.5. **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.

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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.

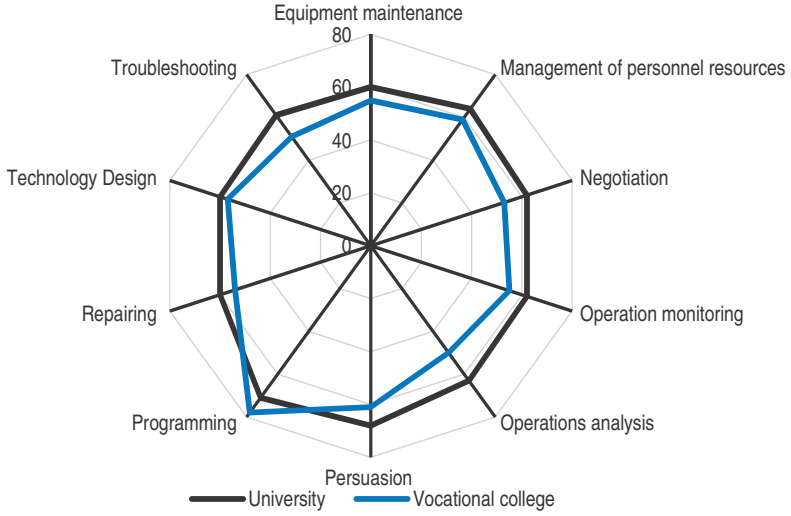
Job seekers' skill sets do not sufficiently match market demand

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 1.6). 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 1.6. **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.

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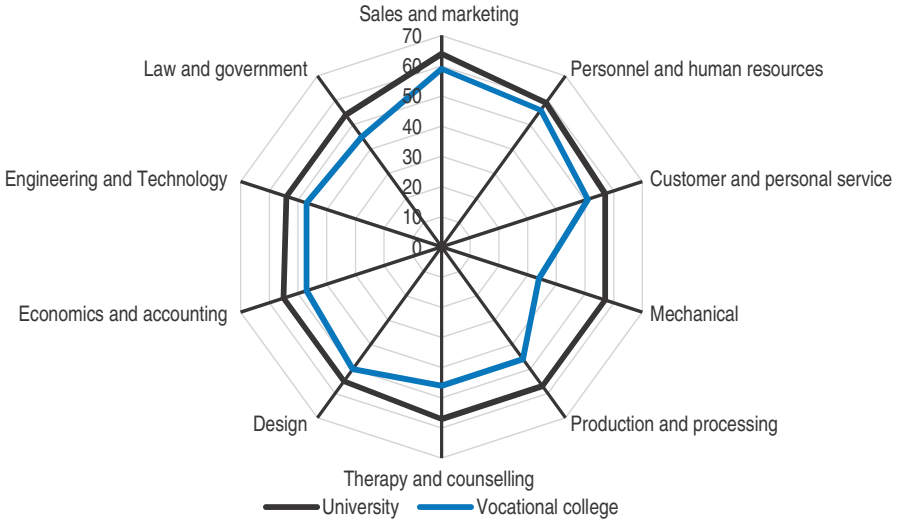
In some knowledge and skill categories, such as maths, monitoring, systems evaluation, instructing and equipment selection, less than half of university graduates think they acquired adequate skills at university to perform their job. Besides, in some of these categories and in financial and material 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.

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 1.7). Other services for which training is insufficient include personnel and human resources, therapy and counselling, and customer and personal services.

Figure 1.7. **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.

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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

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.

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 1 257 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

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.

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

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.

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.

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).

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

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.

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

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

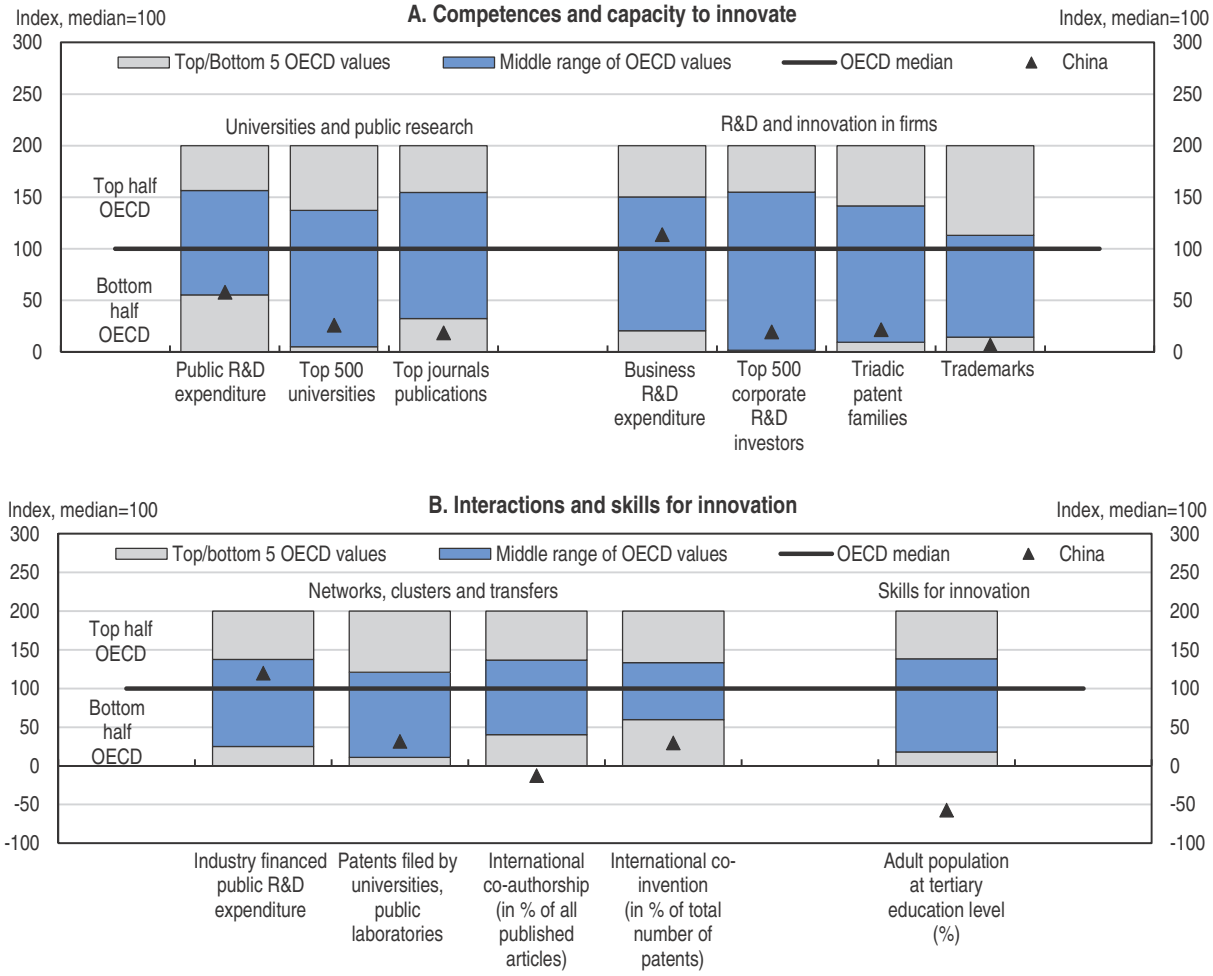
The major structural changes that the Chinese economy has undergone and is expected to undergo in one's working life span imply a continuous need to upgrade skills to meet market demand. Lifelong learning should therefore feature more prominently in the agenda for skill development. The 2010-20 Plan 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.

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"

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 1.8) notwithstanding the exponential rise in the number of patents registered in China.

Figure 1.8. **Capacity and skills to innovate need to be strengthened**



Note: 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).

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Better university-industry collaboration is needed

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.

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.

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.

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

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 1.8.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).

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

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.

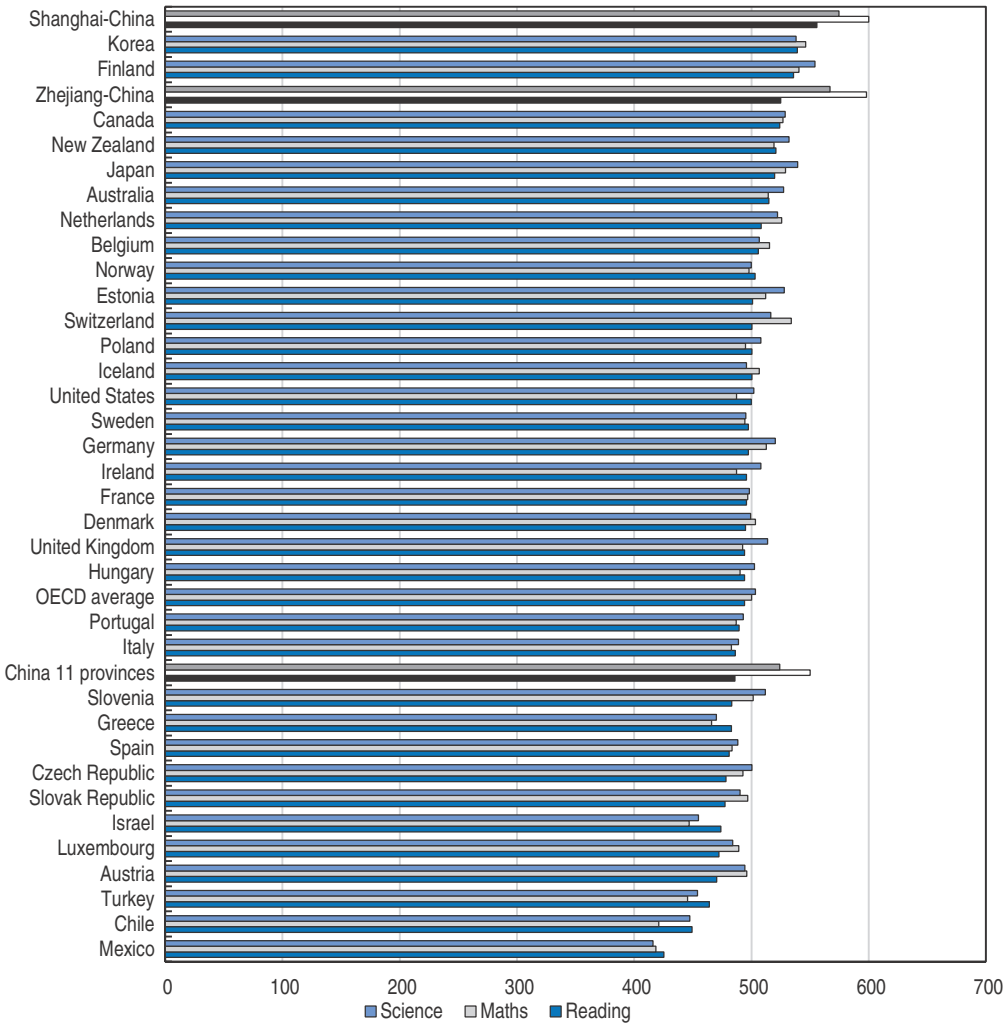
Comparable education outcome measures indicate high quality

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 1.9). 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.

Figure 1.9. **Shanghai leads and 11 other 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. Vocational schools are included except in "Zhejiang-China " and "China 11 provinces".
Source: OECD, PISA 2009 Database and Xue (2012).

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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 1.2). 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 1.3.A and 1.10).

Box 1.2. **"211" and "985" – top league universities**

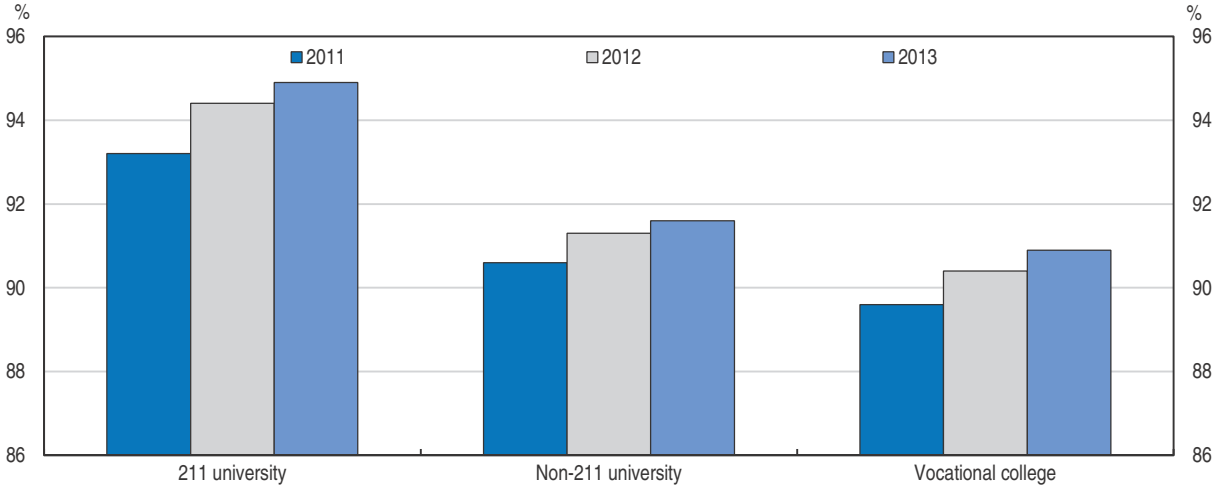
"211" universities represent over 100 top public institutions with some well-reputed departments that have jointly been designated by the National Development and Reform Commission, the Ministry of Education and the Ministry of Finance and tasked since 1995 by the State Council to "nurture talents for 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 1.10. **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.

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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.

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

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.

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.

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.

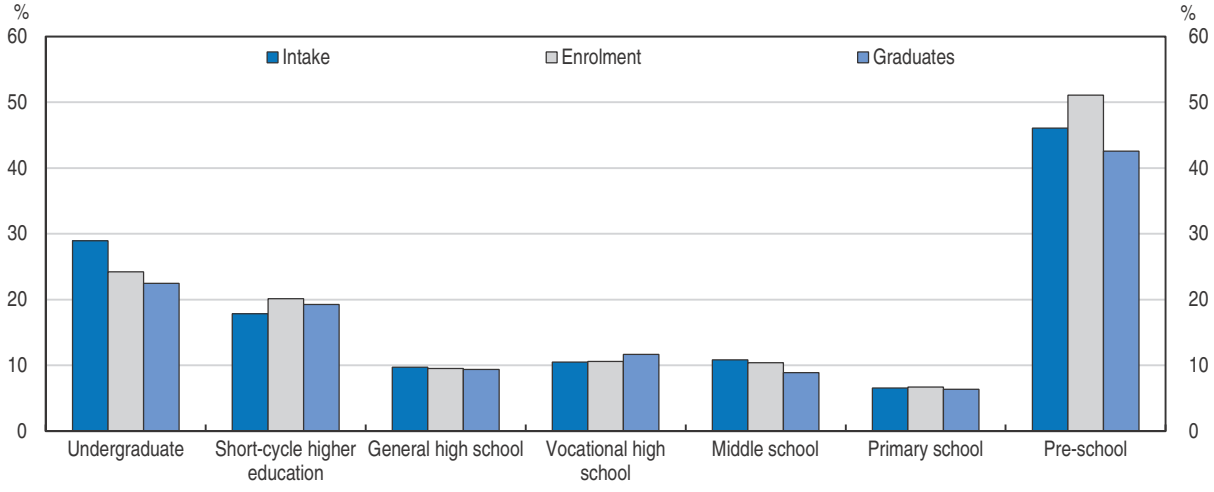
Examination pressure is also an issue during later studies. Plagiarism is widespread at universities (Fang et al., 2013). Excessive focus on certificates has also bred diploma mills producing fake degrees of famous foreign and domestic universities.

Private educational institutions should be provided a level playing field

Private educational institutions can make up over half of enrolment at certain levels in the education system (Figure 1.11), 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 1.11. **Private institutions' share is large at some levels**

Share of private institutions in intakes, enrolment and graduates, 2013



Source: Educational Yearbook of China, 2013.

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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

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

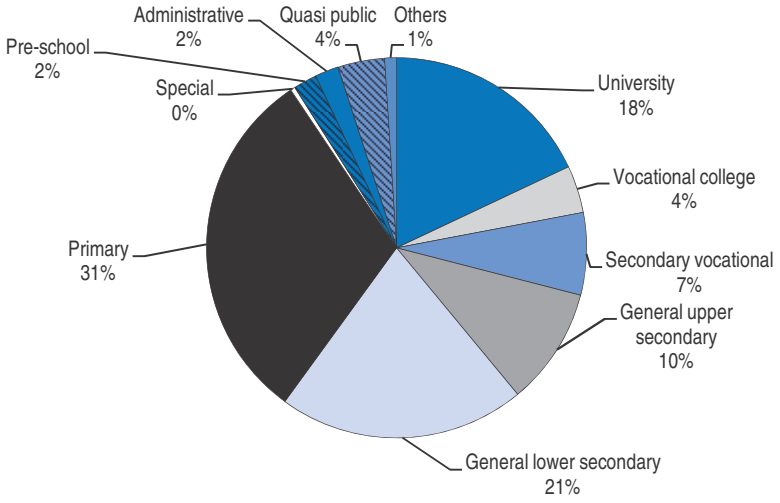
Underfunding of education institutions is a major reason for not delivering the quality needed for China's socio-economic development and demanded by the recipients of the service. China spent a percentage point of GDP less on education than the OECD average at around 6% in 2011, which is in line with 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.

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 1.12). 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 1.12. **Little is being spent on vocational education at secondary and tertiary level**

Share of total education spending, 2011



Source: Ministry of Education.

StatLink http://dx.doi.org/10.1787/888933198773

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

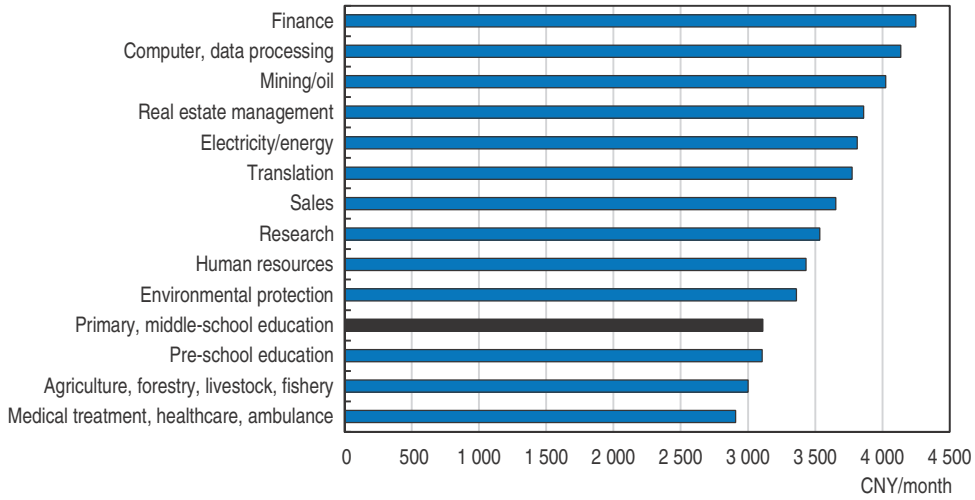
Better qualified and motivated teachers are a prerequisite for high-quality education. China has taken significant steps to improve the teaching force. Teaching qualifications for primary and middle-school teachers are no longer issued automatically when graduating from teacher training schools. Like 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.

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 1.13). 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 1.13. **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.

StatLink http://dx.doi.org/10.1787/888933198667

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.

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).

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

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.

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

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

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*.

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.

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 *tiaozisheng*. 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

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.

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.

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

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.

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 1.2). 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.

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 1.2. **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.

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 1.3). 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 1.3. **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	5.5
	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	1.0
	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	0.9

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

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 1.4). 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 1.4. **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), *Nongmingong Jiance Diaocha Baogao*, 2013 (Migrant Worker Survey Report, 2013).

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.

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.

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

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 chapter. 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).

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.

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.

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.

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

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.

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*.

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.

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 1.3). Financial assistance to poor students is the largest component, followed by loans and merit-based scholarships (Figure 1.14). 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.

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.

Box 1.3. **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 USD1 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".

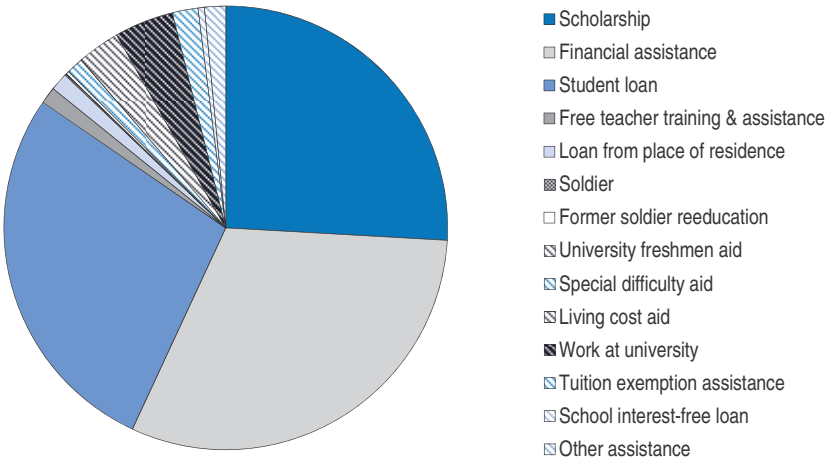
Table 1.5. **There are a variety of assistance schemes**

	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 1.14. **Financial assistance, loans and scholarships make up most of student support**

Student support by type, 2013



Source: Student Financial Assistance Management Centre (2014).

StatLink http://dx.doi.org/10.1787/888933198782

Conclusion

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.

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.

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.

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 Xuewei Lunwen Xueshu Buduan Xiangwei de Tezheng Fenxi" (Characteristics of Academically Improper Behaviour by Graduate Students in their Master's Theses), *Xuewei 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), *OECD Reviews of Vocational Education and Training: A Learning for Jobs Review of China 2010*, OECD Reviews of Vocational Education and Training, OECD Publishing, Paris. DOI: *http://dx.doi.org/10.1787/9789264113749-en*.

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. DOI:*10.1787/observer-v2012-1-en*.

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. DOI: *http://dx.doi.org/10.1787/eco_surveys-chn-2013-en*.

OECD (2014a), *OECD Science, Technology and Industry Outlook 2014*, OECD Publishing, Paris. DOI: *http://dx.doi.org/10.1787/sti_outlook-2014-en*.

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 Publishing, Paris. DOI: *http://dx.doi.org/10.1787/9789264208780-en*.

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, OECD Publishing, Paris. DOI: *http://dx.doi.org/10.1787/5k92n2t3045b-en*.

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 *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 Tantao: 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), "Quyu 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 zhanlüe 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.

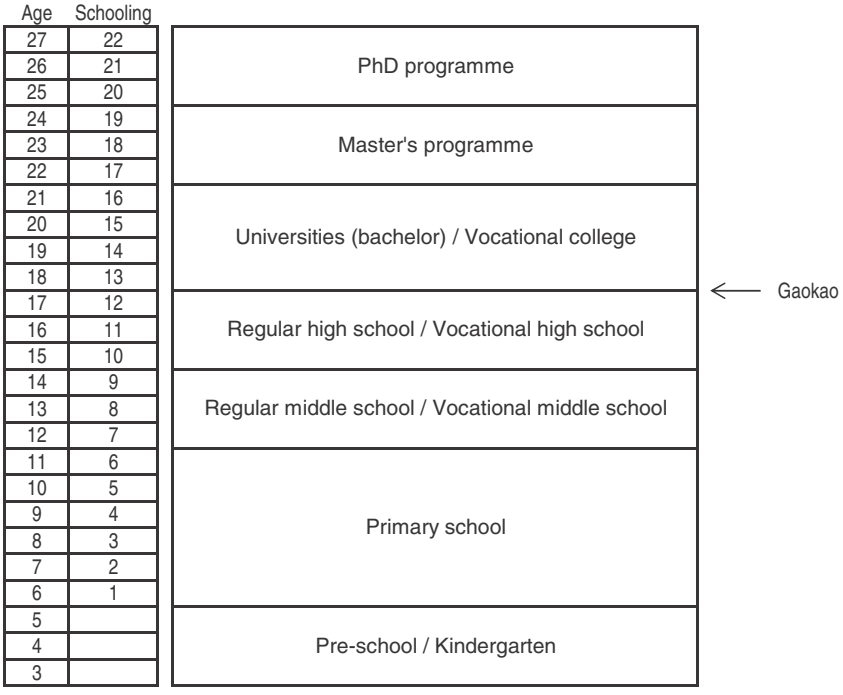
ANNEX A1.1

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 A1.1. **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.

Chapter 2

Agricultural reforms and bridging the gap for rural areas

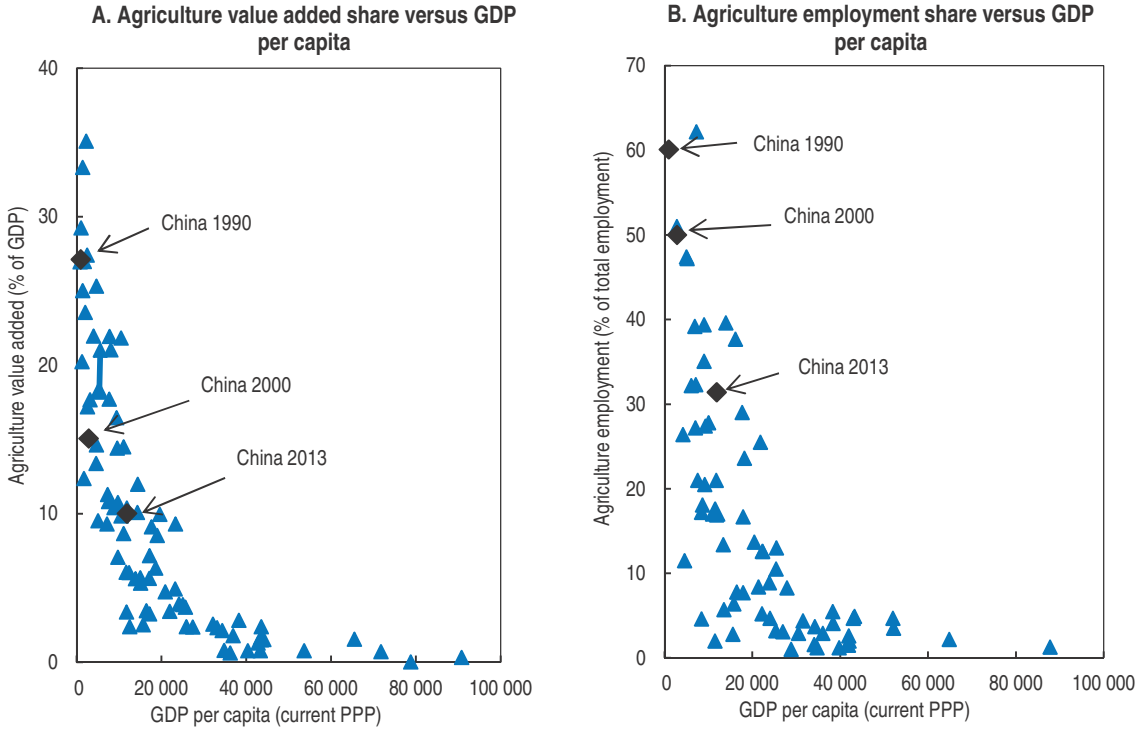
Urbanisation will continue in China, with the government planning to grant urban residential status to an additional 100 million rural workers by 2020. While this process is transforming the urban economy, the rural economy is also undergoing substantial structural change. Government policy settings in rural areas are critical for smoothing the transition and helping bridge the gap in living standards between urban and rural China. Reforms should further enable farmers who wish to continue working in the agricultural sector to raise productivity levels. Specific measures include encouraging land transfer, promoting further rural financial development and technical assistance for farmers. At the same time, obstacles should be removed for those rural residents aspiring to move to jobs in cities where their skills can yield a higher marginal product. For those who remain in rural areas, improved social welfare systems and investment in health services are critical.

Over the past decade, China has experienced unprecedented urbanisation, fuelling economic development that has lifted hundreds of millions of people from poverty and malnutrition and dramatically altered the global economic landscape. While this is transforming China's urban economy, the rural economy is also undergoing substantial structural change. At a time when the government maintains a strong commitment to the goals of food security, reducing urban-rural inequality and protecting natural resources, the development path unfolding in rural areas is of critical importance.

Policy challenges in rural China

As countries develop, the share of agriculture in the overall economy typically diminishes even as the sector's productivity increases. Less productive resources move out of the sector and farmland is consolidated into larger plots that allow for greater mechanisation and more productive farmers to scale up production, gradually moving from labour-intensive to more capital-intensive agricultural production. China is still in the relatively early stages of this process (Figure 2.1), with the share of agriculture in value added above 10% compared with 1-2% in developed economies, and its share in employment at around 35% as against 2-3% (Koen et al., 2013). The scale of the ongoing transition is highlighted by government plans to grant urban residential status to 100 million rural migrants by 2020. This structural adjustment process can deliver

Figure 2.1. **The share of agriculture shrinks as economies develop**



Note: Figures relate to all countries for which comparable data are available. Unless specified, data in Figure A are for 2013 and data in Figure B are for 2012.

Source: World Bank *World Development Indicators*.

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substantial opportunities for the rural economy and China as a whole, but entails major challenges calling for continued reform efforts.

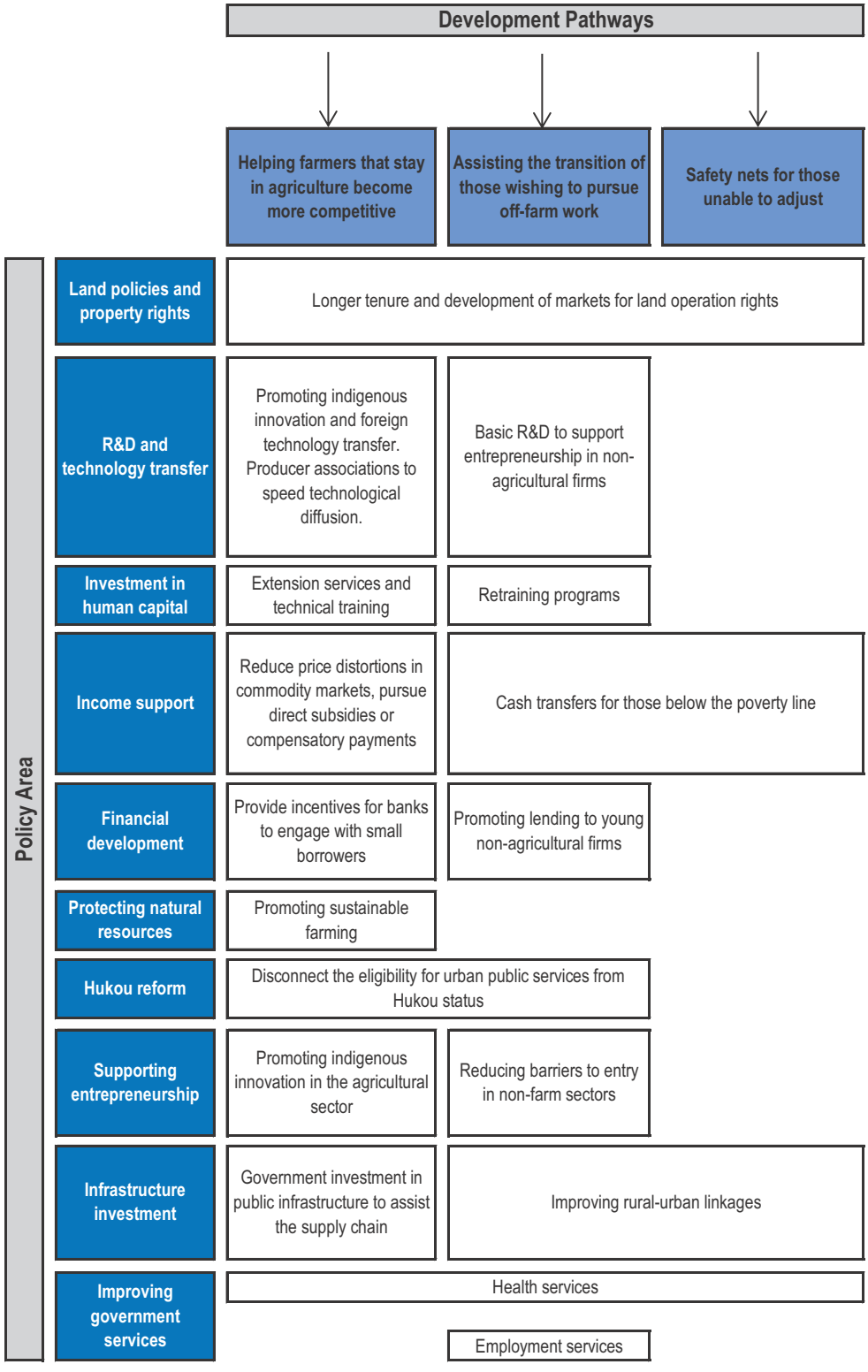
At the centre of this rural adjustment process are agricultural producers who either wish to continue to farm or who realise their skills could yield a higher marginal product if employed elsewhere. Indeed, as the rural sector develops, farmers are faced with the choice of raising farm productivity or reallocating their resources to allow other farmers to scale up operations. Enabling the latter process is particularly important in China, as historical land assignment practices have resulted in a high proportion of small farming operations relative to other middle-income countries.

Figure 2.2 sets out the development pathways facing farmers and the government policy areas that are important for facilitating the transition of the rural economy. Following the experience of other middle-income and OECD countries, farmers commonly follow alternative routes during the adjustment phase: i) stay working the farm and raise productivity, ii) transition away from agriculture to pursue off-farm employment, or iii) discontinue operating their farmland without taking up employment elsewhere (usually the elderly and less able). Many policy dimensions come into play, going well beyond agricultural policies per se.

This chapter first focuses on different aspects of the rural economy that need to be addressed by policymakers to promote productivity gains in China's agricultural sector. These will include measures that benefit the transition of agricultural workers to other work opportunities either within or outside agriculture. The chapter then turns to government policies providing income support to rural citizens and recommends some reforms that would further ease the rural adjustment process. The main findings include:

- Farm size is very small in the agricultural sector, limiting the scope for mechanisation and economies of scale. Furthermore, poorly defined land contract rights and incomplete markets for the transfer of land operation rights impede farm consolidation. This may hamper the government's ability to continue achieving food security objectives (Box 2.1).
- Rural residents aspiring to move to cities with the greatest economic opportunities continue to face policy constraints, slowing the rural adjustment process.
- For those wishing to remain in rural areas, social welfare coverage is incomplete and health services lag significantly behind those in urban China. In many cases, labour mobility is impeded by a lack of portability of health insurance benefits outside the local area.
- Further investment in public infrastructure such as transport, electricity and information technology (IT) networks will be important for enabling agricultural producers to lift productivity and to connect rural citizens wishing to pursue off-farm work or education with desirable locations.
- Many rural citizens have difficulty accessing finance partly because poorly defined land contract rights limit collateral.
- China's arable land per capita is low relative to other countries and the sustainability of farming continues to be threatened by overuse of chemical fertilisers, relatively poor water efficiency and degradation of grassland.
- As Chinese agriculture continues to modernise, farmers need the skills to translate new technologies into productivity gains. Farmer skills are also important to adapt production as consumer demand patterns shift away from traditional grains with rising household incomes.

Figure 2.2. **Government policies are critical in facilitating rural development**



Source: Adapted from Cervantes-Godoy and Brooks (2008).

Box 2.1. **Food security**

With still vivid memories of famine and in the wake of the 2007-08 global food price spike, food security remains a key government priority in China. The Food and Agriculture Organisation of the United Nations (FAO) defines food security as the ideal in which all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life. The task may be particularly challenging in China: it has around 20% of the global population with just 10% of the world's agricultural land and below average water resources per capita. Moreover, the government is committed to a high level of agricultural self-sufficiency. This has led to some specific policy measures including a "red line" for farmland to remain above 120 million hectares, government purchases of food reserves to encourage domestic production and an objective for 95% grain self-sufficiency.

Government reserves of various commodities can provide a buffer in the case of food shortages. The accumulation of reserves is administered by government bodies such as the China Grains Reserves Corporation or commercial enterprises that have storage and operation costs subsidised by the government (Table 2.1). The responsible government department varies depending on the particular commodity. In addition to ensuring food security, reserves are used to reduce price volatility in agricultural markets, limiting spikes in food prices for consumers and fluctuations in farm incomes. Purchases for some commodities, such as grains, are a product of the minimum price policies of the government (discussed further below). For other commodities, reserves are accumulated on an *ad hoc* basis, usually during times of falling prices. While data on the size of government reserves are not publicly available, they are estimated to be significant for some commodities (Zhou, 2010). A downside to these purchases is that they distort market signals and may encourage illegal imports by inflating domestic prices relative to international prices. Furthermore, storage facilities can entail high costs to build and operate, with continued rotation of stock important for reducing potential storage losses from infestation or moisture damage.

Table 2.1. **China maintains reserves of various food commodities**

Commodity class	Varieties	Government department responsible	Storage entities
Meat	Beef, mutton, pork and live animals	Ministry of Commerce (MOFCOM)	Commercial enterprises
Sugar		MOFCOM	Commercial enterprises
Grains	Raw grains, wheat, rice, corn, maize, soybeans, rapeseed and wheat flours	National Development and Reform Commission (NDRC)	China Grains Reserves Corp. of the central government and the grain storage enterprises of the provincial, municipal and county-level governments
Cooking oil		NDRC	China Grains Reserves Corp. of the central government and the grain storage enterprises of the provincial, municipal and county-level governments
Cotton		NDRC	China National Cotton Reserves Corp. of the central government and the cotton storage enterprises of the provincial, municipal and county-level governments
Salt		NDRC	China National Salt Industry Corp. of the central government and the local salt corporations of the provincial, municipal and county-level governments
Tea		MOFCOM	Commercial enterprises

Source: China Merchandise Reserve Management Centre, China Grain Reserves Corporation, China National Cotton Reserves Corporation, China National Salt Industry Corporation and Ministry of Commerce.

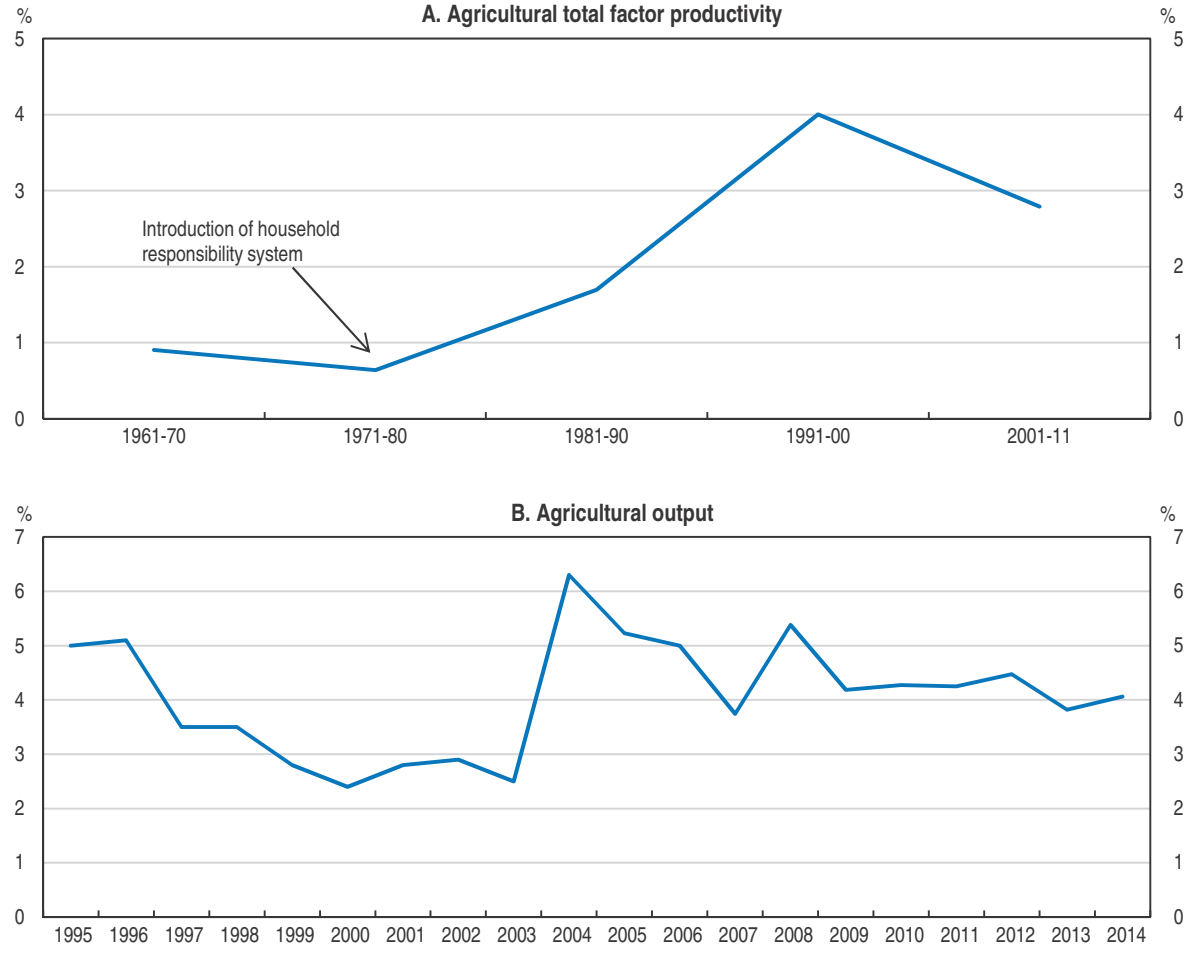
The government's pursuit of food self-sufficiency partly reflects a wariness of the potential impact on global prices if a country as large as China were to increasingly rely on international markets for food supply. Nevertheless, since China's entry into the World Trade Organisation (WTO) China has sourced more agricultural products from abroad. In particular, net imports of vegetable oils, oilseeds, cotton, sugar and milk products have picked up (OECD-FAO, 2013). This has coincided with a change in the government's self-sufficiency policy to emphasise the importance of "absolute self-sufficiency" in the two staple food grains – wheat and rice, while allowing more flexibility in the production of other grains (OECD-FAO, 2014).

Achieving further productivity gains in the agricultural sector and the non-agricultural rural economy

Some country-specific factors have shaped China's rural development process. In particular, reforms that began in the early 1980s have played a big role, including the introduction of the household responsibility system (which allowed farmers to profit from their land allocation even though land remained collectively owned), the gradual abolition of taxes and fees on agricultural production and strong government investment in rural public infrastructure. Accordingly, total factor productivity (TFP) growth in agriculture picked up sharply, contributing to stable agricultural output growth over the past few decades (Figure 2.3).

Figure 2.3. **Reforms have boosted agricultural growth**

Annual percentage change



Note: TFP is calculated using FAO gross agricultural output smoothed with a Hodrick-Prescott filter. Input growth is the weighted-average growth in quality-adjusted land, labour, machinery power, livestock capital, and synthetic three-component fertilisers, where weights are input cost shares (Fuglie, 2012). Measurement issues with this TFP measure have been identified (Alston and Pardey, 2014), suggesting caution in drawing strong conclusions based on these data.

Source: US Department of Agriculture, CEIC.

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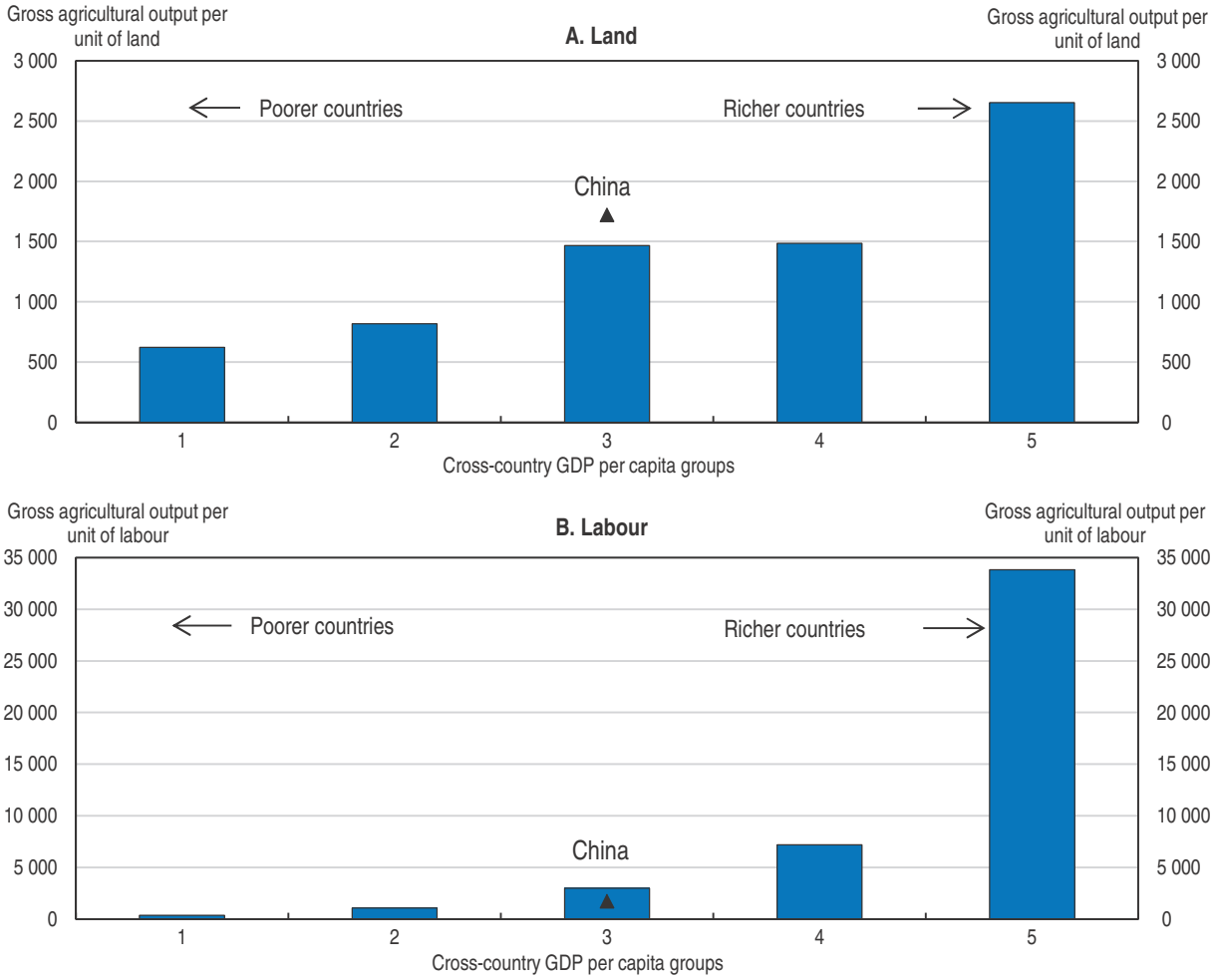
While land productivity is relatively high in China's agricultural sector, labour productivity remains low compared with other countries at a similar stage of development (Figure 2.4). This is despite recent increases in the land-to-labour ratio with rising emigration to urban areas: the number of rural-urban migrants totalled 270 million by 2013 and the land-to-labour ratio rose by 50% between 1990 and 2010 according to some estimates (Fuglie, 2012). Looking forward, further productivity gains can come about through a variety of channels. The policy reforms that can contribute in this regard are now discussed in turn.

Figure 2.4. **Compared with other middle-income countries, agricultural labour productivity is low**

Average level 2006-11



Note: GDP per capita groups are calculated as averages based on data for 132 countries. Gross agricultural output is measured in constant 2005 US dollar terms, the land input is the number of hectares adjusted for quality and labour is the number of economically active persons working in agriculture (Fuglie, 2012).

Source: US Department of Agriculture, authors' calculations.

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The land-tenure system constrains farm consolidation and the mobility of rural workers

Rural land in China is owned collectively at the village or sub-village level and is usually classified as either farmland or construction land. While farmland is exclusively used for agricultural purposes, construction land is collectively-owned rural land for non-agricultural

use such as housing. The government seeks to promote larger-scale farms (Central Committee of the Communist Party and the State Council, 2015). To fulfil this goal, measures to foster the development of markets for the transfer of rural land rights and improvements to the model for local government funding are key (recent revisions to the budget law that entitle local governments to issue municipal bonds are a step in this direction).

Farmland contract rights are poorly defined and tenure length is too short

At the time of the introduction of the household responsibility system, rural households received rights to an allocation of farmland from the village collective. The size of the land allocation was generally based on household size or labour supply, with land use restricted to agricultural purposes. Initially the contracts were granted for five years, before being extended to 15 years in 1984 and 30 in the late 1990s. Reflecting differences in fertility, location and irrigation, each household was assigned a number of non-contiguous land plots of varying quality. The average household received rights to three or four separate plots with some households holding the rights to as many as ten (Huang et al., 2012). While aiming for an equitable distribution of land assets, this practice has raised a number of issues for agricultural production. First, the high degree of fragmentation in farm holdings has limited mechanisation and the extent to which economies of scale can be realised. Second, poorly-defined contract rights and incomplete markets for the transfer (or "circulation", in the domestic terminology) of the operation rights to farmland have constrained agricultural productivity gains. Third, the limited tenure of contracts to farmland may weaken farmers' incentives to invest in sustainable farming practices.

The average farm size (where a farm is defined as a continuous tract of agricultural land) in China is small compared with other middle-income countries (Table 2.2). While the optimal farm size will depend on various elements including topography and production mix, some farm consolidation may improve the scope for mechanisation and vertical integration of production. With significant increases in farm wages over recent years, the incentives for substituting capital for labour have risen (Wang et al., 2014a). Some of the benefits of consolidation have been captured through strong growth in farmer professional cooperatives and equipment rental services in China. However, individual farmers could reap substantial efficiency gains from being able to consolidate fragmented land into larger plots.

Table 2.2. **Average farm size is small in China**

	Average farm size (ha)
China	0.6
Vietnam	0.7
Indonesia	0.8
Japan	1.2
India	1.3
Thailand	3.2
Turkey	3.2
Columbia	25
Venezuela	60
Brazil	73
Chile	84
South Africa	288

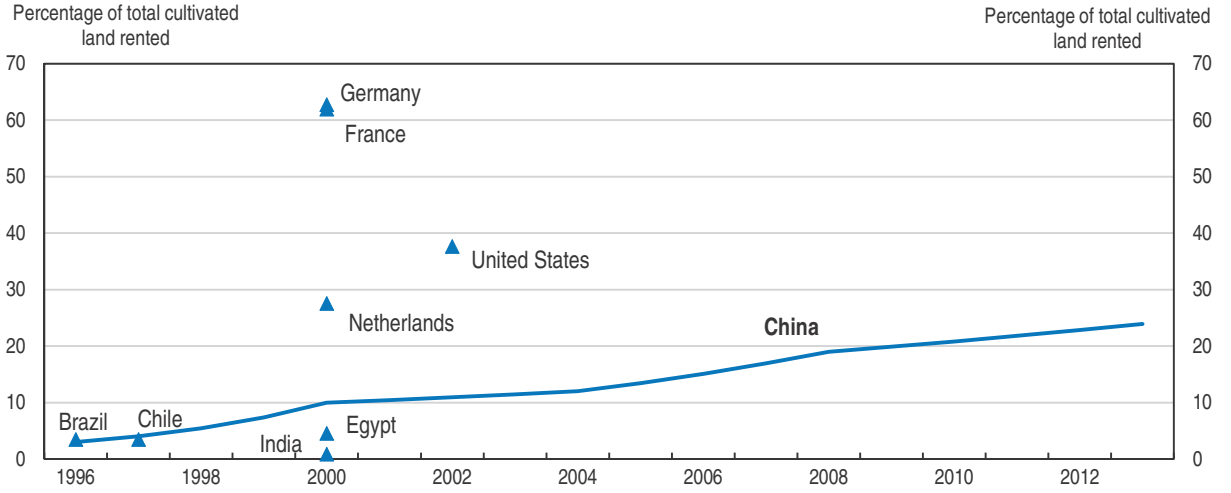
Note: Data for comparison countries are from agricultural censuses between 1996 and 2005. Data for China are for 2010.
Source: 2000 FAO World Census of Agriculture, Huang et al. (2012).

The promotion of large-scale farming has advanced in some provinces, especially for livestock (Huang et al., 2012). Heilongjiang, the province with the greatest area of cultivated land per capita, has been the focus of a government pilot programme that gives subsidies to farmer cooperatives that consolidate at least 5 000 acres (2 023 ha) of arable land. By 2012, China had 2.7 million farms above 100 mu (6.67 ha). Nevertheless, this is equivalent to just 1.4% of the total number of Chinese farms identified in the 2006 agricultural census (Gale, 2013).

More important than merely increasing average farm size is enabling the most productive farmers to scale up their operations. Ideally this will occur through the reallocation of farmland from those farmers who are less productive or have a high opportunity cost of farm production. The optimal mechanism for land reallocation is through a well-developed institutional structure that allows operation rights to be transferred between farmers. However, in China, the absence of such a mechanism has impeded the mobility of rural citizens or led to deserted plots of agricultural land as farmers emigrated elsewhere. Still, arrangements are evolving whereby farmers rent out operating rights while retaining the contractual rights to farmland, and promoting land transfer is among the priorities set out by the Third Plenum. This provides the farmers who wish to emigrate to cities, pursue other rural work opportunities or retire in the rural area an income stream without forcing them to surrender their rural rights altogether. Some areas, such as Henan Province, have gone a step further by exploring the possibility of farmers transferring their contractual rights for monetary compensation. However, at this stage, the transfer of operation rights is the more common tool for land consolidation.

With increasing encouragement from the central government and new instruments, such as joint land-stock cooperatives and land circulation trusts (Box 2.2), the transfer of operating rights has steadily risen over the past two decades (Figure 2.5). This has been particularly the case in coastal areas where off-farm work opportunities have been plentiful (Hoken, 2012). Nevertheless, the intensity of land transfer in China remains below that in advanced countries.

Figure 2.5. **The proportion of rented farmland has increased but remains below advanced countries**



Note: The figure shows that the share of rented cultivated farmland in China increased from 3% in 1996 to around 24% in 2013. Estimates from the World Census of Agriculture highlight that China's share of rented farmland by 2013 remained below point estimates for many developed economies taken around 2000. These included France (taken in 2000), Germany (2000), the US (2002) and the Netherlands (2000).
Source: 2000 FAO World Census of Agriculture, Gao et al. (2012), State Council of the People's Republic of China.

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Box 2.2. **The development of China's land rental market**

China's rural land tenure system has resulted in unique arrangements for transferring land (Research Institute of Economy, Trade and Industry, 2014). There are five main types of arrangements:

i) Exchange of land-use rights – Within the same collective, two farmers may want to exchange operation rights for their respective land. This may aid consolidation for farmers who have a number of non-contiguous plots.

ii) Leasing of operation rights – In such an arrangement, farmers rent out the right to cultivate their land to another entity within or outside the rural collective (however, under equal conditions, members from the collective are given priority). Despite renting out the operation rights, the farmers retain the contract right to the farmland.

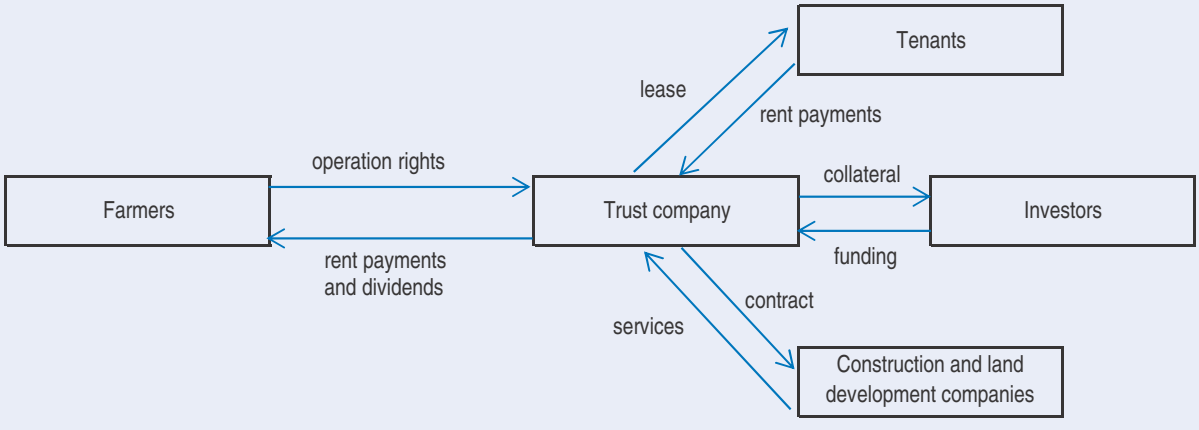
iii) Outright transfer of contract rights – Conditional on the lessor having built a stable livelihood outside the agricultural sector, the outright transfer of contract rights is allowed. At this point, the contract between the household transferring out the land and the village is terminated (Ma et al., 2015).

iv) Land joint-stock cooperatives – Farmers may jointly pool their operation rights to engage in cooperative agricultural production. They are then given a share of the joint-stock cooperative and are generally paid a dividend proportionate to their share. The three major types of joint stock cooperative arrangements are (Chang et al., 2012):

1. "Community type" where a group of farmer households pool their rights and undertake unified planning, production, operation and management of the land.
2. "Collective leasing type" where farmers entrust the operation rights to a collective cooperative which then may re-organise the land before issuing it for public lease.
3. "Joint operating type" where farmers transfer shares to a rural land joint-stock company, which is often a larger agricultural enterprise with modern technologies and skills. Farmers retain a share of the profits derived from the land.

v) Land circulation trusts – Farmers entrust their operation rights to a trust company, which is responsible for finding tenants, land development, procuring funds and organising construction activities (Figure 2.6). Some of these functions, such as land development and recruitment of tenants, are undertaken by an operating company contracted by the trust. The first such trust was CITIC Trust Co., Ltd which was established in 2013 in Yongqiao district, Suzhou, Anhui province. As part of this arrangement, in return for their operation rights, farmers receive rent and a share of the net profits of the trust (dependent on the area of land they initially contributed). Farmers may obtain a further income stream through working as employees of the operation.

Figure 2.6. **Operation of a land circulation trust**



Source: Research Institute of Economy, Trade and Industry, 2014.

Some farmers are hesitant to rent out their land because their contract rights are poorly defined. There are significant differences across provinces, with a 2009-10 survey finding that while only 33% of households in Jiangxi province held a land certificate, 97% did in Gansu province (Ma et al., 2015). The government commenced a pilot programme in 2008 to provide certification of farmland contract rights to households, with 100 counties taking part by 2013. There are also some pilot programmes underway to use satellite technology combined with village records to identify and enforce property boundaries. The government aims to complete the process of assigning land-right certificates to rural households by 2020. If completed, this is a major advance, which will reduce transaction costs of land transfer and allow those households wishing to pursue off-farm work to do so without fearing they will lose their farmland entitlement.

Farmers wishing to rent out land have also been held back by a perceived lack of contract enforcement by independent courts and corruption of local officials (Lohmar, 2013). Land contract insecurity has been identified as a constraint to land rental and the migration of rural households toward better economic opportunities (Giles and Mu, 2014). In late 2014, the Fourth Plenum of the 18th Chinese Communist Party Central Committee emphasised the importance of the rule of law and law enforcement is to be added to the indicators used to evaluate local government officials' performance. Further reforms that improve contract enforcement will be a necessary complement to better defined contract rights for promoting the reallocation of rural land.

Land transfer is also hindered by the difficulty of valuing operation rights: markets for exchanging operation rights lack transparency and there is no uniform method for valuing rights. Indeed, household surveys suggest significant mismatches between the price expectations of those wishing to rent in and those wanting to rent out operation rights to farmland (Khantachavana et al., 2013). Alongside the planned provision of documented contract rights to all farmers, land transfer will be assisted by continued efforts to establish well-regulated, transparent, exchange platforms that intermediate the transfer of operation rights. The government recently issued guidance outlining the desirable characteristics of exchange platforms for rural assets. They advised that exchange platforms should be established by non-profit institutions (public or otherwise), be internet-based and cover a variety of assets (e.g. operation rights to rural land, rural collective operating assets, agricultural production facilities and use rights for water conservation facilities). Exchanges should also aim to provide various services such as asset valuation, legal advisory and assistance in connecting households with land-backed mortgage financing.

While continued development of land rental markets is important for facilitating the rural adjustment process, it could limit investment in sustainable farming practices. Central government law stipulates that the term of the transfer contract for operating rights must not exceed the term of the contract rights. Given that the tenure for contract rights is just 30 years, a farmer renting in land will only be able to guarantee they will be cultivating the area for a limited period of time. This may lower the incentive to undertake farming practices that ensure the long-term fertility of the plot. For example, farm level analysis suggests that there is a significant decrease in the use of organic manure when farmers rent in land (Gao et al., 2012). In general, contract duration for farmland is lower than for urban land which is 70 years for residential land, 50 years for industrial land and 40 years for commercial, tourism or recreational land (World Bank and DRC, 2014). The 2008 and 2013 third plenums have suggested that rights to farmland should be for the "long term without change". This marks important progress. However, no provision has yet been written into law.

Rural construction land rights are still not fully tradable

While also under collective ownership, rural construction land – classified as either commercial or residential – is more strictly controlled by the government. Although the November 2013 Third Plenum announced the government's intention to end restrictions on the transfer of use rights to rural construction land, this appears to only apply to land for commercial purposes (Yuen, 2014). The authorities recognise the benefit of establishing secure and tradable residential property rights, but at this point such transfers are confined to a few pilot programmes.

Rural residential land is intended to be used for farmers to build their residences. The stock of such land is almost twice as large as existing urban land and can be developed without the stringent conditions that exist for the conversion of farmland (World Bank and DRC, 2014). Such land is relatively valuable and, when located on urban fringes, has been prone to expropriation by local governments that convert it to urban land before transferring the use rights to property developers. This practice has proven to be a critical source of revenue for local governments in the face of a rising gap between their expenditures and the revenue transfers they receive from the central government. In the process, farmers are compensated, but the compensation is often meagre compared with the full value of the construction land (OECD, 2015). This has led to episodes of social unrest. Indeed, some estimates suggest that 65% of social conflicts in China's rural areas involved disputes over land (Yuen, 2014). Consequently, reforms that buttress contract rights to rural construction land and reduce local government land expropriations will need to be coupled with measures that ensure local governments have sufficient other sources of revenue to be fiscally sustainable (Wang and Herd, 2013).

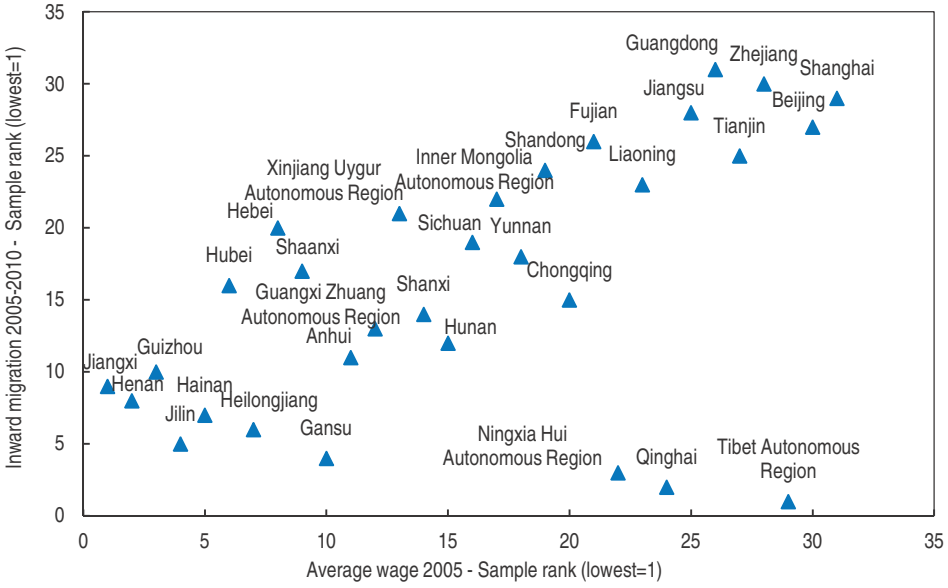
In Chengdu and Chongqing there is currently a scheme whereby, in return for converting their residential construction land to farmland, rural residents obtain a *dipiao* (land ticket). The latter can be sold via a property exchange to developers, entitling them to convert farmland zoned for development in urban areas where demand is high. This approach is supposed to meet multiple objectives of the central government: expanding the housing infrastructure for new urban migrants and the income sources of farmers in rural areas and ensuring that the volume of China's arable land does not fall below the government's "red line" of 120 million hectares. Nevertheless, some farmers claim they have been forced to convert ancestral homes against their will or have not received compensation from the property exchange for the sale of a *dipiao*. In 2010, the State Council documented these problems and urged local governments to step up surveillance of the schemes and punish actions that compromised farmer's interests (State Council, 2010).

Hukou reform will improve the reallocation of labour resources

Removing barriers to migration can complement land reforms in promoting the rural adjustment process. Economic considerations appear to have been a key driver of the pattern of migration in China over recent years (Figure 2.7). Between 2005 and 2010, the top five provinces in the average wage distribution were the destination for over 65% of China's migrants. Nevertheless, China's household registration system (*hukou*) discriminates against rural workers who would like to move to urban areas for off-farm work opportunities. This is because migrants who retain their original *hukou* typically have restricted access to services where they work, notably with respect to education (Chapter 1), health care, pension, welfare and affordable housing. Indeed, despite improvements over recent years, migrant workers still have very low social insurance

coverage rates, with only 18% possessing medical insurance (Table 2.3). In addition, in 2013, over half China's migrant workers did not have an employment contract and the majority of those that did had a fixed-term one. The *hukou* system may also disadvantage firms in rural areas where a lack of suitable local labour holds back growth. In addition, the system may exacerbate urban-rural inequalities by limiting urban migration and the subsequent flow of remittances to rural areas.

Figure 2.7. **Provinces with a high relative wage have attracted migrants**



Source: China Statistical Yearbook 2006, 2010 Census of China, authors' calculations.

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Table 2.3. **Migrant workers have limited access to public services**

In per cent

	2008	2009	2010	2011	2012	2013
Social insurance coverage						
Pension	10	8	10	14	14	16
Industrial injury insurance	24	22	24	24	24	29
Medical insurance	13	12	14	17	17	18
Unemployment insurance	4	4	5	8	8	9
Maternity insurance	2	2	3	6	6	7

Source: National Bureau of Statistics.

Recent government reforms are welcome, such as removing restrictions on the transfer of *hukou* status in small cities and relaxing the regulations in medium-sized ones. A major novelty was the guidance that rural residents converting their *hukou* would retain their contract rights to rural land. In the past, the prospect of losing rural land rights may have discouraged migration (OECD, 2013a). Nevertheless, restrictions remain stringent for migrants to large (3-5 million people) and megacities (above 5 million people), where productivity and wages are highest. In these areas, eligibility for *hukou* is dictated by a points-based system that favours long-time residents and those with high levels of education and skills. Further reforms should focus on disconnecting the eligibility for

urban public services from *hukou* status. This may be achieved by introducing residency permits that allow the holder to access public services, while retaining a system that protects the land entitlements of migrants. Since 2011 the prefecture of Suzhou has established a residency permit system along these lines, with almost full coverage of the entire migrant population (OECD, 2013a). Evaluations of the programme highlight effective electronic information management systems as particularly important for enabling local authorities to keep track of the resident population and provide public services (Ding and Lin, 2013).

One significant challenge to *hukou* reforms is cost. Absent significant new investments, the provision of resident permits to all migrants would place public services in many urban areas under considerable stress. In the context of the current fiscal system, such reforms would require transfers from the central to local governments in proportion to the increased coverage of public services they must provide. An alternative is that funding could partly derive from subnational governments, but this would need to be coupled with tax reforms that boost subnational government income such as a possession-based rather than a transaction-based property tax (OECD, 2013a).

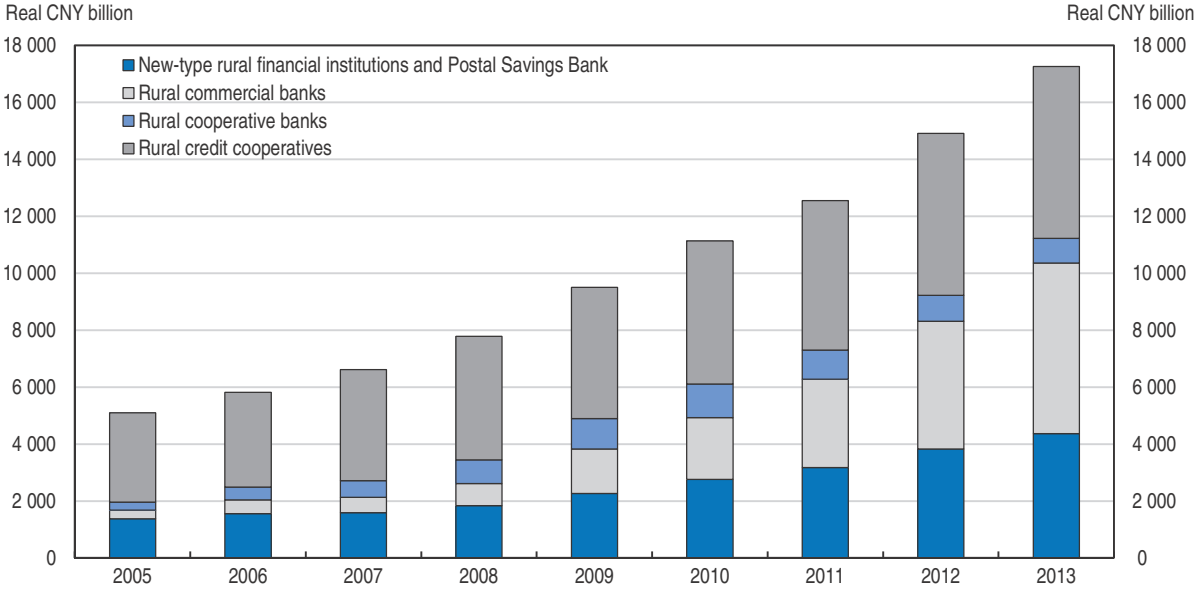
A lack of rural financial development is hampering efficient resource allocation

Difficulty in accessing finance in rural areas may impede the reallocation of resources to high-potential agricultural operations. Even if farmers manage to scale up their land holdings through renting in operating rights to farmland and attract suitable labour, poor access to finance may limit farm investment and mechanisation. A large problem for farmers in many developing countries is a lack of collateral. This is particularly pronounced in China due to the land tenure system and the fact that contract rights are not well defined and tenure is limited. Furthermore, property law forbids the contract rights to rural land to be mortgaged. The 2009 *OECD Rural Policy Review of China* emphasised the importance of continued reforms that improve the availability of finance in rural areas (OECD, 2009). While progress has been made, rural financial development should remain a policy focus.

The rural financial system has gone through significant restructuring over recent years. Rural credit cooperatives – the dominant lending institution since the pre-reform period – are being gradually restructured and those with better asset quality transformed into rural commercial banks and rural cooperative banks. While not the case for rural commercial banks, rural credit cooperatives are obliged to allocate a certain share of their loan portfolios to agricultural projects (Ong, 2013). In addition, China Postal Savings Bank, an institution with more than 39 000 branches nationwide and a considerable rural network, has been allowed to issue loans since 2007 and has also introduced various microloan schemes. These developments have contributed to solid growth in lending to the agricultural sector, with the combined real assets of the major rural lending institutions tripling since 2005 (Figure 2.8).

Nevertheless, lending by these institutions is currently biased toward larger, usually state-owned, enterprises that have significant collateral and guarantees. Regulatory restrictions discourage non-secured lending and many financial institutions are not willing to incur the higher transaction costs involved in accessing farmers or to accept the non-standard attributes often characterising farmers' collateral (Duflos and Ren, 2014; World Bank, 2011). This environment may not only limit the ability of small-scale farmers to scale up production, but also the mobility of those agricultural workers who require finance in making the transition into off-farm work.

Figure 2.8. **Lending to the rural sector has expanded significantly**



Note: Nominal values are deflated by the GDP deflator, with 2005 as the base year.
Source: China Banking Regulatory Commission Annual Report 2013.

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For small-scale farmers, government incentives that encourage "branchless banking" practices which lower transaction costs, and perhaps lower collateral requirements, should be introduced. For those transitioning away from agriculture, the presence of institutions offering microcredit (small loans for individuals with limited formal collateral) may be important. While the Chinese government has promoted this type of finance through establishing a new form of licence for microcredit companies, regulatory restrictions on these firms are tight. For example, microcredit companies cannot accept customer deposits and are not allowed to have a debt-to-equity ratio above 50%, which is very low by international standards. In addition, the central government sets high minimum capital requirements, with most provinces requiring an additional capital buffer (Geraci et al., 2010). Such regulations reduce the profitability of microcredit companies and their capacity to expand credit supply.

Continued growth in the market entry of new private financial institutions will help expand rural lending further and develop new financial products. As the rural market evolves, the central government should encourage the development of credit rating systems that improve the ability for new institutions to access funding. By the same token, a clearer definition of land rights, greater land transfer or an expansion of contract farming relationships (Box 2.3) will help provide collateral which banks can lend against.

Spurring innovation in rural China

In addition to reforms that improve resource allocation, the productivity of China's agricultural sector will benefit from a policy environment that fosters innovative capacity. The potential for innovation to boost agricultural output is significant given that, once disseminated, a single productivity-enhancing idea may be implemented in farms across many different regions.

Box 2.3. **Contract farming**

Contract farming occurs when an agreement is struck between a farmer and a buyer under which the farmer agrees to produce a commodity in a specified way and the buyer agrees to purchase it at a given date. As the commodity must be produced to certain specifications, the buyer often provides the farmer with inputs such as fertiliser on credit and offers technical assistance with production. This arrangement goes some way to alleviating the problems associated with smallholder farming. Firstly, it links farmers to markets through a direct distribution channel. Secondly, it can ease financing constraints both through the provision of inputs on credit and the fact that financial institutions can use the contract to validate that a farmer has steady income. Thirdly, it can provide a conduit for educating farmers about best practice techniques and introducing new technologies. Finally, it can improve food safety through the enforcement of standards by the buyer.

Despite the advantages, contract farming does entail costs for both parties. The buyer must draw up, monitor and enforce the contract, as well as providing technical services. On the other side, the farmer surrenders some autonomy in production decisions. As a result, contract farming is only justifiable when the benefits outweigh these transaction costs. According to Minot (2007), contract farming is suitable when:

1. The buyer is a large firm (i.e. a processor or supermarket chain). This is because the buyer needs a team of field agents who negotiate terms with farmers, distribute inputs, provide technical assistance and collect the product.
2. The product is characterised by large quality variations, perishability, technically difficult production or is high value.
3. When the destination market is willing to pay a premium for certain product attributes that can only be assured through close coordination.
4. When the policy environment is conducive. In particular, this is the case in regions with a favourable investment climate, limited regulations on direct transactions between companies and farms, well defined grades and standards and the presence of farmer organisations that link farmers and firms.

In China, the government often plays a significant role in contract farming arrangements, establishing links between the purchasing firm and farmers. The participating firms are selected on the basis of criteria including capacity to provide technology and training, and receive preferential treatment such as government loans and access to land (Lohmar et al., 2009). Nevertheless, by examining farmer surveys from villages mostly in Zhejiang, Jiangxi and Shandong provinces, Guo and Jolly (2009) conclude that the proportion of households engaged in contract farming is relatively low and well below the proportion willing to produce under contract, owing to an absence of opportunities. The households in the survey identify price stability and market access as the key motivations to contract farming.

The public sector has traditionally been the main source of agricultural research and development (R&D) in China. Coinciding with increasing rates of privatisation, agribusinesses have increasingly invested in their own innovation activity since 2000. Even so, public agricultural R&D has continued to expand rapidly, mostly in the form of technological development rather than basic research. Hu et al. (2011) document that while public basic research has encouraged private agricultural R&D, public technology

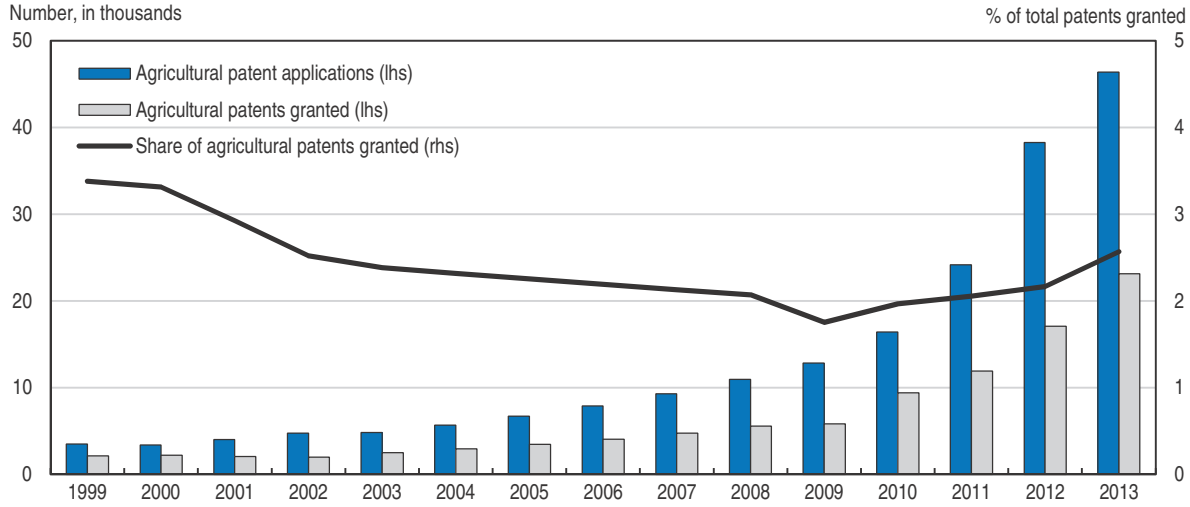
development has crowded out private R&D. In future, the authorities should ensure that government agricultural R&D does not discourage private R&D investment.

Innovation also occurs outside formal R&D programmes: institutions that expose farmers to new technologies and facilitate knowledge spillovers may incubate new ideas and farming processes. Such institutions include farmer cooperatives, which are increasingly being promoted, under the aegis of the 2007 Farmer Specialised Cooperative Law. Their number has increased rapidly, though with considerable differences across provinces. Focusing on Northwest China, Garnevska et al. (2011) conclude that a stable legal environment along with financial and technical support from governments and non-government organisations are important to the success of cooperatives.

Agricultural innovation can also benefit from exposure to new foreign technologies. The high and rising stock of agricultural R&D as well as the increasing presence of foreign firms in the agriculture sector may improve China's ability to absorb new foreign inventions (Andrews and Westmore, 2014). Foreign direct investment (FDI) is encouraged in most parts of the agricultural industry, although there are some restrictions. Changes to China's foreign investment catalogue in 2007 raised restrictions on FDI in five agricultural industries including seed production and development, soybean processing and distribution services. In addition, an update in 2011 expanded restrictions to the areas of grain purchasing and the processing of rice, flour and edible oils. It must be ensured that further amendments to the catalogue take into account the beneficial impact of FDI through knowledge spillovers to domestic firms.

The acceleration of China's agricultural R&D and the development of farmer cooperatives and foreign firms in the sector have been accompanied by a swelling of patenting activity. A proxy for innovation activity, the number of agricultural patents granted quadrupled between 2008 and 2013 (Figure 2.9). While the share of agriculture in the total economy declined, innovation intensity in the agricultural sector kept pace with China's economy as a whole in the past decade.

Figure 2.9. **Proxies for agricultural innovation in China suggest a recent pick-up in activity**



Note: Missing data for 2004-07 are approximated through linear interpolation.
Source: China Statistical Yearbook various years, authors' calculations.

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The recent increase in agricultural patenting may have also been encouraged by improvements to China's system of intellectual property rights. Since joining the World Trade Organisation in 2001, the intellectual property rights framework has been aligned more closely with the system in OECD countries and there has been an effort to improve enforcement with the adoption of the National Intellectual Property Strategy in 2008. With stronger patent rights, the private returns to innovation activity have risen. However, concerns remain with regard to issues such as infringement and the production of counterfeit goods. The number of intellectual property rights cases brought before Chinese courts tripled between 2009 and 2013. Subsequently, China's Leading Group of Overall Reform has established specific courts in Beijing, Shanghai and Guangzhou focusing on intellectual property. Transparency as well as the extent of judicial efficiency and independence will be important determinants in how effective these institutions are in protecting intellectual property rights and private returns to innovation.

Outside of the agricultural sector, government policies can promote broader innovation in the rural economy. Strengthening patent rights and further rural financial development will be beneficial, but so will measures that encourage knowledge spillovers and reduce barriers to firm entry into rural sectors. The existence of entrepreneurs is important for the accumulation of knowledge-based assets and can benefit from the reduction of regulations that impose high fixed costs on firms (Andrews and Criscuolo, 2013). The World Bank Doing Business Indicators suggest that both the number of procedures and time required to start a business is substantially higher in China than in the average OECD country, suggesting scope for reform (World Bank, 2013a). Furthermore, entrepreneurial activities may be particularly likely to be undertaken by rural migrants returning from working in urban China (Démurger and Xu, 2011). In such cases, new businesses are often funded through repatriated earnings, suggesting that reforms that reduce restrictions on urban migration and promote the repatriation of capital can promote rural innovation.

Improvements in farmer education and re-training

As Chinese agriculture continues to modernise, farmers need to have the skills to translate new technologies into productivity gains. This will also be important in the context of shifting consumer demand patterns away from traditional grain consumption as household incomes rise. Assuming that China's consumption preferences further converge to those of advanced countries, per capita consumption of livestock and fish protein in China will continue to increase (Fukase and Martin, 2014). If changes in the composition of agricultural production are to at least partly reflect these patterns, the ability of farmers to have broad skills that allow them to adjust farm output will be critical.

Skills can be acquired through the formal education system by attending agricultural universities and technical schools. For established farmers, skills can be obtained through government programmes or from upstream businesses in a contract farming relationship (Box 2.3).

China has a considerable network of agricultural extension services. These are generally provided at village and township level, reflecting the diverse needs of farmers in different rural areas and the importance of farmers being able to easily access extension agents. Although the majority of such services are still provided by the government, since

the early 1990s reforms have been introduced to gradually privatise aspects of public agricultural extension (Hu et al., 2010). These changes may have had adverse effects with some evidence suggesting that declines in government funding have caused extension agents to spend an increasing amount of time on administrative and commercial activities (Lohmar et al., 2011). Asked about the types of services that they need most, farmers in Shandong, Shanxi and Ningxia provinces emphasise information about new technologies as well as assistance in seed and fertiliser selection (Zhong, 2014). Given the public good properties of the ideas disseminated through extension services, there is a rationale for continued government provision.

The traditional agricultural extension programmes must evolve to better meet the needs of farmers. One concept being tried out is that of farmer field schools, a learning-by-doing method of tailored farmer education that is provided at the village level on demonstration plots with a group of local farmers. The emphasis on group learning is designed to build networks and acknowledges the externalities that can result from farming practices in a local community. For example, misuse of pesticides and fertilisers may have implications for the crops of other farmers nearby. Through randomised control trials in five counties in Hebei and Anhui provinces, Burger et al. (2014) find only tentative evidence of the beneficial impact of attendance in a field school programme on farmers fertiliser use. They observe significant heterogeneity in the quality of the programmes, suggesting that training and performance-based incentives for facilitators will be important for any broader roll-out of farmer field schools.

Improvements in farmers' skills and the increasing introduction of modern technologies into the food production process will lower the potential for food losses (Box 2.4) and the contamination of food products. Food safety risks have arisen numerous times over the past decade, such as when traces of carcinogenic drugs administered by farmers were found in turbot in Beijing and Shanghai (Gale and Buzby, 2009). The resulting food safety concerns have spurred a burgeoning quantity of imports to substitute for domestic products that consumers fear are unsafe. For example, following contamination of infant formula in 2008, demand for imported baby formula products has grown rapidly. Consequently, farmer education and modernisation of production may allay consumer fears and increase the market for Chinese agricultural producers. Such changes will be complemented by recently proposed legislation by the State Council that will increase the accountability of business operators for food safety.

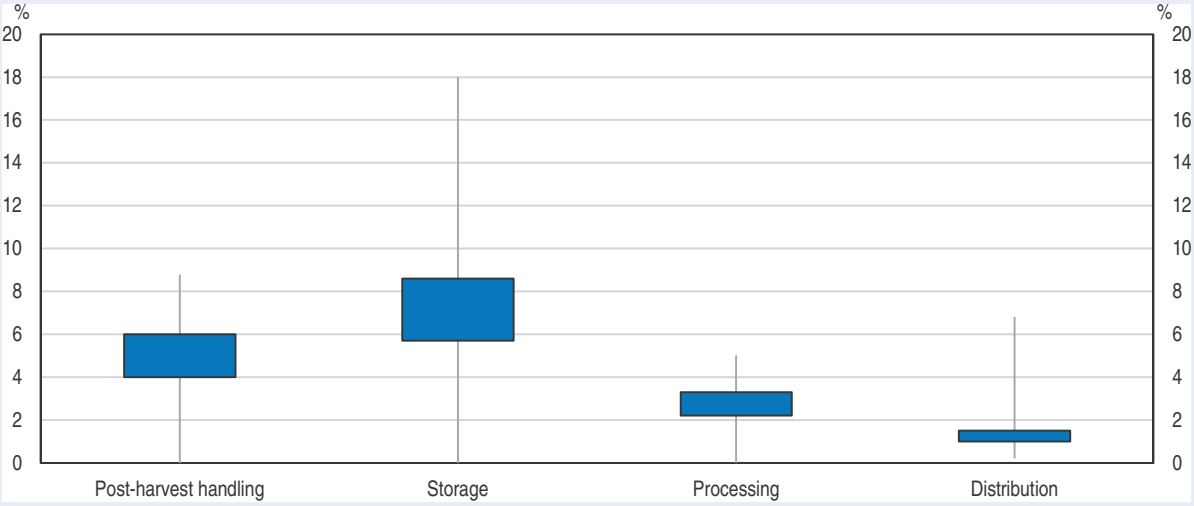
In addition to farmer training, improvements in the quality of general education in rural China can enhance employment prospects for agricultural workers and the capacity for rural citizens to adjust to structural economic changes. Educational opportunities are improving, but the level of human capital in rural areas remains much lower than in urban areas (Chapter 1). At the secondary school level, the graduate-to-population ratio in rural areas was unchanged between 1998 and 2012 while it doubled in urban China. As the rural adjustment process continues to unfold, a solid general education will help rural citizens transition into work in the emerging sectors of the economy. At present, rural citizens can attend vocational high school free of charge while they must pay for general high school. Vocational education should continue to be encouraged especially given its importance for developing non-agricultural industry in China's rural areas. However, in order to promote flexible skills, general high school should also be free.

Box 2.4. **Food losses**

Reducing food losses in agricultural production may improve productivity and farm incomes as well as the sustainability of rural land. In addition to food waste at the consumer level, output losses are often due to inadequate farmer skills and infrastructure. For example, pre-harvest losses can occur from a lack of farmer understanding about pest control and efficient seeding techniques, while post-harvest losses can derive from poor food storage facilities.

Across a sample of studies, the average estimate of pre-harvest grain losses is around 7% of total output, with losses owing largely to pests and natural disasters (Liu, 2014). Post-harvest losses tend to result from poor handling (5% of output) and storage (7% of output), which may reflect that the majority of China's grain handling is conducted manually with sacks rather than with mechanised bulk handling systems (Figure 2.10). These studies also note geographic heterogeneity owing to differences in climate and planting structure. In particular, households in north-eastern provinces are found to display higher post-harvest storage losses than those on the Yellow-Huaihe-Haihe Plain.

Figure 2.10. **Post-harvest losses of grain are estimated to be highest from poor handling and storage**



Note: Estimates are based on a survey of the empirical literature. The vertical line represents the range of estimates with the horizontal bar representing the average. The estimate for post-harvest handling is based on 19 studies, for storage on 46 studies, for processing on 17 studies and for distribution on 22 studies.
Source: Liu (2014).

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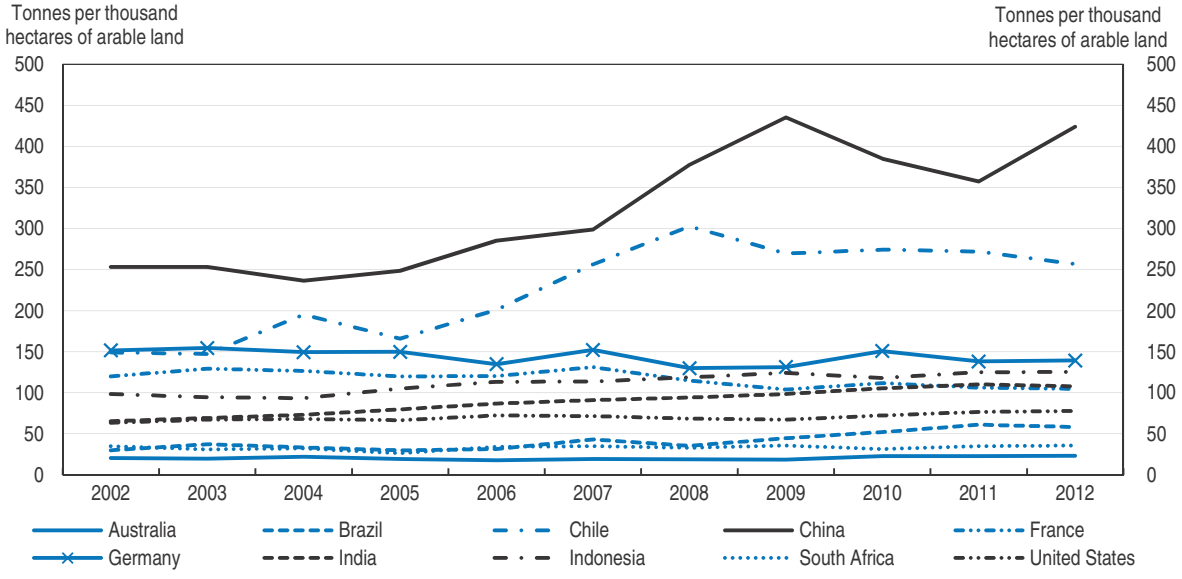
Land productivity and the more efficient use of natural resources

More sustainable use of rural land can help improve both long-run farm productivity and the health of China's rural population. China's arable land per capita is low relative to other countries, so production methods need to preserve the fertility of land resources. Improvements in technical assistance for farmers and the diffusion of new technologies will help. So will policies that better align the price of production inputs with their true social cost.

Chemical fertilisers are overused in Chinese farming

The overuse of chemical fertilisers in Chinese farming has compromised the sustainability of natural resources (Huang and Xiang, 2014). Consumption of nitrogen fertiliser per unit of arable land in China is more than double that of other countries with large agricultural sectors (Figure 2.11). The costs of excessive use of chemical fertiliser are significant. Soil acidity is often affected, leading to longer-term impacts on crop yields. Furthermore, nitrogen run-off can leach into lakes, rivers and coastal waters, hurting rural industries such as fishing and aquaculture in which China is expected to gain market share over the next decade (OECD-FAO, 2014). Such contamination can also taint the drinking water supply. In addition, the production of chemical fertiliser in China is a significant source of greenhouse gas emissions (Zhang et al., 2013), all the more so as this industry is far more energy and carbon-intensive in China than in most other countries, reflecting energy subsidies to fertiliser producers.

Figure 2.11. **Nitrogen fertiliser is heavily overused in China**



Source: FAO, authors' calculations.

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Fertiliser overuse may be due to artificially low prices stemming from government subsidies. These include a tax exemption on value added tax for almost all fertiliser products and a subsidy for fertiliser transportation (Huang and Xiang, 2014). Overuse is also explained by the small scale of Chinese farming, poor technical skills of agricultural producers and the increasing number of agricultural workers undertaking off-farm work. The latter effect is because such workers tend to apply fertiliser in a single large quantity rather than a more labour-intensive split application which has better nitrogen use efficiency (thus requiring less fertiliser). Therefore, land policies that promote farm consolidation and allow off-farm workers to transfer farmland operating rights to specialist agricultural producers may reduce fertiliser overuse. Such measures should be coupled with reforms that improve technical assistance for farmers and remove the price distortions from the fertiliser market so that agricultural production decisions take into account the true costs of the inputs being used. Recent efforts by the government to encourage the application of new farm technologies may also help.

Grassland areas suffer from degradation

Despite recent government reforms, China's grassland continues to suffer degradation that can have important long-term economic and ecological effects. Grassland accounts for 40% of China's total land area and is the feed base for livestock. Grasslands are also important as a "carbon sink" to alleviate greenhouse gas emissions and to lower the probability of sand storms and soil erosion. China has recently introduced policies such as the "grassland protection mechanism" aiming to restore degraded grasslands by compensating herders for reducing the number of animals that graze (Gale, 2013). However, problems of overgrazing, uncontrolled tree logging and pests continue to endanger the sustainability of China's grassland resources. In 2013, over one sixth of the country's grassland was unavailable for utilisation. With increasing consumer demand for livestock products, pressures on grassland may be further exacerbated in the coming years by a rise in China's livestock production (OECD-FAO, 2014).

Against this backdrop, reducing animal overstocking and promoting farmer education regarding appropriate species selection is important. For example, Henan province has begun to encourage the establishment of livestock parks that comply with a list of standards regarding environmental management and animal health. New methods can measure the capacity of a grassland plot to capture and store greenhouse gas emissions (FAO, 2014). This raises the potential for government payments to farmers who restore grassland areas linked to the associated reduction in emissions. Such steps to restore the natural environment may also support the development of related non-agricultural industries, such as agritourism, which have begun to develop in rural areas in response to gains in the average income per capita of China's households.

Water resources are scarce and must be used more efficiently

Efficient water use is also critical to raising China's agricultural productivity and rural living standards. Water resources are relatively scarce, with the country in the bottom half of the distribution of countries by water resources per capita in 2012. However, this masks significant geographical disparity within the country. While water scarcity is less of a problem in the southern part of China, it is a problem in the north. In particular, the Hai-Huai-Huang river basin has just 10% of the country's water resources despite having one-third of China's population and industry. This area also accounts for the majority of China's wheat production and a significant share of cotton and corn output. In response to this regional disparity, the government has undertaken the South-North Water Diversion Project, a pipeline transporting water from the Yangzi River to the north of the country. While this might add water resources for agricultural use in the north, it should be complemented by broader policies designed to promote water efficiency. Such policies are particularly important given imminent challenges to water availability such as the development of China's water-intensive shale gas industry and the prospect of increased aridity in the north of the country from further climate change. Water resources may also be depleted by rising domestic consumption of higher protein foods, as China already uses around 70% of its water-intensive maize crops for animal feed (Sharma, 2014).

China's water productivity is low compared with other countries, with efficiency particularly weak in the agricultural sector (World Bank, 2009). This is due to low efficiency of irrigation systems, water pollution and some misallocation of resources among crops and locations. Irrigation infrastructure has also suffered from a lack of investment partly because, for many years after the introduction of the household responsibility system,

village collectives were uncertain about the extent of their legal ownership (Huang, 2014). In combination with a drop in tax revenues to collectives following the 1994 fiscal reform, this led to poor maintenance and investment in irrigation. Over recent years, irrigation infrastructure has expanded partly due to increased government funding. Between 2000 and 2013 China's effective irrigated area rose by around 40%.

Domestic and industrial wastewater discharges continue to be a damaging source of water pollution. Despite significant investment in urban treatment and recycling infrastructure, such infrastructure is still relatively underdeveloped in rural areas. For example, even in the wealthier Beijing and Shanghai provinces, the proportion of villages with domestic wastewater treatment facilities was 24% and 53% respectively in 2012. Some pilot schemes, such as that governed by the prefecture-level city of Tongling in Anhui province (see Box 2.5), have prioritised the upgrading of water treatment facilities in local villages.

Box 2.5. **Beautiful villages project – Tongling, Anhui Province**

The Beautiful Villages project in Tongling, Anhui province is representative of many of the infrastructure projects in rural China that are being undertaken to improve the facilities of local villages. Predominantly government funded, the scheme is designed to improve village infrastructure on many fronts: solar-powered wastewater treatment facilities and payments to households for upgrading toilets aim to improve the health of the local population and fertility of the land. There is also funding for improving roads and bridges, matched funding for housing renovations and upgrades of the village landscape through maintenance of canals and vegetation.

Initially introduced in 15 villages in the prefecture, the project is to be extended to 30 villages by the end of 2014 and 100 villages by the time of project completion in 2019. An important component of the initiative is the engagement of local villagers. The project is mostly administered through village committees with significant participation by local residents; 60% of villagers are involved in some aspect of the redevelopment.

Very low water prices have reduced the incentive for demand management, contributing to poor water efficiency and underinvestment in water and sewerage infrastructure. Reforms have recently been announced to establish a three-tier pricing system for urban households that would raise average prices and more closely align the income share spent on water to levels observed in other countries. Such water pricing regimes should be closely monitored, not least because such schemes can have unintended redistributive consequences such as penalising larger families. Many provinces are also experimenting with a tiered pricing scheme for industrial users which could be introduced more broadly. In addition, other pilot schemes have focused on industrial water use. In Inner Mongolia, a pilot is in operation whereby downstream industries on the Yellow River invest in upstream water-saving technologies for agricultural producers in return for the rights to the saved water (Doczi et al., 2014).

As yet, the progress on reforms to water prices for agricultural producers has been modest. Farmers are often not charged water resource fees directly but pay an area-based charge before irrigation, leaving little incentive for water conservation (Doczi et al., 2014). Government concerns that farmer costs will rise as a result of water price reforms may be

delaying policy changes. However, such reforms are necessary to ensure a sustainable agricultural sector and can be complemented by income support measures that reduce adverse impacts on rural incomes as well as farmer education that promotes greater water efficiency.

Along with improving water pricing regimes, reforms focusing on water allocation mechanisms are important. In 2011, the government announced a plan to enforce water use quotas for high consumption industries (Piper et al., 2012). Nevertheless, water use quotas in agriculture have so far been implemented with mixed success. Enforcement problems remain with some farmers drilling unapproved wells in order to circumvent quota restrictions, highlighting the need for close monitoring (Doczi et al., 2014). An additional mechanism may be a water trading system whereby entities are issued with tradable water permits to encourage the implementation of water saving practices and technologies. In 2014, the government selected seven provinces to host pilot markets for trade in water rights.

There may be a tension between water security and the government's food security objectives. The existence of the "governor's grain bag policy", whereby each provincial governor must ensure grain demand and supply is balanced within their province, may constrain the ability of provinces to produce the most appropriate crops given local water endowments. For example, under this policy, relatively dry provinces still need to produce water-intensive crops such as rice. In future, grain quotas at the provincial level should evolve to better reflect water availability.

Further government infrastructure investment in rural areas can support private activity

Other types of infrastructure such as transport, electricity and networks will also be important to enable agricultural producers to lift productivity and to connect those wishing to pursue off-farm work or education with desirable locations. Through increasing market size, suitable infrastructure may also promote competition and the adoption of productivity-enhancing technologies. Given such positive externalities, there is often an argument for government provision. Nevertheless, it is also important that framework conditions are designed in a way that encourages private sector infrastructure investment.

Transport infrastructure is critical for linking agricultural producers to end markets. Without a sufficient network of roads and ports, improvements in farm productivity could result in lower local prices for a commodity at the same time as there is inadequate supply in other provinces. Transport connections within rural areas can also foster the growth of non-agricultural industries, such as food processing, that rely on farm output or new growth industries including rural tourism. Reliable electricity supply is also important for improving rural living standards and optimising farm production. It may further help mitigate output losses along the production chain by enabling mechanisation of production and appropriate storage of farm output. China is very close to achieving full electricity coverage. Nevertheless, significant future investment will be required to maintain the electricity grid and incorporate new technologies. As part of this, the Chinese government plans to invest heavily in smart grid technologies which should improve energy efficiency and provide a boost to the burgeoning renewable technology sector.

Investment in IT networks such as broadband can benefit agricultural production and improve rural living standards. Such infrastructure can form the basis of farm systems

which help connect farmers to markets more directly and efficiently and optimise inventory management. Internet-based education programmes tailored to farmers or the general rural population become feasible with reliable broadband networks, raising farm productivity and supporting the development of non-agricultural rural industries. A well-functioning broadband network may also help increase the efficiency of China's rural social welfare systems, improving welfare assessment and targeting and better informing rural citizens about nearby services and opportunities. A recent survey covering 3 000 households in Guizhou, Jilin and Shandong provinces found that only around a quarter of the villages had a facility for public internet access (World Bank, 2013b). The State Council has prioritised the completion of a national broadband network covering both urban and rural areas by 2020. This may need to be complemented by measures that ensure internet access for low income groups.

China's rural infrastructure projects are mainly funded through earmarked transfers from the central to county governments. However, a substantial portion of projects are funded outside of such transfers, raising the question of which level of administration is best equipped to fund and deliver new rural infrastructure. Focusing on road investment, one survey concluded that the quality of infrastructure is higher when funding derives from the county or township government but that unit project costs tend to be lower when village leaders manage the construction themselves (Wong et al., 2013). This may reflect the fact that governments have better resources and experience in undertaking infrastructure design, while village administrations can better oversee the application of project funds on a day-to-day basis. Consequently, this encourages a collaborative approach whereby village leaders work together with the government to provide high quality rural infrastructure at the lowest cost.

The success of any collaboration is likely to depend on the quality of village administration. Good village governance has been identified as a significant factor in the overall success of an infrastructure project (Liu et al., 2013). This might not just be the case for public projects. Private infrastructure investment in rural areas is also likely to depend on the quality of the local administration and the trust that firms have in village leaders.

Supporting rural living standards

Government policies to boost agricultural productivity will be critical for narrowing the gap between urban and rural living standards. However, the benefits to farmers of productivity-enhancing reforms may take some time to eventuate, requiring government assistance to the agricultural sector in the meantime. Furthermore, as highlighted in Figure 2.2, other parts of the rural community will also require government income support to ease the adjustment process. For all groups, policy measures that improve the quality of basic public services will also enhance rural living standards. Mirroring disparities in incomes, the divide between health services in urban and rural areas remains large.

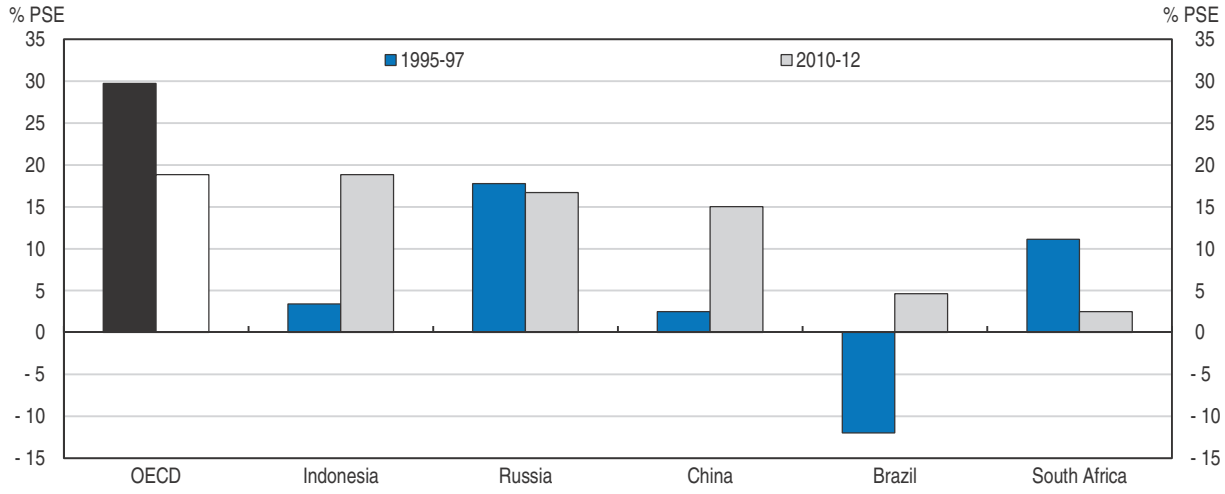
Supporting rural living standards will benefit from well-coordinated policy measures. The 2009 *OECD Rural Policy Review* recommended that more formal contacts should be established between the various ministries and agencies that design rural policy in China. Looking forward, further initiatives that promote such coordination will be important.

Agricultural policies to support rural incomes while minimising distortions

A number of policy measures provide assistance to China's agricultural producers. The value of producer support has been growing in recent years and is now just below that in OECD countries (Figure 2.12). While a prime objective of these policies is income support, some measures have also been designed to promote other government aims such as the modernisation of agricultural production and grain self-sufficiency. To the extent possible, income support to agricultural producers should be provided through the social welfare system and not through introducing distortions into agricultural markets. When the government does intervene in the agricultural sector, care should be taken to ensure that policy support is designed in a way that it can be removed in the future without causing significant disruption.

Figure 2.12. **China's support for agricultural producers has risen substantially**

Producer support estimate (PSE), per cent of gross farm receipts



Note: The producer support estimate represents policy transfers to agricultural producers, measured at the farm gate. Transfers included in the PSE are composed of market price support, budgetary payments and the cost of revenue foregone by the government and other economic agents.
Source: OECD (2013b).

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Agricultural support policies that also promote modernisation of production

Policies that encourage the modernisation of agricultural production at the same time as supporting rural incomes include the machinery-purchase subsidy and the improved seed variety subsidy. Focusing on the first of these, purchasers receive a 30% discount on a list of approved equipment, with the purchase price of a single item not allowed to exceed 50 000 RMB (Ni, 2013). The list is updated every three years and has 185 eligible equipment types. Provinces can include additional subsidies and a further 30 items on the list. The impact of these measures on farm incomes is likely to be concentrated given that only around 3% of farmers receive the subsidy annually (Research Center for Rural Economy, 2011). The fact that different provinces have varying levels of subsidisation may also raise arbitrage opportunities, whereby machinery is bought in a highly subsidised location and resold in a province with a less generous subsidy. Furthermore, the collation of the list of approved equipment requires judgement which has the potential to be captured by vested interests.

The importance of policy design can be illustrated by the historical experience with the improved seed variety subsidy. This subsidy was originally paid to seed companies viewed to produce high quality or novel seed varieties. However, allegations of corruption, abuse, and lack of benefit for farmers resulted in it being converted to a cash payment to farmers (Gale, 2013). Along with most other agricultural subsidies, the value of the improved-seed subsidy has increased rapidly over the past decade, rising tenfold between 2004 and 2012.

Agricultural policies that provide income support and promote food security

As discussed in Box 2.1, a key objective of the government's agricultural policy is to ensure food security. One way the government promotes self-sufficiency at the same time as providing income support is through subsidies to grain producers and by intervening in agricultural markets to guarantee minimum grain prices.

The main subsidy to grain producers is a general-input subsidy that was originally introduced to offset rising production costs. This subsidy can be adjusted upwards on an annual basis, but remains constant if input prices fall. There is also a fixed direct payment to grain producers that is administered by each province and can be based on the land holding of producers, the planted area or the volume of grain sold. Information regarding farm scale is manually compiled at the village level before being passed up to the county and then onto the provincial governments which allocate the funds (Gale, 2013). The administrative costs of this system are high and could be reduced by further progress in the development of a nationwide property register or investment in technology that enables more efficient collection of production data.

Minimum grain prices are implemented only in those regions that have a supply surplus, with the annual price setting based on estimates of the production costs of agricultural producers. The state-owned China Grain Reserves Corporation (Sinograin) is obliged to make intervention purchases when the market price falls below the established support price for three consecutive days. Since support prices were introduced, the minimum price has risen steadily. Between 2010 and 2014, the minimum price for rice and wheat rose by 46% and 34% respectively. This compared with a change in the world price of 26% and -17% over the same period. As the price differential between domestic and international prices has risen, grain imports have increased. In 2014, China's rice imports reached 3 million tonnes, making it the world's largest rice importing country.

A risk in the future is that a supply or demand shock leads to a sharper fall in international prices. Assuming that the price-setting authorities (NDRC, Ministry of Agriculture and State Administration for Grain) resist a proportionate fall in minimum support prices, this may reduce the competitiveness of downstream firms given that grain imports are subject to high tariff rates relative to other commodities once the volume of imports exceed a given quota (Gale, 2013). In addition, such a scenario could lead to a sizeable increase in the scale of government support, to the extent that World Trade Organisation limits on domestic support may be breached.

Replacing the minimum price system with an ex post direct payment based on the difference between a target and the market price could reduce distortions in grain markets. However, administering such a policy may be difficult given it would require comparable records of the quantity of grain sold for all farmers. A more straightforward approach may be to gradually replace minimum purchase prices with a direct payment to farmers. Prices

would then be determined by market conditions while farmer incomes would continue to be supported. A direct payment decoupled from production decisions would be best for ensuring production flexibility in the face of rapidly changing consumer demand patterns for food. However, in the short term, this may not be practical while the government aims at wheat and rice self-sufficiency. Instead, minimum purchase prices could be replaced by a direct payment to grain producers, implemented by raising the general-input subsidy. In the long term, the key determinant of China's capacity to maintain food security will be the ability to raise agricultural productivity growth.

The evolution of the European Union Common Agricultural Policy since the early 1990s is relevant in this context. Market price support was gradually reduced and replaced with direct payments to producers that were progressively decoupled from farm production decisions (OECD, 2011). For most commodities, the size of allowable government market interventions was initially lowered before interventions were eventually abolished altogether.

The coverage of rural poverty reduction measures is limited and rural healthcare services are poor

China's rural citizens will all benefit from improvements in government services but some groups may be more reliant on them than others. The detrimental effects of the rural adjustment process may be particularly acute for agricultural workers who are not able to keep up with sector-wide productivity gains. These may be the less able and elderly or those who are able but are transitioning to off-farm work opportunities. For these groups, a well-functioning social welfare and health system will be particularly important in easing the development process.

Rural social assistance programmes

Between 2010 and 2013, China's rural poverty rate halved to be 8.5% of the rural population. Even so, over 80 million people remain below the poverty line, highlighting the importance of further improvements in the social assistance coverage of the rural population. While most forms of government assistance, such as the numerous subsidies for agricultural production, are not means tested, some are specifically designed to target low-income and elderly rural citizens.

The rural *dibao* programme aims to raise rural incomes, generally through a direct payment to households equal to the difference between actual income and a determined minimum level. Between 2007 and 2010, the number of rural residents receiving the *dibao* rose by 50%, though the coverage rate plateaued in the subsequent few years. In 2013, the recipients numbered around 65% of those living below the poverty line.

The threshold for the *dibao* is determined locally with reference to regional economic conditions and the eligibility of a rural citizen is largely left to the discretion of village officials. This has resulted in significant variations in the criteria and processes used to evaluate eligibility for the payment across provinces. Consequently, a number of reports of corruption in the administration of *dibao* have surfaced, leading to more rigid policies being outlined by the Ministry of Civil Affairs (Golan et al., 2014). One of the most promising remedies is allowing rural citizens to apply directly to the county government for *dibao*. However, county governments may lack the capacity to administer and thoroughly evaluate these applications. As county-level governments' information systems improve, a better design of the *dibao* policy will become increasingly feasible.

In the future, efforts should be made to expand the coverage of the *dibao* programme. Simulations by Golan et al. (2014) suggest that increasing the coverage of *dibao* would lead to a greater reduction in poverty than an increase in the value of the payments. Nevertheless, this depends on the quality of targeting for additional beneficiaries, highlighting the importance of administrative systems that allow payments to be channelled to those most in need.

There is also the *wubao* programme that aims to maintain the basic living standards of the elderly, the disabled and some children (those with no supporting family, no income and no ability to work) often through the provision of in-kind services. Benefits usually include food, clothing, medical care, housing and burial expenses. Depending on the physical condition of the person, care can be given either separately or collectively. Such policy instruments are important for safeguarding the living standards of vulnerable members of the rural population. However, they need to be complemented with good quality rural healthcare services that are readily accessible.

A well-functioning pension system is particularly important for supporting rural living standards in later life. There are disparities between the extent to which China's urban and rural population have been supported by pension payments. In the 2010 Population Census, 66% of the urban population aged over 60 reported pension income as their main source of livelihood compared with 26% of those in towns and 6% of those in villages. However, since then, the coverage of the New Rural Pension Scheme which was originally introduced in 2009 has broadened substantially. The framework of the scheme is very similar to that recently adopted in urban areas: both are voluntary schemes that include a matched defined contribution element and a subsidised flat basic pension (Herd et al., 2010). The primary objective of these programmes is broad coverage with both contributions and benefits low. Indeed, the replacement rate for a rural worker is very low by international standards. The State Council intends to unify the rural and urban pension schemes, which will be aided by the similarities in the scheme designs. A unified national scheme will allow portability across areas and achieve better risk pooling. Once the national scheme is in place, steps should be taken to gradually raise benefits.

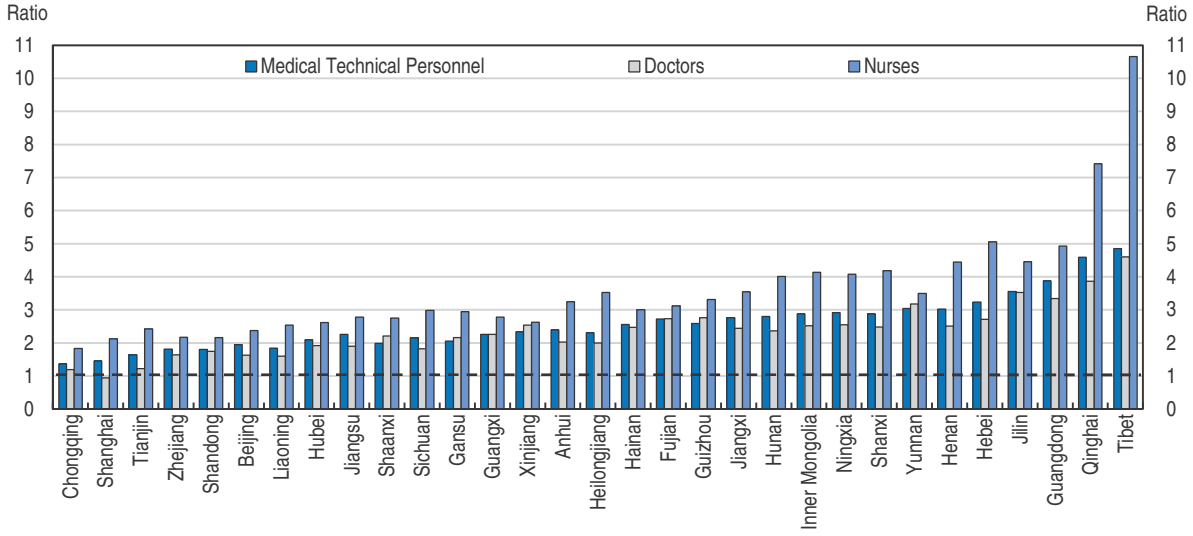
China's rural health reforms

Healthcare services in rural China remain limited compared with urban areas. Policy reforms to redress this imbalance are particularly important in the context of a rapidly ageing population and substantial structural change. In most provinces, the number of healthcare professionals per capita is less than half that in urban regions (Figure 2.13). Furthermore, there is a large differential between urban and rural China in the proportion of doctors that have a college or higher education degree (Hou et al., 2014). In 2013, the mortality rate of rural children under five years old was more than double that in urban areas.

Advances have been made, with the introduction of the New Cooperative Medical Scheme in rural areas promoting voluntary enrolment in health insurance programmes that are partly subsidised by government. The introduction of the scheme has raised rural residents' use of healthcare services. Going forward, this should be complemented by continued investment in rural health facilities so that supply keeps up with healthcare demand.

Figure 2.13. **Healthcare services in rural China are low compared with urban areas**

Ratio of medical staff per capita in urban to rural areas, 2013



Source: China Statistical Yearbook 2014.

StatLink http://dx.doi.org/10.1787/888933198858

The New Cooperative Medical Scheme operates on funding from a combination of central and local governments, village committees and participants. In most cases, however, the majority of the funding burden falls on local governments, meaning funding differs markedly depending on local fiscal conditions (Dai et al., 2014). Out-of-pocket payments are likely to be largest in those areas where local governments have the poorest financing capacity. As such, the design of the scheme may be accentuating existing regional inequities, calling for a larger role for the central government in its funding.

In many cases, local governments only allow scheme participants to utilise health services in the local area in which their household is registered. This may constrain the capacity of some workers to migrate out of rural areas or lead to further inequities between local and migrant workers in China's cities. Future reforms should seek to allow portability of health insurance. More broadly, the urban and rural health insurance systems should be gradually integrated. While integration may entail administrative challenges, gaps in insurance coverage between the New Cooperative Medical Scheme and urban medical insurance schemes remain large (Wang et al., 2014b). A reform of this nature would be a logical step following the intended unification of the rural and urban pension systems.

Conclusion

China's continued urbanisation poses many challenges for the rural economy but is necessary for the country's further economic development. Government policy settings should not impede migration of rural residents to where they yield a higher marginal product by limiting access to public services or portability of social benefits. Those citizens migrating from rural areas should also be able to transfer land rights via well-regulated exchange platforms, providing them an income stream and ensuring that land is not left abandoned.

At the same time as encouraging further urbanisation, measures that promote rural living standards are critical given ongoing inequities between urban and rural China. Some of these measures can benefit both the agricultural sector as well as other parts of the rural economy. These include further rural financial development, public infrastructure spending and reforms that promote innovation and the accumulation of knowledge-based assets. The government has identified a number of these areas as policy priorities and further reform action will be welcome. Given the authorities' objective of maintaining food security, policy settings that promote growth in agricultural productivity to offset the loss of workers migrating from the sector are also critical. Better defining land contract rights and improving farmers' technical skills will be important. However, distortions in both factor and product markets that undermine long-run growth in the agricultural sector, and the rural economy more generally, must also be addressed.

For the elderly and other rural residents struggling to adjust during this period of rapid structural change there must be a continued emphasis on expanding the coverage of government support in rural China. This involves improving healthcare, broadening the scope of social welfare payments, and, eventually, integrating public service systems between urban and rural areas.

Main policy recommendations on agricultural and rural reform

Enabling the reallocation of resources

Give certificates to all rural households detailing their land-use rights and improve enforceability.

Establish well-regulated, transparent, exchange platforms for the transfer of land operation rights for rural farmland and collectively-owned construction land.

Increase the duration of contract rights to rural farmland to 70 years, with contracts automatically renewable upon expiration.

Universally introduce resident permits for migrant workers that allow access to public services, while protecting land entitlements at their origin.

Reduce barriers to entry for microfinance institutions and develop better credit evaluation systems for rural borrowers.

Improving the efficiency of agricultural production

Gradually remove subsidies for fertiliser products.

Maintain public agricultural extension services with a particular focus on providing information about new technologies and assistance in seed and fertiliser selection.

Implement and enforce unit pricing of water for agricultural users and better water allocation mechanisms to encourage demand management and investment in water-saving technology.

Ensure collaboration between village leaders and government to provide high quality rural infrastructure at the lowest cost.

Improving the administration of income support in rural areas

Gradually replace minimum prices for grain with direct payments to farmers.

Expand the coverage of the *dibao* programme and provide adequate funding to county governments to assess applications.

Increase the role of the central government in funding the New Cooperative Medical Scheme and allow portability of the scheme's coverage.

Bibliography

Alston, J. and P. Pardey (2014), "Agriculture in the Global Economy", *Journal of Economic Perspectives*. Vol. 28.

Andrews, D. and C. Criscuolo (2013), "Knowledge-Based Capital, Innovation and Resource Allocation", *OECD Economic Policy Papers*, No. 1046, OECD Publishing, Paris. DOI: *http://dx.doi.org/10.1787/5k46bj546kzs-en*.

Andrews, D. and B. Westmore (2014), "Managerial Capital and Business R&D as Enablers of Productivity Convergence", *OECD Economics Department Working Papers*, No. 1137, OECD Publishing, Paris. DOI: *http://dx.doi.org/10.1787/5jxx3d441knr-en*.

Boao Review (2013), *Report on Small and Microbusiness Financing: Chinese Experience and Asian Paths*, *www.boaoreview.com/*.

Burger, N., M. Fu, K. Gu, X. Jia, K. Kumar, G. Mingliang (2014), "Assessing the Impact of Farmer Field Schools on Fertilizer Use in China", *International Initiative for Impact Evaluation*, August.

Central Committee of the Communist Party and the State Council (2015), "The No. 1 Central Document: Deepening Reforms and Innovation to Accelerate Agricultural Modernisation", Beijing.

Chang, H., Y. Yu and Y. Guo (2012), "Development Model and Characteristics of Rural Land Joint Stock-Cooperative System", *Asian Agricultural Research*, Vol. 4.

Chan, K. (2013), "China, Internal Migration", in *The Encyclopedia of Global Migration,* Blackwell Publishing.

Dai, B., L. Zhou, Y.J. Mei and C. Zhan (2013), "Regional Inequity in Financing New Cooperative Medical Scheme in Jiangsu, China", *The International Journal of Health Planning and Management*, Vol. 29.

Démurger, S. and H. Xu (2011), "Return Migrants: The Rise of New Entrepreneurs in Rural China", *World Development*, Vol. 39.

Ding, Q. and M. Lin (2013), "Social Services Management of Floating Population Residence", *Donyue Tribune*, Vol. 34.

Doczi, J., R. Calow and V. d'Alancon (2014), "Growing More with Less: China's Progress in Agricultural Water Management and Reallocation", *Case Study Report*, Overseas Development Institute.

Duflos, E. and L. Ren (2014), "Financial Inclusion in China: Will Innovation Bridge the Gap?", *CGAP*.

FAO (2013), *2000 World Census of Agriculture: Analysis and international comparison of the results (1996-2005)*, FAO Statistical Development Series.

FAO (2014), "FAO and Chinese Partners Working to Unlock Carbon Finance for Herders and Grazers", Media Release, 30 May. Rome.

Feng, L., J. Ye., Y. Jiang and K. Zhu (2011), "The Sequential Variation and Regional Difference of Land Reallocation in Rural China: An Empirical Study Based on a Survey in 17 Provinces from 1999 to 2010", *China Land Science*, Vol. 25.

Fuglie, K. (2012), "Productivity Growth and Technology Capital in the Global Agricultural Economy ", in Fuglie, K., S. Wang and V. Ball (eds.), *Productivity Growth in Agriculture: An International Perspective*, CAB International, Wallingford, UK.

Fukase, E. and W. Martin (2014), "Who Will Feed China in the 21st Century? Income Growth and Food Demand and Supply in China", *The World Bank Policy Research Working Papers*, No. 6926.

Gale, F. and J.C. Buzby (2009), "Imports From China and Food Safety Issues", *Economic Research Service Economic Information Bulletin*, No. 52.

Gale, F. (2013), "Growth and Evolution in China's Agricultural Support Policies", *Economic Research Service Economic Research Report,* No. 153.

Gao, L., J. Huang and S. Rozelle (2012), "Rental Markets for Cultivated Land and Agricultural Investments in China", *Agricultural Economics*, Vol. 43.

Geraci, M., M. Luan and C. Dixon (2010), "Microcredit in China: Recommendations for Policy Makers", *The Global Policy Institute Policy Papers*, No. 15.

Giles, J. and R. Mu (2014), "Village Political Economy, Land Tenure Insecurity, and the Rural to Urban Migration Decision: Evidence from China", *World Bank Policy Research Working Paper*, No. 7080.

Golan, J., T. Sicular and N. Umapathi (2014), "Any Guarantees? China's Rural Minimum Living Standard Guarantee Program", *World Bank Social Protection & Labor Discussion Papers*, No. 1423.

Herd, R., Hu, H and V. Koen (2010), "Providing Greater Old-Age Security in China", *OECD Economics Department Working Paper*, No. 750, OECD Publishing, Paris. DOI: *http://dx.doi.org/10.1787/5kmlh4x7pc7k-en*.

Hoken, H. (2012), "Development of Land Rental Market and its Effect on Household Farming in Rural China: An Empirical Study in Zhejiang Province", *IDE Discussion Papers*, No. 323.

Hou, J., et al. (2014), "Transformation of the Education of Health Professionals in China: Progress and Challenges", *The Lancet*, Vol. 384.

Huang, J., X. Wang and H. Qui (2012), "Small-scale Farmers in China in the Face of Modernisation and Globalisation", IIED/HIVOS, London/The Hague.

Huang, J. and C. Xiang (2014), "Fertilizer Subsidies in China: Which Way Forward?", *International Food and Agricultural Trade Policy Council Discussion Paper,* forthcoming.

Huang, Q. (2014), "Impact Evaluation of the Irrigation Management Reform in Northern China", *Water Resources Research,* Vol. 50.

Hu, R., C. Yaqing, K.Z. Chen, C. Yongwei, J. Huang (2010), "Effects of Inclusive Public Agricultural Extension Service: Results from a Policy Reform Experiment in Western China", *IFPRI Discussion Papers*, No. 01037.

Hu, R., Q. Liang, C. Pray, J. Huang and J. Yanhong (2011), "Privatization, Public R&D Policy, and Private R&D Investment in China's Agriculture", *Journal of Agricultural and Resource Economics*, Vol. 36.

Hu, R. (2012), "China's Agricultural Innovation System: Issues and Reform", in *Improving Agricultural Knowledge and Innovation Systems*: *OECD Conference Proceedings*, OECD Publishing, Paris. DOI: *http://dx.doi.org/10.1787/9789264167445-7-en*.

Khantachavana, S.V., C. Turvey, R. Kong and X. Xianli (2013), "On the Transaction Values of Land Use Rights in Rural China", *Journal of Comparative Economics*, Vol. 41.

Koen, V., R. Herd and S. Hill (2013), "China's March to Prosperity: Reforms to Avoid the Middle-Income Trap", *OECD Economics Department Working Papers*, No. 1093, OECD Publishing, Paris. DOI: *http://dx.doi.org/10.1787/5k3wd3c4219w-en*.

Kuhn, P. and K. Shen (2014), "Do Employers Prefer Undocumented Workers? Evidence from China's *Hukou* System", *IZA Discussion Paper Series*, No. 8289.

Liu, C., L. Zhang, J. Huang, R. Luo and H. Yi (2013), "Project Design, Village Governance and Infrastructure Quality in Rural China", *China Agricultural Economic Review*, Vol. 5.

Liu, G. (2014), "Food Losses and Food Waste in China: A First Estimate", *OECD Food, Agriculture and Fisheries Papers*, No. 66, OECD Publishing, Paris. DOI: *http://dx.doi.org/10.1787/5jz5sq5173lq-en*.

Lohmar, B., F. Gale, F. Tuan and J. Hansen (2009), "China's Ongoing Agricultural Modernization: Challenges Remain After 30 Years of Reform", *US Department of Agriculture Economic Research Service Economic Information Bulletin*, Vol. 51.

Lohmar, B. (2013), "Planting the Seeds of Reform", *China Economic Quarterly,* Vol. 17.

MacDonald, J. (2011), "Why are Farms Getting Larger? The Case of the US", *German Association of Agricultural Economists Meeting*.

Ma, X., N. Heerink, S. Feng, X. Shi (2015), "Farmland Tenure in China: Comparing Legal, Actual and Perceived Security", *Land Use Policy*, Vol. 42.

Minot, N (2007), "Contract Farming in Developing Countries: Patterns, Impact, and Policy Implications", in Case Study #6-3 of the program: *Food policy for developing countries: the role of government in the global food system"*.

NBS (2010), *China Statistical Yearbook: 2010*, National Bureau of Statistics of China.

Ni, H. (2013), "Agricultural Domestic Support and Sustainable Development in China", *ICTSD Programme on Agricultural Trade and Sustainable Development,* May.

Ong, L.H. (2013), "China's Banking System and Access to Credit", *Testimony before the US-China Economic and Security Review Commission*, March 7.

OECD (2011), *Evaluation of Agricultural Policy Reforms in the European Union,* OECD Publishing, Paris. DOI: *http://dx.doi.org/10.1787/9789264112124-2-en*.

OECD (2013a), *OECD Economic Surveys: China 2013*, OECD Publishing, Paris. DOI: *http://dx.doi.org/10.1787/eco_surveys-chn-2013-en*.

OECD (2013b), *Agricultural Policy Monitoring and Evaluation 2013: OECD Countries and Emerging Economies*, OECD Publishing, Paris. DOI: *http://dx.doi.org/10.1787/agr_pol-2013-en*.

OECD (2014), *Agricultural Policy Monitoring and Evaluation 2014: OECD Countries*, OECD Publishing, Paris. DOI: *http://dx.doi.org/10.1787/agr_pol-2014-en*.

OECD (2015), *National Urban Policy Review: China*, OECD Publishing, Paris (forthcoming).

OECD-FAO (2013), *OECD-FAO Agricultural Outlook 2013-2022,* OECD Publishing, Paris. DOI: *http://dx.doi.org/10.1787/agr_outlook-2013-4-en*.

OECD-FAO (2014), *OECD-FAO Agricultural Outlook 2014-2023*, OECD Publishing, Paris. DOI: *http://dx.doi.org/10.1787/agr_outlook-2014-en*.

Piper, B., Z. Wang and L. Sihui (2012), "EU-China River Basin Management Programme", *Water Resource Supply Security Strategy Analysis: Technical Report*, No. 75.

Research Center for Rural Economy (2011), "Chinese Rural Policy Implementation Report", November.

Research Institute of Economy, Trade & Industry (2014), "Rural Land Circulation in China Gaining Momentum: The Increasing Role of Trust Companies", *www.rieti.go.jp/en/china/14030701.html*.

Sharma, S. (2014), "The Need for Feed: China's Demand for Industrialized Meat and its Impacts", *Institute for Agriculture and Trade Policy*.

State Council (2010), "Guidance Relating to the Dipiao Pilot Scheme", *State Council Information Update*, No. 47.

Wang, X. and R. Herd (2013), "The System of Revenue Sharing and Fiscal Transfers in China", *OECD Economics Department Working Papers*, No. 1030, OECD Publishing, Paris. DOI: *http://dx.doi.org/10.1787/5k4bwnwtmx0r-en*.

Wang, X., F. Yamauchi, K. Otsuka and J. Huang (2014a), "Wage Growth, Landholding and Mechanization in Chinese Agriculture", *World Bank Policy Research Working Papers,* No. 7138.

Wang, X., A. Zheng, X. He and H. Jiang (2014b), "Integration of rural and urban healthcare insurance schemes in China: an empirical research", *BMC Health Services Research,* Vol. 14.

Wong, H.L., R. Luo, L. Zhang and S. Rozelle (2013), "Providing Quality Infrastructure in Rural Villages: The Case of Rural Roads in China", *Journal of Development Economics*, Vol. 103.

World Bank (2009), *Addressing China's Water Scarcity: Recommendations for Selected Water Resource Management Issues*, Washington DC.

World Bank (2011), "Implementation Completion and Results Report on a Loan in the Amount of US$100 Million to the People's Republic of China for a Micro and Small Enterprise Finance Project", December 19.

World Bank (2013a), *Doing Business 2014: Understanding Regulations for Small and Medium-Size Enterprises*, The World Bank, Washington DC.

World Bank (2013b), "China: Improving Rural Access to Information and Communication Technologies", *www.worldbank.org/en/news/feature/2013/01/29/china-improving-rural-access-to-information-communication-technologies*

World Bank and Development Research Center of the State Council (DRC), the People's Republic of China (2014), *Urban China: Toward Efficient, Inclusive and Sustainable Urbanization*, Washington DC.Yuen, S. (2014), "China's New Rural Land Reform? Assessment and Prospects", *CEFC News Analysis*, No. 2014/1.

Zhang, W., D. Zheng-xia, P. He, X. Ju, D. Powlson, D. Chadwick, D. Norse, Y. Lu, Y. Zhang, L. Wu, X. Chen, K.G. Cassman and F. Zhang (2013), "New Technologies Reduce Greenhouse Gas Emissions from Nitrogenous Fertilizer in China", *Proceedings of the National Academy of Sciences of the United States of America*, Vol. 110.

Zhong, Z. (2014), "Chinese Agricultural Extension: History, Current Status and Supply-Demand Characteristics", *Asian-Pacific Information Platform on Agricultural Policy*.

Zhou, Z. (2010), "Achieving Food Security in China: Past Three Decades and Beyond", *China Agricultural Economic Review*, Vol. 2.

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